# Lexium 32M

## Servo Drive

## User Guide

**Original instructions**

**0198441113767.14**
**07/2022**

Schneider Electric

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As part of a group of responsible, inclusive companies, we are updating our communications that contain non-inclusive terminology. Until we complete this process, however, our content may still contain standardized industry terms that may be deemed inappropriate by our customers.

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# Safety Information

## Important Information

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a "Danger" or "Warning" safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

### ⚠ DANGER

**DANGER** indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

### ⚠ WARNING

**WARNING** indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

### ⚠ CAUTION

**CAUTION** indicates a hazardous situation which, if not avoided, **could result** in minor or moderate injury.

### *NOTICE*

*NOTICE* is used to address practices not related to physical injury.

## Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

# Qualification of Personnel

Only appropriately trained persons who are familiar with and understand the contents of this manual and all other pertinent product documentation are authorized to work on and with this product. These persons must have sufficient technical training, knowledge and experience and be able to foresee and detect potential hazards that may be caused by using the product, by modifying the settings and by the mechanical, electrical and electronic equipment of the entire system in which the product is used.

The qualified person must be able to detect possible hazards that may arise from parameterization, modifying parameter values and generally from mechanical, electrical, or electronic equipment.

The qualified person must be familiar with the standards, provisions, and regulations for the prevention of industrial accidents, which they must observe when designing and implementing the system.

# Intended Use

The products described or affected by this document are, along with software, accessories and options, servo-drive systems for three-phase servo motors.

The products are intended for industrial use according to the instructions, directions, examples, and safety information contained in the present user guide and other supporting documentation.

The product may only be used in compliance with all applicable safety regulations and directives, the specified requirements and the technical data.

Prior to using the products, you must perform a risk assessment in view of the planned application. Based on the results, the appropriate safety-related measures must be implemented.

Since the products are used as components in an overall machine or process, you must ensure the safety of persons by means of the design of this overall machine or process.

Operate the products only with the specified cables and accessories. Use only genuine accessories and spare parts.

Any use other than the use explicitly permitted as described herein is prohibited and may result in unanticipated hazards.

# Before You Begin

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to the operator of that machine.

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## ⚠ WARNING

**UNGUARDED EQUIPMENT**

- Do not use this software and related automation equipment on equipment which does not have point-of-operation protection.
- Do not reach into machinery during operation.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

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This automation equipment and related software is used to control a variety of industrial processes. The type or model of automation equipment suitable for each application will vary depending on factors such as the control function required, degree of protection required, production methods, unusual conditions, government regulations, etc. In some applications, more than one processor may be required, as when backup redundancy is needed.

Only you, the user, machine builder or system integrator can be aware of all the conditions and factors present during setup, operation, and maintenance of the machine and, therefore, can determine the automation equipment and the related safeties and interlocks which can be properly used. When selecting automation and control equipment and related software for a particular application, you should refer to the applicable local and national standards and regulations. The National

Safety Council's Accident Prevention Manual (nationally recognized in the United States of America) also provides much useful information.

In some applications, such as packaging machinery, additional operator protection such as point-of-operation guarding must be provided. This is necessary if the operator's hands and other parts of the body are free to enter the pinch points or other hazardous areas and serious injury can occur. Software products alone cannot protect an operator from injury. For this reason the software cannot be substituted for or take the place of point-of-operation protection.

Ensure that appropriate safeties and mechanical/electrical interlocks related to point-of-operation protection have been installed and are operational before placing the equipment into service. All interlocks and safeties related to point-of-operation protection must be coordinated with the related automation equipment and software programming.

> **NOTE:** Coordination of safeties and mechanical/electrical interlocks for point-of-operation protection is outside the scope of the Function Block Library, System User Guide, or other implementation referenced in this documentation.

# Start-up and Test

Before using electrical control and automation equipment for regular operation after installation, the system should be given a start-up test by qualified personnel to verify correct operation of the equipment. It is important that arrangements for such a check are made and that enough time is allowed to perform complete and satisfactory testing.

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### ⚠ WARNING

**EQUIPMENT OPERATION HAZARD**

- Verify that all installation and set up procedures have been completed.
- Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.
- Remove tools, meters, and debris from equipment.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

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Follow all start-up tests recommended in the equipment documentation. Store all equipment documentation for future references.

**Software testing must be done in both simulated and real environments.**

Verify that the completed system is free from all short circuits and temporary grounds that are not installed according to local regulations (according to the National Electrical Code in the U.S.A, for instance). If high-potential voltage testing is necessary, follow recommendations in equipment documentation to prevent accidental equipment damage.

Before energizing equipment:

- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.
- Remove all temporary grounds from incoming power lines.
- Perform all start-up tests recommended by the manufacturer.

# Operation and Adjustments

The following precautions are from the NEMA Standards Publication ICS 7.1-1995 (English version prevails):

- Regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components, there are hazards that can be encountered if such equipment is improperly operated.

- It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer's instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer's instructions and the machinery used with the electrical equipment.

- Only those operational adjustments actually required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics.

# About the Book

## Document Scope

This manual describes technical characteristics, installation, commissioning, operation and maintenance of the servo drive Lexium 32M (LXM32M).

## Validity Note

This manual is valid for the standard products listed in the type code, see Type Code, page 23.

For product compliance and environmental information (RoHS, REACH, PEP, EOLI, etc.), go to www.se.com/ww/en/work/support/green-premium/.

The characteristics that are described in the present document, as well as those described in the documents included in the Related Documents section below, can be found online. To access the information online, go to the Schneider Electric home page www.se.com/ww/en/download/.

The characteristics that are described in the present document should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the document and online information, use the online information as your reference.

## Related Documents

| Title of documentation | Reference number |
|---|---|
| Lexium 32M - Servo Drive - User Guide (this user guide) | 0198441113767 (eng) |
| | 0198441113768 (fre) |
| | 0198441113766 (ger) |
| | 0198441113770 (spa) |
| | 0198441113769 (ita) |
| | 0198441113771 (chi) |
| LXM32M - CANopen Module - User Guide | 0198441113790 (eng) |
| | 0198441113791 (fre) |
| | 0198441113789 (ger) |
| LXM32M - DeviceNet Module - User Guide | 0198441113808 (eng) |
| | 0198441113809 (fre) |
| | 0198441113807 (ger) |
| LXM32M - EtherCAT Module - User Guide | 0198441113868 (eng) |
| | 0198441113869 (fre) |
| | 0198441113867 (ger) |
| LXM32M - EtherNet/IP Module - User Guide | 0198441113802 (eng) |
| | 0198441113803 (fre) |
| | 0198441113801 (ger) |
| LXM32M - Modbus/TCP Module - User Guide | 0198441113843 (eng) |
| | 0198441113844 (fre) |
| | 0198441113842 (ger) |
| LXM32M - Profibus DP-V1 Module - User Guide | 0198441113796 (eng) |

| Title of documentation | Reference number |
|---|---|
|  | 0198441113797 (fre) |
|  | 0198441113795 (ger) |
| LXM32M - PROFINET Module - User Guide | 0198441114106 (eng) |
|  | 0198441114107 (fre) |
|  | 0198441114105 (ger) |
| LXM32M - ANA, DIG And RSR Encoder Modules - User Guide | 0198441113818 (eng) |
|  | 0198441113819 (fre) |
|  | 0198441113817 (ger) |
| LXM32M - IOM1 Module - User Guide | 0198441113874 (eng) |
|  | 0198441113875 (fre) |
|  | 0198441113873 (ger) |
| LXM32M - Safety Module eSM - User Guide | 0198441113825 (eng) |
|  | 0198441113826 (fre) |
|  | 0198441113824 (ger) |
| LXM32 - Common DC Bus - Application Note | MNA01M001EN (eng) |
|  | MNA01M001DE (ger) |

## Product Related Information

The use and application of the information contained herein require expertise in the design and programming of automated control systems.

Only you, the user, machine builder or integrator, can be aware of all the conditions and factors present during installation and setup, operation, repair and maintenance of the machine or process.

You must also consider any applicable standards and/or regulations with respect to grounding of all equipment. Verify compliance with any safety information, different electrical requirements, and normative standards that apply to your machine or process in the use of this equipment.

Many components of the equipment, including the printed circuit board, operate with mains voltage, or present transformed high currents, and/or high voltages.

The motor itself generates voltage when the motor shaft is rotated.

# ⚠ **DANGER**

**ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires.
- Place a "Do Not Turn On" or equivalent hazard label on all power switches and lock them in the non-energized position.
- Wait 15 minutes to allow the residual energy of the DC bus capacitors to discharge.
- Measure the voltage on the DC bus with a properly rated voltage sensing device and verify that the voltage is less than 42 Vdc.
- Do not assume that the DC bus is voltage-free when the DC bus LED is off.
- Block the motor shaft to prevent rotation prior to performing any type of work on the drive system.
- Do not create a short-circuit across the DC bus terminals or the DC bus capacitors.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the unit.
- Use only the specified voltage when operating this equipment and any associated products.

**Failure to follow these instructions will result in death or serious injury.**

This equipment has been designed to operate outside of any hazardous location. Only install this equipment in zones known to be free of a hazardous atmosphere.

# ⚠ **DANGER**

**POTENTIAL FOR EXPLOSION**

Install and use this equipment in non-hazardous locations only.

**Failure to follow these instructions will result in death or serious injury.**

If the power stage is disabled unintentionally, for example as a result of power outage, errors or functions, the motor is no longer decelerated in a controlled way. Overload, errors or incorrect use may cause the holding brake to no longer operate properly and may result in premature wear.

# ⚠ **WARNING**

**UNINTENDED EQUIPMENT OPERATION**

- Verify that movements without braking effect cannot cause injuries or equipment damage.
- Verify the function of the holding brake at regular intervals.
- Do not use the holding brake as a service brake.
- Do not use the holding brake for safety-related purposes.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Drive systems may perform unanticipated movements because of incorrect wiring, incorrect settings, incorrect data or other errors.

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# ⚠WARNING

**UNINTENDED MOVEMENT OR MACHINE OPERATION**

- Carefully install the wiring in accordance with the EMC requirements.

- Do not operate the product with undetermined settings and data.

- Perform comprehensive commissioning tests that include verification of configuration settings and data that determine position and movement.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

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# ⚠WARNING

**LOSS OF CONTROL**

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop, power outage and restart.

- Separate or redundant control paths must be provided for critical control functions.

- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.

- Observe all accident prevention regulations and local safety guidelines.[1]

- Each implementation of this equipment must be individually and thoroughly tested for proper operation before being placed into service.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

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[1] For additional information, refer to NEMA ICS 1.1 (latest edition), "Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control" and to NEMA ICS 7.1 (latest edition), "Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems" or their equivalent governing your particular location.

Machines, controllers, and related equipment are usually integrated into networks. Unauthorized persons and malware may gain access to the machine as well as to other devices on the network/fieldbus of the machine and connected networks via insufficiently secure access to software and networks.

Schneider Electric adheres to industry best practices in the development and implementation of control systems. This includes a "Defense-in-Depth" approach to secure an Industrial Control System. This approach places the controllers behind one or more firewalls to restrict access to authorized personnel and protocols only.

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# ⚠ WARNING

**UNAUTHENTICATED ACCESS AND SUBSEQUENT UNAUTHORIZED MACHINE OPERATION**

- Evaluate whether your environment or your machines are connected to your critical infrastructure and, if so, take appropriate steps in terms of prevention, based on Defense-in-Depth, before connecting the automation system to any network.
- Limit the number of devices connected to a network to the minimum necessary.
- Isolate your industrial network from other networks inside your company.
- Protect any network against unintended access by using firewalls, VPN, or other, proven security measures.
- Monitor activities within your systems.
- Prevent subject devices from direct access or direct link by unauthorized parties or unauthenticated actions.
- Prepare a recovery plan including backup of your system and process information.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

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For more information on organizational measures and rules covering access to infrastructures, refer to ISO/IEC 27000 series, Common Criteria for Information Technology Security Evaluation, ISO/IEC 15408, IEC 62351, ISA/IEC 62443, NIST Cybersecurity Framework, Information Security Forum - Standard of Good Practice for Information Security, and refer to Cybersecurity Guidelines for EcoStruxure Machine Expert, Modicon and PacDrive Controllers and Associated Equipment.

For reasons of Internet security, for those devices that have a native Ethernet connection, TCP/IP forwarding is disabled by default. Therefore, you must manually enable TCP/IP forwarding. However, doing so may expose your network to possible cyberattacks if you do not take additional measures to protect your enterprise. In addition, you may be subject to laws and regulations concerning cybersecurity.

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# ⚠ WARNING

**UNAUTHENTICATED ACCESS AND SUBSEQUENT NETWORK INTRUSION**

- Observe and respect any and all pertinent national, regional and local cybersecurity and/or personal data laws and regulations when enabling TCP/IP forwarding on an industrial network.
- Isolate your industrial network from other networks inside your company.
- Protect any network against unintended access by using firewalls, VPN, or other, proven security measures.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

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Consult the Schneider Electric Cybersecurity Best Practices for additional information.

## Firmware

Use the latest firmware version. Visit https://www.se.com or contact your Schneider Electric representative for information on firmware updates.

## DC Bus Voltage Measurement

The DC bus voltage can exceed 800 Vdc. The DC bus LED is not an indicator of the absence of DC bus voltage.

| ⚠⚠ DANGER |
|---|
| **ELECTRIC SHOCK, EXPLOSION OR ARC FLASH** |
| • Disconnect the voltage supply to all connections. |
| • Wait 15 minutes to allow the DC bus capacitors to discharge. |
| • Use a properly rated voltage-sensing device for measuring (greater than 800 Vdc). |
| • Measure the DC bus voltage between the DC bus terminals (PA/+ and PC/-) to verify that the voltage is less than 42 Vdc. |
| • Contact your local Schneider Electric representative if the DC bus capacitors do not discharge to less than 42 Vdc within a period of 15 minutes. |
| • Do not operate the product if the DC bus capacitors do not discharge properly. |
| • Do not attempt to repair the product if the DC bus capacitors do not discharge properly. |
| • Do not assume that the DC bus is voltage-free when the DC bus LED is off. |
| **Failure to follow these instructions will result in death or serious injury.** |

## Terminology Derived from Standards

The technical terms, terminology, symbols and the corresponding descriptions in this manual, or that appear in or on the products themselves, are generally derived from the terms or definitions of international standards.

In the area of functional safety systems, drives and general automation, this may include, but is not limited to, terms such as *safety*, *safety function*, *safe state*, *fault*, *fault reset*, *malfunction*, *failure*, *error*, *error message*, *dangerous*, etc.

Among others, these standards include:

| Standard | Description |
|---|---|
| IEC 61131-2:2007 | Programmable controllers, part 2: Equipment requirements and tests. |
| ISO 13849-1:2015 | Safety of machinery: Safety related parts of control systems. General principles for design. |
| EN 61496-1:2013 | Safety of machinery: Electro-sensitive protective equipment. Part 1: General requirements and tests. |
| ISO 12100:2010 | Safety of machinery - General principles for design - Risk assessment and risk reduction |
| EN 60204-1:2006 | Safety of machinery - Electrical equipment of machines - Part 1: General requirements |
| ISO 14119:2013 | Safety of machinery - Interlocking devices associated with guards - Principles for design and selection |
| ISO 13850:2015 | Safety of machinery - Emergency stop - Principles for design |
| IEC 62061:2015 | Safety of machinery - Functional safety of safety-related electrical, electronic, and electronic programmable control systems |
| IEC 61508-1:2010 | Functional safety of electrical/electronic/programmable electronic safety-related systems: General requirements. |
| IEC 61508-2:2010 | Functional safety of electrical/electronic/programmable electronic safety-related systems: Requirements for electrical/electronic/programmable electronic safety-related systems. |
| IEC 61508-3:2010 | Functional safety of electrical/electronic/programmable electronic safety-related systems: Software requirements. |
| IEC 61784-3:2016 | Industrial communication networks - Profiles - Part 3: Functional safety fieldbuses - General rules and profile definitions. |
| 2006/42/EC | Machinery Directive |
| 2014/30/EU | Electromagnetic Compatibility Directive |
| 2014/35/EU | Low Voltage Directive |

In addition, terms used in the present document may tangentially be used as they are derived from other standards such as:

| Standard | Description |
|---|---|
| IEC 60034 series | Rotating electrical machines |
| IEC 61800 series | Adjustable speed electrical power drive systems |
| IEC 61158 series | Digital data communications for measurement and control – Fieldbus for use in industrial control systems |

Finally, the term *zone of operation* may be used in conjunction with the description of specific hazards, and is defined as it is for a *hazard zone* or *danger zone* in the *Machinery Directive* (*2006/42/EC*) and *ISO 12100:2010*.

**NOTE:** The aforementioned standards may or may not apply to the specific products cited in the present documentation. For more information concerning the individual standards applicable to the products described herein, see the characteristics tables for those product references.

# Introduction
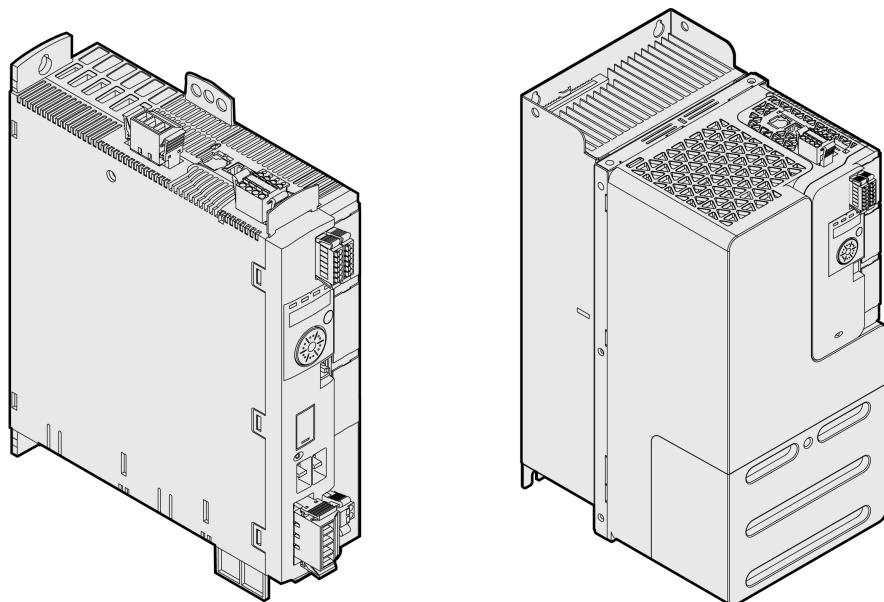
## Device Overview

### General

The Lexium 32 product family consists of various servo drive models that cover different application areas. Together with Lexium BMH servo motors or Lexium BSH servo motors as well as a comprehensive portfolio of options and accessories, the drives are ideally suited to implement compact, high-performance drive solutions for a wide range of power requirements.

### Lexium Servo Drive LXM32M

This product manual describes the LXM32M servo drive.
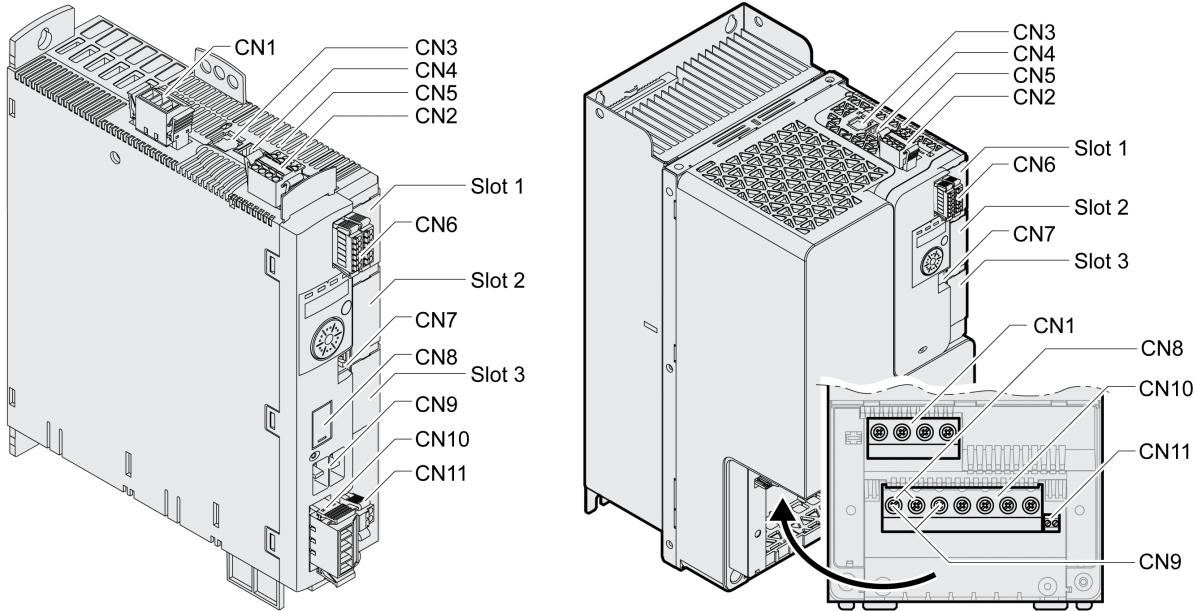
Overview of some of the features of the servo drive:

*   The flexible product can be adapted to a wide variety of tasks by means of numerous modules.

*   The available fieldbus modules comprise CANopen/CANmotion, Profibus DP, PROFINET, EtherNet/IP, Modbus-TCP and EtherCAT.

*   An optional encoder module allows you to add a second encoder interface for digital encoders, analog encoders or resolvers.

*   The product is commissioned via the integrated HMI, the external graphic display terminal, a PC with commissioning software or the fieldbus.

*   The safety-related function "Safe Torque Off" (STO) as per IEC 61800-5-2 is integrated into the drive. The optional safety module eSM offers additional safety-related functions.

*   A memory card slot is provided for backup and copying of parameters and fast device replacement.

# Components and Interfaces

## Overview



**CN1** Power stage supply

**CN2** 24 Vdc control supply and safety-related function STO

**CN3** Motor encoder (Encoder 1)

**CN4** PTO (Pulse Train Out) - ESIM (encoder simulation)

**CN5** PTI (Pulse Train In) - P/D, A/B or CW/CCW signals

**CN6** 6 digital inputs and 3 digital outputs

**CN7** Modbus (commissioning interface)

**CN8** External braking resistor

**CN9** DC bus

**CN10** Motor phases

**CN11** Motor holding brake

**Slot 1** Slot for safety module
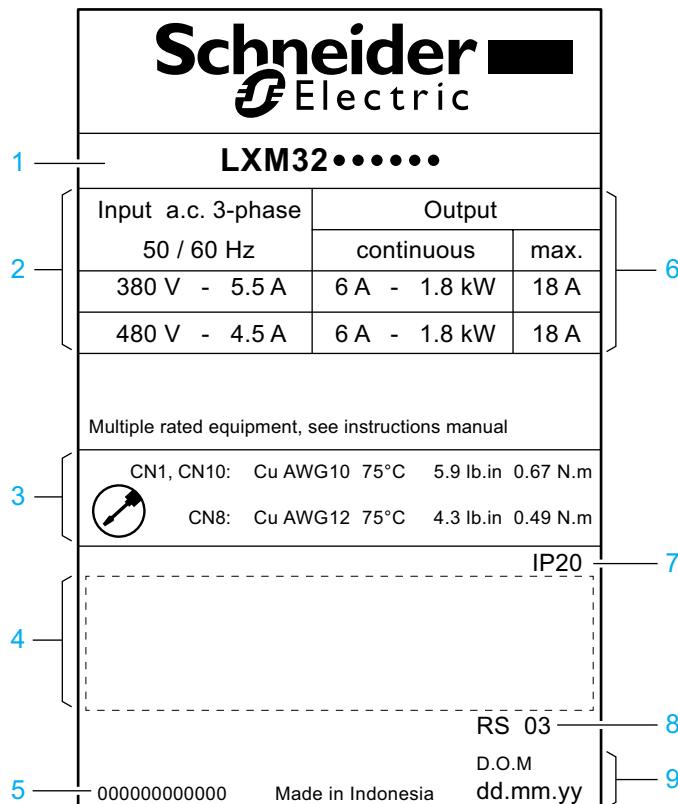
**Slot 2** Slot for encoder module (Encoder 2)

**Slot 3** Slot for fieldbus module

# Nameplate

## Description

The nameplate contains the following data:

**Schneider Electric**

**LXM32••••••**

| Input a.c. 3-phase | Output | |
|---|---|---|
| 50 / 60 Hz | continuous | max. |
| 380 V  -  5.5 A | 6 A  -  1.8 kW | 18 A |
| 480 V  -  4.5 A | 6 A  -  1.8 kW | 18 A |

Multiple rated equipment, see instructions manual

CN1, CN10:   Cu AWG10  75°C     5.9 lb.in  0.67 N.m

CN8:   Cu AWG12  75°C     4.3 lb.in  0.49 N.m

IP20

RS  03

D.O.M
dd.mm.yy

000000000000    Made in Indonesia

**1** Product type, see Type Code, page 23

**2** Power stage supply

**3** Cable specifications and tightening torque

**4** Certifications (see product catalog)

**5** Serial number

**6** Output power

**7** Degree of protection

**8** Hardware version

**9** Date of manufacture

# Type Code

## Description

| Item | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| Type code (example) | L | X | M | 3 | 2 | M | D | 1 | 8 | M | 2 | • | • | • | • |

| Item | Meaning |
|------|---------|
| 1 ... 3 | **Product family** <br><br> LXM = Lexium |
| 4 ... 5 | **Product type** <br><br> 32 = AC servo drive for one axis |
| 6 | **Fieldbus interface** <br><br> M = Modular Drive |
| 7 ... 9 | **Peak current** <br><br> U45 = 4.5 A$_{rms}$ <br><br> U60 = 6 A$_{rms}$ <br><br> U90 = 9 A$_{rms}$ <br><br> D12 = 12 A$_{rms}$ <br><br> D18 = 18 A$_{rms}$ <br><br> D30 = 30 A$_{rms}$ <br><br> D72 = 72 A$_{rms}$ <br><br> D85 = 85 A$_{rms}$ <br><br> C10 = 100 A$_{rms}$ |
| 10 ... 11 | **Power stage supply** <br><br> M2 = Single-phase, 115/200/240 Vac <br><br> N4 = Three-phase, 208/400/480 Vac |
| 12 ... 15 | **Customized version** <br><br> S = Customized version |

If you have questions concerning the type code, contact your Schneider Electric representative.

## Designation Customized Version

In the case of a customized version, position 12 of the type code is an "S". The subsequent number defines the customized version. Example: LXM32••••••S123

Contact your local Schneider Electric service representative if you have questions concerning customized versions.

# Technical Data

## Environmental Conditions

### Conditions for Operation

The maximum permissible ambient temperature during operation depends on the clearances between the devices and on the power consumption. Observe the pertinent instructions in the section .

| Characteristic | Unit | Value |
|---|---|---|
| Ambient temperature (no icing, non-condensing) | °C | 0 ... 50 |
| | (°F) | (32 ... 122) |

The following relative humidity is permissible during operation:

| Characteristic | Unit | Value |
|---|---|---|
| Relative humidity (non-condensing) | % | 5 ... 95 |

The installation altitude is defined in terms of altitude above mean sea level.

| Characteristic | Unit | Value |
|---|---|---|
| Installation altitude above mean sea level without derating. | m | <1000 |
| | (ft) | (<3281) |
| Altitude above mean sea level when all of the following conditions are met:<br>• Maximum ambient temperature 45 °C (113 °F)<br>• Reduction of the continuous power by 1% per 100 m (328 ft) above 1000 m (3281 ft) | m<br><br>(ft) | 1000 ... 2000<br><br>(3281 ... 6562) |
| Altitude above mean sea level when all of the following conditions are met:<br>• Maximum ambient temperature 40 °C (104 °F)<br>• Reduction of the continuous power by 1% per 100 m (328 ft) above 1000 m (3281 ft)<br>• Overvoltages of the supply mains limited to overvoltage category II as per IEC 60664-1[1]<br>• No IT grounding system | m<br><br>(ft) | 2000 ... 3000<br><br>(6562 ... 9843) |
| **(1)** LXM32•U, LXM32•D12, LXM32•D18, LXM32•D30 and LXM32•D72 only. | | |

### Conditions for Transportation and Storage

The environment during transportation and storage must be dry and free from dust.

| Characteristic | Unit | Value |
|---|---|---|
| Temperature | °C | -25 ... 70 |
| | (°F) | (-13 ... 158) |

The following relative humidity is permissible during transportation and storage:

| Characteristic | Unit | Value |
|----------------|------|-------|
| Relative humidity (non-condensing) | % | <95 |

# Installation Site and Connection

For operation, the device must be mounted in a closed and appropriately rated control cabinet secured by a keyed or tooled locking mechanism. The device may only be operated with a permanently installed connection.

# Pollution Degree and Degree of Protection
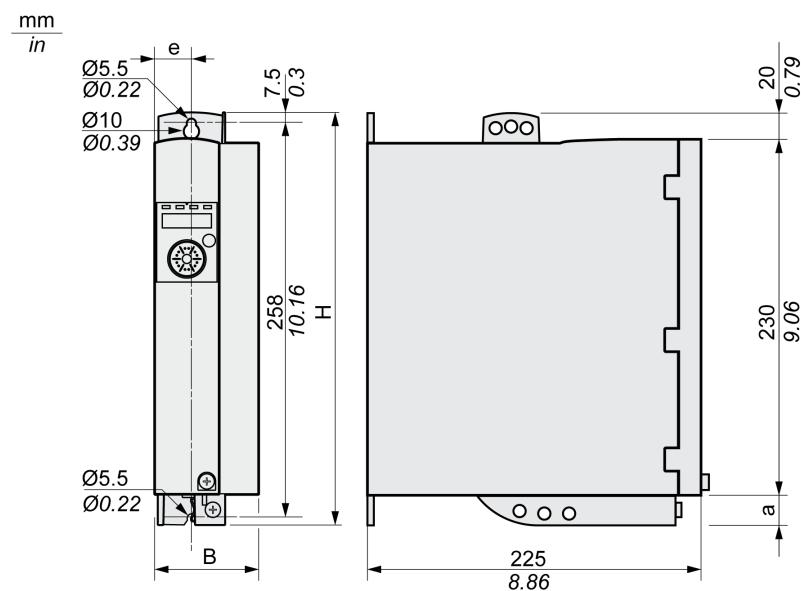
| Characteristic | Value |
|----------------|-------|
| Pollution degree | 2 |
| Degree of protection | IP20 |

# Vibration and Shock

| Characteristic | Value |
|----------------|-------|
| Vibration, sinusoidal | Tested as per IEC 60068-2-6<br><br>3.5 mm (2 ... 8.4 Hz)<br><br>10 m/s² (8.4 ... 200 Hz) |
| Shock, semi-sinusoidal | Tested as per IEC 60068-2-27<br><br>150 m/s² (for 11 ms) |

# Dimensions
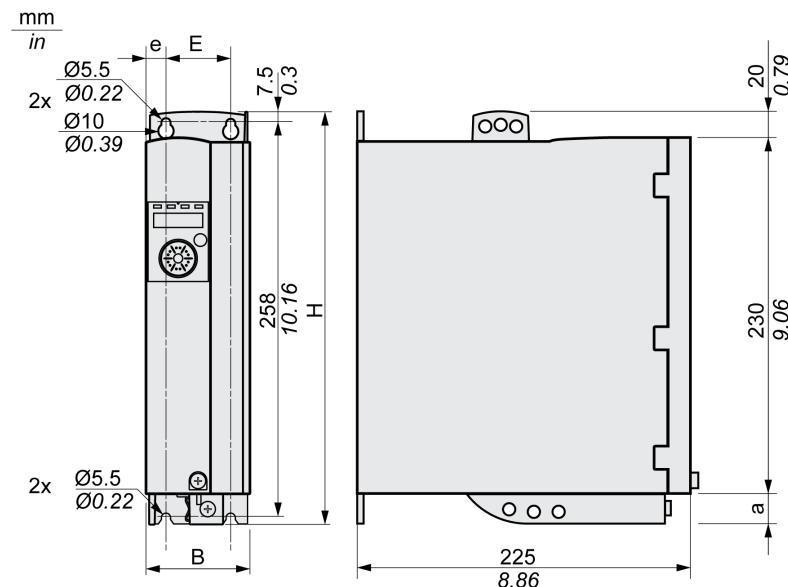
## Dimensions LXM32•U45, LXM32•U60, LXM32•U90, LXM32•D12, LXM32•D18 and LXM32•D30M2

| Characteristic | Unit | Value | |
|---|---|---|---|
| | | LXM32•U45, LXM32•U60, LXM32•U90 | LXM32•D12, LXM32•D18, LXM32•D30M2 |
| B | mm (in) | 68 ±1 (2.68 ±0.04) | 68 ±1 (2.68 ±0.04) |
| H | mm (in) | 270 (10.63) | 270 (10.63) |
| e | mm (in) | 24 (0.94) | 24 (0.94) |
| a | mm (in) | 20 (0.79) | 20 (0.79) |
| Type of cooling | - | Convection[1] | Fan 40 mm (1.57 in) |
| **(1)** Greater than 1 m/s | | | |
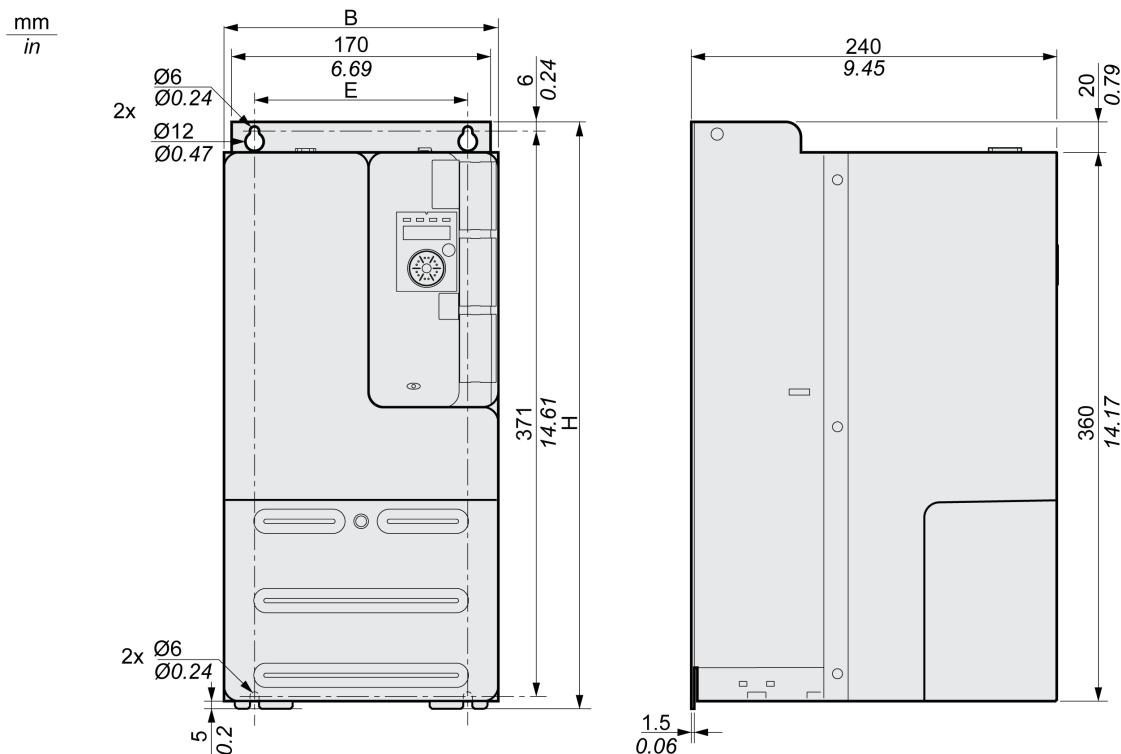
# Dimensions LXM32•D30N4 and LXM32•D72

| Characteristic | Unit | Value | |
| --- | --- | --- | --- |
| | | LXM32•D30N4 | LXM32•D72 |
| B | mm (in) | 68 ±1 (2.68 ±0.04) | 108 ±1 (4.25 ±0.04) |
| H | mm (in) | 270 (10.63) | 274 (10.79) |
| e | mm (in) | 13 (0.51) | 13 (0.51) |
| E | mm (in) | 42 (1.65) | 82 (3.23) |
| a | mm (in) | 20 (0.79) | 24 (0.94) |
| Type of cooling | - | Fan 60 mm (2.36 in) | Fan 80 mm (3.15 in) |

# Dimensions LXM32•D85 and LXM32•C10

| Characteristic | Unit | Value |
| --- | --- | --- |
| | | **LXM32•D85, LXM32•C10** |
| B | mm (in) | 180 ±1 (7.09 ±0.04) |
| H | mm (in) | 385 (15.18) |
| E | mm (in) | 140 (5.51) |
| Type of cooling | - | Fan 80 mm (3.15 in) |

# Mass

| Characteristic | Unit | Value | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | **LXM32•-U45** | **LXM32•-U60, LXM32•-U90** | **LXM32•-D12, LXM32•-D18M2** | **LXM32•-D18N4, LXM32•-D30M2** | **LXM32•-D30N4** | **LXM32•-D72** | **LXM32•-D85, LXM32•-C10** |
| Mass | kg (lb) | 1.7 (3.75) | 1.8 (3.97) | 1.9 (4.19) | 2.1 (4.63) | 2.7 (5.95) | 4.8 (10.58) | 8.8 (19.4) |

# Power Stage Data - General

## Mains Voltage: Range and Tolerance

| Characteristic | Unit | Value |
|---|---|---|
| 115/230 Vac single-phase | Vac | 100 -15% ... 120 +10% |
| | | 200 -15% ... 240 +10% |
| 208/400/480 Vac three-phase [1] | Vac | 200 -15% ... 240 +10% |
| | | 380 -15% ... 480 +10% |
| Frequency | Hz | 50 -5% ... 60 +5% |
| **(1)** 208 Vac: With firmware version ≥V01.02 and DOM ≥10.05.2010 | | |

| Characteristic | Unit | Value |
|---|---|---|
| Transient overvoltages | - | Overvoltage category III[1] |
| Rated voltage to ground | Vac | 300 |
| **(1)** Depends on installation altitude, see Environmental Conditions, page 24. | | |

## Type of Grounding

| Characteristic | Value |
|---|---|
| TT grounding system, TN grounding system | Approved |
| IT grounding system | Depends on hardware version:<br><br>≥RS02: Approved[1]<br><br><RS02: Not approved |
| Mains with corner grounded system | Not approved |
| **(1)** Depending on installation altitude, see Environmental Conditions, page 24. | |

## Leakage Current

| Characteristic | Unit | Value |
|---|---|---|
| Leakage current (as per IEC 60990, figure 3) | mA | <30[1] |
| **(1)** Measured on mains with grounded neutral point and without external mains filter. Take into account that a 30 mA RCD can already trigger at 15 mA. In addition, there is a high-frequency leakage current which is not considered in the measurement. The response to this depends on the type of residual current device. | | |

## Harmonic Currents and Impedance

The harmonic currents depend on the impedance of the supply mains. This is expressed in terms of the short-circuit current of the supply mains. If the supply mains has a higher short-circuit current than indicated in the Technical Data for the drive, use upstream mains reactors. See Accessories and Spare Parts, page 647 for suitable mains reactors.

# Monitoring the Motor Phases for Short-Circuit

The drive provides short-circuit protection according to IEC 60364-4-41:2005/ AMD1:-, Clause 411.

# Monitoring the Continuous Output Current

The continuous output current is monitored by the drive. If the continuous output current is permanently exceeded, the drive reduces the output current.

# PWM Frequency Power Stage

The PWM frequency of the power stage depends on the drive version.

| Characteristic | Unit | Value | |
|---|---|---|---|
| | | LXM32•U45, LXM32•U60, LXM32•U90, LXM32•D12, LXM32•D18, LXM32•D30, LXM32•D72 | LXM32•D85, LXM32•C10 |
| PWM frequency power stage | kHz | 8 | 4 or 8[1] |
| **(1)** Factory setting: 4 kHz. Adjustable via parameter. | | | |

# Approved Motors

The following motor families can be connected: BMH, BSH.

When selecting, consider the type and amount of the mains voltage and the motor inductance.

If an encoder module is installed, additional motors can be used. The conditions can be found in the corresponding user guide for the module.

For other motor possibilities, contact your local Schneider Electric representative.

# Inductance of Motor

The permissible minimum inductance of the motor to be connected depends on the drive type and the nominal mains voltage. See Power Stage Data - Drive-Specific, page 31.

The specified minimum inductance value limits the current ripple of the peak output current. If the inductance value of the connected motor is less than the specified minimum inductance value, this may adversely affect current control and trigger motor phase current monitoring.

# Power Stage Data - Drive-Specific

## Data for Single-Phase Devices at 115 Vac

| Characteristic | Unit | Value | | | |
|---|---|---|---|---|---|
| | | LXM32•U45M2 | LXM32•U90M2 | LXM32•D18M2 | LXM32•D30M2 |
| Nominal voltage (single-phase) | Vac | 115 | 115 | 115 | 115 |
| Inrush current limitation | A | 1.7 | 3.5 | 8 | 16 |
| Maximum fuse to be connected upstream[1] | A | 25 | 25 | 25 | 25 |
| Continuous output current | $A_{rms}$ | 1.5 | 3 | 6 | 10 |
| Peak output current | $A_{rms}$ | 3 | 6 | 10 | 15 |
| Minimum inductance motor (phase/phase) | mH | 5.5 | 3 | 1.4 | 0.8 |
| **Values without mains reactor**[2] | | | | | |
| Nominal power | kW | 0.15 | 0.3 | 0.5 | 0.8 |
| Input current[3] | $A_{rms}$ | 2.9 | 5.4 | 8.5 | 12.9 |
| THD (total harmonic distortion)[4] | % | 173 | 159 | 147 | 135 |
| Power dissipation[5] | W | 7 | 15 | 28 | 33 |
| Maximum inrush current[6] | A | 111 | 161 | 203 | 231 |
| Time for maximum inrush current | ms | 0.8 | 1.0 | 1.2 | 1.4 |
| **Values with mains reactor** | | | | | |
| Mains reactor | mH | 5 | 2 | 2 | 2 |
| Nominal power | kW | 0.2 | 0.4 | 0.8 | 0.8 |
| Input current[3] | $A_{rms}$ | 2.6 | 5.2 | 9.9 | 9.9 |
| THD (total harmonic distortion)[4] | % | 85 | 90 | 74 | 72 |
| Power dissipation[5] | W | 8 | 16 | 32 | 33 |
| Maximum inrush current[6] | A | 22 | 48 | 56 | 61 |
| Time for maximum inrush current | ms | 3.3 | 3.1 | 3.5 | 3.7 |

**(1)** As per IEC 60269. Circuit breakers with B or C characteristic. See Conditions for UL 508C and CSA, page 56. Lower ratings are permissible. The fuse must be rated in such a way that the fuse does not trip at the specified input current.

**(2)** At a mains impedance corresponding to a short-circuit current of the supply mains of 1 kA.

**(3)** At nominal power and nominal voltage.

**(4)** With reference to the input current.

**(5)** Condition: internal braking resistor not active. Value at nominal current, nominal voltage and nominal power. Value approximately proportional with output current.

**(6)** Extreme case, off/on pulse before the inrush current limitation responds, see next line for maximum time.

## Data for Single-Phase Devices at 230 Vac

| Characteristic | Unit | Value | | | |
|---|---|---|---|---|---|
| | | LXM32•U45M2 | LXM32•U90M2 | LXM32•D18M2 | LXM32•D30M2 |
| Nominal voltage (single-phase) | Vac | 230 | 230 | 230 | 230 |
| Inrush current limitation | A | 3.5 | 6.9 | 16 | 33 |
| Maximum fuse to be connected upstream[1] | A | 25 | 25 | 25 | 25 |
| Continuous output current | $A_{rms}$ | 1.5 | 3 | 6 | 10 |
| Peak output current | $A_{rms}$ | 4.5 | 9 | 18 | 30 |

| Characteristic | Unit | Value | | | |
|---|---|---|---|---|---|
| | | LXM32•U45M2 | LXM32•U90M2 | LXM32•D18M2 | LXM32•D30M2 |
| Minimum inductance motor (phase/phase) | mH | 5.5 | 3 | 1.4 | 0.8 |
| **Values without mains reactor**[2] | | | | | |
| Nominal power | kW | 0.3 | 0.5 | 1.0 | 1.6 |
| Input current[3] | $A_{rms}$ | 2.9 | 4.5 | 8.4 | 12.7 |
| THD (total harmonic distortion)[4] | % | 181 | 166 | 148 | 135 |
| Power dissipation[5] | W | 10 | 18 | 34 | 38 |
| Maximum inrush current[6] | A | 142 | 197 | 240 | 270 |
| Time for maximum inrush current | ms | 1.1 | 1.5 | 1.8 | 2.1 |
| **Values with mains reactor** | | | | | |
| Mains reactor | mH | 5 | 2 | 2 | 2 |
| Nominal power | kW | 0.5 | 0.9 | 1.6 | 2.2 |
| Input current[3] | $A_{rms}$ | 3.4 | 6.3 | 10.6 | 14.1 |
| THD (total harmonic distortion)[4] | % | 100 | 107 | 93 | 86 |
| Power dissipation[5] | W | 11 | 20 | 38 | 42 |
| Maximum inrush current[6] | A | 42 | 90 | 106 | 116 |
| Time for maximum inrush current | ms | 3.5 | 3.2 | 3.6 | 4.0 |

**(1)** As per IEC 60269. Circuit breakers with B or C characteristic. See Conditions for UL 508C and CSA, page 56. Lower ratings are permissible. The fuse must be rated in such a way that the fuse does not trip at the specified input current.

**(2)** At a mains impedance corresponding to a short-circuit current of the supply mains of 1 kA.

**(3)** At nominal power and nominal voltage.

**(4)** With reference to the input current.

**(5)** Condition: internal braking resistor not active. Value at nominal current, nominal voltage and nominal power. Value approximately proportional with output current.

**(6)** Extreme case, off/on pulse before the inrush current limitation responds, see next line for maximum time.

# Data for Three-Phase Devices at 208 Vac

| Characteristic | Unit | Value | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | LXM32•-U60N4 | LXM32•-D12N4 | LXM32•-D18N4 | LXM32•-D30N4 | LXM32•-D72N4 | LXM32•-D85N4 | LXM32•-C10N4 |
| Nominal voltage (three-phase) | Vac | 208 | 208 | 208 | 208 | 208 | 208 | 208 |
| Inrush current limitation | A | 2.2 | 4.9 | 10 | 10 | 29 | 29 | 29 |
| Maximum fuse to be connected upstream[1] | A | 32 | 32 | 32 | 32 | 32 | 63 | 63 |
| Continuous output current | $A_{rms}$ | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 32 | 40 |
| PWM frequency = 8 kHz | | 1.5 | 3 | 6 | 10 | 24 | 24 | 24 |
| Peak output current | $A_{rms}$ | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 85 | 100 |
| PWM frequency = 8 kHz | | 6 | 12 | 18 | 30 | 72 | 82 | 82 |
| Minimum inductance motor (phase/phase) | mH | 8.5 | 4.5 | 3 | 1.7 | 0.7 | 0.6 | 0.51 |
| **Values without mains reactor**[2] | | | | | | | | |
| Nominal power | kW | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 5 | 7 |
| PWM frequency = 8 kHz | | 0.35 | 0.7 | 1.2 | 2.0 | 5 | 5 | 6 |

| Characteristic | Unit | Value | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | LXM32•-U60N4 | LXM32•-D12N4 | LXM32•-D18N4 | LXM32•-D30N4 | LXM32•-D72N4 | LXM32•-D85N4 | LXM32•-C10N4 |
| Input current[3] | Arms | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 21.8 | 29.7 |
| PWM frequency = 8 kHz | | 1.8 | 3.6 | 6.2 | 9.8 | 21.9 | 22.3 | 25.9 |
| THD (total harmonic distortion)[4] | % | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 108 | 102 |
| PWM frequency = 8 kHz | | 132 | 136 | 140 | 128 | 106 | 113 | 106 |
| Power dissipation[5] | W | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 235 | 314 |
| PWM frequency = 8 kHz | | 13 | 26 | 48 | 81 | 204 | 301 | 390 |
| Maximum inrush current[6] | A | 60 | 180 | 276 | 341 | 500 | 425 | 347 |
| Time for maximum inrush current | ms | 0.5 | 0.7 | 0.9 | 1.1 | 1.5 | 0.8 | 1.0 |
| **Values with mains reactor** | | | | | | | | |
| Mains reactor | mH | 2 | 2 | 1 | 1 | 1 | 1 | 0.5 |
| Nominal power | kW | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 7 | 11 |
| PWM frequency = 8 kHz | | 0.4 | 0.8 | 1.5 | 2.6 | 6.5 | 6 | 6 |
| Input current[3] | Arms | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 22.1 | 35.3 |
| PWM frequency = 8 kHz | | 1.7 | 3.1 | 6.0 | 9.2 | 21.1 | 18.9 | 19.5 |
| THD (total harmonic distortion)[4] | % | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 33 | 38 |
| PWM frequency = 8 kHz | | 97 | 79 | 78 | 59 | 34 | 32 | 45 |
| Power dissipation[5] | W | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 229 | 328 |
| PWM frequency = 8 kHz | | 13 | 27 | 51 | 86 | 218 | 295 | 404 |
| Maximum inrush current[6] | A | 19 | 55 | 104 | 126 | 155 | 93 | 124 |
| Time for maximum inrush current | ms | 1.9 | 2.6 | 2.6 | 3.0 | 3.6 | 4.4 | 3.1 |

**(1)** As per IEC 60269. Circuit breakers with B or C characteristic. See Conditions for UL 508C and CSA, page 56. Lower ratings are permissible. The fuse must be rated in such a way that the fuse does not trip at the specified input current.

**(2)** At a mains impedance corresponding to a short-circuit current of the supply mains of 5 kA (for LXM32MU60, LXM32MD12, LXM32MD18, LXM32MD30 and LXM32MD72) and of 22 kA (for LXM32MD85 and LXM32MC10)

**(3)** At nominal power and nominal voltage.

**(4)** With reference to the input current.

**(5)** Condition: internal braking resistor not active. Value at nominal current, nominal voltage and nominal power. Value approximately proportional with output current.

**(6)** Extreme case, off/on pulse before the inrush current limitation responds, see next line for maximum time.

# Data for Three-Phase Devices at 400 Vac

| Characteristic | Unit | Value | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | LXM32•-U60N4 | LXM32•-D12N4 | LXM32•-D18N4 | LXM32•-D30N4 | LXM32•-D72N4 | LXM32•-D85N4 | LXM32•-C10N4 |
| Nominal voltage (three-phase) | Vac | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| Inrush current limitation | A | 4.3 | 9.4 | 19 | 19 | 57 | 57 | 57 |

| Characteristic | Unit | Value | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | LXM32•-U60N4 | LXM32•-D12N4 | LXM32•-D18N4 | LXM32•-D30N4 | LXM32•-D72N4 | LXM32•-D85N4 | LXM32•-C10N4 |
| Maximum fuse to be connected upstream[1] | A | 32 | 32 | 32 | 32 | 32 | 63 | 63 |
| Continuous output current | $A_{rms}$ | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 32 | 40 |
| PWM frequency = 8 kHz | | 1.5 | 3 | 6 | 10 | 24 | 24 | 24 |
| Peak output current | $A_{rms}$ | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 85 | 100 |
| PWM frequency = 8 kHz | | 6 | 12 | 18 | 30 | 72 | 82 | 82 |
| Minimum inductance motor (phase/phase) | mH | 8.5 | 4.5 | 3 | 1.7 | 0.7 | 0.6 | 0.51 |
| **Values without mains reactor**[2] | | | | | | | | |
| Nominal power | kW | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 9 | 11 |
| PWM frequency = 8 kHz | | 0.4 | 0.9 | 1.8 | 3.0 | 7 | 9 | 11 |
| Input current[3] | $A_{rms}$ | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 23.3 | 27.8 |
| PWM frequency = 8 kHz | | 1.4 | 2.9 | 5.2 | 8.3 | 17.3 | 23.3 | 27.8 |
| THD (total harmonic distortion)[4] | % | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 139 | 133 |
| PWM frequency = 8 kHz | | 191 | 177 | 161 | 148 | 126 | 139 | 133 |
| Power dissipation[5] | W | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 303 | 375 |
| PWM frequency = 8 kHz | | 17 | 37 | 68 | 115 | 283 | 429 | 522 |
| Maximum inrush current[6] | A | 90 | 131 | 201 | 248 | 359 | 520 | 520 |
| Time for maximum inrush current | ms | 0.5 | 0.7 | 0.9 | 1.1 | 1.4 | 1.0 | 1.0 |
| **Values with mains reactor** | | | | | | | | |
| Mains reactor | mH | 2 | 2 | 1 | 1 | 1 | 1 | 0.5 |
| Nominal power | kW | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 15 | 22 |
| PWM frequency = 8 kHz | | 0.8 | 1.6 | 3.3 | 5.6 | 13 | 13 | 13 |
| Input current[3] | $A_{rms}$ | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 25.0 | 38.1 |
| PWM frequency = 8 kHz | | 1.8 | 3.4 | 6.9 | 11.1 | 22.5 | 21.9 | 24.5 |
| THD (total harmonic distortion)[4] | % | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 42 | 51 |
| PWM frequency = 8 kHz | | 108 | 90 | 90 | 77 | 45 | 45 | 70 |
| Power dissipation[5] | W | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 306 | 416 |
| PWM frequency = 8 kHz | | 19 | 40 | 74 | 125 | 308 | 433 | 563 |
| Maximum inrush current[6] | A | 28 | 36 | 75 | 87 | 112 | 138 | 185 |

| Characteristic | Unit | Value | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | LXM32•-U60N4 | LXM32•-D12N4 | LXM32•-D18N4 | LXM32•-D30N4 | LXM32•-D72N4 | LXM32•-D85N4 | LXM32•-C10N4 |
| Time for maximum inrush current | ms | 1.9 | 2.3 | 2.3 | 2.6 | 3.0 | 4.3 | 3.0 |

**(1)** As per IEC 60269. Circuit breakers with B or C characteristic. See Conditions for UL 508C and CSA, page 56. Lower ratings are permissible. The fuse must be rated in such a way that the fuse does not trip at the specified input current.

**(2)** At a mains impedance corresponding to a short-circuit current of the supply mains of 5 kA (for LXM32MU60, LXM32MD12, LXM32MD18, LXM32MD30 and LXM32MD72) and of 22 kA (for LXM32MD85 and LXM32MC10)

**(3)** At nominal power and nominal voltage.

**(4)** With reference to the input current.

**(5)** Condition: internal braking resistor not active. Value at nominal current, nominal voltage and nominal power. Value approximately proportional with output current.

**(6)** Extreme case, off/on pulse before the inrush current limitation responds, see next line for maximum time.

# Data for Three-Phase Devices at 480 Vac

| Characteristic | Unit | Value | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | LXM32•-U60N4 | LXM32•-D12N4 | LXM32•-D18N4 | LXM32•-D30N4 | LXM32•-D72N4 | LXM32•-D85N4 | LXM32•-C10N4 |
| Nominal voltage (three-phase) | Vac | 480 | 480 | 480 | 480 | 480 | 480 | 480 |
| Inrush current limitation | A | 5.1 | 11.3 | 23 | 23 | 68 | 68 | 68 |
| Maximum fuse to be connected upstream[1] | A | 32 | 32 | 32 | 32 | 32 | 63 | 63 |
| Continuous output current | $A_{rms}$ | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 32 | 40 |
| PWM frequency = 8 kHz | | 1.5 | 3 | 6 | 10 | 24 | 24 | 24 |
| Peak output current | $A_{rms}$ | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 85 | 100 |
| PWM frequency = 8 kHz | | 6 | 12 | 18 | 30 | 72 | 82 | 82 |
| Minimum inductance motor (phase/phase) | mH | 8.5 | 4.5 | 3 | 1.7 | 0.7 | 0.6 | 0.51 |
| **Values without mains reactor**[2] | | | | | | | | |
| Nominal power | kW | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 9 | 11 |
| PWM frequency = 8 kHz | | 0.4 | 0.9 | 1.8 | 3.0 | 7 | 9 | 11 |
| Input current[3] | $A_{rms}$ | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 19.9 | 23.7 |
| PWM frequency = 8 kHz | | 1.2 | 2.4 | 4.5 | 7.0 | 14.6 | 19.9 | 23.7 |
| THD (total harmonic distortion)[4] | % | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 145 | 140 |
| PWM frequency = 8 kHz | | 201 | 182 | 165 | 152 | 129 | 145 | 140 |
| Power dissipation[5] | W | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 312 | 407 |
| PWM frequency = 8 kHz | | 20 | 42 | 76 | 129 | 315 | 464 | 560 |
| Maximum inrush current[6] | A | 129 | 188 | 286 | 350 | 504 | 795 | 795 |
| Time for maximum inrush current | ms | 0.6 | 0.7 | 1.0 | 1.2 | 1.6 | 1.0 | 1.0 |
| **Values with mains reactor** | | | | | | | | |
| Mains reactor | mH | 2 | 2 | 1 | 1 | 1 | 1 | 0.5 |

| Characteristic | Unit | Value | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | LXM32•-U60N4 | LXM32•-D12N4 | LXM32•-D18N4 | LXM32•-D30N4 | LXM32•-D72N4 | LXM32•-D85N4 | LXM32•-C10N4 |
| Nominal power | kW | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 15 | 22 |
| PWM frequency = 8 kHz | | 0.8 | 1.6 | 3.3 | 5.6 | 13 | 13 | 13 |
| Input current[3] | $A_{rms}$ | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 21.0 | 32.0 |
| PWM frequency = 8 kHz | | 1.6 | 2.9 | 6.0 | 9.6 | 19.5 | 18.4 | 20.7 |
| THD (total harmonic distortion)[4] | % | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 45 | 54 |
| PWM frequency = 8 kHz | | 116 | 98 | 98 | 85 | 55 | 48 | 73 |
| Power dissipation[5] | W | | | | | | | |
| PWM frequency = 4 kHz | | - | - | - | - | - | 314 | 417 |
| PWM frequency = 8 kHz | | 21 | 44 | 82 | 137 | 341 | 466 | 593 |
| Maximum inrush current[6] | A | 43 | 57 | 116 | 137 | 177 | 208 | 279 |
| Time for maximum inrush current | ms | 1.9 | 2.4 | 2.4 | 2.7 | 3.2 | 4.1 | 3.4 |

**(1)** As per IEC 60269. Circuit breakers with B or C characteristic. See Conditions for UL 508C and CSA, page 56. Lower ratings are permissible. The fuse must be rated in such a way that the fuse does not trip at the specified input current.

**(2)** At a mains impedance corresponding to a short-circuit current of the supply mains of 5 kA (for LXM32MU60, LXM32MD12, LXM32MD18, LXM32MD30 and LXM32MD72) and of 22 kA (for LXM32MD85 and LXM32MC10)

**(3)** At nominal power and nominal voltage.

**(4)** With reference to the input current.

**(5)** Condition: internal braking resistor not active. Value at nominal current, nominal voltage and nominal power. Value approximately proportional with output current.

**(6)** Extreme case, off/on pulse before the inrush current limitation responds, see next line for maximum time.

# Peak Output Currents

## Description
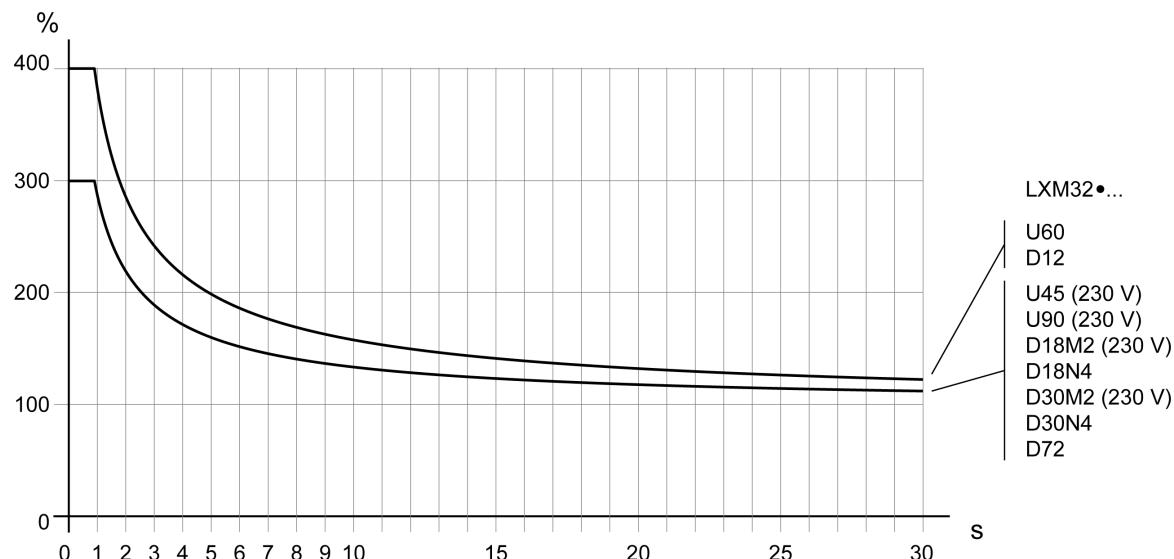
The device can provide the peak output current for a limited period of time. If the peak output current flows when the motor is at a standstill, the higher load on a single semiconductor switch causes the current limitation to become active earlier than when the motor moves.

The period of time for which the peak output current can be provided depends on the hardware version.

Peak output current with hardware version ≥RS03: 5 seconds



Peak output current with hardware version <RS03: 1 second

# DC Bus Data

## DC Bus Data for Single-Phase Drives

| Characteristic | Unit | Value | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | LXM32•U45M2 | | LXM32•U90M2 | | LXM32•D18M2 | | LXM32•D30M2 | |
| Nominal voltage | V | 115 | 230 | 115 | 230 | 115 | 230 | 115 | 230 |
| Nominal voltage DC bus | V | 163 | 325 | 163 | 325 | 163 | 325 | 163 | 325 |
| Undervoltage limit | V | 55 | 130 | 55 | 130 | 55 | 130 | 55 | 130 |
| Voltage limit: activation of Quick Stop | V | 60 | 140 | 60 | 140 | 60 | 140 | 60 | 140 |
| Overvoltage limit | V | 260[1] / 450 | 450 | 260[1] / 450 | 450 | 260[1] / 450 | 450 | 260[1] / 450 | 450 |
| Maximum continuous power via DC bus | kW | 0.2 | 0.5 | 0.4 | 0.9 | 0.8 | 1.6 | 0.8 | 2.2 |
| Maximum continuous current via DC bus | A | 1.5 | 1.5 | 3.2 | 3.2 | 6.0 | 6.0 | 10.0 | 10.0 |
| **(1)** Can be set via parameter *MON_DCbusVdcThresh*. | | | | | | | | | |

## DC Bus Data for Three-Phase Drives

| Characteristic | Unit | Value | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | LXM32•U60N4 | | | LXM32•D12N4 | | | LXM32•D18N4 | | |
| Nominal voltage | V | 208 | 400 | 480 | 208 | 400 | 480 | 208 | 400 | 480 |
| Nominal voltage DC bus | V | 294 | 566 | 679 | 294 | 566 | 679 | 294 | 566 | 679 |
| Undervoltage limit | V | 150 | 350 | 350 | 150 | 350 | 350 | 150 | 350 | 350 |
| Voltage limit: activation of Quick Stop | V | 160 | 360 | 360 | 160 | 360 | 360 | 160 | 360 | 360 |
| Overvoltage limit | V | 450[1] / 820 | 820 | 820 | 450[1] / 820 | 820 | 820 | 450[1] / 820 | 820 | 820 |
| Maximum continuous power via DC bus | kW | 0.4 | 0.8 | 0.8 | 0.8 | 1.6 | 1.6 | 1.7 | 3.3 | 3.3 |
| Maximum continuous current via DC bus | A | 1.5 | 1.5 | 1.5 | 3.2 | 3.2 | 3.2 | 6.0 | 6.0 | 6.0 |
| **(1)** Can be set via parameter *MON_DCbusVdcThresh*. | | | | | | | | | | |

| Characteristic | Unit | Value | | | | | |
|---|---|---|---|---|---|---|---|
| | | LXM32•D30N4 | | | LXM32•D72N4 | | |
| Nominal voltage | V | 208 | 400 | 480 | 208 | 400 | 480 |
| Nominal voltage DC bus | V | 294 | 566 | 679 | 294 | 566 | 679 |
| Undervoltage limit | V | 150 | 350 | 350 | 150 | 350 | 350 |
| Voltage limit: activation of Quick Stop | V | 160 | 360 | 360 | 160 | 360 | 360 |
| Overvoltage limit | V | 450[1] / 820 | 820 | 820 | 450[1] / 820 | 820 | 820 |
| Maximum continuous power via DC bus | kW | 2.8 | 5.6 | 5.6 | 6.5 | 13.0 | 13.0 |
| Maximum continuous current via DC bus | A | 10.0 | 10.0 | 10.0 | 22.0 | 22.0 | 22.0 |
| **(1)** Can be set via parameter *MON_DCbusVdcThresh*. | | | | | | | |

| Characteristic | Unit | Value | | | | | |
|---|---|---|---|---|---|---|---|
| | | LXM32•D85N4 | | | LXM32•C10N4 | | |
| Nominal voltage | V | 208 | 400 | 480 | 208 | 400 | 480 |
| Nominal voltage DC bus | V | 294 | 566 | 679 | 294 | 566 | 679 |
| Undervoltage limit | V | 150 | 350 | 350 | 150 | 350 | 350 |

| Characteristic | Unit | Value | | | | | |
|---|---|---|---|---|---|---|---|
| | | LXM32•D85N4 | | | LXM32•C10N4 | | |
| Voltage limit: activation of Quick Stop | V | 160 | 360 | 360 | 160 | 360 | 360 |
| Overvoltage limit | V | 450[1] / 820 | 820 | 820 | 450[1] / 820 | 820 | 820 |
| Maximum continuous power via DC bus | kW | 7.0 | 15.0 | 15.0 | 11.0 | 22.0 | 22.0 |
| Maximum continuous current via DC bus | A | 28.0 | 28.0 | 28.0 | 40.0 | 40.0 | 40.0 |
| **(1)** Can be set via parameter *MON_DCbusVdcThresh*. | | | | | | | |

# 24 Vdc Control Supply

## Description
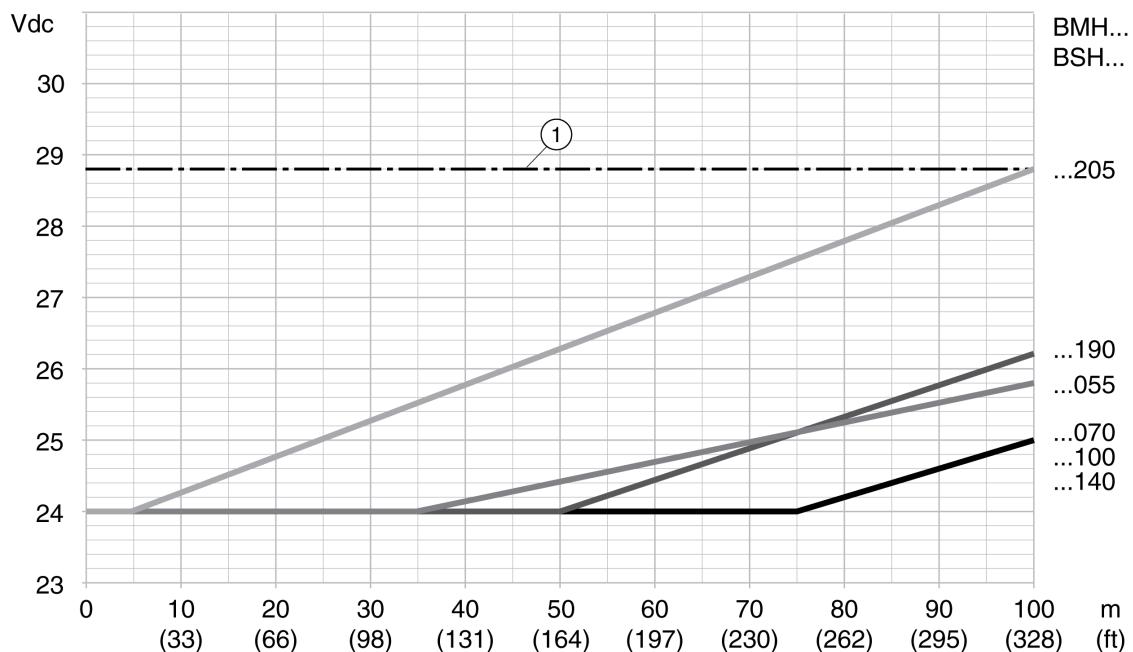
The 24 Vdc control supply must meet the requirements of IEC 61131-2 (PELV standard power supply unit):

| Characteristic | Unit | Value |
|---|---|---|
| Input voltage | Vdc | 24 (-15/+20 %)[1] |
| Input current (without load) | A | ≤1[2] |
| Residual ripple | % | <5 |
| Inrush current | | Charging current for capacitor C= 1.8 mF |
| **(1)** For connection of motors without holding brake. See figure below for motors with holding brake | | |
| **(2)** Input current: holding brake not considered. | | |

## 24 Vdc Control Supply in the Case of Motor with Holding Brake

If a motor with holding brake is connected, the 24 Vdc control supply must be adjusted according to the connected motor type, the motor cable length and the cross section of the wires for the holding brake. The following diagram applies to the motor cables available as accessories, see Accessories and Spare Parts, page 647. See the diagram for the voltage that must be available at CN2 for releasing the holding brake. The voltage tolerance is ±5 %.

24 Vdc control supply in the case of motor with holding brake: the voltage depends on the motor type, the motor cable length and the conductor cross section.
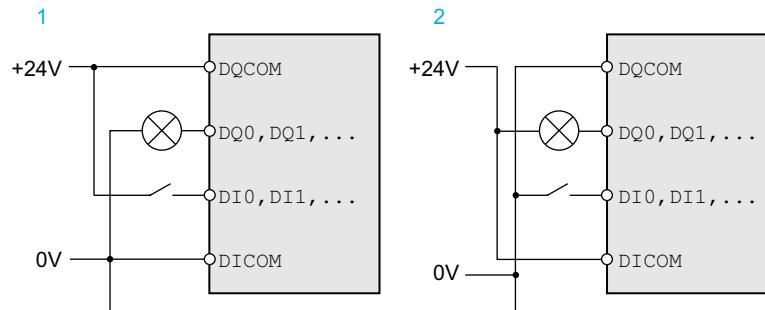


**1** Maximum voltage of the 24 Vdc control supply

# Signals

## Logic Type

The digital inputs and outputs of this product can be wired to enable positive logic or negative logic.

| Logic type | Active state |
|---|---|
| (1) Positive logic | Output supplies current (source output) |
| | Current flows to the input (sink input) |
| (2) Negative logic | Output draws current (sink output) |
| | Current flows from the input (source input) |

Signal inputs are protected against reverse polarity, outputs are short-circuit protected. The inputs and outputs are functionally isolated.

Refer to for more information on sinking, sourcing and positive and negative logic.

## Digital Input Signals 24 V

When wired as sinking inputs, the levels of the digital inputs comply with IEC 61131-2, type 1. The electrical characteristics are also valid when wired as sourcing inputs unless otherwise indicated.

| Characteristic | Unit | Value |
|---|---|---|
| Input voltage - sinking inputs | Vdc | |
| Level 0 | | -3 ... 5 |
| Level 1 | | 15 ... 30 |
| Input voltage - sourcing inputs (at 24 Vdc) | Vdc | |
| Level 0 | | >19 |
| Level 1 | | <9 |
| Input current (at 24 Vdc) | mA | 5 |
| Debounce time (software)[1][2] | ms | 1.5 (default value) |
| Hardware switching time | µs | |
| Rising edge (level 0 -> 1) | | 15 |
| Falling edge (level 1 -> 0) | | 150 |
| Jitter (capture inputs) | µs | <2 |
| **(1)** Adjustable via parameter (sampling period 250µs) | | |
| **(2)** If the capture inputs are used for capture then the debounce time is not applied. | | |

# Digital Output Signals 24 V

When wired as sourcing outputs, the levels of the digital outputs comply with IEC 61131-2. The electrical characteristics are also valid when wired as sinking outputs unless otherwise indicated.

| Characteristic | Unit | Value |
|---|---|---|
| Nominal supply voltage | Vdc | 24 |
| Voltage range for supply voltage | Vdc | 19.2 ... 30 |
| Nominal output voltage - sourcing outputs | Vdc | 24 |
| Nominal output voltage - sinking outputs | Vdc | 0 |
| Voltage drop at 100 mA load | Vdc | ≤3 |
| Maximum current per output | mA | 100 |

# Input Signals Safety-Related Function STO

The inputs for the safety-related function STO (inputs $\overline{STO\_A}$ and $\overline{STO\_B}$) can only be wired for sinking inputs. Observe the information provided in section Functional Safety, page 78.

| Characteristic | Unit | Value |
|---|---|---|
| Input voltage | Vdc | |
| Level 0 | | -3 ... 5 |
| Level 1 | | 15 ... 30 |
| Input current (at 24 Vdc) | mA | 5 |
| Debounce time $\overline{STO\_A}$ and $\overline{STO\_B}$ | ms | >1 |
| Detection of signal differences between $\overline{STO\_A}$ and $\overline{STO\_B}$ | s | >1 |
| Response time of safety-related function STO | ms | ≤10 |

# Holding Brake Output CN11

The 24 Vdc holding brake of the BMH motor or the BSH motor can be connected to the output CN11. Data of output CN11:

| Characteristic | Unit | Value |
|---|---|---|
| Output voltage[1] | V | Voltage at 24 Vdc control supply CN2 minus 0.8 V |
| Maximum switching current | A | 1.7 |
| Energy inductive load[2] | Ws | 1.5 |
| **(1)** See 24 Vdc Control Supply, page 40 | | |
| **(2)** Time between switch off procedures: > 1 s | | |

# Encoder Signals

The encoder signals comply with the Stegmann Hiperface specification.

| Characteristic | Unit | Value |
|---|---|---|
| Output voltage for encoder | V | 10 |
| Output current for encoder | mA | 100 |
| SIN/COS input signal voltage range | - | 1 $V_{pp}$ with 2.5 V offset, 0.5 $V_{pp}$ at 100 kHz |
| Input resistance | Ω | 120 |

The output voltage is short-circuit protected and overload protected.

# Output PTO (CN4)

## Description
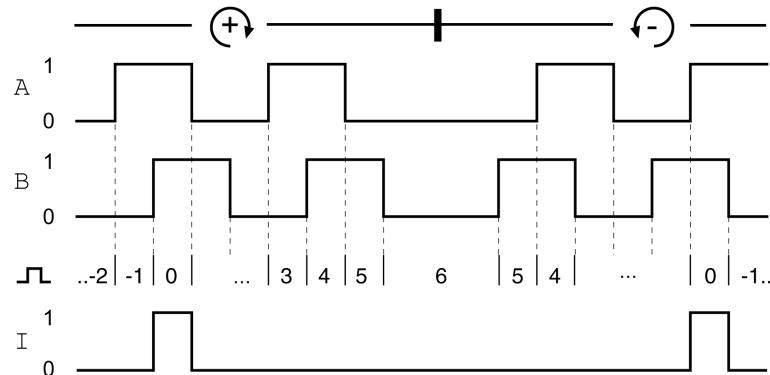
5 V signals are available at the PTO (Pulse Train Out, CN4) output. Depending on parameter *PTO_mode*, these signals are ESIM signals (encoder simulation) or directly transmitted PTI input signals (P/D signals, A/B signals, CW/CCW signals). The PTO output signals can be used as PTI input signals for another device. The PTO output signals have 5 V, even if the PTI input signal is a 24 V signal.

## Output Signal PTO

The PTO output signals comply with the RS422 interface specification. Due to the input current of the optocoupler in the input circuit, a parallel connection of a driver output to several devices is not permitted.

The basic resolution of the encoder simulation at quadruple resolution is 4096 increments per revolution in the case of rotary motors.

Time chart with A, B and index pulse signal, counting forwards and backwards



| Characteristic | Unit | Value |
|---|---|---|
| Logic level | | As per RS422[1] |
| Output frequency per signal | kHz | ≤500 |
| Motor increments per second | Inc/s | ≤1.6 * 10$^6$ |
| **(1)** Due to the input current of the optocoupler in the input circuit, a parallel connection of a driver output to several devices is not permitted. | | |

The device connected to the PTO output must be able to process the specified motor increments per second. Even at low velocities, (medium PTO frequency in the kHz range), edges may change at up to 1.6 MHz.

# Input PTI (CN5)

## Description

5 V signals or 24 V signals can be connected to the PTI (Pulse Train In) input.

The following signals can be connected:

- A/B signals (*ENC_A*/*ENC_B*)
- P/D signals (*PULSE*/*DIR*)
- CW/CCW signals (*CW*/*CCW*)

## Input Circuit and Selection of Method
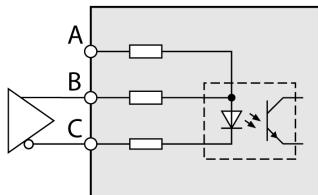
The input circuit and the selected method affect the maximum permissible input frequency and the maximum permissible line length:

| Input circuit | | RS422 | Push pull | Open collector |
|---|---|---|---|---|
| Minimum input frequency with method position synchronization | Hz | 0 | 0 | 0 |
| Minimum input frequency with method velocity synchronization | Hz | 100 | 100 | 100 |
| Maximum input frequency | MHz | 1 | 0.2 | 0.01 |
| Maximum line length | m (ft) | 100 (328) | 10 (32.8) | 1 (3.28) |

Signal input circuits: RS422, Push Pull and Open Collector

5 Vdc



24 Vdc
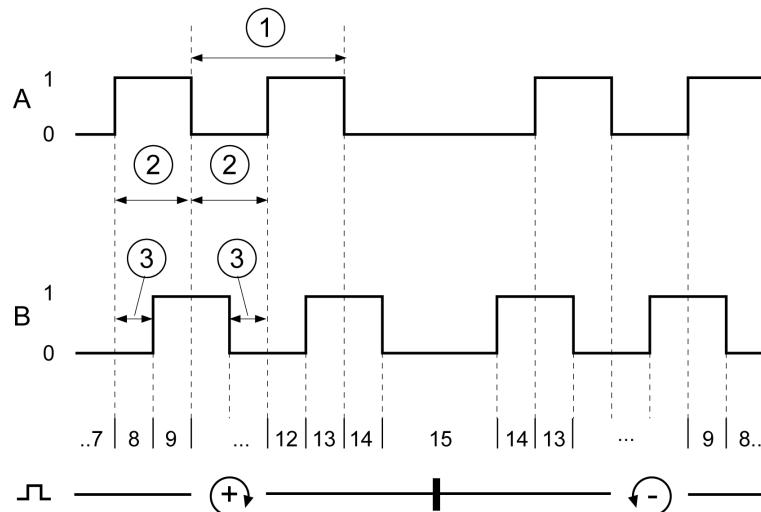
| Input | Pin[1] | RS422[2] | 5V | 24V |
|---|---|---|---|---|
| A | Pin 7 | Reserved | Reserved | *PULSE(24V)* *ENC_A(24V)* *CW(24V)* |
| | Pin 8 | Reserved | Reserved | *DIR(24V)* *ENC_B(24V)* *CCW(24V)* |
| B | Pin 1 | *PULSE(5V)* *ENC_A(5V)* *CW(5V)* | *PULSE(5V)* *ENC_A(5V)* *CW(5V)* | Reserved |
| | Pin4 | *DIR(5V)* *ENC_B(5V)* *CCW(5V)* | *DIR(5V)* *ENC_B(5V)* *CCW(5V)* | Reserved |
| C | Pin 2 | *PULSE* *ENC_A* *CW* | *PULSE* *ENC_A* *CW* | *PULSE* *ENC_A* *CW* |
| | Pin 5 | *DIR* *ENC_B* *CCW* | *DIR* *ENC_B* *CCW* | *DIR* *ENC_B* *CCW* |

**(1)** Observe the different pairing in the case of twisted pair:

Pin 1 / pin 2 and pin 4 / pin 5 for RS422 and 5V

pin 7 / pin 2 and pin 8 / pin 5 for 24V

**(2)** Due to the input current of the optocoupler in the input circuit, a parallel connection of a driver output to several devices is not permitted.

# Function A/B Signals

External A/B signals can be supplied via the PTI input as reference values in operating mode Electronic Gear.

| Signal | Value | Function |
|---|---|---|
| Signal A before signal B | 0 -> 1 | Movement in positive direction |
| Signal B before signal A | 0 -> 1 | Movement in negative direction |

Time chart with A/B signal, counting forwards and backwards



| Times for pulse/direction | Minimum value |
|---|---|
| (1) Cycle duration A, B | 1 µs |
| (2) Pulse duration | 0.4 µs |
| (3) Lead time (A, B) | 200 ns |
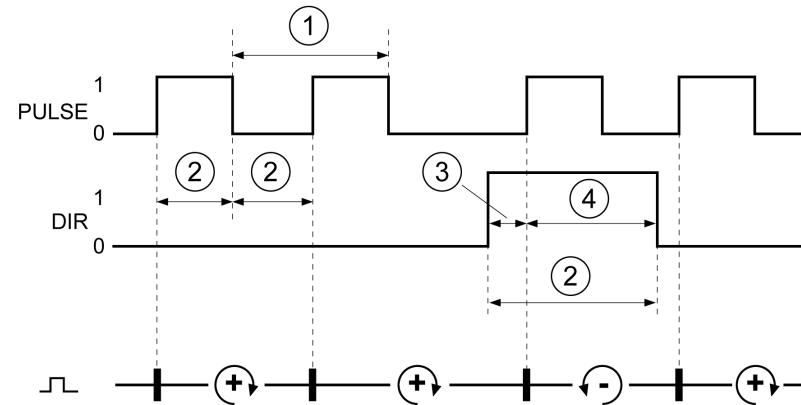
# Function P/D Signals

External P/D signals can be supplied via the PTI input as reference values in the operating mode Electronic Gear.

The motor performs a movement in the case of a rising edge of the *PULSE* signal. The direction is controlled with the *DIR* signal.

| Signal | Value | Function |
|---|---|---|
| *PULSE* | 0 -> 1 | Motor movement |
| *DIR* | 0 / open | Positive direction |

Time chart with pulse/direction signal



| Times for pulse/direction | Minimum value |
|---|---|
| (1) Cycle duration (pulse) | 1 µs |
| (2) Pulse duration (pulse) | 0.4 µs |

| Times for pulse/direction | Minimum value |
|---|---|
| (3) Lead time (Dir-Pulse) | 0 µs |
| (4) Hold time (Pulse-Dir) | 0.4 µs |
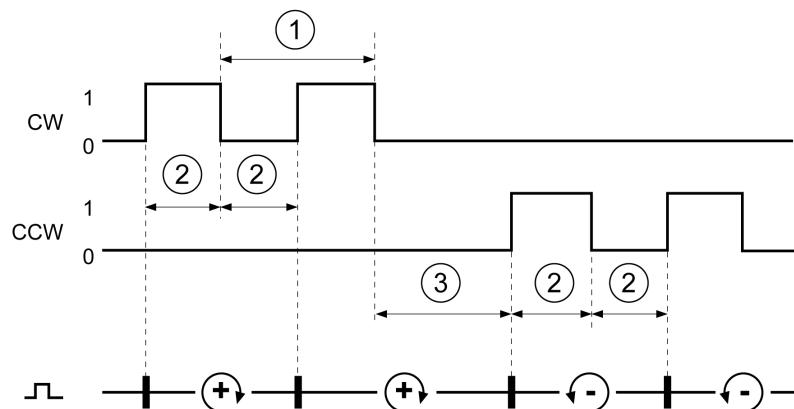
# Function CW/CCW Signals

External CW/CCW signals can be supplied via the PTI input as reference values in operating mode Electronic Gear.

The motor performs a movement in positive direction in the case of a rising edge of the *CW* signal. The motor performs a movement in negative direction in the case of a rising edge of the *CCW* signal.

| Signal | Value | Function |
|---|---|---|
| *CW* | 0 -> 1 | Movement in positive direction |
| *CCW* | 0 -> 1 | Movement in negative direction |

Time chart with "CW/CCW"



| Times for pulse/direction | Minimum value |
|---|---|
| (1) Cycle duration CW, CCW | 1 µs |
| (2) Pulse duration | 0.4 µs |
| (3) Lead time (CW-CCW, CCW-CW) | 0 µs |

# Capacitor and Braking Resistor

## Description

The drive has an internal capacitor and an internal braking resistor. If the internal capacitor and the internal braking resistor are insufficient for the dynamics of the application, one or more external braking resistors must be used.

The resistance values for external braking resistors must not be below the specified minimum resistance. If an external braking resistor is activated by means of the appropriate parameter, the internal braking resistor is deactivated.

## Data of Internal Capacitor

| Characteristic | Unit | Value | | | |
|---|---|---|---|---|---|
| | | LXM32•U45M2 | LXM32•U90M2 | LXM32•D18M2 | LXM32•D30M2 |
| Capacitance of internal capacitor | µF | 390 | 780 | 1170 | 1560 |
| **Parameter** *DCbus_compat* **= 0** (default value) | | | | | |
| Energy absorption of internal capacitors $E_{var}$ at nominal voltage 115 V +10% | Ws | 5 | 9 | 14 | 18 |
| Energy absorption of internal capacitors $E_{var}$ at nominal voltage 200 V +10% | Ws | 17 | 34 | 52 | 69 |
| Energy absorption of internal capacitors $E_{var}$ at nominal voltage 230 V +10% | Ws | 11 | 22 | 33 | 44 |
| **Parameter** *DCbus_compat* **= 1** (reduced switch-on voltage) | | | | | |
| Energy absorption of internal capacitors $E_{var}$ at nominal voltage 115 V +10% | Ws | 24 | 48 | 73 | 97 |
| Energy absorption of internal capacitors $E_{var}$ at nominal voltage 200 V +10% | Ws | 12 | 23 | 35 | 46 |
| Energy absorption of internal capacitors $E_{var}$ at nominal voltage 230 V +10% | Ws | 5 | 11 | 16 | 22 |

| Characteristic | Unit | Value | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | LXM32•-U60N4 | LXM32•-D12N4 | LXM32•-D18N4 | LXM32•-D30N4 | LXM32•-D72N4 | LXM32•-D85N4 | LXM32•-C10N4 |
| Capacitance of internal capacitor | µF | 110 | 195 | 390 | 560 | 1120 | 1230 | 1230 |
| Energy absorption of internal capacitors $E_{var}$ at nominal voltage 208 V +10% | Ws | 4 | 8 | 16 | 22 | 45 | 49 | 49 |
| Energy absorption of internal capacitors $E_{var}$ at nominal voltage 380 V +10% | Ws | 14 | 25 | 50 | 73 | 145 | 159 | 159 |
| Energy absorption of internal capacitors $E_{var}$ at nominal voltage 400 V +10% | Ws | 12 | 22 | 43 | 62 | 124 | 136 | 136 |
| Energy absorption of internal capacitors $E_{var}$ at nominal voltage 480 V +10% | Ws | 3 | 5 | 10 | 14 | 28 | 31 | 31 |
| Parameter *DCbus_compat* has no effect in the case of three-phase devices | | | | | | | | |

# Data of Internal Braking Resistor

| Characteristic | Unit | Value | | | |
|---|---|---|---|---|---|
| | | **LXM32•U45M2** | **LXM32•U90M2** | **LXM32•D18M2** | **LXM32•D30M2** |
| Resistance value of internal braking resistor | Ω | 94 | 47 | 20 | 10 |
| Continuous power internal braking resistor $P_{PR}$ | W | 10 | 20 | 40 | 60 |
| Peak energy $E_{CR}$ | Ws | 82 | 166 | 330 | 550 |
| **Parameter** *DCbus_compat* **= 0** (default value) | | | | | |
| Switch-on voltage of braking resistor at nominal voltage 115 V | V | 236 | 236 | 236 | 236 |
| Switch-on voltage of braking resistor at nominal voltage 200 V and 230 V | V | 430 | 430 | 430 | 430 |
| **Parameter** *DCbus_compat* **= 1** (reduced switch-on voltage) | | | | | |
| Switch-on voltage of braking resistor | V | 395 | 395 | 395 | 395 |

| Characteristic | Unit | Value | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | **LXM32•-U60N4** | **LXM32•-D12N4** | **LXM32•-D18N4** | **LXM32•-D30N4** | **LXM32•-D72N4** | **LXM32•-D85N4** | **LXM32•-C10N4** |
| Resistance value of internal braking resistor | Ω | 132 | 60 | 30 | 30 | 10 | 10 | 10 |
| Continuous power internal braking resistor $P_{PR}$ | W | 20 | 40 | 60 | 100 | 150 | 150 | 150 |
| Peak energy $E_{CR}$ | Ws | 200 | 400 | 600 | 1000 | 2400 | 2400 | 2400 |
| Switch-on voltage of braking resistor at nominal voltage 208 V | V | 430 | 430 | 430 | 430 | 430 | 430 | 430 |
| Switch-on voltage of braking resistor at nominal voltage 380 V, 400 V and 480 V | V | 780 | 780 | 780 | 780 | 780 | 780 | 780 |
| Parameter *DCbus_compat* has no effect in the case of three-phase devices | | | | | | | | |

# Data for External Braking Resistor

| Characteristic | Unit | Value | | | |
|---|---|---|---|---|---|
| | | **LXM32•U45M2** | **LXM32•U90M2** | **LXM32•D18M2** | **LXM32•D30M2** |
| Minimum resistance value of external braking resistor | Ω | 68 | 36 | 20 | 10 |
| Maximum resistance value of external braking resistor[1] | Ω | 110 | 55 | 27 | 16 |
| Maximum continuous power of external braking resistor | W | 200 | 400 | 600 | 800 |
| **Parameter** *DCbus_compat* **= 0** (default value) | | | | | |
| Switch-on voltage of braking resistor at nominal voltage 115 V | V | 236 | 236 | 236 | 236 |
| Switch-on voltage of braking resistor at nominal voltage 200 V and 230 V | V | 430 | 430 | 430 | 430 |
| **Parameter** *DCbus_compat* **= 1** (reduced switch-on voltage) | | | | | |
| Switch-on voltage of braking resistor | V | 395 | 395 | 395 | 395 |

**(1)** The maximum specified braking resistor can derate the peak power of the device. Depending on the application, it is possible to use a higher ohm resistor.

| Characteristic | Unit | Value | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | LXM32•-U60N4 | LXM32•-D12N4 | LXM32•-D18N4 | LXM32•-D30N4 | LXM32•-D72N4 | LXM32•-D85N4 | LXM32•-C10N4 |
| Minimum resistance value of external braking resistor | Ω | 70 | 47 | 25 | 15 | 8 | 8 | 8 |
| Maximum resistance value of external braking resistor[1] | Ω | 145 | 73 | 50 | 30 | 12 | 11 | 11 |
| Maximum continuous power of external braking resistor | W | 200 | 500 | 800 | 1500 | 3000 | 4500 | 5500 |
| Switch-on voltage of braking resistor at nominal voltage 208 V | V | 430 | 430 | 430 | 430 | 430 | 430 | 430 |
| Switch-on voltage of braking resistor at nominal voltage 380 V, 400 V and 480 V | V | 780 | 780 | 780 | 780 | 780 | 780 | 780 |
| Parameter *DCbus_compat* has no effect in the case of three-phase devices | | | | | | | | |
| **(1)** The maximum specified braking resistor can derate the peak power of the device. Depending on the application, it is possible to use a higher ohm resistor. | | | | | | | | |

# Data of External Braking Resistors (Accessories)

| Characteristic | Unit | Value | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | VW3-A7601Rx-x | VW3-A7602Rx-x | VW3-A7603Rx-x | VW3-A7604Rx-x | VW3-A7605Rx-x | VW3-A7606Rx-x | VW3-A7607Rx-x | VW3-A7608Rx-x |
| Resistance | Ω | 10 | 27 | 27 | 27 | 72 | 72 | 72 | 100 |
| Continuous power | W | 400 | 100 | 200 | 400 | 100 | 200 | 400 | 100 |
| Maximum time in braking at 115 V | s | 3 | 1.8 | 4.2 | 10.8 | 6.36 | 16.8 | 42 | 10.8 |
| Peak power at 115 V | kW | 5.6 | 2.1 | 2.1 | 2.1 | 0.8 | 0.8 | 0.8 | 0.6 |
| Maximum peak energy at 115 V | kWs | 16.7 | 3.7 | 8.7 | 22.3 | 4.9 | 13 | 32.5 | 6 |
| Maximum time in braking at 230 V | s | 0.72 | 0.55 | 1.08 | 2.64 | 1.44 | 3.72 | 9.6 | 2.4 |
| Peak power at 230 V | kW | 18.5 | 6.8 | 6.8 | 6.8 | 2.6 | 2.6 | 2.6 | 1.8 |
| Maximum peak energy at 230 V | kWs | 13.3 | 3.8 | 7.4 | 18.1 | 3.7 | 9.6 | 24.7 | 4.4 |
| Maximum time in braking at 400 V and 480 V | s | 0.12 | 0.084 | 0.216 | 0.504 | 0.3 | 0.78 | 1.92 | 0.48 |
| Peak power at 400 V and 480 V | kW | 60.8 | 22.5 | 22.5 | 22.5 | 8.5 | 8.5 | 8.5 | 6.1 |
| Maximum peak energy at 400 V and 480 V | kWs | 7.3 | 1.9 | 4.9 | 11.4 | 2.5 | 6.6 | 16.2 | 2.9 |
| Degree of protection | | IP65 | IP65 | IP65 | IP65 | IP65 | IP65 | IP65 | IP65 |
| UL approval (file no.) | | - | E233422 | E233422 | - | E233422 | E233422 | - | E233422 |

| Characteristic | Unit | Value | |
|---|---|---|---|
| | | VW3A7733 | VW3A7734 |
| Resistance | Ω | 16 | 10 |
| Continuous power | W | 960 | 960 |
| Maximum time in braking at 115 V | s | 20 | 10 |
| Peak power at 115 V | kW | 3.5 | 5.6 |
| Maximum peak energy at 115 V | kWs | 70 | 59 |
| Maximum time in braking at 230 V | s | 3.8 | 1.98 |

| Characteristic | Unit | Value | |
|---|---|---|---|
| | | **VW3A7733** | **VW3A7734** |
| Peak power at 230 V | kW | 11.6 | 18.5 |
| Maximum peak energy at 230 V | kWs | 44 | 36.5 |
| Maximum time in braking at 400 V and 480 V | s | 0.7 | 0.37 |
| Peak power at 400 V and 480 V | kW | 38 | 60.8 |
| Maximum peak energy at 400 V and 480 V | kWs | 26.6 | 22.5 |
| Degree of protection | | IP20 | IP20 |
| UL approval (file no.) | | E226619 | E226619 |

# Electromagnetic Emission

## Overview

The products described in the present manual meet the EMC requirements as per IEC 61800-3 if the EMC measures described in the present manual are implemented.

| **⚠ WARNING** |
|---|
| **ELECTROMAGNETIC DISTURBANCES OF SIGNALS AND DEVICES** |
| Use proper EMI shielding techniques to help prevent unintended device operation. |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |

These types of devices are not intended to be used on a low-voltage public network which supplies domestic premises. Radio frequency interference is expected if used in such a network.

| **⚠ WARNING** |
|---|
| **RADIO INTERFERENCE** |
| Do not use these products in domestic electrical networks. |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |

## EMC Categories

The following categories for emission as per IEC 61800-3 are reached if the EMC measures described in the present manual are implemented.

| Emission type | Category LXM32••••M2 | Category LXM32••••N4 |
|---|---|---|
| Conducted emission | | |
| Motor cable length ≤10 m (≤32.81 ft) | Category C2 | Category C3 |
| Motor cable length 10 ... ≤20 m (32.81 ... ≤65.62 ft) | Category C3 | Category C3 |
| Radiated emission | | |
| Motor cable length ≤20 m (65.62 ft) | Category C3 | Category C3 |

## EMC Categories With External Mains Filter

The following categories for emission as per IEC 61800-3 are reached if the EMC measures described in the present manual are implemented and if the external mains filters offered as accessories are used.

| Emission type | Category | Category |
|---|---|---|
| | LXM32••••M2 | LXM32••••N4 |
| Conducted emission | | |
| Motor cable length ≤20 m (65.62 ft) | Category C1 | Category C1 |
| Motor cable length >20 ... ≤50 m (>65.62 ... ≤164.00 ft) | Category C2 | Category C2 |
| Motor cable length >50 ... ≤100 m (>164.00 ... ≤328.01 ft | Category C3 | Category C3 |
| Radiated emission | | |
| Motor cable length ≤100 m (328.01 ft) | Category C3 | Category C3 |

# Assignment of External Mains Filters

| Single-phase drives | Mains filter reference |
|---|---|
| LXM32•U45M2 (230 V, 1,5 A) | VW3A4420 (9 A) |
| LXM32•U90M2 (230 V, 3 A) | VW3A4420 (9 A) |
| LXM32•D18M2 (230 V, 6 A) | VW3A4421 (16 A) |
| LXM32•D30M2 (230 V, 10 A) | VW3A4421 (16 A) |

| Three-phase drives | Mains filter reference |
|---|---|
| LXM32•U60N4 (480 V, 1,5 A) | VW3A4422 (15 A) |
| LXM32•D12N4 (480 V, 3 A) | VW3A4422 (15 A) |
| LXM32•D18N4 (480 V, 6 A) | VW3A4422 (15 A) |
| LXM32•D30N4 (480 V, 10 A) | VW3A4422 (15 A) |
| LXM32•D72N4 (480 V, 24 A) | VW3A4423 (25 A) |
| LXM32•D85N4 (480 V, 32 A) | VW3A4424 (47 A) |
| LXM32•C10N4 (480 V, 40 A) | VW3A4424 (47 A) |

Several drives can be connected to a common external mains filter.

Prerequisites:

• Single-phase drives may only be connected to single-phase mains filters; three-phase drives may only be connected to three-phase mains filters.

• The total input current of the connected drives must be smaller than or equal to the permissible nominal current of the mains filter.

# Nonvolatile Memory and Memory Card

## Nonvolatile Memory

The following table shows characteristics for the nonvolatile memory:

| Characteristic | Value |
|---|---|
| Minimum number of writing cycles | 100000 |
| Type | EEPROM |

## Memory Card

The following table shows characteristics for the memory card:

| Characteristic | Value |
|---|---|
| Minimum number of writing cycles | 100000 |
| Minimum number of insertion cycles | 1000 |

## Memory Card Holder

The following table shows characteristics for the memory card holder:

| Characteristic | Value |
|---|---|
| Minimum number of insertion cycles | 5000 |

# Conditions for UL 508C and CSA

## General

If the product is used to comply with UL 508C or CSA, the following conditions must also be met:

## Ambient Temperature During Operation

| Characteristic | Unit | Value |
|---|---|---|
| Surrounding air temperature | °C | 0 ... 50 |
| | (°F) | (32 ... 122) |

## Fuses

Use fuses as per UL 248.

| Characteristic | Unit | Value | | |
|---|---|---|---|---|
| | | LXM32••••M2 | LXM32•U60N4, LXM32•D12N4, LXM32•D18N4, LXM32•D30N4, LXM32•D72N4 | LXM32•D85N4, LXM32•C10N4 |
| Maximum fuse rating of fuse to be connected upstream | A | 25 | 30 | 60 |
| Class of fuse | | CC or J | CC or J | J |
| Short-circuit current rating (SCCR) | kA | 12 | 12 | 22 |

## Circuit Breaker

| Characteristic | Unit | Value | | | | | |
|---|---|---|---|---|---|---|---|
| | | LXM32•-U45M2, LXM32•-U90M2 | LXM32•-D18M2, LXM32•-D30M2 | LXM32•U60N4, LXM32•D12N4, LXM32•D18N4 | | LXM32•-D30N4, LXM32•-D72N4 | LXM32•-D85N4, LXM32•-C10N4 |
| Catalog number of type E combination motor controller | | GV2P14 or GV3P25 | GV3P25 | GV2P14 or GV3P25 | GV2P22 | GV2P22 | Not available |
| Short-circuit current rating (SCCR) | kA | 12 | 12 | 12 | 10 | 10 | - |

## Wiring

Use at least 75 °C (167 °F) copper conductors.

## 400/480 V Three-Phase Devices

400/480 V three-phase devices may only be operated via mains up to 480Y/277Vac.

# Overvoltage Category

Use only in overvoltage category III or where the maximum available Rated Impulse Withstand Voltage Peak is equal or less than 4000 Volts.

# Motor Overload Protection

This equipment provides Solid State Motor Overload Protection at 200 % of maximum FLA (Full Load Ampacity).

# Engineering

# Electromagnetic Compatibility (EMC)

## General

### EMC-Compliant Wiring

This drive meets the EMC requirements according to the standard IEC 61800-3 if the measures described in this manual are implemented during installation.

Signal interference can cause unexpected responses of the drive system and of other equipment in the vicinity of the drive system.

| ⚠ **WARNING** |
|---|
| **SIGNAL AND EQUIPMENT INTERFERENCE** |
| • Install the wiring in accordance with the EMC requirements described in the present document. |
| • Verify compliance with the EMC requirements described in the present document. |
| • Verify compliance with all EMC regulations and requirements applicable in the country in which the product is to be operated and with all EMC regulations and requirements applicable at the installation site. |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |

| ⚠ **WARNING** |
|---|
| **ELECTROMAGNETIC DISTURBANCES OF SIGNALS AND DEVICES** |
| Use proper EMI shielding techniques to help prevent unintended device operation. |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |
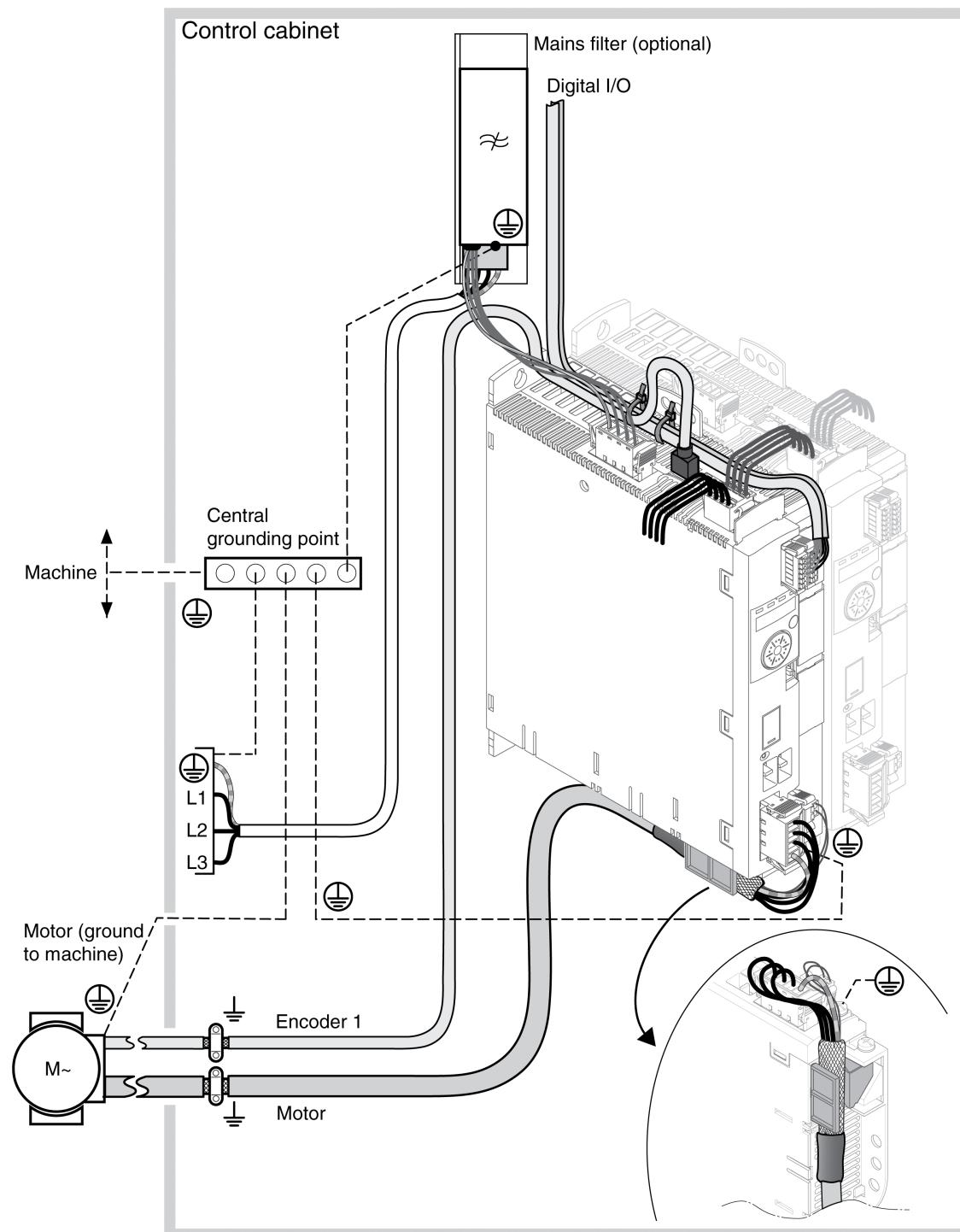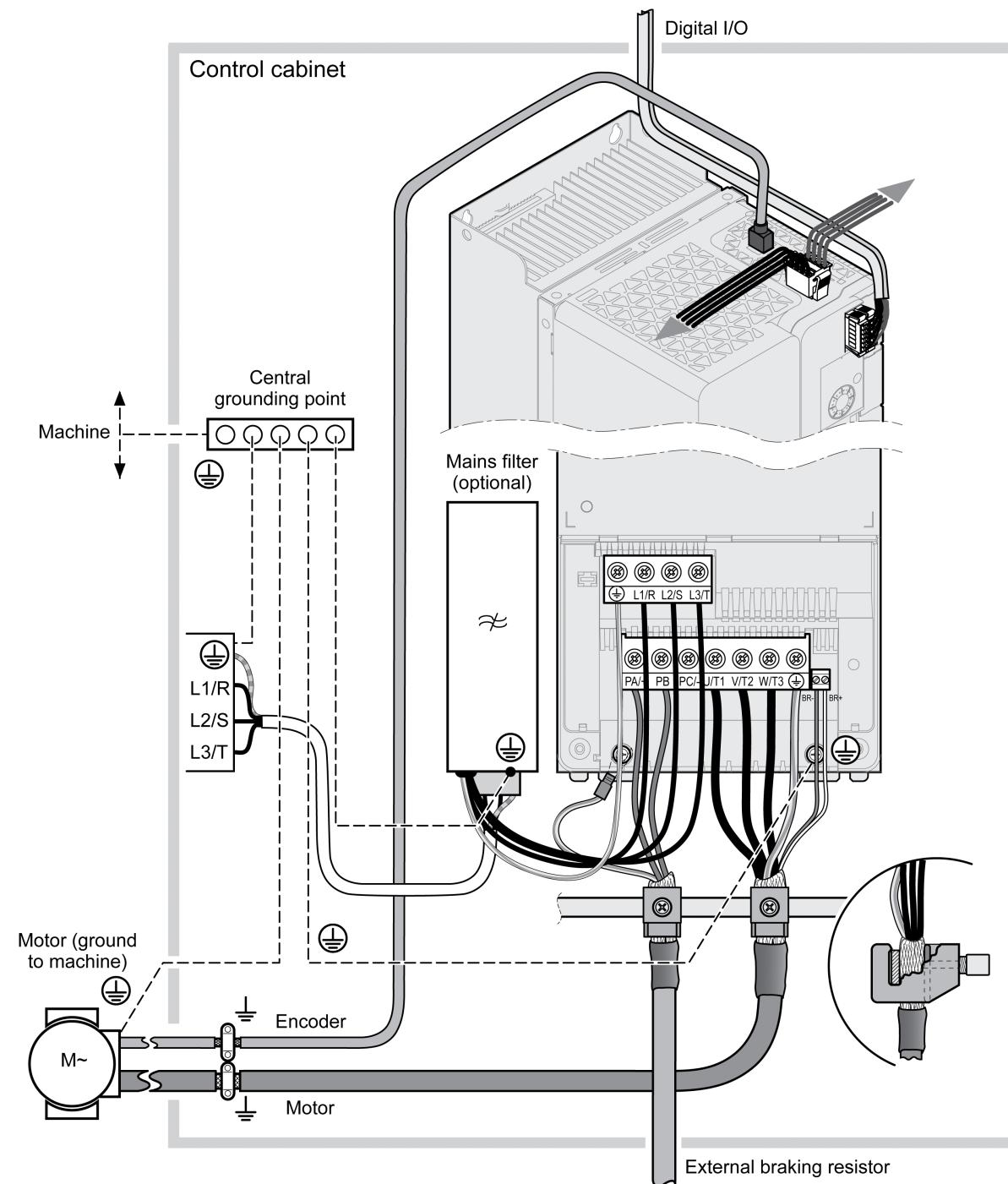
See Electromagnetic Emission, page 53 for the EMC categories.

Overview of wiring with EMC details



Control cabinet

Mains filter (optional)

Digital I/O

Central grounding point

Machine

L1
L2
L3

Motor (ground to machine)

M~

Encoder 1

Motor

Overview of wiring with EMC details



# EMC Requirements for the Control Cabinet

| EMC measures | Objective |
|---|---|
| Use mounting plates with good electrical conductivity, connect large surface areas of metal parts, remove paint from contact areas. | Good conductivity due to large surface contact. |
| Ground the control cabinet, the control cabinet door and the mounting plate with ground straps or ground wires. The conductor cross section must be at least 10 mm$^2$ (AWG 6). | Reduces emissions. |

| EMC measures | Objective |
|---|---|
| Install switching devices such as power contactors, relays or solenoid valves with interference suppression units or arc suppressors (for example, diodes, varistors, RC circuits). | Reduces mutual interference |
| Do not install power components and control components adjacent to one another. | Reduces mutual interference |

## Shielded Cables

| EMC measures | Objective |
|---|---|
| Connect large surface areas of cable shields, use cable clamps and ground straps. | Reduces emissions. |
| Use cable clamps to connect a large surface area of the shields of all shielded cables to the mounting plate at the control cabinet entry. | Reduces emissions. |
| Ground shields of digital signal wires at both ends by connecting them to a large surface area or via conductive connector housings. | Reduces interference affecting the signal wires, reduces emissions |
| Ground the shields of analog signal wires directly at the drive (signal input); insulate the shield at the other cable end or ground it via a capacitor (for example, 10 nF). | Reduces ground loops due to low-frequency interference. |
| Use only shielded motor cables with copper braid and a coverage of at least 85%, ground a large surface area of the shield at both ends. | Diverts interference currents in a controlled way, reduces emissions. |

## Cable Installation

| EMC measures | Objective |
|---|---|
| Do not route fieldbus cables and signal wires in a single cable duct together with lines with DC and AC voltages of more than 60 V. (Fieldbus cables, signal lines and analog lines may be in the same cable duct)<br><br>Use separate cable ducts at least 20 cm (7.87 in) apart. | Reduces mutual interference |
| Keep cables as short as possible. Do not install unnecessary cable loops, use short cables from the central grounding point in the control cabinet to the external ground connection. | Reduces capacitive and inductive interference. |
| Use equipotential bonding conductors in the following cases: wide-area installations, different voltage supplies and installation across several buildings. | Reduces current in the cable shield, reduces emissions. |
| Use fine stranded equipotential bonding conductors. | Diverts high-frequency interference currents. |
| If motor and machine are not conductively connected, for example by an insulated flange or a connection without surface contact, you must ground the motor with a ground strap or a ground wire. The conductor cross section must be at least 10 mm$^2$ (AWG 6). | Reduces emissions, increases immunity. |
| Use twisted pair for the DC supply. | Reduces interference affecting the signal cables, reduces emissions. |

## Power Supply

| EMC measures | Objective |
|---|---|
| Operate product on mains with grounded neutral point. | Enables effectiveness of mains filter. |
| Surge arrester if there is a risk of overvoltage. | Reduces the risk of damage caused by overvoltage. |

## Motor and Encoder Cables

Motor and encoder cables require particular attention in terms of EMC. Use only pre-assembled cables (see Accessories and Spare Parts, page 647) or cables that comply with the specifications (see Cables and Signals, page 64) and implement the EMC measures described below.

| EMC measures | Objective |
|---|---|
| Do not install switching elements in motor cables or encoder cables. | Reduces interference. |
| Route the motor cable at a distance of at least 20 cm (7.87 in) from the signal cable or use shielding plates between the motor cable and signal cable. | Reduces mutual interference |
| For long lines, use equipotential bonding conductors. | Reduces current in the cable shield. |
| Route the motor cable and encoder cable without cutting them.[1] | Reduces emission. |
| **(1)** If a cable has to be cut for the installation, it has to be connected with shield connections and a metal housing at the point of the cut. | |

## Additional Measures for EMC Improvement
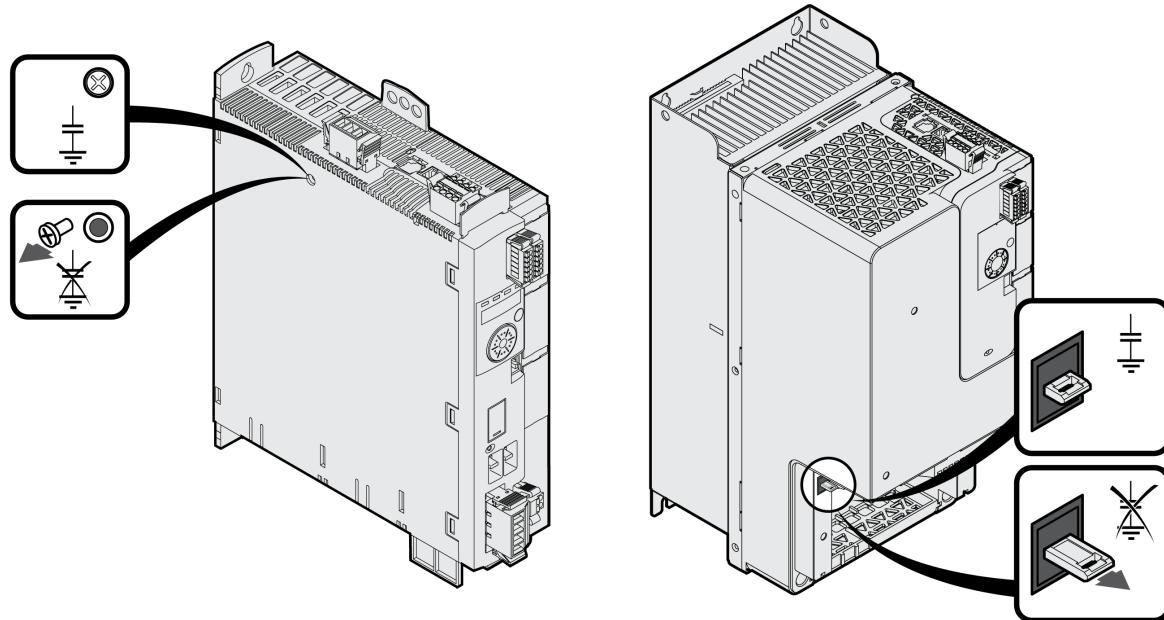
Depending on the application, the following measures can improve the EMC-dependent values:

| EMC measures | Objective |
|---|---|
| Use mains reactors | Reduces mains harmonics, prolongs product service life. |
| Use external mains filters | Improves the EMC limit values. |
| Install in a closed control cabinet with increased shielding. | Improves the EMC limit values. |

# Deactivating the Y Capacitors

## Description

The ground connections of the internal Y capacitors can be disconnected (deactivation). Usually, it is not required to deactivate the ground connection of the Y capacitors.

For LXM32MU45, LXM32MU60, LXM32MU90, LXM32MD12, LXM32MD18, LXM32MD30 and LXM32MD72:

To deactivate the Y capacitors, remove the screw. Keep this screw so you can re-activate the Y capacitors, if required.

For LXM32MD85 and LXM32MC10:

To deactivate the Y capacitors, pull out the selector.

The drive no longer complies with the EMC limit values specified if the Y capacitors are deactivated.

# Cables and Signals

## Cables - General

### Suitability of the Cables

Cables must not be twisted, stretched, crushed or bent. Use only cables that comply with the cable specification. Consider the following in determining suitability of the cables:

- Suitable for drag chain applications
- Temperature range
- Chemical resistance
- Outdoor installation
- Underground installation

### Connecting Shields

Shield connection possibilities:

- Motor cable: The motor cable shield is fastened in the shield clamp at the bottom of the device.
- Other cables: The shields are connected to the shield connection at the bottom of the device.
- Alternative: Connect the shield via shield clamps and rail, for example.

### Equipotential Bonding Conductors

Potential differences can result in excessive currents on the cable shields. Use equipotential bonding conductors to reduce currents on the cable shields. The equipotential bonding conductor must be rated for the maximum current.

---

### ⚠ WARNING

**UNINTENDED EQUIPMENT OPERATION**

- Ground cable shields for all fast I/O, analog I/O, and communication signals at a single point. [1]
- Route communications and I/O cables separately from power cables.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

---

[1] Multipoint grounding is permissible if connections are made to an equipotential ground plane dimensioned to help avoid cable shield damage in the event of power system short-circuit currents.

### Conductor Cross Sections According to Method of Installation

The following sections describe the conductor cross sections for two methods of installation:

- Method of installation B2:

  Cables in conduits or cable trunking systems
- Method of installation E:

  Cables on open cable trays

| Cross section in mm² (AWG) | Current-carrying capacity with method of installation B2 in A[1] | Current carrying capacity with method of installation E in A[1] |
|---|---|---|
| 0.75 (18) | 8.5 | 10.4 |
| 1 (16) | 10.1 | 12.4 |
| 1.5 (14) | 13.1 | 16.1 |
| 2.5 (12) | 17.4 | 22 |
| 4 (10) | 23 | 30 |
| 6 (8) | 30 | 37 |
| 10 (6) | 40 | 52 |
| 16 (4) | 54 | 70 |
| 25 (2) | 70 | 88 |

**(1)** Values as per IEC 60204-1 for continuous operation, copper conductors and ambient air temperature 40 °C (104 °F). See IEC 60204-1 for additional information. The table is an excerpt from this standard and also shows cable cross-sections that are not applicable with regard to the product.

Note the derating factors for grouping of cables and correction factors for other ambient conditions (IEC 60204-1).

The conductors must have a sufficiently large cross section so that the upstream fuse can trip.

In the case of longer cables, it may be necessary to use a greater conductor cross section to reduce the energy losses.

# Overview of the Required Cables

## Overview

The properties of the required cables are listed in the table below. Use pre-assembled cables to reduce the risk of wiring errors. Pre-assembled cables can be found in section Accessories and Spare Parts, page 647. If the product is used to comply with the requirements as per UL 508C, the conditions specified in section Conditions for UL 508C and CSA, page 56 must be met.

| | Maximum length: | Minimum cross section | Shielded, both ends grounded | Twisted pair | PELV |
|---|---|---|---|---|---|
| 24 Vdc control supply | - | 0.75 mm² (AWG 18) | - | - | Required |
| Safety-related function STO[1] | - | 0.75 mm² (AWG 18) | [1] | - | Required |
| Power stage supply | - | –[2] | - | - | - |
| Motor phases | –[3] | –[4] | Required | - | - |
| External braking resistor | 3 m (9.84 ft) | As power stage supply | Required | - | - |
| Motor encoder | 100 m (328.01 ft) | 6 * 0.14 mm² and 2 * 0.34 mm² (6 * AWG 24 and 2 * AWG 20) | Required | Required | Required |
| A/B signals | 100 m (328.08 ft) | 0.25 mm² (AWG 22) | Required | Required | Required |
| PULSE / DIR signals | 100 m (328.08 ft) | 0.14 mm² (AWG 24) | Required | Required | Required |
| CW/CCW signals | 100 m (328.08 ft) | 0.14 mm² (AWG 24) | Required | Required | Required |
| ESIM | 100 m (328.08 ft) | 0.14 mm² (AWG 24) | Required | Required | Required |
| Digital inputs / outputs | 30 m (98.43 ft) | 0.14 mm² (AWG 24) | - | - | Required |

| | Maximum length: | Minimum cross section | Shielded, both ends grounded | Twisted pair | PELV |
|---|---|---|---|---|---|
| PC, commissioning interface | 20 m (65.62 ft) | 0.14 mm² (AWG 24) | Required | Required | Required |
| **(1)** Note the installation requirements (protected cable installation), see Functional Safety, page 78. | | | | | |
| **(2)** See Connection Power Stage Supply (CN1), page 108 | | | | | |
| **(3)** Length depends on the required limit values for conducted interference. | | | | | |
| **(4)** See Connection Motor Phases and Holding Brake (CN10 and CN11), page 97 | | | | | |

# Cable Specifications

## General

Using pre-assembled cables helps to reduce the possibility of wiring errors. See Accessories and Spare Parts, page 647.

The genuine accessories have the following properties:

## Motor Cable With Connector

| Characteristic | Unit | Value | | | | | |
|---|---|---|---|---|---|---|---|
| | | VW3-M5100R•• | VW3-M5101R•• | VW3-M5102R•• | VW3-M5103R•• | VW3-M5105R•• | VW3-M5104R•• |
| Cable jacket, insulation | - | PUR orange (RAL 2003), TPM | PUR orange (RAL 2003), polypropylene (PP) | | | | |
| Capacitance power wires | pF/m | | | | | | |
| Wire/wire | | 80 | 80 | 80 | 90 | 85 | 100 |
| Wire/shield | | 145 | 135 | 150 | 150 | 150 | 160 |
| Number of contacts (shielded) | - | (4 x 1 mm² + 2 x (2 x 0.75 mm²)) | (4 x 1.5 mm² + (2 x 1 mm²)) | (4 x 2.5 mm² + (2 x 1 mm²)) | (4 x 4 mm² + (2 x 1 mm²)) | (4 x 6 mm² + (2 x 1 mm²)) | (4 x 10 mm² + (2 x 1 mm²)) |
| Connector motor side | - | 8-pin circular Y-TEC | 8-pin circular M23 | | 8-pin circular M40 | | |
| Connector drive side | - | Open | | | | | |
| Cable diameter | mm | 11 ± 0.3 | 12 ± 0.2 | 14.3 ± 0.3 | 16.3 ± 0.3 | 18.8 ± 0.4 | 23.5 ± 0.6 |
| | (in) | (0.43 ± 0.01) | (0.47 ± 0.01) | (0.55 ± 0.01) | (0.64 ± 0.01) | (0.74 ± 0.02) | (0.93 ± 0.02) |
| Minimum bend radius with fixed installation | - | 10 times the cable diameter | 5 times the cable diameter | | | | |
| Minimum bend radius with moving installation | - | 10 times the cable diameter | 7.5 times the cable diameter | | | 10 times the cable diameter | |
| Nominal voltage | V | | | | | | |
| Motor phases | | 1000 | 600 | | | | |
| Holding brake | | 1000 | 300 | | | | |
| Maximum orderable length | m (ft) | 25 (82) | 75 (246) | | | | |
| Permissible temperature range during operation with fixed installation | °C (°F) | -40 ... 80 (-40 ... 176) | | | | | |

| Characteristic | Unit | Value | | | | | |
|---|---|---|---|---|---|---|---|
| | | VW3-M5100R••• | VW3-M5101R••• | VW3-M5102R••• | VW3-M5103R••• | VW3-M5105R••• | VW3-M5104R••• |
| Permissible temperature range during operation with moving installation | °C (°F) | -20 ... 60 (-4 ... 140) | -20 ... 80 (-4 ... 176) | | | | |
| Certifications / declaration of conformity | - | CE, DESINA | | | | | |

## Motor Cable Without Connector

| Characteristic | Unit | Value | | | | | |
|---|---|---|---|---|---|---|---|
| | | VW3-M5300R••• | VW3-M5301R••• | VW3-M5302R••• | VW3-M5303R••• | VW3-M5305R••• | VW3-M5304R••• |
| Cable jacket, insulation | - | PUR orange (RAL 2003), TPM | PUR orange (RAL 2003), polypropylene (PP) | | | | |
| Capacitance power wires<br><br>Wire/wire<br><br>Wire/shield | pF/m | <br><br>80<br><br>145 | <br><br>80<br><br>135 | <br><br>80<br><br>150 | <br><br>90<br><br>150 | <br><br>85<br><br>150 | <br><br>100<br><br>160 |
| Number of contacts (shielded) | - | (4 x 1 mm² + 2 x (2 x 0.75 mm²)) | (4 x 1.5 mm² + (2 x 1 mm²)) | (4 x 2.5 mm² + (2 x 1 mm²)) | (4 x 4 mm² + (2 x 1 mm²)) | (4 x 6 mm² + (2 x 1 mm²)) | (4 x 10 mm² + (2 x 1 mm²)) |
| Connector motor side | - | Open | | | | | |
| Connector drive side | - | Open | | | | | |
| Cable diameter | mm<br><br>(in) | 11 ± 0.3<br><br>(0.43 ± 0.01) | 12 ± 0.2<br><br>(0.47 ± 0.01) | 14.3 ± 0.3<br><br>(0.55 ± 0.01) | 16.3 ± 0.3<br><br>(0.64 ± 0.01) | 18.8 ± 0.4<br><br>(0.74 ± 0.02) | 23.5 ± 0.6<br><br>(0.93 ± 0.02) |
| Minimum bend radius with fixed installation | - | 10 times the cable diameter | 5 times the cable diameter | | | | |
| Minimum bend radius with moving installation | - | 10 times the cable diameter | 7.5 times the cable diameter | | | 10 times the cable diameter | |
| Nominal voltage<br><br>Motor phases<br><br>Holding brake | V | <br><br>1000<br><br>1000 | <br><br>600<br><br>300 | | | | |
| Maximum orderable length | m (ft) | 100 (328) | | | | | |
| Permissible temperature range during operation with fixed installation | °C (°F) | -40 ... 80 (-40 ... 176) | | | | | |
| Permissible temperature range during operation with moving installation | °C (°F) | -20 ... 60 (-4 ... 140) | -20 ... 80 (-4 ... 176) | | | | |
| Certifications / declaration of conformity | - | CE, c-UR-us, DESINA | | | | | |
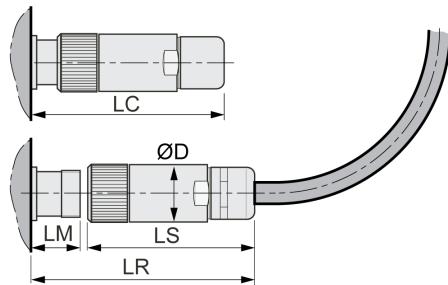
## Encoder Cable With and Without Connectors

| Characteristic | Unit | Value | | |
|---|---|---|---|---|
| | | VW3M8100R••• | VW3M8102R••• | VW3M8222R••• |
| Cable jacket, insulation | - | PUR green (RAL 6018), polypropylene (PP) | | |
| Capacitance | pF/m | Approx. 135 (wire/wire) | | |

| Characteristic | Unit | Value | | |
|---|---|---|---|---|
| | | VW3M8100R••• | VW3M8102R••• | VW3M8222R••• |
| Number of contacts (shielded) | - | (3 x 2 x 0.14 mm² + 2 x 0.34 mm²) | | |
| Connector motor side | - | 12-pin circular Y-TEC | 12-pin circular M23 | Open |
| Connector drive side | - | 10-pin RJ45 | 10-pin RJ45 | Open |
| Cable diameter | mm | 6.8 ± 0.2 | | |
| | (in) | (0.27 ± 0.1) | | |
| Minimum bend radius | mm | 68 | | |
| | (in) | (2.68) | | |
| Nominal voltage | V | 300 | | |
| Maximum orderable length | m | 25 | 75 | 100 |
| | (ft) | (82) | (246) | (328) |
| Permissible temperature range during operation with fixed installation | °C (°F) | -40 ... 80 (-40 ... 176) | | |
| Permissible temperature range during operation with moving installation | °C (°F) | -20 ... 80 (-4 ... 176) | | |
| Certifications / declaration of conformity | - | DESINA | | c-UR-us, DESINA |
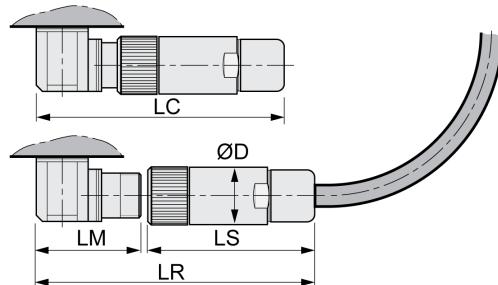
# Clearance For Connectors

Straight connectors                                              Angular connectors



| Dimensions | | Motor connectors straight | | Encoder connector straight |
|---|---|---|---|---|
| | | M23 | M40 | M23 |
| D | mm (in) | 28 (1.1) | 46 (1.81) | 26 (1.02) |
| LS | mm (in) | 76 (2.99) | 100 (3.94) | 51 (2.01) |
| LR | mm (in) | 117 (4.61) | 155 (6.1) | 76 (2.99) |
| LC | mm (in) | 100 (3.94) | 145 (5.71) | 60 (2.36) |
| LM | mm (in) | 40 (1.57) | 54 (2.13) | 23 (0.91) |

| Dimensions | | Motor connectors angular | | | Encoder connector angular | |
|---|---|---|---|---|---|---|
| | | Y-TEC | M23 | M40 | Y-TEC | M23 |
| D | mm (in) | 18.7 (0.74) | 28 (1.1) | 46 (1.81) | 18.7 (0.74) | 26 (1.02) |
| LS | mm (in) | 42 (1.65) | 76 (2.99) | 100 (3.94) | 42 (1.65) | 51 (2.01) |

| Dimensions | | Motor connectors | | | Encoder connector | |
| --- | --- | --- | --- | --- | --- | --- |
| | | angular | | | angular | |
| | | Y-TEC | M23 | M40 | Y-TEC | M23 |
| LR | mm (in) | 100 (3.94) | 132 (5.2) | 191 (7.52) | 100 (3.94) | 105 (4.13) |
| LC | mm (in) | 89 (3.50) | 114 (4.49) | 170 (6.69) | 89 (3.50) | 89 (3.5) |
| LM | mm (in) | 58 (2.28) | 55 (2.17) | 91 (3.58) | 58 (2.28) | 52 (2.05) |
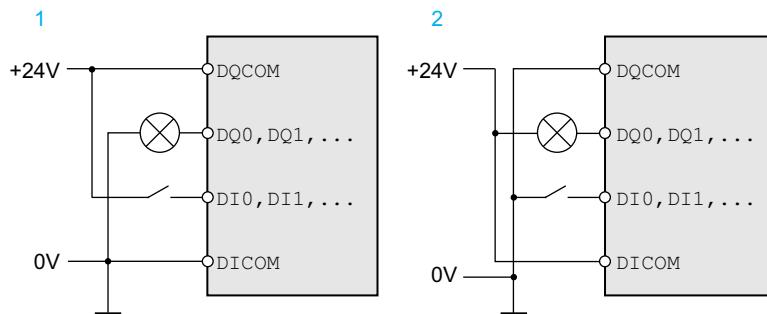
# Logic Type

## Overview

The digital inputs and outputs of this product can be wired to enable positive logic or negative logic.



| Logic type | Active state |
| --- | --- |
| (1) Positive logic | Output supplies current (source output) |
| | Current flows to the input (sink input) |
| (2) Negative logic | Output draws current (sink output) |
| | Current flows from the input (source input) |

Signal inputs are protected against reverse polarity, outputs are short-circuit protected. The inputs and outputs are functionally isolated.

If negative logic is used, a ground fault of a signal is detected as an On state.

---

### ⚠ WARNING

**UNINTENDED EQUIPMENT OPERATION**

Verify that a short-circuit of a signal cannot cause unintended equipment operation.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

---

## Selection of the Logic Type

The logic type is determined by the wiring of *DICOM* and *DQCOM*. The logic type affects wiring and control of the sensors; therefore, you must determine the required value in the engineering phase in view of the application.

## Special Case: Safety-Related Function STO

The inputs for the safety-related function STO (inputs $\overline{STO\_A}$ and $\overline{STO\_B}$) can only be wired for sinking inputs.

# Configurable Inputs and Outputs

## Description

This product has digital inputs and outputs that can be configured for specific functional assignments. The inputs and outputs have a defined standard assignment depending on the operating mode. This assignment can be adapted to the requirements of the customer's installation. See Digital Signal Inputs and Digital Signal Outputs, page 199 for information.

# Mains Supply

## Residual Current Device

### Description

Direct current can be introduced in the protective ground conductor of this drive. If a residual current device (RCD / GFCI) or a residual current monitor (RCM) is used for protection against direct or indirect contact, the following specific types must be used:

| ⚠ **WARNING** |
| --- |
| **DIRECT CURRENT CAN BE INTRODUCED INTO THE PROTECTIVE GROUND CONDUCTOR** |
| • Use a Type A Residual Current Device (RCD / GFCI) or a Residual Current Monitor (RCM) for single-phase drives connected to a phase and to the neutral conductor. |
| • Use a Type B Residual Current Device (RCD / GFCI) or a Residual Current Monitor (RCM) that has approval for use with frequency inverters and is sensitive to all types of current for three-phase devices and for single-phase devices not connected to a phase and the neutral conductor. |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |

Further conditions for use of a residual current device:

• The drive has an increased leakage current at the moment power is applied. Use a residual current device (RCD / GFCI) or a residual current monitor (RCM) with a response delay.

• High-frequency currents must be filtered.

# Common DC Bus

## Function Principle

The DC buses of several drives can be connected so that energy can be used efficiently. If on drive decelerates, a different drive connected to the common DC bus can use the generated braking energy. Without a common DC bus, the braking energy would be converted to heat by the braking resistor while the other drive would have to be supplied with energy from mains.

Another advantage of having a common DC bus is that several drives can share one external braking resistor. The number of the individual external braking resistors can be reduced to a single braking resistor if the braking resistor is properly rated.

This and other important information can be found in the Common DC bus Application Note for the drive. If you wish to take advantage of DC bus sharing, you must first consult the Common DC bus Application Note for important safety-related information.

## Requirements for Use

The requirements and limit values for parallel connection of multiple drives via the DC bus are described in the Common DC bus Application Note for the drive that can be found on https://www.se.com. If there are any issues or questions related to obtaining the Common DC bus Application Note, consult your local Schneider Electric representative.

# Mains Reactor

## Description

A mains reactor must be used under the following conditions:

- Operation via supply mains with low impedance (short-circuit current of supply mains greater than specified in section Technical Data, page 24.

- If the nominal power of the drive is insufficient.

- In the case of operation with supply mains with reactive power compensation systems.

- For improvement of the power factor at the mains input and for reduction of mains harmonics.

A single mains reactor can be used for multiple devices. Use a mains reactor with a properly rated current.

Low-impedance supply mains cause high harmonic currents at the mains input. High harmonic currents result in considerable load on the DC bus capacitors. The load on the DC bus capacitors has a decisive impact on the service life of the devices.

# Rating the Braking Resistor

## Internal Braking Resistor

### Description

The drive is equipped with an internal braking resistor to absorb braking energy.

Braking resistors are required for dynamic applications. During deceleration, the kinetic energy is transformed into electrical energy in the motor. The electrical energy increases the DC bus voltage. The braking resistor is activated when the defined threshold value is exceeded. The braking resistor transforms electrical energy into heat. If highly dynamic deceleration is required, the braking resistor must be well adapted to the system.

An insufficiently rated braking resistor can cause overvoltage on the DC bus. Overvoltage on the DC bus causes the power stage to be disabled. The motor is no longer actively decelerated.

---

### ⚠ WARNING

**UNINTENDED EQUIPMENT OPERATION**

- Verify that the braking resistor has a sufficient rating by performing a test run under maximum load conditions.
- Verify that the parameter settings for the braking resistor are correct.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

---

## External Braking Resistor

### Description

An external braking resistor is required for applications in which the motor must be decelerated quickly and the internal braking resistor cannot absorb the excess braking energy.

The temperature of the braking resistor may exceed 250 °C (482 °F) during operation.

---

### ⚠ WARNING

**HOT SURFACES**

- Ensure that it is not possible to make any contact with a hot braking resistor.
- Do not allow flammable or heat-sensitive parts in the immediate vicinity of the braking resistor.
- Verify that the heat dissipation is sufficient by performing a test run under maximum load conditions.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

---

### Monitoring

The drive monitors the power of the braking resistor. The load on the braking resistor can be read out.

The output for the external braking resistor is short-circuit protected. The drive does not monitor for ground faults of the braking resistor.

---

## Selection of the External Braking Resistor

The rating of an external braking resistor depends on the required peak power and continuous power.

The resistance R is derived from the required peak power and the DC bus voltage.

$$R = \frac{U^2}{P_{max}}$$

R = Resistance in Ω

U = Switching threshold for braking resistor V

$P_{max}$ = Required peak power in W

If two or more braking resistors are connected to one drive, note the following criteria:

- The total resistance of the connected braking resistors must comply with the approved resistance.
- The braking resistors can be connected in parallel or in series. Only connect braking resistors with identical resistance in parallel in order to evenly distribute the load to the braking resistors.
- The total continuous power of the connected braking resistors must be greater than or equal to the required continuous power.

Use only resistors that are specified as braking resistors. For suitable braking resistors, see Accessories and Spare Parts, page 647.

## Mounting and Commissioning of an External Braking Resistor

A parameter is used to switch between the internal braking resistor and an external braking resistor.

The external braking resistors listed in the Accessories and Spare Parts, page 647 section are shipped with an information sheet that provides details on their installation.

# Rating Information

## Description

To rate the braking resistor, calculate the proportion contributing to absorbing braking energy.

An external braking resistor is required if the kinetic energy that must be absorbed exceeds the possible total internal energy absorption.

## Internal Energy Absorption

Braking energy is absorbed internally by:

- DC bus capacitor $E_{var}$
- Internal braking resistor $E_I$
- Electrical losses of the drive $E_{el}$
- Mechanical losses of the drive $E_{mech}$

Values for the energy absorption $E_{var}$ can be found in section Capacitor and Braking Resistor, page 49.

# Internal Braking Resistor

Two characteristic values determine the energy absorption of the internal braking resistor.

- The continuous power $P_{PR}$ is the amount of energy that can be continuously absorbed without overloading the braking resistor.

- The maximum energy $E_{CR}$ limits the maximum short-term power that can be absorbed.

If the continuous power was exceeded for a specific time, the braking resistor must remain without load for a corresponding period.

The characteristic values $P_{PR}$ and $E_{CR}$ of the internal braking resistor can be found in section Capacitor and Braking Resistor, page 49.

# Electrical Losses $E_{el}$

The electrical losses $E_{el}$ of the drive system can be estimated on the basis of the peak power of the drive. The maximum power dissipation is approximately 10% of the peak power at a typical efficiency of 90%. If the current during deceleration is lower, the power dissipation is reduced accordingly.

# Mechanical Losses $E_{mech}$

The mechanical losses result from friction during operation of the system. Mechanical losses are negligible if the time required by the system to coast to a stop without a driving force is considerably longer than the time required to decelerate the system. The mechanical losses can be calculated from the load torque and the velocity from which the motor is to stop.

# Example

Deceleration of a rotary motor with the following data:

- Initial speed of rotation: n = 4000 RPM

- Rotor inertia: $J_R$ = 4 kgcm$^2$

- Load inertia: $J_L$ = 6 kgcm$^2$

- Drive: $E_{var}$ = 23 Ws, $E_{CR}$ = 80 Ws, $P_{PR}$ = 10 W

Calculation of the energy to be absorbed:

$$E_B = \frac{1}{2} J \cdot \left[ \frac{2\pi n}{60} \right]^2$$

to $E_B$ = 88 Ws. Electrical and mechanical losses are ignored.

In this example, the DC bus capacitors absorb $E_{var}$ = 23 Ws (the value depends on the drive type).
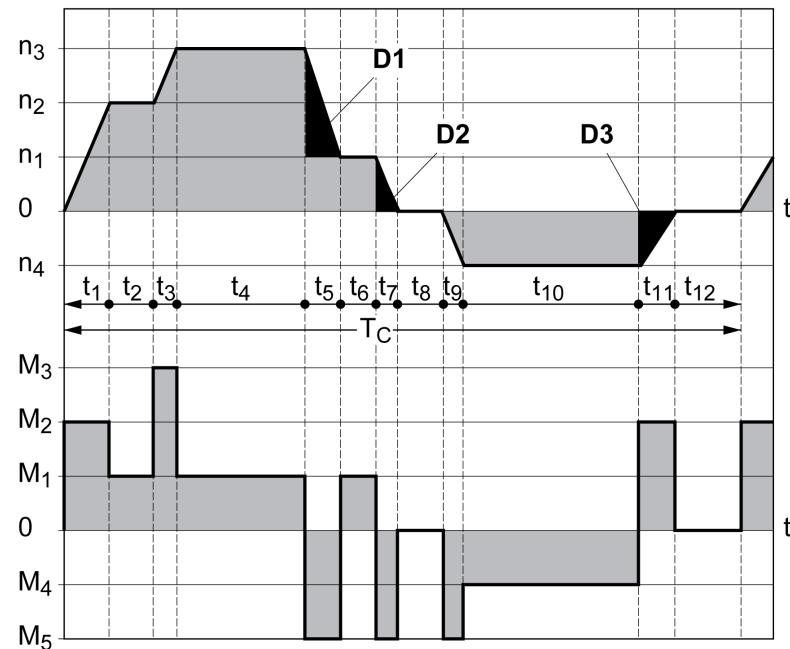
The internal braking resistor must absorb the remaining 65 Ws. It can absorb a pulse of $E_{CR}$ = 80 Ws. If the load is decelerated once, the internal braking resistor is sufficient.

If the deceleration is repeated cyclically, the continuous power must be taken into account. If the cycle time is longer than the ratio of the energy to be absorbed $E_B$ and the continuous power $P_{PR}$, the internal braking resistor is sufficient. If the system decelerates more frequently, the internal braking resistor is not sufficient.

In this example, the ratio of $E_B/P_{PR}$ is 8.8 s. An external braking resistor is required if the cycle time is shorter.

# Rating the External Braking Resistor

Characteristic curves for rating the braking resistor



These two characteristics are also used for the rating the motor. The segments of the characteristic curves to be considered are designated by $D_i$ ($D_1$ ... $D_3$).

The total inertia $J_t$ must be known for the calculation of the energy at constant deceleration.

$J_t = J_m + J_c$

$J_m$: Motor inertia (with holding brake)

$J_c$: Load inertia

The energy for each deceleration segment is calculated as follows:

$$E_i = \frac{1}{2} J_t \cdot \omega_i^2 = \frac{1}{2} J_t \cdot \left[ \frac{2\pi n_i}{60} \right]^2$$

Calculation for the segments ($D_1$) … ($D_3$):

$$E_1 = \frac{1}{2} J_t \cdot \left[ \frac{2\pi}{60} \right]^2 \cdot \left[ n_3^2 - n_1^2 \right]$$

$$E_2 = \frac{1}{2} J_t \cdot \left[ \frac{2\pi n_1}{60} \right]^2$$

$$E_3 = \frac{1}{2} J_t \cdot \left[ \frac{2\pi n_4}{60} \right]^2$$

Units: $E_i$ in Ws (wattseconds), $J_t$ in kgm², $\omega$ in rad and $n_i$ in RPM.

See the technical data for the energy absorption $E_{var}$ of the drives (without consideration of a braking resistor).

In the next calculation steps, only consider those segments $D_i$, whose energy $E_i$ exceeds the energy absorption of the drive. These excess energies $E_{Di}$ must be diverted by means of the braking resistor.

$E_{Di}$ is calculated using the following formula:

$E_{Di} = E_i - E_{var}$ (in Ws)

The continuous power $P_c$ is calculated for each machine cycle:

$$P_c = \frac{\sum E_{Di}}{Cycletime}$$

Units: $P_c$ in W, $E_{Di}$ in Ws and cycle time T in s

The selection is made in two steps:

- If the following conditions are met, the internal braking resistor is sufficient.
  - The maximum energy during deceleration must be less than the peak energy that the braking resistor can absorb: $(E_{Di}) < (E_{Cr})$.
  - The continuous power of the internal braking resistor must not be exceeded: $(P_C) < (P_{Pr})$.
- If the conditions are not met, you must use an external braking resistor that meets the conditions.

For order data for the external braking resistors, see Accessories and Spare Parts, page 647.

# Functional Safety

## Basics

### Functional Safety

Automation and safety engineering are closely related. Engineering, installation and operation of complex automation solutions are simplified by safety-related functions and equipment.

Usually, the safety engineering requirements depend on the application. The level of the requirements results from, among other things, the risk and the hazard potential arising from the specific application and from the applicable standards and regulations.

The goal of designing machines safely is to protect people. The risk associated with machines with electrically controlled drives comes chiefly from moving machine parts and electricity itself.

Only you, the user, machine builder, or system integrator can be aware of all the conditions and factors realized in the design of your application for the machine. Therefore, only you can determine the automation equipment and the related safeties and interlocks which can be properly used, and validate such usage.

---

### ⚠ WARNING

**NON-CONFORMANCE TO SAFETY FUNCTION REQUIREMENTS**

- Specify the requirements and/or measures to be implemented in the risk analysis you perform.
- Verify that your safety-related application complies to applicable safety regulations and standards.
- Make certain that appropriate procedures and measures (according to applicable sector standards) have been established to help avoid hazardous situations when operating the machine.
- Use appropriate safety interlocks where personnel and/or equipment hazards exist.
- Validate the overall safety-related function and thoroughly test the application.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

---

### Hazard and Risk Analysis

The standard IEC 61508 "Functional safety of electrical/electronic/programmable electronic safety-related systems" defines the safety-related aspects of systems. Instead of a single functional unit of a safety-related system, the standard treats all elements of a function chain as a unit. These elements must meet the requirements of the specific safety integrity level as a whole.

The standard IEC 61800-5-2 "Adjustable speed electrical power drive systems – Safety requirements – Functional" is a product standard that defines the safety-related requirements regarding drives. Among other things, this standard defines the safety-related functions for drives.

Based on the system configuration and utilization, a hazard and risk analysis must be carried out for the system (for example, according to EN ISO 12100 or EN ISO 13849-1). The results of this analysis must be considered when designing the machine, and subsequently applying safety-related equipment and safety-related functions. The results of your analysis may deviate from any application examples contained in the present or related documentation. For example, additional safety

components may be required. In principle, the results from the hazard and risk analysis have priority.

> ### ⚠ WARNING
>
> **UNINTENDED EQUIPMENT OPERATION**
>
> - Perform a hazard and risk analysis to determine the appropriate safety integrity level, and any other safety requirements, for your specific application based on all the applicable standards.
> - Ensure that the hazard and risk analysis is conducted and respected according to EN/ISO 12100 during the design of your machine.
>
> **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

The EN ISO 13849-1 Safety of machinery - Safety-related parts of control systems - Part 1: General Principles for Design describes an iterative process for the selection and design of safety-related parts of controllers to reduce the risk to the machine to a reasonable degree.

To perform risk assessment and risk minimization according to EN ISO 12100, proceed as follows:

1. Defining the boundary of the machine.
2. Identifying risks associated with the machine.
3. Assessing risks.
4. Evaluating risks.
5. Minimizing risks by:
   - The design
   - Protective devices
   - User information (see EN ISO 12100)
6. Designing safety-related controller parts (SRP/CS, Safety-Related Parts of the Control System) in an interactive process.

To design the safety-related controller parts in an interactive process, proceed as follows:

| Step | Action |
|---|---|
| 1 | Identify necessary safety functions that are executed via SRP/CS (Safety-Related Parts of the Control System). |
| 2 | Determine required properties for each safety function. |
| 3 | Determine the required performance level $PL_r$. |
| 4 | Identify safety-related parts executing the safety function. |
| 5 | Determine the performance level PL of the afore-mentioned safety-related parts. |
| 6 | Verify the performance level PL for the safety function ($PL \geq PL_r$). |
| 7 | Verify that all requirements have been met (validation). |

Additional information is available on https://www.se.com.

## Safety Integrity Level (SIL)

The standard IEC 61508 defines 4 safety integrity levels (Safety Integrity Level (SIL)). Safety integrity level SIL1 is the lowest level, safety integrity level SIL4 is the highest level. The safety integrity level required for a given application is determined on the basis of the hazard potential resulting from the hazard and risk analysis. This is used to decide whether the relevant function chain is to be considered as a safety-related function chain and which hazard potential it must cover.

# Average Frequency of a Dangerous Failure per Hour (PFH)

To maintain the function of the safety-related system, the IEC 61508 standard requires various levels of measures for avoiding and controlling faults, depending on the required safety integrity level (Safety Integrity Level (SIL)). All components must be subjected to a probability assessment to evaluate the effectiveness of the measures implemented for controlling faults. This assessment determines the probability of a dangerous failure per hour PFH (Average Frequency of a Dangerous Failure per Hour (PFH)) for a safety-related system. This is the frequency per hour with which a safety-related system fails in a hazardous manner so that it can no longer perform its function correctly. Depending on the SIL, the average frequency of a dangerous failure per hour must not exceed certain values for the entire safety-related system. The individual PFH values of a function chain are added. The result must not exceed the maximum value specified in the standard.

| SIL | PFH at high demand or continuous demand |
|---|---|
| 4 | $\geq 10^{-9}$ ... $< 10^{-8}$ |
| 3 | $\geq 10^{-8}$ ... $< 10^{-7}$ |
| 2 | $\geq 10^{-7}$ ... $< 10^{-6}$ |
| 1 | $\geq 10^{-6}$ ... $< 10^{-5}$ |

# Hardware Fault Tolerance (HFT) and Safe Failure Fraction (SFF)

Depending on the safety integrity level (Safety Integrity Level (SIL)) for the safety-related system, the IEC 61508 standard requires a specific hardware fault tolerance (Hardware Fault Tolerance (HFT)) in connection with a specific safe failure fraction (Safe Failure Fraction (SFF)). The hardware fault tolerance is the ability of a safety-related system to execute the required function even if one or more hardware faults are present. The safe failure fraction of a safety-related system is defined as the ratio of the rate of safe failures to the total failure rate of the safety-related system. As per IEC 61508, the maximum achievable safety integrity level of a safety-related system is partly determined by the hardware fault tolerance and the safe failure fraction of the safety-related system.

IEC 61800-5-2 distinguishes two types of subsystems (type A subsystem, type B subsystem). These types are specified on the basis of criteria which the standard defines for the safety-related components.

| SFF | HFT type A subsystem | | | HFT type B subsystem | | |
|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 0 | 1 | 2 |
| <60 % | SIL1 | SIL2 | SIL3 | — | SIL1 | SIL2 |
| 60 ... <90 % | SIL2 | SIL3 | SIL4 | SIL1 | SIL2 | SIL3 |
| 90 ... <99 % | SIL3 | SIL4 | SIL4 | SIL2 | SIL3 | SIL4 |
| ≥99 % | SIL3 | SIL4 | SIL4 | SIL3 | SIL4 | SIL4 |

# Fault Avoidance Measures

Systematic errors in the specifications, in the hardware and the software, incorrect usage and maintenance of the safety-related system must be avoided to the maximum degree possible. To meet these requirements, IEC 61508 specifies a number of measures for fault avoidance that must be implemented depending on the required safety integrity level (Safety Integrity Level (SIL)). These measures for fault avoidance must cover the entire life cycle of the safety-related system, i.e. from design to decommissioning of the system.

# Data for Maintenance Plan and the Calculations for Functional Safety

The safety-related function STO must be tested at regular intervals. The interval depends on the hazard and risk analysis of the total system. The minimum interval is 1 year (high demand mode as per IEC 61508).

Use the following data of the safety-related function STO for your maintenance plan and for the calculations for functional safety:

| Characteristic | Unit | Value |
|---|---|---|
| Lifetime of the safety-related function STO (IEC 61508) | Years | 20 <br><br> See also Lifetime Safety-Related Function STO, page 657. |
| SFF (IEC 61508) <br><br> Safe Failure Fraction | % | 90 |
| HFT (IEC 61508) <br><br> Hardware Fault Tolerance <br><br> Type A subsystem | - | 1 |
| Safety integrity level IEC 61508 | - | SIL3 |
| Safety integrity level IEC 62061 | - | SILCL3 |
| PFH (IEC 61508) <br><br> Probability of Dangerous Hardware Failure per Hour | 1/h <br><br> (FIT) | $1*10^{-9}$ <br><br> (1) |
| PL (ISO 13849-1) <br><br> Performance Level | - | e (category 3) |
| $MTTF_d$ (ISO 13849-1) <br><br> Mean Time to Dangerous Failure | - | High (1400 years) |
| DC (ISO 13849-1) <br><br> Diagnostic Coverage | % | 90 |

Contact your local Schneider Electric representative for additional data, if required.

The data for the safety module eSM can be found in the product manual for the safety module.

# Definitions

## Integrated Safety-Related Function "Safe Torque Off" STO

The integrated safety-related function STO (IEC 61800-5-2) allows for a category 0 stop as per IEC 60204-1 without external power contactors. It is not necessary to interrupt the supply voltage for a category 0 stop. This reduces the system costs and the response times.

## Category 0 Stop (IEC 60204-1)

In stop category 0 (Safe Torque Off, STO), the drive coasts to a stop (provided there are no external forces operating to the contrary). The safety-related function STO is intended to help prevent an unintended start-up, not stop a motor, and therefore corresponds to an unassisted stop in accordance with IEC 60204-1.

In circumstances where external influences are present, the coast down time depends on physical properties of the components used (such as weight, torque, friction, etc.), and additional measures such as external safety-related brakes may

be necessary to help prevent any hazard from materializing. That is to say, if this means a hazard to your personnel or equipment, you must take appropriate measures.

| ⚠ **WARNING** |
|---|
| **UNINTENDED EQUIPMENT OPERATION** |
| • Make certain that no hazards can arise for persons or material during the coast down period of the axis/machine. |
| • Do not enter the zone of operation during the coast down period. |
| • Ensure that no other persons can access the zone of operation during the coast down period. |
| • Use appropriate safety interlocks where personnel and/or equipment hazards exist. |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |

## Category 1 Stop (IEC 60204-1)

For stops of category 1 (Safe Stop 1, SS1), you can initiate a controlled stop via the control system, or through the use of specific functional safety-related devices. A Category 1 Stop is a controlled stop with power available to the machine actuators to achieve the stop.

The controlled stop by the control/safety-related system is not safety-relevant, nor monitored, and does not perform as defined in the case of a power outage or if an error is detected. This has to be implemented by means of an external safety-related switching device with safety-related delay.

# Function

## General

The safety-related function STO integrated into the product can be used to implement an "EMERGENCY STOP" (IEC 60204-1) for category 0 stops. With an additional, approved EMERGENCY STOP safety relay module, it is also possible to implement category 1 stops.

## Function Principle

The safety-related function STO is triggered via two redundant signal inputs. The wiring of the two signal inputs must be separate.

The safety-related function STO is triggered if the level at one of the two signal inputs is 0. The power stage is disabled. The motor can no longer generate torque and coasts down without braking. An error of error class 3 is detected.

If, within one second, the level of the other output also becomes 0, the error class remains 3. If, within one second, the level of the other output does not become 0, the error class changes to 4.

# Requirements for Using the Safety-Related Function STO

## General

The safety-related function STO (Safe Torque Off) does not remove power from the DC bus. The safety-related function STO only removes power to the motor. The DC bus voltage and the mains voltage to the drive are still present.

| ⚠⚠ DANGER |
|---|
| **ELECTRIC SHOCK** |
| • Do not use the safety-related function STO for any other purposes than its intended function. |
| • Use an appropriate switch, that is not part of the circuit of the safety-related function STO, to disconnect the drive from the mains power. |
| **Failure to follow these instructions will result in death or serious injury.** |

After the safety-related function STO is triggered, the motor can no longer generate torque and coasts down without braking.

| ⚠ WARNING |
|---|
| **UNINTENDED EQUIPMENT OPERATION** |
| Install a dedicated, external safety-related brake if coasting does not meet the deceleration requirements of your application. |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |

## Logic Type

The inputs for the safety-related function STO (inputs $\overline{STO\_A}$ and $\overline{STO\_B}$) can only be wired for sinking inputs.

## Holding Brake and Safety-Related Function STO

When the safety-related function STO is triggered, the power stage is immediately disabled. Applying the holding brake requires a certain amount of time. In the case of vertical axes or external forces acting on the load, you may have to take additional measures to bring the load to a standstill and to keep it at a standstill when the safety-related function STO is used, for example, by using a service brake.

| ⚠ WARNING |
|---|
| **FALLING LOAD** |
| Ensure that all loads come to a secure standstill when the safety-related function STO is used. |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |

If the suspension of hanging / pulling loads is a safety objective for the machine, then you can only achieve this objective by using an appropriate external brake as a safety-related measure.

> # ⚠ WARNING
>
> **UNINTENDED AXIS MOVEMENT**
>
> • Do not use the internal holding brake as a safety-related measure.
>
> • Only use certified external brakes as safety-related measures.
>
> **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

**NOTE:** The drive does not provide its own safety-related output to connect an external brake to use as a safety-related measure.

## Unintended Restart

> # ⚠ WARNING
>
> **UNINTENDED EQUIPMENT OPERATION**
>
> • Verify that your risk assessment covers all potential effects of automatic or unintended enabling of the power stage, for example, after power outage.
>
> • Implement all measures such as control functions, guards, or other safety-related functions, required to reliably protect against all hazards that may result from automatic or unintended enabling of the power stage.
>
> • Verify that a master controller cannot enable the power stage in an unintended way.
>
> **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

> # ⚠ WARNING
>
> **UNINTENDED EQUIPMENT OPERATION**
>
> Set the parameter *IO_AutoEnable* to "off" if the automatic enabling of the power stage presents hazards in your application.
>
> **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

## Degree of Protection when the Safety-Related Function STO is Used

You must ensure that conductive substances cannot get into the product (pollution degree 2). Moreover, conductive substances may cause the safety-related function to become inoperative.

> # ⚠ WARNING
>
> **INOPERABLE SAFETY-RELATED FUNCTION**
>
> Ensure that conductive substances (water, contaminated or impregnated oils, metal shavings, etc.) cannot get into the drive.
>
> **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

## Protected Cable Installation

If short circuits and other wiring errors such as a cross circuit between the signals of the safety-related function STO can be expected in connection with safety-related signals, and if these short circuits and cross circuits are not detected by upstream devices, protected cable installation as per ISO 13849-2 is required.

In the case of an unprotected cable installation, the two signals (both channels) of a safety-related function may be connected to external voltage if a cable is damaged. If the two channels are connected to external voltage, the safety-related function is no longer operative.

ISO 13849-2 describes protected cable installation for cables for safety-related signals. The cables for the safety-related function STO must be protected against external voltage. A shield with ground connection helps to keep external voltage away from the cables for the signals of the safety-related function STO.

Ground loops can cause problems in machines. A shield connected at one end only is sufficient for grounding and does not create a ground loop.
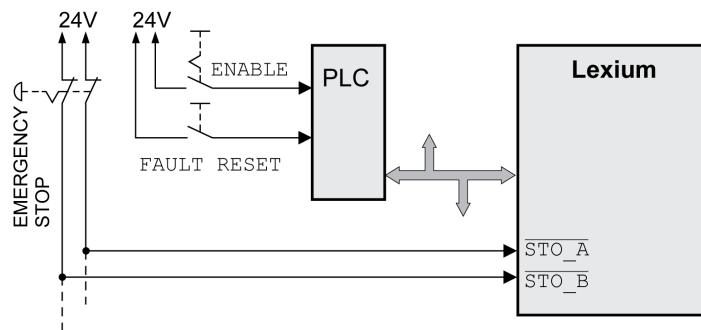
- Use shielded cables for the signals of the safety-related function STO.
- Do not use the cable for the signals of the safety-related function STO for other signals.
- Connect one end of the shield.

# Application Examples STO

## Example of Category 0 stop

Use without EMERGENCY STOP safety relay module, category 0 stop.

Example of category 0 stop:



In this example, when an EMERGENCY STOP is activated, it leads to a category 0 stop.

The safety-related function STO is triggered via a simultaneous 0-level at both inputs (time offset of less than 1 s). The power stage is disabled and an error of error class 3 is detected. The motor can no longer generate torque.

If the motor is not already at a standstill when the safety-related function STO is triggered, it decelerates under the salient physical forces (gravity, friction, etc.) active at the time until presumably coasting to a standstill.

If coasting of the motor and its potential load is unsatisfactory as determined by your risk assessment, an external safety-related brake may also be required.

| ⚠ WARNING |
|---|
| **UNINTENDED EQUIPMENT OPERATION** |
| Install a dedicated, external safety-related brake if coasting does not meet the deceleration requirements of your application. |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |
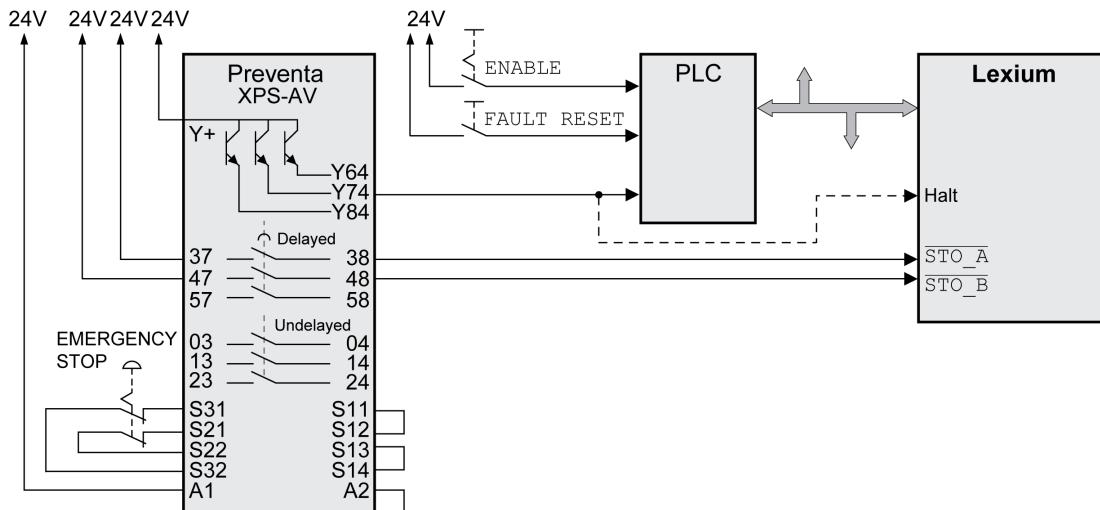
Refer to section Holding Brake and Safety-Related Function STO, page 83.

# Example of Category 1 stop

Use with EMERGENCY STOP safety relay module, category 1 stop.

Example of category 1 stop with external Preventa XPS-AV EMERGENCY STOP safety relay module:



In this example, when an EMERGENCY STOP is activated, it leads to a category 1 stop.

The EMERGENCY STOP safety relay module requests an immediate stop (undelayed) of the drive. After the time delay set in the EMERGENCY STOP safety relay module has elapsed, the EMERGENCY STOP safety relay triggers the safety-related function STO.

The safety-related function STO is triggered via a simultaneous 0-level at both inputs (time offset of less than 1 s). The power stage is disabled and an error of error class 3 is detected. The motor can no longer generate torque.

If coasting of the motor and its potential load is unsatisfactory as determined by your risk assessment, an external safety-related brake may also be required.

---

## ⚠ WARNING

**UNINTENDED EQUIPMENT OPERATION**

Install a dedicated, external safety-related brake if coasting does not meet the deceleration requirements of your application.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

---

Refer to section Holding Brake and Safety-Related Function STO, page 83.

# Installation

## Mechanical Installation

### Before Mounting

### General

An engineering phase is mandatory prior to mechanical and electrical installation. See section Engineering, page 58 for basic information.

<table>
<tr><td colspan="2" style="background:black;color:white;text-align:center">⚡⚠ <strong>DANGER</strong></td></tr>
</table>

| ⚡⚠ **DANGER** |
|---|
| **ELECTRIC SHOCK CAUSED BY INSUFFICIENT GROUNDING** |
| • Verify compliance with all local and national electrical code requirements as well as all other applicable regulations with respect to grounding of the entire drive system. |
| • Ground the drive system before applying voltage. |
| • Do not use conduits as protective ground conductors; use a protective ground conductor inside the conduit. |
| • The cross section of the protective ground conductor must comply with the applicable standards. |
| • Do not consider cable shields to be protective ground conductors. |
| **Failure to follow these instructions will result in death or serious injury.** |

| ⚡⚠ **DANGER** |
|---|
| **ELECTRIC SHOCK OR UNINTENDED EQUIPMENT OPERATION** |
| • Keep foreign objects from getting into the product. |
| • Verify the correct seating of seals and cable entries in order to avoid contamination such as deposits and humidity. |
| **Failure to follow these instructions will result in death or serious injury.** |

## ⚠ **WARNING**

**LOSS OF CONTROL**

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop, power outage and restart.

- Separate or redundant control paths must be provided for critical control functions.

- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.

- Observe all accident prevention regulations and local safety guidelines.[1]

- Each implementation of this equipment must be individually and thoroughly tested for proper operation before being placed into service.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

[1] For additional information, refer to NEMA ICS 1.1 (latest edition), "Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control" and to NEMA ICS 7.1 (latest edition), "Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems" or their equivalent governing your particular location.

Conductive foreign objects, dust or liquids may cause safety-related functions to become inoperative.

## ⚠ **WARNING**

**LOSS OF SAFETY-RELATED FUNCTION CAUSED BY FOREIGN OBJECTS**

Protect the system against contamination by conductive substances.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

The metal surfaces of the product may exceed 70 °C (158 °F) during operation.

## ⚠ **CAUTION**

**HOT SURFACES**

- Avoid unprotected contact with hot surfaces.

- Do not allow flammable or heat-sensitive parts in the immediate vicinity of hot surfaces.

- Verify that the heat dissipation is sufficient by performing a test run under maximum load conditions.

**Failure to follow these instructions can result in injury or equipment damage.**

## ⚠ **CAUTION**

**INOPERABLE EQUIPMENT DUE TO INCORRECT MAINS VOLTAGE CONNECTION**

- Verify that you use the correct mains voltage; install a transformer, if necessary.

- Do not connect mains voltage to the output terminals (U, V, W).

**Failure to follow these instructions can result in injury or equipment damage.**

## Inspecting the Product

- Verify the product version by means of the Type Code, page 23 on the Nameplate, page 22.
- Prior to mounting, inspect the product for visible damage.

Damaged products may cause electric shock or unintended equipment operation.

> ## ⚠⚠ DANGER
> **ELECTRIC SHOCK OR UNINTENDED EQUIPMENT OPERATION**
> - Do not use damaged products.
> - Keep foreign objects (such as chips, screws or wire clippings) from getting into the product.
>
> **Failure to follow these instructions will result in death or serious injury.**

Contact your local Schneider Electric representative if you detect any damage whatsoever to the products.

For information concerning the mounting of the motor, see the individual user guide for your particular motor.

# Installing and Removing Modules

## Overview

Many components of the equipment, including the printed circuit board, operate with mains voltage, or present transformed high currents, and/or high voltages.

The motor itself generates voltage when the motor shaft is rotated.

> ## ⚠ DANGER
> **ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**
> - Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires.
> - Place a "Do Not Turn On" or equivalent hazard label on all power switches and lock them in the non-energized position.
> - Wait 15 minutes to allow the residual energy of the DC bus capacitors to discharge.
> - Measure the voltage on the DC bus with a properly rated voltage sensing device and verify that the voltage is less than 42 Vdc.
> - Do not assume that the DC bus is voltage-free when the DC bus LED is off.
> - Block the motor shaft to prevent rotation prior to performing any type of work on the drive system.
> - Do not create a short-circuit across the DC bus terminals or the DC bus capacitors.
> - Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the unit.
> - Use only the specified voltage when operating this equipment and any associated products.
>
> **Failure to follow these instructions will result in death or serious injury.**

Electrostatic discharge (ESD) may permanently damage the module either immediately or over time.
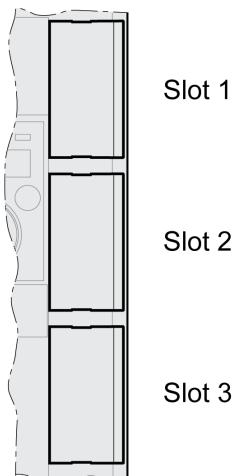
| *NOTICE* |
| --- |
| **EQUIPMENT DAMAGE DUE TO ESD** |
| • Use suitable ESD measures (for example, ESD gloves) when handling the module. |
| • Do not touch internal components. |
| **Failure to follow these instructions can result in equipment damage.** |

The drive has 3 module slots:

Slot 1

Slot 2

Slot 3

The module slots are designed for the following modules:

| Slot | Module |
| --- | --- |
| Slot 1 | Safety module eSM |
| | I/O module IOM1[1] |
| Slot 2 | Encoder module RSR (resolver interface) |
| | Encoder module DIG (digital interface) |
| | Encoder module ANA (analog interface) |
| Slot 3 | Fieldbus module CANopen and CANmotion (module identification CAN) |
| | Fieldbus module DeviceNet (module identification DNT)[2] |
| | Fieldbus module Profibus DP (module identification PDP) |
| | Fieldbus module PROFINET (module identification PNT)[3] |
| | Fieldbus module EtherNet/IP and Modbus-TCP (module identification ETH) |
| | Fieldbus module EtherCAT (module identification ECT) |
| **(1)** With firmware version ≥V01.06 | |
| **(2)** With firmware version ≤V01.22 | |
| **(3)** With firmware version ≥V01.22 | |

## Inserting a Module Into a Slot

Disconnect all power (power stage supply and 24 Vdc control supply) before inserting or removing a module.

Procedure for inserting a module:
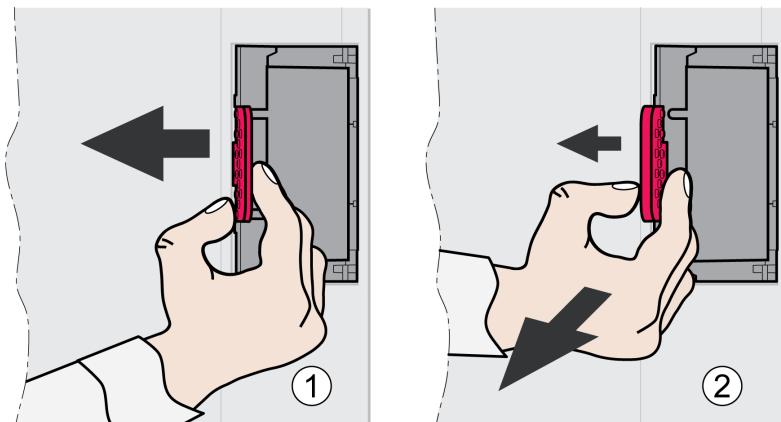
| Step | Action |
|------|--------|
| 1 | Fully read and understand the drive user guide as well as the user guide for the module prior to installing the module. |
| 2 | Verify that the order number on the nameplate of the module corresponds to the specification in the manual for the module. |
| 3 | Note and record the serial number, revision and DOM shown on the nameplate of the module and the nameplate of the device. |
| 4 | Remove the cover from the module slot and keep the cover. |
| 5 | Inspect the module for visible damage. Do not install damaged modules. |
| 6 | Push the module into the appropriate slot until the snap-in lock snaps in. |

Information on wiring can be found in the section "Installation" of the user guide for the module.

Fasten the connection cable to the cable guide of the device.

Various settings must be made the next time the drive is powered on. See the section "Commissioning" of the user guide for the module for details on these settings.

## Removing a Module From a Slot



Disconnect all power (power stage supply and 24 Vdc control supply) before inserting or removing a module.

Procedure for removing a module from a slot of the device:

- Label the connection cables. Remove the wiring of the module.
- Push the snap-in lock of the module to the left (1) and pull out the module at the snap-in lock (2) while holding it to the left.
- Close the module slot with the cover.

The next time the drive is powered on, it will signal a module replacement. See section Acknowledging a Module Replacement, page 394 for additional information.

## Mounting the Drive

## Attaching a Hazard Label with Safety Instructions

Included in the packaging of the drive are adhesive hazard labels in German, French, Italian, Spanish and Chinese. The English version is affixed to the front of

the drive by the factory. If the country to which your final machine or process is to be delivered is other than English speaking:

- Select the label suitable for the target country.

  Observe the safety regulations in the target country.

- Attach the label to the front of the drive so that it is clearly visible.

# Control Cabinet

The control cabinet (enclosure) must have a sufficient size so that all devices and components can be permanently installed and wired in compliance with the EMC requirements.

The ventilation of the control cabinet must be sufficient to comply with the specified ambient conditions for the devices and components operated in the control cabinet.

Install and operate this equipment in a control cabinet rated for its intended environment and secured by a keyed or tooled locking mechanism.
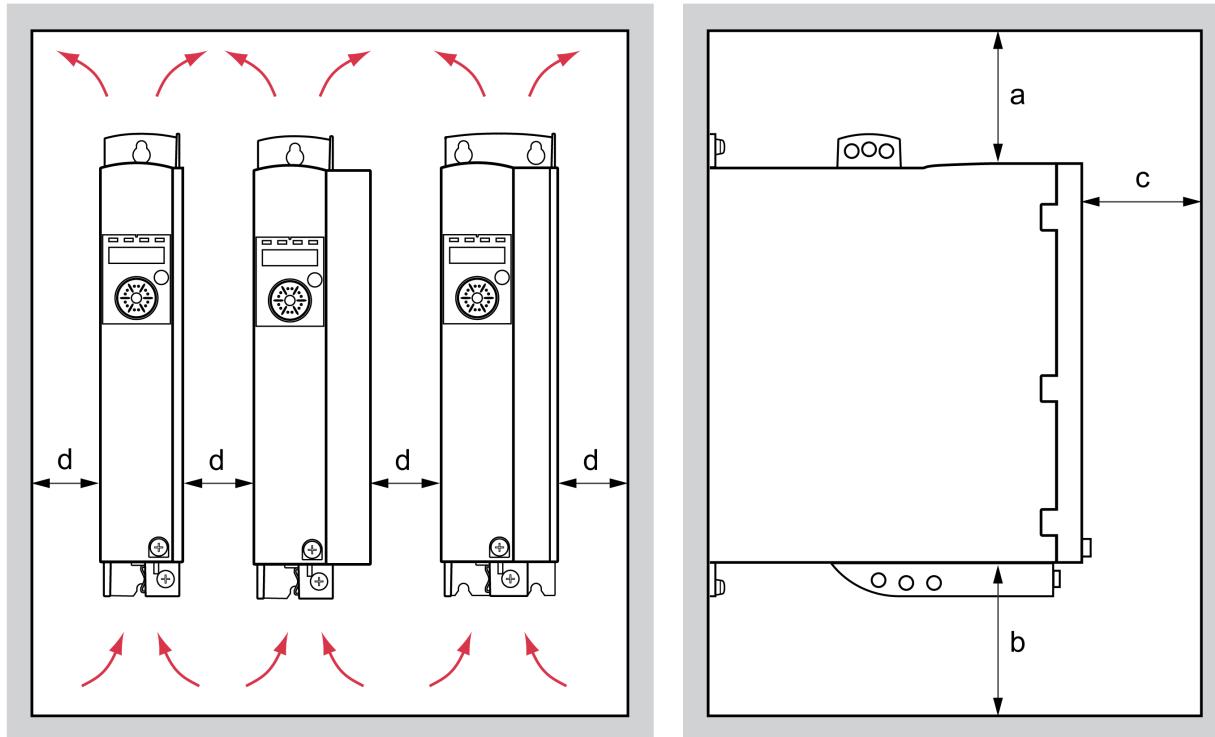
# Mounting Distances, Ventilation

When selecting the position of the device in the control cabinet, note the following:

- Mount the device in a vertical position (±10°). This is required for cooling the device.
- Adhere to the minimum installation distances for required cooling. Avoid heat accumulations.
- Do not mount the device close to heat sources.
- Do not mount the device on or near flammable materials.
- The heated airflow from other devices and components must not heat up the air used for cooling the device.
- If the thermal limits are exceeded during operation, the power stage of the drive is disabled (overtemperature).

The connection cables of the devices are routed to the top and to the bottom. The minimum distances must be adhered to for air circulation and cable installation.

Mounting distances and air circulation



| Free space a | mm | ≥100 |
| | (in) | (≥3.94) |
| Free space b | mm | ≥100 |
| | (in) | (≥3.94) |
| Free space c | mm | ≥60 |
| | (in) | (≥2.36) |
| Free space d | mm | ≥0 |
| | (in) | (≥0) |

# Mounting the Device

See section Dimensions, page 26 for the dimensions of the mounting holes.

Painted surfaces may create electrical resistance or isolation. Before mounting the device to a painted mounting plate, remove all paint across a large area of the mounting points.

# Electrical Installation

## Overview of Procedure

### General

<div style="border:1px solid">

## ⚡⚠ DANGER

**ELECTRIC SHOCK OR UNINTENDED EQUIPMENT OPERATION**

- Keep foreign objects from getting into the product.
- Verify the correct seating of seals and cable entries in order to avoid contamination such as deposits and humidity.

**Failure to follow these instructions will result in death or serious injury.**

</div>

<div style="border:1px solid">

## ⚡⚠ DANGER

**ELECTRIC SHOCK CAUSED BY INSUFFICIENT GROUNDING**

- Verify compliance with all local and national electrical code requirements as well as all other applicable regulations with respect to grounding of the entire drive system.
- Ground the drive system before applying voltage.
- Do not use conduits as protective ground conductors; use a protective ground conductor inside the conduit.
- The cross section of the protective ground conductor must comply with the applicable standards.
- Do not consider cable shields to be protective ground conductors.

**Failure to follow these instructions will result in death or serious injury.**

</div>

Direct current can be introduced in the protective ground conductor of this drive. If a residual current device (RCD / GFCI) or a residual current monitor (RCM) is used for protection against direct or indirect contact, the following specific types must be used:

<div style="border:1px solid">

## ⚠ WARNING

**DIRECT CURRENT CAN BE INTRODUCED INTO THE PROTECTIVE GROUND CONDUCTOR**

- Use a Type A Residual Current Device (RCD / GFCI) or a Residual Current Monitor (RCM) for single-phase drives connected to a phase and to the neutral conductor.
- Use a Type B Residual Current Device (RCD / GFCI) or a Residual Current Monitor (RCM) that has approval for use with frequency inverters and is sensitive to all types of current for three-phase devices and for single-phase devices not connected to a phase and the neutral conductor.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

</div>

The entire installation procedure must be performed without voltage present.

# Connection Overview

## Description



| Connection | Assignment |
|---|---|
| CN1 | Power stage supply |
| CN2 | 24 Vdc control supply and safety-related function STO |
| CN3 | Motor encoder (encoder 1) |
| CN4 | PTO (encoder simulation ESIM) |
| CN5 | PTI (A/B signals, P/D signals, CW/CCW signals) |
| CN6 | Digital inputs/outputs |
| CN7 | Modbus (commissioning interface) |
| CN8 | External braking resistor |
| CN9 | DC bus connection for parallel operation |
| CN10 | Motor phases |
| CN11 | Holding brake |
| Slot 1 | Safety module or I/O module |
| Slot 2 | Encoder module (encoder 2) |
| Slot 3 | Fieldbus module |

# Connection Grounding Screw

## Description

This product has a leakage current greater than 3.5 mA. If the protective ground connection is interrupted, a hazardous touch current may flow if the housing is touched.

---

### ⚡⚠ DANGER

**INSUFFICIENT GROUNDING**

- Use a protective ground conductor with at least 10 mm² (AWG 6) or two protective ground conductors with the cross section of the conductors supplying the power terminals.
- Verify compliance with all local and national electrical code requirements as well as all other applicable regulations with respect to grounding of all equipment.
- Ground the drive system before applying voltage.
- Do not use conduits as protective ground conductors; use a protective ground conductor inside the conduit.
- Do not use cable shields as protective ground conductors.

**Failure to follow these instructions will result in death or serious injury.**

---

The central grounding screw of the product is located at the bottom of the front side.
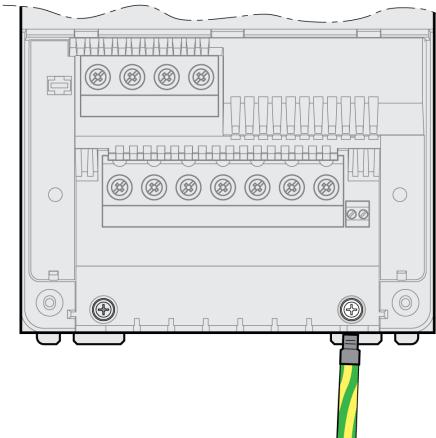
The figure below shows the device versions LXM32MU45, LXM32MU60, LXM32MU90, LXM32MD12, LXM32MD18, LXM32MD30 and LXM32MD72.



The figure below shows the device versions LXM32MD85 and LXM32MC10.

Open the housing by removing the terminal cover.

Remove the cable guide.

Connect the ground connection of the device to the central grounding point of the system.

| Characteristic | Unit | Value | |
|---|---|---|---|
| | | **LXM32•U45, LXM32•U60, LXM32•U90, LXM32•D12, LXM32•D18, LXM32•D30, LXM32•D72** | **LXM32•D85, LXM32•C10** |
| Tightening torque of grounding screw | Nm | 3.5 | 3 |
| | (lb.in) | (31) | (27) |

# Connection Motor Phases and Holding Brake (CN10 and CN11)

## General

The motor is designed for operation via a drive. Connecting the motor directly to AC voltage will damage the motor and can cause fires and initiate an explosion.

---

## ⚠ DANGER

**POTENTIAL FOR EXPLOSION**

Only connect the motor to a matching, approved drive in the way described in the present documentation.

**Failure to follow these instructions will result in death or serious injury.**

---

High voltages may be present at the motor connection. The motor itself generates voltage when the motor shaft is rotated. AC voltage can couple voltage to unused conductors in the motor cable.

---

## ⚠⚠ DANGER

**ELECTRIC SHOCK**

- Verify that no voltage is present prior to performing any type of work on the drive system.

- Block the motor shaft to prevent rotation prior to performing any type of work on the drive system.

- Insulate both ends of unused conductors of the motor cable.

- Supplement the motor cable grounding conductor with an additional protective ground conductor to the motor housing if the protective ground conductor of the motor cable is insufficient.

- Only touch the motor shaft or the mounted output components if all power has been disconnected.

- Verify compliance with all local and national electrical code requirements as well as all other applicable regulations with respect to grounding of all equipment.

**Failure to follow these instructions will result in death or serious injury.**

---

If third-party motors are used, insufficient isolation may allow hazardous voltages to enter the PELV circuit.

---

## ⚠⚠ DANGER

**ELECTRIC SHOCK CAUSED BY INSUFFICIENT ISOLATION**

- Verify protective separation between the temperature sensor and the motor phases.

- Verify that the signals at the encoder connection meet the PELV requirements.

- Verify protective separation between the brake voltage in the motor and the motor cable, and the motor phases.

**Failure to follow these instructions will result in death or serious injury.**

---

Drive systems may perform unintended movements if unapproved combinations of drive and motor are used. Though the connectors for motor connection and encoder connection may match mechanically, this does not imply that the motor is approved for use.

---

## ⚠ WARNING

**UNINTENDED MOVEMENT**

Only use approved combinations of drive and motor.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

---

See section for additional information.

When using pre-assembled cables, route the cables from the motor to the drive starting from the motor. Due to the pre-assembled connectors on the motor side, this direction is often faster and easier.

# Cable Specifications

| | |
|---|---|
| Shield: | Required, both ends grounded |
| Twisted Pair: | - |
| PELV: | The wires for the holding brake are PELV-compliant. |
| Cable composition: | 3 wires for motor phases |
| | 2 wires for holding brake |
| | 1 wire for protective ground (PE) |
| Maximum cable length: | Depends on the required limit values for conducted interference, see Electromagnetic Emission, page 53. |

Note the following information:

- You may only connect the Schneider Electric original motor cable either pre-assembled or open wire.
- The wires for the holding brake must also be connected to the drive at connection CN11 in the case of motors without holding brakes. At the motor end, connect the wires to the appropriate pins for the holding brake; the cable can then be used for motors with or without holding brake. If you do not connect the wires at the motor end, you must isolate each wire individually (inductive voltages).
- Observe the polarity of the holding brake voltage.
- The voltage for the holding brake depends on the 24 Vdc control supply (PELV). Observe the tolerance for the 24 Vdc control supply and the specified voltage for the holding brake, see 24 Vdc Control Supply, page 40.
- Use pre-assembled cables to reduce the risk of wiring errors, see Accessories and Spare Parts, page 647.

The optional holding brake of a motor is connected to connection CN11. The integrated holding brake controller releases the holding brake when the power stage is enabled. When the power stage is disabled, the holding brake is re-applied.

# Properties of the Connection Terminals CN10

The terminals are approved for stranded conductors and solid conductors. Use wire cable ends (ferrules), if possible.

| Characteristic | Unit | Value | | |
|---|---|---|---|---|
| | | LXM32•U45, LXM32•U60, LXM32•U90, LXM32•D12, LXM32•D18, LXM32•D30 | LXM32•D72 | LXM32•D85, LXM32•C10 |
| Connection cross section | mm² | 0.75 ... 5.3 | 0.75 ... 10 | 1.5 ... 25 |
| | (AWG) | (18 ... 10) | (18 ... 8) | (14 ... 4) |
| Tightening torque for terminal screws | Nm | 0.68 | 1.81 | 3.8 |
| | (lb.in) | (6.0) | (16.0) | (33.6) |
| Stripping length | mm | 6 ... 7 | 8 ... 9 | 18 |
| | (in) | (0.24 ... 0.28) | (0.31 ... 0.35) | (0.71) |

## Properties of the Connection Terminals CN11
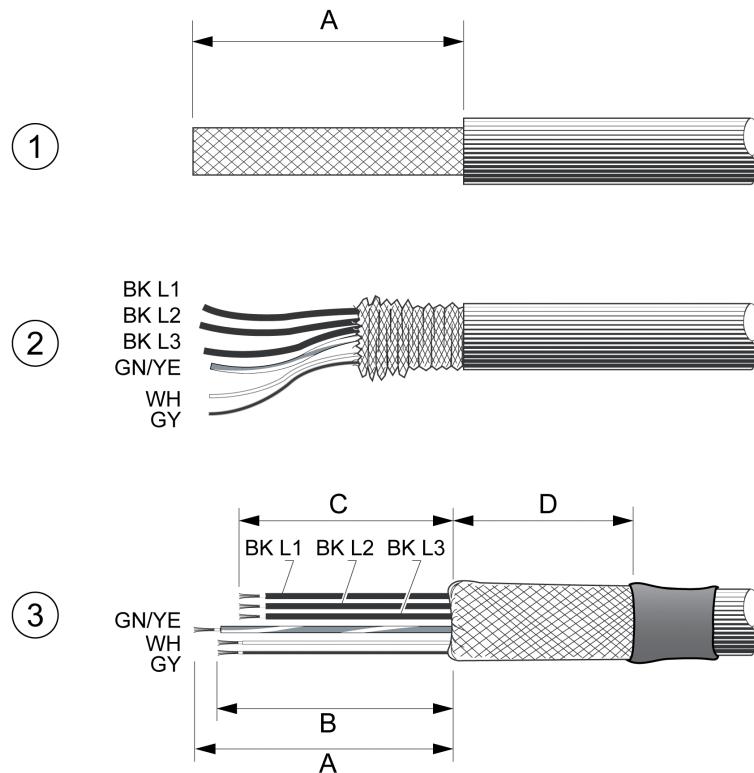
The terminals are approved for stranded conductors and solid conductors. Use wire cable ends (ferrules), if possible.

| Characteristic | Unit | Value | |
|---|---|---|---|
| | | LXM32•U45, LXM32•U60, LXM32•U90, LXM32•D12, LXM32•D18, LXM32•D30, LXM32•D72 | LXM32•D85, LXM32•C10 |
| Maximum terminal current | A | 1.7 | 1.7 |
| Connection cross section | mm$^2$ (AWG) | 0.75 ... 2.5 (18 ... 14) | 0.75 ... 2.5 (18 ... 14) |
| Tightening torque for terminal screws | Nm (lb.in) | - | 0.5 (4.4) |
| Stripping length | mm (in) | 12 ... 13 (0.47 ... 0.51) | 8 (0.31) |

## Assembling Cables

Note the dimensions specified when assembling cables.

Steps for assembling the motor cable



**1** Strip the cable jacket, length A.

**2** Slide the shielding braid back over the cable jacket.

**3** Secure the shielding braid with a heat shrink tube. The shield must have at least length D. Verify that a large surface area of the shielding braid is connected to the EMC shield clamp. Shorten the wires for the holding brake to length B and the three wires for the motor phases to length C. The protective ground conductor has length A. Connect the wires for the holding brake to the drive even in the case of motors without a holding brake (inductive voltage).

| Characteristic | Unit | Value | |
| --- | --- | --- | --- |
| | | **LXM32•U45, LXM32•U60, LXM32•U90, LXM32•D12, LXM32•D18, LXM32•D30, LXM32•D72** | **LXM32•D85, LXM32•C10** |
| A | mm (in) | 140 (5.51) | 220 (8.66) |
| B | mm (in) | 135 (5.32) | 205 (8.07) |
| C | mm (in) | 130 (5.12) | 200 (7.87) |
| D | mm (in) | 50 (1.97) | 50 (1.97) |

Observe the maximum permissible connection cross section. Take into account the fact that wire cable ends (ferrules) increase the cross section size.

# Monitoring

The drive monitors the motor phases for:

• Short-circuit between the motor phases

• Short-circuit between the motor phases and ground
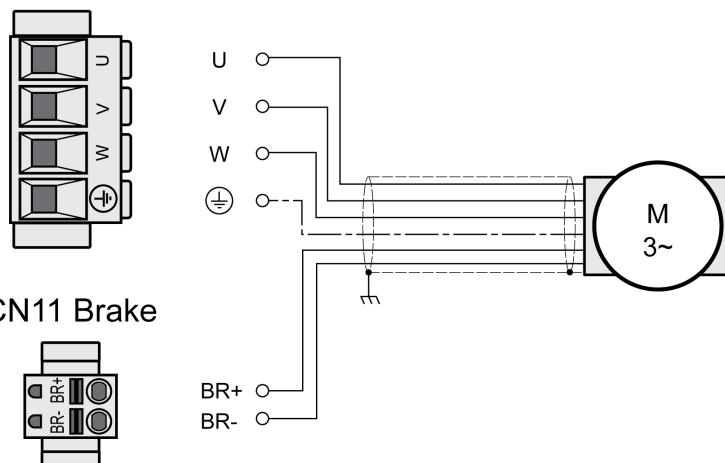
Short-circuits between the motor phases and the DC bus, the braking resistor or the holding brake wires are not detected.

# Wiring Diagram Motor and Holding Brake

The figure below shows the drive versions LXM32MU45, LXM32MU60, LXM32MU90, LXM32MD12, LXM32MD18, LXM32MD30 and LXM32MD72.

Wiring diagram motor with holding brake
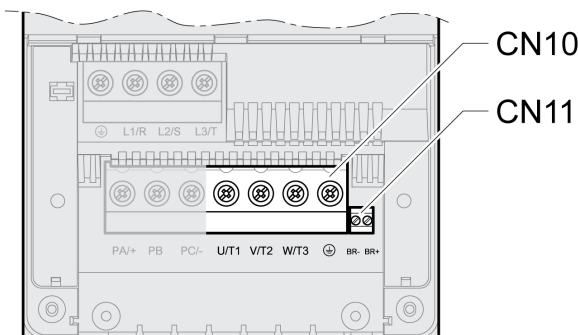


The figure below shows the drive versions LXM32MD85 and LXM32MC10.

Wiring diagram motor with holding brake



| Connection | Meaning | Color |
|---|---|---|
| U | Motor phase | Black L1 (BK) |
| V | Motor phase | Black L2 (BK) |
| W | Motor phase | Black L3 (BK) |
| PE | Protective ground conductor | Green/yellow (GN/YE) |
| BR+ | Holding brake + | White (WH) or black 5 (BK) |
| BR- | Holding brake - | Gray (GR) or black 6 (BK) |

# Connecting the Motor Cable

• Connect the motor phases and protective ground conductor to CN10. Verify that the connections U, V, W and PE (ground) match at the motor and the drive.

• Note the tightening torque specified for the terminal screws.
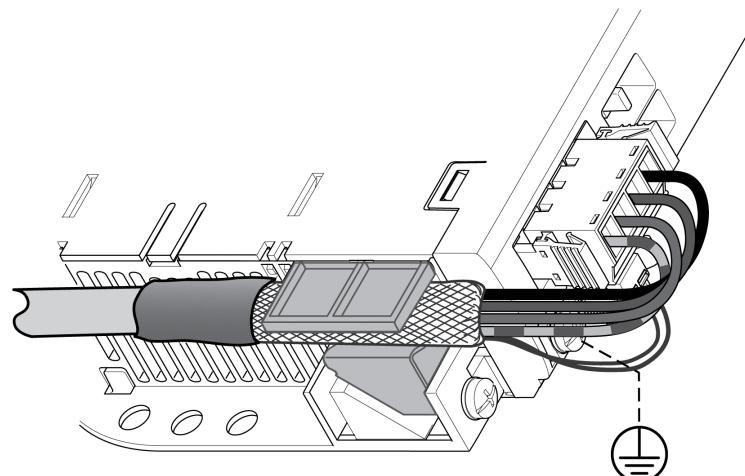
- Connect the white wire or the black wire with the label 5 to connection BR+ of CN11.

  Connect the gray wire or the black wire with the label 6 to connection BR- of CN11.

For LXM32MU45, LXM32MU60, LXM32MU90, LXM32MD12, LXM32MD18, LXM32MD30 and LXM32MD72:

- Verify that the connector locks snap in properly.
- Connect the cable shield to the shield clamp (large surface area contact).

Shield clamp motor cable
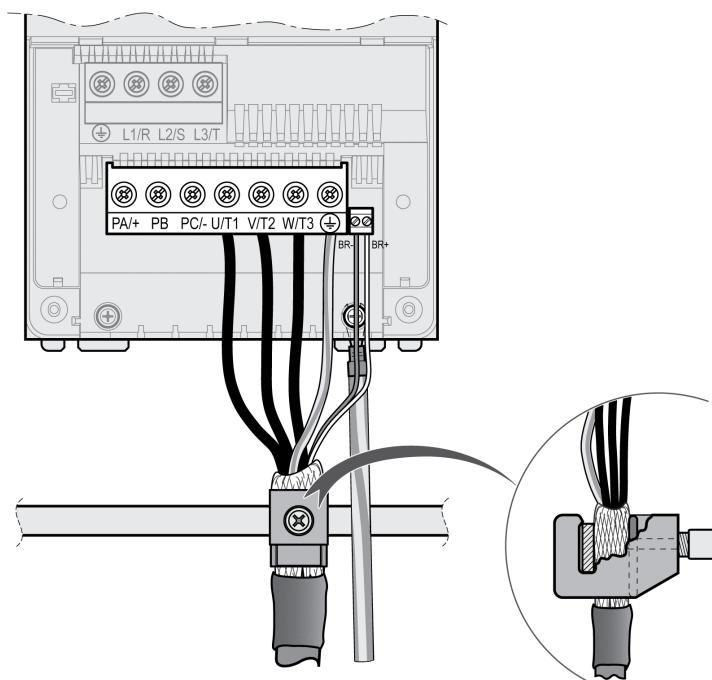


For LXM32MD85 and LXM32MC10:

- Connect the cable shield with a shield clamp to an EMC rail (large surface area contact).

  Verify that the individual wires are in the individual guides.

- If you do not connect and external braking resistor, mount the cable guide.

Shield clamp motor cable

# Connection DC Bus (CN9, DC Bus)

## General

Incorrect use of the DC bus may permanently damage the drives either immediately or over time.

| ⚠ **WARNING** |
|---|
| **INOPERABLE SYSTEM COMPONENTS AND LOSS OF CONTROL** |
| Verify that all requirements for using the DC bus are met. |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |

This and other important information can be found in the "LXM32 - Common DC bus - Application note". If you wish to take advantage of DC bus sharing, you must first read the "LXM32 - Common DC bus - Application note".

## Requirements for Use

The requirements and limit values for parallel connection via the DC bus can be found on https://www.se.com in the form of an application note. If there are any issues or questions related to obtaining the Common DC bus Application Note, consult your local Schneider Electric representative.

# Connection Braking Resistor (CN8, Braking Resistor)

## General

An insufficiently rated braking resistor can cause overvoltage on the DC bus. Overvoltage on the DC bus causes the power stage to be disabled. The motor is no longer actively decelerated.

| ⚠ **WARNING** |
|---|
| **UNINTENDED EQUIPMENT OPERATION** |
| • Verify that the braking resistor has a sufficient rating by performing a test run under maximum load conditions. |
| • Verify that the parameter settings for the braking resistor are correct. |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |

## Internal Braking Resistor

A braking resistor is integrated in the drive to absorb braking energy. The drive is shipped with the internal braking resistor active.

## External Braking Resistor

An external braking resistor is required for applications in which the motor must be decelerated quickly and the internal braking resistor cannot absorb the excess braking energy.

Selection and rating of the external braking resistor are described in section Rating the Braking Resistor, page 73. For suitable braking resistors, see Accessories and Spare Parts, page 647.

# Cable Specifications

| | |
|---|---|
| Shield: | Required, both ends grounded |
| Twisted Pair: | - |
| PELV: | - |
| Cable composition: | Minimum conductor cross section: Same cross section as power stage supply, see Connection Power Stage Supply (CN1), page 108.<br><br>The conductors must have a sufficiently large cross section so that the fuse at the mains connection can protect the equipment if necessary. |
| Maximum cable length: | 3 m (9.84 ft) |

# Properties of the Connection Terminals CN8

| Characteristic | Unit | Value | |
|---|---|---|---|
| | | LXM32•U45, LXM32•U60, LXM32•U90, LXM32•D12, LXM32•D18, LXM32•D30, LXM32•D72 | LXM32•D85, LXM32•C10 |
| Connection cross section | mm$^2$<br><br>(AWG) | 0.75 ... 3.3<br><br>(18 ... 12) | 1.5 ... 25<br><br>(14 ... 4) |
| Tightening torque for terminal screws | Nm<br><br>(lb.in) | 0.51<br><br>(4.5) | 3.8<br><br>(33.6) |
| Stripping length | mm<br><br>(in) | 10 ... 11<br><br>(0.39 ... 0.43) | 18<br><br>(0.71) |
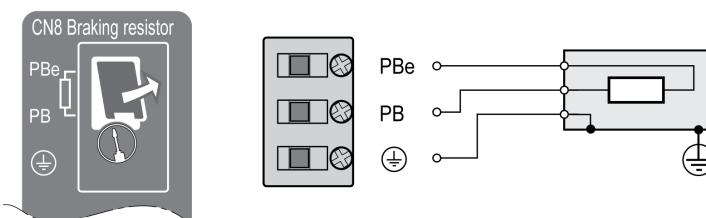
The terminals are approved for fine-stranded conductors and solid conductors. Observe the maximum permissible connection cross section. Take into account the fact that wire cable ends (ferrules) increase the cross section size.

If you use wire cable ends (ferrules), use only wire cable ends (ferrules) with collars for these terminals.
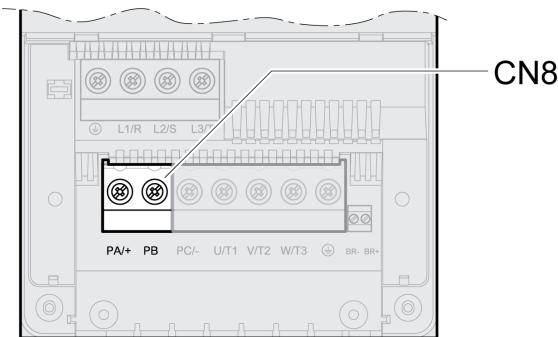
# Wiring Diagram

The figure below shows the drive versions LXM32MU45, LXM32MU60, LXM32MU90, LXM32MD12, LXM32MD18, LXM32MD30 and LXM32MD72.

CN8 Braking resistor

The figure below shows the drive versions LXM32MD85 and LXM32MC10.

CN8

## Connecting the External Braking Resistor

- Power off all supply voltages. Observe the safety instructions concerning electrical installation, see Product Related Information, page 14.
- Verify that no voltages are present (safety instructions).
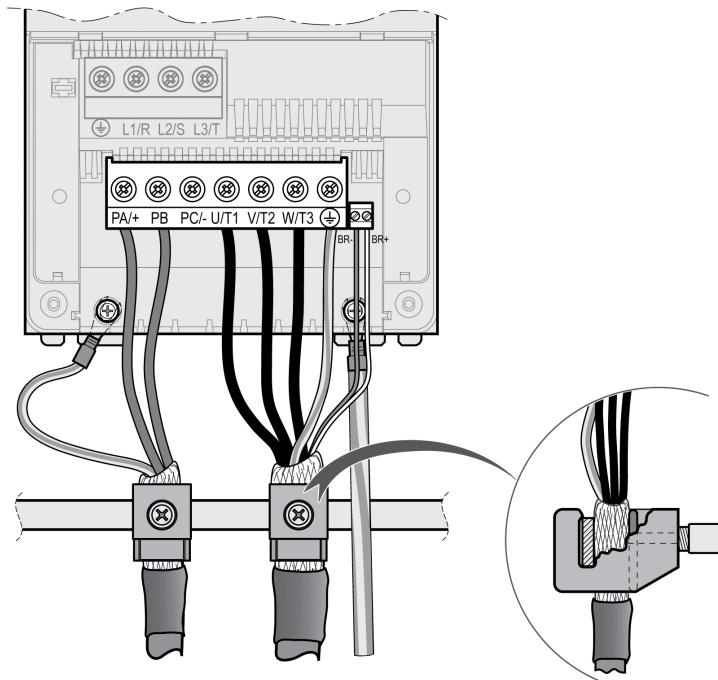
For LXM32MU45, LXM32MU60, LXM32MU90, LXM32MD12, LXM32MD18, LXM32MD30 and LXM32MD72:

- Remove the cover from the connection.
- Ground the ground connection (PE) of the braking resistor.
- Connect the external braking resistor to the drive. Note the tightening torque specified for the terminal screws.
- Connect the cable shield to the shield connection at the bottom of the drive (large surface area contact).

For LXM32MD85 and LXM32MC10:

- Ground the ground connection (PE) of the braking resistor.
- Connect the external braking resistor to the drive. Note the tightening torque specified for the terminal screws.
- Connect the cable shield with a shield clamp to an EMC rail (large surface area contact).
- Verify that the individual wires are in the individual guides.
- Mount the cable guide.
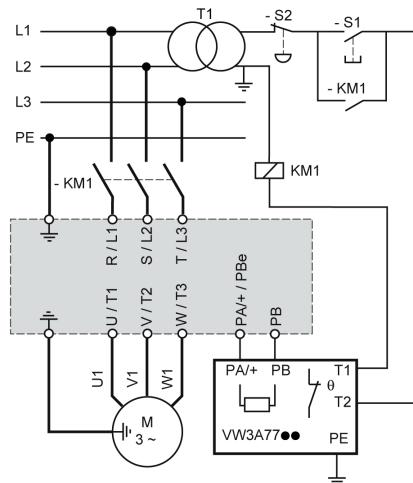
Shield clamp external braking resistor



The parameter *RESint_ext* is used to switch between the internal and an external braking resistor. See section Setting the Braking Resistor Parameters, page 157 for the parameter settings for the braking resistor. Verify correct operation of the braking resistor during commissioning.

## Wiring Example

The following graphic shows a functional principle:

# Connection Power Stage Supply (CN1)

## General

This product has a leakage current greater than 3.5 mA. If the protective ground connection is interrupted, a hazardous touch current may flow if the housing is touched.

| ⚡⚠ **DANGER** |
|:---|
| **INSUFFICIENT GROUNDING** |
| • Use a protective ground conductor with at least 10 mm² (AWG 6) or two protective ground conductors with the cross section of the conductors supplying the power terminals. |
| • Verify compliance with all local and national electrical code requirements as well as all other applicable regulations with respect to grounding of all equipment. |
| • Ground the drive system before applying voltage. |
| • Do not use conduits as protective ground conductors; use a protective ground conductor inside the conduit. |
| • Do not use cable shields as protective ground conductors. |
| **Failure to follow these instructions will result in death or serious injury.** |

| ⚠ **WARNING** |
|:---|
| **INSUFFICIENT PROTECTION AGAINST OVERCURRENT** |
| • Use the external fuses specified in section "Technical data". |
| • Do not connect the product to a supply mains whose short-circuit current rating (SCCR) exceeds the value specified in the section "Technical Data". |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |

| ⚠ **WARNING** |
|:---|
| **INCORRECT MAINS VOLTAGE** |
| Verify that the product is approved for the mains voltage before applying power and configuring the product. |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |

The products are intended for industrial use and may only be operated with a permanently installed connection.

Prior to connecting the drive, verify the approved mains types, see Power Stage Data - General, page 29.

## Cable Specifications

| | |
|:---|:---|
| Shield: | - |
| Twisted Pair: | - |
| PELV: | - |
| Cable composition: | The conductors must have a sufficiently large cross section so that the fuse at the mains connection can protect the equipment if necessary. |
| Maximum cable length: | - |

## Properties of Connection Terminals CN1

| Characteristic | Unit | Value | | |
|---|---|---|---|---|
| | | **LXM32•U45, LXM32•U60, LXM32•U90, LXM32•D12, LXM32•D18, LXM32•D30** | **LXM32•D72** | **LXM32•-D85, LXM32•-C10** |
| Connection cross section | mm² | 0.75 ... 5.3 | 0.75 ... 10 | 1.5 ... 25 |
| | (AWG) | (18 ... 10) | (18 ... 8) | (14 ... 4) |
| Tightening torque for terminal screws | Nm | 0.68 | 1.81 | 3.8 |
| | (lb.in) | (6.0) | (16.0) | (33.6) |
| Stripping length | mm | 6 ... 7 | 8 ... 9 | 18 |
| | (in) | (0.24 ... 0.28) | (0.31 ... 0.35) | (0.71) |

The terminals are approved for stranded conductors and solid conductors. Use wire cable ends (ferrules), if possible.

## Prerequisites for Connecting the Power Stage Supply
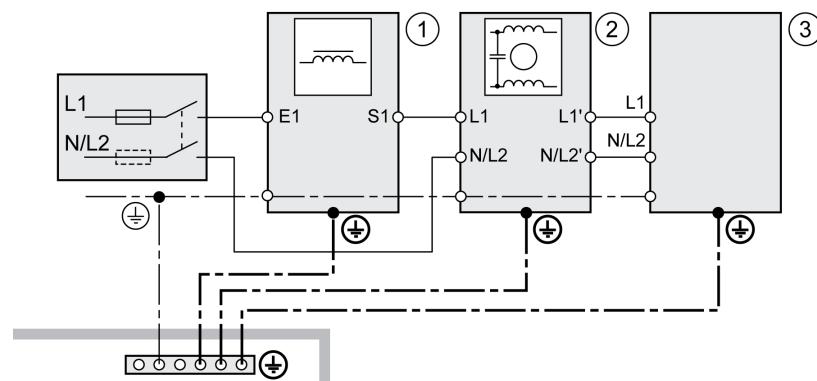
Note the following information:

- Three-phase drives may only be connected and operated via three phases.
- Use upstream mains fuses.
- If you use an external mains filter, the mains cable must be shielded and grounded at both ends if the length between the external mains filter and the drive exceeds 200 mm (7.87 in).
- See section Conditions for UL 508C and CSA, page 56 for a UL-compliant design.

## Power Stage Supply Single-Phase Drive

The illustration shows an overview for wiring the power stage supply for a single-phase drive. The illustration also shows an external mains filter and a mains reactor which are available as accessories.

Overview power stage supply for single-phase drive
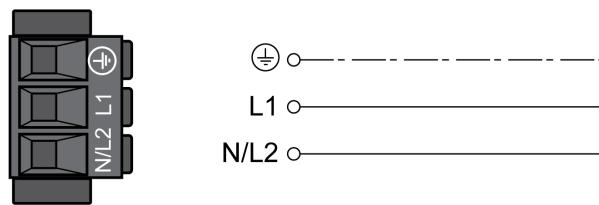


**1** Mains reactor (accessory)

**2** External mains filter (accessory)

**3** Drive

Wiring diagram power stage supply for single-phase drive.

### CN1 Mains 115/230 Vac
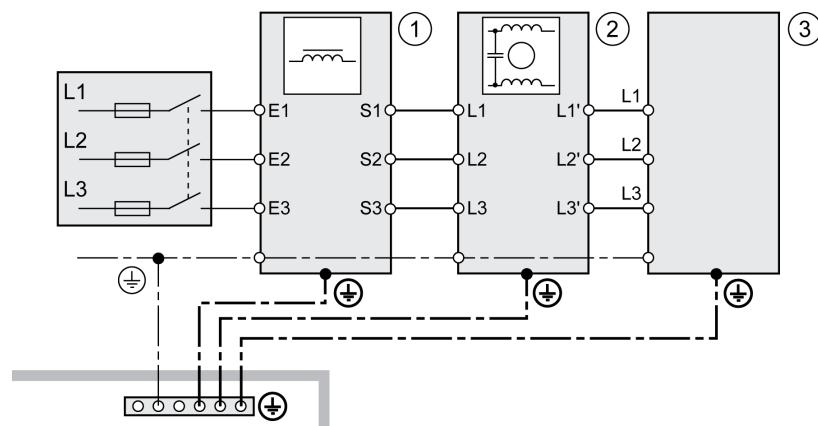


- Verify the type of mains. See section Power Stage Data - General, page 29 for the approved types of mains.
- Connect the mains cable. Note the tightening torque specified for the terminal screws.
- Verify that the connector locks snap in properly.

## Power Stage Supply Three-Phase Drive

The illustration shows an overview for wiring the power stage supply for a three-phase drive. The illustration also shows an external mains filter and a mains reactor which are available as accessories.

Wiring diagram, power stage supply for three-phase drive.



**1** Mains reactor (accessory)
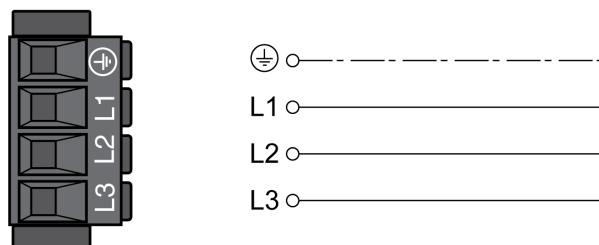
**2** External mains filter (accessory)

**3** Drive

The figure below shows the drive versions LXM32MU60, LXM32MD12, LXM32MD18, LXM32MD30 and LXM32MD72.
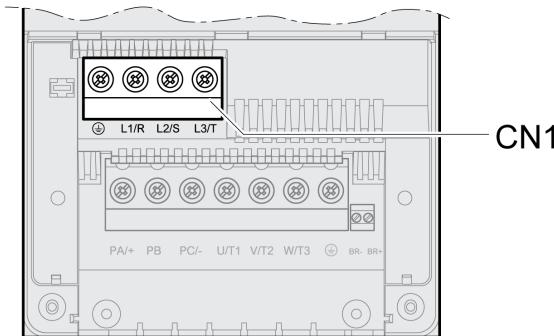
Wiring diagram power stage supply for three-phase drive.

### CN1 Mains 208/400/480 Vac

The figure below shows the drive versions LXM32MD85 and LXM32MC10.

Wiring diagram power stage supply for three-phase drive.



- Verify the type of mains. See section Power Stage Data - General, page 29 for the approved types of mains.
- Connect the mains cable. Note the tightening torque specified for the terminal screws.

For LXM32MU60, LXM32MD12, LXM32MD18, LXM32MD30 and LXM32MD72:

- Verify that the connector locks snap in properly.

For LXM32MD85 and LXM32MC10:

- Close the housing by refitting the terminal cover.

# Connection Motor Encoder (CN3)

## Function and Encoder Type
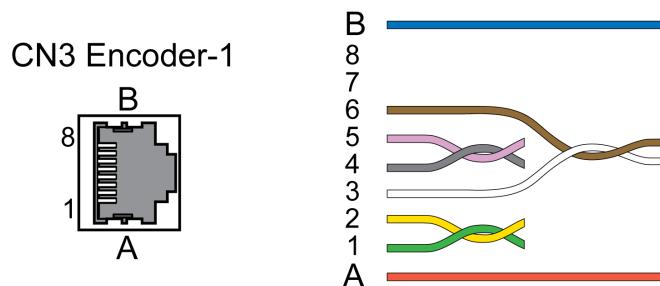
The motor encoder is a Hiperface encoder integrated in the motor. It provides the device with information on the motor position.

## Cable Specifications

| Shield: | Required, both ends grounded |
|---|---|
| Twisted Pair: | Required |
| PELV: | Required |
| Cable composition: | 6 * 0.14 mm$^2$ + 2 * 0.34 mm$^2$ (6 * AWG 24 + 2 * AWG 20) |
| Maximum cable length: | 100 m (328.08 ft) |

Use pre-assembled cables to reduce the risk of wiring errors, see Accessories and Spare Parts, page 647.

# Wiring Diagram

CN3 Encoder-1



| Pin | Signal | Motor, pin | Pair | Meaning | I/O |
|-----|--------|-----------|------|---------|-----|
| 1 | *COS+* | 9 | 2 | Cosine signal | I |
| 2 | *REFCOS* | 5 | 2 | Reference for cosine signal | I |
| 3 | *SIN+* | 8 | 3 | Sine signal | I |
| 6 | *REFSIN* | 4 | 3 | Reference for sine signal | I |
| 4 | *Data* | 6 | 1 | Receive data, transmit data | I/O |
| 5 | *Data* | 7 | 1 | Receive data and transmit data, inverted | I/O |
| 7 ... 8 | - | | 4 | Reserved | |
| A | *ENC+10V_OUT* | 10 | 5 | Encoder supply | O |
| B | *ENC_0V* | 11 | 5 | Reference potential for encoder supply | |
| | *SHLD* | | | Shield | |

---

## ⚠ **WARNING**

**UNINTENDED EQUIPMENT OPERATION**

Do not connect any wiring to reserved, unused connections, or to connections designated as No Connection (N.C.).

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

---

# Connecting the Motor Encoder

- Verify that wiring, cables and connected interfaces meet the PELV requirements.
- Connect the connector to CN3 Encoder-1.
- Verify that the connector locks snap in properly.

When using pre-assembled cables, route the cables from the motor to the drive starting from the motor. Due to the pre-assembled connectors on the motor side, this direction is often faster and easier.

# Connection PTO (CN4, Pulse Train Out)

## General

5 V signals are available at the PTO (Pulse Train Out, CN4) output. Depending on parameter *PTO_mode*, these signals are ESIM signals (encoder simulation) or logically fed through PTI input signals (P/D signals, A/B signals, CW/CCW signals). The PTO output signals can be used as PTI input signals for another

drive. The signal level corresponds to RS422, see Output PTO (CN4), page 44.
The PTO output supplies 5 V signals, even if the PTI input signal is a 24 V signal.
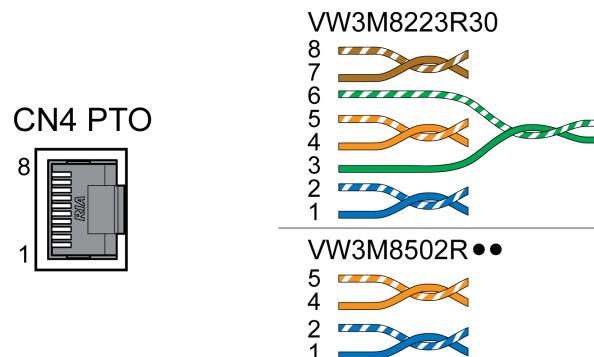
# Cable Specifications

| Shield: | Required, both ends grounded |
|---|---|
| Twisted Pair: | Required |
| PELV: | Required |
| Cable composition: | 8 * 0.14 mm² (8 * AWG 24) |
| Maximum cable length: | 100 m (328 ft) |

Use pre-assembled cables to reduce the risk of wiring errors, see Accessories and Spare Parts, page 647.

# Wiring Diagram

Wiring diagram Pulse Train Out (PTO)



| Pin | Signal | Pair | Meaning |
|---|---|---|---|
| 1 | *ESIM_A* | 2 | ESIM channel A |
| 2 | *ESIM_A* | 2 | ESIM channel A, inverted |
| 4 | *ESIM_B* | 1 | ESIM channel B |
| 5 | *ESIM_B* | 1 | ESIM channel B, inverted |
| 3 | *ESIM_I* | 3 | ESIM index pulse |
| 6 | *ESIM_I* | 3 | ESIM index pulse, inverted |
| 7 | *PTO_0V* | 4 | Reference potential |
| 8 | *PTO_0V* | 4 | Reference potential |

# PTO: Logically Fed Through PTI Signals

At the PTO output, the PTI input signals can be made available again to control a subsequent drive (daisy chain). Depending on the input signal, the output signal can be of type P/D signal, A/B signal or CW/CCW signal. The PTO output supplies 5 V signals.

# Connecting PTO

- Connect the connector to CN4. Verify correct pin assignment.
- Verify that the connector locks snap in properly.

# Connection PTI (CN5, Pulse Train In)

## General

P/D (pulse/direction), A/B signals or CW/CCW signals can be connected to the PTI connection (Pulse Train In, CN5).

It is possible to connect 5 V signals or 24 V signals, see Input PTI (CN5), page 45. Pin assignments and cables are different.

Incorrect or interfered signals as reference values can cause unintended movements.

| ⚠ **WARNING** |
|---|
| **UNINTENDED MOVEMENT** |
| • Use shielded twisted-pair cables. |
| • Do not use signals without push-pull in environments subject to interference. |
| • Use signals with push-pull in the case of cable lengths of more than 3 m (9.84 ft) and limit the frequency to 50 kHz. |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |
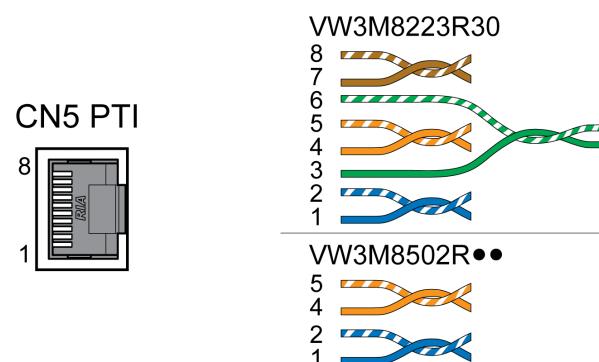
## Cable Specifications PTI

| Shield: | Required, both ends grounded |
|---|---|
| Twisted Pair: | Required |
| PELV: | Required |
| Minimum conductor cross section: | 0.14 mm² (AWG 24) |
| Maximum cable length: | 100 m (328 ft) with RS422 |
| | 10 m (32.8 ft) with push-pull |
| | 1 m (3.28 ft) with open collector |

Use pre-assembled cables to reduce the risk of wiring errors, see Accessories and Spare Parts, page 647.

## Connection Assignment PTI 5 V

Wiring diagram Pulse Train In (PTI) 5 V



P/D signals 5 V

| Pin | Signal | Pair | Meaning |
|-----|--------|------|---------|
| 1 | *PULSE(5V)* | 2 | Pulse 5V |
| 2 | *PULSE* | 2 | Pulse, inverted |
| 4 | *DIR(5V)* | 1 | Direction 5V |
| 5 | *DIR* | 1 | Direction, inverted |

A/B signals 5 V

| Pin | Signal | Pair | Meaning |
|-----|--------|------|---------|
| 1 | *ENC_A(5V)* | 2 | Encoder channel A 5V |
| 2 | *ENC_A* | 2 | Encoder channel A, inverted |
| 4 | *ENC_B(5V)* | 1 | Encoder channel B 5V |
| 5 | *ENC_B* | 1 | Encoder channel B, inverted |

CW/CCW signals 5 V

| Pin | Signal | Pair | Meaning |
|-----|--------|------|---------|
| 1 | *CW(5V)* | 2 | Pulse positive 5V |
| 2 | *CW* | 2 | Pulse positive, inverted |
| 4 | *CCW(5V)* | 1 | Pulse negative 5V |
| 5 | *CCW* | 1 | Pulse negative, inverted |

---

## ⚠ WARNING

**UNINTENDED EQUIPMENT OPERATION**

Do not connect any wiring to reserved, unused connections, or to connections designated as No Connection (N.C.).

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

---
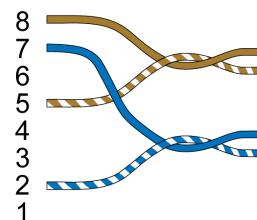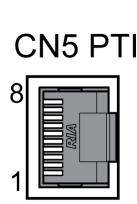
Connecting Pulse Train IN (PTI) 5 V

- Connect the connector to CN5. Verify correct pin assignment.
- Verify that the connector locks snap in properly.

# Connection Assignment PTI 24 V

Note that the wire pairs for 24 V signals require assignments different from those for 5 V signals. Use a cable that complies with the cable specification. Assemble the cable as shown in the illustration below.

Wiring diagram Pulse Train In (PTI) 24 V.



P/D signals 24 V

| Pin | Signal | Pair | Meaning |
|-----|--------|------|---------|
| 7 | *PULSE(24V)* | A | Pulse 24V |
| 2 | *PULSE* | A | Pulse, inverted |
| 8 | *DIR(24V)* | B | Direction 24V |
| 5 | *DIR* | B | Direction, inverted |

A/B signals 24 V

| Pin | Signal | Pair | Meaning |
|-----|--------|------|---------|
| 7 | *ENC_A(24V)* | A | Encoder channel A 24V |
| 2 | *ENC_A* | A | Encoder channel A, inverted |
| 8 | *ENC_B(24V)* | B | Encoder channel B 24V |
| 5 | *ENC_B* | B | Encoder channel B, inverted |

CW/CCW signals 24 V

| Pin | Signal | Pair | Meaning |
|-----|--------|------|---------|
| 7 | *CW(24V)* | A | Pulse positive 24V |
| 2 | *CW* | A | Pulse positive, inverted |
| 8 | *CCW(24V)* | B | Pulse negative 24V |
| 5 | *CCW* | B | Pulse negative, inverted |

---

# ⚠**WARNING**

**UNINTENDED EQUIPMENT OPERATION**

Do not connect any wiring to reserved, unused connections, or to connections designated as No Connection (N.C.).

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

---

Connecting Pulse Train In (PTI) 24 V

• Connect the connector to CN5. Verify correct pin assignment.

• Verify that the connector locks snap in properly.

# Connection 24 Vdc Control Supply and STO (CN2, DC Supply and STO)

## General

The 24 Vdc supply voltage is connected with many exposed signal connections in the drive system.

| ⚠ **WARNING** |
|---|
| **UNINTENDED EQUIPMENT OPERATION** |
| • Use power supply units that meet the PELV (Protective Extra Low Voltage) requirements. |
| • Connect the 0 Vdc outputs of all power supply units to FE (functional earth/ functional ground), for example, for the VDC supply voltage and for the 24 Vdc voltage for the safety-related function STO. |
| • Interconnect all 0 Vdc outputs (reference potentials) of all power supply units used for the drive. |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |

The connection for the 24 Vdc control supply at the product does not have an inrush current limitation. If the voltage is applied by means of switching of contacts, damage to the contacts or contact welding may result.

| *NOTICE* |
|---|
| **PERMANENT DAMAGE TO CONTACTS** |
| • Switch the power input (primary side) of the power supply unit. |
| • Do not switch the output voltage (secondary side) of the power supply unit. |
| **Failure to follow these instructions can result in equipment damage.** |

## Safety-Related Function STO

Information on the signals of the safety-related function STO can be found in section Functional Safety, page 78. If the safety-related function STO is not required, the inputs *STO_A* and *STO_B* must be connected to *+24VDC*.

## Cable Specifications CN2

| | |
|---|---|
| Shield: | –[1] |
| Twisted Pair: | - |
| PELV: | Required |
| Minimum conductor cross section: | 0.75 mm² (AWG 18) |
| Maximum cable length: | 100 m (328 ft) |
| **(1)** See Functional Safety, page 78 | |

## Properties of Connection Terminals CN2

| Characteristic | Unit | Value |
|---|---|---|
| Maximum terminal current | A | 16[1] |
| Connection cross section | mm² | 0.5 ... 2.5 |

| Characteristic | Unit | Value |
|---|---|---|
| | (AWG) | (20 ... 14) |
| Stripping length | mm | 12 ... 13 |
| | (in) | (0.47 ... 0.51) |
| **(1)** Note the maximum permissible terminal current when connecting several drives. | | |
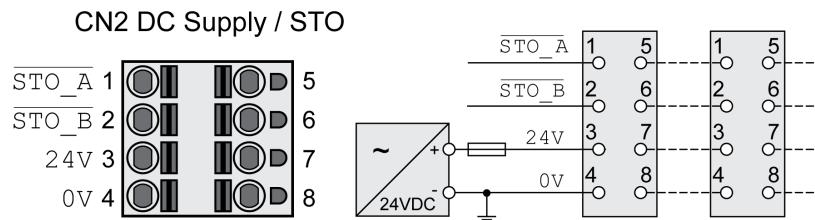
The terminals are approved for stranded conductors and solid conductors. Use wire cable ends (ferrules), if possible.

## Permissible Terminal Current of 24 Vdc Control Supply

- Connection CN2, pins 3 and 7 as well as pins 4 and 8 can be used as 24V/0V connections for additional consumers.

  In the connector, the following pins are connected: pin 1 to pin 5, pin 2 to pin 6, pin 3 to pin 7 and pin 4 to pin 8.

- The voltage at the holding brake output depends on the 24 Vdc control supply. Note that the current of the holding brake also flows via this terminal.

## Wiring Diagram



CN2 DC Supply / STO

| Pin | Signal | Meaning |
|---|---|---|
| 1, 5 | $\overline{STO\_A}$ | Safety-related function STO: Dual-channel connection, connection A |
| 2, 6 | $\overline{STO\_B}$ | Safety-related function STO: Dual-channel connection, connection B |
| 3, 7 | 24V | 24 Vdc control supply |
| 4, 8 | 0V | Reference potential for 24 Vdc control supply and reference potential for safety-related function STO |

## Connecting the Safety-Related Function STO

- Verify that wiring, cables and connected interfaces meet the PELV requirements.
- Connect the safety-related function STO in accordance with the specifications in section Functional Safety, page 78.

## Connecting the 24 Vdc Control Supply

- Verify that wiring, cables and connected interfaces meet the PELV requirements.
- Route the 24 Vdc control supply from a power supply unit (PELV) to the drive.
- Ground the 0 Vdc output at the power supply unit.
- Note the maximum permissible terminal current when connecting several drives.

- Verify that the connector locks snap in properly at the housing.

# Connection Digital Inputs and Outputs (CN6)

## General

The device has configurable inputs and configurable outputs. The standard assignment and the configurable assignment depend on the selected operating mode. For more information, see Digital Signal Inputs and Digital Signal Outputs, page 199.
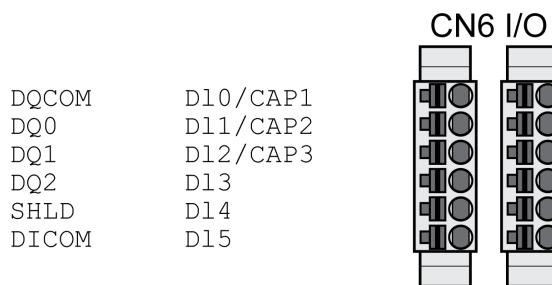
## Cable Specifications

| | |
|---|---|
| Shield: | - |
| Twisted Pair: | - |
| PELV: | Required |
| Cable composition: | 0.25 mm², (AWG 22) |
| Maximum cable length: | 30 m (98.4 ft) |

## Properties of Connection Terminals CN6

| Characteristic | Unit | Value |
|---|---|---|
| Connection cross section | mm² | 0.2 ... 1.0 |
| | (AWG) | (24 ... 16) |
| Stripping length | mm | 10 |
| | (in) | (0.39) |

## Wiring Diagram

```
                              CN6 I/O
DQCOM          DI0/CAP1
DQ0            DI1/CAP2
DQ1            DI2/CAP3
DQ2            DI3
SHLD           DI4
DICOM          DI5
```

| Signal | Meaning |
|---|---|
| DQCOM | Reference potential to *DQ0 ... DQ2* |
| DQ0 | Digital output 0 |
| DQ1 | Digital output 1 |
| DQ2 | Digital output 2 |
| SHLD | Shield connection |
| DICOM | Reference potential to *DI0 ... DI5* |
| DI0/CAP1 | Digital input 0 / Capture input 1 |
| DI1/CAP2 | Digital input 1 / Capture input 2 |
| DI2/CAP3[1] | Digital input 2 / Capture input 3[1] |
| DI3 | Digital input 3 |
| DI4 | Digital input 4 |
| DI5 | Digital input 5 |
| **(1)** Available with hardware version ≥RS03 | |

The connectors are coded. Verify correct assignment when connecting them.

The configuration and the standard assignment of the inputs and outputs are described in section Digital Signal Inputs and Digital Signal Outputs, page 199.

## Connecting the Digital Inputs/Outputs

- Wire the digital connections to CN6.
- Ground the shield to *SHLD*.
- Verify that the connector locks snap in properly.

# Connection PC with Commissioning Software (CN7)

## General

A PC with the commissioning software Lexium DTM Library can be connected for commissioning. The PC is connected via a bidirectional USB/RS485 converter, see Accessories and Spare Parts, page 647.

If the commissioning interface at the product is directly connected to an Ethernet interface at the PC, the PC interface may be damaged and rendered inoperable.
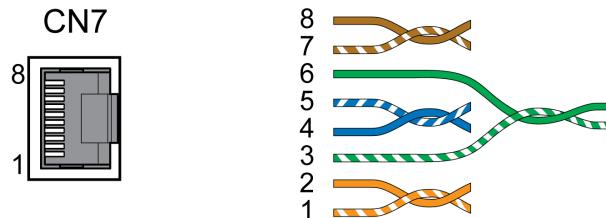
| *NOTICE* |
| --- |
| **DAMAGE TO PC** |
| • Use a bidirectional RJ45/USB-A adapter with an RS485/USB converter to connect to a PC. |
| • Do not directly connect an Ethernet interface to the commissioning interface of this product. |
| **Failure to follow these instructions can result in equipment damage.** |

## Cable Specifications

| | |
| --- | --- |
| Shield: | Required, both ends grounded |
| Twisted Pair: | Required |
| PELV: | Required |
| Cable composition: | 8 * 0.25 mm$^2$ (8 * AWG 22) |
| Maximum cable length: | 100 m (328 ft) |

## Wiring Diagram



| Pin | Signal | Meaning |
| --- | --- | --- |
| 1 ... 3 | - | Reserved |
| 4 | *MOD_D1* | RS485, Bidirectional transmit/receive signal |
| 5 | *MOD_D0* | RS485, Bidirectional transmit/receive signal, inverted |
| 6 | - | Reserved |
| 7 | *MOD+10V_OUT* | 10 V supply, maximum 100 mA |
| 8 | *MOD_0V* | Reference potential to *MOD+10V_OUT* |

| ⚠ **WARNING** |
| --- |
| **UNINTENDED EQUIPMENT OPERATION** |
| Do not connect any wiring to reserved, unused connections, or to connections designated as No Connection (N.C.). |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |

Verify that the connector locks snap in properly.

# Verifying Installation

## Description

Verify proper installation:

- Verify the mechanical installation of the entire drive system:
  - Does the installation meet the specified distance requirements?
  - Did you tighten all fastening screws with the specified tightening torque?
- Verify the electrical connections and the cabling:
  - Did you connect all protective ground conductors?
  - Do all fuses have the correct rating; are the fuses of the specified type?
  - Did you connect all wires of the cables or insulate them?
  - Did you properly connect and install all cables and connectors?
  - Are the mechanical locks of the connectors correct and effective?
  - Did you properly connect the signal wires?
  - Are the required shield connections EMC-compliant?
  - Did you take all measures for EMC compliance?
  - Does the drive installation conform to all local, regional, and national electrical safety codes for the eventual placement of the equipment?
- Verify that all covers and seals have been properly installed to achieve the required degree of protection.

# Commissioning

## Overview

### General

The safety-related function STO (Safe Torque Off) does not remove power from the DC bus. The safety-related function STO only removes power to the motor. The DC bus voltage and the mains voltage to the drive are still present.

---

**⚡⚠ DANGER**

**ELECTRIC SHOCK**

- Do not use the safety-related function STO for any other purposes than its intended function.
- Use an appropriate switch, that is not part of the circuit of the safety-related function STO, to disconnect the drive from the mains power.

**Failure to follow these instructions will result in death or serious injury.**

---

External driving forces acting on the motor can cause high currents to be regenerated and supplied back to the drive.

---

**⚠ DANGER**

**FIRE DUE TO EXTERNAL DRIVING FORCES ACTING ON MOTOR**

Verify that no external forces can act on the motor in the case of errors of error classes 3 or 4.

**Failure to follow these instructions will result in death or serious injury.**

---

Unsuitable parameter values or unsuitable data may trigger unintended movements, trigger signals, damage parts and disable monitoring functions. Some parameter values or data do not become active until after a restart.

---

**⚠ WARNING**

**UNINTENDED EQUIPMENT OPERATION**

- Only start the system if there are no persons or obstructions in the zone of operation.
- Do not operate the drive system with undetermined parameter values or data.
- Never modify a parameter value unless you fully understand the parameter and all effects of the modification.
- Restart the drive and verify the saved operational data and/or parameter values after modifications.
- Carefully run tests for all operating states and potential error situations when commissioning, upgrading or otherwise modifying the operation of the drive.
- Verify the functions after replacing the product and also after making modifications to the parameter values and/or other operational data.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

---

If the power stage is disabled unintentionally, for example as a result of power outage, errors or functions, the motor is no longer decelerated in a controlled way.

| ⚠ **WARNING** |
|---|
| **UNINTENDED EQUIPMENT OPERATION** |
| Verify that movements without braking effect cannot cause injuries or equipment damage. |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |

Applying the holding brake while the motor is running will cause excessive wear and degradation of the braking torque.

| ⚠ **WARNING** |
|---|
| **LOSS OF BRAKING FORCE DUE TO WEAR OR HIGH TEMPERATURE** |
| • Do not use the holding brake as a service brake. |
| • Do not exceed the maximum number of brake applications and the kinetic energy during braking of moving loads. |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |

When the product is operated for the first time, there is a risk of unanticipated movements caused by, for example, incorrect wiring or unsuitable parameter settings. Releasing the holding brake can cause an unintended movement, for example, a falling load in the case of vertical axes.

| ⚠ **WARNING** |
|---|
| **UNINTENDED MOVEMENT** |
| • Verify that there are no persons or obstructions in the zone of operation when operating the system. |
| • Take appropriate measures to avoid hazards caused by falling or lowering loads or other unintended movements. |
| • Run initial tests without coupled loads. |
| • Verify that a functioning emergency stop push-button is within reach of all persons involved in running tests. |
| • Anticipate movements in unintended directions or oscillations of the motor. |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |

The product can be accessed via different types of access channels. Simultaneous access via multiple access channels or the use of exclusive access may cause unintended equipment operation.

| ⚠ **WARNING** |
|---|
| **UNINTENDED EQUIPMENT OPERATION** |
| • Verify that simultaneous access via multiple access channels cannot cause unintended triggering or blocking of commands. |
| • Verify that the use of exclusive access cannot cause unintended triggering or blocking of commands. |
| • Verify that the required access channels are available. |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |

The metal surfaces of the product may exceed 70 °C (158 °F) during operation.

---

## ⚠ CAUTION

**HOT SURFACES**

- Avoid unprotected contact with hot surfaces.

- Do not allow flammable or heat-sensitive parts in the immediate vicinity of hot surfaces.

- Verify that the heat dissipation is sufficient by performing a test run under maximum load conditions.

**Failure to follow these instructions can result in injury or equipment damage.**

---

If the drive was not connected to mains for more than 24 months, the capacitors must be restored to their full performance before the motor is started.

---

## *NOTICE*

**REDUCED CAPACITOR PERFORMANCE**

Apply mains voltage to the drive for at least one hour before enabling the power stage for the first time in case that the drive has not been under power for a period of 24 months or greater.

**Failure to follow these instructions can result in equipment damage.**

---

If the drive is being commissioned for the first time, verify the date of manufacture and run the procedure specified above if the date of manufacture is more than 24 months in the past.

# Preparation

## Required Components

The following is required for commissioning:
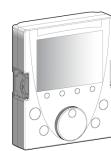
- Commissioning software "Lexium DTM Library"

  https://www.se.com/ww/en/download/document/Lexium_DTM_Library/

- Fieldbus converter for the commissioning software for connection via the commissioning interface

## Interfaces

The following interfaces can be used for commissioning, parameterization and diagnostics:
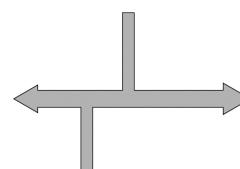
**1** Integrated HMI

**2** External graphic display terminal

**3** PC with commissioning software "Lexium DTM Library"

**4** Fieldbus

Device settings can be duplicated. Stored device settings can be transferred to a device of the same type. Duplicating the device settings can be used if multiple devices are to have the same settings, for example, when devices are replaced.
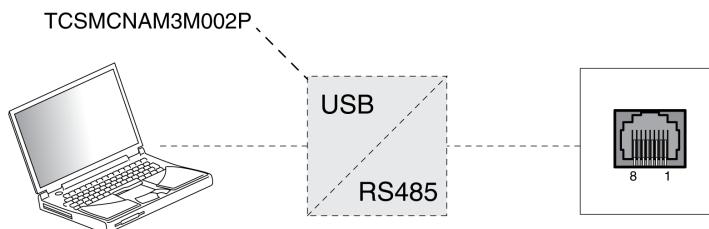
## Commissioning Software

The commissioning software "Lexium DTM Library" has a graphic user interface and is used for commissioning, diagnostics and testing settings.

- Tuning of the control loop parameters via a graphical user interface
- Comprehensive set of diagnostics tools for optimization and maintenance
- Long-term trace for evaluation of the performance
- Testing the input and output signals
- Tracking signals on the screen
- Archiving of device settings and recordings with export function for further processing in other applications

## Connecting a PC

A PC with commissioning software can be connected for commissioning. The PC is connected to a bidirectional USB/RS485 converter, see Accessories and Spare Parts, page 647.
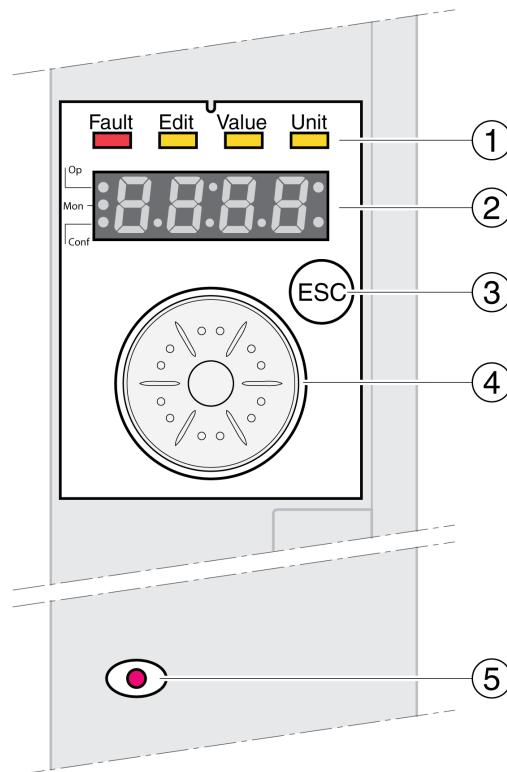
# Integrated HMI

## Overview of Integrated HMI

### Overview

The device allows you to edit parameters, start the operating mode Jog or perform autotuning via the integrated Human-Machine Interface (HMI). Diagnostics information (such as parameter values or error codes) can also be displayed. The individual sections on commissioning and operation include information on whether a function can be carried out via the integrated HMI or whether the commissioning software must be used.



**1** Status LEDs

**2** 7-segment display

**3** ESC key

**4** Navigation button

**5** Red LED on: Voltage present at DC bus

Status LEDs and a 4-digit 7-segment display indicate the device status, menu designation, parameter codes, status codes and error codes. By turning the navigation button, you can select menu levels and parameters and increment or decrement values. To confirm a selection, press the navigation button.
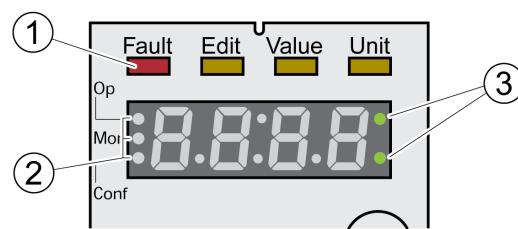
The ESC (Escape) button allows you to exit parameters and menus. If values are displayed, the ESC button lets you return to the last saved value.

## Character Set on the HMI

The following table shows the assignment of the characters to the symbols displayed by the 4-digit 7-segment display.

| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *A* | *b* | *cC* | *d* | *E* | *F* | *G* | *H* | *i* | *J* | *K* | *L* | *N* | *n* | *o* | *P* | *q* | *r* |

| S | T | U | V | W | X | Y | Z | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *S* | *t* | *u* | *V* | *W* | *X* | *y* | *Z* | *I* | *2* | *3* | *4* | *5* | *6* | *7* | *8* | *9* | *0* |

## Indication of the Device Status



**1** Four status LEDs

**2** Three status LEDS for identification of the menu levels

**3** Flashing dots indicate an error of error class 0

1: Four status LEDs are located above the 7-segment display:

| Fault | Edit | Value | Unit | Meaning |
|-------|------|-------|------|---------|
| Red | - | - | - | Operating state Fault |
| - | Yellow | Yellow | - | Parameter value can be edited |
| - | - | Yellow | - | Value of the parameter |
| - | - | - | Yellow | Unit of the selected parameter |

2: Three status LEDS for identification of the menu levels:

| LED | Meaning |
|-----|---------|
| Op | Operation |
| Mon | Status information |
| Conf | Configuration |
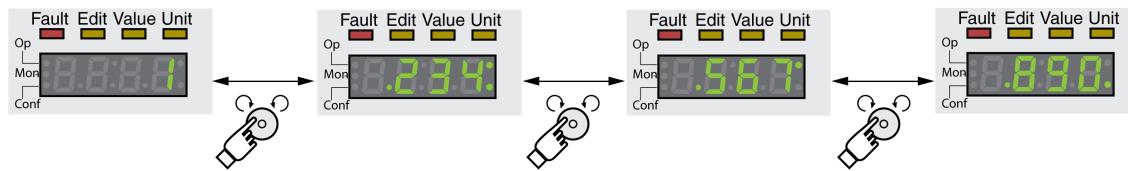
3: Flashing dots indicate an error of error class 0, for example, if a limit value has been exceeded.

## Display of Values

The HMI can directly display values up to 999.

Values greater than 999 are displayed in ranges of 1000. Turn the navigation button to select one of the ranges.

Example: Value 1234567890

## Navigation Button

The navigation button can be turned and pressed. There are two types of pressing: brief pressing (≤1 s) and long pressing (≥3 s).

**Turn** the navigation button to do the following:

- Go to the next or previous menu
- Go to the next or previous parameter
- Increment or decrement values
- Switch between ranges in the case of values greater than 999

Briefly **press** the navigation button to do the following:

- Call the selected menu
- Call the selected parameter
- Save the value to the nonvolatile memory
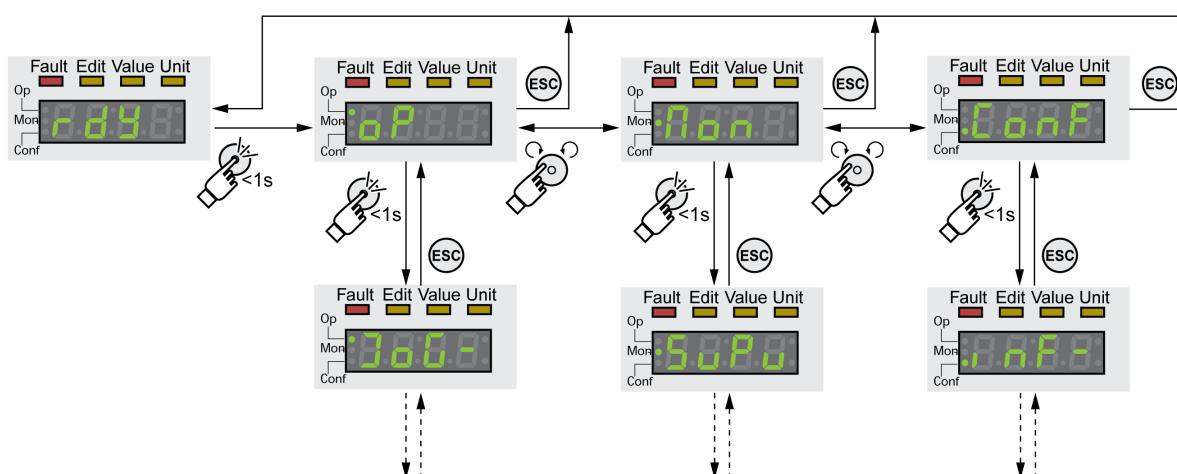
**Hold down** the navigation button to do the following:

- Display a description of the selected parameter
- Display the unit of the selected parameter

# Menu Structure
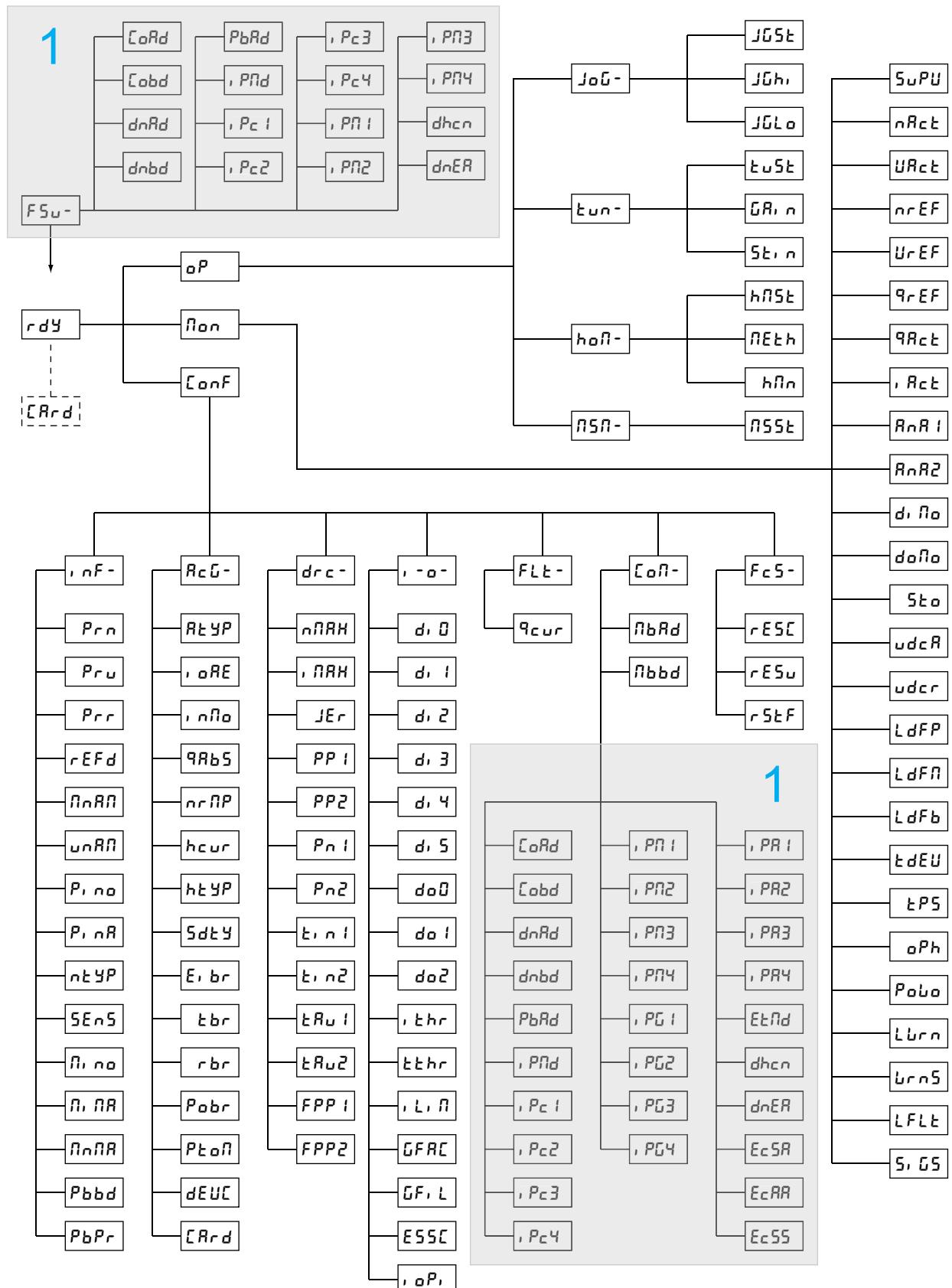
## Description

The integrated HMI is menu-driven. The following illustration shows the top level of the menu structure.



The level below the top level contains the parameters belonging to the respective menu items. To facilitate access, the parameter tables also specify the menu path, for example _o P_ → _J o G_ - .

## Menu Overview



**1** Depending on module

| HMI menu *FSu-* | Description |
|---|---|
| *FSu-* | First setup (**F**irst **S**etup) |
| *CoAd* | CANopen address (node number) |

| HMI menu *F 5 ⊔ -* | Description |
|---|---|
| *C o b d* | CANopen baud rate |
| *d n A d* | DeviceNet node address (MAC ID) |
| *d n b d* | DeviceNet baud rate |
| *P b A d* | Profibus address |
| *i P ∏ d* | Method of obtaining IP address |
| *i P c 1* | IP address Ethernet module, byte 1 |
| *i P c 2* | IP address Ethernet module, byte 2 |
| *i P c 3* | IP address Ethernet module, byte 3 |
| *i P c 4* | IP address Ethernet module, byte 4 |
| *i P ∏ 1* | IP address subnet mask, byte 1 |
| *i P ∏ 2* | IP address subnet mask, byte 2 |
| *i P ∏ 3* | IP address subnet mask, byte 3 |
| *i P ∏ 4* | IP address subnet mask, byte 4 |
| *d h c n* | User application name HMI, part 4 |
| *d n E A* | Value for device name extension |

| HMI menu *o P* | Description |
|---|---|
| *o P* | Operating mode (**Op**eration) |
| *J o G -* | Operating mode Jog |
| *t ⊔ n -* | Autotuning |
| *h o ∏ -* | Operating mode Homing |
| *∏ 5 ∏ -* | Operating mode Motion Sequence |

| HMI menu *J o G -* | Description |
|---|---|
| *J o G -* | Operating mode Jog |
| *J G 5 t* | Start operating mode Jog |
| *J G h i* | Velocity for fast movement |
| *J G L o* | Velocity for slow movement |

| HMI menu *t ⊔ n -* | Description |
|---|---|
| *t ⊔ n -* | Autotuning |
| *t ⊔ 5 t* | Start autotuning |
| *G A i n* | Global gain factor (affects parameter set 1) |
| *5 t i n* | Direction of movement for Autotuning |

| HMI menu *h o ∏ -* | Description |
|---|---|
| *h o ∏ -* | Operating mode Homing |
| *h ∏ 5 t* | Start operating mode Homing |
| *∏ E t h* | Preferred homing method |
| *h ∏ n* | Target velocity for searching the switch |

| HMI menu *∏ 5 ∏ -* | Description |
|---|---|
| *∏ 5 ∏ -* | Operating mode Motion Sequence |
| *∏ 5 5 t* | Start operating mode Motion Sequence |

| HMI menu *Mon* | Description |
|---|---|
| *Mon* | Monitoring (**Mon**itoring) |
| *SuPv* | HMI display when motor moves |
| *nAct* | Actual speed of rotation |
| *VAct* | Actual velocity |
| *nrEF* | Reference speed of rotation |
| *VrEF* | Reference velocity |
| *qrEF* | Reference motor current (q component, generating torque) |
| *qAct* | Actual motor current (q component, generating torque) |
| *iAct* | Total motor current |
| *AnA1* | Analog 1: Value of input voltage |
| *AnA2* | Analog 2: Value of input voltage |
| *diMo* | Status of digital inputs |
| *doMo* | Status of digital outputs |
| *Sto* | Status of the inputs for the safety-related function STO |
| *udcA* | Voltage at DC bus |
| *udcr* | Degree of utilization of DC bus voltage |
| *LdFP* | Load of power stage |
| *LdFM* | Load of motor |
| *LdFb* | Load of braking resistor |
| *tdEV* | Device temperature |
| *tPS* | Temperature of power stage |
| *oPh* | Operating hours counter |
| *PoLo* | Number of power on cycles |
| *LWrn* | Detected error not causing a stop (error class 0) |
| *WrnS* | Detected error of error class 0, bit-coded (parameter _*WarnLatched*) |
| *LFLt* | Detected error causing a stop (error classes 1 to 4) |
| *SiGS* | Saved status of monitoring signals |

| HMI menu *ConF* | Description |
|---|---|
| *ConF* | Configuration (**Conf**iguration) |
| *inF-* | Information/Identification (**INF**ormation / Identification) |
| *AcG-* | Axis configuration (**A**xis **C**onfi**g**uration) |
| *drc-* | Device configuration (**DR**ive **C**onfiguration) |
| *i-o-* | Configurable inputs/outputs (**I**n **O**ut) |
| *FLt-* | Indication of detected error |
| *CoM-* | Communication (**COM**munication) |
| *FcS-* | Restore factory settings (default values) (**Fac**tory **S**ettings) |

| HMI menu *inF-* | Description |
|---|---|
| *inF-* | Information/Identification (**INF**ormation / Identification) |
| *Prn* | Firmware number |
| *Prv* | Firmware Version |
| *Prr* | Firmware Revision |

| HMI menu  ɪ n F - | Description |
|---|---|
| r E F d | Product name |
| Ⲛ n A Ⲛ | Type |
| ᴜ n A Ⲛ | User application name |
| P ɪ n o | Nominal current of power stage |
| P ɪ n A | Maximum current of power stage |
| n t Ꮎ P | Motor type |
| S E n S | Encoder type of motor |
| Ⲛ ɪ n o | Nominal current of motor |
| Ⲛ ɪ Ⲛ A | Maximum motor current |
| Ⲛ n Ⲛ A | Maximum permissible speed of rotation/velocity of motor |
| P b b d | Profibus baud rate |
| P b P r | Profibus drive profile |

| HMI menu A c G - | Description |
|---|---|
| A c G - | Axis configuration (**A**xis **C**onfiguration) |
| A t Ꮎ P | Activation of Modulo |
| ɪ o A E | Enabling the power stage at PowerOn |
| ɪ n Ⲛ o | Inversion of direction of movement |
| 9 A b S | Simulation of absolute position at power cycling |
| n r Ⲛ P | Maximum velocity of the motion profile for velocity |
| h c ᴜ r | Current value for Halt |
| h t Ꮎ P | Halt option code |
| S d t Ꮎ | Behavior for disabling the power stage during movement |
| E ɪ b r | Selection of internal or external braking resistor |
| t b r | Maximum permissible activation duration of external braking resistor |
| r b r | Resistance value of external braking resistor |
| P o b r | Nominal power of external braking resistor |
| P t o Ⲛ | Type of usage of PTO interface |
| d E V C | Specification of the control mode |
| C A r d | Memory card management |

| HMI menu d r C - | Description |
|---|---|
| d r C - | Device configuration (**DR**ive **C**onfiguration) |
| n Ⲛ A X | Velocity limitation |
| ɪ Ⲛ A X | Current limitation |
| J E r | Jerk limitation of the motion profile for velocity |
| P P 1 | Position controller P gain |
| P P 2 | Position controller P gain |
| P n 1 | Velocity controller P gain |
| P n 2 | Velocity controller P gain |
| t ɪ n 1 | Velocity controller integral action time |
| t ɪ n 2 | Velocity controller integral action time |
| t A ᴜ 1 | Filter time constant of the reference velocity value filter |
| t A ᴜ 2 | Filter time constant of the reference velocity value filter |

| HMI menu $drC$ - | Description |
|---|---|
| $FPP1$ | Feed-forward control Velocity |
| $FPP2$ | Feed-forward control Velocity |

| HMI menu $i$-$o$- | Description |
|---|---|
| $i$-$o$- | Configurable inputs/outputs (**In O**ut) |
| $diO$ | Function Input DI0 |
| $di1$ | Function Input DI1 |
| $di2$ | Function Input DI2 |
| $di3$ | Function Input DI3 |
| $di4$ | Function Input DI4 |
| $di5$ | Function Input DI5 |
| $doO$ | Function Output DQ0 |
| $do1$ | Function Output DQ1 |
| $do2$ | Function Output DQ2 |
| $ithr$ | Monitoring of current threshold |
| $tthr$ | Monitoring of time window |
| $iLin$ | Current limitation via input |
| $GFAc$ | Selection of special gear ratios |
| $GFiL$ | Activation of jerk limitation |
| $ESSc$ | Encoder Simulation Resolution |
| $ioPi$ | Selection of type of reference value signal for PTI interface |

| HMI menu $FLt$ - | Description |
|---|---|
| $FLt$ - | Indication of detected error |
| $qcur$ | Current value for Quick Stop |

| HMI menu $CoM$ - | Description |
|---|---|
| $CoM$ - | Communication (**COM**munication) |
| $MbAd$ | Modbus address |
| $Mbbd$ | Modbus baud rate |
| $CoAd$ | CANopen address (node number) |
| $Cobd$ | CANopen baud rate |
| $dnAd$ | DeviceNet node address (MAC ID) |
| $dnbd$ | DeviceNet baud rate |
| $PbAd$ | Profibus address |
| $iPMd$ | Method of obtaining IP address |
| $iPc1$ | IP address Ethernet module, byte 1 |
| $iPc2$ | IP address Ethernet module, byte 2 |
| $iPc3$ | IP address Ethernet module, byte 3 |
| $iPc4$ | IP address Ethernet module, byte 4 |
| $iPM1$ | IP address subnet mask, byte 1 |
| $iPM2$ | IP address subnet mask, byte 2 |
| $iPM3$ | IP address subnet mask, byte 3 |
| $iPM4$ | IP address subnet mask, byte 4 |

| HMI menu $Con$- | Description |
|---|---|
| $iPG1$ | IP address gateway, byte 1 |
| $iPG2$ | IP address gateway, byte 2 |
| $iPG3$ | IP address gateway, byte 3 |
| $iPG4$ | IP address gateway, byte 4 |
| $iPA1$ | Currently used IP address Ethernet module, byte 1 |
| $iPA2$ | Currently used IP address Ethernet module, byte 2 |
| $iPA3$ | Currently used IP address Ethernet module, byte 3 |
| $iPA4$ | Currently used IP address Ethernet module, byte 4 |
| $EtMd$ | Protocol |
| $dhcn$ | User application name HMI, part 4 |
| $dnEA$ | Value for device name extension |
| $EcSA$ | Second EtherCAT address |
| $EcAA$ | EtherCAT address |
| $EcSS$ | EtherCAT slave state |

| HMI menu $FcS$- | Description |
|---|---|
| $FcS$- | Restore factory settings (default values) (**Fac**tory **S**ettings) |
| $rESc$ | Reset control loop parameters |
| $rESu$ | Resetting the user parameters |
| $rStF$ | Restore factory settings (default values) |

# Setting Parameters

## Displaying and Setting Parameters

The figure below shows an example of displaying a parameter (second level) and entering or selecting a parameter value (third level).



- Go to the parameter $iMAX$ (iMax).

- Press the navigation button for a longer period of time to display a parameter description.

  The parameter description is displayed in the form of horizontally scrolling text.

- Briefly press the navigation button to display the value of the selected parameter.

  The LED Value illuminates and the parameter value is displayed.

- Press the navigation button for a longer period of time to display the unit of the parameter value.

  As long as the navigation button is held down, the status LEDs Value and Unit illuminate. The unit of the parameter value is displayed. Once you release the navigation button, the parameter value is displayed again.

- Press the navigation button to modify the value of the parameter.

  The status LEDs Edit and Value illuminate and the parameter value is displayed.

- Turn the navigation button to modify the value of the parameter. The increments and the limit value for each parameter are pre-defined.

- Briefly press the navigation button to save the modified parameter value.

  If you do not want to save the modified parameter value, press the ESC button to cancel. The display returns to the original value of the parameter.

  The displayed modified value of the parameter flashes once and is written to the nonvolatile memory.

- Press ESC to return to the menu

## Information to be Displayed During Motor Movements

By default, the 7-segment display displays the operating state during motor movements.

You can select the type of information to be displayed during motor movements via the menu item $\Pi o n$ / $S u P V$ :

- $S t A t$ displays the operating state (default)

- $V A c t$ displays the actual velocity of the motor

- $i A c t$ displays the actual torque of the motor
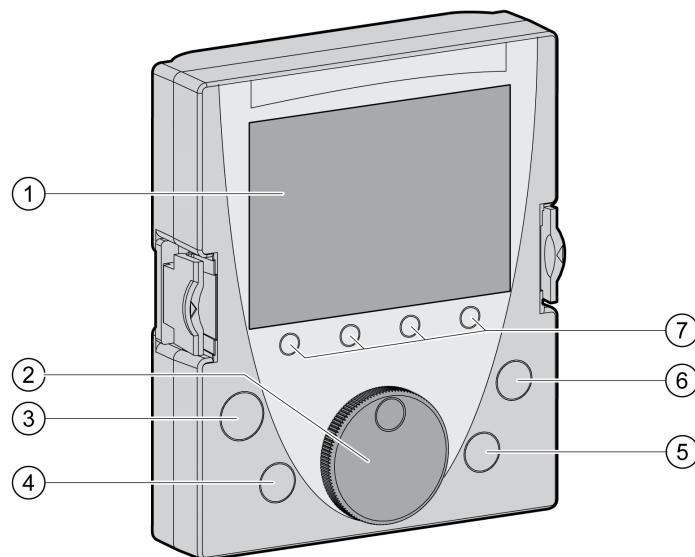
The modified value of the parameter is only taken into account at motor standstill.

# External Graphic Display Terminal

## Display and Controls

### Overview

The external graphic display terminal is designed only for commissioning drives.



**1** Display field

**2** Navigation button

**3** STOP/RESET key

**4** RUN key

**5** FWD/REV key

**6** ESC key
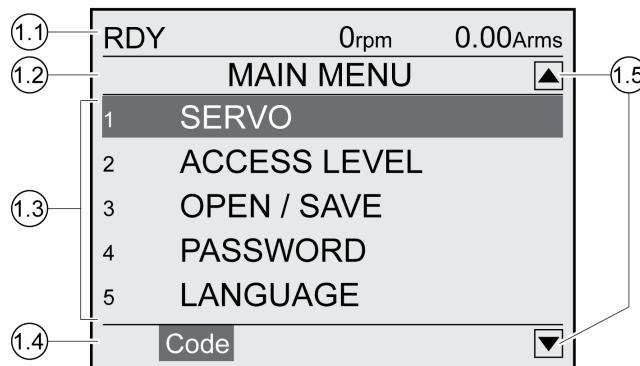
**7** Function keys F1 ... F4

Depending on the firmware version of the external graphic display terminal, the information may be represented differently. Use the most up-to-date firmware version.

## Display Field (1)

The display is subdivided into 5 areas.

Display of the graphic display terminal (example shows English language)

```
┌─────────────────────────────────────┐
│ RDY              0rpm      0.00Arms   │  ← (1.1)
│            MAIN MENU            ▲     │  ← (1.2)    (1.5)
│   1   SERVO                          │
│   2   ACCESS LEVEL                   │
│   3   OPEN / SAVE                    │  ← (1.3)
│   4   PASSWORD                       │
│   5   LANGUAGE                       │
│   Code                          ▼    │  ← (1.4)
└─────────────────────────────────────┘
```

**1.1** Status information of the drive

**1.2** Menu bar

**1.3** Data field

**1.4** Function bar

**1.5** Navigation

# Status Information of the Drive (1.1)

This line displays the operating state, the actual velocity and the actual current of the motor. If an error has been detected, the error code is displayed.

# Menu Bar (1.2)

The menu bar displays the name of the menu.

# Data Field (1.3)

The following information can be displayed and values entered in the data field:

- Submenus
- Operating Mode
- Parameters and parameter values
- State of movement
- Error messages

# Function Bar (1.4)

The function bar displays the name of the function that is triggered when you press the corresponding function key. Example: Pressing the F1 function key displays the "Code". If you press F1, the HMI name of the displayed parameter is shown.

# Navigation (1.5)

Arrows indicate that additional information is available that can be displayed by scrolling.

## Navigation Button (2)

By turning the navigation button, you can select menu levels and parameters and increment or decrement values. To confirm a selection, press the navigation button.

## Key STOP/RESET (3)

The key STOP/RESET terminates a movement by means of a Quick Stop.

## Key RUN (4)

The key RUN allows you to start a movement.

## Key FWD/REV (5)

The key FWD/REV allows you to reverse the direction of movement.

## Key ESC (6)

The ESC (Escape) button allows you to exit parameters and menus or cancel a movement. If values are displayed, the ESC key lets you return to the last saved value.

## Function Keys F1 ... F4 (7)

The function bar displays the name of the function triggered when the corresponding function key is pressed.

# Connecting the External Graphic Display Terminal to LXM32

## Description

The external graphic display terminal is an accessory for the drive, see Accessories and Spare Parts, page 647. The external graphic display terminal is connected to CN7 (commissioning interface). Only use the cable shipped with the external graphic display terminal to connect it. If the external graphic display terminal is connected to LXM32, the integrated HMI is deactivated. The integrated HMI shows *d ı S P* (Display).

# Using the External Graphic Display Terminal

## Example

The following example shows how to use the external graphic display terminal.

## Example 'Setting the Language'

In this example, you set the desired language for the external graphic display terminal. The installation of the drive must have been completed and the 24 Vdc control supply voltage must be on.

- Go to the main menu.

- Rotate the navigation button until item 5 (LANGUAGE) is highlighted.

- Press the navigation button to confirm the selection.

  The menu bar shows the selected function 5 (LANGUAGE). The data field displays the selected value, in this case the selected language.

- Press the navigation button to change the value.

  The menu bar displays the selected function "Language". The supported languages are shown in the data field.

- Turn the navigation button to select the desired language.

  The currently active language is highlighted by a check.

- Press the navigation button to confirm the selected value.

  The menu bar displays the selected function "Language". The selected language is shown in the data field.

- Press ESC to return to the main menu.

  The main menu is displayed in the selected language.

# Commissioning Procedure

## Powering on the Drive for the First Time

### Performing a "First Setup"

A "First Setup" is required when the 24 Vdc control supply of the drive is powered on for the first time or after the factory settings have been restored.

### Automatic Reading of the Motor Data Record

When the drive is powered on and if an encoder is connected to CN3, the drive automatically reads the electronic nameplate from the Hiperface encoder. The data record is verified and written to the nonvolatile memory.

The data record contains technical information on the motor such as nominal torque and peak torque, nominal current, nominal velocity and number of pole pairs. The data record cannot be modified by the user.

### Manual Adjustment of the Motor Parameters

If the motor encoder is not connected to CN3, the motor parameters must be adjusted manually. Refer to the information in the user guide for the encoder modules.

### Preparation

If the drive is not to be commissioned exclusively via the HMI, a PC with the commissioning software must be connected.

### Powering On the Drive

- Verify that the power stage supply and the 24 Vdc control supply are powered off.
- Disconnect the product from the fieldbus during commissioning in order to help avoid conflicts by simultaneous access.
- Power on the 24 Vdc control supply.

  The drive goes through an initialization routine. The segments of the 7-segment display and the status LEDs illuminate.

If a memory card is in the slot of the drive, the message $C\,A\,r\,d$ is displayed by the 7-segment display for a short period of time. This indicates that a memory card has been detected. If the message $C\,A\,r\,d$ is permanently displayed by the 7-segment display, there are differences between the content of the memory card and the parameter values stored in the drive. See section Memory Card, page 174 for additional information.

After initialization and if one or more modules are inserted, you must make additional settings depending on the module(s). Make these settings as described in the corresponding user guides for the modules.

### Restarting the Drive

Depending on the settings of the parameters, a restart of the drive may be required for the modifications to become effective.

- If the HMI shows $r\,d\,y$ the drive is ready for operation.

- If the HMI shows $n\ r\ d\ Y$ a restart of the drive is required. After the restart, the drive is ready for operation.

## Further Steps

- Attach a label to the drive that contains information for servicing the drive such as fieldbus type and device address.
- Make the settings described below for commissioning.

    **NOTE:** For more information on the presentation of parameters and a list of all operational parameters of the drive, see Parameters, page 448.

# Setting Limit Values

## Setting Limit Values

Suitable limit values must be determined and calculated on the basis of the system and motor data. As long as the motor is operated without loads, the default settings do not need to be changed.

## Current Limitation

The maximum motor current can be set with the parameter *CTRL_I_max*.

The maximum current for the "Quick Stop" function can be limited with the parameter *LIM_I_maxQSTP* and for the "Halt" function with the parameter *LIM_I_maxHalt*.

- Use the parameter *CTRL_I_max* to set the maximum motor current.
- Use the parameter *LIM_I_maxQSTP* to set the maximum motor current for the "Quick Stop" function.
- Use the parameter *LIM_I_maxHalt* to set the maximum motor current for the "Halt" function.

The motor can be decelerated via a deceleration ramp or the maximum current for the functions "Quick Stop" and "Halt".

The device limits the maximum permissible current on the basis of the motor data and the device data. Even if the value entered for the maximum current in the parameter *CTRL_I_max* is too high, the value is limited.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CTRL_I_max*<br><br>$C o n F \rightarrow d r C -$<br><br>$, \Pi A X$ | Current limitation.<br><br>During operation, the actual current limit is one of the following values (whichever is lowest):<br><br>- *CTRL_I_max*<br><br>- *_M_I_max*<br><br>- *_PS_I_max*<br><br>- Current limitation via analog input (module IOM1)<br><br>- Current limitation via digital input<br><br>Limitations caused by I2t monitoring are also taken into account.<br><br>Default: *_PS_I_max* at 8 kHz PWM frequency and 230/480 V mains voltage<br><br>In increments of 0.01 $A_{rms}$.<br><br>Modified settings become active immediately. | $A_{rms}$<br><br>0.00<br><br>-<br><br>463.00 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3011:$C_h$<br><br>Modbus 4376<br><br>Profibus 4376<br><br>CIP 117.1.12<br><br>ModbusTCP 4376<br><br>EtherCAT 3011:$C_h$<br><br>PROFINET 4376 |
| *LIM_I_maxQSTP*<br><br>$C o n F \rightarrow F L t -$<br><br>$q c u r$ | Current for Quick Stop.<br><br>This value is only limited by the minimum/ maximum value range (no limitation of this value by motor/power stage).<br><br>In the case of a Quick Stop, the current limit (*_Imax_act*) is one of the following values (whichever is lowest):<br><br>- *LIM_I_maxQSTP*<br><br>- *_M_I_max*<br><br>- *_PS_I_max*<br><br>Further current limitations caused by I2t monitoring are also taken into account during a Quick Stop.<br><br>Default: _PS_I_max at 8 kHz PWM frequency and 230/480 V mains voltage<br><br>In increments of 0.01 $A_{rms}$.<br><br>Modified settings become active immediately. | $A_{rms}$<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3011:$D_h$<br><br>Modbus 4378<br><br>Profibus 4378<br><br>CIP 117.1.13<br><br>ModbusTCP 4378<br><br>EtherCAT 3011:$D_h$<br><br>PROFINET 4378 |
| *LIM_I_maxHalt*<br><br>$C o n F \rightarrow A C G -$<br><br>$h c u r$ | Current for Halt.<br><br>This value is only limited by the minimum/ maximum value range (no limitation of this value by motor/power stage).<br><br>In the case of a Halt, the current limit (*_Imax_act*) is one of the following values (whichever is lowest):<br><br>- *LIM_I_maxHalt*<br><br>- *_M_I_max*<br><br>- *_PS_I_max*<br><br>Further current limitations caused by I2t monitoring are also taken into account during a Halt.<br><br>Default: _PS_I_max at 8 kHz PWM frequency and 230/480 V mains voltage<br><br>In increments of 0.01 $A_{rms}$.<br><br>Modified settings become active immediately. | $A_{rms}$<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3011:$E_h$<br><br>Modbus 4380<br><br>Profibus 4380<br><br>CIP 117.1.14<br><br>ModbusTCP 4380<br><br>EtherCAT 3011:$E_h$<br><br>PROFINET 4380 |

## Velocity Limitation

The parameter *CTRL_v_max* can be used to limit the maximum velocity.

**NOTE:** Values for positions, velocities, acceleration and deceleration are specified in the following user-defined unit:

- usr_p for positions
- usr_v for velocities
- usr_a for acceleration and deceleration

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CTRL_v_max* $\mathcal{C}$ o n F → d r C - n $\Pi$ $\mathcal{R}$ X | Velocity limitation. During operation, the velocity limit is one of the following values (whichever is lowest): - CTRL_v_max - M_n_max - Velocity limitation via analog input (module IOM1) - Velocity limitation via digital input Modified settings become active immediately. | usr_v 1 13200 2147483647 | UINT32 R/W per. - | CANopen 3011:10h Modbus 4384 Profibus 4384 CIP 117.1.16 ModbusTCP 4384 EtherCAT 3011:10h PROFINET 4384 |

# Digital Inputs and Outputs
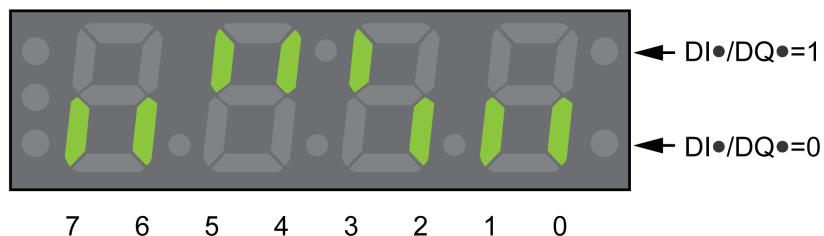
## General

The device has configurable inputs and configurable outputs. See section Digital Signal Inputs and Digital Signal Outputs, page 199 for additional information.

The signal states of the digital inputs and digital outputs can be displayed on the HMI and via the fieldbus.

## Integrated HMI

The signal states can be displayed on the integrated HMI, but they cannot be modified.



**Inputs** (parameter *_IO_DI_act*):

Open the menu item - $\Pi$ o n → d ı $\Pi$ o .

The digital inputs are displayed in a bit-coded way.

| Bit   | Signal |
|-------|--------|
| 0     | *DI0*  |
| 1     | *DI1*  |
| 2     | *DI2*  |
| 3     | *DI3*  |
| 4     | *DI4*  |
| 5     | *DI5*  |
| 6 ... 7 | -    |

The parameter *_IO_DI_act* does not display the states of the inputs of the safety-related function STO. Use the parameter *_IO_STO_act* to visualize the states of the inputs of the safety-related function STO.

**Outputs** (parameter *_IO_DQ_act*):

Open the menu item  - *Π o n → d o Π o* .

The digital outputs are displayed in a bit-coded way.

| Bit   | Signal |
|-------|--------|
| 0     | *DQ0*  |
| 1     | *DQ1*  |
| 2     | *DQ2*  |
| 3 ... 7 | -    |

## Fieldbus

The signal states are contained in the parameter *_IO_act* in a bit-coded way. The values "1" and "0" correspond to the signal state of the input or output.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _IO_act | Physical status of the digital inputs and outputs. Low byte: Bit 0: DI0 Bit 1: DI1 Bit 2: DI2 Bit 3: DI3 Bit 4: DI4 Bit 5: DI5 High byte: Bit 8: DQ0 Bit 9: DQ1 Bit 10: DQ2 | - - - - | UINT16 R/- - - | CANopen 3008:1$_h$ Modbus 2050 Profibus 2050 CIP 108.1.1 ModbusTCP 2050 EtherCAT 3008:1$_h$ PROFINET 2050 |
| _IO_DI_act Пол dıПо | Status of digital inputs. Bit assignments: Bit 0: DI0 Bit 1: DI1 Bit 2: DI2 Bit 3: DI3 Bit 4: DI4 Bit 5: DI5 | - - - - | UINT16 R/- - - | CANopen 3008:F$_h$ Modbus 2078 Profibus 2078 CIP 108.1.15 ModbusTCP 2078 EtherCAT 3008:F$_h$ PROFINET 2078 |
| _IO_DQ_act Пол doПо | Status of digital outputs. Bit assignments: Bit 0: DQ0 Bit 1: DQ1 Bit 2: DQ2 | - - - - | UINT16 R/- - - | CANopen 3008:10$_h$ Modbus 2080 Profibus 2080 CIP 108.1.16 ModbusTCP 2080 EtherCAT 3008:10$_h$ PROFINET 2080 |
| _IO_STO_act Пол Sto | Status of the inputs for the safety-related function STO. Bit 0: STO_A Bit 1: STO_B If no safety module eSM is inserted, this parameter indicates the status of the signal inputs STO_A and STO_B. If a safety module eSM is inserted, the safety-related function STO can be triggered via the signal inputs or via the safety module eSM. This parameter indicates whether or not the safety-related function STO was triggered (regardless of whether it was triggered via the signal inputs or via the safety module eSM). | - - - - | UINT16 R/- - - | CANopen 3008:26$_h$ Modbus 2124 Profibus 2124 CIP 108.1.38 ModbusTCP 2124 EtherCAT 3008:26$_h$ PROFINET 2124 |

# Verifying the Signals of the Limit Switches

## General

The use of limit switches can help protect against some hazards (for example, collision with mechanical stop caused by incorrect reference values).

---

### ⚠ WARNING

**LOSS OF CONTROL**

- Ensure that limit switches are installed as determined by your risk assessment.
- Verify correct connection of the limit switches.
- Verify that the limit switches are sufficiently distant from the mechanical end to allow an adequate stopping distance.
- Verify correct parameterization and function of the limit switches.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

---

- Install and configure the limit switches in such a way that no movements are made beyond the range defined by the limit switches.
- Trigger the limit switches manually.

  If an error message is indicated, the limit switches were triggered.

Parameters can be used to release the limit switches and to set them up as normally closed contacts or normally open contacts, see Limit Switches, page 350.

# Verifying the Safety-Related Function STO

## Operation with Safety-Related Function STO

If you want to use the safety-related function STO, carry out the following steps:

- To help avoid unintended restart after restoration of power, the parameter *IO_AutoEnable* must be set to "off". Verify that the parameter *IO_AutoEnable* is set to "off".

  HMI: $conF \rightarrow AcG \rightarrow ioAE$.

Power off the power stage supply and the 24 Vdc control supply:

- Verify that the signal wires at the inputs ($\overline{STO\_A}$) and ($\overline{STO\_B}$) are isolated from each other. The two signal wires must not be electrically connected.

Power on the power stage supply and the 24 Vdc control supply:

- Enable the power stage without starting a motor movement.
- Trigger the safety-related function STO.

  If the power stage is now disabled and the error message 1300 is indicated, the safety-related function STO was triggered.

  If a different error message is indicated, the safety-related function STO was not triggered.

- Document all tests of the safety-related function STO in your acceptance protocol.

## Operation without Safety-Related Function STO

If you do not want to use the safety-related function STO:

- Verify that the inputs $\overline{STO\_A}$ and $\overline{STO\_B}$ are connected to *+24VDC*.

# Holding Brake (Option)

## Holding Brake

The holding brake in the motor has the task of holding the motor position when the power stage is disabled. The holding brake is not a safety function and not a service brake.

> ## ⚠ WARNING
>
> **UNINTENDED AXIS MOVEMENT**
>
> • Do not use the internal holding brake as a safety-related measure.
> • Only use certified external brakes as safety-related measures.
>
> **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

## Releasing the Holding Brake

When the power stage is enabled, current is applied to the motor. When current is applied to the motor, the holding brake is automatically released.

Releasing the holding brake requires a certain amount of time. This time is contained in the electronic nameplate of the motor. Transition to the operating state **6** Operation Enabled is only possible after this time delay has elapsed.

An additional time delay can be set via parameters, see Additional Time Delay for Releasing the Holding Brake, page 148.

## Applying the Holding Brake

When the power stage is disabled, the holding brake is automatically applied.

However, applying the holding brake requires a certain amount of time. This time is contained in the electronic nameplate of the motor. Current remains to be applied to the motor during this time delay.
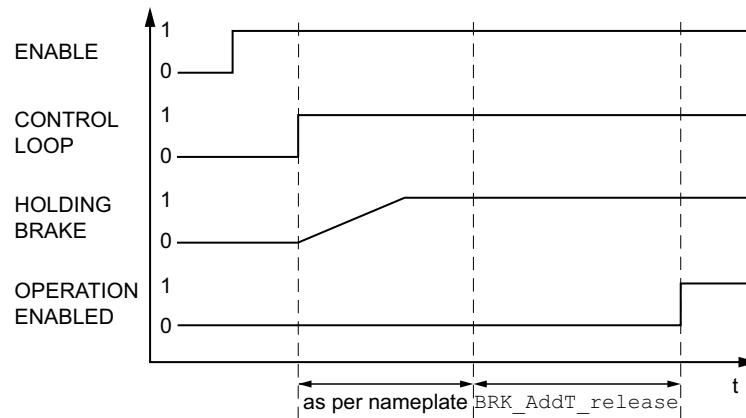
See section Functional Safety, page 78 for additional information on the behavior of the holding brake when the safety-related function STO is triggered.

An additional time delay can be set via parameters, see Additional Time Delay for Applying the Holding Brake, page 149.

## Additional Time Delay for Releasing the Holding Brake

An additional time delay can be set via the parameter *BRK_AddT_release*.

Transition to the operating state **6** Operation Enabled is only possible after the entire time delay has elapsed.

as per nameplate `BRK_AddT_release`

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *BRK_AddT_release* | Additional time delay for releasing the holding brake.<br><br>The overall time delay for releasing the holding brake is the time delay from the electronic nameplate of the motor and the additional time delay in this parameter.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled. | ms<br><br>0<br><br>0<br><br>400 | INT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3005:7$_h$<br><br>Modbus 1294<br><br>Profibus 1294<br><br>CIP 105.1.7<br><br>ModbusTCP 1294<br><br>EtherCAT 3005:7$_h$<br><br>PROFINET 1294 |

## Additional Time Delay for Applying the Holding Brake

An additional time delay can be set via the parameter *BRK_AddT_apply*.

Current continues to be applied to the motor until the entire time delay has passed.



as per nameplate `BRK_AddT_apply`

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *BRK_AddT_apply* | Additional time delay for applying the holding brake.<br><br>The overall time delay for applying the holding brake is the time delay from the electronic nameplate of the motor and the additional time delay in this parameter.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled. | ms<br><br>0<br><br>0<br><br>1000 | INT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3005:8$_h$<br><br>Modbus 1296<br><br>Profibus 1296<br><br>CIP 105.1.8<br><br>ModbusTCP 1296<br><br>EtherCAT 3005:8$_h$<br><br>PROFINET 1296 |

## Verifying the Function of the Holding Brake

The device is in the operating state **4** Ready To Switch On.

| Step | Action |
|---|---|
| 1 | Start the operating mode Jog (HMI: $oP → JoG → JGSt$).<br><br>The power stage is enabled and the holding brake released. The HMI displays $JG -$. |
| 2 | If the holding brake has been released, hold down the navigation button. Then press ESC.<br><br>As long as the navigation button is held down, the motor moves. When you press ESC, the holding brake is applied again and the power stage is disabled. |
| 3 | If the holding brake is not released, press ESC.<br><br>When you press ESC, the power stage is disabled. |
| 4 | Verify the wiring if the behavior of the holding brake is not correct. |

## Releasing the Holding Brake Manually

Mechanical adjustments may require you to manually rotate the motor shaft.

Manual release of the holding brake is only possible in the operating states **3** Switch On Disabled, **4** Ready To Switch On or **9** Fault.

When the product is operated for the first time, there is a risk of unanticipated movements caused by, for example, incorrect wiring or unsuitable parameter settings. Releasing the holding brake can cause an unintended movement, for example, a falling load in the case of vertical axes.

---

### ⚠**WARNING**

**UNINTENDED MOVEMENT**

- Verify that there are no persons or obstructions in the zone of operation when operating the system.
- Take appropriate measures to avoid hazards caused by falling or lowering loads or other unintended movements.
- Run initial tests without coupled loads.
- Verify that a functioning emergency stop push-button is within reach of all persons involved in running tests.
- Anticipate movements in unintended directions or oscillations of the motor.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

---

As of firmware version ≥V01.12, you can manually release the holding brake.

## Applying the Holding Brake Manually

For testing the holding brake, you may want to manually apply the holding brake.

You can only apply the holding brake manually when the motor is at a standstill.

If you enable the power stage after the holding brake has been applied manually, the holding brake remains applied.

Manual application of the holding brake has priority over automatic and manual release of the holding brake.

If a movement is started after the holding brake has been applied manually, this can cause wear.

| *NOTICE* |
| --- |
| **BRAKE WEAR AND LOSS OF BRAKING TORQUE** |
| • Verify that the generated motor torque is not greater than the holding torque of the holding brake if you have applied the holding brake manually. |
| • Only apply the holding brake manually for the purpose of testing the holding brake. |
| **Failure to follow these instructions can result in equipment damage.** |

As of firmware version ≥V01.20, you can manually apply the holding brake.

## Releasing the Holding Brake Manually via a Signal Input

In order to release the holding brake via a signal input, you must first parameterize the signal input function "Release Holding Brake", see Digital Signal Inputs and Digital Signal Outputs, page 199.

## Releasing or Applying the Holding Brake Manually via the Fieldbus

The parameter *BRK_release* can be used to release the holding brake via the fieldbus.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *BRK_release* | Manual operation of the holding brake. **0 / Automatic**: Automatic processing **1 / Manual Release**: Manual release of holding brake **2 / Manual Application**: Manual applying of holding brake You can apply or release the holding brake manually. The holding brake can only be manually released in the operating states 'Switch On Disabled', 'Ready To Switch On' or 'Fault'. If you have applied the holding brake manually and then want to release it manually, you must first set this parameter to Automatic and then to Manual Release. Modified settings become active immediately. Available with firmware version ≥V01.12. | - 0 0 2 | UINT16 R/W - - | CANopen 3008:A$_h$ Modbus 2068 Profibus 2068 CIP 108.1.10 ModbusTCP 2068 EtherCAT 3008:A$_h$ PROFINET 2068 |

# Verifying the Direction of Movement

## Definition of Direction of Movement

In the case of a rotary motors, direction of movement is defined in accordance with IEC 61800-7-204: Positive direction is when the motor shaft rotates clockwise as you look at the end of the protruding motor shaft.

It is important to maintain the IEC 61800-7-204 directional standard within your application because many motion-related function blocks, programming conventions, and, safety-related and conventional devices expect this underlying assumption within their logic and operational methodologies.

> ## ⚠ WARNING
>
> **UNINTENDED MOVEMENT CAUSED BY INTERCHANGED MOTOR PHASES**
>
> Do not interchange the motor phases.
>
> **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

If your application requires an inversion of the direction of movement, you can parameterize the direction of movement.

The direction of movement can be verified by starting a movement.

## Verifying the Direction of Movement

Power supply has been powered on.

*   Start the operating mode Jog. (HMI: ⌐P → JⱺG → JGSt )

    The HMI displays  JG - .

Movement in positive direction:

- Press the navigation button and hold it down.

  A movement is made in positive direction.

Movement in negative direction:

- Turn the navigation button until the HMI displays – ⅃ ᴄ .

- Press the navigation button and hold it down.

  A movement is made in negative direction.

## Changing the Direction of Movement

You can invert the direction of movement.

- Inversion of direction of movement is off:

  Movements are made in positive direction with positive target values.

- Inversion of direction of movement is on:

  Movements are made in positive direction with negative target values.

The parameter *InvertDirOfMove* allows you to invert the direction of movement.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *InvertDirOfMove*<br><br>ᴄ ᴏ ᴨ ᖴ → ᴀ ᴄ ᴦ -<br><br>ı ᴨ ᴨ ᴏ | Inversion of direction of movement.<br><br>**0 / Inversion Off / ᴏ ᖴ ᖴ** : Inversion of direction of movement is off<br><br>**1 / Inversion On / ᴏ ᴨ** : Inversion of direction of movement is on<br><br>The limit switch which is reached with a movement in positive direction must be connected to the positive limit switch input and vice versa.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:C$_h$<br><br>Modbus 1560<br><br>Profibus 1560<br><br>CIP 106.1.12<br><br>ModbusTCP 1560<br><br>EtherCAT 3006:C$_h$<br><br>PROFINET 1560 |

## Setting Parameters for Encoder

## General

When starting up, the device reads the absolute position of the motor from the encoder. The absolute position can be read with the parameter *_p_absENC*.

**NOTE:** Values for positions, velocities, acceleration and deceleration are specified in the following user-defined unit:

- usr_p for positions

- usr_v for velocities

- usr_a for acceleration and deceleration

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _p_absENC<br><br>*Ⴖ o ⴖ*<br><br>*P Ⴖ Ⴖ ⴜ* | Absolute position with reference to the encoder range.<br><br>This value corresponds to the modulo position of the absolute encoder range.<br><br>The value is no longer valid if the gear ratio of machine encoder and motor encoder is changed. A restart is required in such a case. | usr_p<br><br>-<br><br>-<br><br>- | UINT32<br><br>R/-<br><br>-<br><br>- | CANopen 301E:F$_h$<br><br>Modbus 7710<br><br>Profibus 7710<br><br>CIP 130.1.15<br><br>ModbusTCP 7710<br><br>EtherCAT 301E:F$_h$<br><br>PROFINET 7710 |

## Working Range of the Encoder

The working range of the singleturn encoder is 131072 increments per turn.

The working range of the multiturn encoder is 4096 turns with 131072 increments per turn.

## Underrun of Absolute Position

If a motor performs a movement from 0 into negative direction, there is an underrun of the absolute position of the encoder. However, the actual position keeps counting forward and delivers a negative position value. After a power cycle, the actual position no longer corresponds to the negative position value, but to the absolute position of the encoder.

The following options are available to adjust the absolute position of the encoder:

- Adjustment of the absolute position
- Shifting the working range

## Adjustment of the Absolute Position

When the motor is at a standstill, the new absolute position of the motor can be set to the current mechanical motor position the with the parameter *ENC1_adjustment*.

Adjusting the absolute position also shifts the position of the index pulse.

The absolute position of an encoder at encoder 2 (module) can be adjusted via the parameter ENC2_adjustment.

Procedure:

Set the absolute position at the negative mechanical limit to a position value greater than 0. This way, the movements remain within the continuous range of the encoder.

| Parameter name | Description | Unit | Data type | Parameter address via fieldbus |
|---|---|---|---|---|
| **HMI menu** | | **Minimum value** | **R/W** | |
| **HMI name** | | **Factory setting** | **Persistent** | |
| | | **Maximum value** | **Expert** | |
| *ENC1_adjustment* | Adjustment of absolute position of encoder 1. | usr_p | INT32 | CANopen 3005:16h |
| | The value range depends on the encoder type. | - | R/W | Modbus 1324 |
| | Singleturn encoder: | - | - | Profibus 1324 |
| | 0 ... x-1 | - | - | CIP 105.1.22 |
| | Multiturn encoder: | | | ModbusTCP 1324 |
| | 0 ... (4096*x)-1 | | | EtherCAT 3005:16h |
| | Singleturn encoder (shifted with parameter *ShiftEncWorkRang*): | | | PROFINET 1324 |
| | -(x/2) ... (x/2)-1 | | | |
| | Multiturn encoder (shifted with parameter *ShiftEncWorkRang*): | | | |
| | -(2048*x) ... (2048*x)-1 | | | |
| | Definition of 'x': Maximum position for one encoder turn in user-defined units. This value is 16384 with the default scaling. | | | |
| | If processing is to be performed with inversion of the direction of movement, this must be set before the encoder position is adjusted. | | | |
| | After the write access, a wait time of at least 1 second is required before the drive can be powered off. | | | |
| | Modified settings become active the next time the product is powered on. | | | |
| *ENC2_adjustment* | Adjustment of absolute position of encoder 2. | usr_p | INT32 | CANopen 3005:24h |
| | The value range depends on the encoder type at the physical port ENC2. | - | R/W | Modbus 1352 |
| | This parameter can only be changed if the parameter *ENC_abs_source* is set to 'Encoder 2'. | - | - | Profibus 1352 |
| | Singleturn encoder: | - | - | CIP 105.1.36 |
| | 0 … x-1 | | | ModbusTCP 1352 |
| | Multiturn encoder: | | | EtherCAT 3005:24h |
| | 0 … (y*x)-1 | | | PROFINET 1352 |
| | Singleturn encoder (shifted with parameter *ShiftEncWorkRang*): | | | |
| | -(x/2) … (x/2)-1 | | | |
| | Multiturn encoder (shifted with parameter *ShiftEncWorkRang*): | | | |
| | -(y/2)*x … ((y/2)*x)-1 | | | |
| | Definition of 'x': Maximum position for one encoder turn in user-defined units. This value is 16384 with the default scaling. | | | |
| | Definition of 'y': Revolutions of the multiturn encoder. | | | |
| | If processing is to be performed with inversion of the direction of movement, this must be set before the encoder position is adjusted. | | | |
| | After the write access, a wait time of at least 1 second is required before the drive can be powered off. | | | |
| | Modified settings become active the next time the product is powered on. | | | |

| Parameter name | Description | Unit | Data type | Parameter address via fieldbus |
|---|---|---|---|---|
| HMI menu | | Minimum value | R/W | |
| HMI name | | Factory setting | Persistent | |
| | | Maximum value | Expert | |
| | Available with firmware version ≥V01.01. | | | |

## Shifting the Working Range

The parameter *ShiftEncWorkRang* lets you shift the working range.

The working range without shift comprises:

| Singleturn encoder | 0 ... 131071 increments |
|---|---|
| Multiturn encoder | 0 ... 4095 revolutions |



The working range with shift comprises:

| Singleturn encoder | -65536 ... 65535 increments |
|---|---|
| Multiturn encoder | -2048 ... 2047 revolutions |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *ShiftEncWorkRang* | Shifting of the encoder working range. **0 / Off**: Shifting off **1 / On**: Shifting on After activating the shifting function, the position range of a multiturn encoder is shifted by one half of the range. Example for the position range of a multiturn encoder with 4096 revolutions: Value 0: Position values are between 0 … 4096 revolutions. Value 1: Position values are between -2048 … 2048 revolutions. Modified settings become active the next time the product is powered on. | - 0 0 1 | UINT16 R/W per. - | CANopen 3005:21$_h$ Modbus 1346 Profibus 1346 CIP 105.1.33 ModbusTCP 1346 EtherCAT 3005:21$_h$ PROFINET 1346 |

# Setting the Braking Resistor Parameters

## Description

An insufficiently rated braking resistor can cause overvoltage on the DC bus. Overvoltage on the DC bus causes the power stage to be disabled. The motor is no longer actively decelerated.

---

### ⚠ **WARNING**

**UNINTENDED EQUIPMENT OPERATION**

- Verify that the braking resistor has a sufficient rating by performing a test run under maximum load conditions.
- Verify that the parameter settings for the braking resistor are correct.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

---

The temperature of the braking resistor may exceed 250 °C (482 °F) during operation.

---

### ⚠ **WARNING**

**HOT SURFACES**

- Ensure that it is not possible to make any contact with a hot braking resistor.
- Do not allow flammable or heat-sensitive parts in the immediate vicinity of the braking resistor.
- Verify that the heat dissipation is sufficient by performing a test run under maximum load conditions.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

---

If you use an external braking resistor, perform the following steps:

- Set the parameter *RESint_ext* to "External Braking Resistor".
- Set the parameters *RESext_P*, *RESext_R* and *RESext_ton*.

The maximum value of *RESext_P* and the minimum value of *RESext_R* depend on the power stage, see Data for External Braking Resistor, page 50.

See section Rating the Braking Resistor, page 73 for additional information.

If the regenerated power becomes greater than the power that can be absorbed by the braking resistor, an error message is generated and the power stage is disabled.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *RESint_ext* ⊏ o n F → R ⊏ L - E ı b r | Selection of type of braking resistor. **0 / Internal Braking Resistor /** ı n ⊢ : Internal braking resistor **1 / External Braking Resistor /** E h ⊢ : External braking resistor **2 / Reserved /** r 5 V d : Reserved Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. | - 0 0 2 | UINT16 R/W per. - | CANopen 3005:9ₕ Modbus 1298 Profibus 1298 CIP 105.1.9 ModbusTCP 1298 EtherCAT 3005:9ₕ PROFINET 1298 |
| *RESext_P* ⊏ o n F → R ⊏ L - P o b r | Nominal power of external braking resistor. The maximum value depends on the power stage. Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. | W 1 10 - | UINT16 R/W per. - | CANopen 3005:12ₕ Modbus 1316 Profibus 1316 CIP 105.1.18 ModbusTCP 1316 EtherCAT 3005:12ₕ PROFINET 1316 |
| *RESext_R* ⊏ o n F → R ⊏ L - r b r | Resistance value of external braking resistor. The minimum value depends on the power stage. In increments of 0.01 Ω. Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. | Ω - 100.00 327.67 | UINT16 R/W per. - | CANopen 3005:13ₕ Modbus 1318 Profibus 1318 CIP 105.1.19 ModbusTCP 1318 EtherCAT 3005:13ₕ PROFINET 1318 |
| *RESext_ton* ⊏ o n F → R ⊏ L - ⊢ b r | Maximum permissible switch-on time of external braking resistor. Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. | ms 1 1 30000 | UINT16 R/W per. - | CANopen 3005:11ₕ Modbus 1314 Profibus 1314 CIP 105.1.17 ModbusTCP 1314 EtherCAT 3005:11ₕ PROFINET 1314 |

# Autotuning

## General

Autotuning moves the motor in order to tune the control loops. Incorrect parameters may cause unintended movements or the loss of monitoring functions.

---

### ⚠ **WARNING**

**UNINTENDED MOVEMENT**

- Only start the system if there are no persons or obstructions in the zone of operation.
- Verify that the values for the parameters *AT_dir* and *AT_dis_usr* (*AT_dis*) do not exceed the available movement range.
- Verify that the parameterized movement ranges are available, free and clear for the mechanical movement defined by your application logic.
- Include in your calculations when determining the available movement range the additional distance for the deceleration ramp in the case of an emergency stop.
- Verify that the parameter settings for a Quick Stop are correct.
- Verify correct operation of the limit switches.
- Verify that a functioning emergency stop push-button is within reach of all persons involved in all phases of machine operation and maintenance involving this equipment.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

---

Autotuning determines the friction torque as a constantly acting load torque and considers it in the calculation of the moment of inertia of the entire system.

External factors such as a load at the motor are considered. Autotuning optimizes the settings of the control loop parameters, see Controller Optimization with Step Response, page 164.

Autotuning also supports vertical axes.

## Methods

There are three ways of tuning the drive control loops:

- Easy Tuning: Automatic - autotuning without user intervention. For most applications, autotuning yields good, highly dynamic results.
- Comfort Tuning: Semi-automatic - autotuning with user intervention. Parameters for direction and parameters for damping can be set by the user.
- Manual Tuning: The user can set and tune the control loop parameters manually. Manual Tuning is available in the Expert Mode of the commissioning software.

## Function

During autotuning, the motor is activated and small movements are made. Noise development and mechanical oscillations of the system are normal.

If you want to perform Easy Tuning, no additional parameters need to be adjusted. To perform Comfort Tuning, the parameters *AT_dir*, *AT_dis_usr* and *AT_mechanics* are available to be adjusted to meet the requirements of your application.

The parameter *AT_Start* is used to start Easy Tuning or Comfort Tuning.

---

- Start autotuning via the commissioning software.

  It is also possible to start autotuning via the HMI.

  HMI: _o P_ → _t u n_ → _t u S t_

- Save the new settings to the nonvolatile memory via the commissioning software.

  If you have started autotuning via the HMI, press the navigation button to save the new values to the nonvolatile memory.

  The product features 2 control loop parameter sets that can be parameterized separately. The values for the control loop parameters determined during autotuning are stored in control loop parameter set 1.

If autotuning cancels with an error message, the default values are used. Change the mechanical position and restart autotuning. If you want to verify the plausibility of the calculated values, you can have them displayed; see Enhanced Settings for Autotuning, page 161.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *AT_dir* <br><br> _o P_ → _t u n_ - <br> _S t i N_ | Direction of movement for Autotuning. <br><br> **1 / Positive Negative Home /** _P n h_: Positive direction first, then negative direction with return to initial position <br><br> **2 / Negative Positive Home /** _n P h_: Negative direction first, then positive direction with return to initial position <br><br> **3 / Positive Home /** _P - h_: Positive direction only with return to initial position <br><br> **4 / Positive /** _P - -_: Positive direction only without return to initial position <br><br> **5 / Negative Home /** _n - h_: Negative direction only with return to initial position <br><br> **6 / Negative /** _n - -_: Negative direction only without return to initial position <br><br> Modified settings become active the next time the motor moves. | - <br><br> 1 <br><br> 1 <br><br> 6 | UINT16 <br><br> R/W <br><br> - <br><br> - | CANopen 302F:4ₕ <br><br> Modbus 12040 <br><br> Profibus 12040 <br><br> CIP 147.1.4 <br><br> ModbusTCP 12040 <br><br> EtherCAT 302F:4ₕ <br><br> PROFINET 12040 |
| *AT_dis_usr* | Movement range for Autotuning. <br><br> Movement range within which the control parameters are automatically optimized. The movement range is entered with reference to the actual position. <br><br> In the case of "Movement in one direction only" (Parameter AT_dir), the specified range is used for each optimization step. The movement typically corresponds to 20 times the value, but it is not limited. <br><br> The minimum value, the factory setting and the maximum value depend on the scaling factor. <br><br> Modified settings become active the next time the motor moves. <br><br> Available with firmware version ≥V01.03. | usr_p <br><br> 1 <br><br> 32768 <br><br> 2147483647 | INT32 <br><br> R/W <br><br> - <br><br> - | CANopen 302F:12ₕ <br><br> Modbus 12068 <br><br> Profibus 12068 <br><br> CIP 147.1.18 <br><br> ModbusTCP 12068 <br><br> EtherCAT 302F:12ₕ <br><br> PROFINET 12068 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *AT_mechanical* | Type of coupling of the system. **1 / Direct Coupling**: Direct coupling **2 / Belt Axis**: Belt axis **3 / Spindle Axis**: Spindle axis Modified settings become active the next time the motor moves. | - 1 2 3 | UINT16 R/W - - | CANopen 302F:$E_h$ Modbus 12060 Profibus 12060 CIP 147.1.14 ModbusTCP 12060 EtherCAT 302F:$E_h$ PROFINET 12060 |
| *AT_start* | Autotuning start. Value 0: Terminate Value 1: Activate EasyTuning Value 2: Activate ComfortTuning Modified settings become active immediately. | - 0 - 2 | UINT16 R/W - - | CANopen 302F:$1_h$ Modbus 12034 Profibus 12034 CIP 147.1.1 ModbusTCP 12034 EtherCAT 302F:$1_h$ PROFINET 12034 |

# Enhanced Settings for Autotuning

## Description

The following parameters allow you to monitor and influence autotuning.

The parameters *AT_state* and *AT_progress* allow you to monitor the progress and status of autotuning.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *_AT_state* | Autotuning status. Bit assignments: Bits 0 ... 10: Last processing step Bit 13: auto_tune_process Bit 14: auto_tune_end Bit 15: auto_tune_err | - - - - | UINT16 R/- - - | CANopen 302F:$2_h$ Modbus 12036 Profibus 12036 CIP 147.1.2 ModbusTCP 12036 EtherCAT 302F:$2_h$ PROFINET 12036 |
| *_AT_progress* | Progress of Autotuning. | % 0 0 100 | UINT16 R/- - - | CANopen 302F:$B_h$ Modbus 12054 Profibus 12054 CIP 147.1.11 ModbusTCP 12054 EtherCAT 302F:$B_h$ PROFINET 12054 |

If, in a test run, you want to determine the effects of harder or softer settings of the control loop parameters on your system, you can write the parameter *CTRL_GlobGain* to modify the settings determined during autotuning. The parameter *_AT_J* allows you to read the moment of inertia of the entire system calculated during autotuning.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CTRL_GlobGain*<br><br>$oP \rightarrow tun$-<br><br>$GАіn$ | Global gain factor (affects control loop parameter set 1).<br><br>The global gain factor affects the following parameters of control loop parameter set 1:<br><br>- CTRL_KPn<br><br>- CTRL_TNn<br><br>- CTRL_KPp<br><br>- CTRL_TAUnref<br><br>The global gain factor is set to 100%<br><br>- if the control loop parameters are set to default<br><br>- at the end of the Autotuning process<br><br>- if control loop parameter set 2 is copied to set 1 via the parameter CTRL_ParSetCopy<br><br>If a full configuration is transmitted via the fieldbus, the value for CTRL_GlobGain must be transmitted prior to the values of the control loop parameters CTRL_KPn, CTRL_TNn, CTRL_KPp and CTRL_TAUnref. If CTRL_GlobGain is changed during a configuration transmission, CTRL_KPn, CTRL_TNn, CTRL_KPp and CTRL_TAUnref must also be part of the configuration.<br><br>In increments of 0.1 %.<br><br>Modified settings become active immediately. | %<br><br>5.0<br><br>100.0<br><br>1000.0 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3011:15$_h$<br><br>Modbus 4394<br><br>Profibus 4394<br><br>CIP 117.1.21<br><br>ModbusTCP 4394<br><br>EtherCAT 3011:15$_h$<br><br>PROFINET 4394 |
| *_AT_M_friction* | Friction torque of the system.<br><br>Is determined during Autotuning.<br><br>In increments of 0.01 A$_{rms}$. | A$_{rms}$<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 302F:7$_h$<br><br>Modbus 12046<br><br>Profibus 12046<br><br>CIP 147.1.7<br><br>ModbusTCP 12046<br><br>EtherCAT 302F:7$_h$<br><br>PROFINET 12046 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _AT_M_load | Constant load torque.<br><br>Is determined during Autotuning.<br><br>In increments of 0.01 $A_{rms}$. | $A_{rms}$<br><br>-<br><br>-<br><br>- | INT16<br><br>R/-<br><br>-<br><br>- | CANopen 302F:$8_h$<br><br>Modbus 12048<br><br>Profibus 12048<br><br>CIP 147.1.8<br><br>ModbusTCP 12048<br><br>EtherCAT 302F:$8_h$<br><br>PROFINET 12048 |
| _AT_J | Moment of inertia of the system.<br><br>Is automatically calculated during Autotuning.<br><br>In increments of 0.1 kg $cm^2$. | kg $cm^2$<br><br>0.1<br><br>0.1<br><br>6553.5 | UINT16<br><br>R/-<br><br>per.<br><br>- | CANopen 302F:$C_h$<br><br>Modbus 12056<br><br>Profibus 12056<br><br>CIP 147.1.12<br><br>ModbusTCP 12056<br><br>EtherCAT 302F:$C_h$<br><br>PROFINET 12056 |

The parameter *AT_wait* lets you set a waiting time between the individual autotuning steps. Setting a waiting time is only useful in the case of a low-rigidity coupling, in particular so if the next autotuning step (changing the hardness) is already performed while the system is still settling.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| AT_wait | Waiting time between Autotuning steps.<br><br>Modified settings become active the next time the motor moves. | ms<br><br>300<br><br>500<br><br>10000 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 302F:$9_h$<br><br>Modbus 12050<br><br>Profibus 12050<br><br>CIP 147.1.9<br><br>ModbusTCP 12050<br><br>EtherCAT 302F:$9_h$<br><br>PROFINET 12050 |
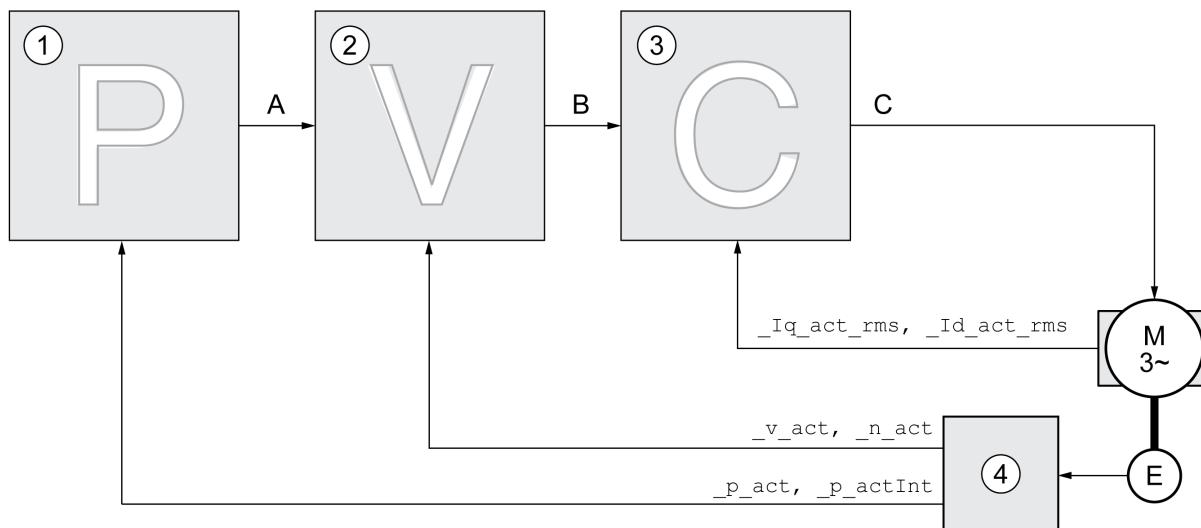
# Controller Optimization with Step Response

## Controller Structure

### Overview

The controller structure corresponds to the classical cascaded closed loop with current controller, velocity controller and position controller. In addition, the reference value of the velocity controller can be smoothed via a filter.

The controllers are tuned one after the other from the "inside" to the "outside" in the following sequence: current control, velocity control, position control.

**1** Position controller

**2** Velocity controller

**3** Current controller

**4** Encoder evaluation

See section Overview of the Controller Structure, page 222 for a detailed description of the controller structure.

### Current Controller

The current controller determines the torque of the motor. The current controller is automatically optimally tuned with the stored motor data.

### Velocity Controller

The velocity controller controls the motor velocity by varying the motor current depending on the load situation. The velocity controller has a decisive influence on the dynamic response of the drive. The dynamics of the velocity controller depend on:

• Moment of inertia of the drive and the controlled system

• Power of the motor

• Stiffness and elasticity of the elements in the flow of forces

• Backlash of the drive elements

• Friction

## Position Controller

The position controller reduces the difference between the reference position and the actual position of the motor (position deviation) to a minimum. When the motor is at a standstill, the position deviation is close to zero in the case of a well-tuned position controller.

An optimized velocity control loop is a prerequisite for good amplification of the position controller.

## Control Loop Parameters

This device allows you to use two control loop parameter sets. It is possible to switch form one set of control loop parameter sets to the other during operation. The active control loop parameter set is selected with the parameter *CTRL_SelParSet*.

The corresponding parameters are *CTRL1_xx* for the first control loop parameter set and *CTRL2_xx* for the second control loop parameter set. The following descriptions use the notation *CTRL1_xx* (*CTRL2_xx*) if there are no functional differences between the two control loop parameter sets.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CTRL_SelParSet* | Selection of control loop parameter set. Coding see parameter: CTRL_PwrUpParSet Modified settings become active immediately. | - 0 1 2 | UINT16 R/W - - | CANopen 3011:19$_h$ Modbus 4402 Profibus 4402 CIP 117.1.25 ModbusTCP 4402 EtherCAT 3011:19$_h$ PROFINET 4402 |
| *_CTRL_ActParSet* | Active control loop parameter set. Value 1: Control loop parameter set 1 is active Value 2: Control loop parameter set 2 is active A control loop parameter set is active after the time for the parameter switching (CTRL_ParChgTime) has elapsed. | - - - - | UINT16 R/- - - | CANopen 3011:17$_h$ Modbus 4398 Profibus 4398 CIP 117.1.23 ModbusTCP 4398 EtherCAT 3011:17$_h$ PROFINET 4398 |
| *CTRL_ParChgTime* | Period of time for control loop parameter set switching. In the case of control loop parameter set switching, the values of the following parameters are changed linearly: - CTRL_KPn - CTRL_TNn - CTRL_KPp - CTRL_TAUnref - CTRL_TAUiref - CTRL_KFPp Modified settings become active immediately. | ms 0 0 2000 | UINT16 R/W per. - | CANopen 3011:14$_h$ Modbus 4392 Profibus 4392 CIP 117.1.20 ModbusTCP 4392 EtherCAT 3011:14$_h$ PROFINET 4392 |

# Optimization

## General

The drive optimization function matches the device to the application conditions. The following options are available:

- Selecting control loops. Upstream control loops are automatically deactivated.
- Defining reference value signals: signal type, amplitude, frequency and starting point
- Testing control performance with the signal generator.
- Recording the control performance on screen and evaluating it with the commissioning software.

## Setting Reference Value Signals

Start controller optimization with the commissioning software.

Set the following values for the reference value signal:

- Signal type: Step "positive"
- Amplitude: 100 RPM
- Cycle duration: 100 ms
- Number of repetitions: 1
- Start the trace.

Only the signal types "Step" and "Square" allow you to determine the entire dynamic behavior of a control loop. The manual shows signal paths for the signal type "Step".

## Entering Values for Optimization

The optimization steps described on the following pages require you to enter control loop parameters and test their effect by triggering a step function.

A step function is triggered as soon as you start a trace in the commissioning software.

## Control Loop Parameters

This device allows you to use two control loop parameter sets. It is possible to switch form one set of control loop parameter sets to the other during operation. The active control loop parameter set is selected with the parameter *CTRL_ SelParSet*.

The corresponding parameters are *CTRL1_xx* for the first control loop parameter set and *CTRL2_xx* for the second control loop parameter set. The following descriptions use the notation *CTRL1_xx* (*CTRL2_xx*) if there are no functional differences between the two control loop parameter sets.

For details see section .

# Optimizing the Velocity Controller

## General

Optimizing complex mechanical control systems require hands-on experience with controller tuning. This includes the ability to calculate control loop parameters and to apply identification procedures.

Less complex mechanical systems can often be optimized by means of experimental adjustment using the aperiodic limit method. The following parameters are used for this:

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CTRL1_KPn*<br><br>*ConF → drC -*<br><br>*Pn 1* | Velocity controller P gain.<br><br>The default value is calculated on the basis of the motor parameters.<br><br>In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime.<br><br>In increments of 0.0001 A/RPM.<br><br>Modified settings become active immediately. | A/RPM<br><br>0.0001<br><br>-<br><br>2.5400 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3012:1$_h$<br><br>Modbus 4610<br><br>Profibus 4610<br><br>CIP 118.1.1<br><br>ModbusTCP 4610<br><br>EtherCAT 3012:1$_h$<br><br>PROFINET 4610 |
| *CTRL2_KPn*<br><br>*ConF → drC -*<br><br>*Pn 2* | Velocity controller P gain.<br><br>The default value is calculated on the basis of the motor parameters.<br><br>In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime.<br><br>In increments of 0.0001 A/RPM.<br><br>Modified settings become active immediately. | A/RPM<br><br>0.0001<br><br>-<br><br>2.5400 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3013:1$_h$<br><br>Modbus 4866<br><br>Profibus 4866<br><br>CIP 119.1.1<br><br>ModbusTCP 4866<br><br>EtherCAT 3013:1$_h$<br><br>PROFINET 4866 |
| *CTRL1_TNn*<br><br>*ConF → drC -*<br><br>*t in 1* | Velocity controller integral action time.<br><br>The default value is calculated.<br><br>In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime.<br><br>In increments of 0.01 ms.<br><br>Modified settings become active immediately. | ms<br><br>0.00<br><br>-<br><br>327.67 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3012:2$_h$<br><br>Modbus 4612<br><br>Profibus 4612<br><br>CIP 118.1.2<br><br>ModbusTCP 4612<br><br>EtherCAT 3012:2$_h$<br><br>PROFINET 4612 |
| *CTRL2_TNn*<br><br>*ConF → drC -*<br><br>*t in 2* | Velocity controller integral action time.<br><br>The default value is calculated.<br><br>In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime.<br><br>In increments of 0.01 ms.<br><br>Modified settings become active immediately. | ms<br><br>0.00<br><br>-<br><br>327.67 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3013:2$_h$<br><br>Modbus 4868<br><br>Profibus 4868<br><br>CIP 119.1.2<br><br>ModbusTCP 4868<br><br>EtherCAT 3013:2$_h$<br><br>PROFINET 4868 |

Verify and optimize the calculated values in a second step, see Verifying and Optimizing the P Gain, page 171.

## Reference Value Filter of the Velocity Controller

The reference value filter of the velocity controller allows you to improve the transient response at optimized velocity control. The reference value filter must be deactivated for the first setup of the velocity controller.

Deactivate the reference value filter of the velocity controller. Set the parameter *CTRL1_TAUnref* (*CTRL2_TAUnref*) to the lower limit value "0".
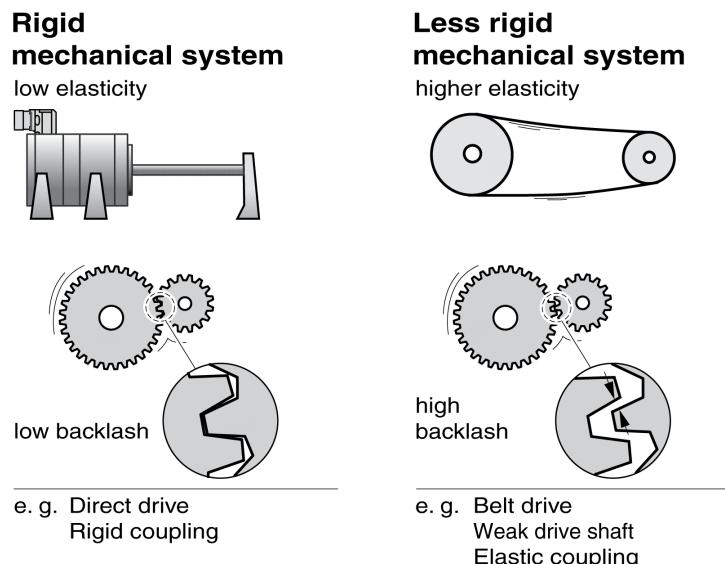
| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CTRL1_TAUnref* ⌐ o n F → d r ⌐ - ⊢ A ∪ l | Filter time constant of the reference velocity value filter. In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime. In increments of 0.01 ms. Modified settings become active immediately. | ms 0.00 9.00 327.67 | UINT16 R/W per. - | CANopen 3012:4$_h$ Modbus 4616 Profibus 4616 CIP 118.1.4 ModbusTCP 4616 EtherCAT 3012:4$_h$ PROFINET 4616 |
| *CTRL2_TAUnref* ⌐ o n F → d r ⌐ - ⊢ A ∪ 2 | Filter time constant of the reference velocity value filter. In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime. In increments of 0.01 ms. Modified settings become active immediately. | ms 0.00 9.00 327.67 | UINT16 R/W per. - | CANopen 3013:4$_h$ Modbus 4872 Profibus 4872 CIP 119.1.4 ModbusTCP 4872 EtherCAT 3013:4$_h$ PROFINET 4872 |

## Determining the Type of Mechanical System

To assess and optimize the transient response behavior of your system, group its mechanical system into one of the following two categories.

- System with rigid mechanical system
- System with a less rigid mechanical system

Rigid and less rigid mechanical systems



**Rigid mechanical system**
low elasticity

**Less rigid mechanical system**
higher elasticity

low backlash

high backlash

e. g.  Direct drive
       Rigid coupling

e. g.  Belt drive
       Weak drive shaft
       Elastic coupling

# Determining Values for Rigid Mechanical Systems

In the case of a rigid mechanical system, adjusting the control performance on the basis of the table is possible if:

- the moment of inertia of the load and of the motor are known and
- the moment of inertia of the load and of the motor are constant

The P gain *CTRL_KPn* and the integral action time *CTRL_TNn* depend on:

- $J_L$: Moment of inertia of the load
- $J_M$: Moment of inertia of the motor
- Determine the values on the basis of the following table:

| $J_L$ | $J_L = J_M$ | | $J_L = 5 * J_M$ | | $J_L = 10 * J_M$ | |
|---|---|---|---|---|---|---|
| | KPn | TNn | KPn | TNn | KPn | TNn |
| 1 kgcm$^2$ | 0.0125 | 8 | 0.008 | 12 | 0.007 | 16 |
| 2 kgcm$^2$ | 0.0250 | 8 | 0.015 | 12 | 0.014 | 16 |
| 5 kgcm$^2$ | 0.0625 | 8 | 0.038 | 12 | 0.034 | 16 |
| 10 kgcm$^2$ | 0.125 | 8 | 0.075 | 12 | 0.069 | 16 |
| 20 kgcm$^2$ | 0.250 | 8 | 0.150 | 12 | 0.138 | 16 |

# Determining Values for Less Rigid Mechanical Systems

For optimization purposes, determine the P gain of the velocity controller at which the controller adjusts velocity *_v_act* as quickly as possible without overshooting.

Set the integral action time *CTRL1_TNn* (*CTRL2_TNn*) to infinite (= 327.67 ms).

If a load torque acts on the motor when the motor is at a standstill, the integral action time must not exceed a value that causes unwanted changes of the motor position.

If the motor is subject to loads when it is at a standstill, setting the integral action time to "infinite" may cause position deviations (for example, in the case of vertical axes). Reduce the integral action time if the position deviation is unacceptable in your application. However, reducing the integral action time can adversely affect optimization results.

The step function moves the motor until the specified time has expired.

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### ⚠ **WARNING**

**UNINTENDED MOVEMENT**

- Only start the system if there are no persons or obstructions in the zone of operation.
- Verify that the values for the velocity and the time do not exceed the available movement range.
- Verify that a functioning emergency stop push-button is within reach of all persons involved in the operation.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

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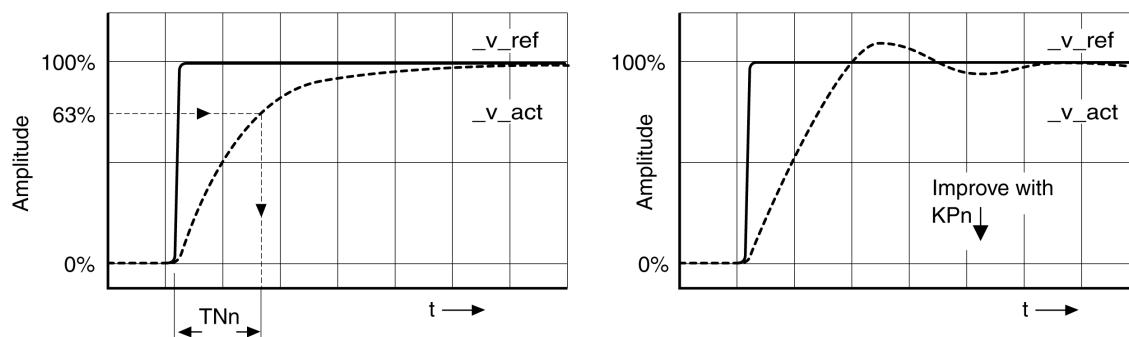
- Trigger a step function.
- After the first test, verify the maximum amplitude for the reference value for the current *_Iq_ref*.

Set the amplitude of the reference value just high enough so the reference value for the current *_Iq_ref* remains below the maximum value *CTRL_I_max*. On the other hand, the value selected should not be too low, otherwise friction effects of the mechanical system will determine the performance of the control loop.

- Trigger another step function if you had to modify _v_ref_ and verify the amplitude of _Iq_ref_.

- Increase or decrease the P gain in small increments until _v_act_ is obtained as fast as possible. The following diagram shows the required transient response on the left. Overshooting - as shown on the right - is reduced by reducing _CTRL1_KPn_ (_CTRL2_KPn_).

Differences between _v_ref_ and _v_act_ result from setting _CTRL1_TNn_ (_CTRL2_TNn_) to "Infinite".

Determining "TNn" for the aperiodic limit



In the case of drive systems in which oscillations occur before the aperiodic limit is reached, the P gain "KPn" must be reduced until oscillations can no longer be detected. This occurs frequently in the case of linear axes with a toothed belt drive.

# Graphic Determination of the 63% Value
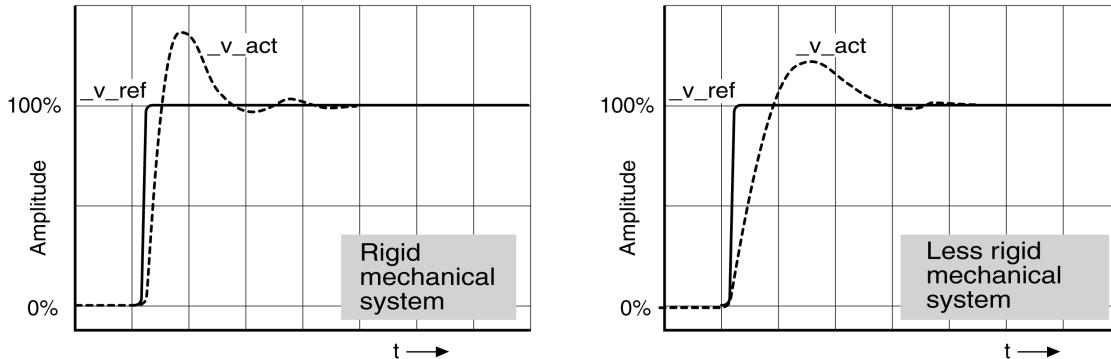
Graphically determine the point at which the actual velocity _v_act_ reaches 63% of the final value. The integral action time _CTRL1_TNn_ (_CTRL2_TNn_) then results as a value on the time axis. The commissioning software supports you with the evaluation:

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| CTRL1_TNn  �header → d r ⌐ - ⊦ ⁱ n 1 | Velocity controller integral action time. The default value is calculated. In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime. In increments of 0.01 ms. Modified settings become active immediately. | ms 0.00 - 327.67 | UINT16 R/W per. - | CANopen 3012:2h Modbus 4612 Profibus 4612 CIP 118.1.2 ModbusTCP 4612 EtherCAT 3012:2h PROFINET 4612 |
| CTRL2_TNn  ⌐ o n F → d r ⌐ - ⊦ ⁱ n 2 | Velocity controller integral action time. The default value is calculated. In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime. In increments of 0.01 ms. Modified settings become active immediately. | ms 0.00 - 327.67 | UINT16 R/W per. - | CANopen 3013:2h Modbus 4868 Profibus 4868 CIP 119.1.2 ModbusTCP 4868 EtherCAT 3013:2h PROFINET 4868 |

# Verifying and Optimizing the P Gain

## General

Step responses with good control performance



The controller is properly set when the step response is approximately identical to the signal shown. Good control performance is characterized by
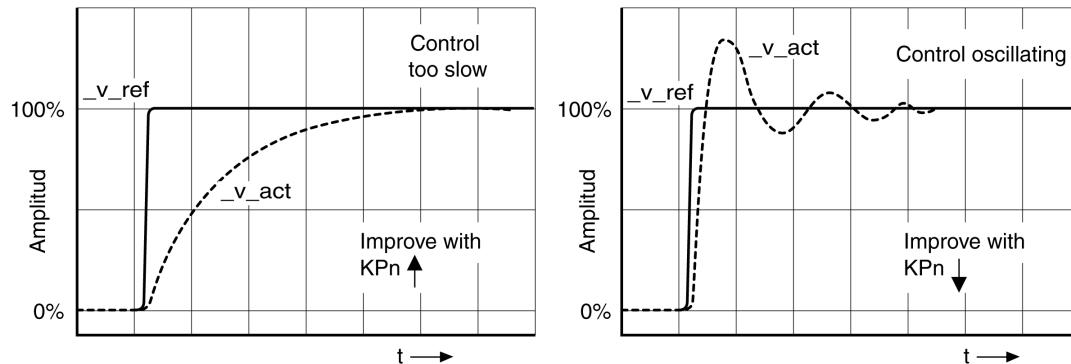
- Fast transient response
- Overshooting with 20%, up to a maximum of 40%.

If the control performance does not correspond to the curve shown, change *CTRL_KPn* in increments of about 10% and then trigger another step function:

- If the control is too slow: Use a higher *CTRL1_KPn* (*CTRL2_KPn*) value.
- If the control tends to oscillate: Use a lower *CTRL1_KPn* (*CTRL2_KPn*) value.

Oscillation ringing is characterized by continuous acceleration and deceleration of the motor.

Optimizing insufficient velocity controller settings



# Optimizing the Position Controller

## General

An optimized velocity controller is a prerequisite for optimization of the position controller.

When tuning the position controller, you must optimize the P gain *CTRL1_KPp* (*CTRL2_KPp*):

- *CTRL1_KPp* (*CTRL2_KPp*) too high: Overshooting, instability
- *CTRL1_KPp* (*CTRL2_KPp*) too low: High position deviation

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CTRL1_KPp* $\mathcal{C}\;o\;n\;F \rightarrow d\;r\;\mathcal{C}$ - $P\;P\;I$ | Position controller P gain. The default value is calculated. In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime. In increments of 0.1 1/s. Modified settings become active immediately. | 1/s 2.0 - 900.0 | UINT16 R/W per. - | CANopen 3012:3h Modbus 4614 Profibus 4614 CIP 118.1.3 ModbusTCP 4614 EtherCAT 3012:3h PROFINET 4614 |
| *CTRL2_KPp* $\mathcal{C}\;o\;n\;F \rightarrow d\;r\;\mathcal{C}$ - $P\;P\;2$ | Position controller P gain. The default value is calculated. In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime. In increments of 0.1 1/s. Modified settings become active immediately. | 1/s 2.0 - 900.0 | UINT16 R/W per. - | CANopen 3013:3h Modbus 4870 Profibus 4870 CIP 119.1.3 ModbusTCP 4870 EtherCAT 3013:3h PROFINET 4870 |

The step function moves the motor until the specified time has expired.

> ## ⚠ WARNING
>
> **UNINTENDED MOVEMENT**
>
> • Only start the system if there are no persons or obstructions in the zone of operation.
>
> • Verify that the values for the velocity and the time do not exceed the available movement range.
>
> • Verify that a functioning emergency stop push-button is within reach of all persons involved in the operation.
>
> **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

## Setting the Reference Value Signal

•  Select Position Controller as the reference value in the commissioning software.

•  Set the reference value signal:

•  Signal type: "Step"

•  Set the amplitude to approximately 1/10 motor revolution.

The amplitude is entered in user-defined units. With the default scaling, the resolution is 16384 user-defined units per motor revolution.

## Selecting the Trace Signals
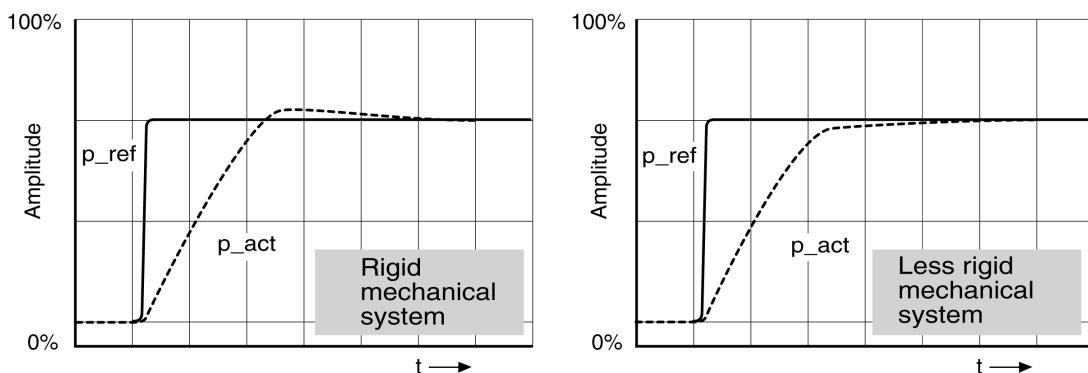
•  Select the values in the box General Trace Parameters:

•  Reference position of position controller *_p_refusr* (*_p_ref*)

•  Actual position of position controller *_p_actusr* (*_p_act*)

•  Actual velocity *_v_act*

- Reference value current _Iq_ref

# Optimizing the Position Controller Value

- Trigger a step function with the default controller values.
- After the first test, verify the values achieved for _v_act and _Iq_ref for current control and velocity control. The values must not reach the current and velocity limitation range.

Step responses of a position controller with good control performance
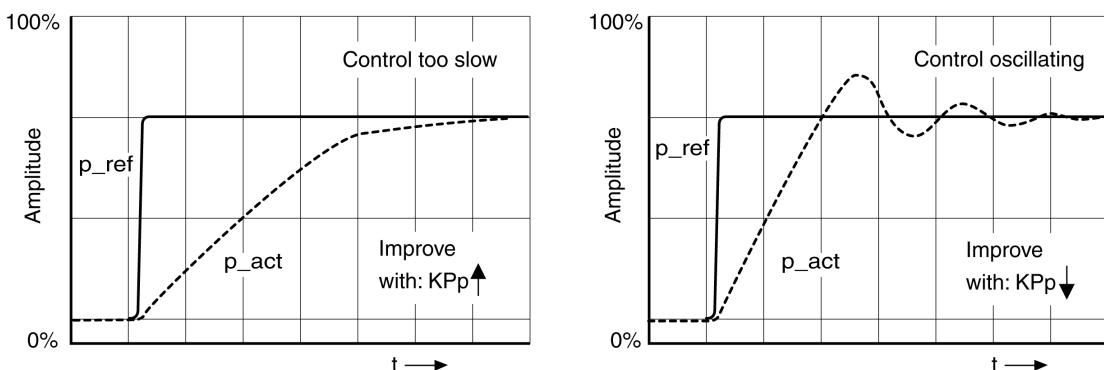


The p gain setting CTRL1_KPp (CTRL2_KPp) is optimal if the reference value is reached rapidly and with little or no overshooting.

If the control performance does not correspond to the curve shown, change the P gain CTRL1_KPp (CTRL2_KPp) in increments of approximately 10% and trigger another step function.

- If the control tends to oscillate: Use a lower KPp value.
- If the actual value is too slow reaching the reference value: Use a higher KPp value.

Optimizing inadequate position controller settings

# Parameter Management

## Memory Card
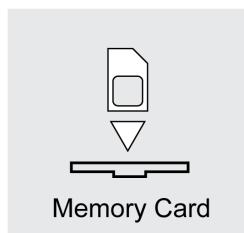
### Description

The drives features a card holder for a memory card. The parameters stored on the memory card can be transferred to other drives. If a drive is replaced, a new drive of the same type can be operated with identical parameters.

The contents of the memory card is compared to the parameters stored in the drive when the drive is powered on.

When the parameters are written to the nonvolatile memory, they are also saved to the memory card.

The parameters of the safety module require special treatment. See the module manual of the safety module for additional information.



Memory Card

Note the following:

- Use only genuine accessory memory cards.
- Do not touch the gold contacts.
- The insert/remove cycles of the memory card are limited.
- The memory card can remain in the drive.
- The memory card can only be removed from the drive by pulling (not by pushing).

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## *NOTICE*

**ELECTROSTATIC DISCHARGE OR INTERMITTENT CONTACT AND LOSS OF DATA**

Do not touch the contacts of the memory card.

**Failure to follow these instructions can result in equipment damage.**

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### Inserting a Memory Card

- 24 Vdc control supply has been powered off.
- Insert the memory card into the drive with the gold contacts face down; the slanted corner must be face to the mounting plate.
- Power on the 24 Vdc control supply.
- Observe the 7-segment display during the initialization of the drive.

### ⌐ ⟋ ⌐ � is Displayed for a Short Period of Time

The drive has detected a memory card. User intervention is not required.

The parameter values stored in the drive and the contents of the memory card are identical. The data on the memory card originates from the drive into which the memory card is inserted.

## $\mathcal{C}\,\mathcal{A}\,\mathcal{r}\,\mathcal{d}$ is Displayed Permanently

The drive has detected a memory card. User intervention is required.

| Cause | Options |
|---|---|
| The memory card is new. | The drive data can be transferred to the memory card. |
| The data on the memory card does not match the drive (different drive type, different motor type, different firmware version). | The drive data can be transferred to the memory card. |
| The data on the memory card matches the drive, but the parameter values are different. | The drive data can be transferred to the memory card. |
| | The data on the memory card can be transferred to the drive. If the memory card is to remain in the drive, the drive data must be transferred to the memory card. |

## $\mathcal{C}\,\mathcal{A}\,\mathcal{r}\,\mathcal{d}$ is Not Displayed

The drive has not detected a memory card. Power off the 24 Vdc control supply. Verify that the memory card has been properly inserted (contacts, slanted corner).
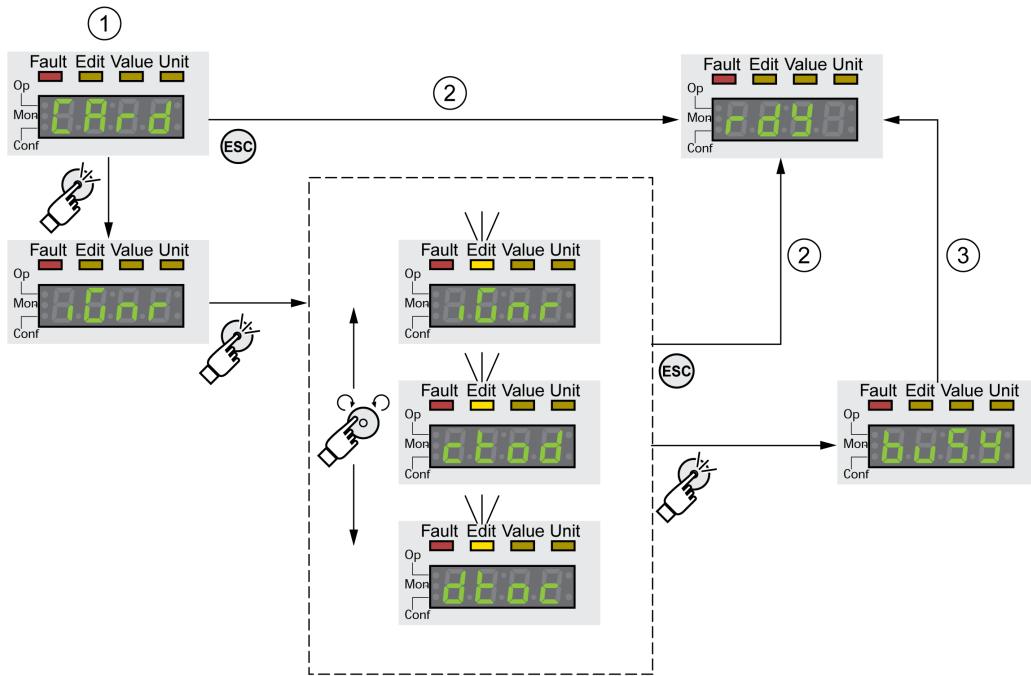
## Data Exchange with the Memory Card

If there are differences between the parameters on the memory card and the parameters stored in the drive, the drive stops after initialization and displays $\mathcal{C}\,\mathcal{A}\,\mathcal{r}\,\mathcal{d}$.

## Copying Data or Ignoring the Memory Card ($\mathcal{C}\,\mathcal{A}\,\mathcal{r}\,\mathcal{d}$, $\mathit{iGnr}$, $\mathit{ctod}$, $\mathit{dtoc}$)

If the 7-segment display shows $\mathcal{C}\,\mathcal{A}\,\mathcal{r}\,\mathcal{d}$:

- Press the navigation button.

  The 7-segment display shows the last setting, for example $\mathit{iGnr}$.

- Briefly press the navigation button to activate the Edit mode.

  The 7-segment display continues to display the last setting, the LED Edit illuminates.

- Select with the navigation button:

  $\mathit{iGnr}$ ignores the memory card.

  $\mathit{ctod}$ transfers the data from the memory card to the drive.

  $\mathit{dtoc}$ transfers the data from the drive to the memory card.

  The drive switches to operating state **4** Ready To Switch On.

**1** Data on the memory card and in the drive are different: The drive displays *c A r d* and waits for user intervention.

**2** Transition to operating state **4** Ready To Switch On (memory card is ignored).

**3** Transfer of data (*c t o d* = card to drive, *d t o c* = drive to card) and transition to operating state **4** Ready To Switch On.

## Memory Card has Been Removed (*C A r d*, *N i S S*)

If you removed the memory card, the drive displays *C A r d* after initialization. If you confirm this, the display shows *N i S S*. If you confirm again, the product transitions to the operating state .**4** Ready To Switch On.

## Write Protection for Memory Card (*C A r d*, *E n P r*, *d i P r*, *P r o t*)

It is possible to write-protect the memory card (*P r o t*). For example, you may want to write-protect memory cards used for regular duplication of drive data.

To write-protect the memory card, select *C o n F - A C G - C A r d* on the HMI.

| Selection | Meaning |
|---|---|
| *E n P r* | Write protection on (*P r o t*) |
| *d i P r* | Write protection off |

Memory cards can also be write-protected via the commissioning software.

# Duplicating Existing Parameter Values

## Application

Multiple devices are to have the same settings, for example, when devices are replaced.

## Prerequisites

- Device type, motor type and firmware version must be identical.
- Tools for duplication:
  - Memory card
  - Commissioning software
- The 24 Vdc control supply must be powered on.

## Duplication Using a Memory Card

Device settings can be stored on a memory card (accessories).

The stored device settings can be copied to a device of the same type. Note that the fieldbus address and the settings for the monitoring functions are copied along with this information.

## Duplication Using the Commissioning Software

The commissioning software can save the settings of a device in the form of a configuration file. The stored device settings can be copied to a device of the same type. Note that the fieldbus address and the settings for the monitoring functions are copied along with this information.

See the manual for the commissioning software for additional information.

# Resetting the User Parameters

## Description

The user parameters are reset by means of the parameter *PARuserReset*.

Disconnect the drive from the fieldbus.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PARuserReset* ⌐ o п F → F ⌐ 5 - ⌐ E 5 ⌐ | Reset user parameters. 0 / No / п o : No 65535 / Yes / ⅄ E 5 : Yes Bit 0: Reset persistent user parameters and control loop parameters to default values Bit 1: Reset Motion Sequence parameters to default values Bits 2 … 15: Reserved The parameters are reset with the exception of: - Communication parameters - Inversion of direction of movement - Type of reference value signal for PTI interface - Settings of encoder simulation - Functions of digital inputs and outputs - Safety module eSM The new settings are not saved to the nonvolatile memory. Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. | - 0 - 65535 | UINT16 R/W - - | CANopen 3004:8ₕ Modbus 1040 Profibus 1040 CIP 104.1.8 ModbusTCP 1040 EtherCAT 3004:8ₕ PROFINET 1040 |

## Resetting via the HMI

Use the menu items ⌐ o п F -> F ⌐ 5 - -> ⌐ E 5 ⌐ of the HMI to reset the user parameters. Confirm the selection with ⅄ E 5 .

The new settings are not saved to the nonvolatile memory.

If the drive transitions to the operating state "**2** Not Ready To Switch On" after the user parameters are reset, the new settings only become active after the 24 Vdc control supply of the drive is power cycled.

## Resetting via the Commissioning Software

Use the menu items "Device -> User Functions -> Reset User Parameters" in the commissioning software to reset the user parameters.

If the drive transitions to the operating state "**2** Not Ready To Switch On" after the user parameters are reset, the new settings only become active after the 24 Vdc control supply of the drive is power cycled.

# Restoring Factory Settings

## Description

The parameter values, both active and those saved in nonvolatile memory, are lost in this process.

> # *NOTICE*
>
> **LOSS OF DATA**
>
> Perform a backup of the drive parameters prior to restoring factory settings (factory established parameter values).
>
> **Failure to follow these instructions can result in equipment damage.**

The commissioning software allows you to save the parameter values set for a drive as a configuration file. For information on saving the existing parameters in the drive, see Parameter Management, page 174.

The factory settings can be restored via the HMI or the commissioning software.

Disconnect the drive from the fieldbus before you restore the factory settings.

## Factory Settings via HMI

Use the menu items **CONF > FCS- > rStF** of the HMI to restore the factory settings. Confirm the selection with _YES_.

The new settings only become active until after the 24 Vdc control supply of the drive is power cycled.

## Factory Settings via Commissioning Software

Use the menu items **Device > User Functions > Restore Factory Settings** in the commissioning software to restore the factory settings.

The new settings only become active until after the 24 Vdc control supply of the drive is power cycled.

# Operation

## Access Channels

### Description

The product can be accessed via different types of access channels.
Simultaneous access via multiple access channels or the use of exclusive access
may cause unintended equipment operation.

| ⚠ **WARNING** |
|---|
| **UNINTENDED EQUIPMENT OPERATION** |
| • Verify that simultaneous access via multiple access channels cannot cause unintended triggering or blocking of commands. |
| • Verify that the use of exclusive access cannot cause unintended triggering or blocking of commands. |
| • Verify that the required access channels are available. |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |

The product can be addressed via different access channels. Access channels
are:

- Integrated HMI
- External graphic display terminal
- Fieldbus
- Commissioning software
- Digital signal inputs

Only one access channel can have exclusive access to the product. An exclusive
access can be provided via different access channels:

- Via the integrated HMI:

  The operating mode Jog or Autotuning can be started via the HMI.

- Via a fieldbus:

  Exclusive access is provided to a fieldbus by blocking the other access
  channels with the parameter *AccessLock*.

- Via the commissioning software:

  The commissioning software receives exclusive access via the switch
  "Exclusive access" in position "On".

When the drive is powered on, there is no exclusive access via an access
channel.

The signal input functions "Halt", "Fault Reset", "Enable", "Positive Limit Switch
(LIMP)", "Negative Limit Switch (LIMN)" and "Reference Switch (REF)" as well as
the signals of the safety-related function STO ($\overline{STO\_A}$ and $\overline{STO\_B}$) are available
during exclusive access.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _AccessInfo | Access channel information. Low byte: Exclusive access Value 0: No Value 1: Yes High byte: Access channel Value 0: Reserved Value 1: I/O Value 2: HMI Value 3: Modbus RS485 Value 4: Fieldbus main channel Value 5: CAN module: CANopen second SDO ETH module (Modbus TCP): Modbus TCP ETH module (Ethernet/IP): Reserved PDP module: Profibus Master Class 2 PNT module (Modbus TCP): Modbus TCP Values 6 ... 12: ETH module (Modbus TCP): Modbus TCP ETH module (Ethernet/IP): Reserved Values 13 ... 28: Ethernet/IP explicit channels 0 to 15 | - - - - | UINT16 R/- - - | CANopen 3001:$C_h$ Modbus 280 Profibus 280 CIP 101.1.12 ModbusTCP 280 EtherCAT 3001:$C_h$ PROFINET 280 |
| AccessLock | Locking other access channels. Value 0: Allow control via other access channels Value 1: Lock control via other access channels Example: The access channel is used by the fieldbus. In this case, control via the commissioning software, for example, is not possible. The access channel can only be locked after the currently active operating mode has terminated. Modified settings become active immediately. | - 0 0 1 | UINT16 R/W - - | CANopen 3001:$E_h$ Modbus 284 Profibus 284 CIP 101.1.14 ModbusTCP 284 EtherCAT 3001:$E_h$ PROFINET 284 |
| HMIlocked | Lock HMI. 0 / Not Locked / ⁿ L ᵒ ᶜ : HMI not locked 1 / Locked / L ᵒ ᶜ : HMI locked The following functions can no longer be started when the HMI is locked: - Parameter change - Jog - Autotuning - Fault Reset Modified settings become active immediately. | - 0 0 1 | UINT16 R/W per. - | CANopen 303A:$1_h$ Modbus 14850 Profibus 14850 CIP 158.1.1 ModbusTCP 14850 EtherCAT 303A:$1_h$ PROFINET 14850 |

# Control Mode

## Overview

The control mode determines whether the operating states are changed and the operating modes started and changed via the signal inputs or via the fieldbus.

In local control mode, the operating states are changed and the operating modes started and changed via the digital signal inputs.

In fieldbus control mode, the operating states are changed and the operating modes started and changed via the fieldbus.

## Availability

The following table provides an overview of the operating modes available in the different control modes.

| Operating Mode | Local control mode | Fieldbus control mode |
|---|---|---|
| Jog | Available[1] | Available |
| Electronic Gear | Available[1] | Available |
| Profile Torque | Available[1][2] | Available |
| Profile Velocity | Available[1][2] | Available |
| Profile Position | Not available | Available |
| Interpolated Position | Not available | Available |
| Homing | Not available | Available |
| Motion Sequence | Available | Available |
| **(1)** With firmware version ≥V01.08 | | |
| **(2)** Only possible with IOM1 module | | |

## Setting the Control Mode

The parameter *DEVcmdinterf* lets you set the control mode.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *DEVcmdinterf*<br><br>$ConF \rightarrow ACG -$<br><br>$nonE$<br><br>$dEVC$ | Control mode.<br><br>**1 / Local Control Mode /** $io$: Local control mode<br><br>**2 / Fieldbus Control Mode /** $Fbus$: Fieldbus control mode<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3005:1$_h$<br><br>Modbus 1282<br><br>Profibus 1282<br><br>CIP 105.1.1<br><br>ModbusTCP 1282<br><br>EtherCAT 3005:1$_h$<br><br>PROFINET 1282 |

# Movement Range
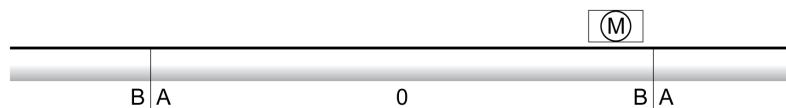
## Size of the Movement Range

### Description

The movement range is the maximum possible range within which a movement can be made to any position.

The actual position of the motor is the position in the movement range.

The figure below shows the movement range in user-defined units with the factory scaling.



**A** -268435456 user-defined units (usr_p)

**B** 268435455 user-defined units (usr_p)

### Availability

The movement range is relevant in the following operating modes:

- Jog
- Profile Position
- Homing
- Motion Sequence (Move Absolute, Move Additive, Move Relative and Reference Movement)

### Zero Point of the Movement Range

The zero point is the point of reference for absolute movements in the operating modes Profile Position and Motion Sequence.

### Valid Zero Point

The zero point of the movement range is set by means of a reference movement or by position setting.

A reference movement and position setting can be performed in the operating modes Homing and Motion Sequence.

In the case of a movement beyond the movement range (for example, a relative movement), the zero point becomes invalid.

## Movement Beyond the Movement Range

### Description

The behavior in the case of a movement beyond the movement range depends on the operating mode and the type of movement.

The following behavior is possible:

- In the case of a movement beyond the movement range, the movement range restarts.
- In the case of a movement with a target position outside of the movement range, position setting to 0 is performed before the movement is started.

As of firmware version ≥V01.04, you can use the parameter *PP_ModeRangeLim* to set the behavior.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PP_ModeRangeLim* | Absolute movement beyond movement range.<br><br>**0 / NoAbsMoveAllowed**: Absolute movement beyond movement range is not possible<br><br>**1 / AbsMoveAllowed**: Absolute movement beyond movement range is possible<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.04. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3023:7$_h$<br><br>Modbus 8974<br><br>Profibus 8974<br><br>CIP 135.1.7<br><br>ModbusTCP 8974<br><br>EtherCAT 3023:7$_h$<br><br>PROFINET 8974 |

## Behavior for Operating Mode Jog (Continuous Movement)

Behavior for continuous movement beyond the movement range:

- The movement range restarts.

## Behavior for Operating Mode Jog (Step Movement)

Behavior for step movement beyond the movement range:

- With firmware version ≥V01.04 and setting via parameter *PP_ModeRangeLim* = 1:

  The movement range restarts.
- With firmware version <V01.04:

  Internal position setting to 0.

## Behavior for Operating Mode Profile Position (Relative Movement)

Behavior for relative movement beyond the movement range:

- With firmware version ≥V01.04 and setting via parameter *PP_ModeRangeLim* = 1:

  The movement range restarts.

  A relative movement is possible when the motor is at a standstill and during movements
- With firmware version <V01.04:

  Internal position setting to 0.

  A relative movement is only possible when the motor is at a standstill.

## Behavior for Operating Mode Profile Position (Absolute Movement)
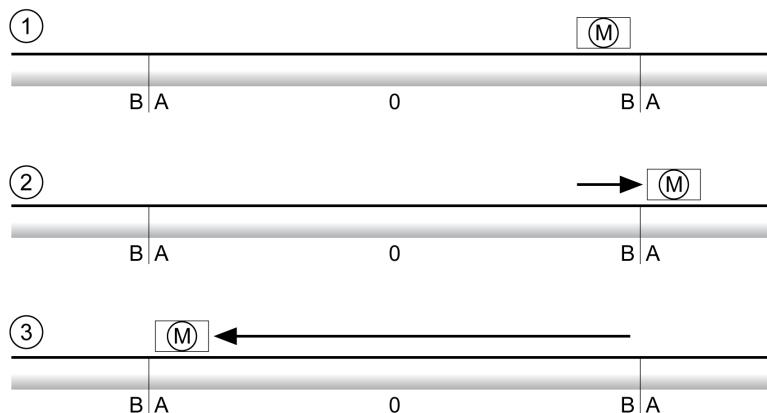
Behavior for absolute movement:

- With firmware version ≥V01.04 and setting via parameter *PP_ ModeRangeLim* = 1:

  An absolute movement beyond the movement range is possible.

- With firmware version <V01.04:

  An absolute movement is made within the movement range. An absolute movement beyond the movement range is not possible.

Example:

Actual position: 268435000 user-defined units (usr_p)

Target position absolute: -268435000 user-defined units (usr_p)



**A** -268435456 user-defined units (usr_p)

**B** 268435455 user-defined units (usr_p)

**1** Actual position: 268435000 user-defined units

**2** Absolute movement to -268435000 user-defined units with parameter *PP_ ModeRangeLim* = 1

**3** Absolute movement to -268435000 user-defined units with parameter *PP_ ModeRangeLim* = 0

## Behavior for Operating Mode Motion Sequence (Move Relative and Move Additive)

Behavior for movement with Move Relative and Move Additive beyond the movement range:

- With firmware version ≥V01.04 and setting via parameter *PP_ ModeRangeLim* = 1:

  The movement range restarts.

- With firmware version <V01.04:

  Internal position setting to 0.

## Behavior for Operating Mode Motion Sequence (Move Absolute)
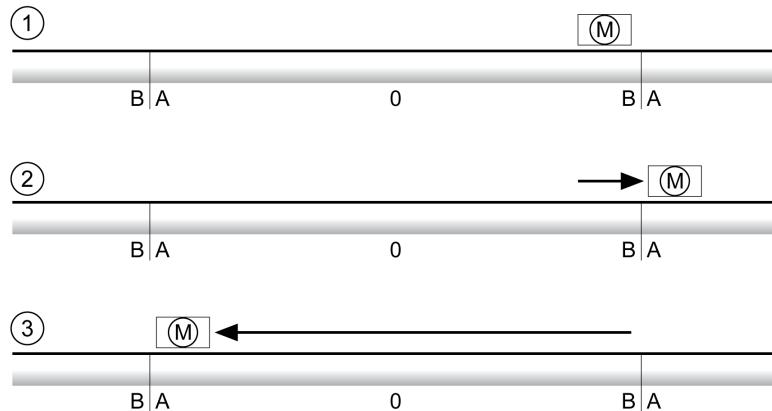
Behavior for a movement with Move Absolute:

- With firmware version ≥V01.04 and setting via parameter *PP_ ModeRangeLim* = 1:

  An absolute movement beyond the movement range is possible.

- With firmware version <V01.04:

  An absolute movement is made within the movement range. An absolute movement beyond the movement range is not possible.

Example:

Actual position: 268435000 user-defined units (usr_p)

Target position absolute: -268435000 user-defined units (usr_p)



**A** -268435456 user-defined units (usr_p)

**B** 268435455 user-defined units (usr_p)

**1** Actual position: 268435000 user-defined units

**2** Absolute movement to -268435000 user-defined units with parameter *PP_ ModeRangeLim* = 1

**3** Absolute movement to -268435000 user-defined units with parameter *PP_ ModeRangeLim* = 0

# Setting a Modulo Range

## Description

The modulo range supports applications with repeating arrangements of target positions (such as rotary indexing tables). The target positions are mapped to a parameterizable movement range.

For details see section Modulo Range, page 187.

# Modulo Range

## Setting a Modulo Range

### Availability

Available with firmware version ≥V01.01.

### Description

The modulo range supports applications with repeating arrangements of target positions (such as rotary indexing tables). The target positions are mapped to a parameterizable movement range.

### Direction of Movement

The direction of movement for absolute target positions can be adjusted to meet the requirements of the application.

- Shortest distance
- Positive direction of movement only
- Negative direction of movement only
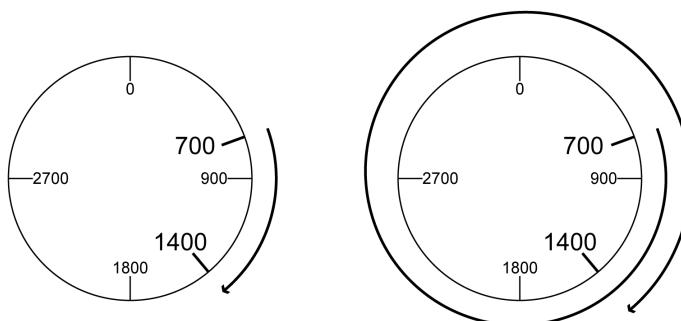
### Multiple Modulo Range

In addition, it is possible to set a multiple modulo range for absolute target positions. A movement with an absolute target position beyond the modulo range is performed in a way as if several modulo ranges had been arranged one after the other.

Example:

- Modulo range
  - Minimum position: 0 usr_p
  - Maximum position: 3600 usr_p
- Actual position: 700 usr_p
- Target positions absolute: 5000 usr_p
- Left: Without multiple modulo range

  Right: With multiple modulo range
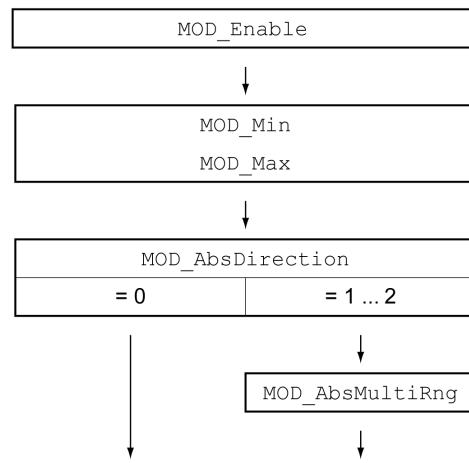
Multiple modulo range

# Parameterization

## Overview

Overview of parameters

```
┌─────────────────────────────────┐
│           MOD_Enable            │
└─────────────────────────────────┘
                 ↓
┌─────────────────────────────────┐
│             MOD_Min             │
│             MOD_Max             │
└─────────────────────────────────┘
                 ↓
┌─────────────────────────────────┐
│         MOD_AbsDirection        │
├────────────────┬────────────────┤
│      = 0       │    = 1 ... 2    │
└────────────────┴────────────────┘
         ↓                ↓
                 ┌─────────────────────┐
                 │   MOD_AbsMultiRng   │
                 └─────────────────────┘
         ↓                ↓
```

## Scaling

Using a modulo range requires the scaling to be adapted. The scaling of the motor must be adapted to the requirements of the application, see .

## Activation

The modulo range is activated with the parameter *MOD_Enable*.

| Parameter name  HMI menu  HMI name | Description | Unit  Minimum value  Factory setting  Maximum value | Data type  R/W  Persistent  Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MOD_Enable*  *ConF → ACG-AtYP* | Activation of Modulo function.  **0 / Modulo Off / oFF** : Modulo is off  **1 / Modulo On / on** : Modulo is on  Setting can only be modified if power stage is disabled.  Modified settings become active immediately.  Available with firmware version ≥V01.01. | -  0  0  1 | UINT16  R/W  per.  - | CANopen 3006:38h  Modbus 1648  Profibus 1648  CIP 106.1.56  ModbusTCP 1648  EtherCAT 3006:38h  PROFINET 1648 |

## Modulo Range

The parameters *MOD_Min* and *MOD_Max* can be used to set the modulo range.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MOD_Min* | Minimum position of modulo range.<br><br>The minimum position value of the modulo range must be less than the maximum position value of the modulo range.<br><br>The value must not exceed the maximum possible value of position scaling _ScalePOSmax.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.01. | usr_p<br><br>-<br><br>0<br><br>- | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:39$_h$<br><br>Modbus 1650<br><br>Profibus 1650<br><br>CIP 106.1.57<br><br>ModbusTCP 1650<br><br>EtherCAT 3006:39$_h$<br><br>PROFINET 1650 |
| *MOD_Max* | Maximum position of modulo range.<br><br>The maximum position value of the modulo range must be greater than the minimum position value of the modulo range.<br><br>The value must not exceed the maximum possible value of position scaling _ScalePOSmax.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.01. | usr_p<br><br>-<br><br>3600<br><br>- | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:3A$_h$<br><br>Modbus 1652<br><br>Profibus 1652<br><br>CIP 106.1.58<br><br>ModbusTCP 1652<br><br>EtherCAT 3006:3A$_h$<br><br>PROFINET 1652 |

## Direction for Absolute Movements

The parameter *MOD_AbsDirection* lets you set the direction of movement for absolute movements.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MOD_AbsDirection* | Direction of absolute movement with Modulo.<br><br>**0 / Shortest Distance**: Movement with shortest distance<br><br>**1 / Positive Direction**: Movement only in positive direction<br><br>**2 / Negative Direction**: Movement only in negative direction<br><br>If the parameter is set to 0, the drive calculates the shortest way to the new target position and starts the movement in the corresponding direction. If the distance to the target position is identical in positive and negative directions, the movement takes place in positive direction.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.01. | -<br><br>0<br><br>0<br><br>2 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:3B$_h$<br><br>Modbus 1654<br><br>Profibus 1654<br><br>CIP 106.1.59<br><br>ModbusTCP 1654<br><br>EtherCAT 3006:3B$_h$<br><br>PROFINET 1654 |

## Multiple Modulo Range for Absolute Movements

The parameter *MOD_AbsMultiRng* lets you set a multiple modulo range for absolute movements.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MOD_AbsMultiRng* | Multiple ranges for absolute movement with Modulo. **0 / Multiple Ranges Off**: Absolute movement in one modulo range **1 / Multiple Ranges On**: Absolute movement in multiple modulo ranges Modified settings become active immediately. Available with firmware version ≥V01.01. | - 0 0 1 | UINT16 R/W per. - | CANopen 3006:3C$_h$ Modbus 1656 Profibus 1656 CIP 106.1.60 ModbusTCP 1656 EtherCAT 3006:3C$_h$ PROFINET 1656 |

# Examples with Relative Movements
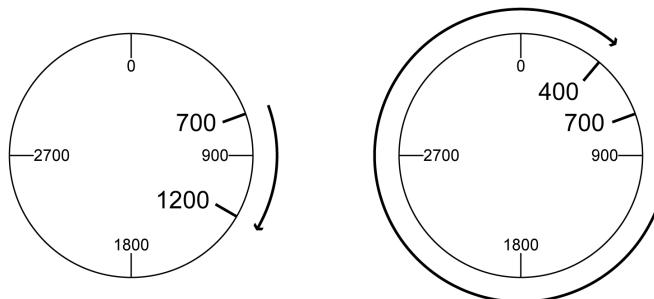
## Assumptions

The settings below are assumed for the examples.

- Rotary motor
- Position scaling
  - Numerator: 1
  - Denominator: 3600
- Modulo range
  - Minimum position: 0 usr_p
  - Maximum position: 3600 usr_p
- Actual position: 700 usr_p
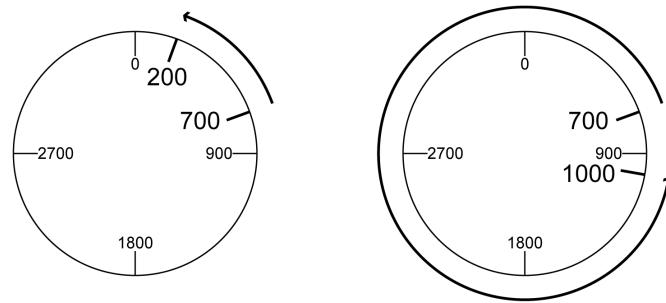
## Example 1

Target positions relative: 500 usr_p and 3300 usr_p



## Example 2

Target positions relative: -500 usr_p and -3300 usr_p

# Examples with Absolute Movements and "Shortest Distance"
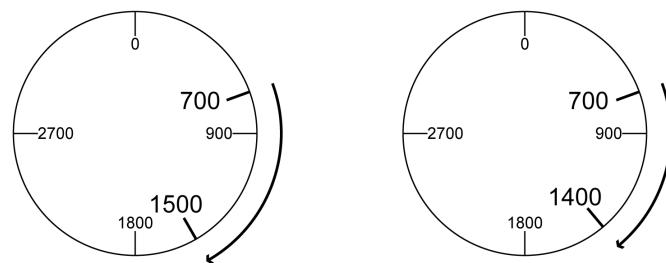
## Assumptions

The settings below are assumed for the examples.

- Rotary motor
- Position scaling
  - Numerator: 1
  - Denominator: 3600
- Modulo range
  - Minimum position: 0 usr_p
  - Maximum position: 3600 usr_p
- Actual position: 700 usr_p
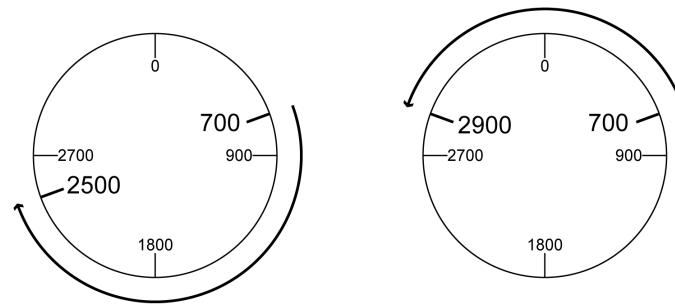
## Example 1

Target positions absolute: 1500 usr_p and 5000 usr_p



## Example 2

Target positions absolute: 2500 usr_p and 2900 usr_p

# Examples with Absolute Movements and "Positive Direction"

## Assumptions
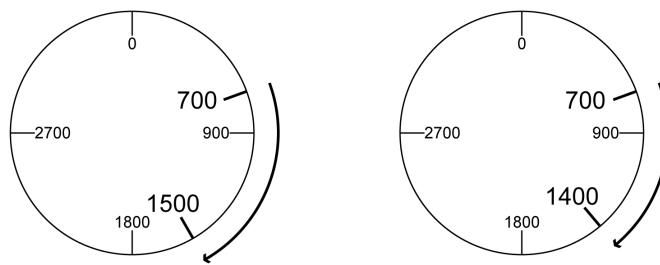
The settings below are assumed for the examples.

- Rotary motor
- Position scaling
  - Numerator: 1
  - Denominator: 3600
- Modulo range
  - Minimum position: 0 usr_p
  - Maximum position: 3600 usr_p
- Actual position: 700 usr_p

Parameter *MOD_AbsDirection*: Positive Direction

## Example 1
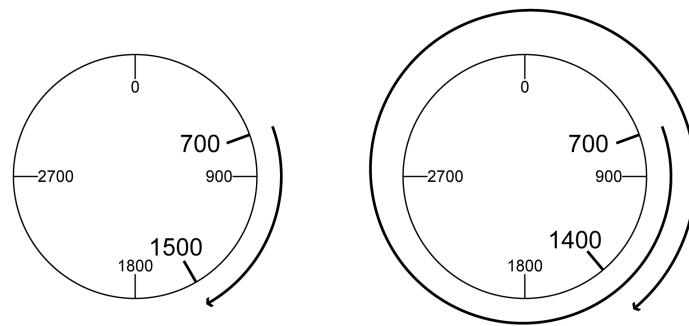
Parameter *MOD_AbsMultiRng*: Off

Target positions absolute: 1500 usr_p and 5000 usr_p



## Example 2

Parameter *MOD_AbsMultiRng*: On

Target positions absolute: 1500 usr_p and 5000 usr_p

# Examples with Absolute Movements and "Negative Direction"

## Assumptions
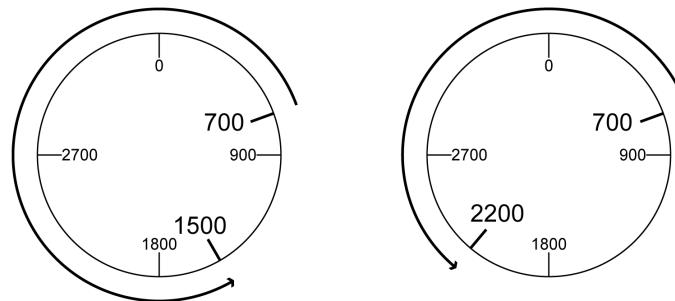
The settings below are assumed for the examples.

- Rotary motor
- Position scaling
  - Numerator: 1
  - Denominator: 3600
- Modulo range
  - Minimum position: 0 usr_p
  - Maximum position: 3600 usr_p
- Actual position: 700 usr_p

Parameter *MOD_AbsDirection*: Negative Direction

## Example 1
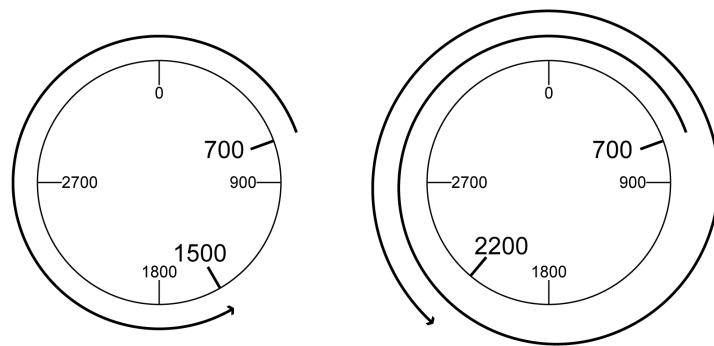
Parameter *MOD_AbsMultiRng*: Off

Target positions absolute: 1500 usr_p and -5000 usr_p



## Example 2

Parameter *MOD_AbsMultiRng*: On

Target positions absolute: 1500 usr_p and -5000 usr_p
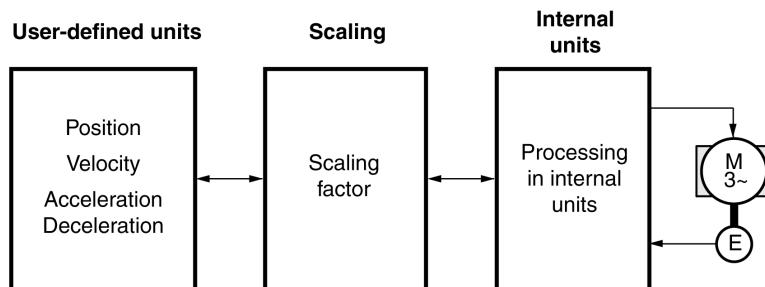
# Scaling

## General

### Overview

Scaling converts user-defined units into internal units of the device, and vice versa.



### User-Defined Units

Values for positions, velocities, acceleration and deceleration are specified in the following user-defined unit:

- usr_p for positions
- usr_v for velocities
- usr_a for acceleration and deceleration

Modifying the scaling modifies the ratio between user-defined units and internal units. After a modification to the scaling, the same value of a parameter specified in a user-defined unit causes a different movement than before the modification. A modification of the scaling affects all parameters whose values are specified in user-defined units.

---

### ⚠ WARNING

**UNINTENDED MOVEMENT**

- Verify all parameters with user-defined units before modifying the scaling factor.
- Verify that a modification of the scaling factor cannot cause unintended movements.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

---

### Scaling Factor

The scaling factor is the relationship between the motor movement and the required user-defined units.

### Commissioning Software

As of firmware version ≥V01.04, you can adjust the scaling via the commissioning software. The parameters with user-defined units are automatically adjusted.

# Configuration of Position Scaling

## Description

Position scaling is the relationship between the number of motor revolutions and the required user-defined units (usr_p).

## Scaling Factor

Position scaling is specified by means of scaling factor:

In the case of a rotary motor, the scaling factor is calculated as shown below:

$$\frac{\text{Number of revolutions of the motor}}{\text{Number of user-defined units [usr\_p]}}$$

A new scaling factor is activated when you specify the numerator value.

With a scaling factor of < 1 / 131072, it is not possible to perform a movement outside of the movement range.

## Factory Setting

The following factory settings are used:

1 motor revolution corresponds to 16384 user-defined units

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *ScalePOSnum* | Position scaling: Numerator. Specification of the scaling factor: Motor revolutions ------------------------------------------ User-defined units [usr_p] A new scaling is activated when the numerator value is supplied. Setting can only be modified if power stage is disabled. Modified settings become active immediately. | revolution 1 1 2147483647 | INT32 R/W per. - | CANopen 3006:8$_h$ Modbus 1552 Profibus 1552 CIP 106.1.8 ModbusTCP 1552 EtherCAT 3006:8$_h$ PROFINET 1552 |
| *ScalePOSdenom* | Position scaling: Denominator. Refer to numerator (ScalePOSnum) for a description. A new scaling is activated when the numerator value is supplied. Setting can only be modified if power stage is disabled. | usr_p 1 16384 2147483647 | INT32 R/W per. - | CANopen 3006:7$_h$ Modbus 1550 Profibus 1550 CIP 106.1.7 ModbusTCP 1550 EtherCAT 3006:7$_h$ PROFINET 1550 |

# Configuration of Velocity Scaling

## Description

Velocity scaling is the relationship between the number of motor revolutions per minute and the required user-defined units (usr_v).

## Scaling Factor

Velocity scaling is specified by means of scaling factor:

In the case of a rotary motor, the scaling factor is calculated as shown below:

$$\frac{\text{Number of revolutions of the motor per minute}}{\text{Number of user-defined units [usr\_v]}}$$

## Factory Setting

The following factory settings are used:

1 motor revolution per minute corresponds to 1 user-defined unit

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *ScaleVELnum* | Velocity scaling: Numerator. Specification of the scaling factor: Speed of rotation of motor [RPM] ------------------------------------------------ User-defined units [usr_v] A new scaling is activated when the numerator value is supplied. Setting can only be modified if power stage is disabled. Modified settings become active immediately. | RPM 1 1 2147483647 | INT32 R/W per. - | CANopen 3006:22$_h$ Modbus 1604 Profibus 1604 CIP 106.1.34 ModbusTCP 1604 EtherCAT 3006:22$_h$ PROFINET 1604 |
| *ScaleVELdenom* | Velocity scaling: Denominator. See numerator (ScaleVELnum) for a description. A new scaling is activated when the numerator value is supplied. Setting can only be modified if power stage is disabled. | usr_v 1 1 2147483647 | INT32 R/W per. - | CANopen 3006:21$_h$ Modbus 1602 Profibus 1602 CIP 106.1.33 ModbusTCP 1602 EtherCAT 3006:21$_h$ PROFINET 1602 |

# Configuration of Ramp Scaling

## Description

Ramp scaling is the relationship between the change in velocity and the required user-defined units (usr_a).

## Scaling Factor

Ramp scaling is specified by means of scaling factor:

$$\frac{\text{Velocity change per second}}{\text{Number of user-defined units [usr\_a]}}$$

## Factory Setting

The following factory settings are used:

A change of 1 motor revolution per minute per second corresponds to 1 user-defined unit.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *ScaleRAMPnum* | Ramp scaling: Numerator.  Setting can only be modified if power stage is disabled.  Modified settings become active immediately. | RPM/s  1  1  2147483647 | INT32  R/W  per.  - | CANopen 3006:31$_h$  Modbus 1634  Profibus 1634  CIP 106.1.49  ModbusTCP 1634  EtherCAT 3006:31$_h$  PROFINET 1634 |
| *ScaleRAMPdenom* | Ramp scaling: Denominator.  See numerator (ScaleRAMPnum) for a description.  A new scaling is activated when the numerator value is supplied.  Setting can only be modified if power stage is disabled. | usr_a  1  1  2147483647 | INT32  R/W  per.  - | CANopen 3006:30$_h$  Modbus 1632  Profibus 1632  CIP 106.1.48  ModbusTCP 1632  EtherCAT 3006:30$_h$  PROFINET 1632 |

# Digital Signal Inputs and Digital Signal Outputs

## Parameterization of the Signal Input Functions

### Signal Input Function

Various signal input functions can be assigned to the digital signal inputs.

The functions of the inputs and outputs depend on the selected operating mode and the settings of the corresponding parameters.

---

**⚠ WARNING**

**UNINTENDED EQUIPMENT OPERATION**

- Verify that the wiring is appropriate for the factory settings and any subsequent parameterizations.
- Only start the system if there are no persons or obstructions in the zone of operation.
- Carefully run tests for all operating states and potential error situations when commissioning, upgrading or otherwise modifying the operation of the drive.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

---

### Factory Settings

The table below shows the factory settings of the digital signal inputs depending on the selected operating mode in local control mode:

| Signal | Jog | Electronic Gear | Profile Torque | Profile Velocity | Motion Sequence |
|--------|-----|-----------------|----------------|------------------|-----------------|
| DI0 | Enable | Enable | Enable | Enable | Enable |
| DI1 | Fault Reset | Fault Reset | Fault Reset | Fault Reset | Reference Switch (REF) |
| DI2 | Positive Limit Switch (LIMP) | Positive Limit Switch (LIMP) | Operating Mode Switch | Operating Mode Switch | Positive Limit Switch (LIMP) |
| DI3 | Negative Limit Switch (LIMN) | Negative Limit Switch (LIMN) | Velocity Limitation | Velocity Limitation | Negative Limit Switch (LIMN) |
| DI4 | Jog negative | Gear Ratio Switch | Current Limitation | Zero Clamp | Start Motion Sequence |
| DI5 | Jog positive | Halt | Halt | Halt | Data Set Select |

The table below shows the factory settings of the digital signal inputs in fieldbus control mode:

| Signal | Signal input function |
|--------|-----------------------|
| DI0 | Freely Available |
| DI1 | Reference Switch (REF) |
| DI2 | Positive Limit Switch (LIMP) |
| DI3 | Negative Limit Switch (LIMN) |
| DI4 | Freely Available |
| DI5 | Freely Available |

# Parameterization

The table below provides an overview of the possible signal input functions depending on the selected operating mode in local control mode:

| Signal input function | Jog | Electronic Gear | Profile Torque | Profile Velocity | Motion Sequence | Description in section |
|---|---|---|---|---|---|---|
| Freely Available | • | • | • | • | • | Setting a Signal Output via Parameter, page 331 |
| Fault Reset | • | • | • | • | • | Changing the Operating State via Signal Inputs, page 243 |
| Enable | • | • | • | • | • | Changing the Operating State via Signal Inputs, page 243 |
| Halt | • | • | • | • | • | Stopping Movement with Halt, page 320 |
| Current Limitation | • | • | • | • | • | Limitation of the Current via Signal Inputs, page 327 |
| Zero Clamp | • | • | • | • | • | Zero Clamp, page 330 |
| Velocity Limitation | • | • | • | • | • | Limitation of the Velocity via Signal Inputs, page 324 |
| Jog Positive | • | | | | | Operating Mode Jog, page 248 |
| Jog Negative | • | | | | | Operating Mode Jog, page 248 |
| Jog Fast/Slow | • | | | | | Operating Mode Jog, page 248 |
| Gear Ratio Switch | | • | | | | Operating Mode Electronic Gear, page 256 |
| Start Single Data Set | | | | | • | Operating Mode Motion Sequence, page 305 |
| Data Set Select | | | | | • | Operating Mode Motion Sequence, page 305 |
| Data Set Bit 0 | | | | | • | Operating Mode Motion Sequence, page 305 |
| Data Set Bit 1 | | | | | • | Operating Mode Motion Sequence, page 305 |
| Data Set Bit 2 | | | | | • | Operating Mode Motion Sequence, page 305 |
| Data Set Bit 3 | | | | | • | Operating Mode Motion Sequence, page 305 |
| Gear Offset 1 | | • | | | | Operating Mode Electronic Gear, page 256 |
| Gear Offset 2 | | • | | | | Operating Mode Electronic Gear, page 256 |
| Reference Switch (REF) | • | • | • | • | • | Reference Switch, page 351 |
| Positive Limit Switch (LIMP) | • | • | • | • | • | Limit Switches, page 350 |
| Negative Limit Switch (LIMN) | • | • | • | • | • | Limit Switches, page 350 |
| Switch Controller Parameter Set | • | • | • | • | • | Switching Between Control Loop Parameter Sets, page 222 |
| Operating Mode Switch | | • | • | • | | Starting and Changing an Operating Mode, page 245 |
| Velocity Controller Integral Off | • | • | • | • | • | Switching Between Control Loop Parameter Sets, page 222 |
| Start Motion Sequence | | | | | • | Operating Mode Motion Sequence, page 305 |

| Signal input function | Jog | Electronic Gear | Profile Torque | Profile Velocity | Motion Sequence | Description in section |
|---|---|---|---|---|---|---|
| Start Signal Of RMAC | • | • | • | • | • | Relative Movement After Capture (RMAC), page 343 |
| Activate RMAC | • | • | • | • | • | Relative Movement After Capture (RMAC), page 343 |
| Activate Operating Mode | • | • | • | • | • | Relative Movement After Capture (RMAC), page 343 |
| Data Set Bit 4 | | | | | • | Operating Mode Motion Sequence, page 305 |
| Data Set Bit 5 | | | | | • | Operating Mode Motion Sequence, page 305 |
| Data Set Bit 6 | | | | | • | Operating Mode Motion Sequence, page 305 |
| Inversion AI11 (IO Module)[1] | | | • | • | | Inverting the Analog Signal Inputs, page 323 |
| Inversion AI12 (IO Module)[1] | | | • | • | | Inverting the Analog Signal Inputs, page 323 |
| Release Holding Brake | • | • | • | • | • | Releasing the Holding Brake Manually, page 150 |
| **(1)** Analog signal inputs are available with the IOM1 module. | | | | | | |

The table below provides an overview of the possible signal input functions in fieldbus control mode:

| Signal input function | Description in section |
|---|---|
| Freely Available | Setting a Signal Output via Parameter, page 331 |
| Fault Reset | Changing the Operating State via Signal Inputs, page 243 |
| Enable | Changing the Operating State via Signal Inputs, page 243 |
| Halt | Stopping Movement with Halt, page 320 |
| Start Profile Positioning | Starting a Movement via a Signal Input, page 331 |
| Current Limitation | Limitation of the Current via Signal Inputs, page 327 |
| Zero Clamp | Zero Clamp, page 330 |
| Velocity Limitation | Limitation of the Velocity via Signal Inputs, page 324 |
| Gear Offset 1 | Operating Mode Electronic Gear, page 256 |
| Gear Offset 2 | Operating Mode Electronic Gear, page 256 |
| Reference Switch (REF) | Reference Switch, page 351 |
| Positive Limit Switch (LIMP) | Limit Switches, page 350 |
| Negative Limit Switch (LIMN) | Limit Switches, page 350 |
| Switch Controller Parameter Set | Switching Between Control Loop Parameter Sets, page 222 |
| Velocity Controller Integral Off | Switching Between Control Loop Parameter Sets, page 222 |
| Start Signal Of RMAC | Relative Movement After Capture (RMAC), page 343 |
| Activate RMAC | Relative Movement After Capture (RMAC), page 343 |
| Release Holding Brake | Releasing the Holding Brake Manually, page 150 |

The following parameters can be used to parameterize the digital signal inputs:

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOfunct_DI0* ⌐ o ⌐ F → , - o - d , 0 | Function Input DI0. | - | UINT16 | CANopen 3007:1ₕ |
| | **1 / Freely Available /** n o n E : Available as required | - | R/W | Modbus 1794 |
| | **2 / Fault Reset /** F ⌐ E 5 : Fault reset after error | - | per. | Profibus 1794 |
| | **3 / Enable /** E n A b : Enables the power stage | - | - | CIP 107.1.1 |
| | **4 / Halt /** h A L t : Halt | | | ModbusTCP 1794 |
| | **5 / Start Profile Positioning /** 5 P t P : Start request for movement | | | EtherCAT 3007:1ₕ |
| | **6 / Current Limitation /** , L , П : Limits the current to parameter value | | | PROFINET 1794 |
| | **7 / Zero Clamp /** C L П P : Zero clamping | | | |
| | **8 / Velocity Limitation /** V L , П : Limits the velocity to parameter value | | | |
| | **9 / Jog Positive /** J o G P : Jog: Moves in positive direction | | | |
| | **10 / Jog Negative /** J o G n : Jog: Moves in negative direction | | | |
| | **11 / Jog Fast/Slow /** J o G F : Jog: Switches between slow and fast movement | | | |
| | **12 / Gear Ratio Switch /** G ⌐ A t : Electronic Gear: Switches between two gear ratios | | | |
| | **13 / Start Single Data Set /** d 5 t A : Motion Sequence: Starts a single data set | | | |
| | **14 / Data Set Select /** d 5 E L : Motion Sequence: Data set selection | | | |
| | **15 / Data Set Bit 0 /** d 5 b 0 : Motion Sequence: Data set bit 0 | | | |
| | **16 / Data Set Bit 1 /** d 5 b 1 : Motion Sequence: Data set bit 1 | | | |
| | **17 / Data Set Bit 2 /** d 5 b 2 : Motion Sequence: Data set bit 2 | | | |
| | **18 / Data Set Bit 3 /** d 5 b 3 : Motion Sequence: Data set bit 3 | | | |
| | **19 / Gear Offset 1 /** G o F 1 : Electronic Gear: Adds first gear offset | | | |
| | **20 / Gear Offset 2 /** G o F 2 : Electronic Gear: Adds second gear offset | | | |
| | **21 / Reference Switch (REF) /** ⌐ E F : Reference switch | | | |
| | **22 / Positive Limit Switch (LIMP) /** L , П P : Positive limit switch | | | |
| | **23 / Negative Limit Switch (LIMN) /** L , П n : Negative limit switch | | | |
| | **24 / Switch Controller Parameter Set /** C P A ⌐ : Switches control loop parameter set | | | |
| | **27 / Operating Mode Switch /** П 5 W t : Switches operating mode | | | |
| | **28 / Velocity Controller Integral Off /** t n o F : Switches off velocity controller integral term | | | |
| | **29 / Start Motion Sequence /** 5 t П 5 : Motion Sequence: Starts a motion sequence | | | |
| | **30 / Start Signal Of RMAC /** 5 ⌐ П c : Start signal of relative movement after capture (RMAC) | | | |
| | **31 / Activate RMAC /** A ⌐ П c : Activates the relative movement after capture (RMAC) | | | |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persis-tent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **32 / Activate Operating Mode /** *A c o P*: Activates operating mode<br><br>**35 / Data Set Bit 4 /** *d S b 4*: Motion Sequence: Data set bit 4<br><br>**36 / Data Set Bit 5 /** *d S b 5*: Motion Sequence: Data set bit 5<br><br>**37 / Data Set Bit 6 /** *d S b 6*: Motion Sequence: Data set bit 6<br><br>**38 / Inversion AI11 (IO Module) /** *A I 1 i*: Inverts analog input AI11 (I/O module)<br><br>**39 / Inversion AI12 (IO Module) /** *A I 2 i*: Inverts analog input AI12 (I/O module)<br><br>**40 / Release Holding Brake /** *r E h b*: Releases the holding brake<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on. | | | |
| *IOfunct_DI1*<br><br>*C o n F → i - o -*<br><br>*d i 1* | Function Input DI1.<br><br>**1 / Freely Available /** *n o n E*: Available as required<br><br>**2 / Fault Reset /** *F r E S*: Fault reset after error<br><br>**3 / Enable /** *E n A b*: Enables the power stage<br><br>**4 / Halt /** *h A L t*: Halt<br><br>**5 / Start Profile Positioning /** *S P t P*: Start request for movement<br><br>**6 / Current Limitation /** *i L i M*: Limits the current to parameter value<br><br>**7 / Zero Clamp /** *C L M P*: Zero clamping<br><br>**8 / Velocity Limitation /** *V L i M*: Limits the velocity to parameter value<br><br>**9 / Jog Positive /** *J o G P*: Jog: Moves in positive direction<br><br>**10 / Jog Negative /** *J o G n*: Jog: Moves in negative direction<br><br>**11 / Jog Fast/Slow /** *J o G F*: Jog: Switches between slow and fast movement<br><br>**12 / Gear Ratio Switch /** *G r A t*: Electronic Gear: Switches between two gear ratios<br><br>**13 / Start Single Data Set /** *d S t A*: Motion Sequence: Starts a single data set<br><br>**14 / Data Set Select /** *d S E L*: Motion Sequence: Data set selection<br><br>**15 / Data Set Bit 0 /** *d S b 0*: Motion Sequence: Data set bit 0<br><br>**16 / Data Set Bit 1 /** *d S b 1*: Motion Sequence: Data set bit 1<br><br>**17 / Data Set Bit 2 /** *d S b 2*: Motion Sequence: Data set bit 2<br><br>**18 / Data Set Bit 3 /** *d S b 3*: Motion Sequence: Data set bit 3<br><br>**19 / Gear Offset 1 /** *G o F 1*: Electronic Gear: Adds first gear offset<br><br>**20 / Gear Offset 2 /** *G o F 2*: Electronic Gear: Adds second gear offset<br><br>**21 / Reference Switch (REF) /** *r E F*: Reference switch<br><br>**22 / Positive Limit Switch (LIMP) /** *L i M P*: Positive limit switch | -<br><br>-<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3007:2ₕ<br><br>Modbus 1796<br><br>Profibus 1796<br><br>CIP 107.1.2<br><br>ModbusTCP 1796<br><br>EtherCAT 3007:2ₕ<br><br>PROFINET 1796 |

| Parameter name<br>HMI menu<br>HMI name | Description | Unit<br>Minimum value<br>Factory setting<br>Maximum value | Data type<br>R/W<br>Persis-tent<br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **23 / Negative Limit Switch (LIMN) /** $L \ i \ \Pi \ n$ : Negative limit switch | | | |
| | **24 / Switch Controller Parameter Set /** $C \ P \ A \ r$ : Switches control loop parameter set | | | |
| | **27 / Operating Mode Switch /** $\Pi \ 5 \ W \ E$ : Switches operating mode | | | |
| | **28 / Velocity Controller Integral Off /** $E \ n \ o \ F$ : Switches off velocity controller integral term | | | |
| | **29 / Start Motion Sequence /** $5 \ E \ \Pi \ 5$ : Motion Sequence: Starts a motion sequence | | | |
| | **30 / Start Signal Of RMAC /** $5 \ r \ \Pi \ c$ : Start signal of relative movement after capture (RMAC) | | | |
| | **31 / Activate RMAC /** $A \ r \ \Pi \ c$ : Activates the relative movement after capture (RMAC) | | | |
| | **32 / Activate Operating Mode /** $A \ c \ o \ P$ : Activates operating mode | | | |
| | **35 / Data Set Bit 4 /** $d \ 5 \ b \ 4$ : Motion Sequence: Data set bit 4 | | | |
| | **36 / Data Set Bit 5 /** $d \ 5 \ b \ 5$ : Motion Sequence: Data set bit 5 | | | |
| | **37 / Data Set Bit 6 /** $d \ 5 \ b \ 6$ : Motion Sequence: Data set bit 6 | | | |
| | **38 / Inversion AI11 (IO Module) /** $A \ I \ I \ i$ : Inverts analog input AI11 (I/O module) | | | |
| | **39 / Inversion AI12 (IO Module) /** $A \ I \ 2 \ i$ : Inverts analog input AI12 (I/O module) | | | |
| | **40 / Release Holding Brake /** $r \ E \ h \ b$ : Releases the holding brake | | | |
| | Setting can only be modified if power stage is disabled. | | | |
| | Modified settings become active the next time the product is powered on. | | | |
| *IOfunct_DI2*<br>$C \ o \ n \ F \rightarrow \ i \ - \ o \ - $<br>$d \ i \ 2$ | Function Input DI2. | - | UINT16 | CANopen 3007:3ₕ |
| | **1 / Freely Available /** $n \ o \ n \ E$ : Available as required | - | R/W | Modbus 1798 |
| | **2 / Fault Reset /** $F \ r \ E \ 5$ : Fault reset after error | - | per. | Profibus 1798 |
| | **3 / Enable /** $E \ n \ A \ b$ : Enables the power stage | - | - | CIP 107.1.3 |
| | **4 / Halt /** $h \ A \ L \ E$ : Halt | | | ModbusTCP 1798 |
| | **5 / Start Profile Positioning /** $5 \ P \ E \ P$ : Start request for movement | | | EtherCAT 3007:3ₕ |
| | **6 / Current Limitation /** $i \ L \ i \ \Pi$ : Limits the current to parameter value | | | PROFINET 1798 |
| | **7 / Zero Clamp /** $C \ L \ \Pi \ P$ : Zero clamping | | | |
| | **8 / Velocity Limitation /** $V \ L \ i \ \Pi$ : Limits the velocity to parameter value | | | |
| | **9 / Jog Positive /** $J \ o \ G \ P$ : Jog: Moves in positive direction | | | |
| | **10 / Jog Negative /** $J \ o \ G \ n$ : Jog: Moves in negative direction | | | |
| | **11 / Jog Fast/Slow /** $J \ o \ G \ F$ : Jog: Switches between slow and fast movement | | | |
| | **12 / Gear Ratio Switch /** $G \ r \ A \ E$ : Electronic Gear: Switches between two gear ratios | | | |
| | **13 / Start Single Data Set /** $d \ 5 \ E \ A$ : Motion Sequence: Starts a single data set | | | |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persis-tent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **14 / Data Set Select /** ⅾ Ƽ Ɛ ʟ : Motion Sequence: Data set selection | | | |
| | **15 / Data Set Bit 0 /** ⅾ Ƽ ƅ ⅆ: Motion Sequence: Data set bit 0 | | | |
| | **16 / Data Set Bit 1 /** ⅾ Ƽ ƅ Ɩ: Motion Sequence: Data set bit 1 | | | |
| | **17 / Data Set Bit 2 /** ⅾ Ƽ ƅ ⒉: Motion Sequence: Data set bit 2 | | | |
| | **18 / Data Set Bit 3 /** ⅾ Ƽ ƅ Ǯ: Motion Sequence: Data set bit 3 | | | |
| | **19 / Gear Offset 1 /** Ɠ ₒ Ƒ Ɩ: Electronic Gear: Adds first gear offset | | | |
| | **20 / Gear Offset 2 /** Ɠ ₒ Ƒ ⒉: Electronic Gear: Adds second gear offset | | | |
| | **21 / Reference Switch (REF) /** ᵣ Ɛ Ƒ : Reference switch | | | |
| | **22 / Positive Limit Switch (LIMP) /** ʟ ᵢ Ʌ Ƥ: Positive limit switch | | | |
| | **23 / Negative Limit Switch (LIMN) /** ʟ ᵢ Ʌ ₙ: Negative limit switch | | | |
| | **24 / Switch Controller Parameter Set /** Ɛ Ƥ Ⴤ ᵣ : Switches control loop parameter set | | | |
| | **27 / Operating Mode Switch /** Ʌ Ƽ ⱳ Ƭ: Switches operating mode | | | |
| | **28 / Velocity Controller Integral Off /** Ƭ ₙ ₒ Ƒ : Switches off velocity controller integral term | | | |
| | **29 / Start Motion Sequence /** Ƽ Ƭ Ʌ Ƽ: Motion Sequence: Starts a motion sequence | | | |
| | **30 / Start Signal Of RMAC /** Ƽ ᵣ Ʌ ₑ : Start signal of relative movement after capture (RMAC) | | | |
| | **31 / Activate RMAC /** Ⴤ ᵣ Ʌ ₑ: Activates the relative movement after capture (RMAC) | | | |
| | **32 / Activate Operating Mode /** Ⴤ ₑ ₒ Ƥ: Activates operating mode | | | |
| | **35 / Data Set Bit 4 /** ⅾ Ƽ ƅ Ƴ: Motion Sequence: Data set bit 4 | | | |
| | **36 / Data Set Bit 5 /** ⅾ Ƽ ƅ Ƽ: Motion Sequence: Data set bit 5 | | | |
| | **37 / Data Set Bit 6 /** ⅾ Ƽ ƅ Ɓ: Motion Sequence: Data set bit 6 | | | |
| | **38 / Inversion AI11 (IO Module) /** Ⴤ Ɩ Ɩ ᵢ: Inverts analog input AI11 (I/O module) | | | |
| | **39 / Inversion AI12 (IO Module) /** Ⴤ Ɩ ⒉ ᵢ: Inverts analog input AI12 (I/O module) | | | |
| | **40 / Release Holding Brake /** ᵣ Ɛ ♄ ƅ: Releases the holding brake | | | |
| | Setting can only be modified if power stage is disabled. | | | |
| | Modified settings become active the next time the product is powered on. | | | |
| *IOfunct_DI3*<br><br>Ɛ ₒ Ƒ → ᵢ ⁻ ₒ ⁻<br><br>ⅾ ᵢ Ǯ | Function Input DI3. | - | UINT16 | CANopen 3007:4ₕ |
| | **1 / Freely Available /** ₙ ₒ ₙ Ɛ : Available as required | - | R/W | Modbus 1800 |
| | **2 / Fault Reset /** Ƒ ᵣ Ɛ Ƽ: Fault reset after error | - | per. | Profibus 1800 |
| | **3 / Enable /** Ɛ ₙ Ⴤ ƅ: Enables the power stage | - | - | CIP 107.1.4 |
| | **4 / Halt /** ♄ Ⴤ ʟ Ƭ : Halt | | | ModbusTCP 1800 |
| | **5 / Start Profile Positioning /** Ƽ Ƥ Ƭ Ƥ: Start request for movement | | | |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persis-tent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **6 / Current Limitation /** ⌐ L ⌐ ⊓ : Limits the current to parameter value | | | EtherCAT 3007:4h<br><br>PROFINET 1800 |
| | **7 / Zero Clamp /** C L ⊓ P : Zero clamping | | | |
| | **8 / Velocity Limitation /** V L ⌐ ⊓ : Limits the velocity to parameter value | | | |
| | **9 / Jog Positive /** ⅃ ₒ G P : Jog: Moves in positive direction | | | |
| | **10 / Jog Negative /** ⅃ ₒ G ⌐ : Jog: Moves in negative direction | | | |
| | **11 / Jog Fast/Slow /** ⅃ ₒ G F : Jog: Switches between slow and fast movement | | | |
| | **12 / Gear Ratio Switch /** G ⌐ A ⊦ : Electronic Gear: Switches between two gear ratios | | | |
| | **13 / Start Single Data Set /** ⅾ S ⊦ A : Motion Sequence: Starts a single data set | | | |
| | **14 / Data Set Select /** ⅾ S E L : Motion Sequence: Data set selection | | | |
| | **15 / Data Set Bit 0 /** ⅾ S ⌐ 0 : Motion Sequence: Data set bit 0 | | | |
| | **16 / Data Set Bit 1 /** ⅾ S ⌐ 1 : Motion Sequence: Data set bit 1 | | | |
| | **17 / Data Set Bit 2 /** ⅾ S ⌐ 2 : Motion Sequence: Data set bit 2 | | | |
| | **18 / Data Set Bit 3 /** ⅾ S ⌐ 3 : Motion Sequence: Data set bit 3 | | | |
| | **19 / Gear Offset 1 /** G ₒ F 1 : Electronic Gear: Adds first gear offset | | | |
| | **20 / Gear Offset 2 /** G ₒ F 2 : Electronic Gear: Adds second gear offset | | | |
| | **21 / Reference Switch (REF) /** ⌐ E F : Reference switch | | | |
| | **22 / Positive Limit Switch (LIMP) /** L ⌐ ⊓ P : Positive limit switch | | | |
| | **23 / Negative Limit Switch (LIMN) /** L ⌐ ⊓ ⌐ : Negative limit switch | | | |
| | **24 / Switch Controller Parameter Set /** C P A ⌐ : Switches control loop parameter set | | | |
| | **27 / Operating Mode Switch /** ⊓ S W ⊦ : Switches operating mode | | | |
| | **28 / Velocity Controller Integral Off /** ⊦ ⌐ ₒ F : Switches off velocity controller integral term | | | |
| | **29 / Start Motion Sequence /** S ⊦ ⊓ S : Motion Sequence: Starts a motion sequence | | | |
| | **30 / Start Signal Of RMAC /** S ⌐ ⊓ c : Start signal of relative movement after capture (RMAC) | | | |
| | **31 / Activate RMAC /** A ⌐ ⊓ c : Activates the relative movement after capture (RMAC) | | | |
| | **32 / Activate Operating Mode /** A c ₒ P : Activates operating mode | | | |
| | **35 / Data Set Bit 4 /** ⅾ S ⌐ 4 : Motion Sequence: Data set bit 4 | | | |
| | **36 / Data Set Bit 5 /** ⅾ S ⌐ 5 : Motion Sequence: Data set bit 5 | | | |
| | **37 / Data Set Bit 6 /** ⅾ S ⌐ 6 : Motion Sequence: Data set bit 6 | | | |
| | **38 / Inversion AI11 (IO Module) /** A 1 1 ⌐ : Inverts analog input AI11 (I/O module) | | | |
| | **39 / Inversion AI12 (IO Module) /** A 1 2 ⌐ : Inverts analog input AI12 (I/O module) | | | |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
|  | **40 / Release Holding Brake /** _r E h b_ : Releases the holding brake<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on. |  |  |  |
| _IOfunct_DI4_<br><br>_C o n F → i -_<br>_o -_<br><br>_d i 4_ | Function Input DI4.<br><br>**1 / Freely Available /** _n o n E_ : Available as required<br><br>**2 / Fault Reset /** _F r E S_ : Fault reset after error<br><br>**3 / Enable /** _E n A b_ : Enables the power stage<br><br>**4 / Halt /** _h A L t_ : Halt<br><br>**5 / Start Profile Positioning /** _S P t P_ : Start request for movement<br><br>**6 / Current Limitation /** _i L i П_ : Limits the current to parameter value<br><br>**7 / Zero Clamp /** _C L П P_ : Zero clamping<br><br>**8 / Velocity Limitation /** _V L i П_ : Limits the velocity to parameter value<br><br>**9 / Jog Positive /** _J o G P_ : Jog: Moves in positive direction<br><br>**10 / Jog Negative /** _J o G n_ : Jog: Moves in negative direction<br><br>**11 / Jog Fast/Slow /** _J o G F_ : Jog: Switches between slow and fast movement<br><br>**12 / Gear Ratio Switch /** _G r A t_ : Electronic Gear: Switches between two gear ratios<br><br>**13 / Start Single Data Set /** _d S t A_ : Motion Sequence: Starts a single data set<br><br>**14 / Data Set Select /** _d S E L_ : Motion Sequence: Data set selection<br><br>**15 / Data Set Bit 0 /** _d S b 0_ : Motion Sequence: Data set bit 0<br><br>**16 / Data Set Bit 1 /** _d S b 1_ : Motion Sequence: Data set bit 1<br><br>**17 / Data Set Bit 2 /** _d S b 2_ : Motion Sequence: Data set bit 2<br><br>**18 / Data Set Bit 3 /** _d S b 3_ : Motion Sequence: Data set bit 3<br><br>**19 / Gear Offset 1 /** _G o F 1_ : Electronic Gear: Adds first gear offset<br><br>**20 / Gear Offset 2 /** _G o F 2_ : Electronic Gear: Adds second gear offset<br><br>**21 / Reference Switch (REF) /** _r E F_ : Reference switch<br><br>**22 / Positive Limit Switch (LIMP) /** _L i П P_ : Positive limit switch<br><br>**23 / Negative Limit Switch (LIMN) /** _L i П n_ : Negative limit switch<br><br>**24 / Switch Controller Parameter Set /** _C P A r_ : Switches control loop parameter set<br><br>**27 / Operating Mode Switch /** _П S W t_ : Switches operating mode<br><br>**28 / Velocity Controller Integral Off /** _t n o F_ : Switches off velocity controller integral term<br><br>**29 / Start Motion Sequence /** _S t П S_ : Motion Sequence: Starts a motion sequence | -<br>-<br>-<br>-<br>- | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3007:5h<br><br>Modbus 1802<br><br>Profibus 1802<br><br>CIP 107.1.5<br><br>ModbusTCP 1802<br><br>EtherCAT 3007:5h<br><br>PROFINET 1802 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persis-tent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **30 / Start Signal Of RMAC / 5 ⌐ ⊓ c** : Start signal of relative movement after capture (RMAC)<br><br>**31 / Activate RMAC / A ⌐ ⊓ c** : Activates the relative movement after capture (RMAC)<br><br>**32 / Activate Operating Mode / A c o P**: Activates operating mode<br><br>**35 / Data Set Bit 4 / d 5 b 4**: Motion Sequence: Data set bit 4<br><br>**36 / Data Set Bit 5 / d 5 b 5**: Motion Sequence: Data set bit 5<br><br>**37 / Data Set Bit 6 / d 5 b 6**: Motion Sequence: Data set bit 6<br><br>**38 / Inversion AI11 (IO Module) / A I I ı**: Inverts analog input AI11 (I/O module)<br><br>**39 / Inversion AI12 (IO Module) / A I 2 ı**: Inverts analog input AI12 (I/O module)<br><br>**40 / Release Holding Brake / ⌐ E h b** : Releases the holding brake<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on. | | | |
| *IOfunct_DI5*<br><br>C o ⊓ F → ı - o -<br><br>d ı 5 | Function Input DI5.<br><br>**1 / Freely Available / ⌐ o ⌐ E** : Available as required<br><br>**2 / Fault Reset / F ⌐ E 5** : Fault reset after error<br><br>**3 / Enable / E ⌐ A b** : Enables the power stage<br><br>**4 / Halt / h A L ⨍** : Halt<br><br>**5 / Start Profile Positioning / 5 P ⨍ P** : Start request for movement<br><br>**6 / Current Limitation / ı L ı ⊓** : Limits the current to parameter value<br><br>**7 / Zero Clamp / C L ⊓ P** : Zero clamping<br><br>**8 / Velocity Limitation / V L ı ⊓** : Limits the velocity to parameter value<br><br>**9 / Jog Positive / ⌡ o G P** : Jog: Moves in positive direction<br><br>**10 / Jog Negative / ⌡ o G ⌐** : Jog: Moves in negative direction<br><br>**11 / Jog Fast/Slow / ⌡ o G F** : Jog: Switches between slow and fast movement<br><br>**12 / Gear Ratio Switch / G ⌐ A ⨍** : Electronic Gear: Switches between two gear ratios<br><br>**13 / Start Single Data Set / d 5 ⨍ A**: Motion Sequence: Starts a single data set<br><br>**14 / Data Set Select / d 5 E L** : Motion Sequence: Data set selection<br><br>**15 / Data Set Bit 0 / d 5 b 0**: Motion Sequence: Data set bit 0<br><br>**16 / Data Set Bit 1 / d 5 b I**: Motion Sequence: Data set bit 1<br><br>**17 / Data Set Bit 2 / d 5 b 2**: Motion Sequence: Data set bit 2<br><br>**18 / Data Set Bit 3 / d 5 b 3**: Motion Sequence: Data set bit 3<br><br>**19 / Gear Offset 1 / G o F I** : Electronic Gear: Adds first gear offset | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3007:6h<br><br>Modbus 1804<br><br>Profibus 1804<br><br>CIP 107.1.6<br><br>ModbusTCP 1804<br><br>EtherCAT 3007:6h<br><br>PROFINET 1804 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persis-tent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **20 / Gear Offset 2 /** $GoF2$: Electronic Gear: Adds second gear offset | | | |
| | **21 / Reference Switch (REF) /** $rEF$: Reference switch | | | |
| | **22 / Positive Limit Switch (LIMP) /** $LiMP$: Positive limit switch | | | |
| | **23 / Negative Limit Switch (LIMN) /** $LiMn$: Negative limit switch | | | |
| | **24 / Switch Controller Parameter Set /** $CPAr$: Switches control loop parameter set | | | |
| | **27 / Operating Mode Switch /** $MSWt$: Switches operating mode | | | |
| | **28 / Velocity Controller Integral Off /** $tnoF$: Switches off velocity controller integral term | | | |
| | **29 / Start Motion Sequence /** $StMS$: Motion Sequence: Starts a motion sequence | | | |
| | **30 / Start Signal Of RMAC /** $SrMc$: Start signal of relative movement after capture (RMAC) | | | |
| | **31 / Activate RMAC /** $ArMc$: Activates the relative movement after capture (RMAC) | | | |
| | **32 / Activate Operating Mode /** $AcoP$: Activates operating mode | | | |
| | **35 / Data Set Bit 4 /** $dSb4$: Motion Sequence: Data set bit 4 | | | |
| | **36 / Data Set Bit 5 /** $dSb5$: Motion Sequence: Data set bit 5 | | | |
| | **37 / Data Set Bit 6 /** $dSb6$: Motion Sequence: Data set bit 6 | | | |
| | **38 / Inversion AI11 (IO Module) /** $AI11i$: Inverts analog input AI11 (I/O module) | | | |
| | **39 / Inversion AI12 (IO Module) /** $AI12i$: Inverts analog input AI12 (I/O module) | | | |
| | **40 / Release Holding Brake /** $rEhb$: Releases the holding brake<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on. | | | |

# Parameterization of the Signal Output Functions

## Signal Output Function

Various signal output functions can be assigned to the digital signal outputs.

The functions of the inputs and outputs depend on the selected operating mode and the settings of the corresponding parameters.

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### ⚠ **WARNING**

**UNINTENDED EQUIPMENT OPERATION**

- Verify that the wiring is appropriate for the factory settings and any subsequent parameterizations.
- Only start the system if there are no persons or obstructions in the zone of operation.
- Carefully run tests for all operating states and potential error situations when commissioning, upgrading or otherwise modifying the operation of the drive.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

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In the case of a detected error the state of the signal outputs remains active according to assigned signal output function.

## Factory Settings

The table below shows the factory settings of the digital signal outputs depending on the selected operating mode in local control mode:

| Signal | Jog | Electronic Gear | Profile Torque | Profile Velocity | Motion Sequence |
|--------|-----|-----------------|----------------|------------------|-----------------|
| DQ0 | No Fault | No Fault | No Fault | No Fault | Motion Sequence: Done |
| DQ1 | Active | Active | Active | Active | Active |
| DQ2 | In Position Deviation Window | In Position Deviation Window | Current Below Threshold | In Velocity Deviation Window | Motion Sequence: Start Acknowledge |

The table below shows the factory settings of the digital signal outputs in fieldbus control mode:

| Signal | Signal output function |
|--------|------------------------|
| DQ0 | No Fault |
| DQ1 | Active |
| DQ2 | Freely Available |

# Parameterization

The table below provides an overview of the possible signal output functions depending on the selected operating mode in local control mode:

| Signal output function | Jog | Electronic Gear | Profile Torque | Profile Velocity | Motion Sequence | Description in section |
|---|---|---|---|---|---|---|
| Freely Available | • | • | • | • | • | Setting a Signal Output via Parameter, page 331 |
| No Fault | • | • | • | • | • | Indication of the Operating State via Signal Inputs, page 242 |
| Active | • | • | • | • | • | Indication of the Operating State via Signal Inputs, page 242 |
| RMAC Active Or Finished | • | • | • | • | • | Relative Movement After Capture (RMAC), page 343 |
| In Position Deviation Window | • | • | | | • | Position Deviation Window, page 371 |
| In Velocity Deviation Window | • | • | | • | • | Velocity Deviation Window, page 373 |
| Velocity Below Threshold | • | • | • | • | • | Velocity Threshold Value, page 375 |
| Current Below Threshold | • | • | • | • | • | Current Threshold Value, page 376 |
| Halt Acknowledge | • | • | • | • | • | Stopping Movement with Halt, page 320 |
| Motion Sequence: Start Acknowledge | | | | | • | Operating Mode Motion Sequence, page 305 |
| Motor Standstill | • | • | • | • | • | Motor Standstill and Direction of Movement, page 358 |
| Selected Error | • | • | • | • | • | Indicating Error Messages, page 397 |
| Drive Referenced (ref_ok) | | | | | • | Operating Mode Homing, page 293 |
| Selected Warning | • | • | • | • | • | Indicating Error Messages, page 397 |
| Motion Sequence: Done | | | | | • | Operating Mode Motion Sequence, page 305 |
| Motor Moves Positive | • | • | • | • | • | Motor Standstill and Direction of Movement, page 358 |
| Motor Moves Negative | • | • | • | • | • | Motor Standstill and Direction of Movement, page 358 |

The table below provides an overview of the possible signal output functions in fieldbus control mode:

| Signal output function | Description in section |
|---|---|
| Freely Available | Setting a Signal Output via Parameter, page 331 |
| No Fault | Indication of the Operating State via Signal Inputs, page 242 |
| Active | Indication of the Operating State via Signal Inputs, page 242 |
| RMAC Active Or Finished | Relative Movement After Capture (RMAC), page 343 |
| In Position Deviation Window | Position Deviation Window, page 371 |
| In Velocity Deviation Window | Velocity Deviation Window, page 373 |
| Velocity Below Threshold | Velocity Threshold Value, page 375 |
| Current Below Threshold | Current Threshold Value, page 376 |

| Signal output function | Description in section |
|---|---|
| Halt Acknowledge | Stopping Movement with Halt, page 320 |
| Motion Sequence: Start Acknowledge | Operating Mode Motion Sequence, page 305 |
| Motor Standstill | Motor Standstill and Direction of Movement, page 358 |
| Selected Error | Indicating Error Messages, page 397 |
| Drive Referenced (ref_ok) | Operating Mode Homing, page 293 |
| Selected Warning | Indicating Error Messages, page 397 |
| Motion Sequence: Done | Operating Mode Motion Sequence, page 305 |
| Position Register Channel 1 | Position Register, page 363 |
| Position Register Channel 2 | Position Register, page 363 |
| Position Register Channel 3 | Position Register, page 363 |
| Position Register Channel 4 | Position Register, page 363 |
| Motor Moves Positive | Motor Standstill and Direction of Movement, page 358 |
| Motor Moves Negative | Motor Standstill and Direction of Movement, page 358 |

The following parameters can be used to parameterize the digital signal outputs:

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOfunct_DQ0*<br><br>ConF → ı-o-<br>do0 | Function Output DQ0.<br><br>**1 / Freely Available /** nonE : Available as required<br><br>**2 / No Fault /** nFLt : Signals operating states Ready To Switch On, Switched On and Operation Enabled<br><br>**3 / Active /** Actı : Signals operating state Operation Enabled<br><br>**4 / RMAC Active Or Finished /** rПcA : Relative movement after capture active or finished (RMAC)<br><br>**5 / In Position Deviation Window /** ın-P : Position deviation is within window<br><br>**6 / In Velocity Deviation Window /** ın-V : Velocity deviation is within window<br><br>**7 / Velocity Below Threshold /** Vthr : Motor velocity below threshold<br><br>**8 / Current Below Threshold /** ıthr : Motor current below threshold<br><br>**9 / Halt Acknowledge /** hALt : Halt acknowledgement<br><br>**11 / Motion Sequence: Start Acknowledge /** dSAc : Motion Sequence: Acknowledgement of start request<br><br>**13 / Motor Standstill /** ПStd : Motor at a standstill<br><br>**14 / Selected Error /** SErr : One of the specified errors of error classes 1 … 4 is active<br><br>**15 / Valid Reference (ref_ok) /** rEFo : Zero point is valid (ref_ok)<br><br>**16 / Selected Warning /** SWrn : One of the specified errors of error class 0 is active<br><br>**17 / Motion Sequence: Done /** ПSCo : Motion Sequence: Sequence done<br><br>**18 / Position Register Channel 1 /** PrC1 : Position register channel 1<br><br>**19 / Position Register Channel 2 /** PrC2 : Position register channel 2<br><br>**20 / Position Register Channel 3 /** PrC3 : Position register channel 3<br><br>**21 / Position Register Channel 4 /** PrC4 : Position register channel 4<br><br>**22 / Motor Moves Positive /** ПPoS : Motor moves in positive direction<br><br>**23 / Motor Moves Negative /** ПnEG : Motor moves in negative direction<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3007:9h<br><br>Modbus 1810<br><br>Profibus 1810<br><br>CIP 107.1.9<br><br>ModbusTCP 1810<br><br>EtherCAT 3007:9h<br><br>PROFINET 1810 |
| *IOfunct_DQ1*<br><br>ConF → ı-o-<br>do1 | Function Output DQ1.<br><br>**1 / Freely Available /** nonE : Available as required | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3007:Ah<br><br>Modbus 1812<br><br>Profibus 1812<br><br>CIP 107.1.10 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **2 / No Fault /** $nFLt$ : Signals operating states Ready To Switch On, Switched On and Operation Enabled | | | ModbusTCP 1812<br><br>EtherCAT 3007:A$_h$<br><br>PROFINET 1812 |
| | **3 / Active /** $Act \iota$ : Signals operating state Operation Enabled | | | |
| | **4 / RMAC Active Or Finished /** $rNcA$ : Relative movement after capture active or finished (RMAC) | | | |
| | **5 / In Position Deviation Window /** $\iota n - P$ : Position deviation is within window | | | |
| | **6 / In Velocity Deviation Window /** $\iota n - V$ : Velocity deviation is within window | | | |
| | **7 / Velocity Below Threshold /** $V t h r$ : Motor velocity below threshold | | | |
| | **8 / Current Below Threshold /** $\iota t h r$ : Motor current below threshold | | | |
| | **9 / Halt Acknowledge /** $hALt$ : Halt acknowledgement | | | |
| | **11 / Motion Sequence: Start Acknowledge /** $dSAc$ : Motion Sequence: Acknowledgement of start request | | | |
| | **13 / Motor Standstill /** $NStd$ : Motor at a standstill | | | |
| | **14 / Selected Error /** $SErr$ : One of the specified errors of error classes 1 … 4 is active | | | |
| | **15 / Valid Reference (ref_ok) /** $rEFo$ : Zero point is valid (ref_ok) | | | |
| | **16 / Selected Warning /** $SWrn$ : One of the specified errors of error class 0 is active | | | |
| | **17 / Motion Sequence: Done /** $NSCo$ : Motion Sequence: Sequence done | | | |
| | **18 / Position Register Channel 1 /** $PrC \; 1$ : Position register channel 1 | | | |
| | **19 / Position Register Channel 2 /** $PrC \; 2$ : Position register channel 2 | | | |
| | **20 / Position Register Channel 3 /** $PrC \; 3$ : Position register channel 3 | | | |
| | **21 / Position Register Channel 4 /** $PrC \; 4$ : Position register channel 4 | | | |
| | **22 / Motor Moves Positive /** $NPoS$ : Motor moves in positive direction | | | |
| | **23 / Motor Moves Negative /** $NnEG$ : Motor moves in negative direction | | | |
| | Setting can only be modified if power stage is disabled. | | | |
| | Modified settings become active the next time the product is powered on. | | | |
| *IOfunct_DQ2*<br><br>$ConF \rightarrow \iota - o -$<br><br>$do2$ | Function Output DQ2. | - <br><br>- <br><br>- <br><br>- | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3007:B$_h$<br><br>Modbus 1814<br><br>Profibus 1814<br><br>CIP 107.1.11<br><br>ModbusTCP 1814<br><br>EtherCAT 3007:B$_h$ |
| | **1 / Freely Available /** $nonE$ : Available as required | | | |
| | **2 / No Fault /** $nFLt$ : Signals operating states Ready To Switch On, Switched On and Operation Enabled | | | |
| | **3 / Active /** $Act \iota$ : Signals operating state Operation Enabled | | | |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **4 / RMAC Active Or Finished /** $r\,\Pi\,c\,A$: Relative movement after capture active or finished (RMAC) | | | PROFINET 1814 |
| | **5 / In Position Deviation Window /** $\iota\,n\,{-}\,P$: Position deviation is within window | | | |
| | **6 / In Velocity Deviation Window /** $\iota\,n\,{-}\,V$: Velocity deviation is within window | | | |
| | **7 / Velocity Below Threshold /** $V\,t\,h\,r$: Motor velocity below threshold | | | |
| | **8 / Current Below Threshold /** $\iota\,t\,h\,r$: Motor current below threshold | | | |
| | **9 / Halt Acknowledge /** $h\,A\,L\,t$: Halt acknowledgement | | | |
| | **11 / Motion Sequence: Start Acknowledge /** $d\,S\,A\,c$: Motion Sequence: Acknowledgement of start request | | | |
| | **13 / Motor Standstill /** $\Pi\,S\,t\,d$: Motor at a standstill | | | |
| | **14 / Selected Error /** $S\,E\,r\,r$: One of the specified errors of error classes 1 … 4 is active | | | |
| | **15 / Valid Reference (ref_ok) /** $r\,E\,F\,o$: Zero point is valid (ref_ok) | | | |
| | **16 / Selected Warning /** $S\,W\,r\,n$: One of the specified errors of error class 0 is active | | | |
| | **17 / Motion Sequence: Done /** $\Pi\,S\,C\,o$: Motion Sequence: Sequence done | | | |
| | **18 / Position Register Channel 1 /** $P\,r\,C\,1$: Position register channel 1 | | | |
| | **19 / Position Register Channel 2 /** $P\,r\,C\,2$: Position register channel 2 | | | |
| | **20 / Position Register Channel 3 /** $P\,r\,C\,3$: Position register channel 3 | | | |
| | **21 / Position Register Channel 4 /** $P\,r\,C\,4$: Position register channel 4 | | | |
| | **22 / Motor Moves Positive /** $\Pi\,P\,o\,S$: Motor moves in positive direction | | | |
| | **23 / Motor Moves Negative /** $\Pi\,n\,E\,G$: Motor moves in negative direction | | | |
| | Setting can only be modified if power stage is disabled. | | | |
| | Modified settings become active the next time the product is powered on. | | | |

# Parameterization of Software Debouncing

## Debounce Time

Signal input debouncing comprises hardware debouncing and software debouncing.

Hardware debounce time is permanently set, see Digital Input Signals 24 V (Hardware switching time), page 41.

When a set signal function is modified, software debouncing is reset to the factory setting on the next power cycle.

The software debounce time can be set via the following parameters.

| Parameter name / HMI menu / HMI name | Description | Unit / Minimum value / Factory setting / Maximum value | Data type / R/W / Persistent / Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *DI_0_Debounce* | Debounce time of DI0.<br><br>**0 / No**: No software debouncing<br><br>**1 / 0.25 ms**: 0.25 ms<br><br>**2 / 0.50 ms**: 0.50 ms<br><br>**3 / 0.75 ms**: 0.75 ms<br><br>**4 / 1.00 ms**: 1.00 ms<br><br>**5 / 1.25 ms**: 1.25 ms<br><br>**6 / 1.50 ms**: 1.50 ms<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>6<br><br>6 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3008:20$_h$<br><br>Modbus 2112<br><br>Profibus 2112<br><br>CIP 108.1.32<br><br>ModbusTCP 2112<br><br>EtherCAT 3008:20$_h$<br><br>PROFINET 2112 |
| *DI_1_Debounce* | Debounce time of DI1.<br><br>**0 / No**: No software debouncing<br><br>**1 / 0.25 ms**: 0.25 ms<br><br>**2 / 0.50 ms**: 0.50 ms<br><br>**3 / 0.75 ms**: 0.75 ms<br><br>**4 / 1.00 ms**: 1.00 ms<br><br>**5 / 1.25 ms**: 1.25 ms<br><br>**6 / 1.50 ms**: 1.50 ms<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>6<br><br>6 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3008:21$_h$<br><br>Modbus 2114<br><br>Profibus 2114<br><br>CIP 108.1.33<br><br>ModbusTCP 2114<br><br>EtherCAT 3008:21$_h$<br><br>PROFINET 2114 |
| *DI_2_Debounce* | Debounce time of DI2.<br><br>**0 / No**: No software debouncing<br><br>**1 / 0.25 ms**: 0.25 ms<br><br>**2 / 0.50 ms**: 0.50 ms<br><br>**3 / 0.75 ms**: 0.75 ms<br><br>**4 / 1.00 ms**: 1.00 ms<br><br>**5 / 1.25 ms**: 1.25 ms<br><br>**6 / 1.50 ms**: 1.50 ms<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>6<br><br>6 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3008:22$_h$<br><br>Modbus 2116<br><br>Profibus 2116<br><br>CIP 108.1.34<br><br>ModbusTCP 2116<br><br>EtherCAT 3008:22$_h$<br><br>PROFINET 2116 |

| Parameter name<br>HMI menu<br>HMI name | Description | Unit<br>Minimum value<br>Factory setting<br>Maximum value | Data type<br>R/W<br>Persistent<br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *DI_3_Debounce* | Debounce time of DI3.<br>**0 / No**: No software debouncing<br>**1 / 0.25 ms**: 0.25 ms<br>**2 / 0.50 ms**: 0.50 ms<br>**3 / 0.75 ms**: 0.75 ms<br>**4 / 1.00 ms**: 1.00 ms<br>**5 / 1.25 ms**: 1.25 ms<br>**6 / 1.50 ms**: 1.50 ms<br>Setting can only be modified if power stage is disabled.<br>Modified settings become active immediately. | -<br>0<br>6<br>6 | UINT16<br>R/W<br>per.<br>- | CANopen 3008:23ₕ<br>Modbus 2118<br>Profibus 2118<br>CIP 108.1.35<br>ModbusTCP 2118<br>EtherCAT 3008:23ₕ<br>PROFINET 2118 |
| *DI_4_Debounce* | Debounce time of DI4.<br>**0 / No**: No software debouncing<br>**1 / 0.25 ms**: 0.25 ms<br>**2 / 0.50 ms**: 0.50 ms<br>**3 / 0.75 ms**: 0.75 ms<br>**4 / 1.00 ms**: 1.00 ms<br>**5 / 1.25 ms**: 1.25 ms<br>**6 / 1.50 ms**: 1.50 ms<br>Setting can only be modified if power stage is disabled.<br>Modified settings become active immediately. | -<br>0<br>6<br>6 | UINT16<br>R/W<br>per.<br>- | CANopen 3008:24ₕ<br>Modbus 2120<br>Profibus 2120<br>CIP 108.1.36<br>ModbusTCP 2120<br>EtherCAT 3008:24ₕ<br>PROFINET 2120 |
| *DI_5_Debounce* | Debounce time of DI5.<br>**0 / No**: No software debouncing<br>**1 / 0.25 ms**: 0.25 ms<br>**2 / 0.50 ms**: 0.50 ms<br>**3 / 0.75 ms**: 0.75 ms<br>**4 / 1.00 ms**: 1.00 ms<br>**5 / 1.25 ms**: 1.25 ms<br>**6 / 1.50 ms**: 1.50 ms<br>Setting can only be modified if power stage is disabled.<br>Modified settings become active immediately. | -<br>0<br>6<br>6 | UINT16<br>R/W<br>per.<br>- | CANopen 3008:25ₕ<br>Modbus 2122<br>Profibus 2122<br>CIP 108.1.37<br>ModbusTCP 2122<br>EtherCAT 3008:25ₕ<br>PROFINET 2122 |

# PTI and PTO Interface

## Setting the PTI Interface

### Type of Reference Value Signal

A/B signals, P/D signals or CW/CCW signals can be connected to the PTI interface.

Set the type of reference value signal for the PTI interface with the parameter *PTI_signal_type*.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PTI_signal_type*<br><br>$C o n F \rightarrow , - o -$<br><br>$, o P ,$ | Type of reference value signal for PTI interface.<br><br>**0 / A/B Signals / $A b$** : Signals ENC_A and ENC_B (quadruple evaluation)<br><br>**1 / P/D Signals / $P d$**: Signals PULSE and DIR<br><br>**2 / CW/CCW Signals / $c W c c$** : Signals clockwise and counterclockwise<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on. | -<br><br>0<br><br>0<br><br>2 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3005:2$_h$<br><br>Modbus 1284<br><br>Profibus 1284<br><br>CIP 105.1.2<br><br>ModbusTCP 1284<br><br>EtherCAT 3005:2$_h$<br><br>PROFINET 1284 |

### Inverting the Reference Value Signals

The direction of counting of the reference value signals at the PTI interface can be inverted by means of the parameter *InvertDirOfCount*.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *InvertDirOfCount* | Inversion of direction of counting at PTI interface.<br><br>**0 / Inversion Off**: Inversion of direction of counting is off<br><br>**1 / Inversion On**: Inversion of direction of counting is on<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3008:7$_h$<br><br>Modbus 2062<br><br>Profibus 2062<br><br>CIP 108.1.7<br><br>ModbusTCP 2062<br><br>EtherCAT 3008:7$_h$<br><br>PROFINET 2062 |

### Setting the Position Value

The position value at the PTI interface can be set manually by means of the parameter *p_PTI_act_set*.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *p_PTI_act_set* | Position value at PTI interface. Available with firmware version ≥V01.26. | Inc -2147483648 - 2147483647 | INT32 R/W - - | CANopen 3008:29ₕ Modbus 2130 Profibus 2130 CIP 108.1.41 ModbusTCP 2130 EtherCAT 3008:29ₕ PROFINET 2130 |

# Setting the PTO Interface

## Type of Usage of PTO Interface

The PTO interface allows you to make reference value signals from the device externally available.

The PTO interface can be used in several ways:

- Encoder simulation based on a position value
- Encoder simulation based on reference current
- PTI signal

The parameter *PTO_mode* lets you set the way the PTO interface is used.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PTO_mode* [ o n F → A C G - P E o N | Type of usage of PTO interface. **0 / Off / o F F**: PTO interface disabled **1 / Esim pAct Enc 1 / P E n 1**: Encoder simulation based on actual position of encoder 1 **2 / Esim pRef / P r E F**: Encoder simulation based on reference position (_p_ref) **3 / PTI Signal / P E i**: Directly the signal from PTI interface **4 / Esim pAct Enc 2 / P E n 2**: Encoder simulation based on actual position of encoder 2 (module) **5 / Esim iqRef / i r E F**: Encoder simulation based on reference current **6 / Esim pActRaw Enc2 / E n c 2**: Encoder simulation based on raw position value of encoder 2 (module) Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. | - 0 0 6 | UINT16 R/W per. - | CANopen 3005:1Fₕ Modbus 1342 Profibus 1342 CIP 105.1.31 ModbusTCP 1342 EtherCAT 3005:1Fₕ PROFINET 1342 |

# Encoder Simulation Based on a Position Value

The following types of encoder simulation based on a position value are possible:

- Encoder simulation based on actual position of encoder 1
- Encoder simulation based on the reference position values (_p_ref)
- Encoder simulation based on actual position of encoder 2
- Encoder simulation based on raw position value (parameter *ResolENC2*) of encoder 2 (with firmware version ≥V01.26)

The resolution for the encoder simulation is set with the parameter *ESIM_scale*.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
| --- | --- | --- | --- | --- |
| *ESIM_scale*<br><br>`ConF → i-o-`<br>`ESSC` | Resolution of encoder simulation.<br><br>Resolution defines the number of increments per revolution (AB signal with quadruple evaluation).<br><br>The index pulse is created once per revolution at an interval where signal A and signal B are high.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on. | EncInc<br><br>8<br><br>4096<br><br>65535 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3005:15$_h$<br><br>Modbus 1322<br><br>Profibus 1322<br><br>CIP 105.1.21<br><br>ModbusTCP 1322<br><br>EtherCAT 3005:15$_h$<br><br>PROFINET 1322 |

With firmware version ≥V01.10, you can set the resolution with decimal places.

The parameter *ESIM_HighResolution* lets you set the resolution with decimal places.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
| --- | --- | --- | --- | --- |
| *ESIM_ HighResolution* | Encoder simulation: High resolution.<br><br>Specifies the number of increments per revolution with 12 bit decimal places. If the parameter is set to a multiple of 4096, the index pulse will be generated exactly at the same position within one revolution.<br><br>The setting of parameter ESIM_scale is only used if parameter ESIM_HighResolution is set to 0. Otherwise, the setting of ESIM_HighResolution is used.<br><br>Example: 1417.322835 encoder simulation pulses per revolution are required.<br><br>Set the parameter to 1417.322835 * 4096 = 5805354.<br><br>In this example, the index pulse will be generated exactly after every 1417 pulses. This means that the index pulse shifts with each revolution.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on. | EncInc<br><br>0<br><br>0<br><br>268431360 | UINT32<br><br>R/W<br><br>per.<br><br>expert | CANopen 3005:32$_h$<br><br>Modbus 1380<br><br>Profibus 1380<br><br>CIP 105.1.50<br><br>ModbusTCP 1380<br><br>EtherCAT 3005:32$_h$<br><br>PROFINET 1380 |

With firmware version ≥V01.10, you can set a phase shift of the encoder simulation.

The phase shift of the encoder simulation is set with the parameter *ESIM_PhaseShift*.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *ESIM_PhaseShift* | Encoder simulation: Phase shift for pulse output.<br><br>The generated encoder simulation pulses can be shifted in units of 1/4096 encoder pulses. The shift results in a position offset at PTO. The index pulse is shifted as well.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.10. | -<br><br>-32768<br><br>0<br><br>32767 | INT16<br><br>R/W<br><br>-<br><br>expert | CANopen 3005:33$_h$<br><br>Modbus 1382<br><br>Profibus 1382<br><br>CIP 105.1.51<br><br>ModbusTCP 1382<br><br>EtherCAT 3005:33$_h$<br><br>PROFINET 1382 |

## Encoder Simulation Based on Reference Current

In the case of encoder simulation based on the reference current, A/B signals are output. The maximum frequency of the A/B signals is $1.6 * 10^{-6}$ increments per second and corresponds to the maximum reference current (value in parameter *CTRL_I_max*).

With firmware version ≥V01.20, you can set encoder simulation based on the reference current.
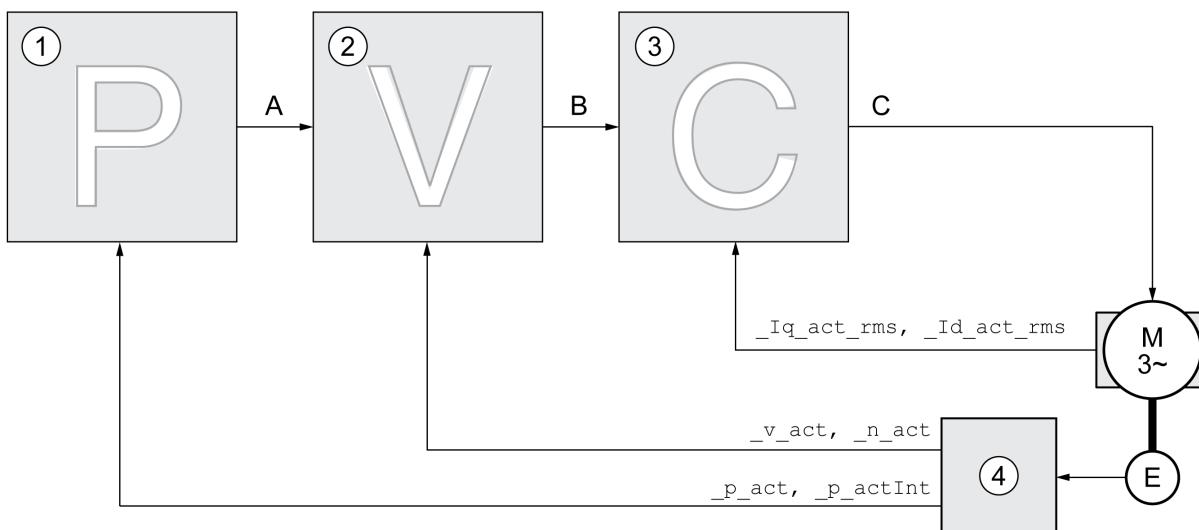
## PTI Signal

If the PTI signal is selected by means of parameter *PTO_mode*, the signal from the PTI interface is directly made available at the PTO interface.

# Switching Between Control Loop Parameter Sets

## Overview of the Controller Structure

### General

The illustration below provides an overview of the controller structure.



**1** Position controller

**2** Velocity controller

**3** Current controller

**4** Encoder evaluation

## Position Controller

The position controller reduces the difference between the reference position and the actual position of the motor (position deviation) to a minimum. When the motor is at a standstill, the position deviation is close to zero in the case of a well-tuned position controller.

An optimized velocity control loop is a prerequisite for good amplification of the position controller.

## Velocity Controller

The velocity controller controls the motor velocity by varying the motor current depending on the load situation. The velocity controller has a decisive influence on the dynamic response of the drive. The dynamics of the velocity controller depend on:

- Moment of inertia of the drive and the controlled system
- Power of the motor
- Stiffness and elasticity of the elements in the flow of forces
- Backlash of the drive elements
- Friction

## Current Controller

The current controller determines the torque of the motor. The current controller is automatically optimally tuned with the stored motor data.

# Overview of Position Controller

## Overview

The illustration below provides an overview of the position controller.



**1** Reference value signals for the operating mode Electronic Gear (position synchronization)

**2** Evaluation of the reference value signal for the operating mode Electronic Gear

**3** Target values for the operating modes Jog, Profile Position, Homing and Motion Sequence

**4** Motion profile for the velocity

**5** Velocity feed-forward control

**6** Position controller
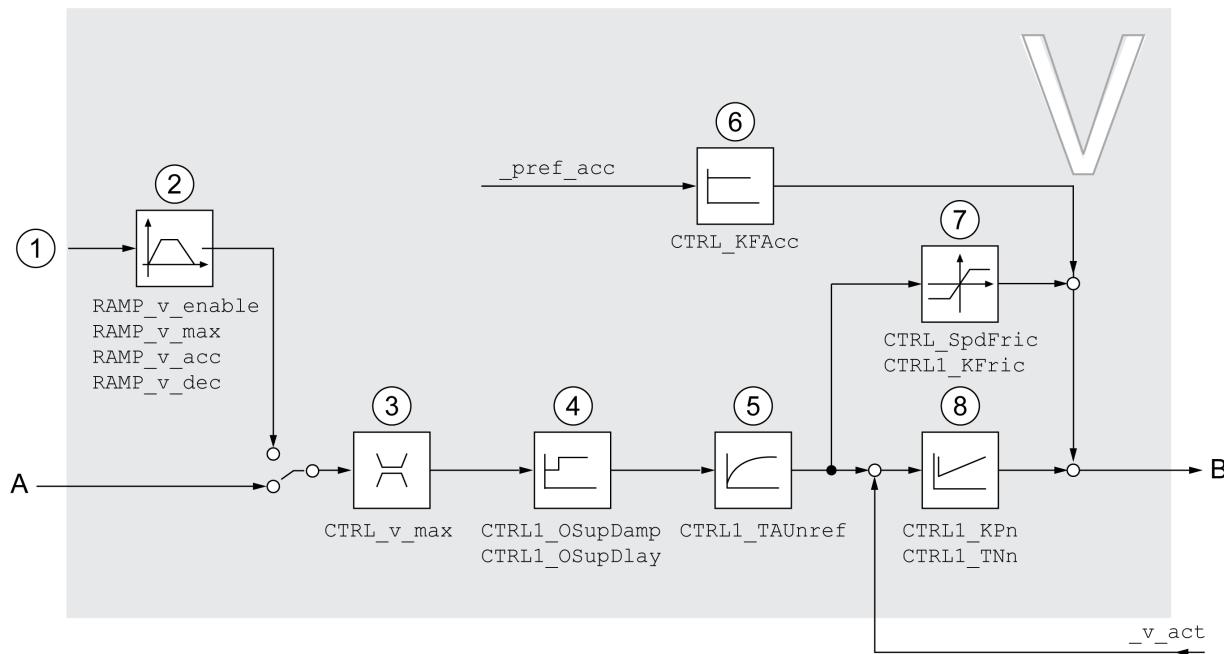
## Sampling Period

The sampling period of the position controller is 250 µs.

# Overview of Velocity Controller

## Overview

The illustration below provides an overview of the velocity controller.

**1** Reference value signals for the operating mode Electronic Gear with the method "Velocity Synchronization" and target values for the operating mode Profile Velocity

**2** Motion profile for the velocity

**3** Velocity limitation

**4** Overshoot suppression filter (parameter accessible in Expert mode)

**5** Filter time constant of the reference velocity value filter

**6** Acceleration feed forward control (parameter accessible in Expert mode)

**7** Friction compensation (parameter accessible in Expert mode)

**8** Velocity Loop Controller
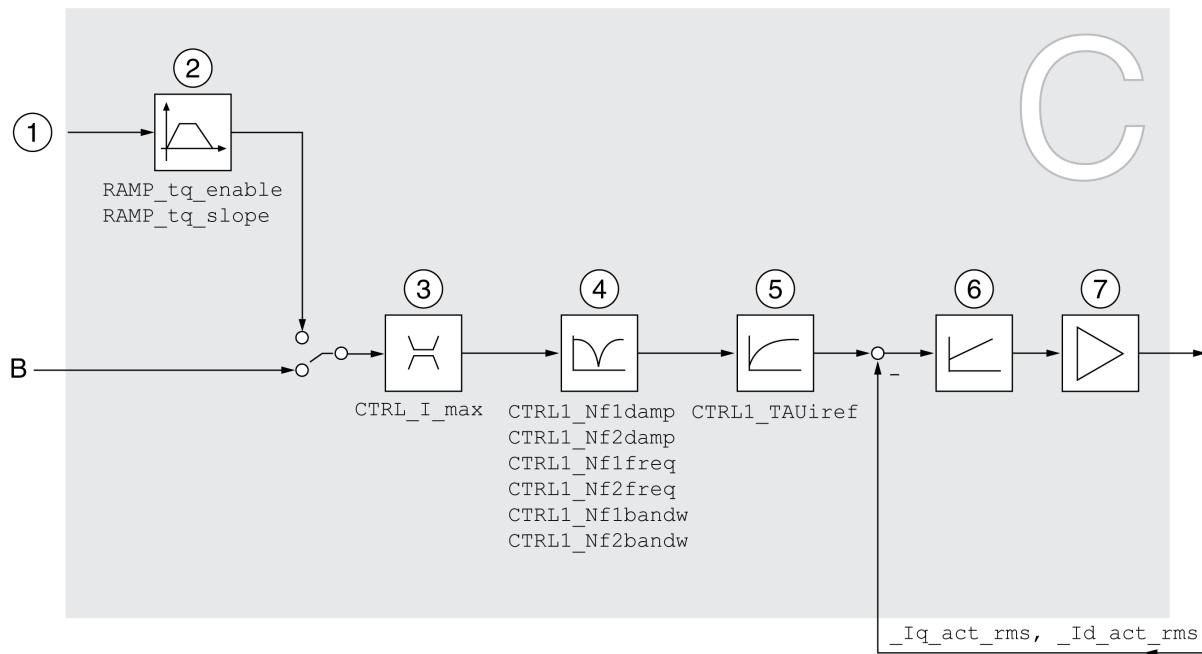
## Sampling Period

The sampling period of the velocity controller is 62.5 µs.

# Overview of Current Controller

## Overview

The illustration below provides an overview of the current controller.

**1** Target values for the operating mode Profile Torque

**2** Motion profile for the torque

**3** Current limitation

**4** Notch filter (parameter accessible in Expert mode)

**5** Filter time constant of the reference current value filter

**6** Current controller

**7** Power stage

## Sampling Period

The sampling period of the current controller is 62.5 µs.

# Parameterizable Control Loop Parameters

## Control Loop Parameter Set

The product features 2 control loop parameter sets that can be parameterized separately. The values for the control loop parameters determined during autotuning are stored in control loop parameter set 1.

A control loop parameter set consists of freely accessible parameters and parameters which are only accessible in Expert mode.

| Control loop parameter set 1 | Control loop parameter set 2 |
|---|---|
| Freely accessible parameters: | Freely accessible parameters: |
| *CTRL1_KPn* | *CTRL2_KPn* |
| *CTRL1_TNn* | *CTRL2_TNn* |
| *CTRL1_KPp* | *CTRL2_KPp* |
| *CTRL1_TAUiref* | *CTRL2_TAUiref* |
| *CTRL1_TAUnref* | *CTRL2_TAUnref* |
| *CTRL1_KFPp* | *CTRL2_KFPp* |
| Parameters only accessible in expert mode: | Parameters only accessible in expert mode: |
| *CTRL1_Nf1damp* | *CTRL2_Nf1damp* |
| *CTRL1_Nf1freq* | *CTRL2_Nf1freq* |
| *CTRL1_Nf1bandw* | *CTRL2_Nf1bandw* |
| *CTRL1_Nf2damp* | *CTRL2_Nf2damp* |
| *CTRL1_Nf2freq* | *CTRL2_Nf2freq* |
| *CTRL1_Nf2bandw* | *CTRL2_Nf2bandw* |
| *CTRL1_Osupdamp* | *CTRL2_Osupdamp* |
| *CTRL1_Osupdelay* | *CTRL2_Osupdelay* |
| *CTRL1_Kfric* | *CTRL2_Kfric* |

See sections Control Loop Parameter Set 1, page 231 and Control Loop Parameter Set 2, page 235.

## Parameterization

- Selecting a control loop parameter set

  Select a control loop parameter set after switching on.

  See Selecting a Control Loop Parameter Set, page 226.

- Automatically switching between control loop parameter sets

  It is possible to switch between the two control loop parameter sets.

  See Automatically Switching Between Control Loop Parameter Sets, page 227.

- Copying a control loop parameter set

  The values of control loop parameter set 1 can be copied to control loop parameter set 2.

  See Copying a Control Loop Parameter Set, page 230.

- Deactivating the integral term

  The integral term and, by implication, the integral action time, can be deactivated via a digital signal input.

  See Deactivating the Integral Term, page 231.

# Selecting a Control Loop Parameter Set

## Description

The active control loop parameter set is indicated via the parameter *_CTRL_ActParSet*.

The parameter *CTRL_PwrUpParSet* allows you to set the control loop parameter set to be activated after powering on. Alternatively, you can set whether or not the product is to switch automatically between the two control loop parameter sets.

The parameter *CTRL_SelParSet* allows you to switch between the two control loop parameter sets during operation.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *_CTRL_ActParSet* | Active control loop parameter set. Value 1: Control loop parameter set 1 is active Value 2: Control loop parameter set 2 is active A control loop parameter set is active after the time for the parameter switching (CTRL_ParChgTime) has elapsed. | - - - - | UINT16 R/- - - | CANopen 3011:17h Modbus 4398 Profibus 4398 CIP 117.1.23 ModbusTCP 4398 EtherCAT 3011:17h PROFINET 4398 |
| *CTRL_PwrUpParSet* | Selection of control loop parameter set at power up. **0 / Switching Condition**: The switching condition is used for control loop parameter set switching **1 / Parameter Set 1**: Control loop parameter set 1 is used **2 / Parameter Set 2**: Control loop parameter set 2 is used The selected value is also written to CTRL_SelParSet (non-persistent). Modified settings become active immediately. | - 0 1 2 | UINT16 R/W per. - | CANopen 3011:18h Modbus 4400 Profibus 4400 CIP 117.1.24 ModbusTCP 4400 EtherCAT 3011:18h PROFINET 4400 |
| *CTRL_SelParSet* | Selection of control loop parameter set. Coding see parameter: CTRL_PwrUpParSet Modified settings become active immediately. | - 0 1 2 | UINT16 R/W - - | CANopen 3011:19h Modbus 4402 Profibus 4402 CIP 117.1.25 ModbusTCP 4402 EtherCAT 3011:19h PROFINET 4402 |

# Automatically Switching Between Control Loop Parameter Sets

## Description
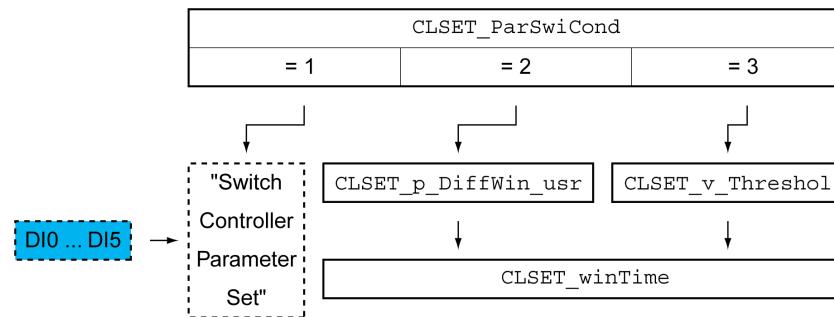
It is possible to automatically switch between the two control loop parameter sets.

The following criteria can be set for switching between the control loop parameter sets:

- Digital signal input
- Position deviation window
- Target velocity below parameterizable value
- Actual velocity below parameterizable value

## Settings

The illustration below provides an overview of switching between the parameter sets.
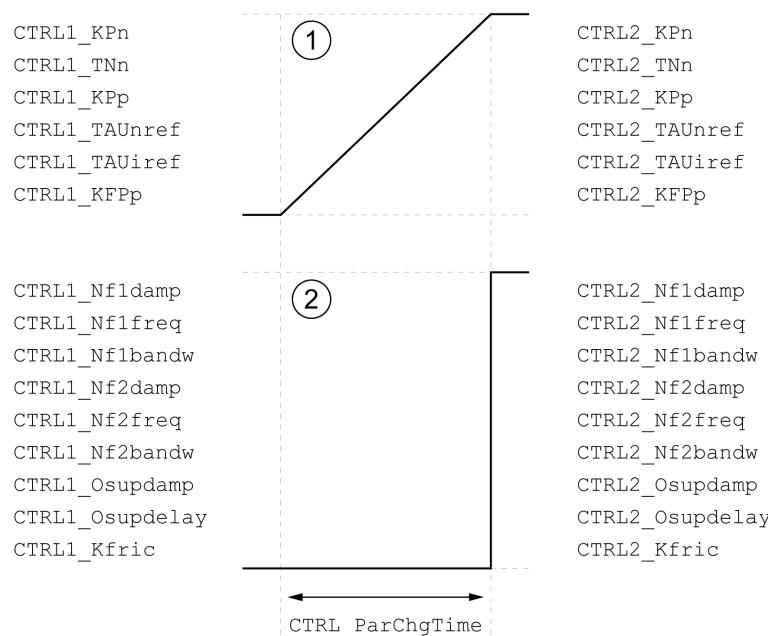


## Time Chart

The freely accessible parameters are changed linearly. This linear change of the values of control loop parameter set 1 to the values of control loop parameter set 2 takes place during the parameterizable time *CTRL_ParChgTime*.

The parameters only accessible in Expert mode are directly changed to the values of the other control loop parameter set after the parameterizable time *CTRL_ParChgTime* has passed.

The figure below shows the time chart for switching the control loop parameters.

Time chart for switching the control loop parameter sets



**1** Freely accessible parameters are changed linearly over time

**2** Parameters which are only accessible in Expert mode are switched over directly

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CLSET_ParSwiCond* | Condition for parameter set switching.<br><br>**0 / None Or Digital Input**: None or digital input function selected<br><br>**1 / Inside Position Deviation**: Inside position deviation (value definition in parameter CLSET_p_DiffWin)<br><br>**2 / Below Reference Velocity**: Below reference velocity (value definition in parameter CLSET_v_Threshol)<br><br>**3 / Below Actual Velocity**: Below actual velocity (value definition in parameter CLSET_v_Threshol)<br><br>**4 / Reserved**: Reserved<br><br>In the case of parameter set switching, the values of the following parameters are changed gradually:<br><br>- CTRL_KPn<br><br>- CTRL_TNn<br><br>- CTRL_KPp<br><br>- CTRL_TAUnref<br><br>- CTRL_TAUiref<br><br>- CTRL_KFPp<br><br>The following parameters are changed immediately after the time for parameter set switching (CTRL_ParChgTime):<br><br>- CTRL_Nf1damp<br><br>- CTRL_Nf1freq<br><br>- CTRL_Nf1bandw<br><br>- CTRL_Nf2damp<br><br>- CTRL_Nf2freq<br><br>- CTRL_Nf2bandw<br><br>- CTRL_Osupdamp<br><br>- CTRL_Osupdelay<br><br>- CTRL_Kfric<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>4 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3011:1A$_h$<br><br>Modbus 4404<br><br>Profibus 4404<br><br>CIP 117.1.26<br><br>ModbusTCP 4404<br><br>EtherCAT 3011:1A$_h$<br><br>PROFINET 4404 |
| *CLSET_p_DiffWin_usr* | Position deviation for control loop parameter set switching.<br><br>If the position deviation of the position controller is less than the value of this parameter, control loop parameter set 2 is used. Otherwise, control loop parameter set 1 is used.<br><br>The minimum value, the factory setting and the maximum value depend on the scaling factor.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.03. | usr_p<br><br>0<br><br>164<br><br>2147483647 | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3011:25$_h$<br><br>Modbus 4426<br><br>Profibus 4426<br><br>CIP 117.1.37<br><br>ModbusTCP 4426<br><br>EtherCAT 3011:25$_h$<br><br>PROFINET 4426 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CLSET_v_Threshol* | Velocity threshold for control loop parameter set switching. If the reference velocity or the actual velocity are less than the value of this parameter, control loop parameter set 2 is used. Otherwise, control loop parameter set 1 is used. Modified settings become active immediately. | usr_v 0 50 2147483647 | UINT32 R/W per. - | CANopen 3011:1D$_h$ Modbus 4410 Profibus 4410 CIP 117.1.29 ModbusTCP 4410 EtherCAT 3011:1D$_h$ PROFINET 4410 |
| *CLSET_winTime* | Time window for parameter set switching. Value 0: Window monitoring deactivated. Value >0: Window time for the parameters CLSET_v_Threshol and CLSET_p_DiffWin. Modified settings become active immediately. | ms 0 0 1000 | UINT16 R/W per. - | CANopen 3011:1B$_h$ Modbus 4406 Profibus 4406 CIP 117.1.27 ModbusTCP 4406 EtherCAT 3011:1B$_h$ PROFINET 4406 |
| *CTRL_ParChgTime* | Period of time for control loop parameter set switching. In the case of control loop parameter set switching, the values of the following parameters are changed linearly: - CTRL_KPn - CTRL_TNn - CTRL_KPp - CTRL_TAUnref - CTRL_TAUiref - CTRL_KFPp Modified settings become active immediately. | ms 0 0 2000 | UINT16 R/W per. - | CANopen 3011:14$_h$ Modbus 4392 Profibus 4392 CIP 117.1.20 ModbusTCP 4392 EtherCAT 3011:14$_h$ PROFINET 4392 |

# Copying a Control Loop Parameter Set

## Description

The parameter *CTRL_ParSetCopy* allows you to copy the values of control loop parameter set 1 to control loop parameter set 2 or the values of control loop parameter set 2 to control loop parameter set 1.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CTRL_ParSetCopy* | Control loop parameter set copying. Value 1: Copy control loop parameter set 1 to set 2 Value 2: Copy control loop parameter set 2 to set 1 If control loop parameter set 2 is copied to control loop parameter set 1, the parameter CTRL_ GlobGain is set to 100%. Modified settings become active immediately. | - 0.0 - 0.2 | UINT16 R/W - - | CANopen 3011:16$_h$ Modbus 4396 Profibus 4396 CIP 117.1.22 ModbusTCP 4396 EtherCAT 3011:16$_h$ PROFINET 4396 |

# Deactivating the Integral Term

## Description

The integral term of the velocity controller can be deactivated via the signal input function "Velocity Controller Integral Off". If the integral term is deactivated, the integral action time of the velocity controller (*CTRL1_TNn* and *CTRL2_TNn*) is implicitly and gradually reduced to zero. The time it takes to reduce the value to zero depends on the parameter *CTRL_ParChgTime*. In the case of vertical axes, the integral term is needed to reduce position deviations during standstill.

# Control Loop Parameter Set 1

## Overview

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CTRL1_KPn* ⊏ o n F → d ⊏ - P n 1 | Velocity controller P gain. The default value is calculated on the basis of the motor parameters. In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime. In increments of 0.0001 A/RPM. Modified settings become active immediately. | A/RPM 0.0001 - 2.5400 | UINT16 R/W per. - | CANopen 3012:1$_h$ Modbus 4610 Profibus 4610 CIP 118.1.1 ModbusTCP 4610 EtherCAT 3012:1$_h$ PROFINET 4610 |
| *CTRL1_TNn* ⊏ o n F → d ⊏ - t i n 1 | Velocity controller integral action time. The default value is calculated. In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime. In increments of 0.01 ms. Modified settings become active immediately. | ms 0.00 - 327.67 | UINT16 R/W per. - | CANopen 3012:2$_h$ Modbus 4612 Profibus 4612 CIP 118.1.2 ModbusTCP 4612 EtherCAT 3012:2$_h$ PROFINET 4612 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CTRL1_KPp* ⌐oɳF → dⲅⲤ- PP 1 | Position controller P gain. The default value is calculated. In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime. In increments of 0.1 1/s. Modified settings become active immediately. | 1/s 2.0 - 900.0 | UINT16 R/W per. - | CANopen 3012:3ₕ Modbus 4614 Profibus 4614 CIP 118.1.3 ModbusTCP 4614 EtherCAT 3012:3ₕ PROFINET 4614 |
| *CTRL1_TAUiref* | Filter time constant of the reference current value filter. In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime. In increments of 0.01 ms. Modified settings become active immediately. | ms 0.00 0.50 4.00 | UINT16 R/W per. - | CANopen 3012:5ₕ Modbus 4618 Profibus 4618 CIP 118.1.5 ModbusTCP 4618 EtherCAT 3012:5ₕ PROFINET 4618 |
| *CTRL1_TAUnref* ⌐oɳF → dⲅⲤ- ŁＡⴎ 1 | Filter time constant of the reference velocity value filter. In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime. In increments of 0.01 ms. Modified settings become active immediately. | ms 0.00 9.00 327.67 | UINT16 R/W per. - | CANopen 3012:4ₕ Modbus 4616 Profibus 4616 CIP 118.1.4 ModbusTCP 4616 EtherCAT 3012:4ₕ PROFINET 4616 |
| *CTRL1_KFPp* ⌐oɳF → dⲅⲤ- FPP 1 | Velocity feed-forward control. In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime. In increments of 0.1 %. Modified settings become active immediately. | % 0.0 0.0 200.0 | UINT16 R/W per. - | CANopen 3012:6ₕ Modbus 4620 Profibus 4620 CIP 118.1.6 ModbusTCP 4620 EtherCAT 3012:6ₕ PROFINET 4620 |
| *CTRL1_Nf1damp* | Notch filter 1: Damping. In increments of 0.1 %. Modified settings become active immediately. | % 55.0 90.0 99.0 | UINT16 R/W per. expert | CANopen 3012:8ₕ Modbus 4624 Profibus 4624 CIP 118.1.8 ModbusTCP 4624 EtherCAT 3012:8ₕ PROFINET 4624 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CTRL1_Nf1freq* | Notch filter 1: Frequency. The filter is deactivated at a value of 15000. In increments of 0.1 Hz. Modified settings become active immediately. | Hz 50.0 1500.0 1500.0 | UINT16 R/W per. expert | CANopen 3012:9$_h$ Modbus 4626 Profibus 4626 CIP 118.1.9 ModbusTCP 4626 EtherCAT 3012:9$_h$ PROFINET 4626 |
| *CTRL1_Nf1bandw* | Notch filter 1: Bandwidth. Definition of bandwidth: 1 - Fb/F0 In increments of 0.1 %. Modified settings become active immediately. | % 1.0 70.0 90.0 | UINT16 R/W per. expert | CANopen 3012:A$_h$ Modbus 4628 Profibus 4628 CIP 118.1.10 ModbusTCP 4628 EtherCAT 3012:A$_h$ PROFINET 4628 |
| *CTRL1_Nf2damp* | Notch filter 2: Damping. In increments of 0.1 %. Modified settings become active immediately. | % 55.0 90.0 99.0 | UINT16 R/W per. expert | CANopen 3012:B$_h$ Modbus 4630 Profibus 4630 CIP 118.1.11 ModbusTCP 4630 EtherCAT 3012:B$_h$ PROFINET 4630 |
| *CTRL1_Nf2freq* | Notch filter 2: Frequency. The filter is deactivated at a value of 15000. In increments of 0.1 Hz. Modified settings become active immediately. | Hz 50.0 1500.0 1500.0 | UINT16 R/W per. expert | CANopen 3012:C$_h$ Modbus 4632 Profibus 4632 CIP 118.1.12 ModbusTCP 4632 EtherCAT 3012:C$_h$ PROFINET 4632 |
| *CTRL1_Nf2bandw* | Notch filter 2: Bandwidth. Definition of bandwidth: 1 - Fb/F0 In increments of 0.1 %. Modified settings become active immediately. | % 1.0 70.0 90.0 | UINT16 R/W per. expert | CANopen 3012:D$_h$ Modbus 4634 Profibus 4634 CIP 118.1.13 ModbusTCP 4634 EtherCAT 3012:D$_h$ PROFINET 4634 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CTRL1_Osupdamp* | Overshoot suppression filter: Damping. The filter is deactivated at a value of 0. In increments of 0.1 %. Modified settings become active immediately. | % 0.0 0.0 50.0 | UINT16 R/W per. expert | CANopen 3012:$E_h$ Modbus 4636 Profibus 4636 CIP 118.1.14 ModbusTCP 4636 EtherCAT 3012:$E_h$ PROFINET 4636 |
| *CTRL1_Osupdelay* | Overshoot suppression filter: Time delay. The filter is deactivated at a value of 0. In increments of 0.01 ms. Modified settings become active immediately. | ms 0.00 0.00 75.00 | UINT16 R/W per. expert | CANopen 3012:$F_h$ Modbus 4638 Profibus 4638 CIP 118.1.15 ModbusTCP 4638 EtherCAT 3012:$F_h$ PROFINET 4638 |
| *CTRL1_Kfric* | Friction compensation: Gain. In increments of 0.01 $A_{rms}$. Modified settings become active immediately. | $A_{rms}$ 0.00 0.00 10.00 | UINT16 R/W per. expert | CANopen 3012:$10_h$ Modbus 4640 Profibus 4640 CIP 118.1.16 ModbusTCP 4640 EtherCAT 3012:$10_h$ PROFINET 4640 |

# Control Loop Parameter Set 2

## Overview

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| CTRL2_KPn<br><br>ConF → drC-<br><br>Pn2 | Velocity controller P gain.<br><br>The default value is calculated on the basis of the motor parameters.<br><br>In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime.<br><br>In increments of 0.0001 A/RPM.<br><br>Modified settings become active immediately. | A/RPM<br><br>0.0001<br><br>-<br><br>2.5400 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3013:1$_h$<br><br>Modbus 4866<br><br>Profibus 4866<br><br>CIP 119.1.1<br><br>ModbusTCP 4866<br><br>EtherCAT 3013:1$_h$<br><br>PROFINET 4866 |
| CTRL2_TNn<br><br>ConF → drC-<br><br>tin2 | Velocity controller integral action time.<br><br>The default value is calculated.<br><br>In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime.<br><br>In increments of 0.01 ms.<br><br>Modified settings become active immediately. | ms<br><br>0.00<br><br>-<br><br>327.67 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3013:2$_h$<br><br>Modbus 4868<br><br>Profibus 4868<br><br>CIP 119.1.2<br><br>ModbusTCP 4868<br><br>EtherCAT 3013:2$_h$<br><br>PROFINET 4868 |
| CTRL2_KPp<br><br>ConF → drC-<br><br>PP2 | Position controller P gain.<br><br>The default value is calculated.<br><br>In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime.<br><br>In increments of 0.1 1/s.<br><br>Modified settings become active immediately. | 1/s<br><br>2.0<br><br>-<br><br>900.0 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3013:3$_h$<br><br>Modbus 4870<br><br>Profibus 4870<br><br>CIP 119.1.3<br><br>ModbusTCP 4870<br><br>EtherCAT 3013:3$_h$<br><br>PROFINET 4870 |
| CTRL2_TAUiref | Filter time constant of the reference current value filter.<br><br>In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime.<br><br>In increments of 0.01 ms.<br><br>Modified settings become active immediately. | ms<br><br>0.00<br><br>0.50<br><br>4.00 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3013:5$_h$<br><br>Modbus 4874<br><br>Profibus 4874<br><br>CIP 119.1.5<br><br>ModbusTCP 4874<br><br>EtherCAT 3013:5$_h$<br><br>PROFINET 4874 |
| CTRL2_TAUnref<br><br>ConF → drC-<br><br>tAu2 | Filter time constant of the reference velocity value filter.<br><br>In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime.<br><br>In increments of 0.01 ms.<br><br>Modified settings become active immediately. | ms<br><br>0.00<br><br>9.00<br><br>327.67 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3013:4$_h$<br><br>Modbus 4872<br><br>Profibus 4872<br><br>CIP 119.1.4<br><br>ModbusTCP 4872<br><br>EtherCAT 3013:4$_h$<br><br>PROFINET 4872 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| CTRL2_KFPp<br><br>$\mathcal{L}\,o\,n\,F \rightarrow d\,r\,\mathcal{L}$ -<br><br>$F\,P\,P\,2$ | Velocity feed-forward control.<br><br>In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime.<br><br>In increments of 0.1 %.<br><br>Modified settings become active immediately. | %<br><br>0.0<br><br>0.0<br><br>200.0 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3013:6$_h$<br><br>Modbus 4876<br><br>Profibus 4876<br><br>CIP 119.1.6<br><br>ModbusTCP 4876<br><br>EtherCAT 3013:6$_h$<br><br>PROFINET 4876 |
| CTRL2_Nf1damp | Notch filter 1: Damping.<br><br>In increments of 0.1 %.<br><br>Modified settings become active immediately. | %<br><br>55.0<br><br>90.0<br><br>99.0 | UINT16<br><br>R/W<br><br>per.<br><br>expert | CANopen 3013:8$_h$<br><br>Modbus 4880<br><br>Profibus 4880<br><br>CIP 119.1.8<br><br>ModbusTCP 4880<br><br>EtherCAT 3013:8$_h$<br><br>PROFINET 4880 |
| CTRL2_Nf1freq | Notch filter 1: Frequency.<br><br>The filter is deactivated at a value of 15000.<br><br>In increments of 0.1 Hz.<br><br>Modified settings become active immediately. | Hz<br><br>50.0<br><br>1500.0<br><br>1500.0 | UINT16<br><br>R/W<br><br>per.<br><br>expert | CANopen 3013:9$_h$<br><br>Modbus 4882<br><br>Profibus 4882<br><br>CIP 119.1.9<br><br>ModbusTCP 4882<br><br>EtherCAT 3013:9$_h$<br><br>PROFINET 4882 |
| CTRL2_Nf1bandw | Notch filter 1: Bandwidth.<br><br>Definition of bandwidth: 1 - Fb/F0<br><br>In increments of 0.1 %.<br><br>Modified settings become active immediately. | %<br><br>1.0<br><br>70.0<br><br>90.0 | UINT16<br><br>R/W<br><br>per.<br><br>expert | CANopen 3013:A$_h$<br><br>Modbus 4884<br><br>Profibus 4884<br><br>CIP 119.1.10<br><br>ModbusTCP 4884<br><br>EtherCAT 3013:A$_h$<br><br>PROFINET 4884 |
| CTRL2_Nf2damp | Notch filter 2: Damping.<br><br>In increments of 0.1 %.<br><br>Modified settings become active immediately. | %<br><br>55.0<br><br>90.0<br><br>99.0 | UINT16<br><br>R/W<br><br>per.<br><br>expert | CANopen 3013:B$_h$<br><br>Modbus 4886<br><br>Profibus 4886<br><br>CIP 119.1.11<br><br>ModbusTCP 4886<br><br>EtherCAT 3013:B$_h$<br><br>PROFINET 4886 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CTRL2_Nf2freq* | Notch filter 2: Frequency. The filter is deactivated at a value of 15000. In increments of 0.1 Hz. Modified settings become active immediately. | Hz 50.0 1500.0 1500.0 | UINT16 R/W per. expert | CANopen 3013:$C_h$ Modbus 4888 Profibus 4888 CIP 119.1.12 ModbusTCP 4888 EtherCAT 3013:$C_h$ PROFINET 4888 |
| *CTRL2_Nf2bandw* | Notch filter 2: Bandwidth. Definition of bandwidth: 1 - Fb/F0 In increments of 0.1 %. Modified settings become active immediately. | % 1.0 70.0 90.0 | UINT16 R/W per. expert | CANopen 3013:$D_h$ Modbus 4890 Profibus 4890 CIP 119.1.13 ModbusTCP 4890 EtherCAT 3013:$D_h$ PROFINET 4890 |
| *CTRL2_Osupdamp* | Overshoot suppression filter: Damping. The filter is deactivated at a value of 0. In increments of 0.1 %. Modified settings become active immediately. | % 0.0 0.0 50.0 | UINT16 R/W per. expert | CANopen 3013:$E_h$ Modbus 4892 Profibus 4892 CIP 119.1.14 ModbusTCP 4892 EtherCAT 3013:$E_h$ PROFINET 4892 |
| *CTRL2_Osupdelay* | Overshoot suppression filter: Time delay. The filter is deactivated at a value of 0. In increments of 0.01 ms. Modified settings become active immediately. | ms 0.00 0.00 75.00 | UINT16 R/W per. expert | CANopen 3013:$F_h$ Modbus 4894 Profibus 4894 CIP 119.1.15 ModbusTCP 4894 EtherCAT 3013:$F_h$ PROFINET 4894 |
| *CTRL2_Kfric* | Friction compensation: Gain. In increments of 0.01 $A_{rms}$. Modified settings become active immediately. | $A_{rms}$ 0.00 0.00 10.00 | UINT16 R/W per. expert | CANopen 3013:$10_h$ Modbus 4896 Profibus 4896 CIP 119.1.16 ModbusTCP 4896 EtherCAT 3013:$10_h$ PROFINET 4896 |

# PWM Frequency of the Power Stage

## PWM Frequency of Power Stage

The PWM frequency of the power stage depends on the device version.

| Characteristic | Unit | Value | |
|---|---|---|---|
| | | **LXM32•U45, LXM32•U60, LXM32•U90, LXM32•D12, LXM32•D18, LXM32•D30, LXM32•D72** | **LXM32•D85, LXM32•C10** |
| PWM frequency power stage | kHz | 8 | 4 or 8[1] |
| **(1)** Factory setting: 4 kHz. Adjustable via parameter. | | | |

The parameter *PWM_fChop* lets you set the PWM frequency of the power stage.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PWM_fChop* | PWM frequency of power stage.<br><br>**4 / 4 kHz**: 4 kHz<br><br>**8 / 8 kHz**: 8 kHz<br><br>**16 / 16 kHz**: 16 kHz<br><br>Factory setting:<br><br>Peak output current ≤72 Arms: 8 kHz<br><br>Peak output current >72 Arms: 4 kHz<br><br>Changing this setting is only possible in the case of devices with a peak output current >72 Arms.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled. | -<br><br>4<br><br>-<br><br>16 | UINT16<br><br>R/W<br><br>per.<br><br>expert | CANopen 3005:E$_h$<br><br>Modbus 1308<br><br>Profibus 1308<br><br>CIP 105.1.14<br><br>ModbusTCP 1308<br><br>EtherCAT 3005:E$_h$<br><br>PROFINET 1308 |

The technical data change depending on the PWM frequency of the power stage, see Power Stage Data - Drive-Specific, page 31.

# Operating States and Operating Modes

## Operating States
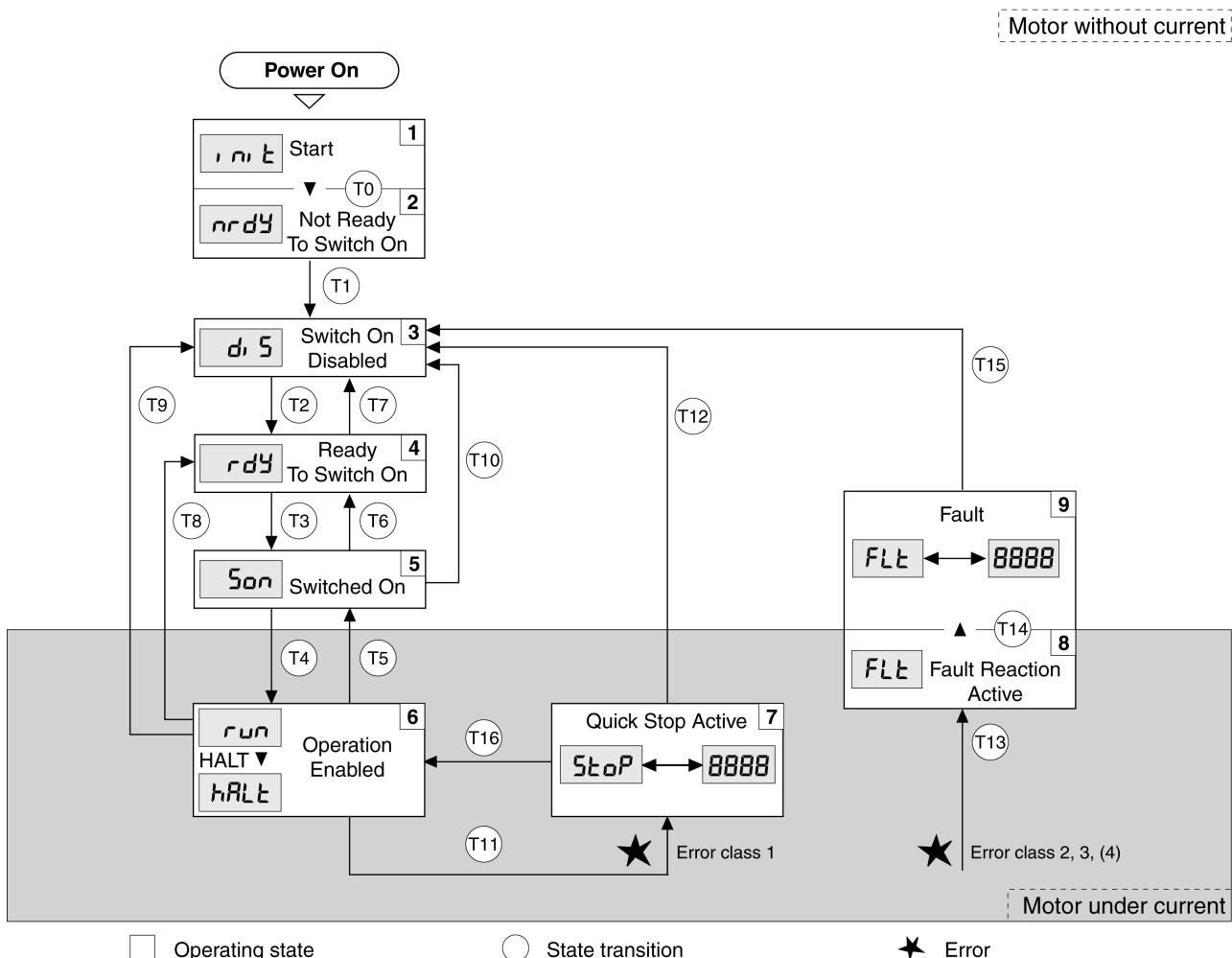
### State Diagram and State Transitions

#### State Diagram

When the product is powered on and when an operating mode is started, the product goes through a number of operating states.

The state diagram (state machine) shows the relationships between the operating states and the state transitions.

The operating states are internally monitored and influenced by monitoring functions.



## Operating States

| Operating state | Description |
| --- | --- |
| **1** Start | Electronics are initialized |
| **2** Not Ready To Switch On | The power stage is not ready to switch on |
| **3** Switch On Disabled | Impossible to enable the power stage |
| **4** Ready To Switch On | The power stage is ready to switch on. |

| Operating state | Description |
|---|---|
| **5** Switched On | Power stage is switched on |
| **6** Operation Enabled | Power stage is enabled |
| | Selected operating mode is active |
| **7** Quick Stop Active | "Quick Stop" is being executed |
| **8** Fault Reaction Active | Error response is active |
| **9** Fault | Error response terminated |
| | Power stage is disabled |

# Error Class

The errors are classified according to the following error classes:

| Error class | State transition | Error response | Resetting an error message |
|---|---|---|---|
| 0 | - | No interruption of the movement | Function "Fault Reset" |
| 1 | T11 | Stop movement with "Quick Stop" | Function "Fault Reset" |
| 2 | T13, T14 | Stop movement with "Quick Stop" and disable the power stage when the motor has come to a standstill | Function "Fault Reset" |
| 3 | T13, T14 | Disable the power stage immediately without stopping the movement first | Function "Fault Reset" |
| 4 | T13, T14 | Disable the power stage immediately without stopping the movement first | Power cycle |

# Error Response

The state transition T13 (error class 2, 3 or 4) initiates an error response as soon as an internal occurrence signals an error to which the device must react.

| Error class | Response |
|---|---|
| 2 | Movement is stopped with "Quick Stop" |
| | Holding brake is applied |
| | Power stage is disabled |
| 3, 4 or safety-related function STO | Power stage is immediately disabled |

An error can be triggered by a temperature sensor, for example. The drive cancels the movement and triggers an error response. Subsequently, the operating state changes to **9** Fault.

# Resetting an Error Message

A "Fault Reset" resets an error message.

In the event of a "Quick Stop" triggered by a detected error of class 1 (operating state **7** Quick Stop Active), a "Fault Reset" causes a direct transition to operating state **6** Operation Enabled.

# State Transitions

State transitions are triggered by an input signal, a fieldbus command or as a response to a monitoring function.

| State transition | Operating state | Condition / event[1] | Response |
|---|---|---|---|
| T0 | **1**-> **2** | • Device electronics successfully initialized | |
| T1 | **2**-> **3** | • Parameter successfully initialized | |
| T2 | **3** -> **4** | • No undervoltage and Encoder successfully checked and Actual velocity: <1000 RPM and STO signals = +24V and fieldbus command: Shutdown[2] | |
| T3 | **4** -> **5** | • Request for enabling the power stage<br>• Fieldbus command: Switch On or Enable Operation | |
| T4 | **5** -> **6** | • Automatic transition<br>• Fieldbus command: Enable Operation | Power stage is enabled.<br><br>User parameters are checked.<br><br>Holding brake is released (if available). |
| T5 | **6** -> **5** | • Fieldbus command: Disable Operation | Movement is canceled with "Halt".<br><br>Holding brake is applied (if available).<br><br>Power stage is disabled. |
| T6 | **5** -> **4** | • Fieldbus command: Shutdown | |
| T7 | **4** -> **3** | • Undervoltage<br>• STO signals = 0V<br>• Actual velocity: >1000 RPM (for example by external driving force)<br>• Fieldbus command: Disable Voltage | - |
| T8 | **6** -> **4** | • Fieldbus command: Shutdown | Movement is canceled with "Halt" or power stage is immediately disabled. Can be set via parameter *DSM_ShutDownOption*. |
| T9 | **6** -> **3** | • Request for disabling the power stage<br>• Fieldbus command: Disable Voltage | For "Request for disabling the power stage": Movement is canceled with "Halt" or power stage is immediately disabled. Can be set via parameter *DSM_ShutDownOption*.<br><br>For "Fieldbus command: Disable Voltage": Power stage is disabled immediately. |
| T10 | **5** -> **3** | • Request for disabling the power stage<br>• Fieldbus command: Disable Voltage | |
| T11 | **6** -> **7** | • Error of error class 1<br>• Fieldbus command: Quick Stop | Movement is canceled with "Quick Stop". |
| T12 | **7** -> **3** | • Request for disabling the power stage<br>• Fieldbus command: Disable Voltage | Power stage is disabled immediately, even if "Quick Stop" is still active. |
| T13 | **x** -> **8** | • Error of error classes 2, 3 or 4 | Error response is carried out, see "Error Response". |
| T14 | **8** -> **9** | • Error response terminated (error class 2)<br>• Error of error classes 3 or 4 | |
| T15 | **9** -> **3** | • Function: "Fault Reset" | Error is reset (cause of error must have been corrected). |
| T16 | **7** -> **6** | • Function: "Fault Reset"<br>• Fieldbus command: Enable Operation[3] | In the event of a "Quick Stop" triggered by a detected error of class 1, a "Fault Reset" causes a direct transition to the operating state **6** Operation Enabled. |

**(1)** In order to trigger a state transition it is sufficient if one condition is met.

**(2)** Only required with fieldbus control mode and parameter *DS402compatib* = 1.

**(3)** Possible only if operating state was triggered via the fieldbus.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *DSM_ ShutDownOption*<br><br>$\Gamma \circ \cap F \rightarrow R \Gamma \Box -$ $5 d E Y$ | Behavior for disabling the power stage during movement.<br><br>**0 / Disable Immediately /** $d \cdot 5 \cdot$ : Disable power stage immediately<br><br>**1 / Disable After Halt /** $d \cdot 5 h$ : Disable power stage after deceleration to standstill<br><br>This parameter specifies the response to a power stage disable request.<br><br>Halt is used for deceleration to standstill.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.26. | -<br><br>0<br><br>0<br><br>1 | INT16<br><br>R/W<br><br>per.<br><br>- | CANopen 605B:$0_h$<br><br>Modbus 1684<br><br>Profibus 1684<br><br>CIP 106.1.74<br><br>ModbusTCP 1684<br><br>EtherCAT 605B:$0_h$<br><br>PROFINET 1684 |

# Indication of the Operating State via HMI

## Description

The operating state is displayed by the HMI. The table below provides an overview:

| Operating state | HMI |
|---|---|
| **1** Start | $\cap \cdot E$ |
| **2** Not Ready To Switch On | $\cap \Gamma d Y$ |
| **3** Switch On Disabled | $d \cdot 5$ |
| **4** Ready To Switch On | $\Gamma d Y$ |
| **5** Switched On | $5 \circ \cap$ |
| **6** Operation Enabled | $\Gamma \cup \cap$ |
| **7** Quick Stop Active | $5 E \circ P$ |
| **8** Fault Reaction Active | $F L E$ |
| **9** Fault | $F L E$ |

# Indication of the Operating State via Signal Outputs

## Description

Information on the operating state is available via the signal outputs. The table below provides an overview:

| Operating state | Signal output function "No fault"[1] | Signal output function "Active"[2] |
|---|---|---|
| **1** Start | 0 | 0 |
| **2** Not Ready To Switch On | 0 | 0 |
| **3** Switch On Disabled | 0 | 0 |
| **4** Ready To Switch On | 1 | 0 |
| **5** Switched On | 1 | 0 |
| **6** Operation Enabled | 1 | 1 |

| Operating state | Signal output function "No fault"[1] | Signal output function "Active"[2] |
|---|---|---|
| **7** Quick Stop Active | 0 | 0 |
| **8** Fault Reaction Active | 0 | 0 |
| **9** Fault | 0 | 0 |
| **(1)** The signal output function is factory setting for *DQ0* | | |
| **(2)** The signal output function is the factory setting for *DQ1* | | |

# Indication of the Operating State via Fieldbus
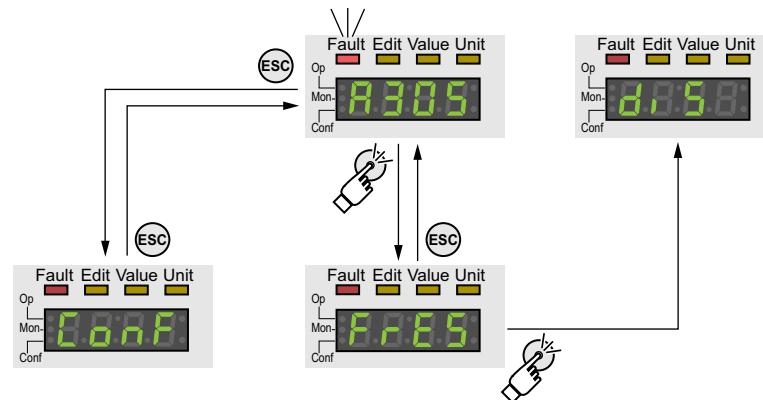
## Description

Descriptions of how to indicate the operating states via a fieldbus can be found in the fieldbus user guides.

# Changing the Operating State via HMI

## Description

An error message can be reset via the HMI.



In the case of a detected error of error class 1, resetting the error message causes a transition from operating state **7** Quick Stop Active back to operating state **6** Operation Enabled.

In the case of a detected error of error classes 2 or 3, resetting the error message causes a transition from operating state **9** Fault back to operating state **3** Switch On Disabled.

# Changing the Operating State via Signal Inputs

## Overview

It is possible to switch between operating states via the signal inputs.

- Signal input function "Enable"
- Signal input function "Fault Reset"

# Signal Input Function "Enable"

The power stage is enabled by means of the signal input function "Enable".

| "Enable" | State transition |
|---|---|
| Rising edge | Enable power stage (T3) |
| Falling edge | Disabling the power stage (T9 and T12) |

In local control mode, the signal input function "Enable" is the factory setting for *DI0*.

In order to enable the power stage via the signal input in fieldbus control mode, you must first parameterize the signal input function "Enable", see Digital Signal Inputs and Digital Signal Outputs, page 199.

As of firmware version ≥V01.12, it is possible to also reset an error message with a rising or a falling edge at the signal input.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IO_FaultResOnEnaInp*<br><br>$C o n F \rightarrow A C G -$<br><br>$, E F r$ | Additional 'Fault Reset' for the signal input function 'Enable'.<br><br>**0 / Off /** $o F F$ : No additional 'Fault Reset'<br><br>**1 / OnFallingEdge /** $F A L L$ : Additional 'Fault Reset' with falling edge<br><br>**2 / OnRisingEdge /** $r , S E$ : Additional 'Fault Reset' with rising edge<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.12. | -<br><br>0<br><br>0<br><br>2 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3005:34h<br><br>Modbus 1384<br><br>Profibus 1384<br><br>CIP 105.1.52<br><br>ModbusTCP 1384<br><br>EtherCAT 3005:34h<br><br>PROFINET 1384 |

## Signal Input Function "Fault Reset"

The signal input function "Fault Reset" is used to reset an error message.

| "Fault Reset" | State transition |
|---|---|
| Rising edge | Resetting an error message (T15 and T16) |

In local control mode, the signal input function "Fault Reset" is the factory setting for *DI1*.

In order to reset an error message via the signal input in fieldbus control mode, you must first parameterize the signal input function "Fault Reset", see Digital Signal Inputs and Digital Signal Outputs, page 199.

# Changing the Operating State via Fieldbus

## Description

The operating states can only be changed via the fieldbus in fieldbus control mode.

Descriptions of how to change the operating states via a fieldbus can be found in the fieldbus user guides.

# Operating Modes

## Starting and Changing an Operating Mode

### Starting the Operating Mode

In local control mode, the parameter *IOdefaultMode* is used to set the desired operating mode.

The set operating mode is automatically started by enabling the power stage.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOdefaultMode*<br><br>$ConF \rightarrow ACG -$<br><br>$io - \Pi$ | Operating mode.<br><br>**0 / None /** $nonE$ : None<br><br>**1 / Profile Torque /** $torq$: Profile Torque<br><br>**2 / Profile Velocity /** $VELP$: Profile Velocity<br><br>**3 / Electronic Gear /** $GEAr$: Electronic Gear<br><br>**5 / Jog /** $JoG$: Jog<br><br>**6 / Motion Sequence /** $\Pi otS$: Motion Sequence<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on. | -<br><br>0<br><br>6<br><br>6 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3005:3$_h$<br><br>Modbus 1286<br><br>Profibus 1286<br><br>CIP 105.1.3<br><br>ModbusTCP 1286<br><br>EtherCAT 3005:3$_h$<br><br>PROFINET 1286 |

In fieldbus control mode, the desired operating mode is set via the fieldbus.

Descriptions of how to start and change operating modes via the fieldbus can be found in the fieldbus user guides.

### Starting the Operating Mode via Signal Input

As of firmware version ≥V01.08, the signal input function "Activate Operating Mode" is available in local control mode.

This means that you can start the set operating mode via a signal input.

If the signal input function "Activate Operating Mode" has been set, the operating mode is not started automatically when the power stage is enabled. The operating mode is only started when a rising edge is available at the edge.

In order to start the set operating mode via a signal input, you must first parameterize the signal input function "Activate Operating Mode", see Digital Signal Inputs and Digital Signal Outputs, page 199.

### Changing the Operating Mode

The operating mode can be changed after the active operating mode has been terminated.

In addition, it is also possible to change the operating mode during a running movement; however, this is only possible in certain operating modes.

# Changing the Operating Mode During a Movement

You can switch between the following operating modes during a running movement.

- Electronic Gear
- Profile Torque
- Profile Velocity
- Profile Position

The operating mode can be changed while the motor is at a standstill or while the motor is not at a standstill, depending on the new operating mode.

| Operating mode to be changed to | Motor standstill |
|---|---|
| Jog | With motor standstill |
| Electronic Gear<br><br>(position synchronization) | With motor standstill |
| Electronic Gear<br><br>(velocity synchronization) | Without motor standstill |
| Profile Torque | Without motor standstill |
| Profile Velocity | Without motor standstill |
| Profile Position<br><br>With firmware version ≥V01.04 | Drive profile Drive Profile Lexium:<br><br>Adjustable via parameter *PP_OpmChgType*<br><br>Drive profile DS402:<br><br>With motor standstill[1] |
| Profile Position<br><br>With firmware version <V01.04 | With motor standstill |
| **(1)** Parameter *PP_OpmChgType* must be set to the value 0. | |

The motor is decelerated to a standstill via the ramp set in the parameter *LIM_HaltReaction*, see .

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PP_OpmChgType* | Change to operating mode Profile Position during movements.<br><br>**0 / WithStandStill**: Change with standstill<br><br>**1 / OnTheFly**: Change without standstill<br><br>If Modulo is active, a transition to the operating mode Profile Position is performed with the setting WithStandStill, regardless of the setting of this parameter.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.04. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3023:9$_h$<br><br>Modbus 8978<br><br>Profibus 8978<br><br>CIP 135.1.9<br><br>ModbusTCP 8978<br><br>EtherCAT 3023:9$_h$<br><br>PROFINET 8978 |

# Changing the Operating Mode via Signal Input

In local control mode, the signal input function "Operating Mode Switch" is available.

It allows you to switch via a signal input from the operating mode set in the *IOdefaultMode* to the operating mode set in the parameter *IO_ModeSwitch*.

In order to switch between two operating modes, you must first parameterize the signal input function "Operating Mode Switch", see .

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IO_ModeSwitch*<br><br>$\Box \Box F \to H \Box \Box -$<br>$\Box \Box S$ | Operating mode for signal input function Operating Mode Switch.<br><br>**0 / None /** $\Box \Box \Box E$ : None<br><br>**1 / Profile Torque /** $\Box \Box \Box \Box$: Profile Torque<br><br>**2 / Profile Velocity /** $V \Box L \Box$: Profile Velocity<br><br>**3 / Electronic Gear /** $\Box E \Box \Box$ : Electronic Gear<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>3 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:2F$_h$<br><br>Modbus 1630<br><br>Profibus 1630<br><br>CIP 106.1.47<br><br>ModbusTCP 1630<br><br>EtherCAT 3006:2F$_h$<br><br>PROFINET 1630 |

# Operating Mode Jog

## Overview

### Availability

### Description

In the operating mode Jog, a movement is made from the actual motor position in the specified direction.

A movement can be made using one of two methods:
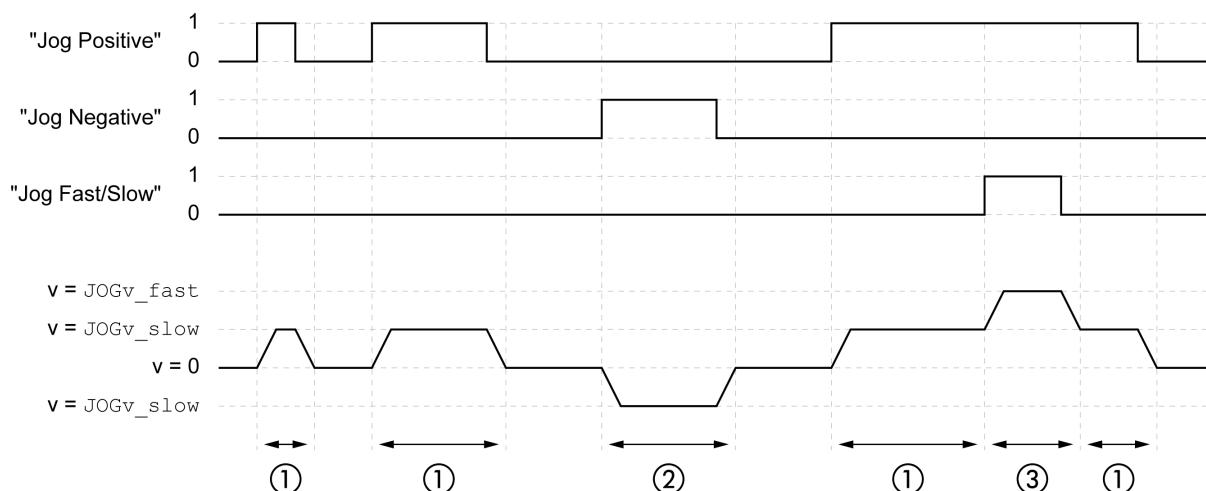
- Continuous movement
- Step movement

In addition, the product features two parameterizable velocities.

## Continuous Movement

As long as the signal for the direction is available, a continuous movement is made in the desired direction.

The illustration below provides an example of continuous movement via the signal inputs in local control mode:
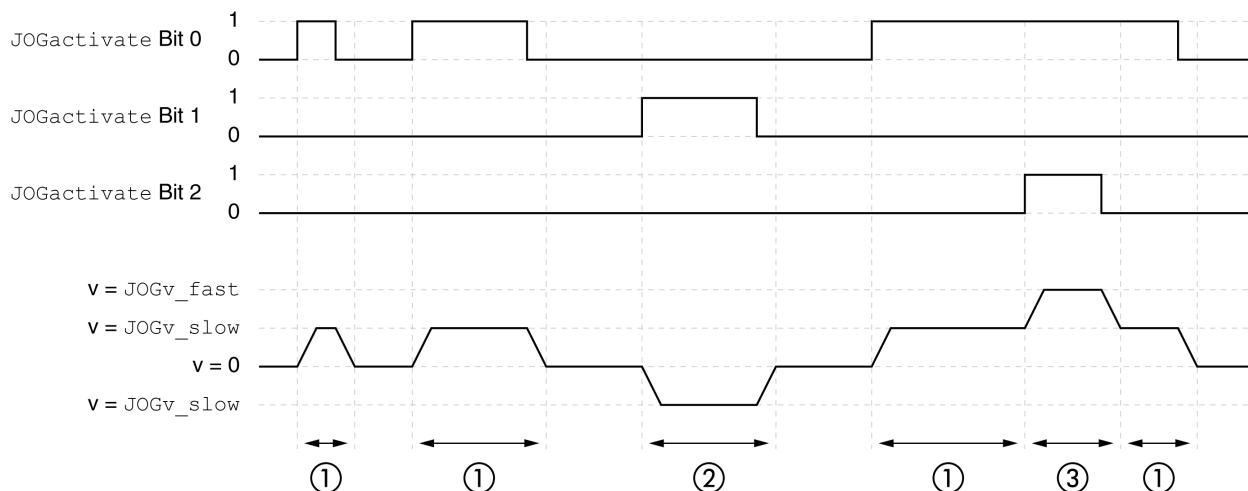


**1** Slow movement in positive direction

**2** Slow movement in negative direction

**3** Fast movement in positive direction

The illustration below provides an example of continuous movement via the fieldbus in fieldbus control mode:

**1** Slow movement in positive direction

**2** Slow movement in negative direction
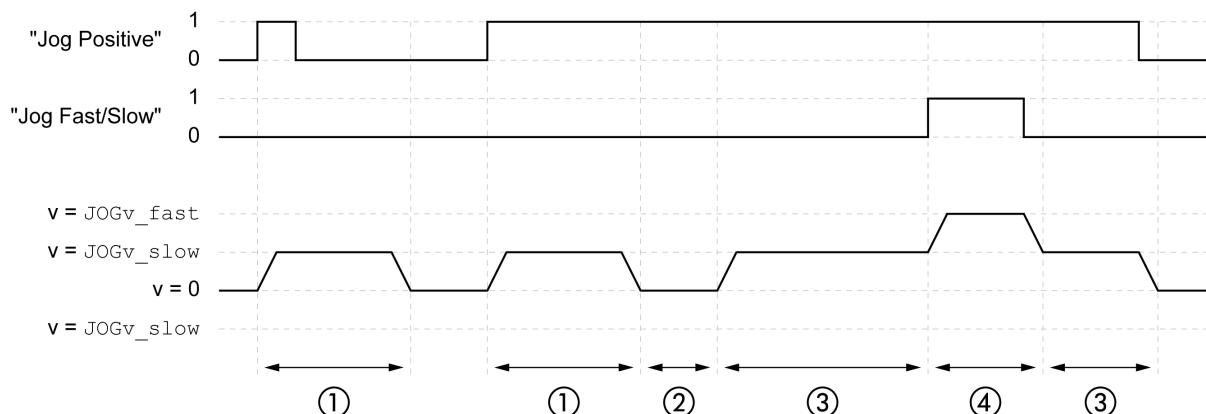
**3** Fast movement in positive direction

# Step Movement

If the signal for the direction is available for a short period of time, a movement with a parameterizable number of user-defined units is made in the desired direction.

If the signal for the direction is available continuously, a movement with a parameterizable number of user-defined units is made in the desired direction. After this movement, the motor stops for a defined period of time. Then a continuous movement is made in the desired direction.

The illustration below provides an example of step movement via the signal inputs in local control mode:
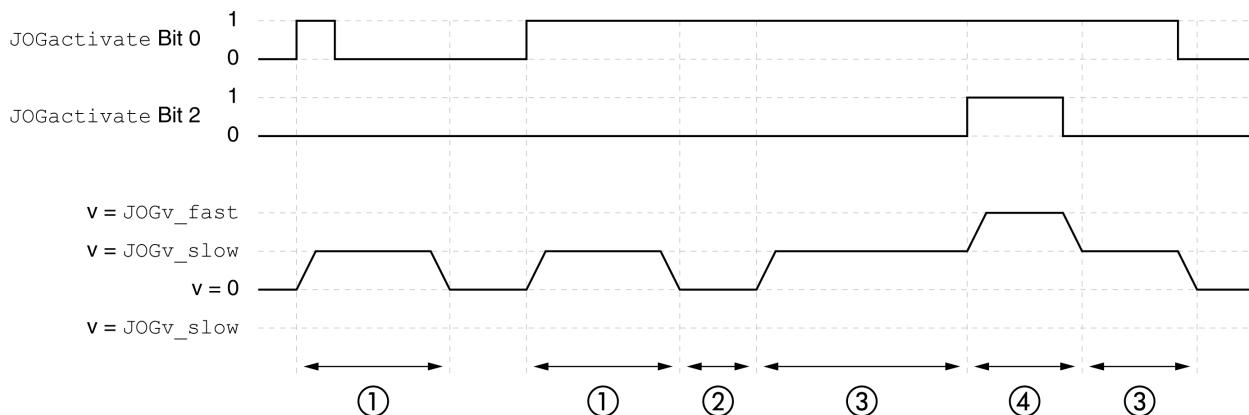


**1** Slow movement in positive direction with a parameterizable number of user-defined units *JOGstep*

**2** Waiting time *JOGtime*

**3** Slow continuous movement in positive direction

**4** Fast continuous movement in positive direction

The illustration below provides an example of step movement via the fieldbus in fieldbus control mode:

**1** Slow movement in positive direction with a parameterizable number of user-defined units *JOGstep*

**2** Waiting time *JOGtime*

**3** Slow continuous movement in positive direction

**4** Fast continuous movement in positive direction

# Starting the Operating Mode

In local control mode, the operating mode must first have been selected, see Starting and Changing an Operating Mode, page 245.

After the power stage is enabled, the operating mode is started automatically.

The power stage is enabled via the signal inputs. The table below provides an overview of the factory settings of the signal inputs:

| Signal input | Signal input function |
|---|---|
| *DI0* | "Enable"<br>Enable and disable the power stage |
| *DI1* | "Fault Reset"<br>Resetting an error message |
| *DI2* | "Positive Limit Switch (LIMP)"<br>See Limit Switches, page 350 |
| *DI3* | "Negative Limit Switch (LIMN)"<br>See Limit Switches, page 350 |
| *DI4* | "Jog Negative"<br>Operating mode Jog: Movement in negative direction |
| *DI5* | "Jog Positive"<br>Operating mode Jog: Movement in positive direction |

The factory settings of the signal inputs depend on the selected operating mode; they can be adapted, see Digital Signal Inputs and Digital Signal Outputs, page 199.

In fieldbus control mode, the operating mode is started via the fieldbus. See the fieldbus user guides for a description.

# Integrated HMI

It is also possible to start the operating mode via the HMI. Calling →ᴏP→ ᴊᴏᴳ -→ ᴊᴳ5ᴛ enables the power stage and starts the operating mode.

The method Continuous Movement is controlled via the HMI.

Turn the navigation button to select one of 4 types of movement:

- ⌐ ⌐ - : slow movement in positive direction
- ⌐ ⌐ ⌐ : fast movement in positive direction
- - ⌐ ⌐ : slow movement in negative direction
- ⌐ ⌐ ⌐ : fast movement in negative direction

Press the navigation button to start the movement.

## Status Messages

In local control mode, information on the operating state and the ongoing movement is available via signal outputs.

In fieldbus control mode, information on the operating state and the ongoing movement is available via the fieldbus and the signal outputs.

Descriptions on obtaining information on the operating state and the ongoing movement can be found in the fieldbus user guides.

The table below provides an overview of the signal outputs:

| Signal output | Signal output function |
|---|---|
| DQ0 | "No Fault" |
| | Signals the operating states **4** Ready To Switch On, **5** Switched On and **6** Operation Enabled |
| DQ1 | "Active" |
| | Signals the operating state **6** Operation Enabled |
| DQ2 | With local control mode: |
| | "In Position Deviation Window" |
| | See Position Deviation Window, page 371 |
| | With fieldbus control mode: |
| | "Freely Available" |
| | See Setting a Signal Output via Parameter, page 331 |

The factory settings of the signal outputs depend on the selected control mode and the selected operating mode; they can be adapted, see Digital Signal Inputs and Digital Signal Outputs, page 199.

## Terminating the Operating Mode

The operating mode is terminated when the motor is at a standstill and one of the following conditions is met:

- Stop caused by "Halt" or "Quick Stop"
- Stop caused by a detected error

## Parameterization

### Overview

The illustration below provides an overview of the parameters that can be adjusted in local control mode.

| DI4 | DI5 | DI0 ... DI5 |
|---|---|---|
| "Jog Negative" | "Jog Positive" | "Jog Fast/Slow" |

```
JOGv_slow, JOGv_fast
```

| IO_JOGmethod | |
|---|---|
| = 0 | = 1 |

```
JOGstep
JOGtime
```

```
RAMP_v_acc, RAMP_v_dec, RAMP_v_max
```

The illustration below provides an overview of the parameters that can be adjusted in fieldbus control mode.

```
JOGactivate
```

```
JOGv_slow, JOGv_fast
```

| JOGmethod | |
|---|---|
| = 0 | = 1 |

```
JOGstep
JOGtime
```

```
RAMP_v_acc, RAMP_v_dec, RAMP_v_max
```

## Velocities

Two parameterizable velocities are available.

Set the desired values with the parameters *JOGv_slow* and *JOGv_fast*.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *JOGv_slow* oP → JoG - JGLo | Velocity for slow movement. The adjustable value is internally limited to the parameter setting in RAMP_v_max. Modified settings become active immediately. | usr_v 1 60 2147483647 | UINT32 R/W per. - | CANopen 3029:4h Modbus 10504 Profibus 10504 CIP 141.1.4 ModbusTCP 10504 EtherCAT 3029:4h PROFINET 10504 |
| *JOGv_fast* oP → JoG - JGhi | Velocity for fast movement. The adjustable value is internally limited to the parameter setting in RAMP_v_max. Modified settings become active immediately. | usr_v 1 180 2147483647 | UINT32 R/W per. - | CANopen 3029:5h Modbus 10506 Profibus 10506 CIP 141.1.5 ModbusTCP 10506 EtherCAT 3029:5h PROFINET 10506 |

## Switching Between Velocities

In local control mode, the signal input function "Jog Fast/Slow" is available. It allows you to switch between the two velocities via a signal input.

In order to switch between the two velocities, you must first parameterize the signal input function "Jog Fast/Slow", see Digital Signal Inputs and Digital Signal Outputs, page 199.

## Selection of the Method

In local control mode, the parameter *IO_JOGmethod* is used to set the method.

In fieldbus control mode, the parameter *JOGmethod* is used to set the method.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IO_JOGmethod* ⸦ ⸧ ⸦ F → A ⸦ G - ⸦ ⸧ J G | Selection of jog method. **0 / Continuous Movement /** ⸦ ⸧ Π ⸧ : Jog with continuous movement **1 / Step Movement /** 5 ⸦ Π ⸧ : Jog with step movement Modified settings become active the next time the motor moves. | - 0 0 1 | UINT16 R/W per. - | CANopen 3005:18h Modbus 1328 Profibus 1328 CIP 105.1.24 ModbusTCP 1328 EtherCAT 3005:18h PROFINET 1328 |
| *JOGmethod* | Selection of jog method. **0 / Continuous Movement /** ⸦ ⸧ Π ⸧ : Jog with continuous movement **1 / Step Movement /** 5 ⸦ Π ⸧ : Jog with step movement Modified settings become active immediately. | - 0 1 1 | UINT16 R/W - - | CANopen 3029:3h Modbus 10502 Profibus 10502 CIP 141.1.3 ModbusTCP 10502 EtherCAT 3029:3h PROFINET 10502 |

## Setting the Step Movement

The parameters *JOGstep* and *JOGtime* are used to set the parameterizable number of user-defined units and the time for which the motor is stopped.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *JOGstep* | Distance for step movement. Modified settings become active the next time the motor moves. | usr_p 1 20 2147483647 | INT32 R/W per. - | CANopen 3029:7h Modbus 10510 Profibus 10510 CIP 141.1.7 ModbusTCP 10510 EtherCAT 3029:7h PROFINET 10510 |
| *JOGtime* | Wait time for step movement. Modified settings become active the next time the motor moves. | ms 1 500 32767 | UINT16 R/W per. - | CANopen 3029:8h Modbus 10512 Profibus 10512 CIP 141.1.8 ModbusTCP 10512 EtherCAT 3029:8h PROFINET 10512 |

# Changing the Motion Profile for the Velocity

It is possible to change the parameterization of the Motion Profile for the Velocity, page 317.

# Additional Settings

## Overview

The following functions can be used for target value processing:

- Jerk Limitation, page 319
- Stopping Movement with Halt, page 320
- Stopping Movement with Quick Stop, page 322
- Limitation of the Velocity via Signal Inputs, page 324
- Limitation of the Current via Signal Inputs, page 327
- Setting a Signal Output via Parameter, page 331
- Position Capture via Signal Input (Vendor-Specific Profile), page 331
- Position Capture via Signal Input (DS402 Profile), page 338
- Relative Movement After Capture (RMAC), page 343

The following functions can be used for monitoring the movement:

- Limit Switches, page 350
- Software Limit Switches, page 352
- Load-Dependent Position Deviation (Following Error), page 354
- Motor Standstill and Direction of Movement, page 358
- Standstill Window, page 361

  This function is only available for a step movement.

- Position Register, page 363
- Position Deviation Window, page 371
- Velocity Deviation Window, page 373
- Velocity Threshold Value, page 375
- Current Threshold Value, page 376

# Operating Mode Electronic Gear

## Overview

### Availability

See Control Mode, page 182.

## Description

In the operating mode Electronic Gear, movements are carried out according to externally supplied reference value signals. A position reference value is calculated on the basis of these external reference values plus an adjustable gear ratio. The reference value signals can be A/B signals, P/D signals or CW/CCW signals.

A movement can be made using one of 3 methods:

- Position synchronization without compensation movement

  In the case of position synchronization without compensation movement, the movement is made synchronously (position synchronicity) with the supplied reference value signals. Reference value signals supplied during an interruption caused by Halt or by a detected error of error class 1 are not taken into account.

- Position synchronization with compensation movement

  In the case of position synchronization with compensation movement, the movement is made synchronously (position synchronicity) with the supplied reference value signals. Reference value signals supplied during an interruption caused by Halt or by a detected error of error class 1 are taken into account and compensated for.

- Velocity synchronization

  In the case of velocity synchronization, the movement is made synchronously (velocity synchronicity) with the supplied reference value signals.

## Internal Units

The position value for the movement depends on the internal units.

The internal units are 131072 increments per revolution.

## Starting the Operating Mode

In local control mode, the operating mode must first have been selected, see Starting and Changing an Operating Mode, page 245. After the power stage is enabled, the operating mode is started automatically.

The power stage is enabled via the signal inputs. The table below provides an overview of the factory settings of the signal inputs:

| Signal input | Signal input function |
|---|---|
| DI0 | "Enable" <br> Enable and disable the power stage |
| DI1 | "Fault Reset" <br> Resetting an error message |
| DI2 | "Positive Limit Switch (LIMP)" <br> See Limit Switches, page 350 |

| Signal input | Signal input function |
|---|---|
| *DI3* | "Negative Limit Switch (LIMN)"<br><br>See Limit Switches, page 350 |
| *DI4* | "Gear Ratio Switch"<br><br>Switch between 2 parameterizable gear ratios |
| *DI5* | "Halt"<br><br>See Stopping Movement with Halt, page 320 |

The factory settings of the signal inputs depend on the selected operating mode; they can be adapted, see Digital Signal Inputs and Digital Signal Outputs, page 199.

In the case of fieldbus control mode, the operating mode is started via the fieldbus. See the fieldbus user guides for a description.

## Status Messages

In local control mode, information on the operating state and the ongoing movement is available via signal outputs.

In fieldbus control mode, information on the operating state and the ongoing movement is available via the fieldbus and the signal outputs.

Descriptions on obtaining information on the operating state and the ongoing movement can be found in the fieldbus user guides.

The table below provides an overview of the signal outputs:

| Signal output | Signal output function |
|---|---|
| *DQ0* | "No Fault"<br><br>Signals the operating states **4** Ready To Switch On, **5** Switched On and **6** Operation Enabled |
| *DQ1* | "Active"<br><br>Signals the operating state **6** Operation Enabled |
| *DQ2* | With local control mode:<br><br>"In Position Deviation Window"<br><br>See Position Deviation Window, page 371<br><br>With fieldbus control mode:<br><br>"Freely Available"<br><br>See Setting a Signal Output via Parameter, page 331 |

The factory settings of the signal outputs depend on the selected control mode and the selected operating mode; they can be adapted, see Digital Signal Inputs and Digital Signal Outputs, page 199.

## Terminating the Operating Mode

In local control mode, the operating mode is automatically terminated by disabling the power stage.

In fieldbus control mode, the operating mode is terminated via the fieldbus. See the fieldbus user guides for a description.

# Parameterization

## Overview

The illustration below provides an overview of the parameters that can be adjusted in local control mode.

```
                        ┌────────────────────────────┐
                        │  ⊓⊔⊓⊔        PTI           │
                        ├──────────┬─────────┬───────┤
                        │   A/B    │   P/D   │ CW/CCW│
                        └──────────┴─────────┴───────┘
                             ↓          ↓        ↓
                        ┌──────────┬─────────┬───────┐
                        │   = 0    │   = 1   │  = 2  │
                        ├──────────┴─────────┴───────┤
                        │      PTI_signaltype         │
                        └────────────────────────────┘
                                    ↓
                        ┌────────────────────────────┐
                        │      InvertDirOfCount        │
                        └────────────────────────────┘
                                    ↓
        ┌──────────┐    ┌────────────────────────────┐
        │   DI4    │ →  │     "Gear Ratio Switch"     │
        │(DI0 ...DI5)│  └────────────────────────────┘
        └──────────┘       ↓                  ↓
                    ┌───────────────┐   ┌──────────────┐
                    │   GEARratio   │   │  GEARnum2    │
                    ├───────┬───────┤   │  GEARdenom2  │
                    │  = 0  │= 1...11│  └──────────────┘
                    └───────┴───────┘
                        ↓
                ┌───────────────┐
                │   GEARnum     │
                │  GEARdenom    │
                └───────────────┘
                        ↓              ↓
                ┌────────────────────────────┐
                │      IO_GEARmethod          │
                ├───────┬─────────┬──────────┤
                │  = 1  │   = 2   │   = 3    │
                └───────┴─────────┴──────────┘
                    ↓       ↓          ↓
                        ┌──────────────┐   ┌──────────────┐
                        │GEARposChgMode│   │ RAMP_v_enable│
                        └──────────────┘   ├──────┬───────┤
                                           │ = 0  │  = 1  │
                                           └──────┴───────┘
                            ↓                          ↓
        ┌──────────┐  ┌────────────────┐         ┌──────────────┐
        │DI0 ...DI5│⋯→│ "Gear Offset 1" │        │ RAMP_v_acc   │
        └──────────┘  │ "Gear Offset 2" │        │ RAMP_v_dec   │
                      └────────────────┘         │ RAMP_v_max   │
                            ↓                     └──────────────┘
                ┌──────────────────────────┐
                │OFSp_RelPos1, OFSp_RelPos2│
                │ OFSv_target, OFS_Ramp    │
                └──────────────────────────┘
                            ↓
                ┌──────────────────┐
                │ GEARpos_v_max    │
                └──────────────────┘
                            ↓
                ┌──────────────────┐
                │  GEARdir_enabl   │
                └──────────────────┘
                            ↓
```

The illustration below provides an overview of the parameters that can be adjusted in fieldbus control mode.



## Type of Reference Value Signal and Inversion of the Reference Value Signals

The PTI interface can be set:

- Type of reference value signal

- Inverting the reference value signals

See section Setting the PTI Interface, page 218 for information on setting the PTI interface.

# Gear Ratio

The gear ratio is the ratio of the number of motor increments and the number of externally supplied reference increments.

$$\text{Gear factor} = \frac{\text{Motor increments}}{\text{Reference increments}} = \frac{\text{Gear factor numerator}}{\text{Gear factor denominator}}$$

In local control mode, the signal input function "Gear Ratio Switch" allows you to switch between 2 parameterizable gear ratios during operation.

In fieldbus control mode, the parameter *GEARselect* allows you to switch between 2 parameterizable gear ratios during operation.

The parameter *GEARratio* allows you to set a predefined gear ratio. It is also possible to set a parameterizable gear ratio.

The parameterizable gear ratio is defined with the parameters *GEARnum* and *GEARdenom*. A negative numerator value reverses the motor's direction of movement.

Set the desired gear ratio with the parameters *GEARratio*, *GEARnum*, *GEARdenom*, *GEARnum2* and *GEARdenom2*.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *GEARratio* ⌂ o ⊓ F → ı - o - ⌂ F ⊓ ⌂ | Selection of gear ratio. **0 / Gear Factor / F ⊓ c ⊦** : Usage of gear ratio adjusted with GEARnum/GEARdenom **1 / 200 / ⵦ ⵔ ⵔ** : 200 **2 / 400 / ⵎ ⵔ ⵔ** : 400 **3 / 500 / ⵕ ⵔ ⵔ** : 500 **4 / 1000 / ı ⵔ ⵔ ⵔ** : 1000 **5 / 2000 / ⵦ ⵔ ⵔ ⵔ** : 2000 **6 / 4000 / ⵎ ⵔ ⵔ ⵔ** : 4000 **7 / 5000 / ⵕ ⵔ ⵔ ⵔ** : 5000 **8 / 10000 / ı ⵔ . ⵔ ⵔ** : 10000 **9 / 4096 / ⵎ ⵔ ⵍ ⵣ** : 4096 **10 / 8192 / ⵠ ı ⵍ ⵦ** : 8192 **11 / 16384 / ı ⵣ . ⵍ ⵠ** : 16384 A change of the reference value by the specified value causes one motor revolution. Modified settings become active immediately. | - 0 0 11 | UINT16 R/W per. - | CANopen 3026:6ₕ Modbus 9740 Profibus 9740 CIP 138.1.6 ModbusTCP 9740 EtherCAT 3026:6ₕ PROFINET 9740 |
| *GEARselect* | Gear ratio selection. Switches between two gear ratios: Value 0: Use gear ratio defined by parameter GEARratio Value 1: Use gear ratio from parameters GEARnum2/GEARdenom2 Modified settings become active immediately. | - 0 0 1 | UINT16 R/W - - | CANopen 3026:Eₕ Modbus 9756 Profibus 9756 CIP 138.1.14 ModbusTCP 9756 EtherCAT 3026:Eₕ PROFINET 9756 |
| *GEARnum* | Numerator of gear ratio. Gear ratio = GEARnum / GEARdenom The new gear ratio is applied when the numerator value is supplied. Modified settings become active immediately. | - -2147483648 1 2147483647 | INT32 R/W per. - | CANopen 3026:4ₕ Modbus 9736 Profibus 9736 CIP 138.1.4 ModbusTCP 9736 EtherCAT 3026:4ₕ PROFINET 9736 |
| *GEARdenom* | Denominator of gear ratio. See description GEARnum | - 1 1 2147483647 | INT32 R/W per. - | CANopen 3026:3ₕ Modbus 9734 Profibus 9734 CIP 138.1.3 ModbusTCP 9734 EtherCAT 3026:3ₕ PROFINET 9734 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *GEARnum2* | Numerator of gear ratio number 2. Gear ratio = GEARnum2 / GEARdenom2 The new gear ratio is applied when the numerator value is supplied. Modified settings become active immediately. | - -2147483648 1 2147483647 | INT32 R/W per. - | CANopen 3026:D$_h$ Modbus 9754 Profibus 9754 CIP 138.1.13 ModbusTCP 9754 EtherCAT 3026:D$_h$ PROFINET 9754 |
| *GEARdenom2* | Denominator of gear ratio number 2. See description GEARnum | - 1 1 2147483647 | INT32 R/W per. - | CANopen 3026:C$_h$ Modbus 9752 Profibus 9752 CIP 138.1.12 ModbusTCP 9752 EtherCAT 3026:C$_h$ PROFINET 9752 |

## Selection of the Method

The method specifies the way the movement is to be performed.

- In local control mode, set the desired method with the parameter *IO_GEARmethod*.
- In fieldbus control mode, set the desired method with the parameter *GEARreference*.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *GEARreference* | Synchronization method for operating mode Electronic Gear. **0 / Deactivated**: Deactivated **1 / Position Synchronization Immediate**: Position synchronization without compensation movement **2 / Position Synchronization Compensated**: Position synchronization with compensation movement **3 / Velocity Synchronization**: Velocity synchronization Modified settings become active immediately. | - 0 0 3 | UINT16 R/W - - | CANopen 301B:12$_h$ Modbus 6948 Profibus 6948 CIP 127.1.18 ModbusTCP 6948 EtherCAT 301B:12$_h$ PROFINET 6948 |

## Position Change with Power Stage Disabled

If the method "Synchronization With Compensation Movement" is selected, the parameter *GEARposChgMode* determines the way changes to the motor position and to the reference value signals are handled with disabled power stage.

Position changes can be ignored or taken into account during a transition to operating state **6** Operation Enabled.

- • Off: Position changes with disabled power stage are ignored.
- • On: Position changes with disabled power stage are taken into account.

    Position changes between starting the operating mode and the subsequent enabling of the power stage are not taken into account.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *GEARposChgMode* | Treatment of position changes with inactive power stage.<br><br>**0 / Off**: Position changes in states with disabled power stage are ignored.<br><br>**1 / On**: Position changes in states with disabled power stage are taken into account.<br><br>This setting has an effect only if gear processing is started in the mode 'Synchronization with compensation movement'.<br><br>Modified settings become active the next time the power stage is enabled. | -<br>0<br>0<br>1 | UINT16<br>R/W<br>per.<br>- | CANopen 3026:B$_h$<br>Modbus 9750<br>Profibus 9750<br>CIP 138.1.11<br>ModbusTCP 9750<br>EtherCAT 3026:B$_h$<br>PROFINET 9750 |

# Offset Movement

The offset movement allows you to perform a movement with a parameterizable number of increments.

Offset movements are only available for the methods "Position Synchronization Without Compensation Movement" and "Position Synchronization With Compensation Movement".

Two parameterizable offset positions are available. The parameters *OFSp_RelPos1* and *OFSp_RelPos2* are used to set the offset positions.

In local control mode, an offset movement is started via a signal input.

In fieldbus control mode, an offset movement is started via a signal input or via the fieldbus.

In order to start offset movements via the signal input, you must first parameterize the signal input functions "Gear Offset 1" and "Gear Offset 2", see Digital Signal Inputs and Digital Signal Outputs, page 199.

The velocity and the acceleration for the offset movement are set via the parameters *OFSv_target* and *OFS_Ramp*.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *OFSp_RelPos1* | Relative offset position 1 for offset movement. Modified settings become active immediately. | Inc -2147483648 0 2147483647 | INT32 R/W per. - | CANopen 3027:8$_h$ Modbus 10000 Profibus 10000 CIP 139.1.8 ModbusTCP 10000 EtherCAT 3027:8$_h$ PROFINET 10000 |
| *OFSp_RelPos2* | Relative offset position 2 for offset movement. Modified settings become active immediately. | Inc -2147483648 0 2147483647 | INT32 R/W per. - | CANopen 3027:A$_h$ Modbus 10004 Profibus 10004 CIP 139.1.10 ModbusTCP 10004 EtherCAT 3027:A$_h$ PROFINET 10004 |
| *OFS_PosActivate* | Offset movement with relative offset position. This parameter starts an offset movement with one of the relative offset positions specified by means of the parameters OFSp_RelPos1 and OFSp_RelPos2. Value 0: No offset movement Value 1: Start offset movement with relative offset position 1 (OFSp_RelPos1) Value 2: Start offset movement with relative offset position 2 (OFSp_RelPos2) Modified settings become active immediately. | - 0 0 3 | UINT16 R/W - - | CANopen 3027:B$_h$ Modbus 10006 Profibus 10006 CIP 139.1.11 ModbusTCP 10006 EtherCAT 3027:B$_h$ PROFINET 10006 |
| *OFSv_target* | Target velocity for offset movement. The maximum value is 5000 if the user-defined scaling factor of the velocity scaling is 1. This applies to the user-defined scaling factors. Example: If the user-defined scaling factor of the velocity scaling is 2 (ScaleVELnum = 2, ScaleVELdenom = 1), the maximum value is 2500. Modified settings become active immediately. | usr_v 1 60 2147483647 | UINT32 R/W per. - | CANopen 3027:4$_h$ Modbus 9992 Profibus 9992 CIP 139.1.4 ModbusTCP 9992 EtherCAT 3027:4$_h$ PROFINET 9992 |
| *OFS_Ramp* | Acceleration and deceleration for offset movement. Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. | usr_a 1 600 2147483647 | UINT32 R/W per. - | CANopen 3027:6$_h$ Modbus 9996 Profibus 9996 CIP 139.1.6 ModbusTCP 9996 EtherCAT 3027:6$_h$ PROFINET 9996 |

# Changing the Motion Profile for the Velocity

If the method "Velocity Synchronization" is selected, the motion profile for the velocity can be changed.

It is possible to change the parameterization of the motion profile for the velocity, see .

# Velocity Limitation

As of firmware version ≥V01.10 a velocity limitation can be activated for the methods "Positions synchronization without compensation movement" and "Positions synchronisation with compensation movement".

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *GEARpos_v_max* | Velocity limitation for the method Position Synchronization. Value 0: No velocity limitation Value >0: Velocity limitation in usr_v Modified settings become active immediately. Available with firmware version ≥V01.10. | usr_v 0 0 2147483647 | UINT32 R/W per. - | CANopen 3026:9$_h$ Modbus 9746 Profibus 9746 CIP 138.1.9 ModbusTCP 9746 EtherCAT 3026:9$_h$ PROFINET 9746 |

# Release of Direction

Release of direction allows you to limit movements to positive or negative direction. Release of direction is set with the parameter *GEARdir_enabl*.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *GEARdir_enabl* | Enabled direction of movement for operating mode Electronic Gear. **1 / Positive**: Positive direction **2 / Negative**: Negative direction **3 / Both**: Both directions This allows you to activate a return movement lock function. Modified settings become active immediately. | - 1 3 3 | UINT16 R/W per. - | CANopen 3026:5$_h$ Modbus 9738 Profibus 9738 CIP 138.1.5 ModbusTCP 9738 EtherCAT 3026:5$_h$ PROFINET 9738 |

# Additional Settings

# Overview

The following functions can be used for target value processing:

- Jerk Limitation, page 319

    This function is only available for the methods "Position Synchronization Without Compensation Movement" and "Position Synchronization With Compensation Movement".

- Stopping Movement with Halt, page 320

- Stopping Movement with Quick Stop, page 322

- Limitation of the Velocity via Signal Inputs, page 324

- Limitation of the Current via Signal Inputs, page 327

- Zero Clamp, page 330

    This function is only available with the method "Velocity Synchronization".

- Setting a Signal Output via Parameter, page 331

- Position Capture via Signal Input (Vendor-Specific Profile), page 331

- Position Capture via Signal Input (DS402 Profile), page 338

- Relative Movement After Capture (RMAC), page 343

The following functions can be used for monitoring the movement:

- Limit Switches, page 350

- Software Limit Switches, page 352

- Load-Dependent Position Deviation (Following Error), page 354

    This function is only available for the methods "Position Synchronization Without Compensation Movement" and "Position Synchronization With Compensation Movement".

- Motor Standstill and Direction of Movement, page 358

- Velocity Window, page 360

    This function is only available with the method "Velocity Synchronization".

- Position Register, page 363

- Position Deviation Window, page 371

    This function is only available for the methods "Position Synchronization Without Compensation Movement" and "Position Synchronization With Compensation Movement".

- Velocity Deviation Window, page 373

    This function is only available with the method "Velocity Synchronization".

- Velocity Threshold Value, page 375

- Current Threshold Value, page 376

# Operating Mode Profile Torque

## Overview

### Availability

See Control Mode, page 182.

## Description

In the operating mode Profile Torque, a movement is made with a specified target torque.

In local control mode, the torque can be set via the following interface:

- Target torque via analog inputs (module IOM1)
- Reference current via PTI interface (with firmware version ≥V01.20)

In fieldbus control mode, the torque can be set via the following interface:

- Target torque via parameter
- Target torque via analog inputs (module IOM1)
- Reference current via PTI interface (with firmware version ≥V01.20)

Without a proper limit value, the motor can reach an unintentionally high velocity in this operating mode.

---

### ⚠ WARNING

**UNINTENTIONALLY HIGH VELOCITY**

Verify that the parameterized velocity limitation is appropriate for the motor.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

---

## Starting the Operating Mode

In local control mode, the operating mode must first have been selected, see Starting and Changing an Operating Mode, page 245. After the power stage is enabled, the operating mode is started automatically.

The power stage is enabled via the signal inputs. The table below provides an overview of the factory settings of the signal inputs:

| Signal input | Signal input function |
|---|---|
| DI0 | "Enable"<br><br>Enable and disable the power stage |
| DI1 | "Fault Reset"<br><br>Resetting an error message |
| DI2 | "Operating Mode Switch"<br><br>See Starting and Changing an Operating Mode, page 245 |
| DI3 | "Velocity Limitation"<br><br>See Limitation of the Velocity via Signal Inputs, page 324 |
| DI4 | "Current Limitation"<br><br>See Limitation of the Current via Signal Inputs, page 327 |
| DI5 | "Halt"<br><br>See Stopping Movement with Halt, page 320 |

The factory settings of the signal inputs depend on the selected operating mode; they can be adapted, see Digital Signal Inputs and Digital Signal Outputs, page 199.

In fieldbus control mode, the operating mode is started via the fieldbus. See the fieldbus user guides for a description.

## Status Messages

In local control mode, information on the operating state and the ongoing movement is available via signal outputs.

In fieldbus control mode, information on the operating state and the ongoing movement is available via the fieldbus and the signal outputs.

Descriptions on obtaining information on the operating state and the ongoing movement can be found in the fieldbus user guides.

The table below provides an overview of the signal outputs:

| Signal output | Signal output function |
|---|---|
| DQ0 | "No Fault"<br><br>Signals the operating states **4** Ready To Switch On, **5** Switched On and **6** Operation Enabled |
| DQ1 | "Active"<br><br>Signals the operating state **6** Operation Enabled |
| DQ2 | With local control mode:<br><br>"Current Below Threshold"<br><br>See Current Threshold Value, page 376<br><br>With fieldbus control mode:<br><br>"Freely Available"<br><br>See Setting a Signal Output via Parameter, page 331 |

The factory settings of the signal outputs depend on the selected control mode and the selected operating mode; they can be adapted, see Digital Signal Inputs and Digital Signal Outputs, page 199.

# Terminating the Operating Mode
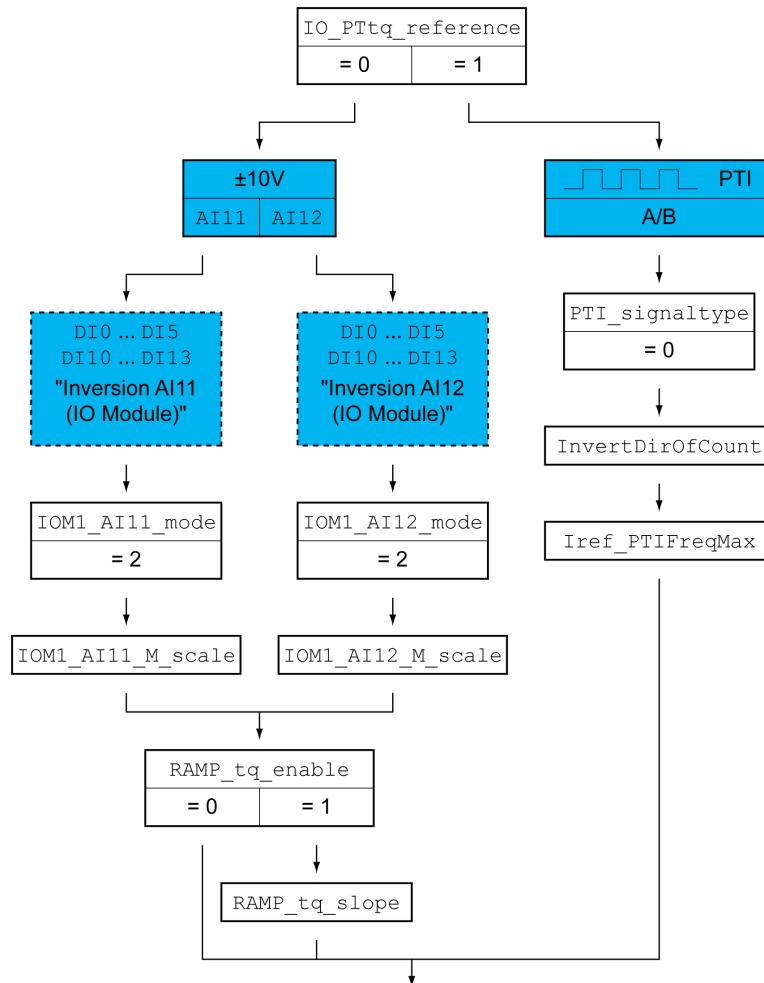
The operating mode is terminated when the motor is at a standstill and one of the following conditions is met:

- Stop caused by "Halt" or "Quick Stop"
- Stop caused by a detected error

# Parameterization

## Overview

The illustration below provides an overview of the parameters that can be adjusted in local control mode.



The illustration below provides an overview of the parameters that can be adjusted in fieldbus control mode.

```
                          ┌──────────────────────────┐
                          │      PTtq_reference       │
                          ├────────┬────────┬─────────┤
                          │  = 1   │  = 2   │   = 3   │
                          └────────┴────────┴─────────┘
```

```
┌──────────────┐      ┌──────────────┐              ┌──────────────┐
│ PTtq_target  │      │    ±10V      │  PTI         │     PTI      │
└──────────────┘      ├──────┬───────┤              ├──────────────┤
                      │ AI11 │ AI12  │              │     A/B      │
                      └──────┴───────┘              └──────────────┘
```

±10V / AI11 / AI12

```
┌──────────────────┐   ┌──────────────────┐      ┌──────────────────┐
│ DI0 ... DI5      │   │ DI0 ... DI5      │      │  PTI_signaltype  │
│ DI10 ... DI13    │   │ DI10 ... DI13    │      ├──────────────────┤
│ "Inversion AI11  │   │ "Inversion AI12  │      │       = 0        │
│  (IO Module)"    │   │  (IO Module)"    │      └──────────────────┘
└──────────────────┘   └──────────────────┘
```

```
┌──────────────────┐   ┌──────────────────┐      ┌──────────────────┐
│  IOM1_AI11_mode  │   │  IOM1_AI12_mode  │      │ InvertDirOfCount │
├──────────────────┤   ├──────────────────┤      └──────────────────┘
│       = 2        │   │       = 2        │
└──────────────────┘   └──────────────────┘
```

```
┌────────────────────┐ ┌────────────────────┐    ┌──────────────────┐
│ IOM1_AI11_M_scale  │ │ IOM1_AI12_M_scale  │    │  Iref_PTIFreqMax │
└────────────────────┘ └────────────────────┘    └──────────────────┘
```

```
              ┌──────────────────────────┐
              │     RAMP_tq_enable        │
              ├────────────┬─────────────┤
              │    = 0     │    = 1      │
              └────────────┴─────────────┘
```

```
                 ┌──────────────────────┐
                 │    RAMP_tq_slope     │
                 └──────────────────────┘
```

# Setting the Source of the Reference Value

In local control mode, the parameter *IO_PTtq_reference* is used to set the source of the reference value.

In fieldbus control mode, the parameter *PTtq_reference* is used to set the source of the reference value.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IO_PTtq_reference* ⌐ □ ∩ F → A ⌐ G - ⌐ □ ⊢ 9 | Reference value source for operating mode Profile Torque. **0 / Analog Input /** ⌐ A ∩ A: Reference value via analog input **1 / PTI Interface /** ⌐ P ⊢ ⌐: Reference value via PTI interface Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. Available with firmware version ≥V01.20. | - 0 0 1 | UINT16 R/W per. - | CANopen 3005:38ₕ Modbus 1392 Profibus 1392 CIP 105.1.56 ModbusTCP 1392 EtherCAT 3005:38ₕ PROFINET 1392 |
| *PTtq_reference* | Reference value source for operating mode Profile Torque. **0 / None**: None **1 / Parameter 'PTtq_target'**: Reference value via parameter PTtq_target **2 / Analog Input**: Reference value via analog input **3 / PTI Interface**: Reference value via PTI interface Modified settings become active immediately. Available with firmware version ≥V01.10. | - 0 1 3 | UINT16 R/W - - | CANopen 301B:38ₕ Modbus 7024 Profibus 7024 CIP 127.1.56 ModbusTCP 7024 EtherCAT 301B:38ₕ PROFINET 7024 |

## Offset and Zero Voltage Window (for Analog Inputs Only)

It is possible to change the development of the target value with reference to the ±10V input value:

- Parameterization of an offset
- Parameterization of a zero voltage window

Refer to the user guide for the module IOM1 for settings for the analog inputs.

## Setting the Type of Usage (for Analog Inputs Only)

The parameters *IOM1_AI11_mode* and *IOM1_AI12_mode* let you select the type of usage of the analog signal inputs.

- If you want to use the analog signal input *AI11*, set the parameter *IOM1_AI11_mode* to the value "Target Torque".
- If you want to use the analog signal input *AI12*, set the parameter *IOM1_AI12_mode* to the value "Target Torque".

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOM1_AI11_mode*<br><br>$ConF → i-o-$<br><br>$AI1u$ | IOM1 Type of usage of AI11.<br><br>**0 / None /** $nonE$ : No function<br><br>**1 / Target Velocity /** $SPdS$ : Target velocity for the velocity controller<br><br>**2 / Target Torque /** $trqS$ : Target torque for the current controller<br><br>**3 / Velocity Limitation /** $LSPd$ : Limitation of the reference velocity for the velocity controller<br><br>**4 / Current Limitation /** $Lcur$ : Limitation of the reference current for the current controller<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.06. | -<br><br>0<br><br>1<br><br>4 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 304F:Eh<br><br>Modbus 20252<br><br>Profibus 20252<br><br>CIP 179.1.14<br><br>ModbusTCP 20252<br><br>EtherCAT 304F:Eh<br><br>PROFINET 20252 |
| *IOM1_AI12_mode*<br><br>$ConF → i-o-$<br><br>$AI2u$ | IOM1 Type of usage of AI12.<br><br>**0 / None /** $nonE$ : No function<br><br>**1 / Target Velocity /** $SPdS$ : Target velocity for the velocity controller<br><br>**2 / Target Torque /** $trqS$ : Target torque for the current controller<br><br>**3 / Velocity Limitation /** $LSPd$ : Limitation of the reference velocity for the velocity controller<br><br>**4 / Current Limitation /** $Lcur$ : Limitation of the reference current for the current controller<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.06. | -<br><br>0<br><br>0<br><br>4 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 304F:13h<br><br>Modbus 20262<br><br>Profibus 20262<br><br>CIP 179.1.19<br><br>ModbusTCP 20262<br><br>EtherCAT 304F:13h<br><br>PROFINET 20262 |

## Setting the Target Torque (for Analog Inputs Only)

The parameters *IOM1_AI11_M_scale* and *IOM1_AI12_M_scale* let you set the target torque for a voltage value of 10 V.

- If you want to use the analog signal input *AI11*, use the parameter *IOM1_AI11_M_scale* to set the desired target torque for a voltage value of 10 V.
- If you want to use the analog signal input *AI12*, use the parameter *IOM1_AI12_M_scale* to set the desired target torque for a voltage value of 10 V.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOM1_AI11_M_scale* ⊏ o п F → ı - o - ʏ ı ı ʏ | IOM1 Target torque at 10 V in operating mode Profile Torque of AI11. 100.0 % correspond to the continuous stall torque _M_M_0. By using a negative sign, you can invert the evaluation of the analog signal. In increments of 0.1 %. Modified settings become active immediately. Available with firmware version ≥V01.06. | % -3000.0 100.0 3000.0 | INT16 R/W per. - | CANopen 304F:12ₕ Modbus 20260 Profibus 20260 CIP 179.1.18 ModbusTCP 20260 EtherCAT 304F:12ₕ PROFINET 20260 |
| *IOM1_AI12_M_scale* ⊏ o п F → ı - o - ʏ ı 2 ı | IOM1 Target torque at 10 V in operating mode Profile Torque of AI12. 100.0 % correspond to the continuous stall torque _M_M_0. By using a negative sign, you can invert the evaluation of the analog signal. In increments of 0.1 %. Modified settings become active immediately. Available with firmware version ≥V01.06. | % -3000.0 100.0 3000.0 | INT16 R/W per. - | CANopen 304F:17ₕ Modbus 20270 Profibus 20270 CIP 179.1.23 ModbusTCP 20270 EtherCAT 304F:17ₕ PROFINET 20270 |

## Setting the Target Torque (for Parameter Only)

In fieldbus control mode, the parameter *PTtq_target* is used to set the target torque.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PTtq_target* | Target torque. 100.0 % correspond to the continuous stall torque _M_M_0. In increments of 0.1 %. Modified settings become active immediately. | % -3000.0 0.0 3000.0 | INT16 R/W - - | CANopen 6071:0ₕ Modbus 6944 Profibus 6944 CIP 127.1.16 ModbusTCP 6944 EtherCAT 6071:0ₕ PROFINET 6944 |

## Changing the Motion Profile for the Torque (for Analog Inputs and Parameter Only)

It is possible to change the parameterization of the motion profile for the torque.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *RAMP_tq_enable* | Activation of the motion profile for torque. **0 / Profile Off**: Profile off **1 / Profile On**: Profile on In the operating mode Profile Torque, the motion profile for torque can be activated or deactivated. In the other operating modes, the motion profile for torque is inactive. Setting can only be modified if power stage is disabled. Modified settings become active immediately. | - 0 1 1 | UINT16 R/W per. - | CANopen 3006:2C$_h$ Modbus 1624 Profibus 1624 CIP 106.1.44 ModbusTCP 1624 EtherCAT 3006:2C$_h$ PROFINET 1624 |
| *RAMP_tq_slope* | Slope setting of the motion profile for torque. 100.00 % of the torque setting correspond to the continuous stall torque _M_M_0. Example: A ramp setting of 10000.00 %/s results in a torque change of 100.0% of _M_M_0 in 0.01s. In increments of 0.1 %/s. Modified settings become active immediately. | %/s 0.1 10000.0 3000000.0 | UINT32 R/W per. - | CANopen 6087:0$_h$ Modbus 1620 Profibus 1620 CIP 106.1.42 ModbusTCP 1620 EtherCAT 6087:0$_h$ PROFINET 1620 |

## Type of Reference Value Signal and Inversion of the Reference Value Signals (for PTI Interface Only)

The PTI interface can be set:

- Type of reference value signal (must be set to A/B signals)
- Inverting the reference value signals

See section for information on setting the PTI interface.

## Setting the Reference Current (for PTI Interface Only)

The parameter *Iref_PTIFreqMax* is used to set the reference current.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *Iref_PTIFreqMax* | Reference current for operating mode Profile Torque via PTI interface. Reference current corresponding to 1.6 million increments per second at the PTI interface for operating mode Profile Torque. In increments of 0.01 A$_{rms}$. Modified settings become active immediately. Available with firmware version ≥V01.20. | A$_{rms}$ 0.00 - 463.00 | UINT16 R/W per. - | CANopen 3020:4$_h$ Modbus 8200 Profibus 8200 CIP 132.1.4 ModbusTCP 8200 EtherCAT 3020:4$_h$ PROFINET 8200 |

# Additional Settings

## Overview

The following functions can be used for target value processing:

- Stopping Movement with Halt, page 320
- Stopping Movement with Quick Stop, page 322
- Limitation of the Velocity via Signal Inputs, page 324
- Limitation of the Current via Signal Inputs, page 327
- Setting a Signal Output via Parameter, page 331
- Position Capture via Signal Input (Vendor-Specific Profile), page 331
- Position Capture via Signal Input (DS402 Profile), page 338
- Relative Movement After Capture (RMAC), page 343

The following functions can be used for monitoring the movement:

- Limit Switches, page 350
- Software Limit Switches, page 352
- Motor Standstill and Direction of Movement, page 358
- Torque Window, page 359
- Position Register, page 363
- Velocity Threshold Value, page 375
- Current Threshold Value, page 376

# Operating Mode Profile Velocity

## Overview

### Availability

See Control Mode, page 182.

### Description

In the operating mode Profile Velocity, a movement is made with a specified target velocity.

### Starting the Operating Mode

In local control mode, the operating mode must first have been selected, see Starting and Changing an Operating Mode, page 245. After the power stage is enabled, the operating mode is started automatically.

The power stage is enabled via the signal inputs. The table below provides an overview of the factory settings of the signal inputs:

| Signal input | Signal input function |
|---|---|
| DI0 | "Enable"<br><br>Enable and disable the power stage |
| DI1 | "Fault Reset"<br><br>Resetting an error message |
| DI2 | "Operating Mode Switch"<br><br>See Starting and Changing an Operating Mode, page 245 |
| DI3 | "Velocity Limitation"<br><br>See Limitation of the Velocity via Signal Inputs, page 324 |
| DI4 | "Zero Clamp"<br><br>See Zero Clamp, page 330 |
| DI5 | "Halt"<br><br>See Stopping Movement with Halt, page 320 |

The factory settings of the signal inputs depend on the selected operating mode; they can be adapted, see Digital Signal Inputs and Digital Signal Outputs, page 199.

In the case of fieldbus control mode, the operating mode is started via the fieldbus. See the fieldbus user guides for a description.

### Status Messages

In local control mode, information on the operating state and the ongoing movement is available via signal outputs.

In fieldbus control mode, information on the operating state and the ongoing movement is available via the fieldbus and the signal outputs.

Descriptions on obtaining information on the operating state and the ongoing movement can be found in the fieldbus user guides.

The table below provides an overview of the signal outputs:

| Signal output | Signal output function |
|---|---|
| *DQ0* | "No Fault"<br><br>Signals the operating states **4** Ready To Switch On, **5** Switched On and **6** Operation Enabled |
| *DQ1* | "Active"<br><br>Signals the operating state **6** Operation Enabled |
| *DQ2* | With local control mode:<br><br>"In Velocity Deviation Window"<br><br>See Velocity Deviation Window, page 373<br><br>With fieldbus control mode:<br><br>"Freely Available"<br><br>See Setting a Signal Output via Parameter, page 331 |

The factory settings of the signal outputs depend on the selected control mode and the selected operating mode; they can be adapted, see Digital Signal Inputs and Digital Signal Outputs, page 199.

# Terminating the Operating Mode

The operating mode is terminated when the motor is at a standstill and one of the following conditions is met:

- Stop caused by "Halt" or "Quick Stop"
- Stop caused by a detected error

# Parameterization

## Overview

The illustration below provides an overview of the parameters that can be adjusted in local control mode.

```
                            ┌──────────┐
                            │   ±10V   │
                            │   AI11   │
                            │  (AI12)  │
                            └──────────┘
                                  │
                                  ▼
┌──────────────┐         ┌─────────────────────────────┐
│ DI0 ... DI5  │ ─ ─ ►   │  "Inversion AI11 (IO Module)"│
│ DI10 ... DI13│         │ ("Inversion AI12 (IO Module)")│
└──────────────┘         └─────────────────────────────┘
                                  │
                                  ▼
                         ┌─────────────────────┐
                         │   IOM1_AI11_mode     │
                         │  (IOM1_AI12_mode)    │
                         ├─────────────────────┤
                         │         = 1          │
                         └─────────────────────┘
                                  │
                                  ▼
                         ┌─────────────────────┐
                         │  IOM1_AI11_v_scale   │
                         │ (IOM1_AI12_v_scale)  │
                         └─────────────────────┘
                                  │
                                  ▼
                         ┌─────────────────────┐
                         │   RAMP_v_enable      │
                         ├──────────┬──────────┤
                         │   = 0    │   = 1    │
                         └──────────┴──────────┘
                              │          │
                              │          ▼
                              │    ┌─────────────┐
                              │    │ RAMP_v_acc  │
                              │    │ RAMP_v_dec  │
                              │    │ RAMP_v_max  │
                              │    └─────────────┘
                              │          │
                              └──────────┤
                                         ▼
```

The illustration below provides an overview of the parameters that can be adjusted in fieldbus control mode.

## Setting the Type of Usage

In local control mode, the parameters *IOM1_AI11_mode* and *IOM1_AI12_mode* let you select the type of usage of the analog signal inputs.

- If you want to use the analog signal input *AI1*, set the parameter *IOM1_AI11_mode* to the value "Target Velocity".

- If you want to use the analog signal input *AI2*, set the parameter *IOM1_AI12_mode* to the value "Target Velocity".

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOM1_AI11_mode*<br><br>ConF → i-o-<br><br>AI1u | IOM1 Type of usage of AI11.<br><br>0 / **None** / nonE : No function<br><br>1 / **Target Velocity** / SPdS : Target velocity for the velocity controller<br><br>2 / **Target Torque** / trqS : Target torque for the current controller<br><br>3 / **Velocity Limitation** / LSPd : Limitation of the reference velocity for the velocity controller<br><br>4 / **Current Limitation** / Lcur : Limitation of the reference current for the current controller<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.06. | -<br><br>0<br><br>1<br><br>4 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 304F:E$_h$<br><br>Modbus 20252<br><br>Profibus 20252<br><br>CIP 179.1.14<br><br>ModbusTCP 20252<br><br>EtherCAT 304F:E$_h$<br><br>PROFINET 20252 |
| *IOM1_AI12_mode*<br><br>ConF → i-o-<br><br>AI2u | IOM1 Type of usage of AI12.<br><br>0 / **None** / nonE : No function<br><br>1 / **Target Velocity** / SPdS : Target velocity for the velocity controller<br><br>2 / **Target Torque** / trqS : Target torque for the current controller<br><br>3 / **Velocity Limitation** / LSPd : Limitation of the reference velocity for the velocity controller<br><br>4 / **Current Limitation** / Lcur : Limitation of the reference current for the current controller<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.06. | -<br><br>0<br><br>0<br><br>4 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 304F:13$_h$<br><br>Modbus 20262<br><br>Profibus 20262<br><br>CIP 179.1.19<br><br>ModbusTCP 20262<br><br>EtherCAT 304F:13$_h$<br><br>PROFINET 20262 |

## Setting the Target Velocity

In local control mode, the parameters *IOM1_AI11_v_scale* and *IOM1_AI12_v_scale* are used to set the target velocity for a voltage value of 10 V.

- If you want to use the analog signal input *AI11*, use the parameter *IOM1_AI11_v_scale* to set the desired target velocity for a voltage value of 10 V.
- If you want to use the analog signal input *AI12*, use the parameter *IOM1_AI12_v_scale* to set the desired target velocity for a voltage value of 10 V.

In fieldbus control mode, use the parameter *PVv_reference* to specify whether the target velocity is set via the parameter *PVv_target* or via an analog signal input.

- If you want to use the parameter *PVv_target*, set the parameter *PVv_reference* to the value "Parameter 'PVv_target'". Set the target velocity with the parameter *PVv_target*.
- If you want to use the analog signal input *AI11*, set the parameter *PVv_reference* to the value "Analog Input". Set the desired target velocity for a voltage value of 10 V with the parameter *IOM1_AI11_v_scale*.
- If you want to use the analog signal input *AI12*, set the parameter *PVv_reference* to the value "Analog Input". Set the desired target velocity for a voltage value of 10 V with the parameter *IOM1_AI12_v_scale*.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PVv_reference* | Reference value source for operating mode Profile Velocity.<br><br>**0 / None**: None<br><br>**1 / Parameter 'PVv_target'**: Reference value via parameter PVv_target<br><br>**2 / Analog Input**: Reference value via analog input<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.10. | -<br>0<br>1<br>2 | UINT16<br>R/W<br>-<br>- | CANopen 301B:39$_h$<br>Modbus 7026<br>Profibus 7026<br>CIP 127.1.57<br>ModbusTCP 7026<br>EtherCAT 301B:39$_h$<br>PROFINET 7026 |
| *IOM1_AI11_v_scale* | IOM1 Target velocity at 10 V in operating mode Profile Velocity of AI11.<br><br>The maximum velocity is limited to the setting in CTRL_v_max.<br><br>By using a negative sign, you can invert the evaluation of the analog signal.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.06. | usr_v<br>-2147483648<br>6000<br>2147483647 | INT32<br>R/W<br>per.<br>- | CANopen 304F:11$_h$<br>Modbus 20258<br>Profibus 20258<br>CIP 179.1.17<br>ModbusTCP 20258<br>EtherCAT 304F:11$_h$<br>PROFINET 20258 |
| *IOM1_AI12_v_scale* | IOM1 Target velocity at 10 V in operating mode Profile Velocity of AI12.<br><br>The maximum velocity is limited to the setting in CTRL_v_max.<br><br>By using a negative sign, you can invert the evaluation of the analog signal.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.06. | usr_v<br>-2147483648<br>6000<br>2147483647 | INT32<br>R/W<br>per.<br>- | CANopen 304F:16$_h$<br>Modbus 20268<br>Profibus 20268<br>CIP 179.1.22<br>ModbusTCP 20268<br>EtherCAT 304F:16$_h$<br>PROFINET 20268 |
| *PVv_target* | Target velocity.<br><br>The target velocity is limited to the setting in CTRL_v_max and RAMP_v_max.<br><br>Modified settings become active immediately. | usr_v<br>-<br>0<br>- | INT32<br>R/W<br>-<br>- | CANopen 60FF:0$_h$<br>Modbus 6938<br>Profibus 6938<br>CIP 127.1.13<br>ModbusTCP 6938<br>EtherCAT 60FF:0$_h$<br>PROFINET 6938 |

## Changing the Motion Profile for the Velocity

It is possible to change the parameterization of the Motion Profile for the Velocity, page 317.

# Additional Settings

## Overview

The following functions can be used for target value processing:
- Stopping Movement with Halt, page 320
- Stopping Movement with Quick Stop, page 322

- Limitation of the Velocity via Signal Inputs, page 324
- Limitation of the Current via Signal Inputs, page 327
- Zero Clamp, page 330
- Setting a Signal Output via Parameter, page 331
- Position Capture via Signal Input (Vendor-Specific Profile), page 331
- Position Capture via Signal Input (DS402 Profile), page 338
- Relative Movement After Capture (RMAC), page 343

The following functions can be used for monitoring the movement:

- Limit Switches, page 350
- Software Limit Switches, page 352
- Motor Standstill and Direction of Movement, page 358
- Velocity Window, page 360
- Position Register, page 363
- Velocity Deviation Window, page 373
- Velocity Threshold Value, page 375
- Current Threshold Value, page 376

# Operating Mode Profile Position

## Overview

### Availability

See Control Mode, page 182.

### Description
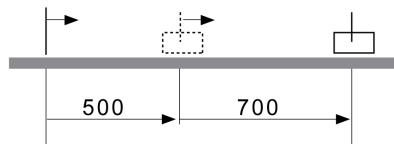
In the operating mode Profile Position, a movement to a desired target position is performed.

A movement can be made using one of 2 methods:

- Relative movement
- Absolute movement
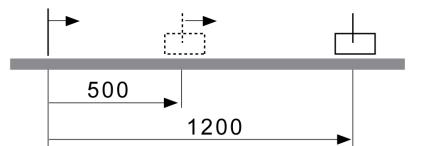
### Relative Movement

In the case of a relative movement, the movement is relative with reference to the previous target position or the actual position of the motor.



### Absolute Movement

In the case of an absolute movement, the movement is absolute with reference to the zero point.



A zero point must be defined with the operating mode Homing prior to the first absolute movement.

## Starting the Operating Mode

The operating mode is started via the fieldbus. See the fieldbus user guides for a description.

## Status Messages

Information on the operating state and the ongoing movement is available via the fieldbus and the signal outputs.

Descriptions on obtaining information on the operating state and the ongoing movement can be found in the fieldbus user guides.

The table below provides an overview of the signal outputs:

| Signal output | Signal output function |
|---|---|
| *DQ0* | "No Fault"<br><br>Signals the operating states **4** Ready To Switch On, **5** Switched On and **6** Operation Enabled |
| *DQ1* | "Active"<br><br>Signals the operating state **6** Operation Enabled |
| *DQ2* | "Freely Available"<br><br>See Setting a Signal Output via Parameter, page 331 |

It is possible to change the factory settings of the signal outputs, see Digital Signal Inputs and Digital Signal Outputs, page 199.

### Terminating the Operating Mode

The operating mode is terminated when the motor is at a standstill and one of the following conditions is met:

- Target position reached
- Stop caused by "Halt" or "Quick Stop"
- Stop caused by a detected error

# Parameterization

## Overview

The illustration below provides an overview of the adjustable parameters.

Overview of adjustable parameters



## Target Position

The parameter *PPp_target* allows you to set the target position.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PPp_target* | Target position for operating mode Profile Position.<br><br>Minimum/maximum values depend on:<br><br>- Scaling factor<br><br>- Software limit switches (if they are activated)<br><br>Modified settings become active immediately. | usr_p<br><br>-<br><br>-<br><br>- | INT32<br><br>R/W<br><br>-<br><br>- | CANopen 607A:$0_h$<br><br>Modbus 6940<br><br>Profibus 6940<br><br>CIP 127.1.14<br><br>ModbusTCP 6940<br><br>EtherCAT 607A:$0_h$<br><br>PROFINET 6940 |

## Target Velocity

The parameter *PPv_target* allows you to set the target velocity.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PPv_target* | Target velocity for operating mode Profile Position.<br><br>The target velocity is limited to the setting in CTRL_v_max and RAMP_v_max.<br><br>Modified settings become active the next time the motor moves. | usr_v<br><br>1<br><br>60<br><br>4294967295 | UINT32<br><br>R/W<br><br>-<br><br>- | CANopen 6081:$0_h$<br><br>Modbus 6942<br><br>Profibus 6942<br><br>CIP 127.1.15<br><br>ModbusTCP 6942<br><br>EtherCAT 6081:$0_h$<br><br>PROFINET 6942 |

## Selection of the Method

The parameter *PPoption* allows you to set the method for a relative movement.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PPoption* | Options for operating mode Profile Position.<br><br>Determines the reference position for relative positioning:<br><br>0: Relative with reference to the previous target position of the profile generator<br><br>1: Not supported<br><br>2: Relative with reference to the actual position of the motor<br><br>Modified settings become active the next time the motor moves. | -<br><br>0<br><br>0<br><br>2 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 60F2:$0_h$<br><br>Modbus 6960<br><br>Profibus 6960<br><br>CIP 127.1.24<br><br>ModbusTCP 6960<br><br>EtherCAT 60F2:$0_h$<br><br>PROFINET 6960 |

# Changing the Motion Profile for the Velocity

It is possible to change the parameterization of the Motion Profile for the Velocity, page 317.

# Additional Settings

## Overview

The following functions can be used for target value processing:

- Jerk Limitation, page 319
- Stopping Movement with Halt, page 320
- Stopping Movement with Quick Stop, page 322
- Limitation of the Velocity via Signal Inputs, page 324
- Limitation of the Current via Signal Inputs, page 327
- Setting a Signal Output via Parameter, page 331
- Starting a Movement via a Signal Input, page 331
- Position Capture via Signal Input (Vendor-Specific Profile), page 331
- Position Capture via Signal Input (DS402 Profile), page 338
- Relative Movement After Capture (RMAC), page 343

The following functions can be used for monitoring the movement:

- Limit Switches, page 350
- Software Limit Switches, page 352
- Load-Dependent Position Deviation (Following Error), page 354
- Motor Standstill and Direction of Movement, page 358
- Standstill Window, page 361
- Position Register, page 363
- Position Deviation Window, page 371
- Velocity Deviation Window, page 373
- Velocity Threshold Value, page 375
- Current Threshold Value, page 376

# Operating Mode Interpolated Position

## Overview

### Availability

See Control Mode, page 182.

Available with firmware version ≥V01.08.

The operating mode is only possible with the CAN fieldbus.

### Description

In the operating mode Interpolated Position, movements are made to cyclically set reference positions.

The monitoring functions Heartbeat and Node Guarding cannot be used in this operating mode.
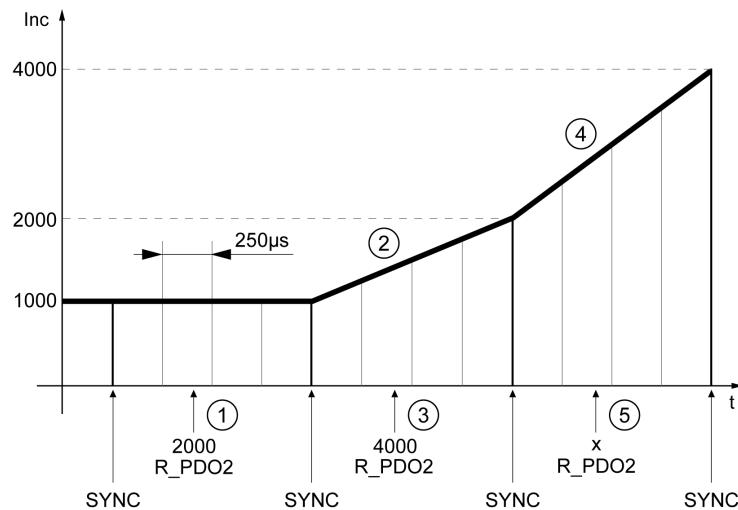
Verify cyclical reception of PDOs at the controller in order to detect an interruption of the connection.

The reference positions are transmitted synchronously with each cycle. The cycle time of a cycle can be set from 1 ... 20 ms.

The movement to the reference positions starts with the SYNC signal.

The drive performs an internal fine interpolation with a raster of 250 μs.

The illustration below provides an overview:



**1** Transmission of first reference position (example)

**2** Movement to first reference position

**3** Transmission of second reference position (example)

**4** Movement to second reference position

**5** Transmission of next reference position (example)

## Starting the Operating Mode

The operating mode is started via the fieldbus. See the fieldbus user guides for a description.

## Status Messages

Information on the operating state and the ongoing movement is available via the fieldbus and the signal outputs.

Descriptions on obtaining information on the operating state and the ongoing movement can be found in the fieldbus user guides.

The table below provides an overview of the signal outputs:

| Signal output | Signal output function |
|---|---|
| *DQ0* | "No Fault" <br><br> Signals the operating states **4** Ready To Switch On, **5** Switched On and **6** Operation Enabled |
| *DQ1* | "Active" <br><br> Signals the operating state **6** Operation Enabled |
| *DQ2* | "Freely Available" <br><br> See Setting a Signal Output via Parameter, page 331 |

It is possible to change the factory settings of the signal outputs, see Digital Signal Inputs and Digital Signal Outputs, page 199.

## Terminating the Operating Mode

The operating mode is terminated via the fieldbus. See the fieldbus user guides for a description.

# Parameterization

## Synchronization Mechanism

The synchronization mechanism must be activated for the operating mode Interpolated Position.

The synchronization mechanism is activated via the parameter *SyncMechStart* = 2.

The parameter *SyncMechTol* is used to set a synchronization tolerance. The value of the parameter *SyncMechTol* is internally multiplied by 250 µs. For example, a value of 4 corresponds to a tolerance of 1 ms.

The status of the synchronizations mechanism can be read by means of the parameter *SyncMechStatus*.

Activate the synchronization mechanism by means of the parameter *SyncMechStart*.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *SyncMechStart* | Activation of synchronization mechanism. Value 0: Deactivate synchronization mechanism Value 1: Activate synchronization mechanism (CANmotion). Value 2: Activate synchronization mechanism, standard CANopen mechanism. The cycle time of the synchronization signal is derived from the parameters intTimPerVal and intTimInd. Modified settings become active immediately. | - 0 0 2 | UINT16 R/W - - | CANopen 3022:5$_h$ Modbus 8714 Profibus 8714 CIP 134.1.5 ModbusTCP 8714 EtherCAT 3022:5$_h$ PROFINET 8714 |
| *SyncMechTol* | Synchronization tolerance. The value is applied when the synchronization mechanism is activated via the parameter SyncMechStart. Modified settings become active immediately. Available with firmware version ≥V01.08. | - 1 1 20 | UINT16 R/W - - | CANopen 3022:4$_h$ Modbus 8712 Profibus 8712 CIP 134.1.4 ModbusTCP 8712 EtherCAT 3022:4$_h$ PROFINET 8712 |
| *SyncMechStatus* | Status of synchronization mechanism. Status of synchronization mechanism: Value 1: Synchronization mechanism of drive is inactive. Value 32: Drive is synchronizing with external sync signal. Value 64: Drive is synchronized with external sync signal. Available with firmware version ≥V01.08. | - - - - | UINT16 R/- - - | CANopen 3022:6$_h$ Modbus 8716 Profibus 8716 CIP 134.1.6 ModbusTCP 8716 EtherCAT 3022:6$_h$ PROFINET 8716 |

# Cycle Time

The cycle time is set via the parameters *IP_IntTimPerVal* and *IP_IntTimInd*.

The cycle time depends on the following factors:
- Number of drives
- Baud rate
- Time of the minimum data packets per cycle:
  ◦ SYNC
  ◦ R_PDO2, T_PDO2
  ◦ EMCY (This time must be reserved.)
- Optionally the time of the additional data packets per cycle:
  ◦ R_SDO and T_SDO

    The controller must make sure that the number of requests (R_SDO) and the cycle time match. The response (T_SDO) is transmitted with the next cycle.
  ◦ $n_{PDO}$ - additional R_PDO and T_PDO:

    R_PDO1, T_PDO1, R_PDO3, T_PDO3, R_PDO4 and T_PDO4

The table below shows the typical values for the individual data packets, depending on the baud rate:

| Data packets | Size in bytes | 1 Mbit | 500 kbit | 250 kbit |
|---|---|---|---|---|
| R_PDO2 | 6 | 0.114 ms | 0.228 ms | 0.456 ms |
| T_PDO2 | 6 | 0.114 ms | 0.228 ms | 0.456 ms |
| SYNC | 0 | 0.067 ms | 0.134 ms | 0.268 ms |
| EMCY | 8 | 0.130 ms | 0.260 ms | 0.520 ms |
| R_PDOx | 8 | 0.130 ms | 0.260 ms | 0.520 ms |
| T_PDOx | 8 | 0.130 ms | 0.260 ms | 0.520 ms |
| R_SDO and T_SDO | 16 | 0.260 ms | 0.520 ms | 1.040 ms |

In the case of one drive, the minimum cycle time is calculated as follows: $t_{cycle}$= SYNC + R_PDO2+ T_PDO2 + EMCY + SDO +$n_{PDO}$

The following table shows $t_{cycle}$ depending on the baud rate and the number of additional PDOs $n_{PDO}$, based on one drive:

| Number of additional PDOs ($n_{PDO}$) | Minimum cycle time at 1 Mbit | Minimum cycle time at 500 kbit | Minimum cycle time at 250 kbit |
|---|---|---|---|
| 0 | 1 ms | 2 ms | 3 ms |
| 1 | 1 ms | 2 ms | 3 ms |
| 2 | 1 ms | 2 ms | 4 ms |
| 3 | 2 ms | 2 ms | 4 ms |
| 4 | 2 ms | 3 ms | 5 ms |
| 5 | 2 ms | 3 ms | 5 ms |
| 6 | 2 ms | 3 ms | 6 ms |

Cycle time in seconds: $IP\_IntTimPerVal * 10^{IP\_IntTimInd}$

Set the desired cycle time with the parameters *IP_IntTimPerVal* and *IP_IntTimInd*.

Valid cycle times are 1 ... 20 ms in increments of 1 ms.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IP_IntTimPerVal* | Interpolation time period value. Available with firmware version ≥V01.08. * Datatype for CANopen: UINT8 | s 0 1 255 | UINT16* R/W - - | CANopen 60C2:1$_h$ Modbus 7000 Profibus 7000 CIP 127.1.44 ModbusTCP 7000 EtherCAT 60C2:1$_h$ PROFINET 7000 |
| *IP_IntTimInd* | Interpolation time index. Available with firmware version ≥V01.08. * Datatype for CANopen: INT8 | - -128 -3 63 | INT16* R/W - - | CANopen 60C2:2$_h$ Modbus 7002 Profibus 7002 CIP 127.1.45 ModbusTCP 7002 EtherCAT 60C2:2$_h$ PROFINET 7002 |

## Position Comparison

The drive cyclically processes the reference position as soon as bit 4 of the control word is set to 1. If the difference between reference position and actual position is too great, a position deviation error (following error) is detected. To help avoid such an error, the actual position must be read via the parameter _p_act before the operating mode is activated or continued. New reference positions must correspond to the actual position in the first cycle.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _p_act | Actual position. | usr_p - - - | INT32 R/- - - | CANopen 6064:0$_h$ Modbus 7706 Profibus 7706 CIP 130.1.13 ModbusTCP 7706 EtherCAT 6064:0$_h$ PROFINET 7706 |

## Reference Position

The parameter *IPp_target* cyclically transmits a reference value.

Set the desired reference value with the parameter *IPp_target*.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| IPp_target | Position reference value for operating mode Interpolated Position. Available with firmware version ≥V01.08. | - -2147483648 - 2147483647 | INT32 R/W - - | CANopen 60C1:1$_h$ Modbus 7004 Profibus 7004 CIP 127.1.46 ModbusTCP 7004 EtherCAT 60C1:1$_h$ PROFINET 7004 |

# Operating Mode Homing

## Overview

### Availability

See Control Mode, page 182.

### Description

In the operating mode Homing, a reference is generated between a mechanical position and the actual position of the motor.

A reference between a mechanical position and the actual position of the motor is generated by means of a reference movement or by means of position setting.

A successful reference movement or position setting homes the motor and the zero point becomes valid.

The zero point of the movement range is the point of reference for absolute movements in the operating modes Profile Position and Motion Sequence.

### Methods

Different methods are available:

- Reference movement to a limit switch

  In the case of a reference movement to a limit switch, a movement to the negative limit switch or the positive limit switch is performed.

  When the limit switch is reached, the movement is stopped and then a movement is made back to the switching point of the limit switch.

  From the switching point of the limit switch, a movement is made to the next index pulse of the motor or to a parameterizable distance from the switching point.

  The position of the index pulse or the position of the parameterizable distance from the switching point is the reference point.

- Reference movement to the reference switch

  In the case of a reference movement to the reference switch, a movement to the reference switch is performed.

  When the reference switch is reached, the movement is stopped and then a movement is made to the switching point of the reference switch.

  From the switching point of the reference switch, a movement is made to the next index pulse of the motor or to a parameterizable distance from the switching point.

  The position of the index pulse or the position of the parameterizable distance from the switching point is the reference point.

- Reference movement to the index pulse

  In the case of a reference movement to the index pulse, a movement is made from the actual position to the next index pulse. The position of the index pulse is the reference point.

- Position setting

  In the case of position setting, the actual position of the motor is set to a desired position value.

A reference movement must be terminated without interruption for the new zero point to be valid. If the reference movement is interrupted, it must be started again.

Motors with multiturn encoder deliver a valid zero point after they are powered on.

# Starting the Operating Mode

The operating mode is started via the fieldbus. See the fieldbus user guides for a description.

# Status Messages

Information on the operating state and the ongoing movement is available via the fieldbus and the signal outputs.

Descriptions on obtaining information on the operating state and the ongoing movement can be found in the fieldbus user guides.

The table below provides an overview of the signal outputs:

| Signal output | Signal output function |
|---|---|
| *DQ0* | "No Fault"<br><br>Signals the operating states **4** Ready To Switch On, **5** Switched On and **6** Operation Enabled |
| *DQ1* | "Active"<br><br>Signals the operating state **6** Operation Enabled |
| *DQ2* | "Freely Available"<br><br>See Setting a Signal Output via Parameter, page 331 |

It is possible to change the factory settings of the signal outputs, see Digital Signal Inputs and Digital Signal Outputs, page 199.

# Terminating the Operating Mode

The operating mode is terminated when the motor is at a standstill and one of the following conditions is met:

- Homing successful
- Stop caused by "Halt" or "Quick Stop"
- Stop caused by a detected error

# Parameterization

## Overview

The illustration below provides an overview of the adjustable parameters.

```
┌─────────────────────────────────────────────────────────────────┐
│                            HMmethod                               │
├──────────────────┬──────────────────┬──────────────┬─────────────┤
│  = 1, 2, 7 ... 14 │ = 17, 18, 23 ... 30 │  = 33, 34   │    = 35     │
└──────────────────┴──────────────────┴──────────────┴─────────────┘
                            ↓
                   ┌──────────────┐
                   │    HMdis      │
                   └──────────────┘
                            ↓
        ┌──────────────────────────────────────┐    ┌──────────────┐
        │              HMp_home                 │    │   HMp_setP   │
        └──────────────────────────────────────┘    └──────────────┘
                            ↓
           ┌──────────────────────────────┐
           │         HMv, HMv_out          │
           └──────────────────────────────┘
                            ↓
           ┌──────────────────────────────┐
           │  RAMP_v_acc, RAMP_v_dec,      │
           │  RAMP_v_max, RAMP_v_jerk      │
           └──────────────────────────────┘
```

## Setting Limit Switches and Reference Switches

The limit switches and reference switches must be set to meet the requirements, see Limit Switches, page 350 and Reference Switch, page 351.

## Selection of the Method

The operating mode Homing establishes an absolute position reference between the motor position and a defined axis position. There are various Homing methods which can be selected via the parameter *HMmethod*.

The *HMprefmethod* parameter is used to save the preferred method to the nonvolatile memory (persistent). When the preferred method has been set in this parameter, the method is performed during homing even after the device is powered off and on. The value to be entered corresponds to the value in the *HMmethod* parameter.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *HMmethod* | Homing method. | - | INT16* | CANopen 6098:0h |
| | 1: LIMN with index pulse | 1 | R/W | Modbus 6936 |
| | 2: LIMP with index pulse | 18 | - | Profibus 6936 |
| | 7: REF+ with index pulse, inv., outside | 35 | - | CIP 127.1.12 |
| | 8: REF+ with index pulse, inv., inside | | | ModbusTCP 6936 |
| | 9: REF+ with index pulse, not inv., inside | | | EtherCAT 6098:0h |
| | 10: REF+ with index pulse, not inv., outside | | | PROFINET 6936 |
| | 11: REF- with index pulse, inv., outside | | | |
| | 12: REF- with index pulse, inv., inside | | | |
| | 13: REF- with index pulse, not inv., inside | | | |
| | 14: REF- with index pulse, not inv., outside | | | |
| | 17: LIMN | | | |
| | 18: LIMP | | | |
| | 23: REF+, inv., outside | | | |
| | 24: REF+, inv., inside | | | |
| | 25: REF+, not inv., inside | | | |
| | 26: REF+, not inv., outside | | | |
| | 27: REF-, inv., outside | | | |
| | 28: REF-, inv., inside | | | |
| | 29: REF-, not inv., inside | | | |
| | 30: REF-, not inv., outside | | | |
| | 33: Index pulse negative direction | | | |
| | 34: Index pulse positive direction | | | |
| | 35: Position setting | | | |
| | Abbreviations: | | | |
| | REF+: Search movement in positive direction | | | |
| | REF-: Search movement in negative direction | | | |
| | inv.: Invert direction in switch | | | |
| | not inv.: Direction not inverted in switch | | | |
| | outside: Index pulse / distance outside switch | | | |
| | inside: Index pulse / distance inside switch | | | |
| | Modified settings become active immediately. | | | |
| | * Datatype for CANopen: INT8 | | | |
| *HMprefmethod* ᴏP → hᴏΠ - ΠEᴛh | Preferred homing method. Modified settings become active immediately. | - 1 18 35 | INT16 R/W per. - | CANopen 3028:Ah Modbus 10260 Profibus 10260 CIP 140.1.10 ModbusTCP 10260 EtherCAT 3028:Ah PROFINET 10260 |

## Setting the Distance From the Switching Point

A distance to the switching point of the limit switch or the reference switch must be parameterized for a reference movement with index pulse. The parameter *HMdis* lets you set the distance to the switching limit switch or the reference switch.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *HMdis* | Distance from switching point. The distance from the switching point is defined as the reference point. The parameter is only effective during a reference movement without index pulse. Modified settings become active the next time the motor moves. | usr_p 1 200 2147483647 | INT32 R/W per. - | CANopen 3028:7$_h$ Modbus 10254 Profibus 10254 CIP 140.1.7 ModbusTCP 10254 EtherCAT 3028:7$_h$ PROFINET 10254 |

## Defining the Zero Point

The parameter *HMp_home* is used to specify a desired position value, which is set at the reference point after a successful reference movement. The desired position value at the reference point defines the zero point.

If the value 0 is used, the zero point corresponds to the reference point.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *HMp_home* | Position at reference point. After a successful reference movement, this position is automatically set at the reference point. Modified settings become active the next time the motor moves. | usr_p -2147483648 0 2147483647 | INT32 R/W per. - | CANopen 3028:B$_h$ Modbus 10262 Profibus 10262 CIP 140.1.11 ModbusTCP 10262 EtherCAT 3028:B$_h$ PROFINET 10262 |

## Setting Monitoring

The parameters *HMoutdis* and *HMsrchdis* allow you to activate monitoring of the limit switches and the reference switch.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *HMoutdis* | Maximum distance for search for switching point. 0: Monitoring of distance inactive >0: Maximum distance After detection of the switch, the drive starts to search for the defined switching point. If the defined switching point is not found within the distance defined here, the reference movement is canceled and an error is detected. Modified settings become active the next time the motor moves. | usr_p 0 0 2147483647 | INT32 R/W per. - | CANopen 3028:6$_h$ Modbus 10252 Profibus 10252 CIP 140.1.6 ModbusTCP 10252 EtherCAT 3028:6$_h$ PROFINET 10252 |
| *HMsrchdis* | Maximum search distance after overtravel of switch. 0: Search distance monitoring disabled >0: Search distance The switch must be activated again within this search distance, otherwise the reference movement is canceled. Modified settings become active the next time the motor moves. | usr_p 0 0 2147483647 | INT32 R/W per. - | CANopen 3028:D$_h$ Modbus 10266 Profibus 10266 CIP 140.1.13 ModbusTCP 10266 EtherCAT 3028:D$_h$ PROFINET 10266 |

## Reading out the Position Distance

The position distance between the switching point and index pulse can be read out with the following parameter.

The distance between the switching point and the index pulse must be >0.05 revolutions for reproducible reference movements with index pulse.

If the index pulse is too close to the switching point, the limit switch or reference switch can be moved mechanically.

Otherwise the position of the index pulse can be moved with the parameter *ENC_pabsusr*, see .

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *_HMdisREFtoIDX_usr* | Distance from switching point to index pulse. Allows you to verify the distance between the index pulse and the switching point and serves as a criterion for determining whether the reference movement with index pulse can be reproduced. Available with firmware version ≥V01.03. | usr_p -2147483648 - 2147483647 | INT32 R/- - - | CANopen 3028:F$_h$ Modbus 10270 Profibus 10270 CIP 140.1.15 ModbusTCP 10270 EtherCAT 3028:F$_h$ PROFINET 10270 |

## Setting Velocities

The parameters *HMv* and *HMv_out* are used to set the velocities for searching the switch and for moving away from the switch.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *HMv*<br><br>$o\,P \rightarrow h\,o\,\Pi$ -<br><br>$h\,\Pi\,o$ | Target velocity for searching the switch.<br><br>The adjustable value is internally limited to the parameter setting in RAMP_v_max.<br><br>Modified settings become active the next time the motor moves. | usr_v<br><br>1<br><br>60<br><br>2147483647 | UINT32<br><br>R/W<br><br>per.<br><br>- | CANopen 6099:1$_h$<br><br>Modbus 10248<br><br>Profibus 10248<br><br>CIP 140.1.4<br><br>ModbusTCP 10248<br><br>EtherCAT 6099:1$_h$<br><br>PROFINET 10248 |
| *HMv_out* | Target velocity for moving away from switch.<br><br>The adjustable value is internally limited to the parameter setting in RAMP_v_max.<br><br>Modified settings become active the next time the motor moves. | usr_v<br><br>1<br><br>6<br><br>2147483647 | UINT32<br><br>R/W<br><br>per.<br><br>- | CANopen 6099:2$_h$<br><br>Modbus 10250<br><br>Profibus 10250<br><br>CIP 140.1.5<br><br>ModbusTCP 10250<br><br>EtherCAT 6099:2$_h$<br><br>PROFINET 10250 |

## Changing the Motion Profile for the Velocity

It is possible to change the parameterization of the Motion Profile for the Velocity, .
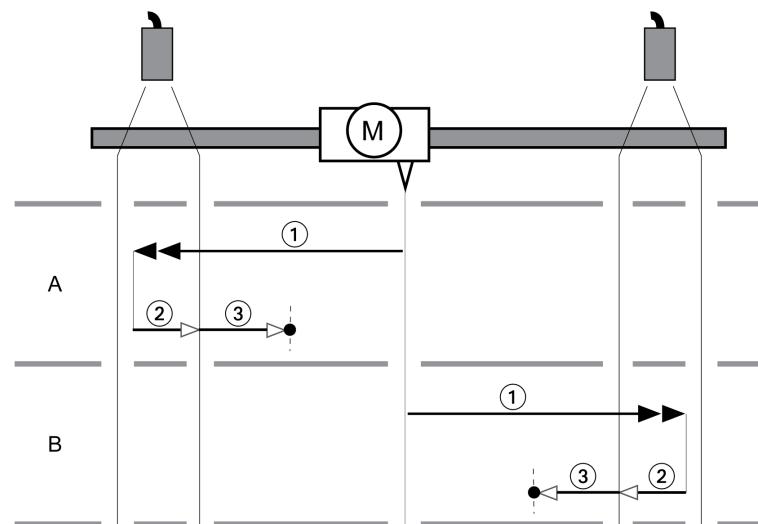
# Reference Movement to a Limit Switch

## Overview

The illustration below shows a reference movement to a limit switch

**1** Movement to limit switch at velocity *HMv*

**2** Movement to the switching point of the limit switch at velocity *HMv_out*

**3** Movement to index pulse or movement to a distance from the switching point at velocity *HMv_out*

## Type A

Method 1: Movement to the index pulse.

Method 17: Movement to distance from switching point.

## Type B
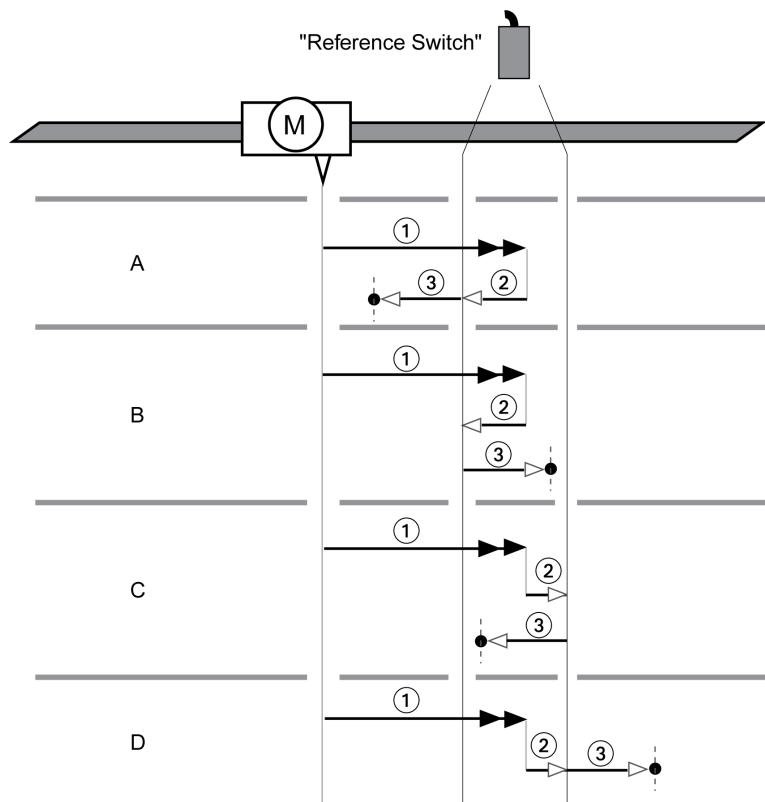
Method 2: Movement to the index pulse.

Method 18: Movement to distance from switching point.

# Reference Movement to the Reference Switch in Positive Direction

## Overview

The illustration below shows a reference movement to the reference switch in positive direction



**1** Movement to reference switch at velocity *HMv*

**2** Movement to the switching point of the reference switch at velocity *HMv_out*

**3** Movement to index pulse or movement to a distance from the switching point at velocity *HMv_out*

## Type A

Method 7: Movement to the index pulse.

Method 23: Movement to distance from switching point.

## Type B

Method 8: Movement to the index pulse.

Method 24: Movement to distance from switching point.

## Type C

Method 9: Movement to the index pulse.

Method 25: Movement to distance from switching point.

## Type D
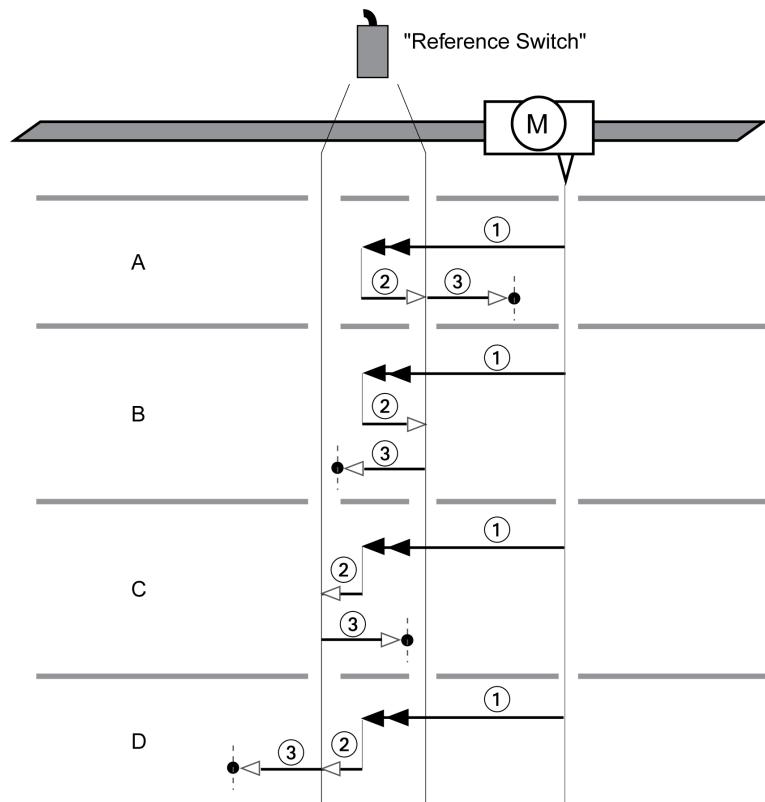
Method 10: Movement to the index pulse.

Method 26: Movement to distance from switching point.

# Reference Movement to the Reference Switch in Negative Direction

## Overview

The illustration below shows a reference movement to the reference switch in negative direction

**1** Movement to reference switch at velocity *HMv*

**2** Movement to the switching point of the reference switch at velocity *HMv_out*

**3** Movement to index pulse or movement to a distance from the switching point at velocity *HMv_out*

## Type A

Method 11: Movement to the index pulse.

Method 27: Movement to distance from switching point.

## Type B

Method 12: Movement to the index pulse.

Method 28: Movement to distance from switching point.

## Type C

Method 13: Movement to the index pulse.

Method 29: Movement to distance from switching point.

## Type D
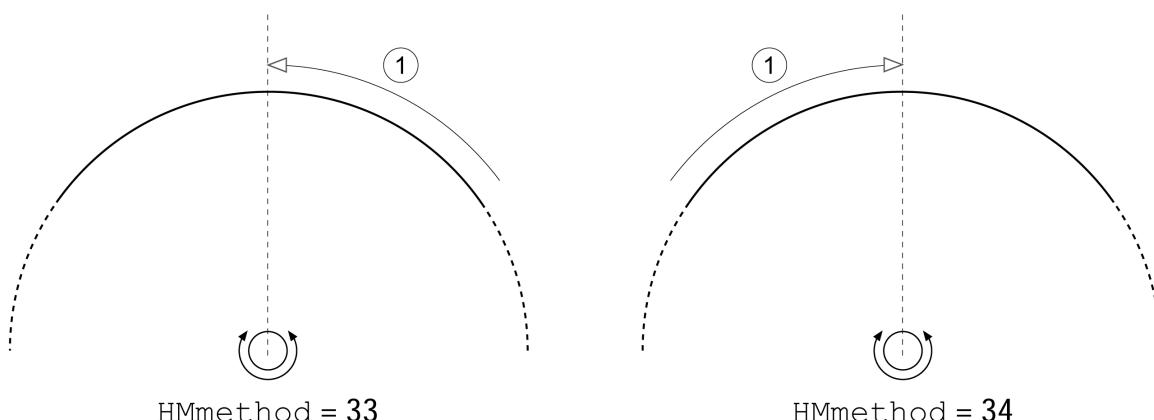
Method 14: Movement to the index pulse.

Method 30: Movement to distance from switching point.

# Reference Movement to the Index Pulse

## Overview

The illustration below shows a reference movement to the index pulse



HMmethod = 33                                              HMmethod = 34

**1** Movement to index pulse at velocity *HMv_out*

# Position Setting

## Description

By means of position setting, the actual position of the motor is set to the position value in parameter *HMp_setP*. This also defines the zero point.
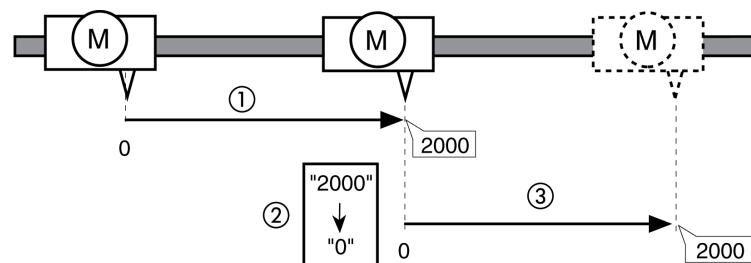
Position setting is only possible when the motor is at a standstill. Any active position deviation remains active and can still be compensated for by the position controller after position setting.

## Setting the Position for Position Setting

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *HMp_setP* | Position for Position Setting. Position for operating mode Homing, method 35. Modified settings become active immediately. | usr_p - 0 - | INT32 R/W - - | CANopen 301B:16$_h$ Modbus 6956 Profibus 6956 CIP 127.1.22 ModbusTCP 6956 EtherCAT 301B:16$_h$ PROFINET 6956 |

## Example

Movement by 4000 user-defined units with position setting



**1** The motor is positioned by 2000 user-defined units.

**2** By means of position setting to 0, the actual position of the motor is set to position value 0 which, at the same time, defines a new zero point.

**3** When a new movement by 2000 user-defined units is triggered, the new target position is 2000 user-defined units.

# Additional Settings

## Overview

The following functions can be used for target value processing:

- Jerk Limitation, page 319

The following functions can be used for monitoring the movement:

# Operating Mode Motion Sequence

## Overview

### Availability

Available with firmware version ≥V01.01.

## Description

In the operating mode Motion Sequence, movements are started via parameterizable data sets.

A parameterizable data set contains settings on the type of movement (data set type) and the appropriate target values (such as the target velocity and target position).

In addition, you can specify in a data set that a subsequent data set is to be started once the movement has been terminated. You can also define a transition condition for starting the subsequent data set.

The data sets are parameterized via the commissioning software.

## Sequence

A data set can be started in two different ways:

- Start of a data set with sequence:

  The set data set is started.

  If a subsequent data set has been defined in the data set, the subsequent data set is started once the movement has been terminated.

  If a transition condition has been defined, the subsequent data set is started once the transition condition is met.

- Start of a data set without sequence:

  The set data set is started.

  If a subsequent data set has been defined in the data set, the subsequent data set is not started when the movement has been terminated.

## Data Set Types

The following data set types are available:

- Movement to a specific position value (absolute movement, additive movement or relative movement)
- Movement at a specific velocity
- Homing the motor (reference movement or position setting)
- Repetition of a given sequence (1 ... 65535)

The following types of data set types are available with firmware version ≥V01.09:

- Movement synchronized with external reference value signals (Electronic Gear)
- Write parameter with desired value

# Number of Data Sets

The number of data sets depends on the hardware version:

- With hardware version ≥RS03: 128 data sets
- With hardware version <RS03: 32 data sets

# Control Mode

In local control mode, a movement is started via the digital signal inputs.

In fieldbus control mode, a movement is started via the fieldbus.

See Control Mode, page 182 for information on setting the control mode.

# Starting the Operating Mode

In local control mode, the operating mode must first have been selected, see Starting and Changing an Operating Mode, page 245. After the power stage is enabled, the operating mode is started automatically.

The power stage is enabled via the signal inputs. The table below provides an overview of the factory settings of the signal inputs:

| Signal input | Signal input function |
|---|---|
| DI0 | "Enable"<br>Enable and disable the power stage |
| DI1 | "Reference Switch (REF)"<br>See Reference Switch, page 351 |
| DI2 | "Positive Limit Switch (LIMP)"<br>See Limit Switches, page 350 |
| DI3 | "Negative Limit Switch (LIMN)"<br>See Limit Switches, page 350 |
| DI4 | "Start Motion Sequence"<br>Start sequence |
| DI5 | "Data Set Select"<br>Select data set number |

The factory settings of the signal inputs depend on the selected operating mode; they can be adapted, see Digital Signal Inputs and Digital Signal Outputs, page 199.

In fieldbus control mode, the operating mode is started via the fieldbus. See the fieldbus user guides for a description.

# Status Messages

In local control mode, information on the operating state and the ongoing movement is available via signal outputs.

In fieldbus control mode, information on the operating state and the ongoing movement is available via the fieldbus and the signal outputs.

Descriptions on obtaining information on the operating state and the ongoing movement can be found in the fieldbus user guides.

The table below provides an overview of the signal outputs:

| Signal output | Signal output function |
|---|---|
| *DQ0* | With local control mode: |
| | "Motion Sequence: Done" |
| | Signals the end of a sequence. |
| | With fieldbus control mode: |
| | "No Fault" |
| | Signals the operating states **4** Ready To Switch On, **5** Switched On and **6** Operation Enabled |
| *DQ1* | "Active" |
| | Signals the operating state **6** Operation Enabled |
| *DQ2* | With local control mode: |
| | "Motion Sequence: Start Acknowledge" |
| | Signals that the system is waiting for a transition condition to be met. |
| | With fieldbus control mode: |
| | "Freely Available" |
| | See Setting a Signal Output via Parameter, page 331 |

The factory settings of the signal outputs depend on the selected control mode and the selected operating mode; they can be adapted, see Digital Signal Inputs and Digital Signal Outputs, page 199.

## Terminating the Operating Mode

In local control mode, the operating mode is automatically terminated by disabling the power stage.

In fieldbus control mode, the operating mode is terminated via the fieldbus. See the fieldbus user guides for a description.

# Start of a Data Set with Sequence

## Description

The set data set is started.

If a subsequent data set has been defined in the data set, the subsequent data set is started once the movement has been terminated.

If a transition condition has been defined, the subsequent data set is started once the transition condition is met.

## Signal Input Functions

In local control mode, the following signal input functions are required to start a data set with sequence:

| Signal input function | Description |
|---|---|
| "Start Motion Sequence"<br><br>Factory setting for *DI4* | Start of a data set with sequence.<br><br>A data set is set via the signal input functions "Data Set Bit 0" to "Data Set Bit x" and confirmed with the signal input function "Data Set Select". |
| "Data Set Select"<br><br>Factory setting for *DI5* | The signal input function "Data Set Select" is used to confirmed the set data set.<br><br>If the signal input functions "Data Set Bit 0" to "Data Set Bit x" are not set to any of the signal inputs, data set 0 is confirmed with the signal input function "Data Set Select". |
| "Data Set Bit 0" to "Data Set Bit x"<br><br>Adjustable for signal inputs *DI0 ... DI5* | The signal input functions "Data Set Bit 0" to "Data Set Bit x" are used to set a data set in a bit-coded way.<br><br>The set data set must be confirmed with the signal input function "Data Set Select". |

## Start Condition

A start condition is defined for starting a data set with sequence. The start conditions can be set with the parameter *MSM_CondSequ*.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MSM_CondSequ* | Start condition for the start of a sequence via a signal input.<br><br>**0 / Rising Edge**: Rising edge<br><br>**1 / Falling Edge**: Falling edge<br><br>**2 / 1-level**: 1 level<br><br>**3 / 0-level**: 0 level<br><br>The start condition defines the way the start request is to be processed. This setting is used for the first start after activation of the operating mode.<br><br>Modified settings become active the next time the motor moves. | -<br><br>0<br><br>0<br><br>3 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 302D:8$_h$<br><br>Modbus 11536<br><br>Profibus 11536<br><br>CIP 145.1.8<br><br>ModbusTCP 11536<br><br>EtherCAT 302D:8$_h$<br><br>PROFINET 11536 |

## End of a Sequence

With firmware version ≥V01.09 you can parameterize whether the set data set is to be confirmed at the end of a sequence.

The confirmation can be set with the parameter *MSMendNumSequence.*

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MSMendNumSequence* | Selection of the data set number after the end of a sequence.<br><br>**0 / DataSetSelect**: Data set is set via the signal input function "Data Set Select"<br><br>**1 / Automatic**: Data set is set automatically<br><br>Value 0: After the end of a sequence, the selected data set must be set via the signal input function "Data Set Select".<br><br>Value 1: After the end of a sequence, the selected data set is set automatically.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.09. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 302D:9$_h$<br><br>Modbus 11538<br><br>Profibus 11538<br><br>CIP 145.1.9<br><br>ModbusTCP 11538<br><br>EtherCAT 302D:9$_h$<br><br>PROFINET 11538 |

# Start of a Data Set without Sequence

## Description

The set data set is started.

If a subsequent data set has been defined in the data set, the subsequent data set is not started when the movement has been terminated.

## Signal Input Functions

In local control mode, the following signal input functions are required to start a data set without sequence:

| Signal input function | Description |
|---|---|
| "Start Single Data Set"<br><br>The signal input function must be set. | The set data set is started without a sequence via a rising edge.<br><br>A data set is set via the signal input functions "Data Set Bit 0" to "Data Set Bit x". |
| "Data Set Bit 0" to "Data Set Bit x"<br><br>Adjustable for signal inputs *DI0 ... DI5* | The signal input functions "Data Set Bit 0" to "Data Set Bit x" are used to set a data set in a bit-coded way.<br><br>The set data set is immediately confirmed; it does not need to be confirmed with the signal input function "Data Set Select". |

## Setting the Start Signal

With firmware version ≥V01.09, you can parameterize whether a movement can be aborted via a rising edge at the signal input.
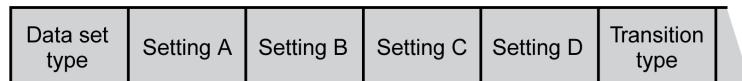
The parameter *MSMstartSignal* lets you set the behavior of the start signal.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MSMstartSignal* | Response to falling edge at signal input for 'Start Signal Data Set'.<br><br>**0 / No Reaction**: No response<br><br>**1 / Cancel Movement**: Cancel active movement<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.09. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 302D:C$_h$<br><br>Modbus 11544<br><br>Profibus 11544<br><br>CIP 145.1.12<br><br>ModbusTCP 11544<br><br>EtherCAT 302D:C$_h$<br><br>PROFINET 11544 |

# Structure of a Data Set

## Data Set Type, Settings and Type of Transition

Structure of a data set

| Data set type | Setting A | Setting B | Setting C | Setting D | Transition type |
|---|---|---|---|---|---|

| Data set type | Setting A | Setting B | Setting C | Setting D | Transition type |
|---|---|---|---|---|---|
| "Move Absolute"<br><br>Movement to an absolute position value | Acceleration<br><br>Unit: usr_a | Velocity<br><br>Unit: usr_v | Absolute target position<br><br>Unit: usr_p | Deceleration<br><br>Unit: usr_a | • No Transition<br>• Abort And Go Next<br>• Buffer And Start Next<br>• Blending Previous<br>• Blending Next |
| "Move Additive"<br><br>Movement that is added to target position | Acceleration<br><br>Unit: usr_a | Velocity<br><br>Unit: usr_v | Added target position<br><br>Unit: usr_p | Deceleration<br><br>Unit: usr_a | • No Transition<br>• Abort And Go Next<br>• Buffer And Start Next |
| "Reference Movement"<br><br>Reference movement[1] | Homing method<br><br>Like parameter *HMmethod* | Desired position value at reference point<br><br>Unit: usr_p | - | - | • No Transition<br>• Buffer And Start Next |
| "Position Setting"<br><br>Position setting | Position for Position Setting<br><br>Unit: usr_p | - | - | - | • No Transition<br>• Buffer And Start Next |
| "Repeat"<br><br>Repeat part of a sequence | Number of repetitions (1 ... 65535) | Number of the data set at which the repetition is to be started | - | - | • No Transition<br>• Buffer And Start Next |
| "Move Relative"<br><br>Movement relative with reference to actual position | Acceleration<br><br>Unit: usr_a | Velocity<br><br>Unit: usr_v | Relative target position<br><br>Unit: usr_p | Deceleration<br><br>Unit: usr_a | • No Transition<br>• Abort And Go Next<br>• Buffer And Start Next |

| Data set type | Setting A | Setting B | Setting C | Setting D | Transition type |
|---|---|---|---|---|---|
| "Move Velocity"<br><br>Movement at a specific velocity | Acceleration[2]<br><br>Unit: usr_a | Velocity<br><br>Unit: usr_v | Direction of movement<br><br>Value 0: Positive<br><br>Value 1: Negative<br><br>Value 2: From previous data set | Deceleration[2]<br><br>Unit: usr_a | • Abort And Go Next |
| **(1)** Function principle like operating mode Homing. | | | | | |
| **(2)** The motion profile for velocity must have been activated see parameter *RAMP_v_enable* in section Motion Profile for the Velocity, page 317. | | | | | |

The following data set types are available with firmware version ≥V01.09:

| Data set type | Setting A | Setting B | Setting C | Setting D | Transition type |
|---|---|---|---|---|---|
| "Gear"<br><br>Electronic Gear[1] | Method<br><br>Value 0: No synchronization<br><br>Value 1: Position synchronization without compensation movement<br><br>Value 2: Position synchronization with compensation movement<br><br>Value 3: Velocity synchronization | Numerator of gear ratio<br><br>Like parameter *GEARnum* | Denominator of gear ratio<br><br>Like parameter *GEARdenom* | Acceleration and deceleration for velocity synchronization[2][3][4]<br><br>Unit: usr_a | • Abort And Go Next |
| "Write Parameter"<br><br>Write parameter directly | Modbus address of the parameter<br><br>The parameters of the safety module eSM and the following parameters cannot be written directly:<br><br>*AccessLock*<br><br>*AT_start*<br><br>*DCOMopmode*<br><br>*GEARreference*<br><br>*JOGactivate*<br><br>*OFSp_rel*<br><br>*PAR_CTRLreset*<br><br>*PAR_ScalingStart*<br><br>*PAReeprSave*<br><br>*PARuserReset*<br><br>*PTtq_reference*<br><br>*PTtq_target*<br><br>*PVv_reference*<br><br>*PVv_target* | Value of the parameter<br><br>(Values greater than 2147483647 must be entered as negative values.) | - | - | • No Transition<br>• Buffer And Start Next |
| **(1)** Function principle like operating mode Electronic Gear. | | | | | |
| **(2)** Available with firmware version ≥V01.20. | | | | | |
| **(3)** Value 0 means that the values for acceleration and deceleration are taken from the previous data set. | | | | | |
| **(4)** The motion profile for velocity must have been activated see parameter *RAMP_v_enable* in section Motion Profile for the Velocity, page 317. | | | | | |
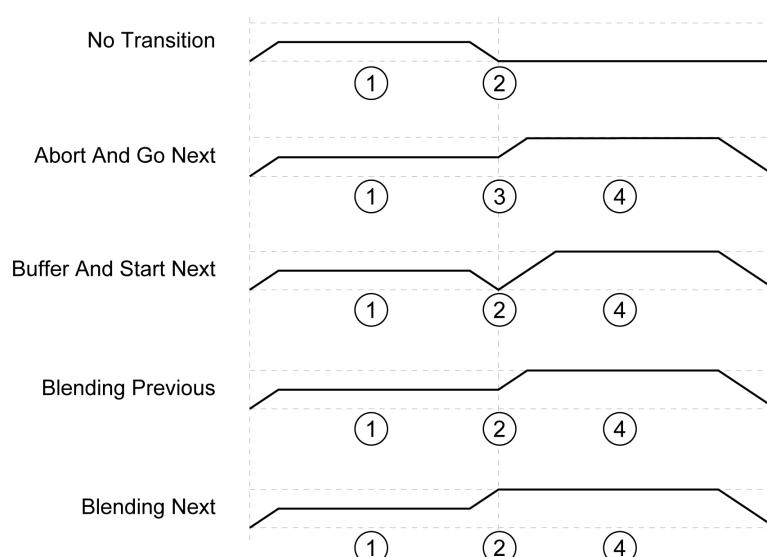
# Transition Type

Transition type is used to set the type of transition to the subsequent data set. The following types of transitions are possible:

- No Transition

  No further data set is started upon successful completion of the movement (end of sequence).

- Abort And Go Next

  If the transition condition is met, the current movement is aborted and the subsequent data set started.

  The transition conditions are considered for the transition.

- Buffer And Start Next

  Upon successful completion of the movement and if the transition condition is met, the subsequent data set is started.

  The transition conditions are considered for the transition.

- Blending Previous / Blending Next (data set type Move Absolute only)

  The velocity is adapted to the velocity of the subsequent data set until the target position is reached or when it has been reached.

  The transition is performed without consideration of the transition conditions.

Transition type



**1** First data set.

**2** Target position of first data set reached.

**3** Transition condition met, the first data set is terminated and the next data set is started.

**4** Next data set.

# Subsequent Data Set and Transition Conditions

Structure of a data set

| Subsequent data set | Transition condition 1 | Transition value 1 | Logical operator | Transition condition 2 | Transition value 2 |
|---|---|---|---|---|---|

## Subsequent Data Set

Subsequent data set defines the data set to be started next.

## Transition Condition 1

Transition condition 1 is used to set the first transition condition. The following transition conditions are possible:

- Continue Without Condition

  No condition for a transition. The subsequent data set is started directly. Any second transition condition is without effect.

- Wait Time

  The condition for a transition is a waiting time.

- Start Request Edge

  The condition for a transition is an edge at the signal input.

- Start Request Level

  The condition for a transition is a level at the signal input.

## Transition Value 1

Transition value 1 is used to set the value for the first transition condition. The meaning depends on the selected transition condition.

- In the case of transition condition Continue Without Condition
  - No meaning
- In the case of transition condition Waiting Time
  - Value 0 ... 30000: Waiting time of 0 ... 30000 ms
- In the case of transition condition Start Request Edge
  - Value 0: CCLR is triggered by rising-edge
  - Value 1: Falling edge
  - Value 4: Rising or falling edge
- In the case of transition condition Start Request Level
  - Value 2: 1 level
  - Value 3: 0 level

## Logical Operator

Logical operator is used to logically link transition condition 1 and transition condition 2. The following logical operators are available:

- None

  No operator (transition condition 2 has no effect)

- AND

  Logical AND

- OR

  Logical OR

## Transition Condition 2

Transition condition 2 is used to set the second transition condition. The following transition conditions are possible:

- Continue Without Condition

    No condition for a transition. The subsequent data set is started directly.

- Start Request Edge

    The condition for a transition is an edge at the signal input.

    If an And is used to logically link an edge and a waiting time, the edge is not evaluated until the waiting time has elapsed.

- Start Request Level

    The condition for a transition is a level at the signal input.

## Transition Value 2

Transition value 2 is used to set the value for the second transition condition. The meaning depends on the selected transition condition.

- In the case of transition condition Continue Without Condition
    - No meaning
- In the case of transition condition Start Request Edge
    - Value 0: CCLR is triggered by rising-edge
    - Value 1: Falling edge
    - Value 4: Rising or falling edge
- In the case of transition condition Start Request Level
    - Value 2: 1 level
    - Value 3: 0 level

# Error Diagnostics

## Plausibility Verification

The fields of a data set are verified for plausibility when the data set is started. If an error is detected in a data set, the parameters _*MSM_error_num*_ and _*MSM_error_field*_ provide information on the data set number and the data set field containing the error.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _MSM_error_num | Number of the data set in which an error has been detected. Value -1: No error Values 0 … 127: Number of the data set in which an error has been detected. Available with firmware version ≥V01.09. | - -1 -1 127 | INT16 R/- - - | CANopen 302D:$D_h$ Modbus 11546 Profibus 11546 CIP 145.1.13 ModbusTCP 11546 EtherCAT 302D:$D_h$ PROFINET 11546 |
| _MSM_error_field | Field of the data set in which an error has been detected. Value -1: No error Value 0: Data set type Value 1: Setting A Value 2: Setting B Value 3: Setting C Value 4: Setting D Value 5: Transition type Value 6: Subsequent data set Value 7: Transition condition 1 Value 8: Transition value 1 Value 9: Logical operator Value 10: Transition condition 2 Value 11: Transition value 2 Available with firmware version ≥V01.09. | - -1 -1 11 | INT16 R/- - - | CANopen 302D:$E_h$ Modbus 11548 Profibus 11548 CIP 145.1.14 ModbusTCP 11548 EtherCAT 302D:$E_h$ PROFINET 11548 |

# Diagnostics via Parameter

The parameter _MSMnumFinish lets you read the number of the data set that was being executed at the point in time the movement was canceled.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _MSMNumFinish | Number of data set that was active when a movement was interrupted. When a movement is interrupted, the number of the data set that was being processed at the point in time of the interruption is contained in this parameter. | - -1 -1 127 | INT16 R/- - - | CANopen 302D:$B_h$ Modbus 11542 Profibus 11542 CIP 145.1.11 ModbusTCP 11542 EtherCAT 302D:$B_h$ PROFINET 11542 |

# Additional Settings

## Overview

The following functions can be used for target value processing:

The following functions can be used for monitoring the movement:

# Functions for Operation

## Functions for Target Value Processing

### Motion Profile for the Velocity

#### Description

Target position and target velocity are input values specified by the user. A motion profile for the velocity is calculated on the basis of these input values.

The motion profile for the velocity consists of an acceleration, a deceleration and a maximum velocity.

A linear ramp for both directions of movement is available.

#### Availability

The availability of the motion profile for the velocity depends on the operating mode.

In the following operating modes, the motion profile for the velocity is permanently active:

- Jog
- Profile Position
- Homing
- Motion Sequence (Move Absolute, Move Additive, Move Relative and Reference Movement)

In the following operating modes, the motion profile for the velocity can be activated and deactivated:
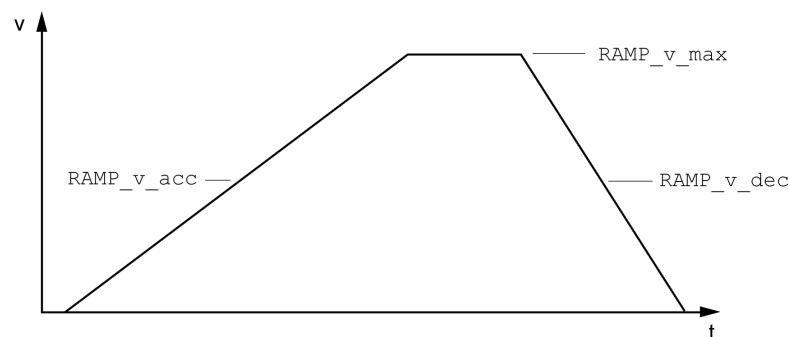
- Electronic Gear (velocity synchronization)
- Profile Velocity
- Motion Sequence (Move Velocity and Gear)

In the following operating modes, the motion profile for the velocity is unavailable:

- Electronic Gear (position synchronization)
- Profile Torque
- Interpolated Position

#### Ramp Slope

The ramp slope determines the velocity changes of the motor per time unit. The ramp slope can be set for acceleration and deceleration.
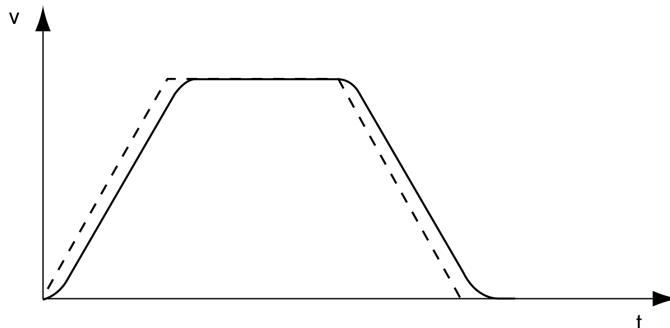
| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *RAMP_v_enable* | Activation of the motion profile for velocity. **0 / Profile Off**: Profile off **1 / Profile On**: Profile on Setting can only be modified if power stage is disabled. Modified settings become active immediately. | - 0 1 1 | UINT16 R/W per. - | CANopen 3006:2B$_h$ Modbus 1622 Profibus 1622 CIP 106.1.43 ModbusTCP 1622 EtherCAT 3006:2B$_h$ PROFINET 1622 |
| *RAMP_v_max* $ConF \rightarrow ACG-$ $nrMP$ | Maximum velocity of the motion profile for velocity. If a greater reference velocity is set in one of these operating modes, it is automatically limited to RAMP_v_max. This way, commissioning at limited velocity is easier to perform. Setting can only be modified if power stage is disabled. Modified settings become active the next time the motor moves. | usr_v 1 13200 2147483647 | UINT32 R/W per. - | CANopen 607F:0$_h$ Modbus 1554 Profibus 1554 CIP 106.1.9 ModbusTCP 1554 EtherCAT 607F:0$_h$ PROFINET 1554 |
| *RAMP_v_acc* | Acceleration of the motion profile for velocity. Writing the value 0 has no effect on the parameter. Modified settings become active the next time the motor moves. | usr_a 1 600 2147483647 | UINT32 R/W per. - | CANopen 6083:0$_h$ Modbus 1556 Profibus 1556 CIP 106.1.10 ModbusTCP 1556 EtherCAT 6083:0$_h$ PROFINET 1556 |
| *RAMP_v_dec* | Deceleration of the motion profile for velocity. The minimum value depends on the operating mode: Operating modes with minimum value 1: Electronic Gear (velocity synchronization) Profile Velocity Motion Sequence (Move Velocity) Operating modes with minimum value 120: Jog Profile Position Homing Motion Sequence (Move Absolute, Move Additive, Move Relative and Reference Movement) Writing the value 0 has no effect on the parameter. Modified settings become active the next time the motor moves. | usr_a 1 600 2147483647 | UINT32 R/W per. - | CANopen 6084:0$_h$ Modbus 1558 Profibus 1558 CIP 106.1.11 ModbusTCP 1558 EtherCAT 6084:0$_h$ PROFINET 1558 |

# Jerk Limitation

## Description

Jerk limitation smoothes sudden acceleration changes to allow for smooth transitions with almost no jerking.



## Availability

Jerk limitation is available in the following operating modes.

- Jog
- Electronic Gear (position synchronization)

  (with firmware version ≥V01.02 and parameter *GEARjerklim*)

- Profile Position
- Homing
- Motion Sequence (Move Absolute, Move Additive, Move Relative, Reference Movement and Gear)

## Settings

Jerk limitation is activated and set via the parameter *RAMP_v_jerk*.

| Parameter name / HMI menu / HMI name | Description | Unit / Minimum value / Factory setting / Maximum value | Data type / R/W / Persistent / Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *RAMP_v_jerk* <br> *ConF → drC- JEr* | Jerk limitation of the motion profile for velocity. <br> **0 / Off /** *oFF*: Off <br> **1 / 1 /** *I*: 1 ms <br> **2 / 2 /** *2*: 2 ms <br> **4 / 4 /** *4*: 4 ms <br> **8 / 8 /** *8*: 8 ms <br> **16 / 16 /** *I6*: 16 ms <br> **32 / 32 /** *32*: 32 ms <br> **64 / 64 /** *64*: 64 ms <br> **128 / 128 /** *I28*: 128 ms <br> Adjustments can only be made if the operating mode is inactive (x_end=1). <br> Modified settings become active the next time the motor moves. | ms <br> 0 <br> 0 <br> 128 | UINT16 <br> R/W <br> per. <br> - | CANopen 3006:D$_h$ <br> Modbus 1562 <br> Profibus 1562 <br> CIP 106.1.13 <br> ModbusTCP 1562 <br> EtherCAT 3006:D$_h$ <br> PROFINET 1562 |

## Operating Modes Electronic Gear and Motion Sequence

Jerk limitation is activated for the operating mode Electronic Gear (position synchronization) and for the operating mode Motion Sequence with the data set type Gear (position synchronization) by means of the parameter *GEARjerklim*.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *GEARjerklim* $\mathcal{L} \, \mathcal{o} \, \mathcal{n} \, \mathcal{F} \rightarrow \, \imath - \mathcal{o} -$ $\mathcal{L} \, \mathcal{F} \, \imath \, \mathcal{L}$ | Activation of jerk limitation. **0 / Off /** $\mathcal{o} \, F \, F$ : Jerk limitation deactivated. **1 / PosSyncOn /** $P \, \llcorner \, \mathcal{o} \, \mathcal{n}$ : Jerk limitation active (only with position synchronization). The time for jerk limitation must be set via parameter RAMP_v_jerk. Setting can only be modified if power stage is disabled. Modified settings become active immediately. Available with firmware version ≥V01.02. | - 0 0 1 | UINT16 R/W per. - | CANopen 3026:7$_h$ Modbus 9742 Profibus 9742 CIP 138.1.7 ModbusTCP 9742 EtherCAT 3026:7$_h$ PROFINET 9742 |

# Stopping Movement with Halt

## Description

With a Halt, the ongoing movement is interrupted. The movement can be resumed when the Halt is cleared.

A Halt can be triggered via a digital signal input or a fieldbus command.

In order to interrupt a movement via a signal input, you must first parameterize the signal input function "Halt", see Digital Signal Inputs and Digital Signal Outputs, page 199.

The following deceleration types are available:

- Deceleration via deceleration ramp
- Deceleration via torque ramp

## Setting the Type of Deceleration

The parameter *LIM_HaltReaction* lets you set the type of deceleration.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *LIM_HaltReaction* ⊏ o n F → A ⊏ G - h t 9 P | Halt option code. **1 / Deceleration Ramp / d E c E** : Deceleration ramp **3 / Torque Ramp / t o r 9**: Torque ramp Set the deceleration ramp with parameter RAMP_v_dec. Set the torque ramp with parameter LIM_I_maxHalt. If a deceleration ramp is already active, the parameter cannot be written. Modified settings become active immediately. | - 1 1 3 | INT16 R/W per. - | CANopen 605D:0$_h$ Modbus 1582 Profibus 1582 CIP 106.1.23 ModbusTCP 1582 EtherCAT 605D:0$_h$ PROFINET 1582 |

## Setting the Deceleration Ramp

The deceleration ramp is set with the parameter *Ramp_v_dec* via the .

## Setting the Torque Ramp

The parameter *LIM_I_maxHalt* lets you set the torque ramp.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *LIM_I_maxHalt* ⊏ o n F → A ⊏ G - h c u r | Current for Halt. This value is only limited by the minimum/ maximum value range (no limitation of this value by motor/power stage). In the case of a Halt, the current limit (_Imax_act) is one of the following values (whichever is lowest): - *LIM_I_maxHalt* - *_M_I_max* - *_PS_I_max* Further current limitations caused by I2t monitoring are also taken into account during a Halt. Default: _PS_I_max at 8 kHz PWM frequency and 230/480 V mains voltage In increments of 0.01 A$_{rms}$. Modified settings become active immediately. | A$_{rms}$ - - - | UINT16 R/W per. - | CANopen 3011:E$_h$ Modbus 4380 Profibus 4380 CIP 117.1.14 ModbusTCP 4380 EtherCAT 3011:E$_h$ PROFINET 4380 |

# Stopping Movement with Quick Stop

## Description

With a Quick Stop, the ongoing movement is stopped.

A Quick Stop can be triggered by a detected error of error classes 1 or 2 or via a fieldbus command.

The movement can be stopped with 2 different deceleration types.

- Deceleration via deceleration ramp
- Deceleration via torque ramp

In addition, you can set the operating state to switch to after the deceleration.

- Transition to operating state **9** Fault
- Transition to operating state **7** Quick Stop Active

## Setting the Type of Deceleration

The parameter *LIM_QStopReact* lets you set the type of deceleration.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *LIM_QStopReact* | Quick Stop option code.<br><br>**-2 / Torque ramp (Fault)**: Use torque ramp and transit to operating state 9 Fault<br><br>**-1 / Deceleration Ramp (Fault)**: Use deceleration ramp and transit to operating state 9 Fault<br><br>**6 / Deceleration ramp (Quick Stop)**: Use deceleration ramp and remain in operating state 7 Quick Stop<br><br>**7 / Torque ramp (Quick Stop)**: Use torque ramp and remain in operating state 7 Quick Stop<br><br>Type of deceleration for Quick Stop.<br><br>Setting of deceleration ramp with parameter RAMPquickstop.<br><br>Setting of torque ramp with parameter LIM_I_maxQSTP.<br><br>If a deceleration ramp is already active, the parameter cannot be written.<br><br>Modified settings become active immediately. | -<br><br>-2<br><br>6<br><br>7 | INT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:18$_h$<br><br>Modbus 1584<br><br>Profibus 1584<br><br>CIP 106.1.24<br><br>ModbusTCP 1584<br><br>EtherCAT 3006:18$_h$<br><br>PROFINET 1584 |

## Setting the Deceleration Ramp

The parameter *RAMPquickstop* lets you set the deceleration ramp.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *RAMPquickstop* | Deceleration ramp for Quick Stop. Deceleration ramp for a software stop or an error with error class 1 or 2. Modified settings become active the next time the motor moves. | usr_a 1 6000 2147483647 | UINT32 R/W per. - | CANopen 3006:12$_h$ Modbus 1572 Profibus 1572 CIP 106.1.18 ModbusTCP 1572 EtherCAT 3006:12$_h$ PROFINET 1572 |

## Setting the Torque Ramp

The parameter *LIM_I_maxQSTP* lets you set the torque ramp.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *LIM_I_maxQSTP* ⌐ o n F → F L ⊦ - 9 c u r | Current for Quick Stop. This value is only limited by the minimum/ maximum value range (no limitation of this value by motor/power stage). In the case of a Quick Stop, the current limit (_Imax_act) is one of the following values (whichever is lowest): - *LIM_I_maxQSTP* - _M_I_max - _PS_I_max Further current limitations caused by I2t monitoring are also taken into account during a Quick Stop. Default: _PS_I_max at 8 kHz PWM frequency and 230/480 V mains voltage In increments of 0.01 A$_{rms}$. Modified settings become active immediately. | A$_{rms}$ - - - | UINT16 R/W per. - | CANopen 3011:D$_h$ Modbus 4378 Profibus 4378 CIP 117.1.13 ModbusTCP 4378 EtherCAT 3011:D$_h$ PROFINET 4378 |

# Inverting the Analog Signal Inputs

## Description

The evaluation of the analog signal inputs can be inverted via the digital signal inputs.

- The signal input function "Inversion AI11 (I/O module)" inverts the signal evaluation of the analog signal input AI11.

- The signal input function "Inversion AI12 (I/O module)" inverts the signal evaluation of the analog signal input AI12.

In order to invert the signal evaluation of the analog signal inputs, you must first parameterize the signal input functions "Inversion AI11 (I/O module)" and/or "Inversion AI12 (I/O module)", see Digital Signal Inputs and Digital Signal Outputs, page 199.

## Availability

Analog signal inputs are available with the IOM1 module.

The signal input functions are available in the following operating modes:

- Profile Torque
- Profile Velocity

# Limitation of the Velocity via Signal Inputs

## Limitation via Analog Signal Input

The velocity can be limited via an analog signal input.

Analog signal inputs are available with the IOM1 module.

The parameters *IOM1_AI11_mode* and *IOM1_AI12_mode* let you select the type of usage of the analog signal inputs.

- If you want to use the analog signal input *AI11*, set the parameter *IOM1_AI11_mode* to the value "Velocity Limitation".
- If you want to use the analog signal input *AI12*, set the parameter *IOM1_AI12_mode* to the value "Velocity Limitation".

| Parameter name / HMI menu / HMI name | Description | Unit / Minimum value / Factory setting / Maximum value | Data type / R/W / Persistent / Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOM1_AI11_mode*<br>ConF → i-o-<br>AI1u | IOM1 Type of usage of AI11.<br><br>**0 / None /** nonE : No function<br><br>**1 / Target Velocity /** SPdS : Target velocity for the velocity controller<br><br>**2 / Target Torque /** trqS : Target torque for the current controller<br><br>**3 / Velocity Limitation /** LSPd : Limitation of the reference velocity for the velocity controller<br><br>**4 / Current Limitation /** Lcur : Limitation of the reference current for the current controller<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.06. | -<br><br>0<br><br>1<br><br>4 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 304F:E$_h$<br><br>Modbus 20252<br><br>Profibus 20252<br><br>CIP 179.1.14<br><br>ModbusTCP 20252<br><br>EtherCAT 304F:E$_h$<br><br>PROFINET 20252 |
| *IOM1_AI12_mode*<br>ConF → i-o-<br>AI2u | IOM1 Type of usage of AI12.<br><br>**0 / None /** nonE : No function<br><br>**1 / Target Velocity /** SPdS : Target velocity for the velocity controller<br><br>**2 / Target Torque /** trqS : Target torque for the current controller<br><br>**3 / Velocity Limitation /** LSPd : Limitation of the reference velocity for the velocity controller<br><br>**4 / Current Limitation /** Lcur : Limitation of the reference current for the current controller<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.06. | -<br><br>0<br><br>0<br><br>4 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 304F:13$_h$<br><br>Modbus 20262<br><br>Profibus 20262<br><br>CIP 179.1.19<br><br>ModbusTCP 20262<br><br>EtherCAT 304F:13$_h$<br><br>PROFINET 20262 |

The parameters *IOM1_AI11_v_max* and *IOM1_AI12_v_max* are used to set the value of the limitation for a voltage value of 10 V.

- If you want to use the analog signal input *AI11*, use the parameter *IOM1_AI11_v_max* to set the value of the limitation for a voltage value of 10 V.
- If you want to use the analog signal input *AI12*, use the parameter *IOM1_AI12_v_max* to set the value of the limitation for a voltage value of 10 V.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOM1_AI11_v_max* | IOM1 Limitation of velocity at 10 V of AI11.<br><br>The maximum velocity is limited to the setting in CTRL_v_max.<br><br>The minimum velocity is internally limited to 100 RPM.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.06. | usr_v<br><br>1<br><br>3000<br><br>2147483647 | UINT32<br><br>R/W<br><br>per.<br><br>- | CANopen 304F:10$_h$<br><br>Modbus 20256<br><br>Profibus 20256<br><br>CIP 179.1.16<br><br>ModbusTCP 20256<br><br>EtherCAT 304F:10$_h$<br><br>PROFINET 20256 |
| *IOM1_AI12_v_max* | IOM1 Limitation of velocity at 10 V of AI12.<br><br>The maximum velocity is limited to the setting in CTRL_v_max.<br><br>The minimum velocity is internally limited to 100 RPM.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.06. | usr_v<br><br>1<br><br>3000<br><br>2147483647 | UINT32<br><br>R/W<br><br>per.<br><br>- | CANopen 304F:15$_h$<br><br>Modbus 20266<br><br>Profibus 20266<br><br>CIP 179.1.21<br><br>ModbusTCP 20266<br><br>EtherCAT 304F:15$_h$<br><br>PROFINET 20266 |

## Limitation via Digital Signal Input

The velocity can be limited to a specific value via a digital signal input.

The parameter *IO_v_limit* lets you set the velocity limitation.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IO_v_limit* | Velocity limitation via input.<br><br>A velocity limitation can be activated via a digital input.<br><br>In operating mode Profile Torque, the minimum velocity is internally limited to 100 RPM.<br><br>Modified settings become active immediately. | usr_v<br><br>0<br><br>10<br><br>2147483647 | UINT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:1E$_h$<br><br>Modbus 1596<br><br>Profibus 1596<br><br>CIP 106.1.30<br><br>ModbusTCP 1596<br><br>EtherCAT 3006:1E$_h$<br><br>PROFINET 1596 |

In order to limit the velocity via a digital signal input, you must first parameterize the signal input function "Velocity Limitation", see Digital Signal Inputs and Digital Signal Outputs, page 199.

As of firmware version ≥V01.24 you can configure the signal evaluation of the signal input function via the parameter *IOsigVelLim*.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOsigVelLim* | Signal evaluation for signal input function Velocity Limitation.<br><br>**1 / Normally Closed**: Normally closed NC<br><br>**2 / Normally Open**: Normally open NO<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.24. | -<br><br>1<br><br>2<br><br>2 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3008:27h<br><br>Modbus 2126<br><br>Profibus 2126<br><br>CIP 108.1.39<br><br>ModbusTCP 2126<br><br>EtherCAT 3008:27h<br><br>PROFINET 2126 |

# Limitation of the Current via Signal Inputs

## Limitation via Analog Signal Input

The current can be limited via an analog signal input.

Analog signal inputs are available with the IOM1 module.

The parameters *IOM1_AI11_mode* and *IOM1_AI12_mode* let you select the type of usage of the analog signal inputs.

- If you want to use the analog signal input *AI11*, set the parameter *IOM1_AI11_mode* to the value "Current Limitation".
- If you want to use the analog signal input *AI12*, set the parameter *IOM1_AI12_mode* to the value "Current Limitation".

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOM1_AI11_mode*<br><br>$ConF → i-o-$<br><br>$AI1u$ | IOM1 Type of usage of AI11.<br><br>**0 / None /** $nonE$ : No function<br><br>**1 / Target Velocity /** $SPdS$ : Target velocity for the velocity controller<br><br>**2 / Target Torque /** $trqS$ : Target torque for the current controller<br><br>**3 / Velocity Limitation /** $LSPd$ : Limitation of the reference velocity for the velocity controller<br><br>**4 / Current Limitation /** $Lcur$ : Limitation of the reference current for the current controller<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.06. | -<br><br>0<br><br>1<br><br>4 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 304F:E$_h$<br><br>Modbus 20252<br><br>Profibus 20252<br><br>CIP 179.1.14<br><br>ModbusTCP 20252<br><br>EtherCAT 304F:E$_h$<br><br>PROFINET 20252 |
| *IOM1_AI12_mode*<br><br>$ConF → i-o-$<br><br>$AI2u$ | IOM1 Type of usage of AI12.<br><br>**0 / None /** $nonE$ : No function<br><br>**1 / Target Velocity /** $SPdS$ : Target velocity for the velocity controller<br><br>**2 / Target Torque /** $trqS$ : Target torque for the current controller<br><br>**3 / Velocity Limitation /** $LSPd$ : Limitation of the reference velocity for the velocity controller<br><br>**4 / Current Limitation /** $Lcur$ : Limitation of the reference current for the current controller<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.06. | -<br><br>0<br><br>0<br><br>4 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 304F:13$_h$<br><br>Modbus 20262<br><br>Profibus 20262<br><br>CIP 179.1.19<br><br>ModbusTCP 20262<br><br>EtherCAT 304F:13$_h$<br><br>PROFINET 20262 |

The parameters *IOM1_AI11_I_max* and *IOM1_AI12_I_max* are used to set the value of the limitation for a voltage value of 10 V.

- If you want to use the analog signal input *AI11*, use the parameter *IOM1_AI11_I_max* to set the value of the limitation for a voltage value of 10 V.
- If you want to use the analog signal input *AI12*, use the parameter *IOM1_AI12_I_max* to set the value of the limitation for a voltage value of 10 V.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOM1_AI11_I_max* ⊏ ⍛ ⍴ ⊑ → ⍳ - ⍛ - ⌶ ⌶ ⌶ ⍳ | IOM1 Limitation of current at 10 V of AI11. In increments of 0.01 $A_{rms}$. Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. Available with firmware version ≥V01.06. | $A_{rms}$ 0.00 3.00 463.00 | UINT16 R/W per. - | CANopen 304F:$F_h$ Modbus 20254 Profibus 20254 CIP 179.1.15 ModbusTCP 20254 EtherCAT 304F:$F_h$ PROFINET 20254 |
| *IOM1_AI12_I_max* ⊏ ⍛ ⍴ ⊑ → ⍳ - ⍛ - ⌶ ⌶2 ⍳ | IOM1 Limitation of current at 10 V of AI12. In increments of 0.01 $A_{rms}$. Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. Available with firmware version ≥V01.06. | $A_{rms}$ 0.00 3.00 463.00 | UINT16 R/W per. - | CANopen 304F:$14_h$ Modbus 20264 Profibus 20264 CIP 179.1.20 ModbusTCP 20264 EtherCAT 304F:$14_h$ PROFINET 20264 |

## Limitation via Digital Signal Input

The current can be limited to a specific value via a digital signal input.

The parameter *IO_I_limit* lets you set the current limitation.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IO_I_limit* ⊏ ⍛ ⍴ ⊑ → ⍳ - ⍛ - ⍳⌶ ⍳⍀ | Current limitation via input. A current limit can be activated via a digital input. In increments of 0.01 $A_{rms}$. Modified settings become active immediately. | $A_{rms}$ 0.00 0.20 300.00 | UINT16 R/W per. - | CANopen 3006:$27_h$ Modbus 1614 Profibus 1614 CIP 106.1.39 ModbusTCP 1614 EtherCAT 3006:$27_h$ PROFINET 1614 |

In order to limit the current via a digital signal input, you must first parameterize the signal input function "Current Limitation", see .

As of firmware version ≥V01.24 you can configure the signal evaluation of the signal input function via the parameter *IOsigCurrLim*.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOsigCurrLim* | Signal evaluation for signal input function Current Limitation.<br><br>**1 / Normally Closed**: Normally closed NC<br><br>**2 / Normally Open**: Normally open NO<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.24. | -<br><br>1<br><br>2<br><br>2 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3008:28ₕ<br><br>Modbus 2128<br><br>Profibus 2128<br><br>CIP 108.1.40<br><br>ModbusTCP 2128<br><br>EtherCAT 3008:28ₕ<br><br>PROFINET 2128 |

# Zero Clamp

## Description

The motor can be stopped via a digital signal input. The velocity of the motor must be below a parameterizable velocity value.

## Availability

The signal input function "Zero Clamp" is available in the following operating mode:

- Electronic Gear (velocity synchronization)
- Profile Velocity
- Motion Sequence (Move Velocity)

## Settings

Target velocities in the operating mode Profile Velocity and reference velocities in the operating mode Electronic Gear (Velocity Synchronization) that are below the parameterizable velocity value are interpreted as "Zero".

The signal input function "Zero Clamp" has a hysteresis of 20 %.

The parameter *MON_v_zeroclamp* lets you set the velocity value.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MON_v_zeroclamp* | Velocity limit for Zero Clamp.<br><br>A Zero Clamp operation is only possible if the reference velocity is below the Zero Clamp velocity limit.<br><br>Modified settings become active immediately. | usr_v<br><br>0<br><br>10<br><br>2147483647 | UINT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:28ₕ<br><br>Modbus 1616<br><br>Profibus 1616<br><br>CIP 106.1.40<br><br>ModbusTCP 1616<br><br>EtherCAT 3006:28ₕ<br><br>PROFINET 1616 |

In order to stop the motor via a digital signal input, you must first parameterize the signal input function "Zero Clamp", see Digital Signal Inputs and Digital Signal Outputs, page 199.

# Setting a Signal Output via Parameter

## Description

The digital signal outputs can be set as required via the fieldbus.

In order to set the digital signal outputs via the parameter, you must first parameterize the signal output function "Freely Available", see Digital Signal Inputs and Digital Signal Outputs, page 199.

If one or more of the outputs are not set to "Freely Available", writing to that or those outputs is ignored.

The parameter *IO_DQ_set* lets you set the digital signal outputs.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IO_DQ_set* | Setting the digital outputs directly. Digital outputs can only be set directly if the signal output function has been set to 'Freely Available'. Bit assignments: Bit 0: DQ0 Bit 1: DQ1 Bit 2: DQ2 | - - - - | UINT16 R/W - - | CANopen 3008:11$_h$ Modbus 2082 Profibus 2082 CIP 108.1.17 ModbusTCP 2082 EtherCAT 3008:11$_h$ PROFINET 2082 |

# Starting a Movement via a Signal Input

## Description

The signal input function "Start Profile Positioning" sets the start signal for the movement in the operating mode Profile Position. The positioning movement is then executed when the edge at the digital input rises.

# Position Capture via Signal Input (Vendor-Specific Profile)

## Description

The motor position can be captured when a signal is detected at a Capture input.

# Number of Capture Inputs

The number of Capture inputs depends on the hardware version.

- With hardware version ≥RS03:

  3 Capture inputs: *DI0/CAP1*, *DI1/CAP2* and *DI2/CAP3*

- With hardware version <RS03:

  2 Capture inputs: *DI0/CAP1* and *DI1/CAP2*

# Selection of the Method

The motor position can be captured in 2 different ways:

- One-time position capture

  One-time capture means that the position is captured at the first edge.

- Continuous motor position capture

  Continuous capture means that the motor position is captured anew at every edge. The previously captured value is lost.

The motor position can be captured when the edge at the Capture input rises or falls.

# Accuracy

A jitter of 2 µs results in an inaccuracy of the captured position of approximately 1.6 user-defined units at a velocity of 3000 RPM.

$(3000\ RPM = (3000*16384)/(60*10^6) = 0.8\ usr\_p/µs)$

If the factory settings for scaling are used, 1.6 user-defined units correspond to 0.035 °.

The captured motor position is less accurate during the acceleration phase and the deceleration phase.

# Overview of the Parameters

The following graphics provide an overview of the parameters:



# Setting the Source

The following parameters let you set the source for position capture.

Set the source for position capture with the parameters *Cap1Source*, *Cap2Source* and *Cap3Source*.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *Cap1Source* | Capture input 1 encoder source. **0 / Pact Encoder 1**: Source for capture input 1 is Pact of encoder 1 **1 / Pact Encoder 2**: Source for capture input 1 is Pact of encoder 2 (module) Modified settings become active immediately. Available with firmware version ≥V01.01. | - 0 0 1 | UINT16 R/W - - | CANopen 300A:A$_h$ Modbus 2580 Profibus 2580 CIP 110.1.10 ModbusTCP 2580 EtherCAT 300A:A$_h$ PROFINET 2580 |
| *Cap2Source* | Capture input 2 encoder source. **0 / Pact Encoder 1**: Source for capture input 2 is Pact of encoder 1 **1 / Pact Encoder 2**: Source for capture input 2 is Pact of encoder 2 (module) Modified settings become active immediately. Available with firmware version ≥V01.01. | - 0 0 1 | UINT16 R/W - - | CANopen 300A:B$_h$ Modbus 2582 Profibus 2582 CIP 110.1.11 ModbusTCP 2582 EtherCAT 300A:B$_h$ PROFINET 2582 |
| *Cap3Source* | Capture input 3 encoder source. **0 / Pact Encoder 1**: Source for capture input 3 is Pact of encoder 1 **1 / Pact Encoder 2**: Source for capture input 3 is Pact of encoder 2 (module) Available with hardware version ≥RS03. Modified settings become active immediately. | - 0 0 1 | UINT16 R/W - - | CANopen 300A:15$_h$ Modbus 2602 Profibus 2602 CIP 110.1.21 ModbusTCP 2602 EtherCAT 300A:15$_h$ PROFINET 2602 |

## Setting the Edge

The following parameters let you set the edge for position capture.

Set the desired edge with the parameters *Cap1Config*, *Cap2Config* and *Cap3Config*.

| Parameter name / HMI menu / HMI name | Description | Unit / Minimum value / Factory setting / Maximum value | Data type / R/W / Persistent / Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *Cap1Config* | Capture input 1 configuration.<br>**0 / Falling Edge**: Position capture at falling edge<br>**1 / Rising Edge**: Position capture at rising edge<br>**2 / Both Edges**: Position capture at both edges<br>Modified settings become active immediately. | -<br>0<br>0<br>2 | UINT16<br>R/W<br>-<br>- | CANopen 300A:$2_h$<br>Modbus 2564<br>Profibus 2564<br>CIP 110.1.2<br>ModbusTCP 2564<br>EtherCAT 300A:$2_h$<br>PROFINET 2564 |
| *Cap2Config* | Capture input 2 configuration.<br>**0 / Falling Edge**: Position capture at falling edge<br>**1 / Rising Edge**: Position capture at rising edge<br>**2 / Both Edges**: Position capture at both edges<br>Modified settings become active immediately. | -<br>0<br>0<br>2 | UINT16<br>R/W<br>-<br>- | CANopen 300A:$3_h$<br>Modbus 2566<br>Profibus 2566<br>CIP 110.1.3<br>ModbusTCP 2566<br>EtherCAT 300A:$3_h$<br>PROFINET 2566 |
| *Cap3Config* | Capture input 3 configuration.<br>**0 / Falling Edge**: Position capture at falling edge<br>**1 / Rising Edge**: Position capture at rising edge<br>Available with hardware version ≥RS03.<br>Modified settings become active immediately. | -<br>0<br>0<br>1 | UINT16<br>R/W<br>-<br>- | CANopen 300A:$11_h$<br>Modbus 2594<br>Profibus 2594<br>CIP 110.1.17<br>ModbusTCP 2594<br>EtherCAT 300A:$11_h$<br>PROFINET 2594 |

## Starting Position Capture

The following parameters let you start position capture.

Set the desired method with the parameters *Cap1Activate*, *Cap2Activate* and *Cap3Activate*.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *Cap1Activate* | Capture input 1 start/stop.<br><br>**0 / Capture Stop**: Cancel capture function<br><br>**1 / Capture Once**: Start one-time capture<br><br>**2 / Capture Continuous**: Start continuous capture<br><br>**3 / Reserved**: Reserved<br><br>**4 / Reserved**: Reserved<br><br>In the case of one-time capture, the function is terminated when the first value is captured.<br><br>In the case of continuous capture, the function continues to run.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>-<br><br>4 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 300A:4$_h$<br><br>Modbus 2568<br><br>Profibus 2568<br><br>CIP 110.1.4<br><br>ModbusTCP 2568<br><br>EtherCAT 300A:4$_h$<br><br>PROFINET 2568 |
| *Cap2Activate* | Capture input 2 start/stop.<br><br>**0 / Capture Stop**: Cancel capture function<br><br>**1 / Capture Once**: Start one-time capture<br><br>**2 / Capture Continuous**: Start continuous capture<br><br>**3 / Reserved**: Reserved<br><br>**4 / Reserved**: Reserved<br><br>In the case of one-time capture, the function is terminated when the first value is captured.<br><br>In the case of continuous capture, the function continues to run.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>-<br><br>4 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 300A:5$_h$<br><br>Modbus 2570<br><br>Profibus 2570<br><br>CIP 110.1.5<br><br>ModbusTCP 2570<br><br>EtherCAT 300A:5$_h$<br><br>PROFINET 2570 |
| *Cap3Activate* | Capture input 3 start/stop.<br><br>**0 / Capture Stop**: Cancel capture function<br><br>**1 / Capture Once**: Start one-time capture<br><br>**2 / Capture Continuous**: Start continuous capture<br><br>In the case of one-time capture, the function is terminated when the first value is captured.<br><br>In the case of continuous capture, the function continues to run.<br><br>Available with hardware version ≥RS03.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>-<br><br>2 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 300A:12$_h$<br><br>Modbus 2596<br><br>Profibus 2596<br><br>CIP 110.1.18<br><br>ModbusTCP 2596<br><br>EtherCAT 300A:12$_h$<br><br>PROFINET 2596 |

## Status Messages

The parameter _*CapStatus* indicates the capture status.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _CapStatus | Status of the capture inputs.<br><br>Read access:<br><br>Bit 0: Position captured via input CAP1<br><br>Bit 1: Position captured via input CAP2<br><br>Bit 2: Position captured via input CAP3 | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 300A:1$_h$<br><br>Modbus 2562<br><br>Profibus 2562<br><br>CIP 110.1.1<br><br>ModbusTCP 2562<br><br>EtherCAT 300A:1$_h$<br><br>PROFINET 2562 |

## Captured Position

The captured positions for one-time capture can be read via the following parameters:

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _Cap1Pos | Capture input 1 captured position (one-time).<br><br>Captured position at the time of the "capture signal".<br><br>The captured position is re-calculated after "Position Setting" or "Reference Movement". | usr_p<br><br>-<br><br>-<br><br>- | INT32<br><br>R/-<br><br>-<br><br>- | CANopen 300A:6$_h$<br><br>Modbus 2572<br><br>Profibus 2572<br><br>CIP 110.1.6<br><br>ModbusTCP 2572<br><br>EtherCAT 300A:6$_h$<br><br>PROFINET 2572 |
| _Cap2Pos | Capture input 2 captured position (one-time).<br><br>Captured position at the time of the "capture signal".<br><br>The captured position is re-calculated after "Position Setting" or "Reference Movement". | usr_p<br><br>-<br><br>-<br><br>- | INT32<br><br>R/-<br><br>-<br><br>- | CANopen 300A:7$_h$<br><br>Modbus 2574<br><br>Profibus 2574<br><br>CIP 110.1.7<br><br>ModbusTCP 2574<br><br>EtherCAT 300A:7$_h$<br><br>PROFINET 2574 |
| _Cap3Pos | Capture input 3 captured position (one-time).<br><br>Captured position at the time of the "capture signal".<br><br>The captured position is re-calculated after "Position Setting" or "Reference Movement".<br><br>Available with hardware version ≥RS03. | usr_p<br><br>-<br><br>-<br><br>- | INT32<br><br>R/-<br><br>-<br><br>- | CANopen 300A:13$_h$<br><br>Modbus 2598<br><br>Profibus 2598<br><br>CIP 110.1.19<br><br>ModbusTCP 2598<br><br>EtherCAT 300A:13$_h$<br><br>PROFINET 2598 |

The captured positions for continuous capture can be read via the following parameters:

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _Cap1CountCons | Capture input 1 event counter (continuous). Counts the capture events. The event counter is reset when capture input 1 is activated. By reading this parameter, the parameter "_Cap1PosCons" is updated and locked so it cannot be changed. Both parameter values remain consistent. Available with firmware version ≥V01.12. | - - - - | UINT16 R/- - - | CANopen 300A:17$_h$ Modbus 2606 Profibus 2606 CIP 110.1.23 ModbusTCP 2606 EtherCAT 300A:17$_h$ PROFINET 2606 |
| _Cap1PosCons | Capture input 1 captured position (continuous). Captured position at the time of the "capture signal". The captured position is re-calculated after "Position Setting" or "Reference Movement". By reading the parameter "_Cap1CountCons", this parameter is updated and locked so it cannot be changed. Both parameter values remain consistent. Available with firmware version ≥V01.12. | usr_p - - - | INT32 R/- - - | CANopen 300A:18$_h$ Modbus 2608 Profibus 2608 CIP 110.1.24 ModbusTCP 2608 EtherCAT 300A:18$_h$ PROFINET 2608 |
| _Cap2CountCons | Capture input 2 event counter (continuous). Counts the capture events. The event counter is reset when capture input 2 is activated. By reading this parameter, the parameter "_Cap2PosCons" is updated and locked so it cannot be changed. Both parameter values remain consistent. Available with firmware version ≥V01.12. | - - - - | UINT16 R/- - - | CANopen 300A:19$_h$ Modbus 2610 Profibus 2610 CIP 110.1.25 ModbusTCP 2610 EtherCAT 300A:19$_h$ PROFINET 2610 |
| _Cap2PosCons | Capture input 2 captured position (continuous). Captured position at the time of the "capture signal". The captured position is re-calculated after "Position Setting" or "Reference Movement". By reading the parameter "_Cap2CountCons", this parameter is updated and locked so it cannot be changed. Both parameter values remain consistent. Available with firmware version ≥V01.12. | usr_p - - - | INT32 R/- - - | CANopen 300A:1A$_h$ Modbus 2612 Profibus 2612 CIP 110.1.26 ModbusTCP 2612 EtherCAT 300A:1A$_h$ PROFINET 2612 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _Cap3CountCons_ | Capture input 3 event counter (continuous). Counts the capture events. The event counter is reset when capture input 3 is activated. By reading this parameter, the parameter "_Cap3PosCons" is updated and locked so it cannot be changed. Both parameter values remain consistent. Available with hardware version ≥RS03. Available with firmware version ≥V01.12. | - - - - | UINT16 R/- - - | CANopen 300A:1B$_h$ Modbus 2614 Profibus 2614 CIP 110.1.27 ModbusTCP 2614 EtherCAT 300A:1B$_h$ PROFINET 2614 |
| _Cap3PosCons_ | Capture input 3 captured position (continuous). Captured position at the time of the "capture signal". The captured position is re-calculated after "Position Setting" or "Reference Movement". By reading the parameter "_Cap3CountCons", this parameter is updated and locked so it cannot be changed. Both parameter values remain consistent. Available with hardware version ≥RS03. Available with firmware version ≥V01.12. | usr_p - - - | INT32 R/- - - | CANopen 300A:1C$_h$ Modbus 2616 Profibus 2616 CIP 110.1.28 ModbusTCP 2616 EtherCAT 300A:1C$_h$ PROFINET 2616 |

# Position Capture via Signal Input (DS402 Profile)

## Description

The motor position can be captured when a signal is detected at a Capture input.

## Availability

Available with firmware version ≥V01.16.

## Number of Capture Inputs

Two Capture inputs are available under DS402 profile.
- Capture input: *DI0/CAP1*
- Capture input: *DI1/CAP2*

## Selection of the Method

The motor position can be captured in 2 different ways:
- One-time position capture

  One-time capture means that the position is captured at the first edge.
- Continuous motor position capture

  Continuous capture means that the motor position is captured anew at every edge. The previously captured value is lost.

The motor position can be captured when the edge at the Capture input rises or falls.

## Accuracy

A jitter of 2 μs results in an inaccuracy of the captured position of approximately 1.6 user-defined units at a velocity of 3000 RPM.

(3000 RPM = (3000*16384)/(60*10$^6$) = 0.8 usr_p/μs)

If the factory settings for scaling are used, 1.6 user-defined units correspond to 0.035 °.

The captured motor position is less accurate during the acceleration phase and the deceleration phase.

## Overview of the Parameters

The following graphics provide an overview of the parameters.

Parameters for one-time capture:

| Cap1Source | | Cap2Source | |
|---|---|---|---|

TouchProbeFct

| _Cap1PosRisEdge | _Cap1PosFallEdge | _Cap2PosRisEdge | _Cap2PosFallEdge |
|---|---|---|---|

Parameters for continuous capture:

| Cap1Source | | Cap2Source | |
|---|---|---|---|

TouchProbeFct

| _Cap1CntRise <br> _Cap1PosRisEdge | _Cap1CntFall <br> _Cap1PosFallEdge | _Cap2CntRise <br> _Cap2PosRisEdge | _Cap2CntFall <br> _Cap2PosFallEdge |
|---|---|---|---|

## Setting the Source

The following parameters let you set the source for position capture.

Set the source for position capture with the parameters *Cap1Source* and *Cap2Source*.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *Cap1Source* | Capture input 1 encoder source. **0 / Pact Encoder 1**: Source for capture input 1 is Pact of encoder 1 **1 / Pact Encoder 2**: Source for capture input 1 is Pact of encoder 2 (module) Modified settings become active immediately. Available with firmware version ≥V01.01. | - 0 0 1 | UINT16 R/W - - | CANopen 300A:A$_h$ Modbus 2580 Profibus 2580 CIP 110.1.10 ModbusTCP 2580 EtherCAT 300A:A$_h$ PROFINET 2580 |
| *Cap2Source* | Capture input 2 encoder source. **0 / Pact Encoder 1**: Source for capture input 2 is Pact of encoder 1 **1 / Pact Encoder 2**: Source for capture input 2 is Pact of encoder 2 (module) Modified settings become active immediately. Available with firmware version ≥V01.01. | - 0 0 1 | UINT16 R/W - - | CANopen 300A:B$_h$ Modbus 2582 Profibus 2582 CIP 110.1.11 ModbusTCP 2582 EtherCAT 300A:B$_h$ PROFINET 2582 |

## Adjusting and Starting Position Capture

The following parameter let you adjust and start position capture.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *TouchProbeFct* | Touch Probe function (DS402). Modified settings become active immediately. Available with firmware version ≥V01.16. | - - - - | UINT16 R/W - - | CANopen 60B8:0$_h$ Modbus 7028 Profibus 7028 CIP 127.1.58 ModbusTCP 7028 EtherCAT 60B8:0$_h$ PROFINET 7028 |

| Bit | Value 0 | Value 1 |
|---|---|---|
| 0 | Deactivate Capture input 1 | Activate Capture input 1 |
| 1 | One-time capture | Continuous capture |
| 2 ... 3 | Reserved (must be 0) | - |
| 4 | Disabling capture with rising edge | Enabling capture with rising edge |
| 5 | Disabling capture with falling edge | Enabling capture with falling edge |
| 6 ... 7 | Reserved (must be 0) | - |
| 8 | Deactivate Capture input 2 | Activate Capture input 2 |
| 9 | One-time capture | Continuous capture |
| 10 ... 11 | Reserved (must be 0) | - |

| Bit | Value 0 | Value 1 |
|-----|---------|---------|
| 12 | Disabling capture with rising edge | Enabling capture with rising edge |
| 13 | Disabling capture with falling edge | Enabling capture with falling edge |
| 14 ... 15 | Reserved (must be 0) | - |

## Status Messages

The following parameter lets you indicate the capture status.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|-----------------------------------|-------------|---------------------------------------------------|----------------------------------|--------------------------------|
| _TouchProbeStat | Touch Probe status (DS402). Available with firmware version ≥V01.16. | - - - - | UINT16 R/- - - | CANopen 60B9:0<sub></sub>h Modbus 7030 Profibus 7030 CIP 127.1.59 ModbusTCP 7030 EtherCAT 60B9:0h PROFINET 7030 |

| Bit | Value 0 | Value 1 |
|-----|---------|---------|
| 0 | Capture input 1 deactivated | Capture input 1 activated |
| 1 | Capture input 1 no value captured for rising edge | Capture input 1 value captured for rising edge |
| 2 | Capture input 1 no value captured for falling edge | Capture input 1 value captured for falling edge |
| 3 ... 7 | Reserved | - |
| 8 | Capture input 2 deactivated | Capture input 2 activated |
| 9 | Capture input 2 no value captured for rising edge | Capture input 2 value captured for rising edge |
| 10 | Capture input 2 no value captured for falling edge | Capture input 2 value captured for falling edge |
| 11 ... 15 | Reserved | - |

## Captured Position

The captured position can be read via the following parameters:

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _Cap1PosRisEdge | Capture input 1 captured position at rising edge (DS402).<br><br>This parameter contains the position captured at the point in time a rising edge was detected.<br><br>The captured position is recalculated after "Position Setting" or "Reference Movement".<br><br>Available with firmware version ≥V01.16. | usr_p<br><br>-<br><br>-<br><br>- | INT32<br><br>R/-<br><br>-<br><br>- | CANopen 60BA:0$_h$<br><br>Modbus 2634<br><br>Profibus 2634<br><br>CIP 110.1.37<br><br>ModbusTCP 2634<br><br>EtherCAT 60BA:0$_h$<br><br>PROFINET 2634 |
| _Cap1CntRise | Capture input 1 event counter at rising edges (DS402).<br><br>Counts the capture events at rising edges.<br><br>The event counter is reset when capture input 1 is activated.<br><br>Available with firmware version ≥V01.16. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 300A:2B$_h$<br><br>Modbus 2646<br><br>Profibus 2646<br><br>CIP 110.1.43<br><br>ModbusTCP 2646<br><br>EtherCAT 300A:2B$_h$<br><br>PROFINET 2646 |
| _Cap1PosFallEdge | Capture input 1 captured position at falling edge (DS402).<br><br>This parameter contains the position captured at the point in time a falling edge was detected.<br><br>The captured position is recalculated after "Position Setting" or "Reference Movement".<br><br>Available with firmware version ≥V01.16. | usr_p<br><br>-<br><br>-<br><br>- | INT32<br><br>R/-<br><br>-<br><br>- | CANopen 60BB:0$_h$<br><br>Modbus 2636<br><br>Profibus 2636<br><br>CIP 110.1.38<br><br>ModbusTCP 2636<br><br>EtherCAT 60BB:0$_h$<br><br>PROFINET 2636 |
| _Cap1CntFall | Capture input 1 event counter at falling edges (DS402).<br><br>Counts the capture events at falling edges.<br><br>The event counter is reset when capture input 1 is activated.<br><br>Available with firmware version ≥V01.16. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 300A:2C$_h$<br><br>Modbus 2648<br><br>Profibus 2648<br><br>CIP 110.1.44<br><br>ModbusTCP 2648<br><br>EtherCAT 300A:2C$_h$<br><br>PROFINET 2648 |
| _Cap2PosRisEdge | Capture input 2 captured position at rising edge (DS402).<br><br>This parameter contains the position captured at the point in time a rising edge was detected.<br><br>The captured position is recalculated after "Position Setting" or "Reference Movement".<br><br>Available with firmware version ≥V01.16. | usr_p<br><br>-<br><br>-<br><br>- | INT32<br><br>R/-<br><br>-<br><br>- | CANopen 60BC:0$_h$<br><br>Modbus 2638<br><br>Profibus 2638<br><br>CIP 110.1.39<br><br>ModbusTCP 2638<br><br>EtherCAT 60BC:0$_h$<br><br>PROFINET 2638 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _Cap2CntRise | Capture input 2 event counter at rising edges (DS402).<br><br>Counts the capture events at rising edges.<br><br>The event counter is reset when capture input 2 is activated.<br><br>Available with firmware version ≥V01.16. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 300A:2D$_h$<br><br>Modbus 2650<br><br>Profibus 2650<br><br>CIP 110.1.45<br><br>ModbusTCP 2650<br><br>EtherCAT 300A:2D$_h$<br><br>PROFINET 2650 |
| _Cap2PosFallEdge | Capture input 2 captured position at falling edge (DS402).<br><br>This parameter contains the position captured at the point in time a falling edge was detected.<br><br>The captured position is recalculated after "Position Setting" or "Reference Movement".<br><br>Available with firmware version ≥V01.16. | usr_p<br><br>-<br><br>-<br><br>- | INT32<br><br>R/-<br><br>-<br><br>- | CANopen 60BD:0$_h$<br><br>Modbus 2640<br><br>Profibus 2640<br><br>CIP 110.1.40<br><br>ModbusTCP 2640<br><br>EtherCAT 60BD:0$_h$<br><br>PROFINET 2640 |
| _Cap2CntFall | Capture input 2 event counter at falling edges (DS402).<br><br>Counts the capture events at falling edges.<br><br>The event counter is reset when capture input 2 is activated.<br><br>Available with firmware version ≥V01.16. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 300A:2E$_h$<br><br>Modbus 2652<br><br>Profibus 2652<br><br>CIP 110.1.46<br><br>ModbusTCP 2652<br><br>EtherCAT 300A:2E$_h$<br><br>PROFINET 2652 |
| _CapEventCounters | Capture inputs 1 and 2 summary of event counters (DS402).<br><br>This parameter contains the counted capture events.<br><br>Bits 0 ... 3: _Cap1CntRise (lowest 4 bits)<br><br>Bits 4 ... 7: _Cap1CntFall (lowest 4 bits)<br><br>Bits 8 ... 11: _Cap2CntRise (lowest 4 bits)<br><br>Bits 12 ... 15: _Cap2CntFall (lowest 4 bits)<br><br>Available with firmware version ≥V01.16. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 300A:2F$_h$<br><br>Modbus 2654<br><br>Profibus 2654<br><br>CIP 110.1.47<br><br>ModbusTCP 2654<br><br>EtherCAT 300A:2F$_h$<br><br>PROFINET 2654 |

# Relative Movement After Capture (RMAC)

## Description

Relative Movement After Capture (RMAC) starts a relative movement via a signal input while another movement is running.

The target position and the velocity can be parameterized.

**1** Movement with set operating mode (for example operating mode Profile Velocity)

**2** Start of the relative movement after capture with the signal input function Start Signal Of RMAC

**3a** Relative movement after capture is performed with unchanged velocity

**3b** Relative movement after capture is performed with parameterized velocity

**4** Target position reached

# Availability

A Relative Movement After Capture (RMAC) can be started in the following operating modes:

- Jog
- Electronic Gear
- Profile Torque
- Profile Velocity
- Profile Position
- Motion Sequence (Move Absolute, Move Additive, Move Relative, Move Velocity and Gear)

Available with hardware version ≥RS03.

# Signal Input Functions

In local control mode, the following signal input functions are required to start the relative movement:

| Signal input function | Meaning | Activation |
|---|---|---|
| Activate RMAC | Activation of relative movement after capture | 1 level |
| Start Signal Of RMAC | Start signal for relative movement | Adjustable via parameter *RMAC_Edge* |
| Activate Operating Mode | When the relative movement has terminated, the operating mode is resumed. | Rising edge |

In fieldbus control mode, the signal input function "Start Signal Of RMAC" is required to start the relative movement.

The signal input functions must have been parameterized, see Digital Signal Inputs and Digital Signal Outputs, page 199.

## Status Indication

The status is available via a signal output or via the fieldbus.

In order to read the status via a signal output, you must first parameterize the signal output function "RMAC Active Or Finished", see Digital Signal Inputs and Digital Signal Outputs, page 199.

In order to read the status via the fieldbus, you must set the status bits of the status parameters, see Adjustable Bits of the Status Parameters, page 378.

In addition, the status is available via the parameters _RMAC_Status and _RMAC_DetailStatus.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _RMAC_Status | Status of relative movement after capture.<br><br>**0 / Not Active**: Not active<br><br>**1 / Active Or Finished**: Relative movement after capture is active or finished<br><br>Available with firmware version ≥V01.10. | -<br><br>0<br><br>-<br><br>1 | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 3023:11$_h$<br><br>Modbus 8994<br><br>Profibus 8994<br><br>CIP 135.1.17<br><br>ModbusTCP 8994<br><br>EtherCAT 3023:11$_h$<br><br>PROFINET 8994 |
| _RMAC_DetailStatus | Detailed status of relative movement after capture (RMAC).<br><br>**0 / Not Activated**: Not activated<br><br>**1 / Waiting**: Waiting for capture signal<br><br>**2 / Moving**: Relative movement after capture running<br><br>**3 / Interrupted**: Relative movement after capture interrupted<br><br>**4 / Finished**: Relative movement after capture terminated<br><br>Available with firmware version ≥V01.16. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 3023:12$_h$<br><br>Modbus 8996<br><br>Profibus 8996<br><br>CIP 135.1.18<br><br>ModbusTCP 8996<br><br>EtherCAT 3023:12$_h$<br><br>PROFINET 8996 |

## Activates Relative Movement After Capture

Relative Movement After Capture (RMAC) must be activated before it can be started.

In local control mode, Relative Movement After Capture is activated via the signal input function "Activate RMAC".

In fieldbus control mode, Relative Movement After Capture (RMAC) is activated via the following parameter:

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *RMAC_Activate* | Activation of relative movement after capture. **0 / Off**: Off **1 / On**: On Modified settings become active immediately. Available with firmware version ≥V01.10. | - 0 0 1 | UINT16 R/W - - | CANopen 3023:C$_h$ Modbus 8984 Profibus 8984 CIP 135.1.12 ModbusTCP 8984 EtherCAT 3023:C$_h$ PROFINET 8984 |

In fieldbus control mode, it is also possible to activate relative Movement After Capture (RMAC) via the signal input function "Activate RMAC".

## Target Values

The target position and the velocity for the relative movement are set via the following parameters.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *RMAC_Position* | Target position of relative movement after capture. Minimum/maximum values depend on: - Scaling factor Modified settings become active the next time the motor moves. Available with firmware version ≥V01.10. | usr_p - 0 - | INT32 R/W per. - | CANopen 3023:D$_h$ Modbus 8986 Profibus 8986 CIP 135.1.13 ModbusTCP 8986 EtherCAT 3023:D$_h$ PROFINET 8986 |
| *RMAC_Velocity* | Velocity of relative movement after capture. Value 0: Use actual motor velocity Value >0: Value is the target velocity The adjustable value is internally limited to the setting in RAMP_v_max. Modified settings become active the next time the motor moves. Available with firmware version ≥V01.10. | usr_v 0 0 2147483647 | UINT32 R/W per. - | CANopen 3023:E$_h$ Modbus 8988 Profibus 8988 CIP 135.1.14 ModbusTCP 8988 EtherCAT 3023:E$_h$ PROFINET 8988 |

## Edge for the Start Signal

The edge which is to trigger the relative movement is set via the following parameter.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *RMAC_Edge* | Edge of capture signal for relative movement after capture.<br><br>**0 / Falling edge**: Falling edge<br><br>**1 / Rising edge**: Rising edge<br><br>Available with firmware version ≥V01.10. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3023:10h<br><br>Modbus 8992<br><br>Profibus 8992<br><br>CIP 135.1.16<br><br>ModbusTCP 8992<br><br>EtherCAT 3023:10h<br><br>PROFINET 8992 |

## Response to Overtravelling of the Target Position

Depending on the set velocity, target position and deceleration ramp, the target position may be overtraveled.

The response to overtravelling of the target position is set via the following parameter.
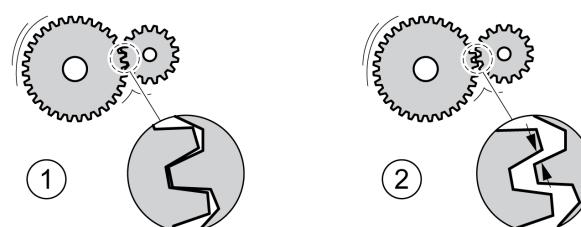
| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *RMAC_Response* | Response if target position is overtraveled.<br><br>**0 / Error Class 1**: Error class 1<br><br>**1 / No Movement To Target Position**: No movement to target position<br><br>**2 / Movement To Target Position**: Movement to target position<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.10. | -<br><br>0<br><br>0<br><br>2 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3023:Fh<br><br>Modbus 8990<br><br>Profibus 8990<br><br>CIP 135.1.15<br><br>ModbusTCP 8990<br><br>EtherCAT 3023:Fh<br><br>PROFINET 8990 |

# Backlash Compensation

## Description

By setting backlash compensation, you can compensate for mechanical backlash.

Example of mechanical backlash



**1** Example of low mechanical backlash

**2** Example of high mechanical backlash

When backlash compensation is activated, the drive automatically compensates for the mechanical backlash during each movement.

## Availability

Available with firmware version ≥V01.14.

Backlash compensation is possible in the following operating modes:

- Jog
- Electronic Gear (position synchronization)
- Profile Position
- Interpolated Position
- Homing
- Motion Sequence (Move Absolute, Move Additive, Move Relative, Reference Movement and Gear)

## Parameterization

To use backlash compensation, you must set the amount of backlash.

The parameter *BLSH_Position* lets you set the amount of backlash in user-defined units.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *BLSH_Position* | Position value for backlash compensation.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.14. | usr_p<br><br>0<br><br>0<br><br>2147483647 | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:42$_h$<br><br>Modbus 1668<br><br>Profibus 1668<br><br>CIP 106.1.66<br><br>ModbusTCP 1668<br><br>EtherCAT 3006:42$_h$<br><br>PROFINET 1668 |

In addition, you can set a processing time. The processing time specifies the period of time during which the mechanical backlash is to be compensated for.

The parameter *BLSH_Time* lets you set the processing time in ms.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *BLSH_Time* | Processing time for backlash compensation.<br><br>Value 0: Immediate backlash compensation<br><br>Value >0: Processing time for backlash compensation<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.14. | ms<br><br>0<br><br>0<br><br>16383 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:44$_h$<br><br>Modbus 1672<br><br>Profibus 1672<br><br>CIP 106.1.68<br><br>ModbusTCP 1672<br><br>EtherCAT 3006:44$_h$<br><br>PROFINET 1672 |

## Activating Backlash Compensation

Before you can activate backlash compensation, there must be a movement in positive or negative direction. Backlash compensation is activated with the parameter *BLSH_Mode*.

- Start a movement in positive direction or in negative direction. This movement must last as long as it takes to move the mechanical system connected to the motor.

- If the movement was in positive direction (positive target values), activate backlash compensation with the value "OnAfterPositiveMovement".

- If the movement was in negative direction (negative target values), activate backlash compensation with the value "OnAfterNegativeMovement".

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *BLSH_Mode* | Processing mode of backlash compensation. **0 / Off**: Backlash compensation is off **1 / OnAfterPositiveMovement**: Backlash compensation is on, last movement was in positive direction **2 / OnAfterNegativeMovement**: Backlash compensation is on, last movement was in negative direction Modified settings become active immediately. Available with firmware version ≥V01.14. | - 0 0 2 | UINT16 R/W per. - | CANopen 3006:41$_h$ Modbus 1666 Profibus 1666 CIP 106.1.65 ModbusTCP 1666 EtherCAT 3006:41$_h$ PROFINET 1666 |

# Functions for Monitoring Movements

## Limit Switches

### Description

The use of limit switches can help protect against some hazards (for example, collision with mechanical stop caused by incorrect reference values).

---

### ⚠ WARNING

**LOSS OF CONTROL**

- Ensure that limit switches are installed as determined by your risk assessment.
- Verify correct connection of the limit switches.
- Verify that the limit switches are sufficiently distant from the mechanical end to allow an adequate stopping distance.
- Verify correct parameterization and function of the limit switches.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

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Movements can be monitored using limit switches. A positive limit switch and a negative limit switch can be used for monitoring.

If the positive or negative limit switch are tripped, the movement stops. An error message is generated and the operating state switches to **7** Quick Stop Active.

The error message can be reset by means of a "Fault Reset". The operating state switches back to **6** Operation Enabled.

The movement can continue, however, only in the opposite direction. For example, if the positive limit switch was triggered, further movement is only possible in negative direction. In the case of further movement in positive direction, a new error message is generated and the operating state switches back to **7** Quick Stop Active.

The parameters *IOsigLIMP* and *IOsigLIMN* are used to set the type of limit switch.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOsigLIMP* | Signal evaluation for positive limit switch. **0 / Inactive**: Inactive **1 / Normally Closed**: Normally closed NC **2 / Normally Open**: Normally open NO Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. | - 0 1 2 | UINT16 R/W per. - | CANopen 3006:10$_h$ Modbus 1568 Profibus 1568 CIP 106.1.16 ModbusTCP 1568 EtherCAT 3006:10$_h$ PROFINET 1568 |
| *IOsigLIMN* | Signal evaluation for negative limit switch. **0 / Inactive**: Inactive **1 / Normally Closed**: Normally closed NC **2 / Normally Open**: Normally open NO Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. | - 0 1 2 | UINT16 R/W per. - | CANopen 3006:F$_h$ Modbus 1566 Profibus 1566 CIP 106.1.15 ModbusTCP 1566 EtherCAT 3006:F$_h$ PROFINET 1566 |

The signal input functions "Positive Limit Switch (LIMP)" and "Negative Limit Switch (LIMN)" must have been parameterized, see Digital Signal Inputs and Digital Signal Outputs, page 199.

# Reference Switch

## Description

The reference switch is only active in the operating mode Homing and in the operating mode Motion Sequence (Reference Movement).

The parameter *IOsigREF* lets you set the type of reference switch.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOsigREF* | Signal evaluation for reference switch. **1 / Normally Closed**: Normally closed NC **2 / Normally Open**: Normally open NO The reference switch is only active while a reference movement to the reference switch is processed. Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. | - 1 1 2 | UINT16 R/W per. - | CANopen 3006:E$_h$ Modbus 1564 Profibus 1564 CIP 106.1.14 ModbusTCP 1564 EtherCAT 3006:E$_h$ PROFINET 1564 |

The signal input function "Reference Switch (REF)" must have been parameterized, see Digital Signal Inputs and Digital Signal Outputs, page 199.

# Software Limit Switches

## Description

Movements can be monitored using software limit switches. A positive position limit and a negative position limit can be set for monitoring.

If the positive or negative position limit switch are reached, the movement stops. An error message is generated and the operating state switches to **7** Quick Stop Active.

The error message can be reset by means of a "Fault Reset". The operating state switches back to **6** Operation Enabled.

The movement can continue, however, only in the opposite direction of the position limit. For example, if the positive position limit was reached, further movement is only possible in negative direction. In the case of further movement in positive direction, a new error message is generated and the operating state switches back to **7** Quick Stop Active.

## Prerequisite

Software limit switch monitoring only works with a valid zero point, see Size of the Movement Range, page 183.

## Behavior in Operating Modes with Target Positions

In operating modes with target positions, the movement is started even if the target position is beyond the positive position limit or the negative position limit. The movement is stopped so that the motor comes to a standstill at the position limit. After standstill, the drive transitions to the operating state Quick Stop Active.

In the following operating modes, the target position is verified prior to the start of a movement so that the position limit is not exceeded regardless of the target position.

- Jog (step movement)
- Profile Position
- Motion Sequence (Move Absolute, Move Additive and Move Relative)

## Behavior in Operating Modes Without Target Positions

In the following operating modes, a Quick Stop is triggered at the position limit.

- Jog (continuous movement)
- Electronic Gear
- Profile Torque
- Profile Velocity
- Motion Sequence (Move Velocity and Gear)

As of firmware version ≥V01.16, you can use the parameter *MON_SWLimMode* to set the behavior for approaching a position limit.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MON_SWLimMode* | Behavior when position limit is reached. **0 / Standstill Behind Position Limit**: Quick Stop is triggered at position limit and standstill is reached behind position limit **1 / Standstill At Position Limit**: Quick Stop is triggered in front of position limit and standstill is reached at position limit Modified settings become active immediately. Available with firmware version ≥V01.16. | - 0 0 1 | UINT16 R/W per. - | CANopen 3006:47$_h$ Modbus 1678 Profibus 1678 CIP 106.1.71 ModbusTCP 1678 EtherCAT 3006:47$_h$ PROFINET 1678 |

Standstill at the position limit in operating modes without target position requires the parameter *LIM_QStopReact* to be set to "Deceleration ramp (Quick Stop)", see Stopping Movement with Quick Stop, page 322. If the parameter *LIM_QStopReact* is set to "Torque ramp (Quick Stop)", the movement may come to a standstill in front of or behind the position limit due to different loads.

## Activation

The software limit switches are activated via the parameter *MON_SW_Limits*.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MON_SW_Limits* | Activation of software limit switches. **0 / None**: Deactivated **1 / SWLIMP**: Activation of software limit switches positive direction **2 / SWLIMN**: Activation of software limit switches negative direction **3 / SWLIMP+SWLIMN**: Activation of software limit switches both directions Software limit switches can only be activated if the zero point is valid. Modified settings become active immediately. | - 0 0 3 | UINT16 R/W per. - | CANopen 3006:3$_h$ Modbus 1542 Profibus 1542 CIP 106.1.3 ModbusTCP 1542 EtherCAT 3006:3$_h$ PROFINET 1542 |

## Setting Position Limits

The software limit switches are set via the parameters *MON_swLimP* and *MON_swLimN*.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MON_swLimP* | Positive position limit for software limit switch.<br><br>If a user-defined value entered is outside of the permissible range, the limit switch limits are automatically set to the maximum user-defined value.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled. | usr_p<br><br>-<br><br>2147483647<br><br>- | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 607D:2$_h$<br><br>Modbus 1544<br><br>Profibus 1544<br><br>CIP 106.1.4<br><br>ModbusTCP 1544<br><br>EtherCAT 607D:2$_h$<br><br>PROFINET 1544 |
| *MON_swLimN* | Negative position limit for software limit switch.<br><br>See description 'MON_swLimP'.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled. | usr_p<br><br>-<br><br>-2147483648<br><br>- | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 607D:1$_h$<br><br>Modbus 1546<br><br>Profibus 1546<br><br>CIP 106.1.5<br><br>ModbusTCP 1546<br><br>EtherCAT 607D:1$_h$<br><br>PROFINET 1546 |

# Load-Dependent Position Deviation (Following Error)

## Description

The load-dependent position deviation is the difference between the reference position and the actual position caused by the load inertia.

Parameters are available to read the load-dependent position deviation during operation and the maximum position deviation reached since the last power cycle.

The maximum permissible load-dependent position deviation can be parameterized. In addition, you can set the error class.

## Availability

Monitoring of the load-dependent position deviation is available in the following operating modes:

- Jog
- Electronic Gear (position synchronization)
- Profile Position
- Homing
- Motion Sequence (Move Absolute, Move Additive, Move Relative and Reference Movement)

## Reading the Position Deviation

The following parameters let you read the load-dependent position deviation.

| Parameter name / HMI menu / HMI name | Description | Unit / Minimum value / Factory setting / Maximum value | Data type / R/W / Persistent / Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _p_dif_load_usr | Load-dependent position deviation between reference and actual positions.<br><br>The load-dependent position deviation is the difference between the reference position and the actual position caused by the load. This value is used for following error monitoring.<br><br>Available with firmware version ≥V01.03. | usr_p<br>-2147483648<br>-<br>2147483647 | INT32<br>R/-<br>-<br>- | CANopen 301E:16$_h$<br>Modbus 7724<br>Profibus 7724<br>CIP 130.1.22<br>ModbusTCP 7724<br>EtherCAT 301E:16$_h$<br>PROFINET 7724 |

The following parameters let you read the maximum value of the load-dependent position deviation reached since the last power cycle.

| Parameter name / HMI menu / HMI name | Description | Unit / Minimum value / Factory setting / Maximum value | Data type / R/W / Persistent / Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _p_dif_load_peak_usr | Maximum value of the load-dependent position deviation.<br><br>This parameter contains the maximum load-dependent position deviation reached so far. A write access resets this value.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.03. | usr_p<br>0<br>-<br>2147483647 | INT32<br>R/W<br>-<br>- | CANopen 301E:15$_h$<br>Modbus 7722<br>Profibus 7722<br>CIP 130.1.21<br>ModbusTCP 7722<br>EtherCAT 301E:15$_h$<br>PROFINET 7722 |

## Setting the Maximum Values for the Position Deviation

The following parameter lets you set the threshold for the maximum load-dependent position deviation that is to trigger an error of error class 0.

| Parameter name / HMI menu / HMI name | Description | Unit / Minimum value / Factory setting / Maximum value | Data type / R/W / Persistent / Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| MON_p_dif_warn | Advisory limit of the load-dependent position deviation (error class 0).<br><br>100.0 % correspond to the maximum position deviation (following error) as specified by means of parameter MON_p_dif_load.<br><br>Modified settings become active immediately. | %<br>0<br>75<br>100 | UINT16<br>R/W<br>per.<br>- | CANopen 3006:29$_h$<br>Modbus 1618<br>Profibus 1618<br>CIP 106.1.41<br>ModbusTCP 1618<br>EtherCAT 3006:29$_h$<br>PROFINET 1618 |

The following parameters let you set the maximum load-dependent position deviation at which a movement is canceled with an error of error classes 1, 2, or 3.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MON_p_dif_load_usr* | Maximum load-dependent position deviation. The load-dependent position deviation is the difference between the reference position and the actual position caused by the load. The minimum value, the factory setting and the maximum value depend on the scaling factor. Modified settings become active immediately. Available with firmware version ≥V01.03. | usr_p 1 16384 2147483647 | INT32 R/W per. - | CANopen 3006:3E$_h$ Modbus 1660 Profibus 1660 CIP 106.1.62 ModbusTCP 1660 EtherCAT 3006:3E$_h$ PROFINET 1660 |

## Setting the Error Class

The following parameter lets you set the error class for an excessively high load-dependent position deviation.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *ErrorResp_p_dif* | Error response to excessively high load-dependent position deviation. **1 / Error Class 1**: Error class 1 **2 / Error Class 2**: Error class 2 **3 / Error Class 3**: Error class 3 Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. | - 1 3 3 | UINT16 R/W per. - | CANopen 3005:B$_h$ Modbus 1302 Profibus 1302 CIP 105.1.11 ModbusTCP 1302 EtherCAT 3005:B$_h$ PROFINET 1302 |

# Load-Dependent Velocity Deviation

## Description

The load-dependent velocity deviation is the difference between the reference velocity and the actual velocity caused by the load.

The maximum permissible load-dependent velocity deviation can be parameterized. In addition, you can set the error class.

## Availability

Monitoring of the load-dependent velocity deviation is available in the following operating modes:

- Electronic Gear (velocity synchronization)
- Profile Velocity

## Reading the Velocity Deviation

The following parameters let you read the load-dependent velocity deviation.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _v_dif_usr | Load-dependent velocity deviation. The load-dependent velocity deviation is the difference between reference velocity and actual velocity. Available with firmware version ≥V01.26. | usr_v -2147483648 - 2147483647 | INT32 R/- - - | CANopen 301E:2C$_h$ Modbus 7768 Profibus 7768 CIP 130.1.44 ModbusTCP 7768 EtherCAT 301E:2C$_h$ PROFINET 7768 |

## Setting the Maximum Values for the Velocity Deviation

The following parameters let you specify the size of the window for the maximum load-dependent velocity deviation at which a movement is canceled.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| MON_VelDiff | Maximum load-dependent velocity deviation. Value 0: Monitoring deactivated. Value >0: Maximum value Modified settings become active immediately. Available with firmware version ≥V01.26. | usr_v 0 0 2147483647 | UINT32 R/W per. - | CANopen 3006:4B$_h$ Modbus 1686 Profibus 1686 CIP 106.1.75 ModbusTCP 1686 EtherCAT 3006:4B$_h$ PROFINET 1686 |
| MON_VelDiff_Time | Time window for maximum load-dependent velocity deviation. Value 0: Monitoring deactivated. Value >0: Time window for maximum value Modified settings become active immediately. Available with firmware version ≥V01.26. | ms 0 10 - | UINT16 R/W per. - | CANopen 3006:4C$_h$ Modbus 1688 Profibus 1688 CIP 106.1.76 ModbusTCP 1688 EtherCAT 3006:4C$_h$ PROFINET 1688 |

## Setting the Error Class

The following parameter lets you set the error class for an excessively high load-dependent velocity deviation.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *ErrorResp_v_dif* | Error response to excessively high load-dependent velocity deviation.<br><br>**1 / Error Class 1**: Error class 1<br><br>**2 / Error Class 2**: Error class 2<br><br>**3 / Error Class 3**: Error class 3<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.26. | -<br><br>1<br><br>3<br><br>3 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3005:3C$_h$<br><br>Modbus 1400<br><br>Profibus 1400<br><br>CIP 105.1.60<br><br>ModbusTCP 1400<br><br>EtherCAT 3005:3C$_h$<br><br>PROFINET 1400 |

# Motor Standstill and Direction of Movement

## Availability
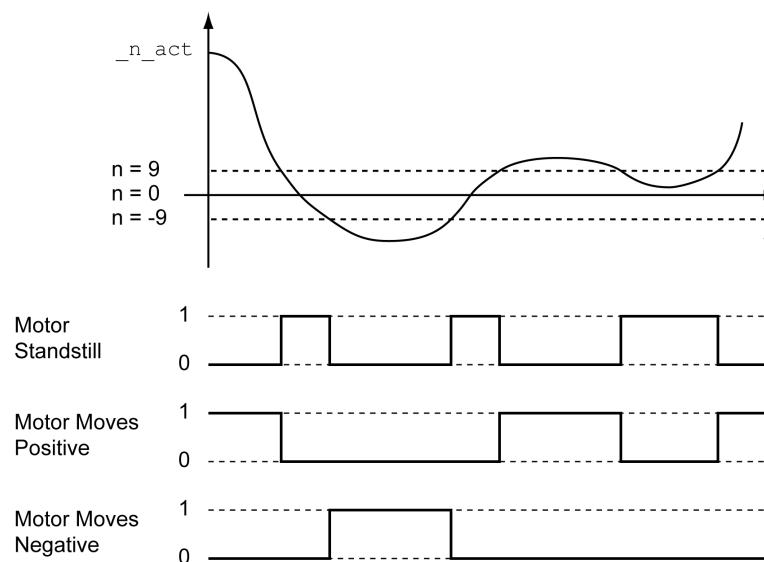
Monitoring depends on the firmware version

- Motor standstill: Available with firmware version ≥V01.00.
- Direction of movement: Available with firmware version ≥V01.14.

## Description

The status of a movement can be monitored. You can determine whether the motor is at a standstill or whether it moves in a specific direction.

A velocity of <9 RPM is interpreted as standstill.



The status is available via signal outputs. In order to read the status, you must first parameterize the signal output functions "Motor Standstill", "Motor Moves Positive" or "Motor Moves Negative", see Digital Signal Inputs and Digital Signal Outputs, page 199.

# Torque Window

## Description

The torque window allows you to monitor whether the motor has reached the target torque.
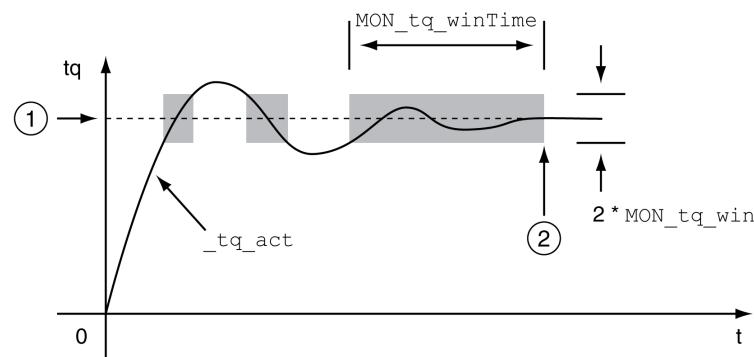
If the difference between the target torque and the actual torque remains in the torque window for the time *MON_tq_winTime*, the target torque is considered to have been reached.

## Availability

The torque window is available in the following operating modes.

- Profile Torque

## Settings



**1** Target torque

**2** Target torque reached (the actual torque did not exceed the permissible deviation *MON_tq_win* during time *MON_tq_winTime*).

The parameters *MON_tq_win* and *MON_tq_winTime* specify the size of the window.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MON_tq_win* | Torque window, permissible deviation. The torque window can only be activated in operating mode Profile Torque. In increments of 0.1 %. Modified settings become active immediately. | % 0.0 3.0 3000.0 | UINT16 R/W per. - | CANopen 3006:2D$_h$ Modbus 1626 Profibus 1626 CIP 106.1.45 ModbusTCP 1626 EtherCAT 3006:2D$_h$ PROFINET 1626 |
| *MON_tq_winTime* | Torque window, time. Value 0: Torque window monitoring deactivated Changing the value causes a restart of torque monitoring. Torque window is only used in operating mode Profile Torque. Modified settings become active immediately. | ms 0 0 16383 | UINT16 R/W per. - | CANopen 3006:2E$_h$ Modbus 1628 Profibus 1628 CIP 106.1.46 ModbusTCP 1628 EtherCAT 3006:2E$_h$ PROFINET 1628 |

# Velocity Window

## Description

The velocity window allows you to monitor whether the motor has reached the target velocity.
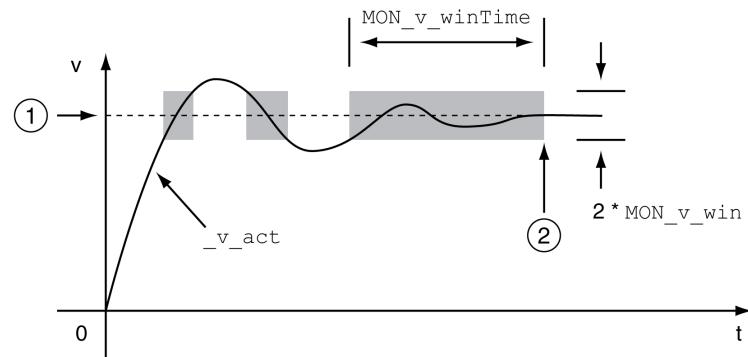
If the difference between the target velocity and the actual velocity remains in the velocity window for the time *MON_v_winTime*, the target velocity is considered to have been reached.

## Availability

The velocity window is available in the following operating modes.

- Electronic Gear (velocity synchronization)
- Profile Velocity

## Settings



**1** Target velocity

**2** Target velocity reached (the target velocity did not exceed the permissible deviation *MON_v_win* during time *MON_v_winTime*).

The parameters *MON_v_win* and *MON_v_winTime* specify the size of the window.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MON_v_win* | Velocity window, permissible deviation.<br><br>Modified settings become active immediately.<br><br>* Datatype for CANopen: UINT16 | usr_v<br><br>1<br><br>10<br><br>2147483647 | UINT32*<br><br>R/W<br><br>per.<br><br>- | CANopen 606D:0$_h$<br><br>Modbus 1576<br><br>Profibus 1576<br><br>CIP 106.1.20<br><br>ModbusTCP 1576<br><br>EtherCAT 606D:0$_h$<br><br>PROFINET 1576 |
| *MON_v_winTime* | Velocity window, time.<br><br>Value 0: Velocity window monitoring deactivated<br><br>Changing the value causes a restart of velocity monitoring.<br><br>Modified settings become active immediately. | ms<br><br>0<br><br>0<br><br>16383 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 606E:0$_h$<br><br>Modbus 1578<br><br>Profibus 1578<br><br>CIP 106.1.21<br><br>ModbusTCP 1578<br><br>EtherCAT 606E:0$_h$<br><br>PROFINET 1578 |

# Standstill Window

## Description

The standstill window allows you to monitor whether the motor has reached the target position.
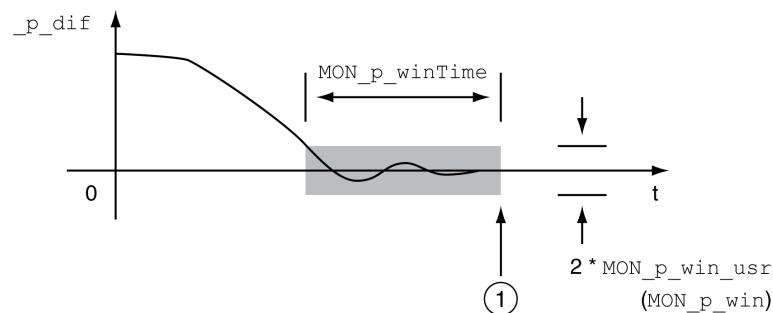
If the difference between the target position and the actual position remains in the standstill window for the time *MON_p_winTime*, the target position is considered to have been reached.

## Availability

The standstill window is available in the following operating modes.

- Jog (step movement)
- Profile Position
- Homing
- Motion Sequence (Move Absolute, Move Additive, Move Relative and Reference Movement)

## Settings



**1** Target position reached (the actual position did not exceed the permissible deviation *MON_p_win_usr* during time *MON_p_winTime*).

The parameters *MON_p_win_usr(MON_p_win)* and *MON_p_winTime* specify the size of the window.

The parameter *MON_p_winTout* can be used to set the period of time after which a detected error is signaled if the standstill window was not reached.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MON_p_win_usr* | Standstill window, permissible control deviation. The control deviation for the standstill window time must be within this range for a standstill of the drive to be detected. Processing of the standstill window must be activated via the parameter MON_p_winTime. The minimum value, the factory setting and the maximum value depend on the scaling factor. Modified settings become active immediately. Available with firmware version ≥V01.03. | usr_p 0 16 2147483647 | INT32 R/W per. - | CANopen 3006:40h Modbus 1664 Profibus 1664 CIP 106.1.64 ModbusTCP 1664 EtherCAT 3006:40h PROFINET 1664 |
| *MON_p_win* | Standstill window, permissible control deviation. The control deviation for the standstill window time must be within this range for a standstill of the drive to be detected. Processing of the standstill window must be activated via the parameter MON_p_winTime. The parameter MON_p_win_usr allows you to enter the value in user-defined units. In increments of 0.0001 revolution. Modified settings become active immediately. * Datatype for CANopen: UINT32 | revolution 0.0000 0.0010 3.2767 | UINT16* R/W per. - | CANopen 6067:0h Modbus 1608 Profibus 1608 CIP 106.1.36 ModbusTCP 1608 EtherCAT 6067:0h PROFINET 1608 |
| *MON_p_winTime* | Standstill window, time. Value 0: Monitoring of standstill window deactivated Value >0: Time in ms during which the control deviation must be in the standstill window Modified settings become active immediately. | ms 0 0 32767 | UINT16 R/W per. - | CANopen 6068:0h Modbus 1610 Profibus 1610 CIP 106.1.37 ModbusTCP 1610 EtherCAT 6068:0h PROFINET 1610 |
| *MON_p_winTout* | Timeout time for standstill window monitoring. Value 0: Timeout monitoring deactivated Value >0: Timeout time in ms Standstill window processing values are set via MON_p_win and MON_p_winTime. Time monitoring starts when the target position (reference position of position controller) is reached or when the profile generator has finished processing. Modified settings become active immediately. | ms 0 0 16000 | UINT16 R/W per. - | CANopen 3006:26h Modbus 1612 Profibus 1612 CIP 106.1.38 ModbusTCP 1612 EtherCAT 3006:26h PROFINET 1612 |

# Position Register
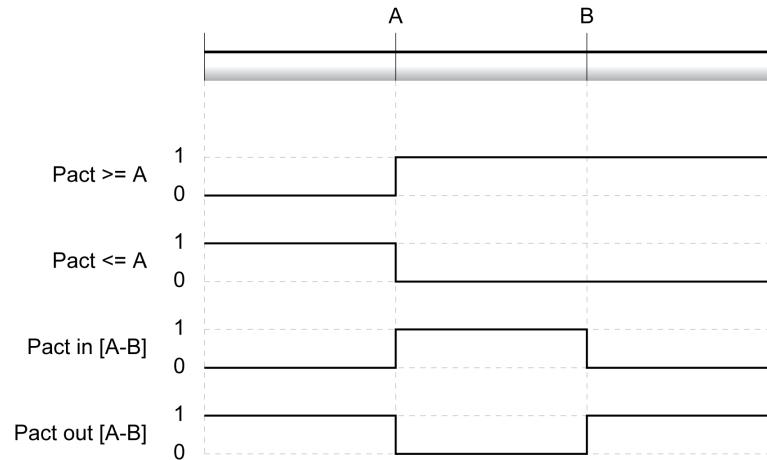
## Description

The position register allows you to monitor whether the motor is within a parameterizable position range.

A movement can be monitored using one of 4 methods:

- The motor position is greater than or equal to comparison value A.
- The motor position is less than or equal to comparison value A.
- The motor position is within the range between comparison value A and comparison value B.
- The motor position is outside the range between comparison value A and comparison value B.

Separate channels are available for monitoring.



## Number of Channels

The number of channels depends on the firmware version:

- 4 channels (with firmware version ≥V01.04)
- 2 channels (with firmware version <V01.04)

## Status Messages

The status of the position register is available via the parameter _*PosRegStatus*.

| Parameter name / HMI menu / HMI name | Description | Unit / Minimum value / Factory setting / Maximum value | Data type / R/W / Persistent / Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _*PosRegStatus* | Status of the position register channels. | - | UINT16 | CANopen 300B:1h |
| | Signal state: | - | R/- | Modbus 2818 |
| | 0: Comparison criterion not met | - | - | Profibus 2818 |
| | 1: Comparison criterion met | - | - | CIP 111.1.1 |
| | Bit assignments: | | | ModbusTCP 2818 |
| | Bit 0: State of position register channel 1 | | | EtherCAT 300B:1h |
| | Bit 1: State of position register channel 2 | | | PROFINET 2818 |
| | Bit 2: State of position register channel 3 | | | |
| | Bit 3: State of position register channel 4 | | | |

In addition, the status is available via signal outputs. In order to read the status via the signal outputs, you must first parameterize the signal output function "Position Register Channel 1","Position Register Channel 2", "Position Register Channel 3" and "Position Register Channel 4", see Digital Signal Inputs and Digital Signal Outputs, page 199.

## Starting the Position Registers

The channels of the position registers are started via the following parameters.

| Parameter name / HMI menu / HMI name | Description | Unit / Minimum value / Factory setting / Maximum value | Data type / R/W / Persistent / Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PosReg1Start* | Start/stop of position register channel 1.<br><br>**0 / Off (keep last state)**: Position Register channel 1 is off and status bit keeps last state<br><br>**1 / On**: Position Register channel 1 is on<br><br>**2 / Off (set state 0)**: Position Register channel 1 is off and status bit is set to 0<br><br>**3 / Off (set state 1)**: Position Register channel 1 is off and status bit is set to 1<br><br>Modified settings become active immediately. | -<br>0<br>0<br>3 | UINT16<br>R/W<br>-<br>- | CANopen 300B:2$_h$<br>Modbus 2820<br>Profibus 2820<br>CIP 111.1.2<br>ModbusTCP 2820<br>EtherCAT 300B:2$_h$<br>PROFINET 2820 |
| *PosReg2Start* | Start/stop of position register channel 2.<br><br>**0 / Off (keep last state)**: Position Register channel 2 is off and status bit keeps last state<br><br>**1 / On**: Position Register channel 2 is on<br><br>**2 / Off (set state 0)**: Position Register channel 2 is off and status bit is set to 0<br><br>**3 / Off (set state 1)**: Position Register channel 2 is off and status bit is set to 1<br><br>Modified settings become active immediately. | -<br>0<br>0<br>3 | UINT16<br>R/W<br>-<br>- | CANopen 300B:3$_h$<br>Modbus 2822<br>Profibus 2822<br>CIP 111.1.3<br>ModbusTCP 2822<br>EtherCAT 300B:3$_h$<br>PROFINET 2822 |
| *PosReg3Start* | Start/stop of position register channel 3.<br><br>**0 / Off (keep last state)**: Position Register channel 3 is off and status bit keeps last state<br><br>**1 / On**: Position Register channel 3 is on<br><br>**2 / Off (set state 0)**: Position Register channel 3 is off and status bit is set to 0<br><br>**3 / Off (set state 1)**: Position Register channel 3 is off and status bit is set to 1<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.04. | -<br>0<br>0<br>3 | UINT16<br>R/W<br>-<br>- | CANopen 300B:C$_h$<br>Modbus 2840<br>Profibus 2840<br>CIP 111.1.12<br>ModbusTCP 2840<br>EtherCAT 300B:C$_h$<br>PROFINET 2840 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PosReg4Start* | Start/stop of position register channel 4. **0 / Off (keep last state)**: Position Register channel 4 is off and status bit keeps last state **1 / On**: Position Register channel 4 is on **2 / Off (set state 0)**: Position Register channel 4 is off and status bit is set to 0 **3 / Off (set state 1)**: Position Register channel 4 is off and status bit is set to 1 Modified settings become active immediately. Available with firmware version ≥V01.04. | - 0 0 3 | UINT16 R/W - - | CANopen 300B:D$_h$ Modbus 2842 Profibus 2842 CIP 111.1.13 ModbusTCP 2842 EtherCAT 300B:D$_h$ PROFINET 2842 |
| *PosRegGroupStart* | Start/stop of position register channels. **0 / No Channel**: No channel activated **1 / Channel 1**: Channel 1 activated **2 / Channel 2**: Channel 2 activated **3 / Channel 1 & 2**: Channels 1 and 2 activated **4 / Channel 3**: Channel 3 activated **5 / Channel 1 & 3**: Channels 1 and 3 activated **6 / Channel 2 & 3**: Channels 2 and 3 activated **7 / Channel 1 & 2 & 3**: Channels 1, 2 and 3 activated **8 / Channel 4**: Channel 4 activated **9 / Channel 1 & 4**: Channels 1 and 4 activated **10 / Channel 2 & 4**: Channels 2 and 4 activated **11 / Channel 1 & 2 & 4**: Channels 1, 2 and 4 activated **12 / Channel 3 & 4**: Channels 3 and 4 activated **13 / Channel 1 & 3 & 4**: Channels 1, 3 and 4 activated **14 / Channel 2 & 3 & 4**: Channels 2, 3 and 4 activated **15 / Channel 1 & 2 & 3 & 4**: Channels 1, 2, 3 and 4 activated Modified settings become active immediately. Available with firmware version ≥V01.14. | - 0 0 15 | UINT16 R/W per. - | CANopen 300B:16$_h$ Modbus 2860 Profibus 2860 CIP 111.1.22 ModbusTCP 2860 EtherCAT 300B:16$_h$ PROFINET 2860 |

## Setting the Source

The source of the comparison criterion is set via the following parameters.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PosReg1Source* | Selection of source for position register channel 1.<br><br>**0 / Pact Encoder 1**: Source for position register channel 1 is Pact of encoder 1<br><br>**1 / Pact Encoder 2**: Source for position register channel 1 is Pact of encoder 2 (module)<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 300B:6$_h$<br><br>Modbus 2828<br><br>Profibus 2828<br><br>CIP 111.1.6<br><br>ModbusTCP 2828<br><br>EtherCAT 300B:6$_h$<br><br>PROFINET 2828 |
| *PosReg2Source* | Selection of source for position register channel 2.<br><br>**0 / Pact Encoder 1**: Source for position register channel 2 is Pact of encoder 1<br><br>**1 / Pact Encoder 2**: Source for position register channel 2 is Pact of encoder 2 (module)<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 300B:7$_h$<br><br>Modbus 2830<br><br>Profibus 2830<br><br>CIP 111.1.7<br><br>ModbusTCP 2830<br><br>EtherCAT 300B:7$_h$<br><br>PROFINET 2830 |
| *PosReg3Source* | Selection of source for position register channel 3.<br><br>**0 / Pact Encoder 1**: Source for position register channel 3 is Pact of encoder 1<br><br>**1 / Pact Encoder 2**: Source for position register channel 3 is Pact of encoder 2 (module)<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.04. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 300B:10$_h$<br><br>Modbus 2848<br><br>Profibus 2848<br><br>CIP 111.1.16<br><br>ModbusTCP 2848<br><br>EtherCAT 300B:10$_h$<br><br>PROFINET 2848 |
| *PosReg4Source* | Selection of source for position register channel 4.<br><br>**0 / Pact Encoder 1**: Source for position register channel 4 is Pact of encoder 1<br><br>**1 / Pact Encoder 2**: Source for position register channel 4 is Pact of encoder 2 (module)<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.04. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 300B:11$_h$<br><br>Modbus 2850<br><br>Profibus 2850<br><br>CIP 111.1.17<br><br>ModbusTCP 2850<br><br>EtherCAT 300B:11$_h$<br><br>PROFINET 2850 |

## Setting the Comparison Criterion

The comparison criterion is set via the following parameters.

In the case of the comparison criteria "Pact in" and "Pact out", there is a difference between "basic" and "extended".

- Basic: The movement to be performed remains within the movement range.
- Extended: The movement to be performed can extend beyond the movement range.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PosReg1Mode* | Selection of comparison criterion for position register channel 1.<br><br>**0 / Pact greater equal A**: Actual position is greater than or equal to comparison value A for position register channel 1<br><br>**1 / Pact less equal A**: Actual position is less than or equal to comparison value A for position register channel 1<br><br>**2 / Pact in [A-B] (basic)**: Actual position is in the range A-B including limits (basic)<br><br>**3 / Pact out [A-B] (basic)**: Actual position is out of the range A-B excluding limits (basic)<br><br>**4 / Pact in [A-B] (extended)**: Actual position is in the range A-B including limits (extended)<br><br>**5 / Pact out [A-B] (extended)**: Actual position is out of the range A-B excluding limits (extended)<br><br>Modified settings become active immediately. | -<br>0<br>0<br>5 | UINT16<br>R/W<br>per.<br>- | CANopen 300B:4$_h$<br>Modbus 2824<br>Profibus 2824<br>CIP 111.1.4<br>ModbusTCP 2824<br>EtherCAT 300B:4$_h$<br>PROFINET 2824 |
| *PosReg2Mode* | Selection of comparison criterion for position register channel 2.<br><br>**0 / Pact greater equal A**: Actual position is greater than or equal to comparison value A for position register channel 2<br><br>**1 / Pact less equal A**: Actual position is less than or equal to comparison value A for position register channel 2<br><br>**2 / Pact in [A-B] (basic)**: Actual position is in the range A-B including limits (basic)<br><br>**3 / Pact out [A-B] (basic)**: Actual position is out of the range A-B excluding limits (basic)<br><br>**4 / Pact in [A-B] (extended)**: Actual position is in the range A-B including limits (extended)<br><br>**5 / Pact out [A-B] (extended)**: Actual position is out of the range A-B excluding limits (extended)<br><br>Modified settings become active immediately. | -<br>0<br>0<br>5 | UINT16<br>R/W<br>per.<br>- | CANopen 300B:5$_h$<br>Modbus 2826<br>Profibus 2826<br>CIP 111.1.5<br>ModbusTCP 2826<br>EtherCAT 300B:5$_h$<br>PROFINET 2826 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PosReg3Mode* | Selection of comparison criterion for position register channel 3.<br><br>**0 / Pact greater equal A**: Actual position is greater than or equal to comparison value A for position register channel 3<br><br>**1 / Pact less equal A**: Actual position is less than or equal to comparison value A for position register channel 3<br><br>**2 / Pact in [A-B] (basic)**: Actual position is in the range A-B including limits (basic)<br><br>**3 / Pact out [A-B] (basic)**: Actual position is out of the range A-B excluding limits (basic)<br><br>**4 / Pact in [A-B] (extended)**: Actual position is in the range A-B including limits (extended)<br><br>**5 / Pact out [A-B] (extended)**: Actual position is out of the range A-B excluding limits (extended)<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.04. | -<br><br>0<br><br>0<br><br>5 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 300B:E$_h$<br><br>Modbus 2844<br><br>Profibus 2844<br><br>CIP 111.1.14<br><br>ModbusTCP 2844<br><br>EtherCAT 300B:E$_h$<br><br>PROFINET 2844 |
| *PosReg4Mode* | Selection of comparison criterion for position register channel 4.<br><br>**0 / Pact greater equal A**: Actual position is greater than or equal to comparison value A for position register channel 4<br><br>**1 / Pact less equal A**: Actual position is less than or equal to comparison value A for position register channel 4<br><br>**2 / Pact in [A-B] (basic)**: Actual position is in the range A-B including limits (basic)<br><br>**3 / Pact out [A-B] (basic)**: Actual position is out of the range A-B excluding limits (basic)<br><br>**4 / Pact in [A-B] (extended)**: Actual position is in the range A-B including limits (extended)<br><br>**5 / Pact out [A-B] (extended)**: Actual position is out of the range A-B excluding limits (extended)<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.04. | -<br><br>0<br><br>0<br><br>5 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 300B:F$_h$<br><br>Modbus 2846<br><br>Profibus 2846<br><br>CIP 111.1.15<br><br>ModbusTCP 2846<br><br>EtherCAT 300B:F$_h$<br><br>PROFINET 2846 |

## Setting Comparison Values

The comparison values are set via the following parameters.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PosReg1ValueA* | Comparison value A for position register channel 1. | usr_p - 0 - | INT32 R/W per. - | CANopen 300B:8$_h$ Modbus 2832 Profibus 2832 CIP 111.1.8 ModbusTCP 2832 EtherCAT 300B:8$_h$ PROFINET 2832 |
| *PosReg1ValueB* | Comparison value B for position register channel 1. | usr_p - 0 - | INT32 R/W per. - | CANopen 300B:9$_h$ Modbus 2834 Profibus 2834 CIP 111.1.9 ModbusTCP 2834 EtherCAT 300B:9$_h$ PROFINET 2834 |
| *PosReg2ValueA* | Comparison value A for position register channel 2. | usr_p - 0 - | INT32 R/W per. - | CANopen 300B:A$_h$ Modbus 2836 Profibus 2836 CIP 111.1.10 ModbusTCP 2836 EtherCAT 300B:A$_h$ PROFINET 2836 |
| *PosReg2ValueB* | Comparison value B for position register channel 2. | usr_p - 0 - | INT32 R/W per. - | CANopen 300B:B$_h$ Modbus 2838 Profibus 2838 CIP 111.1.11 ModbusTCP 2838 EtherCAT 300B:B$_h$ PROFINET 2838 |
| *PosReg3ValueA* | Comparison value A for position register channel 3. Available with firmware version ≥V01.04. | usr_p - 0 - | INT32 R/W per. - | CANopen 300B:12$_h$ Modbus 2852 Profibus 2852 CIP 111.1.18 ModbusTCP 2852 EtherCAT 300B:12$_h$ PROFINET 2852 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PosReg3ValueB* | Comparison value B for position register channel 3.<br><br>Available with firmware version ≥V01.04. | usr_p<br><br>-<br><br>0<br><br>- | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 300B:13$_h$<br><br>Modbus 2854<br><br>Profibus 2854<br><br>CIP 111.1.19<br><br>ModbusTCP 2854<br><br>EtherCAT 300B:13$_h$<br><br>PROFINET 2854 |
| *PosReg4ValueA* | Comparison value A for position register channel 4.<br><br>Available with firmware version ≥V01.04. | usr_p<br><br>-<br><br>0<br><br>- | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 300B:14$_h$<br><br>Modbus 2856<br><br>Profibus 2856<br><br>CIP 111.1.20<br><br>ModbusTCP 2856<br><br>EtherCAT 300B:14$_h$<br><br>PROFINET 2856 |
| *PosReg4ValueB* | Comparison value B for position register channel 4.<br><br>Available with firmware version ≥V01.04. | usr_p<br><br>-<br><br>0<br><br>- | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 300B:15$_h$<br><br>Modbus 2858<br><br>Profibus 2858<br><br>CIP 111.1.21<br><br>ModbusTCP 2858<br><br>EtherCAT 300B:15$_h$<br><br>PROFINET 2858 |

# Position Deviation Window

## Description

The position deviation window allows you to monitor whether the motor is within a parameterizable position deviation.

The position deviation is the difference between reference position and actual position.
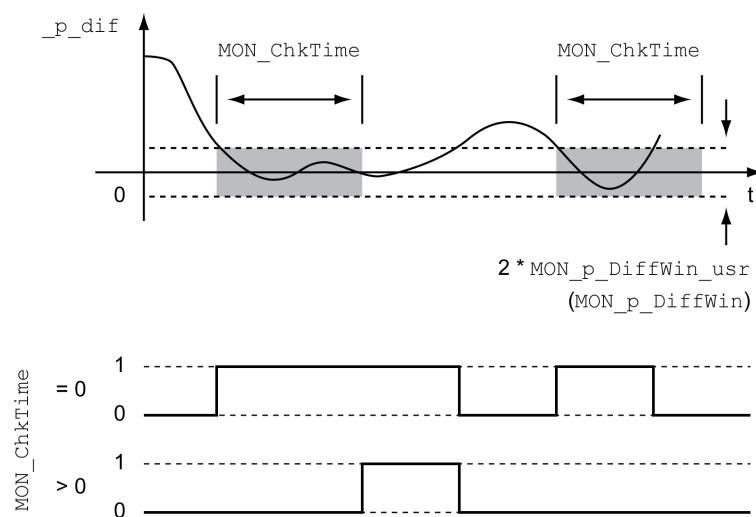
The position deviation window comprises position deviation and monitoring time.

## Availability

The position deviation window is available in the following operating modes.

- Jog
- Electronic Gear (position synchronization)
- Profile Position
- Homing
- Motion Sequence (Move Absolute, Move Additive, Move Relative and Reference Movement)

## Settings



The parameters *MON_p_DiffWin_usr* and *MON_ChkTime* specify the size of the window.

## Status Indication

The status is available via a signal output or via the fieldbus.

In order to read the status via a signal output, you must first parameterize the signal output function "In Position Deviation Window", see Digital Signal Inputs and Digital Signal Outputs, page 199.

In order to read the status via the fieldbus, you must set the status bits of the status parameters, see Adjustable Bits of the Status Parameters, page 378.

The parameter *MON_ChkTime* acts on the parameters *MON_p_DiffWin_usr* (*MON_p_DiffWin*), *MON_v_DiffWin*, *MON_v_Threshold* and *MON_I_Threshold*.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MON_p_DiffWin_usr* | Monitoring of position deviation.<br><br>The system verifies whether the drive is within the defined deviation during the period set with MON_ChkTime.<br><br>The status can be output via a parameterizable output.<br><br>The minimum value, the factory setting and the maximum value depend on the scaling factor.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.03. | usr_p<br><br>0<br><br>16<br><br>2147483647 | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:3F$_h$<br><br>Modbus 1662<br><br>Profibus 1662<br><br>CIP 106.1.63<br><br>ModbusTCP 1662<br><br>EtherCAT 3006:3F$_h$<br><br>PROFINET 1662 |
| *MON_ChkTime*<br><br>ConF → i-o-<br><br>tthr | Monitoring of time window.<br><br>Adjustment of a time for monitoring of position deviation, velocity deviation, velocity value and current value. If the monitored value is in the permissible range during the adjusted time, the monitoring function delivers a positive result.<br><br>The status can be output via a parameterizable output.<br><br>Modified settings become active immediately. | ms<br><br>0<br><br>0<br><br>9999 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:1D$_h$<br><br>Modbus 1594<br><br>Profibus 1594<br><br>CIP 106.1.29<br><br>ModbusTCP 1594<br><br>EtherCAT 3006:1D$_h$<br><br>PROFINET 1594 |

# Velocity Deviation Window

## Description

The velocity deviation window allows you to monitor whether the motor is within a parameterizable velocity deviation.

The velocity deviation is the difference between the reference velocity and the actual velocity.
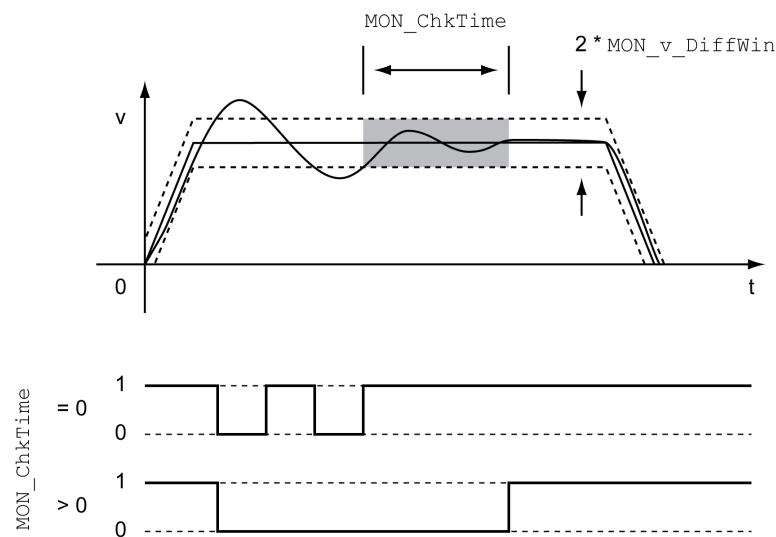
The velocity deviation window comprises velocity deviation and monitoring time.

## Availability

The velocity deviation window is available in the following operating modes.

- Jog
- Electronic Gear (velocity synchronization)
- Profile Velocity
- Profile Position
- Homing
- Motion Sequence

## Settings



The parameters *MON_v_DiffWin* and *MON_ChkTime* specify the size of the window.

## Status Indication

The status is available via a signal output or via the fieldbus.

In order to read the status via a signal output, you must first parameterize the signal output function "In Velocity Deviation Window", see Digital Signal Inputs and Digital Signal Outputs, page 199.

In order to read the status via the fieldbus, you must set the status bits of the status parameters, see Adjustable Bits of the Status Parameters, page 378.

The parameter *MON_ChkTime* acts on the parameters *MON_p_DiffWin_usr*, *MON_v_DiffWin*, *MON_v_Threshold* and *MON_I_Threshold*.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MON_v_DiffWin* | Monitoring of velocity deviation. The system monitors whether the drive is within the defined deviation during the period set with MON_ChkTime. The status can be output via a parameterizable output. Modified settings become active immediately. | usr_v 1 10 2147483647 | UINT32 R/W per. - | CANopen 3006:1A$_h$ Modbus 1588 Profibus 1588 CIP 106.1.26 ModbusTCP 1588 EtherCAT 3006:1A$_h$ PROFINET 1588 |
| *MON_ChkTime* ⌐ o n F → ı - o - ⊢ ⊢ h ⌐ | Monitoring of time window. Adjustment of a time for monitoring of position deviation, velocity deviation, velocity value and current value. If the monitored value is in the permissible range during the adjusted time, the monitoring function delivers a positive result. The status can be output via a parameterizable output. Modified settings become active immediately. | ms 0 0 9999 | UINT16 R/W per. - | CANopen 3006:1D$_h$ Modbus 1594 Profibus 1594 CIP 106.1.29 ModbusTCP 1594 EtherCAT 3006:1D$_h$ PROFINET 1594 |
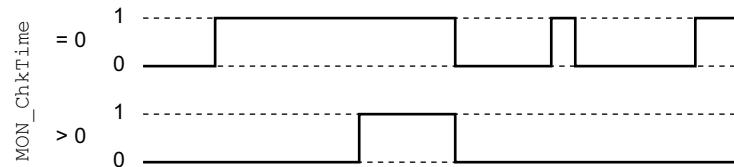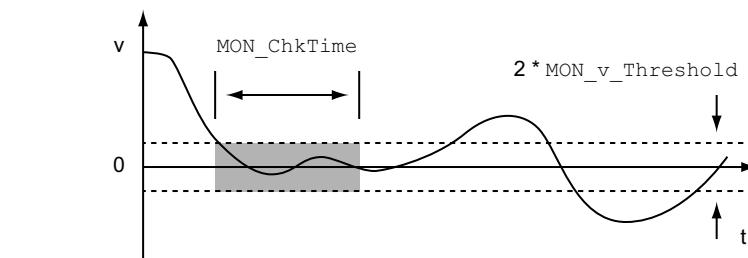
# Velocity Threshold Value

## Description

The velocity threshold value allows you to monitor whether the actual velocity is below a parameterizable velocity value.

The velocity threshold value comprises the velocity and the monitoring time.

## Settings



The parameters *MON_v_Threshold* and *MON_ChkTime* specify the size of the window.

## Status Indication

The status is available via a signal output or via the fieldbus.

In order to read the status via a signal output, you must first parameterize the signal output function "Velocity Below Threshold", see Digital Signal Inputs and Digital Signal Outputs, page 199.

In order to read the status via the fieldbus, you must set the status bits of the status parameters, see Adjustable Bits of the Status Parameters, page 378.

The parameter *MON_ChkTime* acts on the parameters *MON_p_DiffWin_usr*, *MON_v_DiffWin*, *MON_v_Threshold* and *MON_I_Threshold*.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MON_v_Threshold* | Monitoring of velocity threshold. The system monitors whether the drive is below the defined value during the period set with MON_ChkTime. The status can be output via a parameterizable output. Modified settings become active immediately. | usr_v 1 10 2147483647 | UINT32 R/W per. - | CANopen 3006:1B$_h$ Modbus 1590 Profibus 1590 CIP 106.1.27 ModbusTCP 1590 EtherCAT 3006:1B$_h$ PROFINET 1590 |
| *MON_ChkTime* ⌂⌂⌂⌂⌂ → ⌂-⌂- ⌂⌂⌂⌂ | Monitoring of time window. Adjustment of a time for monitoring of position deviation, velocity deviation, velocity value and current value. If the monitored value is in the permissible range during the adjusted time, the monitoring function delivers a positive result. The status can be output via a parameterizable output. Modified settings become active immediately. | ms 0 0 9999 | UINT16 R/W per. - | CANopen 3006:1D$_h$ Modbus 1594 Profibus 1594 CIP 106.1.29 ModbusTCP 1594 EtherCAT 3006:1D$_h$ PROFINET 1594 |
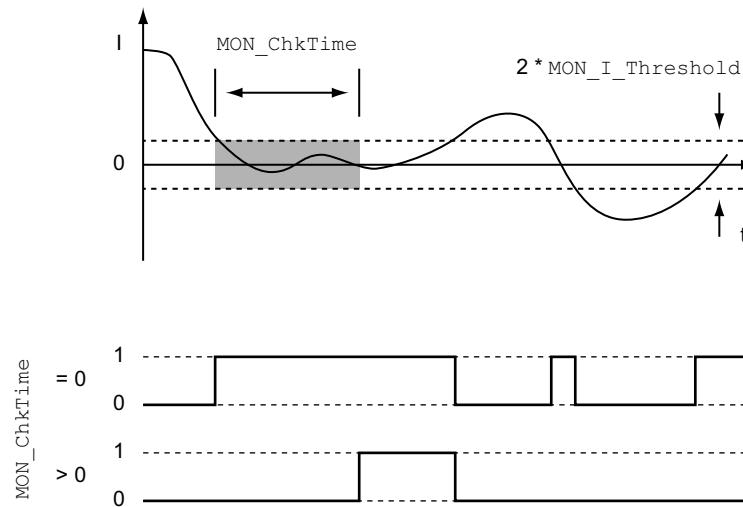
# Current Threshold Value

## Description

The current threshold value allows you to monitor whether the actual current is below a parameterizable current value.

The current threshold value comprises the current value and the monitoring time.

## Settings



The parameters *MON_I_Threshold* and *MON_ChkTime* specify the size of the window.

## Status Indication

The status is available via a signal output or via the fieldbus.

In order to read the status via a signal output, you must first parameterize the signal output function "Current Below Threshold", see Digital Signal Inputs and Digital Signal Outputs, page 199.

In order to read the status via the fieldbus, you must set the status bits of the status parameters, see Adjustable Bits of the Status Parameters, page 378.

The parameter *MON_ChkTime* acts on the parameters *MON_p_DiffWin_usr*, *MON_v_DiffWin*, *MON_v_Threshold* and *MON_I_Threshold*.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MON_I_Threshold* ConF → i-o- ithr | Monitoring of current threshold. The system monitors whether the drive is below the defined value during the period set with MON_ChkTime. The status can be output via a parameterizable output. The parameter _Iq_act_rms is used as comparison value. In increments of 0.01 A_rms. Modified settings become active immediately. | A_rms 0.00 0.20 300.00 | UINT16 R/W per. - | CANopen 3006:1C_h Modbus 1592 Profibus 1592 CIP 106.1.28 ModbusTCP 1592 EtherCAT 3006:1C_h PROFINET 1592 |
| *MON_ChkTime* ConF → i-o- tthr | Monitoring of time window. Adjustment of a time for monitoring of position deviation, velocity deviation, velocity value and current value. If the monitored value is in the permissible range during the adjusted time, the monitoring function delivers a positive result. The status can be output via a parameterizable output. Modified settings become active immediately. | ms 0 0 9999 | UINT16 R/W per. - | CANopen 3006:1D_h Modbus 1594 Profibus 1594 CIP 106.1.29 ModbusTCP 1594 EtherCAT 3006:1D_h PROFINET 1594 |

# Adjustable Bits of the Status Parameters

## Overview

The status bits of the following parameters can be adjusted:

- Parameter _actionStatus
  - Setting of bit 9 via parameter DPL_intLim
  - Setting of bit 10 via parameter DS402intLim
- Parameter _DPL_motionStat
  - Setting of bit 9 via parameter DPL_intLim
  - Setting of bit 10 via parameter DS402intLim
- Parameter _DCOMstatus
  - Setting of bit 11 via parameter DS402intLim

## Status Parameter

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _actionStatus_ | Action word. | - | UINT16 | CANopen 301C:4$_h$ |
| | Signal state: | - | R/- | Modbus 7176 |
| | 0: Not activated | - | - | Profibus 7176 |
| | 1: Activated | - | - | CIP 128.1.4 |
| | Bit assignments: | | | ModbusTCP 7176 |
| | Bit 0: Error class 0 | | | EtherCAT 301C:4$_h$ |
| | Bit 1: Error class 1 | | | PROFINET 7176 |
| | Bit 2: Error class 2 | | | |
| | Bit 3: Error class 3 | | | |
| | Bit 4: Error class 4 | | | |
| | Bit 5: Reserved | | | |
| | Bit 6: Motor is at a standstill (_n_act < 9 RPM) | | | |
| | Bit 7: Motor movement in positive direction | | | |
| | Bit 8: Motor movement in negative direction | | | |
| | Bit 9: Assignment can be set via parameter DPL_intLim | | | |
| | Bit 10: Assignment can be set via parameter DS402intLim | | | |
| | Bit 11: Profile generator idle (reference velocity is 0) | | | |
| | Bit 12: Profile generator decelerates | | | |
| | Bit 13: Profile generator accelerates | | | |
| | Bit 14: Profile generator moves at constant speed | | | |
| | Bit 15: Reserved | | | |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _DCOMstatus | DriveCom status word.<br><br>Bit assignments:<br><br>Bit 0: Operating state Ready To Switch On<br><br>Bit 1: Operating state Switched On<br><br>Bit 2: Operating state Operation Enabled<br><br>Bit 3: Operating state Fault<br><br>Bit 4: Voltage Enabled<br><br>Bit 5: Operating state Quick Stop<br><br>Bit 6: Operating state Switch On Disabled<br><br>Bit 7: Error of error class 0<br><br>Bit 8: HALT request active<br><br>Bit 9: Remote<br><br>Bit 10: Target Reached<br><br>Bit 11: Internal Limit Active<br><br>Bit 12: Operating mode-specific<br><br>Bit 13: x_err<br><br>Bit 14: x_end<br><br>Bit 15: ref_ok | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 6041:0$_h$<br><br>Modbus 6916<br><br>Profibus 6916<br><br>CIP 127.1.2<br><br>ModbusTCP 6916<br><br>EtherCAT 6041:0$_h$<br><br>PROFINET 6916 |
| _DPL_motionStat | Drive Profile Lexium motionStat. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 301B:27$_h$<br><br>Modbus 6990<br><br>Profibus 6990<br><br>CIP 127.1.39<br><br>ModbusTCP 6990<br><br>EtherCAT 301B:27$_h$<br><br>PROFINET 6990 |

## Parameter for Setting the Status Bits

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *DPL_intLim* | Setting for bit 9 of _DPL_motionStat and _actionStatus.<br><br>**0 / None**: Not used (reserved)<br><br>**1 / Current Below Threshold**: Current threshold value<br><br>**2 / Velocity Below Threshold**: Velocity threshold value<br><br>**3 / In Position Deviation Window**: Position deviation window<br><br>**4 / In Velocity Deviation Window**: Velocity deviation window<br><br>**5 / Position Register Channel 1**: Position register channel 1<br><br>**6 / Position Register Channel 2**: Position register channel 2<br><br>**7 / Position Register Channel 3**: Position register channel 3<br><br>**8 / Position Register Channel 4**: Position register channel 4<br><br>**9 / Hardware Limit Switch**: Hardware limit switch<br><br>**10 / RMAC active or finished**: Relative movement after capture is active or finished<br><br>**11 / Position Window**: Position window<br><br>Setting for:<br><br>Bit 9 of the parameter _actionStatus<br><br>Bit 9 of the parameter _DPL_motionStat<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.08. | -<br>0<br>11<br>11 | UINT16<br>R/W<br>per.<br>- | CANopen 301B:35$_h$<br>Modbus 7018<br>Profibus 7018<br>CIP 127.1.53<br>ModbusTCP 7018<br>EtherCAT 301B:35$_h$<br>PROFINET 7018 |
| *DS402intLim* | DS402 status word: Setting for bit 11 (internal limit).<br><br>**0 / None**: Not used (reserved)<br><br>**1 / Current Below Threshold**: Current threshold value<br><br>**2 / Velocity Below Threshold**: Velocity threshold value<br><br>**3 / In Position Deviation Window**: Position deviation window<br><br>**4 / In Velocity Deviation Window**: Velocity deviation window<br><br>**5 / Position Register Channel 1**: Position register channel 1<br><br>**6 / Position Register Channel 2**: Position register channel 2<br><br>**7 / Position Register Channel 3**: Position register channel 3<br><br>**8 / Position Register Channel 4**: Position register channel 4<br><br>**9 / Hardware Limit Switch**: Hardware limit switch | -<br>0<br>0<br>11 | UINT16<br>R/W<br>per.<br>- | CANopen 301B:1E$_h$<br>Modbus 6972<br>Profibus 6972<br>CIP 127.1.30<br>ModbusTCP 6972<br>EtherCAT 301B:1E$_h$<br>PROFINET 6972 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **10 / RMAC active or finished**: Relative movement after capture is active or finished **11 / Position Window**: Position window Setting for: Bit 11 of the parameter _DCOMstatus Bit 10 of the parameter _actionStatus Bit 10 of the parameter _DPL_motionStat Modified settings become active immediately. | | | |

# Functions for Monitoring Internal Device Signals

## Temperature Monitoring

### Temperature of Power Stage

The parameter _PS_T_current indicates the temperature of the power stage.

The parameter _PS_T_warn contains the threshold value for an error of error class 0. The parameter _PS_T_max indicates the maximum power stage temperature.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _PS_T_current<br><br>*∏ o n*<br><br>*t P S* | Temperature of power stage. | °C<br><br>-<br><br>-<br><br>- | INT16<br><br>R/-<br><br>-<br><br>- | CANopen 301C:10$_h$<br><br>Modbus 7200<br><br>Profibus 7200<br><br>CIP 128.1.16<br><br>ModbusTCP 7200<br><br>EtherCAT 301C:10$_h$<br><br>PROFINET 7200 |
| _PS_T_warn | Advisory temperature limit of power stage (error class 0). | °C<br><br>-<br><br>-<br><br>- | INT16<br><br>R/-<br><br>per.<br><br>- | CANopen 3010:6$_h$<br><br>Modbus 4108<br><br>Profibus 4108<br><br>CIP 116.1.6<br><br>ModbusTCP 4108<br><br>EtherCAT 3010:6$_h$<br><br>PROFINET 4108 |
| _PS_T_max | Maximum temperature of power stage. | °C<br><br>-<br><br>-<br><br>- | INT16<br><br>R/-<br><br>per.<br><br>- | CANopen 3010:7$_h$<br><br>Modbus 4110<br><br>Profibus 4110<br><br>CIP 116.1.7<br><br>ModbusTCP 4110<br><br>EtherCAT 3010:7$_h$<br><br>PROFINET 4110 |

### Temperature of Motor

The parameter _M_T_current indicates the motor temperature.

The parameter _M_T_max indicates the maximum motor temperature.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _M_T_current $\Pi \, o \, n$ $t \, \Pi \, o \, t$ | Temperature of motor. | °C - - - | INT16 R/- - - | CANopen 301C:11$_h$ Modbus 7202 Profibus 7202 CIP 128.1.17 ModbusTCP 7202 EtherCAT 301C:11$_h$ PROFINET 7202 |
| _M_T_max | Maximum temperature of motor. | °C - - - | INT16 R/- - - | CANopen 300D:10$_h$ Modbus 3360 Profibus 3360 CIP 113.1.16 ModbusTCP 3360 EtherCAT 300D:10$_h$ PROFINET 3360 |
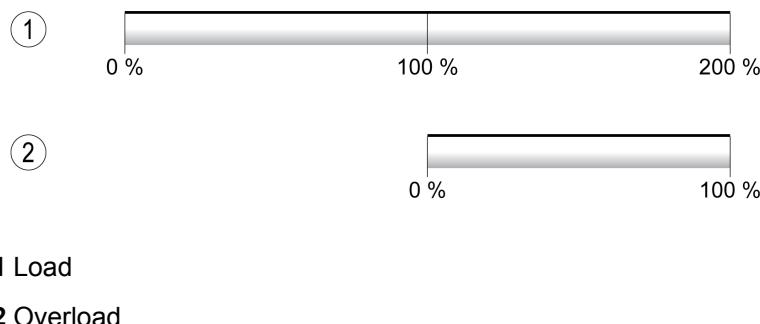
# Monitoring Load and Overload (I$^2$T Monitoring)

## Description

The load is the thermal load on the power stage, the motor and the braking resistor.

Load and overload on the individual components are monitored internally; the values can be read by means of parameters.

Overload starts at a load value of 100 %.

① ┌─────────────┬─────────────┐
   0 %          100 %         200 %

② ┌─────────────┐
                0 %          100 %

**1** Load

**2** Overload

## Load Monitoring

The load can be read using the following parameters:

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _PS_load<br><br>*∏ o n*<br><br>*L d F P* | Load of power stage. | %<br><br>-<br><br>-<br><br>- | INT16<br><br>R/-<br><br>-<br><br>- | CANopen 301C:17$_h$<br><br>Modbus 7214<br><br>Profibus 7214<br><br>CIP 128.1.23<br><br>ModbusTCP 7214<br><br>EtherCAT 301C:17$_h$<br><br>PROFINET 7214 |
| _M_load<br><br>*∏ o n*<br><br>*L d F ∏* | Load of motor. | %<br><br>-<br><br>-<br><br>- | INT16<br><br>R/-<br><br>-<br><br>- | CANopen 301C:1A$_h$<br><br>Modbus 7220<br><br>Profibus 7220<br><br>CIP 128.1.26<br><br>ModbusTCP 7220<br><br>EtherCAT 301C:1A$_h$<br><br>PROFINET 7220 |
| _RES_load<br><br>*∏ o n*<br><br>*L d F b* | Load of braking resistor.<br><br>The braking resistor set via parameter RESint_ext is monitored. | %<br><br>-<br><br>-<br><br>- | INT16<br><br>R/-<br><br>-<br><br>- | CANopen 301C:14$_h$<br><br>Modbus 7208<br><br>Profibus 7208<br><br>CIP 128.1.20<br><br>ModbusTCP 7208<br><br>EtherCAT 301C:14$_h$<br><br>PROFINET 7208 |

## Overload Monitoring

In the case of 100 % overload of the power stage or the motor, the current is limited internally. In the case of 100 % overload of the braking resistor, the braking resistor is deactivated.

The overload and the peak value can be read using the following parameters:

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _PS_overload | Overload of power stage. | % - - - | INT16 R/- - - | CANopen 301C:24h Modbus 7240 Profibus 7240 CIP 128.1.36 ModbusTCP 7240 EtherCAT 301C:24h PROFINET 7240 |
| _PS_maxoverload | Maximum value of overload of power stage. Maximum overload of power stage during the last 10 seconds. | % - - - | INT16 R/- - - | CANopen 301C:18h Modbus 7216 Profibus 7216 CIP 128.1.24 ModbusTCP 7216 EtherCAT 301C:18h PROFINET 7216 |
| _M_overload | Overload of motor (I2t). | % - - - | INT16 R/- - - | CANopen 301C:19h Modbus 7218 Profibus 7218 CIP 128.1.25 ModbusTCP 7218 EtherCAT 301C:19h PROFINET 7218 |
| _M_maxoverload | Maximum value of overload of motor. Maximum overload of motor during the last 10 seconds. | % - - - | INT16 R/- - - | CANopen 301C:1Bh Modbus 7222 Profibus 7222 CIP 128.1.27 ModbusTCP 7222 EtherCAT 301C:1Bh PROFINET 7222 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _RES_overload | Overload of braking resistor (I2t). The braking resistor set via parameter RESint_ext is monitored. | % - - - | INT16 R/- - - | CANopen 301C:13h Modbus 7206 Profibus 7206 CIP 128.1.19 ModbusTCP 7206 EtherCAT 301C:13h PROFINET 7206 |
| _RES_maxoverload | Maximum value of overload of braking resistor. Maximum overload of braking resistor during the last 10 seconds. The braking resistor set via parameter RESint_ext is monitored. | % - - - | INT16 R/- - - | CANopen 301C:15h Modbus 7210 Profibus 7210 CIP 128.1.21 ModbusTCP 7210 EtherCAT 301C:15h PROFINET 7210 |

# Commutation Monitoring

## Description

Commutation monitoring verifies the plausibility of acceleration and effective motor torque.

If the motor accelerates though the drive control decelerates the motor with the maximum current, an error is detected.

Deactivating commutation monitoring can cause unintended movements.

| ⚠ **WARNING** |
|---|
| **UNINTENDED MOVEMENT** |
| • Only deactivate commutation monitoring during commissioning and only for test purposes. |
| • Verify that the commutation monitoring is active prior to putting the equipment into service. |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |

The parameter *MON_commutat* lets you deactivate commutation monitoring.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MON_commutat* | Commutation monitoring. **0 / Off**: Commutation monitoring off **1 / On**: Commutation monitoring on in operating states 6, 7 and 8 **2 / On (OpState6+7)**: Commutation monitoring on in operating states 6 and 7 Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. | - 0 1 2 | UINT16 R/W per. - | CANopen 3005:5ₕ Modbus 1290 Profibus 1290 CIP 105.1.5 ModbusTCP 1290 EtherCAT 3005:5ₕ PROFINET 1290 |

# Monitoring of Mains Phases

## Description

If a three-phase drive is missing a mains phase and mains phase monitoring is not correctly set, this can cause overload of the product.

| *NOTICE* |
|---|
| **INOPERABLE EQUIPMENT DUE TO MISSING MAINS PHASE** |
| • Verify that mains phase monitoring is set to "Automatic Mains Detection" or to "Mains ..." with the correct voltage value if the drive is supplied via the mains phases. |
| • Verify that mains phase monitoring is set to "DC bus only ..." with the correct voltage value if the drive is supplied via the DC bus. |
| **Failure to follow these instructions can result in equipment damage.** |

**NOTE:** The mains phases are only monitored in the operating states **5** Switched On, **6** Operation Enabled, **7** Quick Stop Active, and **8** Fault Reaction Active.

The parameter *ErrorResp_Flt_AC* lets you set the error response to a missing mains phase for three-phase devices.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *ErrorResp_Flt_AC* | Error response to missing mains phase. **0 / Error Class 0**: Error class 0 **1 / Error Class 1**: Error class 1 **2 / Error Class 2**: Error class 2 **3 / Error Class 3**: Error class 3 Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. | - 0 2 3 | UINT16 R/W per. - | CANopen 3005:Aₕ Modbus 1300 Profibus 1300 CIP 105.1.10 ModbusTCP 1300 EtherCAT 3005:Aₕ PROFINET 1300 |

If the product is supplied via the DC bus, mains phase monitoring must be set to "DC bus only ..." with the correct voltage value.

Mains phase monitoring is set by means of the parameter *MON_MainsVolt*.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MON_MainsVolt* | Detection and monitoring of mains phases.<br><br>**0 / Automatic Mains Detection**: Automatic detection and monitoring of mains voltage<br><br>**1 / DC-Bus Only (Mains 1~230 V / 3~480 V)**: DC bus supply only, corresponding to mains voltage 230 V (single-phase) or 480 V (three phases)<br><br>**2 / DC-Bus Only (Mains 1~115 V / 3~208 V)**: DC bus supply only, corresponding to mains voltage 115 V (single-phase) or 208 V (three phases)<br><br>**3 / Mains 1~230 V / 3~480 V**: Mains voltage 230 V (single-phase) or 480 V (three phases)<br><br>**4 / Mains 1~115 V / 3~208 V**: Mains voltage 115 V (single-phase) or 208 V (three phases)<br><br>**5 / Reserved**: Reserved<br><br>Value 0: As soon as mains voltage detected, the device automatically verifies whether the mains voltage is 115 V or 230 V in the case of single-phase devices or 208 V or 400/480 V in the case of three-phase devices.<br><br>Values 1 … 2: If the device is supplied only via the DC bus, the parameter has to be set to the voltage value corresponding to the mains voltage of the supplying device. There is no mains voltage monitoring.<br><br>Values 3 … 4: If the mains voltage is not detected properly during start-up, the mains voltage to be used can be selected manually.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled. | -<br><br>0<br><br>0<br><br>5 | UINT16<br><br>R/W<br><br>per.<br><br>expert | CANopen 3005:$F_h$<br><br>Modbus 1310<br><br>Profibus 1310<br><br>CIP 105.1.15<br><br>ModbusTCP 1310<br><br>EtherCAT 3005:$F_h$<br><br>PROFINET 1310 |

# Ground Monitoring

## Description

When the power stage is enabled, the device monitors the motor phases for ground errors. A ground error occurs when one or more motor phases are short-circuited to the ground (earth) of the application.

A ground error of one or more motor phases is detected. A ground error of the DC bus or the braking resistor is not monitored.

If the ground error monitoring is deactivated, the drive may be rendered inoperable by a ground error.

| *NOTICE* |
|---|
| **INOPERABLE EQUIPMENT DUE TO GROUND ERRORS** |
| • Only deactivate ground monitoring during commissioning and only for test purposes. |
| • Verify that the ground monitoring is active prior to putting the equipment into service. |
| **Failure to follow these instructions can result in equipment damage.** |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MON_GroundFault* | Ground monitoring. **0 / Off**: Ground monitoring off **1 / On**: Ground monitoring on Modified settings become active the next time the product is powered on. | - 0 1 1 | UINT16 R/W per. expert | CANopen 3005:10$_h$ Modbus 1312 Profibus 1312 CIP 105.1.16 ModbusTCP 1312 EtherCAT 3005:10$_h$ PROFINET 1312 |

# Examples

## Examples

## General Information

The examples show some typical applications of the product. The examples are intended to provide an overview; they are not exhaustive wiring plans.

The examples described here are intended for learning purposes only. In general, they are intended to help you understand how to develop, test, commission, and integrate application logic and/or the device wiring of the equipment associated with your own design in your control systems. The examples are not intended to be used directly on products that are part of a machine or process.

| ⚠ **WARNING** |
|---|
| **UNINTENDED EQUIPMENT OPERATION** |
| Do not include any wiring information, programming or configuration logic, or parameterization values from the Examples in your machine or process without thoroughly testing your entire application. |
| **Failure to follow these instructions can result in death, serious injury, or equipment damage.** |
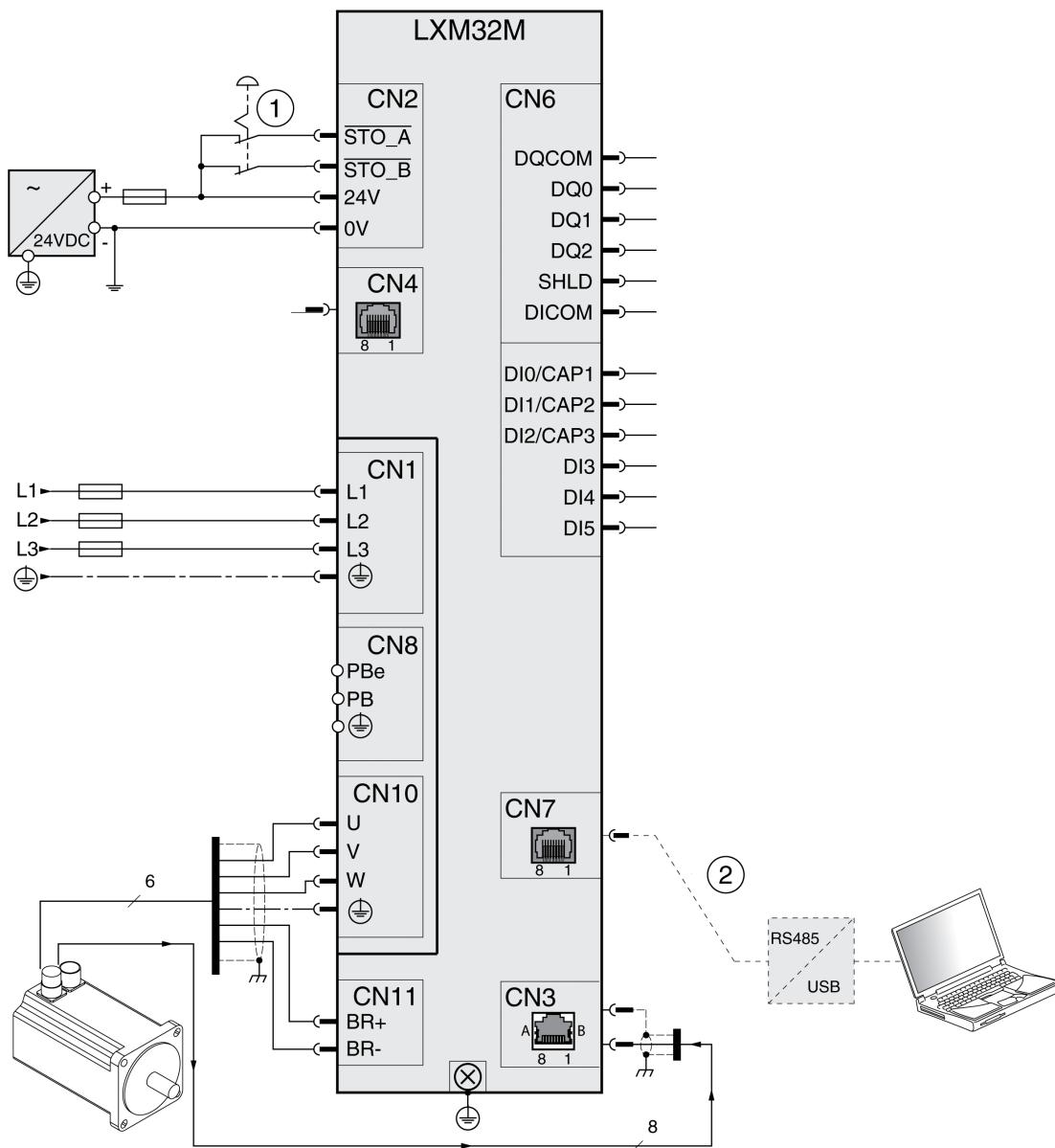
Using the safety-related function STO integrated in this product requires careful planning. See section Functional Safety, page 78 for additional information.

# Example of Operation with a Module

See the manual for the modules for details on wiring.

Wiring example:



**1** EMERGENCY STOP

**2** Commissioning accessories
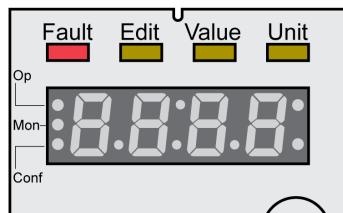
# Diagnostics and Troubleshooting

## Diagnostics via HMI

### Diagnostics via the Integrated HMI

#### Overview

The 7-segment display provides the user with information.



With the factory setting, the 7-segment display shows the operating states. The operating states are described in section Operating States, page 239.

| Message | Description |
|---|---|
| ꞮnꞮt | Operating state **1** Start |
| nrdY | Operating state **2** Not Ready To Switch On |
| dꞮS | Operating state **3** Switch On Disabled |
| rdY | Operating state **4** Ready To Switch On |
| Son | Operating state **5** Switched On |
| run and hALt | Operating state **6** Operation Enabled |
| StoP | Operating state **7** Quick Stop Active |
| FLt | Operating state **8** Fault Reaction Active and **9** Fault |

#### Additional Messages

The table below provides an overview of the messages that can additionally be displayed on the integrated HMI.

| Message | Description |
|---|---|
| CArd | Data on the memory card differs from data in the product. See Memory Card, page 174 for information on how to proceed. |
| dꞮSP | An external HMI is connected. The integrated HMI has no function. |
| FSu | Perform a First Setup. See Powering on the Device for the First Time, page 141. |
| Not | A new motor was detected. See section Acknowledging a Motor Change, page 394 for replacing a motor. |
| Prot | Parts of the integrated HMI were locked with the parameter *HMIlocked*. |
| SLt1 ... SLt3 | The device has detected a different equipment with modules. See section Acknowledging a Module Replacement, page 394 for replacing modules. |
| uLoW | 24 Vdc control supply during initialization not high enough. |
| 8888 | Undervoltage 24 Vdc control supply. |

| Message | Description |
|---------|-------------|
| W d o G | Undeterminable system error. Contact your Schneider Electric representative. |
| - - - - | Firmware not available. Retry to flash the firmware. If the condition persists, contact your Schneider Electric representative. |

If the HMI displays a message that is not contained in this user guide, contact your Schneider Electric representative.

# Acknowledging a Motor Change
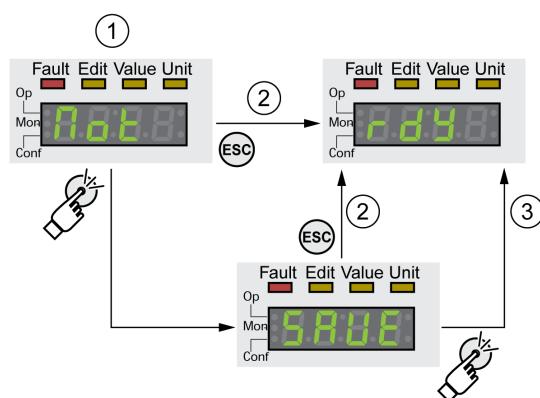
## Description

Procedure for confirming a motor change via the integrated HMI.

If the 7-segment display shows $\Pi \, o \, E$ :

- Press the navigation button.

  The 7-segment display shows $5 \, R \, V \, E$ .

- Press the navigation button to save the new motor parameters to the nonvolatile memory.

  The drive switches to operating state **4** Ready To Switch On.

Confirming a motor change via the integrated HMI



**1** HMI displays that a replacement of a motor has been detected.

**2** Canceling the saving process

**3** Saving switching to operating state **4** Ready To Switch On.

# Acknowledging a Module Replacement

## General

Note the information in the user guides for the respective modules.

## Slot 1

If the safety module eSM is used in Slot 1, refer to the user guide for the safety module eSM for information on replacing a module in slot 1.

Otherwise, follow the procedure for Slot 2 and Slot 3.

## Slot 2 and Slot 3

The replacement of a module is confirmed via the integrated HMI.

The 7-segment display shows *SLt2* or *SLt3*.
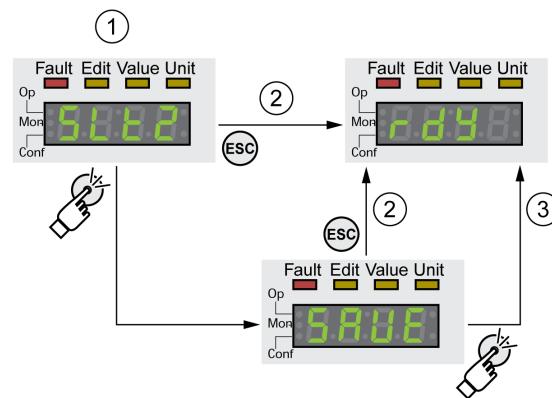
- Press the navigation button.

  The 7-segment display shows *SAVE*.

- Press the navigation button.

  The drive switches to operating state **4** Ready To Switch On.

Confirming a module change via the integrated HMI



**1** HMI displays that a replacement of a module has been detected.

**2** Canceling the saving process

**3** Saving switching to operating state **4** Ready To Switch On.
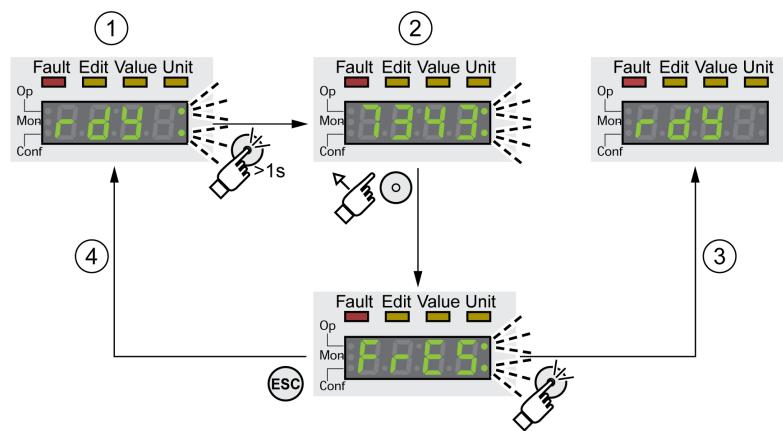
# Displaying Error Messages via the HMI

## Resetting Errors of Error Class 0

If there are errors of error class 0, the two dots to the right of the 7-segment display (2) flash. The error code is not directly displayed on the 7-segment display, but must be explicitly queried by the user.

Procedure for displaying and resetting:

- Press the navigation button and hold it down.

  The 7-segment display shows the error code.

- Release the navigation button.

  The 7-segment display shows *FrE5*.

- Remedy the cause.

- Press the navigation button to reset the error message.

  The 7-segment display returns to the initial state.

**1** HMI shows an error of error class 0

**2** Indication of error code

**3** Resetting an error message

**4** Canceling (the error code remains in the memory)

See Error Messages, page 408 for the meaning of the error codes.
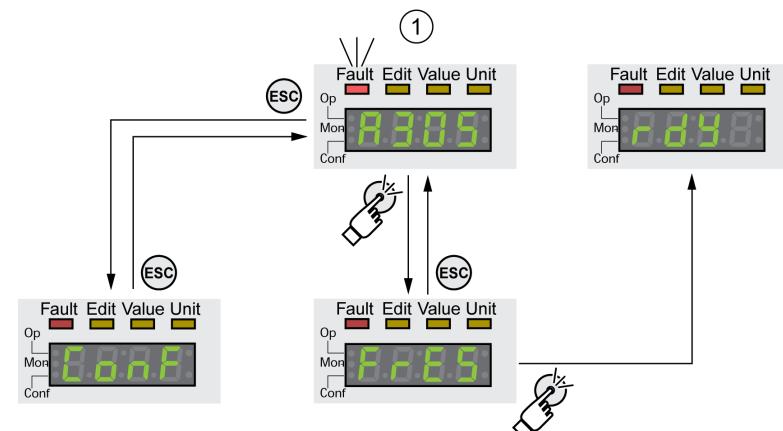
## Reading and Acknowledging Errors of Error Classes 1 ...4

In the case of a detected error of error class 1, the error code and $5 \, t \, o \, P$ are alternately shown on the 7 segment display.

In the case of a detected error of error class 2 ... 4, the error code and $F L t$ are alternately shown on the 7 segment display.

Procedure for displaying and resetting:

- Remedy the cause.
- Press the navigation button.

  The 7-segment display shows $F \, r \, E \, 5$.

- Press the navigation button to reset the error message.

  The product switches to operating state **4** Ready To Switch On.



**1** HMI shows and error message with an error code

See Error Messages, page 408 for the meaning of the error codes.

# Diagnostics via Signal Outputs

## Indicating the Operating State

### Description

Information on the operating state is available via the signal outputs.

The table below provides an overview.

|  | Signal output function | |
|---|---|---|
| Operating state | "No fault"[1] | "Active"[2] |
| **1** Start | 0 | 0 |
| **2** Not Ready To Switch On | 0 | 0 |
| **3** Switch On Disabled | 0 | 0 |
| **4** Ready To Switch On | 1 | 0 |
| **5** Switched On | 1 | 0 |
| **6** Operation Enabled | 1 | 1 |
| **7** Quick Stop Active | 0 | 0 |
| **8** Fault Reaction Active | 0 | 0 |
| **9** Fault | 0 | 0 |
| **(1)** The signal output function is factory setting for signal output DQ0 | | |
| **(2)** The signal output function is the factory setting for signal output DQ1 | | |

## Indicating Error Messages

### Description

Selected error messages can be output via the signal outputs.

In order to output an error message via a signal output, you must first parameterizes the signal output functions "Selected Warning" or "Selected Error", see Digital Signal Inputs and Digital Signal Outputs, page 199.

The parameters *MON_IO_SelWar1* and *MON_IO_SelWar2* are used to specify error codes with the error class 0.

The parameters *MON_IO_SelErr1* and *MON_IO_SelErr2* are used to specify error codes with the error classes 1 ... 4.

If an error specified in one of these parameters is detected, the corresponding signal output is to be set.

The list of the error messages sorted by error code can be found in the section Error Messages, page 408.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MON_IO_SelWar1* | Signal output function Selected Warning (error class 0): First error code. This parameter specifies the error code of an error of error class 0 which is to activate the signal output function. Modified settings become active immediately. | - 0 0 65535 | UINT16 R/W per. - | CANopen 303B:8$_h$ Modbus 15120 Profibus 15120 CIP 159.1.8 ModbusTCP 15120 EtherCAT 303B:8$_h$ PROFINET 15120 |
| *MON_IO_SelWar2* | Signal output function Selected Warning (error class 0): Second error code. This parameter specifies the error code of an error of error class 0 which is to activate the signal output function. Modified settings become active immediately. | - 0 0 65535 | UINT16 R/W per. - | CANopen 303B:9$_h$ Modbus 15122 Profibus 15122 CIP 159.1.9 ModbusTCP 15122 EtherCAT 303B:9$_h$ PROFINET 15122 |
| *MON_IO_SelErr1* | Signal output function Selected Error (error classes 1 to 4): First error code. This parameter specifies the error code of an error of error classes 1 ... 4 which is to activate the signal output function. Modified settings become active immediately. | - 0 0 65535 | UINT16 R/W per. - | CANopen 303B:6$_h$ Modbus 15116 Profibus 15116 CIP 159.1.6 ModbusTCP 15116 EtherCAT 303B:6$_h$ PROFINET 15116 |
| *MON_IO_SelErr2* | Signal output function Selected Error (error classes 1 to 4): Second error code. This parameter specifies the error code of an error of error classes 1 ... 4 which is to activate the signal output function. Modified settings become active immediately. | - 0 0 65535 | UINT16 R/W per. - | CANopen 303B:7$_h$ Modbus 15118 Profibus 15118 CIP 159.1.7 ModbusTCP 15118 EtherCAT 303B:7$_h$ PROFINET 15118 |

# Diagnostics via the Fieldbus

## Fieldbus Communication Error Diagnostics

### Verifying Connections

A properly operating fieldbus is essential for evaluating status and error messages.

If the product cannot be addressed via the fieldbus, first verify the connections.

Verify the following connections:

- System power supply
- Supply connections
- Fieldbus cables and wiring
- Fieldbus connection

### Fieldbus Function Test

If the connections are correct, verify that you can address the product on the fieldbus.

## Most Recent Detected Error - Status Bits

### Parameter *DCOMstatus*

The parameter *DCOMstatus* is a part of the process data communication. The parameter *DCOMstatus* is transmitted asynchronously and in an event-driven way whenever the status information changes.

In the case of an error of error class 0, bit 7 is set in the parameter *DCOMstatus*.

In the case of an error of error class 1, 2, 3 or 4, bit 13 is set in the parameter *DCOMstatus*.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _DCOMstatus_ | DriveCom status word. Bit assignments: Bit 0: Operating state Ready To Switch On Bit 1: Operating state Switched On Bit 2: Operating state Operation Enabled Bit 3: Operating state Fault Bit 4: Voltage Enabled Bit 5: Operating state Quick Stop Bit 6: Operating state Switch On Disabled Bit 7: Error of error class 0 Bit 8: HALT request active Bit 9: Remote Bit 10: Target Reached Bit 11: Internal Limit Active Bit 12: Operating mode-specific Bit 13: x_err Bit 14: x_end Bit 15: ref_ok | - - - - | UINT16 R/- - - | CANopen 6041:0$_h$ Modbus 6916 Profibus 6916 CIP 127.1.2 ModbusTCP 6916 EtherCAT 6041:0$_h$ PROFINET 6916 |

## Error Bits

The parameters _WarnLatched_ and _SigLatched_ contain information on errors of error class 0 and errors of error classes 1 ... 4.

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _WarnLatched<br><br>Ποη<br><br>ωϲηՏ | Saved errors of error class 0, bit-coded.<br><br>The bits are set to 0 in the case of a Fault Reset.<br><br>Bits 10 and 13 are set to 0 automatically.<br><br>Signal state:<br><br>0: Not activated<br><br>1: Activated<br><br>Bit assignments:<br><br>Bit 0: General<br><br>Bit 1: Reserved<br><br>Bit 2: Out of range (software limit switches, tuning)<br><br>Bit 3: Reserved<br><br>Bit 4: Active operating mode<br><br>Bit 5: Commissioning interface (RS485)<br><br>Bit 6: Integrated fieldbus<br><br>Bit 7: Reserved<br><br>Bit 8: Following error<br><br>Bit 9: Reserved<br><br>Bit 10: Inputs STO_A and/or STO_B<br><br>Bits 11 ... 12: Reserved<br><br>Bit 13: Low voltage DC bus or mains phase missing<br><br>Bits 14 ... 15: Reserved<br><br>Bit 16: Integrated encoder interface<br><br>Bit 17: Temperature of motor high<br><br>Bit 18: Temperature of power stage high<br><br>Bit 19: Reserved<br><br>Bit 20: Memory card<br><br>Bit 21: Fieldbus module<br><br>Bit 22: Encoder module<br><br>Bit 23: Safety module eSM or module IOM1<br><br>Bits 24 … 27: Reserved<br><br>Bit 28: Transistor for braking resistor overload ($I^2t$)<br><br>Bit 29: Braking resistor overload ($I^2t$)<br><br>Bit 30: Power stage overload ($I^2t$)<br><br>Bit 31: Motor overload ($I^2t$)<br><br>Monitoring functions are product-dependent. | -<br>-<br>-<br>- | UINT32<br>R/-<br>-<br>- | CANopen 301C:C$_h$<br>Modbus 7192<br>Profibus 7192<br>CIP 128.1.12<br>ModbusTCP 7192<br>EtherCAT 301C:C$_h$<br>PROFINET 7192 |
| _SigLatched<br><br>Ποη<br><br>Տ ιϲՏ | Saved status of monitoring signals.<br><br>Signal state:<br><br>0: Not activated<br><br>1: Activated<br><br>Bit assignments: | -<br>-<br>-<br>- | UINT32<br>R/-<br>-<br>- | CANopen 301C:8$_h$<br>Modbus 7184<br>Profibus 7184<br>CIP 128.1.8<br>ModbusTCP 7184 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | Bit 0: General error | | | EtherCAT 301C:8$_h$ |
| | Bit 1: Hardware limit switches (LIMP/LIMN/REF) | | | PROFINET 7184 |
| | Bit 2: Out of range (software limit switches, tuning) | | | |
| | Bit 3: Quick Stop via fieldbus | | | |
| | Bit 4: Error in active operating mode | | | |
| | Bit 5: Commissioning interface (RS485) | | | |
| | Bit 6: Integrated fieldbus | | | |
| | Bit 7: Reserved | | | |
| | Bit 8: Following error | | | |
| | Bit 9: Reserved | | | |
| | Bit 10: Inputs STO are 0 | | | |
| | Bit 11: Inputs STO different | | | |
| | Bit 12: Reserved | | | |
| | Bit 13: DC bus voltage low | | | |
| | Bit 14: DC bus voltage high | | | |
| | Bit 15: Mains phase missing | | | |
| | Bit 16: Integrated encoder interface | | | |
| | Bit 17: Overtemperature motor | | | |
| | Bit 18: Overtemperature power stage | | | |
| | Bit 19: Reserved | | | |
| | Bit 20: Memory card | | | |
| | Bit 21: Fieldbus module | | | |
| | Bit 22: Encoder module | | | |
| | Bit 23: Safety module eSM or module IOM1 | | | |
| | Bit 24: Reserved | | | |
| | Bit 25: Reserved | | | |
| | Bit 26: Motor connection | | | |
| | Bit 27: Motor overcurrent/short circuit | | | |
| | Bit 28: Frequency of reference signal too high | | | |
| | Bit 29: Nonvolatile memory error detected | | | |
| | Bit 30: System start-up (hardware or parameter) | | | |
| | Bit 31: System error detected (for example, watchdog, internal hardware interface) | | | |
| | Monitoring functions are product-dependent. | | | |

# Most Recent Detected Error - Error Code

## Description

If the controller receives information concerning a detected error via the process data communication, the following parameters can be used to read the error code.

The list of the error messages sorted by error code can be found in the section Error Messages, page 408.

## Most Recent Detected Error with Error Class 0

The parameter _LastWarning allows you to read the error number of the last detected error with error class 0.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _LastWarning<br><br>∏ o n<br><br>L W r n | Code of most recent error of error class 0.<br><br>If the error is no longer active, the code is stored until the next Fault Reset.<br><br>Value 0: No error of error class 0 | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 301C:9$_h$<br><br>Modbus 7186<br><br>Profibus 7186<br><br>CIP 128.1.9<br><br>ModbusTCP 7186<br><br>EtherCAT 301C:9$_h$<br><br>PROFINET 7186 |

## Most Recent Detected Error with Error Class 1 ... 4

The parameter _LastError allows you to read the error number of the last detected error with error class 1 ... 4.

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _LastError<br><br>∏ o n<br><br>L F L E | Detected error causing a stop (error classes 1 to 4).<br><br>Error code of the most recent detected error. Consecutive detected errors do not overwrite this error code.<br><br>Example: If an error response to a detected limit switch error causes overvoltage, this parameter contains the code of the detected limit switch error.<br><br>Exception: Detected errors of error class 4 overwrite existing entries. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 603F:0$_h$<br><br>Modbus 7178<br><br>Profibus 7178<br><br>CIP 128.1.5<br><br>ModbusTCP 7178<br><br>EtherCAT 603F:0$_h$<br><br>PROFINET 7178 |

# Error Memory

## General

The error memory is an error history of the last 10 error messages. It is not cleared even if the product is powered off. The error memory allows you to read and evaluate past events.

The following information on the events is stored:
- Error class
- Error code
- Motor current

- Number of power on cycles

- Additional error information (for example, parameter numbers)

- Product temperature

- Power stage temperature

- Time the error was detected (with reference to operating hours counter)

- DC Bus Voltage

- Velocity

- Number of Enable cycles after powering on

- Time from Enable until detection of the error

The stored information relates to the situation at the point in time the error was detected.

The list of the error messages sorted by error code can be found in the section Error Messages, page 408.

## Reading the Error Memory

The error memory can only be read sequentially. The parameter *ERR_reset* must be used to reset the read pointer. Then the first error entry can be read. The read pointer is automatically set to the next entry. A new read access delivers the next error entry. If the error code 0 is returned, there is no additional error entry.

| Position of the entry | Meaning |
|---|---|
| 1 | First error message (oldest message). |
| 2 | Second error message (later message). |
| ... | ... |
| 10 | Tenth error message. In the case of ten error messages, the most recent error message is contained here. |

An error entry consists of several pieces of information which can be read using different parameters. When you read an error entry, the error code must be read first with the parameter *_ERR_number*.

The following parameters allow you to manage the error memory:

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _ERR_class | Error class. Value 0: Error class 0 Value 1: Error class 1 Value 2: Error class 2 Value 3: Error class 3 Value 4: Error class 4 | - 0 - 4 | UINT16 R/- - - | CANopen 303C:2$_h$ Modbus 15364 Profibus 15364 CIP 160.1.2 ModbusTCP 15364 EtherCAT 303C:2$_h$ PROFINET 15364 |
| _ERR_number | Error code. Reading this parameter copies the entire entry for the detected error (error class, time of detection of error, …) to an intermediate memory from which the elements of the detected error can then be read. In addition, the read pointer of the error memory is automatically set to the next error entry. | - 0 - 65535 | UINT16 R/- - - | CANopen 303C:1$_h$ Modbus 15362 Profibus 15362 CIP 160.1.1 ModbusTCP 15362 EtherCAT 303C:1$_h$ PROFINET 15362 |
| _ERR_motor_I | Motor current at the time the error was detected. In increments of 0.01 A$_{rms}$. | A$_{rms}$ - - - | UINT16 R/- - - | CANopen 303C:9$_h$ Modbus 15378 Profibus 15378 CIP 160.1.9 ModbusTCP 15378 EtherCAT 303C:9$_h$ PROFINET 15378 |
| _ERR_powerOn $\Pi o n$ $P o W o$ | Number of power on cycles. | - 0 - 4294967295 | UINT32 R/- - - | CANopen 303B:2$_h$ Modbus 15108 Profibus 15108 CIP 159.1.2 ModbusTCP 15108 EtherCAT 303B:2$_h$ PROFINET 15108 |
| _ERR_qual | Additional information on detected error. This entry contains additional information on the detected error, depending on the error number. Example: a parameter address | - 0 - 65535 | UINT16 R/- - - | CANopen 303C:4$_h$ Modbus 15368 Profibus 15368 CIP 160.1.4 ModbusTCP 15368 EtherCAT 303C:4$_h$ PROFINET 15368 |

| Parameter name  HMI menu  HMI name | Description | Unit  Minimum value  Factory setting  Maximum value | Data type  R/W  Persistent  Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _ERR_temp_dev | Temperature of device at the time the error was detected. | °C  -  -  - | INT16  R/-  -  - | CANopen 303C:B$_h$  Modbus 15382  Profibus 15382  CIP 160.1.11  ModbusTCP 15382  EtherCAT 303C:B$_h$  PROFINET 15382 |
| _ERR_temp_ps | Temperature of power stage at the time the error was detected. | °C  -  -  - | INT16  R/-  -  - | CANopen 303C:A$_h$  Modbus 15380  Profibus 15380  CIP 160.1.10  ModbusTCP 15380  EtherCAT 303C:A$_h$  PROFINET 15380 |
| _ERR_time | Time of detection of error.  With reference to operating hours counter | s  0  -  536870911 | UINT32  R/-  -  - | CANopen 303C:3$_h$  Modbus 15366  Profibus 15366  CIP 160.1.3  ModbusTCP 15366  EtherCAT 303C:3$_h$  PROFINET 15366 |
| _ERR_DCbus | DC bus voltage at the time the error was detected.  In increments of 0.1 V. | V  -  -  - | UINT16  R/-  -  - | CANopen 303C:7$_h$  Modbus 15374  Profibus 15374  CIP 160.1.7  ModbusTCP 15374  EtherCAT 303C:7$_h$  PROFINET 15374 |
| _ERR_motor_v | Motor velocity at the time the error was detected. | usr_v  -  -  - | INT32  R/-  -  - | CANopen 303C:8$_h$  Modbus 15376  Profibus 15376  CIP 160.1.8  ModbusTCP 15376  EtherCAT 303C:8$_h$  PROFINET 15376 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _ERR_enable_cycl | Number of cycles of enabling the power stage at error time. Number of cycles of enabling the power stage from the time the control voltage was applied to the time the error was detected. | - - - - | UINT16 R/- - - | CANopen 303C:5h Modbus 15370 Profibus 15370 CIP 160.1.5 ModbusTCP 15370 EtherCAT 303C:5h PROFINET 15370 |
| _ERR_enable_time | Time between enabling of power stage and detection of the error. | s - - - | UINT16 R/- - - | CANopen 303C:6h Modbus 15372 Profibus 15372 CIP 160.1.6 ModbusTCP 15372 EtherCAT 303C:6h PROFINET 15372 |
| ERR_reset | Reset error memory read pointer. Value 1: Set error memory read pointer to oldest error entry. Modified settings become active immediately. | - 0 - 1 | UINT16 R/W - - | CANopen 303B:5h Modbus 15114 Profibus 15114 CIP 159.1.5 ModbusTCP 15114 EtherCAT 303B:5h PROFINET 15114 |
| ERR_clear | Clear error memory. Value 1: Delete entries in the error memory The clearing process is completed if a 0 is returned after a read access. Modified settings become active immediately. | - 0 - 1 | UINT16 R/W - - | CANopen 303B:4h Modbus 15112 Profibus 15112 CIP 159.1.4 ModbusTCP 15112 EtherCAT 303B:4h PROFINET 15112 |

# Error Messages

## Description of Error Messages

### Description

If monitoring functions of the drive detect an error, the drive generates an error message. Each error message is identified by an error code.

The following information is available for each error message:

- Error code
- Error class
- Description of error
- Possible causes
- Possible remedies

### Range of Error Messages

The table below summarizes the error codes classified by range.

| Error code (hex) | Range |
|---|---|
| 1xxx | General |
| 2xxx | Overcurrent |
| 3xxx | Voltage |
| 4xxx | Temperature |
| 5xxx | Hardware |
| 6xxx | Software |
| 7xxx | Interface, wiring |
| 8xxx | Fieldbus |
| Axxx | Motor movement |
| Bxxx | Communication |

### Error Class of Error Messages

The error messages are classified according to the following error classes:

| Error class | State transition[1] | Error response | Resetting the error message |
|---|---|---|---|
| 0 | - | No interruption of the movement | Function "Fault Reset" |
| 1 | T11 | Stop movement with "Quick Stop" | Function "Fault Reset" |
| 2 | T13, T14 | Stop movement with "Quick Stop" and disable the power stage when the motor has come to a standstill | Function "Fault Reset" |
| 3 | T13, T14 | Disable the power stage immediately without stopping the movement first | Function "Fault Reset" |
| 4 | T13, T14 | Disable the power stage immediately without stopping the movement first | Power cycle |
| **(1)** See section Operating States, page 239. | | | |

# Table of Error Messages

## List of the Error Messages Sorted by Error Code

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 1100 | 0 | Parameter out of permissible value range | The value entered was outside of the permissible value range for this parameter. | The entered value must be within the permissible value range. |
| 1101 | 0 | Parameter does not exist | Error detected by parameter management: Parameter (index) does not exist. | Select a different parameter (index). |
| 1102 | 0 | Parameter does not exist | Error detected by parameter management: Parameter (subindex) does not exist. | Select a different parameter (subindex). |
| 1103 | 0 | Parameter write not permissible (READ only) | Write access to read only parameter. | Write only to parameters that are not read-only. |
| 1104 | 0 | Write access denied (no access authorization) | Parameter only accessible at expert level. | The write access level expert is required. |
| 1105 | 0 | Block Upload/Download not initialized | - | - |
| 1106 | 0 | Command not permissible while power stage is active | Command not permissible while the power stage is enabled (operating state Operation Enabled or Quick Stop Active). | Disable the power stage and repeat the command. |
| 1107 | 0 | Access via other interface blocked | Access occupied by another channel (for example: Commissioning software is active and fieldbus access was tried at the same time). | Verify the channel that blocks access. |
| 1108 | 0 | File cannot be uploaded: Incorrect file ID | - | - |
| 1109 | 1 | Data stored after a power outage is invalid | - | - |
| 110A | 0 | System error detected: No bootloader available | - | - |
| 110B | 3 | Configuration error detected. Additional information in the error memory indicates the Modbus register address.<br><br>Parameter _SigLatched Bit 30 | Error detected during parameter check (for example, reference velocity value for operating mode Profile Position is greater than maximum permissible velocity of drive). | Value in additional error information shows the Modbus register address of the parameter where the initialization error was detected. |
| 110D | 1 | Basic configuration of drive required after factory setting | The "First Setup" (FSU) was not run at all or not completed. | Perform a First Setup. |
| 110E | 0 | Parameter changed that requires a restart of the drive | Only displayed by the commissioning software.<br><br>A parameter modification requires the drive to be powered off and on. | Restart the drive to activate the parameter functionality.<br><br>See the section Parameters for the parameter that requires a restart of the drive. |
| 110F | 0 | Function not available in this type of device | The specific type of device does not support this function or this parameter value. | Verify that you have the correct device type, in particular type of motor, type of encoder, holding brake. |
| 1110 | 0 | Incorrect file ID for upload or download | The specific type of device does not support this kind of file. | Verify that you have the correct device type or the correct configuration file. |
| 1111 | 0 | File transfer not correctly initialized | A previous file transfer has been aborted. | - |
| 1112 | 0 | Locking of configuration denied | An external tool has tried to lock the configuration of the drive for upload or download. This may not work because another tool had already locked the configuration of the drive or the drive is in an operating state that does not allow locking. | - |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 1113 | 0 | System not locked for configuration transfer | An external tool has tried to transfer the configuration without locking the drive. | - |
| 1114 | 4 | Configuration download aborted<br><br>Parameter _*SigLatched* Bit 5 | During a configuration download, a communication error or an error in the external tool was detected. The configuration was only partially transferred to the drive and might be inconsistent now. | Power the drive off/on and retry to download the configuration or restore the factory settings. |
| 1115 | 0 | Incorrect configuration file format<br><br>Parameter _*WarnLatched* Bit 5 | An external tool has downloaded a configuration which has an incorrect format. | - |
| 1116 | 0 | Request is processed asynchronously | - | - |
| 1117 | 0 | Asynchronous request blocked | Request to a module is blocked because the module is currently processing another request. | - |
| 1118 | 0 | Configuration data incompatible with device | The configuration data contains data from a different device. | Verify device type including type of power stage. |
| 1119 | 0 | Incorrect data length, too many bytes | - | - |
| 111A | 0 | Incorrect data length, insufficient number of bytes | - | - |
| 111B | 4 | Configuration download error detected. Additional information in the error memory indicates the Modbus register address. | During a configuration download, one or more configuration values were not accepted by the drive. | Verify that the configuration file is valid and matches the type and version of the drive. The value in the additional error info shows the Modbus register address of the parameter where the initialization error was detected. |
| 111C | 1 | Not possible to initialize recalculation for scaling | A parameter could not be initialized. | The address of the parameter that caused the detected error can be read via the parameter _PAR_ ScalingError. |
| 111D | 3 | Original state of a parameter cannot be restored after an error was detected during recalculation of parameters with user-defined units. | The drive contained an invalid configuration before the recalculation was started. An error was detected during the recalculation. | Power the drive off and on again. This may help you to identify the affected parameter(s). Change the parameters as required. Verify that the parameter configuration is valid before starting the recalculation procedure. |
| 111E | 1 | Not possible to recalculate data set | A data set of the operating mode Motion Sequence could not be recalculated. | The address of the parameter and the number of the data set that caused this condition can be read via the parameter _PAR_ScalingError. |
| 111F | 1 | Recalculation not possible. | Invalid scaling factor. | Verify that you really want the selected scaling factor. Try a different scaling factor. Before triggering scaling, reset the parameters with user-defined units. |
| 1120 | 1 | Recalculation for scaling not possible | A parameter could not be recalculated. | The address of the parameter that caused this condition can be read via the parameter _PAR_ScalingError. |
| 1121 | 0 | Incorrect sequence of steps for scaling (fieldbus) | The recalculation has been started prior to the initialization. | The recalculation must be started after the initialization. |
| 1122 | 0 | Recalculation for scaling not possible | Recalculation for scaling is already running. | Wait for the running recalculation for scaling to finish. |
| 1123 | 0 | Parameter cannot be changed | Recalculation for scaling is running. | Wait for the running recalculation for scaling to finish. |
| 1124 | 1 | Timeout during recalculation for scaling | The time between the initialization of the recalculation and the start of the recalculation has been exceeded (30 seconds). | Recalculation must be started within 30 seconds after initialization. |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 1125 | 1 | Scaling not possible | The scaling factors for position, velocity or acceleration/deceleration are beyond internal calculation limits. | Retry with different scaling factors. |
| 1126 | 0 | Configuration is blocked by another access channel | - | Close other access channel (for example, other instance of commissioning software). |
| 1127 | 0 | Invalid key received | - | - |
| 1128 | 0 | Special login is required for Manufacturing Test Firmware | - | - |
| 1129 | 0 | Test step not yet started | - | - |
| 112D | 0 | Configuration of edges is not supported | The selected capture input does not support rising and falling edge at the same time. | Set the edge to either "rising" or "falling". |
| 112F | 0 | Time filter settings cannot be changed | Position capture is already active with a time filter. The filter settings cannot be changed. | Deactivate position capture. |
| 1130 | 0 | Incorrect parameter setting | The parameter ENC_ModeOfMaEnc is set to "Velocity And Position". The parameter ErrorResp_PDiffEncM is set to "Error Class 1" or "Error Class 2". The combination of these settings is invalid. | Set parameter ErrorResp_PDiffEncM to "Error Class 3". |
| 1131 | 0 | Function not available | Function not available | - |
| 1132 | 0 | Incorrect size of configuration file (odd number of bytes) | Incorrect number of bytes. | Retry. If the condition persists, contact your Schneider Electric service representative. |
| 1140 | 0 | File transfer over fieldbus: Read or write access to file denied (for example, due to invalid access channel) | Invalid access channel used.<br><br>The String field (for the file name) does not contain "Config" or "config". | Use a valid access channel (fieldbus main channel or Modbus RTU).<br><br>Use "Config" or "config" in the String field (for the file name). |
| 1141 | 0 | File transfer over fieldbus: Insufficient memory space | - | - |
| 1142 | 0 | File transfer over fieldbus: Invalid password | No password has been set (password = 0).<br><br>The password used does not match the password set. | Set a password not equal to 0 to enable the EtherCAT function File Access over EtherCAT.<br><br>Use the correct password. |
| 1143 | 0 | File transfer over fieldbus: Error detected with indeterminable error cause | - | - |
| 1144 | 0 | File transfer over fieldbus: Incorrect checksum | - | - |
| 1145 | 0 | File transfer over fieldbus: Hardware version does not support file transfer over fieldbus | The hardware version of the drive does not support the EtherCAT function File Access over EtherCAT. | Use a drive with the hardware version ≥RS03. |
| 1146 | 0 | File transfer over fieldbus: Invalid file header | - | - |
| 1147 | 0 | File transfer over fieldbus: File cannot be stored or file already exists | No memory available for the configuration file or the configuration file already exists. | Power cycle the drive. |
| 1300 | 3 | Safety-related function STO activated (STO_A, STO_B)<br><br>Parameter _SigLatched Bit 10 | The safety-related function STO was activated in the operating state Operation Enabled. | Verify correct wiring of the inputs of the safety-related function STO and perform a Fault Reset. |
| 1301 | 4 | STO_A and STO_B different level<br><br>Parameter _SigLatched Bit 11 | The levels of the inputs STO_A and STO_B were different for more than 1 second. | Verify correct wiring of the inputs of the safety-related function STO. |
| 1302 | 0 | Safety-related function STO activated (STO_A, STO_B)<br><br>Parameter _WarnLatched Bit 10 | Safety-related function STO was activated while the power stage was disabled. | Verify correct wiring of the inputs of the safety-related function STO. |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 1310 | 2 | Frequency of the external reference value signal too high<br><br>Parameter _SigLatched_ Bit 28 | The frequency of the external reference value signals (A/B signals, P/D signals or CW/CCW signals) is higher than the permissible value. | Verify the frequency of the external reference values. Verify the gear ratio in the operating mode Electronic Gear. |
| 1311 | 0 | The selected signal input function or signal output function cannot be configured | The selected signal input function or signal output function cannot be used in the selected operating mode. | Select another function or change the operating mode. |
| 1312 | 0 | Limit switch or reference switch signal not defined for signal input function | Reference movements require limit switches. These limit switches are not assigned to inputs. | Assign the signal input functions Positive Limit Switch, Negative Limit Switch and Reference Switch. |
| 1313 | 0 | Configured debounce time not possible for this signal input function | The signal input function does not support the selected debounce time. | Set the debounce time to a valid value. |
| 1314 | 4 | At least two inputs have the same signal input function. | The same signal input function has been assigned to at least two inputs. | Reconfigure the inputs. |
| 1315 | 0 | Frequency of reference value signal is too high.<br><br>Parameter _WarnLatched_ Bit 28 | The frequency of the pulse signal (A/B, Pulse/Direction, CW/CCW) exceeds the specified range. Received pulses may be lost. | Adapt the frequency of the reference value signal to match the input specification of the drive. Also adapt the gear ratio in the operating mode Electronic Gear to the application requirements (position accuracy and velocity). |
| 1316 | 1 | Position capture via signal input currently not possible<br><br>Parameter _SigLatched_ Bit 28 | Position capture is already being used. | - |
| 1317 | 0 | Interference at PTI input<br><br>Parameter _WarnLatched_ Bit 28 | Interfering pulses or impermissible edge transitions (A and B signal simultaneously) have been detected. | Verify cable specifications, shield connection and EMC. |
| 1318 | 0 | The selected type of usage of the analog inputs is not possible. | At least two analog inputs are configured with the same type of usage. | Reconfigure the analog inputs. |
| 1501 | 4 | System error detected: DriveCom state machine indeterminable state | - | - |
| 1502 | 4 | System error detected: HWL low-level state machine indeterminable state | - | - |
| 1503 | 1 | Quick Stop triggered via fieldbus | A Quick Stop has been triggered via the fieldbus. The Quick Stop option code has been set to -1 or -2 which causes the drive to transition to the operating state 9 Fault instead of the operating state 7 Quick Stop Active. | - |
| 1600 | 0 | Oscilloscope: No additional data available | - | - |
| 1601 | 0 | Oscilloscope: Parameterization incomplete | - | - |
| 1602 | 0 | Oscilloscope: Trigger variable not defined | - | - |
| 1606 | 0 | Logging still active | - | - |
| 1607 | 0 | Logging: No trigger defined | - | - |
| 1608 | 0 | Logging: Invalid trigger option | - | - |
| 1609 | 0 | Logging: No channel selected | - | - |
| 160A | 0 | Logging: No data available | - | - |
| 160B | 0 | Parameter cannot be logged | - | - |
| 160C | 1 | Autotuning: Moment of inertia outside permissible range | The load inertia is too high. | Verify that the system can easily be moved.<br><br>Verify the load.<br><br>Use a differently rated drive. |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 160E | 1 | Autotuning: Test movement could not be started | - | - |
| 160F | 1 | Autotuning: Power stage cannot be enabled | Autotuning was not started in the operating state Ready To Switch On. | Start Autotuning when the drive is in the operating state Ready To Switch On. |
| 1610 | 1 | Autotuning: Processing stopped | Autotuning stopped by user command or by detected error (see additional error message in error memory, for example, DC bus undervoltage, limit switches triggered) | Remove the cause of the stop and restart Autotuning. |
| 1611 | 1 | System error detected: Parameter could not be written during Autotuning. Additional information in the error memory indicates the Modbus register address. | - | - |
| 1612 | 1 | System error detected: Parameter could not be read during Autotuning | - | - |
| 1613 | 1 | Autotuning: Maximum permissible movement range exceeded\n\nParameter _SigLatched Bit 2 | The movement exceeded the adjusted movement range during Autotuning. | Increase the movement range value or disable movement range monitoring by setting AT_DIS = 0. |
| 1614 | 0 | Autotuning: Already active | Autotuning has been started twice simultaneously or an Autotuning parameter is modified during Autotuning (parameter AT_dis and AT_dir). | Wait for Autotuning to finish before restarting Autotuning. |
| 1615 | 0 | Autotuning: This parameter cannot be changed while Autotuning is active | Parameter AT_gain or AT_J are written during Autotuning. | Wait for Autotuning to finish before changing the parameter. |
| 1617 | 1 | Autotuning: Friction torque or load torque too great | The current limit has been reached (parameter CTRL_I_max). | Verify that the system can easily be moved.\n\nVerify the load.\n\nUse a differently rated drive. |
| 1618 | 1 | Autotuning: Optimization aborted | The internal Autotuning sequence has not been finished, there may have been a following error. | See the additional information provided in the error memory. |
| 1619 | 0 | Autotuning: Velocity jump in parameter AT_n_ref is not sufficient | Parameter AT_n_ref < 2 * AT_n_tolerance.\n\nThe drive only checks this for the first velocity jump. | Modify the parameter AT_n_ref or AT_n_tolerance to meet the required condition. |
| 1620 | 1 | Autotuning: Load torque too high | Product rating is not suitable for the machine load.\n\nDetected machine inertia is too high compared to the inertia of the motor. | Reduce load, verify rating. |
| 1621 | 1 | System error detected: Calculation error | - | - |
| 1622 | 0 | Autotuning: Not possible to perform Autotuning | Autotuning can only be performed if no operating mode is active. | Terminate the active operating mode or disable the power stage. |
| 1623 | 1 | Autotuning: HALT request has stopped the autotuning process | Autotuning can only be performed if no operating mode is active. | Terminate the active operating mode or disable the power stage. |
| 1A00 | 0 | System error detected: FIFO memory overflow | - | - |
| 1A01 | 3 | Motor has been changed (different type of motor)\n\nParameter _SigLatched Bit 16 | Detected motor type is different from previously detected motor. | Confirm the change. |
| 1A03 | 4 | System error detected: Hardware and firmware do not match | - | - |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 1B00 | 3 | System error detected: Incorrect parameters for motor and power stage<br><br>Parameter _SigLatched Bit 30 | Incorrect manufacturer parameter value (data) nonvolatile memory of device. | Replace device. |
| 1B02 | 3 | Target value too high.<br><br>Parameter _SigLatched Bit 30 | - | - |
| 1B04 | 2 | Product of encoder simulation resolution and the maximum velocity is too high<br><br>Parameter _SigLatched Bit 30 | Value in parameter CTRL_v_max or resolution or the encoder simulation ESIM_scale are too high. | Reduce the resolution of the encoder simulation or the maximum velocity in parameter CTRL_v_max. |
| 1B05 | 2 | Error detected during parameter switching<br><br>Parameter _SigLatched Bit 30 | - | - |
| 1B06 | 3 | Wake & shake cannot be started.<br><br>Parameter _SigLatched Bit 30 | Motor velocity is too high at the beginning of the wake and shake procedure. | Verify that the motor is at a standstill at the beginning wake and shake procedure. |
| 1B07 | 0 | Motor velocity is too high at the end of the wake and shake sequence. | Motor was not at a standstill at the end of the wake and shake sequence. Depending on the mechanical system, the commutation offset calculated during wake and shake might be incorrect. | Verify the mechanical system. |
| 1B08 | 3 | Position difference during the wake and shake procedure is too high. | Incorrect motor data entered by user (especially motor resistance, motor inertia (in case of rotary motors) or motor mass (in case of linear motors)).<br><br>Incorrect setting for parameter WakeAndShakeGain. | Verify motor data.<br><br>Verify setting of parameter WakeAndShakeGain. |
| 1B09 | 0 | The reference current during the wake and shake procedure is reduced as a result of I2t monitoring. | The current used during wake and shake is too high. | - |
| 1B0A | 0 | Reference current during wake and shake might be too high for the power stage used. | The wake and shake procedure is performed with the nominal motor current. If the nominal motor current is greater than the nominal power stage current, power stage I2t monitoring might reduce the current used during wake and shake. | - |
| 1B0B | 1 | The operating state at the beginning of the commutation offset identification must be Ready To Switch On. | - | Set the operating state to Ready To Switch On and restart commutation offset identification. |
| 1B0C | 3 | Motor velocity too high. | - | - |
| 1B0D | 3 | Velocity value determined by velocity observer is incorrect | Incorrect system inertia for velocity observer calculations.<br><br>Incorrect velocity observer dynamics.<br><br>System inertia changes during operation. In this case, operation with velocity observer is not possible and the velocity observer must be deactivated. | Change the velocity observer dynamics via the parameter CTRL_SpdObsDyn.<br><br>Change the system inertia used for velocity observer calculations via the parameter CTRL_SpdObsInert.<br><br>If the detected error persists, deactivate the velocity observer. |
| 1B0E | 3 | Not possible to determine the commutation angle at the end of the wake and shake procedure | Incorrect motor data, for example motor resistance, motor inertia (in case of rotary motors) or motor mass (in case of linear motors).<br><br>Incorrect setting for parameter WakeAndShakeGain.<br><br>Holding brake (if available) not properly wired. | Verify correct motor data.<br><br>Verify setting of parameter WakesAndShakeGain.<br><br>Verify correct wiring of holding brake. |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 1B0F | 3 | Velocity deviation too high | - | - |
| 2300 | 3 | Power stage overcurrent<br><br>Parameter _SigLatched Bit 27 | Motor short circuit and disabling of the power stage.<br><br>Motor phases are inverted. | Verify the motor power connection. |
| 2301 | 3 | Braking resistor overcurrent<br><br>Parameter _SigLatched Bit 27 | Braking resistor short circuit. | If you use the internal braking resistor, contact your Schneider Electric service representative.<br><br>If you use an external braking resistor, verify correct wiring and rating of the braking resistor. |
| 3100 | par. | Missing mains supply, undervoltage mains supply or overvoltage mains supply<br><br>Parameter _SigLatched Bit 15 | Missing phase(s) for more than 50 ms.<br><br>Mains voltage is out of range.<br><br>Mains frequency is out of range. | Verify that the values of the mains power supply network comply with the technical data. |
| 3200 | 3 | DC bus overvoltage<br><br>Parameter _SigLatched Bit 14 | Excessive regeneration during deceleration. | Verify correct deceleration ramp, rating of drive and braking resistor. |
| 3201 | 3 | DC bus undervoltage (shutdown threshold)<br><br>Parameter _SigLatched Bit 13 | Power supply outage, insufficient power supply. | Verify mains supply. |
| 3202 | 2 | DC bus undervoltage (Quick Stop threshold)<br><br>Parameter _SigLatched Bit 13 | Power supply outage, insufficient power supply. | Verify mains supply. |
| 3206 | 0 | Undervoltage DC bus, missing mains supply, undervoltage mains supply or overvoltage mains supply<br><br>Parameter _WarnLatched Bit 13 | Missing phase(s) for more than 50 ms.<br><br>Mains voltage is out of range.<br><br>Mains frequency is out of range.<br><br>Mains voltage and setting of parameter MON_MainsVolt do not match (for example, mains voltage is 230 V and MON_MainsVolt is set to 115 V). | Verify that the values of the mains power supply network comply with the technical data.<br><br>Verify the settings of the parameter for reduced mains voltage. |
| 3300 | 0 | The winding voltage of the motor is lower than the nominal supply voltage of the drive | If the winding voltage of the motor is lower than the nominal supply voltage of the drive, this may result in motor overtemperature due to high current ripple. | Verify the motor temperature. In the case of overtemperature, use a motor with a higher winding voltage or use a drive with a lower nominal supply voltage. |
| 4100 | 3 | Power stage overtemperature<br><br>Parameter _SigLatched Bit 18 | Excessively high ambient temperature due to, for example, dust. | Improve heat dissipation.<br><br>If a fan is installed, verify correct operation of the fan. |
| 4101 | 0 | Power stage overtemperature<br><br>Parameter _WarnLatched Bit 18 | Excessively high ambient temperature due to, for example, dust. | Improve heat dissipation.<br><br>If a fan is installed, verify correct operation of the fan. |
| 4102 | 0 | Power stage overload (I2t)<br><br>Parameter _WarnLatched Bit 30 | The current has exceeded the nominal value for an extended period of time. | Verify rating, reduce cycle time. |
| 4200 | 3 | Device overtemperature<br><br>Parameter _SigLatched Bit 18 | Excessively high ambient temperature due to, for example, dust. | Improve heat dissipation.<br><br>If a fan is installed, verify correct operation of the fan. |
| 4300 | 2 | Motor overtemperature<br><br>Parameter _SigLatched Bit 17 | Ambient temperature is too high.<br><br>Duty cycle is too high.<br><br>Motor not properly mounted (thermal isolation).<br><br>Motor overload. | Verify motor installation: The heat must be dissipated via the mounting surface.<br><br>Reduce ambient temperature.<br><br>Provide ventilation. |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 4301 | 0 | Motor overtemperature<br><br>Parameter _WarnLatched_ Bit 17 | Ambient temperature is too high.<br><br>Duty cycle is too high.<br><br>Motor not properly mounted (thermal isolation).<br><br>Motor overload. | Verify motor installation: The heat must be dissipated via the mounting surface.<br><br>Reduce ambient temperature.<br><br>Provide ventilation. |
| 4302 | 0 | Motor overload (I2t)<br><br>Parameter _WarnLatched_ Bit 31 | The current has exceeded the nominal value for an extended period of time. | Verify that the system can easily be moved.<br><br>Verify the load.<br><br>Use a differently sized motor, if necessary. |
| 4303 | 0 | No motor temperature monitoring | The temperature parameters (in electronic nameplate of motor, nonvolatile memory of encoder) are unavailable or invalid; parameter A12 is equal to 0. | Contact your Schneider Electric service representative.<br><br>Replace motor. |
| 4304 | 0 | The encoder does not support motor temperature monitoring. | - | - |
| 4402 | 0 | Braking resistor overload (I2t > 75%)<br><br>Parameter _WarnLatched_ Bit 29 | Regeneration energy too high.<br><br>External loads too high.<br><br>Motor velocity too high.<br><br>Deceleration too fast.<br><br>Insufficient braking resistor. | Reduce load, velocity, deceleration.<br><br>Verify correct braking resistor rating. |
| 4403 | par. | Braking resistor overload (I2t > 100%) | Regeneration energy too high.<br><br>External loads too high.<br><br>Motor velocity too high.<br><br>Deceleration too fast.<br><br>Insufficient braking resistor. | Reduce load, velocity, deceleration.<br><br>Verify correct braking resistor rating. |
| 4404 | 0 | Overload of transistor for braking resistor<br><br>Parameter _WarnLatched_ Bit 28 | Regeneration energy too high.<br><br>External loads too high.<br><br>Deceleration too fast. | Reduce load and/or deceleration. |
| 5101 | 0 | Modbus power supply missing | - | - |
| 5102 | 4 | Motor encoder supply voltage<br><br>Parameter _SigLatched_ Bit 16 | Encoder power supply is not within permissible range of 8 V to 12 V. | Replace the device.<br><br>Contact your Schneider Electric service representative. |
| 5200 | 4 | Error detected at connection to motor encoder<br><br>Parameter _SigLatched_ Bit 16 | Encoder not properly connected, EMI | - |
| 5201 | 4 | Error detected in motor encoder communication<br><br>Parameter _SigLatched_ Bit 16 | Encoder not properly connected, EMI | - |
| 5202 | 4 | Motor encoder is not supported<br><br>Parameter _SigLatched_ Bit 16 | Incompatible encoder connected. | - |
| 5203 | 4 | Error detected in connection motor encoder<br><br>Parameter _SigLatched_ Bit 16 | Encoder not properly connected | - |
| 5204 | 3 | Connection to motor encoder lost<br><br>Parameter _SigLatched_ Bit 16 | Encoder not properly connected | - |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 5206 | 0 | Communication error detected in encoder<br><br>Parameter _WarnLatched_ Bit 16 | Communication channel to encoder is subject to interference. | Verify EMC measures. |
| 5207 | 1 | Function is not supported | The hardware revision does not support the function. | - |
| 5302 | 4 | The motor requires a PWM frequency (16kHz) which the power stage does not support. | The motor only works with a PWM frequency of 16 kHz (motor nameplate entry). However, the power stage does not support this PWM frequency. | Use a motor that works with a PWM frequency of 8 kHz.<br><br>Contact your Schneider Electric service representative. |
| 5430 | 4 | System error detected: Nonvolatile memory read error<br><br>Parameter _SigLatched_ Bit 29 | - | - |
| 5431 | 3 | System error: Nonvolatile memory write error<br><br>Parameter _SigLatched_ Bit 29 | - | - |
| 5432 | 3 | System error: Nonvolatile memory state machine<br><br>Parameter _SigLatched_ Bit 29 | - | - |
| 5433 | 3 | System error: Nonvolatile memory address error<br><br>Parameter _SigLatched_ Bit 29 | - | - |
| 5434 | 3 | System error: Nonvolatile memory incorrect data length<br><br>Parameter _SigLatched_ Bit 29 | - | - |
| 5435 | 4 | System error: Nonvolatile memory not formatted<br><br>Parameter _SigLatched_ Bit 29 | - | - |
| 5436 | 4 | System error: Nonvolatile memory incompatible structure<br><br>Parameter _SigLatched_ Bit 29 | - | - |
| 5437 | 4 | System error detected: Nonvolatile memory checksum error (manufacturer data)<br><br>Parameter _SigLatched_ Bit 29 | - | - |
| 5438 | 3 | System error detected: Nonvolatile memory checksum error (user parameters)<br><br>Parameter _SigLatched_ Bit 29 | - | - |
| 5439 | 3 | System error detected: Nonvolatile memory checksum error (fieldbus parameters)<br><br>Parameter _SigLatched_ Bit 29 | - | - |
| 543B | 4 | System error detected: No valid manufacturer data<br><br>Parameter _SigLatched_ Bit 29 | - | - |
| 543E | 3 | System error detected: Nonvolatile memory checksum error (NoInit parameter)<br><br>Parameter _SigLatched_ Bit 29 | - | - |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 543F | 3 | System error detected: Nonvolatile memory checksum error (motor parameters)<br><br>Parameter _SigLatched Bit 29 | - | - |
| 5441 | 4 | System error detected: Nonvolatile memory checksum error (global control loop parameter set)<br><br>Parameter _SigLatched Bit 29 | - | - |
| 5442 | 4 | System error detected: Nonvolatile memory checksum error (control loop parameter set 1)<br><br>Parameter _SigLatched Bit 29 | - | - |
| 5443 | 4 | System error detected: Nonvolatile memory checksum error (control loop parameter set 2)<br><br>Parameter _SigLatched Bit 29 | - | - |
| 5444 | 4 | System error detected: Nonvolatile memory checksum error (NoReset parameter)<br><br>Parameter _SigLatched Bit 29 | - | - |
| 5445 | 4 | System error detected: Nonvolatile memory checksum error (hardware information)<br><br>Parameter _SigLatched Bit 29 | - | - |
| 5446 | 4 | System error detected: Nonvolatile memory checksum error (for power outage data)<br><br>Parameter _SigLatched Bit 29 | Internal nonvolatile memory not operative. | Restart the drive. If the detected error persists, contact your Schneider Electric service representative. |
| 5447 | 3 | System error detected: Nonvolatile memory checksum error (data sets operating mode Motion Sequence)<br><br>Parameter _SigLatched Bit 29 | - | - |
| 5448 | 2 | System error detected: Communication with memory card<br><br>Parameter _SigLatched Bit 20 | - | - |
| 5449 | 2 | System error detected: Memory card bus is busy<br><br>Parameter _SigLatched Bit 20 | - | - |
| 544A | 4 | System error detected: Nonvolatile memory checksum error (administration data)<br><br>Parameter _SigLatched Bit 29 | - | - |
| 544B | 4 | System error detected: Nonvolatile memory checksum error (DeviceNet data)<br><br>Parameter _SigLatched Bit 29 | - | - |
| 544C | 4 | System error detected: Nonvolatile memory is write-protected<br><br>Parameter _SigLatched Bit 29 | - | - |
| 544D | 2 | System error detected: Memory card<br><br>Parameter _SigLatched Bit 20 | The last saving procedure may not have been successful; the memory card may be inoperative. | Retry saving the data.<br><br>Replace the memory card. |
| 544E | 2 | System error detected: Memory card<br><br>Parameter _SigLatched Bit 20 | The last saving procedure may not have been successful; the memory card may be inoperative. | Retry saving the data.<br><br>Replace the memory card. |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 544F | 2 | System error detected: Memory card<br><br>Parameter _SigLatched Bit 20 | The last saving procedure may not have been successful; the memory card may be inoperative. | Retry saving the data.<br><br>Replace the memory card. |
| 5451 | 0 | System error detected: No memory card available<br><br>Parameter _WarnLatched Bit 20 | - | - |
| 5452 | 2 | System error detected: Data on memory card and device do not match<br><br>Parameter _SigLatched Bit 20 | Different type of device.<br><br>Different type of power stage.<br><br>Data on memory card does not match firmware version of device. | - |
| 5453 | 2 | System error detected: Incompatible data on the memory card<br><br>Parameter _SigLatched Bit 20 | - | - |
| 5454 | 2 | System error detected: Capacity of detected memory card insufficient<br><br>Parameter _SigLatched Bit 20 | - | - |
| 5455 | 2 | System error detected: Memory card not formatted properly<br><br>Parameter _SigLatched Bit 20 | - | Format memory card or copy data from drive to memory card. |
| 5456 | 1 | System error detected: Memory card is write-protected<br><br>Parameter _SigLatched Bit 20 | The memory card has been write-protected. | Remove memory card or disable write protection. |
| 5457 | 2 | System error detected: Incompatible memory card<br><br>Parameter _SigLatched Bit 20 | Memory card capacity is insufficient. | Replace memory card |
| 5462 | 0 | Memory card implicitly written by the device<br><br>Parameter _WarnLatched Bit 20 | The content of the memory card and the content of the nonvolatile memory are not identical. | - |
| 5468 | 3 | System error detected: Nonvolatile memory checksum error (device name)<br><br>Parameter _SigLatched Bit 29 | - | - |
| 5469 | 3 | System error detected: Nonvolatile memory checksum error (SNMP information)<br><br>Parameter _SigLatched Bit 29 | - | - |
| 546A | 3 | System error detected: Nonvolatile memory checksum error<br><br>Parameter _SigLatched Bit 29 | - | - |
| 546B | 3 | System error detected: Nonvolatile memory checksum error (LLDP MIB data)<br><br>Parameter _SigLatched Bit 29 | - | - |
| 546C | 0 | Nonvolatile memory file not available | - | - |
| 546D | 3 | System error detected: Checksum error in nonvolatile memory (IM data)<br><br>Parameter _SigLatched Bit 29 | - | - |
| 5500 | 3 | System error detected: Timeout during transmission of data | - | - |
| 5501 | 4 | System error detected: Received toggle bit does not match | Software watchdog safety module eSM (CPU_A) | - |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 5502 | 2 | System error detected: Timeout during read/write request | - | - |
| 5503 | 2 | System error detected: Invalid response in the case of a read/write request | - | - |
| 5504 | 4 | System error detected: Safety module not available | - | - |
| 5505 | 4 | System error detected: Indeterminable type of safety module | - | - |
| 5506 | 1 | Error detected during write access to safety module via fieldbus. Additional information in the error memory indicates the detailed error code. | - | - |
| 5507 | 3 | A Fault Reset was not processed by the safety module eSM | The safety module eSM was unable to execute the Fault Reset, for example, because it was still processing an error response. | Trigger the Fault Reset again. |
| 5600 | 3 | Motor connection phase error detected<br><br>Parameter _SigLatched Bit 26 | Missing motor phase. | - |
| 5603 | 3 | Commutation error detected. Additional information in the error memory indicates Internal_DeltaQuep.<br><br>Parameter _SigLatched Bit 26 | Incorrect wiring of motor cable.<br><br>Encoder signals are lost or subject to interference.<br><br>The load torque is greater than the motor torque.<br><br>The encoder nonvolatile memory contains incorrect data (encoder phase offset is incorrect).<br><br>Motor is not adjusted. | Verify motor phases, verify encoder wiring.<br><br>Improve EMC, verify grounding and shield connection.<br><br>Use a differently sized motor that can withstand the load torque.<br><br>Verify the motor data.<br><br>Contact your Schneider Electric service representative. |
| 6102 | 4 | System error detected: Internal software error<br><br>Parameter _SigLatched Bit 30 | - | - |
| 6103 | 4 | System error detected: System stack overflow<br><br>Parameter _SigLatched Bit 31 | - | - |
| 6104 | 0 | System error detected: Division by zero (internal) | - | - |
| 6105 | 0 | System error detected: Overflow during 32 bit calculation (internal) | - | - |
| 6106 | 4 | System error detected: Size of data interface does not match<br><br>Parameter _SigLatched Bit 30 | - | - |
| 6107 | 0 | Parameter outside of value range (calculation error detected) | - | - |
| 6108 | 0 | Function not available | - | - |
| 6109 | 0 | System error detected: Internal range exceeded | - | - |
| 610A | 2 | System error detected: Calculated value cannot be represented as a 32 bit value | - | - |
| 610D | 0 | Error detected in selection parameter | Incorrect parameter value selected. | Verify the value to be written. |
| 610E | 4 | System error detected: 24 VDC below undervoltage threshold for shutdown | - | - |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 610F | 4 | System error detected: Internal timer basis missing (Timer0)<br><br>Parameter _SigLatched_ Bit 30 | - | - |
| 6111 | 2 | System error detected: Memory area locked<br><br>Parameter _SigLatched_ Bit 30 | - | - |
| 6112 | 2 | System error detected: Out of memory<br><br>Parameter _SigLatched_ Bit 30 | - | - |
| 6113 | 1 | System error detected: Calculated value cannot be represented as a 16 bit value | - | - |
| 6114 | 4 | System error detected: Impermissible function call from interrupt service routine | Incorrect programming | - |
| 6117 | 0 | Holding brake cannot be released manually. | The holding brake cannot be released manually because it is still applied manually. | First, switch from applying the holding brake manually to Automatic, then to releasing the holding brake manually. |
| 7100 | 4 | System error detected: Invalid power stage data<br><br>Parameter _SigLatched_ Bit 30 | Error detected in power stage data stored in device (incorrect CRC), error detected in internal memory data. | Contact your Schneider Electric service representative or replace the device. |
| 7110 | 2 | System error detected: Internal braking resistor | Internal braking resistor is inoperative or not connected. | Contact your Schneider Electric service representative. |
| 7111 | 0 | Parameter cannot be changed because the external braking resistor is active. | An attempt is made to change one of the parameters RESext_ton, RESext_P or RESext_R even though the external braking resistor is active. | Verify that the external braking resistor is not active if one of the parameters RESext_ton, RESext_P or RESext_R has to be changed. |
| 7112 | 2 | No external braking resistor connected | External braking resistor activated (Parameter RESint_ext), but no external resistor is detected. | Verify wiring of the external braking resistor. Verify correct resistance. |
| 7120 | 4 | Invalid motor data<br><br>Parameter _SigLatched_ Bit 16 | Motor data is incorrect (incorrect CRC). | Contact your Schneider Electric service representative or replace the motor. |
| 7121 | 2 | System error detected: Error in motor encoder communication<br><br>Parameter _SigLatched_ Bit 16 | EMI, detailed information can be found in the error memory that contains the error code of the encoder. | Contact your Schneider Electric service representative. |
| 7122 | 4 | Invalid motor data<br><br>Parameter _SigLatched_ Bit 30 | Error detected in motor data stored in motor encoder, error detected in internal memory data. | Contact your Schneider Electric service representative or replace the motor. |
| 7124 | 4 | System error detected: Motor encoder inoperative<br><br>Parameter _SigLatched_ Bit 16 | - | Contact your Schneider Electric service representative or replace the motor. |
| 7125 | 4 | System error detected: Length specification for user data too great<br><br>Parameter _SigLatched_ Bit 16 | - | - |
| 7129 | 0 | System error detected: Motor encoder<br><br>Parameter _WarnLatched_ Bit 16 | - | - |
| 712C | 0 | System error detected: Communication with encoder not possible<br><br>Parameter _WarnLatched_ Bit 16 | - | - |
| 712D | 4 | Electronic motor nameplate not found<br><br>Parameter _SigLatched_ Bit 16 | Incorrect motor data (incorrect CRC).<br><br>Motor without electronic motor nameplate (for example, SER motor) | Contact your Schneider Electric service representative or replace the motor. |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 712F | 0 | No data segment of the electronic motor nameplate | - | - |
| 7132 | 0 | System error detected: Motor configuration cannot be written | - | - |
| 7133 | 0 | Not possible to write motor configuration | - | - |
| 7134 | 4 | Incomplete motor configuration<br><br>Parameter _SigLatched_ Bit 16 | - | - |
| 7135 | 4 | Format is not supported<br><br>Parameter _SigLatched_ Bit 16 | - | - |
| 7136 | 4 | Incorrect encoder type selected with parameter MotEnctype<br><br>Parameter _SigLatched_ Bit 16 | - | - |
| 7137 | 4 | Error detected during the internal conversion of the motor configuration<br><br>Parameter _SigLatched_ Bit 16 | - | - |
| 7138 | 4 | Parameter of the motor configuration out of permissible range<br><br>Parameter _SigLatched_ Bit 16 | - | - |
| 7139 | 0 | Encoder offset: Data segment in encoder is incorrect. | - | - |
| 713A | 3 | Adjustment value of the encoder of the third party motor has not yet been determined.<br><br>Parameter _SigLatched_ Bit 16 | - | - |
| 7200 | 4 | System error detected: Calibration analog/digital converter during manufacturing / incorrect BLE file<br><br>Parameter _SigLatched_ Bit 30 | - | - |
| 7320 | 4 | System error detected: Invalid encoder parameter<br><br>Parameter _SigLatched_ Bit 16 | Communication channel (Hiperface) to encoder is subject to interference, motor encoder has not been factory-parameterized. | Contact your Schneider Electric service representative. |
| 7321 | 3 | Timeout reading the absolute position from the encoder<br><br>Parameter _SigLatched_ Bit 16 | Communication channel (Hiperface) to encoder is subject to interference or motor encoder is inoperative. | Verify EMC measures. |
| 7327 | 0 | Error bit set in Hiperface answer<br><br>Parameter _WarnLatched_ Bit 16 | EMI. | Verify wiring (shield). |
| 7328 | 4 | Motor encoder: Position evaluation error detected<br><br>Parameter _SigLatched_ Bit 16 | Encoder has detected incorrect position evaluation. | Contact your Schneider Electric service representative or replace the motor. |
| 7329 | 0 | Motor encoder Warn signal<br><br>Parameter _WarnLatched_ Bit 16 | EMI. | Contact your Schneider Electric service representative or replace the motor. |
| 7330 | 4 | System error detected: Motor encoder (Hiperface)<br><br>Parameter _SigLatched_ Bit 16 | - | Verify EMC measures.<br><br>Contact your Schneider Electric service representative. |
| 7331 | 4 | System error detected: Motor encoder initialization<br><br>Parameter _SigLatched_ Bit 30 | - | Verify EMC measures.<br><br>Contact your Schneider Electric service representative. |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 7335 | 0 | Communication with motor encoder active<br><br>Parameter _WarnLatched_ Bit 16 | Command is being processed or communication may be disturbed (EMI). | Verify EMC measures.<br><br>Contact your Schneider Electric service representative. |
| 733F | 4 | Amplitude of encoder analog signals too low<br><br>Parameter _SigLatched_ Bit 16 | Incorrect encoder wiring.<br><br>Encoder not connected.<br><br>Encoder signals subject to EMI (shield connection, cabling, etc.). | Verify EMC measures.<br><br>Contact your Schneider Electric service representative. |
| 7340 | 3 | Reading of absolute position aborted<br><br>Parameter _SigLatched_ Bit 16 | Communication channel (Hiperface) to encoder is subject to interference.<br><br>Encoder (in motor) is inoperative. | Verify EMC measures.<br><br>Contact your Schneider Electric service representative. |
| 7341 | 0 | Encoder overtemperature<br><br>Parameter _WarnLatched_ Bit 16 | The maximum permissible duty cycle is exceeded.<br><br>The motor was not mounted properly, for example, it is thermally isolated.<br><br>The motor is blocked so that more current is used than under normal conditions.<br><br>The ambient temperature is too high. | Reduce the duty cycle, for example, reduce acceleration.<br><br>Supply additional cooling, for example, use a fan.<br><br>Mount the motor in such a way as to increase thermal conductivity.<br><br>Use a differently rated drive or motor.<br><br>Replace the motor. |
| 7342 | 2 | Encoder overtemperature<br><br>Parameter _SigLatched_ Bit 16 | The maximum permissible duty cycle is exceeded.<br><br>The motor was not mounted properly, for example, it is thermally isolated.<br><br>The motor is blocked so that more current is used than under normal conditions.<br><br>The ambient temperature is too high. | Reduce the duty cycle, for example, reduce acceleration.<br><br>Supply additional cooling, for example, use a fan.<br><br>Mount the motor in such a way as to increase thermal conductivity.<br><br>Use a differently rated drive or motor.<br><br>Replace the motor. |
| 7343 | 0 | Absolute position is different from incremental position<br><br>Parameter _WarnLatched_ Bit 16 | Encoder is subject to EMI.<br><br>Motor encoder is inoperative. | Verify EMC measures.<br><br>Contact your Schneider Electric service representative. |
| 7344 | 3 | Absolute position is different from incremental position<br><br>Parameter _SigLatched_ Bit 16 | Encoder is subject to EMI.<br><br>Motor encoder is inoperative. | Verify EMC measures.<br><br>Contact your Schneider Electric service representative. |
| 7345 | 0 | Amplitude of analog signals too high, limit of AD conversion exceeded | Encoder signals subject to EMI (shield connection, wiring, etc.).<br><br>Encoder inoperative. | Verify EMC measures.<br><br>Contact your Schneider Electric service representative. |
| 7346 | 4 | System error detected: Encoder not ready<br><br>Parameter _SigLatched_ Bit 16 | - | Verify EMC measures.<br><br>Contact your Schneider Electric service representative. |
| 7347 | 0 | System error detected: Position initialization not possible | Analog and digital encoder signals subject to massive interference. | Verify EMC measures.<br><br>Contact your Schneider Electric service representative. |
| 7348 | 3 | Timeout reading encoder temperature<br><br>Parameter _SigLatched_ Bit 16 | Encoder without temperature sensor, incorrect encoder connection. | Verify EMC measures.<br><br>Contact your Schneider Electric service representative. |
| 7349 | 0 | Discrepancy between absolute and analog encoder phases | Analog encoder signals are subject to interference.<br><br>Encoder inoperative. | Verify EMC measures.<br><br>Contact your Schneider Electric service representative. |
| 734A | 3 | Amplitude of analog signals from encoder too high, signals are clipped<br><br>Parameter _SigLatched_ Bit 16 | Incorrect encoder wiring.<br><br>Encoder hardware interface inoperative. | - |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 734B | 0 | Signal position evaluation of analog encoder inoperative<br><br>Parameter _WarnLatched_ Bit 16 | Incorrect encoder wiring.<br><br>Encoder hardware interface inoperative. | - |
| 734C | par. | Error detected with quasi absolute position<br><br>Parameter _SigLatched_ Bit 16 | The motor shaft may have been moved while the drive was powered down. A quasi absolute position has been detected that is not within the permissible motor shaft deviation range. | If the quasi absolute function is active, only power down the drive if the motor is at a standstill and do not move the motor shaft when the drive is off. |
| 734D | 0 | Index pulse is not available for the encoder<br><br>Parameter _WarnLatched_ Bit 16 | - | - |
| 734E | 4 | Error in analog signals from encoder detected. Additional information in the error memory indicates Internal_ DeltaQuep.<br><br>Parameter _SigLatched_ Bit 16 | Encoder cable not properly connected.<br><br>Encoder signals subject to EMI (shield connection, wiring, etc.).<br><br>Mechanical issue. | Verify EMC measures.<br><br>Contact your Schneider Electric service representative. |
| 7500 | 0 | RS485/Modbus: Overrun error detected<br><br>Parameter _WarnLatched_ Bit 5 | EMI; incorrect cabling. | Verify cables. |
| 7501 | 0 | RS485/Modbus: Framing error detected<br><br>Parameter _WarnLatched_ Bit 5 | EMI; incorrect cabling. | Verify cables. |
| 7502 | 0 | RS485/Modbus: Parity error detected<br><br>Parameter _WarnLatched_ Bit 5 | EMI; incorrect cabling. | Verify cables. |
| 7503 | 0 | RS485/Modbus: Receive error detected<br><br>Parameter _WarnLatched_ Bit 5 | EMI; incorrect cabling. | Verify cables. |
| 7601 | 4 | System error detected: Indeterminable type of encoder<br><br>Parameter _SigLatched_ Bit 22 | - | - |
| 7602 | 4 | Configuration error detected: Encoder module and selected machine encoder type do not match<br><br>Parameter _SigLatched_ Bit 22 | - | - |
| 7603 | 4 | Configuration error detected: Encoder module and selected motor encoder type do not match<br><br>Parameter _SigLatched_ Bit 22 | - | - |
| 7604 | 4 | Configuration error detected: Encoder module parameterized, but no module detected<br><br>Parameter _SigLatched_ Bit 22 | - | - |
| 7605 | 4 | Configuration error detected: No motor encoder type selected for encoder module<br><br>Parameter _SigLatched_ Bit 22 | - | - |
| 7606 | 4 | Configuration error detected: No machine encoder type selected for encoder module<br><br>Parameter _SigLatched_ Bit 22 | - | - |
| 7607 | 4 | Encoder module cannot be identified<br><br>Parameter _SigLatched_ Bit 22 | The encoder module is indeterminable. | Use correct encoder module. |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 7608 | 4 | Encoder module power supply overcurrent<br><br>Parameter _SigLatched_ Bit 22 | - Short circuit at connector or encoder cable.<br><br>- Incorrect or inoperative encoder. | - |
| 7609 | 4 | Encoder not connected to encoder module<br><br>Parameter _SigLatched_ Bit 22 | Connector not connected to module or not connected to motor/encoder.<br><br>Incorrect or inoperative encoder cable. | - |
| 760A | 3 | Encoder module in slot 2 missing.<br><br>Parameter _SigLatched_ Bit 22 | Module has been removed or module is inoperative. | - |
| 760C | 2 | Maximum encoder frequency exceeded<br><br>Parameter _SigLatched_ Bit 22 | Velocity too high for the encoder. | - |
| 760D | 4 | Configuration error detected: Incorrect use of encoder module<br><br>Parameter _SigLatched_ Bit 22 | Incorrect value in parameter ENC2_ usage. | - |
| 760E | 2 | Position evaluation error detected (signal tracking error detected)<br><br>Parameter _SigLatched_ Bit 22 | Encoder signals subject to EMI. | Verify wiring and cable shield. |
| 760F | 0 | Incorrect position evaluation (interference detected)<br><br>Parameter _WarnLatched_ Bit 22 | Encoder signals subject to EMI. | Verify wiring, cable shield. |
| 7610 | 0 | Resolver: Loss of position tracking, position is inaccurate<br><br>Parameter _WarnLatched_ Bit 22 | - Motor velocity is too high.<br><br>- Motor acceleration is too fast. | - Reduce velocity.<br><br>- Reduce acceleration.<br><br>- Reduce resolver resolution.<br><br>- Adapt resolver excitation frequency. |
| 7611 | 2 | Resolver: Signal degradation, position is inaccurate<br><br>Parameter _SigLatched_ Bit 22 | Resolver is inoperative.<br><br>Resolver signals are subject to interference.<br><br>Resolver cable is too long. | Replace resolver.<br><br>Verify resolver cable: wiring and shield connection.<br><br>Additional info bits:<br><br>D5: Sine/cosine inputs exceed DOS out of range threshold.<br><br>D4: Sine/cosine inputs exceed DOS mismatch threshold. |
| 7612 | 3 | Resolver: Loss of signal, position unreliable<br><br>Parameter _SigLatched_ Bit 22 | Resolver is inoperative.<br><br>Resolver wiring is incorrect.<br><br>Resolver signals are subject to excessive interference.<br><br>Resolver is unsuitable for drive.<br><br>Incorrect parameter transformation ratio. | Verify resolver cable: wiring and shield connection.<br><br>Replace resolver.<br><br>Additional info bits:<br><br>D7: Sine/cosine inputs clipped.<br><br>D6: Sine/cosine inputs below LOS threshold. |
| 7613 | 3 | Resolver: Signal communication subject to interference<br><br>Parameter _SigLatched_ Bit 22 | Resolver signals are subject to interference. | Verify resolver cable: wiring and shield connection. |
| 7614 | 3 | Error detected at resolver power supply.<br><br>Parameter _SigLatched_ Bit 22 | Resolver is not properly connected. | Verify resolver cable. |
| 7615 | 3 | System error detected: Encoder module RES is not ready for position evaluation<br><br>Parameter _SigLatched_ Bit 22 | EMI. | Verify resolver cable. |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 7616 | 3 | System error detected: Resolver timeout<br><br>Parameter _SigLatched_ Bit 22 | - | Replace encoder module. |
| 7617 | 1 | Resolver velocity is too high<br><br>Parameter _SigLatched_ Bit 22 | Motor velocity is too high. | Reduce motor velocity. |
| 7618 | 4 | Encoder 2 Hall sensor error detected<br><br>Parameter _SigLatched_ Bit 22 | Incorrect wiring or inoperative cable for Hall signals of encoder 2. | Verify encoder cable. |
| 7619 | 4 | Incorrect communication between module and encoder<br><br>Parameter _SigLatched_ Bit 22 | Incorrect encoder wiring/adjustment or incorrect encoder parameter settings (example: parameter ENCDigSSICoding is set for SSI encoder). | Verify encoder cable: wiring and shield connection.. Verify encoder parameter settings. Verify encoder adjustment. |
| 761A | 0 | Incorrect communication between module and encoder<br><br>Parameter _WarnLatched_ Bit 22 | Incorrect encoder wiring. | Verify encoder cable: wiring and shield connection. |
| 761B | 4 | Connected type of EnDat encoder is not supported<br><br>Parameter _SigLatched_ Bit 22 | - | Use a supported EnDat encoder. |
| 761C | 4 | Configuration error detected: Invalid SSI encoder parameter setting<br><br>Parameter _SigLatched_ Bit 22 | Incorrect values in parameter ENCDigSSIResSgl or ENCDigSSIResMult. | - |
| 761D | 2 | Maximum velocity of the encoder is exceeded<br><br>Parameter _SigLatched_ Bit 22 | Velocity too high for the encoder. In the case of SSI or EnDat2.2, the reason may also be a detected encoder communication error. | - |
| 761E | 2 | Encoder module overtemperature<br><br>Parameter _SigLatched_ Bit 22 | The ambient temperature is too high. | Improve the heat dissipation in the control cabinet. |
| 761F | 2 | Position evaluation error detected (AB encoder signals)<br><br>Parameter _SigLatched_ Bit 22 | No sync signal available. | - |
| 7620 | 4 | Checksum error detected in EnDat encoder data<br><br>Parameter _SigLatched_ Bit 22 | - | - |
| 7621 | 1 | Runtime compensation was not successful<br><br>Parameter _SigLatched_ Bit 22 | - | Verify encoder cable: wiring and shield connection. |
| 7622 | 0 | Resolver timeout<br><br>Parameter _WarnLatched_ Bit 22 | System error detected. | Replace encoder module |
| 7623 | 0 | Absolute encoder signal is not available<br><br>Parameter _WarnLatched_ Bit 22 | There is no encoder available at the input specified via the parameter ENC_abs_source. | Verify wiring, verify encoder. Change the value of the parameter ENC_abs_source. |
| 7624 | 0 | Absolute position for encoder 2 cannot be set<br><br>Parameter _WarnLatched_ Bit 22 | No encoder connected or encoder does not support setting of absolute positions. | Use an encoder that supports direct setting of the absolute position via ENC2_setpabs. |
| 7625 | 0 | Not possible to set the absolute position for encoder 1.<br><br>Parameter _WarnLatched_ Bit 22 | There is no encoder connected to the input for encoder 1. | Connect an encoder to the input for encoder 1 before trying to set the absolute position directly via ENC1_abs_pos. |
| 7626 | 4 | Overflow error detected during encoder scaling<br><br>Parameter _SigLatched_ Bit 22 | The multiturn resolution of the machine encoder with reference to the motor shaft exceeds the system limits, for example, due to the mechanical gear ratio between machine encoder and motor encoder. | Reduce the number of bits of the multitun resolution that are used for position evaluation via the parameter ENCDigResMulUsed. |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 7627 | 4 | Configuration error detected: Invalid BiSS encoder parameter setting<br><br>Parameter _SigLatched Bit 22 | Incorrect values in parameters ENCDigBISSResSgl or ENCDigBISSResMult. | - |
| 7628 | 0 | BiSS encoder bits 'War' or 'Err' are set<br><br>Parameter _WarnLatched Bit 22 | The bits are used for diverse types of monitoring such as:<br><br>- Encoder temperature is too high.<br><br>- Service life of LED inside encoder exceeded.<br><br>- Position is not reliable. | Replace encoder. |
| 7629 | 3 | BiSS initialization error detected<br><br>Parameter _SigLatched Bit 22 | - | - |
| 7701 | 4 | System error detected: Timeout during connection to power stage<br><br>Parameter _SigLatched Bit 31 | - | Contact your Schneider Electric service representative. |
| 7702 | 4 | System error detected: Invalid data received from power stage<br><br>Parameter _SigLatched Bit 31 | - | Contact your Schneider Electric service representative. |
| 7703 | 4 | System error detected: Data exchange with power stage lost<br><br>Parameter _SigLatched Bit 31 | - | Contact your Schneider Electric service representative. |
| 7704 | 4 | System error detected: Exchange of identification data from power stage not successful<br><br>Parameter _SigLatched Bit 31 | - | Contact your Schneider Electric service representative. |
| 7705 | 4 | System error detected: Checksum identification data from power stage incorrect<br><br>Parameter _SigLatched Bit 31 | - | Contact your Schneider Electric service representative. |
| 7706 | 4 | System error detected: No identification frame received from power stage<br><br>Parameter _SigLatched Bit 31 | - | Contact your Schneider Electric service representative. |
| 7707 | 4 | System error detected: Type of power stage and manufacture data do not match | - | Contact your Schneider Electric service representative. |
| 7708 | 4 | PIC voltage supply too low<br><br>Parameter _SigLatched Bit 31 | - | Contact your Schneider Electric service representative. |
| 7709 | 4 | System error detected: Invalid numbers of data received<br><br>Parameter _SigLatched Bit 31 | - | Contact your Schneider Electric service representative. |
| 770A | 2 | PIC received data with incorrect parity<br><br>Parameter _SigLatched Bit 31 | - | Contact your Schneider Electric service representative. |
| 7800 | 1 | eSM module: System error detected: Error of class 1 forced<br><br>Parameter _SigLatched Bit 23 | - | - |
| 7801 | 2 | eSM module: System error detected: Error of class 2 forced<br><br>Parameter _SigLatched Bit 23 | - | - |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 7802 | 3 | eSM module: System error detected: Error of class 3 forced<br><br>Parameter _SigLatched_ Bit 23 | - | - |
| 7803 | 4 | eSM module: System error detected: Error of class 4 forced<br><br>Parameter _SigLatched_ Bit 23 | - | - |
| 7804 | 3 | eSM module: Insufficient deceleration for Quick Stop<br><br>Parameter _SigLatched_ Bit 23 | Quick Stop ramp of drive lower than Quick Stop ramp configured for eSM. | Change ramp in eSM or drive. |
| 7805 | 1 | eSM module: Error detected during Safe Operating Stop (SOS)<br><br>Parameter _SigLatched_ Bit 23 | Motor movement during Safe Operating Stop (SOS). | Keep motor from moving while Safe Operating Stop is active (external forces, loads). |
| 7806 | 1 | eSM module: Safely Limited Speed (SLS) exceeded in machine operating mode Setup Mode<br><br>Parameter _SigLatched_ Bit 23 | Delay for reaching Safely Limited Speed (SLS) too low or eSM deceleration ramp too high. | Increase delay for eSM control of Safely Limited Speed (SLS) or decrease eSM deceleration ramp for reaching Safely Limited Speed (SLS). |
| 780A | 2 | eSM module: /ESTOP signal for EMERGENCY STOP triggered<br><br>Parameter _SigLatched_ Bit 23 | EMERGENCY STOP is active. | Reset EMERGENCY STOP. |
| 780B | 0 | eSM module: Not ready for Fault Reset<br><br>Parameter _WarnLatched_ Bit 23 | eSM is in state Quick Stop Active or Fault Reaction Active or Fault. | Wait until eSM is no longer in state Quick Stop Active or Fault Reaction Active or Fault or reboot the drive. |
| 780C | 0 | eSM module: Not ready for eSM Disable<br><br>Parameter _WarnLatched_ Bit 23 | Safety module eSM is not in operating state Operation Enabled. | eSM Disable requires the safety module eSM to be in operating state Operation Enabled. |
| 780F | 0 | eSM module: Parameter cannot be written in this operating state<br><br>Parameter _WarnLatched_ Bit 23 | Parameter cannot be written in this eSM state. | Change eSM state to write this parameter. |
| 7810 | 0 | eSM module: Incorrect password<br><br>Parameter _WarnLatched_ Bit 23 | The password that was sent by the configuration tool is not identical to the password stored in the device. | Send the stored password. |
| 7811 | 0 | eSM module: Timeout during parameter download (default values loaded)<br><br>Parameter _WarnLatched_ Bit 23 | Incorrect connection or EMI. | Verify wiring (shield). |
| 7813 | 0 | eSM module: Parameter checksum cannot be written in this operating state<br><br>Parameter _WarnLatched_ Bit 23 | eSM is not ready to be configured. | Use correct password. Reconfigure safety module eSM. Contact your Schneider Electric service representative. |
| 7814 | 0 | eSM module: Parameter checksum incorrect (default values loaded)<br><br>Parameter _WarnLatched_ Bit 23 | EMI.<br><br>The commissioning software is outdated and not compatible with the safety module eSM. | Verify wiring (shield).<br><br>Install latest commissioning software version. |
| 7815 | 0 | eSM module: Undertemperature<br><br>Parameter _WarnLatched_ Bit 23 | Temperature too low. | - |
| 7816 | 0 | eSM module: Overtemperature<br><br>Parameter _WarnLatched_ Bit 23 | Temperature too high. | Verify the ambient conditions. Verify that the flow of air is sufficient (pollution, objects). |
| 7818 | 2 | eSM module: System error detected: ESM5VDC undervoltage<br><br>Parameter _SigLatched_ Bit 23 | Error detected in eSM 5V supply. | - |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 7819 | 2 | eSM module: Overload outputs channel A<br><br>Parameter _SigLatched_ Bit 23 | Short circuit or overload. | Verify wiring and connected devices. |
| 781A | 4 | eSM module: System error detected: 5V overvoltage<br><br>Parameter _SigLatched_ Bit 23 | eSM internal power supply error detected | - |
| 781B | 4 | eSM module: System error detected: 5V undervoltage<br><br>Parameter _SigLatched_ Bit 23 | eSM internal power supply error detected | - |
| 781D | 2 | eSM module: ESMSTART: Maximum permissible pulse duration exceeded<br><br>Parameter _SigLatched_ Bit 23 | Pulse duration longer than 4 seconds. | Pulse duration must be less than 4 seconds. |
| 781E | 4 | eSM module: System error detected: RAM<br><br>Parameter _SigLatched_ Bit 23 | eSM RAM error detected | - |
| 781F | 4 | eSM module: System error detected: Stack overflow<br><br>Parameter _SigLatched_ Bit 23 | - | - |
| 7820 | 4 | eSM module: System error detected: Program sequence control (communication)<br><br>Parameter _SigLatched_ Bit 23 | Software watchdog eSM (CPU_B) | - |
| 7821 | 4 | eSM module: System error detected: Program sequence control (Idle task)<br><br>Parameter _SigLatched_ Bit 23 | - | - |
| 7825 | 4 | eSM module: System error detected: Firmware checksum<br><br>Parameter _SigLatched_ Bit 23 | - | - |
| 7826 | 0 | eSM module: Parameter outside of permissible value range<br><br>Parameter _WarnLatched_ Bit 23 | Parameter outside of permissible value range. | Verify parameter value. |
| 7827 | 2 | eSM module: Parameter checksum error detected<br><br>Parameter _SigLatched_ Bit 23 | Saved parameter values are invalid. | Reconfigure the eSM. Contact your Schneider Electric service representative. |
| 7828 | 2 | eSM module: System error detected: SPI framing error detected<br><br>Parameter _SigLatched_ Bit 23 | - | - |
| 7829 | 4 | eSM module: Input states channel A and channel B are not identical<br><br>Parameter _SigLatched_ Bit 23 | Wire break or connected devices are inoperable. | Verify wiring and connected devices. |
| 782A | 2 | eSM module: Output states channel A and channel B are not identical<br><br>Parameter _SigLatched_ Bit 23 | Short circuit to 24V DC. System error detected. | Verify wiring and connected devices. Verify connection of STO_A and STO_B. Contact your Schneider Electric service representative. |
| 782B | 3 | eSM module: System error detected: Position evaluation error detected (values not identical)<br><br>Parameter _SigLatched_ Bit 23 | CPU_A and CPU_B have different position values. This condition may have been caused by the encoder. | - |
| 782C | 3 | eSM module: System error detected: Velocity evaluation error detected (values not identical)<br><br>Parameter _SigLatched_ Bit 23 | CPU_A and CPU_B have different velocity values. This condition may have been caused by the encoder. | - |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 782F | 2 | eSM module: System error detected: Error detected during dynamization of STO signal<br><br>Parameter _SigLatched_ Bit 23 | - | - |
| 7833 | 0 | eSM module: System error detected: Nonvolatile memory incorrect checksum (default values loaded)<br><br>Parameter _WarnLatched_ Bit 23 | Nonvolatile memory inoperative. | - |
| 7834 | 0 | eSM module: Safety module replaced (default values loaded)<br><br>Parameter _WarnLatched_ Bit 23 | This safety module has not been configured with this drive. The parameters have been reset to the default values. | Reconfigure the safety module. |
| 7835 | 4 | eSM module: Commutation position<br><br>Parameter _SigLatched_ Bit 23 | Encoder error or error in internal communication with the drive detected (for example, EMI). | Verify EMC. Verify encoder connection. Contact your Schneider Electric service representative. |
| 7836 | 4 | eSM module: Parameter checksums not identical<br><br>Parameter _SigLatched_ Bit 23 | Parameter of CPU_A is not identical to parameter of CPU_B. Not possible to load parameters into safety module eSM. | Retry loading the parameters into the safety module eSM. If the condition persists, contact your Schneider Electric service representative. |
| 7837 | 0 | eSM module: System error detected: Boot program: Invalid address<br><br>Parameter _WarnLatched_ Bit 23 | Invalid write access of bootloader to flash memory range. | - |
| 7838 | 1 | eSM module: Safely Limited Speed (SLS) exceeded in machine operating mode Automatic Mode<br><br>Parameter _SigLatched_ Bit 23 | Drive velocity greater than configured eSM speed limit. | Reduce velocity of the drive or verify eSM speed limit for machine operating mode Automatic Mode. |
| 7839 | 2 | eSM module: Input ESMSTART low instead of high (automatic start)<br><br>Parameter _SigLatched_ Bit 23 | ESMSTART is configured for automatic start and must be high at start. | Verify parameter configuration of ESMSTART. Verify wiring of ESMSTART. |
| 783A | 2 | eSM module: Input ESMSTART high instead of low (manual start)<br><br>Parameter _SigLatched_ Bit 23 | ESMSTART is configured for manual start and must be low at start. | Verify parameter configuration of ESMSTART. Verify wiring of ESMSTART. |
| 783B | 2 | eSM module: Guard door acknowledgment: The acknowledgement signal is available for too long a time.<br><br>Parameter _SigLatched_ Bit 23 | The acknowledgement signal is available for more than 6 seconds. | The acknowledgement signal must be available for less than 6 seconds. |
| 783C | 4 | eSM module: System error detected: States of eSM state machines not identical<br><br>Parameter _SigLatched_ Bit 23 | - | - |
| 783F | 2 | eSM module: Output AUXOUT1 (cross fault to another output detected)<br><br>Parameter _SigLatched_ Bit 23 | Cross fault detection detected a cross fault to another output. | Verify wiring and connected devices. |
| 7840 | 2 | eSM module: Output /INTERLOCK_ OUT (cross fault to another output detected)<br><br>Parameter _SigLatched_ Bit 23 | Cross fault detection detected a cross fault to another output. | Verify wiring and connected devices. |
| 7841 | 2 | eSM module: Output RELAY_OUT_A (cross fault to another output detected)<br><br>Parameter _SigLatched_ Bit 23 | Cross fault detection detected a cross fault to another output. | Verify wiring and connected devices. |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 7842 | 2 | eSM module: Output CCM24V_ OUT_A (cross fault to another output detected)<br><br>Parameter _*SigLatched* Bit 23 | Cross fault detection detected a cross fault to another output. | Verify wiring and connected devices. |
| 7843 | 2 | eSM module: Output AUXOUT1 (cross fault to 24 V detected)<br><br>Parameter _*SigLatched* Bit 23 | Cross fault detection detected a cross fault to 24 V. | Verify wiring and connected devices. |
| 7844 | 2 | eSM module: Output /INTERLOCK_ OUT (cross fault to 24 V detected)<br><br>Parameter _*SigLatched* Bit 23 | Cross fault detection detected a cross fault to 24 V. | Verify wiring and connected devices. |
| 7845 | 2 | eSM module: Output RELAY_OUT_A (cross fault to 24 V detected)<br><br>Parameter _*SigLatched* Bit 23 | Cross fault detection detected a cross fault to 24 V. | Verify wiring and connected devices. |
| 7846 | 2 | eSM module: Output CCM24V_ OUT_A (cross fault to 24 V detected)<br><br>Parameter _*SigLatched* Bit 23 | Cross fault detection detected a cross fault to 24 V. | - |
| 7848 | 2 | eSM module: System error detected: Input ESMSTART_A<br><br>Parameter _*SigLatched* Bit 23 | - | - |
| 7849 | 2 | eSM module: System error detected: Input SETUPENABLE_A<br><br>Parameter _*SigLatched* Bit 23 | - | - |
| 784A | 2 | eSM module: System error detected: Input SETUPMODE_A<br><br>Parameter _*SigLatched* Bit 23 | - | - |
| 784B | 2 | eSM module: System error detected: Input GUARD_A<br><br>Parameter _*SigLatched* Bit 23 | - | - |
| 784C | 2 | eSM module: System error detected: Input GUARD_ACK<br><br>Parameter _*SigLatched* Bit 23 | - | - |
| 784D | 2 | eSM module: System error detected: Input /INTERLOCK_IN_A<br><br>Parameter _*SigLatched* Bit 23 | - | - |
| 784E | 2 | eSM module: System error detected: Input /ESTOP_A<br><br>Parameter _*SigLatched* Bit 23 | - | - |
| 784F | 2 | eSM module: System error detected: Input NOTUSED_A<br><br>Parameter _*SigLatched* Bit 23 | - | - |
| 7850 | 2 | eSM module: Overload outputs channel B<br><br>Parameter _*SigLatched* Bit 23 | Short circuit or overload. | Verify wiring and connected devices. |
| 7851 | 4 | eSM module: System error detected: UART overrun/framing error<br><br>Parameter _*SigLatched* Bit 23 | - | - |
| 7852 | 2 | eSM module: System error detected: ResEnc (encoder resolution) is set to 0<br><br>Parameter _*SigLatched* Bit 23 | - | - |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 7853 | 4 | eSM module: System error detected: CPU synchronization<br><br>Parameter _*SigLatched* Bit 23 | - | - |
| 7854 | 2 | eSM module: No motor movement for 36 hours<br><br>Parameter _*SigLatched* Bit 23 | There has not been a minimum motor movement for the last 36 hours. | There must be a minimum motor movement at least once every 36 hours. |
| 7855 | 2 | eSM module: System error detected: Timeout high-priority tests (5 sec)<br><br>Parameter _*SigLatched* Bit 23 | - | - |
| 7856 | 2 | eSM module: System error detected: Timeout low-priority tests<br><br>Parameter _*SigLatched* Bit 23 | - | - |
| 7857 | 2 | eSM module: Parameter dec_Qstop (minimum deceleration) is set to 0<br><br>Parameter _*SigLatched* Bit 23 | Module is not configured. | Download a configuration. |
| 7858 | 2 | eSM module: Output AUXOUT2 (cross fault to another output detected)<br><br>Parameter _*SigLatched* Bit 23 | Cross fault detection detected a cross fault to another output. | Verify wiring and connected devices. |
| 7859 | 2 | eSM module: Output /INTERLOCK_OUT (cross fault to another output detected)<br><br>Parameter _*SigLatched* Bit 23 | Cross fault detection detected a cross fault to another output. | Verify wiring and connected devices. |
| 785A | 2 | eSM module: Output RELAY_OUT_B (cross fault to another output detected)<br><br>Parameter _*SigLatched* Bit 23 | Cross fault detection detected a cross fault to another output. | Verify wiring and connected devices. |
| 785B | 2 | eSM module: Output CCM24V_OUT_B (cross fault to another output detected)<br><br>Parameter _*SigLatched* Bit 23 | Cross fault detection detected a cross fault to another output. | Verify wiring and connected devices. |
| 785C | 2 | eSM module: Output AUXOUT2 (cross fault to 24 V detected)<br><br>Parameter _*SigLatched* Bit 23 | Cross fault detection detected a cross fault to 24 V. | Verify wiring and connected devices. |
| 785D | 2 | eSM module: Output /INTERLOCK_OUT (cross fault to 24 V detected)<br><br>Parameter _*SigLatched* Bit 23 | Cross fault detection detected a cross fault to 24 V. | Verify wiring and connected devices. |
| 785E | 2 | eSM module: Output RELAY_OUT_B (cross fault to 24 V detected)<br><br>Parameter _*SigLatched* Bit 23 | Cross fault detection detected a cross fault to 24 V. | Verify wiring and connected devices. |
| 785F | 2 | eSM module: Output CCM24V_OUT_B (cross fault to 24 V detected)<br><br>Parameter _*SigLatched* Bit 23 | Cross fault detection detected a cross fault to 24 V. | Verify wiring and connected devices. |
| 7861 | 2 | eSM module: System error detected: Input ESMSTART_B<br><br>Parameter _*SigLatched* Bit 23 | - | - |
| 7862 | 2 | eSM module: System error detected: Input SETUPENABLE_B<br><br>Parameter _*SigLatched* Bit 23 | - | - |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 7863 | 2 | eSM module: System error detected: Input SETUPMODE_B<br><br>Parameter _SigLatched Bit 23 | - | - |
| 7864 | 2 | eSM module: System error detected: Input GUARD_B<br><br>Parameter _SigLatched Bit 23 | - | - |
| 7865 | 2 | eSM module: System error detected: Input GUARD_ACK<br><br>Parameter _SigLatched Bit 23 | - | - |
| 7866 | 2 | eSM module: System error detected: Input /INTERLOCK_IN_B<br><br>Parameter _SigLatched Bit 23 | - | - |
| 7867 | 2 | eSM module: System error detected: Input /ESTOP_B<br><br>Parameter _SigLatched Bit 23 | - | - |
| 786A | 4 | eSM module: Undertemperature<br><br>Parameter _SigLatched Bit 23 | Temperature of the eSM too low. | Verify ambient conditions. |
| 786C | 2 | eSM module: Overvoltage ESM24VDC<br><br>Parameter _SigLatched Bit 23 | Voltage too high at the ESM24VDC. | Verify power supply. |
| 786D | 4 | eSM module: Overtemperature<br><br>Parameter _SigLatched Bit 23 | Temperature too high. | Verify the ambient conditions. Verify that the flow of air is sufficient (pollution, objects). |
| 786E | 4 | eSM module: System error detected: Operating states not identical<br><br>Parameter _SigLatched Bit 23 | - | - |
| 7870 | 4 | eSM module: System error detected: Software versions not identical<br><br>Parameter _SigLatched Bit 23 | - | - |
| 7871 | 3 | eSM module: Error detected during Safe Operating Stop (SOS) after detected error<br><br>Parameter _SigLatched Bit 23 | Motor movement during Safe Operating Stop (SOS). | - |
| 7872 | 4 | eSM module: System error detected: Software incompatible with hardware<br><br>Parameter _SigLatched Bit 23 | - | - |
| 7873 | 1 | eSM module: Error detected during deceleration to Safely Limited Speed (SLS)<br><br>Parameter _SigLatched Bit 23 | Velocity of drive greater than speed limit configured for eSM Safely Limited Speed (SLS). | Verify speed limit and delay time for eSM Safely Limited Speed (SLS). Adapt the drive values for ramp and velocity, if necessary. |
| 7874 | 2 | eSM module: Repeated error detected during Safe Operating Stop (SOS)<br><br>Parameter _SigLatched Bit 23 | - | - |
| 7875 | 4 | eSM module: Repeated error detected during deceleration for Quick Stop<br><br>Parameter _SigLatched Bit 23 | - | - |
| 7876 | 3 | eSM module: /INTERLOCK_IN not high (timeout if t_Relay = 2)<br><br>Parameter _SigLatched Bit 23 | - | - |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 7877 | 2 | eSM module: Input /INTERLOCK_IN is high even though Ignore has been configured<br><br>Parameter _*SigLatched* Bit 23 | - | - |
| 7878 | 2 | eSM module: Speed limit for machine operating mode Setup Mode (eSM_ v_maxSetup) higher than speed limit for machine operating mode Automatic Mode (eSM_v_maxAuto)<br><br>Parameter _*SigLatched* Bit 23 | Speed limit for machine operating mode Setup Mode must not be greater than speed limit for machine operating mode Automatic Mode. | Verify the speed limits for machine operating modes Automatic Mode and Setup Mode and change them as required. |
| 7879 | 4 | eSM module: System error detected: Indeterminable state of eSM state machine<br><br>Parameter _*SigLatched* Bit 23 | - | - |
| 787A | 2 | eSM module: ESM24VDC undervoltage<br><br>Parameter _*SigLatched* Bit 23 | Voltage at the ESM24VDC connector to low. | Verify power supply. |
| 787D | 4 | eSM module: System error detected: Asynchronous communication (UART/SPI)<br><br>Parameter _*SigLatched* Bit 23 | - | - |
| 787E | 4 | eSM module: System error detected: RAM (bit)<br><br>Parameter _*SigLatched* Bit 23 | - | - |
| 787F | 4 | eSM module: Encoder signal error detected<br><br>Parameter _*SigLatched* Bit 23 | Encoder or encoder cable inoperative. Incorrect signal evaluation in drive. | - |
| 7880 | 2 | eSM module: Indeterminable service<br><br>Parameter _*SigLatched* Bit 23 | - | - |
| 7881 | 2 | eSM module: Parameter does not exist<br><br>Parameter _*SigLatched* Bit 23 | Parameter does not exist. | Verify the parameter number. |
| 7882 | 4 | eSM module: System error detected: 3_3V overvoltage<br><br>Parameter _*SigLatched* Bit 23 | Overvoltage in internal eSM power supply. | - |
| 7883 | 4 | eSM module: System error detected: 3_3V undervoltage<br><br>Parameter _*SigLatched* Bit 23 | Undervoltage in internal eSM power supply. | - |
| 7884 | 4 | eSM module: System error detected: Temperature sensor<br><br>Parameter _*SigLatched* Bit 23 | Temperature sensor for CPU_A or CPU_B does not work properly. | - |
| 7886 | 2 | eSM module: No speed limit for negative direction set for direction-dependent SLS<br><br>Parameter _*SigLatched* Bit 23 | Direction-dependent SLS is active, but no speed limit greater than 0 RPM has been specified in the parameter eSM_v_maxSetup or in parameter eSM_SLSnegDirS. | Set a speed limit for direction-dependent SLS greater than 0 RPM in the parameter _eSM_v_maxSetup or in the parameter eSM_ SLSnegDirS or deactivate direction-dependent SLS via the parameter eSM_FuncSwitches. |
| 7887 | 2 | eSM module: Speed limit for SLS in negative direction has been specified, but direction-dependant SLS has not been activated<br><br>Parameter _*SigLatched* Bit 23 | Direction-dependent SLS is not active, but a speed limit for direction-dependent SLS in negative direction has been specified. | Set the speed limit for direction-dependent SLS in negative direction in parameter eSM_SLSnegDirS to 0 RPM or activate direction-dependent SLS via the parameter eSM_ FuncSwitches. |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 7889 | 2 | eSM module: Order of speed limits for multiple SLS in positive direction is incorrect<br><br>Parameter _*SigLatched* Bit 23 | The values for the speed limits for multiple SLS are not in ascending order. | Set correct speed limits for multiple SLS. |
| 788A | 2 | eSM module: Order of speed limits for multiple SLS in negative direction is incorrect<br><br>Parameter _*SigLatched* Bit 23 | The values for the speed limits for multiple SLS are not in ascending order. | Set correct speed limits for multiple SLS. |
| 788B | 2 | eSM module: Invalid speed limit for multiple SLS in positive direction<br><br>Parameter _*SigLatched* Bit 23 | Speed limit for multiple SLS in positive direction has a value of zero. | Set a speed limit not equal to zero for multiple SLS. |
| 788C | 2 | eSM module: Invalid speed limit for multiple SLS in negative direction has a value of zero<br><br>Parameter _*SigLatched* Bit 23 | Speed limit for multiple SLS in negative direction has a value of zero. | Set a speed limit not equal to zero for multiple SLS. |
| 788D | 2 | eSM module: Two types of multiple SLS selected at the same time<br><br>Parameter _*SigLatched* Bit 23 | eSM module: Two types of multiple SLS selected at the same time. | Select a single type of multiple SLS. |
| 7900 | 4 | Module in fieldbus slot not correctly detected<br><br>Parameter _*SigLatched* Bit 21 | Fieldbus module not correctly mounted in the slot.<br><br>Unsupported fieldbus module inserted.<br><br>Fieldbus module inoperative.<br><br>EMI. | Replace fieldbus module.<br><br>Improve EMC. |
| 7901 | 4 | Indeterminable type of fieldbus module detected in fieldbus slot<br><br>Parameter _*SigLatched* Bit 21 | The type of module detected in fieldbus slot is not supported by the drive. | Use supported type of fieldbus module. Refer to manual or catalog. |
| 7903 | 3 | Fieldbus module in slot 3 missing<br><br>Parameter _*SigLatched* Bit 21 | Fieldbus module has been removed or fieldbus module is inoperative. | Confirm or cancel HMI dialog box for fieldbus module replacement.<br><br>Install a new fieldbus module. |
| 7904 | 0 | Parameter access error detected in fieldbus module | Fieldbus module parameter does not exist or cannot be written. | - |
| 7905 | 3 | Fieldbus module in slot 3 has been changed<br><br>Parameter _*SigLatched* Bit 21 | The fieldbus module has been replaced by another type of fieldbus module. | Confirm the new fieldbus module via the HMI dialog. |
| 7906 | 0 | Internal timeout in communication with fieldbus module | Internal communication with fieldbus module not correct.<br><br>Fieldbus module inoperative.<br><br>EMI. | Replace fieldbus module.<br><br>Improve EMC. |
| 7907 | 4 | The module detected in the slot for fieldbus modules slot is not supported.<br><br>Parameter _*SigLatched* Bit 21 | The module detected in the slot for fieldbus modules is not supported by older drive hardware revisions. | - |
| 7A05 | 3 | Module IOM1: System error detected: Calibration analog/digital converter during manufacturing<br><br>Parameter _*SigLatched* Bit 23 | - | - |
| 7A06 | 3 | Module IOM1: System error detected: Initialization<br><br>Parameter _*SigLatched* Bit 23 | - | - |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 7A07 | 3 | Module IOM1: System error detected: Nonvolatile memory read error detected, CRC does not match<br><br>Parameter _*SigLatched* Bit 23 | - | - |
| 7A08 | 3 | Module IOM1: System error detected: Nonvolatile memory write error detected<br><br>Parameter _*SigLatched* Bit 23 | - | - |
| 7A09 | 3 | Module IOM1: System error detected: Nonvolatile memory erase error detected<br><br>Parameter _*SigLatched* Bit 23 | - | - |
| 7A0A | 3 | Module IOM1: System error detected: Incorrect flash API implemented<br><br>Parameter _*SigLatched* Bit 23 | - | - |
| 7A0B | 0 | Module IOM1: Overtemperature<br><br>Parameter _*WarnLatched* Bit 23 | Device cooling not sufficient.<br><br>Cooling fan inoperative.<br><br>Ambient temperature too high. | Verify fan and ambient temperature. |
| 7A0C | 2 | Module IOM1: Overtemperature<br><br>Parameter _*SigLatched* Bit 23 | Device cooling not sufficient.<br><br>Cooling fan inoperative.<br><br>Ambient temperature too high. | Verify fan and ambient temperature. |
| 7A0D | 2 | Module IOM1: Module not available<br><br>Parameter _*SigLatched* Bit 23 | The module IOM1 was not detected when the operating mode Profile Velocity or Profile Torque with reference value via analog input was activated.<br><br>The module IOM1 has been removed when the de device was off. | Insert the module IOM1. |
| 7A0E | 4 | Module IOM1: Inoperative<br><br>Parameter _*SigLatched* Bit 23 | Module IOM1 inoperative.<br><br>Hardware interface to the module IOM1 inoperative. | - |
| 7A0F | 2 | Module IOM1: Inoperative<br><br>Parameter _*SigLatched* Bit 23 | Module IOM1 inoperative.<br><br>Hardware interface to the module IOM1 inoperative. | - |
| 7A10 | 4 | Module IOM1: Inoperative<br><br>Parameter _*SigLatched* Bit 23 | Module IOM1 inoperative.<br><br>Hardware interface to the module IOM1 inoperative. | - |
| 7A11 | 4 | Module IOM1: Inoperative<br><br>Parameter _*SigLatched* Bit 23 | Module IOM1 inoperative.<br><br>Hardware interface to the module IOM1 inoperative. | - |
| 7A12 | 2 | Module IOM1: Module IOM1 required for velocity or torque limitation via analog input<br><br>Parameter _*SigLatched* Bit 23 | Velocity or torque limitation via analog input has been activated, but the module IOM1 has not been inserted. | Insert the module IOM1 or deactivate the velocity or torque limitation setting via the analog input. |
| 7A13 | par. | Module IOM1: Overload or short circuit at analog output<br><br>Parameter _*SigLatched* Bit 23 | Overload or shot circuit at one of the analog outputs. | Verify wiring and connected load. |
| 7A14 | 4 | Module IOM1: Module IOM1 not supported in combination with PROFINET fieldbus module<br><br>Parameter _*SigLatched* Bit 23 | The module IOM1 is not supported if the PROFINET fieldbus module is used. | - |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 8110 | 0 | CANopen: Overflow internal receive queue (message lost)<br><br>Parameter _WarnLatched Bit 21 | Two short CAN messages have been sent too fast (at 1 Mbits only). | - |
| 8120 | 0 | CANopen: CAN Controller in state Error Passive<br><br>Parameter _WarnLatched Bit 21 | Too many error frames have been detected. | Verify CAN bus installation. |
| 8130 | par. | CANopen: Detected Heartbeat or Life Guard error<br><br>Parameter _SigLatched Bit 21 | The bus cycle time of the CANopen master is longer than the programmed heartbeat or node guarding time. | Verify the CANopen configuration, increase the heartbeat or node guarding time. |
| 8131 | 0 | CANopen: Detected Heartbeat or Life Guard error<br><br>Parameter _WarnLatched Bit 21 | - | - |
| 8140 | 0 | CANopen: CAN controller was in state 'bus-off', communication is possible again<br><br>Parameter _WarnLatched Bit 21 | - | - |
| 8141 | 2 | CANopen: CAN controller is in state 'bus-off'<br><br>Parameter _SigLatched Bit 21 | Too many error frames have been detected, CAN devices with different baud rates. | Verify CAN bus installation. |
| 8142 | 0 | CANopen: CAN controller is in state 'bus-off'<br><br>Parameter _WarnLatched Bit 21 | Too many error frames have been detected, CAN devices with different baud rates. | Verify CAN bus installation. |
| 8281 | 0 | CANopen: RxPDO1 could not be processed<br><br>Parameter _WarnLatched Bit 21 | Error detected while processing Receive PDO1: PDO1 contains invalid value. | Verify RxPDO1 content (application). |
| 8282 | 0 | CANopen: RxPDO2 could not be processed<br><br>Parameter _WarnLatched Bit 21 | Error detected while processing Receive PDO2: PDO2 contains invalid value. | Verify RxPDO2 content (application). |
| 8283 | 0 | CANopen: RxPDO3 could not be processed<br><br>Parameter _WarnLatched Bit 21 | Error detected while processing Receive PDO3: PDO3 contains invalid value. | Verify RxPDO3 content (application). |
| 8284 | 0 | CANopen: RxPDO4 could not be processed<br><br>Parameter _WarnLatched Bit 21 | Error detected while processing Receive PDO4: PDO4 contains invalid value. | Verify RxPDO4 content (application) |
| 8291 | 0 | CANopen: TxPdo could not be processed<br><br>Parameter _WarnLatched Bit 21 | - | - |
| 8292 | 0 | CANopen: TxPdo could not be processed<br><br>Parameter _WarnLatched Bit 21 | - | - |
| 8293 | 0 | CANopen: TxPdo could not be processed<br><br>Parameter _WarnLatched Bit 21 | - | - |
| 8294 | 0 | CANopen: TxPdo could not be processed<br><br>Parameter _WarnLatched Bit 21 | - | - |
| 82A0 | 0 | CANopen: Initialization CANopen stack<br><br>Parameter _WarnLatched Bit 21 | - | - |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| 82A1 | 0 | CANopen: Overflow internal transmit queue (message lost)<br><br>Parameter _WarnLatched_ Bit 21 | - | - |
| 82B1 | 0 | CANopen: The data tunneling protocol is not Modbus RTU<br><br>Parameter _WarnLatched_ Bit 21 | - | - |
| 82B2 | 0 | CANopen: Data frame is still being processed<br><br>Parameter _WarnLatched_ Bit 21 | A new data frame was written but the previous data frame is still being processed. | Write the data frame again later on. |
| A060 | 2 | Calculated velocity too high for operating mode Electronic Gear<br><br>Parameter _SigLatched_ Bit 4 | Gear ratio or reference velocity value too high | Reduce the gear ratio or reference velocity. |
| A061 | 2 | Position change in reference value for operating mode Electronic Gear too high<br><br>Parameter _SigLatched_ Bit 4 | Position reference change is too high.<br><br>Error detected at signal input for reference value. | Reduce the resolution of the master.<br><br>Verify signal input for reference value signal. |
| A065 | 0 | Parameters cannot be written<br><br>Parameter _WarnLatched_ Bit 4 | A data set is still active. | Wait until the currently active data set has been terminated. |
| A066 | 0 | Teach-in position cannot be accepted<br><br>Parameter _WarnLatched_ Bit 4 | Data set type is not 'MoveAbsolute' | Set the data set type to 'MoveAbsolute' |
| A067 | 1 | Invalid value in data set. Additional information in the error memory indicates the data set number (low byte) and entry (high byte).<br><br>Parameter _SigLatched_ Bit 4 | Value not possible in data set. | See also parameters _MSM_error_num and _MSM_error_entry for additional information. |
| A068 | 0 | Offset positioning not possible<br><br>Parameter _WarnLatched_ Bit 4 | Operating mode Electronic Gear inactive or no gear method selected. | Start operating mode Electronic Gear and/or select a gear method. |
| A069 | 0 | Setting the offset position is not possible<br><br>Parameter _WarnLatched_ Bit 4 | If offset positioning is active, it is not possible to set the position offset. | Wait until ongoing offset positioning has finished. |
| A06B | 2 | Position deviation in operating mode Electronic Gear too high<br><br>Parameter _SigLatched_ Bit 4 | The position deviation has become excessively high due to a velocity limitation or the release of direction. | Verify the velocity of the external reference values and the velocity limitation. Verify release of direction. |
| A300 | 0 | Deceleration after HALT request still running | HALT was removed too soon.<br><br>New command was sent before motor standstill was reached after a HALT request. | Wait for complete stop before removing HALT signal.<br><br>Wait until motor has come to a complete standstill. |
| A301 | 0 | Drive in operating state Quick Stop Active | Error with error class 1 detected.<br><br>Drive stopped with Quick Stop. | - |
| A302 | 1 | Stop by positive limit switch<br><br>Parameter _SigLatched_ Bit 1 | The positive limit switch was activated because movement range was exceeded, incorrect operation of limit switch or signal disturbance. | Verify application.<br><br>Verify limit switch function and connection. |
| A303 | 1 | Stop by negative limit switch<br><br>Parameter _SigLatched_ Bit 1 | The negative limit switch was activated because movement range was exceeded, incorrect operation of limit switch or signal disturbance. | Verify application.<br><br>Verify limit switch function and connection. |
| A304 | 1 | Stop by reference switch<br><br>Parameter _SigLatched_ Bit 1 | - | - |
| A305 | 0 | Power stage cannot be enabled in the operating state Not Ready To Switch On | Fieldbus: An attempt was made to enable the power stage in the operating state Not Ready To Switch On. | Refer to the state diagram. |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| A306 | 1 | Stop by user-initiated software stop<br><br>Parameter _SigLatched Bit 3 | Drive is in operating state Quick Stop Active due to a software stop request. The activation of a new operating mode is not possible, the error code is sent as the response to the activation command. | Clear break condition with command Fault Reset. |
| A307 | 0 | Interruption by internal software stop | In the operating modes Homing and Jog, the movement is internally interrupted by an internal software stop. The activation of a new operating mode is not possible, the error code is sent as the response to the activation command. | Perform a Fault Reset. |
| A308 | 0 | Drive is in operating state Fault or Fault Reaction Active | Error with error class 2 or higher detected. | Verify the error code, remove the cause and perform a Fault Reset. |
| A309 | 0 | Drive not in operating state Operation Enabled | A command was sent that requires the drive to be in the operating state Operation Enabled (for example, a command to change the operating mode). | Set drive to operating state Operation Enabled and repeat the command. |
| A310 | 0 | Power stage not enabled | Command cannot be used because the power stage is not enabled (operating state Operation Enabled or Quick Stop Active). | Set drive to an operating state in which the power stage is enabled, see state diagram. |
| A311 | 0 | Operating mode change active | A start request for an operating mode has been received while a change of the operating mode was active. | Wait until the operating mode change has terminated before triggering a start request for another operating mode. |
| A312 | 0 | Profile generation interrupted | - | - |
| A313 | 0 | Position overflow, zero point is therefore no longer valid (ref_ok=0) | The movement range limits were exceeded and the zero point is no longer valid. An absolute movement requires a valid zero point. | Define a valid zero point by means of the operating mode Homing. |
| A314 | 0 | No valid zero point | Command needs a valid zero point (ref_ok=1). | Define a valid zero point by means of the operating mode Homing. |
| A315 | 0 | Homing active | Command cannot be used while the operating mode Homing is active. | Wait until reference movement is finished. |
| A316 | 0 | Overflow during calculation of acceleration | - | - |
| A317 | 0 | Motor is not at a standstill | Command sent which is not permissible when the motor is not at a standstill.<br><br>For example:<br><br>- Change of software limit switches<br><br>- Change of handling of monitoring signals<br><br>- Setting of reference point<br><br>- Teach in of data set | Wait until the motor has come to a standstill (x_end = 1). |
| A318 | 0 | Operating mode active (x_end=0) | Activation of a new operating mode is not possible while another operating mode is still active. | Wait until the command in the operating mode has finished (x_end= 1)<br><br>or terminate active operating mode with HALT command. |
| A319 | 1 | Manual tuning/Autotuning: Movement out of range<br><br>Parameter _SigLatched Bit 2 | The movement exceeds the parameterized maximum movement range. | Verify permissible movement range value and time interval. |
| A31A | 0 | Manual tuning/Autotuning: Amplitude/offset too high | Amplitude plus offset for tuning exceed internal velocity or current limitation. | Choose lower amplitude and offset values. |
| A31B | 0 | Halt requested | Command not permissible while Halt is requested. | Clear Halt request and repeat command. |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| A31C | 0 | Invalid position setting with software limit switch | Value for negative (positive) software limit switch is greater (less) than value for positive (negative) software limit switch. | Set correct position values. |
| A31D | 0 | Velocity range exceeded (parameter CTRL_v_max, M_n_max) | The velocity was set to a value greater than the maximum permissible velocity in parameter CTRL_v_max or M_n_max, whichever is lower. | If the value of parameter M_n_max is greater than the value of parameter CTRL_v_max, increase the value of parameter CTRL_v_max or reduce the velocity value. |
| A31E | 1 | Stop by positive software limit switch<br><br>Parameter _SigLatched Bit 2 | Not possible to execute command because positive software limit switch was triggered. | Return to the permissible movement range. |
| A31F | 1 | Stop by negative software limit switch<br><br>Parameter _SigLatched Bit 2 | Not possible to execute command because negative software limit switch was triggered. | Return to the permissible movement range. |
| A320 | par. | Permissible position deviation exceeded<br><br>Parameter _SigLatched Bit 8 | External load or acceleration are too high. | Reduce external load or acceleration.<br><br>Use a differently rated drive, if necessary.<br><br>Error response can be adjusted via parameter ErrorResp_p_dif. |
| A321 | 0 | Invalid setting for RS422 position interface | - | - |
| A322 | 0 | Error detected in ramp calculation | - | - |
| A323 | 3 | System error detected: Processing error detected during generation of profile | - | - |
| A324 | 1 | Error detected during homing. Additional information in the error memory indicates the detailed error code.<br><br>Parameter _SigLatched Bit 4 | Homing movement was stopped in response to a detected error, the detailed reason is indicated by the additional info in the error memory. | Possible sub-error codes:<br><br>A325, A326, A327, A328 or A329. |
| A325 | 1 | Limit switch to be approached not enabled<br><br>Parameter _SigLatched Bit 4 | Homing to positive limit switch or negative limit switch is disabled. | Enable limit switch via 'IOsigLimP' or 'IOsigLimN'. |
| A326 | 1 | Reference switch not found between positive limit switch and negative limit switch<br><br>Parameter _SigLatched Bit 4 | Reference switch inoperative or not correctly connected. | Verify the function and wiring of the reference switch. |
| A329 | 1 | More than one signal positive limit switch/negative limit switch/reference switch active<br><br>Parameter _SigLatched Bit 4 | Reference switch or limit switch not connected correctly or supply voltage for switches too low. | Verify the wiring and 24 VDC supply voltage. |
| A32A | 1 | Positive limit switch triggered with negative direction of movement<br><br>Parameter _SigLatched Bit 4 | Start reference movement with negative direction (for example, reference movement to negative limit switch) and activate the positive limit switch (switch in opposite direction of movement). | Verify correct connection and function of limit switch.<br><br>Activate a jog movement with negative direction of movement (target limit switch must be connected to the negative limit switch). |
| A32B | 1 | Negative limit switch triggered with positive direction of movement<br><br>Parameter _SigLatched Bit 4 | Start reference movement with positive direction (for example, reference movement to positive limit switch) and activate the negative limit switch (switch in opposite direction of movement). | Verify correct connection and function of limit switch.<br><br>Activate a jog movement with positive direction of movement (target limit switch must be connected to the positive limit switch). |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| A32C | 1 | Reference switch error detected (switch signal briefly enabled or switch overtraveled)<br><br>Parameter _SigLatched Bit 4 | Switch signal disturbance.<br><br>Motor subjected to vibration or shock when stopped after activation of the switch signal. | Verify supply voltage, cabling and function of switch.<br><br>Verify motor response after stopping and optimize control loop settings. |
| A32D | 1 | Positive limit switch error detected (switch signal briefly enabled or switch overtraveled)<br><br>Parameter _SigLatched Bit 4 | Switch signal disturbance.<br><br>Motor subjected to vibration or shock when stopped after activation of the switch signal. | Verify supply voltage, cabling and function of switch.<br><br>Verify motor response after stopping and optimize control loop settings. |
| A32E | 1 | Negative limit switch error detected (switch signal briefly enabled or switch overtraveled)<br><br>Parameter _SigLatched Bit 4 | Switch signal disturbance.<br><br>Motor subjected to vibration or shock when stopped after activation of the switch signal. | Verify supply voltage, cabling and function of switch.<br><br>Verify motor response after stopping and optimize control loop settings. |
| A32F | 1 | Index pulse not found<br><br>Parameter _SigLatched Bit 4 | Index pulse signal not connected or not working properly. | Verify index pulse signal and connection. |
| A330 | 0 | Reference movement to index pulse cannot be reproduced. Index pulse is too close to the switch<br><br>Parameter _WarnLatched Bit 4 | The position difference between the index pulse and the switching point is insufficient. | Increase the distance between the index pulse and the switching point. If possible, the distance between the index pulse and the switching point should be a half motor revolution. |
| A332 | 1 | Jog error detected. Additional information in the error memory indicates the detailed error code.<br><br>Parameter _SigLatched Bit 4 | Jog movement was stopped in response to a detected error. | For additional info, verify the detailed error code in the error memory. |
| A333 | 3 | System error detected: Invalid internal selection | - | - |
| A334 | 2 | Timeout Standstill Window monitoring | Position deviation after movement greater than standstill window. This may have been caused by an external load. | Verify load.<br><br>Verify settings for standstill window (parameter MON_p_win, MON_p_winTime and MON_p_winTout).<br><br>Optimize control loop settings. |
| A336 | 1 | System error detected: Jerk limitation with position offset after end of movement. Additional information in the error memory indicates the offset in Increments. | - | - |
| A337 | 0 | Operating mode cannot be continued<br><br>Parameter _WarnLatched Bit 4 | Continuation of interrupted movement in operating mode Profile Position is not possible because another operating mode had been active in the meantime.<br><br>In the operating mode Motion Sequence, continuation is not possible if a motion blend was interrupted. | Restart the operating mode. |
| A338 | 0 | Operating mode unavailable<br><br>Parameter _WarnLatched Bit 4 | The selected operating mode is not available. | - |
| A339 | 0 | No processing of motor encoder selected or position capture of motor index pulse active<br><br>Parameter _WarnLatched Bit 4 | - | - |
| A33A | 0 | No valid zero point (ref_ok=0)<br><br>Parameter _WarnLatched Bit 4 | No zero point defined by means of operating mode Homing.<br><br>Zero point no longer valid due to movement beyond permissible movement range.<br><br>Motor does not have an absolute encoder. | Use operating mode Homing to define a valid zero point.<br><br>Use a motor with an absolute encoder. |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| A33C | 0 | Function not available in this operating mode<br><br>Parameter _WarnLatched_ Bit 4 | Activation of a function which is not available in the active operating mode.<br><br>Example: Start of backlash compensation while autotuning/ manual tuning is active. | - |
| A33D | 0 | Motion blend is already active<br><br>Parameter _WarnLatched_ Bit 4 | Change of motion blend during the ongoing motion blend (end position of motion blend not yet reached) | Wait for the motion blend to complete before setting the next position. |
| A33E | 0 | No movement activated<br><br>Parameter _WarnLatched_ Bit 4 | Activation of a motion blend without movement. | Start a movement before the motion blend is activated. |
| A33F | 0 | Position of motion blend movement not in the range of the ongoing movement<br><br>Parameter _WarnLatched_ Bit 4 | The position of the motion blend is outside of the movement range. | Verify the position of the motion blend and the movement range. |
| A340 | 1 | Error detected in operating mode Motion Sequence. Additional information in the error memory indicates the detailed error code.<br><br>Parameter _SigLatched_ Bit 4 | The operating mode Motion Sequence was stopped in response to a detected error. Verify the error memory for details on the detected error. | See the additional error information. |
| A341 | 0 | Position of motion blend has already been passed<br><br>Parameter _WarnLatched_ Bit 4 | The movement has passed beyond the position of the motion blend. | - |
| A342 | 1 | Target velocity was not reached at motion blend position.<br><br>Parameter _SigLatched_ Bit 4 | The position of the motion blend was overtraveled, the target velocity was not reached. | Reduce the ramp velocity so that the target velocity is reached at the position of the motion blend. |
| A343 | 0 | Processing only possible with linear ramp<br><br>Parameter _WarnLatched_ Bit 4 | Motion blend position was set with a non-linear ramp. | Set a linear ramp. |
| A344 | par. | Maximum position deviation between motor encoder and machine encoder exceeded<br><br>Parameter _SigLatched_ Bit 8 | Incorrect or inoperative encoder cable.<br><br>Machine encoder not connected or not supplied correctly.<br><br>Different counting directions of motor encoder and machine encoder.<br><br>Incorrect setting of resolution factors (numerator or denominator) of machine encoder. | Verify encoder connection.<br><br>Verify parameterization of machine encoder. |
| A347 | 0 | Permissible position deviation exceeded<br><br>Parameter _WarnLatched_ Bit 8 | External load or acceleration are too high. | Reduce external load or acceleration.<br><br>Threshold value can be adjusted via the parameter MON_p_dif_warn. |
| A348 | 1 | No analog reference value source selected<br><br>Parameter _SigLatched_ Bit 4 | No analog reference value selected | Select an analog reference value source. |
| A349 | 0 | Position setting exceeds system limits | Position scaling of POSscaleDenom and POSscaleNum results in a scaling factor that is too small. | Change POSscaleDenom and POSscaleNum in such a way as to increase the resulting scaling factor. |
| A34A | 0 | Velocity setting exceeds system limits | The velocity scaling of 'VELscaleDenom' and 'VELscaleNum' results in a scaling factor that is too small.<br><br>The velocity has been set to a value greater than the maximum possible velocity (the maximum velocity is 13200 RPM). | Change 'VELscaleDenom' and 'VELscaleNum' in such a way as to increase the resulting scaling factor. |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| A34B | 0 | Ramp setting exceeds system limits | The ramp scaling of 'RAMPscaleDenom' and 'RAMPscaleNum' results in a scaling factor that is too small. | Change of 'RAMPscaleDenom' and 'RAMPscaleNum' in such a way as to increase the resulting scaling factor. |
| A34C | 0 | Resolution of scaling too high (range exceeded) | - | - |
| A34D | 0 | Function not available when Modulo is active | The function cannot be executed when Modulo is active. | Deactivate Modulo to use the function. |
| A34E | 0 | Target value for absolute movement not possible with defined modulo range and modulo handling. | If parameter 'MOD_Absolute' is set to: Shortest Distance: Target value is not in defined modulo range. Positive Direction: Target value is less than parameter 'MOD_Min'. Negative Direction: Target value is greater than parameter 'MOD_Max'. | Set a correct target value for absolute movement. |
| A34F | 0 | Target position outside of modulo range. Corresponding movement within range performed instead. | The setting of parameter 'MOD_AbsMultiRng' only allows for a movement within the modulo range. | Change the parameter 'MOD_AbsMultiRng' to allow for movements beyond the modulo range. |
| A350 | 1 | Change for jerk filter input position too great Parameter _SigLatched Bit 4 | Operating mode Electronic Gear with processing method 'Position synchronization with compensation movement' has been activated which resulted in a position change greater than 0.25 revolutions. | Deactivate jerk filter processing for Electronic Gear or use processing method 'Position synchronization without compensation movement'. |
| A351 | 1 | Function cannot be executed with this position scaling factor Parameter _SigLatched Bit 4 | The positions scaling factor is set to a value less than 1rev/131072usr_p, which is less than the internal resolution. In the operating mode Cyclic Synchronous Position, the resolution is not set to 1rev/131072usr_p. | Use a different position scaling factor or deactivate the selected function. |
| A352 | 0 | Position list active | - | - |
| A353 | 0 | Position list not sorted | - | - |
| A354 | 0 | Position list does not match the configuration of the Modulo range | - | - |
| A355 | 1 | Error detected during relative movement after capture. Additional information in the error memory indicates the detailed error code. Parameter _SigLatched Bit 4 | Movement was stopped by error. | Verify the error memory. |
| A356 | 0 | Function Relative Movement After Capture not assigned to a digital input | - | Assign the function Relative Movement After Capture to a digital input. |
| A357 | 0 | Deceleration still running | Command is not permissible during deceleration. | Wait until motor has come to a complete standstill. |
| A358 | 1 | Target position overtraveled with function Relative Movement After Capture Parameter _SigLatched Bit 4 | Stopping distance too small or velocity too high at the point in time of the capture event. | Reduce the velocity. |
| A359 | 0 | Request cannot be processed since the relative movement after capture is still active | - | - |
| A35A | 1 | Selected data set cannot be started Parameter _SigLatched Bit 4 | The data set with the selected number is not available. | Verify the number of the data set. |
| A35B | 0 | Modulo cannot be activated Parameter _WarnLatched Bit 4 | The set operating mode does not support Modulo. | - |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| A35D | par. | Permissible velocity deviation exceeded<br><br>Parameter _SigLatched_ Bit 8 | Load or acceleration too high. | Reduce load or acceleration. |
| A35E | 0 | The selected velocity scaling factor reduces the accuracy of the velocity scaling. | - | Increase or decrease the value of the numerator and/or denominator of the scaling factor. If the condition persists, contact your Schneider Electric service representative. |
| A35F | 0 | The selected ramp scaling factor reduces the accuracy of the ramp scaling. | - | Increase or decrease the value of the numerator and/or denominator of the scaling factor. If the condition persists, contact your Schneider Electric service representative. |
| B100 | 0 | RS485/Modbus: Indeterminable service<br><br>Parameter _WarnLatched_ Bit 5 | Unsupported Modbus service was received. | Verify application on the Modbus master. |
| B101 | 1 | Incorrect I/O data configuration. Additional information in the error memory indicates the Modbus register address.<br><br>Parameter _SigLatched_ Bit 21 | The I/O data configuration or the Modbus I/O scanning configuration contains an invalid parameter. | Verify the configuration of the I/O data. |
| B102 | 1 | Fieldbus module: General error detected<br><br>Parameter _SigLatched_ Bit 21 | - | - |
| B103 | 2 | Fieldbus module: Controlling communication channel has been closed<br><br>Parameter _SigLatched_ Bit 21 | - | - |
| B104 | 2 | Fieldbus module: Internal communication error detected<br><br>Parameter _SigLatched_ Bit 21 | - | - |
| B105 | 2 | Fieldbus module: I/O data timeout<br><br>Parameter _SigLatched_ Bit 21 | - | - |
| B106 | 2 | Fieldbus module: I/O data mapping error detected<br><br>Parameter _SigLatched_ Bit 21 | - | - |
| B107 | 4 | Fieldbus module: Nonvolatile memory error detected in module<br><br>Parameter _SigLatched_ Bit 21 | - | - |
| B108 | 1 | Fieldbus module: Active IOC physical layer does not match the IOC physical layer of the detected fieldbus module.<br><br>Parameter _SigLatched_ Bit 21 | The manufacturer data has been stored with a physical layer different from the physical layer normally used by the module. | Contact your Schneider Electric service representative. |
| B120 | 2 | Cyclic communication: Incorrect cycle time<br><br>Parameter _SigLatched_ Bit 21 | The drive does not support the configured cycle time or the difference between the measured cycle time and the configured cycle time is too great. | Change the cycle time in the master controller to a cycle time supported by the drive or verify synchronization requirements. |
| B121 | 2 | Cyclic communication: Synchronization signal missing<br><br>Parameter _SigLatched_ Bit 21 | Two cycles have passed without a synchronization signal having been received. | Analyze the communication. |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| B122 | 2 | Cyclic communication: Incorrect synchronization<br><br>Parameter _SigLatched_ Bit 21 | One signal was missing and the expected second signal was received at an incorrect point in time. The master controller may be unable to provide the required synchronization signals at the set cycle time, for example, due to insufficient computing power. | Analyze the communication or increase the cycle time. |
| B123 | 2 | Cyclic communication: The selected cycle time tolerance is too high<br><br>Parameter _SigLatched_ Bit 21 | The cycle time tolerance may not exceed one quarter of the set cycle time. | Enter a correct value. |
| B124 | 0 | Cyclic Communication: Drive is not synchronous with master cycle<br><br>Parameter _WarnLatched_ Bit 21 | Operating mode has been activated but drive is not synchronized to external synchronization signal. | After having started the synchronization mechanism, wait for 120 cycles before activating the operating mode. |
| B200 | 0 | RS485/Modbus: Protocol error detected<br><br>Parameter _WarnLatched_ Bit 5 | Logical protocol error detected: Incorrect length or unsupported subfunction. | Verify application on the Modbus master. |
| B201 | 2 | RS485/Modbus: Interruption of the connection<br><br>Parameter _SigLatched_ Bit 5 | Connection monitoring has detected an interruption of the connection. | Verify all connections and cables used for data exchange. Verify that the device is on. |
| B202 | 0 | RS485/Modbus: Interruption of the connection<br><br>Parameter _WarnLatched_ Bit 5 | Connection monitoring has detected an interruption of the connection. | Verify all connections and cables used for data exchange. Verify that the device is on. |
| B203 | 0 | RS485/Modbus: Incorrect number of monitor objects<br><br>Parameter _WarnLatched_ Bit 5 | - | - |
| B312 | 2 | Profibus: Clear command with error response<br><br>Parameter _SigLatched_ Bit 21 | Clear command sent by master, detected bus error. | Verify the application. |
| B314 | 2 | Watchdog error with error response<br><br>Parameter _SigLatched_ Bit 21 | The bus cycle time is greater than the programmed watchdog time. | Increase watchdog time. |
| B316 | 2 | Communication error detected with error response<br><br>Parameter _SigLatched_ Bit 21 | Detected system or bus error, EMI. | Verify fieldbus connection, shield connection. |
| B400 | 2 | CANopen: NMT reset with power stage enabled<br><br>Parameter _SigLatched_ Bit 21 | NMT Reset command is received while drive is in operating state Operation Enabled. | Disable the power stage before sending a NMT reset command. |
| B401 | 2 | CANopen: NMT stop with power stage enabled<br><br>Parameter _SigLatched_ Bit 21 | NMT Stop command is received while drive is in operating state Operation Enabled. | Disable the power stage before sending a NMT Stop command. |
| B402 | 0 | CAN PLL active<br><br>Parameter _WarnLatched_ Bit 21 | An attempt has been made to start the synchronization mechanism, but the synchronization mechanism was already active. | Deactivate the synchronization mechanism. |
| B403 | 2 | Excessive Sync period deviation<br><br>Parameter _SigLatched_ Bit 21 | The period time of the SYNC signals is not stable. The deviation is more than 100 usec. | The SYNC signals of the motion controller must be more accurate. |
| B404 | 2 | Sync signal error detected<br><br>Parameter _SigLatched_ Bit 21 | SYNC signal missed more than twice. | Verify CAN connection, verify motion controller. |
| B405 | 2 | Drive could not be adapted to master cycle<br><br>Parameter _SigLatched_ Bit 21 | The jitter of the SYNC object is too great or the motion bus requirements are not taken into account. | Verify the timing requirements regarding interpolation time period and number of devices. |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| B406 | 0 | Baud rate is not supported<br><br>Parameter _*WarnLatched* Bit 21 | The configured baud rate is not supported. | Choose one of the following baud rates: 250 kB, 500 kB, 1000 kB. |
| B407 | 0 | Drive is not synchronous with master cycle<br><br>Parameter _*WarnLatched* Bit 21 | The operating mode 'Cyclic Synchronous Mode' cannot be activated as long as the drive is not synchronized. | Verify motion controller. To be synchronized, the motion controller must cyclically send SYNC signals. |
| B500 | 0 | DeviceNet: IO data could not be processed<br><br>Parameter _*WarnLatched* Bit 21 | Error detected while processing I/O data: Output data contains invalid value. | Verify output data content (application). |
| B501 | 2 | DeviceNet: Duplicate MAC ID<br><br>Parameter _*SigLatched* Bit 21 | There is a device with the same MAC ID on the DeviceNet bus. | Use another MAC ID for this device or for the other device. |
| B502 | 2 | DeviceNet: Receive queue overrun<br><br>Parameter _*SigLatched* Bit 21 | - | - |
| B503 | 2 | DeviceNet: Transmit queue overrun<br><br>Parameter _*SigLatched* Bit 21 | - | - |
| B504 | 2 | DeviceNet: Error detected while sending an I/O message<br><br>Parameter _*SigLatched* Bit 21 | - | - |
| B505 | 2 | DeviceNet: CAN controller in state bus-off<br><br>Parameter _*SigLatched* Bit 21 | Too many error frames have been detected, CAN devices with different baudrates. | Verify CAN bus installation. |
| B506 | 2 | DeviceNet: CAN overflow (message lost)<br><br>Parameter _*SigLatched* Bit 21 | Two short DeviceNet messages have been sent too fast. | - |
| B507 | 2 | DeviceNet: Reset request, change of baud rate or MAC ID<br><br>Parameter _*SigLatched* Bit 21 | Master sent DeviceNet reset request while the power stage was enabled. | Reset the device only while the power stage is disabled. |
| B508 | 2 | DeviceNet: Power supply disabled<br><br>Parameter _*SigLatched* Bit 21 | DeviceNet bus power supply was powered off while the power stage was enabled. | Disable the power stage before powering off the DeviceNet master. |
| B509 | 2 | DeviceNet: Timeout explicit connection<br><br>Parameter _*SigLatched* Bit 21 | - | - |
| B50A | 2 | DeviceNet: Timeout I/O connection<br><br>Parameter _*SigLatched* Bit 21 | - | - |
| B50B | 2 | DeviceNet: Explicit connection terminated while operating state was Operation Enabled<br><br>Parameter _*SigLatched* Bit 21 | An explicit connection was terminated while no I/O channel was open and the power stage was enabled. | If you use explicit connections only, disable the power stage before terminating the connection. |
| B50C | 2 | DeviceNet: I/O connection terminated while operating state was Operation Enabled<br><br>Parameter _*SigLatched* Bit 21 | An I/O connection was terminated while the power stage was enabled. | Disable the power stage before terminating the I/O connection. |
| B600 | 2 | Ethernet: Network overload<br><br>Parameter _*SigLatched* Bit 21 | - | - |
| B601 | 2 | Ethernet: Loss of Ethernet carrier<br><br>Parameter _*SigLatched* Bit 21 | - | - |
| B602 | 2 | Ethernet: Duplicate IP address<br><br>Parameter _*SigLatched* Bit 21 | - | - |

| Error code (hex) | Error class | Description | Cause | Correctives |
|---|---|---|---|---|
| B603 | 2 | Ethernet: No valid IP address<br><br>Parameter _SigLatched_ Bit 21 | - | - |
| B604 | 0 | Ethernet: DHCP/BOOTP<br><br>Parameter _WarnLatched_ Bit 21 | IP assignment via DHCP/BOOTP unsuccessfull. Effort was given up after 2 minutes. | Set up a properly working DHCP or BOOTP server or assign the IP address manually. |
| B605 | 2 | Ethernet FDR: Unconfigured error detected<br><br>Parameter _SigLatched_ Bit 21 | - | - |
| B606 | 2 | Ethernet FDR: Irrecoverable error detected<br><br>Parameter _SigLatched_ Bit 21 | - | - |
| B607 | 2 | Ethernet: I/O data idle<br><br>Parameter _SigLatched_ Bit 21 | Controller has been stopped, but I/O data keeps being transmitted. | Disable power stage of connected drives before stopping the controller. |
| B610 | 2 | EtherCAT: Fieldbus watchdog. Additional information in the error memory indicates the detailed error code.<br><br>Parameter _SigLatched_ Bit 21 | EtherCAT frames are lost, for example, due to inoperative cables or errors caused by the master. | Verify correct cabling and shield connection. Verify diagnostics info of EtherCAT master. |
| B611 | 2 | EtherCAT: Invalid I/O data. Additional information in the error memory indicates the Modbus address.<br><br>Parameter _SigLatched_ Bit 21 | Incorrect input data or output data (such as object length, object type) | Verify correct PDO configuration (length, objects, etc.). |
| B612 | 2 | EtherCAT: Link lost at input and output port<br><br>Parameter _SigLatched_ Bit 21 | EtherCAT cable. Link to connected devices lost. | Verify link LEDs. Verify cables and that the devices connected to input port and output port operate. Use EtherCAT master diagnostics for further troubleshooting. |
| B613 | 2 | Ethernet: Ethernet carrier port 2 not available<br><br>Parameter _SigLatched_ Bit 21 | - | - |
| B614 | 1 | EtherCAT: General error detected. Additional information in the error memory indicates the detailed error code.<br><br>Parameter _SigLatched_ Bit 21 | - | - |
| B700 | 0 | Drive Profile Lexium: On activation of the profile, no dmControl, refA or refB has been mapped. | dmControl, refA or refB have not been mapped. | Map dmControl, refA or refB. |
| B702 | 1 | Insufficient velocity resolution due to velocity scaling | Due to the configured velocity scaling, the velocity resolution in REFA16 is insufficient. | Change the velocity scaling. |
| B703 | 0 | Drive Profile Lexium: Write request with incorrect data type. | - | - |

# Parameters

## Representation of the Parameters

### Description

This section provides an overview of the parameters which can be used for operating the drive.

In addition, special parameters for communication via the fieldbus are described in the corresponding fieldbus user guide.

Unsuitable parameter values or unsuitable data may trigger unintended movements, trigger signals, damage parts and disable monitoring functions. Some parameter values or data do not become active until after a restart.

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### ⚠ WARNING

**UNINTENDED EQUIPMENT OPERATION**

- Only start the system if there are no persons or obstructions in the zone of operation.

- Do not operate the drive system with undetermined parameter values or data.

- Never modify a parameter value unless you fully understand the parameter and all effects of the modification.

- Restart the drive and verify the saved operational data and/or parameter values after modifications.

- Carefully run tests for all operating states and potential error situations when commissioning, upgrading or otherwise modifying the operation of the drive.

- Verify the functions after replacing the product and also after making modifications to the parameter values and/or other operational data.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

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### Overview

The way parameters are shown provides information required for unique identification, the default values and the properties of a parameter.

Structure of the parameter representation:

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *ABCDE*<br>⌐ o ⌐ F → ı ⌐ F -<br><br>P r ⌐ | Short description<br><br>Selection values<br>**1 / Abc1 /** *Я b ⌐ ı*: Explanation 1<br><br>**2 / Abc2 /** *Я b ⌐ �_2_*: Explanation 2<br><br>Description and details | A_pk<br><br>0.00<br><br>3.00<br><br>300.00 | UINT32<br><br>R/W<br><br>per.<br><br>- | Fieldbus 1234 |

# Field "Parameter Name"

The parameter name uniquely identifies a parameter.

# Field "HMI menu" and "HMI name"

HMI menu shows the sequence of menus and commands to access the parameter via the HMI.

# Field "Description"

Short description:

The short description contains information on the parameter and a cross reference to the page that describes the use of the parameter.

Selection values:

In the case of parameters which offer a selection of settings, the value to be entered via the fieldbus, the designation of the value for entry via the commissioning software and the designation of the value for entry via the HMI are specified.

**1** = Value for input via fieldbus

**Abc1** = Designation for entry via the commissioning software

$Abc\ 1$ = Designation for entry via the HMI

Description and details:

Provides further information on the parameter.

# Field "Unit"

The unit of the value.

# Field "Minimum Value"

The minimum value which can be entered.

# Field "Factory Settings"

Settings when the product is shipped.

# Field "Maximum Value"

The maximum value which can be entered.

# Field "Data Type"

If the minimum and the maximum values are not explicitly indicated, the valid range of values is determined by the data type.

| Data type | Minumum value | Maximum value |
|-----------|---------------|---------------|
| INT8 | -128 | 127 |
| UINT8 | 0 | 255 |
| INT16 | -32768 | 32767 |
| UINT16 | 0 | 65535 |
| INT32 | -2147483648 | 2147483647 |
| UINT32 | 0 | 4294967295 |

# Field "R/W"

Indicates read and/or write values

"R/" values can only be read

"R/W" values can be read and written.

# Field "Persistent"

"per." indicates whether the value of the parameter is persistent, i.e. whether it remains in the memory after the device is powered off.

When a value of a persistent parameter is modified via the HMI, the drive stores the value automatically in the persistent memory.

When a value of a persistent parameter is modified via the commissioning software or the fieldbus, the user must explicitly store the modified value in the persistent memory.

Parameters for the safety module eSM are modified using the commissioning software. The parameter values are saved persistently after transfer. Explicit saving to the persistent memory is not required in the case of the eSM module.

# Field "Parameter Address"

Each parameter has a unique parameter address.

# Decimal Numbers Entered via the Fieldbus

Note that parameter values are entered via the fieldbus without a decimal point. All decimal places must be entered.

Input examples:

| Value | Commissioning software | Fieldbus |
|-------|------------------------|----------|
| 20 | 20 | 20 |
| 5.0 | 5.0 | 50 |
| 23.57 | 23.57 | 2357 |
| 1.000 | 1.000 | 1000 |

# List of Parameters

## List of the Parameters Sorted by Parameter Name

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _AccessInfo | Access channel information.<br><br>Low byte: Exclusive access<br><br>Value 0: No<br><br>Value 1: Yes<br><br>High byte: Access channel<br><br>Value 0: Reserved<br><br>Value 1: I/O<br><br>Value 2: HMI<br><br>Value 3: Modbus RS485<br><br>Value 4: Fieldbus main channel<br><br>Value 5:<br><br>CAN module: CANopen second SDO<br><br>ETH module (Modbus TCP): Modbus TCP<br><br>ETH module (Ethernet/IP): Reserved<br><br>PDP module: Profibus Master Class 2<br><br>PNT module (Modbus TCP): Modbus TCP<br><br>Values 6 ... 12:<br><br>ETH module (Modbus TCP): Modbus TCP<br><br>ETH module (Ethernet/IP): Reserved<br><br>Values 13 ... 28: Ethernet/IP explicit channels 0 to 15 | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 3001:C$_h$<br><br>Modbus 280<br><br>Profibus 280<br><br>CIP 101.1.12<br><br>ModbusTCP 280<br><br>EtherCAT 3001:C$_h$<br><br>PROFINET 280 |
| _actionStatus | Action word.<br><br>Signal state:<br><br>0: Not activated<br><br>1: Activated<br><br>Bit assignments:<br><br>Bit 0: Error class 0<br><br>Bit 1: Error class 1<br><br>Bit 2: Error class 2<br><br>Bit 3: Error class 3<br><br>Bit 4: Error class 4<br><br>Bit 5: Reserved<br><br>Bit 6: Motor is at a standstill (_n_act < 9 RPM)<br><br>Bit 7: Motor movement in positive direction<br><br>Bit 8: Motor movement in negative direction<br><br>Bit 9: Assignment can be set via parameter DPL_intLim | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 301C:4$_h$<br><br>Modbus 7176<br><br>Profibus 7176<br><br>CIP 128.1.4<br><br>ModbusTCP 7176<br><br>EtherCAT 301C:4$_h$<br><br>PROFINET 7176 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | Bit 10: Assignment can be set via parameter DS402intLim Bit 11: Profile generator idle (reference velocity is 0) Bit 12: Profile generator decelerates Bit 13: Profile generator accelerates Bit 14: Profile generator moves at constant speed Bit 15: Reserved | | | |
| _AT_J | Moment of inertia of the system. Is automatically calculated during Autotuning. In increments of 0.1 kg cm$^2$. | kg cm$^2$ 0.1 0.1 6553.5 | UINT16 R/- per. - | CANopen 302F:C$_h$ Modbus 12056 Profibus 12056 CIP 147.1.12 ModbusTCP 12056 EtherCAT 302F:C$_h$ PROFINET 12056 |
| _AT_M_friction | Friction torque of the system. Is determined during Autotuning. In increments of 0.01 A$_{rms}$. | A$_{rms}$ - - - | UINT16 R/- - - | CANopen 302F:7$_h$ Modbus 12046 Profibus 12046 CIP 147.1.7 ModbusTCP 12046 EtherCAT 302F:7$_h$ PROFINET 12046 |
| _AT_M_load | Constant load torque. Is determined during Autotuning. In increments of 0.01 A$_{rms}$. | A$_{rms}$ - - - | INT16 R/- - - | CANopen 302F:8$_h$ Modbus 12048 Profibus 12048 CIP 147.1.8 ModbusTCP 12048 EtherCAT 302F:8$_h$ PROFINET 12048 |
| _AT_progress | Progress of Autotuning. | % 0 0 100 | UINT16 R/- - - | CANopen 302F:B$_h$ Modbus 12054 Profibus 12054 CIP 147.1.11 ModbusTCP 12054 EtherCAT 302F:B$_h$ PROFINET 12054 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _AT_state | Autotuning status.<br><br>Bit assignments:<br><br>Bits 0 ... 10: Last processing step<br><br>Bit 13: auto_tune_process<br><br>Bit 14: auto_tune_end<br><br>Bit 15: auto_tune_err | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 302F:2$_h$<br><br>Modbus 12036<br><br>Profibus 12036<br><br>CIP 147.1.2<br><br>ModbusTCP 12036<br><br>EtherCAT 302F:2$_h$<br><br>PROFINET 12036 |
| _CanDiag | CANopen diagnostics word.<br><br>0001h: pms read error for TxPdo<br><br>0002h: pms write error for RxPdo1<br><br>0004h: pms write error for RxPdo2<br><br>0008h: pms write error for RxPdo3<br><br>0010h: pms write error for RxPdo4<br><br>0020h: heartbeat or lifeguard error (timer expired)<br><br>0040h: heartbeat msg with incorrect state received<br><br>0080h: CAN error counter >96<br><br>0100h: CAN message lost<br><br>0200h: CAN error counter = 256 (bus-off)<br><br>0400h: software queue rx/tx overrun<br><br>0800h: error indication from last detected error | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 3041:6$_h$<br><br>Modbus 16652<br><br>Profibus 16652<br><br>CIP 165.1.6<br><br>ModbusTCP 16652<br><br>EtherCAT 3041:6$_h$<br><br>PROFINET 16652 |
| _Cap1CntFall | Capture input 1 event counter at falling edges (DS402).<br><br>Counts the capture events at falling edges.<br><br>The event counter is reset when capture input 1 is activated.<br><br>Available with firmware version ≥V01.16. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 300A:2C$_h$<br><br>Modbus 2648<br><br>Profibus 2648<br><br>CIP 110.1.44<br><br>ModbusTCP 2648<br><br>EtherCAT 300A:2C$_h$<br><br>PROFINET 2648 |
| _Cap1CntRise | Capture input 1 event counter at rising edges (DS402).<br><br>Counts the capture events at rising edges.<br><br>The event counter is reset when capture input 1 is activated.<br><br>Available with firmware version ≥V01.16. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 300A:2B$_h$<br><br>Modbus 2646<br><br>Profibus 2646<br><br>CIP 110.1.43<br><br>ModbusTCP 2646<br><br>EtherCAT 300A:2B$_h$<br><br>PROFINET 2646 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _Cap1Count | Capture input 1 event counter (one-time). Counts the capture events. The event counter is reset when capture input 1 is activated. | - - - - | UINT16 R/- - - | CANopen 300A:8$_h$ Modbus 2576 Profibus 2576 CIP 110.1.8 ModbusTCP 2576 EtherCAT 300A:8$_h$ PROFINET 2576 |
| _Cap1CountCons | Capture input 1 event counter (continuous). Counts the capture events. The event counter is reset when capture input 1 is activated. By reading this parameter, the parameter "_Cap1PosCons" is updated and locked so it cannot be changed. Both parameter values remain consistent. Available with firmware version ≥V01.12. | - - - - | UINT16 R/- - - | CANopen 300A:17$_h$ Modbus 2606 Profibus 2606 CIP 110.1.23 ModbusTCP 2606 EtherCAT 300A:17$_h$ PROFINET 2606 |
| _Cap1Pos | Capture input 1 captured position (one-time). Captured position at the time of the "capture signal". The captured position is re-calculated after "Position Setting" or "Reference Movement". | usr_p - - - | INT32 R/- - - | CANopen 300A:6$_h$ Modbus 2572 Profibus 2572 CIP 110.1.6 ModbusTCP 2572 EtherCAT 300A:6$_h$ PROFINET 2572 |
| _Cap1PosCons | Capture input 1 captured position (continuous). Captured position at the time of the "capture signal". The captured position is re-calculated after "Position Setting" or "Reference Movement". By reading the parameter "_Cap1CountCons", this parameter is updated and locked so it cannot be changed. Both parameter values remain consistent. Available with firmware version ≥V01.12. | usr_p - - - | INT32 R/- - - | CANopen 300A:18$_h$ Modbus 2608 Profibus 2608 CIP 110.1.24 ModbusTCP 2608 EtherCAT 300A:18$_h$ PROFINET 2608 |
| _Cap1PosFallEdge | Capture input 1 captured position at falling edge (DS402). This parameter contains the position captured at the point in time a falling edge was detected. The captured position is recalculated after "Position Setting" or "Reference Movement". Available with firmware version ≥V01.16. | usr_p - - - | INT32 R/- - - | CANopen 60BB:0$_h$ Modbus 2636 Profibus 2636 CIP 110.1.38 ModbusTCP 2636 EtherCAT 60BB:0$_h$ PROFINET 2636 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _Cap1PosRisEdge | Capture input 1 captured position at rising edge (DS402). This parameter contains the position captured at the point in time a rising edge was detected. The captured position is recalculated after "Position Setting" or "Reference Movement". Available with firmware version ≥V01.16. | usr_p - - - | INT32 R/- - - | CANopen 60BA:0$_h$ Modbus 2634 Profibus 2634 CIP 110.1.37 ModbusTCP 2634 EtherCAT 60BA:0$_h$ PROFINET 2634 |
| _Cap2CntFall | Capture input 2 event counter at falling edges (DS402). Counts the capture events at falling edges. The event counter is reset when capture input 2 is activated. Available with firmware version ≥V01.16. | - - - - | UINT16 R/- - - | CANopen 300A:2E$_h$ Modbus 2652 Profibus 2652 CIP 110.1.46 ModbusTCP 2652 EtherCAT 300A:2E$_h$ PROFINET 2652 |
| _Cap2CntRise | Capture input 2 event counter at rising edges (DS402). Counts the capture events at rising edges. The event counter is reset when capture input 2 is activated. Available with firmware version ≥V01.16. | - - - - | UINT16 R/- - - | CANopen 300A:2D$_h$ Modbus 2650 Profibus 2650 CIP 110.1.45 ModbusTCP 2650 EtherCAT 300A:2D$_h$ PROFINET 2650 |
| _Cap2Count | Capture input 2 event counter (one-time). Counts the capture events. The event counter is reset when capture input 2 is activated. | - - - - | UINT16 R/- - - | CANopen 300A:9$_h$ Modbus 2578 Profibus 2578 CIP 110.1.9 ModbusTCP 2578 EtherCAT 300A:9$_h$ PROFINET 2578 |
| _Cap2CountCons | Capture input 2 event counter (continuous). Counts the capture events. The event counter is reset when capture input 2 is activated. By reading this parameter, the parameter "_Cap2PosCons" is updated and locked so it cannot be changed. Both parameter values remain consistent. Available with firmware version ≥V01.12. | - - - - | UINT16 R/- - - | CANopen 300A:19$_h$ Modbus 2610 Profibus 2610 CIP 110.1.25 ModbusTCP 2610 EtherCAT 300A:19$_h$ PROFINET 2610 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _Cap2Pos | Capture input 2 captured position (one-time). Captured position at the time of the "capture signal". The captured position is re-calculated after "Position Setting" or "Reference Movement". | usr_p - - - | INT32 R/- - - | CANopen 300A:7$_h$ Modbus 2574 Profibus 2574 CIP 110.1.7 ModbusTCP 2574 EtherCAT 300A:7$_h$ PROFINET 2574 |
| _Cap2PosCons | Capture input 2 captured position (continuous). Captured position at the time of the "capture signal". The captured position is re-calculated after "Position Setting" or "Reference Movement". By reading the parameter "_Cap2CountCons", this parameter is updated and locked so it cannot be changed. Both parameter values remain consistent. Available with firmware version ≥V01.12. | usr_p - - - | INT32 R/- - - | CANopen 300A:1A$_h$ Modbus 2612 Profibus 2612 CIP 110.1.26 ModbusTCP 2612 EtherCAT 300A:1A$_h$ PROFINET 2612 |
| _Cap2PosFallEdge | Capture input 2 captured position at falling edge (DS402). This parameter contains the position captured at the point in time a falling edge was detected. The captured position is recalculated after "Position Setting" or "Reference Movement". Available with firmware version ≥V01.16. | usr_p - - - | INT32 R/- - - | CANopen 60BD:0$_h$ Modbus 2640 Profibus 2640 CIP 110.1.40 ModbusTCP 2640 EtherCAT 60BD:0$_h$ PROFINET 2640 |
| _Cap2PosRisEdge | Capture input 2 captured position at rising edge (DS402). This parameter contains the position captured at the point in time a rising edge was detected. The captured position is recalculated after "Position Setting" or "Reference Movement". Available with firmware version ≥V01.16. | usr_p - - - | INT32 R/- - - | CANopen 60BC:0$_h$ Modbus 2638 Profibus 2638 CIP 110.1.39 ModbusTCP 2638 EtherCAT 60BC:0$_h$ PROFINET 2638 |
| _Cap3Count | Capture input 3 event counter (one-time). Counts the capture events. The event counter is reset when capture input 3 is activated. Available with hardware version ≥RS03. | - - - - | UINT16 R/- - - | CANopen 300A:14$_h$ Modbus 2600 Profibus 2600 CIP 110.1.20 ModbusTCP 2600 EtherCAT 300A:14$_h$ PROFINET 2600 |

| Parameter name / HMI menu / HMI name | Description | Unit / Minimum value / Factory setting / Maximum value | Data type / R/W / Persistent / Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _Cap3CountCons | Capture input 3 event counter (continuous). Counts the capture events. The event counter is reset when capture input 3 is activated. By reading this parameter, the parameter "_Cap3PosCons" is updated and locked so it cannot be changed. Both parameter values remain consistent. Available with hardware version ≥RS03. Available with firmware version ≥V01.12. | - - - - | UINT16 R/- - - | CANopen 300A:1Bh Modbus 2614 Profibus 2614 CIP 110.1.27 ModbusTCP 2614 EtherCAT 300A:1Bh PROFINET 2614 |
| _Cap3Pos | Capture input 3 captured position (one-time). Captured position at the time of the "capture signal". The captured position is re-calculated after "Position Setting" or "Reference Movement". Available with hardware version ≥RS03. | usr_p - - - | INT32 R/- - - | CANopen 300A:13h Modbus 2598 Profibus 2598 CIP 110.1.19 ModbusTCP 2598 EtherCAT 300A:13h PROFINET 2598 |
| _Cap3PosCons | Capture input 3 captured position (continuous). Captured position at the time of the "capture signal". The captured position is re-calculated after "Position Setting" or "Reference Movement". By reading the parameter "_Cap3CountCons", this parameter is updated and locked so it cannot be changed. Both parameter values remain consistent. Available with hardware version ≥RS03. Available with firmware version ≥V01.12. | usr_p - - - | INT32 R/- - - | CANopen 300A:1Ch Modbus 2616 Profibus 2616 CIP 110.1.28 ModbusTCP 2616 EtherCAT 300A:1Ch PROFINET 2616 |
| _CapEventCounters | Capture inputs 1 and 2 summary of event counters (DS402). This parameter contains the counted capture events. Bits 0 ... 3: _Cap1CntRise (lowest 4 bits) Bits 4 ... 7: _Cap1CntFall (lowest 4 bits) Bits 8 ... 11: _Cap2CntRise (lowest 4 bits) Bits 12 ... 15: _Cap2CntFall (lowest 4 bits) Available with firmware version ≥V01.16. | - - - - | UINT16 R/- - - | CANopen 300A:2Fh Modbus 2654 Profibus 2654 CIP 110.1.47 ModbusTCP 2654 EtherCAT 300A:2Fh PROFINET 2654 |
| _CapStatus | Status of the capture inputs. Read access: Bit 0: Position captured via input CAP1 Bit 1: Position captured via input CAP2 Bit 2: Position captured via input CAP3 | - - - - | UINT16 R/- - - | CANopen 300A:1h Modbus 2562 Profibus 2562 CIP 110.1.1 ModbusTCP 2562 EtherCAT 300A:1h PROFINET 2562 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _CommutCntAct | Actual value of commutation monitoring counter.<br><br>Available with firmware version ≥V01.30. | -<br>-<br>-<br>- | INT16<br>R/-<br>-<br>- | CANopen 303F:62h<br>Modbus 16324<br>Profibus 16324<br>CIP 163.1.98<br>ModbusTCP 16324<br>EtherCAT 303F:62h<br>PROFINET 16324 |
| _Cond_State4 | Conditions for transition to operating state Ready To Switch On.<br><br>Signal state:<br><br>0: Condition not met<br><br>1: Condition met<br><br>Bit 0: DC bus or mains voltage<br><br>Bit 1: Inputs for safety function<br><br>Bit 2: No configuration download ongoing<br><br>Bit 3: Velocity greater than limit value<br><br>Bit 4: Absolute position has been set<br><br>Bit 5: Holding brake not manually released | -<br>-<br>-<br>- | UINT16<br>R/-<br>-<br>- | CANopen 301C:26h<br>Modbus 7244<br>Profibus 7244<br>CIP 128.1.38<br>ModbusTCP 7244<br>EtherCAT 301C:26h<br>PROFINET 7244 |
| _CTRL_ActParSet | Active control loop parameter set.<br><br>Value 1: Control loop parameter set 1 is active<br><br>Value 2: Control loop parameter set 2 is active<br><br>A control loop parameter set is active after the time for the parameter switching (CTRL_ParChgTime) has elapsed. | -<br>-<br>-<br>- | UINT16<br>R/-<br>-<br>- | CANopen 3011:17h<br>Modbus 4398<br>Profibus 4398<br>CIP 117.1.23<br>ModbusTCP 4398<br>EtherCAT 3011:17h<br>PROFINET 4398 |
| _CTRL_KPid | Current controller d component P gain.<br><br>This value is calculated on the basis of the motor parameters.<br><br>In increments of 0.1 V/A. | V/A<br>0.5<br>-<br>1270.0 | UINT16<br>R/-<br>per.<br>- | CANopen 3011:1h<br>Modbus 4354<br>Profibus 4354<br>CIP 117.1.1<br>ModbusTCP 4354<br>EtherCAT 3011:1h<br>PROFINET 4354 |
| _CTRL_KPiq | Current controller q component P gain.<br><br>This value is calculated on the basis of the motor parameters.<br><br>In increments of 0.1 V/A. | V/A<br>0.5<br>-<br>1270.0 | UINT16<br>R/-<br>per.<br>- | CANopen 3011:3h<br>Modbus 4358<br>Profibus 4358<br>CIP 117.1.3<br>ModbusTCP 4358<br>EtherCAT 3011:3h<br>PROFINET 4358 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _CTRL_TNid | Current controller d component integral action time. This value is calculated on the basis of the motor parameters. In increments of 0.01 ms. | ms 0.13 - 327.67 | UINT16 R/- per. - | CANopen 3011:2$_h$ Modbus 4356 Profibus 4356 CIP 117.1.2 ModbusTCP 4356 EtherCAT 3011:2$_h$ PROFINET 4356 |
| _CTRL_TNiq | Current controller q component integral action time. This value is calculated on the basis of the motor parameters. In increments of 0.01 ms. | ms 0.13 - 327.67 | UINT16 R/- per. - | CANopen 3011:4$_h$ Modbus 4360 Profibus 4360 CIP 117.1.4 ModbusTCP 4360 EtherCAT 3011:4$_h$ PROFINET 4360 |
| _DataError | Error code for detected synchronous errors (DE bit). Drive Profile Lexium: Manufacturer-specific error code that caused the DataError bit to be set. Usually, this is an error that was detected as a result to changing of a data value within the process data. The DataError bit relates to MT-independent parameters. | - - - - | UINT16 R/- - - | CANopen 301B:1B$_h$ Modbus 6966 Profibus 6966 CIP 127.1.27 ModbusTCP 6966 EtherCAT 301B:1B$_h$ PROFINET 6966 |
| _DataErrorInfo | Additional error information of a detected DataError (DE bit). Drive Profile Lexium: Indicates the parameter of the mapping that caused the DE bit to be set. The DE bit is set if MT-independent parameters of the active mapping cause an error in connection with a write command. Example: 1 = First mapped parameter 2 = Second mapped parameter etc. | - - - - | UINT16 R/- - - | CANopen 301B:1D$_h$ Modbus 6970 Profibus 6970 CIP 127.1.29 ModbusTCP 6970 EtherCAT 301B:1D$_h$ PROFINET 6970 |

| Parameter name<br>HMI menu<br>HMI name | Description | Unit<br>Minimum value<br>Factory setting<br>Maximum value | Data type<br>R/W<br>Persistent<br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _DCOMopmd_act | Active operating mode.<br><br>**-6 / Manual Tuning / Autotuning**: Manual Tuning / Autotuning<br><br>**-3 / Motion Sequence**: Motion Sequence<br><br>**-2 / Electronic Gear**: Electronic Gear<br><br>**-1 / Jog**: Jog<br><br>**0 / Reserved**: Reserved<br><br>**1 / Profile Position**: Profile Position<br><br>**3 / Profile Velocity**: Profile Velocity<br><br>**4 / Profile Torque**: Profile Torque<br><br>**6 / Homing**: Homing<br><br>**7 / Interpolated Position**: Interpolated Position<br><br>**8 / Cyclic Synchronous Position**: Cyclic Synchronous Position<br><br>**9 / Cyclic Synchronous Velocity**: Cyclic Synchronous Velocity<br><br>**10 / Cyclic Synchronous Torque**: Cyclic Synchronous Torque<br><br>* Datatype for CANopen: INT8 | -<br>-6<br>0<br>10 | INT16*<br>R/-<br>-<br>- | CANopen 6061:0$_h$<br>Modbus 6920<br>Profibus 6920<br>CIP 127.1.4<br>ModbusTCP 6920<br>EtherCAT 6061:0$_h$<br>PROFINET 6920 |
| _DCOMstatus | DriveCom status word.<br><br>Bit assignments:<br><br>Bit 0: Operating state Ready To Switch On<br><br>Bit 1: Operating state Switched On<br><br>Bit 2: Operating state Operation Enabled<br><br>Bit 3: Operating state Fault<br><br>Bit 4: Voltage Enabled<br><br>Bit 5: Operating state Quick Stop<br><br>Bit 6: Operating state Switch On Disabled<br><br>Bit 7: Error of error class 0<br><br>Bit 8: HALT request active<br><br>Bit 9: Remote<br><br>Bit 10: Target Reached<br><br>Bit 11: Internal Limit Active<br><br>Bit 12: Operating mode-specific<br><br>Bit 13: x_err<br><br>Bit 14: x_end<br><br>Bit 15: ref_ok | -<br>-<br>-<br>- | UINT16<br>R/-<br>-<br>- | CANopen 6041:0$_h$<br>Modbus 6916<br>Profibus 6916<br>CIP 127.1.2<br>ModbusTCP 6916<br>EtherCAT 6041:0$_h$<br>PROFINET 6916 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _DEV_T_current  *∏ o n*  *Ł d E V* | Temperature of device. | °C - - - | INT16 R/- - - | CANopen 301C:12h Modbus 7204 Profibus 7204 CIP 128.1.18 ModbusTCP 7204 EtherCAT 301C:12h PROFINET 7204 |
| _DPL_BitShiftRefA16 | Bit shift for RefA16 for Drive Profile Lexium.  Velocity scaling may lead to values that cannot be represented as 16 bit values. If RefA16 is used, this parameter indicates the number of bits by which the value is shifted so that transmission is possible. The master must take into account this value prior to transmission and shift the bits to the right accordingly. The number of bits is recalculated each time the power stage is enabled. | - 0 0 12 | UINT16 R/- - - | CANopen 301B:5h Modbus 6922 Profibus 6922 CIP 127.1.5 ModbusTCP 6922 EtherCAT 301B:5h PROFINET 6922 |
| _DPL_driveInput | Drive Profile Lexium driveInput. | - - - - | UINT16 R/- - - | CANopen 301B:28h Modbus 6992 Profibus 6992 CIP 127.1.40 ModbusTCP 6992 EtherCAT 301B:28h PROFINET 6992 |
| _DPL_driveStat | Drive Profile Lexium driveStat. | - - - - | UINT16 R/- - - | CANopen 301B:25h Modbus 6986 Profibus 6986 CIP 127.1.37 ModbusTCP 6986 EtherCAT 301B:25h PROFINET 6986 |
| _DPL_mfStat | Drive Profile Lexium mfStat. | - - - - | UINT16 R/- - - | CANopen 301B:26h Modbus 6988 Profibus 6988 CIP 127.1.38 ModbusTCP 6988 EtherCAT 301B:26h PROFINET 6988 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _DPL_motionStat | Drive Profile Lexium motionStat. | - - - - | UINT16 R/- - - | CANopen 301B:27h Modbus 6990 Profibus 6990 CIP 127.1.39 ModbusTCP 6990 EtherCAT 301B:27h PROFINET 6990 |
| _ECATaddress ConF → CoΠ- EcAA | EtherCAT address used. EtherCAT slave address set by the master. | - - 1 - | UINT16 R/- - - | CANopen 3045:7h Modbus 17678 Profibus 17678 CIP 169.1.7 ModbusTCP 17678 EtherCAT 3045:7h PROFINET 17678 |
| _ECATslavestate ConF → CoΠ- EcSS | EtherCAT slave state. **1 / Init /** ınıt: Init **2 / PreOp /** ProP: Pre-Operational **3 / Boot /** boot: Bootstrap **4 / SafeOp /** SFoP: Safe-Operational **8 / Op /** oP: Operational | - - 1 - | UINT16 R/- - - | CANopen 3045:2h Modbus 17668 Profibus 17668 CIP 169.1.2 ModbusTCP 17668 EtherCAT 3045:2h PROFINET 17668 |
| _ENC_AmplMax | Maximum value of the SinCos amplitude. This value is only available if monitoring of the SinCos amplitude has been activated. Available with firmware version ≥V01.26. | mV - - - | UINT16 R/- - - | CANopen 303F:60h Modbus 16320 Profibus 16320 CIP 163.1.96 ModbusTCP 16320 EtherCAT 303F:60h PROFINET 16320 |
| _ENC_AmplMean | Mean value of the SinCos amplitude. This value is only available if monitoring of the SinCos amplitude has been activated. Available with firmware version ≥V01.26. | mV - - - | UINT16 R/- - - | CANopen 303F:5Eh Modbus 16316 Profibus 16316 CIP 163.1.94 ModbusTCP 16316 EtherCAT 303F:5Eh PROFINET 16316 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _ENC_AmplMin | Minimum value of the SinCos amplitude. This value is only available if monitoring of the SinCos amplitude has been activated. Available with firmware version ≥V01.26. | mV - - - | UINT16 R/- - - | CANopen 303F:5F$_h$ Modbus 16318 Profibus 16318 CIP 163.1.95 ModbusTCP 16318 EtherCAT 303F:5F$_h$ PROFINET 16318 |
| _ENC_AmplVal | Value of the SinCos amplitude. This value is only available if monitoring of the SinCos amplitude has been activated. Available with firmware version ≥V01.26. | mV - - - | UINT16 R/- - - | CANopen 303F:5D$_h$ Modbus 16314 Profibus 16314 CIP 163.1.93 ModbusTCP 16314 EtherCAT 303F:5D$_h$ PROFINET 16314 |
| _Enc2Cos | Cosine signal of encoder 2. In increments of 0.001 V. Available with firmware version ≥V01.26. | V - - - | INT16 R/- - - | CANopen 3051:5$_h$ Modbus 20746 Profibus 20746 CIP 181.1.5 ModbusTCP 20746 EtherCAT 3051:5$_h$ PROFINET 20746 |
| _Enc2Sin | Sine signal of encoder 2. In increments of 0.001 V. Available with firmware version ≥V01.26. | V - - - | INT16 R/- - - | CANopen 3051:6$_h$ Modbus 20748 Profibus 20748 CIP 181.1.6 ModbusTCP 20748 EtherCAT 3051:6$_h$ PROFINET 20748 |
| _ENCAnaHallStatu | Sequence of Hall effect sensor signals of analog encoder. This parameter can be used to read the sequence of the Hall effect sensor signals of an analog encoder with the interface "SinCos 1Vpp (with Hall)". Available with firmware version ≥V01.01. | - 0 - 7 | UINT16 R/- - - | CANopen 3051:3$_h$ Modbus 20742 Profibus 20742 CIP 181.1.3 ModbusTCP 20742 EtherCAT 3051:3$_h$ PROFINET 20742 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *_ERR_class* | Error class. Value 0: Error class 0 Value 1: Error class 1 Value 2: Error class 2 Value 3: Error class 3 Value 4: Error class 4 | - 0 - 4 | UINT16 R/- - - | CANopen 303C:$2_h$ Modbus 15364 Profibus 15364 CIP 160.1.2 ModbusTCP 15364 EtherCAT 303C:$2_h$ PROFINET 15364 |
| *_ERR_DCbus* | DC bus voltage at the time the error was detected. In increments of 0.1 V. | V - - - | UINT16 R/- - - | CANopen 303C:$7_h$ Modbus 15374 Profibus 15374 CIP 160.1.7 ModbusTCP 15374 EtherCAT 303C:$7_h$ PROFINET 15374 |
| *_ERR_enable_cycl* | Number of cycles of enabling the power stage at error time. Number of cycles of enabling the power stage from the time the control voltage was applied to the time the error was detected. | - - - - | UINT16 R/- - - | CANopen 303C:$5_h$ Modbus 15370 Profibus 15370 CIP 160.1.5 ModbusTCP 15370 EtherCAT 303C:$5_h$ PROFINET 15370 |
| *_ERR_enable_time* | Time between enabling of power stage and detection of the error. | s - - - | UINT16 R/- - - | CANopen 303C:$6_h$ Modbus 15372 Profibus 15372 CIP 160.1.6 ModbusTCP 15372 EtherCAT 303C:$6_h$ PROFINET 15372 |
| *_ERR_motor_I* | Motor current at the time the error was detected. In increments of 0.01 $A_{rms}$. | $A_{rms}$ - - - | UINT16 R/- - - | CANopen 303C:$9_h$ Modbus 15378 Profibus 15378 CIP 160.1.9 ModbusTCP 15378 EtherCAT 303C:$9_h$ PROFINET 15378 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _ERR_motor_v | Motor velocity at the time the error was detected. | usr_v - - - | INT32 R/- - - | CANopen 303C:8$_h$ Modbus 15376 Profibus 15376 CIP 160.1.8 ModbusTCP 15376 EtherCAT 303C:8$_h$ PROFINET 15376 |
| _ERR_number | Error code. Reading this parameter copies the entire entry for the detected error (error class, time of detection of error, …) to an intermediate memory from which the elements of the detected error can then be read. In addition, the read pointer of the error memory is automatically set to the next error entry. | - 0 - 65535 | UINT16 R/- - - | CANopen 303C:1$_h$ Modbus 15362 Profibus 15362 CIP 160.1.1 ModbusTCP 15362 EtherCAT 303C:1$_h$ PROFINET 15362 |
| _ERR_powerOn Πon PoWo | Number of power on cycles. | - 0 - 4294967295 | UINT32 R/- - - | CANopen 303B:2$_h$ Modbus 15108 Profibus 15108 CIP 159.1.2 ModbusTCP 15108 EtherCAT 303B:2$_h$ PROFINET 15108 |
| _ERR_qual | Additional information on detected error. This entry contains additional information on the detected error, depending on the error number. Example: a parameter address | - 0 - 65535 | UINT16 R/- - - | CANopen 303C:4$_h$ Modbus 15368 Profibus 15368 CIP 160.1.4 ModbusTCP 15368 EtherCAT 303C:4$_h$ PROFINET 15368 |
| _ERR_temp_dev | Temperature of device at the time the error was detected. | °C - - - | INT16 R/- - - | CANopen 303C:B$_h$ Modbus 15382 Profibus 15382 CIP 160.1.11 ModbusTCP 15382 EtherCAT 303C:B$_h$ PROFINET 15382 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _ERR_temp_ps | Temperature of power stage at the time the error was detected. | °C - - - | INT16 R/- - - | CANopen 303C:A$_h$ Modbus 15380 Profibus 15380 CIP 160.1.10 ModbusTCP 15380 EtherCAT 303C:A$_h$ PROFINET 15380 |
| _ERR_time | Time of detection of error. With reference to operating hours counter | s 0 - 536870911 | UINT32 R/- - - | CANopen 303C:3$_h$ Modbus 15366 Profibus 15366 CIP 160.1.3 ModbusTCP 15366 EtherCAT 303C:3$_h$ PROFINET 15366 |
| _ErrNumFbParSvc | Last error code of fieldbus parameter services. Some fieldbusses only provide general error codes if a request for a parameter service is not successful. This parameter returns the vendor-specific error code of the last unsuccessful service. | - - - - | UINT16 R/- - - | CANopen 3040:43$_h$ Modbus 16518 Profibus 16518 CIP 164.1.67 ModbusTCP 16518 EtherCAT 3040:43$_h$ PROFINET 16518 |
| _eSM_funct *Πoη* *SΠoP* | eSM function. Active eSM function Value 0: Safe Torque Off (STO) Value 1: No function active Value 2: Safe Operating Stop (SOS) Value 3: Safely Limited Speed (SLS) Value 4: Reserved Value 5: Safe Stop 1 (SS1) Value 6: Safe Stop 2 (SS2) Value 7: Safe Operating Stop (SOS) after error Value 8: Safely Limited Speed (SLS) in machine operating mode Automatic Mode If bit 15 of the value is set: GUARD_ACK was triggered Available with firmware version ≥V01.01. | - - - - | UINT16 R/- - - | CANopen 304C:17$_h$ Modbus 19502 Profibus 19502 CIP 176.1.23 ModbusTCP 19502 EtherCAT 304C:17$_h$ PROFINET 19502 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _eSM_LI_act | eSM digital inputs channel B.<br><br>Signal state:<br><br>0: 0 level<br><br>1: 1 level<br><br>Bit assignments:<br><br>Bit 0: /ESTOP_B<br><br>Bit 1: GUARD_B<br><br>Bit 3: SETUPMODE_B<br><br>Bit 4: SETUPENABLE_B<br><br>Bit 6: GUARD_ACK<br><br>Bit 8: ESMSTART<br><br>Bit 9: /INTERLOCK_IN<br><br>Available with firmware version ≥V01.01. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 304C:12$_h$<br><br>Modbus 19492<br><br>Profibus 19492<br><br>CIP 176.1.18<br><br>ModbusTCP 19492<br><br>EtherCAT 304C:12$_h$<br><br>PROFINET 19492 |
| _eSM_LI_mask | eSM digital inputs channel B mask.<br><br>Mask of active digital inputs<br><br>0: Digital input is not active<br><br>1: Digital input is active<br><br>Bit assignments:<br><br>See digital inputs channel.<br><br>Available with firmware version ≥V01.01. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 304C:13$_h$<br><br>Modbus 19494<br><br>Profibus 19494<br><br>CIP 176.1.19<br><br>ModbusTCP 19494<br><br>EtherCAT 304C:13$_h$<br><br>PROFINET 19494 |
| _eSM_LO_act | eSM digital outputs channel B.<br><br>Signal state:<br><br>0: 0 level<br><br>1: 1 level<br><br>Bit assignments:<br><br>Bit 0: CCM24V_OUT_B<br><br>Bit 1: Drive operating state 6 Operation Enabled (B)<br><br>Bit 2: RELAY_OUT_B<br><br>Bit 3: AUXOUT2<br><br>Bit 4: /INTERLOCK_OUT<br><br>Bits 5 ... 15: Reserved<br><br>Available with firmware version ≥V01.01. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 304C:14$_h$<br><br>Modbus 19496<br><br>Profibus 19496<br><br>CIP 176.1.20<br><br>ModbusTCP 19496<br><br>EtherCAT 304C:14$_h$<br><br>PROFINET 19496 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _eSM_state<br><br>∏ o ∩<br><br>5 ∏ 5 Ł | eSM operating state.<br><br>**0 / eSM module missing /** ∏ ι 5 5: eSM module missing<br><br>**1 / Start /** 5 Ł ┌ Ł : Start<br><br>**2 / Not Ready To Switch On /** ∩ ┌ ┌ Ꮍ: Not Ready To Switch On<br><br>**3 / Switch On Disabled /** ┌ ι 5: Switch On Disabled<br><br>**4 / Ready To Switch On /** ┌ ┌ Ꮍ: Ready To Switch On<br><br>**6 / Operation Enabled /** ┌ ∪ ∩: Operation Enabled<br><br>**7 / Quick Stop /** 9 5 Ł Ρ: Quick Stop<br><br>**8 / Fault Reaction Active /** F L Ł : Fault Reaction Active<br><br>**9 / Fault /** F L Ł : Fault<br><br>Status word of eSM state machine<br><br>Available with firmware version ≥V01.01. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 304C:16$_h$<br><br>Modbus 19500<br><br>Profibus 19500<br><br>CIP 176.1.22<br><br>ModbusTCP 19500<br><br>EtherCAT 304C:16$_h$<br><br>PROFINET 19500 |
| _eSMVer | eSM revision of firmware.<br><br>Revision of firmware:<br><br>Bits 0 ... 7: Firmware evolution (dec)<br><br>Bits 8 ... 15: Firmware minor revision (dec)<br><br>Bits 16 ... 23: Firmware major revision (dec)<br><br>Bits 24 ... 31: Reserved<br><br>Available with firmware version ≥V01.01. | -<br><br>-<br><br>-<br><br>- | UINT32<br><br>R/-<br><br>-<br><br>- | CANopen 304C:F$_h$<br><br>Modbus 19486<br><br>Profibus 19486<br><br>CIP 176.1.15<br><br>ModbusTCP 19486<br><br>EtherCAT 304C:F$_h$<br><br>PROFINET 19486 |
| _EthIPgateAct1 | Currently used IP address gateway, byte 1.<br><br>Byte 1 (x.0.0.0) of the IP address of the gateway. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 3044:1B$_h$<br><br>Modbus 17462<br><br>Profibus 17462<br><br>CIP 168.1.27<br><br>ModbusTCP 17462<br><br>EtherCAT 3044:1B$_h$<br><br>PROFINET 17462 |
| _EthIPgateAct2 | Currently used IP address gateway, byte 2. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 3044:1C$_h$<br><br>Modbus 17464<br><br>Profibus 17464<br><br>CIP 168.1.28<br><br>ModbusTCP 17464<br><br>EtherCAT 3044:1C$_h$<br><br>PROFINET 17464 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _EthIPgateAct3_ | Currently used IP address gateway, byte 3. | - - - - | UINT16 R/- - - | CANopen 3044:1D$_h$ Modbus 17466 Profibus 17466 CIP 168.1.29 ModbusTCP 17466 EtherCAT 3044:1D$_h$ PROFINET 17466 |
| _EthIPgateAct4_ | Currently used IP address gateway, byte 4. | - - - - | UINT16 R/- - - | CANopen 3044:1E$_h$ Modbus 17468 Profibus 17468 CIP 168.1.30 ModbusTCP 17468 EtherCAT 3044:1E$_h$ PROFINET 17468 |
| _EthIPmaskAct1_ | Currently used IP address subnet mask, byte 1. Byte 1 (x.0.0.0) of the IP address of the subnet mask. | - - - - | UINT16 R/- - - | CANopen 3044:17$_h$ Modbus 17454 Profibus 17454 CIP 168.1.23 ModbusTCP 17454 EtherCAT 3044:17$_h$ PROFINET 17454 |
| _EthIPmaskAct2_ | Currently used IP address subnet mask, byte 2. | - - - - | UINT16 R/- - - | CANopen 3044:18$_h$ Modbus 17456 Profibus 17456 CIP 168.1.24 ModbusTCP 17456 EtherCAT 3044:18$_h$ PROFINET 17456 |
| _EthIPmaskAct3_ | Currently used IP address subnet mask, byte 3. | - - - - | UINT16 R/- - - | CANopen 3044:19$_h$ Modbus 17458 Profibus 17458 CIP 168.1.25 ModbusTCP 17458 EtherCAT 3044:19$_h$ PROFINET 17458 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address<br>via fieldbus |
|---|---|---|---|---|
| _EthIPmaskAct4_ | Currently used IP address subnet mask, byte 4. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 3044:1A$_h$<br><br>Modbus 17460<br><br>Profibus 17460<br><br>CIP 168.1.26<br><br>ModbusTCP 17460<br><br>EtherCAT 3044:1A$_h$<br><br>PROFINET 17460 |
| _EthIPmoduleAct1_<br><br>ConF → CoN-<br><br>iPA 1 | Currently used IP address Ethernet module, byte 1.<br><br>Byte 1 (x.0.0.0) of the IP address of the Ethernet module. | -<br><br>0<br><br>0<br><br>255 | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 3044:13$_h$<br><br>Modbus 17446<br><br>Profibus 17446<br><br>CIP 168.1.19<br><br>ModbusTCP 17446<br><br>EtherCAT 3044:13$_h$<br><br>PROFINET 17446 |
| _EthIPmoduleAct2_<br><br>ConF → CoN-<br><br>iPA 2 | Currently used IP address Ethernet module, byte 2. | -<br><br>0<br><br>0<br><br>255 | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 3044:14$_h$<br><br>Modbus 17448<br><br>Profibus 17448<br><br>CIP 168.1.20<br><br>ModbusTCP 17448<br><br>EtherCAT 3044:14$_h$<br><br>PROFINET 17448 |
| _EthIPmoduleAct3_<br><br>ConF → CoN-<br><br>iPA 3 | Currently used IP address Ethernet module, byte 3. | -<br><br>0<br><br>0<br><br>255 | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 3044:15$_h$<br><br>Modbus 17450<br><br>Profibus 17450<br><br>CIP 168.1.21<br><br>ModbusTCP 17450<br><br>EtherCAT 3044:15$_h$<br><br>PROFINET 17450 |
| _EthIPmoduleAct4_<br><br>ConF → CoN-<br><br>iPA 4 | Currently used IP address Ethernet module, byte 4. | -<br><br>0<br><br>0<br><br>255 | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 3044:16$_h$<br><br>Modbus 17452<br><br>Profibus 17452<br><br>CIP 168.1.22<br><br>ModbusTCP 17452<br><br>EtherCAT 3044:16$_h$<br><br>PROFINET 17452 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _EthMAC1 | MAC address Ethernet module, byte 1. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 3044:1F$_h$<br><br>Modbus 17470<br><br>Profibus 17470<br><br>CIP 168.1.31<br><br>ModbusTCP 17470<br><br>EtherCAT 3044:1F$_h$<br><br>PROFINET 17470 |
| _EthMAC2 | MAC address Ethernet module, byte 2. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 3044:20$_h$<br><br>Modbus 17472<br><br>Profibus 17472<br><br>CIP 168.1.32<br><br>ModbusTCP 17472<br><br>EtherCAT 3044:20$_h$<br><br>PROFINET 17472 |
| _EthMAC3 | MAC address Ethernet module, byte 3. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 3044:21$_h$<br><br>Modbus 17474<br><br>Profibus 17474<br><br>CIP 168.1.33<br><br>ModbusTCP 17474<br><br>EtherCAT 3044:21$_h$<br><br>PROFINET 17474 |
| _EthMAC4 | MAC address Ethernet module, byte 4. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 3044:22$_h$<br><br>Modbus 17476<br><br>Profibus 17476<br><br>CIP 168.1.34<br><br>ModbusTCP 17476<br><br>EtherCAT 3044:22$_h$<br><br>PROFINET 17476 |
| _EthMAC5 | MAC address Ethernet module, byte 5. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 3044:23$_h$<br><br>Modbus 17478<br><br>Profibus 17478<br><br>CIP 168.1.35<br><br>ModbusTCP 17478<br><br>EtherCAT 3044:23$_h$<br><br>PROFINET 17478 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _EthMAC6 | MAC address Ethernet module, byte 6. | - - - - | UINT16 R/- - - | CANopen 3044:24$_h$ Modbus 17480 Profibus 17480 CIP 168.1.36 ModbusTCP 17480 EtherCAT 3044:24$_h$ PROFINET 17480 |
| _FTOF_ErrorCode | File transfer over fieldbus: Oldest and most recent error code. Low word: Oldest error code High word: Most recent error code Available with firmware version ≥V01.34. | - - - - | UINT32 R/- - - | CANopen 3004:21$_h$ Modbus 1090 Profibus 1090 CIP 104.1.33 ModbusTCP 1090 EtherCAT 3004:21$_h$ PROFINET 1090 |
| _FTOF_Status | File transfer over fieldbus: Status information for file download. Bit assignments: Bits 0 … 15: General status information Bits 16 … 25: Reserved Bit 26: XML file not valid Bit 27: CRC invalid Bit 28: Configuration data incompatible with drive Bit 29: Drive locked for file transfer Bit 30: Error detected during parsing of file Bit 31: Parsing of file completed Available with firmware version ≥V01.34. | - - - - | UINT32 R/- - - | CANopen 3004:1F$_h$ Modbus 1086 Profibus 1086 CIP 104.1.31 ModbusTCP 1086 EtherCAT 3004:1F$_h$ PROFINET 1086 |
| _fwNoSlot1 | Firmware number of slot 1. Example: PR0912.00 The value is provided as a decimal value: 91200. If no module is installed, the value 0 is returned. | - - - - | UINT32 R/- - - | CANopen 3002:17$_h$ Modbus 558 Profibus 558 CIP 102.1.23 ModbusTCP 558 EtherCAT 3002:17$_h$ PROFINET 558 |
| _fwNoSlot2 | Firmware number of slot 2. Example: PR0912.00 The value is provided as a decimal value: 91200. If no module is installed, the value 0 is returned. | - - - - | UINT32 R/- - - | CANopen 3002:1C$_h$ Modbus 568 Profibus 568 CIP 102.1.28 ModbusTCP 568 EtherCAT 3002:1C$_h$ PROFINET 568 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _fwNoSlot3 | Firmware number of slot 3.<br><br>Example: PR0912.00<br><br>The value is provided as a decimal value: 91200.<br><br>If no module is installed, the value 0 is returned. | -<br><br>-<br><br>-<br><br>- | UINT32<br><br>R/-<br><br>-<br><br>- | CANopen 3002:21$_h$<br><br>Modbus 578<br><br>Profibus 578<br><br>CIP 102.1.33<br><br>ModbusTCP 578<br><br>EtherCAT 3002:21$_h$<br><br>PROFINET 578 |
| _fwNoSlot3Boot | Firmware number of slot 3 (Bootloader).<br><br>Example: PR0912.00<br><br>The value is provided as a decimal value: 91200.<br><br>If no module is installed, the value 0 is returned. | -<br><br>-<br><br>-<br><br>- | UINT32<br><br>R/-<br><br>-<br><br>- | CANopen 3002:27$_h$<br><br>Modbus 590<br><br>Profibus 590<br><br>CIP 102.1.39<br><br>ModbusTCP 590<br><br>EtherCAT 3002:27$_h$<br><br>PROFINET 590 |
| _fwNoSlot3FPGA | Firmware number of slot 3 (FPGA).<br><br>Example: PR0912.00<br><br>The value is provided as a decimal value: 91200.<br><br>If no module is installed, the value 0 is returned. | -<br><br>-<br><br>-<br><br>- | UINT32<br><br>R/-<br><br>-<br><br>- | CANopen 3002:24$_h$<br><br>Modbus 584<br><br>Profibus 584<br><br>CIP 102.1.36<br><br>ModbusTCP 584<br><br>EtherCAT 3002:24$_h$<br><br>PROFINET 584 |
| _fwRevSlot1 | Firmware revision of slot 1.<br><br>The version format is XX.YY.ZZ.<br><br>Part XX.YY is contained in parameter _fwVerSlot1.<br><br>Part ZZ is used for quality evolution and contained in this parameter.<br><br>If no module is installed, the value 0 is returned.<br><br>Example: V01.23.45<br><br>The value is provided as a decimal value: 45 | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 3002:19$_h$<br><br>Modbus 562<br><br>Profibus 562<br><br>CIP 102.1.25<br><br>ModbusTCP 562<br><br>EtherCAT 3002:19$_h$<br><br>PROFINET 562 |
| _fwRevSlot2 | Firmware revision of slot 2.<br><br>The version format is XX.YY.ZZ.<br><br>Part XX.YY is contained in parameter _fwVersSlot2.<br><br>Part ZZ is used for quality evolution and contained in this parameter.<br><br>If no module is installed, the value 0 is returned.<br><br>Example: V01.23.45<br><br>The value is provided as a decimal value: 45 | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 3002:1E$_h$<br><br>Modbus 572<br><br>Profibus 572<br><br>CIP 102.1.30<br><br>ModbusTCP 572<br><br>EtherCAT 3002:1E$_h$<br><br>PROFINET 572 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _fwRevSlot3 | Firmware revision of slot 3. The version format is XX.YY.ZZ. Part XX.YY is contained in parameter _fwVerSlot3. Part ZZ is used for quality evolution and contained in this parameter. If no module is installed, the value 0 is returned. Example: V01.23.45 The value is provided as a decimal value: 45 | - - - - | UINT16 R/- - - | CANopen 3002:23h Modbus 582 Profibus 582 CIP 102.1.35 ModbusTCP 582 EtherCAT 3002:23h PROFINET 582 |
| _fwRevSlot3Boot ⌐ o n F → ı n F - b r E V | Firmware revision of slot 3 (Bootloader). The version format is XX.YY.ZZ.BB. Part XX.YY is contained in parameter _fwVerSlot3Boot. Part ZZ.BB is used for quality evolution and contained in this parameter. If no module is installed, the value 0 is returned. Example: V01.23.45.67 The value is provided as a decimal value: 4567 | - - - - | UINT16 R/- - - | CANopen 3002:29h Modbus 594 Profibus 594 CIP 102.1.41 ModbusTCP 594 EtherCAT 3002:29h PROFINET 594 |
| _fwRevSlot3FPGA ⌐ o n F → ı n F - F r E V | Firmware revision of slot 3 (FPGA). The version format is XX.YY.ZZ. Part XX.YY is contained in parameter _fwVerSlot3FPGA. Part ZZ is used for quality evolution and contained in this parameter. If no module is installed, the value 0 is returned. Example: V01.23.45 The value is provided as a decimal value: 45 | - - - - | UINT16 R/- - - | CANopen 3002:26h Modbus 588 Profibus 588 CIP 102.1.38 ModbusTCP 588 EtherCAT 3002:26h PROFINET 588 |
| _fwVersSlot1 | Firmware version of slot 1. The version format is XX.YY.ZZ. Part XX.YY is contained in this parameter. Part ZZ is contained in parameter _fwRevSlot1. If no module is installed, the value 0 is returned. Example: V01.23.45 The value is provided as a decimal value: 123 | - - - - | UINT16 R/- - - | CANopen 3002:18h Modbus 560 Profibus 560 CIP 102.1.24 ModbusTCP 560 EtherCAT 3002:18h PROFINET 560 |
| _fwVersSlot2 | Firmware version of slot 2. The version format is XX.YY.ZZ. Part XX.YY is contained in this parameter. Part ZZ is contained in parameter _fwRevSlot2. If no module is installed, the value 0 is returned. Example: V01.23.45 The value is provided as a decimal value: 123 | - - - - | UINT16 R/- - - | CANopen 3002:1Dh Modbus 570 Profibus 570 CIP 102.1.29 ModbusTCP 570 EtherCAT 3002:1Dh PROFINET 570 |

| Parameter name / HMI menu / HMI name | Description | Unit / Minimum value / Factory setting / Maximum value | Data type / R/W / Persistent / Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _fwVersSlot3 | Firmware version of slot 3. The version format is XX.YY.ZZ. Part XX.YY is contained in this parameter. Part ZZ is contained in parameter _fwRevSlot3. If no module is installed, the value 0 is returned. Example: V01.23.45 The value is provided as a decimal value: 123 | - - - - | UINT16 R/- - - | CANopen 3002:22$_h$ Modbus 580 Profibus 580 CIP 102.1.34 ModbusTCP 580 EtherCAT 3002:22$_h$ PROFINET 580 |
| _fwVersSlot3Boot ConF → inF- bVEr | Firmware version of slot 3 (Bootloader). The version format is XX.YY.ZZ.BB. Part XX.YY is contained in this parameter. Part ZZ.BB is contained in parameter _fwRevSlot3Boot. If no module is installed, the value 0 is returned. Example: V01.23.45.67 The value is provided as a decimal value: 123 | - - - - | UINT16 R/- - - | CANopen 3002:28$_h$ Modbus 592 Profibus 592 CIP 102.1.40 ModbusTCP 592 EtherCAT 3002:28$_h$ PROFINET 592 |
| _fwVersSlot3FPGA ConF → inF- FVEr | Firmware version of slot 3 (FPGA). The version format is XX.YY.ZZ. Part XX.YY is contained in this parameter. Part ZZ is contained in parameter _fwRevSlot3FPGA. If no module is installed, the value 0 is returned. Example: V01.23.45 The value is provided as a decimal value: 123 | - - - - | UINT16 R/- - - | CANopen 3002:25$_h$ Modbus 586 Profibus 586 CIP 102.1.37 ModbusTCP 586 EtherCAT 3002:25$_h$ PROFINET 586 |
| _GEAR_p_diff | Position deviation in operating mode Electronic Gear. Position deviation between reference position and actual position with the methods "Position Synchronization Without Compensation Movement" and "Position Synchronization With Compensation Movement". A position deviation can be caused by a movement in a blocked direction (parameter GEARdir_enabl) or by a velocity limitation (parameter GEARpos_v_max). Available with firmware version ≥V01.10. | Inc - - - | INT32 R/- - - | CANopen 301F:D$_h$ Modbus 7962 Profibus 7962 CIP 131.1.13 ModbusTCP 7962 EtherCAT 301F:D$_h$ PROFINET 7962 |
| _HMdisREFtoIDX | Distance from switching point to index pulse. Allows you to verify the distance between the index pulse and the switching point and serves as a criterion for determining whether the reference movement with index pulse can be reproduced. The parameter _HMdisREFtoIDX_usr allows you to enter the value in user-defined units. In increments of 0.0001 revolution. | revolution - - - | INT32 R/- - - | CANopen 3028:C$_h$ Modbus 10264 Profibus 10264 CIP 140.1.12 ModbusTCP 10264 EtherCAT 3028:C$_h$ PROFINET 10264 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _HMdisREFtoIDX_ usr | Distance from switching point to index pulse. Allows you to verify the distance between the index pulse and the switching point and serves as a criterion for determining whether the reference movement with index pulse can be reproduced. Available with firmware version ≥V01.03. | usr_p -2147483648 - 2147483647 | INT32 R/- - - | CANopen 3028:$F_h$ Modbus 10270 Profibus 10270 CIP 140.1.15 ModbusTCP 10270 EtherCAT 3028:$F_h$ PROFINET 10270 |
| _hwVersCPU | Hardware version of control board. | - - - - | UINT16 R/- - - | CANopen 3002:$12_h$ Modbus 548 Profibus 548 CIP 102.1.18 ModbusTCP 548 EtherCAT 3002:$12_h$ PROFINET 548 |
| _hwVersPS | Hardware version of power stage. | - - - - | UINT16 R/- - - | CANopen 3002:$14_h$ Modbus 552 Profibus 552 CIP 102.1.20 ModbusTCP 552 EtherCAT 3002:$14_h$ PROFINET 552 |
| _hwVersSlot1 | Hardware version of module in slot 1. | - - - - | UINT16 R/- - - | CANopen 3002:$16_h$ Modbus 556 Profibus 556 CIP 102.1.22 ModbusTCP 556 EtherCAT 3002:$16_h$ PROFINET 556 |
| _hwVersSlot2 | Hardware version of module in slot 2. | - - - - | UINT16 R/- - - | CANopen 3002:$1B_h$ Modbus 566 Profibus 566 CIP 102.1.27 ModbusTCP 566 EtherCAT 3002:$1B_h$ PROFINET 566 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _hwVersSlot3 | Hardware version of module in slot 3. | -<br>-<br>-<br>- | UINT16<br>R/-<br>-<br>- | CANopen 3002:20h<br>Modbus 576<br>Profibus 576<br>CIP 102.1.32<br>ModbusTCP 576<br>EtherCAT 3002:20h<br>PROFINET 576 |
| _I_act<br><br>ⁿoⁿ<br><br>ıАcᵗ | Total motor current.<br><br>In increments of 0.01 A_rms. | A_rms<br>-<br>-<br>- | INT16<br>R/-<br>-<br>- | CANopen 301E:3h<br>Modbus 7686<br>Profibus 7686<br>CIP 130.1.3<br>ModbusTCP 7686<br>EtherCAT 301E:3h<br>PROFINET 7686 |
| _Id_act_rms | Actual motor current (d component, field weakening).<br><br>In increments of 0.01 A_rms. | A_rms<br>-<br>-<br>- | INT16<br>R/-<br>-<br>- | CANopen 301E:2h<br>Modbus 7684<br>Profibus 7684<br>CIP 130.1.2<br>ModbusTCP 7684<br>EtherCAT 301E:2h<br>PROFINET 7684 |
| _Id_ref_rms | Reference motor current (d component, field weakening).<br><br>In increments of 0.01 A_rms. | A_rms<br>-<br>-<br>- | INT16<br>R/-<br>-<br>- | CANopen 301E:11h<br>Modbus 7714<br>Profibus 7714<br>CIP 130.1.17<br>ModbusTCP 7714<br>EtherCAT 301E:11h<br>PROFINET 7714 |
| _Imax_act | Currently effective current limitation.<br><br>Value of the currently effective current limitation. This is one of the following values (whichever is lowest):<br><br>- CTRL_I_max (only during normal operation)<br><br>- LIM_I_maxQSTP (only during Quick Stop)<br><br>- LIM_I_maxHalt (only during Halt)<br><br>- Current limitation via digital input<br><br>- _M_I_max (only if motor is connected)<br><br>- _PS_I_max<br><br>Limitations caused by I2t monitoring are also taken into account.<br><br>In increments of 0.01 A_rms. | A_rms<br>-<br>-<br>- | UINT16<br>R/-<br>-<br>- | CANopen 301C:28h<br>Modbus 7248<br>Profibus 7248<br>CIP 128.1.40<br>ModbusTCP 7248<br>EtherCAT 301C:28h<br>PROFINET 7248 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _Imax_system_ | Current limitation of the system. This parameter specifies the maximum system current. This is the lower value of the maximum motor current and the maximum power stage current. If no motor is connected, only the maximum power stage current is taken into account in this parameter. In increments of 0.01 $A_{rms}$. | $A_{rms}$ - - - | UINT16 R/- - - | CANopen 301C:27$_h$ Modbus 7246 Profibus 7246 CIP 128.1.39 ModbusTCP 7246 EtherCAT 301C:27$_h$ PROFINET 7246 |
| _Inc_ENC2Raw_ | Raw increment value of encoder 2. This parameter is only needed for commissioning of encoder 2 in case of an indeterminable machine encoder resolution. Available with firmware version ≥V01.01. | EncInc - - - | INT32 R/- - - | CANopen 301E:25$_h$ Modbus 7754 Profibus 7754 CIP 130.1.37 ModbusTCP 7754 EtherCAT 301E:25$_h$ PROFINET 7754 |
| _InvalidParam_ | Modbus address of parameter with invalid value. If a configuration error is detected, the Modbus address of the parameter with an invalid value is indicated here. | - - 0 - | UINT16 R/- - - | CANopen 301C:6$_h$ Modbus 7180 Profibus 7180 CIP 128.1.6 ModbusTCP 7180 EtherCAT 301C:6$_h$ PROFINET 7180 |
| _IO_act_ | Physical status of the digital inputs and outputs. Low byte: Bit 0: DI0 Bit 1: DI1 Bit 2: DI2 Bit 3: DI3 Bit 4: DI4 Bit 5: DI5 High byte: Bit 8: DQ0 Bit 9: DQ1 Bit 10: DQ2 | - - - - | UINT16 R/- - - | CANopen 3008:1$_h$ Modbus 2050 Profibus 2050 CIP 108.1.1 ModbusTCP 2050 EtherCAT 3008:1$_h$ PROFINET 2050 |
| _IO_DI_act_ ПоП dіПо | Status of digital inputs. Bit assignments: Bit 0: DI0 Bit 1: DI1 Bit 2: DI2 Bit 3: DI3 Bit 4: DI4 Bit 5: DI5 | - - - - | UINT16 R/- - - | CANopen 3008:F$_h$ Modbus 2078 Profibus 2078 CIP 108.1.15 ModbusTCP 2078 EtherCAT 3008:F$_h$ PROFINET 2078 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _IO_DQ_act<br>_ⁿ o n_<br>_d o ⁿ o_ | Status of digital outputs.<br>Bit assignments:<br>Bit 0: DQ0<br>Bit 1: DQ1<br>Bit 2: DQ2 | -<br>-<br>-<br>- | UINT16<br>R/-<br>-<br>- | CANopen 3008:10ₕ<br>Modbus 2080<br>Profibus 2080<br>CIP 108.1.16<br>ModbusTCP 2080<br>EtherCAT 3008:10ₕ<br>PROFINET 2080 |
| _IO_STO_act<br>_ⁿ o n_<br>_5 t o_ | Status of the inputs for the safety-related function STO.<br>Bit 0: STO_A<br>Bit 1: STO_B<br>If no safety module eSM is inserted, this parameter indicates the status of the signal inputs STO_A and STO_B.<br>If a safety module eSM is inserted, the safety-related function STO can be triggered via the signal inputs or via the safety module eSM. This parameter indicates whether or not the safety-related function STO was triggered (regardless of whether it was triggered via the signal inputs or via the safety module eSM). | -<br>-<br>-<br>- | UINT16<br>R/-<br>-<br>- | CANopen 3008:26ₕ<br>Modbus 2124<br>Profibus 2124<br>CIP 108.1.38<br>ModbusTCP 2124<br>EtherCAT 3008:26ₕ<br>PROFINET 2124 |
| _IOdataMtoS01 | I/O parameter data Master to Slave - parameter 01.<br>Data of the cyclic communication between the master and slave.<br>This parameter contains the data of the first parameter mapped from the master to the slave.<br>The parameters _IOdataMtoS02 to _IOdataMtoS16 contain the data of the remaining mapped parameters. | -<br>0<br>FFFFFFFFhex<br>4294967295 | UINT32<br>R/-<br>-<br>- | CANopen 3040:1ₕ<br>Modbus 16386<br>Profibus 16386<br>CIP 164.1.1<br>ModbusTCP 16386<br>EtherCAT 3040:1ₕ<br>PROFINET 16386 |
| _IOdataStoM01 | I/O parameter data Slave to Master - parameter 01.<br>Data of the cyclic communication between the master and slave.<br>This parameter contains the data of the first parameter mapped from the slave to the master.<br>The parameters _IOdataStoM02 to _IOdataStoM16 contain the data of the remaining mapped parameters. | -<br>0<br>FFFFFFFFhex<br>4294967295 | UINT32<br>R/-<br>-<br>- | CANopen 3040:21ₕ<br>Modbus 16450<br>Profibus 16450<br>CIP 164.1.33<br>ModbusTCP 16450<br>EtherCAT 3040:21ₕ<br>PROFINET 16450 |
| _IOM1_AI11_act<br>_ⁿ o n_<br>_A n 1 1_ | IOM1 Value of input voltage of AI11.<br>Available with firmware version ≥V01.06. | mV<br>-10000<br>-<br>10000 | INT16<br>R/-<br>-<br>- | CANopen 304F:1ₕ<br>Modbus 20226<br>Profibus 20226<br>CIP 179.1.1<br>ModbusTCP 20226<br>EtherCAT 304F:1ₕ<br>PROFINET 20226 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _IOM1_AI12_act<br>Ⅰⅰ ⁿ<br>Ⅰⁿ Ⅰ2 | IOM1 Value of input voltage of AI12.<br>Available with firmware version ≥V01.06. | mV<br>-10000<br>-<br>10000 | INT16<br>R/-<br>-<br>- | CANopen 304F:5$_h$<br>Modbus 20234<br>Profibus 20234<br>CIP 179.1.5<br>ModbusTCP 20234<br>EtherCAT 304F:5$_h$<br>PROFINET 20234 |
| _IOM1_AQ11_ref<br>Ⅰⅰ ⁿ<br>Ⅰⁿ Ⅰ Ⅰ | IOM1 Value of AQ11.<br>Unit depends on setting in parameter IOM1_AQ_mode.<br>If setting is 'Voltage':<br>Unit: mV<br>If setting is 'Current':<br>Unit: µA<br>Available with firmware version ≥V01.06. | -<br>-10000<br>-<br>20000 | INT16<br>R/-<br>-<br>- | CANopen 304F:27$_h$<br>Modbus 20302<br>Profibus 20302<br>CIP 179.1.39<br>ModbusTCP 20302<br>EtherCAT 304F:27$_h$<br>PROFINET 20302 |
| _IOM1_AQ12_ref<br>Ⅰⅰ ⁿ<br>Ⅰⁿ Ⅰ2 | IOM1 Value of AQ12.<br>Unit depends on setting in parameter IOM1_AQ_mode.<br>If setting is 'Voltage':<br>Unit: mV<br>If setting is 'Current':<br>Unit: µA<br>Available with firmware version ≥V01.06. | -<br>-10000<br>-<br>20000 | INT16<br>R/-<br>-<br>- | CANopen 304F:31$_h$<br>Modbus 20322<br>Profibus 20322<br>CIP 179.1.49<br>ModbusTCP 20322<br>EtherCAT 304F:31$_h$<br>PROFINET 20322 |
| _IOM1_DI_act<br>Ⅰⅰ ⁿ<br>ⁿ ⁱ Ⅰ𝖷 | IOM1 Status of digital inputs.<br>Bit assignments:<br>Bit 0: DI10<br>Bit 1: DI11<br>Bit 2: DI12<br>Bit 3: DI13<br>Available with firmware version ≥V01.06. | -<br>-<br>-<br>- | UINT16<br>R/-<br>-<br>- | CANopen 304F:35$_h$<br>Modbus 20330<br>Profibus 20330<br>CIP 179.1.53<br>ModbusTCP 20330<br>EtherCAT 304F:35$_h$<br>PROFINET 20330 |
| _IOM1_DQ_act<br>Ⅰⅰ ⁿ<br>ⁿ ⁿ Ⅰ𝖷 | IOM1 Status of digital outputs.<br>Bit assignments:<br>Bit 0: DQ10<br>Bit 1: DQ11<br>Available with firmware version ≥V01.06. | -<br>-<br>-<br>- | UINT16<br>R/-<br>-<br>- | CANopen 304F:36$_h$<br>Modbus 20332<br>Profibus 20332<br>CIP 179.1.54<br>ModbusTCP 20332<br>EtherCAT 304F:36$_h$<br>PROFINET 20332 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _IOmappingMtoS01_ | I/O parameter mapping Master to Slave - parameter 01. Mapping of the cyclic communication between the master and slave. This parameter contains the mapping of the first parameter mapped from the master to the slave. The parameters _IOmappingMtoS02 to _IOmappingMtoS16 contain the mapping of the remaining mapped parameters. | - 0 FFFFhex 65535 | UINT16 R/- - - | CANopen 3040:11$_h$ Modbus 16418 Profibus 16418 CIP 164.1.17 ModbusTCP 16418 EtherCAT 3040:11$_h$ PROFINET 16418 |
| _IOmappingStoM01_ | I/O parameter mapping Slave to Master - parameter 01. Mapping of the cyclic communication between the master and slave. This parameter contains the mapping of the first parameter mapped from the slave to the master. The parameters _IOmappingStoM02 to _IOmappingStoM16 contain the mapping of the remaining mapped parameters. | - 0 FFFFhex 65535 | UINT16 R/- - - | CANopen 3040:31$_h$ Modbus 16482 Profibus 16482 CIP 164.1.49 ModbusTCP 16482 EtherCAT 3040:31$_h$ PROFINET 16482 |
| _IPAddressAct1_ ⌐ o п F → ⌐ o П - ı P A ı | Currently used IP address, byte 1. Byte 1 (x.0.0.0) of the IP address. Available with firmware version ≥V01.26. | - 0 0 255 | UINT16 R/- - - | CANopen 303E:4$_h$ Modbus 15880 Profibus 15880 CIP 162.1.4 ModbusTCP 15880 EtherCAT 303E:4$_h$ PROFINET 15880 |
| _IPAddressAct2_ ⌐ o п F → ⌐ o П - ı P A 2 | Currently used IP address, byte 2. Byte 2 (0.x.0.0) of the IP address. Available with firmware version ≥V01.26. | - 0 0 255 | UINT16 R/- - - | CANopen 303E:5$_h$ Modbus 15882 Profibus 15882 CIP 162.1.5 ModbusTCP 15882 EtherCAT 303E:5$_h$ PROFINET 15882 |
| _IPAddressAct3_ ⌐ o п F → ⌐ o П - ı P A 3 | Currently used IP address, byte 3. Byte 3 (0.0.x.0) of the IP address. Available with firmware version ≥V01.26. | - 0 0 255 | UINT16 R/- - - | CANopen 303E:6$_h$ Modbus 15884 Profibus 15884 CIP 162.1.6 ModbusTCP 15884 EtherCAT 303E:6$_h$ PROFINET 15884 |

| Parameter name<br>HMI menu<br>HMI name | Description | Unit<br>Minimum value<br>Factory setting<br>Maximum value | Data type<br>R/W<br>Persistent<br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _IPAddressAct4<br>ᴄₒₙF → ᴄₒᴨ-<br>ᵢᴘᴀ4 | Currently used IP address, byte 4.<br>Byte 4 (0.0.0.x) of the IP address.<br>Available with firmware version ≥V01.26. | -<br>0<br>0<br>255 | UINT16<br>R/-<br>-<br>- | CANopen 303E:7$_h$<br>Modbus 15886<br>Profibus 15886<br>CIP 162.1.7<br>ModbusTCP 15886<br>EtherCAT 303E:7$_h$<br>PROFINET 15886 |
| _IPgateAct1 | Currently used IP address gateway, byte 1.<br>Byte 1 (x.0.0.0) of the IP address of the gateway.<br>Available with firmware version ≥V01.26. | -<br>0<br>0<br>255 | UINT16<br>R/-<br>-<br>- | CANopen 303E:C$_h$<br>Modbus 15896<br>Profibus 15896<br>CIP 162.1.12<br>ModbusTCP 15896<br>EtherCAT 303E:C$_h$<br>PROFINET 15896 |
| _IPgateAct2 | Currently used IP address gateway, byte 2.<br>Byte 2 (0.x.0.0) of the IP address of the gateway.<br>Available with firmware version ≥V01.26. | -<br>0<br>0<br>255 | UINT16<br>R/-<br>-<br>- | CANopen 303E:D$_h$<br>Modbus 15898<br>Profibus 15898<br>CIP 162.1.13<br>ModbusTCP 15898<br>EtherCAT 303E:D$_h$<br>PROFINET 15898 |
| _IPgateAct3 | Currently used IP address gateway, byte 3.<br>Byte 3 (0.0.x.0) of the IP address of the gateway.<br>Available with firmware version ≥V01.26. | -<br>0<br>0<br>255 | UINT16<br>R/-<br>-<br>- | CANopen 303E:E$_h$<br>Modbus 15900<br>Profibus 15900<br>CIP 162.1.14<br>ModbusTCP 15900<br>EtherCAT 303E:E$_h$<br>PROFINET 15900 |
| _IPgateAct4 | Currently used IP address gateway, byte 4.<br>Byte 4 (0.0.0.x) of the IP address of the gateway.<br>Available with firmware version ≥V01.26. | -<br>0<br>0<br>255 | UINT16<br>R/-<br>-<br>- | CANopen 303E:F$_h$<br>Modbus 15902<br>Profibus 15902<br>CIP 162.1.15<br>ModbusTCP 15902<br>EtherCAT 303E:F$_h$<br>PROFINET 15902 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address<br>via fieldbus |
|---|---|---|---|---|
| _IPmaskAct1 | Currently used IP address subnet mask, byte 1.<br><br>Byte 1 (x.0.0.0) of the IP address of the subnet mask.<br><br>Available with firmware version ≥V01.26. | -<br><br>0<br><br>0<br><br>255 | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 303E:8$_h$<br><br>Modbus 15888<br><br>Profibus 15888<br><br>CIP 162.1.8<br><br>ModbusTCP 15888<br><br>EtherCAT 303E:8$_h$<br><br>PROFINET 15888 |
| _IPmaskAct2 | Currently used IP address subnet mask, byte 2.<br><br>Byte 2 (0.x.0.0) of the IP address of the subnet mask.<br><br>Available with firmware version ≥V01.26. | -<br><br>0<br><br>0<br><br>255 | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 303E:9$_h$<br><br>Modbus 15890<br><br>Profibus 15890<br><br>CIP 162.1.9<br><br>ModbusTCP 15890<br><br>EtherCAT 303E:9$_h$<br><br>PROFINET 15890 |
| _IPmaskAct3 | Currently used IP address subnet mask, byte 3.<br><br>Byte 3 (0.0.x.0) of the IP address of the subnet mask.<br><br>Available with firmware version ≥V01.26. | -<br><br>0<br><br>0<br><br>255 | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 303E:A$_h$<br><br>Modbus 15892<br><br>Profibus 15892<br><br>CIP 162.1.10<br><br>ModbusTCP 15892<br><br>EtherCAT 303E:A$_h$<br><br>PROFINET 15892 |
| _IPmaskAct4 | Currently used IP address subnet mask, byte 4.<br><br>Byte 4 (0.0.0.x) of the IP address of the subnet mask.<br><br>Available with firmware version ≥V01.26. | -<br><br>0<br><br>0<br><br>255 | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 303E:B$_h$<br><br>Modbus 15894<br><br>Profibus 15894<br><br>CIP 162.1.11<br><br>ModbusTCP 15894<br><br>EtherCAT 303E:B$_h$<br><br>PROFINET 15894 |
| _Iq_act_rms<br><br>ⁿ o n<br><br>q A c t | Actual motor current (q component, generating torque).<br><br>In increments of 0.01 A$_{rms}$. | A$_{rms}$<br><br>-<br><br>-<br><br>- | INT16<br><br>R/-<br><br>-<br><br>- | CANopen 301E:1$_h$<br><br>Modbus 7682<br><br>Profibus 7682<br><br>CIP 130.1.1<br><br>ModbusTCP 7682<br><br>EtherCAT 301E:1$_h$<br><br>PROFINET 7682 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _Iq_ref_rms<br><br>Π o n<br><br>9 r E F | Reference motor current (q component, generating torque).<br><br>In increments of 0.01 A$_{rms}$. | A$_{rms}$<br><br>-<br><br>-<br><br>- | INT16<br><br>R/-<br><br>-<br><br>- | CANopen 301E:10$_h$<br>Modbus 7712<br>Profibus 7712<br>CIP 130.1.16<br>ModbusTCP 7712<br>EtherCAT 301E:10$_h$<br>PROFINET 7712 |
| _LastError<br><br>Π o n<br><br>L F L E | Detected error causing a stop (error classes 1 to 4).<br><br>Error code of the most recent detected error. Consecutive detected errors do not overwrite this error code.<br><br>Example: If an error response to a detected limit switch error causes overvoltage, this parameter contains the code of the detected limit switch error.<br><br>Exception: Detected errors of error class 4 overwrite existing entries. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 603F:0$_h$<br>Modbus 7178<br>Profibus 7178<br>CIP 128.1.5<br>ModbusTCP 7178<br>EtherCAT 603F:0$_h$<br>PROFINET 7178 |
| _LastError_Qual<br><br> | Additional info on most recent error.<br><br>This parameter contains additional information on the most recent detected error, depending on the error code. For example: a parameter address. | -<br><br>-<br><br>0<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 301C:1F$_h$<br>Modbus 7230<br>Profibus 7230<br>CIP 128.1.31<br>ModbusTCP 7230<br>EtherCAT 301C:1F$_h$<br>PROFINET 7230 |
| _LastWarning<br><br>Π o n<br><br>L W r n | Code of most recent error of error class 0.<br><br>If the error is no longer active, the code is stored until the next Fault Reset.<br><br>Value 0: No error of error class 0 | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 301C:9$_h$<br>Modbus 7186<br>Profibus 7186<br>CIP 128.1.9<br>ModbusTCP 7186<br>EtherCAT 301C:9$_h$<br>PROFINET 7186 |
| _M_BRK_T_apply | Holding brake application time. | ms<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 300D:21$_h$<br>Modbus 3394<br>Profibus 3394<br>CIP 113.1.33<br>ModbusTCP 3394<br>EtherCAT 300D:21$_h$<br>PROFINET 3394 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _M_BRK_T_release | Holding brake release time. | ms - - - | UINT16 R/- - - | CANopen 300D:22h Modbus 3396 Profibus 3396 CIP 113.1.34 ModbusTCP 3396 EtherCAT 300D:22h PROFINET 3396 |
| _M_Enc_Cosine | Voltage of cosine signal of encoder. In increments of 0.001 V. Available with firmware version ≥V01.26. | V - - - | INT16 R/- - - | CANopen 301C:2Bh Modbus 7254 Profibus 7254 CIP 128.1.43 ModbusTCP 7254 EtherCAT 301C:2Bh PROFINET 7254 |
| _M_Enc_Sine | Voltage of sine signal of encoder. In increments of 0.001 V. Available with firmware version ≥V01.26. | V - - - | INT16 R/- - - | CANopen 301C:2Ch Modbus 7256 Profibus 7256 CIP 128.1.44 ModbusTCP 7256 EtherCAT 301C:2Ch PROFINET 7256 |
| _M_Encoder ConF → inF- SEnS | Type of motor encoder. **1 / SinCos With HiFa / 5W h ı**: SinCos with Hiperface **2 / SinCos Without HiFa / 5W o h**: SinCos without Hiperface **3 / SinCos With Hall / 5W h A**: SinCos with Hall **4 / SinCos With EnDat / 5W E n**: SinCos with EnDat **5 / EnDat Without SinCos / E n d A**: EnDat without SinCos **6 / Resolver / r E 5 o**: Resolver **7 / Hall / h A L L**: Hall (not supported yet) **8 / BiSS / b ı 5 5**: BiSS High byte: Value 0: Rotary encoder Value 1: Linear encoder | - - - - | UINT16 R/- - - | CANopen 300D:3h Modbus 3334 Profibus 3334 CIP 113.1.3 ModbusTCP 3334 EtherCAT 300D:3h PROFINET 3334 |

| Parameter name<br>HMI menu<br>HMI name | Description | Unit<br>Minimum value<br>Factory setting<br>Maximum value | Data type<br>R/W<br>Persistent<br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _M_HoldingBrake | Holding brake identification.<br>Value 0: Motor without holding brake<br>Value 1: Motor with holding brake | -<br>-<br>-<br>- | UINT16<br>R/-<br>-<br>- | CANopen 300D:20h<br>Modbus 3392<br>Profibus 3392<br>CIP 113.1.32<br>ModbusTCP 3392<br>EtherCAT 300D:20h<br>PROFINET 3392 |
| _M_I_0 | Continuous stall current of motor.<br>In increments of 0.01 $A_{rms}$. | $A_{rms}$<br>-<br>-<br>- | UINT16<br>R/-<br>-<br>- | CANopen 300D:13h<br>Modbus 3366<br>Profibus 3366<br>CIP 113.1.19<br>ModbusTCP 3366<br>EtherCAT 300D:13h<br>PROFINET 3366 |
| _M_I_max<br>ConF → inF-<br>ΠιΠA | Maximum current of motor.<br>In increments of 0.01 $A_{rms}$. | $A_{rms}$<br>-<br>-<br>- | UINT16<br>R/-<br>-<br>- | CANopen 300D:6h<br>Modbus 3340<br>Profibus 3340<br>CIP 113.1.6<br>ModbusTCP 3340<br>EtherCAT 300D:6h<br>PROFINET 3340 |
| _M_I_nom<br>ConF → inF-<br>Πιno | Nominal current of motor.<br>In increments of 0.01 $A_{rms}$. | $A_{rms}$<br>-<br>-<br>- | UINT16<br>R/-<br>-<br>- | CANopen 300D:7h<br>Modbus 3342<br>Profibus 3342<br>CIP 113.1.7<br>ModbusTCP 3342<br>EtherCAT 300D:7h<br>PROFINET 3342 |
| _M_I2t | Maximum permissible time for maximum current of motor. | ms<br>-<br>-<br>- | UINT16<br>R/-<br>-<br>- | CANopen 300D:11h<br>Modbus 3362<br>Profibus 3362<br>CIP 113.1.17<br>ModbusTCP 3362<br>EtherCAT 300D:11h<br>PROFINET 3362 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _M_Jrot | Moment of inertia of motor. Units: Rotary motors: kgcm$^2$ Linear motors: kg In increments of 0.001 motor_f. | motor_f - - - | UINT32 R/- - - | CANopen 300D:C$_h$ Modbus 3352 Profibus 3352 CIP 113.1.12 ModbusTCP 3352 EtherCAT 300D:C$_h$ PROFINET 3352 |
| _M_kE | Voltage constant kE of motor. Voltage constant in Vrms at 1000 RPM. Units: Rotary motors: Vrms/RPM Linear motors: Vrms/(m/s) In increments of 0.1 motor_u. | motor_u - - - | UINT32 R/- - - | CANopen 300D:B$_h$ Modbus 3350 Profibus 3350 CIP 113.1.11 ModbusTCP 3350 EtherCAT 300D:B$_h$ PROFINET 3350 |
| _M_L_d | Inductance d component of motor. In increments of 0.01 mH. | mH - - - | UINT16 R/- - - | CANopen 300D:F$_h$ Modbus 3358 Profibus 3358 CIP 113.1.15 ModbusTCP 3358 EtherCAT 300D:F$_h$ PROFINET 3358 |
| _M_L_q | Inductance q component of motor. In increments of 0.01 mH. | mH - - - | UINT16 R/- - - | CANopen 300D:E$_h$ Modbus 3356 Profibus 3356 CIP 113.1.14 ModbusTCP 3356 EtherCAT 300D:E$_h$ PROFINET 3356 |
| _M_load ⁿoⁿ LdFⁿ | Load of motor. | % - - - | INT16 R/- - - | CANopen 301C:1A$_h$ Modbus 7220 Profibus 7220 CIP 128.1.26 ModbusTCP 7220 EtherCAT 301C:1A$_h$ PROFINET 7220 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _M_M_0 | Continuous stall torque of motor.<br><br>A value of 100 % in operating mode Profile Torque corresponds to this parameter.<br><br>Units:<br><br>Rotary motors: Ncm<br><br>Linear motors: N | motor_m<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 300D:16h<br><br>Modbus 3372<br><br>Profibus 3372<br><br>CIP 113.1.22<br><br>ModbusTCP 3372<br><br>EtherCAT 300D:16h<br><br>PROFINET 3372 |
| _M_M_max | Maximum torque of motor.<br><br>In increments of 0.1 Nm. | Nm<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 300D:9h<br><br>Modbus 3346<br><br>Profibus 3346<br><br>CIP 113.1.9<br><br>ModbusTCP 3346<br><br>EtherCAT 300D:9h<br><br>PROFINET 3346 |
| _M_M_nom | Nominal torque/force of motor.<br><br>Units:<br><br>Rotary motors: Ncm<br><br>Linear motors: N | motor_m<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 300D:8h<br><br>Modbus 3344<br><br>Profibus 3344<br><br>CIP 113.1.8<br><br>ModbusTCP 3344<br><br>EtherCAT 300D:8h<br><br>PROFINET 3344 |
| _M_maxoverload | Maximum value of overload of motor.<br><br>Maximum overload of motor during the last 10 seconds. | %<br><br>-<br><br>-<br><br>- | INT16<br><br>R/-<br><br>-<br><br>- | CANopen 301C:1Bh<br><br>Modbus 7222<br><br>Profibus 7222<br><br>CIP 128.1.27<br><br>ModbusTCP 7222<br><br>EtherCAT 301C:1Bh<br><br>PROFINET 7222 |
| _M_n_max<br><br>ConF → inF-<br><br>NnNA | Maximum permissible speed of rotation/velocity of motor.<br><br>Units:<br><br>Rotary motors: RPM<br><br>Linear motors: mm/s | motor_v<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 300D:4h<br><br>Modbus 3336<br><br>Profibus 3336<br><br>CIP 113.1.4<br><br>ModbusTCP 3336<br><br>EtherCAT 300D:4h<br><br>PROFINET 3336 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _M_n_nom | Nominal speed of rotation/velocity of motor.<br><br>Units:<br><br>Rotary motors: RPM<br><br>Linear motors: mm/s | motor_v<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 300D:5$_h$<br><br>Modbus 3338<br><br>Profibus 3338<br><br>CIP 113.1.5<br><br>ModbusTCP 3338<br><br>EtherCAT 300D:5$_h$<br><br>PROFINET 3338 |
| _M_overload | Overload of motor (I2t). | %<br><br>-<br><br>-<br><br>- | INT16<br><br>R/-<br><br>-<br><br>- | CANopen 301C:19$_h$<br><br>Modbus 7218<br><br>Profibus 7218<br><br>CIP 128.1.25<br><br>ModbusTCP 7218<br><br>EtherCAT 301C:19$_h$<br><br>PROFINET 7218 |
| _M_Polepair | Number of pole pairs of motor. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 300D:14$_h$<br><br>Modbus 3368<br><br>Profibus 3368<br><br>CIP 113.1.20<br><br>ModbusTCP 3368<br><br>EtherCAT 300D:14$_h$<br><br>PROFINET 3368 |
| _M_PolePairPitch | Pole pair pitch of motor.<br><br>In increments of 0.01 mm.<br><br>Available with firmware version ≥V01.01. | mm<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 300D:23$_h$<br><br>Modbus 3398<br><br>Profibus 3398<br><br>CIP 113.1.35<br><br>ModbusTCP 3398<br><br>EtherCAT 300D:23$_h$<br><br>PROFINET 3398 |
| _M_R_UV | Winding resistance of motor.<br><br>In increments of 0.01 Ω. | Ω<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 300D:D$_h$<br><br>Modbus 3354<br><br>Profibus 3354<br><br>CIP 113.1.13<br><br>ModbusTCP 3354<br><br>EtherCAT 300D:D$_h$<br><br>PROFINET 3354 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *_M_T_current* Пол ЬПоЬ | Temperature of motor. | °C - - - | INT16 R/- - - | CANopen 301C:11h Modbus 7202 Profibus 7202 CIP 128.1.17 ModbusTCP 7202 EtherCAT 301C:11h PROFINET 7202 |
| *_M_T_max* | Maximum temperature of motor. | °C - - - | INT16 R/- - - | CANopen 300D:10h Modbus 3360 Profibus 3360 CIP 113.1.16 ModbusTCP 3360 EtherCAT 300D:10h PROFINET 3360 |
| *_M_Type* ГолF → ınF- ПЬ ЧР | Motor type. Value 0: No motor selected Value >0: Connected motor type | - - - - | UINT32 R/- - - | CANopen 300D:2h Modbus 3332 Profibus 3332 CIP 113.1.2 ModbusTCP 3332 EtherCAT 300D:2h PROFINET 3332 |
| *_M_U_max* | Maximum voltage of motor. In increments of 0.1 V. | V - - - | UINT16 R/- - - | CANopen 300D:19h Modbus 3378 Profibus 3378 CIP 113.1.25 ModbusTCP 3378 EtherCAT 300D:19h PROFINET 3378 |
| *_M_U_nom* | Nominal voltage of motor. In increments of 0.1 V. | V - - - | UINT16 R/- - - | CANopen 300D:Ah Modbus 3348 Profibus 3348 CIP 113.1.10 ModbusTCP 3348 EtherCAT 300D:Ah PROFINET 3348 |

| Parameter name  HMI menu  HMI name | Description | Unit  Minimum value  Factory setting  Maximum value | Data type  R/W  Persistent  Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _ManuSdoAbort | CANopen manufacturer-specific SDO abort code.  Provides more detailed information on a general SDO abort code (0800 0000). | -  -  -  - | UINT16  R/-  -  - | CANopen 3041:A$_h$  Modbus 16660  Profibus 16660  CIP 165.1.10  ModbusTCP 16660  EtherCAT 3041:A$_h$  PROFINET 16660 |
| _ModeError | Error code for detected synchronous errors (ME bit).  Drive Profile Lexium:  Manufacturer-specific error code that caused the ModeError bit to be set.  Usually, this is an error that was detected as a result of the activation of an operating mode. The ModeError bit relates to MT-dependent parameters. | -  -  -  - | UINT16  R/-  -  - | CANopen 301B:19$_h$  Modbus 6962  Profibus 6962  CIP 127.1.25  ModbusTCP 6962  EtherCAT 301B:19$_h$  PROFINET 6962 |
| _ModeErrorInfo | Additional error information of a detected ModeError (ME bit).  Drive Profile Lexium:  Indicates the parameter of the mapping that caused the ME bit to be set. The ME bit is set if MT-dependent parameters of the active mapping cause an error in connection with a write command.  Example:  1 = First mapped parameter  2 = Second mapped parameter  etc. | -  -  -  - | UINT16  R/-  -  - | CANopen 301B:1C$_h$  Modbus 6968  Profibus 6968  CIP 127.1.28  ModbusTCP 6968  EtherCAT 301B:1C$_h$  PROFINET 6968 |
| _ModuleSlot1 | Module in slot 1.  **0 / None**: No module  **1025 / eSM**: Safety module eSM  **1281 / IOM_1**: IO module IOM1 | -  -  -  - | UINT16  R/-  -  - | CANopen 3002:15$_h$  Modbus 554  Profibus 554  CIP 102.1.21  ModbusTCP 554  EtherCAT 3002:15$_h$  PROFINET 554 |
| _ModuleSlot2 | Module in slot 2.  **0 / None**: No module  **769 / Encoder ANA**: Encoder module ANA  **770 / Encoder DIG**: Encoder module DIG  **771 / Encoder RSR**: Encoder module RSR | -  -  -  - | UINT16  R/-  -  - | CANopen 3002:1A$_h$  Modbus 564  Profibus 564  CIP 102.1.26  ModbusTCP 564  EtherCAT 3002:1A$_h$  PROFINET 564 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _ModuleSlot3 | Module in slot 3. 0 / None: No module 513 / CANopen (D-SUB): Fieldbus CANopen (D-SUB) 514 / CANopen (RJ45): Fieldbus CANopen (RJ45) 515 / DeviceNet (Open-Style): Fieldbus DeviceNet (Open-Style) 517 / CANopen (Open-Style): Fieldbus CANopen (Open-Style) 528 / ProfibusDP: Fieldbus Profibus DP 529 / EtherNetIP: Fieldbus EtherNetIP 530 / EtherCAT: Fieldbus EtherCAT 531 / SercosII: Fieldbus Sercos II 532 / PROFINET: Fieldbus PROFINET 533 / SercosIII: Fieldbus Sercos III | - - - - | UINT16 R/- - - | CANopen 3002:1F$_h$ Modbus 574 Profibus 574 CIP 102.1.31 ModbusTCP 574 EtherCAT 3002:1F$_h$ PROFINET 574 |
| _MSM_avail_ds | Number of available data sets. Number of data sets that are available. | - - - - | UINT16 R/- - - | CANopen 302D:F$_h$ Modbus 11550 Profibus 11550 CIP 145.1.15 ModbusTCP 11550 EtherCAT 302D:F$_h$ PROFINET 11550 |
| _MSM_error_field | Field of the data set in which an error has been detected. Value -1: No error Value 0: Data set type Value 1: Setting A Value 2: Setting B Value 3: Setting C Value 4: Setting D Value 5: Transition type Value 6: Subsequent data set Value 7: Transition condition 1 Value 8: Transition value 1 Value 9: Logical operator Value 10: Transition condition 2 Value 11: Transition value 2 Available with firmware version ≥V01.09. | - -1 -1 11 | INT16 R/- - - | CANopen 302D:E$_h$ Modbus 11548 Profibus 11548 CIP 145.1.14 ModbusTCP 11548 EtherCAT 302D:E$_h$ PROFINET 11548 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _MSM_error_num | Number of the data set in which an error has been detected. Value -1: No error Values 0 … 127: Number of the data set in which an error has been detected. Available with firmware version ≥V01.09. | - -1 -1 127 | INT16 R/- - - | CANopen 302D:Dh Modbus 11546 Profibus 11546 CIP 145.1.13 ModbusTCP 11546 EtherCAT 302D:Dh PROFINET 11546 |
| _MSM_used_data_ sets | Number of data sets used. Any data set whose data set type is not equal to 'None' is counted as a used data set. Available with firmware version ≥V01.16. | - - - - | UINT16 R/- - - | CANopen 302D:1Fh Modbus 11582 Profibus 11582 CIP 145.1.31 ModbusTCP 11582 EtherCAT 302D:1Fh PROFINET 11582 |
| _MSMactNum | Number of data set being processed. Value -1: Operating mode is inactive or no data set has been triggered Value >0: Number of the data set being processed | - -1 -1 127 | INT16 R/- - - | CANopen 302D:6h Modbus 11532 Profibus 11532 CIP 145.1.6 ModbusTCP 11532 EtherCAT 302D:6h PROFINET 11532 |
| _MSMnextNum | Next data set to be triggered. Value -1: Operating mode is inactive or no data set is selected Value >0: Number of the next data set | - -1 -1 127 | INT16 R/- - - | CANopen 302D:7h Modbus 11534 Profibus 11534 CIP 145.1.7 ModbusTCP 11534 EtherCAT 302D:7h PROFINET 11534 |
| _MSMNumFinish | Number of data set that was active when a movement was interrupted. When a movement is interrupted, the number of the data set that was being processed at the point in time of the interruption is contained in this parameter. | - -1 -1 127 | INT16 R/- - - | CANopen 302D:Bh Modbus 11542 Profibus 11542 CIP 145.1.11 ModbusTCP 11542 EtherCAT 302D:Bh PROFINET 11542 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _n_act<br>Π o n<br>n A c t | Actual speed of rotation. | RPM<br>-<br>-<br>- | INT16<br>R/-<br>-<br>- | CANopen 301E:8$_h$<br>Modbus 7696<br>Profibus 7696<br>CIP 130.1.8<br>ModbusTCP 7696<br>EtherCAT 301E:8$_h$<br>PROFINET 7696 |
| _n_act_ENC1 | Actual speed of rotation of encoder 1.<br>Available with firmware version ≥V01.01. | RPM<br>-<br>-<br>- | INT16<br>R/-<br>-<br>- | CANopen 301E:28$_h$<br>Modbus 7760<br>Profibus 7760<br>CIP 130.1.40<br>ModbusTCP 7760<br>EtherCAT 301E:28$_h$<br>PROFINET 7760 |
| _n_act_ENC2 | Actual speed of rotation of encoder 2 (module). | RPM<br>-<br>-<br>- | INT16<br>R/-<br>-<br>- | CANopen 301E:1E$_h$<br>Modbus 7740<br>Profibus 7740<br>CIP 130.1.30<br>ModbusTCP 7740<br>EtherCAT 301E:1E$_h$<br>PROFINET 7740 |
| _n_ref<br>Π o n<br>n r E F | Reference speed of rotation. | RPM<br>-<br>-<br>- | INT16<br>R/-<br>-<br>- | CANopen 301E:7$_h$<br>Modbus 7694<br>Profibus 7694<br>CIP 130.1.7<br>ModbusTCP 7694<br>EtherCAT 301E:7$_h$<br>PROFINET 7694 |
| _OFSp_act | Actual position of offset movement. | Inc<br>-<br>-<br>- | INT32<br>R/-<br>-<br>- | CANopen 3027:C$_h$<br>Modbus 10008<br>Profibus 10008<br>CIP 139.1.12<br>ModbusTCP 10008<br>EtherCAT 3027:C$_h$<br>PROFINET 10008 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _OpHours<br><br>Π o n<br><br>o P h | Operating hours counter. | s<br><br>-<br><br>-<br><br>- | UINT32<br><br>R/-<br><br>-<br><br>- | CANopen 301C:A$_h$<br><br>Modbus 7188<br><br>Profibus 7188<br><br>CIP 128.1.10<br><br>ModbusTCP 7188<br><br>EtherCAT 301C:A$_h$<br><br>PROFINET 7188 |
| _p_absENC<br><br>Π o n<br><br>P Α Π u | Absolute position with reference to the encoder range.<br><br>This value corresponds to the modulo position of the absolute encoder range.<br><br>The value is no longer valid if the gear ratio of machine encoder and motor encoder is changed. A restart is required in such a case. | usr_p<br><br>-<br><br>-<br><br>- | UINT32<br><br>R/-<br><br>-<br><br>- | CANopen 301E:F$_h$<br><br>Modbus 7710<br><br>Profibus 7710<br><br>CIP 130.1.15<br><br>ModbusTCP 7710<br><br>EtherCAT 301E:F$_h$<br><br>PROFINET 7710 |
| _p_absmodulo | Absolute position with reference to internal resolution in internal units.<br><br>This value is based on encoder raw position with reference to internal resolution (131072 Inc). | Inc<br><br>-<br><br>-<br><br>- | UINT32<br><br>R/-<br><br>-<br><br>- | CANopen 301E:E$_h$<br><br>Modbus 7708<br><br>Profibus 7708<br><br>CIP 130.1.14<br><br>ModbusTCP 7708<br><br>EtherCAT 301E:E$_h$<br><br>PROFINET 7708 |
| _p_act | Actual position. | usr_p<br><br>-<br><br>-<br><br>- | INT32<br><br>R/-<br><br>-<br><br>- | CANopen 6064:0$_h$<br><br>Modbus 7706<br><br>Profibus 7706<br><br>CIP 130.1.13<br><br>ModbusTCP 7706<br><br>EtherCAT 6064:0$_h$<br><br>PROFINET 7706 |
| _p_act_ENC1 | Actual position of encoder 1.<br><br>Available with firmware version ≥V01.01. | usr_p<br><br>-<br><br>-<br><br>- | INT32<br><br>R/-<br><br>-<br><br>- | CANopen 301E:27$_h$<br><br>Modbus 7758<br><br>Profibus 7758<br><br>CIP 130.1.39<br><br>ModbusTCP 7758<br><br>EtherCAT 301E:27$_h$<br><br>PROFINET 7758 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _p_act_ENC1_int | Actual position of encoder 1 in internal units.<br><br>Available with firmware version ≥V01.01. | Inc<br><br>-<br><br>-<br><br>- | INT32<br><br>R/-<br><br>-<br><br>- | CANopen 301E:26h<br><br>Modbus 7756<br><br>Profibus 7756<br><br>CIP 130.1.38<br><br>ModbusTCP 7756<br><br>EtherCAT 301E:26h<br><br>PROFINET 7756 |
| _p_act_ENC2 | Actual position of encoder 2 (module). | usr_p<br><br>-<br><br>-<br><br>- | INT32<br><br>R/-<br><br>-<br><br>- | CANopen 301E:1Ah<br><br>Modbus 7732<br><br>Profibus 7732<br><br>CIP 130.1.26<br><br>ModbusTCP 7732<br><br>EtherCAT 301E:1Ah<br><br>PROFINET 7732 |
| _p_act_ENC2_int | Actual position of encoder 2 (module) in internal units. | Inc<br><br>-<br><br>-<br><br>- | INT32<br><br>R/-<br><br>-<br><br>- | CANopen 301E:19h<br><br>Modbus 7730<br><br>Profibus 7730<br><br>CIP 130.1.25<br><br>ModbusTCP 7730<br><br>EtherCAT 301E:19h<br><br>PROFINET 7730 |
| _p_act_int | Actual position in internal units. | Inc<br><br>-<br><br>-<br><br>- | INT32<br><br>R/-<br><br>-<br><br>- | CANopen 6063:0h<br><br>Modbus 7700<br><br>Profibus 7700<br><br>CIP 130.1.10<br><br>ModbusTCP 7700<br><br>EtherCAT 6063:0h<br><br>PROFINET 7700 |
| _p_addGEAR | Initial position electronic gear.<br><br>When Electronic Gear is inactive, the reference position for the position controller can be determined here. This position is set when Electronic Gear is activated with the selection of 'Synchronization with compensation movement'. | Inc<br><br>-<br><br>-<br><br>- | INT32<br><br>R/-<br><br>-<br><br>- | CANopen 301F:3h<br><br>Modbus 7942<br><br>Profibus 7942<br><br>CIP 131.1.3<br><br>ModbusTCP 7942<br><br>EtherCAT 301F:3h<br><br>PROFINET 7942 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _p_dif | Position deviation including dynamic position deviation.<br><br>Position deviation is the difference between reference position and actual position. The position deviation consists of the load-dependent position deviation and the dynamic position deviation.<br><br>The parameter _p_dif_usr allows you to enter the value in user-defined units.<br><br>In increments of 0.0001 revolution. | revolution<br><br>-214748.3648<br><br>-<br><br>214748.3647 | INT32<br><br>R/-<br><br>-<br><br>- | CANopen 60F4:0$_h$<br><br>Modbus 7716<br><br>Profibus 7716<br><br>CIP 130.1.18<br><br>ModbusTCP 7716<br><br>EtherCAT 60F4:0$_h$<br><br>PROFINET 7716 |
| _p_dif_load | Load-dependent position deviation between reference and actual positions.<br><br>The load-dependent position deviation is the difference between the reference position and the actual position caused by the load. This value is used for following error monitoring.<br><br>The parameter _p_dif_load_usr allows you to enter the value in user-defined units.<br><br>In increments of 0.0001 revolution. | revolution<br><br>-214748.3648<br><br>-<br><br>214748.3647 | INT32<br><br>R/-<br><br>-<br><br>- | CANopen 301E:1C$_h$<br><br>Modbus 7736<br><br>Profibus 7736<br><br>CIP 130.1.28<br><br>ModbusTCP 7736<br><br>EtherCAT 301E:1C$_h$<br><br>PROFINET 7736 |
| _p_dif_load_peak | Maximum value of the load-dependent position deviation.<br><br>This parameter contains the maximum load-dependent position deviation reached so far. A write access resets this value.<br><br>The parameter _p_dif_load_peak_usr allows you to enter the value in user-defined units.<br><br>In increments of 0.0001 revolution.<br><br>Modified settings become active immediately. | revolution<br><br>0.0000<br><br>-<br><br>429496.7295 | UINT32<br><br>R/W<br><br>-<br><br>- | CANopen 301E:1B$_h$<br><br>Modbus 7734<br><br>Profibus 7734<br><br>CIP 130.1.27<br><br>ModbusTCP 7734<br><br>EtherCAT 301E:1B$_h$<br><br>PROFINET 7734 |
| _p_dif_load_peak_usr | Maximum value of the load-dependent position deviation.<br><br>This parameter contains the maximum load-dependent position deviation reached so far. A write access resets this value.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.03. | usr_p<br><br>0<br><br>-<br><br>2147483647 | INT32<br><br>R/W<br><br>-<br><br>- | CANopen 301E:15$_h$<br><br>Modbus 7722<br><br>Profibus 7722<br><br>CIP 130.1.21<br><br>ModbusTCP 7722<br><br>EtherCAT 301E:15$_h$<br><br>PROFINET 7722 |
| _p_dif_load_usr | Load-dependent position deviation between reference and actual positions.<br><br>The load-dependent position deviation is the difference between the reference position and the actual position caused by the load. This value is used for following error monitoring.<br><br>Available with firmware version ≥V01.03. | usr_p<br><br>-2147483648<br><br>-<br><br>2147483647 | INT32<br><br>R/-<br><br>-<br><br>- | CANopen 301E:16$_h$<br><br>Modbus 7724<br><br>Profibus 7724<br><br>CIP 130.1.22<br><br>ModbusTCP 7724<br><br>EtherCAT 301E:16$_h$<br><br>PROFINET 7724 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _p_dif_usr | Position deviation including dynamic position deviation.<br><br>Position deviation is the difference between reference position and actual position. The position deviation consists of the load-dependent position deviation and the dynamic position deviation.<br><br>Available with firmware version ≥V01.03. | usr_p<br><br>-2147483648<br><br>-<br><br>2147483647 | INT32<br><br>R/-<br><br>-<br><br>- | CANopen 301E:14$_h$<br><br>Modbus 7720<br><br>Profibus 7720<br><br>CIP 130.1.20<br><br>ModbusTCP 7720<br><br>EtherCAT 301E:14$_h$<br><br>PROFINET 7720 |
| _p_DifENC1toENC2 | Deviation of encoder positions.<br><br>Available with firmware version ≥V01.01. | Inc<br><br>-<br><br>-<br><br>- | INT32<br><br>R/-<br><br>-<br><br>- | CANopen 301E:18$_h$<br><br>Modbus 7728<br><br>Profibus 7728<br><br>CIP 130.1.24<br><br>ModbusTCP 7728<br><br>EtherCAT 301E:18$_h$<br><br>PROFINET 7728 |
| _p_PTI_act | Actual position at PTI interface.<br><br>Counted position increments at PTI interface. | Inc<br><br>-2147483648<br><br>-<br><br>2147483647 | INT32<br><br>R/-<br><br>-<br><br>- | CANopen 3008:5$_h$<br><br>Modbus 2058<br><br>Profibus 2058<br><br>CIP 108.1.5<br><br>ModbusTCP 2058<br><br>EtherCAT 3008:5$_h$<br><br>PROFINET 2058 |
| _p_ref | Reference position.<br><br>Value corresponds to the reference position of the position controller. | usr_p<br><br>-<br><br>-<br><br>- | INT32<br><br>R/-<br><br>-<br><br>- | CANopen 301E:C$_h$<br><br>Modbus 7704<br><br>Profibus 7704<br><br>CIP 130.1.12<br><br>ModbusTCP 7704<br><br>EtherCAT 301E:C$_h$<br><br>PROFINET 7704 |
| _p_ref_int | Reference position in internal units.<br><br>Value corresponds to the reference position of the position controller. | Inc<br><br>-<br><br>-<br><br>- | INT32<br><br>R/-<br><br>-<br><br>- | CANopen 301E:9$_h$<br><br>Modbus 7698<br><br>Profibus 7698<br><br>CIP 130.1.9<br><br>ModbusTCP 7698<br><br>EtherCAT 301E:9$_h$<br><br>PROFINET 7698 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _PAR_ScalingError | Additional information on error detected during recalculation.<br><br>Coding:<br><br>Bits 0 ... 15: Address of the parameter that caused the error<br><br>Bits 16 ... 31: Number of the data set in the operating mode Motion Sequence that caused the error<br><br>Available with firmware version ≥V01.03. | -<br><br>-<br><br>-<br><br>- | UINT32<br><br>R/-<br><br>-<br><br>- | CANopen 3004:16h<br><br>Modbus 1068<br><br>Profibus 1068<br><br>CIP 104.1.22<br><br>ModbusTCP 1068<br><br>EtherCAT 3004:16h<br><br>PROFINET 1068 |
| _PAR_ScalingState | Status of recalculation of the parameters with user-defined units.<br><br>**0 / Recalculation Active**: Recalculation active<br><br>**1 / Reserved (1)**: Reserved<br><br>**2 / Recalculation Finished - No Error**: Recalculation finished, no error<br><br>**3 / Error During Recalculation**: Error during recalculation<br><br>**4 / Initialization Successful**: Initialization successful<br><br>**5 / Reserved (5)**: Reserved<br><br>**6 / Reserved (6)**: Reserved<br><br>**7 / Reserved (7)**: Reserved<br><br>Status of recalculation of the parameters with user-defined units which are recalculated with a changed scaling factor.<br><br>Available with firmware version ≥V01.03. | -<br><br>0<br><br>2<br><br>7 | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 3004:15h<br><br>Modbus 1066<br><br>Profibus 1066<br><br>CIP 104.1.21<br><br>ModbusTCP 1066<br><br>EtherCAT 3004:15h<br><br>PROFINET 1066 |
| _PBbaud<br><br>ConF → inF-<br><br>Pbbd | Profibus baud rate.<br><br>**0 / None / nonE**: No connection<br><br>**28 / 9.6 kBaud / 9.6**: 9.6 kBaud<br><br>**32 / 19.2 kBaud / 19.2**: 19.2 kBaud<br><br>**42 / 93.75 kBaud / 93.7**: 93.75 kBaud<br><br>**54 / 187.5 kBaud / 187**: 187.5 kBaud<br><br>**68 / 500 kBaud / 500**: 500 kBaud<br><br>**80 / 1500 kBaud / 1500**: 1500 kBaud<br><br>**82 / 3000 kBaud / 3000**: 3000 kBaud<br><br>**83 / 6000 kBaud / 6000**: 6000 kBaud<br><br>**88 / 12000 kBaud / 12Mb**: 12000 kBaud | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 3043:4h<br><br>Modbus 17160<br><br>Profibus 17160<br><br>CIP 167.1.4<br><br>ModbusTCP 17160<br><br>EtherCAT 3043:4h<br><br>PROFINET 17160 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *_PBprofile* $\Box$ $\omega$ $\Box$ $F \rightarrow$ $\iota$ $\Box$ $F$ - $P$ $b$ $P$ $r$ | Profibus drive profile. **0 / None /** $\Box$ $\omega$ $\Box$ $E$ : No connection **1 / Profidrive Telegram 1 /** $P$ $d$ $\_$ $I$: Profidrive standard telegram 1 (not yet supported) **2 / Profidrive Telegram 2 /** $P$ $d$ $\_$ $2$: Profidrive standard telegram 2 (not yet supported) **7 / Profidrive Telegram 7 /** $P$ $d$ $\_$ $7$: Profidrive standard telegram 7 (not yet supported) **9 / Profidrive Telegram 9 /** $P$ $d$ $\_$ $9$: Profidrive standard telegram 9 (not yet supported) **103 / Profidrive Manufact /** $P$ $d$ $\_$ $\Pi$: Profidrive manufacturer-specific (not yet supported) **104 / Drive Profile Lexium 1 /** $d$ $P$ $L$ $I$: Drive Profile Lexium telegram 1 (library) **105 / Drive Profile Lexium 2 /** $d$ $P$ $L$ $2$: Drive Profile Lexium telegram 2 | - - - - | UINT16 R/- - - | CANopen 3043:3$_h$ Modbus 17158 Profibus 17158 CIP 167.1.3 ModbusTCP 17158 EtherCAT 3043:3$_h$ PROFINET 17158 |
| *_PntMAC1* | MAC address PROFINET module, byte 1. | - - - - | UINT16 R/- - - | CANopen 3048:25$_h$ Modbus 18506 Profibus 18506 CIP 172.1.37 ModbusTCP 18506 EtherCAT 3048:25$_h$ PROFINET 18506 |
| *_PntMAC2* | MAC address PROFINET module, byte 2. | - - - - | UINT16 R/- - - | CANopen 3048:26$_h$ Modbus 18508 Profibus 18508 CIP 172.1.38 ModbusTCP 18508 EtherCAT 3048:26$_h$ PROFINET 18508 |
| *_PntMAC3* | MAC address PROFINET module, byte 3. | - - - - | UINT16 R/- - - | CANopen 3048:27$_h$ Modbus 18510 Profibus 18510 CIP 172.1.39 ModbusTCP 18510 EtherCAT 3048:27$_h$ PROFINET 18510 |
| *_PntMAC4* | MAC address PROFINET module, byte 4. | - - - - | UINT16 R/- - - | CANopen 3048:28$_h$ Modbus 18512 Profibus 18512 CIP 172.1.40 ModbusTCP 18512 EtherCAT 3048:28$_h$ PROFINET 18512 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _PntMAC5_ | MAC address PROFINET module, byte 5. | - - - - | UINT16 R/- - - | CANopen 3048:29h Modbus 18514 Profibus 18514 CIP 172.1.41 ModbusTCP 18514 EtherCAT 3048:29h PROFINET 18514 |
| _PntMAC6_ | MAC address PROFINET module, byte 6. | - - - - | UINT16 R/- - - | CANopen 3048:2Ah Modbus 18516 Profibus 18516 CIP 172.1.42 ModbusTCP 18516 EtherCAT 3048:2Ah PROFINET 18516 |
| _PntProfile_ ConF → inF- PnPr | PROFINET drive profile. 0 / None / nonE : No connection 104 / Drive Profile Lexium 1 / dPL 1: Drive Profile Lexium telegram 1 (library) 105 / Drive Profile Lexium 2 / dPL 2: Drive Profile Lexium telegram 2 | - - - - | UINT16 R/- - - | CANopen 3048:3h Modbus 18438 Profibus 18438 CIP 172.1.3 ModbusTCP 18438 EtherCAT 3048:3h PROFINET 18438 |
| _PosRegStatus_ | Status of the position register channels. Signal state: 0: Comparison criterion not met 1: Comparison criterion met Bit assignments: Bit 0: State of position register channel 1 Bit 1: State of position register channel 2 Bit 2: State of position register channel 3 Bit 3: State of position register channel 4 | - - - - | UINT16 R/- - - | CANopen 300B:1h Modbus 2818 Profibus 2818 CIP 111.1.1 ModbusTCP 2818 EtherCAT 300B:1h PROFINET 2818 |
| _Power_act_ | Output power. | W - - - | INT32 R/- - - | CANopen 301C:Dh Modbus 7194 Profibus 7194 CIP 128.1.13 ModbusTCP 7194 EtherCAT 301C:Dh PROFINET 7194 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _Power_mean | Mean output power. | W<br>-<br>-<br>- | UINT16<br>R/-<br>-<br>- | CANopen 301C:E$_h$<br>Modbus 7196<br>Profibus 7196<br>CIP 128.1.14<br>ModbusTCP 7196<br>EtherCAT 301C:E$_h$<br>PROFINET 7196 |
| _pref_acc | Acceleration of reference value for acceleration feed-forward control.<br>Sign according to the changed velocity value:<br>Increased velocity: Positive sign<br>Reduced velocity: Negative sign | usr_a<br>-<br>-<br>- | INT32<br>R/-<br>-<br>- | CANopen 301F:9$_h$<br>Modbus 7954<br>Profibus 7954<br>CIP 131.1.9<br>ModbusTCP 7954<br>EtherCAT 301F:9$_h$<br>PROFINET 7954 |
| _pref_v | Velocity of reference value for velocity feed-forward control. | usr_v<br>-<br>-<br>- | INT32<br>R/-<br>-<br>- | CANopen 301F:7$_h$<br>Modbus 7950<br>Profibus 7950<br>CIP 131.1.7<br>ModbusTCP 7950<br>EtherCAT 301F:7$_h$<br>PROFINET 7950 |
| _prgNoDEV<br>ⵧⵓⵏF → ⵉⵏF -<br>Pⵔⵓ | Firmware number of device.<br>Example: PR0912.00<br>The value is provided as a decimal value: 91200 | -<br>-<br>-<br>- | UINT32<br>R/-<br>-<br>- | CANopen 3001:1$_h$<br>Modbus 258<br>Profibus 258<br>CIP 101.1.1<br>ModbusTCP 258<br>EtherCAT 3001:1$_h$<br>PROFINET 258 |
| _prgRevDEV<br>ⵧⵓⵏF → ⵉⵏF -<br>Pⵔⵔ | Firmware revision of device.<br>The version format is XX.YY.ZZ.<br>Part XX.YY is contained in parameter _prgVerDEV.<br>Part ZZ is used for quality evolution and contained in this parameter.<br>Example: V01.23.45<br>The value is provided as a decimal value: 45 | -<br>-<br>-<br>- | UINT16<br>R/-<br>-<br>- | CANopen 3001:4$_h$<br>Modbus 264<br>Profibus 264<br>CIP 101.1.4<br>ModbusTCP 264<br>EtherCAT 3001:4$_h$<br>PROFINET 264 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _prgVerDEV<br>ConF → inF -<br>P r V | Firmware version of device.<br>The version format is XX.YY.ZZ.<br>Part XX.YY is contained in this parameter.<br>Part ZZ is contained in parameter _prgRevDEV.<br>Example: V01.23.45<br>The value is provided as a decimal value: 123 | -<br>-<br>-<br>- | UINT16<br>R/-<br>-<br>- | CANopen 3001:2$_h$<br>Modbus 260<br>Profibus 260<br>CIP 101.1.2<br>ModbusTCP 260<br>EtherCAT 3001:2$_h$<br>PROFINET 260 |
| _PS_I_max<br>ConF → inF -<br>P iПA | Maximum current of power stage.<br>In increments of 0.01 A$_{rms}$. | A$_{rms}$<br>-<br>-<br>- | UINT16<br>R/-<br>per.<br>- | CANopen 3010:2$_h$<br>Modbus 4100<br>Profibus 4100<br>CIP 116.1.2<br>ModbusTCP 4100<br>EtherCAT 3010:2$_h$<br>PROFINET 4100 |
| _PS_I_nom<br>ConF → inF -<br>P ino | Nominal current of power stage.<br>In increments of 0.01 A$_{rms}$. | A$_{rms}$<br>-<br>-<br>- | UINT16<br>R/-<br>per.<br>- | CANopen 3010:1$_h$<br>Modbus 4098<br>Profibus 4098<br>CIP 116.1.1<br>ModbusTCP 4098<br>EtherCAT 3010:1$_h$<br>PROFINET 4098 |
| _PS_load<br>Пon<br>L d F P | Load of power stage. | %<br>-<br>-<br>- | INT16<br>R/-<br>-<br>- | CANopen 301C:17$_h$<br>Modbus 7214<br>Profibus 7214<br>CIP 128.1.23<br>ModbusTCP 7214<br>EtherCAT 301C:17$_h$<br>PROFINET 7214 |
| _PS_maxoverload | Maximum value of overload of power stage.<br>Maximum overload of power stage during the last 10 seconds. | %<br>-<br>-<br>- | INT16<br>R/-<br>-<br>- | CANopen 301C:18$_h$<br>Modbus 7216<br>Profibus 7216<br>CIP 128.1.24<br>ModbusTCP 7216<br>EtherCAT 301C:18$_h$<br>PROFINET 7216 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _PS_overload | Overload of power stage. | %<br><br>-<br><br>-<br><br>- | INT16<br><br>R/-<br><br>-<br><br>- | CANopen 301C:24$_h$<br><br>Modbus 7240<br><br>Profibus 7240<br><br>CIP 128.1.36<br><br>ModbusTCP 7240<br><br>EtherCAT 301C:24$_h$<br><br>PROFINET 7240 |
| _PS_overload_cte | Overload of power stage (chip temperature). | %<br><br>-<br><br>-<br><br>- | INT16<br><br>R/-<br><br>-<br><br>- | CANopen 301C:22$_h$<br><br>Modbus 7236<br><br>Profibus 7236<br><br>CIP 128.1.34<br><br>ModbusTCP 7236<br><br>EtherCAT 301C:22$_h$<br><br>PROFINET 7236 |
| _PS_overload_I2t | Overload of power stage (I2t). | %<br><br>-<br><br>-<br><br>- | INT16<br><br>R/-<br><br>-<br><br>- | CANopen 301C:16$_h$<br><br>Modbus 7212<br><br>Profibus 7212<br><br>CIP 128.1.22<br><br>ModbusTCP 7212<br><br>EtherCAT 301C:16$_h$<br><br>PROFINET 7212 |
| _PS_overload_psq | Overload of power stage (power squared). | %<br><br>-<br><br>-<br><br>- | INT16<br><br>R/-<br><br>-<br><br>- | CANopen 301C:23$_h$<br><br>Modbus 7238<br><br>Profibus 7238<br><br>CIP 128.1.35<br><br>ModbusTCP 7238<br><br>EtherCAT 301C:23$_h$<br><br>PROFINET 7238 |
| _PS_T_current<br><br>_Π o n_<br><br>_t P S_ | Temperature of power stage. | °C<br><br>-<br><br>-<br><br>- | INT16<br><br>R/-<br><br>-<br><br>- | CANopen 301C:10$_h$<br><br>Modbus 7200<br><br>Profibus 7200<br><br>CIP 128.1.16<br><br>ModbusTCP 7200<br><br>EtherCAT 301C:10$_h$<br><br>PROFINET 7200 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _PS_T_max | Maximum temperature of power stage. | °C - - - | INT16 R/- per. - | CANopen 3010:7h Modbus 4110 Profibus 4110 CIP 116.1.7 ModbusTCP 4110 EtherCAT 3010:7h PROFINET 4110 |
| _PS_T_warn | Advisory temperature limit of power stage (error class 0). | °C - - - | INT16 R/- per. - | CANopen 3010:6h Modbus 4108 Profibus 4108 CIP 116.1.6 ModbusTCP 4108 EtherCAT 3010:6h PROFINET 4108 |
| _PS_U_maxDC | Maximum permissible DC bus voltage. In increments of 0.1 V. | V - - - | UINT16 R/- per. - | CANopen 3010:3h Modbus 4102 Profibus 4102 CIP 116.1.3 ModbusTCP 4102 EtherCAT 3010:3h PROFINET 4102 |
| _PS_U_minDC | Minimum permissible DC bus voltage. In increments of 0.1 V. | V - - - | UINT16 R/- per. - | CANopen 3010:4h Modbus 4104 Profibus 4104 CIP 116.1.4 ModbusTCP 4104 EtherCAT 3010:4h PROFINET 4104 |
| _PS_U_minStopDC | DC bus voltage low threshold for Quick Stop. If the threshold is reached, the drive performs a Quick Stop. In increments of 0.1 V. | V - - - | UINT16 R/- per. - | CANopen 3010:Ah Modbus 4116 Profibus 4116 CIP 116.1.10 ModbusTCP 4116 EtherCAT 3010:Ah PROFINET 4116 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _PT_max_val | Maximum possible value for operating mode Profile Torque. 100.0 % correspond to the continuous stall torque _M_M_0. In increments of 0.1 %. | % - - - | INT16 R/- - - | CANopen 301C:1E$_h$ Modbus 7228 Profibus 7228 CIP 128.1.30 ModbusTCP 7228 EtherCAT 301C:1E$_h$ PROFINET 7228 |
| _RAMP_p_act | Actual position of profile generator. | usr_p - - - | INT32 R/- - - | CANopen 301F:2$_h$ Modbus 7940 Profibus 7940 CIP 131.1.2 ModbusTCP 7940 EtherCAT 301F:2$_h$ PROFINET 7940 |
| _RAMP_p_target | Target position of profile generator. Absolute position value of the profile generator, calculated on the basis of the relative and absolute position values received. | usr_p - - - | INT32 R/- - - | CANopen 301F:1$_h$ Modbus 7938 Profibus 7938 CIP 131.1.1 ModbusTCP 7938 EtherCAT 301F:1$_h$ PROFINET 7938 |
| _RAMP_v_act | Actual velocity of profile generator. | usr_v - - - | INT32 R/- - - | CANopen 606B:0$_h$ Modbus 7948 Profibus 7948 CIP 131.1.6 ModbusTCP 7948 EtherCAT 606B:0$_h$ PROFINET 7948 |
| _RAMP_v_target | Target velocity of profile generator. | usr_v - - - | INT32 R/- - - | CANopen 301F:5$_h$ Modbus 7946 Profibus 7946 CIP 131.1.5 ModbusTCP 7946 EtherCAT 301F:5$_h$ PROFINET 7946 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _RES_load<br><br>*∏ o n*<br><br>*L d F b* | Load of braking resistor.<br><br>The braking resistor set via parameter RESint_ext is monitored. | %<br>-<br>-<br>- | INT16<br>R/-<br>-<br>- | CANopen 301C:14$_h$<br>Modbus 7208<br>Profibus 7208<br>CIP 128.1.20<br>ModbusTCP 7208<br>EtherCAT 301C:14$_h$<br>PROFINET 7208 |
| _RES_maxoverload | Maximum value of overload of braking resistor.<br><br>Maximum overload of braking resistor during the last 10 seconds.<br><br>The braking resistor set via parameter RESint_ext is monitored. | %<br>-<br>-<br>- | INT16<br>R/-<br>-<br>- | CANopen 301C:15$_h$<br>Modbus 7210<br>Profibus 7210<br>CIP 128.1.21<br>ModbusTCP 7210<br>EtherCAT 301C:15$_h$<br>PROFINET 7210 |
| _RES_overload | Overload of braking resistor (I2t).<br><br>The braking resistor set via parameter RESint_ext is monitored. | %<br>-<br>-<br>- | INT16<br>R/-<br>-<br>- | CANopen 301C:13$_h$<br>Modbus 7206<br>Profibus 7206<br>CIP 128.1.19<br>ModbusTCP 7206<br>EtherCAT 301C:13$_h$<br>PROFINET 7206 |
| _RESint_P | Nominal power of internal braking resistor. | W<br>-<br>-<br>- | UINT16<br>R/-<br>per.<br>- | CANopen 3010:9$_h$<br>Modbus 4114<br>Profibus 4114<br>CIP 116.1.9<br>ModbusTCP 4114<br>EtherCAT 3010:9$_h$<br>PROFINET 4114 |
| _RESint_R | Resistance value of internal braking resistor.<br><br>In increments of 0.01 Ω. | Ω<br>-<br>-<br>- | UINT16<br>R/-<br>per.<br>- | CANopen 3010:8$_h$<br>Modbus 4112<br>Profibus 4112<br>CIP 116.1.8<br>ModbusTCP 4112<br>EtherCAT 3010:8$_h$<br>PROFINET 4112 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _RMAC_DetailStatus | Detailed status of relative movement after capture (RMAC). **0 / Not Activated**: Not activated **1 / Waiting**: Waiting for capture signal **2 / Moving**: Relative movement after capture running **3 / Interrupted**: Relative movement after capture interrupted **4 / Finished**: Relative movement after capture terminated Available with firmware version ≥V01.16. | - - - - | UINT16 R/- - - | CANopen 3023:12$_h$ Modbus 8996 Profibus 8996 CIP 135.1.18 ModbusTCP 8996 EtherCAT 3023:12$_h$ PROFINET 8996 |
| _RMAC_Status | Status of relative movement after capture. **0 / Not Active**: Not active **1 / Active Or Finished**: Relative movement after capture is active or finished Available with firmware version ≥V01.10. | - 0 - 1 | UINT16 R/- - - | CANopen 3023:11$_h$ Modbus 8994 Profibus 8994 CIP 135.1.17 ModbusTCP 8994 EtherCAT 3023:11$_h$ PROFINET 8994 |
| _ScalePOSmax | Maximum user-defined value for positions. This value depends on ScalePOSdenom and ScalePOSnum. | usr_p - - - | INT32 R/- - - | CANopen 301F:A$_h$ Modbus 7956 Profibus 7956 CIP 131.1.10 ModbusTCP 7956 EtherCAT 301F:A$_h$ PROFINET 7956 |
| _ScaleRAMPmax | Maximum user-defined value for acceleration and deceleration. This value depends on ScaleRAMPdenom and ScaleRAMPnum. | usr_a - - - | INT32 R/- - - | CANopen 301F:C$_h$ Modbus 7960 Profibus 7960 CIP 131.1.12 ModbusTCP 7960 EtherCAT 301F:C$_h$ PROFINET 7960 |
| _ScaleVELmax | Maximum user-defined value for velocity. This value depends on ScaleVELdenom and ScaleVELnum. | usr_v - - - | INT32 R/- - - | CANopen 301F:B$_h$ Modbus 7958 Profibus 7958 CIP 131.1.11 ModbusTCP 7958 EtherCAT 301F:B$_h$ PROFINET 7958 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _SigActive | Status of monitoring signals.<br><br>See _SigLatched for more details on the bit codes. | -<br><br>-<br><br>-<br><br>- | UINT32<br><br>R/-<br><br>-<br><br>- | CANopen 301C:7$_h$<br><br>Modbus 7182<br><br>Profibus 7182<br><br>CIP 128.1.7<br><br>ModbusTCP 7182<br><br>EtherCAT 301C:7$_h$<br><br>PROFINET 7182 |
| _SigLatched<br><br>ⁿoⁿ<br><br>5 ı␣5 | Saved status of monitoring signals.<br><br>Signal state:<br><br>0: Not activated<br><br>1: Activated<br><br>Bit assignments:<br><br>Bit 0: General error<br><br>Bit 1: Hardware limit switches (LIMP/LIMN/REF)<br><br>Bit 2: Out of range (software limit switches, tuning)<br><br>Bit 3: Quick Stop via fieldbus<br><br>Bit 4: Error in active operating mode<br><br>Bit 5: Commissioning interface (RS485)<br><br>Bit 6: Integrated fieldbus<br><br>Bit 7: Reserved<br><br>Bit 8: Following error<br><br>Bit 9: Reserved<br><br>Bit 10: Inputs STO are 0<br><br>Bit 11: Inputs STO different<br><br>Bit 12: Reserved<br><br>Bit 13: DC bus voltage low<br><br>Bit 14: DC bus voltage high<br><br>Bit 15: Mains phase missing<br><br>Bit 16: Integrated encoder interface<br><br>Bit 17: Overtemperature motor<br><br>Bit 18: Overtemperature power stage<br><br>Bit 19: Reserved<br><br>Bit 20: Memory card<br><br>Bit 21: Fieldbus module<br><br>Bit 22: Encoder module<br><br>Bit 23: Safety module eSM or module IOM1<br><br>Bit 24: Reserved<br><br>Bit 25: Reserved<br><br>Bit 26: Motor connection<br><br>Bit 27: Motor overcurrent/short circuit<br><br>Bit 28: Frequency of reference signal too high | -<br><br>-<br><br>-<br><br>- | UINT32<br><br>R/-<br><br>-<br><br>- | CANopen 301C:8$_h$<br><br>Modbus 7184<br><br>Profibus 7184<br><br>CIP 128.1.8<br><br>ModbusTCP 7184<br><br>EtherCAT 301C:8$_h$<br><br>PROFINET 7184 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | Bit 29: Nonvolatile memory error detected Bit 30: System start-up (hardware or parameter) Bit 31: System error detected (for example, watchdog, internal hardware interface) Monitoring functions are product-dependent. | | | |
| _SuppDriveModes | Supported operating modes as per DSP402. Bit 0: Profile Position Bit 2: Profile Velocity Bit 3: Profile Torque Bit 5: Homing Bit 6: Interpolated Position Bit 7: Cyclic Synchronous Position Bit 8: Cyclic Synchronous Velocity Bit 9: Cyclic Synchronous Torque Bit 16: Jog Bit 17: Electronic Gear Bit 21: Manual Tuning Bit 23: Motion Sequence | - - - - | UINT32 R/- - - | CANopen 6502:0$_h$ Modbus 6952 Profibus 6952 CIP 127.1.20 ModbusTCP 6952 EtherCAT 6502:0$_h$ PROFINET 6952 |
| _TouchProbeStat | Touch Probe status (DS402). Available with firmware version ≥V01.16. | - - - - | UINT16 R/- - - | CANopen 60B9:0$_h$ Modbus 7030 Profibus 7030 CIP 127.1.59 ModbusTCP 7030 EtherCAT 60B9:0$_h$ PROFINET 7030 |
| _tq_act | Actual torque. Positive value: Actual torque in positive direction of movement Negative value: Actual torque in negative direction of movement 100.0 % correspond to the continuous stall torque _M_M_0. In increments of 0.1 %. | % - - - | INT16 R/- - - | CANopen 6077:0$_h$ Modbus 7752 Profibus 7752 CIP 130.1.36 ModbusTCP 7752 EtherCAT 6077:0$_h$ PROFINET 7752 |
| _Ud_ref | Reference motor voltage d component. In increments of 0.1 V. | V - - - | INT16 R/- - - | CANopen 301E:5$_h$ Modbus 7690 Profibus 7690 CIP 130.1.5 ModbusTCP 7690 EtherCAT 301E:5$_h$ PROFINET 7690 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _UDC_act $\Pi \, o \, n$ $u \, d \, c \, A$ | Voltage at DC bus. In increments of 0.1 V. | V - - - | UINT16 R/- - - | CANopen 301C:F$_h$ Modbus 7198 Profibus 7198 CIP 128.1.15 ModbusTCP 7198 EtherCAT 301C:F$_h$ PROFINET 7198 |
| _Udq_ref | Total motor voltage (vector sum d components and q components). Square root of ( _Uq_ref$^2$ + _Ud_ref$^2$) In increments of 0.1 V. | V - - - | INT16 R/- - - | CANopen 301E:6$_h$ Modbus 7692 Profibus 7692 CIP 130.1.6 ModbusTCP 7692 EtherCAT 301E:6$_h$ PROFINET 7692 |
| _Uq_ref | Reference motor voltage q component. In increments of 0.1 V. | V - - - | INT16 R/- - - | CANopen 301E:4$_h$ Modbus 7688 Profibus 7688 CIP 130.1.4 ModbusTCP 7688 EtherCAT 301E:4$_h$ PROFINET 7688 |
| _v_act $\Pi \, o \, n$ $V \, A \, c \, t$ | Actual velocity. | usr_v - - - | INT32 R/- - - | CANopen 606C:0$_h$ Modbus 7744 Profibus 7744 CIP 130.1.32 ModbusTCP 7744 EtherCAT 606C:0$_h$ PROFINET 7744 |
| _v_act_ENC1 | Actual velocity of encoder 1. Available with firmware version ≥V01.01. | usr_v - - - | INT32 R/- - - | CANopen 301E:29$_h$ Modbus 7762 Profibus 7762 CIP 130.1.41 ModbusTCP 7762 EtherCAT 301E:29$_h$ PROFINET 7762 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _v_act_ENC2 | Actual velocity of encoder 2 (module). | usr_v - - - | INT32 R/- - - | CANopen 301E:23h Modbus 7750 Profibus 7750 CIP 130.1.35 ModbusTCP 7750 EtherCAT 301E:23h PROFINET 7750 |
| _v_dif_usr | Load-dependent velocity deviation. The load-dependent velocity deviation is the difference between reference velocity and actual velocity. Available with firmware version ≥V01.26. | usr_v -2147483648 - 2147483647 | INT32 R/- - - | CANopen 301E:2Ch Modbus 7768 Profibus 7768 CIP 130.1.44 ModbusTCP 7768 EtherCAT 301E:2Ch PROFINET 7768 |
| _v_PTI_act | Actual velocity at PTI interface. Determined pulse frequency at position interface PTI. | Inc/s -2147483648 - 2147483647 | INT32 R/- - - | CANopen 3008:6h Modbus 2060 Profibus 2060 CIP 108.1.6 ModbusTCP 2060 EtherCAT 3008:6h PROFINET 2060 |
| _v_ref Πο π V r E F | Reference velocity. | usr_v - - - | INT32 R/- - - | CANopen 301E:1Fh Modbus 7742 Profibus 7742 CIP 130.1.31 ModbusTCP 7742 EtherCAT 301E:1Fh PROFINET 7742 |
| _Vmax_act | Currently effective velocity limitation. Value of the currently effective velocity limitation. This is one of the following values (whichever is lowest): - CTRL_v_max - M_n_max (only if motor is connected) - Velocity limitation via digital input | usr_v - - - | UINT32 R/- - - | CANopen 301C:29h Modbus 7250 Profibus 7250 CIP 128.1.41 ModbusTCP 7250 EtherCAT 301C:29h PROFINET 7250 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _VoltUtil<br><br>ⁿ o ⁿ<br><br>u d c r | Degree of utilization of DC bus voltage.<br><br>With a value of 100%, the drive operates at the voltage limit. | %<br><br>-<br><br>-<br><br>- | INT16<br><br>R/-<br><br>-<br><br>- | CANopen 301E:13$_h$<br><br>Modbus 7718<br><br>Profibus 7718<br><br>CIP 130.1.19<br><br>ModbusTCP 7718<br><br>EtherCAT 301E:13$_h$<br><br>PROFINET 7718 |
| _WarnActive | Active errors of error class 0, bit-coded.<br><br>See parameter _WarnLatched for more details on the bits. | -<br><br>-<br><br>-<br><br>- | UINT32<br><br>R/-<br><br>-<br><br>- | CANopen 301C:B$_h$<br><br>Modbus 7190<br><br>Profibus 7190<br><br>CIP 128.1.11<br><br>ModbusTCP 7190<br><br>EtherCAT 301C:B$_h$<br><br>PROFINET 7190 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| _WarnLatched ∏ o n W r n S | Saved errors of error class 0, bit-coded. The bits are set to 0 in the case of a Fault Reset. Bits 10 and 13 are set to 0 automatically. Signal state: 0: Not activated 1: Activated Bit assignments: Bit 0: General Bit 1: Reserved Bit 2: Out of range (software limit switches, tuning) Bit 3: Reserved Bit 4: Active operating mode Bit 5: Commissioning interface (RS485) Bit 6: Integrated fieldbus Bit 7: Reserved Bit 8: Following error Bit 9: Reserved Bit 10: Inputs STO_A and/or STO_B Bits 11 ... 12: Reserved Bit 13: Low voltage DC bus or mains phase missing Bits 14 ... 15: Reserved Bit 16: Integrated encoder interface Bit 17: Temperature of motor high Bit 18: Temperature of power stage high Bit 19: Reserved Bit 20: Memory card Bit 21: Fieldbus module Bit 22: Encoder module Bit 23: Safety module eSM or module IOM1 Bits 24 … 27: Reserved Bit 28: Transistor for braking resistor overload ($I^2t$) Bit 29: Braking resistor overload ($I^2t$) Bit 30: Power stage overload ($I^2t$) Bit 31: Motor overload ($I^2t$) Monitoring functions are product-dependent. | - - - - | UINT32 R/- - - | CANopen 301C:C$_h$ Modbus 7192 Profibus 7192 CIP 128.1.12 ModbusTCP 7192 EtherCAT 301C:C$_h$ PROFINET 7192 |
| AbsHomeRequest 0 / No: No 1 / Yes: Yes | Absolute positioning only after homing. This parameter has no function if the parameter 'PP_ModeRangeLim' is set to '1' which allows | - 0 1 1 | UINT16 R/W per. - | CANopen 3006:16$_h$ Modbus 1580 Profibus 1580 CIP 106.1.22 ModbusTCP 1580 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | overtraveling of the movement range (ref_ok is set to 0 when the range is overtraveled).<br><br>Modified settings become active immediately. | | | EtherCAT 3006:16h<br><br>PROFINET 1580 |
| *AccessExcl* | Get exclusive access to access channel.<br><br>Write parameter:<br><br>Value 0: Release access channel<br><br>Value 1: Use exclusive access for access channel<br><br>Read parameter:<br><br>Value 0: Access channel is not used exclusively<br><br>Value 1: Access channel is used exclusively (access channel used for reading)<br><br>Modified settings become active immediately. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 3001:Dh<br><br>Modbus 282<br><br>Profibus 282<br><br>CIP 101.1.13<br><br>ModbusTCP 282<br><br>EtherCAT 3001:Dh<br><br>PROFINET 282 |
| *AccessLock* | Locking other access channels.<br><br>Value 0: Allow control via other access channels<br><br>Value 1: Lock control via other access channels<br><br>Example:<br><br>The access channel is used by the fieldbus.<br><br>In this case, control via the commissioning software, for example, is not possible.<br><br>The access channel can only be locked after the currently active operating mode has terminated.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 3001:Eh<br><br>Modbus 284<br><br>Profibus 284<br><br>CIP 101.1.14<br><br>ModbusTCP 284<br><br>EtherCAT 3001:Eh<br><br>PROFINET 284 |
| *AT_dir*<br><br>o P → t u n -<br><br>5 t ı П | Direction of movement for Autotuning.<br><br>**1 / Positive Negative Home /** P n h: Positive direction first, then negative direction with return to initial position<br><br>**2 / Negative Positive Home /** n P h: Negative direction first, then positive direction with return to initial position<br><br>**3 / Positive Home /** P - h: Positive direction only with return to initial position<br><br>**4 / Positive /** P - -: Positive direction only without return to initial position<br><br>**5 / Negative Home /** n - h: Negative direction only with return to initial position<br><br>**6 / Negative /** n - -: Negative direction only without return to initial position<br><br>Modified settings become active the next time the motor moves. | -<br><br>1<br><br>1<br><br>6 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 302F:4h<br><br>Modbus 12040<br><br>Profibus 12040<br><br>CIP 147.1.4<br><br>ModbusTCP 12040<br><br>EtherCAT 302F:4h<br><br>PROFINET 12040 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *AT_dis* | Movement range for Autotuning.<br><br>Movement range within which the control parameters are automatically optimized. The movement range is entered with reference to the actual position.<br><br>In the case of "Movement in one direction only" (Parameter AT_dir), the specified movement range is used for each optimization step. The movement typically corresponds to 20 times the value, but it is not limited.<br><br>The parameter AT_dis_usr allows you to enter the value in user-defined units.<br><br>In increments of 0.1 revolution.<br><br>Modified settings become active the next time the motor moves. | revolution<br><br>1.0<br><br>2.0<br><br>999.9 | UINT32<br><br>R/W<br><br>-<br><br>- | CANopen 302F:3$_h$<br><br>Modbus 12038<br><br>Profibus 12038<br><br>CIP 147.1.3<br><br>ModbusTCP 12038<br><br>EtherCAT 302F:3$_h$<br><br>PROFINET 12038 |
| *AT_dis_usr* | Movement range for Autotuning.<br><br>Movement range within which the control parameters are automatically optimized. The movement range is entered with reference to the actual position.<br><br>In the case of "Movement in one direction only" (Parameter AT_dir), the specified range is used for each optimization step. The movement typically corresponds to 20 times the value, but it is not limited.<br><br>The minimum value, the factory setting and the maximum value depend on the scaling factor.<br><br>Modified settings become active the next time the motor moves.<br><br>Available with firmware version ≥V01.03. | usr_p<br><br>1<br><br>32768<br><br>2147483647 | INT32<br><br>R/W<br><br>-<br><br>- | CANopen 302F:12$_h$<br><br>Modbus 12068<br><br>Profibus 12068<br><br>CIP 147.1.18<br><br>ModbusTCP 12068<br><br>EtherCAT 302F:12$_h$<br><br>PROFINET 12068 |
| *AT_mechanical* | Type of coupling of the system.<br><br>**1 / Direct Coupling**: Direct coupling<br><br>**2 / Belt Axis**: Belt axis<br><br>**3 / Spindle Axis**: Spindle axis<br><br>Modified settings become active the next time the motor moves. | -<br><br>1<br><br>2<br><br>3 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 302F:E$_h$<br><br>Modbus 12060<br><br>Profibus 12060<br><br>CIP 147.1.14<br><br>ModbusTCP 12060<br><br>EtherCAT 302F:E$_h$<br><br>PROFINET 12060 |
| *AT_n_ref* | Velocity jump for Autotuning.<br><br>The parameter AT_v_ref allows you to enter the value in user-defined units.<br><br>Modified settings become active the next time the motor moves. | RPM<br><br>10<br><br>100<br><br>1000 | UINT32<br><br>R/W<br><br>-<br><br>- | CANopen 302F:6$_h$<br><br>Modbus 12044<br><br>Profibus 12044<br><br>CIP 147.1.6<br><br>ModbusTCP 12044<br><br>EtherCAT 302F:6$_h$<br><br>PROFINET 12044 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *AT_start* | Autotuning start. Value 0: Terminate Value 1: Activate EasyTuning Value 2: Activate ComfortTuning Modified settings become active immediately. | - 0 - 2 | UINT16 R/W - - | CANopen 302F:1$_h$ Modbus 12034 Profibus 12034 CIP 147.1.1 ModbusTCP 12034 EtherCAT 302F:1$_h$ PROFINET 12034 |
| *AT_v_ref* | Velocity jump for Autotuning. The minimum value, the factory setting and the maximum value depend on the scaling factor. Modified settings become active the next time the motor moves. Available with firmware version ≥V01.03. | usr_v 1 100 2147483647 | INT32 R/W - - | CANopen 302F:13$_h$ Modbus 12070 Profibus 12070 CIP 147.1.19 ModbusTCP 12070 EtherCAT 302F:13$_h$ PROFINET 12070 |
| *AT_wait* | Waiting time between Autotuning steps. Modified settings become active the next time the motor moves. | ms 300 500 10000 | UINT16 R/W - - | CANopen 302F:9$_h$ Modbus 12050 Profibus 12050 CIP 147.1.9 ModbusTCP 12050 EtherCAT 302F:9$_h$ PROFINET 12050 |
| *BLSH_Mode* | Processing mode of backlash compensation. **0 / Off**: Backlash compensation is off **1 / OnAfterPositiveMovement**: Backlash compensation is on, last movement was in positive direction **2 / OnAfterNegativeMovement**: Backlash compensation is on, last movement was in negative direction Modified settings become active immediately. Available with firmware version ≥V01.14. | - 0 0 2 | UINT16 R/W per. - | CANopen 3006:41$_h$ Modbus 1666 Profibus 1666 CIP 106.1.65 ModbusTCP 1666 EtherCAT 3006:41$_h$ PROFINET 1666 |
| *BLSH_Position* | Position value for backlash compensation. Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. Available with firmware version ≥V01.14. | usr_p 0 0 2147483647 | INT32 R/W per. - | CANopen 3006:42$_h$ Modbus 1668 Profibus 1668 CIP 106.1.66 ModbusTCP 1668 EtherCAT 3006:42$_h$ PROFINET 1668 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *BLSH_Time* | Processing time for backlash compensation. Value 0: Immediate backlash compensation Value >0: Processing time for backlash compensation Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. Available with firmware version ≥V01.14. | ms 0 0 16383 | UINT16 R/W per. - | CANopen 3006:44$_h$ Modbus 1672 Profibus 1672 CIP 106.1.68 ModbusTCP 1672 EtherCAT 3006:44$_h$ PROFINET 1672 |
| *BRK_AddT_apply* | Additional time delay for applying the holding brake. The overall time delay for applying the holding brake is the time delay from the electronic nameplate of the motor and the additional time delay in this parameter. Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. | ms 0 0 1000 | INT16 R/W per. - | CANopen 3005:8$_h$ Modbus 1296 Profibus 1296 CIP 105.1.8 ModbusTCP 1296 EtherCAT 3005:8$_h$ PROFINET 1296 |
| *BRK_AddT_release* | Additional time delay for releasing the holding brake. The overall time delay for releasing the holding brake is the time delay from the electronic nameplate of the motor and the additional time delay in this parameter. Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. | ms 0 0 400 | INT16 R/W per. - | CANopen 3005:7$_h$ Modbus 1294 Profibus 1294 CIP 105.1.7 ModbusTCP 1294 EtherCAT 3005:7$_h$ PROFINET 1294 |
| *BRK_release* | Manual operation of the holding brake. **0 / Automatic**: Automatic processing **1 / Manual Release**: Manual release of holding brake **2 / Manual Application**: Manual applying of holding brake You can apply or release the holding brake manually. The holding brake can only be manually released in the operating states 'Switch On Disabled', 'Ready To Switch On' or 'Fault'. If you have applied the holding brake manually and then want to release it manually, you must first set this parameter to Automatic and then to Manual Release. Modified settings become active immediately. Available with firmware version ≥V01.12. | - 0 0 2 | UINT16 R/W - - | CANopen 3008:A$_h$ Modbus 2068 Profibus 2068 CIP 108.1.10 ModbusTCP 2068 EtherCAT 3008:A$_h$ PROFINET 2068 |
| *CANaddress* $\mathcal{L} o n \mathcal{F} \to \mathcal{L} o \Pi -$ $\mathcal{L} o \mathcal{H} d$ | CANopen address (node number). Modified settings become active the next time the product is powered on. | - 1 - 127 | UINT16 R/W per. - | - |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CANbaud* ꕃꝋꞑꞙ → ꕃꝋꞐ - ꕃꝋꞲꝒ | CANopen baud rate. **50 kBaud /** 5 0: 50 kBaud **125 kBaud /** 1 2 5: 125 kBaud **250 kBaud /** 2 5 0: 250 kBaud **500 kBaud /** 5 0 0: 500 kBaud **1 MBaud /** 1 0 0 0: 1 MBaud Modified settings become active the next time the product is powered on. | - 50 250 1000 | UINT16 R/W per. - | - |
| *CANpdo1Event* | PDO 1 event mask. Changes of values in the object trigger an event: Bit 0: First PDO object Bit 1: Second PDO object Bit 2: Third PDO object Bit 3: Fourth PDO object Modified settings become active immediately. | - 0 1 15 | UINT16 R/W - - | CANopen 3041:B$_h$ Modbus 16662 Profibus 16662 CIP 165.1.11 ModbusTCP 16662 EtherCAT 3041:B$_h$ PROFINET 16662 |
| *CANpdo2Event* | PDO 2 event mask. Changes of values in the object trigger an event: Bit 0: First PDO object Bit 1: Second PDO object Bit 2: Third PDO object Bit 3: Fourth PDO object Modified settings become active immediately. | - 0 1 15 | UINT16 R/W - - | CANopen 3041:C$_h$ Modbus 16664 Profibus 16664 CIP 165.1.12 ModbusTCP 16664 EtherCAT 3041:C$_h$ PROFINET 16664 |
| *CANpdo3Event* | PDO 3 event mask. Changes of values in the object trigger an event: Bit 0: First PDO object Bit 1: Second PDO object Bit 2: Third PDO object Bit 3: Fourth PDO object Modified settings become active immediately. | - 0 1 15 | UINT16 R/W - - | CANopen 3041:D$_h$ Modbus 16666 Profibus 16666 CIP 165.1.13 ModbusTCP 16666 EtherCAT 3041:D$_h$ PROFINET 16666 |
| *CANpdo4Event* | PDO 4 event mask. Changes of values in the object trigger an event: Bit 0: First PDO object Bit 1: Second PDO object Bit 2: Third PDO object Bit 3: Fourth PDO object Modified settings become active immediately. | - 0 15 15 | UINT16 R/W - - | CANopen 3041:E$_h$ Modbus 16668 Profibus 16668 CIP 165.1.14 ModbusTCP 16668 EtherCAT 3041:E$_h$ PROFINET 16668 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *Cap1Activate* | Capture input 1 start/stop.<br><br>**0 / Capture Stop**: Cancel capture function<br><br>**1 / Capture Once**: Start one-time capture<br><br>**2 / Capture Continuous**: Start continuous capture<br><br>**3 / Reserved**: Reserved<br><br>**4 / Reserved**: Reserved<br><br>In the case of one-time capture, the function is terminated when the first value is captured.<br><br>In the case of continuous capture, the function continues to run.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>-<br><br>4 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 300A:4$_h$<br><br>Modbus 2568<br><br>Profibus 2568<br><br>CIP 110.1.4<br><br>ModbusTCP 2568<br><br>EtherCAT 300A:4$_h$<br><br>PROFINET 2568 |
| *Cap1Config* | Capture input 1 configuration.<br><br>**0 / Falling Edge**: Position capture at falling edge<br><br>**1 / Rising Edge**: Position capture at rising edge<br><br>**2 / Both Edges**: Position capture at both edges<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>2 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 300A:2$_h$<br><br>Modbus 2564<br><br>Profibus 2564<br><br>CIP 110.1.2<br><br>ModbusTCP 2564<br><br>EtherCAT 300A:2$_h$<br><br>PROFINET 2564 |
| *Cap1Source* | Capture input 1 encoder source.<br><br>**0 / Pact Encoder 1**: Source for capture input 1 is Pact of encoder 1<br><br>**1 / Pact Encoder 2**: Source for capture input 1 is Pact of encoder 2 (module)<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.01. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 300A:A$_h$<br><br>Modbus 2580<br><br>Profibus 2580<br><br>CIP 110.1.10<br><br>ModbusTCP 2580<br><br>EtherCAT 300A:A$_h$<br><br>PROFINET 2580 |
| *Cap2Activate* | Capture input 2 start/stop.<br><br>**0 / Capture Stop**: Cancel capture function<br><br>**1 / Capture Once**: Start one-time capture<br><br>**2 / Capture Continuous**: Start continuous capture<br><br>**3 / Reserved**: Reserved<br><br>**4 / Reserved**: Reserved<br><br>In the case of one-time capture, the function is terminated when the first value is captured.<br><br>In the case of continuous capture, the function continues to run.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>-<br><br>4 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 300A:5$_h$<br><br>Modbus 2570<br><br>Profibus 2570<br><br>CIP 110.1.5<br><br>ModbusTCP 2570<br><br>EtherCAT 300A:5$_h$<br><br>PROFINET 2570 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *Cap2Config* | Capture input 2 configuration.<br><br>**0 / Falling Edge**: Position capture at falling edge<br><br>**1 / Rising Edge**: Position capture at rising edge<br><br>**2 / Both Edges**: Position capture at both edges<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>2 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 300A:3$_h$<br><br>Modbus 2566<br><br>Profibus 2566<br><br>CIP 110.1.3<br><br>ModbusTCP 2566<br><br>EtherCAT 300A:3$_h$<br><br>PROFINET 2566 |
| *Cap2Source* | Capture input 2 encoder source.<br><br>**0 / Pact Encoder 1**: Source for capture input 2 is Pact of encoder 1<br><br>**1 / Pact Encoder 2**: Source for capture input 2 is Pact of encoder 2 (module)<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.01. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 300A:B$_h$<br><br>Modbus 2582<br><br>Profibus 2582<br><br>CIP 110.1.11<br><br>ModbusTCP 2582<br><br>EtherCAT 300A:B$_h$<br><br>PROFINET 2582 |
| *Cap3Activate* | Capture input 3 start/stop.<br><br>**0 / Capture Stop**: Cancel capture function<br><br>**1 / Capture Once**: Start one-time capture<br><br>**2 / Capture Continuous**: Start continuous capture<br><br>In the case of one-time capture, the function is terminated when the first value is captured.<br><br>In the case of continuous capture, the function continues to run.<br><br>Available with hardware version ≥RS03.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>-<br><br>2 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 300A:12$_h$<br><br>Modbus 2596<br><br>Profibus 2596<br><br>CIP 110.1.18<br><br>ModbusTCP 2596<br><br>EtherCAT 300A:12$_h$<br><br>PROFINET 2596 |
| *Cap3Config* | Capture input 3 configuration.<br><br>**0 / Falling Edge**: Position capture at falling edge<br><br>**1 / Rising Edge**: Position capture at rising edge<br><br>Available with hardware version ≥RS03.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 300A:11$_h$<br><br>Modbus 2594<br><br>Profibus 2594<br><br>CIP 110.1.17<br><br>ModbusTCP 2594<br><br>EtherCAT 300A:11$_h$<br><br>PROFINET 2594 |
| *Cap3Source* | Capture input 3 encoder source.<br><br>**0 / Pact Encoder 1**: Source for capture input 3 is Pact of encoder 1<br><br>**1 / Pact Encoder 2**: Source for capture input 3 is Pact of encoder 2 (module)<br><br>Available with hardware version ≥RS03.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 300A:15$_h$<br><br>Modbus 2602<br><br>Profibus 2602<br><br>CIP 110.1.21<br><br>ModbusTCP 2602<br><br>EtherCAT 300A:15$_h$<br><br>PROFINET 2602 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CLSET_p_DiffWin* | Position deviation for control loop parameter set switching.<br><br>If the position deviation of the position controller is less than the value of this parameter, control loop parameter set 2 is used. Otherwise, control loop parameter set 1 is used.<br><br>The parameter CLSET_p_DiffWin_usr allows you to enter the value in user-defined units.<br><br>In increments of 0.0001 revolution.<br><br>Modified settings become active immediately. | revolution<br><br>0.0000<br><br>0.0100<br><br>2.0000 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3011:1C$_h$<br><br>Modbus 4408<br><br>Profibus 4408<br><br>CIP 117.1.28<br><br>ModbusTCP 4408<br><br>EtherCAT 3011:1C$_h$<br><br>PROFINET 4408 |
| *CLSET_p_DiffWin_usr* | Position deviation for control loop parameter set switching.<br><br>If the position deviation of the position controller is less than the value of this parameter, control loop parameter set 2 is used. Otherwise, control loop parameter set 1 is used.<br><br>The minimum value, the factory setting and the maximum value depend on the scaling factor.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.03. | usr_p<br><br>0<br><br>164<br><br>2147483647 | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3011:25$_h$<br><br>Modbus 4426<br><br>Profibus 4426<br><br>CIP 117.1.37<br><br>ModbusTCP 4426<br><br>EtherCAT 3011:25$_h$<br><br>PROFINET 4426 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CLSET_ParSwiCond* | Condition for parameter set switching.<br><br>**0 / None Or Digital Input**: None or digital input function selected<br><br>**1 / Inside Position Deviation**: Inside position deviation (value definition in parameter CLSET_p_DiffWin)<br><br>**2 / Below Reference Velocity**: Below reference velocity (value definition in parameter CLSET_v_Threshol)<br><br>**3 / Below Actual Velocity**: Below actual velocity (value definition in parameter CLSET_v_Threshol)<br><br>**4 / Reserved**: Reserved<br><br>In the case of parameter set switching, the values of the following parameters are changed gradually:<br><br>- CTRL_KPn<br><br>- CTRL_TNn<br><br>- CTRL_KPp<br><br>- CTRL_TAUnref<br><br>- CTRL_TAUiref<br><br>- CTRL_KFPp<br><br>The following parameters are changed immediately after the time for parameter set switching (CTRL_ParChgTime):<br><br>- CTRL_Nf1damp<br><br>- CTRL_Nf1freq<br><br>- CTRL_Nf1bandw<br><br>- CTRL_Nf2damp<br><br>- CTRL_Nf2freq<br><br>- CTRL_Nf2bandw<br><br>- CTRL_Osupdamp<br><br>- CTRL_Osupdelay<br><br>- CTRL_Kfric<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>4 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3011:1A$_h$<br><br>Modbus 4404<br><br>Profibus 4404<br><br>CIP 117.1.26<br><br>ModbusTCP 4404<br><br>EtherCAT 3011:1A$_h$<br><br>PROFINET 4404 |
| *CLSET_v_Threshol* | Velocity threshold for control loop parameter set switching.<br><br>If the reference velocity or the actual velocity are less than the value of this parameter, control loop parameter set 2 is used. Otherwise, control loop parameter set 1 is used.<br><br>Modified settings become active immediately. | usr_v<br><br>0<br><br>50<br><br>2147483647 | UINT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3011:1D$_h$<br><br>Modbus 4410<br><br>Profibus 4410<br><br>CIP 117.1.29<br><br>ModbusTCP 4410<br><br>EtherCAT 3011:1D$_h$<br><br>PROFINET 4410 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CLSET_winTime* | Time window for parameter set switching. Value 0: Window monitoring deactivated. Value >0: Window time for the parameters CLSET_v_Threshol and CLSET_p_DiffWin. Modified settings become active immediately. | ms 0 0 1000 | UINT16 R/W per. - | CANopen 3011:1B$_h$ Modbus 4406 Profibus 4406 CIP 117.1.27 ModbusTCP 4406 EtherCAT 3011:1B$_h$ PROFINET 4406 |
| *CommutCntCred* | Value for increased threshold for commutation monitoring. This parameter contains the value which is added to the threshold value for commutation monitoring. Setting can only be modified if power stage is disabled. Modified settings become active immediately. Available with firmware version ≥V01.30. | - 0 0 1000 | INT16 R/W per. expert | CANopen 3005:3E$_h$ Modbus 1404 Profibus 1404 CIP 105.1.62 ModbusTCP 1404 EtherCAT 3005:3E$_h$ PROFINET 1404 |
| *CommutCntMax* | Maximum value the commutation monitoring counter has reached. This parameter contains the maximum value the commutation monitoring counter has reached since power on or reset. The maximum value can be reset by writing the value 0. Available with firmware version ≥V01.30. | - - - - | INT16 R/W - expert | CANopen 303F:63$_h$ Modbus 16326 Profibus 16326 CIP 163.1.99 ModbusTCP 16326 EtherCAT 303F:63$_h$ PROFINET 16326 |
| *CTRL_GlobGain* o P → t u n - G A i n | Global gain factor (affects control loop parameter set 1). The global gain factor affects the following parameters of control loop parameter set 1: - CTRL_KPn - CTRL_TNn - CTRL_KPp - CTRL_TAUnref The global gain factor is set to 100% - if the control loop parameters are set to default - at the end of the Autotuning process - if control loop parameter set 2 is copied to set 1 via the parameter CTRL_ParSetCopy If a full configuration is transmitted via the fieldbus, the value for CTRL_GlobGain must be transmitted prior to the values of the control loop parameters CTRL_KPn, CTRL_TNn, CTRL_KPp and CTRL_TAUnref. If CTRL_GlobGain is changed during a configuration transmission, CTRL_KPn, CTRL_TNn, CTRL_KPp and CTRL_TAUnref must also be part of the configuration. In increments of 0.1 %. Modified settings become active immediately. | % 5.0 100.0 1000.0 | UINT16 R/W per. - | CANopen 3011:15$_h$ Modbus 4394 Profibus 4394 CIP 117.1.21 ModbusTCP 4394 EtherCAT 3011:15$_h$ PROFINET 4394 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CTRL_I_max*<br><br>$\mathcal{L}\,o\,n\,F \rightarrow d\,r\,\mathcal{L}\,-$<br><br>$\imath\,\mathcal{\Pi}\,\mathcal{H}\,\mathbf{x}$ | Current limitation.<br><br>During operation, the actual current limit is one of the following values (whichever is lowest):<br><br>- *CTRL_I_max*<br><br>- *_M_I_max*<br><br>- *_PS_I_max*<br><br>- Current limitation via analog input (module IOM1)<br><br>- Current limitation via digital input<br><br>Limitations caused by I2t monitoring are also taken into account.<br><br>Default: *_PS_I_max* at 8 kHz PWM frequency and 230/480 V mains voltage<br><br>In increments of 0.01 A$_{rms}$.<br><br>Modified settings become active immediately. | A$_{rms}$<br><br>0.00<br><br>-<br><br>463.00 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3011:C$_h$<br><br>Modbus 4376<br><br>Profibus 4376<br><br>CIP 117.1.12<br><br>ModbusTCP 4376<br><br>EtherCAT 3011:C$_h$<br><br>PROFINET 4376 |
| *CTRL_I_max_fw* | Maximum current for field weakening (d component).<br><br>This value is only limited by the minimum/maximum parameter range (no limitation of this value by motor/power stage).<br><br>The actually effective field weakening current is the minimum of CTRL_I_max_fw and one half of the lower value of the nominal current of the power stage and the motor.<br><br>In increments of 0.01 A$_{rms}$.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled. | A$_{rms}$<br><br>0.00<br><br>0.00<br><br>300.00 | UINT16<br><br>R/W<br><br>per.<br><br>expert | CANopen 3011:F$_h$<br><br>Modbus 4382<br><br>Profibus 4382<br><br>CIP 117.1.15<br><br>ModbusTCP 4382<br><br>EtherCAT 3011:F$_h$<br><br>PROFINET 4382 |
| *CTRL_KFAcc* | Acceleration feed-forward control.<br><br>In increments of 0.1 %.<br><br>Modified settings become active immediately. | %<br><br>0.0<br><br>0.0<br><br>3000.0 | UINT16<br><br>R/W<br><br>per.<br><br>expert | CANopen 3011:A$_h$<br><br>Modbus 4372<br><br>Profibus 4372<br><br>CIP 117.1.10<br><br>ModbusTCP 4372<br><br>EtherCAT 3011:A$_h$<br><br>PROFINET 4372 |
| *CTRL_ParChgTime* | Period of time for control loop parameter set switching.<br><br>In the case of control loop parameter set switching, the values of the following parameters are changed linearly:<br><br>- CTRL_KPn<br><br>- CTRL_TNn<br><br>- CTRL_KPp<br><br>- CTRL_TAUnref<br><br>- CTRL_TAUiref<br><br>- CTRL_KFPp<br><br>Modified settings become active immediately. | ms<br><br>0<br><br>0<br><br>2000 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3011:14$_h$<br><br>Modbus 4392<br><br>Profibus 4392<br><br>CIP 117.1.20<br><br>ModbusTCP 4392<br><br>EtherCAT 3011:14$_h$<br><br>PROFINET 4392 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CTRL_ParSetCopy* | Control loop parameter set copying. Value 1: Copy control loop parameter set 1 to set 2 Value 2: Copy control loop parameter set 2 to set 1 If control loop parameter set 2 is copied to control loop parameter set 1, the parameter CTRL_GlobGain is set to 100%. Modified settings become active immediately. | - 0.0 - 0.2 | UINT16 R/W - - | CANopen 3011:16$_h$ Modbus 4396 Profibus 4396 CIP 117.1.22 ModbusTCP 4396 EtherCAT 3011:16$_h$ PROFINET 4396 |
| *CTRL_PwrUpParSet* | Selection of control loop parameter set at power up. **0 / Switching Condition**: The switching condition is used for control loop parameter set switching **1 / Parameter Set 1**: Control loop parameter set 1 is used **2 / Parameter Set 2**: Control loop parameter set 2 is used The selected value is also written to CTRL_SelParSet (non-persistent). Modified settings become active immediately. | - 0 1 2 | UINT16 R/W per. - | CANopen 3011:18$_h$ Modbus 4400 Profibus 4400 CIP 117.1.24 ModbusTCP 4400 EtherCAT 3011:18$_h$ PROFINET 4400 |
| *CTRL_SelParSet* | Selection of control loop parameter set. Coding see parameter: CTRL_PwrUpParSet Modified settings become active immediately. | - 0 1 2 | UINT16 R/W - - | CANopen 3011:19$_h$ Modbus 4402 Profibus 4402 CIP 117.1.25 ModbusTCP 4402 EtherCAT 3011:19$_h$ PROFINET 4402 |
| *CTRL_SmoothCurr* | Smoothing factor for current controller. This parameter decreases the dynamics of the current control loop. Modified settings become active immediately. Available with firmware version ≥V01.26. | % 50 100 100 | UINT16 R/W per. - | CANopen 3011:26$_h$ Modbus 4428 Profibus 4428 CIP 117.1.38 ModbusTCP 4428 EtherCAT 3011:26$_h$ PROFINET 4428 |
| *CTRL_SpdFric* | Speed of rotation up to which the friction compensation is linear. Modified settings become active immediately. | RPM 0 5 20 | UINT32 R/W per. expert | CANopen 3011:9$_h$ Modbus 4370 Profibus 4370 CIP 117.1.9 ModbusTCP 4370 EtherCAT 3011:9$_h$ PROFINET 4370 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CTRL_TAUnact* | Filter time constant to smooth velocity of motor. The default value is calculated on the basis of the motor data. In increments of 0.01 ms. Modified settings become active immediately. | ms 0.00 - 30.00 | UINT16 R/W per. expert | CANopen 3011:8$_h$ Modbus 4368 Profibus 4368 CIP 117.1.8 ModbusTCP 4368 EtherCAT 3011:8$_h$ PROFINET 4368 |
| *CTRL_v_max* $\mathcal{C} o n F \rightarrow d r \mathcal{C} - n \mathcal{\Pi} \mathcal{A} X$ | Velocity limitation. During operation, the velocity limit is one of the following values (whichever is lowest): - CTRL_v_max - M_n_max - Velocity limitation via analog input (module IOM1) - Velocity limitation via digital input Modified settings become active immediately. | usr_v 1 13200 2147483647 | UINT32 R/W per. - | CANopen 3011:10$_h$ Modbus 4384 Profibus 4384 CIP 117.1.16 ModbusTCP 4384 EtherCAT 3011:10$_h$ PROFINET 4384 |
| *CTRL_VelObsActiv* | Activation of velocity observer. **0 / Velocity Observer Off**: Velocity observer is off **1 / Velocity Observer Passive**: Velocity observer is on, but not used for motor control **2 / Velocity Observer Active**: Velocity observer is on and used for motor control Velocity observer control reduces velocity ripple and enhances controller bandwidth. Set the correct dynamics and inertia values before activation. Setting can only be modified if power stage is disabled. Modified settings become active immediately. Available with firmware version ≥V01.01. | - 0 0 2 | UINT16 R/W per. expert | CANopen 3011:22$_h$ Modbus 4420 Profibus 4420 CIP 117.1.34 ModbusTCP 4420 EtherCAT 3011:22$_h$ PROFINET 4420 |
| *CTRL_VelObsDyn* | Dynamics of velocity observer. The value of this parameter must be less than (for example, between 5 % and 20 %) the integral action time of the velocity controller (parameter CTRL1_TNn und CTRL2_TNn). In increments of 0.01 ms. Setting can only be modified if power stage is disabled. Modified settings become active immediately. Available with firmware version ≥V01.01. | ms 0.03 0.25 200.00 | UINT16 R/W per. expert | CANopen 3011:23$_h$ Modbus 4422 Profibus 4422 CIP 117.1.35 ModbusTCP 4422 EtherCAT 3011:23$_h$ PROFINET 4422 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CTRL_VelObsInert* | Inertia value for velocity observer.<br><br>System inertia that is used for velocity observer calculations.<br><br>The default value is the inertia of the mounted motor.<br><br>In the case of autotuning, the value of this parameter can be set equal to that of _AT_J.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.01. | $g\ cm^2$<br>1<br>-<br>2147483648 | UINT32<br>R/W<br>per.<br>expert | CANopen 3011:24$_h$<br>Modbus 4424<br>Profibus 4424<br>CIP 117.1.36<br>ModbusTCP 4424<br>EtherCAT 3011:24$_h$<br>PROFINET 4424 |
| *CTRL_vPIDDPart* | PID velocity controller: D gain.<br><br>In increments of 0.1 %.<br><br>Modified settings become active immediately. | %<br>0.0<br>0.0<br>400.0 | UINT16<br>R/W<br>per.<br>expert | CANopen 3011:6$_h$<br>Modbus 4364<br>Profibus 4364<br>CIP 117.1.6<br>ModbusTCP 4364<br>EtherCAT 3011:6$_h$<br>PROFINET 4364 |
| *CTRL_vPIDDTime* | PID velocity controller: Time constant of D term smoothing filter.<br><br>In increments of 0.01 ms.<br><br>Modified settings become active immediately. | ms<br>0.01<br>0.25<br>10.00 | UINT16<br>R/W<br>per.<br>expert | CANopen 3011:5$_h$<br>Modbus 4362<br>Profibus 4362<br>CIP 117.1.5<br>ModbusTCP 4362<br>EtherCAT 3011:5$_h$<br>PROFINET 4362 |
| *CTRL1_KFPp*<br>ΓσnF → drΓ -<br>FPP1 | Velocity feed-forward control.<br><br>In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime.<br><br>In increments of 0.1 %.<br><br>Modified settings become active immediately. | %<br>0.0<br>0.0<br>200.0 | UINT16<br>R/W<br>per.<br>- | CANopen 3012:6$_h$<br>Modbus 4620<br>Profibus 4620<br>CIP 118.1.6<br>ModbusTCP 4620<br>EtherCAT 3012:6$_h$<br>PROFINET 4620 |
| *CTRL1_Kfric* | Friction compensation: Gain.<br><br>In increments of 0.01 $A_{rms}$.<br><br>Modified settings become active immediately. | $A_{rms}$<br>0.00<br>0.00<br>10.00 | UINT16<br>R/W<br>per.<br>expert | CANopen 3012:10$_h$<br>Modbus 4640<br>Profibus 4640<br>CIP 118.1.16<br>ModbusTCP 4640<br>EtherCAT 3012:10$_h$<br>PROFINET 4640 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CTRL1_KPn*<br><br>ConF → drC -<br><br>Pn1 | Velocity controller P gain.<br><br>The default value is calculated on the basis of the motor parameters.<br><br>In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime.<br><br>In increments of 0.0001 A/RPM.<br><br>Modified settings become active immediately. | A/RPM<br><br>0.0001<br><br>-<br><br>2.5400 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3012:1h<br><br>Modbus 4610<br><br>Profibus 4610<br><br>CIP 118.1.1<br><br>ModbusTCP 4610<br><br>EtherCAT 3012:1h<br><br>PROFINET 4610 |
| *CTRL1_KPp*<br><br>ConF → drC -<br><br>PP1 | Position controller P gain.<br><br>The default value is calculated.<br><br>In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime.<br><br>In increments of 0.1 1/s.<br><br>Modified settings become active immediately. | 1/s<br><br>2.0<br><br>-<br><br>900.0 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3012:3h<br><br>Modbus 4614<br><br>Profibus 4614<br><br>CIP 118.1.3<br><br>ModbusTCP 4614<br><br>EtherCAT 3012:3h<br><br>PROFINET 4614 |
| *CTRL1_Nf1bandw* | Notch filter 1: Bandwidth.<br><br>Definition of bandwidth: 1 - Fb/F0<br><br>In increments of 0.1 %.<br><br>Modified settings become active immediately. | %<br><br>1.0<br><br>70.0<br><br>90.0 | UINT16<br><br>R/W<br><br>per.<br><br>expert | CANopen 3012:Ah<br><br>Modbus 4628<br><br>Profibus 4628<br><br>CIP 118.1.10<br><br>ModbusTCP 4628<br><br>EtherCAT 3012:Ah<br><br>PROFINET 4628 |
| *CTRL1_Nf1damp* | Notch filter 1: Damping.<br><br>In increments of 0.1 %.<br><br>Modified settings become active immediately. | %<br><br>55.0<br><br>90.0<br><br>99.0 | UINT16<br><br>R/W<br><br>per.<br><br>expert | CANopen 3012:8h<br><br>Modbus 4624<br><br>Profibus 4624<br><br>CIP 118.1.8<br><br>ModbusTCP 4624<br><br>EtherCAT 3012:8h<br><br>PROFINET 4624 |
| *CTRL1_Nf1freq* | Notch filter 1: Frequency.<br><br>The filter is deactivated at a value of 15000.<br><br>In increments of 0.1 Hz.<br><br>Modified settings become active immediately. | Hz<br><br>50.0<br><br>1500.0<br><br>1500.0 | UINT16<br><br>R/W<br><br>per.<br><br>expert | CANopen 3012:9h<br><br>Modbus 4626<br><br>Profibus 4626<br><br>CIP 118.1.9<br><br>ModbusTCP 4626<br><br>EtherCAT 3012:9h<br><br>PROFINET 4626 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CTRL1_Nf2bandw* | Notch filter 2: Bandwidth. Definition of bandwidth: 1 - Fb/F0 In increments of 0.1 %. Modified settings become active immediately. | % 1.0 70.0 90.0 | UINT16 R/W per. expert | CANopen 3012:$D_h$ Modbus 4634 Profibus 4634 CIP 118.1.13 ModbusTCP 4634 EtherCAT 3012:$D_h$ PROFINET 4634 |
| *CTRL1_Nf2damp* | Notch filter 2: Damping. In increments of 0.1 %. Modified settings become active immediately. | % 55.0 90.0 99.0 | UINT16 R/W per. expert | CANopen 3012:$B_h$ Modbus 4630 Profibus 4630 CIP 118.1.11 ModbusTCP 4630 EtherCAT 3012:$B_h$ PROFINET 4630 |
| *CTRL1_Nf2freq* | Notch filter 2: Frequency. The filter is deactivated at a value of 15000. In increments of 0.1 Hz. Modified settings become active immediately. | Hz 50.0 1500.0 1500.0 | UINT16 R/W per. expert | CANopen 3012:$C_h$ Modbus 4632 Profibus 4632 CIP 118.1.12 ModbusTCP 4632 EtherCAT 3012:$C_h$ PROFINET 4632 |
| *CTRL1_Osupdamp* | Overshoot suppression filter: Damping. The filter is deactivated at a value of 0. In increments of 0.1 %. Modified settings become active immediately. | % 0.0 0.0 50.0 | UINT16 R/W per. expert | CANopen 3012:$E_h$ Modbus 4636 Profibus 4636 CIP 118.1.14 ModbusTCP 4636 EtherCAT 3012:$E_h$ PROFINET 4636 |
| *CTRL1_Osupdelay* | Overshoot suppression filter: Time delay. The filter is deactivated at a value of 0. In increments of 0.01 ms. Modified settings become active immediately. | ms 0.00 0.00 75.00 | UINT16 R/W per. expert | CANopen 3012:$F_h$ Modbus 4638 Profibus 4638 CIP 118.1.15 ModbusTCP 4638 EtherCAT 3012:$F_h$ PROFINET 4638 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| CTRL1_TAUiref | Filter time constant of the reference current value filter. In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime. In increments of 0.01 ms. Modified settings become active immediately. | ms 0.00 0.50 4.00 | UINT16 R/W per. - | CANopen 3012:5h Modbus 4618 Profibus 4618 CIP 118.1.5 ModbusTCP 4618 EtherCAT 3012:5h PROFINET 4618 |
| CTRL1_TAUnref $\mathsf{C o n F \to d r C -}$ $\mathsf{t A u\ 1}$ | Filter time constant of the reference velocity value filter. In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime. In increments of 0.01 ms. Modified settings become active immediately. | ms 0.00 9.00 327.67 | UINT16 R/W per. - | CANopen 3012:4h Modbus 4616 Profibus 4616 CIP 118.1.4 ModbusTCP 4616 EtherCAT 3012:4h PROFINET 4616 |
| CTRL1_TNn $\mathsf{C o n F \to d r C -}$ $\mathsf{t\ i n\ 1}$ | Velocity controller integral action time. The default value is calculated. In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime. In increments of 0.01 ms. Modified settings become active immediately. | ms 0.00 - 327.67 | UINT16 R/W per. - | CANopen 3012:2h Modbus 4612 Profibus 4612 CIP 118.1.2 ModbusTCP 4612 EtherCAT 3012:2h PROFINET 4612 |
| CTRL2_KFPp $\mathsf{C o n F \to d r C -}$ $\mathsf{F P P 2}$ | Velocity feed-forward control. In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime. In increments of 0.1 %. Modified settings become active immediately. | % 0.0 0.0 200.0 | UINT16 R/W per. - | CANopen 3013:6h Modbus 4876 Profibus 4876 CIP 119.1.6 ModbusTCP 4876 EtherCAT 3013:6h PROFINET 4876 |
| CTRL2_Kfric | Friction compensation: Gain. In increments of 0.01 $A_{rms}$. Modified settings become active immediately. | $A_{rms}$ 0.00 0.00 10.00 | UINT16 R/W per. expert | CANopen 3013:10h Modbus 4896 Profibus 4896 CIP 119.1.16 ModbusTCP 4896 EtherCAT 3013:10h PROFINET 4896 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| CTRL2_KPn <br> Conf → drC - Pn2 | Velocity controller P gain. <br><br> The default value is calculated on the basis of the motor parameters. <br><br> In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime. <br><br> In increments of 0.0001 A/RPM. <br><br> Modified settings become active immediately. | A/RPM <br><br> 0.0001 <br><br> - <br><br> 2.5400 | UINT16 <br><br> R/W <br><br> per. <br><br> - | CANopen 3013:1$_h$ <br> Modbus 4866 <br> Profibus 4866 <br> CIP 119.1.1 <br> ModbusTCP 4866 <br> EtherCAT 3013:1$_h$ <br> PROFINET 4866 |
| CTRL2_KPp <br> Conf → drC - PP2 | Position controller P gain. <br><br> The default value is calculated. <br><br> In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime. <br><br> In increments of 0.1 1/s. <br><br> Modified settings become active immediately. | 1/s <br><br> 2.0 <br><br> - <br><br> 900.0 | UINT16 <br><br> R/W <br><br> per. <br><br> - | CANopen 3013:3$_h$ <br> Modbus 4870 <br> Profibus 4870 <br> CIP 119.1.3 <br> ModbusTCP 4870 <br> EtherCAT 3013:3$_h$ <br> PROFINET 4870 |
| CTRL2_Nf1bandw | Notch filter 1: Bandwidth. <br><br> Definition of bandwidth: 1 - Fb/F0 <br><br> In increments of 0.1 %. <br><br> Modified settings become active immediately. | % <br><br> 1.0 <br><br> 70.0 <br><br> 90.0 | UINT16 <br><br> R/W <br><br> per. <br><br> expert | CANopen 3013:A$_h$ <br> Modbus 4884 <br> Profibus 4884 <br> CIP 119.1.10 <br> ModbusTCP 4884 <br> EtherCAT 3013:A$_h$ <br> PROFINET 4884 |
| CTRL2_Nf1damp | Notch filter 1: Damping. <br><br> In increments of 0.1 %. <br><br> Modified settings become active immediately. | % <br><br> 55.0 <br><br> 90.0 <br><br> 99.0 | UINT16 <br><br> R/W <br><br> per. <br><br> expert | CANopen 3013:8$_h$ <br> Modbus 4880 <br> Profibus 4880 <br> CIP 119.1.8 <br> ModbusTCP 4880 <br> EtherCAT 3013:8$_h$ <br> PROFINET 4880 |
| CTRL2_Nf1freq | Notch filter 1: Frequency. <br><br> The filter is deactivated at a value of 15000. <br><br> In increments of 0.1 Hz. <br><br> Modified settings become active immediately. | Hz <br><br> 50.0 <br><br> 1500.0 <br><br> 1500.0 | UINT16 <br><br> R/W <br><br> per. <br><br> expert | CANopen 3013:9$_h$ <br> Modbus 4882 <br> Profibus 4882 <br> CIP 119.1.9 <br> ModbusTCP 4882 <br> EtherCAT 3013:9$_h$ <br> PROFINET 4882 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CTRL2_Nf2bandw* | Notch filter 2: Bandwidth. Definition of bandwidth: 1 - Fb/F0 In increments of 0.1 %. Modified settings become active immediately. | % 1.0 70.0 90.0 | UINT16 R/W per. expert | CANopen 3013:$D_h$ Modbus 4890 Profibus 4890 CIP 119.1.13 ModbusTCP 4890 EtherCAT 3013:$D_h$ PROFINET 4890 |
| *CTRL2_Nf2damp* | Notch filter 2: Damping. In increments of 0.1 %. Modified settings become active immediately. | % 55.0 90.0 99.0 | UINT16 R/W per. expert | CANopen 3013:$B_h$ Modbus 4886 Profibus 4886 CIP 119.1.11 ModbusTCP 4886 EtherCAT 3013:$B_h$ PROFINET 4886 |
| *CTRL2_Nf2freq* | Notch filter 2: Frequency. The filter is deactivated at a value of 15000. In increments of 0.1 Hz. Modified settings become active immediately. | Hz 50.0 1500.0 1500.0 | UINT16 R/W per. expert | CANopen 3013:$C_h$ Modbus 4888 Profibus 4888 CIP 119.1.12 ModbusTCP 4888 EtherCAT 3013:$C_h$ PROFINET 4888 |
| *CTRL2_Osupdamp* | Overshoot suppression filter: Damping. The filter is deactivated at a value of 0. In increments of 0.1 %. Modified settings become active immediately. | % 0.0 0.0 50.0 | UINT16 R/W per. expert | CANopen 3013:$E_h$ Modbus 4892 Profibus 4892 CIP 119.1.14 ModbusTCP 4892 EtherCAT 3013:$E_h$ PROFINET 4892 |
| *CTRL2_Osupdelay* | Overshoot suppression filter: Time delay. The filter is deactivated at a value of 0. In increments of 0.01 ms. Modified settings become active immediately. | ms 0.00 0.00 75.00 | UINT16 R/W per. expert | CANopen 3013:$F_h$ Modbus 4894 Profibus 4894 CIP 119.1.15 ModbusTCP 4894 EtherCAT 3013:$F_h$ PROFINET 4894 |

| Parameter name / HMI menu / HMI name | Description | Unit / Minimum value / Factory setting / Maximum value | Data type / R/W / Persistent / Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *CTRL2_TAUiref* | Filter time constant of the reference current value filter. <br><br>In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime. <br><br>In increments of 0.01 ms. <br><br>Modified settings become active immediately. | ms <br> 0.00 <br> 0.50 <br> 4.00 | UINT16 <br> R/W <br> per. <br> - | CANopen 3013:5$_h$ <br> Modbus 4874 <br> Profibus 4874 <br> CIP 119.1.5 <br> ModbusTCP 4874 <br> EtherCAT 3013:5$_h$ <br> PROFINET 4874 |
| *CTRL2_TAUnref* <br> ⌐ o n F → d ⊓ ⌐ - <br> ⊢ A ⌐ 2 | Filter time constant of the reference velocity value filter. <br><br>In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime. <br><br>In increments of 0.01 ms. <br><br>Modified settings become active immediately. | ms <br> 0.00 <br> 9.00 <br> 327.67 | UINT16 <br> R/W <br> per. <br> - | CANopen 3013:4$_h$ <br> Modbus 4872 <br> Profibus 4872 <br> CIP 119.1.4 <br> ModbusTCP 4872 <br> EtherCAT 3013:4$_h$ <br> PROFINET 4872 |
| *CTRL2_TNn* <br> ⌐ o n F → d ⊓ ⌐ - <br> ⊢ ⌐ n 2 | Velocity controller integral action time. <br><br>The default value is calculated. <br><br>In the case of switching between the two control loop parameter sets, the values are changed linearly over the time defined in the parameter CTRL_ParChgTime. <br><br>In increments of 0.01 ms. <br><br>Modified settings become active immediately. | ms <br> 0.00 <br> - <br> 327.67 | UINT16 <br> R/W <br> per. <br> - | CANopen 3013:2$_h$ <br> Modbus 4868 <br> Profibus 4868 <br> CIP 119.1.2 <br> ModbusTCP 4868 <br> EtherCAT 3013:2$_h$ <br> PROFINET 4868 |
| *DCbus_compat* | DC bus compatibility LXM32 and ATV32. <br><br>**0 / No DC bus or LXM32 only**: DC bus not used or only LXM32 connected via the DC bus <br><br>**1 / DC bus with LXM32 and ATV32**: LXM32 and ATV32 connected via the DC bus <br><br>Setting can only be modified if power stage is disabled. <br><br>Modified settings become active the next time the product is powered on. <br><br>Available with firmware version ≥V01.03. | - <br> 0 <br> 0 <br> 1 | UINT16 <br> R/W <br> per. <br> - | CANopen 3005:26$_h$ <br> Modbus 1356 <br> Profibus 1356 <br> CIP 105.1.38 <br> ModbusTCP 1356 <br> EtherCAT 3005:26$_h$ <br> PROFINET 1356 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *DCOMcontrol* | DriveCom control word. See Operation, Operating States, for bit assignment information. Bit 0: Operating state Switch On Bit 1: Enable Voltage Bit 2: Operating state Quick Stop Bit 3: Enable Operation Bits 4 … 6: Operating mode-specific Bit 7: Fault Reset Bit 8: Halt Bit 9: Operating mode-specific Bits 10 … 15: Reserved (must be 0) Modified settings become active immediately. | - - - - | UINT16 R/W - - | CANopen 6040:0$_h$ Modbus 6914 Profibus 6914 CIP 127.1.1 ModbusTCP 6914 EtherCAT 6040:0$_h$ PROFINET 6914 |
| *DCOMopmode* | Operating mode. **-6 / Manual Tuning / Autotuning**: Manual Tuning or Autotuning **-3 / Motion Sequence**: Motion Sequence **-2 / Electronic Gear**: Electronic Gear **-1 / Jog**: Jog **0 / Reserved**: Reserved **1 / Profile Position**: Profile Position **3 / Profile Velocity**: Profile Velocity **4 / Profile Torque**: Profile Torque **6 / Homing**: Homing **7 / Interpolated Position**: Interpolated Position **8 / Cyclic Synchronous Position**: Cyclic Synchronous Position **9 / Cyclic Synchronous Velocity**: Cyclic Synchronous Velocity **10 / Cyclic Synchronous Torque**: Cyclic Synchronous Torque Modified settings become active immediately. * Datatype for CANopen: INT8 | - -6 - 10 | INT16* R/W - - | CANopen 6060:0$_h$ Modbus 6918 Profibus 6918 CIP 127.1.3 ModbusTCP 6918 EtherCAT 6060:0$_h$ PROFINET 6918 |
| *DEVcmdinterf* $\mathsf{C o n F} \to \mathsf{A C G -}$ $\mathsf{n o n E}$ $\mathsf{d E V C}$ | Control mode. **1 / Local Control Mode / $\mathsf{i o}$**: Local control mode **2 / Fieldbus Control Mode / $\mathsf{F b u S}$**: Fieldbus control mode Setting can only be modified if power stage is disabled. Modified settings become active the next time the product is powered on. | - - - - | UINT16 R/W per. - | CANopen 3005:1$_h$ Modbus 1282 Profibus 1282 CIP 105.1.1 ModbusTCP 1282 EtherCAT 3005:1$_h$ PROFINET 1282 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *DevNameExtAddr* ⌐ ⌐ ⌐ F → ⌐ ⌐ Π - d n E A | Value for device name extension. Modified settings become active the next time the product is powered on. | - 0 0 65535 | UINT16 R/W per. - | CANopen 303E:11$_h$ Modbus 15906 Profibus 15906 CIP 162.1.17 ModbusTCP 15906 EtherCAT 303E:11$_h$ PROFINET 15906 |
| *DI_0_Debounce* | Debounce time of DI0. **0 / No**: No software debouncing **1 / 0.25 ms**: 0.25 ms **2 / 0.50 ms**: 0.50 ms **3 / 0.75 ms**: 0.75 ms **4 / 1.00 ms**: 1.00 ms **5 / 1.25 ms**: 1.25 ms **6 / 1.50 ms**: 1.50 ms Setting can only be modified if power stage is disabled. Modified settings become active immediately. | - 0 6 6 | UINT16 R/W per. - | CANopen 3008:20$_h$ Modbus 2112 Profibus 2112 CIP 108.1.32 ModbusTCP 2112 EtherCAT 3008:20$_h$ PROFINET 2112 |
| *DI_1_Debounce* | Debounce time of DI1. **0 / No**: No software debouncing **1 / 0.25 ms**: 0.25 ms **2 / 0.50 ms**: 0.50 ms **3 / 0.75 ms**: 0.75 ms **4 / 1.00 ms**: 1.00 ms **5 / 1.25 ms**: 1.25 ms **6 / 1.50 ms**: 1.50 ms Setting can only be modified if power stage is disabled. Modified settings become active immediately. | - 0 6 6 | UINT16 R/W per. - | CANopen 3008:21$_h$ Modbus 2114 Profibus 2114 CIP 108.1.33 ModbusTCP 2114 EtherCAT 3008:21$_h$ PROFINET 2114 |
| *DI_2_Debounce* | Debounce time of DI2. **0 / No**: No software debouncing **1 / 0.25 ms**: 0.25 ms **2 / 0.50 ms**: 0.50 ms **3 / 0.75 ms**: 0.75 ms **4 / 1.00 ms**: 1.00 ms **5 / 1.25 ms**: 1.25 ms **6 / 1.50 ms**: 1.50 ms Setting can only be modified if power stage is disabled. Modified settings become active immediately. | - 0 6 6 | UINT16 R/W per. - | CANopen 3008:22$_h$ Modbus 2116 Profibus 2116 CIP 108.1.34 ModbusTCP 2116 EtherCAT 3008:22$_h$ PROFINET 2116 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *DI_3_Debounce* | Debounce time of DI3.<br><br>**0 / No**: No software debouncing<br><br>**1 / 0.25 ms**: 0.25 ms<br><br>**2 / 0.50 ms**: 0.50 ms<br><br>**3 / 0.75 ms**: 0.75 ms<br><br>**4 / 1.00 ms**: 1.00 ms<br><br>**5 / 1.25 ms**: 1.25 ms<br><br>**6 / 1.50 ms**: 1.50 ms<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>6<br><br>6 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3008:23$_h$<br><br>Modbus 2118<br><br>Profibus 2118<br><br>CIP 108.1.35<br><br>ModbusTCP 2118<br><br>EtherCAT 3008:23$_h$<br><br>PROFINET 2118 |
| *DI_4_Debounce* | Debounce time of DI4.<br><br>**0 / No**: No software debouncing<br><br>**1 / 0.25 ms**: 0.25 ms<br><br>**2 / 0.50 ms**: 0.50 ms<br><br>**3 / 0.75 ms**: 0.75 ms<br><br>**4 / 1.00 ms**: 1.00 ms<br><br>**5 / 1.25 ms**: 1.25 ms<br><br>**6 / 1.50 ms**: 1.50 ms<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>6<br><br>6 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3008:24$_h$<br><br>Modbus 2120<br><br>Profibus 2120<br><br>CIP 108.1.36<br><br>ModbusTCP 2120<br><br>EtherCAT 3008:24$_h$<br><br>PROFINET 2120 |
| *DI_5_Debounce* | Debounce time of DI5.<br><br>**0 / No**: No software debouncing<br><br>**1 / 0.25 ms**: 0.25 ms<br><br>**2 / 0.50 ms**: 0.50 ms<br><br>**3 / 0.75 ms**: 0.75 ms<br><br>**4 / 1.00 ms**: 1.00 ms<br><br>**5 / 1.25 ms**: 1.25 ms<br><br>**6 / 1.50 ms**: 1.50 ms<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>6<br><br>6 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3008:25$_h$<br><br>Modbus 2122<br><br>Profibus 2122<br><br>CIP 108.1.37<br><br>ModbusTCP 2122<br><br>EtherCAT 3008:25$_h$<br><br>PROFINET 2122 |
| *DPL_Activate* | Activation of Drive Profile Lexium.<br><br>Value 0: Deactivate Drive Profile Lexium<br><br>Value 1: Activate Drive Profile Lexium<br><br>The access channel via which the drive profile has been activated is the only access channel that can use the drive profile.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 301B:8$_h$<br><br>Modbus 6928<br><br>Profibus 6928<br><br>CIP 127.1.8<br><br>ModbusTCP 6928<br><br>EtherCAT 301B:8$_h$<br><br>PROFINET 6928 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *DPL_dmControl* | Drive Profile Lexium dmControl. | - - - - | UINT16 R/W - - | CANopen 301B:1F<sub>h</sub> Modbus 6974 Profibus 6974 CIP 127.1.31 ModbusTCP 6974 EtherCAT 301B:1F<sub>h</sub> PROFINET 6974 |
| *DPL_intLim* | Setting for bit 9 of _DPL_motionStat and _actionStatus. **0 / None**: Not used (reserved) **1 / Current Below Threshold**: Current threshold value **2 / Velocity Below Threshold**: Velocity threshold value **3 / In Position Deviation Window**: Position deviation window **4 / In Velocity Deviation Window**: Velocity deviation window **5 / Position Register Channel 1**: Position register channel 1 **6 / Position Register Channel 2**: Position register channel 2 **7 / Position Register Channel 3**: Position register channel 3 **8 / Position Register Channel 4**: Position register channel 4 **9 / Hardware Limit Switch**: Hardware limit switch **10 / RMAC active or finished**: Relative movement after capture is active or finished **11 / Position Window**: Position window Setting for: Bit 9 of the parameter _actionStatus Bit 9 of the parameter _DPL_motionStat Modified settings become active immediately. Available with firmware version ≥V01.08. | - 0 11 11 | UINT16 R/W per. - | CANopen 301B:35<sub>h</sub> Modbus 7018 Profibus 7018 CIP 127.1.53 ModbusTCP 7018 EtherCAT 301B:35<sub>h</sub> PROFINET 7018 |
| *DPL_RefA16* | Drive Profile Lexium RefA16. | - - - - | INT16 R/W - - | CANopen 301B:22<sub>h</sub> Modbus 6980 Profibus 6980 CIP 127.1.34 ModbusTCP 6980 EtherCAT 301B:22<sub>h</sub> PROFINET 6980 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *DPL_RefA32* | Drive Profile Lexium RefA32. | -<br>-<br>-<br>- | INT32<br>R/W<br>-<br>- | CANopen 301B:20$_h$<br>Modbus 6976<br>Profibus 6976<br>CIP 127.1.32<br>ModbusTCP 6976<br>EtherCAT 301B:20$_h$<br>PROFINET 6976 |
| *DPL_RefB32* | Drive Profile Lexium RefB32. | -<br>-<br>-<br>- | INT32<br>R/W<br>-<br>- | CANopen 301B:21$_h$<br>Modbus 6978<br>Profibus 6978<br>CIP 127.1.33<br>ModbusTCP 6978<br>EtherCAT 301B:21$_h$<br>PROFINET 6978 |
| *DplParChCheckData-Typ* | Drive Profile Lexium: Data type verification for write access.<br><br>**0 / Data Type Verification Off**: Data type verification for write access is off<br><br>**1 / Data Type Verification On**: Data type verification for write access is on<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.26. | -<br>0<br>0<br>1 | UINT16<br>R/W<br>per.<br>- | CANopen 3005:39$_h$<br>Modbus 1394<br>Profibus 1394<br>CIP 105.1.57<br>ModbusTCP 1394<br>EtherCAT 3005:39$_h$<br>PROFINET 1394 |
| *DS402compatib* | DS402 state machine: State transition from 3 to 4.<br><br>**0 / Automatic**: Automatic (state transition is performed automatically)<br><br>**1 / DS402-compliant**: DS402-compliant (state transition must be controlled via the fieldbus)<br><br>Determines the state transition between the states SwitchOnDisabled (3) and ReadyToSwitchOn (4).<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately. | -<br>0<br>0<br>1 | UINT16<br>R/W<br>per.<br>- | CANopen 301B:13$_h$<br>Modbus 6950<br>Profibus 6950<br>CIP 127.1.19<br>ModbusTCP 6950<br>EtherCAT 301B:13$_h$<br>PROFINET 6950 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *DS402intLim* | DS402 status word: Setting for bit 11 (internal limit). **0 / None**: Not used (reserved) **1 / Current Below Threshold**: Current threshold value **2 / Velocity Below Threshold**: Velocity threshold value **3 / In Position Deviation Window**: Position deviation window **4 / In Velocity Deviation Window**: Velocity deviation window **5 / Position Register Channel 1**: Position register channel 1 **6 / Position Register Channel 2**: Position register channel 2 **7 / Position Register Channel 3**: Position register channel 3 **8 / Position Register Channel 4**: Position register channel 4 **9 / Hardware Limit Switch**: Hardware limit switch **10 / RMAC active or finished**: Relative movement after capture is active or finished **11 / Position Window**: Position window Setting for: Bit 11 of the parameter _DCOMstatus Bit 10 of the parameter _actionStatus Bit 10 of the parameter _DPL_motionStat Modified settings become active immediately. | - 0 0 11 | UINT16 R/W per. - | CANopen 301B:1E$_h$ Modbus 6972 Profibus 6972 CIP 127.1.30 ModbusTCP 6972 EtherCAT 301B:1E$_h$ PROFINET 6972 |
| *DSM_ ShutDownOption* $\text{ConF} \to \text{ACG-} \text{SdtY}$ | Behavior for disabling the power stage during movement. **0 / Disable Immediately / $diSi$**: Disable power stage immediately **1 / Disable After Halt / $diSh$**: Disable power stage after deceleration to standstill This parameter specifies the response to a power stage disable request. Halt is used for deceleration to standstill. Modified settings become active immediately. Available with firmware version ≥V01.26. | - 0 0 1 | INT16 R/W per. - | CANopen 605B:0$_h$ Modbus 1684 Profibus 1684 CIP 106.1.74 ModbusTCP 1684 EtherCAT 605B:0$_h$ PROFINET 1684 |
| *DVNaddress* $\text{ConF} \to \text{ConN-} \text{dnAd}$ | DeviceNet node address (MAC ID). Modified settings become active the next time the product is powered on. | - 0 63 63 | UINT16 R/W per. - | CANopen 3042:1$_h$ Modbus 16898 Profibus 16898 CIP 166.1.1 ModbusTCP 16898 EtherCAT 3042:1$_h$ PROFINET 16898 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *DVNbaud*  ⊏ ⊓ ⊢ → ⊏ ⊐ Π - ⊐ ⊓ ⊢ ⊐ | DeviceNet baud rate.  **0 / 125 kBaud / ⌐ ⌐ ⌐**: 125 kBaud  **1 / 250 kBaud / ⌐ ⌐ ⌐**: 250 kBaud  **2 / 500 kBaud / ⌐ ⌐ ⌐**: 500 kBaud  **3 / Autobaud / ⌐ ⌐ ⌐ ⌐**: Autobaud  Modified settings become active the next time the product is powered on. | -  0  3  3 | UINT16  R/W  per.  - | CANopen 3042:2ₕ  Modbus 16900  Profibus 16900  CIP 166.1.2  ModbusTCP 16900  EtherCAT 3042:2ₕ  PROFINET 16900 |
| *DVNbuspower* | Monitoring of DeviceNet bus power supply.  **0 / Off**: Monitoring off  **1 / On**: Monitoring on  Modified settings become active immediately. | -  0  1  1 | UINT16  R/W  per.  - | CANopen 3042:3ₕ  Modbus 16902  Profibus 16902  CIP 166.1.3  ModbusTCP 16902  EtherCAT 3042:3ₕ  PROFINET 16902 |
| *DVNioDataIn* | DeviceNet I/O data input.  **110 / Position Controller Profile**: Position Controller Profile  **111 / Standard Assembly**: Standard assembly  **112 / Extended Assembly**: Extended assembly  Setting can only be modified if power stage is disabled.  Modified settings become active the next time the product is powered on. | -  110  110  112 | UINT16  R/W  per.  - | CANopen 3042:4ₕ  Modbus 16904  Profibus 16904  CIP 166.1.4  ModbusTCP 16904  EtherCAT 3042:4ₕ  PROFINET 16904 |
| *DVNioDataOut* | DeviceNet I/O data output.  **100 / Position Controller Profile**: Position Controller Profile  **101 / Standard Assembly**: Standard assembly  **102 / Extended Assembly**: Extended assembly  Setting can only be modified if power stage is disabled.  Modified settings become active the next time the product is powered on. | -  100  100  102 | UINT16  R/W  per.  - | CANopen 3042:5ₕ  Modbus 16906  Profibus 16906  CIP 166.1.5  ModbusTCP 16906  EtherCAT 3042:5ₕ  PROFINET 16906 |
| *ECAT2ndaddress*  ⊏ ⊓ ⊢ → ⊏ ⊐ Π - ⊢ ⊏ ⊢ ⊣ | Value for an EtherCAT Identification.  Value for an EtherCAT "Identification" (also known as "Station Alias"), for example, for the EtherCAT function Hot Connect.  Modified settings become active the next time the product is powered on. | -  0  0  65535 | UINT16  R/W  per.  - | CANopen 3045:6ₕ  Modbus 17676  Profibus 17676  CIP 169.1.6  ModbusTCP 17676  EtherCAT 3045:6ₕ  PROFINET 17676 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *ENC_abs_source* | Source for setting absolute encoder position.<br><br>**0 / Encoder 1**: Absolute position determined from encoder 1<br><br>**1 / Encoder 2 (module)**: Absolute position determined from encoder 2 (module)<br><br>This parameter defines the encoder source which is used to determine the base absolute position after power cycling. If this is set to Encoder 1, the absolute position from encoder 1 is read and copied to the system values of encoder 2.<br><br>Modified settings become active the next time the product is powered on. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3005:25h<br><br>Modbus 1354<br><br>Profibus 1354<br><br>CIP 105.1.37<br><br>ModbusTCP 1354<br><br>EtherCAT 3005:25h<br><br>PROFINET 1354 |
| *ENC_ModeOfMaEnc* | Selection of mode of machine encoder.<br><br>**0 / None**: Machine encoder is not used for motor control<br><br>**1 / Position Control**: Machine encoder is used for position control<br><br>**2 / Velocity And Position Control**: Machine encoder is used for velocity and position control<br><br>It is not possible to use the machine encoder for velocity control and the motor encoder for position control.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled. | -<br><br>0<br><br>1<br><br>2 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3050:2h<br><br>Modbus 20484<br><br>Profibus 20484<br><br>CIP 180.1.2<br><br>ModbusTCP 20484<br><br>EtherCAT 3050:2h<br><br>PROFINET 20484 |
| *ENC1_adjustment* | Adjustment of absolute position of encoder 1.<br><br>The value range depends on the encoder type.<br><br>Singleturn encoder:<br><br>0 ... x-1<br><br>Multiturn encoder:<br><br>0 ... (4096*x)-1<br><br>Singleturn encoder (shifted with parameter *ShiftEncWorkRang*):<br><br>-(x/2) ... (x/2)-1<br><br>Multiturn encoder (shifted with parameter *ShiftEncWorkRang*):<br><br>-(2048*x) ... (2048*x)-1<br><br>Definition of 'x': Maximum position for one encoder turn in user-defined units. This value is 16384 with the default scaling.<br><br>If processing is to be performed with inversion of the direction of movement, this must be set before the encoder position is adjusted.<br><br>After the write access, a wait time of at least 1 second is required before the drive can be powered off.<br><br>Modified settings become active the next time the product is powered on. | usr_p<br><br>-<br><br>-<br><br>- | INT32<br><br>R/W<br><br>-<br><br>- | CANopen 3005:16h<br><br>Modbus 1324<br><br>Profibus 1324<br><br>CIP 105.1.22<br><br>ModbusTCP 1324<br><br>EtherCAT 3005:16h<br><br>PROFINET 1324 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address<br>via fieldbus |
|---|---|---|---|---|
| *ENC2_adjustment* | Adjustment of absolute position of encoder 2.<br><br>The value range depends on the encoder type at the physical port ENC2.<br><br>This parameter can only be changed if the parameter *ENC_abs_source* is set to 'Encoder 2'.<br><br>Singleturn encoder:<br><br>0 … x-1<br><br>Multiturn encoder:<br><br>0 … (y*x)-1<br><br>Singleturn encoder (shifted with parameter *ShiftEncWorkRang*):<br><br>-(x/2) … (x/2)-1<br><br>Multiturn encoder (shifted with parameter *ShiftEncWorkRang*):<br><br>-(y/2)*x … ((y/2)*x)-1<br><br>Definition of 'x': Maximum position for one encoder turn in user-defined units. This value is 16384 with the default scaling.<br><br>Definition of 'y': Revolutions of the multiturn encoder.<br><br>If processing is to be performed with inversion of the direction of movement, this must be set before the encoder position is adjusted.<br><br>After the write access, a wait time of at least 1 second is required before the drive can be powered off.<br><br>Modified settings become active the next time the product is powered on.<br><br>Available with firmware version ≥V01.01. | usr_p<br><br>-<br><br>-<br><br>- | INT32<br><br>R/W<br><br>-<br><br>- | CANopen 3005:24$_h$<br><br>Modbus 1352<br><br>Profibus 1352<br><br>CIP 105.1.36<br><br>ModbusTCP 1352<br><br>EtherCAT 3005:24$_h$<br><br>PROFINET 1352 |
| *ENC2_type* | Type of encoder at encoder 2 (module).<br><br>**0 / None**: Undefined<br><br>**1 / SinCos Hiperface (rotary)**: SinCos Hiperface (rotary)<br><br>**2 / SinCos 1Vpp (rotary)**: SinCos 1Vpp (rotary)<br><br>**3 / Sincos 1Vpp Hall (rotary)**: SinCos 1Vpp Hall (rotary)<br><br>**5 / EnDat 2.2 (rotary)**: EnDat 2.2 (rotary)<br><br>**6 / Resolver**: Resolver<br><br>**8 / BiSS**: BiSS<br><br>**9 / A/B/I (rotary)**: A/B/I (rotary)<br><br>**10 / SSI (rotary)**: SSI (rotary)<br><br>**257 / SinCos Hiperface (linear)**: SinCos Hiperface (linear)<br><br>**258 / SinCos 1Vpp (linear)**: SinCos 1Vpp (linear)<br><br>**259 / SinCos 1Vpp Hall (linear)**: SinCos 1Vpp Hall (linear)<br><br>**261 / EnDat 2.2 (linear)**: EnDat 2.2 (linear)<br><br>**265 / A/B/I (linear)**: A/B/I (linear) | -<br><br>0<br><br>0<br><br>266 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3050:3$_h$<br><br>Modbus 20486<br><br>Profibus 20486<br><br>CIP 180.1.3<br><br>ModbusTCP 20486<br><br>EtherCAT 3050:3$_h$<br><br>PROFINET 20486 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **266 / SSI (linear)**: SSI (linear) Setting can only be modified if power stage is disabled. Modified settings become active the next time the product is powered on. | | | |
| *ENC2_usage* | Type of usage of encoder 2 (module). **0 / None**: Undefined **1 / Motor**: Configured as motor encoder **2 / Machine**: Configured as machine encoder If the parameter is set to "Motor", encoder 1 has no functionality. Setting can only be modified if power stage is disabled. Modified settings become active the next time the product is powered on. | - 0 0 2 | UINT16 R/W per. - | CANopen 3050:1$_h$ Modbus 20482 Profibus 20482 CIP 180.1.1 ModbusTCP 20482 EtherCAT 3050:1$_h$ PROFINET 20482 |
| *ENCAnaPowSupply* | Power supply encoder module ANA (analog interface). **5 / 5V**: 5 V supply voltage **12 / 12V**: 12 V supply voltage Power supply of the analog encoder only if the encoder is used as a machine encoder supplying 1Vpp encoder signals. This parameter is not used for Hiperface encoders. Hiperface encoders are supplied with 12 V. Setting can only be modified if power stage is disabled. Modified settings become active the next time the product is powered on. Available with firmware version ≥V01.01. | - 5 5 12 | UINT16 R/W per. - | CANopen 3051:2$_h$ Modbus 20740 Profibus 20740 CIP 181.1.2 ModbusTCP 20740 EtherCAT 3051:2$_h$ PROFINET 20740 |
| *ENCDigABIMaxFreq* | ABI maximum frequency. The maximum possible ABI frequency is encoder-specific (specified by the encoder manufacturer). The encoder module DIG supports a maximum ABI frequency of 1 MHz (this is the default and maximum value of ENCDigABIMaxFreq). An ABI frequency of 1 MHz means that there are 4000000 encoder increments in 1 second. Setting can only be modified if power stage is disabled. Modified settings become active the next time the product is powered on. Available with firmware version ≥V01.01. | kHz 1 1000 1000 | UINT16 R/W per. - | CANopen 3052:6$_h$ Modbus 21004 Profibus 21004 CIP 182.1.6 ModbusTCP 21004 EtherCAT 3052:6$_h$ PROFINET 21004 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *ENCDigABImaxIx* | ABI maximum distance for index pulse search.<br><br>In the case of a reference movement to the index pulse, ENCDigABImaxIx contains the maximum distance within which the index pulse must be found. If no physical index pulse is found over this range, an error message is generated.<br><br>Example: A rotary ABI encoder with one index pulse per revolution is connected. The resolution of the encoder is 8000 encoder increments per revolution (this value can be determined using parameter _Inc_Enc2Raw. _Inc_Enc2Raw and ENCDigABImaxIx have the same scaling). The maximum distance necessary for a reference movement to the index pulse is one revolution. This means that ENCDigABImaxIx should be set to 8000. Internally, a tolerance of 10% is added. This means that during a reference movement to the index pulse, an index pulse must be found within 8800 encoder increments.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.01. | EncInc<br>1<br>10000<br>2147483647 | INT32<br>R/W<br>per.<br>- | CANopen 3052:7$_h$<br>Modbus 21006<br>Profibus 21006<br>CIP 182.1.7<br>ModbusTCP 21006<br>EtherCAT 3052:7$_h$<br>PROFINET 21006 |
| *ENCDigBISSCoding* | Position coding of BiSS encoder.<br><br>**0 / binary**: Binary coding<br><br>**1 / gray**: Gray coding<br><br>This parameter defines the type of position coding of the BiSS encoder.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on.<br><br>Available with firmware version ≥V01.01. | -<br>0<br>0<br>1 | UINT16<br>R/W<br>per.<br>- | CANopen 3052:A$_h$<br>Modbus 21012<br>Profibus 21012<br>CIP 182.1.10<br>ModbusTCP 21012<br>EtherCAT 3052:A$_h$<br>PROFINET 21012 |
| *ENCDigBISSResMul* | BiSS multiturn resolution.<br><br>This parameter is only relevant for BiSS encoders (singleturn and multiturn). If a singleturn BiSS encoder is used, ENCDigBISSResMult must be set to 0.<br><br>Example: If ENCDigBISSResMult is set to 12, the number of turns of the encoder used must be 2^12 = 4096.<br><br>The sum of ENCDigBISSResMult + ENCDigBISSResSgl must be less than or equal to 46 bits.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on.<br><br>Available with firmware version ≥V01.01. | bit<br>0<br>0<br>24 | UINT16<br>R/W<br>per.<br>- | CANopen 3052:9$_h$<br>Modbus 21010<br>Profibus 21010<br>CIP 182.1.9<br>ModbusTCP 21010<br>EtherCAT 3052:9$_h$<br>PROFINET 21010 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *ENCDigBISSResSgl* | BiSS singleturn resolution.<br><br>This parameter is only relevant for BiSS encoders (singleturn and multiturn).<br><br>Example: If ENCDigBISSResSgl is set to 13, an BiSS encoder with a singleturn resolution of 2^13 = 8192 increments must be used.<br><br>If a multiturn encoder is used, the sum of ENCDigBISSResMult + ENCDigBISSResSgl must be less than or equal to 46 bits.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on.<br><br>Available with firmware version ≥V01.01. | bit<br><br>8<br><br>13<br><br>25 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3052:8$_h$<br><br>Modbus 21008<br><br>Profibus 21008<br><br>CIP 182.1.8<br><br>ModbusTCP 21008<br><br>EtherCAT 3052:8$_h$<br><br>PROFINET 21008 |
| *ENCDigEnDatBits* | Evaluation of bits of EnDat 2.2 encoders with more than 32 bits.<br><br>**0 / Evaluate32MostSignificantBits**: Evaluate the 32 most significant bits (MSB)<br><br>**1 / Evaluate32LeastSignificantBits**: Evaluate the 32 least significant bits (LSB)<br><br>This parameter specifies the way the bits provided by EnDat 2.2 encoders with more than 32 bits are evaluated. The parameter specifies whether the 32 most significant bits (MSB) or the 32 least significant bits (LSB) are evaluated.<br><br>If the 32 most significant bits are evaluated, the entire working range of the encoder is available. The resolution is reduced.<br><br>If the 32 least significant bits are evaluated, the entire resolution of the encoder is available. The working range is reduced.<br><br>Example for an EnDat 2.2 encoder with 36 bits:<br><br>Value 0: Bits 4 to 35 are evaluated.<br><br>Value 1: Bits 0 to 31 are evaluated.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on.<br><br>Available with firmware version ≥V01.32. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3052:F$_h$<br><br>Modbus 21022<br><br>Profibus 21022<br><br>CIP 182.1.15<br><br>ModbusTCP 21022<br><br>EtherCAT 3052:F$_h$<br><br>PROFINET 21022 |
| *ENCDigLinBitsUsed* | Linear encoder: Number of bits of the position resolution used.<br><br>Specifies the number of bits of the position resolution used for position evaluation.<br><br>If ENCDigLinBitsUsed = 0, all position bits of the position resolution of the encoder are used.<br><br>Example:<br><br>If ENCDigLinBitsUsed = 22, only 22 bits of the position resolution of the encoder are used.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on.<br><br>Available with firmware version ≥V01.26. | bit<br><br>0<br><br>0<br><br>31 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3052:E$_h$<br><br>Modbus 21020<br><br>Profibus 21020<br><br>CIP 182.1.14<br><br>ModbusTCP 21020<br><br>EtherCAT 3052:E$_h$<br><br>PROFINET 21020 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *ENCDigPowSupply* | Power supply encoder module DIG (digital interface). **5 / 5V**: 5 V supply voltage **12 / 12V**: 12 V supply voltage Power supply of the digital encoder. Setting can only be modified if power stage is disabled. Modified settings become active the next time the product is powered on. Available with firmware version ≥V01.01. | - 5 5 12 | UINT16 R/W per. - | CANopen 3052:4ₕ Modbus 21000 Profibus 21000 CIP 182.1.4 ModbusTCP 21000 EtherCAT 3052:4ₕ PROFINET 21000 |
| *ENCDigResMulUsed* | Number of bits of the multiturn resolution used from the encoder. Specifies the number of bits of the multiturn resolution used for position evaluation. If ENCDigResMulUsed = 0, all bits of the multiturn resolution of the encoder are used. Example: If ENCDigResMulUsed = 11, only 11 bits of the multiturn resolution of the encoder are used. Setting can only be modified if power stage is disabled. Modified settings become active the next time the product is powered on. Available with firmware version ≥V01.03. | bit 0 0 24 | UINT16 R/W per. - | CANopen 3052:Bₕ Modbus 21014 Profibus 21014 CIP 182.1.11 ModbusTCP 21014 EtherCAT 3052:Bₕ PROFINET 21014 |
| *ENCDigSSICoding* | Position coding of SSI encoder. **0 / binary**: Binary coding **1 / gray**: Gray coding This parameter defines the type of position coding of the SSI encoder. Setting can only be modified if power stage is disabled. Modified settings become active the next time the product is powered on. Available with firmware version ≥V01.01. | - 0 0 1 | UINT16 R/W per. - | CANopen 3052:3ₕ Modbus 20998 Profibus 20998 CIP 182.1.3 ModbusTCP 20998 EtherCAT 3052:3ₕ PROFINET 20998 |
| *ENCDigSSILinAdd* | SSI encoder additional bits (linear). This parameter is used to set the number of resolution bits of a linear SSI encoder. The total number of resolution bits (*ENCDigSSILinRes*) and additional bits (*ENCDigSSILinAdd*) is limited to 32. Setting can only be modified if power stage is disabled. Modified settings become active the next time the product is powered on. Available with firmware version ≥V01.26. | bit 0 0 3 | UINT16 R/W per. - | CANopen 3052:Dₕ Modbus 21018 Profibus 21018 CIP 182.1.13 ModbusTCP 21018 EtherCAT 3052:Dₕ PROFINET 21018 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *ENCDigSSILinRes* | SSI encoder resolution bits (linear). This parameter is used to set the number of resolution bits of a linear SSI encoder. The total number of resolution bits (*ENCDigSSILinRes*) and additional bits (*ENCDigSSILinAdd*) is limited to 32. Setting can only be modified if power stage is disabled. Modified settings become active the next time the product is powered on. Available with firmware version ≥V01.26. | bit 8 24 32 | UINT16 R/W per. - | CANopen 3052:C$_h$ Modbus 21016 Profibus 21016 CIP 182.1.12 ModbusTCP 21016 EtherCAT 3052:C$_h$ PROFINET 21016 |
| *ENCDigSSIMaxFreq* | SSI maximum transfer frequency. This parameter is used to set the SSI transfer frequency for SSI encoders (singleturn and multiturn). The SSI transfer frequency depends on the encoder (maximum frequency specified by the encoder manufacturer) and on the length of the encoder cable. The encoder module supports SSI transfer frequencies of 200 kHz and 1000 kHz. If your SSI encoder supports a maximum frequency of 1000 kHz, set the value of this parameter to 1000. If the length of the encoder cable in your system exceeds 50 m, set the value of this parameter to 200, regardless of the maximum possible frequency specified by the encoder manufacturer. Setting can only be modified if power stage is disabled. Modified settings become active the next time the product is powered on. Available with firmware version ≥V01.01. | kHz 200 200 1000 | UINT16 R/W per. - | CANopen 3052:5$_h$ Modbus 21002 Profibus 21002 CIP 182.1.5 ModbusTCP 21002 EtherCAT 3052:5$_h$ PROFINET 21002 |
| *ENCDigSSIResMult* | SSI multiturn resolution (rotary). This parameter is only relevant for SSI encoders (singleturn and multiturn). If a singleturn SSI encoder is used, ENCDigSSIResMult must be set to 0. Example: If ENCDigSSIResMult is set to 12, the number of turns of the encoder used must be 2^12 = 4096. The sum of ENCDigSSIResMult + ENCDigSSIResSgl must be less than or equal to 32 bits. Setting can only be modified if power stage is disabled. Modified settings become active the next time the product is powered on. Available with firmware version ≥V01.01. | bit 0 0 24 | UINT16 R/W per. - | CANopen 3052:2$_h$ Modbus 20996 Profibus 20996 CIP 182.1.2 ModbusTCP 20996 EtherCAT 3052:2$_h$ PROFINET 20996 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *ENCDigSSIResSgl* | SSI singleturn resolution (rotary).<br><br>This parameter is only relevant for SSI encoders (singleturn and multiturn).<br><br>Example: If ENCDigSSIResSgl is set to 13, an SSI encoder with a singleturn resolution of 2^13 = 8192 increments must be used.<br><br>If a multiturn encoder is used, the sum of ENCDigSSIResMult + ENCDigSSIResSgl must be less than or equal to 32 bits.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on.<br><br>Available with firmware version ≥V01.01. | bit<br>8<br>13<br>25 | UINT16<br>R/W<br>per.<br>- | CANopen 3052:1$_h$<br>Modbus 20994<br>Profibus 20994<br>CIP 182.1.1<br>ModbusTCP 20994<br>EtherCAT 3052:1$_h$<br>PROFINET 20994 |
| *ENCSinCosMaxIx* | Maximum distance for search for index pulse for SinCos encoder.<br><br>The parameter specifies the maximum number of periods during which the index pulse must be found (search range).<br><br>A tolerance of 10 % is added to this value. If no index pulse is found within this range (including the 10% tolerance), an error message is generated.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.01. | -<br>1<br>1024<br>2147483647 | INT32<br>R/W<br>per.<br>- | CANopen 3051:4$_h$<br>Modbus 20744<br>Profibus 20744<br>CIP 181.1.4<br>ModbusTCP 20744<br>EtherCAT 3051:4$_h$<br>PROFINET 20744 |
| *ERR_clear* | Clear error memory.<br><br>Value 1: Delete entries in the error memory<br><br>The clearing process is completed if a 0 is returned after a read access.<br><br>Modified settings become active immediately. | -<br>0<br>-<br>1 | UINT16<br>R/W<br>-<br>- | CANopen 303B:4$_h$<br>Modbus 15112<br>Profibus 15112<br>CIP 159.1.4<br>ModbusTCP 15112<br>EtherCAT 303B:4$_h$<br>PROFINET 15112 |
| *ERR_reset* | Reset error memory read pointer.<br><br>Value 1: Set error memory read pointer to oldest error entry.<br><br>Modified settings become active immediately. | -<br>0<br>-<br>1 | UINT16<br>R/W<br>-<br>- | CANopen 303B:5$_h$<br>Modbus 15114<br>Profibus 15114<br>CIP 159.1.5<br>ModbusTCP 15114<br>EtherCAT 303B:5$_h$<br>PROFINET 15114 |

| Parameter name<br>HMI menu<br>HMI name | Description | Unit<br>Minimum value<br>Factory setting<br>Maximum value | Data type<br>R/W<br>Persistent<br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *ErrorResp_bit_DE* | Error response to detected data error (DE bit).<br><br>**-1 / No Error Response**: No error response<br><br>**0 / Error Class 0**: Error class 0<br><br>**1 / Error Class 1**: Error class 1<br><br>**2 / Error Class 2**: Error class 2<br><br>**3 / Error Class 3**: Error class 3<br><br>For the Drive Profile Lexium, the error response to a detected data error (DE bit) can be parameterized.<br><br>For EtherCAT RxPDO data error handling, this parameter is also used to classify the error response. | -<br>-1<br>-1<br>3 | INT16<br>R/W<br>per.<br>- | CANopen 301B:6$_h$<br>Modbus 6924<br>Profibus 6924<br>CIP 127.1.6<br>ModbusTCP 6924<br>EtherCAT 301B:6$_h$<br>PROFINET 6924 |
| *ErrorResp_bit_ME* | Error response to detected mode error (ME bit).<br><br>**-1 / No Error Response**: No error response<br><br>**0 / Error Class 0**: Error class 0<br><br>**1 / Error Class 1**: Error class 1<br><br>**2 / Error Class 2**: Error class 2<br><br>**3 / Error Class 3**: Error class 3<br><br>For the Drive Profile Lexium, the error response to a detected mode error (ME bit) can be parameterized. | -<br>-1<br>-1<br>3 | INT16<br>R/W<br>per.<br>- | CANopen 301B:7$_h$<br>Modbus 6926<br>Profibus 6926<br>CIP 127.1.7<br>ModbusTCP 6926<br>EtherCAT 301B:7$_h$<br>PROFINET 6926 |
| *ErrorResp_Flt_AC* | Error response to missing mains phase.<br><br>**0 / Error Class 0**: Error class 0<br><br>**1 / Error Class 1**: Error class 1<br><br>**2 / Error Class 2**: Error class 2<br><br>**3 / Error Class 3**: Error class 3<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled. | -<br>0<br>2<br>3 | UINT16<br>R/W<br>per.<br>- | CANopen 3005:A$_h$<br>Modbus 1300<br>Profibus 1300<br>CIP 105.1.10<br>ModbusTCP 1300<br>EtherCAT 3005:A$_h$<br>PROFINET 1300 |
| *ErrorResp_I2tRES* | Error response to 100% I2t braking resistor.<br><br>**0 / Error Class 0**: Error class 0<br><br>**1 / Error Class 1**: Error class 1<br><br>**2 / Error Class 2**: Error class 2<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled. | -<br>0<br>0<br>2 | UINT16<br>R/W<br>per.<br>- | CANopen 3005:22$_h$<br>Modbus 1348<br>Profibus 1348<br>CIP 105.1.34<br>ModbusTCP 1348<br>EtherCAT 3005:22$_h$<br>PROFINET 1348 |
| *ErrorResp_p_dif* | Error response to excessively high load-dependent position deviation.<br><br>**1 / Error Class 1**: Error class 1<br><br>**2 / Error Class 2**: Error class 2<br><br>**3 / Error Class 3**: Error class 3<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled. | -<br>1<br>3<br>3 | UINT16<br>R/W<br>per.<br>- | CANopen 3005:B$_h$<br>Modbus 1302<br>Profibus 1302<br>CIP 105.1.11<br>ModbusTCP 1302<br>EtherCAT 3005:B$_h$<br>PROFINET 1302 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *ErrorResp_ PDiffEncM* | Error response to position deviation motor encoder and machine encoder exceeded.<br><br>**1 / Error Class 1**: Error class 1<br><br>**2 / Error Class 2**: Error class 2<br><br>**3 / Error Class 3**: Error class 3<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.26. | -<br><br>0<br><br>3<br><br>3 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3005:3B<sub>h</sub><br><br>Modbus 1398<br><br>Profibus 1398<br><br>CIP 105.1.59<br><br>ModbusTCP 1398<br><br>EtherCAT 3005:3B<sub>h</sub><br><br>PROFINET 1398 |
| *ErrorResp_QuasiAbs* | Error response to detected error with quasi absolute position.<br><br>**3 / Error Class 3**: Error class 3<br><br>**4 / Error Class 4**: Error class 4<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.26. | -<br><br>3<br><br>3<br><br>4 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3005:3A<sub>h</sub><br><br>Modbus 1396<br><br>Profibus 1396<br><br>CIP 105.1.58<br><br>ModbusTCP 1396<br><br>EtherCAT 3005:3A<sub>h</sub><br><br>PROFINET 1396 |
| *ErrorResp_v_dif* | Error response to excessively high load-dependent velocity deviation.<br><br>**1 / Error Class 1**: Error class 1<br><br>**2 / Error Class 2**: Error class 2<br><br>**3 / Error Class 3**: Error class 3<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.26. | -<br><br>1<br><br>3<br><br>3 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3005:3C<sub>h</sub><br><br>Modbus 1400<br><br>Profibus 1400<br><br>CIP 105.1.60<br><br>ModbusTCP 1400<br><br>EtherCAT 3005:3C<sub>h</sub><br><br>PROFINET 1400 |
| *ErrResp_HeartB_ LifeG* | CANopen error response to detected Heartbeat or Life Guarding error.<br><br>**1 / Error Class 1**: Error class 1<br><br>**2 / Error Class 2**: Error class 2<br><br>**3 / Error Class 3**: Error class 3<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.30. | -<br><br>1<br><br>2<br><br>3 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3041:11<sub>h</sub><br><br>Modbus 16674<br><br>Profibus 16674<br><br>CIP 165.1.17<br><br>ModbusTCP 16674<br><br>EtherCAT 3041:11<sub>h</sub><br><br>PROFINET 16674 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *ESIM_ HighResolution* | Encoder simulation: High resolution.<br><br>Specifies the number of increments per revolution with 12 bit decimal places. If the parameter is set to a multiple of 4096, the index pulse will be generated exactly at the same position within one revolution.<br><br>The setting of parameter ESIM_scale is only used if parameter ESIM_HighResolution is set to 0. Otherwise, the setting of ESIM_HighResolution is used.<br><br>Example: 1417.322835 encoder simulation pulses per revolution are required.<br><br>Set the parameter to 1417.322835 * 4096 = 5805354.<br><br>In this example, the index pulse will be generated exactly after every 1417 pulses. This means that the index pulse shifts with each revolution.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on. | EncInc<br><br>0<br><br>0<br><br>268431360 | UINT32<br><br>R/W<br><br>per.<br><br>expert | CANopen 3005:32$_h$<br><br>Modbus 1380<br><br>Profibus 1380<br><br>CIP 105.1.50<br><br>ModbusTCP 1380<br><br>EtherCAT 3005:32$_h$<br><br>PROFINET 1380 |
| *ESIM_PhaseShift* | Encoder simulation: Phase shift for pulse output.<br><br>The generated encoder simulation pulses can be shifted in units of 1/4096 encoder pulses. The shift results in a position offset at PTO. The index pulse is shifted as well.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.10. | -<br><br>-32768<br><br>0<br><br>32767 | INT16<br><br>R/W<br><br>-<br><br>expert | CANopen 3005:33$_h$<br><br>Modbus 1382<br><br>Profibus 1382<br><br>CIP 105.1.51<br><br>ModbusTCP 1382<br><br>EtherCAT 3005:33$_h$<br><br>PROFINET 1382 |
| *ESIM_scale*<br><br>ᴄₒₙF → ᵢ-ₒ-<br><br>ESSC | Resolution of encoder simulation.<br><br>Resolution defines the number of increments per revolution (AB signal with quadruple evaluation).<br><br>The index pulse is created once per revolution at an interval where signal A and signal B are high.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on. | EncInc<br><br>8<br><br>4096<br><br>65535 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3005:15$_h$<br><br>Modbus 1322<br><br>Profibus 1322<br><br>CIP 105.1.21<br><br>ModbusTCP 1322<br><br>EtherCAT 3005:15$_h$<br><br>PROFINET 1322 |
| *eSM_BaseSetting* | eSM basic settings.<br><br>**None**: No function<br><br>**Auto Start**: Automatic start (ESMSTART)<br><br>**Ignore GUARD_ACK**: GUARD_ACK inactive<br><br>**Ignore /INTERLOCK_IN**: INTERLOCK chain inactive<br><br>Setting can only be modified if power stage is disabled.<br><br>Available with firmware version ≥V01.01. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/W<br><br>per.<br><br>- | - |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *eSM_dec_NC* | eSM deceleration ramp. Deceleration ramp for monitored deceleration Value 0: Disabled, no monitoring of deceleration ramp Value >0: Deceleration ramp in RPM/s Setting can only be modified if power stage is disabled. Available with firmware version ≥V01.01. | RPM/s 0 0 32786009 | UINT32 R/W per. - | - |
| *eSM_dec_Qstop* | eSM deceleration ramp for Quick Stop. Deceleration ramp for monitored Quick Stop. This value must be greater than 0. Value 0: eSM module is not configured Value >0: Deceleration ramp in RPM/s Setting can only be modified if power stage is disabled. Available with firmware version ≥V01.01. | RPM/s 0 0 32786009 | UINT32 R/W per. - | - |
| *eSM_disable* | eSM disable. Value 0: No action Value 1: Force a change of eSM state 6 to eSM state 3 Available with firmware version ≥V01.01. | - - - - | UINT16 R/W - - | CANopen 304C:1A$_h$ Modbus 19508 Profibus 19508 CIP 176.1.26 ModbusTCP 19508 EtherCAT 304C:1A$_h$ PROFINET 19508 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *eSM_FuncAUXOUT1* | eSM function of status output AUXOUT1. | - | UINT32 | - |
| | **None**: No function | - | R/W | |
| | **/ESTOP**: Signal state /ESTOP | - | per. | |
| | **GUARD**: Signal state GUARD | - | - | |
| | **SETUPMODE**: Signal state SETUPMODE | | | |
| | **SETUPENABLE**: Signal state SETUPENABLE | | | |
| | **GUARD_ACK**: Signal state GUARD_ACK | | | |
| | **/INTERLOCK_IN**: Signal state /INTERLOCK_IN | | | |
| | **STO by eSM**: Signal state of internal STO | | | |
| | **RELAY**: Signal state RELAY | | | |
| | **/INTERLOCK_OUT**: Signal state /INTERLOCK_OUT | | | |
| | **Standstill**: Standstill (v = 0) | | | |
| | **SLS**: SLS | | | |
| | **Error class 4**: Error of error class 4 detected | | | |
| | **Error class 1 ... 4**: Error of error classes 1 … 4 detected | | | |
| | **/ESTOP inv.**: Signal state /ESTOP, inverted | | | |
| | **GUARD inv.**: Signal state GUARD, inverted | | | |
| | **SETUPMODE inv.**: Signal state SETUPMODE, inverted | | | |
| | **SETUPENABLE inv.**: Signal state SETUPENABLE, inverted | | | |
| | **GUARD_ACK inv.**: Signal state GUARD_ACK, inverted | | | |
| | **/INTERLOCK_IN inv.**: Signal state /INTERLOCK_IN, inverted | | | |
| | **STO by eSM inv.**: Signal state of internal STO, inverted | | | |
| | **RELAY inv.**: Signal state RELAY, inverted | | | |
| | **/INTERLOCK_OUT inv.**: Signal state /INTERLOCK_OUT, inverted | | | |
| | **Standstill inv.**: Standstill, inverted | | | |
| | **SLS inv.**: SLS, inverted | | | |
| | **Error class 4 inv.**: Error of error class 4 detected (inverted) | | | |
| | **Error class 1 ... 4 inv.**: Error of error classes 1 … 4 detected (inverted) | | | |
| | Setting can only be modified if power stage is disabled. | | | |
| | Available with firmware version ≥V01.01. | | | |
| *eSM_FuncAUXOUT2* | eSM function of status output AUXOUT2. | - | UINT32 | - |
| | **None**: No function | - | R/W | |
| | **/ESTOP**: Signal state /ESTOP | - | per. | |
| | **GUARD**: Signal state GUARD | - | - | |
| | **SETUPMODE**: Signal state SETUPMODE | | | |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **SETUPENABLE**: Signal state SETUPENABLE | | | |
| | **GUARD_ACK**: Signal state GUARD_ACK | | | |
| | **/INTERLOCK_IN**: Signal state /INTERLOCK_IN | | | |
| | **STO by eSM**: Signal state of internal STO | | | |
| | **RELAY**: Signal state RELAY | | | |
| | **/INTERLOCK_OUT**: Signal state /INTERLOCK_OUT | | | |
| | **Standstill**: Standstill (v = 0) | | | |
| | **SLS**: SLS | | | |
| | **Error class 4**: Error of error class 4 detected | | | |
| | **Error class 1 ... 4**: Error of error classes 1 … 4 occurred | | | |
| | **/ESTOP inv.**: Signal state /ESTOP, inverted | | | |
| | **GUARD inv.**: Signal state GUARD, inverted | | | |
| | **SETUPMODE inv.**: Signal state SETUPMODE, inverted | | | |
| | **SETUPENABLE inv.**: Signal state SETUPENABLE, inverted | | | |
| | **GUARD_ACK inv.**: Signal state GUARD_ACK, inverted | | | |
| | **/INTERLOCK_IN inv.**: Signal state /INTERLOCK_IN, inverted | | | |
| | **STO by eSM inv.**: Signal state of internal STO, inverted | | | |
| | **RELAY inv.**: Signal state RELAY, inverted | | | |
| | **/INTERLOCK_OUT inv.**: Signal state /INTERLOCK_OUT, inverted | | | |
| | **Standstill inv.**: Standstill, inverted | | | |
| | **SLS inv.**: SLS, inverted | | | |
| | **Error class 4 inv.**: Error of error class 4 detected (inverted) | | | |
| | **Error class 1 ... 4 inv.**: Error of error classes 1 … 4 detected (inverted) | | | |
| | Setting can only be modified if power stage is disabled. | | | |
| | Available with firmware version ≥V01.01. | | | |
| *eSM_FuncSwitches* | eSM switches for functions. | - | UINT16 | - |
| | **None**: No function | 0 | R/W | |
| | **DirectionDependentSLS**: SLS dependent on direction of movement | 0 | per. | |
| | **Reserved (Bit 1)**: Reserved (bit 1) | 63 | - | |
| | **Reserved (Bit 2)**: Reserved (bit 2) | | | |
| | **Reserved (Bit 3)**: Reserved (bit 3) | | | |
| | **Reserved (Bit 4)**: Reserved (bit 4) | | | |
| | **Reserved (Bit 5)**: Reserved (bit 5) | | | |
| | Available as of firmware version safety module eSM ≥V01.01. | | | |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | Bit 0 = 0: SLS independent of direction of movement Bit 0 = 1: SLS dependent on direction of movement Bits 1 … 15: Reserved (must be set to 0) Setting can only be modified if power stage is disabled. Available with firmware version ≥V01.01. | | | |
| *eSM_LO_mask* | eSM digital outputs channel B mask. Mask of active digital outputs 0: Digital output is not active 1: Digital output is active Bit assignments: See digital outputs channel. Available with firmware version ≥V01.01. | - - - - | UINT16 R/W - - | CANopen 304C:15h Modbus 19498 Profibus 19498 CIP 176.1.21 ModbusTCP 19498 EtherCAT 304C:15h PROFINET 19498 |
| *eSM_SLSnegDirS* | eSM speed limit negative direction machine operating mode Setup Mode. Firmware version safety module eSM ≥V01.01. Parameter eSM_FuncSwitches Bit 0 = 1: Value = Monitored speed limit for negative direction of movement. Setting can only be modified if power stage is disabled. Available with firmware version ≥V01.01. | RPM 0 0 8000 | UINT16 R/W per. - | - |
| *eSM_t_NCDel* | eSM time delay until start of monitored deceleration. This time can be adjusted to meet the requirements of a controller. Setting can only be modified if power stage is disabled. Available with firmware version ≥V01.01. | ms 0 0 10000 | UINT16 R/W per. - | - |
| *eSM_t_Relay* | eSM deactivation of output RELAY. Deactivation of the digital output RELAY: Value 0: Immediate, no time delay Value 1: At motor standstill (v = 0) Value 2: At motor standstill (v = 0) and /INTERLOCK_OUT = 1 Value >2: Time delay in ms, deactivation of output after this time has passed Setting can only be modified if power stage is disabled. Available with firmware version ≥V01.01. | ms 0 0 10000 | UINT16 R/W per. - | - |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *eSM_v_maxAuto* | eSM speed limit for machine operating mode Automatic Mode.<br><br>This value sets the speed limit for monitoring in machine operating mode Automatic Mode.<br><br>Value 0: The speed limit is not monitored<br><br>Value >0: Monitored speed limit<br><br>Setting can only be modified if power stage is disabled.<br><br>Available with firmware version ≥V01.01. | RPM<br><br>0<br><br>0<br><br>8000 | UINT16<br><br>R/W<br><br>per.<br><br>- | - |
| *eSM_v_maxSetup* | eSM speed limit for machine operating mode Setup Mode.<br><br>This value sets the speed limit for monitoring in machine operating mode Setup Mode.<br><br>Firmware version safety module eSM ≥V01.01:<br><br>Parameter eSM_FuncSwitches Bit 0 = 0: Value = Monitored speed limit for positive and negative directions of movement.<br><br>Parameter eSM_FuncSwitches Bit 0 = 1: Value = Monitored speed limit for positive direction of movement.<br><br>Setting can only be modified if power stage is disabled.<br><br>Available with firmware version ≥V01.01. | RPM<br><br>0<br><br>0<br><br>8000 | UINT16<br><br>R/W<br><br>per.<br><br>- | - |
| *EthIPgate1*<br><br>$ConF \rightarrow CoM-$<br><br>$iPG1$ | IP address gateway, byte 1.<br><br>Modified settings become active the next time the product is powered on. | -<br><br>0<br><br>0<br><br>255 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3044:$F_h$<br><br>Modbus 17438<br><br>Profibus 17438<br><br>CIP 168.1.15<br><br>ModbusTCP 17438<br><br>EtherCAT 3044:$F_h$<br><br>PROFINET 17438 |
| *EthIPgate2*<br><br>$ConF \rightarrow CoM-$<br><br>$iPG2$ | IP address gateway, byte 2.<br><br>Modified settings become active the next time the product is powered on. | -<br><br>0<br><br>0<br><br>255 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3044:$10_h$<br><br>Modbus 17440<br><br>Profibus 17440<br><br>CIP 168.1.16<br><br>ModbusTCP 17440<br><br>EtherCAT 3044:$10_h$<br><br>PROFINET 17440 |
| *EthIPgate3*<br><br>$ConF \rightarrow CoM-$<br><br>$iPG3$ | IP address gateway, byte 3.<br><br>Modified settings become active the next time the product is powered on. | -<br><br>0<br><br>0<br><br>255 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3044:$11_h$<br><br>Modbus 17442<br><br>Profibus 17442<br><br>CIP 168.1.17<br><br>ModbusTCP 17442<br><br>EtherCAT 3044:$11_h$<br><br>PROFINET 17442 |

| Parameter name<br>HMI menu<br>HMI name | Description | Unit<br>Minimum value<br>Factory setting<br>Maximum value | Data type<br>R/W<br>Persistent<br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *EthIPgate4*<br>$\mathsf{C o n F} \to \mathsf{C o \Pi -}$<br>$\mathsf{, P G \; 4}$ | IP address gateway, byte 4.<br><br>Modified settings become active the next time the product is powered on. | -<br>0<br>0<br>255 | UINT16<br>R/W<br>per.<br>- | CANopen 3044:12$_h$<br>Modbus 17444<br>Profibus 17444<br>CIP 168.1.18<br>ModbusTCP 17444<br>EtherCAT 3044:12$_h$<br>PROFINET 17444 |
| *EthIPmask1*<br>$\mathsf{C o n F} \to \mathsf{C o \Pi -}$<br>$\mathsf{, P \Pi \; 1}$ | IP address subnet mask, byte 1.<br><br>Modified settings become active the next time the product is powered on. | -<br>0<br>255<br>255 | UINT16<br>R/W<br>per.<br>- | CANopen 3044:B$_h$<br>Modbus 17430<br>Profibus 17430<br>CIP 168.1.11<br>ModbusTCP 17430<br>EtherCAT 3044:B$_h$<br>PROFINET 17430 |
| *EthIPmask2*<br>$\mathsf{C o n F} \to \mathsf{C o \Pi -}$<br>$\mathsf{, P \Pi \; 2}$ | IP address subnet mask, byte 2.<br><br>Modified settings become active the next time the product is powered on. | -<br>0<br>255<br>255 | UINT16<br>R/W<br>per.<br>- | CANopen 3044:C$_h$<br>Modbus 17432<br>Profibus 17432<br>CIP 168.1.12<br>ModbusTCP 17432<br>EtherCAT 3044:C$_h$<br>PROFINET 17432 |
| *EthIPmask3*<br>$\mathsf{C o n F} \to \mathsf{C o \Pi -}$<br>$\mathsf{, P \Pi \; 3}$ | IP address subnet mask, byte 3.<br><br>Modified settings become active the next time the product is powered on. | -<br>0<br>255<br>255 | UINT16<br>R/W<br>per.<br>- | CANopen 3044:D$_h$<br>Modbus 17434<br>Profibus 17434<br>CIP 168.1.13<br>ModbusTCP 17434<br>EtherCAT 3044:D$_h$<br>PROFINET 17434 |
| *EthIPmask4*<br>$\mathsf{C o n F} \to \mathsf{C o \Pi -}$<br>$\mathsf{, P \Pi \; 4}$ | IP address subnet mask, byte 4.<br><br>Modified settings become active the next time the product is powered on. | -<br>0<br>0<br>255 | UINT16<br>R/W<br>per.<br>- | CANopen 3044:E$_h$<br>Modbus 17436<br>Profibus 17436<br>CIP 168.1.14<br>ModbusTCP 17436<br>EtherCAT 3044:E$_h$<br>PROFINET 17436 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *EthIPmaster1* | IP address master, byte 1.<br><br>IP address of the master that is permitted to perform Modbus TCP I/O scanning.<br><br>If set to 0.0.0.0 (default), any master can perform I/O scanning.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>255 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3044:29$_h$<br><br>Modbus 17490<br><br>Profibus 17490<br><br>CIP 168.1.41<br><br>ModbusTCP 17490<br><br>EtherCAT 3044:29$_h$<br><br>PROFINET 17490 |
| *EthIPmaster2* | IP address master, byte 2.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>255 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3044:2A$_h$<br><br>Modbus 17492<br><br>Profibus 17492<br><br>CIP 168.1.42<br><br>ModbusTCP 17492<br><br>EtherCAT 3044:2A$_h$<br><br>PROFINET 17492 |
| *EthIPmaster3* | IP address master, byte 3.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>255 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3044:2B$_h$<br><br>Modbus 17494<br><br>Profibus 17494<br><br>CIP 168.1.43<br><br>ModbusTCP 17494<br><br>EtherCAT 3044:2B$_h$<br><br>PROFINET 17494 |
| *EthIPmaster4* | IP address master, byte 4.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>255 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3044:2C$_h$<br><br>Modbus 17496<br><br>Profibus 17496<br><br>CIP 168.1.44<br><br>ModbusTCP 17496<br><br>EtherCAT 3044:2C$_h$<br><br>PROFINET 17496 |
| *EthIpMode*<br><br>$ConF \rightarrow CoN-$<br><br>$iPNd$ | Method of obtaining IP address.<br><br>**0 / Manual /** $NAnu$: Manual<br><br>**1 / BOOTP /** $boot$: BOOTP<br><br>**2 / DHCP /** $dhcP$: DHCP<br><br>Modified settings become active immediately. | -<br><br>0<br><br>2<br><br>2 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3044:5$_h$<br><br>Modbus 17418<br><br>Profibus 17418<br><br>CIP 168.1.5<br><br>ModbusTCP 17418<br><br>EtherCAT 3044:5$_h$<br><br>PROFINET 17418 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *EthIPmodule1* $\mathsf{L} \, o \, \mathsf{F} \rightarrow \mathsf{L} \, o \, \mathsf{\Pi}$ - $\mathsf{IP} \, \mathsf{C} \, \mathsf{I}$ | IP address Ethernet module, byte 1. Byte 1 (x.0.0.0) of the IP address of the Ethernet module. Modified settings become active the next time the product is powered on. | - 0 0 255 | UINT16 R/W per. - | CANopen 3044:7$_h$ Modbus 17422 Profibus 17422 CIP 168.1.7 ModbusTCP 17422 EtherCAT 3044:7$_h$ PROFINET 17422 |
| *EthIPmodule2* $\mathsf{L} \, o \, \mathsf{F} \rightarrow \mathsf{L} \, o \, \mathsf{\Pi}$ - $\mathsf{IP} \, \mathsf{C} \, \mathsf{2}$ | IP address Ethernet module, byte 2. Modified settings become active the next time the product is powered on. | - 0 0 255 | UINT16 R/W per. - | CANopen 3044:8$_h$ Modbus 17424 Profibus 17424 CIP 168.1.8 ModbusTCP 17424 EtherCAT 3044:8$_h$ PROFINET 17424 |
| *EthIPmodule3* $\mathsf{L} \, o \, \mathsf{F} \rightarrow \mathsf{L} \, o \, \mathsf{\Pi}$ - $\mathsf{IP} \, \mathsf{C} \, \mathsf{3}$ | IP address Ethernet module, byte 3. Modified settings become active the next time the product is powered on. | - 0 0 255 | UINT16 R/W per. - | CANopen 3044:9$_h$ Modbus 17426 Profibus 17426 CIP 168.1.9 ModbusTCP 17426 EtherCAT 3044:9$_h$ PROFINET 17426 |
| *EthIPmodule4* $\mathsf{L} \, o \, \mathsf{F} \rightarrow \mathsf{L} \, o \, \mathsf{\Pi}$ - $\mathsf{IP} \, \mathsf{C} \, \mathsf{4}$ | IP address Ethernet module, byte 4. Modified settings become active the next time the product is powered on. | - 0 0 255 | UINT16 R/W per. - | CANopen 3044:A$_h$ Modbus 17428 Profibus 17428 CIP 168.1.10 ModbusTCP 17428 EtherCAT 3044:A$_h$ PROFINET 17428 |
| *EthMbIPswap1* | IP address of master for Modbus word swap, byte 1. IP address of a Modbus master device. For this master, the word order is swapped to "Low word first", instead of the default "High word first". High word first: Modicon Quantum Low word first: Premium, HMI (Schneider Electric) Modified settings become active immediately. | - 0 0 255 | UINT16 R/W per. - | CANopen 3044:50$_h$ Modbus 17568 Profibus 17568 CIP 168.1.80 ModbusTCP 17568 EtherCAT 3044:50$_h$ PROFINET 17568 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *EthMbIPswap2* | IP address of master for Modbus word swap, byte 2.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>255 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3044:51$_h$<br><br>Modbus 17570<br><br>Profibus 17570<br><br>CIP 168.1.81<br><br>ModbusTCP 17570<br><br>EtherCAT 3044:51$_h$<br><br>PROFINET 17570 |
| *EthMbIPswap3* | IP address of master for Modbus word swap, byte 3.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>255 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3044:52$_h$<br><br>Modbus 17572<br><br>Profibus 17572<br><br>CIP 168.1.82<br><br>ModbusTCP 17572<br><br>EtherCAT 3044:52$_h$<br><br>PROFINET 17572 |
| *EthMbIPswap4* | IP address of master for Modbus word swap, byte 4.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>255 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3044:53$_h$<br><br>Modbus 17574<br><br>Profibus 17574<br><br>CIP 168.1.83<br><br>ModbusTCP 17574<br><br>EtherCAT 3044:53$_h$<br><br>PROFINET 17574 |
| *EthMbScanner* | Modbus TCP I/O scanning.<br><br>**0 / Off**: Modbus TCP I/O scanning off<br><br>**1 / On**: Modbus TCP I/O scanning on<br><br>I/O scanning only works if the parameter EthMode is set to Modbus TCP.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>1<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3044:28$_h$<br><br>Modbus 17488<br><br>Profibus 17488<br><br>CIP 168.1.40<br><br>ModbusTCP 17488<br><br>EtherCAT 3044:28$_h$<br><br>PROFINET 17488 |
| *EthMbScanTimeout* | Modbus TCP I/O scanning timeout.<br><br>Communication monitoring timeout for Modbus TCP.<br><br>Value 0: Timeout monitoring disabled<br><br>In increments of 0.1 s.<br><br>Modified settings become active immediately. | s<br><br>0.0<br><br>2.0<br><br>60.0 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3044:2D$_h$<br><br>Modbus 17498<br><br>Profibus 17498<br><br>CIP 168.1.45<br><br>ModbusTCP 17498<br><br>EtherCAT 3044:2D$_h$<br><br>PROFINET 17498 |

| Parameter name<br>HMI menu<br>HMI name | Description | Unit<br>Minimum value<br>Factory setting<br>Maximum value | Data type<br>R/W<br>Persistent<br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *EthMode*<br>⊑ o n F → ⊑ o ∏ -<br>E ⊏ ∏ d | Protocol.<br><br>**0 / Modbus TCP /** ∏ ⊏ ⊑ P: Modbus TCP I/O scanning is enabled<br><br>**1 / EtherNet/IP /** E ⊏ ı P: EtherNet/IP communication is enabled<br><br>Modbus TCP parameter access is possible irrespective of the selected setting.<br><br>Modified settings become active the next time the product is powered on. | -<br>0<br>1<br>1 | UINT16<br>R/W<br>per.<br>- | CANopen 3044:1$_h$<br>Modbus 17410<br>Profibus 17410<br>CIP 168.1.1<br>ModbusTCP 17410<br>EtherCAT 3044:1$_h$<br>PROFINET 17410 |
| *EthOptMapInp1* | Optionally mapped input parameter 1 (drive to controller).<br><br>Modbus address of parameter which is optionally mapped to Ethernet/IP assembly or Modbus TCP I/O scanner data (drive to controller).<br><br>Modified settings become active immediately. | -<br>-<br>0<br>- | UINT16<br>R/W<br>per.<br>- | CANopen 3044:34$_h$<br>Modbus 17512<br>Profibus 17512<br>CIP 168.1.52<br>ModbusTCP 17512<br>EtherCAT 3044:34$_h$<br>PROFINET 17512 |
| *EthOptMapInp2* | Optionally mapped input parameter 2 (drive to controller).<br><br>Modbus address of parameter which is optionally mapped to Ethernet/IP assembly or Modbus TCP I/O scanner data (drive to controller).<br><br>Modified settings become active immediately. | -<br>-<br>0<br>- | UINT16<br>R/W<br>per.<br>- | CANopen 3044:35$_h$<br>Modbus 17514<br>Profibus 17514<br>CIP 168.1.53<br>ModbusTCP 17514<br>EtherCAT 3044:35$_h$<br>PROFINET 17514 |
| *EthOptMapInp3* | Optionally mapped input parameter 3 (drive to controller).<br><br>Modbus address of parameter which is optionally mapped to Ethernet/IP assembly or Modbus TCP I/O scanner data (drive to controller).<br><br>Modified settings become active immediately. | -<br>-<br>0<br>- | UINT16<br>R/W<br>per.<br>- | CANopen 3044:36$_h$<br>Modbus 17516<br>Profibus 17516<br>CIP 168.1.54<br>ModbusTCP 17516<br>EtherCAT 3044:36$_h$<br>PROFINET 17516 |
| *EthOptMapOut1* | Optionally mapped output parameter 1 (controller to drive).<br><br>Modbus address of parameter which is optionally mapped to Ethernet/IP assembly or Modbus TCP I/O scanner data (controller to drive).<br><br>Modified settings become active immediately. | -<br>-<br>0<br>- | UINT16<br>R/W<br>per.<br>- | CANopen 3044:2E$_h$<br>Modbus 17500<br>Profibus 17500<br>CIP 168.1.46<br>ModbusTCP 17500<br>EtherCAT 3044:2E$_h$<br>PROFINET 17500 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *EthOptMapOut2* | Optionally mapped output parameter 2 (controller to drive). Modbus address of parameter which is optionally mapped to Ethernet/IP assembly or Modbus TCP I/O scanner data (controller to drive). Modified settings become active immediately. | - - 0 - | UINT16 R/W per. - | CANopen 3044:2F$_h$ Modbus 17502 Profibus 17502 CIP 168.1.47 ModbusTCP 17502 EtherCAT 3044:2F$_h$ PROFINET 17502 |
| *EthOptMapOut3* | Optionally mapped output parameter 3 (controller to drive). Modbus address of parameter which is optionally mapped to Ethernet/IP assembly or Modbus TCP I/O scanner data (controller to drive). Modified settings become active immediately. | - - 0 - | UINT16 R/W per. - | CANopen 3044:30$_h$ Modbus 17504 Profibus 17504 CIP 168.1.48 ModbusTCP 17504 EtherCAT 3044:30$_h$ PROFINET 17504 |
| *EthRateSet* | Transmission rate setting. **0 / Autodetect**: Autodetect **1 / 10 Mbps Full**: 10 Mbps full duplex **2 / 10 Mbps Half**: 10 Mbps half duplex **3 / 100 Mbps Full**: 100 Mbps full duplex **4 / 100 Mbps Half**: 100 Mbps half duplex Modified settings become active immediately. | - 0 0 4 | UINT16 R/W per. - | CANopen 3044:2$_h$ Modbus 17412 Profibus 17412 CIP 168.1.2 ModbusTCP 17412 EtherCAT 3044:2$_h$ PROFINET 17412 |
| *FTOF_CreateFile* | File transfer over fieldbus: Create file for upload. Value 1: Create file for upload Parameter is only accessible via the following access channels: - Fieldbus main channel - Modbus RTU The creation process is complete when the parameter is read and 1 is returned. If the parameter is read via a different access channel, the value 0 is returned. If a file has been created, a new file can only be created after a power cycle of the drive. Setting can only be modified if power stage is disabled. Available with firmware version ≥V01.34. | - 0 0 1 | UINT16 R/W - - | CANopen 3004:1E$_h$ Modbus 1084 Profibus 1084 CIP 104.1.30 ModbusTCP 1084 EtherCAT 3004:1E$_h$ PROFINET 1084 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *FTOF_Password* | File transfer over fieldbus: Password.<br><br>Value 0: File transfer over fieldbus disabled<br><br>Value >0: File transfer over fieldbus enabled; password (numbers only)<br><br>Parameter is only accessible via the following access channels:<br><br>- Fieldbus main channel<br><br>- Modbus RTU<br><br>If the parameter is read via a different access channel, the value 0 is returned.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.34. | -<br><br>-<br><br>0<br><br>4294967295 | UINT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3004:20ₕ<br><br>Modbus 1088<br><br>Profibus 1088<br><br>CIP 104.1.32<br><br>ModbusTCP 1088<br><br>EtherCAT 3004:20ₕ<br><br>PROFINET 1088 |
| *GEARdenom* | Denominator of gear ratio.<br><br>See description GEARnum | -<br><br>1<br><br>1<br><br>2147483647 | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3026:3ₕ<br><br>Modbus 9734<br><br>Profibus 9734<br><br>CIP 138.1.3<br><br>ModbusTCP 9734<br><br>EtherCAT 3026:3ₕ<br><br>PROFINET 9734 |
| *GEARdenom2* | Denominator of gear ratio number 2.<br><br>See description GEARnum | -<br><br>1<br><br>1<br><br>2147483647 | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3026:Cₕ<br><br>Modbus 9752<br><br>Profibus 9752<br><br>CIP 138.1.12<br><br>ModbusTCP 9752<br><br>EtherCAT 3026:Cₕ<br><br>PROFINET 9752 |
| *GEARdir_enabl* | Enabled direction of movement for operating mode Electronic Gear.<br><br>**1 / Positive**: Positive direction<br><br>**2 / Negative**: Negative direction<br><br>**3 / Both**: Both directions<br><br>This allows you to activate a return movement lock function.<br><br>Modified settings become active immediately. | -<br><br>1<br><br>3<br><br>3 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3026:5ₕ<br><br>Modbus 9738<br><br>Profibus 9738<br><br>CIP 138.1.5<br><br>ModbusTCP 9738<br><br>EtherCAT 3026:5ₕ<br><br>PROFINET 9738 |
| *GEARjerklim*<br><br>*Conf → ı-o-*<br><br>*GFıL* | Activation of jerk limitation.<br><br>**0 / Off / oFF**: Jerk limitation deactivated.<br><br>**1 / PosSyncOn / P_on**: Jerk limitation active (only with position synchronization).<br><br>The time for jerk limitation must be set via parameter RAMP_v_jerk.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.02. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3026:7ₕ<br><br>Modbus 9742<br><br>Profibus 9742<br><br>CIP 138.1.7<br><br>ModbusTCP 9742<br><br>EtherCAT 3026:7ₕ<br><br>PROFINET 9742 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *GEARnum* | Numerator of gear ratio.<br><br>Gear ratio = GEARnum / GEARdenom<br><br>The new gear ratio is applied when the numerator value is supplied.<br><br>Modified settings become active immediately. | -<br><br>-2147483648<br><br>1<br><br>2147483647 | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3026:4$_h$<br><br>Modbus 9736<br><br>Profibus 9736<br><br>CIP 138.1.4<br><br>ModbusTCP 9736<br><br>EtherCAT 3026:4$_h$<br><br>PROFINET 9736 |
| *GEARnum2* | Numerator of gear ratio number 2.<br><br>Gear ratio = GEARnum2 / GEARdenom2<br><br>The new gear ratio is applied when the numerator value is supplied.<br><br>Modified settings become active immediately. | -<br><br>-2147483648<br><br>1<br><br>2147483647 | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3026:D$_h$<br><br>Modbus 9754<br><br>Profibus 9754<br><br>CIP 138.1.13<br><br>ModbusTCP 9754<br><br>EtherCAT 3026:D$_h$<br><br>PROFINET 9754 |
| *GEARpos_v_max* | Velocity limitation for the method Position Synchronization.<br><br>Value 0: No velocity limitation<br><br>Value >0: Velocity limitation in usr_v<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.10. | usr_v<br><br>0<br><br>0<br><br>2147483647 | UINT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3026:9$_h$<br><br>Modbus 9746<br><br>Profibus 9746<br><br>CIP 138.1.9<br><br>ModbusTCP 9746<br><br>EtherCAT 3026:9$_h$<br><br>PROFINET 9746 |
| *GEARposChgMode* | Treatment of position changes with inactive power stage.<br><br>**0 / Off**: Position changes in states with disabled power stage are ignored.<br><br>**1 / On**: Position changes in states with disabled power stage are taken into account.<br><br>This setting has an effect only if gear processing is started in the mode 'Synchronization with compensation movement'.<br><br>Modified settings become active the next time the power stage is enabled. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3026:B$_h$<br><br>Modbus 9750<br><br>Profibus 9750<br><br>CIP 138.1.11<br><br>ModbusTCP 9750<br><br>EtherCAT 3026:B$_h$<br><br>PROFINET 9750 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *GEARratio* $\mathsf{L}\,\mathsf{o}\,\mathsf{n}\,\mathsf{F} \to \mathsf{r}\,\mathsf{-}\,\mathsf{o}\,\mathsf{-}$ $\mathsf{L}\,\mathsf{F}\,\mathsf{R}\,\mathsf{L}$ | Selection of gear ratio. 0 / **Gear Factor** / $\mathsf{F}\,\mathsf{R}\,\mathsf{L}\,\mathsf{E}$ : Usage of gear ratio adjusted with GEARnum/GEARdenom 1 / **200** / $\mathsf{2}\,\mathsf{0}\,\mathsf{0}$: 200 2 / **400** / $\mathsf{4}\,\mathsf{0}\,\mathsf{0}$: 400 3 / **500** / $\mathsf{5}\,\mathsf{0}\,\mathsf{0}$: 500 4 / **1000** / $\mathsf{1}\,\mathsf{0}\,\mathsf{0}\,\mathsf{0}$: 1000 5 / **2000** / $\mathsf{2}\,\mathsf{0}\,\mathsf{0}\,\mathsf{0}$: 2000 6 / **4000** / $\mathsf{4}\,\mathsf{0}\,\mathsf{0}\,\mathsf{0}$: 4000 7 / **5000** / $\mathsf{5}\,\mathsf{0}\,\mathsf{0}\,\mathsf{0}$: 5000 8 / **10000** / $\mathsf{1}\,\mathsf{0}.\mathsf{0}\,\mathsf{0}$: 10000 9 / **4096** / $\mathsf{4}\,\mathsf{0}\,\mathsf{9}\,\mathsf{6}$: 4096 10 / **8192** / $\mathsf{8}\,\mathsf{1}\,\mathsf{9}\,\mathsf{2}$: 8192 11 / **16384** / $\mathsf{1}\,\mathsf{6}.\mathsf{3}\,\mathsf{8}$: 16384 A change of the reference value by the specified value causes one motor revolution. Modified settings become active immediately. | - 0 0 11 | UINT16 R/W per. - | CANopen 3026:6h Modbus 9740 Profibus 9740 CIP 138.1.6 ModbusTCP 9740 EtherCAT 3026:6h PROFINET 9740 |
| *GEARreference* | Synchronization method for operating mode Electronic Gear. 0 / **Deactivated**: Deactivated 1 / **Position Synchronization Immediate**: Position synchronization without compensation movement 2 / **Position Synchronization Compensated**: Position synchronization with compensation movement 3 / **Velocity Synchronization**: Velocity synchronization Modified settings become active immediately. | - 0 0 3 | UINT16 R/W - - | CANopen 301B:12h Modbus 6948 Profibus 6948 CIP 127.1.18 ModbusTCP 6948 EtherCAT 301B:12h PROFINET 6948 |
| *GEARselect* | Gear ratio selection. Switches between two gear ratios: Value 0: Use gear ratio defined by parameter GEARratio Value 1: Use gear ratio from parameters GEARnum2/GEARdenom2 Modified settings become active immediately. | - 0 0 1 | UINT16 R/W - - | CANopen 3026:Eh Modbus 9756 Profibus 9756 CIP 138.1.14 ModbusTCP 9756 EtherCAT 3026:Eh PROFINET 9756 |
| *HMdis* | Distance from switching point. The distance from the switching point is defined as the reference point. The parameter is only effective during a reference movement without index pulse. Modified settings become active the next time the motor moves. | usr_p 1 200 2147483647 | INT32 R/W per. - | CANopen 3028:7h Modbus 10254 Profibus 10254 CIP 140.1.7 ModbusTCP 10254 EtherCAT 3028:7h PROFINET 10254 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *HMIDispPara*<br><br>*∏ o ∩*<br><br>*S ᴜ P V* | HMI display when motor moves.<br><br>**0 / OperatingState /** *5 ᴛ ᴀ ᴛ* : Operating state<br><br>**1 / v_act /** *V ᴀ ᴄ ᴛ* : Actual motor velocity<br><br>**2 / I_act /** *ɪ ᴀ ᴄ ᴛ* : Actual motor current<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>2 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 303A:2ₕ<br><br>Modbus 14852<br><br>Profibus 14852<br><br>CIP 158.1.2<br><br>ModbusTCP 14852<br><br>EtherCAT 303A:2ₕ<br><br>PROFINET 14852 |
| *HMIlocked* | Lock HMI.<br><br>**0 / Not Locked /** *∩ L o ᴄ* : HMI not locked<br><br>**1 / Locked /** *L o ᴄ* : HMI locked<br><br>The following functions can no longer be started when the HMI is locked:<br><br>- Parameter change<br><br>- Jog<br><br>- Autotuning<br><br>- Fault Reset<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 303A:1ₕ<br><br>Modbus 14850<br><br>Profibus 14850<br><br>CIP 158.1.1<br><br>ModbusTCP 14850<br><br>EtherCAT 303A:1ₕ<br><br>PROFINET 14850 |

| Parameter name  HMI menu  HMI name | Description | Unit  Minimum value  Factory setting  Maximum value | Data type  R/W  Persistent  Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *HMmethod* | Homing method.  1: LIMN with index pulse  2: LIMP with index pulse  7: REF+ with index pulse, inv., outside  8: REF+ with index pulse, inv., inside  9: REF+ with index pulse, not inv., inside  10: REF+ with index pulse, not inv., outside  11: REF- with index pulse, inv., outside  12: REF- with index pulse, inv., inside  13: REF- with index pulse, not inv., inside  14: REF- with index pulse, not inv., outside  17: LIMN  18: LIMP  23: REF+, inv., outside  24: REF+, inv., inside  25: REF+, not inv., inside  26: REF+, not inv., outside  27: REF-, inv., outside  28: REF-, inv., inside  29: REF-, not inv., inside  30: REF-, not inv., outside  33: Index pulse negative direction  34: Index pulse positive direction  35: Position setting  Abbreviations:  REF+: Search movement in positive direction  REF-: Search movement in negative direction  inv.: Invert direction in switch  not inv.: Direction not inverted in switch  outside: Index pulse / distance outside switch  inside: Index pulse / distance inside switch  Modified settings become active immediately.  * Datatype for CANopen: INT8 | -  1  18  35 | INT16*  R/W  -  - | CANopen 6098:0$_h$  Modbus 6936  Profibus 6936  CIP 127.1.12  ModbusTCP 6936  EtherCAT 6098:0$_h$  PROFINET 6936 |
| *HMoutdis* | Maximum distance for search for switching point.  0: Monitoring of distance inactive  >0: Maximum distance  After detection of the switch, the drive starts to search for the defined switching point. If the defined switching point is not found within the distance defined here, the reference movement is canceled and an error is detected.  Modified settings become active the next time the motor moves. | usr_p  0  0  2147483647 | INT32  R/W  per.  - | CANopen 3028:6$_h$  Modbus 10252  Profibus 10252  CIP 140.1.6  ModbusTCP 10252  EtherCAT 3028:6$_h$  PROFINET 10252 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *HMp_home* | Position at reference point. After a successful reference movement, this position is automatically set at the reference point. Modified settings become active the next time the motor moves. | usr_p -2147483648 0 2147483647 | INT32 R/W per. - | CANopen 3028:B$_h$ Modbus 10262 Profibus 10262 CIP 140.1.11 ModbusTCP 10262 EtherCAT 3028:B$_h$ PROFINET 10262 |
| *HMp_setP* | Position for Position Setting. Position for operating mode Homing, method 35. Modified settings become active immediately. | usr_p - 0 - | INT32 R/W - - | CANopen 301B:16$_h$ Modbus 6956 Profibus 6956 CIP 127.1.22 ModbusTCP 6956 EtherCAT 301B:16$_h$ PROFINET 6956 |
| *HMprefmethod* $o\,P \rightarrow h\,o\,\Pi$ - $\Pi\,E\,E\,h$ | Preferred homing method. Modified settings become active immediately. | - 1 18 35 | INT16 R/W per. - | CANopen 3028:A$_h$ Modbus 10260 Profibus 10260 CIP 140.1.10 ModbusTCP 10260 EtherCAT 3028:A$_h$ PROFINET 10260 |
| *HMsrchdis* | Maximum search distance after overtravel of switch. 0: Search distance monitoring disabled >0: Search distance The switch must be activated again within this search distance, otherwise the reference movement is canceled. Modified settings become active the next time the motor moves. | usr_p 0 0 2147483647 | INT32 R/W per. - | CANopen 3028:D$_h$ Modbus 10266 Profibus 10266 CIP 140.1.13 ModbusTCP 10266 EtherCAT 3028:D$_h$ PROFINET 10266 |
| *HMv* $o\,P \rightarrow h\,o\,\Pi$ - $h\,\Pi\,o$ | Target velocity for searching the switch. The adjustable value is internally limited to the parameter setting in RAMP_v_max. Modified settings become active the next time the motor moves. | usr_v 1 60 2147483647 | UINT32 R/W per. - | CANopen 6099:1$_h$ Modbus 10248 Profibus 10248 CIP 140.1.4 ModbusTCP 10248 EtherCAT 6099:1$_h$ PROFINET 10248 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *HMv_out* | Target velocity for moving away from switch.<br><br>The adjustable value is internally limited to the parameter setting in RAMP_v_max.<br><br>Modified settings become active the next time the motor moves. | usr_v<br>1<br>6<br>2147483647 | UINT32<br>R/W<br>per.<br>- | CANopen 6099:2$_h$<br>Modbus 10250<br>Profibus 10250<br>CIP 140.1.5<br>ModbusTCP 10250<br>EtherCAT 6099:2$_h$<br>PROFINET 10250 |
| *InvertDirOfCount* | Inversion of direction of counting at PTI interface.<br><br>**0 / Inversion Off**: Inversion of direction of counting is off<br><br>**1 / Inversion On**: Inversion of direction of counting is on<br><br>Modified settings become active immediately. | -<br>0<br>0<br>1 | UINT16<br>R/W<br>per.<br>- | CANopen 3008:7$_h$<br>Modbus 2062<br>Profibus 2062<br>CIP 108.1.7<br>ModbusTCP 2062<br>EtherCAT 3008:7$_h$<br>PROFINET 2062 |
| *InvertDirOfMaEnc* | Inversion of direction of machine encoder.<br><br>**0 / Inversion Off**: Inversion of direction is off<br><br>**1 / Inversion On**: Inversion of direction is on<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately. | -<br>0<br>0<br>1 | UINT16<br>R/W<br>per.<br>- | CANopen 3050:8$_h$<br>Modbus 20496<br>Profibus 20496<br>CIP 180.1.8<br>ModbusTCP 20496<br>EtherCAT 3050:8$_h$<br>PROFINET 20496 |
| *InvertDirOfMove*<br><br>$ConF \rightarrow ACG-$<br>$inMo$ | Inversion of direction of movement.<br><br>**0 / Inversion Off / $oFF$**: Inversion of direction of movement is off<br><br>**1 / Inversion On / $on$**: Inversion of direction of movement is on<br><br>The limit switch which is reached with a movement in positive direction must be connected to the positive limit switch input and vice versa.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on. | -<br>0<br>0<br>1 | UINT16<br>R/W<br>per.<br>- | CANopen 3006:C$_h$<br>Modbus 1560<br>Profibus 1560<br>CIP 106.1.12<br>ModbusTCP 1560<br>EtherCAT 3006:C$_h$<br>PROFINET 1560 |
| *IO_AutoEnable*<br><br>$ConF \rightarrow ACG-$<br>$ioAE$ | Enabling the power stage at PowerOn.<br><br>**0 / RisingEdge / $riSE$**: A rising edge with the signal input function "Enable" enables the power stage<br><br>**1 / HighLevel / $LEVL$**: An active signal input with signal input function "Enable" enables the power stage<br><br>**2 / AutoOn / $Auto$**: The power stage is automatically enabled<br><br>Modified settings become active the next time the power stage is enabled. | -<br>0<br>0<br>2 | UINT16<br>R/W<br>per.<br>- | CANopen 3005:6$_h$<br>Modbus 1292<br>Profibus 1292<br>CIP 105.1.6<br>ModbusTCP 1292<br>EtherCAT 3005:6$_h$<br>PROFINET 1292 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IO_AutoEnaConfig*<br><br>$ConF \rightarrow ACG -$<br><br>$ioEN$ | Enabling the power stage as set via IO_AutoEnable even after error.<br><br>**0 / Off / $\_oFF$** : Setting in parameter IO_AutoEnable is only used after start-up<br><br>**1 / On / $on$** : Setting in parameter IO_AutoEnable is used after start-up and after detected error<br><br>Modified settings become active the next time the power stage is enabled. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3005:4$_h$<br><br>Modbus 1288<br><br>Profibus 1288<br><br>CIP 105.1.4<br><br>ModbusTCP 1288<br><br>EtherCAT 3005:4$_h$<br><br>PROFINET 1288 |
| *IO_DQ_set* | Setting the digital outputs directly.<br><br>Digital outputs can only be set directly if the signal output function has been set to 'Freely Available'.<br><br>Bit assignments:<br><br>Bit 0: DQ0<br><br>Bit 1: DQ1<br><br>Bit 2: DQ2 | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 3008:11$_h$<br><br>Modbus 2082<br><br>Profibus 2082<br><br>CIP 108.1.17<br><br>ModbusTCP 2082<br><br>EtherCAT 3008:11$_h$<br><br>PROFINET 2082 |
| *IO_FaultResOnEnaInp*<br><br>$ConF \rightarrow ACG -$<br><br>$iEFr$ | Additional 'Fault Reset' for the signal input function 'Enable'.<br><br>**0 / Off / $oFF$** : No additional 'Fault Reset'<br><br>**1 / OnFallingEdge / $FALL$** : Additional 'Fault Reset' with falling edge<br><br>**2 / OnRisingEdge / $riSE$** : Additional 'Fault Reset' with rising edge<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.12. | -<br><br>0<br><br>0<br><br>2 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3005:34$_h$<br><br>Modbus 1384<br><br>Profibus 1384<br><br>CIP 105.1.52<br><br>ModbusTCP 1384<br><br>EtherCAT 3005:34$_h$<br><br>PROFINET 1384 |
| *IO_GEARmethod*<br><br>$ConF \rightarrow ACG -$<br><br>$ioGN$ | Processing mode for operating mode Electronic Gear.<br><br>**1 / Position Synchronization Immediate / $PoiN$** : Position synchronization without compensation movement<br><br>**2 / Position Synchronization Compensated / $Poco$** : Position synchronization with compensation movement<br><br>**3 / Velocity Synchronization / $VELo$** : Velocity synchronization<br><br>Modified settings become active the next time the motor moves. | -<br><br>1<br><br>1<br><br>3 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3005:17$_h$<br><br>Modbus 1326<br><br>Profibus 1326<br><br>CIP 105.1.23<br><br>ModbusTCP 1326<br><br>EtherCAT 3005:17$_h$<br><br>PROFINET 1326 |
| *IO_I_limit*<br><br>$ConF \rightarrow i - o -$<br><br>$iLiN$ | Current limitation via input.<br><br>A current limit can be activated via a digital input.<br><br>In increments of 0.01 A$_{rms}$.<br><br>Modified settings become active immediately. | A$_{rms}$<br><br>0.00<br><br>0.20<br><br>300.00 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:27$_h$<br><br>Modbus 1614<br><br>Profibus 1614<br><br>CIP 106.1.39<br><br>ModbusTCP 1614<br><br>EtherCAT 3006:27$_h$<br><br>PROFINET 1614 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IO_JOGmethod* ⊏ � ƒ → � ⊏ � - ⍳ � ⍠ ⍐ | Selection of jog method. **0 / Continuous Movement / ⊏ ⍧ ⍨ ⍧**: Jog with continuous movement **1 / Step Movement / ⌇ ⍷ ⍨ ⍧**: Jog with step movement Modified settings become active the next time the motor moves. | - 0 0 1 | UINT16 R/W per. - | CANopen 3005:18$_h$ Modbus 1328 Profibus 1328 CIP 105.1.24 ModbusTCP 1328 EtherCAT 3005:18$_h$ PROFINET 1328 |
| *IO_ModeSwitch* ⊏ ⍧ ⍨ ƒ → ⍧ ⊏ ⍧ - ⍳ ⍧ ⌇ | Operating mode for signal input function Operating Mode Switch. **0 / None / ⍨ ⍧ ⍨ ⍷**: None **1 / Profile Torque / ⍷ ⍧ ⍢ ⍧**: Profile Torque **2 / Profile Velocity / ⌵ ⍷ ⌊ ⍧**: Profile Velocity **3 / Electronic Gear / ⌊ ⍷ ⍧ ⍢**: Electronic Gear Modified settings become active immediately. | - 0 0 3 | UINT16 R/W per. - | CANopen 3006:2F$_h$ Modbus 1630 Profibus 1630 CIP 106.1.47 ModbusTCP 1630 EtherCAT 3006:2F$_h$ PROFINET 1630 |
| *IO_PTtq_reference* ⊏ ⍧ ⍨ ƒ → ⍧ ⊏ ⍧ - ⍳ ⍧ ⍷ ⍢ | Reference value source for operating mode Profile Torque. **0 / Analog Input / ⍳ ⍧ ⍨ ⍧**: Reference value via analog input **1 / PTI Interface / ⍳ ⍒ ⍷ ⍳**: Reference value via PTI interface Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. Available with firmware version ≥V01.20. | - 0 0 1 | UINT16 R/W per. - | CANopen 3005:38$_h$ Modbus 1392 Profibus 1392 CIP 105.1.56 ModbusTCP 1392 EtherCAT 3005:38$_h$ PROFINET 1392 |
| *IO_v_limit* | Velocity limitation via input. A velocity limitation can be activated via a digital input. In operating mode Profile Torque, the minimum velocity is internally limited to 100 RPM. Modified settings become active immediately. | usr_v 0 10 2147483647 | UINT32 R/W per. - | CANopen 3006:1E$_h$ Modbus 1596 Profibus 1596 CIP 106.1.30 ModbusTCP 1596 EtherCAT 3006:1E$_h$ PROFINET 1596 |
| *IOdefaultMode* ⊏ ⍧ ⍨ ƒ → ⍧ ⊏ ⍧ - ⍳ ⍧ - ⍨ | Operating mode. **0 / None / ⍨ ⍧ ⍨ ⍷**: None **1 / Profile Torque / ⍷ ⍧ ⍢ ⍧**: Profile Torque **2 / Profile Velocity / ⌵ ⍷ ⌊ ⍧**: Profile Velocity **3 / Electronic Gear / ⌊ ⍷ ⍧ ⍢**: Electronic Gear **5 / Jog / ⍠ ⍧ ⌊**: Jog **6 / Motion Sequence / ⍨ ⍧ ⍷ ⌇**: Motion Sequence Setting can only be modified if power stage is disabled. Modified settings become active the next time the product is powered on. | - 0 6 6 | UINT16 R/W per. - | CANopen 3005:3$_h$ Modbus 1286 Profibus 1286 CIP 105.1.3 ModbusTCP 1286 EtherCAT 3005:3$_h$ PROFINET 1286 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOfunct_DI0* ⫠ ⎓ ⊓ ⎓ → ␣ - ⎓ - ⎓ ␣ ⎓ | Function Input DI0.<br><br>**1 / Freely Available /** ⊓ ⎓ ⊓ ⎓ : Available as required<br><br>**2 / Fault Reset /** ⎓ ⎓ ⎓ ⎓ : Fault reset after error<br><br>**3 / Enable /** ⎓ ⊓ ⎓ ␣ : Enables the power stage<br><br>**4 / Halt /** ␣ ⎓ ⎓ ␣ : Halt<br><br>**5 / Start Profile Positioning /** ⎓ ⎓ ␣ ⎓ : Start request for movement<br><br>**6 / Current Limitation /** ␣ ⎓ ␣ ⎓ : Limits the current to parameter value<br><br>**7 / Zero Clamp /** ⎓ ⎓ ⎓ ⎓ : Zero clamping<br><br>**8 / Velocity Limitation /** ⎓ ⎓ ␣ ⎓ : Limits the velocity to parameter value<br><br>**9 / Jog Positive /** ⎓ ⎓ ⎓ ⎓ : Jog: Moves in positive direction<br><br>**10 / Jog Negative /** ⎓ ⎓ ⎓ ⊓ : Jog: Moves in negative direction<br><br>**11 / Jog Fast/Slow /** ⎓ ⎓ ⎓ ⎓ : Jog: Switches between slow and fast movement<br><br>**12 / Gear Ratio Switch /** ⎓ ⎓ ⎓ ␣ : Electronic Gear: Switches between two gear ratios<br><br>**13 / Start Single Data Set /** ⎓ ⎓ ␣ ⎓ : Motion Sequence: Starts a single data set<br><br>**14 / Data Set Select /** ⎓ ⎓ ⎓ ⎓ : Motion Sequence: Data set selection<br><br>**15 / Data Set Bit 0 /** ⎓ ⎓ ␣ ⎓ : Motion Sequence: Data set bit 0<br><br>**16 / Data Set Bit 1 /** ⎓ ⎓ ␣ ␣ : Motion Sequence: Data set bit 1<br><br>**17 / Data Set Bit 2 /** ⎓ ⎓ ␣ ⎓ : Motion Sequence: Data set bit 2<br><br>**18 / Data Set Bit 3 /** ⎓ ⎓ ␣ ⎓ : Motion Sequence: Data set bit 3<br><br>**19 / Gear Offset 1 /** ⎓ ⎓ ⎓ ␣ : Electronic Gear: Adds first gear offset<br><br>**20 / Gear Offset 2 /** ⎓ ⎓ ⎓ ⎓ : Electronic Gear: Adds second gear offset<br><br>**21 / Reference Switch (REF) /** ⎓ ⎓ ⎓ : Reference switch<br><br>**22 / Positive Limit Switch (LIMP) /** ⎓ ␣ ⎓ ⎓ : Positive limit switch<br><br>**23 / Negative Limit Switch (LIMN) /** ⎓ ␣ ⎓ ⊓ : Negative limit switch<br><br>**24 / Switch Controller Parameter Set /** ⎓ ⎓ ⎓ ⎓ : Switches control loop parameter set<br><br>**27 / Operating Mode Switch /** ⎓ ⎓ ⎓ ␣ : Switches operating mode<br><br>**28 / Velocity Controller Integral Off /** ␣ ⊓ ⎓ ⎓ : Switches off velocity controller integral term<br><br>**29 / Start Motion Sequence /** ⎓ ␣ ⎓ ⎓ : Motion Sequence: Starts a motion sequence | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3007:1h<br><br>Modbus 1794<br><br>Profibus 1794<br><br>CIP 107.1.1<br><br>ModbusTCP 1794<br><br>EtherCAT 3007:1h<br><br>PROFINET 1794 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **30 / Start Signal Of RMAC / 5 ⌐ Π c** : Start signal of relative movement after capture (RMAC)<br><br>**31 / Activate RMAC / A ⌐ Π c** : Activates the relative movement after capture (RMAC)<br><br>**32 / Activate Operating Mode / A c o P**: Activates operating mode<br><br>**35 / Data Set Bit 4 / d 5 b 4**: Motion Sequence: Data set bit 4<br><br>**36 / Data Set Bit 5 / d 5 b 5**: Motion Sequence: Data set bit 5<br><br>**37 / Data Set Bit 6 / d 5 b 6**: Motion Sequence: Data set bit 6<br><br>**38 / Inversion AI11 (IO Module) / A I 1 i**: Inverts analog input AI11 (I/O module)<br><br>**39 / Inversion AI12 (IO Module) / A I 2 i**: Inverts analog input AI12 (I/O module)<br><br>**40 / Release Holding Brake / ⌐ E h b**: Releases the holding brake<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on. | | | |
| *IOfunct_DI1*<br><br>*C o n F → i - o - d i 1* | Function Input DI1.<br><br>**1 / Freely Available / n o n E** : Available as required<br><br>**2 / Fault Reset / F ⌐ E 5**: Fault reset after error<br><br>**3 / Enable / E n A b** : Enables the power stage<br><br>**4 / Halt / h A L t** : Halt<br><br>**5 / Start Profile Positioning / 5 P t P**: Start request for movement<br><br>**6 / Current Limitation / i L i Π**: Limits the current to parameter value<br><br>**7 / Zero Clamp / C L Π P**: Zero clamping<br><br>**8 / Velocity Limitation / V L i Π**: Limits the velocity to parameter value<br><br>**9 / Jog Positive / J o G P**: Jog: Moves in positive direction<br><br>**10 / Jog Negative / J o G n**: Jog: Moves in negative direction<br><br>**11 / Jog Fast/Slow / J o G F** : Jog: Switches between slow and fast movement<br><br>**12 / Gear Ratio Switch / G ⌐ A t** : Electronic Gear: Switches between two gear ratios<br><br>**13 / Start Single Data Set / d 5 t A**: Motion Sequence: Starts a single data set<br><br>**14 / Data Set Select / d 5 E L** : Motion Sequence: Data set selection<br><br>**15 / Data Set Bit 0 / d 5 b 0**: Motion Sequence: Data set bit 0<br><br>**16 / Data Set Bit 1 / d 5 b 1**: Motion Sequence: Data set bit 1 | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3007:2h<br><br>Modbus 1796<br><br>Profibus 1796<br><br>CIP 107.1.2<br><br>ModbusTCP 1796<br><br>EtherCAT 3007:2h<br><br>PROFINET 1796 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **17 / Data Set Bit 2 /** d 5 b 2: Motion Sequence: Data set bit 2 | | | |
| | **18 / Data Set Bit 3 /** d 5 b 3: Motion Sequence: Data set bit 3 | | | |
| | **19 / Gear Offset 1 /** G o F 1: Electronic Gear: Adds first gear offset | | | |
| | **20 / Gear Offset 2 /** G o F 2: Electronic Gear: Adds second gear offset | | | |
| | **21 / Reference Switch (REF) /** r E F: Reference switch | | | |
| | **22 / Positive Limit Switch (LIMP) /** L i M P: Positive limit switch | | | |
| | **23 / Negative Limit Switch (LIMN) /** L i M n: Negative limit switch | | | |
| | **24 / Switch Controller Parameter Set /** C P A r: Switches control loop parameter set | | | |
| | **27 / Operating Mode Switch /** M 5 W t: Switches operating mode | | | |
| | **28 / Velocity Controller Integral Off /** t n o F: Switches off velocity controller integral term | | | |
| | **29 / Start Motion Sequence /** 5 t M 5: Motion Sequence: Starts a motion sequence | | | |
| | **30 / Start Signal Of RMAC /** 5 r M c: Start signal of relative movement after capture (RMAC) | | | |
| | **31 / Activate RMAC /** A r M c: Activates the relative movement after capture (RMAC) | | | |
| | **32 / Activate Operating Mode /** A c o P: Activates operating mode | | | |
| | **35 / Data Set Bit 4 /** d 5 b 4: Motion Sequence: Data set bit 4 | | | |
| | **36 / Data Set Bit 5 /** d 5 b 5: Motion Sequence: Data set bit 5 | | | |
| | **37 / Data Set Bit 6 /** d 5 b 6: Motion Sequence: Data set bit 6 | | | |
| | **38 / Inversion AI11 (IO Module) /** A I 1 i: Inverts analog input AI11 (I/O module) | | | |
| | **39 / Inversion AI12 (IO Module) /** A I 2 i: Inverts analog input AI12 (I/O module) | | | |
| | **40 / Release Holding Brake /** r E h b: Releases the holding brake | | | |
| | Setting can only be modified if power stage is disabled. | | | |
| | Modified settings become active the next time the product is powered on. | | | |
| *IOfunct_DI2*<br><br>C o n F → i - o -<br>d i 2 | Function Input DI2. | - | UINT16 | CANopen 3007:3ₕ |
| | **1 / Freely Available /** n o n E: Available as required | - | R/W | Modbus 1798 |
| | | - | per. | Profibus 1798 |
| | **2 / Fault Reset /** F r E 5: Fault reset after error | - | - | CIP 107.1.3 |
| | **3 / Enable /** E n A b: Enables the power stage | | | ModbusTCP 1798 |
| | **4 / Halt /** h A L t: Halt | | | EtherCAT 3007:3ₕ |
| | **5 / Start Profile Positioning /** 5 P t P: Start request for movement | | | PROFINET 1798 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **6 / Current Limitation /** _ı L ı Π_: Limits the current to parameter value | | | |
| | **7 / Zero Clamp /** _C L Π P_: Zero clamping | | | |
| | **8 / Velocity Limitation /** _V L ı Π_: Limits the velocity to parameter value | | | |
| | **9 / Jog Positive /** _J o G P_: Jog: Moves in positive direction | | | |
| | **10 / Jog Negative /** _J o G n_: Jog: Moves in negative direction | | | |
| | **11 / Jog Fast/Slow /** _J o G F_: Jog: Switches between slow and fast movement | | | |
| | **12 / Gear Ratio Switch /** _G r A t_: Electronic Gear: Switches between two gear ratios | | | |
| | **13 / Start Single Data Set /** _d S t A_: Motion Sequence: Starts a single data set | | | |
| | **14 / Data Set Select /** _d S E L_: Motion Sequence: Data set selection | | | |
| | **15 / Data Set Bit 0 /** _d S b 0_: Motion Sequence: Data set bit 0 | | | |
| | **16 / Data Set Bit 1 /** _d S b 1_: Motion Sequence: Data set bit 1 | | | |
| | **17 / Data Set Bit 2 /** _d S b 2_: Motion Sequence: Data set bit 2 | | | |
| | **18 / Data Set Bit 3 /** _d S b 3_: Motion Sequence: Data set bit 3 | | | |
| | **19 / Gear Offset 1 /** _G o F 1_: Electronic Gear: Adds first gear offset | | | |
| | **20 / Gear Offset 2 /** _G o F 2_: Electronic Gear: Adds second gear offset | | | |
| | **21 / Reference Switch (REF) /** _r E F_: Reference switch | | | |
| | **22 / Positive Limit Switch (LIMP) /** _L ı Π P_: Positive limit switch | | | |
| | **23 / Negative Limit Switch (LIMN) /** _L ı Π n_: Negative limit switch | | | |
| | **24 / Switch Controller Parameter Set /** _C P A r_: Switches control loop parameter set | | | |
| | **27 / Operating Mode Switch /** _Π S W t_: Switches operating mode | | | |
| | **28 / Velocity Controller Integral Off /** _t n o F_: Switches off velocity controller integral term | | | |
| | **29 / Start Motion Sequence /** _S t Π S_: Motion Sequence: Starts a motion sequence | | | |
| | **30 / Start Signal Of RMAC /** _S r Π c_: Start signal of relative movement after capture (RMAC) | | | |
| | **31 / Activate RMAC /** _A r Π c_: Activates the relative movement after capture (RMAC) | | | |
| | **32 / Activate Operating Mode /** _A c o P_: Activates operating mode | | | |
| | **35 / Data Set Bit 4 /** _d S b 4_: Motion Sequence: Data set bit 4 | | | |
| | **36 / Data Set Bit 5 /** _d S b 5_: Motion Sequence: Data set bit 5 | | | |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **37 / Data Set Bit 6 /** _d 5 b 6_ : Motion Sequence: Data set bit 6 | | | |
| | **38 / Inversion AI11 (IO Module) /** _A 1 1 ı_ : Inverts analog input AI11 (I/O module) | | | |
| | **39 / Inversion AI12 (IO Module) /** _A 1 2 ı_ : Inverts analog input AI12 (I/O module) | | | |
| | **40 / Release Holding Brake /** _r E h b_ : Releases the holding brake<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on. | | | |
| _IOfunct_DI3_<br><br>_C o n F → ı - o -_<br><br>_d ı 3_ | Function Input DI3.<br><br>**1 / Freely Available /** _n o n E_ : Available as required<br><br>**2 / Fault Reset /** _F r E 5_ : Fault reset after error<br><br>**3 / Enable /** _E n A b_ : Enables the power stage<br><br>**4 / Halt /** _h A L t_ : Halt<br><br>**5 / Start Profile Positioning /** _5 P t P_ : Start request for movement<br><br>**6 / Current Limitation /** _ı L ı П_ : Limits the current to parameter value<br><br>**7 / Zero Clamp /** _C L П P_ : Zero clamping<br><br>**8 / Velocity Limitation /** _V L ı П_ : Limits the velocity to parameter value<br><br>**9 / Jog Positive /** _J o G P_ : Jog: Moves in positive direction<br><br>**10 / Jog Negative /** _J o G n_ : Jog: Moves in negative direction<br><br>**11 / Jog Fast/Slow /** _J o G F_ : Jog: Switches between slow and fast movement<br><br>**12 / Gear Ratio Switch /** _G r A t_ : Electronic Gear: Switches between two gear ratios<br><br>**13 / Start Single Data Set /** _d 5 t A_ : Motion Sequence: Starts a single data set<br><br>**14 / Data Set Select /** _d 5 E L_ : Motion Sequence: Data set selection<br><br>**15 / Data Set Bit 0 /** _d 5 b 0_ : Motion Sequence: Data set bit 0<br><br>**16 / Data Set Bit 1 /** _d 5 b 1_ : Motion Sequence: Data set bit 1<br><br>**17 / Data Set Bit 2 /** _d 5 b 2_ : Motion Sequence: Data set bit 2<br><br>**18 / Data Set Bit 3 /** _d 5 b 3_ : Motion Sequence: Data set bit 3<br><br>**19 / Gear Offset 1 /** _G o F 1_ : Electronic Gear: Adds first gear offset<br><br>**20 / Gear Offset 2 /** _G o F 2_ : Electronic Gear: Adds second gear offset<br><br>**21 / Reference Switch (REF) /** _r E F_ : Reference switch | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3007:4$_h$<br><br>Modbus 1800<br><br>Profibus 1800<br><br>CIP 107.1.4<br><br>ModbusTCP 1800<br><br>EtherCAT 3007:4$_h$<br><br>PROFINET 1800 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **22 / Positive Limit Switch (LIMP) / L ɪ Π P**: Positive limit switch | | | |
| | **23 / Negative Limit Switch (LIMN) / L ɪ Π n**: Negative limit switch | | | |
| | **24 / Switch Controller Parameter Set / C P A r**: Switches control loop parameter set | | | |
| | **27 / Operating Mode Switch / Π S W E**: Switches operating mode | | | |
| | **28 / Velocity Controller Integral Off / E n o F**: Switches off velocity controller integral term | | | |
| | **29 / Start Motion Sequence / S E Π S**: Motion Sequence: Starts a motion sequence | | | |
| | **30 / Start Signal Of RMAC / S r Π c**: Start signal of relative movement after capture (RMAC) | | | |
| | **31 / Activate RMAC / A r Π c**: Activates the relative movement after capture (RMAC) | | | |
| | **32 / Activate Operating Mode / A c o P**: Activates operating mode | | | |
| | **35 / Data Set Bit 4 / d S b 4**: Motion Sequence: Data set bit 4 | | | |
| | **36 / Data Set Bit 5 / d S b 5**: Motion Sequence: Data set bit 5 | | | |
| | **37 / Data Set Bit 6 / d S b 6**: Motion Sequence: Data set bit 6 | | | |
| | **38 / Inversion AI11 (IO Module) / A I I ɪ**: Inverts analog input AI11 (I/O module) | | | |
| | **39 / Inversion AI12 (IO Module) / A I 2 ɪ**: Inverts analog input AI12 (I/O module) | | | |
| | **40 / Release Holding Brake / r E h b**: Releases the holding brake | | | |
| | Setting can only be modified if power stage is disabled. | | | |
| | Modified settings become active the next time the product is powered on. | | | |
| *IOfunct_DI4* C o n F → ɪ - o - d ɪ 4 | Function Input DI4. | - | UINT16 | CANopen 3007:5ₕ |
| | **1 / Freely Available / n o n E**: Available as required | - | R/W | Modbus 1802 |
| | **2 / Fault Reset / F r E S**: Fault reset after error | - | per. | Profibus 1802 |
| | **3 / Enable / E n A b**: Enables the power stage | - | - | CIP 107.1.5 |
| | **4 / Halt / h A L E**: Halt | | | ModbusTCP 1802 |
| | **5 / Start Profile Positioning / S P E P**: Start request for movement | | | EtherCAT 3007:5ₕ |
| | **6 / Current Limitation / ɪ L ɪ Π**: Limits the current to parameter value | | | PROFINET 1802 |
| | **7 / Zero Clamp / C L Π P**: Zero clamping | | | |
| | **8 / Velocity Limitation / V L ɪ Π**: Limits the velocity to parameter value | | | |
| | **9 / Jog Positive / J o G P**: Jog: Moves in positive direction | | | |
| | **10 / Jog Negative / J o G n**: Jog: Moves in negative direction | | | |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **11 / Jog Fast/Slow /** *J o G F* : Jog: Switches between slow and fast movement | | | |
| | **12 / Gear Ratio Switch /** *G r A t* : Electronic Gear: Switches between two gear ratios | | | |
| | **13 / Start Single Data Set /** *d S t A*: Motion Sequence: Starts a single data set | | | |
| | **14 / Data Set Select /** *d S E L* : Motion Sequence: Data set selection | | | |
| | **15 / Data Set Bit 0 /** *d S b 0*: Motion Sequence: Data set bit 0 | | | |
| | **16 / Data Set Bit 1 /** *d S b 1*: Motion Sequence: Data set bit 1 | | | |
| | **17 / Data Set Bit 2 /** *d S b 2*: Motion Sequence: Data set bit 2 | | | |
| | **18 / Data Set Bit 3 /** *d S b 3*: Motion Sequence: Data set bit 3 | | | |
| | **19 / Gear Offset 1 /** *G o F 1*: Electronic Gear: Adds first gear offset | | | |
| | **20 / Gear Offset 2 /** *G o F 2*: Electronic Gear: Adds second gear offset | | | |
| | **21 / Reference Switch (REF) /** *r E F* : Reference switch | | | |
| | **22 / Positive Limit Switch (LIMP) /** *L i M P*: Positive limit switch | | | |
| | **23 / Negative Limit Switch (LIMN) /** *L i M n*: Negative limit switch | | | |
| | **24 / Switch Controller Parameter Set /** *C P A r* : Switches control loop parameter set | | | |
| | **27 / Operating Mode Switch /** *M S W t* : Switches operating mode | | | |
| | **28 / Velocity Controller Integral Off /** *t n o F* : Switches off velocity controller integral term | | | |
| | **29 / Start Motion Sequence /** *S t M S*: Motion Sequence: Starts a motion sequence | | | |
| | **30 / Start Signal Of RMAC /** *S r M c* : Start signal of relative movement after capture (RMAC) | | | |
| | **31 / Activate RMAC /** *A r M c* : Activates the relative movement after capture (RMAC) | | | |
| | **32 / Activate Operating Mode /** *A c o P*: Activates operating mode | | | |
| | **35 / Data Set Bit 4 /** *d S b 4*: Motion Sequence: Data set bit 4 | | | |
| | **36 / Data Set Bit 5 /** *d S b 5*: Motion Sequence: Data set bit 5 | | | |
| | **37 / Data Set Bit 6 /** *d S b 6*: Motion Sequence: Data set bit 6 | | | |
| | **38 / Inversion AI11 (IO Module) /** *A I 1 i*: Inverts analog input AI11 (I/O module) | | | |
| | **39 / Inversion AI12 (IO Module) /** *A I 2 i*: Inverts analog input AI12 (I/O module) | | | |
| | **40 / Release Holding Brake /** *r E h b*: Releases the holding brake Setting can only be modified if power stage is disabled. | | | |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | Modified settings become active the next time the product is powered on. | | | |
| *IOfunct_DI5*<br><br>⊏ ⍺ ⍴ F → ⍳ - ⍺ -<br><br>⍴ ⍳ 5 | Function Input DI5.<br><br>**1 / Freely Available /** �ⰰ �ⰰ ⍀ ⍀: Available as required<br><br>**2 / Fault Reset /** F ⍀ E 5: Fault reset after error<br><br>**3 / Enable /** E �ⰰ Я ъ: Enables the power stage<br><br>**4 / Halt /** ъ Я L Ł: Halt<br><br>**5 / Start Profile Positioning /** 5 P Ł P: Start request for movement<br><br>**6 / Current Limitation /** ⍳ L ⍳ П: Limits the current to parameter value<br><br>**7 / Zero Clamp /** ⊏ L П P: Zero clamping<br><br>**8 / Velocity Limitation /** V L ⍳ П: Limits the velocity to parameter value<br><br>**9 / Jog Positive /** ⌐ ⍺ L P: Jog: Moves in positive direction<br><br>**10 / Jog Negative /** ⌐ ⍺ L �ⰰ: Jog: Moves in negative direction<br><br>**11 / Jog Fast/Slow /** ⌐ ⍺ L F: Jog: Switches between slow and fast movement<br><br>**12 / Gear Ratio Switch /** L ⍀ Я Ł: Electronic Gear: Switches between two gear ratios<br><br>**13 / Start Single Data Set /** ⍴ 5 Ł Я: Motion Sequence: Starts a single data set<br><br>**14 / Data Set Select /** ⍴ 5 E L: Motion Sequence: Data set selection<br><br>**15 / Data Set Bit 0 /** ⍴ 5 ъ 0: Motion Sequence: Data set bit 0<br><br>**16 / Data Set Bit 1 /** ⍴ 5 ъ 1: Motion Sequence: Data set bit 1<br><br>**17 / Data Set Bit 2 /** ⍴ 5 ъ 2: Motion Sequence: Data set bit 2<br><br>**18 / Data Set Bit 3 /** ⍴ 5 ъ 3: Motion Sequence: Data set bit 3<br><br>**19 / Gear Offset 1 /** L ⍺ F 1: Electronic Gear: Adds first gear offset<br><br>**20 / Gear Offset 2 /** L ⍺ F 2: Electronic Gear: Adds second gear offset<br><br>**21 / Reference Switch (REF) /** ⍀ E F: Reference switch<br><br>**22 / Positive Limit Switch (LIMP) /** L ⍳ П P: Positive limit switch<br><br>**23 / Negative Limit Switch (LIMN) /** L ⍳ П �ⰰ: Negative limit switch<br><br>**24 / Switch Controller Parameter Set /** ⊏ P Я ⍀: Switches control loop parameter set<br><br>**27 / Operating Mode Switch /** П 5 ⍉ Ł: Switches operating mode<br><br>**28 / Velocity Controller Integral Off /** Ł ⍺ ⍺ F: Switches off velocity controller integral term | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3007:6ₕ<br><br>Modbus 1804<br><br>Profibus 1804<br><br>CIP 107.1.6<br><br>ModbusTCP 1804<br><br>EtherCAT 3007:6ₕ<br><br>PROFINET 1804 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **29 / Start Motion Sequence /** ⊏ ⊏ ⊓ ⊏ : Motion Sequence: Starts a motion sequence | | | |
| | **30 / Start Signal Of RMAC /** ⊏ ⊏ ⊓ ⊏ : Start signal of relative movement after capture (RMAC) | | | |
| | **31 / Activate RMAC /** ⊏ ⊏ ⊓ ⊏ : Activates the relative movement after capture (RMAC) | | | |
| | **32 / Activate Operating Mode /** ⊏ ⊏ ⊏ P: Activates operating mode | | | |
| | **35 / Data Set Bit 4 /** ⊏ ⊏ ⊏ ⊔ : Motion Sequence: Data set bit 4 | | | |
| | **36 / Data Set Bit 5 /** ⊏ ⊏ ⊏ ⊏ : Motion Sequence: Data set bit 5 | | | |
| | **37 / Data Set Bit 6 /** ⊏ ⊏ ⊏ ⊏ : Motion Sequence: Data set bit 6 | | | |
| | **38 / Inversion AI11 (IO Module) /** ⊏ ⊏ ⊏ ⊏ : Inverts analog input AI11 (I/O module) | | | |
| | **39 / Inversion AI12 (IO Module) /** ⊏ ⊏ ⊏ ⊏ : Inverts analog input AI12 (I/O module) | | | |
| | **40 / Release Holding Brake /** ⊏ ⊏ ⊏ ⊏ : Releases the holding brake | | | |
| | Setting can only be modified if power stage is disabled. | | | |
| | Modified settings become active the next time the product is powered on. | | | |
| *IOfunct_DQ0* ⊏ ⊏ ⊓ F → ⊏ - ⊏ - ⊏ ⊏ 0 | Function Output DQ0. | - | UINT16 | CANopen 3007:9ₕ |
| | **1 / Freely Available /** ⊓ ⊏ ⊓ ⊏ : Available as required | - | R/W | Modbus 1810 |
| | **2 / No Fault /** ⊓ F L ⊏ : Signals operating states Ready To Switch On, Switched On and Operation Enabled | - | per. | Profibus 1810 |
| | **3 / Active /** ⊏ ⊏ ⊏ ⊏ : Signals operating state Operation Enabled | - | - | CIP 107.1.9 |
| | **4 / RMAC Active Or Finished /** ⊏ ⊓ ⊏ ⊏ : Relative movement after capture active or finished (RMAC) | | | ModbusTCP 1810 |
| | **5 / In Position Deviation Window /** ⊏ ⊓ - P: Position deviation is within window | | | EtherCAT 3007:9ₕ |
| | **6 / In Velocity Deviation Window /** ⊏ ⊓ - V : Velocity deviation is within window | | | PROFINET 1810 |
| | **7 / Velocity Below Threshold /** V ⊏ ⊏ ⊏ : Motor velocity below threshold | | | |
| | **8 / Current Below Threshold /** ⊏ ⊏ ⊏ ⊏ : Motor current below threshold | | | |
| | **9 / Halt Acknowledge /** ⊏ ⊏ L ⊏ : Halt acknowledgement | | | |
| | **11 / Motion Sequence: Start Acknowledge /** ⊏ ⊏ ⊏ ⊏ : Motion Sequence: Acknowledgement of start request | | | |
| | **13 / Motor Standstill /** ⊓ ⊏ ⊏ ⊏ : Motor at a standstill | | | |
| | **14 / Selected Error /** ⊏ ⊏ ⊏ ⊏ : One of the specified errors of error classes 1 … 4 is active | | | |
| | **15 / Valid Reference (ref_ok) /** ⊏ ⊏ F ⊏ : Zero point is valid (ref_ok) | | | |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **16 / Selected Warning / 5 W ⌐ n**: One of the specified errors of error class 0 is active | | | |
| | **17 / Motion Sequence: Done / ∏ 5 C o**: Motion Sequence: Sequence done | | | |
| | **18 / Position Register Channel 1 / P ⌐ C 1**: Position register channel 1 | | | |
| | **19 / Position Register Channel 2 / P ⌐ C 2**: Position register channel 2 | | | |
| | **20 / Position Register Channel 3 / P ⌐ C 3**: Position register channel 3 | | | |
| | **21 / Position Register Channel 4 / P ⌐ C 4**: Position register channel 4 | | | |
| | **22 / Motor Moves Positive / ∏ P o 5**: Motor moves in positive direction | | | |
| | **23 / Motor Moves Negative / ∏ n E G**: Motor moves in negative direction | | | |
| | Setting can only be modified if power stage is disabled. | | | |
| | Modified settings become active the next time the product is powered on. | | | |
| *IOfunct_DQ1*<br><br>C o n F → ı - o -<br>d o 1 | Function Output DQ1.<br><br>**1 / Freely Available / n o n E**: Available as required<br><br>**2 / No Fault / n F L E**: Signals operating states Ready To Switch On, Switched On and Operation Enabled<br><br>**3 / Active / A c E ı**: Signals operating state Operation Enabled<br><br>**4 / RMAC Active Or Finished / ⌐ ∏ c A**: Relative movement after capture active or finished (RMAC)<br><br>**5 / In Position Deviation Window / ı n - P**: Position deviation is within window<br><br>**6 / In Velocity Deviation Window / ı n - V**: Velocity deviation is within window<br><br>**7 / Velocity Below Threshold / V E h ⌐**: Motor velocity below threshold<br><br>**8 / Current Below Threshold / ı E h ⌐**: Motor current below threshold<br><br>**9 / Halt Acknowledge / h A L E**: Halt acknowledgement<br><br>**11 / Motion Sequence: Start Acknowledge / d 5 A c**: Motion Sequence: Acknowledgement of start request<br><br>**13 / Motor Standstill / ∏ 5 E d**: Motor at a standstill<br><br>**14 / Selected Error / 5 E ⌐ ⌐**: One of the specified errors of error classes 1 … 4 is active<br><br>**15 / Valid Reference (ref_ok) / ⌐ E F o**: Zero point is valid (ref_ok)<br><br>**16 / Selected Warning / 5 W ⌐ n**: One of the specified errors of error class 0 is active<br><br>**17 / Motion Sequence: Done / ∏ 5 C o**: Motion Sequence: Sequence done | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3007:A$_h$<br><br>Modbus 1812<br><br>Profibus 1812<br><br>CIP 107.1.10<br><br>ModbusTCP 1812<br><br>EtherCAT 3007:A$_h$<br><br>PROFINET 1812 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **18 / Position Register Channel 1** / P r C 1: Position register channel 1 | | | |
| | **19 / Position Register Channel 2** / P r C 2: Position register channel 2 | | | |
| | **20 / Position Register Channel 3** / P r C 3: Position register channel 3 | | | |
| | **21 / Position Register Channel 4** / P r C 4: Position register channel 4 | | | |
| | **22 / Motor Moves Positive** / Π P o S: Motor moves in positive direction | | | |
| | **23 / Motor Moves Negative** / Π n E G: Motor moves in negative direction | | | |
| | Setting can only be modified if power stage is disabled. | | | |
| | Modified settings become active the next time the product is powered on. | | | |
| _IOfunct_DQ2_ C o n F → i - o - d o 2 | Function Output DQ2. | - | UINT16 | CANopen 3007:Bₕ |
| | **1 / Freely Available** / n o n E: Available as required | - | R/W | Modbus 1814 |
| | **2 / No Fault** / n F L t: Signals operating states Ready To Switch On, Switched On and Operation Enabled | - | per. | Profibus 1814 |
| | **3 / Active** / A c t i: Signals operating state Operation Enabled | - | - | CIP 107.1.11 |
| | **4 / RMAC Active Or Finished** / r Π c A: Relative movement after capture active or finished (RMAC) | | | ModbusTCP 1814 |
| | **5 / In Position Deviation Window** / i n - P: Position deviation is within window | | | EtherCAT 3007:Bₕ |
| | **6 / In Velocity Deviation Window** / i n - V: Velocity deviation is within window | | | PROFINET 1814 |
| | **7 / Velocity Below Threshold** / V t h r: Motor velocity below threshold | | | |
| | **8 / Current Below Threshold** / i t h r: Motor current below threshold | | | |
| | **9 / Halt Acknowledge** / h A L t: Halt acknowledgement | | | |
| | **11 / Motion Sequence: Start Acknowledge** / d S A c: Motion Sequence: Acknowledgement of start request | | | |
| | **13 / Motor Standstill** / Π S t d: Motor at a standstill | | | |
| | **14 / Selected Error** / S E r r: One of the specified errors of error classes 1 … 4 is active | | | |
| | **15 / Valid Reference (ref_ok)** / r E F o: Zero point is valid (ref_ok) | | | |
| | **16 / Selected Warning** / S W r n: One of the specified errors of error class 0 is active | | | |
| | **17 / Motion Sequence: Done** / Π S C o: Motion Sequence: Sequence done | | | |
| | **18 / Position Register Channel 1** / P r C 1: Position register channel 1 | | | |
| | **19 / Position Register Channel 2** / P r C 2: Position register channel 2 | | | |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **20 / Position Register Channel 3 /** $P \, r \, C \, 3$: Position register channel 3 | | | |
| | **21 / Position Register Channel 4 /** $P \, r \, C \, 4$: Position register channel 4 | | | |
| | **22 / Motor Moves Positive /** $\Pi \, P \, o \, 5$: Motor moves in positive direction | | | |
| | **23 / Motor Moves Negative /** $\Pi \, n \, E \, G$: Motor moves in negative direction | | | |
| | Setting can only be modified if power stage is disabled. | | | |
| | Modified settings become active the next time the product is powered on. | | | |
| *IOM1_AI11_I_max* $C \, o \, n \, F \rightarrow \, \iota \, - \, o \, -$ $L \, I \, I \, \iota$ | IOM1 Limitation of current at 10 V of AI11. In increments of 0.01 $A_{rms}$. Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. Available with firmware version ≥V01.06. | $A_{rms}$ 0.00 3.00 463.00 | UINT16 R/W per. - | CANopen 304F:F$_h$ Modbus 20254 Profibus 20254 CIP 179.1.15 ModbusTCP 20254 EtherCAT 304F:F$_h$ PROFINET 20254 |
| *IOM1_AI11_M_scale* $C \, o \, n \, F \rightarrow \, \iota \, - \, o \, -$ $t \, I \, I \, t$ | IOM1 Target torque at 10 V in operating mode Profile Torque of AI11. 100.0 % correspond to the continuous stall torque _M_M_0. By using a negative sign, you can invert the evaluation of the analog signal. In increments of 0.1 %. Modified settings become active immediately. Available with firmware version ≥V01.06. | % -3000.0 100.0 3000.0 | INT16 R/W per. - | CANopen 304F:12$_h$ Modbus 20260 Profibus 20260 CIP 179.1.18 ModbusTCP 20260 EtherCAT 304F:12$_h$ PROFINET 20260 |
| *IOM1_AI11_mode* $C \, o \, n \, F \rightarrow \, \iota \, - \, o \, -$ $A \, I \, I \, \upsilon$ | IOM1 Type of usage of AI11. **0 / None /** $n \, o \, n \, E$: No function **1 / Target Velocity /** $5 \, P \, d \, 5$: Target velocity for the velocity controller **2 / Target Torque /** $t \, r \, 9 \, 5$: Target torque for the current controller **3 / Velocity Limitation /** $L \, 5 \, P \, d$: Limitation of the reference velocity for the velocity controller **4 / Current Limitation /** $L \, c \, u \, r$: Limitation of the reference current for the current controller Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. Available with firmware version ≥V01.06. | - 0 1 4 | UINT16 R/W per. - | CANopen 304F:E$_h$ Modbus 20252 Profibus 20252 CIP 179.1.14 ModbusTCP 20252 EtherCAT 304F:E$_h$ PROFINET 20252 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOM1_AI11_offset* ⊏ o n F → ι - o - A I I o | IOM1 Offset voltage of AI11. The analog input AI11 is corrected/offset by the offset value. If you have defined a zero voltage window, this window is effective in the zero pass range of the corrected analog input AI11. Modified settings become active immediately. Available with firmware version ≥V01.06. | mV -5000 0 5000 | INT16 R/W per. - | CANopen 304F:B$_h$ Modbus 20246 Profibus 20246 CIP 179.1.11 ModbusTCP 20246 EtherCAT 304F:B$_h$ PROFINET 20246 |
| *IOM1_AI11_Tau* ⊏ o n F → ι - o - A I I F | IOM1 Filter time constant of AI11. First-order low pass (PT1) filter time constant for analog input AI11. In increments of 0.01 ms. Modified settings become active immediately. Available with firmware version ≥V01.06. | ms 0.00 0.00 327.67 | UINT16 R/W per. - | CANopen 304F:2$_h$ Modbus 20228 Profibus 20228 CIP 179.1.2 ModbusTCP 20228 EtherCAT 304F:2$_h$ PROFINET 20228 |
| *IOM1_AI11_v_max* | IOM1 Limitation of velocity at 10 V of AI11. The maximum velocity is limited to the setting in CTRL_v_max. The minimum velocity is internally limited to 100 RPM. Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. Available with firmware version ≥V01.06. | usr_v 1 3000 2147483647 | UINT32 R/W per. - | CANopen 304F:10$_h$ Modbus 20256 Profibus 20256 CIP 179.1.16 ModbusTCP 20256 EtherCAT 304F:10$_h$ PROFINET 20256 |
| *IOM1_AI11_v_scale* | IOM1 Target velocity at 10 V in operating mode Profile Velocity of AI11. The maximum velocity is limited to the setting in CTRL_v_max. By using a negative sign, you can invert the evaluation of the analog signal. Modified settings become active immediately. Available with firmware version ≥V01.06. | usr_v -2147483648 6000 2147483647 | INT32 R/W per. - | CANopen 304F:11$_h$ Modbus 20258 Profibus 20258 CIP 179.1.17 ModbusTCP 20258 EtherCAT 304F:11$_h$ PROFINET 20258 |
| *IOM1_AI11_win* ⊏ o n F → ι - o - A I I W | IOM1 Zero voltage window of AI11. Threshold value up to which an input voltage value is treated as 0 V. Example: Value 20, this means a range from -20 ... +20 mV is treated as 0 mV. Modified settings become active immediately. Available with firmware version ≥V01.06. | mV 0 0 1000 | UINT16 R/W per. - | CANopen 304F:9$_h$ Modbus 20242 Profibus 20242 CIP 179.1.9 ModbusTCP 20242 EtherCAT 304F:9$_h$ PROFINET 20242 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOM1_AI12_I_max* ⊏ ⍙ ⊓ ⎓ → ı - ⍙ - ⎿ 1 2 ı | IOM1 Limitation of current at 10 V of AI12. In increments of 0.01 A$_{rms}$. Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. Available with firmware version ≥V01.06. | A$_{rms}$ 0.00 3.00 463.00 | UINT16 R/W per. - | CANopen 304F:14$_h$ Modbus 20264 Profibus 20264 CIP 179.1.20 ModbusTCP 20264 EtherCAT 304F:14$_h$ PROFINET 20264 |
| *IOM1_AI12_M_scale* ⊏ ⍙ ⊓ ⎓ → ı - ⍙ - �ᴛ 1 2 ı | IOM1 Target torque at 10 V in operating mode Profile Torque of AI12. 100.0 % correspond to the continuous stall torque _M_M_0. By using a negative sign, you can invert the evaluation of the analog signal. In increments of 0.1 %. Modified settings become active immediately. Available with firmware version ≥V01.06. | % -3000.0 100.0 3000.0 | INT16 R/W per. - | CANopen 304F:17$_h$ Modbus 20270 Profibus 20270 CIP 179.1.23 ModbusTCP 20270 EtherCAT 304F:17$_h$ PROFINET 20270 |
| *IOM1_AI12_mode* ⊏ ⍙ ⊓ ⎓ → ı - ⍙ - ⍲ 1 2 �=› | IOM1 Type of usage of AI12. **0 / None /** ⍲ ⍙ ⍲ ⴹ : No function **1 / Target Velocity /** 5 �ᑭ ⍼ 5 : Target velocity for the velocity controller **2 / Target Torque /** ⴹ ⍐ ᕴ 5 : Target torque for the current controller **3 / Velocity Limitation /** ⎿ 5 ᑭ ⍼ : Limitation of the reference velocity for the velocity controller **4 / Current Limitation /** ⎿ ⊏ ⍴ ⍐ : Limitation of the reference current for the current controller Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. Available with firmware version ≥V01.06. | - 0 0 4 | UINT16 R/W per. - | CANopen 304F:13$_h$ Modbus 20262 Profibus 20262 CIP 179.1.19 ModbusTCP 20262 EtherCAT 304F:13$_h$ PROFINET 20262 |
| *IOM1_AI12_offset* ⊏ ⍙ ⊓ ⎓ → ı - ⍙ - ⍲ 1 2 ⍙ | IOM1 Offset voltage of AI12. The analog input AI12 is corrected/offset by the offset value. If you have defined a zero voltage window, this window is effective in the zero pass range of the corrected analog input AI12. Modified settings become active immediately. Available with firmware version ≥V01.06. | mV -5000 0 5000 | INT16 R/W per. - | CANopen 304F:C$_h$ Modbus 20248 Profibus 20248 CIP 179.1.12 ModbusTCP 20248 EtherCAT 304F:C$_h$ PROFINET 20248 |
| *IOM1_AI12_Tau* ⊏ ⍙ ⊓ ⎓ → ı - ⍙ - ⍲ 1 2 ⎓ | IOM1 Filter time constant of AI12. First-order low pass (PT1) filter time constant for analog input AI12. In increments of 0.01 ms. Modified settings become active immediately. Available with firmware version ≥V01.06. | ms 0.00 0.00 327.67 | UINT16 R/W per. - | CANopen 304F:18$_h$ Modbus 20272 Profibus 20272 CIP 179.1.24 ModbusTCP 20272 EtherCAT 304F:18$_h$ PROFINET 20272 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOM1_AI12_v_max* | IOM1 Limitation of velocity at 10 V of AI12.<br><br>The maximum velocity is limited to the setting in CTRL_v_max.<br><br>The minimum velocity is internally limited to 100 RPM.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.06. | usr_v<br><br>1<br><br>3000<br><br>2147483647 | UINT32<br><br>R/W<br><br>per.<br><br>- | CANopen 304F:15$_h$<br><br>Modbus 20266<br><br>Profibus 20266<br><br>CIP 179.1.21<br><br>ModbusTCP 20266<br><br>EtherCAT 304F:15$_h$<br><br>PROFINET 20266 |
| *IOM1_AI12_v_scale* | IOM1 Target velocity at 10 V in operating mode Profile Velocity of AI12.<br><br>The maximum velocity is limited to the setting in CTRL_v_max.<br><br>By using a negative sign, you can invert the evaluation of the analog signal.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.06. | usr_v<br><br>-2147483648<br><br>6000<br><br>2147483647 | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 304F:16$_h$<br><br>Modbus 20268<br><br>Profibus 20268<br><br>CIP 179.1.22<br><br>ModbusTCP 20268<br><br>EtherCAT 304F:16$_h$<br><br>PROFINET 20268 |
| *IOM1_AI12_win*<br><br>$ConF \rightarrow \iota\text{-}o\text{-}$<br><br>$A\,l2W$ | IOM1 Zero voltage window of AI12.<br><br>Threshold value up to which an input voltage value is treated as 0 V.<br><br>Example: Value 20, this means a range from -20 ... +20 mV is treated as 0 mV.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.06. | mV<br><br>0<br><br>0<br><br>1000 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 304F:A$_h$<br><br>Modbus 20244<br><br>Profibus 20244<br><br>CIP 179.1.10<br><br>ModbusTCP 20244<br><br>EtherCAT 304F:A$_h$<br><br>PROFINET 20244 |
| *IOM1_AQ_ErrResp* | IOM1 Error response to overload of analog outputs.<br><br>**0 / Error Class 0**: Error class 0<br><br>**1 / Error Class 1**: Error class 1<br><br>**2 / Error Class 2**: Error class 2<br><br>**3 / Error Class 3**: Error class 3<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled. | -<br><br>0<br><br>1<br><br>3 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 304F:1F$_h$<br><br>Modbus 20286<br><br>Profibus 20286<br><br>CIP 179.1.31<br><br>ModbusTCP 20286<br><br>EtherCAT 304F:1F$_h$<br><br>PROFINET 20286 |
| *IOM1_AQ_mode*<br><br>$ConF \rightarrow \iota\text{-}o\text{-}$<br><br>$A o t\,Y$ | IOM1 Type of usage of analog outputs.<br><br>**0 / none /** $nonE$ : Analog outputs are deactivated<br><br>**1 / Voltage /** $VolE$ : Both analog outputs are voltage outputs<br><br>**2 / Current /** $Curr$ : Both analog outputs are current outputs<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on.<br><br>Available with firmware version ≥V01.06. | -<br><br>0<br><br>0<br><br>2 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 304F:20$_h$<br><br>Modbus 20288<br><br>Profibus 20288<br><br>CIP 179.1.32<br><br>ModbusTCP 20288<br><br>EtherCAT 304F:20$_h$<br><br>PROFINET 20288 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOM1_AQ11_FixVal* | IOM1 Fixed value for AQ11.<br><br>Only available if parameter IOM1_AQ11_func is set to 'Fixed Value'.<br><br>Unit and range depend on setting in parameter IOM1_AQ_mode.<br><br>If setting is 'Voltage':<br><br>Unit: mV<br><br>Range: -10000 … 10000<br><br>If setting is 'Current':<br><br>Unit: µA<br><br>Range: 0 … 20000<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.06. | -<br><br>-10000<br><br>0<br><br>20000 | INT16<br><br>R/W<br><br>-<br><br>- | CANopen 304F:24h<br><br>Modbus 20296<br><br>Profibus 20296<br><br>CIP 179.1.36<br><br>ModbusTCP 20296<br><br>EtherCAT 304F:24h<br><br>PROFINET 20296 |
| *IOM1_AQ11_func*<br><br>$ConF \to i\text{-}o\text{-}$<br><br>$A11n$ | IOM1 Function of AQ11.<br><br>**0 / None / $nonE$**: No function<br><br>**1 / Actual Velocity / $VACt$**: Actual velocity (10 V / 20 mA correspond to value in CTRL_v_max)<br><br>**2 / Actual Torque / $tAct$**: Actual torque (10 V / 20 mA correspond to value in CTRL_I_max)<br><br>**3 / Reference Velocity / $VrEF$**: Reference velocity (10 V / 20 mA correspond to value in CTRL_v_max)<br><br>**4 / Reference Torque / $trEF$**: Reference torque (10 V / 20 mA correspond to value in CTRL_I_max)<br><br>**5 / Position Deviation / $PdiF$**: Position deviation (10 V / 20 mA correspond to value in MON_p_dif_load_usr)<br><br>**6 / Fixed Value / $FiVA$**: Fixed value (setting in parameter IOM1_AQ11_FixVal)<br><br>**7 / Actual Position / $PAct$**: Actual position in the modulo range (10 V / 20 mA correspond to value in MOD_Max)<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.06. | -<br><br>0<br><br>0<br><br>7 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 304F:21h<br><br>Modbus 20290<br><br>Profibus 20290<br><br>CIP 179.1.33<br><br>ModbusTCP 20290<br><br>EtherCAT 304F:21h<br><br>PROFINET 20290 |
| *IOM1_AQ11_I_range*<br><br>$ConF \to i\text{-}o\text{-}$<br><br>$A11C$ | IOM1 Range of current of AQ11.<br><br>**0 / 0-20mA / $0\text{-}2$**: 0 mA … 20 mA (0 mA correspond to 0 user-defined units)<br><br>**1 / 4-20mA unsigned / $4\text{-}2u$**: 4 mA … 20 mA (4 mA correspond to 0 user-defined units)<br><br>**2 / 4-20mA signed / $4\text{-}2S$**: 4 mA … 20 mA (12 mA correspond to 0 user-defined units)<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on.<br><br>Available with firmware version ≥V01.06. | -<br><br>0<br><br>0<br><br>2 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 304F:22h<br><br>Modbus 20292<br><br>Profibus 20292<br><br>CIP 179.1.34<br><br>ModbusTCP 20292<br><br>EtherCAT 304F:22h<br><br>PROFINET 20292 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOM1_AQ11_invert* | IOM1 Inversion of AQ11.<br><br>Only available if output is set to a voltage output.<br><br>Value 0: No inversion<br><br>Value 1: Inversion active<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.06. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 304F:23ₕ<br><br>Modbus 20294<br><br>Profibus 20294<br><br>CIP 179.1.35<br><br>ModbusTCP 20294<br><br>EtherCAT 304F:23ₕ<br><br>PROFINET 20294 |
| *IOM1_AQ12_FixVal* | IOM1 Fixed value for AQ12.<br><br>Only available if parameter IOM1_AQ12_func is set to 'Fixed Value'.<br><br>Unit and range depend on setting in parameter IOM1_AQ_mode.<br><br>If setting is 'Voltage':<br><br>Unit: mV<br><br>Range: -10000 … 10000<br><br>If setting is 'Current':<br><br>Unit: µA<br><br>Range: 0 … 20000<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.06. | -<br><br>-10000<br><br>0<br><br>20000 | INT16<br><br>R/W<br><br>-<br><br>- | CANopen 304F:2Eₕ<br><br>Modbus 20316<br><br>Profibus 20316<br><br>CIP 179.1.46<br><br>ModbusTCP 20316<br><br>EtherCAT 304F:2Eₕ<br><br>PROFINET 20316 |
| *IOM1_AQ12_func*<br><br>ConF → i-o-<br><br>A12n | IOM1 Function of AQ12.<br><br>0 / **None** / nonE: No function<br><br>1 / **Actual Velocity** / VACt: Actual velocity (10 V / 20 mA correspond to value in CTRL_v_max)<br><br>2 / **Actual Torque** / tAct: Actual torque (10 V / 20 mA correspond to value in CTRL_I_max)<br><br>3 / **Reference Velocity** / VrEF: Reference velocity (10 V / 20 mA correspond to value in CTRL_v_max)<br><br>4 / **Reference Torque** / trEF: Reference torque (10 V / 20 mA correspond to value in CTRL_I_max)<br><br>5 / **Position Deviation** / PdiF: Position deviation (10 V / 20 mA correspond to value in MON_p_dif_load_usr)<br><br>6 / **Fixed Value** / FiVA: Fixed value (setting in parameter IOM1_AQ12_FixVal)<br><br>7 / **Actual Position** / PAct: Actual position in the modulo range (10 V / 20 mA correspond to value in MOD_Max)<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.06. | -<br><br>0<br><br>0<br><br>7 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 304F:2Bₕ<br><br>Modbus 20310<br><br>Profibus 20310<br><br>CIP 179.1.43<br><br>ModbusTCP 20310<br><br>EtherCAT 304F:2Bₕ<br><br>PROFINET 20310 |

| Parameter name<br>HMI menu<br>HMI name | Description | Unit<br>Minimum value<br>Factory setting<br>Maximum value | Data type<br>R/W<br>Persistent<br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOM1_AQ12_I_range*<br>$\mathcal{L} \circ \cap \mathcal{F} \rightarrow \iota - \circ -$<br>$\mathcal{H} \, \mathit{l} \, \mathcal{Z} \, \mathcal{L}$ | IOM1 Range of current of AQ12.<br><br>**0 / 0-20mA /** $\mathit{0} - \mathit{2}$: 0 mA … 20 mA (0 mA correspond to 0 user-defined units)<br><br>**1 / 4-20mA unsigned /** $\mathit{4} - \mathit{2} \, \mathit{u}$: 4 mA … 20 mA (4 mA correspond to 0 user-defined units)<br><br>**2 / 4-20mA signed /** $\mathit{4} - \mathit{2} \, \mathit{5}$: 4 mA … 20 mA (12 mA correspond to 0 user-defined units)<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on.<br><br>Available with firmware version ≥V01.06. | -<br><br>0<br><br>0<br><br>2 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 304F:2C$_h$<br><br>Modbus 20312<br><br>Profibus 20312<br><br>CIP 179.1.44<br><br>ModbusTCP 20312<br><br>EtherCAT 304F:2C$_h$<br><br>PROFINET 20312 |
| *IOM1_AQ12_invert* | IOM1 Inversion of AQ12.<br><br>Only available if output is set to a voltage output.<br><br>Value 0: No inversion<br><br>Value 1: Inversion active<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.06. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 304F:2D$_h$<br><br>Modbus 20314<br><br>Profibus 20314<br><br>CIP 179.1.45<br><br>ModbusTCP 20314<br><br>EtherCAT 304F:2D$_h$<br><br>PROFINET 20314 |
| *IOM1_DI_10_Deb* | IOM1 Debounce time of DI10.<br><br>**0 / No**: No software debouncing<br><br>**1 / 0.25 ms**: 0.25 ms<br><br>**2 / 0.50 ms**: 0.50 ms<br><br>**3 / 0.75 ms**: 0.75 ms<br><br>**4 / 1.00 ms**: 1.00 ms<br><br>**5 / 1.25 ms**: 1.25 ms<br><br>**6 / 1.50 ms**: 1.50 ms<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.06. | -<br><br>0<br><br>6<br><br>6 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 304F:40$_h$<br><br>Modbus 20352<br><br>Profibus 20352<br><br>CIP 179.1.64<br><br>ModbusTCP 20352<br><br>EtherCAT 304F:40$_h$<br><br>PROFINET 20352 |
| *IOM1_DI_11_Deb* | IOM1 Debounce time of DI11.<br><br>**0 / No**: No software debouncing<br><br>**1 / 0.25 ms**: 0.25 ms<br><br>**2 / 0.50 ms**: 0.50 ms<br><br>**3 / 0.75 ms**: 0.75 ms<br><br>**4 / 1.00 ms**: 1.00 ms<br><br>**5 / 1.25 ms**: 1.25 ms<br><br>**6 / 1.50 ms**: 1.50 ms<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.06. | -<br><br>0<br><br>6<br><br>6 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 304F:41$_h$<br><br>Modbus 20354<br><br>Profibus 20354<br><br>CIP 179.1.65<br><br>ModbusTCP 20354<br><br>EtherCAT 304F:41$_h$<br><br>PROFINET 20354 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOM1_DI_12_Deb* | IOM1 Debounce time of DI12. **0 / No**: No software debouncing **1 / 0.25 ms**: 0.25 ms **2 / 0.50 ms**: 0.50 ms **3 / 0.75 ms**: 0.75 ms **4 / 1.00 ms**: 1.00 ms **5 / 1.25 ms**: 1.25 ms **6 / 1.50 ms**: 1.50 ms Setting can only be modified if power stage is disabled. Modified settings become active immediately. Available with firmware version ≥V01.06. | - 0 6 6 | UINT16 R/W per. - | CANopen 304F:42$_h$ Modbus 20356 Profibus 20356 CIP 179.1.66 ModbusTCP 20356 EtherCAT 304F:42$_h$ PROFINET 20356 |
| *IOM1_DI_13_Deb* | IOM1 Debounce time of DI13. **0 / No**: No software debouncing **1 / 0.25 ms**: 0.25 ms **2 / 0.50 ms**: 0.50 ms **3 / 0.75 ms**: 0.75 ms **4 / 1.00 ms**: 1.00 ms **5 / 1.25 ms**: 1.25 ms **6 / 1.50 ms**: 1.50 ms Setting can only be modified if power stage is disabled. Modified settings become active immediately. Available with firmware version ≥V01.06. | - 0 6 6 | UINT16 R/W per. - | CANopen 304F:43$_h$ Modbus 20358 Profibus 20358 CIP 179.1.67 ModbusTCP 20358 EtherCAT 304F:43$_h$ PROFINET 20358 |
| *IOM1_DQ_set* | IOM1 Setting the digital outputs directly. Digital outputs can only be set directly if the signal output function has been set to 'Available as required'. Bit assignments: Bit 0: DQ10 Bit 1: DQ11 | - - - - | UINT16 R/W - - | CANopen 304F:37$_h$ Modbus 20334 Profibus 20334 CIP 179.1.55 ModbusTCP 20334 EtherCAT 304F:37$_h$ PROFINET 20334 |

| Parameter name<br>HMI menu<br>HMI name | Description | Unit<br>Minimum value<br>Factory setting<br>Maximum value | Data type<br>R/W<br>Persistent<br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOM1_IOfunct_DI10*<br><br>`ConF → i-o-`<br>`di10` | IOM1 Function Input DI10.<br><br>**1 / Freely Available /** `nonE`: Available as required<br><br>**2 / Fault Reset /** `FrES`: Fault reset after error<br><br>**3 / Enable /** `EnAb`: Enables the power stage<br><br>**4 / Halt /** `hALt`: Halt<br><br>**5 / Start Profile Positioning /** `SPtP`: Start request for movement<br><br>**6 / Current Limitation /** `iLiM`: Limits the current to parameter value<br><br>**7 / Zero Clamp /** `CLMP`: Zero clamping<br><br>**8 / Velocity Limitation /** `VLiM`: Limits the velocity to parameter value<br><br>**9 / Jog Positive /** `JoGP`: Jog: Moves in positive direction<br><br>**10 / Jog Negative /** `JoGn`: Jog: Moves in negative direction<br><br>**11 / Jog Fast/Slow /** `JoGF`: Jog: Switches between slow and fast movement<br><br>**12 / Gear Ratio Switch /** `GrAt`: Electronic Gear: Switches between two gear ratios<br><br>**13 / Start Single Data Set /** `dStA`: Motion Sequence: Starts a single data set<br><br>**14 / Data Set Select /** `dSEL`: Motion Sequence: Data set selection<br><br>**15 / Data Set Bit 0 /** `dSb0`: Motion Sequence: Data set bit 0<br><br>**16 / Data Set Bit 1 /** `dSb1`: Motion Sequence: Data set bit 1<br><br>**17 / Data Set Bit 2 /** `dSb2`: Motion Sequence: Data set bit 2<br><br>**18 / Data Set Bit 3 /** `dSb3`: Motion Sequence: Data set bit 3<br><br>**19 / Gear Offset 1 /** `GoF1`: Electronic Gear: Adds first gear offset<br><br>**20 / Gear Offset 2 /** `GoF2`: Electronic Gear: Adds second gear offset<br><br>**21 / Reference Switch (REF) /** `rEF`: Reference switch<br><br>**22 / Positive Limit Switch (LIMP) /** `LiMP`: Positive limit switch<br><br>**23 / Negative Limit Switch (LIMN) /** `LiMn`: Negative limit switch<br><br>**24 / Switch Controller Parameter Set /** `CPAr`: Switches control loop parameter set<br><br>**27 / Operating Mode Switch /** `MSWt`: Switches operating mode<br><br>**28 / Velocity Controller Integral Off /** `tnoF`: Switches off velocity controller integral term<br><br>**29 / Start Motion Sequence /** `StMS`: Motion Sequence: Starts a motion sequence | -<br>-<br>-<br>- | UINT16<br>R/W<br>per.<br>- | CANopen 304F:50h<br>Modbus 20384<br>Profibus 20384<br>CIP 179.1.80<br>ModbusTCP 20384<br>EtherCAT 304F:50h<br>PROFINET 20384 |

| Parameter name  HMI menu  HMI name | Description | Unit  Minimum value  Factory setting  Maximum value | Data type  R/W  Persistent  Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **31 / Activate RMAC /** $A\,r\,\Pi\,c$ : Activates the relative movement after capture (RMAC) | | | |
| | **32 / Activate Operating Mode /** $A\,c\,o\,P$ : Activates operating mode | | | |
| | **35 / Data Set Bit 4 /** $d\,5\,b\,4$ : Motion Sequence: Data set bit 4 | | | |
| | **36 / Data Set Bit 5 /** $d\,5\,b\,5$ : Motion Sequence: Data set bit 5 | | | |
| | **37 / Data Set Bit 6 /** $d\,5\,b\,6$ : Motion Sequence: Data set bit 6 | | | |
| | **38 / Inversion AI11 (IO Module) /** $A\,1\,1\,i$ : Inverts analog input AI11 (I/O module) | | | |
| | **39 / Inversion AI12 (IO Module) /** $A\,1\,2\,i$ : Inverts analog input AI12 (I/O module) | | | |
| | **40 / Release Holding Brake /** $r\,E\,h\,b$ : Releases the holding brake | | | |
| | Setting can only be modified if power stage is disabled. | | | |
| | Modified settings become active the next time the product is powered on. | | | |
| | Available with firmware version ≥V01.06. | | | |
| *IOM1_IOfunct_DI11*  $C\,o\,n\,F \rightarrow \iota\,-\,o\,-$  $d\,\iota\,1\,1$ | IOM1 Function Input DI11. | - | UINT16 | CANopen 304F:51ₕ |
| | **1 / Freely Available /** $n\,o\,n\,E$ : Available as required | - | R/W | Modbus 20386 |
| | **2 / Fault Reset /** $F\,r\,E\,5$ : Fault reset after error | - | per. | Profibus 20386 |
| | **3 / Enable /** $E\,n\,A\,b$ : Enables the power stage | - | - | CIP 179.1.81 |
| | **4 / Halt /** $h\,A\,L\,t$ : Halt | | | ModbusTCP 20386 |
| | **5 / Start Profile Positioning /** $5\,P\,t\,P$ : Start request for movement | | | EtherCAT 304F:51ₕ |
| | **6 / Current Limitation /** $\iota\,L\,\iota\,\Pi$ : Limits the current to parameter value | | | PROFINET 20386 |
| | **7 / Zero Clamp /** $C\,L\,\Pi\,P$ : Zero clamping | | | |
| | **8 / Velocity Limitation /** $V\,L\,\iota\,\Pi$ : Limits the velocity to parameter value | | | |
| | **9 / Jog Positive /** $J\,o\,G\,P$ : Jog: Moves in positive direction | | | |
| | **10 / Jog Negative /** $J\,o\,G\,n$ : Jog: Moves in negative direction | | | |
| | **11 / Jog Fast/Slow /** $J\,o\,G\,F$ : Jog: Switches between slow and fast movement | | | |
| | **12 / Gear Ratio Switch /** $G\,r\,A\,t$ : Electronic Gear: Switches between two gear ratios | | | |
| | **13 / Start Single Data Set /** $d\,5\,t\,A$ : Motion Sequence: Starts a single data set | | | |
| | **14 / Data Set Select /** $d\,5\,E\,L$ : Motion Sequence: Data set selection | | | |
| | **15 / Data Set Bit 0 /** $d\,5\,b\,0$ : Motion Sequence: Data set bit 0 | | | |
| | **16 / Data Set Bit 1 /** $d\,5\,b\,1$ : Motion Sequence: Data set bit 1 | | | |
| | **17 / Data Set Bit 2 /** $d\,5\,b\,2$ : Motion Sequence: Data set bit 2 | | | |

| Parameter name / HMI menu / HMI name | Description | Unit / Minimum value / Factory setting / Maximum value | Data type / R/W / Persistent / Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **18 / Data Set Bit 3 /** d S b 3: Motion Sequence: Data set bit 3 | | | |
| | **19 / Gear Offset 1 /** G o F 1: Electronic Gear: Adds first gear offset | | | |
| | **20 / Gear Offset 2 /** G o F 2: Electronic Gear: Adds second gear offset | | | |
| | **21 / Reference Switch (REF) /** r E F: Reference switch | | | |
| | **22 / Positive Limit Switch (LIMP) /** L i Π P: Positive limit switch | | | |
| | **23 / Negative Limit Switch (LIMN) /** L i Π n: Negative limit switch | | | |
| | **24 / Switch Controller Parameter Set /** C P A r: Switches control loop parameter set | | | |
| | **27 / Operating Mode Switch /** Π S W t: Switches operating mode | | | |
| | **28 / Velocity Controller Integral Off /** t n o F: Switches off velocity controller integral term | | | |
| | **29 / Start Motion Sequence /** S t Π S: Motion Sequence: Starts a motion sequence | | | |
| | **31 / Activate RMAC /** A r Π c: Activates the relative movement after capture (RMAC) | | | |
| | **32 / Activate Operating Mode /** A c o P: Activates operating mode | | | |
| | **35 / Data Set Bit 4 /** d S b 4: Motion Sequence: Data set bit 4 | | | |
| | **36 / Data Set Bit 5 /** d S b 5: Motion Sequence: Data set bit 5 | | | |
| | **37 / Data Set Bit 6 /** d S b 6: Motion Sequence: Data set bit 6 | | | |
| | **38 / Inversion AI11 (IO Module) /** A I 1 i: Inverts analog input AI11 (I/O module) | | | |
| | **39 / Inversion AI12 (IO Module) /** A I 2 i: Inverts analog input AI12 (I/O module) | | | |
| | **40 / Release Holding Brake /** r E h b: Releases the holding brake | | | |
| | Setting can only be modified if power stage is disabled. | | | |
| | Modified settings become active the next time the product is powered on. | | | |
| | Available with firmware version ≥V01.06. | | | |
| *IOM1_IOfunct_DI12* | IOM1 Function Input DI12. | - | UINT16 | CANopen 304F:52h |
| C o n F → i - o - d i 12 | **1 / Freely Available /** n o n E: Available as required | - | R/W | Modbus 20388 |
| | **2 / Fault Reset /** F r E S: Fault reset after error | - | per. | Profibus 20388 |
| | **3 / Enable /** E n A b: Enables the power stage | - | - | CIP 179.1.82 |
| | **4 / Halt /** h A L t: Halt | | | ModbusTCP 20388 |
| | **5 / Start Profile Positioning /** S P t P: Start request for movement | | | EtherCAT 304F:52h |
| | **6 / Current Limitation /** i L i Π: Limits the current to parameter value | | | PROFINET 20388 |
| | **7 / Zero Clamp /** C L Π P: Zero clamping | | | |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **8 / Velocity Limitation /** $V L \cdot \Pi$: Limits the velocity to parameter value | | | |
| | **9 / Jog Positive /** $J o G P$: Jog: Moves in positive direction | | | |
| | **10 / Jog Negative /** $J o G n$: Jog: Moves in negative direction | | | |
| | **11 / Jog Fast/Slow /** $J o G F$: Jog: Switches between slow and fast movement | | | |
| | **12 / Gear Ratio Switch /** $G r A t$: Electronic Gear: Switches between two gear ratios | | | |
| | **13 / Start Single Data Set /** $d S t A$: Motion Sequence: Starts a single data set | | | |
| | **14 / Data Set Select /** $d S E L$: Motion Sequence: Data set selection | | | |
| | **15 / Data Set Bit 0 /** $d S b 0$: Motion Sequence: Data set bit 0 | | | |
| | **16 / Data Set Bit 1 /** $d S b 1$: Motion Sequence: Data set bit 1 | | | |
| | **17 / Data Set Bit 2 /** $d S b 2$: Motion Sequence: Data set bit 2 | | | |
| | **18 / Data Set Bit 3 /** $d S b 3$: Motion Sequence: Data set bit 3 | | | |
| | **19 / Gear Offset 1 /** $G o F 1$: Electronic Gear: Adds first gear offset | | | |
| | **20 / Gear Offset 2 /** $G o F 2$: Electronic Gear: Adds second gear offset | | | |
| | **21 / Reference Switch (REF) /** $r E F$: Reference switch | | | |
| | **22 / Positive Limit Switch (LIMP) /** $L \cdot \Pi P$: Positive limit switch | | | |
| | **23 / Negative Limit Switch (LIMN) /** $L \cdot \Pi n$: Negative limit switch | | | |
| | **24 / Switch Controller Parameter Set /** $C P A r$: Switches control loop parameter set | | | |
| | **27 / Operating Mode Switch /** $\Pi S W t$: Switches operating mode | | | |
| | **28 / Velocity Controller Integral Off /** $t n o F$: Switches off velocity controller integral term | | | |
| | **29 / Start Motion Sequence /** $S t \Pi S$: Motion Sequence: Starts a motion sequence | | | |
| | **31 / Activate RMAC /** $A r \Pi c$: Activates the relative movement after capture (RMAC) | | | |
| | **32 / Activate Operating Mode /** $A c o P$: Activates operating mode | | | |
| | **35 / Data Set Bit 4 /** $d S b 4$: Motion Sequence: Data set bit 4 | | | |
| | **36 / Data Set Bit 5 /** $d S b 5$: Motion Sequence: Data set bit 5 | | | |
| | **37 / Data Set Bit 6 /** $d S b 6$: Motion Sequence: Data set bit 6 | | | |
| | **38 / Inversion AI11 (IO Module) /** $A I 1 1$: Inverts analog input AI11 (I/O module) | | | |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **39 / Inversion AI12 (IO Module) /** $A$ $I2$ $i$: Inverts analog input AI12 (I/O module) **40 / Release Holding Brake /** $r$ $E$ $h$ $b$: Releases the holding brake Setting can only be modified if power stage is disabled. Modified settings become active the next time the product is powered on. Available with firmware version ≥V01.06. | | | |
| *IOM1_IOfunct_DI13* $[$ $o$ $n$ $F$ $\rightarrow$ $i$ - $o$ - $d$ $i$ $I3$ | IOM1 Function Input DI13. **1 / Freely Available /** $n$ $o$ $n$ $E$: Available as required **2 / Fault Reset /** $F$ $r$ $E$ $5$: Fault reset after error **3 / Enable /** $E$ $n$ $A$ $b$: Enables the power stage **4 / Halt /** $h$ $A$ $L$ $t$: Halt **5 / Start Profile Positioning /** $5$ $P$ $t$ $P$: Start request for movement **6 / Current Limitation /** $i$ $L$ $i$ $\Pi$: Limits the current to parameter value **7 / Zero Clamp /** $[$ $L$ $\Pi$ $P$: Zero clamping **8 / Velocity Limitation /** $V$ $L$ $i$ $\Pi$: Limits the velocity to parameter value **9 / Jog Positive /** $J$ $o$ $G$ $P$: Jog: Moves in positive direction **10 / Jog Negative /** $J$ $o$ $G$ $n$: Jog: Moves in negative direction **11 / Jog Fast/Slow /** $J$ $o$ $G$ $F$: Jog: Switches between slow and fast movement **12 / Gear Ratio Switch /** $G$ $r$ $A$ $t$: Electronic Gear: Switches between two gear ratios **13 / Start Single Data Set /** $d$ $5$ $t$ $A$: Motion Sequence: Starts a single data set **14 / Data Set Select /** $d$ $5$ $E$ $L$: Motion Sequence: Data set selection **15 / Data Set Bit 0 /** $d$ $5$ $b$ $0$: Motion Sequence: Data set bit 0 **16 / Data Set Bit 1 /** $d$ $5$ $b$ $I$: Motion Sequence: Data set bit 1 **17 / Data Set Bit 2 /** $d$ $5$ $b$ $2$: Motion Sequence: Data set bit 2 **18 / Data Set Bit 3 /** $d$ $5$ $b$ $3$: Motion Sequence: Data set bit 3 **19 / Gear Offset 1 /** $G$ $o$ $F$ $I$: Electronic Gear: Adds first gear offset **20 / Gear Offset 2 /** $G$ $o$ $F$ $2$: Electronic Gear: Adds second gear offset **21 / Reference Switch (REF) /** $r$ $E$ $F$: Reference switch **22 / Positive Limit Switch (LIMP) /** $L$ $i$ $\Pi$ $P$: Positive limit switch **23 / Negative Limit Switch (LIMN) /** $L$ $i$ $\Pi$ $n$: Negative limit switch | - - - - | UINT16 R/W per. - | CANopen 304F:53$_h$ Modbus 20390 Profibus 20390 CIP 179.1.83 ModbusTCP 20390 EtherCAT 304F:53$_h$ PROFINET 20390 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **24 / Switch Controller Parameter Set /** $\mathcal{C} \, P \, H \, r$ : Switches control loop parameter set | | | |
| | **27 / Operating Mode Switch /** $\Pi \, 5 \, W \, E$ : Switches operating mode | | | |
| | **28 / Velocity Controller Integral Off /** $E \, n \, o \, F$ : Switches off velocity controller integral term | | | |
| | **29 / Start Motion Sequence /** $5 \, E \, \Pi \, 5$ : Motion Sequence: Starts a motion sequence | | | |
| | **31 / Activate RMAC /** $H \, r \, \Pi \, c$ : Activates the relative movement after capture (RMAC) | | | |
| | **32 / Activate Operating Mode /** $H \, c \, o \, P$ : Activates operating mode | | | |
| | **35 / Data Set Bit 4 /** $d \, 5 \, b \, 4$ : Motion Sequence: Data set bit 4 | | | |
| | **36 / Data Set Bit 5 /** $d \, 5 \, b \, 5$ : Motion Sequence: Data set bit 5 | | | |
| | **37 / Data Set Bit 6 /** $d \, 5 \, b \, 6$ : Motion Sequence: Data set bit 6 | | | |
| | **38 / Inversion AI11 (IO Module) /** $H \, I \, I \, i$ : Inverts analog input AI11 (I/O module) | | | |
| | **39 / Inversion AI12 (IO Module) /** $H \, I \, 2 \, i$ : Inverts analog input AI12 (I/O module) | | | |
| | **40 / Release Holding Brake /** $r \, E \, h \, b$ : Releases the holding brake | | | |
| | Setting can only be modified if power stage is disabled. | | | |
| | Modified settings become active the next time the product is powered on. | | | |
| | Available with firmware version ≥V01.06. | | | |
| *IOM1_IOfunct_DQ10* $\mathcal{C} \, o \, n \, F \rightarrow i - o - \\ d \, o \, I \, 0$ | IOM1 Function Output DQ10. | - | UINT16 | CANopen 304F:5A$_h$ |
| | **1 / Freely Available /** $n \, o \, n \, E$ : Available as required | - | R/W | Modbus 20404 |
| | **2 / No Fault /** $n \, F \, L \, E$ : Signals operating states Ready To Switch On, Switched On and Operation Enabled | - | per. | Profibus 20404 |
| | **3 / Active /** $H \, c \, E \, i$ : Signals operating state Operation Enabled | - | - | CIP 179.1.90 |
| | **4 / RMAC Active Or Finished /** $r \, \Pi \, c \, H$ : Relative movement after capture active or finished (RMAC) | | | ModbusTCP 20404 |
| | **5 / In Position Deviation Window /** $i \, n - P$ : Position deviation is within window | | | EtherCAT 304F:5A$_h$ |
| | **6 / In Velocity Deviation Window /** $i \, n - V$ : Velocity deviation is within window | | | PROFINET 20404 |
| | **7 / Velocity Below Threshold /** $V \, E \, h \, r$ : Motor velocity below threshold | | | |
| | **8 / Current Below Threshold /** $i \, E \, h \, r$ : Motor current below threshold | | | |
| | **9 / Halt Acknowledge /** $h \, H \, L \, E$ : Halt acknowledgement | | | |
| | **11 / Motion Sequence: Start Acknowledge /** $d \, 5 \, H \, c$ : Motion Sequence: Acknowledgement of start request | | | |
| | **13 / Motor Standstill /** $\Pi \, 5 \, E \, d$ : Motor at a standstill | | | |

| Parameter name<br>HMI menu<br>HMI name | Description | Unit<br>Minimum value<br>Factory setting<br>Maximum value | Data type<br>R/W<br>Persistent<br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **14 / Selected Error / 5 E ⌐ ⌐**: One of the specified errors of error classes 1 … 4 is active | | | |
| | **15 / Valid Reference (ref_ok) / ⌐ E F ◌**: Zero point is valid (ref_ok) | | | |
| | **16 / Selected Warning / 5 ⊔ ⌐ ⌐**: One of the specified errors of error class 0 is active | | | |
| | **17 / Motion Sequence: Done / Π 5 C ◌**: Motion Sequence: Sequence done | | | |
| | **18 / Position Register Channel 1 / P ⌐ C 1**: Position register channel 1 | | | |
| | **19 / Position Register Channel 2 / P ⌐ C 2**: Position register channel 2 | | | |
| | **20 / Position Register Channel 3 / P ⌐ C 3**: Position register channel 3 | | | |
| | **21 / Position Register Channel 4 / P ⌐ C 4**: Position register channel 4 | | | |
| | **22 / Motor Moves Positive / Π P ◌ 5**: Motor moves in positive direction | | | |
| | **23 / Motor Moves Negative / Π ⌐ E G**: Motor moves in negative direction | | | |
| | Setting can only be modified if power stage is disabled. | | | |
| | Modified settings become active the next time the product is powered on. | | | |
| | Available with firmware version ≥V01.06. | | | |
| *IOM1_IOfunct_DQ11*<br><br>C ◌ ⌐ F → ı - ◌ -<br>d ◌ 1 1 | IOM1 Function Output DQ11. | - | UINT16 | CANopen 304F:5B_h |
| | **1 / Freely Available / ⌐ ◌ ⌐ E**: Available as required | - | R/W | Modbus 20406 |
| | **2 / No Fault / ⌐ F L ⊢**: Signals operating states Ready To Switch On, Switched On and Operation Enabled | - | per. | Profibus 20406 |
| | **3 / Active / A c ⊢ ı**: Signals operating state Operation Enabled | - | - | CIP 179.1.91 |
| | **4 / RMAC Active Or Finished / ⌐ Π c A**: Relative movement after capture active or finished (RMAC) | | | ModbusTCP 20406 |
| | **5 / In Position Deviation Window / ı ⌐ - P**: Position deviation is within window | | | EtherCAT 304F:5B_h |
| | **6 / In Velocity Deviation Window / ı ⌐ - V**: Velocity deviation is within window | | | PROFINET 20406 |
| | **7 / Velocity Below Threshold / V ⊢ h ⌐**: Motor velocity below threshold | | | |
| | **8 / Current Below Threshold / ı ⊢ h ⌐**: Motor current below threshold | | | |
| | **9 / Halt Acknowledge / h A L ⊢**: Halt acknowledgement | | | |
| | **11 / Motion Sequence: Start Acknowledge / d 5 A c**: Motion Sequence: Acknowledgement of start request | | | |
| | **13 / Motor Standstill / Π 5 ⊢ d**: Motor at a standstill | | | |
| | **14 / Selected Error / 5 E ⌐ ⌐**: One of the specified errors of error classes 1 … 4 is active | | | |
| | **15 / Valid Reference (ref_ok) / ⌐ E F ◌**: Zero point is valid (ref_ok) | | | |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| | **16 / Selected Warning / 5 W r n**: One of the specified errors of error class 0 is active<br><br>**17 / Motion Sequence: Done / ∏ 5 C o**: Motion Sequence: Sequence done<br><br>**18 / Position Register Channel 1 / P r C 1**: Position register channel 1<br><br>**19 / Position Register Channel 2 / P r C 2**: Position register channel 2<br><br>**20 / Position Register Channel 3 / P r C 3**: Position register channel 3<br><br>**21 / Position Register Channel 4 / P r C 4**: Position register channel 4<br><br>**22 / Motor Moves Positive / ∏ P o 5**: Motor moves in positive direction<br><br>**23 / Motor Moves Negative / ∏ n E G**: Motor moves in negative direction<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on.<br><br>Available with firmware version ≥V01.06. | | | |
| *IOsigCurrLim* | Signal evaluation for signal input function Current Limitation.<br><br>**1 / Normally Closed**: Normally closed NC<br><br>**2 / Normally Open**: Normally open NO<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.24. | -<br>1<br>2<br>2 | UINT16<br>R/W<br>per.<br>- | CANopen 3008:28h<br>Modbus 2128<br>Profibus 2128<br>CIP 108.1.40<br>ModbusTCP 2128<br>EtherCAT 3008:28h<br>PROFINET 2128 |
| *IOsigLIMN* | Signal evaluation for negative limit switch.<br><br>**0 / Inactive**: Inactive<br><br>**1 / Normally Closed**: Normally closed NC<br><br>**2 / Normally Open**: Normally open NO<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled. | -<br>0<br>1<br>2 | UINT16<br>R/W<br>per.<br>- | CANopen 3006:Fh<br>Modbus 1566<br>Profibus 1566<br>CIP 106.1.15<br>ModbusTCP 1566<br>EtherCAT 3006:Fh<br>PROFINET 1566 |
| *IOsigLIMP* | Signal evaluation for positive limit switch.<br><br>**0 / Inactive**: Inactive<br><br>**1 / Normally Closed**: Normally closed NC<br><br>**2 / Normally Open**: Normally open NO<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled. | -<br>0<br>1<br>2 | UINT16<br>R/W<br>per.<br>- | CANopen 3006:10h<br>Modbus 1568<br>Profibus 1568<br>CIP 106.1.16<br>ModbusTCP 1568<br>EtherCAT 3006:10h<br>PROFINET 1568 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IOsigREF* | Signal evaluation for reference switch. **1 / Normally Closed**: Normally closed NC **2 / Normally Open**: Normally open NO The reference switch is only active while a reference movement to the reference switch is processed. Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. | - 1 1 2 | UINT16 R/W per. - | CANopen 3006:E$_h$ Modbus 1564 Profibus 1564 CIP 106.1.14 ModbusTCP 1564 EtherCAT 3006:E$_h$ PROFINET 1564 |
| *IOsigRespOfPS* | Response to active limit switch during enabling of power stage. **0 / Error**: Active limit switch triggers an error. **1 / No Error**: Active limit switch does not trigger an error. Defines the response when the power stage is enabled while a hardware limit switch is active. Modified settings become active immediately. | - 0 0 1 | UINT16 R/W per. - | CANopen 3006:6$_h$ Modbus 1548 Profibus 1548 CIP 106.1.6 ModbusTCP 1548 EtherCAT 3006:6$_h$ PROFINET 1548 |
| *IOsigVelLim* | Signal evaluation for signal input function Velocity Limitation. **1 / Normally Closed**: Normally closed NC **2 / Normally Open**: Normally open NO Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. Available with firmware version ≥V01.24. | - 1 2 2 | UINT16 R/W per. - | CANopen 3008:27$_h$ Modbus 2126 Profibus 2126 CIP 108.1.39 ModbusTCP 2126 EtherCAT 3008:27$_h$ PROFINET 2126 |
| *IP_IntTimInd* | Interpolation time index. Available with firmware version ≥V01.08. * Datatype for CANopen: INT8 | - -128 -3 63 | INT16* R/W - - | CANopen 60C2:2$_h$ Modbus 7002 Profibus 7002 CIP 127.1.45 ModbusTCP 7002 EtherCAT 60C2:2$_h$ PROFINET 7002 |
| *IP_IntTimPerVal* | Interpolation time period value. Available with firmware version ≥V01.08. * Datatype for CANopen: UINT8 | s 0 1 255 | UINT16* R/W - - | CANopen 60C2:1$_h$ Modbus 7000 Profibus 7000 CIP 127.1.44 ModbusTCP 7000 EtherCAT 60C2:1$_h$ PROFINET 7000 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *IPp_target* | Position reference value for operating mode Interpolated Position. Available with firmware version ≥V01.08. | - -2147483648 - 2147483647 | INT32 R/W - - | CANopen 60C1:1$_h$ Modbus 7004 Profibus 7004 CIP 127.1.46 ModbusTCP 7004 EtherCAT 60C1:1$_h$ PROFINET 7004 |
| *Iref_PTIFreqMax* | Reference current for operating mode Profile Torque via PTI interface. Reference current corresponding to 1.6 million increments per second at the PTI interface for operating mode Profile Torque. In increments of 0.01 A$_{rms}$. Modified settings become active immediately. Available with firmware version ≥V01.20. | A$_{rms}$ 0.00 - 463.00 | UINT16 R/W per. - | CANopen 3020:4$_h$ Modbus 8200 Profibus 8200 CIP 132.1.4 ModbusTCP 8200 EtherCAT 3020:4$_h$ PROFINET 8200 |
| *JOGactivate* | Activation of operating mode Jog. Bit 0: Positive direction of movement Bit 1: Negative direction of movement Bit 2: 0=slow 1=fast Modified settings become active immediately. | - 0 0 7 | UINT16 R/W - - | CANopen 301B:9$_h$ Modbus 6930 Profibus 6930 CIP 127.1.9 ModbusTCP 6930 EtherCAT 301B:9$_h$ PROFINET 6930 |
| *JOGmethod* | Selection of jog method. **0 / Continuous Movement /** $c\,o\,\Pi\,o$: Jog with continuous movement **1 / Step Movement /** $5\,\varepsilon\,\Pi\,o$: Jog with step movement Modified settings become active immediately. | - 0 1 1 | UINT16 R/W - - | CANopen 3029:3$_h$ Modbus 10502 Profibus 10502 CIP 141.1.3 ModbusTCP 10502 EtherCAT 3029:3$_h$ PROFINET 10502 |
| *JOGstep* | Distance for step movement. Modified settings become active the next time the motor moves. | usr_p 1 20 2147483647 | INT32 R/W per. - | CANopen 3029:7$_h$ Modbus 10510 Profibus 10510 CIP 141.1.7 ModbusTCP 10510 EtherCAT 3029:7$_h$ PROFINET 10510 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *JOGtime* | Wait time for step movement. Modified settings become active the next time the motor moves. | ms 1 500 32767 | UINT16 R/W per. - | CANopen 3029:8$_h$ Modbus 10512 Profibus 10512 CIP 141.1.8 ModbusTCP 10512 EtherCAT 3029:8$_h$ PROFINET 10512 |
| *JOGv_fast* $o P \rightarrow J o G -$ $J G h \, \imath$ | Velocity for fast movement. The adjustable value is internally limited to the parameter setting in RAMP_v_max. Modified settings become active immediately. | usr_v 1 180 2147483647 | UINT32 R/W per. - | CANopen 3029:5$_h$ Modbus 10506 Profibus 10506 CIP 141.1.5 ModbusTCP 10506 EtherCAT 3029:5$_h$ PROFINET 10506 |
| *JOGv_slow* $o P \rightarrow J o G -$ $J G L o$ | Velocity for slow movement. The adjustable value is internally limited to the parameter setting in RAMP_v_max. Modified settings become active immediately. | usr_v 1 60 2147483647 | UINT32 R/W per. - | CANopen 3029:4$_h$ Modbus 10504 Profibus 10504 CIP 141.1.4 ModbusTCP 10504 EtherCAT 3029:4$_h$ PROFINET 10504 |
| *LIM_HaltReaction* $C o n F \rightarrow A C G -$ $h E y P$ | Halt option code. **1 / Deceleration Ramp /** $d E c E$ : Deceleration ramp **3 / Torque Ramp /** $t o r \, 9$: Torque ramp Set the deceleration ramp with parameter RAMP_v_dec. Set the torque ramp with parameter LIM_I_maxHalt. If a deceleration ramp is already active, the parameter cannot be written. Modified settings become active immediately. | - 1 1 3 | INT16 R/W per. - | CANopen 605D:0$_h$ Modbus 1582 Profibus 1582 CIP 106.1.23 ModbusTCP 1582 EtherCAT 605D:0$_h$ PROFINET 1582 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *LIM_I_maxHalt* ⎓⎓⎓⎓ → ACG- hcur | Current for Halt. This value is only limited by the minimum/ maximum value range (no limitation of this value by motor/power stage). In the case of a Halt, the current limit (*_Imax_act*) is one of the following values (whichever is lowest): - *LIM_I_maxHalt* - *_M_I_max* - *_PS_I_max* Further current limitations caused by I2t monitoring are also taken into account during a Halt. Default: _PS_I_max at 8 kHz PWM frequency and 230/480 V mains voltage In increments of 0.01 $A_{rms}$. Modified settings become active immediately. | $A_{rms}$ - - - | UINT16 R/W per. - | CANopen 3011:E$_h$ Modbus 4380 Profibus 4380 CIP 117.1.14 ModbusTCP 4380 EtherCAT 3011:E$_h$ PROFINET 4380 |
| *LIM_I_maxQSTP* ⎓⎓⎓⎓ → FLt- qcur | Current for Quick Stop. This value is only limited by the minimum/ maximum value range (no limitation of this value by motor/power stage). In the case of a Quick Stop, the current limit (*_Imax_act*) is one of the following values (whichever is lowest): - *LIM_I_maxQSTP* - *_M_I_max* - *_PS_I_max* Further current limitations caused by I2t monitoring are also taken into account during a Quick Stop. Default: _PS_I_max at 8 kHz PWM frequency and 230/480 V mains voltage In increments of 0.01 $A_{rms}$. Modified settings become active immediately. | $A_{rms}$ - - - | UINT16 R/W per. - | CANopen 3011:D$_h$ Modbus 4378 Profibus 4378 CIP 117.1.13 ModbusTCP 4378 EtherCAT 3011:D$_h$ PROFINET 4378 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *LIM_QStopReact* | Quick Stop option code.<br><br>**-2 / Torque ramp (Fault)**: Use torque ramp and transit to operating state 9 Fault<br><br>**-1 / Deceleration Ramp (Fault)**: Use deceleration ramp and transit to operating state 9 Fault<br><br>**6 / Deceleration ramp (Quick Stop)**: Use deceleration ramp and remain in operating state 7 Quick Stop<br><br>**7 / Torque ramp (Quick Stop)**: Use torque ramp and remain in operating state 7 Quick Stop<br><br>Type of deceleration for Quick Stop.<br><br>Setting of deceleration ramp with parameter RAMPquickstop.<br><br>Setting of torque ramp with parameter LIM_I_maxQSTP.<br><br>If a deceleration ramp is already active, the parameter cannot be written.<br><br>Modified settings become active immediately. | -<br><br>-2<br><br>6<br><br>7 | INT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:18h<br><br>Modbus 1584<br><br>Profibus 1584<br><br>CIP 106.1.24<br><br>ModbusTCP 1584<br><br>EtherCAT 3006:18h<br><br>PROFINET 1584 |
| *Mains_reactor* | Mains reactor.<br><br>**0 / No**: No<br><br>**1 / Yes**: Yes<br><br>Value 0: No mains reactor connected. The nominal power of the power stage is reduced.<br><br>Value 1: A mains reactor is connected.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3005:20h<br><br>Modbus 1344<br><br>Profibus 1344<br><br>CIP 105.1.32<br><br>ModbusTCP 1344<br><br>EtherCAT 3005:20h<br><br>PROFINET 1344 |
| *MBaddress*<br><br>$\mathit{ConF} \rightarrow \mathit{CoM}$ - <br><br>$\mathit{MbAd}$ | Modbus address.<br><br>Valid addresses: 1 to 247<br><br>Modified settings become active the next time the product is powered on. | -<br><br>1<br><br>1<br><br>247 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3016:4h<br><br>Modbus 5640<br><br>Profibus 5640<br><br>CIP 122.1.4<br><br>ModbusTCP 5640<br><br>EtherCAT 3016:4h<br><br>PROFINET 5640 |
| *MBbaud*<br><br>$\mathit{ConF} \rightarrow \mathit{CoM}$ - <br><br>$\mathit{Mbbd}$ | Modbus baud rate.<br><br>**9600 / 9600 Baud / 9.6**: 9600 Baud<br><br>**19200 / 19200 Baud / 19.2**: 19200 Baud<br><br>**38400 / 38400 Baud / 38.4**: 38400 Baud<br><br>Modified settings become active the next time the product is powered on. | -<br><br>9600<br><br>19200<br><br>38400 | UINT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3016:3h<br><br>Modbus 5638<br><br>Profibus 5638<br><br>CIP 122.1.3<br><br>ModbusTCP 5638<br><br>EtherCAT 3016:3h<br><br>PROFINET 5638 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MBnode_guard* | Modbus Node Guarding.<br><br>Value 0: Node Guarding inactive<br><br>Value >0: Monitoring time<br><br>A read request or a write request must be performed during the monitoring time.<br><br>Modified settings become active immediately. | ms<br><br>0<br><br>0<br><br>10000 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 3016:6$_h$<br><br>Modbus 5644<br><br>Profibus 5644<br><br>CIP 122.1.6<br><br>ModbusTCP 5644<br><br>EtherCAT 3016:6$_h$<br><br>PROFINET 5644 |
| *Mfb_HallOffset* | Hall offset (electrical angle).<br><br>This parameter specifies the Hall offset of a Hall sensor (analog encoder module) as an electrical angle.<br><br>In increments of 0.1 °.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on. | °<br><br>0.0<br><br>0.0<br><br>360.0 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 3060:4$_h$<br><br>Modbus 24584<br><br>Profibus 24584<br><br>CIP 196.1.4<br><br>ModbusTCP 24584<br><br>EtherCAT 3060:4$_h$<br><br>PROFINET 24584 |
| *Mfb_lines_lin* | Number of encoder signal periods per pole pair pitch, numerator.<br><br>Calculation:<br><br>*Mfb_lines_lin* = Pole pair pitch / length of one signal period of analog encoder<br><br>If the value required for your encoder is an integer, you can write this value to this parameter. The parameter *Mfb_polepairs_lin* does not need to be adjusted.<br><br>Example:<br><br>Pole pair pitch: 32000 µm<br><br>Length of one signal period of analog encoder: 0.5 µm<br><br>Result: 32000 / 0.5 = 64000<br><br>*Mfb_lines_lin*: 64000<br><br>*Mfb_polepairs_lin*: 1 (default value)<br><br>If the value required for your encoder is not an integer, you can use this parameter as the numerator and the parameter *Mfb_polepairs_lin* as the denominator to obtain an integer value.<br><br>Example:<br><br>Pole pair pitch: 28.2 mm<br><br>Length of one signal period of analog encoder: 0.5 mm<br><br>Result: 28.2 / 0.5 = 56.4<br><br>*Mfb_lines_lin*: 564<br><br>*Mfb_polepairs_lin*: 10<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 305C:18$_h$<br><br>Modbus 23600<br><br>Profibus 23600<br><br>CIP 192.1.24<br><br>ModbusTCP 23600<br><br>EtherCAT 305C:18$_h$<br><br>PROFINET 23600 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *Mfb_polepairs_lin* | Number of encoder signal periods per pole pair pitch, denominator.<br><br>Description see parameter *Mfb_lines_lin*.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on.<br><br>Available with firmware version ≥V01.34. | -<br><br>1<br><br>1<br><br>1000 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 305C:19$_h$<br><br>Modbus 23602<br><br>Profibus 23602<br><br>CIP 192.1.25<br><br>ModbusTCP 23602<br><br>EtherCAT 305C:19$_h$<br><br>PROFINET 23602 |
| *Mfb_U_max* | Maximum encoder supply voltage.<br><br>In increments of 0.01 V.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on. | V<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 305C:7$_h$<br><br>Modbus 23566<br><br>Profibus 23566<br><br>CIP 192.1.7<br><br>ModbusTCP 23566<br><br>EtherCAT 305C:7$_h$<br><br>PROFINET 23566 |
| *Mfb_U_min* | Minimum encoder supply voltage.<br><br>In increments of 0.01 V.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on. | V<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 305C:6$_h$<br><br>Modbus 23564<br><br>Profibus 23564<br><br>CIP 192.1.6<br><br>ModbusTCP 23564<br><br>EtherCAT 305C:6$_h$<br><br>PROFINET 23564 |
| *MOD_AbsDirection* | Direction of absolute movement with Modulo.<br><br>**0 / Shortest Distance**: Movement with shortest distance<br><br>**1 / Positive Direction**: Movement only in positive direction<br><br>**2 / Negative Direction**: Movement only in negative direction<br><br>If the parameter is set to 0, the drive calculates the shortest way to the new target position and starts the movement in the corresponding direction. If the distance to the target position is identical in positive and negative directions, the movement takes place in positive direction.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.01. | -<br><br>0<br><br>0<br><br>2 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:3B$_h$<br><br>Modbus 1654<br><br>Profibus 1654<br><br>CIP 106.1.59<br><br>ModbusTCP 1654<br><br>EtherCAT 3006:3B$_h$<br><br>PROFINET 1654 |
| *MOD_AbsMultiRng* | Multiple ranges for absolute movement with Modulo.<br><br>**0 / Multiple Ranges Off**: Absolute movement in one modulo range<br><br>**1 / Multiple Ranges On**: Absolute movement in multiple modulo ranges<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.01. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:3C$_h$<br><br>Modbus 1656<br><br>Profibus 1656<br><br>CIP 106.1.60<br><br>ModbusTCP 1656<br><br>EtherCAT 3006:3C$_h$<br><br>PROFINET 1656 |

| Parameter name  HMI menu  HMI name | Description | Unit  Minimum value  Factory setting  Maximum value | Data type  R/W  Persistent  Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MOD_Enable*  ⊏ o n F → A ⊏ ⌂ -  A t ⅄ P | Activation of Modulo function.  **0 / Modulo Off / o F F** : Modulo is off  **1 / Modulo On / o n**: Modulo is on  Setting can only be modified if power stage is disabled.  Modified settings become active immediately.  Available with firmware version ≥V01.01. | -  0  0  1 | UINT16  R/W  per.  - | CANopen 3006:38ₕ  Modbus 1648  Profibus 1648  CIP 106.1.56  ModbusTCP 1648  EtherCAT 3006:38ₕ  PROFINET 1648 |
| *MOD_Max* | Maximum position of modulo range.  The maximum position value of the modulo range must be greater than the minimum position value of the modulo range.  The value must not exceed the maximum possible value of position scaling _ScalePOSmax.  Setting can only be modified if power stage is disabled.  Modified settings become active immediately.  Available with firmware version ≥V01.01. | usr_p  -  3600  - | INT32  R/W  per.  - | CANopen 3006:3Aₕ  Modbus 1652  Profibus 1652  CIP 106.1.58  ModbusTCP 1652  EtherCAT 3006:3Aₕ  PROFINET 1652 |
| *MOD_Min* | Minimum position of modulo range.  The minimum position value of the modulo range must be less than the maximum position value of the modulo range.  The value must not exceed the maximum possible value of position scaling _ScalePOSmax.  Setting can only be modified if power stage is disabled.  Modified settings become active immediately.  Available with firmware version ≥V01.01. | usr_p  -  0  - | INT32  R/W  per.  - | CANopen 3006:39ₕ  Modbus 1650  Profibus 1650  CIP 106.1.57  ModbusTCP 1650  EtherCAT 3006:39ₕ  PROFINET 1650 |
| *MON_ChkTime*  ⊏ o n F → ı - o -  t t h r | Monitoring of time window.  Adjustment of a time for monitoring of position deviation, velocity deviation, velocity value and current value. If the monitored value is in the permissible range during the adjusted time, the monitoring function delivers a positive result.  The status can be output via a parameterizable output.  Modified settings become active immediately. | ms  0  0  9999 | UINT16  R/W  per.  - | CANopen 3006:1Dₕ  Modbus 1594  Profibus 1594  CIP 106.1.29  ModbusTCP 1594  EtherCAT 3006:1Dₕ  PROFINET 1594 |
| *MON_commutat* | Commutation monitoring.  **0 / Off**: Commutation monitoring off  **1 / On**: Commutation monitoring on in operating states 6, 7 and 8  **2 / On (OpState6+7)**: Commutation monitoring on in operating states 6 and 7  Setting can only be modified if power stage is disabled.  Modified settings become active the next time the power stage is enabled. | -  0  1  2 | UINT16  R/W  per.  - | CANopen 3005:5ₕ  Modbus 1290  Profibus 1290  CIP 105.1.5  ModbusTCP 1290  EtherCAT 3005:5ₕ  PROFINET 1290 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| MON_<br>ConfModification | Configuration modification monitoring.<br><br>Value 0: Modification detected for each write access.<br><br>Value 1: Modification detected for each write access which modifies a value.<br><br>Value 2: Identical to value 0 if commissioning software is not connected. Identical to value 1 if commissioning software is connected.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.26. | -<br><br>0<br><br>2<br><br>2 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3004:1D$_h$<br><br>Modbus 1082<br><br>Profibus 1082<br><br>CIP 104.1.29<br><br>ModbusTCP 1082<br><br>EtherCAT 3004:1D$_h$<br><br>PROFINET 1082 |
| MON_<br>DCbusVdcThresh | DC bus overvoltage monitoring threshold.<br><br>**0 / Reduction Off**: Reduction is off<br><br>**1 / Reduction On**: Reduction is on<br><br>This parameter is used to reduce the threshold for DC bus overvoltage monitoring. The parameter only affects single-phase devices supplied with 115 V and three-phase devices supplied with 208 V.<br><br>Value 0:<br><br>Single-phase: 450 Vdc<br><br>Three-phase: 820 Vdc<br><br>Value 1:<br><br>Single-phase: 260 Vdc<br><br>Three-phase: 450 Vdc<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.26. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3005:3D$_h$<br><br>Modbus 1402<br><br>Profibus 1402<br><br>CIP 105.1.61<br><br>ModbusTCP 1402<br><br>EtherCAT 3005:3D$_h$<br><br>PROFINET 1402 |
| MON_ENC_Ampl | Activation of monitoring of SinCos amplitude.<br><br>Value 0: Deactivate monitoring<br><br>Value 1: Activate monitoring<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.26. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 303F:61$_h$<br><br>Modbus 16322<br><br>Profibus 16322<br><br>CIP 163.1.97<br><br>ModbusTCP 16322<br><br>EtherCAT 303F:61$_h$<br><br>PROFINET 16322 |
| MON_GroundFault | Ground monitoring.<br><br>**0 / Off**: Ground monitoring off<br><br>**1 / On**: Ground monitoring on<br><br>Modified settings become active the next time the product is powered on. | -<br><br>0<br><br>1<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>expert | CANopen 3005:10$_h$<br><br>Modbus 1312<br><br>Profibus 1312<br><br>CIP 105.1.16<br><br>ModbusTCP 1312<br><br>EtherCAT 3005:10$_h$<br><br>PROFINET 1312 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MON_HW_Limits* | Temporary deactivation of hardware limit switches.<br><br>**0 / None**: No limit switch deactivated<br><br>**1 / Positive Limit Switch**: Deactivate positive limit switch<br><br>**2 / Negative Limit Switch**: Deactivate negative limit switch<br><br>**3 / Both Limit Switches**: Deactivate both limit switches<br><br>With this parameter, a controller can temporarily deactivate hardware limit switches. This is useful if a homing procedure controlled by a controller is to use a limit switch as a reference switch without an error response of the drive.<br><br>The parameter is only available with the EtherCAT module.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>3 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 3006:11$_h$<br><br>Modbus 1570<br><br>Profibus 1570<br><br>CIP 106.1.17<br><br>ModbusTCP 1570<br><br>EtherCAT 3006:11$_h$<br><br>PROFINET 1570 |
| *MON_I_Threshold*<br><br>$ConF \rightarrow i\text{-}o\text{-}$<br><br>$ithr$ | Monitoring of current threshold.<br><br>The system monitors whether the drive is below the defined value during the period set with MON_ChkTime.<br><br>The status can be output via a parameterizable output.<br><br>The parameter _Iq_act_rms is used as comparison value.<br><br>In increments of 0.01 A$_{rms}$.<br><br>Modified settings become active immediately. | A$_{rms}$<br><br>0.00<br><br>0.20<br><br>300.00 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:1C$_h$<br><br>Modbus 1592<br><br>Profibus 1592<br><br>CIP 106.1.28<br><br>ModbusTCP 1592<br><br>EtherCAT 3006:1C$_h$<br><br>PROFINET 1592 |
| *MON_IO_SelErr1* | Signal output function Selected Error (error classes 1 to 4): First error code.<br><br>This parameter specifies the error code of an error of error classes 1 ... 4 which is to activate the signal output function.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>65535 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 303B:6$_h$<br><br>Modbus 15116<br><br>Profibus 15116<br><br>CIP 159.1.6<br><br>ModbusTCP 15116<br><br>EtherCAT 303B:6$_h$<br><br>PROFINET 15116 |
| *MON_IO_SelErr2* | Signal output function Selected Error (error classes 1 to 4): Second error code.<br><br>This parameter specifies the error code of an error of error classes 1 ... 4 which is to activate the signal output function.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>65535 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 303B:7$_h$<br><br>Modbus 15118<br><br>Profibus 15118<br><br>CIP 159.1.7<br><br>ModbusTCP 15118<br><br>EtherCAT 303B:7$_h$<br><br>PROFINET 15118 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MON_IO_SelWar1* | Signal output function Selected Warning (error class 0): First error code. This parameter specifies the error code of an error of error class 0 which is to activate the signal output function. Modified settings become active immediately. | - 0 0 65535 | UINT16 R/W per. - | CANopen 303B:8$_h$ Modbus 15120 Profibus 15120 CIP 159.1.8 ModbusTCP 15120 EtherCAT 303B:8$_h$ PROFINET 15120 |
| *MON_IO_SelWar2* | Signal output function Selected Warning (error class 0): Second error code. This parameter specifies the error code of an error of error class 0 which is to activate the signal output function. Modified settings become active immediately. | - 0 0 65535 | UINT16 R/W per. - | CANopen 303B:9$_h$ Modbus 15122 Profibus 15122 CIP 159.1.9 ModbusTCP 15122 EtherCAT 303B:9$_h$ PROFINET 15122 |
| *MON_MainsVolt* | Detection and monitoring of mains phases. **0 / Automatic Mains Detection**: Automatic detection and monitoring of mains voltage **1 / DC-Bus Only (Mains 1~230 V / 3~480 V)**: DC bus supply only, corresponding to mains voltage 230 V (single-phase) or 480 V (three phases) **2 / DC-Bus Only (Mains 1~115 V / 3~208 V)**: DC bus supply only, corresponding to mains voltage 115 V (single-phase) or 208 V (three phases) **3 / Mains 1~230 V / 3~480 V**: Mains voltage 230 V (single-phase) or 480 V (three phases) **4 / Mains 1~115 V / 3~208 V**: Mains voltage 115 V (single-phase) or 208 V (three phases) **5 / Reserved**: Reserved Value 0: As soon as mains voltage detected, the device automatically verifies whether the mains voltage is 115 V or 230 V in the case of single-phase devices or 208 V or 400/480 V in the case of three-phase devices. Values 1 … 2: If the device is supplied only via the DC bus, the parameter has to be set to the voltage value corresponding to the mains voltage of the supplying device. There is no mains voltage monitoring. Values 3 … 4: If the mains voltage is not detected properly during start-up, the mains voltage to be used can be selected manually. Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. | - 0 0 5 | UINT16 R/W per. expert | CANopen 3005:F$_h$ Modbus 1310 Profibus 1310 CIP 105.1.15 ModbusTCP 1310 EtherCAT 3005:F$_h$ PROFINET 1310 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MON_ MotOvLoadOvTemp* | Motor overload and overtemperature monitoring. Value 0: Motor overload and overtemperature monitoring using thermal retention and speed sensitivity (as per IEC 61800-5-1:2007/ AMD1:2016) Value 1: Motor overload and overtemperature monitoring using the nominal stall torque of the motor, without thermal retention and speed sensitivity. Additional external measures may have to be implemented. Setting can only be modified if power stage is disabled. Modified settings become active immediately. Available with firmware version ≥V01.32. | - 0 0 1 | UINT16 R/W per. expert | CANopen 303F:68h Modbus 16336 Profibus 16336 CIP 163.1.104 ModbusTCP 16336 EtherCAT 303F:68h PROFINET 16336 |
| *MON_p_dif_load* | Maximum load-dependent position deviation. The load-dependent position deviation is the difference between the reference position and the actual position caused by the load. The parameter MON_p_dif_load_usr allows you to enter the value in user-defined units. In increments of 0.0001 revolution. Modified settings become active immediately. | revolution 0.0001 1.0000 200.0000 | UINT32 R/W per. - | CANopen 6065:0h Modbus 1606 Profibus 1606 CIP 106.1.35 ModbusTCP 1606 EtherCAT 6065:0h PROFINET 1606 |
| *MON_p_dif_load_usr* | Maximum load-dependent position deviation. The load-dependent position deviation is the difference between the reference position and the actual position caused by the load. The minimum value, the factory setting and the maximum value depend on the scaling factor. Modified settings become active immediately. Available with firmware version ≥V01.03. | usr_p 1 16384 2147483647 | INT32 R/W per. - | CANopen 3006:3Eh Modbus 1660 Profibus 1660 CIP 106.1.62 ModbusTCP 1660 EtherCAT 3006:3Eh PROFINET 1660 |
| *MON_p_dif_warn* | Advisory limit of the load-dependent position deviation (error class 0). 100.0 % correspond to the maximum position deviation (following error) as specified by means of parameter MON_p_dif_load. Modified settings become active immediately. | % 0 75 100 | UINT16 R/W per. - | CANopen 3006:29h Modbus 1618 Profibus 1618 CIP 106.1.41 ModbusTCP 1618 EtherCAT 3006:29h PROFINET 1618 |
| *MON_p_DiffWin* | Monitoring of position deviation. The system verifies whether the drive is within the defined deviation during the period set with MON_ ChkTime. The status can be output via a parameterizable output. The parameter MON_p_DiffWin_usr allows you to enter the value in user-defined units. In increments of 0.0001 revolution. Modified settings become active immediately. | revolution 0.0000 0.0010 0.9999 | UINT16 R/W per. - | CANopen 3006:19h Modbus 1586 Profibus 1586 CIP 106.1.25 ModbusTCP 1586 EtherCAT 3006:19h PROFINET 1586 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MON_p_DiffWin_usr* | Monitoring of position deviation.<br><br>The system verifies whether the drive is within the defined deviation during the period set with MON_ChkTime.<br><br>The status can be output via a parameterizable output.<br><br>The minimum value, the factory setting and the maximum value depend on the scaling factor.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.03. | usr_p<br><br>0<br><br>16<br><br>2147483647 | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:3F$_h$<br><br>Modbus 1662<br><br>Profibus 1662<br><br>CIP 106.1.63<br><br>ModbusTCP 1662<br><br>EtherCAT 3006:3F$_h$<br><br>PROFINET 1662 |
| *MON_p_win* | Standstill window, permissible control deviation.<br><br>The control deviation for the standstill window time must be within this range for a standstill of the drive to be detected.<br><br>Processing of the standstill window must be activated via the parameter MON_p_winTime.<br><br>The parameter MON_p_win_usr allows you to enter the value in user-defined units.<br><br>In increments of 0.0001 revolution.<br><br>Modified settings become active immediately.<br><br>* Datatype for CANopen: UINT32 | revolution<br><br>0.0000<br><br>0.0010<br><br>3.2767 | UINT16*<br><br>R/W<br><br>per.<br><br>- | CANopen 6067:0$_h$<br><br>Modbus 1608<br><br>Profibus 1608<br><br>CIP 106.1.36<br><br>ModbusTCP 1608<br><br>EtherCAT 6067:0$_h$<br><br>PROFINET 1608 |
| *MON_p_win_usr* | Standstill window, permissible control deviation.<br><br>The control deviation for the standstill window time must be within this range for a standstill of the drive to be detected.<br><br>Processing of the standstill window must be activated via the parameter MON_p_winTime.<br><br>The minimum value, the factory setting and the maximum value depend on the scaling factor.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.03. | usr_p<br><br>0<br><br>16<br><br>2147483647 | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:40$_h$<br><br>Modbus 1664<br><br>Profibus 1664<br><br>CIP 106.1.64<br><br>ModbusTCP 1664<br><br>EtherCAT 3006:40$_h$<br><br>PROFINET 1664 |
| *MON_p_winTime* | Standstill window, time.<br><br>Value 0: Monitoring of standstill window deactivated<br><br>Value >0: Time in ms during which the control deviation must be in the standstill window<br><br>Modified settings become active immediately. | ms<br><br>0<br><br>0<br><br>32767 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 6068:0$_h$<br><br>Modbus 1610<br><br>Profibus 1610<br><br>CIP 106.1.37<br><br>ModbusTCP 1610<br><br>EtherCAT 6068:0$_h$<br><br>PROFINET 1610 |
| *MON_p_winTout* | Timeout time for standstill window monitoring.<br><br>Value 0: Timeout monitoring deactivated<br><br>Value >0: Timeout time in ms<br><br>Standstill window processing values are set via MON_p_win and MON_p_winTime.<br><br>Time monitoring starts when the target position (reference position of position controller) is reached or when the profile generator has finished processing.<br><br>Modified settings become active immediately. | ms<br><br>0<br><br>0<br><br>16000 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:26$_h$<br><br>Modbus 1612<br><br>Profibus 1612<br><br>CIP 106.1.38<br><br>ModbusTCP 1612<br><br>EtherCAT 3006:26$_h$<br><br>PROFINET 1612 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MON_SW_Limits* | Activation of software limit switches. **0 / None**: Deactivated **1 / SWLIMP**: Activation of software limit switches positive direction **2 / SWLIMN**: Activation of software limit switches negative direction **3 / SWLIMP+SWLIMN**: Activation of software limit switches both directions Software limit switches can only be activated if the zero point is valid. Modified settings become active immediately. | - 0 0 3 | UINT16 R/W per. - | CANopen 3006:3h Modbus 1542 Profibus 1542 CIP 106.1.3 ModbusTCP 1542 EtherCAT 3006:3h PROFINET 1542 |
| *MON_SWLimMode* | Behavior when position limit is reached. **0 / Standstill Behind Position Limit**: Quick Stop is triggered at position limit and standstill is reached behind position limit **1 / Standstill At Position Limit**: Quick Stop is triggered in front of position limit and standstill is reached at position limit Modified settings become active immediately. Available with firmware version ≥V01.16. | - 0 0 1 | UINT16 R/W per. - | CANopen 3006:47h Modbus 1678 Profibus 1678 CIP 106.1.71 ModbusTCP 1678 EtherCAT 3006:47h PROFINET 1678 |
| *MON_swLimN* | Negative position limit for software limit switch. See description 'MON_swLimP'. Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. | usr_p - -2147483648 - | INT32 R/W per. - | CANopen 607D:1h Modbus 1546 Profibus 1546 CIP 106.1.5 ModbusTCP 1546 EtherCAT 607D:1h PROFINET 1546 |
| *MON_swLimP* | Positive position limit for software limit switch. If a user-defined value entered is outside of the permissible range, the limit switch limits are automatically set to the maximum user-defined value. Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. | usr_p - 2147483647 - | INT32 R/W per. - | CANopen 607D:2h Modbus 1544 Profibus 1544 CIP 106.1.4 ModbusTCP 1544 EtherCAT 607D:2h PROFINET 1544 |
| *MON_tq_win* | Torque window, permissible deviation. The torque window can only be activated in operating mode Profile Torque. In increments of 0.1 %. Modified settings become active immediately. | % 0.0 3.0 3000.0 | UINT16 R/W per. - | CANopen 3006:2Dh Modbus 1626 Profibus 1626 CIP 106.1.45 ModbusTCP 1626 EtherCAT 3006:2Dh PROFINET 1626 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MON_tq_winTime* | Torque window, time.<br><br>Value 0: Torque window monitoring deactivated<br><br>Changing the value causes a restart of torque monitoring.<br><br>Torque window is only used in operating mode Profile Torque.<br><br>Modified settings become active immediately. | ms<br><br>0<br><br>0<br><br>16383 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:2E$_h$<br><br>Modbus 1628<br><br>Profibus 1628<br><br>CIP 106.1.46<br><br>ModbusTCP 1628<br><br>EtherCAT 3006:2E$_h$<br><br>PROFINET 1628 |
| *MON_v_DiffWin* | Monitoring of velocity deviation.<br><br>The system monitors whether the drive is within the defined deviation during the period set with MON_ChkTime.<br><br>The status can be output via a parameterizable output.<br><br>Modified settings become active immediately. | usr_v<br><br>1<br><br>10<br><br>2147483647 | UINT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:1A$_h$<br><br>Modbus 1588<br><br>Profibus 1588<br><br>CIP 106.1.26<br><br>ModbusTCP 1588<br><br>EtherCAT 3006:1A$_h$<br><br>PROFINET 1588 |
| *MON_v_Threshold* | Monitoring of velocity threshold.<br><br>The system monitors whether the drive is below the defined value during the period set with MON_ChkTime.<br><br>The status can be output via a parameterizable output.<br><br>Modified settings become active immediately. | usr_v<br><br>1<br><br>10<br><br>2147483647 | UINT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:1B$_h$<br><br>Modbus 1590<br><br>Profibus 1590<br><br>CIP 106.1.27<br><br>ModbusTCP 1590<br><br>EtherCAT 3006:1B$_h$<br><br>PROFINET 1590 |
| *MON_v_win* | Velocity window, permissible deviation.<br><br>Modified settings become active immediately.<br><br>* Datatype for CANopen: UINT16 | usr_v<br><br>1<br><br>10<br><br>2147483647 | UINT32*<br><br>R/W<br><br>per.<br><br>- | CANopen 606D:0$_h$<br><br>Modbus 1576<br><br>Profibus 1576<br><br>CIP 106.1.20<br><br>ModbusTCP 1576<br><br>EtherCAT 606D:0$_h$<br><br>PROFINET 1576 |
| *MON_v_winTime* | Velocity window, time.<br><br>Value 0: Velocity window monitoring deactivated<br><br>Changing the value causes a restart of velocity monitoring.<br><br>Modified settings become active immediately. | ms<br><br>0<br><br>0<br><br>16383 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 606E:0$_h$<br><br>Modbus 1578<br><br>Profibus 1578<br><br>CIP 106.1.21<br><br>ModbusTCP 1578<br><br>EtherCAT 606E:0$_h$<br><br>PROFINET 1578 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MON_v_zeroclamp* | Velocity limit for Zero Clamp. A Zero Clamp operation is only possible if the reference velocity is below the Zero Clamp velocity limit. Modified settings become active immediately. | usr_v 0 10 2147483647 | UINT32 R/W per. - | CANopen 3006:28$_h$ Modbus 1616 Profibus 1616 CIP 106.1.40 ModbusTCP 1616 EtherCAT 3006:28$_h$ PROFINET 1616 |
| *MON_VelDiff* | Maximum load-dependent velocity deviation. Value 0: Monitoring deactivated. Value >0: Maximum value Modified settings become active immediately. Available with firmware version ≥V01.26. | usr_v 0 0 2147483647 | UINT32 R/W per. - | CANopen 3006:4B$_h$ Modbus 1686 Profibus 1686 CIP 106.1.75 ModbusTCP 1686 EtherCAT 3006:4B$_h$ PROFINET 1686 |
| *MON_VelDiff_Time* | Time window for maximum load-dependent velocity deviation. Value 0: Monitoring deactivated. Value >0: Time window for maximum value Modified settings become active immediately. Available with firmware version ≥V01.26. | ms 0 10 - | UINT16 R/W per. - | CANopen 3006:4C$_h$ Modbus 1688 Profibus 1688 CIP 106.1.76 ModbusTCP 1688 EtherCAT 3006:4C$_h$ PROFINET 1688 |
| *MON_ VelDiffOpSt578* | Maximum load-dependent velocity deviation for operating states 5, 7 and 8. Maximum load-dependent velocity deviation for operating states 5 Switch On, 7 Quick Stop Active and 8 Fault Reaction Active. Value 0: Monitoring deactivated. Value >0: Maximum value. Monitoring is active if parameter *LIM_QStopReact* is set to "Deceleration Ramp (Fault)" or to "Deceleration ramp (Quick Stop)". Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. Available with firmware version ≥V01.30. | usr_v 0 0 2147483647 | UINT32 R/W per. - | CANopen 3006:48$_h$ Modbus 1680 Profibus 1680 CIP 106.1.72 ModbusTCP 1680 EtherCAT 3006:48$_h$ PROFINET 1680 |
| *MSM_AddtlSettings* | Additional settings for operating mode Motion Sequence. Bit 0 = 0: After Relative Movement After Capture (RMAC), the operating mode Motion Sequence is resumed without a rising edge or a falling edge of the signal input function Start Motion Sequence. Bit 0 = 1: After Relative Movement After Capture (RMAC), the operating mode Motion Sequence is resumed with a rising edge or a falling edge of the signal input function Start Motion Sequence. Modified settings become active immediately. Available with firmware version ≥V01.26. | - 0 0 65535 | UINT16 R/W per. - | CANopen 302D:21$_h$ Modbus 11586 Profibus 11586 CIP 145.1.33 ModbusTCP 11586 EtherCAT 302D:21$_h$ PROFINET 11586 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MSM_CondSequ* | Start condition for the start of a sequence via a signal input.<br><br>**0 / Rising Edge**: Rising edge<br><br>**1 / Falling Edge**: Falling edge<br><br>**2 / 1-level**: 1 level<br><br>**3 / 0-level**: 0 level<br><br>The start condition defines the way the start request is to be processed. This setting is used for the first start after activation of the operating mode.<br><br>Modified settings become active the next time the motor moves. | -<br>0<br>0<br>3 | UINT16<br>R/W<br>per.<br>- | CANopen 302D:8$_h$<br>Modbus 11536<br>Profibus 11536<br>CIP 145.1.8<br>ModbusTCP 11536<br>EtherCAT 302D:8$_h$<br>PROFINET 11536 |
| *MSM_datasetnum* | Selection of data set number in data set table.<br><br>Before an entry in the data set table can be read or written, the corresponding data set number must be selected.<br><br>Modified settings become active immediately. | -<br>0<br>0<br>127 | UINT16<br>R/W<br>-<br>- | CANopen 302D:10$_h$<br>Modbus 11552<br>Profibus 11552<br>CIP 145.1.16<br>ModbusTCP 11552<br>EtherCAT 302D:10$_h$<br>PROFINET 11552 |
| *MSM_DebDigInNum* | Debounce time for data set selection.<br><br>Debounce time for which the signal at the digital input must be stable before the data set is considered to be valid.<br><br>The debounce time is the value of this parameter multiplied by 250 µs.<br><br>The value 0 deactivates debouncing.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.20. | -<br>0<br>0<br>32767 | UINT16<br>R/W<br>per.<br>- | CANopen 302D:20$_h$<br>Modbus 11584<br>Profibus 11584<br>CIP 145.1.32<br>ModbusTCP 11584<br>EtherCAT 302D:20$_h$<br>PROFINET 11584 |
| *MSM_ds_logopera* | Logical operator.<br><br>**0 / None**: None<br><br>**1 / Logical AND**: Logical AND<br><br>**2 / Logical OR**: Logical OR<br><br>Transition condition 1 and transition condition 2 can be logically combined.<br><br>Modified settings become active immediately. | -<br>0<br>0<br>2 | UINT16<br>R/W<br>per.<br>- | CANopen 302D:1A$_h$<br>Modbus 11572<br>Profibus 11572<br>CIP 145.1.26<br>ModbusTCP 11572<br>EtherCAT 302D:1A$_h$<br>PROFINET 11572 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MSM_ds_setA* | Setting A. The value depends on the type of data set as selected with parameter *MSM_ds_type*: - Move Absolute: Acceleration - Move Relative: Acceleration - Reference Movement: Homing method (except method 35) - Position Setting: Position for Position Setting - Repeat: Loop counter (1 … 65535) - Move Additive: Acceleration - Move Velocity: Acceleration - Gear: Synchronization method - Write Parameter: Modbus address of the parameter Modified settings become active immediately. | - -2147483648 0 2147483647 | INT32 R/W per. - | CANopen 302D:12$_h$ Modbus 11556 Profibus 11556 CIP 145.1.18 ModbusTCP 11556 EtherCAT 302D:12$_h$ PROFINET 11556 |
| *MSM_ds_setB* | Setting B. The value depends on the type of data set as selected with parameter *MSM_ds_type*: - Move Absolute: Velocity - Move Relative: Velocity - Reference Movement: Position at reference point after a successful reference movement - Position Setting: - - Repeat: Number of data set to be executed - Move Additive: Velocity - Move Velocity: Velocity - Gear: Numerator - Write Parameter: Value of the parameter Modified settings become active immediately. | - -2147483648 0 2147483647 | INT32 R/W per. - | CANopen 302D:13$_h$ Modbus 11558 Profibus 11558 CIP 145.1.19 ModbusTCP 11558 EtherCAT 302D:13$_h$ PROFINET 11558 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MSM_ds_setC* | Setting C. The value depends on the type of data set as selected with parameter *MSM_ds_type*: <br> - Move Absolute: Absolute position <br> - Move Relative: Relative position <br> - Reference Movement: - <br> - Position Setting: - <br> - Repeat: - <br> - Move Additive: Relative position <br> - Move Velocity: Selection of direction <br> Value 0: Positive <br> Value 1: Negative <br> Value 2: Active direction <br> - Gear: Denominator <br> - Write Parameter: - <br> Modified settings become active immediately. | - <br> -2147483648 <br> 0 <br> 2147483647 | INT32 <br> R/W <br> per. <br> - | CANopen 302D:14h <br> Modbus 11560 <br> Profibus 11560 <br> CIP 145.1.20 <br> ModbusTCP 11560 <br> EtherCAT 302D:14h <br> PROFINET 11560 |
| *MSM_ds_setD* | Setting D. The value depends on the type of data set as selected with parameter *MSM_ds_type*: <br> - Move Absolute: Decelaration <br> - Move Relative: Decelaration <br> - Reference Movement: - <br> - Position Setting: - <br> - Repeat: - <br> - Move Additive: Decelaration <br> - Move Velocity: Deceleration <br> - Gear: - <br> - Write Parameter: - <br> Modified settings become active immediately. | - <br> -2147483648 <br> 0 <br> 2147483647 | INT32 <br> R/W <br> per. <br> - | CANopen 302D:15h <br> Modbus 11562 <br> Profibus 11562 <br> CIP 145.1.21 <br> ModbusTCP 11562 <br> EtherCAT 302D:15h <br> PROFINET 11562 |
| *MSM_ds_sub_ds* | Subsequent data set. Number of the next data set to be started. Modified settings become active immediately. | - <br> 0 <br> 0 <br> 127 | UINT16 <br> R/W <br> per. <br> - | CANopen 302D:17h <br> Modbus 11566 <br> Profibus 11566 <br> CIP 145.1.23 <br> ModbusTCP 11566 <br> EtherCAT 302D:17h <br> PROFINET 11566 |

| Parameter name / HMI menu / HMI name | Description | Unit / Minimum value / Factory setting / Maximum value | Data type / R/W / Persistent / Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MSM_ds_trancon1* | Transition condition 1. **0 / Continue Without Condition**: Continue without condition **1 / Wait Time**: Wait time **2 / Start Request Edge**: Start request edge **3 / Start Request Level**: Start request level Modified settings become active immediately. | - 0 0 3 | UINT16 R/W per. - | CANopen 302D:18$_h$ Modbus 11568 Profibus 11568 CIP 145.1.24 ModbusTCP 11568 EtherCAT 302D:18$_h$ PROFINET 11568 |
| *MSM_ds_trancon2* | Transition condition 2. **0 / Continue Without Condition**: Continue without condition **2 / Start Request Edge**: Start request edge **3 / Start Request Level**: Start request level Modified settings become active immediately. | - 0 0 3 | UINT16 R/W per. - | CANopen 302D:1C$_h$ Modbus 11576 Profibus 11576 CIP 145.1.28 ModbusTCP 11576 EtherCAT 302D:1C$_h$ PROFINET 11576 |
| *MSM_ds_transiti* | Transition type. **0 / No Transition**: No transition **1 / Abort And Go Next**: Abort and go next **2 / Buffer And Start Next**: Buffer and start next **3 / Blending Previous**: Blending previous **4 / Blending Next**: Blending next Modified settings become active immediately. | - 0 0 4 | UINT16 R/W per. - | CANopen 302D:16$_h$ Modbus 11564 Profibus 11564 CIP 145.1.22 ModbusTCP 11564 EtherCAT 302D:16$_h$ PROFINET 11564 |
| *MSM_ds_tranval1* | Value for transition condition 1. The value depends on the type of data set as selected with parameter *MSM_ds_trancon1*: - Continue Without Condition: No transition condition value - Waiting Time: Wait time in ms Values: 0 … 30000 - Start Request Edge: Start request edge Value 0: Rising edge Value 1: Falling edge Value 4: Rising or falling edge - Start Request Level: Start request level Value 2: 1 level Value 3: 0 level Modified settings become active immediately. | - 0 0 30000 | INT32 R/W per. - | CANopen 302D:19$_h$ Modbus 11570 Profibus 11570 CIP 145.1.25 ModbusTCP 11570 EtherCAT 302D:19$_h$ PROFINET 11570 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MSM_ds_tranval2* | Value for transition condition 2.<br><br>The value depends on the type of data set as selected with parameter *MSM_ds_trancon2*:<br><br>- Continue Without Condition: No transition condition value<br><br>- Start Request Edge: Start request edge<br><br>Value 0: Rising edge<br><br>Value 1: Falling edge<br><br>Value 4: Rising or falling edge<br><br>- Start Request Level: Start request level<br><br>Value 2: 1 level<br><br>Value 3: 0 level<br><br>Modified settings become active immediately. | -<br>0<br>0<br>4 | INT32<br>R/W<br>per.<br>- | CANopen 302D:1D$_h$<br>Modbus 11578<br>Profibus 11578<br>CIP 145.1.29<br>ModbusTCP 11578<br>EtherCAT 302D:1D$_h$<br>PROFINET 11578 |
| *MSM_ds_type* | Data set type.<br><br>**0 / None**: None<br><br>**1 / Move Absolute**: Absolute movement<br><br>**2 / Move Additive**: Additive movement<br><br>**3 / Reference Movement**: Reference movement<br><br>**4 / Position Setting**: Position setting<br><br>**5 / Repeat**: Repeat<br><br>**6 / Move Relative**: Relative movement<br><br>**7 / Move Velocity**: Movement with a defined velocity<br><br>**8 / Gear**: Movement with a defined gear factor<br><br>**9 / Write Parameter**: Write a parameter<br><br>The values for the selected data set type are specified by means of the parameters MSM_ds_set1 to MSM_ds_set4.<br><br>Modified settings become active immediately. | -<br>0<br>0<br>9 | UINT16<br>R/W<br>per.<br>- | CANopen 302D:11$_h$<br>Modbus 11554<br>Profibus 11554<br>CIP 145.1.17<br>ModbusTCP 11554<br>EtherCAT 302D:11$_h$<br>PROFINET 11554 |
| *MSM_start_ds* | Selection of a data set to be started for operating mode Motion Sequence.<br><br>Modified settings become active immediately. | -<br>0<br>0<br>127 | UINT16<br>R/W<br>-<br>- | CANopen 301B:A$_h$<br>Modbus 6932<br>Profibus 6932<br>CIP 127.1.10<br>ModbusTCP 6932<br>EtherCAT 301B:A$_h$<br>PROFINET 6932 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *MSMendNumSe-quence* | Selection of the data set number after the end of a sequence.<br><br>**0 / DataSetSelect**: Data set is set via the signal input function "Data Set Select"<br><br>**1 / Automatic**: Data set is set automatically<br><br>Value 0: After the end of a sequence, the selected data set must be set via the signal input function "Data Set Select".<br><br>Value 1: After the end of a sequence, the selected data set is set automatically.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.09. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 302D:9$_h$<br><br>Modbus 11538<br><br>Profibus 11538<br><br>CIP 145.1.9<br><br>ModbusTCP 11538<br><br>EtherCAT 302D:9$_h$<br><br>PROFINET 11538 |
| *MSMstartSignal* | Response to falling edge at signal input for 'Start Signal Data Set'.<br><br>**0 / No Reaction**: No response<br><br>**1 / Cancel Movement**: Cancel active movement<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.09. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 302D:C$_h$<br><br>Modbus 11544<br><br>Profibus 11544<br><br>CIP 145.1.12<br><br>ModbusTCP 11544<br><br>EtherCAT 302D:C$_h$<br><br>PROFINET 11544 |
| *MT_dismax* | Maximum permissible distance.<br><br>If the reference value is active and the maximum permissible distance is exceeded, an error of error class 1 is detected.<br><br>The value 0 switches off monitoring.<br><br>The parameter MT_dismax_usr allows you to enter the value in user-defined units.<br><br>In increments of 0.1 revolution.<br><br>Modified settings become active the next time the motor moves. | revolution<br><br>0.0<br><br>1.0<br><br>999.9 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 302E:3$_h$<br><br>Modbus 11782<br><br>Profibus 11782<br><br>CIP 146.1.3<br><br>ModbusTCP 11782<br><br>EtherCAT 302E:3$_h$<br><br>PROFINET 11782 |
| *MT_dismax_usr* | Maximum permissible distance.<br><br>If the reference value is active and the maximum permissible distance is exceeded, an error of error class 1 is detected.<br><br>The value 0 switches off monitoring.<br><br>The minimum value, the factory setting and the maximum value depend on the scaling factor.<br><br>Modified settings become active the next time the motor moves.<br><br>Available with firmware version ≥V01.03. | usr_p<br><br>0<br><br>16384<br><br>2147483647 | INT32<br><br>R/W<br><br>-<br><br>- | CANopen 302E:A$_h$<br><br>Modbus 11796<br><br>Profibus 11796<br><br>CIP 146.1.10<br><br>ModbusTCP 11796<br><br>EtherCAT 302E:A$_h$<br><br>PROFINET 11796 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *OFS_PosActivate* | Offset movement with relative offset position.<br><br>This parameter starts an offset movement with one of the relative offset positions specified by means of the parameters OFSp_RelPos1 and OFSp_RelPos2.<br><br>Value 0: No offset movement<br><br>Value 1: Start offset movement with relative offset position 1 (OFSp_RelPos1)<br><br>Value 2: Start offset movement with relative offset position 2 (OFSp_RelPos2)<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>3 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 3027:B$_h$<br><br>Modbus 10006<br><br>Profibus 10006<br><br>CIP 139.1.11<br><br>ModbusTCP 10006<br><br>EtherCAT 3027:B$_h$<br><br>PROFINET 10006 |
| *OFS_Ramp* | Acceleration and deceleration for offset movement.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled. | usr_a<br><br>1<br><br>600<br><br>2147483647 | UINT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3027:6$_h$<br><br>Modbus 9996<br><br>Profibus 9996<br><br>CIP 139.1.6<br><br>ModbusTCP 9996<br><br>EtherCAT 3027:6$_h$<br><br>PROFINET 9996 |
| *OFSp_abs* | Start absolute offset movement.<br><br>Modified settings become active immediately. | Inc<br><br>-2147483648<br><br>-<br><br>2147483647 | INT32<br><br>R/W<br><br>-<br><br>- | CANopen 3027:1$_h$<br><br>Modbus 9986<br><br>Profibus 9986<br><br>CIP 139.1.1<br><br>ModbusTCP 9986<br><br>EtherCAT 3027:1$_h$<br><br>PROFINET 9986 |
| *OFSp_rel* | Start relative offset movement.<br><br>Modified settings become active immediately. | Inc<br><br>-2147483648<br><br>0<br><br>2147483647 | INT32<br><br>R/W<br><br>-<br><br>- | CANopen 3027:3$_h$<br><br>Modbus 9990<br><br>Profibus 9990<br><br>CIP 139.1.3<br><br>ModbusTCP 9990<br><br>EtherCAT 3027:3$_h$<br><br>PROFINET 9990 |
| *OFSp_RelPos1* | Relative offset position 1 for offset movement.<br><br>Modified settings become active immediately. | Inc<br><br>-2147483648<br><br>0<br><br>2147483647 | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3027:8$_h$<br><br>Modbus 10000<br><br>Profibus 10000<br><br>CIP 139.1.8<br><br>ModbusTCP 10000<br><br>EtherCAT 3027:8$_h$<br><br>PROFINET 10000 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *OFSp_RelPos2* | Relative offset position 2 for offset movement.<br><br>Modified settings become active immediately. | Inc<br><br>-2147483648<br><br>0<br><br>2147483647 | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3027:A$_h$<br><br>Modbus 10004<br><br>Profibus 10004<br><br>CIP 139.1.10<br><br>ModbusTCP 10004<br><br>EtherCAT 3027:A$_h$<br><br>PROFINET 10004 |
| *OFSp_SetPos* | Set offset position.<br><br>Modified settings become active immediately. | Inc<br><br>-2147483648<br><br>0<br><br>2147483647 | INT32<br><br>R/W<br><br>-<br><br>- | CANopen 3027:5$_h$<br><br>Modbus 9994<br><br>Profibus 9994<br><br>CIP 139.1.5<br><br>ModbusTCP 9994<br><br>EtherCAT 3027:5$_h$<br><br>PROFINET 9994 |
| *OFSv_target* | Target velocity for offset movement.<br><br>The maximum value is 5000 if the user-defined scaling factor of the velocity scaling is 1.<br><br>This applies to the user-defined scaling factors. Example: If the user-defined scaling factor of the velocity scaling is 2 (ScaleVELnum = 2, ScaleVELdenom = 1), the maximum value is 2500.<br><br>Modified settings become active immediately. | usr_v<br><br>1<br><br>60<br><br>2147483647 | UINT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3027:4$_h$<br><br>Modbus 9992<br><br>Profibus 9992<br><br>CIP 139.1.4<br><br>ModbusTCP 9992<br><br>EtherCAT 3027:4$_h$<br><br>PROFINET 9992 |
| *p_MaxDifToENC2* | Maximum permissible deviation of encoder positions.<br><br>The maximum permissible position deviation between the encoder positions is cyclically monitored. If the limit is exceeded, an error is detected.<br><br>The position deviation is available via the parameter '_p_DifEnc1ToEnc2'.<br><br>The default value corresponds to 1/2 motor revolution.<br><br>The maximum value corresponds to 100 motor revolutions.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled. | Inc<br><br>1<br><br>65536<br><br>13107200 | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3050:7$_h$<br><br>Modbus 20494<br><br>Profibus 20494<br><br>CIP 180.1.7<br><br>ModbusTCP 20494<br><br>EtherCAT 3050:7$_h$<br><br>PROFINET 20494 |
| *p_PTI_act_set* | Position value at PTI interface.<br><br>Available with firmware version ≥V01.26. | Inc<br><br>-2147483648<br><br>-<br><br>2147483647 | INT32<br><br>R/W<br><br>-<br><br>- | CANopen 3008:29$_h$<br><br>Modbus 2130<br><br>Profibus 2130<br><br>CIP 108.1.41<br><br>ModbusTCP 2130<br><br>EtherCAT 3008:29$_h$<br><br>PROFINET 2130 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PAR_CTRLreset* ⊏ o n F → F ⊏ 5 - r E 5 ⊏ | Reset control loop parameters. **0 / No /** n o: No **1 / Yes /** Y E 5: Yes Reset of the control loop parameters. The control loop parameters are recalculated on the basis of the motor data of the connected motor. Current and velocity limitations are not reset. Therefore, a user parameter reset is required. The new settings are not saved to the nonvolatile memory. Setting can only be modified if power stage is disabled. Modified settings become active immediately. | - 0 0 1 | UINT16 R/W - - | CANopen 3004:7ₕ Modbus 1038 Profibus 1038 CIP 104.1.7 ModbusTCP 1038 EtherCAT 3004:7ₕ PROFINET 1038 |
| *PAR_ScalingStart* | Recalculation of parameters with user-defined units. The parameters with user-defined units can be recalculated with a changed scaling factor. Value 0: Inactive Value 1: Initialize recalculation Value 2: Start recalculation Setting can only be modified if power stage is disabled. Modified settings become active immediately. Available with firmware version ≥V01.03. | - 0 0 2 | UINT16 R/W - - | CANopen 3004:14ₕ Modbus 1064 Profibus 1064 CIP 104.1.20 ModbusTCP 1064 EtherCAT 3004:14ₕ PROFINET 1064 |
| *PAReeprSave* | Save parameter values to the nonvolatile memory. Value 1: Save persistent parameters The currently set parameters are saved to the nonvolatile memory. The saving process is complete when the parameter is read and 0 is returned. Parameters for the safety module eSM are modified using the commissioning software. The parameter values are saved persistently after transfer. Explicit saving to the persistent memory is not required in the case of the safety module eSM. Modified settings become active immediately. | - - - - | UINT16 R/W - - | CANopen 3004:1ₕ Modbus 1026 Profibus 1026 CIP 104.1.1 ModbusTCP 1026 EtherCAT 3004:1ₕ PROFINET 1026 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PARuserReset* � ConF → FCS- rESu | Reset user parameters. **0 / No / no**: No **65535 / Yes / YES**: Yes Bit 0: Reset persistent user parameters and control loop parameters to default values Bit 1: Reset Motion Sequence parameters to default values Bits 2 … 15: Reserved The parameters are reset with the exception of: - Communication parameters - Inversion of direction of movement - Type of reference value signal for PTI interface - Settings of encoder simulation - Functions of digital inputs and outputs - Safety module eSM The new settings are not saved to the nonvolatile memory. Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. | - 0 - 65535 | UINT16 R/W - - | CANopen 3004:8ₕ Modbus 1040 Profibus 1040 CIP 104.1.8 ModbusTCP 1040 EtherCAT 3004:8ₕ PROFINET 1040 |
| *PBaddress* ConF → CoN- PbAd | Profibus address. Setting can only be modified if power stage is disabled. Modified settings become active the next time the product is powered on. | - 1 126 126 | UINT16 R/W per. - | CANopen 3043:2ₕ Modbus 17156 Profibus 17156 CIP 167.1.2 ModbusTCP 17156 EtherCAT 3043:2ₕ PROFINET 17156 |
| *PDOmask* | Deactivate receive PDO. Value 0: Activate receive PDO Value 1: Deactivate receive PDO Modified settings become active immediately. | - 0 0 1 | UINT16 R/W - - | CANopen 3040:42ₕ Modbus 16516 Profibus 16516 CIP 164.1.66 ModbusTCP 16516 EtherCAT 3040:42ₕ PROFINET 16516 |
| *PntIPAddress1* ConF → CoN- iPc1 | IP address, byte 1. Modified settings become active the next time the product is powered on. | - 0 0 255 | UINT16 R/W per. - | CANopen 3048:7ₕ Modbus 18446 Profibus 18446 CIP 172.1.7 ModbusTCP 18446 EtherCAT 3048:7ₕ PROFINET 18446 |

| Parameter name<br>HMI menu<br>HMI name | Description | Unit<br>Minimum value<br>Factory setting<br>Maximum value | Data type<br>R/W<br>Persistent<br>Expert | Parameter address<br>via fieldbus |
|---|---|---|---|---|
| *PntIPAddress2*<br>$ConF \rightarrow CoM -$<br>$iPc2$ | IP address, byte 2.<br><br>Modified settings become active the next time the product is powered on. | -<br>0<br>0<br>255 | UINT16<br>R/W<br>per.<br>- | CANopen 3048:8$_h$<br>Modbus 18448<br>Profibus 18448<br>CIP 172.1.8<br>ModbusTCP 18448<br>EtherCAT 3048:8$_h$<br>PROFINET 18448 |
| *PntIPAddress3*<br>$ConF \rightarrow CoM -$<br>$iPc3$ | IP address, byte 3.<br><br>Modified settings become active the next time the product is powered on. | -<br>0<br>0<br>255 | UINT16<br>R/W<br>per.<br>- | CANopen 3048:9$_h$<br>Modbus 18450<br>Profibus 18450<br>CIP 172.1.9<br>ModbusTCP 18450<br>EtherCAT 3048:9$_h$<br>PROFINET 18450 |
| *PntIPAddress4*<br>$ConF \rightarrow CoM -$<br>$iPc4$ | IP address, byte 4.<br><br>Modified settings become active the next time the product is powered on. | -<br>0<br>0<br>255 | UINT16<br>R/W<br>per.<br>- | CANopen 3048:A$_h$<br>Modbus 18452<br>Profibus 18452<br>CIP 172.1.10<br>ModbusTCP 18452<br>EtherCAT 3048:A$_h$<br>PROFINET 18452 |
| *PntIPgate1*<br>$ConF \rightarrow CoM -$<br>$iPG1$ | IP address gateway, byte 1.<br><br>Modified settings become active the next time the product is powered on. | -<br>0<br>0<br>255 | UINT16<br>R/W<br>per.<br>- | CANopen 3048:F$_h$<br>Modbus 18462<br>Profibus 18462<br>CIP 172.1.15<br>ModbusTCP 18462<br>EtherCAT 3048:F$_h$<br>PROFINET 18462 |
| *PntIPgate2*<br>$ConF \rightarrow CoM -$<br>$iPG2$ | IP address gateway, byte 2.<br><br>Modified settings become active the next time the product is powered on. | -<br>0<br>0<br>255 | UINT16<br>R/W<br>per.<br>- | CANopen 3048:10$_h$<br>Modbus 18464<br>Profibus 18464<br>CIP 172.1.16<br>ModbusTCP 18464<br>EtherCAT 3048:10$_h$<br>PROFINET 18464 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PntIPgate3* ⊂ o n F → ⊂ o Π - , P G 3 | IP address gateway, byte 3. Modified settings become active the next time the product is powered on. | - 0 0 255 | UINT16 R/W per. - | CANopen 3048:11$_h$ Modbus 18466 Profibus 18466 CIP 172.1.17 ModbusTCP 18466 EtherCAT 3048:11$_h$ PROFINET 18466 |
| *PntIPgate4* ⊂ o n F → ⊂ o Π - , P G 4 | IP address gateway, byte 4. Modified settings become active the next time the product is powered on. | - 0 0 255 | UINT16 R/W per. - | CANopen 3048:12$_h$ Modbus 18468 Profibus 18468 CIP 172.1.18 ModbusTCP 18468 EtherCAT 3048:12$_h$ PROFINET 18468 |
| *PntIPmask1* ⊂ o n F → ⊂ o Π - , P Π 1 | IP address subnet mask, byte 1. Modified settings become active the next time the product is powered on. | - 0 255 255 | UINT16 R/W per. - | CANopen 3048:B$_h$ Modbus 18454 Profibus 18454 CIP 172.1.11 ModbusTCP 18454 EtherCAT 3048:B$_h$ PROFINET 18454 |
| *PntIPmask2* ⊂ o n F → ⊂ o Π - , P Π 2 | IP address subnet mask, byte 2. Modified settings become active the next time the product is powered on. | - 0 255 255 | UINT16 R/W per. - | CANopen 3048:C$_h$ Modbus 18456 Profibus 18456 CIP 172.1.12 ModbusTCP 18456 EtherCAT 3048:C$_h$ PROFINET 18456 |
| *PntIPmask3* ⊂ o n F → ⊂ o Π - , P Π 3 | IP address subnet mask, byte 3. Modified settings become active the next time the product is powered on. | - 0 255 255 | UINT16 R/W per. - | CANopen 3048:D$_h$ Modbus 18458 Profibus 18458 CIP 172.1.13 ModbusTCP 18458 EtherCAT 3048:D$_h$ PROFINET 18458 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PntIPmask4* ⌐ o n F → ⌐ o ⌐ - , P ⌐ ч | IP address subnet mask, byte 4. Modified settings become active the next time the product is powered on. | - 0 0 255 | UINT16 R/W per. - | CANopen 3048:E$_h$ Modbus 18460 Profibus 18460 CIP 172.1.14 ModbusTCP 18460 EtherCAT 3048:E$_h$ PROFINET 18460 |
| *PntIpMode* ⌐ o n F → ⌐ o ⌐ - , P ⌐ d | Method of obtaining IP address. **0 / Manual / ⌐ ⌐ ⌐ ⌐**: Manual **3 / DCP / d ⌐ P**: DCP | - 0 3 3 | UINT16 R/W per. - | CANopen 3048:2$_h$ Modbus 18436 Profibus 18436 CIP 172.1.2 ModbusTCP 18436 EtherCAT 3048:2$_h$ PROFINET 18436 |
| *PosReg1Mode* | Selection of comparison criterion for position register channel 1. **0 / Pact greater equal A**: Actual position is greater than or equal to comparison value A for position register channel 1 **1 / Pact less equal A**: Actual position is less than or equal to comparison value A for position register channel 1 **2 / Pact in [A-B] (basic)**: Actual position is in the range A-B including limits (basic) **3 / Pact out [A-B] (basic)**: Actual position is out of the range A-B excluding limits (basic) **4 / Pact in [A-B] (extended)**: Actual position is in the range A-B including limits (extended) **5 / Pact out [A-B] (extended)**: Actual position is out of the range A-B excluding limits (extended) Modified settings become active immediately. | - 0 0 5 | UINT16 R/W per. - | CANopen 300B:4$_h$ Modbus 2824 Profibus 2824 CIP 111.1.4 ModbusTCP 2824 EtherCAT 300B:4$_h$ PROFINET 2824 |
| *PosReg1Source* | Selection of source for position register channel 1. **0 / Pact Encoder 1**: Source for position register channel 1 is Pact of encoder 1 **1 / Pact Encoder 2**: Source for position register channel 1 is Pact of encoder 2 (module) Modified settings become active immediately. | - 0 0 1 | UINT16 R/W per. - | CANopen 300B:6$_h$ Modbus 2828 Profibus 2828 CIP 111.1.6 ModbusTCP 2828 EtherCAT 300B:6$_h$ PROFINET 2828 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PosReg1Start* | Start/stop of position register channel 1.<br><br>**0 / Off (keep last state)**: Position Register channel 1 is off and status bit keeps last state<br><br>**1 / On**: Position Register channel 1 is on<br><br>**2 / Off (set state 0)**: Position Register channel 1 is off and status bit is set to 0<br><br>**3 / Off (set state 1)**: Position Register channel 1 is off and status bit is set to 1<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>3 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 300B:2$_h$<br><br>Modbus 2820<br><br>Profibus 2820<br><br>CIP 111.1.2<br><br>ModbusTCP 2820<br><br>EtherCAT 300B:2$_h$<br><br>PROFINET 2820 |
| *PosReg1ValueA* | Comparison value A for position register channel 1. | usr_p<br><br>-<br><br>0<br><br>- | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 300B:8$_h$<br><br>Modbus 2832<br><br>Profibus 2832<br><br>CIP 111.1.8<br><br>ModbusTCP 2832<br><br>EtherCAT 300B:8$_h$<br><br>PROFINET 2832 |
| *PosReg1ValueB* | Comparison value B for position register channel 1. | usr_p<br><br>-<br><br>0<br><br>- | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 300B:9$_h$<br><br>Modbus 2834<br><br>Profibus 2834<br><br>CIP 111.1.9<br><br>ModbusTCP 2834<br><br>EtherCAT 300B:9$_h$<br><br>PROFINET 2834 |
| *PosReg2Mode* | Selection of comparison criterion for position register channel 2.<br><br>**0 / Pact greater equal A**: Actual position is greater than or equal to comparison value A for position register channel 2<br><br>**1 / Pact less equal A**: Actual position is less than or equal to comparison value A for position register channel 2<br><br>**2 / Pact in [A-B] (basic)**: Actual position is in the range A-B including limits (basic)<br><br>**3 / Pact out [A-B] (basic)**: Actual position is out of the range A-B excluding limits (basic)<br><br>**4 / Pact in [A-B] (extended)**: Actual position is in the range A-B including limits (extended)<br><br>**5 / Pact out [A-B] (extended)**: Actual position is out of the range A-B excluding limits (extended)<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>5 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 300B:5$_h$<br><br>Modbus 2826<br><br>Profibus 2826<br><br>CIP 111.1.5<br><br>ModbusTCP 2826<br><br>EtherCAT 300B:5$_h$<br><br>PROFINET 2826 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PosReg2Source* | Selection of source for position register channel 2. **0 / Pact Encoder 1**: Source for position register channel 2 is Pact of encoder 1 **1 / Pact Encoder 2**: Source for position register channel 2 is Pact of encoder 2 (module) Modified settings become active immediately. | - 0 0 1 | UINT16 R/W per. - | CANopen 300B:7$_h$ Modbus 2830 Profibus 2830 CIP 111.1.7 ModbusTCP 2830 EtherCAT 300B:7$_h$ PROFINET 2830 |
| *PosReg2Start* | Start/stop of position register channel 2. **0 / Off (keep last state)**: Position Register channel 2 is off and status bit keeps last state **1 / On**: Position Register channel 2 is on **2 / Off (set state 0)**: Position Register channel 2 is off and status bit is set to 0 **3 / Off (set state 1)**: Position Register channel 2 is off and status bit is set to 1 Modified settings become active immediately. | - 0 0 3 | UINT16 R/W - - | CANopen 300B:3$_h$ Modbus 2822 Profibus 2822 CIP 111.1.3 ModbusTCP 2822 EtherCAT 300B:3$_h$ PROFINET 2822 |
| *PosReg2ValueA* | Comparison value A for position register channel 2. | usr_p - 0 - | INT32 R/W per. - | CANopen 300B:A$_h$ Modbus 2836 Profibus 2836 CIP 111.1.10 ModbusTCP 2836 EtherCAT 300B:A$_h$ PROFINET 2836 |
| *PosReg2ValueB* | Comparison value B for position register channel 2. | usr_p - 0 - | INT32 R/W per. - | CANopen 300B:B$_h$ Modbus 2838 Profibus 2838 CIP 111.1.11 ModbusTCP 2838 EtherCAT 300B:B$_h$ PROFINET 2838 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PosReg3Mode* | Selection of comparison criterion for position register channel 3.<br><br>**0 / Pact greater equal A**: Actual position is greater than or equal to comparison value A for position register channel 3<br><br>**1 / Pact less equal A**: Actual position is less than or equal to comparison value A for position register channel 3<br><br>**2 / Pact in [A-B] (basic)**: Actual position is in the range A-B including limits (basic)<br><br>**3 / Pact out [A-B] (basic)**: Actual position is out of the range A-B excluding limits (basic)<br><br>**4 / Pact in [A-B] (extended)**: Actual position is in the range A-B including limits (extended)<br><br>**5 / Pact out [A-B] (extended)**: Actual position is out of the range A-B excluding limits (extended)<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.04. | -<br><br>0<br><br>0<br><br>5 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 300B:E$_h$<br><br>Modbus 2844<br><br>Profibus 2844<br><br>CIP 111.1.14<br><br>ModbusTCP 2844<br><br>EtherCAT 300B:E$_h$<br><br>PROFINET 2844 |
| *PosReg3Source* | Selection of source for position register channel 3.<br><br>**0 / Pact Encoder 1**: Source for position register channel 3 is Pact of encoder 1<br><br>**1 / Pact Encoder 2**: Source for position register channel 3 is Pact of encoder 2 (module)<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.04. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 300B:10$_h$<br><br>Modbus 2848<br><br>Profibus 2848<br><br>CIP 111.1.16<br><br>ModbusTCP 2848<br><br>EtherCAT 300B:10$_h$<br><br>PROFINET 2848 |
| *PosReg3Start* | Start/stop of position register channel 3.<br><br>**0 / Off (keep last state)**: Position Register channel 3 is off and status bit keeps last state<br><br>**1 / On**: Position Register channel 3 is on<br><br>**2 / Off (set state 0)**: Position Register channel 3 is off and status bit is set to 0<br><br>**3 / Off (set state 1)**: Position Register channel 3 is off and status bit is set to 1<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.04. | -<br><br>0<br><br>0<br><br>3 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 300B:C$_h$<br><br>Modbus 2840<br><br>Profibus 2840<br><br>CIP 111.1.12<br><br>ModbusTCP 2840<br><br>EtherCAT 300B:C$_h$<br><br>PROFINET 2840 |
| *PosReg3ValueA* | Comparison value A for position register channel 3.<br><br>Available with firmware version ≥V01.04. | usr_p<br><br>-<br><br>0<br><br>- | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 300B:12$_h$<br><br>Modbus 2852<br><br>Profibus 2852<br><br>CIP 111.1.18<br><br>ModbusTCP 2852<br><br>EtherCAT 300B:12$_h$<br><br>PROFINET 2852 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PosReg3ValueB* | Comparison value B for position register channel 3. Available with firmware version ≥V01.04. | usr_p - 0 - | INT32 R/W per. - | CANopen 300B:13$_h$ Modbus 2854 Profibus 2854 CIP 111.1.19 ModbusTCP 2854 EtherCAT 300B:13$_h$ PROFINET 2854 |
| *PosReg4Mode* | Selection of comparison criterion for position register channel 4. **0 / Pact greater equal A**: Actual position is greater than or equal to comparison value A for position register channel 4 **1 / Pact less equal A**: Actual position is less than or equal to comparison value A for position register channel 4 **2 / Pact in [A-B] (basic)**: Actual position is in the range A-B including limits (basic) **3 / Pact out [A-B] (basic)**: Actual position is out of the range A-B excluding limits (basic) **4 / Pact in [A-B] (extended)**: Actual position is in the range A-B including limits (extended) **5 / Pact out [A-B] (extended)**: Actual position is out of the range A-B excluding limits (extended) Modified settings become active immediately. Available with firmware version ≥V01.04. | - 0 0 5 | UINT16 R/W per. - | CANopen 300B:F$_h$ Modbus 2846 Profibus 2846 CIP 111.1.15 ModbusTCP 2846 EtherCAT 300B:F$_h$ PROFINET 2846 |
| *PosReg4Source* | Selection of source for position register channel 4. **0 / Pact Encoder 1**: Source for position register channel 4 is Pact of encoder 1 **1 / Pact Encoder 2**: Source for position register channel 4 is Pact of encoder 2 (module) Modified settings become active immediately. Available with firmware version ≥V01.04. | - 0 0 1 | UINT16 R/W per. - | CANopen 300B:11$_h$ Modbus 2850 Profibus 2850 CIP 111.1.17 ModbusTCP 2850 EtherCAT 300B:11$_h$ PROFINET 2850 |
| *PosReg4Start* | Start/stop of position register channel 4. **0 / Off (keep last state)**: Position Register channel 4 is off and status bit keeps last state **1 / On**: Position Register channel 4 is on **2 / Off (set state 0)**: Position Register channel 4 is off and status bit is set to 0 **3 / Off (set state 1)**: Position Register channel 4 is off and status bit is set to 1 Modified settings become active immediately. Available with firmware version ≥V01.04. | - 0 0 3 | UINT16 R/W - - | CANopen 300B:D$_h$ Modbus 2842 Profibus 2842 CIP 111.1.13 ModbusTCP 2842 EtherCAT 300B:D$_h$ PROFINET 2842 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PosReg4ValueA* | Comparison value A for position register channel 4.<br><br>Available with firmware version ≥V01.04. | usr_p<br><br>-<br><br>0<br><br>- | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 300B:14$_h$<br><br>Modbus 2856<br><br>Profibus 2856<br><br>CIP 111.1.20<br><br>ModbusTCP 2856<br><br>EtherCAT 300B:14$_h$<br><br>PROFINET 2856 |
| *PosReg4ValueB* | Comparison value B for position register channel 4.<br><br>Available with firmware version ≥V01.04. | usr_p<br><br>-<br><br>0<br><br>- | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 300B:15$_h$<br><br>Modbus 2858<br><br>Profibus 2858<br><br>CIP 111.1.21<br><br>ModbusTCP 2858<br><br>EtherCAT 300B:15$_h$<br><br>PROFINET 2858 |
| *PosRegGroupStart* | Start/stop of position register channels.<br><br>**0 / No Channel**: No channel activated<br><br>**1 / Channel 1**: Channel 1 activated<br><br>**2 / Channel 2**: Channel 2 activated<br><br>**3 / Channel 1 & 2**: Channels 1 and 2 activated<br><br>**4 / Channel 3**: Channel 3 activated<br><br>**5 / Channel 1 & 3**: Channels 1 and 3 activated<br><br>**6 / Channel 2 & 3**: Channels 2 and 3 activated<br><br>**7 / Channel 1 & 2 & 3**: Channels 1, 2 and 3 activated<br><br>**8 / Channel 4**: Channel 4 activated<br><br>**9 / Channel 1 & 4**: Channels 1 and 4 activated<br><br>**10 / Channel 2 & 4**: Channels 2 and 4 activated<br><br>**11 / Channel 1 & 2 & 4**: Channels 1, 2 and 4 activated<br><br>**12 / Channel 3 & 4**: Channels 3 and 4 activated<br><br>**13 / Channel 1 & 3 & 4**: Channels 1, 3 and 4 activated<br><br>**14 / Channel 2 & 3 & 4**: Channels 2, 3 and 4 activated<br><br>**15 / Channel 1 & 2 & 3 & 4**: Channels 1, 2, 3 and 4 activated<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.14. | -<br><br>0<br><br>0<br><br>15 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 300B:16$_h$<br><br>Modbus 2860<br><br>Profibus 2860<br><br>CIP 111.1.22<br><br>ModbusTCP 2860<br><br>EtherCAT 300B:16$_h$<br><br>PROFINET 2860 |

| Parameter name<br>HMI menu<br>HMI name | Description | Unit<br>Minimum value<br>Factory setting<br>Maximum value | Data type<br>R/W<br>Persistent<br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PP_ModeRangeLim* | Absolute movement beyond movement range.<br><br>**0 / NoAbsMoveAllowed**: Absolute movement beyond movement range is not possible<br><br>**1 / AbsMoveAllowed**: Absolute movement beyond movement range is possible<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.04. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3023:7$_h$<br><br>Modbus 8974<br><br>Profibus 8974<br><br>CIP 135.1.7<br><br>ModbusTCP 8974<br><br>EtherCAT 3023:7$_h$<br><br>PROFINET 8974 |
| *PP_OpmChgType* | Change to operating mode Profile Position during movements.<br><br>**0 / WithStandStill**: Change with standstill<br><br>**1 / OnTheFly**: Change without standstill<br><br>If Modulo is active, a transition to the operating mode Profile Position is performed with the setting WithStandStill, regardless of the setting of this parameter.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.04. | -<br><br>0<br><br>0<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3023:9$_h$<br><br>Modbus 8978<br><br>Profibus 8978<br><br>CIP 135.1.9<br><br>ModbusTCP 8978<br><br>EtherCAT 3023:9$_h$<br><br>PROFINET 8978 |
| *PPoption* | Options for operating mode Profile Position.<br><br>Determines the reference position for relative positioning:<br><br>0: Relative with reference to the previous target position of the profile generator<br><br>1: Not supported<br><br>2: Relative with reference to the actual position of the motor<br><br>Modified settings become active the next time the motor moves. | -<br><br>0<br><br>0<br><br>2 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 60F2:0$_h$<br><br>Modbus 6960<br><br>Profibus 6960<br><br>CIP 127.1.24<br><br>ModbusTCP 6960<br><br>EtherCAT 60F2:0$_h$<br><br>PROFINET 6960 |
| *PPp_target* | Target position for operating mode Profile Position.<br><br>Minimum/maximum values depend on:<br><br>- Scaling factor<br><br>- Software limit switches (if they are activated)<br><br>Modified settings become active immediately. | usr_p<br><br>-<br><br>-<br><br>- | INT32<br><br>R/W<br><br>-<br><br>- | CANopen 607A:0$_h$<br><br>Modbus 6940<br><br>Profibus 6940<br><br>CIP 127.1.14<br><br>ModbusTCP 6940<br><br>EtherCAT 607A:0$_h$<br><br>PROFINET 6940 |
| *PPv_target* | Target velocity for operating mode Profile Position.<br><br>The target velocity is limited to the setting in CTRL_v_max and RAMP_v_max.<br><br>Modified settings become active the next time the motor moves. | usr_v<br><br>1<br><br>60<br><br>4294967295 | UINT32<br><br>R/W<br><br>-<br><br>- | CANopen 6081:0$_h$<br><br>Modbus 6942<br><br>Profibus 6942<br><br>CIP 127.1.15<br><br>ModbusTCP 6942<br><br>EtherCAT 6081:0$_h$<br><br>PROFINET 6942 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PTI_pulse_filter* | Filter time for input signals at the PTI interface.<br><br>A signal at the PTI interface is only evaluated if it is available for a time that is longer than the set filter time.<br><br>For example, if an interference pulse is available for a period shorter than the set filter time, the interference pulse is not evaluated.<br><br>The interval between 2 signals must also be greater than the set filter time.<br><br>Available with hardware version ≥RS03.<br><br>In increments of 0.01 µs.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled. | µs<br>0.00<br>0.25<br>13.00 | UINT16<br>R/W<br>per.<br>expert | CANopen 3005:2F$_h$<br>Modbus 1374<br>Profibus 1374<br>CIP 105.1.47<br>ModbusTCP 1374<br>EtherCAT 3005:2F$_h$<br>PROFINET 1374 |
| *PTI_signal_type*<br><br>$ConF \rightarrow i$-$o$-$ioPi$ | Type of reference value signal for PTI interface.<br><br>**0 / A/B Signals / $Ab$**: Signals ENC_A and ENC_B (quadruple evaluation)<br><br>**1 / P/D Signals / $Pd$**: Signals PULSE and DIR<br><br>**2 / CW/CCW Signals / $cWcc$**: Signals clockwise and counterclockwise<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the product is powered on. | -<br>0<br>0<br>2 | UINT16<br>R/W<br>per.<br>- | CANopen 3005:2$_h$<br>Modbus 1284<br>Profibus 1284<br>CIP 105.1.2<br>ModbusTCP 1284<br>EtherCAT 3005:2$_h$<br>PROFINET 1284 |
| *PTO_mode*<br><br>$ConF \rightarrow ACG$-$PtoM$ | Type of usage of PTO interface.<br><br>**0 / Off / $oFF$**: PTO interface disabled<br><br>**1 / Esim pAct Enc 1 / $PEn1$**: Encoder simulation based on actual position of encoder 1<br><br>**2 / Esim pRef / $PrEF$**: Encoder simulation based on reference position (_p_ref)<br><br>**3 / PTI Signal / $Pti$**: Directly the signal from PTI interface<br><br>**4 / Esim pAct Enc 2 / $PEn2$**: Encoder simulation based on actual position of encoder 2 (module)<br><br>**5 / Esim iqRef / $irEF$**: Encoder simulation based on reference current<br><br>**6 / Esim pActRaw Enc2 / $Enc2$**: Encoder simulation based on raw position value of encoder 2 (module)<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled. | -<br>0<br>0<br>6 | UINT16<br>R/W<br>per.<br>- | CANopen 3005:1F$_h$<br>Modbus 1342<br>Profibus 1342<br>CIP 105.1.31<br>ModbusTCP 1342<br>EtherCAT 3005:1F$_h$<br>PROFINET 1342 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PTtq_reference* | Reference value source for operating mode Profile Torque. **0 / None**: None **1 / Parameter 'PTtq_target'**: Reference value via parameter PTtq_target **2 / Analog Input**: Reference value via analog input **3 / PTI Interface**: Reference value via PTI interface Modified settings become active immediately. Available with firmware version ≥V01.10. | - 0 1 3 | UINT16 R/W - - | CANopen 301B:38$_h$ Modbus 7024 Profibus 7024 CIP 127.1.56 ModbusTCP 7024 EtherCAT 301B:38$_h$ PROFINET 7024 |
| *PTtq_target* | Target torque. 100.0 % correspond to the continuous stall torque _M_M_0. In increments of 0.1 %. Modified settings become active immediately. | % -3000.0 0.0 3000.0 | INT16 R/W - - | CANopen 6071:0$_h$ Modbus 6944 Profibus 6944 CIP 127.1.16 ModbusTCP 6944 EtherCAT 6071:0$_h$ PROFINET 6944 |
| *PVv_reference* | Reference value source for operating mode Profile Velocity. **0 / None**: None **1 / Parameter 'PVv_target'**: Reference value via parameter PVv_target **2 / Analog Input**: Reference value via analog input Modified settings become active immediately. Available with firmware version ≥V01.10. | - 0 1 2 | UINT16 R/W - - | CANopen 301B:39$_h$ Modbus 7026 Profibus 7026 CIP 127.1.57 ModbusTCP 7026 EtherCAT 301B:39$_h$ PROFINET 7026 |
| *PVv_target* | Target velocity. The target velocity is limited to the setting in CTRL_v_max and RAMP_v_max. Modified settings become active immediately. | usr_v - 0 - | INT32 R/W - - | CANopen 60FF:0$_h$ Modbus 6938 Profibus 6938 CIP 127.1.13 ModbusTCP 6938 EtherCAT 60FF:0$_h$ PROFINET 6938 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *PWM_fChop* | PWM frequency of power stage. **4 / 4 kHz**: 4 kHz **8 / 8 kHz**: 8 kHz **16 / 16 kHz**: 16 kHz Factory setting: Peak output current ≤72 Arms: 8 kHz Peak output current >72 Arms: 4 kHz Changing this setting is only possible in the case of devices with a peak output current >72 Arms. Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. | - 4 - 16 | UINT16 R/W per. expert | CANopen 3005:E$_h$ Modbus 1308 Profibus 1308 CIP 105.1.14 ModbusTCP 1308 EtherCAT 3005:E$_h$ PROFINET 1308 |
| *RAMP_tq_enable* | Activation of the motion profile for torque. **0 / Profile Off**: Profile off **1 / Profile On**: Profile on In the operating mode Profile Torque, the motion profile for torque can be activated or deactivated. In the other operating modes, the motion profile for torque is inactive. Setting can only be modified if power stage is disabled. Modified settings become active immediately. | - 0 1 1 | UINT16 R/W per. - | CANopen 3006:2C$_h$ Modbus 1624 Profibus 1624 CIP 106.1.44 ModbusTCP 1624 EtherCAT 3006:2C$_h$ PROFINET 1624 |
| *RAMP_tq_slope* | Slope setting of the motion profile for torque. 100.00 % of the torque setting correspond to the continuous stall torque _M_M_0. Example: A ramp setting of 10000.00 %/s results in a torque change of 100.0% of _M_M_0 in 0.01s. In increments of 0.1 %/s. Modified settings become active immediately. | %/s 0.1 10000.0 3000000.0 | UINT32 R/W per. - | CANopen 6087:0$_h$ Modbus 1620 Profibus 1620 CIP 106.1.42 ModbusTCP 1620 EtherCAT 6087:0$_h$ PROFINET 1620 |
| *RAMP_v_acc* | Acceleration of the motion profile for velocity. Writing the value 0 has no effect on the parameter. Modified settings become active the next time the motor moves. | usr_a 1 600 2147483647 | UINT32 R/W per. - | CANopen 6083:0$_h$ Modbus 1556 Profibus 1556 CIP 106.1.10 ModbusTCP 1556 EtherCAT 6083:0$_h$ PROFINET 1556 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *RAMP_v_dec* | Deceleration of the motion profile for velocity.<br><br>The minimum value depends on the operating mode:<br><br>Operating modes with minimum value 1:<br><br>Electronic Gear (velocity synchronization)<br><br>Profile Velocity<br><br>Motion Sequence (Move Velocity)<br><br>Operating modes with minimum value 120:<br><br>Jog<br><br>Profile Position<br><br>Homing<br><br>Motion Sequence (Move Absolute, Move Additive, Move Relative and Reference Movement)<br><br>Writing the value 0 has no effect on the parameter.<br><br>Modified settings become active the next time the motor moves. | usr_a<br><br>1<br><br>600<br><br>2147483647 | UINT32<br><br>R/W<br><br>per.<br><br>- | CANopen 6084:0$_h$<br><br>Modbus 1558<br><br>Profibus 1558<br><br>CIP 106.1.11<br><br>ModbusTCP 1558<br><br>EtherCAT 6084:0$_h$<br><br>PROFINET 1558 |
| *RAMP_v_enable* | Activation of the motion profile for velocity.<br><br>**0 / Profile Off**: Profile off<br><br>**1 / Profile On**: Profile on<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>1<br><br>1 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:2B$_h$<br><br>Modbus 1622<br><br>Profibus 1622<br><br>CIP 106.1.43<br><br>ModbusTCP 1622<br><br>EtherCAT 3006:2B$_h$<br><br>PROFINET 1622 |
| *RAMP_v_jerk*<br><br>$\mathit{ConF} \rightarrow \mathit{drC}$-<br><br>$\mathit{JEr}$ | Jerk limitation of the motion profile for velocity.<br><br>**0 / Off / $oFF$**: Off<br><br>**1 / 1 / $I$**: 1 ms<br><br>**2 / 2 / $2$**: 2 ms<br><br>**4 / 4 / $4$**: 4 ms<br><br>**8 / 8 / $B$**: 8 ms<br><br>**16 / 16 / $I6$**: 16 ms<br><br>**32 / 32 / $32$**: 32 ms<br><br>**64 / 64 / $64$**: 64 ms<br><br>**128 / 128 / $I2B$**: 128 ms<br><br>Adjustments can only be made if the operating mode is inactive (x_end=1).<br><br>Modified settings become active the next time the motor moves. | ms<br><br>0<br><br>0<br><br>128 | UINT16<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:D$_h$<br><br>Modbus 1562<br><br>Profibus 1562<br><br>CIP 106.1.13<br><br>ModbusTCP 1562<br><br>EtherCAT 3006:D$_h$<br><br>PROFINET 1562 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *RAMP_v_max* ⌐ o ⌐ F → A ⌐ G - ⌐ ⌐ Π P | Maximum velocity of the motion profile for velocity. If a greater reference velocity is set in one of these operating modes, it is automatically limited to RAMP_v_max. This way, commissioning at limited velocity is easier to perform. Setting can only be modified if power stage is disabled. Modified settings become active the next time the motor moves. | usr_v 1 13200 2147483647 | UINT32 R/W per. - | CANopen 607F:0$_h$ Modbus 1554 Profibus 1554 CIP 106.1.9 ModbusTCP 1554 EtherCAT 607F:0$_h$ PROFINET 1554 |
| *RAMP_v_sym* | Acceleration and deceleration of the motion profile for velocity. The values are internally multiplied by 10 (example: 1 = 10 RPM/s). Write access changes the values of RAMP_v_acc and RAMP_v_dec. The limit values are verified on the basis of the values indicated for these parameters. Read access returns the greater value from RAMP_v_acc/RAMP_v_dec. If the value cannot be represented as a 16 bit value, the value is set to 65535 (maximum UINT16 value) Modified settings become active the next time the motor moves. | - - - - | UINT16 R/W - - | CANopen 3006:1$_h$ Modbus 1538 Profibus 1538 CIP 106.1.1 ModbusTCP 1538 EtherCAT 3006:1$_h$ PROFINET 1538 |
| *RAMPaccdec* | Acceleration and deceleration for the Drive Profile Lexium. High word: Acceleration Low word: Deceleration The values are internally multiplied by 10 (example: 1 = 10 RPM/s). Write access changes the values of RAMP_v_acc and RAMP_v_dec. The limit values are verified on the basis of the values indicated for these parameters. If the value cannot be represented as a 16 bit value, the value is set to 65535 (maximum UINT16 value). Modified settings become active the next time the motor moves. | - - - - | UINT32 R/W - - | CANopen 3006:2$_h$ Modbus 1540 Profibus 1540 CIP 106.1.2 ModbusTCP 1540 EtherCAT 3006:2$_h$ PROFINET 1540 |
| *RAMPquickstop* | Deceleration ramp for Quick Stop. Deceleration ramp for a software stop or an error with error class 1 or 2. Modified settings become active the next time the motor moves. | usr_a 1 6000 2147483647 | UINT32 R/W per. - | CANopen 3006:12$_h$ Modbus 1572 Profibus 1572 CIP 106.1.18 ModbusTCP 1572 EtherCAT 3006:12$_h$ PROFINET 1572 |

| Parameter name<br>HMI menu<br>HMI name | Description | Unit<br>Minimum value<br>Factory setting<br>Maximum value | Data type<br>R/W<br>Persistent<br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *RESext_P*<br>*ConF → ACG -*<br>*Pobr* | Nominal power of external braking resistor.<br><br>The maximum value depends on the power stage.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled. | W<br>1<br>10<br>- | UINT16<br>R/W<br>per.<br>- | CANopen 3005:12ₕ<br>Modbus 1316<br>Profibus 1316<br>CIP 105.1.18<br>ModbusTCP 1316<br>EtherCAT 3005:12ₕ<br>PROFINET 1316 |
| *RESext_R*<br>*ConF → ACG -*<br>*rbr* | Resistance value of external braking resistor.<br><br>The minimum value depends on the power stage.<br><br>In increments of 0.01 Ω.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled. | Ω<br>-<br>100.00<br>327.67 | UINT16<br>R/W<br>per.<br>- | CANopen 3005:13ₕ<br>Modbus 1318<br>Profibus 1318<br>CIP 105.1.19<br>ModbusTCP 1318<br>EtherCAT 3005:13ₕ<br>PROFINET 1318 |
| *RESext_ton*<br>*ConF → ACG -*<br>*tbr* | Maximum permissible switch-on time of external braking resistor.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled. | ms<br>1<br>1<br>30000 | UINT16<br>R/W<br>per.<br>- | CANopen 3005:11ₕ<br>Modbus 1314<br>Profibus 1314<br>CIP 105.1.17<br>ModbusTCP 1314<br>EtherCAT 3005:11ₕ<br>PROFINET 1314 |
| *RESint_ext*<br>*ConF → ACG -*<br>*Eibr* | Selection of type of braking resistor.<br><br>**0 / Internal Braking Resistor /** *int* : Internal braking resistor<br>**1 / External Braking Resistor /** *Eht* : External braking resistor<br>**2 / Reserved /** *rSVd* : Reserved<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled. | -<br>0<br>0<br>2 | UINT16<br>R/W<br>per.<br>- | CANopen 3005:9ₕ<br>Modbus 1298<br>Profibus 1298<br>CIP 105.1.9<br>ModbusTCP 1298<br>EtherCAT 3005:9ₕ<br>PROFINET 1298 |
| *ResolENC2* | Raw resolution of encoder 2.<br><br>Digital encoders:<br><br>Number of encoder increments per encoder revolution.<br><br>Analog encoders:<br><br>Number of analog periods per encoder revolution.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active the next time the power stage is enabled.<br><br>Available with firmware version ≥V01.26. | EncInc<br>1<br>10000<br>2147483647 | UINT32<br>R/W<br>per.<br>- | CANopen 3050:Fₕ<br>Modbus 20510<br>Profibus 20510<br>CIP 180.1.15<br>ModbusTCP 20510<br>EtherCAT 3050:Fₕ<br>PROFINET 20510 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *ResolENC2Denom* | Resolution of encoder 2, denominator. See numerator (*ResolEnc2Num*) for a description. Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. | revolution 1 1 16383 | INT32 R/W per. - | CANopen 3050:5ₕ Modbus 20490 Profibus 20490 CIP 180.1.5 ModbusTCP 20490 EtherCAT 3050:5ₕ PROFINET 20490 |
| *ResolENC2Num* | Resolution of encoder 2, numerator. Digital encoders: Specification of the encoder increments the external encoder returns for one or several revolutions of the motor shaft. The value is indicated with a numerator and a denominator so that it is possible, for example, to take into account the gear ratio of a mechanical gearing. The value must not be set to 0. The resolution factor is not applied until this numerator value is specified. Example: One motor revolution causes 1/3 encoder revolution at an encoder resolution of 16384 EncInc/revolution. ResolENC2Num = 16384 EncInc ResolENC2Denom = 3 revolutions Analog encoders: Num/Denom must be set equivalent to the number of analog periods per 1 motor revolution. Example: One motor revolution causes 1/3 encoder revolution at an encoder resolution of 16 analog periods per revolution. ResolENC2Num = 16 periods ResolENC2Denom = 3 revolutions Setting can only be modified if power stage is disabled. Modified settings become active the next time the power stage is enabled. | EncInc 1 10000 2147483647 | INT32 R/W per. - | CANopen 3050:6ₕ Modbus 20492 Profibus 20492 CIP 180.1.6 ModbusTCP 20492 EtherCAT 3050:6ₕ PROFINET 20492 |
| *ResWriComNotOpEn* | Response to write command (operating state is not Operation Enabled). **0 / Emergency Message**: An Emergency message is sent **1 / Error class 0**: An error with error class 0 is sent This parameter specifies the response of the drive to a write command that cannot be executed because the operating state is not Operation Enabled. Modified settings become active immediately. Available with firmware version ≥V01.26. | - 0 0 1 | UINT16 R/W per. - | CANopen 3006:49ₕ Modbus 1682 Profibus 1682 CIP 106.1.73 ModbusTCP 1682 EtherCAT 3006:49ₕ PROFINET 1682 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *RMAC_Activate* | Activation of relative movement after capture. **0 / Off**: Off **1 / On**: On Modified settings become active immediately. Available with firmware version ≥V01.10. | - 0 0 1 | UINT16 R/W - - | CANopen 3023:C$_h$ Modbus 8984 Profibus 8984 CIP 135.1.12 ModbusTCP 8984 EtherCAT 3023:C$_h$ PROFINET 8984 |
| *RMAC_Edge* | Edge of capture signal for relative movement after capture. **0 / Falling edge**: Falling edge **1 / Rising edge**: Rising edge Available with firmware version ≥V01.10. | - 0 0 1 | UINT16 R/W per. - | CANopen 3023:10$_h$ Modbus 8992 Profibus 8992 CIP 135.1.16 ModbusTCP 8992 EtherCAT 3023:10$_h$ PROFINET 8992 |
| *RMAC_Position* | Target position of relative movement after capture. Minimum/maximum values depend on: - Scaling factor Modified settings become active the next time the motor moves. Available with firmware version ≥V01.10. | usr_p - 0 - | INT32 R/W per. - | CANopen 3023:D$_h$ Modbus 8986 Profibus 8986 CIP 135.1.13 ModbusTCP 8986 EtherCAT 3023:D$_h$ PROFINET 8986 |
| *RMAC_Response* | Response if target position is overtraveled. **0 / Error Class 1**: Error class 1 **1 / No Movement To Target Position**: No movement to target position **2 / Movement To Target Position**: Movement to target position Modified settings become active immediately. Available with firmware version ≥V01.10. | - 0 0 2 | UINT16 R/W per. - | CANopen 3023:F$_h$ Modbus 8990 Profibus 8990 CIP 135.1.15 ModbusTCP 8990 EtherCAT 3023:F$_h$ PROFINET 8990 |
| *RMAC_Velocity* | Velocity of relative movement after capture. Value 0: Use actual motor velocity Value >0: Value is the target velocity The adjustable value is internally limited to the setting in RAMP_v_max. Modified settings become active the next time the motor moves. Available with firmware version ≥V01.10. | usr_v 0 0 2147483647 | UINT32 R/W per. - | CANopen 3023:E$_h$ Modbus 8988 Profibus 8988 CIP 135.1.14 ModbusTCP 8988 EtherCAT 3023:E$_h$ PROFINET 8988 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *ScalePOSdenom* | Position scaling: Denominator.<br><br>Refer to numerator (ScalePOSnum) for a description.<br><br>A new scaling is activated when the numerator value is supplied.<br><br>Setting can only be modified if power stage is disabled. | usr_p<br><br>1<br><br>16384<br><br>2147483647 | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:7$_h$<br><br>Modbus 1550<br><br>Profibus 1550<br><br>CIP 106.1.7<br><br>ModbusTCP 1550<br><br>EtherCAT 3006:7$_h$<br><br>PROFINET 1550 |
| *ScalePOSnum* | Position scaling: Numerator.<br><br>Specification of the scaling factor:<br><br>Motor revolutions<br><br>-----------------------------------------<br><br>User-defined units [usr_p]<br><br>A new scaling is activated when the numerator value is supplied.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately. | revolution<br><br>1<br><br>1<br><br>2147483647 | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:8$_h$<br><br>Modbus 1552<br><br>Profibus 1552<br><br>CIP 106.1.8<br><br>ModbusTCP 1552<br><br>EtherCAT 3006:8$_h$<br><br>PROFINET 1552 |
| *ScaleRAMPdenom* | Ramp scaling: Denominator.<br><br>See numerator (ScaleRAMPnum) for a description.<br><br>A new scaling is activated when the numerator value is supplied.<br><br>Setting can only be modified if power stage is disabled. | usr_a<br><br>1<br><br>1<br><br>2147483647 | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:30$_h$<br><br>Modbus 1632<br><br>Profibus 1632<br><br>CIP 106.1.48<br><br>ModbusTCP 1632<br><br>EtherCAT 3006:30$_h$<br><br>PROFINET 1632 |
| *ScaleRAMPnum* | Ramp scaling: Numerator.<br><br>Setting can only be modified if power stage is disabled.<br><br>Modified settings become active immediately. | RPM/s<br><br>1<br><br>1<br><br>2147483647 | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:31$_h$<br><br>Modbus 1634<br><br>Profibus 1634<br><br>CIP 106.1.49<br><br>ModbusTCP 1634<br><br>EtherCAT 3006:31$_h$<br><br>PROFINET 1634 |
| *ScaleVELdenom* | Velocity scaling: Denominator.<br><br>See numerator (ScaleVELnum) for a description.<br><br>A new scaling is activated when the numerator value is supplied.<br><br>Setting can only be modified if power stage is disabled. | usr_v<br><br>1<br><br>1<br><br>2147483647 | INT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3006:21$_h$<br><br>Modbus 1602<br><br>Profibus 1602<br><br>CIP 106.1.33<br><br>ModbusTCP 1602<br><br>EtherCAT 3006:21$_h$<br><br>PROFINET 1602 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *ScaleVELnum* | Velocity scaling: Numerator. Specification of the scaling factor: Speed of rotation of motor [RPM] ------------------------------------------------- User-defined units [usr_v] A new scaling is activated when the numerator value is supplied. Setting can only be modified if power stage is disabled. Modified settings become active immediately. | RPM 1 1 2147483647 | INT32 R/W per. - | CANopen 3006:22$_h$ Modbus 1604 Profibus 1604 CIP 106.1.34 ModbusTCP 1604 EtherCAT 3006:22$_h$ PROFINET 1604 |
| *ShiftEncWorkRang* | Shifting of the encoder working range. **0 / Off**: Shifting off **1 / On**: Shifting on After activating the shifting function, the position range of a multiturn encoder is shifted by one half of the range. Example for the position range of a multiturn encoder with 4096 revolutions: Value 0: Position values are between 0 … 4096 revolutions. Value 1: Position values are between -2048 … 2048 revolutions. Modified settings become active the next time the product is powered on. | - 0 0 1 | UINT16 R/W per. - | CANopen 3005:21$_h$ Modbus 1346 Profibus 1346 CIP 105.1.33 ModbusTCP 1346 EtherCAT 3005:21$_h$ PROFINET 1346 |
| *SimAbsolutePos* $\mathit{ConF} \to \mathit{ACG}\text{-}$ $\mathit{9Ab5}$ | Simulation of absolute position at power cycling. **0 / Simulation Off / *oFF***: Do not use the last mechanical position after power cycling **1 / Simulation On / *on***: Use last mechanical position after power cycling This parameter specifies the way position values are handled over a power cycle and allows for the simulation of an absolute position encoder using singleturn encoders. If this function is activated, the drive saves the pertinent position data prior to a power removal so that the drive can restore the mechanical position the next time it is powered on. In the case of singleturn encoders, the position can be restored if the motor shaft has not been moved by more than 0.25 revolutions while the drive was powered off. In the case of multiturn encoders, the permissible shaft movement while the drive is off can be much greater, depending on the type of multiturn encoder. For this function to work, the drive may only be powered off while the motor is at a standstill and the motor shaft must not be moved outside of the permissible range (for example, use a holding brake). Modified settings become active immediately. Available with firmware version ≥V01.01. | - 0 0 1 | UINT16 R/W per. - | CANopen 3005:23$_h$ Modbus 1350 Profibus 1350 CIP 105.1.35 ModbusTCP 1350 EtherCAT 3005:23$_h$ PROFINET 1350 |

| Parameter name<br><br>HMI menu<br><br>HMI name | Description | Unit<br><br>Minimum value<br><br>Factory setting<br><br>Maximum value | Data type<br><br>R/W<br><br>Persistent<br><br>Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *SyncMechStart* | Activation of synchronization mechanism.<br><br>Value 0: Deactivate synchronization mechanism<br><br>Value 1: Activate synchronization mechanism (CANmotion).<br><br>Value 2: Activate synchronization mechanism, standard CANopen mechanism.<br><br>The cycle time of the synchronization signal is derived from the parameters intTimPerVal and intTimInd.<br><br>Modified settings become active immediately. | -<br><br>0<br><br>0<br><br>2 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 3022:5$_h$<br><br>Modbus 8714<br><br>Profibus 8714<br><br>CIP 134.1.5<br><br>ModbusTCP 8714<br><br>EtherCAT 3022:5$_h$<br><br>PROFINET 8714 |
| *SyncMechStatus* | Status of synchronization mechanism.<br><br>Status of synchronization mechanism:<br><br>Value 1: Synchronization mechanism of drive is inactive.<br><br>Value 32: Drive is synchronizing with external sync signal.<br><br>Value 64: Drive is synchronized with external sync signal.<br><br>Available with firmware version ≥V01.08. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/-<br><br>-<br><br>- | CANopen 3022:6$_h$<br><br>Modbus 8716<br><br>Profibus 8716<br><br>CIP 134.1.6<br><br>ModbusTCP 8716<br><br>EtherCAT 3022:6$_h$<br><br>PROFINET 8716 |
| *SyncMechTol* | Synchronization tolerance.<br><br>The value is applied when the synchronization mechanism is activated via the parameter SyncMechStart.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.08. | -<br><br>1<br><br>1<br><br>20 | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 3022:4$_h$<br><br>Modbus 8712<br><br>Profibus 8712<br><br>CIP 134.1.4<br><br>ModbusTCP 8712<br><br>EtherCAT 3022:4$_h$<br><br>PROFINET 8712 |
| *TouchProbeFct* | Touch Probe function (DS402).<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.16. | -<br><br>-<br><br>-<br><br>- | UINT16<br><br>R/W<br><br>-<br><br>- | CANopen 60B8:0$_h$<br><br>Modbus 7028<br><br>Profibus 7028<br><br>CIP 127.1.58<br><br>ModbusTCP 7028<br><br>EtherCAT 60B8:0$_h$<br><br>PROFINET 7028 |
| *UsrAppDataMem1* | User-specific data 1.<br><br>This parameter can be used to store user-specific data.<br><br>Modified settings become active immediately.<br><br>Available with firmware version ≥V01.20. | -<br><br>-<br><br>-<br><br>- | UINT32<br><br>R/W<br><br>per.<br><br>- | CANopen 3001:43$_h$<br><br>Modbus 390<br><br>Profibus 390<br><br>CIP 101.1.67<br><br>ModbusTCP 390<br><br>EtherCAT 3001:43$_h$<br><br>PROFINET 390 |

| Parameter name HMI menu HMI name | Description | Unit Minimum value Factory setting Maximum value | Data type R/W Persistent Expert | Parameter address via fieldbus |
|---|---|---|---|---|
| *UsrAppDataMem2* | User-specific data 2. This parameter can be used to store user-specific data. Modified settings become active immediately. Available with firmware version ≥V01.20. | - - 0 - | UINT32 R/W per. - | CANopen 3001:44$_h$ Modbus 392 Profibus 392 CIP 101.1.68 ModbusTCP 392 EtherCAT 3001:44$_h$ PROFINET 392 |
| *WakesAndShake-Gain* | Gain for wake and shake. If wake and shake does not work properly, this parameter can be used to adapt the dynamics of the wake and shake procedure. Value >100 %: Increases dynamics which leads to less motor movement. Value <100 %: Reduces dynamics which leads to more motor movement. In increments of 0.1 %. Setting can only be modified if power stage is disabled. Modified settings become active immediately. Available with firmware version ≥V01.10. | % 1.0 100.0 400.0 | UINT16 R/W per. - | CANopen 3050:E$_h$ Modbus 20508 Profibus 20508 CIP 180.1.14 ModbusTCP 20508 EtherCAT 3050:E$_h$ PROFINET 20508 |

# Accessories and Spare Parts

## Commissioning Tools

| Description | Reference |
|---|---|
| PC connection kit, serial connection between drive and PC, USB-A to RJ45 | TCSMCNAM3M002P |
| Multi-Loader, device for copying the parameter settings to a PC or to another drive | VW3A8121 |
| Modbus cable, 1 m (3.28 ft), 2 x RJ45 | VW3A8306R10 |
| External graphic display terminal | VW3A1101 |

## Memory Cards

| Description | Reference |
|---|---|
| Memory card for copying parameter settings | VW3M8705 |
| 25 memory cards for copying parameter settings | VW3M8704 |

## Additional Modules

| Description | Reference |
|---|---|
| I/O module (module identification IOM1), additional analog and digital inputs and outputs with spring terminals | VW3M3302 |
| Fieldbus module CANopen (module identification CAN) with 2 x RJ45 connection | VW3A3608 |
| Fieldbus module CANopen (module identification CAN) with DE9 D-SUB connection (male) | VW3A3618 |
| Fieldbus module CANopen (module identification CAN) with Open Style Connection (female) | VW3A3628 |
| Fieldbus module Profibus DP (module identification PDP) with DE9 D-SUB connection (female) | VW3A3607 |
| Fieldbus module PROFINET (module identification PNT) with 2 x RJ45 connection | VW3M3308 |
| Fieldbus module DeviceNet (module identification DNT) with Open Style Connection (female) | VW3M3301 |
| Fieldbus module EtherNet/IP (module identification ETH) with 2 x RJ45 connection. For EtherNet/IP and Modbus-TCP | VW3A3616 |
| Fieldbus module EtherCAT (module identification ECT) with 2 x RJ45 connection | VW3A3601 |
| Encoder module RSR (resolver interface) with DE9 D-SUB connection (female) | VW3M3401 |
| Encoder module DIG (digital interface) with HD15 D-SUB connection (female) | VW3M3402 |
| Encoder module ANA (analog interface) with HD15 D-SUB connection (female) | VW3M3403 |

## Safety Module eSM

| Description | Reference |
|---|---|
| Safety module eSM with safety functions SOS, SLS, SS1, SS2 as per IEC/EN 61800-5-2 | VW3M3501 |
| Cable for safety module eSM, 3 m (9.84 ft); 24-pin connector, other cable end open | VW3M8801R30 |
| Cable for safety module eSM, 1.5 m (4.92 ft); 2 x 24-pin connector | VW3M8802R15 |
| Cable for safety module eSM, 3 m (9.84 ft); 2 x 24-pin connector | VW3M8802R30 |

| Description | Reference |
|---|---|
| Connection terminal adapter for eSM safety module, for wiring of several safety modules in the control cabinet | VW3M8810 |
| Connector with wire jumper (for INTERLOCK signal) for eSM terminal adapter; 4 pieces | VW3M8820 |

# Mounting Accessories

| Description | Reference |
|---|---|
| EMC plate for LXM32MD85/C10 | VW3M2106 |
| Metal kit for flush mounting for LXM32MD85/C10 | VW3M2606 |

# CANopen Cable With Connectors

| Description | Reference |
|---|---|
| CANopen cable, 0.3 m (0.98 ft), 2 x RJ45 | VW3CANCARR03 |
| CANopen cable, 1 m (3.28 ft), 2 x RJ45 | VW3CANCARR1 |
| CANopen cable, 2 m (6.56 ft), 2 x RJ45, shielded twisted pair cable | 490NTW00002 |
| CANopen cable, 5 m (16.4 ft), 2 x RJ45, shielded twisted pair cable | 490NTW00005 |
| CANopen cable, 12 m (39.4 ft), 2 x RJ45, shielded twisted pair cable | 490NTW00012 |
| CANopen cable, 2 m (6.56 ft), 2 x RJ45, shielded twisted pair cable with UL and CSA 22.1 certification | 490NTW00002U |
| CANopen cable, 5 m (16.4 ft), 2 x RJ45, shielded twisted pair cable with UL and CSA 22.1 certification | 490NTW00005U |
| CANopen cable, 12 m (39.4 ft), 2 x RJ45, shielded twisted pair cable with UL and CSA 22.1 certification | 490NTW00012U |
| CANopen cable, 1 m (3.28 ft), D9-SUB (female) to RJ45 | TCSCCN4F3M1T |
| CANopen cable, 1 m (3.28 ft), D9-SUB (female) with integrated terminating resistor to RJ45 | VW3M3805R010 |
| CANopen cable, 3 m (9.84 ft), D9-SUB (female) with integrated terminating resistor to RJ45 | VW3M3805R030 |
| CANopen cable, 0.3 m (0.98 ft), 2 x D9-SUB (female), LSZH standard cable (low-smoke, zero halogen, flame-retardant, tested as per IEC 60332-1) | TSXCANCADD03 |
| CANopen cable, 1 m (3.28 ft), 2 x D9-SUB (female), LSZH standard cable (low-smoke, zero halogen, flame-retardant, tested as per IEC 60332-1) | TSXCANCADD1 |
| CANopen cable, 3 m (9.84 ft), 2 x D9-SUB (female), LSZH standard cable (low-smoke, zero halogen, flame-retardant, tested as per IEC 60332-1) | TSXCANCADD3 |
| CANopen cable, 5 m (16.4 ft), 2 x D9-SUB (female), LSZH standard cable (low-smoke, zero halogen, flame-retardant, tested as per IEC 60332-1) | TSXCANCADD5 |
| CANopen cable, 0.3 m (0.98 ft), 2 x D9-SUB (female), flame-retardant, tested as per IEC 60332-2, UL certification | TSXCANCBDD03 |
| CANopen cable, 1 m (3.28 ft), 2 x D9-SUB (female), flame-retardant, tested as per IEC 60332-2, UL certification | TSXCANCBDD1 |
| CANopen cable, 3 m (9.84 ft), 2 x D9-SUB (female), flame-retardant, tested as per IEC 60332-2, UL certification | TSXCANCBDD3 |
| CANopen cable, 5 m (16.4 ft), 2 x D9-SUB (female), flame-retardant, tested as per IEC 60332-2, UL certification | TSXCANCBDD5 |

# CANopen Connectors, Distributors, Terminating Resistors

| Description | Reference |
|---|---|
| CANopen terminating resistor, 120 Ohm, integrated in RJ45 connector | TCSCAR013M120 |
| CANopen connector with PC interface, D9-SUB (female), with switchable terminating resistor and additional D9-SUB (male) to connect a PC to the bus, PC interface straight, bus cable angled 90° | TSXCANKCDF90TP |
| CANopen connector, D9-SUB (female), with switchable terminating resistor, angled 90° | TSXCANKCDF90T |
| CANopen connector, D9-SUB (female), with switchable terminating resistor, straight | TSXCANKCDF180T |
| Four-port tap, for connection of 4 drop lines to trunk line, 4 x D9-SUB (male) with switchable terminating resistor | TSXCANTDM4 |
| Two-port tap for connection of 2 drop lines to trunk line, with additional commissioning interface, 3 x RJ45 (female), with switchable terminating resistor | VW3CANTAP2 |
| CANopen adapter cable D9-SUB to RJ45, 3 m (9.84 ft) | TCSCCN4F3M3T |

# CANopen Cables With Open Cable Ends

Cables with open cable ends are suitable for connection of D-SUB connectors. Observe the cable cross section and the connection cross section of the required connector.

| Description | Reference |
|---|---|
| CANopen cable, 50 m (164 ft), [(2 x AWG 22) + (2 x AWG 24)], LSZH standard cable (low-smoke, zero halogen, flame-retardant, tested as per IEC 60332-1), both cable ends open | TSXCANCA50 |
| CANopen cable, 100 m (328 ft), [(2 x AWG 22) + (2 x AWG 24)], LSZH standard cable (low-smoke, zero halogen, flame-retardant, tested as per IEC 60332-1), both cable ends open | TSXCANCA100 |
| CANopen cable, 300 m (984 ft), [(2 x AWG 22) + (2 x AWG 24)], LSZH standard cable (low-smoke, zero halogen, flame-retardant, tested as per IEC 60332-1), both cable ends open | TSXCANCA300 |
| CANopen cable, 50 m (164 ft), [(2 x AWG 22) + (2 x AWG 24)], flame-retardant, tested as per IEC 60332-2, UL certification, both cable ends open | TSXCANCB50 |
| CANopen cable, 100 m (328 ft), [(2 x AWG 22) + (2 x AWG 24)], flame-retardant, tested as per IEC 60332-2, UL certification, both cable ends open | TSXCANCB100 |
| CANopen cable, 300 m (984 ft), [(2 x AWG 22) + (2 x AWG 24)], flame-retardant, tested as per IEC 60332-2, UL certification, both cable ends open | TSXCANCB300 |
| CANopen cable, 50 m (164 ft), [(2 x AWG 22) + (2 x AWG 24)], flexible LSZH HD standard cable (low-smoke, zero halogen, flame-retardant, tested as per IEC 60332-1), for heavy-duty or flexible installation, oil-resistant, both cable ends open | TSXCANCD50 |
| CANopen cable, 100 m (328 ft), [(2 x AWG 22) + (2 x AWG 24)], flexible LSZH HD standard cable (low-smoke, zero halogen, flame-retardant, tested as per IEC 60332-1), for heavy-duty or flexible installation, oil-resistant, both cable ends open | TSXCANCD100 |
| CANopen cable, 300 m (984 ft), [(2 x AWG 22) + (2 x AWG 24)], flexible LSZH HD standard cable (low-smoke, zero halogen, flame-retardant, tested as per IEC 60332-1), for heavy-duty or flexible installation, oil-resistant, both cable ends open | TSXCANCD300 |

# Adapter Cable for Encoder Signals LXM05/LXM15 to LXM32

| Description | Reference |
|---|---|
| Encoder adapter cable Molex 12-pin (LXM05) to RJ45 10-pin (LXM32), 1 m (3.28 ft) | VW3M8111R10 |
| Encoder adapter cable D15-SUB (LXM15) to RJ45 10-pin (LXM32), 1 m (3.28 ft) | VW3M8112R10 |

# Cables for PTO and PTI

| Description | Reference |
|---|---|
| Signal cable 2 x RJ45, PTO to PTI, 0.3 m (0.98 ft) | VW3M8502R03 |
| Signal cable 2 x RJ45, PTO to PTI, 1.5 m (4.92 ft) | VW3M8502R15 |
| Signal cable 1 x RJ45, other cable end open, for connecting PTI in the control cabinet, 3 m (9.84 ft) | VW3M8223R30 |

# Motor Cables

## Motor cables 1.0 mm²

| Description | Reference |
|---|---|
| Motor cable 3 m (9.84 ft), (4 x 1.0 mm² + 2 x (2 x 0.75 mm²)) shielded; motor end 8-pin circular connector Y-TEC, other cable end open | VW3M5100R30 |
| Motor cable 5 m (16.4 ft), (4 x 1.0 mm² + 2 x (2 x 0.75 mm²)) shielded; motor end 8-pin circular connector Y-TEC, other cable end open | VW3M5100R50 |
| Motor cable 10 m (32.8 ft), (4 x 1.0 mm² + 2 x (2 x 0.75 mm²)) shielded; motor end 8-pin circular connector Y-TEC, other cable end open | VW3M5100R100 |
| Motor cable 15 m (49.2 ft), (4 x 1.0 mm² + 2 x (2 x 0.75 mm²)) shielded; motor end 8-pin circular connector Y-TEC, other cable end open | VW3M5100R150 |
| Motor cable 25 m (82 ft), (4 x 1.0 mm² + 2 x (2 x 0.75 mm²)) shielded; motor end 8-pin circular connector Y-TEC, other cable end open | VW3M5100R250 |
| Motor cable 100 m (328 ft), (4 x 1.0 mm² + 2 x (2 x 0.75 mm²)) shielded; both cable ends open | VW3M5300R1000 |

## Motor cables 1.5 mm²

| Description | Reference |
|---|---|
| Motor cable 1.5 m (4.92 ft), (4 x 1.5 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M23, other cable end open | VW3M5101R15 |
| Motor cable 3 m (9.84 ft), (4 x 1.5 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M23, other cable end open | VW3M5101R30 |
| Motor cable 5 m (16.4 ft), (4 x 1.5 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M23, other cable end open | VW3M5101R50 |
| Motor cable 10 m (32.8 ft), (4 x 1.5 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M23, other cable end open | VW3M5101R100 |
| Motor cable 15 m (49.2 ft), (4 x 1.5 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M23, other cable end open | VW3M5101R150 |
| Motor cable 20 m (65.6 ft), (4 x 1.5 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M23, other cable end open | VW3M5101R200 |
| Motor cable 25 m (82 ft), (4 x 1.5 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M23, other cable end open | VW3M5101R250 |
| Motor cable 50 m (164 ft), (4 x 1.5 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M23, other cable end open | VW3M5101R500 |
| Motor cable 75 m (246 ft), (4 x 1.5 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M23, other cable end open | VW3M5101R750 |
| Motor cable 25 m (82 ft), (4 x 1.5 mm² + (2 x 1 mm²)) shielded; both cable ends open | VW3M5301R250 |
| Motor cable 50 m (164 ft), (4 x 1.5 mm² + (2 x 1 mm²)) shielded; both cable ends open | VW3M5301R500 |
| Motor cable 100 m (328 ft), (4 x 1.5 mm² + (2 x 1 mm²)) shielded; both cable ends open | VW3M5301R1000 |

# Motor cables 2.5 mm²

| Description | Reference |
|---|---|
| Motor cable 3 m (9.84 ft), (4 x 2.5 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M23, other cable end open | VW3M5102R30 |
| Motor cable 5 m (16.4 ft), (4 x 2.5 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M23, other cable end open | VW3M5102R50 |
| Motor cable 10 m (32.8 ft), (4 x 2.5 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M23, other cable end open | VW3M5102R100 |
| Motor cable 15 m (49.2 ft), (4 x 2.5 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M23, other cable end open | VW3M5102R150 |
| Motor cable 20 m (65.6 ft), (4 x 2.5 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M23, other cable end open | VW3M5102R200 |
| Motor cable 25 m (82 ft), (4 x 2.5 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M23, other cable end open | VW3M5102R250 |
| Motor cable 50 m (164 ft), (4 x 2.5 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M23, other cable end open | VW3M5102R500 |
| Motor cable 75 m (246 ft), (4 x 2.5 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M23, other cable end open | VW3M5102R750 |
| Motor cable 25 m (82 ft), (4 x 2.5 mm² + (2 x 1 mm²)) shielded; both cable ends open | VW3M5302R250 |
| Motor cable 50 m (164 ft), (4 x 2.5 mm² + (2 x 1 mm²)) shielded; both cable ends open | VW3M5302R500 |
| Motor cable 100 m (328 ft), (4 x 2.5 mm² + (2 x 1 mm²)) shielded; both cable ends open | VW3M5302R1000 |

# Motor cables 4 mm²

| Description | Reference |
|---|---|
| Motor cable 3 m (9.84 ft), (4 x 4 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5103R30 |
| Motor cable 5 m (16.4 ft), (4 x 4 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5103R50 |
| Motor cable 10 m (32.8 ft), (4 x 4 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5103R100 |
| Motor cable 15 m (49.2 ft), (4 x 4 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5103R150 |
| Motor cable 20 m (65.6 ft), (4 x 4 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5103R200 |
| Motor cable 25 m (82 ft), (4 x 4 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5103R250 |
| Motor cable 50 m (164 ft), (4 x 4 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5103R500 |
| Motor cable 75 m (246 ft), (4 x 4 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5103R750 |
| Motor cable 25 m (82 ft), (4 x 4 mm² + (2 x 1 mm²)) shielded; both cable ends open | VW3M5303R250 |
| Motor cable 50 m (164 ft), (4 x 4 mm² + (2 x 1 mm²)) shielded; both cable ends open | VW3M5303R500 |
| Motor cable 100 m (328 ft), (4 x 4 mm² + (2 x 1 mm²)) shielded; both cable ends open | VW3M5303R1000 |

# Motor cables 6 mm²

| Description | Reference |
|---|---|
| Motor cable 3 m (9.84 ft), (4 x 6 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5105R30 |
| Motor cable 5 m (16.4 ft), (4 x 6 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5105R50 |
| Motor cable 10 m (32.8 ft), (4 x 6 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5105R100 |
| Motor cable 15 m (49.2 ft), (4 x 6 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5105R150 |
| Motor cable 20 m (65.6 ft), (4 x 6 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5105R200 |
| Motor cable 25 m (82 ft), (4 x 6 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5105R250 |
| Motor cable 50 m (164 ft), (4 x 6 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5105R500 |
| Motor cable 75 m (246 ft), (4 x 6 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5105R750 |
| Motor cable 25 m (82 ft), (4 x 6 mm² + (2 x 1 mm²)) shielded; both cable ends open | VW3M5305R250 |
| Motor cable 50 m (164 ft), (4 x 6 mm² + (2 x 1 mm²)) shielded; both cable ends open | VW3M5305R500 |
| Motor cable 100 m (328 ft), (4 x 6 mm² + (2 x 1 mm²)) shielded; both cable ends open | VW3M5305R1000 |

# Motor cables 10 mm²

| Description | Reference |
|---|---|
| Motor cable 3 m (9.84 ft), (4 x 10 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5104R30 |
| Motor cable 5 m (16.4 ft), (4 x 10 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5104R50 |
| Motor cable 10 m (32.8 ft), (4 x 10 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5104R100 |
| Motor cable 15 m (49.2 ft), (4 x 10 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5104R150 |
| Motor cable 20 m (65.6 ft), (4 x 10 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5104R200 |
| Motor cable 25 m (82 ft), (4 x 10 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5104R250 |
| Motor cable 50 m (164 ft), (4 x 10 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5104R500 |
| Motor cable 75 m (246 ft), (4 x 10 mm² + (2 x 1 mm²)) shielded; motor end 8-pin circular connector M40, other cable end open | VW3M5104R750 |
| Motor cable 25 m (82 ft), (4 x 10 mm² + (2 x 1 mm²)) shielded; both cable ends open | VW3M5304R250 |
| Motor cable 50 m (164 ft), (4 x 10 mm² + (2 x 1 mm²)) shielded; both cable ends open | VW3M5304R500 |
| Motor cable 100 m (328 ft), (4 x 10 mm² + (2 x 1 mm²)) shielded; both cable ends open | VW3M5304R1000 |

# Encoder Cables

| Description | Reference |
|---|---|
| Encoder cable 3 m (9.84 ft), (3 x 2 x 0.14 mm² + 2 x 0.34 mm²) shielded; motor end 12-pin circular connector Y-TEC, device end 10-pin connector RJ45 | VW3M8100R30 |
| Encoder cable 5 m (16.4 ft), (3 x 2 x 0.14 mm² + 2 x 0.34 mm²) shielded; motor end 12-pin circular connector Y-TEC, device end 10-pin connector RJ45 | VW3M8100R50 |
| Encoder cable 10 m (32.8 ft), (3 x 2 x 0.14 mm² + 2 x 0.34 mm²) shielded; motor end 12-pin circular connector Y-TEC, device end 10-pin connector RJ45 | VW3M8100R100 |
| Encoder cable 15 m (49.2 ft), (3 x 2 x 0.14 mm² + 2 x 0.34 mm²) shielded; motor end 12-pin circular connector Y-TEC, device end 10-pin connector RJ45 | VW3M8100R150 |
| Encoder cable 25 m (82 ft), (3 x 2 x 0.14 mm² + 2 x 0.34 mm²) shielded; motor end 12-pin circular connector Y-TEC, device end 10-pin connector RJ45 | VW3M8100R250 |
| Encoder cable 1.5 m (4.92 ft), (3 x 2 x 0.14 mm² + 2 x 0.34 mm²) shielded; motor end 12-pin circular connector M23, device end 10-pin connector RJ45 | VW3M8102R15 |
| Encoder cable 3 m (9.84 ft), (3 x 2 x 0.14 mm² + 2 x 0.34 mm²) shielded; motor end 12-pin circular connector M23, device end 10-pin connector RJ45 | VW3M8102R30 |
| Encoder cable 5 m (16.4 ft), (3 x 2 x 0.14 mm² + 2 x 0.34 mm²) shielded; motor end 12-pin circular connector M23, device end 10-pin connector RJ45 | VW3M8102R50 |
| Encoder cable 10 m (32.8 ft), (3 x 2 x 0.14 mm² + 2 x 0.34 mm²) shielded; motor end 12-pin circular connector M23, device end 10-pin connector RJ45 | VW3M8102R100 |
| Encoder cable 15 m (49.2 ft), (3 x 2 x 0.14 mm² + 2 x 0.34 mm²) shielded; motor end 12-pin circular connector M23, device end 10-pin connector RJ45 | VW3M8102R150 |
| Encoder cable 20 m (65.6 ft), (3 x 2 x 0.14 mm² + 2 x 0.34 mm²) shielded; motor end 12-pin circular connector M23, device end 10-pin connector RJ45 | VW3M8102R200 |
| Encoder cable 25 m (82 ft), (3 x 2 x 0.14 mm² + 2 x 0.34 mm²) shielded; motor end 12-pin circular connector M23, device end 10-pin connector RJ45 | VW3M8102R250 |
| Encoder cable 50 m (164 ft), (3 x 2 x 0.14 mm² + 2 x 0.34 mm²) shielded; motor end 12-pin circular connector M23, device end 10-pin connector RJ45 | VW3M8102R500 |
| Encoder cable 75 m (246 ft), (3 x 2 x 0.14 mm² + 2 x 0.34 mm²) shielded; motor end 12-pin circular connector M23, device end 10-pin connector RJ45 | VW3M8102R750 |
| Encoder cable 25 m (82 ft), (3 x 2 x 0.14 mm² + 2 x 0.34 mm²) shielded; both cable ends open | VW3M8222R250 |
| Encoder cable 50 m (164 ft), (3 x 2 x 0.14 mm² + 2 x 0.34 mm²) shielded; both cable ends open | VW3M8222R500 |
| Encoder cable 100 m (328 ft), (3 x 2 x 0.14 mm² + 2 x 0.34 mm²) shielded; both cable ends open | VW3M8222R1000 |
| Encoder cable 100 m (328 ft), (5 x 2 x 0.25 mm² + 2 x 0.5 mm²) shielded; both cable ends open | VW3M8221R1000 |
| Encoder cable 1 m (3.28 ft), shielded; HD15 D-SUB (male); other cable end open | VW3M4701 |

# Connectors

| Description | Reference |
|---|---|
| Connector for motor cable, motor end Y-TEC, 1 mm², 5 pieces | VW3M8219 |
| Connector for motor cable, motor end M23, 1.5 ... 2.5 mm², 5 pieces | VW3M8215 |
| Connector for motor cable, motor end M40, 4 mm², 5 pieces | VW3M8217 |
| Connector for motor cable, motor end M40, 6...10 mm², 5 pieces | VW3M8218 |
| Connector for encoder cable, motor end Y-TEC, 5 pieces | VW3M8220 |
| Connector for encoder cable, motor end M23, 5 pieces | VW3M8214 |
| Connector for encoder cable, drive end RJ45 (10 pins), 5 pieces | VW3M2208 |

The tools required for cable assembly can be ordered directly from the manufacturer.

- Crimping tool for power connector Y-TEC:
  Intercontec C0.201.00 or C0.235.00
  www.intercontec.com
- Crimping tool for power connector M23/M40:
  Coninvers SF-Z0025, SF-Z0026
  www.coninvers.com
- Crimping tool for encoder connector Y-TEC:
  Intercontec C0.201.00 or C0.235.00
  www.intercontec.com
- Crimping tool for encoder connector M23:
  Coninvers RC-Z2514
  www.coninvers.com
- Crimping tools for encoder connector RJ45 10 pins:
  Yamaichi Y-ConTool-11, Y-ConTool-20, Y-ConTool-30
  www.yamaichi.com

# External Braking Resistors

| Description | Reference |
|---|---|
| Braking resistor IP65; 10 Ω; maximum continuous power 400 W; 0.75 m (2.46 ft) connection cable, 2.1 mm² (AWG 14) | VW3A7601R07 |
| Braking resistor IP65; 10 Ω; maximum continuous power 400 W; 2 m (6.56 ft) connection cable, 2.1 mm² (AWG 14) | VW3A7601R20 |
| Braking resistor IP65; 10 Ω; maximum continuous power 400 W; 3 m (9.84 ft) connection cable, 2.1 mm² (AWG 14) | VW3A7601R30 |
| Braking resistor IP65; 27 Ω; maximum continuous power 100 W; 0.75 m (2.46 ft) connection cable, 2.1 mm² (AWG 14), UL | VW3A7602R07 |
| Braking resistor IP65; 27 Ω; maximum continuous power 100 W; 2 m (6.56 ft) connection cable, 2.1 mm² (AWG 14), UL | VW3A7602R20 |
| Braking resistor IP65; 27 Ω; maximum continuous power 100 W; 3 m (9.84 ft) connection cable, 2.1 mm² (AWG 14), UL | VW3A7602R30 |
| Braking resistor IP65; 27 Ω; maximum continuous power 200 W; 0.75 m (2.46 ft) connection cable, 2.1 mm² (AWG 14), UL | VW3A7603R07 |
| Braking resistor IP65; 27 Ω; maximum continuous power 200 W; 2 m (6.56 ft) connection cable, 2.1 mm² (AWG 14), UL | VW3A7603R20 |
| Braking resistor IP65; 27 Ω; maximum continuous power 200 W; 3 m (9.84 ft) connection cable, 2.1 mm² (AWG 14), UL | VW3A7603R30 |
| Braking resistor IP65; 27 Ω; maximum continuous power 400 W; 0.75 m (2.46 ft) connection cable, 2.1 mm² (AWG 14) | VW3A7604R07 |
| Braking resistor IP65; 27 Ω; maximum continuous power 400 W; 2 m (6.56 ft) connection cable, 2.1 mm² (AWG 14) | VW3A7604R20 |
| Braking resistor IP65; 27 Ω; maximum continuous power 400 W; 3 m (9.84 ft) connection cable, 2.1 mm² (AWG 14) | VW3A7604R30 |
| Braking resistor IP65; 72 Ω; maximum continuous power 100 W; 0.75 m (2.46 ft) connection cable, 2.1 mm² (AWG 14), UL | VW3A7605R07 |
| Braking resistor IP65; 72 Ω; maximum continuous power 100 W; 2 m (6.56 ft) connection cable, 2.1 mm² (AWG 14), UL | VW3A7605R20 |
| Braking resistor IP65; 72 Ω; maximum continuous power 100 W; 3 m (9.84 ft) connection cable, 2.1 mm² (AWG 14), UL | VW3A7605R30 |
| Braking resistor IP65; 72 Ω; maximum continuous power 200 W; 0.75 m (2.46 ft) connection cable, 2.1 mm² (AWG 14), UL | VW3A7606R07 |

| Description | Reference |
|---|---|
| Braking resistor IP65; 72 Ω; maximum continuous power 200 W; 2 m (6.56 ft) connection cable, 2.1 mm² (AWG 14), UL | VW3A7606R20 |
| Braking resistor IP65; 72 Ω; maximum continuous power 200 W; 3 m (9.84 ft) connection cable, 2.1 mm² (AWG 14), UL | VW3A7606R30 |
| Braking resistor IP65; 72 Ω; maximum continuous power 400 W; 0.75 m (2.46 ft) connection cable, 2.1 mm² (AWG 14) | VW3A7607R07 |
| Braking resistor IP65; 72 Ω; maximum continuous power 400 W; 2 m (6.56 ft) connection cable, 2.1 mm² (AWG 14) | VW3A7607R20 |
| Braking resistor IP65; 72 Ω; maximum continuous power 400 W; 3 m (9.84 ft) connection cable, 2.1 mm² (AWG 14) | VW3A7607R30 |
| Braking resistor IP65; 100 Ω; maximum continuous power 100 W; 0.75 m (2.46 ft) connection cable, 2.1 mm² (AWG 14), UL | VW3A7608R07 |
| Braking resistor IP65; 100 Ω; maximum continuous power 100 W; 2 m (6.56 ft) connection cable, 2.1 mm² (AWG 14), UL | VW3A7608R20 |
| Braking resistor IP65; 100 Ω; maximum continuous power 100 W; 3 m (9.84 ft) connection cable, 2.1 mm² (AWG 14), UL | VW3A7608R30 |
| Braking resistor IP20; 16 Ω; maximum continuous power 960 W; M6 terminals, UL | VW3A7733 |
| Braking resistor IP20; 10 Ω; maximum continuous power 960 W; M6 terminals, UL | VW3A7734 |

# DC Bus Accessories

| Description | Reference |
|---|---|
| DC bus connection cable, 0.1 m (0.33 ft), 2 * 6 mm² (2 * AWG 10), pre-assembled, 5 pieces | VW3M7101R01 |
| DC bus connection cable, 15 m (49.2 ft), 2 * 6 mm² (2 * AWG 10), Twisted Pair, shielded | VW3M7102R150 |
| DC bus connector kit, connector housing and crimp contacts for 3 ... 6 mm² (AWG 12 ... 10), 10 pieces | VW3M2207 |

A crimping tool is required for the crimp contacts of the connector kit. Manufacturer:

Tyco Electronics, Heavy Head Hand Tool, Tool Pt. No 180250

# Mains Reactors

| Description | Reference |
|---|---|
| Mains reactor single-phase; 50-60 Hz; 7 A; 5 mH; IP00 | VZ1L007UM50 |
| Mains reactor single-phase; 50-60 Hz; 18 A; 2 mH; IP00 | VZ1L018UM20 |
| Mains reactor three-phase; 50-60 Hz; 16 A; 2 mH; IP00 | VW3A4553 |
| Mains reactor three-phase; 50-60 Hz; 30 A; 1 mH; IP00 | VW3A4554 |
| Mains reactor three-phase; 50-60 Hz; 60 A; 0.5 mH; IP00 | VW3A4555 |

# External Mains Filters

| Description | Reference |
|---|---|
| Mains filter single-phase; 9 A; 115/230 Vac | VW3A4420 |
| Mains filter single-phase; 16 A; 115/230 Vac | VW3A4421 |
| Mains filter three-phase; 15 A; 208/400/480 Vac | VW3A4422 |

| Description | Reference |
|---|---|
| Mains filter three-phase; 25 A; 208/400/480 Vac | VW3A4423 |
| Mains filter three-phase; 47 A; 208/400/480 Vac | VW3A4424 |

# Spare Parts Connectors, Fans, Cover Plates

| Description | Reference |
|---|---|
| Connector kit LXM32M: 3 x AC power stage supply (230/400 Vac), 1 x control supply, 2 x digital inputs/outputs (6-pin), 2 x motor (10 A / 24 A), 1 x holding brake | VW3M2203 |
| Cover plate for module slot, spare part to replace damaged/lost cover plates, 10 pieces | VW3M2405 |
| Cooling fan kit 40 x 40 mm (1.57 x 1.57 in), plastic housing, with connection cable | VW3M2401 |
| Cooling fan kit 60 x 60 mm (2.36 x 2.36 in), plastic housing, with connection cable | VW3M2402 |
| Cooling fan kit 80 x 80 mm (3.15 x 3.15 in), plastic housing, with connection cable | VW3M2403 |

# Service, Maintenance, and Disposal

## Maintenance

### Maintenance Plan

Inspect the product for pollution or damage at regular intervals.

Repairs may only be made by the manufacturer.

Prior to any type of work on the drive system, consult the sections on Installation and Commissioning for information on the precautions and processes to be observed.

Include the following points in the maintenance plan of your machine.

### Connections and Fastening

- Inspect all connection cables and connectors regularly for damage. Replace damaged cables immediately.
- Verify that all output elements are firmly seated.
- Tighten all mechanical and electrical threaded connections to the specified torque.

### Lifetime Safety-Related Function STO

The safety-related function STO is designed for a lifetime of 20 years. After this period, the data of the safety-related function STO are no longer valid. The expiry date is determined by adding 20 years to the DOM shown on the nameplate of the product.

This date must be included in the maintenance plan of the system.

Do not use the safety-related function STO after this date.

Example:

The DOM on the nameplate of the product is shown in the format DD.MM.YY, for example 31.12.20. (31 December 2020). This means: Do not use the safety-related function STO after December 31, 2040.

# Replacing the Product

## Description

Unsuitable parameter values or unsuitable data may trigger unintended movements, trigger signals, damage parts and disable monitoring functions. Some parameter values or data do not become active until after a restart.

> ### ⚠ WARNING
>
> **UNINTENDED EQUIPMENT OPERATION**
>
> - Only start the system if there are no persons or obstructions in the zone of operation.
> - Do not operate the drive system with undetermined parameter values or data.
> - Never modify a parameter value unless you fully understand the parameter and all effects of the modification.
> - Restart the drive and verify the saved operational data and/or parameter values after modifications.
> - Carefully run tests for all operating states and potential error situations when commissioning, upgrading or otherwise modifying the operation of the drive.
> - Verify the functions after replacing the product and also after making modifications to the parameter values and/or other operational data.
>
> **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Follow the procedure below for replacing devices.

- Save all parameter settings. To do so, use a memory card or save the data to a PC using the commissioning software, see Parameter Management, page 174.
- Power off all supply voltages. Verify that no voltages are present (safety instructions), see Product Related Information, page 14.
- Label all connections and remove all connection cables (unlock connector locks).
- Uninstall the product.
- Note the identification number and the serial number shown on the product nameplate for later identification.
- Install the new product as per section Installation, page 87.
- If the product to be installed has previously been used in a different system or application, you must restore the factory settings before commissioning the product.
- Commission the product as per section Commissioning, page 123.

# Replacement of the Motor

## Description

Drive systems may perform unintended movements if unapproved combinations of drive and motor are used. Though the connectors for motor connection and encoder connection may match mechanically, this does not imply that the motor is approved for use.

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### ⚠ WARNING

**UNINTENDED MOVEMENT**

Only use approved combinations of drive and motor.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

---

- Power off all supply voltages. Verify that no voltages are present (safety instructions), see Product Related Information, page 14.
- Label all connections and uninstall the product.
- Note the identification number and the serial number shown on the product nameplate for later identification.
- Install the new product as per section Installation, page 87.

If the connected motor is replaced by another motor, the motor data set is read again. If the device detects a different motor type, the control loop parameters are recalculated and the HMI displays $\Pi\,\sigma\,\boldsymbol{\mathsf{E}}$. See section Acknowledging a Motor Change, page 394 for additional information.

If the motor is replaced, the encoder parameters must also be re-adjusted, see Setting Parameters for Encoder, page 153.

If a motor encoder is connected via encoder 2 (module), a motor replacement is not detected. Observe the information provided in the encoder manual.

## Changing the Motor Type Temporarily

If you want to operate the new motor type only temporarily via the device, press ESC at the HMI.

The newly calculated control loop parameters are not saved to the nonvolatile memory. This way, you can resume operation with the original motor using the saved control loop parameters.

## Changing the Motor Type Permanently

If you want to operate the new motor type permanently via this device, press the navigation button at the HMI.

The newly calculated control loop parameters are saved to the nonvolatile memory.

See also Acknowledging a Motor Change, page 394.

# Shipping, Storage, Disposal

## Shipping

The product must be protected against shocks during transportation. If possible, use the original packaging for shipping.

## Storage

The product may only be stored in spaces where the specified permissible ambient conditions are met.

Protect the product from dust and dirt.

## Disposal

The product consists of various materials that can be recycled. Dispose of the product in accordance with local regulations.

Visit https://www.se.com/green-premium for information and documents on environmental protection as per ISO 14025 such as:

- EoLi (Product End-of-Life Instructions)
- PEP (Product Environmental Profile)

# Glossary

## A

**Actual value:**

In control engineering, the actual value is the value of the controlled variable at a given instant (for example, actual velocity, actual torque, actual position, actual current, and so on). An actual value can be a measured value (for example, the actual position can be a value measured by an encoder) or a derived value (for example, the actual torque can be a value derived from the actual current). The actual value is an input value used by the control loops of the drive to reach the reference value. Definition as per IEC 61800-7 series and IEC 60050.

## C

**CCW:**

**C**ounter **C**lock**w**ise.

**CW:**

**C**lock**w**ise.

## D

**DC bus:**

Circuit that supplies the power stage with energy (direct voltage).

**Degree of protection:**

The degree of protection is a standardized specification for electrical equipment that describes the protection against the ingress of foreign objects and water (for example: IP 20).

**Direction of movement :**

In the case of a rotary motors, direction of movement is defined in accordance with IEC 61800-7-204: Positive direction is when the motor shaft rotates clockwise as you look at the end of the protruding motor shaft.

**DOM:**

**D**ate **o**f **m**anufacturing: The nameplate of the product shows the date of manufacture in the format DD.MM.YY or in the format DD.MM.YYYY. For example:

31.12.19 corresponds to December 31, 2019.

31.12.2019 corresponds to December 31, 2019.

**Drive system:**

System consisting of controller, drive and motor.

## E

**Electronic gear:**

Calculation of a new output velocity for the motor movement based on the input velocity and the values of an adjustable gear ratio; calculated by the drive system.

**EMC:**

Electromagnetic compatibility

**Encoder :**

Sensor that converts a measured distance or angle into an electrical signal. This signal is evaluated by the drive to determine the actual position of a shaft (rotor) or a driving unit.

**Error class :**

Classification of errors into groups. The different error classes allow for specific responses to errors, for example by severity.

**Error:**

Discrepancy between a detected (computed, measured or signaled) value or condition and the specified or theoretically correct value or condition.

## F

**Factory settings:**

Settings when the product is shipped.

**Fault Reset:**

Function used to exit the operating state Fault. Before the function is used, the cause of the detected error must be removed.

**Fault:**

Fault is an operating state. If the monitoring functions detect an error, a transition to this operating state is triggered, depending on the error class. A "Fault Reset" or a power cycle are required to exit this operating state. Prior to this, the cause of the detected error must be removed. Further information can be found in the pertinent standards such as IEC 61800-7, ODVA Common Industrial Protocol (CIP).

## I

**I/O:**

Inputs/outputs

**I2t monitoring:**

Anticipatory temperature monitoring. The expected temperature rise of components is calculated in advance on the basis of the motor current. If a limit value is exceeded, the drive reduces the motor current.

**Inc:**

Increments

**Index pulse:**

Signal of an encoder to reference the rotor position in the motor. The encoder returns one index pulse per revolution.

**Internal units:**

Resolution of the power stage at which the motor can be positioned. Internal units are specified in increments.

## L

**Limit switch:**

Switches that signal overtravel of the permissible range of travel.

## M

**Monitoring function:**

Monitoring functions acquire a value continuously or cyclically (for example, by measuring) in order to check whether it is within permissible limits. Monitoring functions are used for error detection. Monitoring functions are not safety functions.

## N

**NMT:**

Network Management (NMT), part of the CANopen communication profile; tasks include initialization of the network and devices, starting, stopping and monitoring of devices

**Node guarding:**

Monitoring of the connection to the slave at an interface for cyclic data traffic.

## P

**Parameter :**

Device data and values that can be read and set (to a certain extent) by the user.

**PELV:**

Protective Extra Low Voltage, low voltage with isolation. For more information: IEC 60364-4-41

**Persistent:**

Indicates whether the value of the parameter remains in the memory after the device is switched off.

**Power stage :**

The power stage controls the motor. The power stage generates current for controlling the motor on the basis of the motion signals from the controller.

**Pulse/direction signals:**

Digital signals with variable pulse frequencies which signal changes in position and direction of movement via separate signal wires.

## Q

**Quick Stop:**

The function can be used for fast deceleration of a movement as a response to a detected error or via a command.

## R

**RCD:**

RCD residual current device.

**rms:**

"Root Mean Square" value of a voltage ($V_{rms}$) or a current ($A_{rms}$)

**RS485 :**

Fieldbus interface as per EIA-485 which enables serial data transmission with multiple devices.

## S

**Safety-related function:**

Safety-related functions are defined in the standard IEC 61800-5-2 (for example, Safe Torque Off (STO), Safe Operating Stop (SOS) or Safe Stop 1 (SS1)).

**Scaling factor:**

This factor is the ratio between an internal unit and a user-defined unit.

## U

**User-defined unit:**

Unit whose reference to motor movement can be determined by the user via parameters.

## S

**Safety-related function:**

Safety-related functions are defined in the standard IEC 61800-5-2 (for example, Safe Torque Off (STO), Safe Operating Stop (SOS) or Safe Stop 1 (SS1)).

# Index

## Q

## R

## S

## T

## U

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