LXM32M

IOM1 Module

User Guide

Original instructions

0198441113874.01
06/2021

Schneider **Electric**
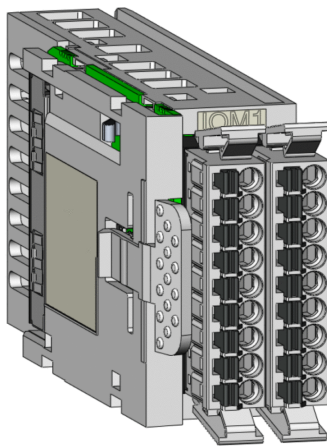
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Safety Information

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.

About the Book

Document Scope

The information provided in this user guide supplements the user guide of the servo drive LXM32M.

The functions described in this user guide are only intended for use with the associated product. You must read and understand the appropriate user guide of the drive.

Validity Note

This user guide applies to the module IOM1 for the servo drive LXM32M, module identification IOM1 (VW3M3302).

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
LXM32M - IOM1 Module - User Guide (this user guide)	0198441113874 (eng)
	0198441113875 (fre)
	0198441113873 (ger)
Lexium 32M - Servo Drive - User Guide	0198441113767 (eng)
	0198441113768 (fre)
	0198441113766 (ger)
	0198441113770 (spa)
	0198441113769 (ita)
	0198441113771 (chi)

Product Related Information

⚠ **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.

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

Additional Analog and Digital Signal Inputs and Signal Outputs

Overview

The analog and digital signals of the IOM1 module extend the I/O capacity of the drive. Configuration and commissioning of the functions of the extended inputs and outputs correspond to the inputs and outputs of the drive.

The IOM1 module provides the following signal interfaces:

- Analog interfaces:
  - 2 analog inputs
  - 2 analog outputs
- Digital interfaces:
  - 4 digital inputs
  - 2 digital outputs

Availability

Drives with firmware version V01.06 and higher support the module.

Technical Data

Analog Signals

Analog Input Signals

Characteristic	Unit	Value
Voltage range of differential input circuit	V	-10 ... 10
Input resistance, typical	kΩ	20
Resolution		14 bits
Sampling period	ms	0.25

Analog Output Signals

Characteristic	Unit	Value
Voltage range	V	-10 ... 10
Output current	mA	0 ... 20
Minimum load resistance (voltage source)	Ω	470
Maximum load resistance (current source)	Ω	470
Resolution		12 bits
Update rate	ms	0.25
Time constant	ms	5

Digital Signals

Logic Type

The digital inputs and outputs of this product can be wired to enable positive logic or negative logic.
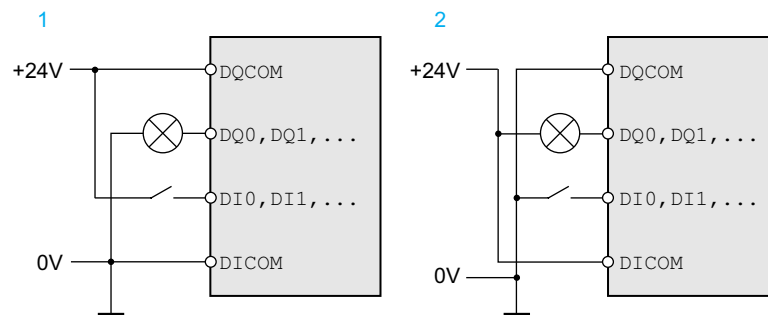
Logic type	Active state
(1) Positive logic	Output supplies current (source output)
	Current flows to the input (sink input)
(2) Negative logic	Output draws current (sink output)
	Current flows from the input (source input)

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

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 Level 0 Level 1	Vdc Vdc	-3 ... 5 15 ... 30
Input voltage - sourcing inputs (at 24 Vdc) Level 0 Level 1	Vdc Vdc	>19 <9
Input current (at 24 Vdc)	mA	2.5
Debounce time (software)[1]	ms	1.5 (default value)

(1)	Adjustable via parameter (sampling period 250 µs)

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

Installation

Installation of the Module

Mechanical Installation

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.

Install the module according to the instructions in the user guide of the drive.

Cable Specifications Analog Inputs and Outputs

Characteristic	Value
Shield:	Required, grounded at the device, other end isolated or grounded via capacitor (for example, 10nF)
PELV:	Required
Twisted Pair:	Yes
Cable composition:	4 x 2 x 0.25 mm^2 (4 x 2 x AWG 22)
Maximum cable length:	30 m (98.4 ft)

Cable Specifications Digital Inputs and Outputs

Characteristic	Value
Shield:	-
PELV:	Required
Twisted Pair:	-
Cable composition:	8 x 0.25 mm^2 (8 x AWG 22)
Maximum cable length:	30 m (98.4 ft)

Properties of Spring Terminals

Characteristic	Value
Connection cross section	0.2 ... 1.0 mm^2 (AWG 24 ... AWG 16)
Stripping length	10 mm (0.39 in)

Note the pertinent information on equipotential bonding conductors in the user guide of the drive.

Wiring Diagram

```
AI11+  9          18  DICOM
AI11-  8          17  DI10
AI12+  7          16  DI11
AI12-  6          15  DI12
SHLD   5          14  DI13
AQ11+  4          13  DQCOM
AQCOM  3          12  DQ10
AQ12+  2          11  DQ11
AQCOM  1          10  reserved
```
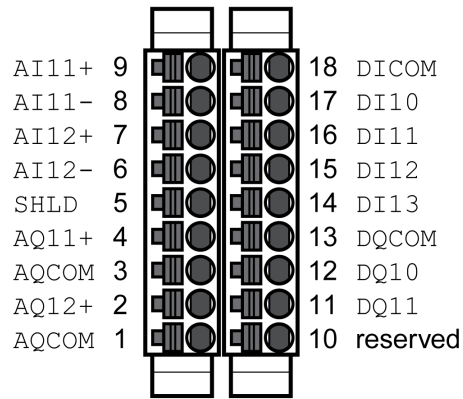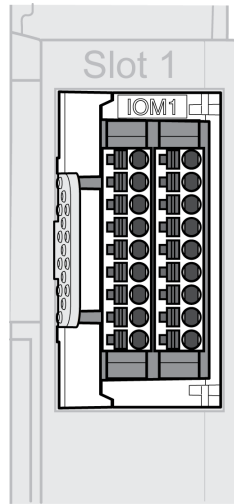
Pin	Signal	Meaning
9	*AI11+*	Analog input 11
8	*AI11-*	Reference potential to *AI11+*
7	*AI12+*	Analog input 12
6	*AI12-*	Reference potential to *AI12+*,
5	*SHLD*	Shield connection
4	*AQ11+*	Analog output 11
3	*AQCOM*[1]	Reference potential to *AQ11*
2	*AQ12+*	Analog output 12
1	*AQCOM*[1]	Reference potential to *AQ12*

(1)	Pin 1 and Pin 3 are internally connected.

Pin	Signal	Meaning
18	*DICOM*	Reference potential for the digital inputs
17	*DI10*	Digital input 10
16	*DI11*	Digital input 11
15	*DI12*	Digital input 12
14	*DI13*	Digital input 13
13	*DQCOM*	Reference potential for the digital outputs
12	*DQ10*	Digital output 10
11	*DQ11*	Digital output 11
10	Reserved	Reserved

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

Connecting the Inputs and the Outputs

- Wire the inputs and outputs.
- Ground the shield to pin 5.
- Verify that the connector locks have snapped in properly.

Commissioning

Preparation

This chapter describes how to commission the product.

⚠ **WARNING**
UNINTENDED EQUIPMENT OPERATION
• Only start the system if there are no persons or obstructions in the zone of operation.
• Do not write values to reserved parameters.
• Do not write values to parameters unless you fully understand the function.
• Run initial tests without coupled loads.
• Verify correct word order for fieldbus communication.
• Do not establish a fieldbus connection unless you have fully understood the communication principles.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Required Components

The following is required for commissioning:

- Commissioning software "Lexium32 DTM Library"

  www.se.com/en/download/document/Lexium_DTM_Library/

- Fieldbus converter for the commissioning software for connection via the commissioning interface
- Lexium 32M Drive User Guide and this user guide, LXM32M IOM1 Module User Guide

Setting the Analog Signal Inputs

Analog Inputs

The two analog inputs are referred to as *AI11* and *AI12*. The following descriptions use the notation *AI11* (*AI12*) if there are no functional differences between the two inputs.

Analog input voltages between -10 Vdc and +10 Vdc can be read via the analog inputs. The voltage values are processed using a parameterizable offset and zero voltage window. The processed values can be read by means of the parameter *_IOM1_AI11_act* (*_IOM1_AI12_act*).

- Power off the power stage supply. Power on the controller supply.
- Apply a voltage to the analog input *AI11* (*AI12*) (±10Vdc)
- Read the voltage with the parameter *_IOM1_AI11_act* (*_IOM1_AI12_act*).

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_act Π ο ɴ Ᵽ ɴ I I	IOM1 Value of input voltage of AI11. Available with firmware version ≥V01.06.	mV -10000 - 10000	INT16 R/- - -	CANopen 304F:1$_h$ Modbus 20226 Profibus 20226 CIP 179.1.1 ModbusTCP 20226 EtherCAT 304F:1$_h$ PROFINET 20226
_IOM1_AI12_act Π ο ɴ Ᵽ ɴ I2	IOM1 Value of input voltage of AI12. Available with firmware version ≥V01.06.	mV -10000 - 10000	INT16 R/- - -	CANopen 304F:5$_h$ Modbus 20234 Profibus 20234 CIP 179.1.5 ModbusTCP 20234 EtherCAT 304F:5$_h$ PROFINET 20234

Offset and Zero Voltage Window

The parameter _IOM1_AI11_offset (_IOM1_AI2_offset) is used to parameterize an offset and the parameter _IOM1_AI11_win (_IOM1_AI12_win) to parameterize a zero voltage window for the input voltage at AI11 (AI12).

This corrected input voltage is the voltage value for further processing as well as the read value of the parameter _IOM1_AI11_act (_IOM1_AI12_act).

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 ᴄ ο ɴ Ᵽ → ι - ο - Ᵽ I I ο	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_AI12_offset ᴄ ο ɴ Ᵽ → ι - ο - Ᵽ I2 ο	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

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_win ⌐ o ⌐ F → ı - 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:9h Modbus 20242 Profibus 20242 CIP 179.1.9 ModbusTCP 20242 EtherCAT 304F:9h PROFINET 20242
IOM1_AI12_win ⌐ o ⌐ F → ı - o - A I 2 W	IOM1 Zero voltage window of AI12. 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:Ah Modbus 20244 Profibus 20244 CIP 179.1.10 ModbusTCP 20244 EtherCAT 304F:Ah PROFINET 20244

Offset and zero voltage window
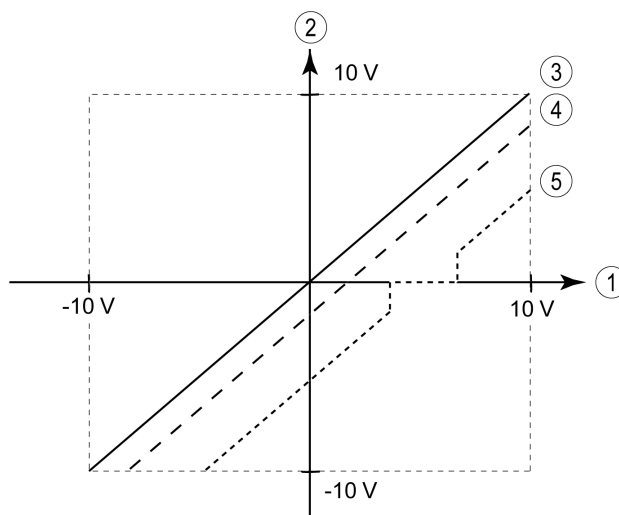
1 Input voltage at *AI11* (*AI12*)

2 Processed input voltage *_IOM1_AI11_act* (*_IOM1_AI12_act*)

3 Input voltage without processing

4 Input voltage with offset

5 Input voltage with offset and zero voltage window

Setting the Type of Usage

The analog inputs can be used in a variety of ways. The applied voltage is interpreted depending on the settings.

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 ⊑ ₒ n F → ι - ₒ - A l l υ	IOM1 Type of usage of AI11. **0** / **None** / n ₒ n E : No function **1** / **Target Velocity** / � P d ⅝ : Target velocity for the velocity controller **2** / **Target Torque** / ⅾ ⌐ ⅾ ⅝ : Target torque for the current controller **3** / **Velocity Limitation** / L ⅝ P d : Limitation of the reference velocity for the velocity controller **4** / **Current Limitation** / L ⌐ υ ⌐ : 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
IOM1_AI12_mode ⊑ ₒ n F → ι - ₒ - A l 2 υ	IOM1 Type of usage of AI12. **0** / **None** / n ₒ n E : No function **1** / **Target Velocity** / ⅝ P d ⅝ : Target velocity for the velocity controller **2** / **Target Torque** / ⅾ ⌐ ⅾ ⅝ : Target torque for the current controller **3** / **Velocity Limitation** / L ⅝ P d : Limitation of the reference velocity for the velocity controller **4** / **Current Limitation** / L ⌐ υ ⌐ : 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

Setting the Velocity Limitation

A velocity limitation can be set via the analog inputs. The maximum velocity at 10 V is set as a point of reference. The values for other voltages are derived from this point of reference.

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_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_AI12_v_max	IOM1 Limitation of velocity at 10 V of AI12. 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:15$_h$ Modbus 20266 Profibus 20266 CIP 179.1.21 ModbusTCP 20266 EtherCAT 304F:15$_h$ PROFINET 20266

Setting the Current Limitation

A current limitation can be set via the analog inputs. The maximum current at 10 V is set as a point of reference. The values for other voltages are derived from this point of reference.

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 ConF → i-o- LI1i	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 ConF → i-o- LI2i	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

Setting the Target Velocity

A target velocity for the operating mode Profile Velocity can be set via the analog inputs. The velocity at 10 V is set as a point of reference. The values for other voltages are derived from this point of reference.

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_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_AI12_v_scale	IOM1 Target velocity at 10 V in operating mode Profile Velocity of AI12. 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:16$_h$ Modbus 20268 Profibus 20268 CIP 179.1.22 ModbusTCP 20268 EtherCAT 304F:16$_h$ PROFINET 20268

Setting the Target Torque

A target torque for the operating mode Profile Torque can be set via the analog inputs. The torque at 10 V is set as a point of reference. The value corresponds to one hundredth of the nominal torque. The values for other voltages are derived from this point of reference.

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 - Ŀ I IĿ	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_AI12_M_scale ⊏ o п F → ı - o - Ŀ I2 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

Setting the Filter Time Constant

A filter time constant can be set via the analog inputs to suppress disturbance. 63.2 % of the applied voltage are reached after the set time.

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_Tau ⊏ o п F → ı - o - Я I IF	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_AI12_Tau ⊏ o п F → ı - o - Я I2 F	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

Setting the Analog Signal Outputs

Analog Outputs

The two analog outputs are referred to as *AQ11* and *AQ12*. The following descriptions use the notation *AQ11* (*AQ12*) if there are no functional differences between the two inputs. The parameters *_IOM1_AO11_ref* and *_IOM1_AO12_ref* correspond to the reference values of the 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
_IOM1_AQ11_ref Π o n A o 11	IOM1 Value of AQ11. Unit depends on setting in parameter IOM1_AQ_mode. If setting is 'Voltage': Unit: mV If setting is 'Current': Unit: µA Available with firmware version ≥V01.06.	- -10000 - 20000	INT16 R/- - -	CANopen 304F:27$_h$ Modbus 20302 Profibus 20302 CIP 179.1.39 ModbusTCP 20302 EtherCAT 304F:27$_h$ PROFINET 20302
_IOM1_AQ12_ref Π o n A o 12	IOM1 Value of AQ12. Unit depends on setting in parameter IOM1_AQ_mode. If setting is 'Voltage': Unit: mV If setting is 'Current': Unit: µA Available with firmware version ≥V01.06.	- -10000 - 20000	INT16 R/- - -	CANopen 304F:31$_h$ Modbus 20322 Profibus 20322 CIP 179.1.49 ModbusTCP 20322 EtherCAT 304F:31$_h$ PROFINET 20322

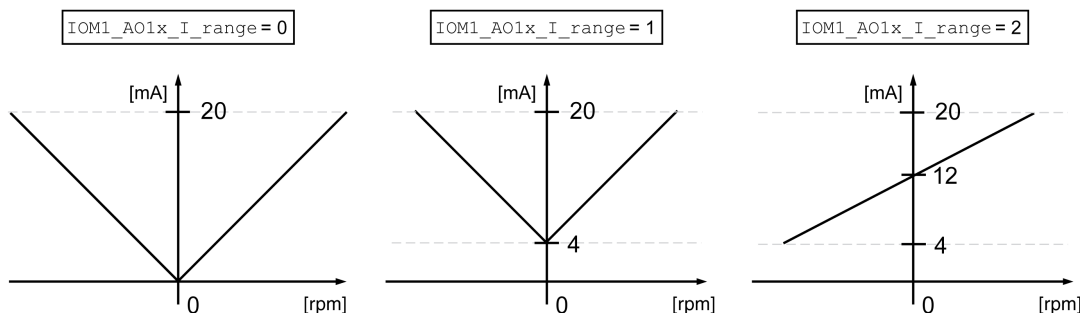## Setting the Outputs as Voltage Outputs or as Current Outputs

The parameter *IOM1_AO_mode* allows you to specify whether the outputs are to be used as voltage outputs or as current 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
IOM1_AQ_mode C o n F → ι - o - A o t y	IOM1 Type of usage of analog outputs. **0 / none /** $n o n E$: Analog outputs are deactivated **1 / Voltage /** $V o L t$: Both analog outputs are voltage outputs **2 / Current /** $C u r r$: Both analog outputs are current outputs 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.	- 0 0 2	UINT16 R/W per. -	CANopen 304F:20$_h$ Modbus 20288 Profibus 20288 CIP 179.1.32 ModbusTCP 20288 EtherCAT 304F:20$_h$ PROFINET 20288

Setting the Current Range

If the outputs are used as current sources, the parameters *IOM1_AO11_I_range* and *IOM1_AO12_I_range* are used to set the current range.

Example of current ranges when a reference velocity is 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
IOM1_AQ11_I_range $ConF \rightarrow \iota - o -$ $A\ 1\ 1C$	IOM1 Range of current of AQ11. **0 / 0-20mA /** $0 - 2$: 0 mA … 20 mA (0 mA correspond to 0 user-defined units) **1 / 4-20mA unsigned /** $4 - 2\ u$: 4 mA … 20 mA (4 mA correspond to 0 user-defined units) **2 / 4-20mA signed /** $4 - 2\ 5$: 4 mA … 20 mA (12 mA correspond to 0 user-defined units) 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.	- 0 0 2	UINT16 R/W per. -	CANopen 304F:22$_h$ Modbus 20292 Profibus 20292 CIP 179.1.34 ModbusTCP 20292 EtherCAT 304F:22$_h$ PROFINET 20292
IOM1_AQ12_I_range $ConF \rightarrow \iota - o -$ $A\ 1\ 2C$	IOM1 Range of current of AQ12. **0 / 0-20mA /** $0 - 2$: 0 mA … 20 mA (0 mA correspond to 0 user-defined units) **1 / 4-20mA unsigned /** $4 - 2\ u$: 4 mA … 20 mA (4 mA correspond to 0 user-defined units) **2 / 4-20mA signed /** $4 - 2\ 5$: 4 mA … 20 mA (12 mA correspond to 0 user-defined units) 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.	- 0 0 2	UINT16 R/W per. -	CANopen 304F:2C$_h$ Modbus 20312 Profibus 20312 CIP 179.1.44 ModbusTCP 20312 EtherCAT 304F:2C$_h$ PROFINET 20312

Setting the Function

Various functions can be assigned to the analog outputs. The assignment is made by means of the parameters *IOM1_AO11_func* and *IOM1_AO12_func*.

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_func $ConF \rightarrow i$-o- $A11n$	IOM1 Function of AQ11. **0 / None /** $nonE$: No function **1 / Actual Velocity /** $VACt$: Actual velocity (10 V / 20 mA correspond to value in CTRL_v_max) **2 / Actual Torque /** $tAct$: Actual torque (10 V / 20 mA correspond to value in CTRL_I_max) **3 / Reference Velocity /** $VrEF$: Reference velocity (10 V / 20 mA correspond to value in CTRL_v_max) **4 / Reference Torque /** $trEF$: Reference torque (10 V / 20 mA correspond to value in CTRL_I_max) **5 / Position Deviation /** $PdiF$: Position deviation (10 V / 20 mA correspond to value in MON_p_dif_load_usr) **6 / Fixed Value /** $FiVA$: Fixed value (setting in parameter IOM1_AQ11_FixVal) **7 / Actual Position /** $PAct$: Actual position in the modulo range (10 V / 20 mA correspond to value in MOD_Max) Modified settings become active immediately. Available with firmware version ≥V01.06.	- 0 0 7	UINT16 R/W per. -	CANopen 304F:21$_h$ Modbus 20290 Profibus 20290 CIP 179.1.33 ModbusTCP 20290 EtherCAT 304F:21$_h$ PROFINET 20290
IOM1_AQ12_func $ConF \rightarrow i$-o- $A12n$	IOM1 Function of AQ12. **0 / None /** $nonE$: No function **1 / Actual Velocity /** $VACt$: Actual velocity (10 V / 20 mA correspond to value in CTRL_v_max) **2 / Actual Torque /** $tAct$: Actual torque (10 V / 20 mA correspond to value in CTRL_I_max) **3 / Reference Velocity /** $VrEF$: Reference velocity (10 V / 20 mA correspond to value in CTRL_v_max) **4 / Reference Torque /** $trEF$: Reference torque (10 V / 20 mA correspond to value in CTRL_I_max) **5 / Position Deviation /** $PdiF$: Position deviation (10 V / 20 mA correspond to value in MON_p_dif_load_usr) **6 / Fixed Value /** $FiVA$: Fixed value (setting in parameter IOM1_AQ12_FixVal) **7 / Actual Position /** $PAct$: Actual position in the modulo range (10 V / 20 mA correspond to value in MOD_Max) Modified settings become active immediately. Available with firmware version ≥V01.06.	- 0 0 7	UINT16 R/W per. -	CANopen 304F:2B$_h$ Modbus 20310 Profibus 20310 CIP 179.1.43 ModbusTCP 20310 EtherCAT 304F:2B$_h$ PROFINET 20310

Setting a Fixed Value via Parameters

The parameters *IOM1_AO11_FixVal* and *IOM1_AO12_FixVal* are used to parameterize the values for the 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
IOM1_AQ11_FixVal	IOM1 Fixed value for AQ11. Only available if parameter IOM1_AQ11_func is set to 'Fixed Value'. Unit and range depend on setting in parameter IOM1_AQ_mode. If setting is 'Voltage': Unit: mV Range: -10000 … 10000 If setting is 'Current': Unit: µA Range: 0 … 20000 Modified settings become active immediately. Available with firmware version ≥V01.06.	- -10000 0 20000	INT16 R/W - -	CANopen 304F:24$_h$ Modbus 20296 Profibus 20296 CIP 179.1.36 ModbusTCP 20296 EtherCAT 304F:24$_h$ PROFINET 20296
IOM1_AQ12_FixVal	IOM1 Fixed value for AQ12. Only available if parameter IOM1_AQ12_func is set to 'Fixed Value'. Unit and range depend on setting in parameter IOM1_AQ_mode. If setting is 'Voltage': Unit: mV Range: -10000 … 10000 If setting is 'Current': Unit: µA Range: 0 … 20000 Modified settings become active immediately. Available with firmware version ≥V01.06.	- -10000 0 20000	INT16 R/W - -	CANopen 304F:2E$_h$ Modbus 20316 Profibus 20316 CIP 179.1.46 ModbusTCP 20316 EtherCAT 304F:2E$_h$ PROFINET 20316

Inverting the Voltage

The parameters *IOM1_AO11_invert* and *IOM1_AO11_invert* allow you to invert the voltage values of the 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
IOM1_AQ11_invert	IOM1 Inversion of AQ11. Only available if output is set to a voltage output. Value 0: No inversion Value 1: Inversion active Modified settings become active immediately. Available with firmware version ≥V01.06.	- 0 0 1	UINT16 R/W per. -	CANopen 304F:23$_h$ Modbus 20294 Profibus 20294 CIP 179.1.35 ModbusTCP 20294 EtherCAT 304F:23$_h$ PROFINET 20294
IOM1_AQ12_invert	IOM1 Inversion of AQ12. Only available if output is set to a voltage output. Value 0: No inversion Value 1: Inversion active Modified settings become active immediately. Available with firmware version ≥V01.06.	- 0 0 1	UINT16 R/W per. -	CANopen 304F:2D$_h$ Modbus 20314 Profibus 20314 CIP 179.1.45 ModbusTCP 20314 EtherCAT 304F:2D$_h$ PROFINET 20314

Overload Monitoring of the Voltage Source

If used as voltage source, the two analog outputs *AQ11* and *AQ12* are monitored for overload. An overload is detected outside of the voltage range +2 ... -2 V_{dc}. The error response can be set via the parameter *IOM1_AO_ErrResp*.

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_AQ_ErrResp	IOM1 Error response to overload of analog outputs. **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 1 3	UINT16 R/W per. -	CANopen 304F:1F$_h$ Modbus 20286 Profibus 20286 CIP 179.1.31 ModbusTCP 20286 EtherCAT 304F:1F$_h$ PROFINET 20286

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 in local control mode depending on the selected operating mode:

Signal	Jog	Electronic Gear	Profile Torque	Profile Velocity	Motion Sequence
DI10	Switch Controller Parameter Set	Switch Controller Parameter Set	Switch Controller Parameter Set	Switch Controller Parameter Set	Data Set Bit 0
DI11	Jog Fast/Slow	Gear Offset 1	Inversion AI11 (IO Module)	Inversion AI11 (IO Module)	Data Set Bit 1
DI12	Operating Mode Switch	Gear Offset 2	Inversion AI12 (IO Module)	Inversion AI12 (IO Module)	Data Set Bit 2
DI13	Freely Available	Freely Available	Freely Available	Freely Available	Data Set Bit 3

The table below shows the factory settings of the digital signal inputs in fieldbus control mode:

Signal	Signal input function
DI10	Freely Available
DI11	Freely Available
DI12	Freely Available
DI13	Freely Available

Parameterization

The table below provides an overview of the possible signal input functions:

Signal input function	Local control mode					Fieldbus control mode
	Jog	Electronic Gear	Profile Torque	Profile Velocity	Motion Sequence	Operating mode independent
Freely Available	•	•	•	•	•	•
Fault Reset	•	•	•	•	•	•
Enable	•	•	•	•	•	•
Halt	•	•	•	•	•	•
Start Profile Positioning						•
Current Limitation	•	•	•	•	•	•
Zero Clamp	•	•	•	•	•	•

Signal input function	Local control mode					Fieldbus control mode
	Jog	Electronic Gear	Profile Torque	Profile Velocity	Motion Sequence	Operating mode independent
Velocity Limitation	•	•	•	•	•	•
Jog Positive	•					
Jog Negative	•					
Jog Fast/Slow	•					
Gear Ratio Switch	•(1)	•	•(1)	•(1)		
Start Single Data Set					•	
Data Set Select					•	
Data Set Bit 0					•	
Data Set Bit 1					•	
Data Set Bit 2					•	
Data Set Bit 3					•	
Gear Offset 1	•(1)	•	•(1)	•(1)		•
Gear Offset 2	•(1)	•	•(1)	•(1)		•
Reference Switch (REF)					•	•
Positive Limit Switch (LIMP)	•	•	•	•	•	•
Negative Limit Switch (LIMN)	•	•	•	•	•	•
Switch Controller Parameter Set	•	•	•	•	•	•
Operating Mode Switch	•	•	•	•		
Velocity Controller Integral Off	•	•	•	•	•	•
Start Motion Sequence					•	
Activate RMAC	•	•	•	•	•	•
Activate Operating Mode	•	•	•	•	•	
Data Set Bit 4					•	
Data Set Bit 5					•	
Data Set Bit 6					•	
Inversion AI11 (IO Module)	•(1)	•(1)	•	•	•	•
Inversion AI12 (IO Module)	•(1)	•(1)	•	•	•	•
Release Holding Brake	•	•	•	•	•	•

(1)	With firmware version ≥V01.26 of the drive. The signal input function can be used in the specific operating mode in conjunction with the signal input function "Operating Mode Switch".

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
IOM1_IOfunct_DI10 ConF → ı-o- dı10	IOM1 Function Input DI10. **1 / Freely Available /** nonE : Available as required **2 / Fault Reset /** FrES : Fault reset after error **3 / Enable /** EnAb : Enables the power stage **4 / Halt /** hALt : Halt **5 / Start Profile Positioning /** SPtP : Start request for movement **6 / Current Limitation /** ıLıM : Limits the current to parameter value **7 / Zero Clamp /** CLMP : Zero clamping **8 / Velocity Limitation /** VLıM : Limits the velocity to parameter value **9 / Jog Positive /** JoGP : Jog: Moves in positive direction **10 / Jog Negative /** JoGn : Jog: Moves in negative direction **11 / Jog Fast/Slow /** JoGF : Jog: Switches between slow and fast movement **12 / Gear Ratio Switch /** GrAt : Electronic Gear: Switches between two gear ratios **13 / Start Single Data Set /** dStA : Motion Sequence: Starts a single data set **14 / Data Set Select /** dSEL : Motion Sequence: Data set selection **15 / Data Set Bit 0 /** dSb0 : Motion Sequence: Data set bit 0 **16 / Data Set Bit 1 /** dSb1 : Motion Sequence: Data set bit 1 **17 / Data Set Bit 2 /** dSb2 : Motion Sequence: Data set bit 2 **18 / Data Set Bit 3 /** dSb3 : Motion Sequence: Data set bit 3 **19 / Gear Offset 1 /** GoF1 : Electronic Gear: Adds first gear offset **20 / Gear Offset 2 /** GoF2 : Electronic Gear: Adds second gear offset **21 / Reference Switch (REF) /** rEF : Reference switch **22 / Positive Limit Switch (LIMP) /** LıMP : Positive limit switch **23 / Negative Limit Switch (LIMN) /** LıMn : 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	- - - -	UINT16 R/W per. -	CANopen 304F:50h Modbus 20384 Profibus 20384 CIP 179.1.80 ModbusTCP 20384 EtherCAT 304F:50h 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) /** $A\ I\ I\ i$: 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. Available with firmware version ≥V01.06.			
IOM1_IOfunct_DI11 $C\ o\ n\ F \rightarrow\ i\ -\ o\ -$ $d\ i\ 1\ 1$	IOM1 Function Input DI11. **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 /** $C\ L\ \Pi\ P$: 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 /** $G\ r\ A\ t$: 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	- - - -	UINT16 R/W per. -	CANopen 304F:51$_h$ Modbus 20386 Profibus 20386 CIP 179.1.81 ModbusTCP 20386 EtherCAT 304F:51$_h$ PROFINET 20386

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 ∏ P: Positive limit switch			
	23 / Negative Limit Switch (LIMN) / L i ∏ n: Negative limit switch			
	24 / Switch Controller Parameter Set / C P A r: Switches control loop parameter set			
	27 / Operating Mode Switch / ∏ 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 ∏ S: Motion Sequence: Starts a motion sequence			
	31 / Activate RMAC / A r ∏ 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 C o n F → i - o - d i 12	IOM1 Function Input DI12.	-	UINT16	CANopen 304F:52h
	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 ∏: Limits the current to parameter value			PROFINET 20388
	7 / Zero Clamp / C L ∏ P: Zero clamping			

Parameter name HMI menu HMI name	Description	Unit Minimum value Factory setting Maximum value	Data type R/W Persistent Expert	Parameter address via fieldbus
	8 / Velocity Limitation / V L ı 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 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 П P: Positive limit switch			
	23 / Negative Limit Switch (LIMN) / L ı П n: Negative limit switch			
	24 / Switch Controller Parameter Set / C P A r: Switches control loop parameter set			
	27 / Operating Mode Switch / П 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 П S: Motion Sequence: Starts a motion sequence			
	31 / Activate RMAC / A r П 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 ı 1 ı: 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 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_DI13 *ConF → i-o-d i 13*	IOM1 Function Input DI13.	-	UINT16	CANopen 304F:53h
	1 / Freely Available / *n o n E*: Available as required	-	R/W	Modbus 20390
	2 / Fault Reset / *F r E S*: Fault reset after error	-	per.	Profibus 20390
	3 / Enable / *E n A b*: Enables the power stage	-	-	CIP 179.1.83
	4 / Halt / *h A L t*: Halt			ModbusTCP 20390
	5 / Start Profile Positioning / *S P t P*: Start request for movement			EtherCAT 304F:53h
	6 / Current Limitation / *i L i П*: Limits the current to parameter value			PROFINET 20390
	7 / Zero Clamp / *C L П P*: Zero clamping			
	8 / Velocity Limitation / *V L i 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 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 П P*: Positive limit switch			
	23 / Negative Limit Switch (LIMN) / *L i П n*: Negative 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
	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			
	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 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.			

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.

⚠ 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.

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 in local control mode depending on the selected operating mode:

Signal	Jog	Electronic Gear	Profile Torque	Profile Velocity	Motion Sequence
DQ10	Motor standstill	Motor Standstill	Motor Standstill	Motor Standstill	Motor Standstill
DQ11	Selected Error	Selected Error	Selected Error	Selected Error	Selected Error

The table below shows the factory settings of the digital signal outputs in fieldbus control mode:

Signal	Signal output function
DQ10	Freely Available
DQ11	Freely Available

Parameterization

The table below provides an overview of the possible signal output functions:

Signal output function	Local control mode					Fieldbus control mode
	Jog	Electronic Gear	Profile Torque	Profile Velocity	Motion Sequence	Operating mode independent
Freely Available	•	•	•	•	•	•
No Fault	•	•	•	•	•	•
Active	•	•	•	•	•	•
RMAC Active Or Finished	•	•	•	•	•	•
In Position Deviation Window	•	•	•(1)	•(1)	•	•
In Velocity Deviation Window	•	•	•(1)	•	•	•
Velocity Below Threshold	•	•	•	•	•	•
Current Below Threshold	•	•	•	•	•	•
Halt Acknowledge	•	•	•	•	•	•
Motion Sequence: Start Acknowledge					•	•
Motor Standstill	•	•	•	•	•	•
Selected Error	•	•	•	•	•	•
Drive Referenced (ref_ok)					•	•
Selected Warning	•	•	•	•	•	•
Motion Sequence: Done					•	•
Position Register Channel 1					•	•
Position Register Channel 2					•	•
Position Register Channel 3					•	•
Position Register Channel 4					•	•
Motor Moves Positive	•	•	•	•	•	•

Signal output function	Local control mode					Fieldbus control mode
	Jog	Electronic Gear	Profile Torque	Profile Velocity	Motion Sequence	Operating mode independent
Motor Moves Negative	•	•	•	•	•	•

(1)	With firmware version ≥V01.26 of the drive.

The following parameters can be used to parameterize the digital signal outputs:

Signal output function	Local control mode					Fieldbus control mode
	Jog	Electronic Gear	Profile Torque	Profile Velocity	Motion Sequence	Operating mode independent

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_IOfunct_DQ10 Ｃ o n F → ı - o - d o I 0	IOM1 Function Output DQ10. **1 / Freely Available /** n o n E : Available as required **2 / No Fault /** n F L ŧ : Signals operating states Ready To Switch On, Switched On and Operation Enabled **3 / Active /** A c ŧ ı : Signals operating state Operation Enabled **4 / RMAC Active Or Finished /** r Ṅ c A : Relative movement after capture active or finished (RMAC) **5 / In Position Deviation Window /** ı n - P : Position deviation is within window **6 / In Velocity Deviation Window /** ı n - V : Velocity deviation is within window **7 / Velocity Below Threshold /** V ŧ h r : Motor velocity below threshold **8 / Current Below Threshold /** ı ŧ h r : Motor current below threshold **9 / Halt Acknowledge /** h A L ŧ : Halt acknowledgement **11 / Motion Sequence: Start Acknowledge /** d S A c : Motion Sequence: Acknowledgement of start request **13 / Motor Standstill /** Ṅ S ŧ 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 /** Ṅ S Ċ o : Motion Sequence: Sequence done **18 / Position Register Channel 1 /** P r Ċ I : Position register channel 1 **19 / Position Register Channel 2 /** P r Ċ 2 : Position register channel 2 **20 / Position Register Channel 3 /** P r Ċ 3 : Position register channel 3 **21 / Position Register Channel 4 /** P r Ċ 4 : Position register channel 4 **22 / Motor Moves Positive /** Ṅ P o S : Motor moves in positive direction **23 / Motor Moves Negative /** Ṅ n E Ġ : 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.	- - - -	UINT16 R/W per. -	CANopen 304F:5Aₕ Modbus 20404 Profibus 20404 CIP 179.1.90 ModbusTCP 20404 EtherCAT 304F:5Aₕ PROFINET 20404
IOM1_IOfunct_DQ11 Ｃ o n F → ı - o - d o I I	IOM1 Function Output DQ11. **1 / Freely Available /** n o n E : Available as required	- - -	UINT16 R/W per.	CANopen 304F:5Bₕ Modbus 20406 Profibus 20406

Parameter name HMI menu HMI name	Description	Unit Minimum value Factory setting Maximum value	Data type R/W Persistent Expert	Parameter address via fieldbus
	2 / No Fault / $nFLt$: Signals operating states Ready To Switch On, Switched On and Operation Enabled	-	-	CIP 179.1.91 ModbusTCP 20406 EtherCAT 304F:5B_h PROFINET 20406
	3 / Active / $Act i$: Signals operating state Operation Enabled			
	4 / RMAC Active Or Finished / $rMcA$: Relative movement after capture active or finished (RMAC)			
	5 / In Position Deviation Window / $in-P$: Position deviation is within window			
	6 / In Velocity Deviation Window / $in-V$: Velocity deviation is within window			
	7 / Velocity Below Threshold / $Vthr$: Motor velocity below threshold			
	8 / Current Below Threshold / $ithr$: 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 / $MStd$: 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 / $MSCo$: 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 / $MPoS$: Motor moves in positive direction			
	23 / Motor Moves Negative / $MnEG$: 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.			

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, page 12.

If a different signal input function is assigned and when the product is powered off and on again, software debouncing is reset to the factory setting.

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
IOM1_DI_10_Deb	IOM1 Debounce time of DI10. **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:40$_h$ Modbus 20352 Profibus 20352 CIP 179.1.64 ModbusTCP 20352 EtherCAT 304F:40$_h$ PROFINET 20352
IOM1_DI_11_Deb	IOM1 Debounce time of DI11. **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:41$_h$ Modbus 20354 Profibus 20354 CIP 179.1.65 ModbusTCP 20354 EtherCAT 304F:41$_h$ 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

Setting a Signal Output via Parameter

The digital signal outputs can be set as required via the fieldbus.

In order to set a digital signal output via the parameter, you must first parameterize the signal output function "Freely Available", see Parameterization of the Signal Output Functions, page 34.

The parameter *IOM1_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
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

Glossary

D

Direction of rotation :

Rotation of the motor shaft in a positive or negative direction of rotation. Positive direction of rotation is when the motor shaft rotates clockwise as you look at the end of the protruding motor shaft.

DOM:

Date **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. Example:

31.12.09 corresponds to December 31, 2009

31.12.2009 corresponds to December 31, 2009

E

EMC:

Electromagnetic compatibility

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 computed, observed or measured value or condition and the specified or theoretically correct value or condition.

F

Factory setting:

Factory settings when the product is shipped

Fault reset:

A function used to restore the drive to an operational state after a detected error is cleared by removing the cause of the error so that the error is no longer active.

Fault:

Fault is a state that can be caused by an error. Further information can be found in the pertinent standards such as IEC 61800-7, ODVA Common Industrial Protocol (CIP).

G

GSD file:

A file provided by the vendor; contains specific information on a Profibus device and is required for commissioning the device

I

I/O:

Inputs/outputs

Inc:

Increments

Incremental signals:

Steps of an encoder as rectangular pulse sequences. The pulses indicate changes in positions.

L

Limit switch:

Switches that signal overtravel of the permissible range of travel.

P

Parameter :

Device data and values that can be read and set (to a certain extent) by the user.

PTC:

Resistor with positive temperature coefficient. Resistance value increases as the temperature rises.

Q

Quick Stop:

Function which can be used for fast deceleration of the motor via a command or in the event of an error.

L

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