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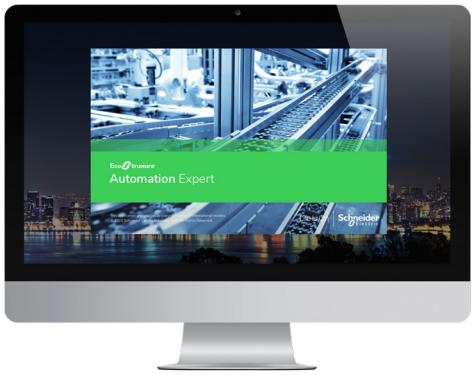

Industrial Automation systems

EcoStruxure™ Automation Expert

Software Centric Automation

Software version v21.2

www.se.com

Life Is On Schneider Electric

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EcoStruxure™ Automation Expert

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EcoStruxure™
Innovation At Every Level

Schneider Electric's IoT-enabled, plug-and-play, open, secure, interoperable architecture and platform, in Industries, Infrastructures, Data Centers, and Buildings.

Innovation at every level

EcoStruxure is based on a three-tiered technology stack delivering innovation at every level, from connected products to edge control and apps, analytics, and services.

Together with our hybrid segments approach, this enhances your value around safety, reliability, operational efficiency, sustainability, and connectivity across 6 domains of expertise:

- Power
- IT
- Building
- Plant
- Grid
- Machine

Dedicated architectures and IoT

We tailor our solutions in the form of dedicated reference architectures for plants:

- Management systems
- Power systems
- Data center systems
- Industrial plant and machine systems
- Smart grid systems

The Industrial Internet of Things (IIoT) gives an additional boost to technologies. That's why we provide our customers with an IoT-enabled architecture and platform offering simple, reliable, productive, and cost-efficient solutions.

Cybersecurity solutions

Robust cybersecurity protection is a must, and Schneider Electric's solutions can deliver it, regardless of business type or industry.

The vendor-agnostic services provided by our skilled professionals help to protect your entire critical infrastructure. We help to assess your risk, implement cyber-specific solutions, and maintain your onsite defenses over time, while integrating appropriate IT policies and requirements.

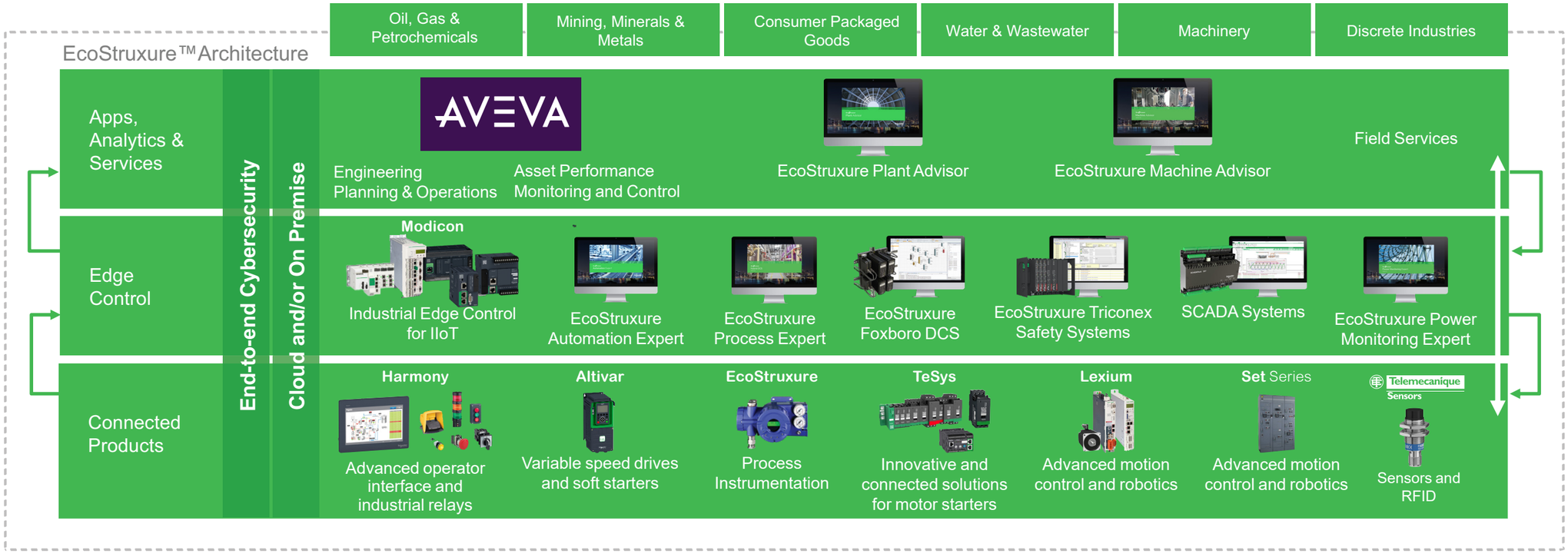
This is our difference and your advantage.

Enhanced safety

With the release of M580 Safety, Schneider Electric further expands the EcoStruxure platform.

This consolidates our position as one of the most trusted industrial safety vendor, with thousands of Modicon and Triconex safety systems protecting the most critical industrial processes globally.

EcoStruxure™ Innovation At Every Level **for Industry**



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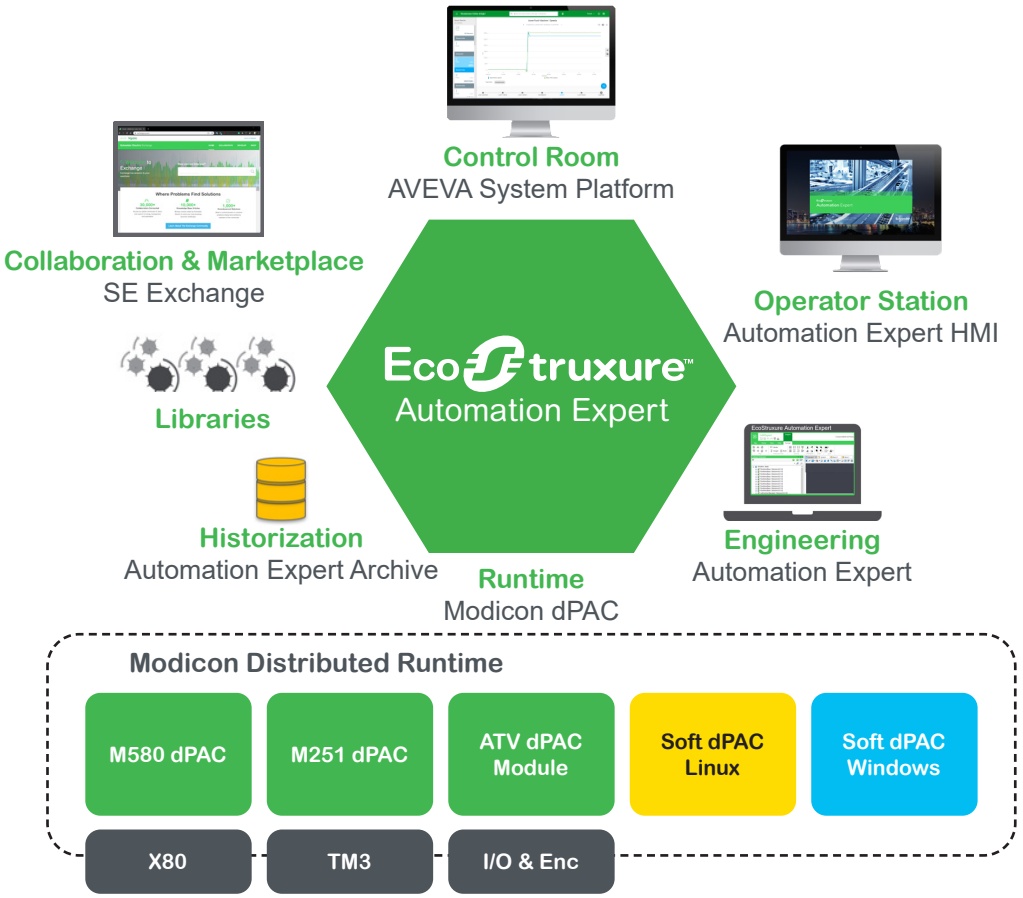
EcoStruxure™ Automation Expert

EcoStruxure Automation Expert is a new category of industrial automation system that leverages innovative technology to enable industrial operators to realise a step-change improvement over traditional process control systems in productivity, quality, flexibility, and security over the full lifecycle of their industrial assets.



EcoStruxure Automation Expert is a cohesive system consisting of a suite of integrated hardware and software solutions:

- EcoStruxure Automation Expert engineering, monitoring, and management environment
- Distributed Programmable Automation Controller (dPAC) platforms with a common, flexible, scalable runtime across:
  - Schneider Electric hardware:
    - ATV dPAC for Altivar
    - Modicon M251d/TM3 I/O
    - Modicon M580d/X80 I/O
  - Innovative new software-based controllers:
    - Soft dPAC for Linux™
    - Soft dPAC for Windows™
- EcoStruxure Automation Expert - HMI, a fully integrated, object-orientated industrial visualization solution
- EcoStruxure Automation Expert - Archive, a centralized solution for the historization of process data, alarms, and trends
- Schneider Electric Libraries, a comprehensive set of hardware-independent libraries, ranging from basic functions to segment solutions

Feature overview

EcoStruxure Automation Expert represents a new approach to designing, building, operating, and maintaining industrial automation systems that offers a unique technology mix to define a new category of integrated automation systems.

Complexity mastered

Systems, devices, services, and assets are natively represented as ready-to-use software objects that called composite automation types (CATs) that encapsulate internal behaviour and simplify functional interfaces. An object-orientated approach promotes code reuse, standardization on best practice, and helps manage complexity while providing the fundamental building blocks for the creation of state-of-the-art cyber-physical systems. CAT objects follow a type/instance relation and can be combined to new objects that encapsulate:

- Control logic
- HMI/SCADA visualization
- I/O and device communications
- Simulation and test rigging
- Documentation

Decoupling the application from implementation

EcoStruxure Automation Expert addresses full automation system engineering and extends the best features of classic PLC and DCS control approaches to a new generation of automation system that completely decouples the application design from runtime deployment, enabling automation professionals to focus on these tasks independently in their project lifecycle. Applications are portable, reusable, and interoperable across runtime platforms, meaning deployment decisions are made just in time and on the fly, enabling exceptional system agility.

Efficient engineering

EcoStruxure Automation Expert provides a single, modular engineering environment for all tasks engineering, monitoring, and managing the complete automation system including hardware and software, control, and visualization. EcoStruxure Automation Expert automates low-value engineering and integration tasks, thus reducing engineering effort and sources of error. Complex functions can be encapsulated into manageable objects, enabling non-technical users to understand and manage complex systems. Cross communications are transparent and implicit regardless of physical location, requiring zero engineering consideration.

Common runtime environment

Through the implementation of a common distributed control runtime across hardware and software platforms, EcoStruxure Automation Expert provides excellent reusability, scalability, and architectural flexibility. Application portability provides cost savings through the decoupling of the lifecycles of software and hardware systems.

Simple system orchestration

EcoStruxure Automation Expert was designed with the complete lifecycle of an automation system in mind, with functions to facilitate management and monitoring of multiple assets and devices at scale. With a single user environment covering the entire system scope including third-party devices, orchestration of complex, heterogenous systems becomes simple.

Native IT integration

Modern automation systems generate increased value when coupled with business information and hence wider IT ecosystems. EcoStruxure Automation Expert provides an expandable platform for Industry 4.0 solutions with support for high-level programming, modular systems design, and open standards.

EcoStruxure Automation Expert Hardware

EcoStruxure Automation Expert consists of several hardware components working together to create a complete automation system.

Modicon M580 dPAC

BMED581020

A high-performance, rugged distributed field controller based on the widely successful Modicon M580 ePAC platform with up to 64 MB ECC RAM for programs and data. The M580 dPAC supports the robust, high-performance Modicon X80 I/O catalog *(1)* and is available in standard and conformal coated versions.

Product references:
- **BMED581020**: Modicon M580 dPAC (standard)
- **BMED581020C**: Modicon M580 dPAC (conformal coated)

BMED581020 and **BMED581020C** controllers support:
- Up to 1,024 discrete I/O channels *(3)*
- Up to 256 analog I/O channels *(3)*
- Up to 4 racks of local I/O

Modicon M251 dPAC

TM251MDESE

A cost-optimized, low-footprint distributed controller based on the machine-specialized Modicon M251 PAC platform. The Modicon M251 dPAC provides a single Ethernet port for fieldbus, switched dual Ethernet ports for peer communications, and supports the field-proven TM3 I/O system *(1)*.

Product reference:
- **TM251MDESE**: Modicon M251 dPAC

The **TM251MDESE** controller has no embedded I/O; it supports Modicon TM3 I/O expansion modules:
- Up to 448 discrete I/O channels *(3)*
- Up to 112 analog I/O channels *(3)*
- Up to 14 Modicon TM3 expansion modules (7 local modules + 7 remote modules) with Modicon TM3 bus expansion modules (transmitter module and receiver module)

It is possible to control up to 4 TeSys U and TeSys D motor starters by connecting a **TM3XTYS4** TM3 module to the Modicon M251 dPAC.

Altivar ATV dPAC module

Altivar Process drives slots

The ATV dPAC module is part of the EcoStruxure Automation Expert distributed controller solution platform. It is intended to be used as a slide-in option for ATV600, ATV900, and ATV340 variable speed drive (VSD) families *(2)*. The Altivar ATV dPAC module is powered by the drive and provides dual Ethernet sockets for connection to peer controllers, distributed I/O, or remote secondary devices.

Product references:
- **VW3A3530D**: Altivar ATV dPAC module
- **VW3A1111**: Graphic display terminal for ATV340

VW3A3530D

The **VW3A3530D** dedicated controller has no embedded I/O. However, all standard I/O on the respective Altivar Process and Altivar Machine drives can be used and extended with I/O modules.

(1) Expert/specialist modules are not supported in this release. Some I/O modules will be supported in a later release. Please refer to the compatibility list on page 13.
(2) For details, please refer to the compatibility table on page 15.
(3) These values are theoretical limits, the device limits are highly dependent on the event load of the user application.

EcoStruxure Automation Expert Software

The EcoStruxure Automation Expert software offer includes the EcoStruxure Automation Expert engineering environment, plus HMI runtime, historian, libraries, AVEVA System Platform integration, and the software-based distributed process automation controller (Soft dPAC).

EcoStruxure Automation Expert

EcoStruxure Automation Expert is an asset-based, fully integrated engineering environment designed to allow users to design, configure, and manage next-generation automation systems based on multifaceted asset models within a single engineering environment. EcoStruxure Automation Expert includes the capability to:

- Create portable, IEC 61499-standard-based automation programs
- Create rich HMI screens and design user interactions
- Support multi-user change management through SVN integration
- Design, configure, and manage network and device topologies
- Create, import, and export wrap-and-reuse code libraries
- Flexibly deploy applications to multiple hardware platforms based on a common runtime
- Automatically discover compatible runtime devices
- Automate bulk generation of asset instances from AVEVA Engineering or DEXPI files

EcoStruxure Automation Expert system requirements

System requirements	Minimum	Recommended
Processor	1 GHz	2 GHz or higher
RAM	2 GB	4 GB or higher
Hard disk free space	4 GB	10 GB
Display resolution	1280x1024	1920x1080 or higher
Pointing device	Mouse or compatible	
Network access	One Ethernet interface	
Operating system	Microsoft Windows 10 Professional (64-bit) Version 1903	Latest Microsoft Windows 10 Professional (64-bit)
.NET framework	.NET 4.8	.NET 4.8 or higher

EcoStruxure Automation Expert – HMI

EcoStruxure Automation Expert HMI is a Windows 10 Professional and Linux compatible HMI runtime designed to provide a high-performance and highly integrated user interface for EcoStruxure Automation Expert applications that is asset-based and network transparent. It enables pluggable reuse of asset models and interactions, and requires minimal engineering effort to create rich user interfaces, providing exceptional flexibility and agility in deployment. It is possible to use the cost effective Harmony ST6 touch panel screens **HMIST6200**, **HMIST6400**, **HMIST6500**, **HMIST6600**, or **HMIST6700** to host an Automation Expert HMI.

Automation Expert HMI system requirements

System requirements	Minimum	Recommended
Processor	1 GHz	2 GHz or higher
RAM	2 GB	4 GB or higher
Hard disk free space	1 GB	10 GB
Display resolution	1280x1024	1920x1080 or higher
Pointing device	Mouse or compatible	
Network access	One Ethernet interface	
Operating system	Microsoft Windows 10 Professional (64-bit) Version 1903	Latest Microsoft Windows 10 Professional (64-bit)
.NET framework	.NET 4.8	.NET 4.8 or higher

EcoStruxure Automation Expert – Archive

EcoStruxure Automation Expert Archive is a high-performance, highly integrated data historian, providing historization and retrieval of live process data with a flexible Windows 10-based runtime.

EcoStruxure Automation Expert – Archive system requirements

System requirements	Minimum	Recommended
Processor	1 GHz	2 GHz or higher
RAM	2 GB	4 GB or higher
Hard disk free space	1.5 GB	10 GB
Display resolution	1280x1024	1920x1080 or higher
Pointing device	Mouse or compatible	
Network access	One Ethernet interface	
Operating system	Microsoft Windows 10 Professional (64-bit) Version 1903	Latest Microsoft Windows 10 Professional (64-bit)
.NET framework	.NET 4.8	.NET 4.8 or higher

EcoStruxure Automation Expert Software (continued)

EcoStruxure Automation Expert – AVEVA System Platform integration

EcoStruxure Automation Expert includes native support for System Platform - AVEVA's real-time operations control platform for supervisory, HMI, SCADA, and IIoT applications. EcoStruxure Automation Expert is capable of auto-generating OPC UA-based secure communications between platforms and will generate System Platform-compatible graphics for clean integration.

EcoStruxure Automation Expert – Software dPAC

EcoStruxure Automation Expert Software dPAC is a state-of-the-art multi-platform IEC 61499-based control runtime that includes:

- Event-based, network-transparent automation capability
- Native process alarm support
- Modbus/TCP client and server
- OPC UA client and server
- Ethernet/IP server

EcoStruxure Automation Expert Soft dPAC enables an open, flexible, scalable, highly integrated IEC 61499 runtime for standard PCs from low-cost embedded systems through to high-performance IT servers.

The runtime provides an open platform to integrate and run advanced IT tools, libraries, and applications at the industrial edge.

EcoStruxure Automation Expert Soft dPAC for Linux is compatible with realtime Linux kernels and supports multiple Soft PAC instances per machine with communications via Modbus/TCP and Ethernet/IP.

Software dPAC – System requirements for Linux

System requirements	Minimum	Recommended	Required for RT control
OS	Debian 10.3, Ubuntu 18.04 and 20.04, or Raspbian 32- or 64-bit	Debian 10.3, Ubuntu 18.04 and 20.04, or Raspbian 32- or 64-bit	Ubuntu 20.04 with low-latency patch or other distribution with PREEMPT-RT patch
Docker	Docker 19.03.8 and above	Docker 19.03.8 and above	Docker 19.03.8 and above
CPU	X86/ARM 1 GHz or higher	Multi-core X86/ARM 1 GHz or higher	Dedicated cores
RAM	256 MB	1 GB	1 GB
HDD/SSD	16 GB	32 GB	32 GB
Network	At least one NIC	Two NICs to isolate control and device networks	One NIC per container for RT fieldbuses
Time synchronization	NTPv4 client	NTPv4 client support with monotonic and drift compensation	NTPv4 client support with monotonic and drift compensation

Software dPAC – System requirements for Windows

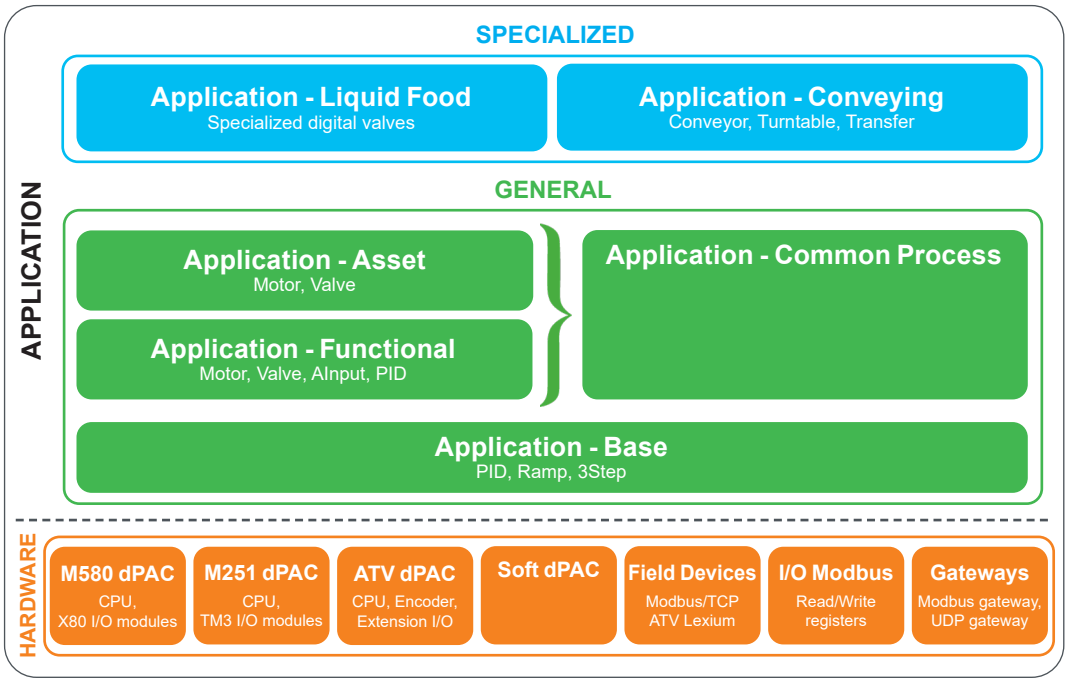
System requirements	Minimum	Recommended
Processor	1 GHz	2 GHz or higher
RAM	2 GB	4 GB or higher
Hard disk free space	1 GB	10 GB
Display resolution	1280x1024	1920x1080 or higher
Pointing device	Mouse or compatible	
Network access	One Ethernet interface	
Operating system	Microsoft Windows 10 Professional (64-bit) Version 1903	Latest Microsoft Windows 10 Professional (64-bit)
.NET framework	.NET 4.8	.NET 4.8 or higher

EcoStruxure Automation Expert Software (continued)

EcoStruxure Automation Expert – Libraries

By leveraging asset-based engineering, an open code format, and a wrap-and-reuse approach, EcoStruxure Automation Expert includes system, device, and segment-based libraries that include multiple facets - code, HMI, documentation, etc. - within a single package. With this release the libraries include:

- System and device
- CPG liquid food
- Logistics
- Automation sequences
- Asset state management



EcoStruxure Automation Expert Software (continued)

EcoStruxure Automation Expert – Libraries (continued)

EcoStruxure Automation Expert libraries

Name	Description
Runtime.Base	
SE.AppAsset	Assets with I/O connectivity library
SE.AppBase	Elementary block of the application library
SE.AppCommonProcess	Application common process library
SE.AppConveying	Conveying library
SE.AppFunctional	Application functional library
SE.AppLiquidFood	Liquid and Food library
SE.AppSequence	Sequence library
SE.AppStateManagement	State management library
SE.DPAC	dPAC HW controllers
SE.EAEPortal	Used to create Aveva server device and other related functionalities
SE.FieldDevice	
SE.HwCommon	Common functions used in the HW CATs
SE.IoATV	Variables speed drive I/O services for ATV dPAC
SE.IoNet	
SE.IoTMx	TM I/O services for M251d
SE.IoX80	X80 I/O services for M508d
SE.ModbusGateway	
SE.Standard	
Standard.HMIExtensions	HMI extensions library
Standard.IoEtherNetIP	
Standard.IoModbus	Standard Modbus functions
Standard.IoModbusSlave	Standard Modbus server functions
Standard.OPCUAClient	Standard OPC UA client functions
AVEVA.IndustrialGraphicsLibrary	Schneider Electric engineering tool function block libraries
IEC61131.Standard	
nxtControl.Standard	
nxtControl.Tutorial	
nxtControl.TutorialHardware	

EcoStruxure Automation Expert licensing

The EcoStruxure Automation Expert license offer is based on two types of license:

Engineering license

- One license requested per **engineering workstation seat**

Includes:
- Buildtime tool suite
- Latest software version
- Engineering of control, HMI, and archive

Available as single seat only

Application license

- One license requested per **controller or HMI runtime instance**
- Portfolio options with scaled pricing based on platform capability

Includes:
- Seperate IEC 61499 control and HMI licenses
- Perpetual usage rights

Licenced per runtime instance

EcoStruxure Automation Expert – Engineering license

One engineering license is required per EcoStruxure Automation Expert engineering seat. The base engineering license provides the capability to create, configure, and manage IEC 61499 control applications, HMI, archive, and network/device topologies.

Each license provides the user with:
- The capability to design, develop, simulate with HMI, and commission a complete system
- Collaborative engineering (SVN client) plugin
- Physical topology editor
- Free software updates
- Access to private communities on exchange.se.com for:
  - p2p support, libraries, project samples, training material, TVDAs, etc.
  - 9 am to 5 pm support desk

An engineering licence is perpetual and is available as a single seat option only.

Engineering license reference

Number of seats	Reference	Description
1	EALBTP21	Engineering license for perpetual usage

EcoStruxure Automation Expert licensing (continued)

EcoStruxure Automation Expert – Application license

In addition to the build-time engineering license required to create applications, each EcoStruxure Automation Expert runtime must be licenced for operational use. Per instance licenses are available and required for Automation Expert HMI, Automation Expert dPAC, and Automation Expert Soft dPAC runtimes. The Automation Expert HMI license includes rights to both HMI and Archive runtimes. All runtime licenses are perpetual.

Different license types are required depending on the platform on which the runtime is installed, as per the following table:

		Application license type					
Automation Expert Runtime	**Platform**	**DEVICE**	**NANO**	**MICRO**	**SMALL**	**LARGE**	**PERFORMANCE**
dPAC	Schneider Electric dPAC *(1)*	Altivar ATV dPAC Module	–	Modicon M251 dPAC	Modicon M580 dPAC (single backplane)	Modicon M580 dPAC (extended backplane)	–
Soft dPAC	Schneider Electric Harmony iPC	–	Edge Box Core Harmony HMIBSC	–	Edge Box Harmony HMIBMI/HMIBMO	iPC Harmony HMIP6 Standard	iPC Harmony HMIP6 Advanced
Soft dPAC	Third party iPC	–	ARM Cortex ≤1 GHz *(2)*	ARM Cortex ≤1.4 GHz *(2)*	ARM Cortex >1.4 GHz Intel Atom, Celeron, Pentium*(2)*	Intel Core i3, i5 *(2)*	Intel Core i7,i9, Xeon *(2)*
HMI *(3)*	Linux	1 license per HMI runtime instance					
HMI *(3)*	Windows 10	1 license per HMI runtime instance					

(1) Schneider Electric dPAC controllers must be purchased separately from their respective runtime license.
(2) Or equivalent/comparable CPU from other manufacturer.
(3) Each license includes both Automation Expert HMI and Automation Expert Archive runtime rights.

Application license reference

Reference	Description
EALADP	Application license for one runtime instance, DEVICE
EALANP	Application license for one runtime instance, NANO
EALAMP	Application license for one runtime instance, MICRO
EALASP	Application license for one runtime instance, SMALL
EALALP	Application license for one runtime instance, LARGE
EALAPP	Application license for one runtime instance, PERFORMANCE
EALH1P	Automation Expert HMI for Linux
EALH2P	Automation Expert HMI for Windows

List of X80 hardware compatible with Modicon M580 dPAC

Type	Reference	Description
Rack	BMEXBP0400	4-slot Ethernet backplane
Rack	BMEXBP0400H	Ruggedized 4-slot Ethernet backplane
Rack	BMEXBP0602	6-slot Ethernet backplane redundant PS
Rack	BMEXBP0602H	Ruggedized 6-slot Ethernet backplane redundant PS
Rack	BMEXBP0800	8-slot Ethernet backplane
Rack	BMEXBP0800H	Ruggedized 8-slot Ethernet backplane
Rack	BMEXBP1002	10-slot Ethernet backplane redundant PS
Rack	BMEXBP1002H	Ruggedized 10-slot Ethernet backplane redundant PS
Rack	BMEXBP1200	12-slot Ethernet backplane
Rack	BMEXBP1200H	Ruggedized 12-slot Ethernet backplane
Rack	BMXXBC008K	Backplane extension cable 0.8 m/*2.6 ft*
Rack	BMXXBC015K	Backplane extension cable 1.5 m/*4.9 ft*
Rack	BMXXBC030K	Backplane extension cable 3 m/*9.8 ft*
Rack	BMXXBC050K	Backplane extension cable 5 m/*16.4 ft*
Rack	BMXXBC120K	Backplane extension cable 12 m/*39 ft*
Rack	BMXXBE1000	Standard backplane extender
Rack	BMXXBE1000H	Ruggedized standard backplane extender
Rack	BMXXBE2005	Backplane extender kit
Rack	BMXXBP0400	4-slot backplane
Rack	BMXXBP0400H	Ruggedized 4-slot backplane
Rack	BMXXBP0600	6-slot backplane
Rack	BMXXBP0600H	Ruggedized 6-slot backplane
Rack	BMXXBP0800	8-slot backplane
Rack	BMXXBP0800H	Ruggedized 8-slot backplane
Rack	BMXXBP1200	12-slot backplane
Rack	BMXXBP1200H	Ruggedized 12-slot backplane
SD card	BMXRMS004GPF	Optional M580 SD card 4 GB
Analog I/O	BMXAMI0410	4 voltage/current isolated high-speed analog inputs
Analog I/O	BMXAMI0410H	Ruggedized 4 voltage/current isolated high-level analog inputs
Analog I/O	BMXAMI0800	8 voltage/current non-isolated fast analog inputs
Analog I/O	BMXAMI0810	8 voltage/current isolated fast analog inputs
Analog I/O	BMXAMI0810H	Ruggedized 8 voltage/current isolated fast analog inputs
Analog I/O	BMXAMO0410	4 voltage/current isolated analog outputs
Analog I/O	BMXAMO0410H	Ruggedized 4 voltage/current isolated analog outputs
Analog I/O	BMXAMO0802	8 current non-isolated analog outputs
Analog I/O	BMXAMM0600	4 analog inputs - 2 analog outputs
Analog I/O	BMXAMM0600H	Ruggedized 4 analog inputs - 2 analog outputs
Analog I/O	BMXAMO0210	2 isolated analog outputs
Analog I/O	BMXAMO0210H	Ruggedized 2 voltage/current isolated analog outputs
Analog I/O	BMXART0814	8 isolated TC/RTD inputs
Analog I/O	BMXART0814H	Ruggedized 8 isolated TC/RTD inputs
Power	BMXCPS2000	Standard AC power supply
Power	BMXCPS2010	Standard isolated DC power supply
Power	BMXCPS3020	High-power isolated 24 to 48 VDC power supply
Power	BMXCPS3020H	Ruggedized high-power isolated 24 to 48 VDC power supply
Power	BMXCPS3500	High-power AC power supply
Power	BMXCPS3500H	Ruggedized high-power AC power supply
Power	BMXCPS3522	Redundant 125 VDC power supply
Power	BMXCPS3540T	High-power 125 VDC power supply
Power	BMXCPS4002	Redundant AC power supply
Power	BMXCPS4022	Redundant 24 to 48 VDC power supply
Discrete I/O	BMXDDI1602	16x 24 VDC sink discrete inputs
Discrete I/O	BMXDDI1602H	Ruggedized 16x 24 VDC sink discrete inputs
Discrete I/O	BMXDDI3202K	32x 24 VDC sink discrete inputs
Discrete I/O	BMXDDI6402K	64x 24 VDC sink discrete inputs
Discrete I/O	BMXDDM16025	8x 24 VDC discrete inputs, 8x discrete relay outputs
Discrete I/O	BMXDDM16025H	Ruggedized 8x 24 VDC discrete inputs, 8x discrete relay outputs
Discrete I/O	BMXDDO1602	16 transistor source 0.5 A discrete outputs
Discrete I/O	BMXDDO1602H	Ruggedized 16 transistor source 0.5 A discrete outputs
Discrete I/O	BMXDDO3202K	32 transistor source 0.1 A discrete outputs
Discrete I/O	BMXDDO6402K	64 transistor source 0.1 A discrete outputs
Discrete I/O	BMXDRA0805	8x discrete relay outputs
Discrete I/O	BMXDRA0805H	Ruggedized 8 discrete relay outputs
Discrete I/O	BMXDRA0815	8 isolated relay outputs
Discrete I/O	BMXDRA0815H	Ruggedized 8 isolated relay outputs

List of X80 hardware compatible with Modicon M580 dPAC (continued)

Type	Reference	Description
Discrete I/O	**BMXDRA1605**	16 discrete relay outputs
Discrete I/O	**BMXDRA1605H**	Ruggedized 16 discrete relay outputs
Discrete I/O	**BMXDAI0814**	8x 100...120 VAC isolated inputs
Discrete I/O	**BMXDAI1604**	16x 100..120 VAC capacitive inputs
Discrete I/O	**BMXDAI1604H**	Ruggedized 16x 100..120 VAC capacitive inputs
Discrete I/O	**BMXDAO1605**	16x 100..240 V AC triac outputs
Discrete I/O	**BMXDAO1605H**	Ruggedized 16x 100..240 VAC triac outputs
Discrete I/O	**BMXDDM16022**	3-channel SSI encoder interface
Discrete I/O	**BMXDDM16022H**	Ruggedized 3-channel SSI encoder interface
Discrete I/O	**BMXDDM3202K**	16x 24 VDC inputs - 16x solid state outputs
Other	**BMXNRP0200**	Fiber converter MM/LC 2-channel, 100 m/*328 ft*
Other	**BMXNRP0201**	Fiber converter SM/LC 2-channel, 100 m/*328 ft*
Expert	**BMXEHC0800**	8 high-speed counter channels
Expert	**BMXEHC0800H**	Ruggedized 8 high-speed counter channels
Expert	**BMXEAE0300**	3-channel SSI encoder interface module
Expert	**BMXEAE0300H**	Ruggedized 3-channel SSI encoder interface module

List of TM3 hardware compatible with Modicon M251 dPAC

Type	Reference	Description
Discrete I/O	**TM3DI16/TM3DI16G**	16 discrete inputs
Discrete I/O	**TM3DI32K**	32 discrete inputs, HE10 connection
Discrete I/O	**TM3DI8/TM3DI8A/TM3DI8G**	8 discrete inputs
Discrete I/O	**TM3DQ8T/TM3DQ8TG**	8 discrete outputs 0.5 A source
Discrete I/O	**TM3DQ16T/TM3DQ16TG**	16x 0.5 A transistor source discrete outputs
Discrete I/O	**TM3DQ16R/TM3DQ16RG**	16x 2 A discrete relay outputs
Discrete I/O	**TM3DQ32TK**	32x 0.1 A transistor source discrete outputs, HE10 connection
Discrete I/O	**TM3DQ8U/TM3DQ8UG**	8x 0.3 A transistor sink discrete outputs
Discrete I/O	**TM3DQ16U/TM3DQ16UG**	16x 0.3 A transistor sink discrete outputs
Discrete I/O	**TM3DQ32UK**	32x 0.4 A transistor sink discrete outputs, HE10 connection
Analog I/O	**TM3AI2H/TM3AI2HG**	2 high-resolution analog inputs, +-10 V, 0-10 V, 0-20 mA, 4-20 mA, 16-bit, 1 ms
Analog I/O	**TM3AI8/TM3AI8G**	8 analog inputs, +-10 V, 0-10 V, 0-20 mA, 4-20 mA, 12-bit, 1 ms
Analog I/O	**TM3AQ4/TM3AQ4G**	4 analog inputs, +-10 V, 0-10 V, 0-20 mA, 4-20 mA, 12-bit, 1 ms
Safety I/O	**TM3SAC5R/TM3SAC5RG**	CAT3 Safety, 1 function, max. PL d/SIL3, 3 outputs 6 A relays
Safety I/O	**TM3SAFL5R/TM3SAFL5RG**	CAT3 Safety, 2 function, max. PL d/SIL3, 3 outputs 6 A relays
Mixed analog I/O	**TM3AM6/TM3AM6G**	4 analog outputs, 2 analog inputs, +-10 V, 0-10 V, 0-20 mA, 4-20 mA, 12-bit, 1 ms
Thermocouple mixed	**TM3TM3/TM3TM3G**	2 temperature inputs + 1 analog output TC (J, K, R, S, B, T, N, E, C, L) RTD (NI100, NI1000, PT100, PT1000) (+-10 V, 0-10 V) (0-20 mA, 4-20 mA) 16-bit, 100 ms
Thermocouple input	**TM3TI4/TM3TI4G**	4 temperature inputs TC (J, K, R, S, B, T, N, E, C, L) RTD (NI100, NI1000, PT100, PT1000), (+-10 V, 0-10 V) (0-20 mA, 4-20 mA) 16-bit, 100 ms
Thermocouple input	**TM3TI8T/TM3TI8TG**	8 temperature inputs, NTC, PTC, and TC (J, K, R, S, B, T, N, E, C, L), 16-bit 100 ms
Relay I/O	**TM3DM8R/TM3DM8RG**	8x 2 A relay outputs
Relay I/O	**TM3DM24R/TM3DM24RG**	24x 2 A relay outputs
Relay I/O	**TM3DQ8R/TM3DQ8RG**	8x 2 A relays outputs
Other	**TM3XREC1**	TM3 remote receiver module
Other	**TM3XTRA1**	TM3 remote transmitter module
Other	**TM3XTYS4**	TM3 parallel interface for 4 Tesys motor starters
Other	**TM4ES4**	Ethernet switch
Expert	**TM3XHSC202/TM3XHSC202G**	high-speed counting, 2 channels HSC, 10 inputs, 8 outputs

Altivar hardware and Altivar ATV dPAC compatibility

Type	Reference	Description	Compatible
Drive	**ATV340●●●N4**	Altivar Machine drives	Yes
Drive	**ATV340●●●N4E ≤ D22**	Altivar Machine drives	No
Drive	**ATV340●●●N4E ≥ D30**	Altivar Machine drives	Yes
Drive	**ATV630●●●●●** **ATV630●●●●●F**	Altivar Process drives	Yes
Drive	**ATV650●●●●●** **ATV650●●●●●E** **ATV650●●●●●F**	Altivar Process drives	Yes
Drive	**ATV930●●●●●** **ATV930●●●●●C** **ATV930●●●●●F**	Altivar Process drives	Yes
Drive	**ATV950●●●●●** **ATV950●●●●●E** **ATV950●●●●●F**	Altivar Process drives	Yes
Drive	**ATV660●●●●●** **ATV680●●●●●**	Altivar Process drive systems	Yes
Drive	**ATV960●●●●●** **ATV980●●●●●**	Altivar Process drive systems	Yes
Drive	**ATV99●●●●●**	Altivar Process drive systems	Yes
Drive	**ATV6A0●●●●●** **ATV6B0●●●●●**	Altivar Process Modular drives	Yes
Drive	**ATV9A0●●●●●** **ATV9B0●●●●●**	Altivar Process Modular drives	Yes
Drive	**ATV6L0●●●●●** **ATV9L0●●●●●**	Altivar Process liquid cooled drives	Yes
Other	**VW3A1111**	Graphic display terminal	Yes
Other	**VW3A1112**	Door mounting kit	Yes
I/O	**VW3A3203**	Extended I/O module - 6 digital inputs/ 2 digital outputs/2 analog inputs	Yes
I/O	**VW3A3204**	Extended relay module - 3 relay outputs	Yes
Encoder	**VW3A3420**	Digital encoder interface module	Yes
Encoder	**VW3A3422**	Analog encoder interface module for Altivar 340 and Altivar 9xx variable speed drives	Yes
Encoder	**VW3A3423**	Resolver interface module for Altivar 340 and Altivar 9xx variable speed drives	Yes
Encoder	**VW3A3424**	HTL encoder interface module	Yes

Industrial automation systems
EcoStruxure Automation Expert
Modicon M580 dPAC

BMED581020

Modicon M580 dPAC

Local I/O capacity	Communication ports	Service ports	Reference	Weight kg/*lb*
Up to 1024 discrete I/O Up to 256 analog I/O 64 MB integrated memory	2	1	BMED581020 BMED581020C	0.848/ *1.872*

Standards and certifications

The Modicon M580 automation platform has been developed to comply with the principal national and international standards concerning electronic equipment for industrial automation systems.

- Requirements specific to programmable controllers: functional characteristics, immunity, resistance, etc.: IEC/EN 61131-2 and IEC/EN/UL/CSA 61010-2-201
- Requirements specific to power utility automation systems: IEC/EN 61000-6-5, IEC/EN 61850-3 (with installation restrictions)
- Requirements specific to railway applications: EN 50155/IEC 60571 (with installation restrictions)
- Ex areas:
  - For USA and Canada: Hazardous location class I, division 2, groups A, B, C, and D
  - For other countries: CE ATEX (2014/34/EU) or IECEx in defined atmosphere Zone 2 (gas) and/or Zone 22 (dust)
- Merchant navy requirements of the major international organizations: unified in IACS (International Association of Classification Societies)
- Compliance with European Directives for CE marking:
  - Low voltage: 2014/35/EU
  - Electromagnetic compatibility: 2014/30/EU
  - Machinery: 2006/42/EC

Up-to-date information on which certifications have been obtained is available on our website.

M580 PACs are considered as open equipment and are designed for use in industrial environments, in pollution degree 2, overvoltage category II (IEC 60664-1), and in low-voltage installations, where the main power branch is protected on both wires by devices such as fuses or circuit breakers limiting the current to 15 A for North America and 16 A for the rest of the world.

Characteristics

Service conditions and recommendations relating to the environment

			Modicon M580 automation platform	Modicon M580 harsh I/O platform
Temperature	Operation	**°C/*°F***	0...+ 60/*32...140*	-25...+70/*-13...+158*
	Storage	**°C/*°F***	-40...+85/*-40...+185*	-40...+85/*-40...+185*
Relative humidity (without condensation)	Cyclical humidity	**%**	+5 ... +95 up to 55 °C/*131 °F*	+5 ... +95 up to 55 °C/*131 °F*
	Continuous humidity	**%**	+5 ... +93 up to 55 °C/*131 °F*	+5 ... +93 up to 60 °C/*140 °F*
Altitude	Operation	**m/*ft***	0…2,000/*0...6,562* (full specification: temperature and isolation) 2,000...5,000/*6,562...16,404* (temperature derating: approx. 1 °C/400 m (*33.8 °F/1,312 ft*), isolation 150 V/1,000 m*(3,281 ft)* For accurate temperature derating calculation, refer to IEC 61131-2 Ed 4.0 Annex A	

			Modicon X80 I/O power supply modules				
			BMXCPS2010	**BMXCPS3020** **BMXCPS3020H**	**BMXCPS3540T**	**BMXCPS2000**	**BMXCPS3500** **BMXCPS3500H** **BMXCPS4002** **BMXCPS4002S** **BMXCPS4002H**
Supply voltage	Nominal voltage	**V**	24 ⎓	24...48 ⎓	125 ⎓	100...240 ∿	100...240 ∿
	Limit voltages	**V**	18...31.2 ⎓	18...62.4 ⎓	100…150 ⎓	85...264 ∿	85...264 ∿
	Nominal frequencies	**Hz**	–	–	–	50/60	50/60
	Limit frequencies	**Hz**	–	–	–	47/63	47/63

Protective treatment of the Modicon M580 automation platform

The Modicon M580 platform meets the requirements of “TC” treatment (treatment for all climates).

For installations in industrial production workshops or environments corresponding to “TH” treatment (treatment for hot and humid environments), Modicon M580 must be embedded in enclosures with minimum IP54 protection.

The Modicon M580 platform offers **protection to IP20 level** and **protection against access to terminals** (enclosed equipment) *(1)*. They can therefore be installed without an enclosure in reserved-access areas that do not exceed **pollution level 2** (control room with no dust-producing machine or activity). Pollution level 2 does not take account of more severe environmental conditions: air pollution by dust, smoke, corrosive or radioactive particles, vapors or salts, molds, insects, etc.

(1) In cases where a slot is not occupied by a module, a **BMXXEM010** *protective cover must be installed.*

(CE)*: Tests required by European directives* (CE) *and based on IEC/EN 61131-2 standards.*

Environment tests

Name of test	Standards	Levels
Immunity to LF interference (CE) *(1)*		
Voltage and frequency variations	**IEC/EN 61131-2; IEC/EN 61000-6-2; IEC 61000-4-11**	0.85...1.10 Un - 0.94...1.04 Fn; 4 steps t = 30 min
	IACS E10; IEC 61000-4-11	0.80 Un...0.90 Fn; 1.20 Un...1.10 Fn; t = 1.5 s/5 s
Direct voltage variations	**IEC/EN 61131-2; IEC 61000-4-29; IACS E10** (PLC not connected to charging battery)	0.85...1.2 Un + ripple: 5% peak; 2 steps t = 30 min
Third harmonic	**IEC/EN 61131-2**	H3 (10% Un), 0°/180°; 2 steps t = 5 min
Voltage interruptions	**IEC/EN 61131-2; IEC/EN 61000-6-2; IEC 61000-4-11; IEC 61000-4-29; IACS E10**	Power supply immunity: ■ 10 ms for ∿ and ⎓ PS2 (20 ms DS criteria) ■ Check operating mode for longer interruptions up to 5 s, 85% Un ■ For IACS, 3 times 30 s in 5 min, 85% Un
	IEC/EN 61131-2; IEC/EN 61000-6-2; IEC 61000-4-11	For ∿ PS2: ■ 20% Un, t0: ½ period ■ 40% Un, cycle 10/12 ■ 70% Un, cycle 25/30 ■ 0% Un, cycle 250/300
Voltage shut-down and start-up	**IEC/EN 61131-2**	■ Un…0…Un; t = Un/60 s ■ Umin…0…Umin; t = Umin/5 s ■ Umin…0.9 Udl…Umin; t = Umin/60 s
Magnetic field	**IEC/EN 61131-2; IEC 61000-4-8** (for MV power stations**: IEC 61000-6-5; IEC 61850-3**)	Power frequency: 50/60 Hz, 100 A/m continuous ...1000 A/m; t = 3 s; 3 axes
	IEC 61000-4-10	Oscillatory: 100 kHz...1 MHz, 100 A/m; t = 9 s; 3 axes
Conducted common mode disturbances range 0 Hz …150 kHz	**IEC 61000-4-16** (for MV power stations: **IEC 61000-6-5; IEC 61850-3**)	For remote systems: ■ 50/60 Hz and ⎓, 300 V, t = 1s ■ 50/60 Hz and ⎓, 30 V, t = 1 min ■ 5 Hz…150 kHz, sweep 3 V…30 ■ For ∿: 10 V ■ For ⎓: 10 V cont. or 100 V, t = 1 s

Where:
- PS1 applies to PLC supplied by battery, PS2 applies to PLC energized from ∿ or ⎓ supplies
- Un: nominal voltage; Fn: nominal frequency; Udl: detection level with power on

(1) Devices must be installed, wired, and maintained in accordance with the instructions provided in the manual "Grounding and Electromagnetic Compatibility of PLC Systems".

(2) These tests are performed without an enclosure, with devices fixed on a metal grid and wired as per the recommendations in the manual "Grounding and Electromagnetic Compatibility of PLC systems".

(CE): *Tests required by European directives* (CE) *and based on IEC/EN 61131-2 standards.*

TM251MDESE

Modicon M251 dPAC

Local I/O capacity	Device ports	Service ports	Reference	Weight kg/*lb*
No embedded I/O, supporting Modicon TM3 I/O expansion modules	2	1	TM251MDESE	0.848/ *1.872*

Standards and certifications

■ Standards
□ IEC/EN 61131-2 (Edition 2 2007)
□ UL508 (UL61010-2-201)
□ ANSI/ISA 12.12.01-2007
□ CSA C22.2 No. 213, No. 142
□ E61131-2 and IACS E10

■ Certifications
□ CE
□ cULus Listing Mark
□ C-Tick
□ Achilles
□ UKCA

Environmental characteristics

□ Ambient operating temperature: -10…+55 °C *(+14…+131 °F)*
□ Storage temperature: -40…+70 °C *(-40…+158 °F)*
□ Relative humidity: 5…95% (non-condensing)

Operating altitude:
□ 0…2,000 m *(0…6,562 ft)*: complete specification for temperature and exposure
□ 2,000…4,000 m *(6,562…13,123 ft)*:
- Temperature derating: =1 °C/400 m *(+1.8 °F/1,312 ft)*
- Insulation losses: 150 Vc/1,000 m *(150 Vc/3,280 ft)*

□ Storage altitude: 0…3,000 m *(0…9,842 ft)*
□ Immunity to mechanical stress:
- For 1131: 5…8.4 Hz (amplitude 3.5 mm/*0.138 in.*); 8.4…150 Hz (acceleration 1 g)
- For Merchant Navy: 5…13.2 Hz (amplitude 1.0 mm/*0.039 in.*); 13.2…100 Hz (acceleration 0.7g)

Supply charecteristics

□ 24 V ⎓ power supply
□ Voltage limit (including ripple): 19.2...28.8 V ⎓
□ Immunity to micro-cuts (class PS-2): 10 ms
□ Max. consumption: 45 W

VW3A3530D

Altivar ATV dPAC

ATV dPAC module

Local I/O capacity	Device ports	Service ports	Reference	Weight kg/*lb*
I/O available from respective drive configuration	2	–	VW3A3530D	0.020/ *0.044*

VW3A1111

Graphic display terminal

Description	Reference	Weight kg/*lb*
To be used with ATV340 (ATV600 and ATV900 are equipped with the graphic display terminal as standard) Resolution 240 x 160 pixels Protection IP65	VW3A1111	0.020/ *0.044*

VW3A1112

Remote mounting kit

Description	Reference	Weight kg/*lb*
Remote mounting kit For remote mounting of graphic display terminal, suitable for ATV340, ATV600, and ATV900 families Protection IP65	VW3A1112	0.020/ *0.044*

Remote mounting cordset

Description	Length (m/*ft*)	Reference	Weight kg/*lb*
Remote mounting cordset Equipped with 2 RJ45 connectors for connection of the graphic display terminal to the drive	1/ *3.28*	VW3A1104R10	*0.050/ 0.110*
	3/ *9.84*	VW3A1104R30	*0.150/ 0.331*
	5/ *16.4*	VW3A1104R50	*0.250/ 0.551*
	10/ *32.8*	VW3A1104R100	*0.500/ 1.102*

VW3A1104R10

Altivar ATV dPAC (continued)

Environmental characteristics

Altivar Process and Altivar Machine drives are designed to operate in a variety of environments, including harsh environments. The conditions stated below are general data and must be verified with the respective ATV600, ATV900, and ATV340 manuals for the specific drive type used.

- ◻ Ambient operating temperature: -15...+50 °C/+ *5...122 °F* as standard, up to 60 °C/*140 °F* with derating
- ◻ Relative humidity without condensing: 5...95%
- ◻ Storage and transport temperature: -40…+70 °C/*-40…+158 °F*
- ◻ Operating altitude:
  - 0…1,000 m/*0…3,281 ft* without derating
  - 1,000...4,800 m/*3,281…15,700 ft* with derating of 1% per 100 m/*328 ft* (1)
- ◻ Withstand to harsh environments:
  - Chemical class 3C3 conforming to IEC/EN 60721-3-3
  - Mechanical class 3S3 conforming to IEC/EN 60721-3-3
  - Printed circuit boards with protective coating
- ◻ Protection of drives: IP20 up to IP55

Electromagnetic compatibility (EMC)

Compliance with electromagnetic compatibility requirements has been incorporated into the design of Altivar Process and Altivar Machine drives. They are CE marked according to the European EMC directive (2014/30/EU).

Depending on the specific drive type used for ATV dPAC integration, the EMC compliance values must be checked in the corresponding ATV340/600/900 manual

Standards and certifications

Depending on the specific drive type used for ATV dPAC integration, the standards and certifications must be checked in the corresponding ATV340/600/900 manual.

■ Standards
- ◻ EN/IEC 61800-3
- ◻ EN/IEC 61800-5-1
- ◻ IEC 61000-3-12
- ◻ IEC 60721-3
- ◻ IEC 61508
- ◻ SEMI F47-0706
- ◻ UL508C and UL61800-5-1
- ◻ RoHS-2 according to EU directive 2002/95/EC
- ◻ REACH according to EU regulation 1907/2006

■ Certifications
- ◻ CE
- ◻ UL
- ◻ CSA
- ◻ RCM
- ◻ EAC
- ◻ ATEX
- ◻ DNV-GL

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