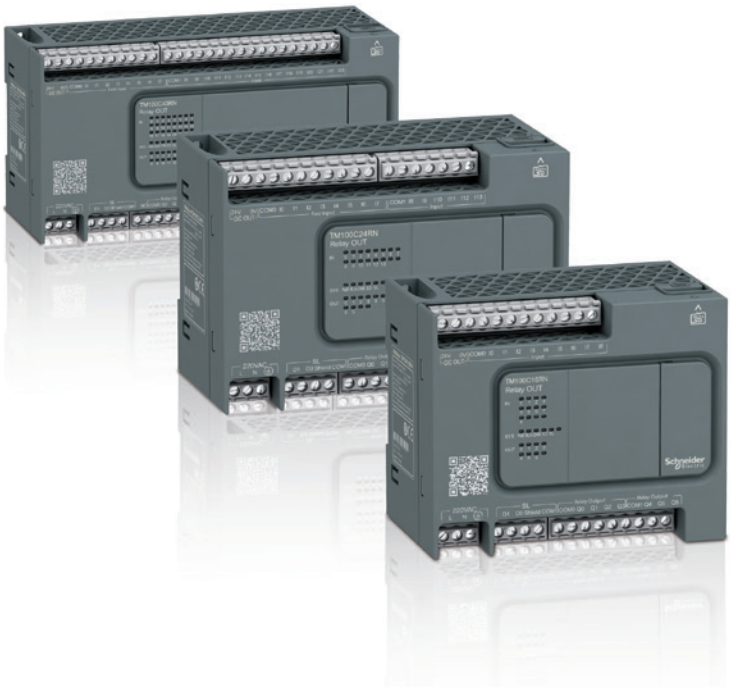
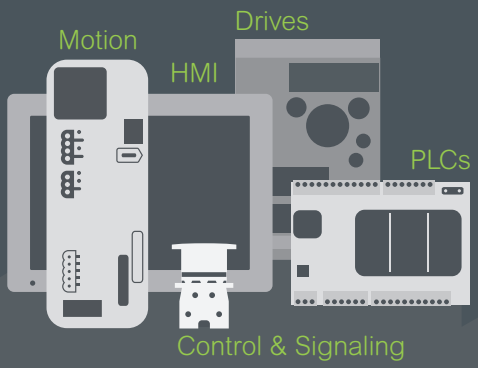
Catalog | November 2019



Introducing the Easy Series

Essential automation & control products

When just enough is just right!



Easy Modicon M100

Logic controllers
For simple machines up to 40 I/O

schneider-electric.com

Life Is On Schneider Electric

Content

Easy Modicon™ M100 Logic controllers

Easy Modicon M100
Logic controllers
Introduction, A user-oriented range of products, Applications

Compatibility of offers

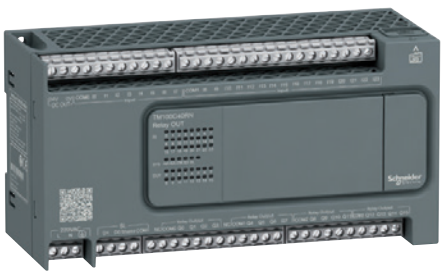
Easy Modicon M100 logic controllers

> EcoStruxure™ Machine Expert – Basic software

16 I/O channels
110 x 70 x 90 mm (W x H x D)
(4.33 x 2.76 x 3.55 in.)

24 I/O channels
130 x 70 x 90 mm (W x H x D)
(5.12 x 2.76 x 3.55 in.)

32 I/O channels
175 x 70 x 90 mm (W x H x D)
(6.89 x 2.76 x 3.55)



40 I/O channels
175 x 70 x 90 mm (W x H x D)
(6.89 x 2.76 x 3.55)

Introduction

The new range of Easy Modicon™ M100 logic controllers comprises 4 logic controllers for 110...220 V AC power supply:

- One model with 16 I/O
- One model with 24 I/O
- One model with 32 I/O
- One model with 40 I/O

A user-oriented range of products

The Easy Modicon M100 range of logic controllers has been designed to meet customer requirements, specifically on the 4 following key-points:

Fit for purpose

- Dedicated to sequential control and communication

Easy throughout the life cycle

- Easy to order thanks to the just enough number of references
- Easy to mount and wire
- Easy to set up and program thanks to EcoStruxure Machine Expert – Basic software
- Easy to test and debug thanks to the standard USB port
- Easy to duplicate without specific skills using the Micro SD memory card
- Easy to maintain and update with USB powerless download, and Micro SD memory card

Robustness

- Inputs designed to help protect against overvoltage
- Coated electronics for enhanced robustness in polluted environments

Widely available

- Fast delivery through a large distribution network
- Fast access to information and support through Partner Relationship Management tool and dedicated network of engineers

Applications

Designed for simple machines, the particularly small dimensions of Easy Modicon M100 logic controllers are ideal to fit wall-mounted and floor-standing control system enclosures.

- The functions embedded in M100 controllers minimize the cost of the machine:
  - Modbus serial link
  - USB port dedicated to programming
- EcoStruxure Machine Expert – Basic programming software is intuitive, making it quick to create applications.

Easy Modicon M100
Logic controllers
Control architecture for standalone machines

Control architecture for standalone machines

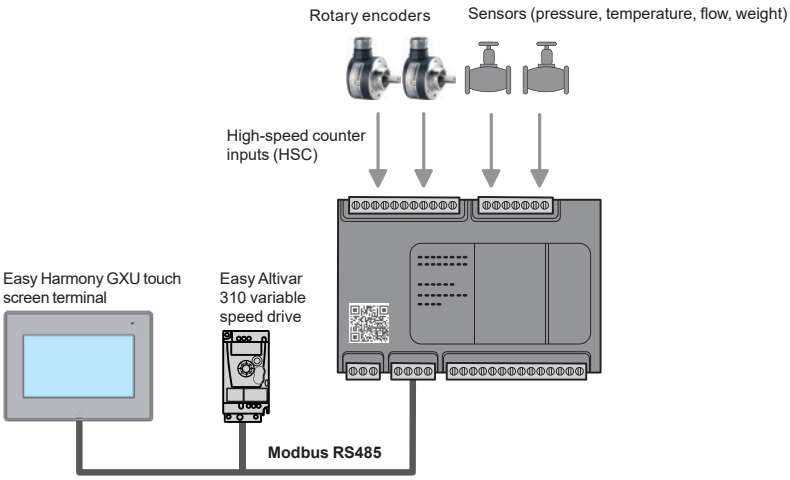
Typical applications: repetitive machines

The Easy Modicon M100 range has been designed for use in small automation systems and machines, with few actuators and sensors.

Easy Modicon™ M100 logic controllers are ideal for use in the following sectors and for the following repetitive machines:

- Packaging
  - Compactor
  - Baling presses
  - etc.
- Material handling
  - Small conveyors
  - Palletizers
  - Goods elevating platform
  - etc.
- Metal working
  - Small punching machines
- Water
  - Small pumping equipment
- Building
  - Automatic door
  - Automatic awning
  - Roller blind and shutters
  - Car park occupancy management
  - Lighting control
  - Greenhouse air circulator control
  - etc.

Control architecture with Easy Modicon M100 logic controller



Easy Modicon M100
Logic controllers
Main features

Main features *(1)*

Processing power

- Execution speed: 0.2 µs/Boolean instruction
- Program: 6 K list instructions
- Number of words: 4,000%MW
- Number of internal bits: 512%M
- Retain memory: 2,000 words (%MW0 to %MW1999)
- Application structure:
  - Master task: 1 task configurable as freewheeling or cyclic
  - Auxiliary task: 1 task configurable as timer cycle interrupt
  - Interrupt task: 4 external tasks tripped by fast inputs and 4 high-speed counters

Supply characteristics

- Power supply: 100...220 V ∿
- Voltage limit (ripple included): 85...264 V ∿
- Max. consumption: 33...45 VA (AC power supply)

Connection of the embedded I/O

On fixed screw terminal blocks at intervals of 5.08 mm/*0.200 in.*
24 V DC sensor power output provided by the controller: 400 mA.

Programming

Easy Modicon M100 controllers are programmed with EcoStruxure Machine Expert – Basic software.
EcoStruxure Machine Expert – Basic is an integral component of EcoStruxure Machine Expert software and is available as a free download from our global website www.schneider-electric.com *(2)*.

EcoStruxure Machine Expert – Basic software

Environmental characteristics

- Degree of protection: IP 20

Product certification and conformity to standards

- CE certification
- Conformity to the main national and international standards concerning electronic industrial control devices (IEC/EN 61131-2, UL 508, and IEC/EN 61010-2-201)

(1) For more information on our range of products, please visit our website https://www.https://www.schneider-electric.cn/

(2) EcoStruxure Machine Expert – Basic for Easy Modicon M100 logic controller could be activated with the special code "ulck8loca" in the software settings.

Easy Modicon M100
Logic controllers
Embedded communication

Embedded communication

- M100 logic controllers have 2 types of integrated communication port:
  - RS485 embedded serial link
  - Mini USB programming port

Serial links

Each TM100C●●●● logic controller has an embedded RS 485 serial link.

This serial link also provides the functionality for loading, updating, and development when the controller is powered.

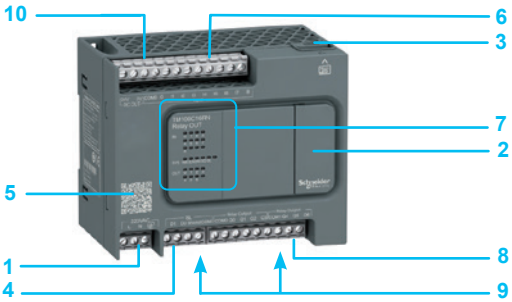
- The two main protocols used in the market are embedded in this link:
  - Modbus ASCII/RTU Master or Slave
  - Character string (ASCII)

Software programming with power off charging function

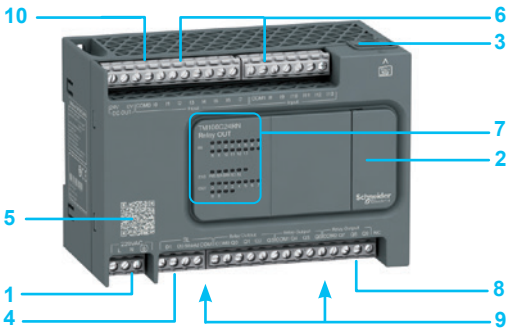
The programming port, equipped with a USB mini-B connector, is embedded in each M100 controller; it is used to communicate with a PC equipped with EcoStruxure Machine Expert – Basic for programming, debugging, and maintenance.

In addition, it offers the ability to upload an application program or update the firmware without the controller being powered by another source.

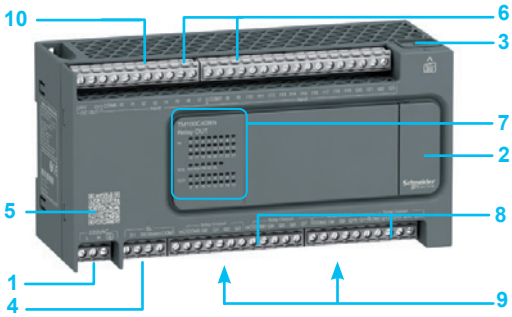
Easy Modicon M100
Logic controllers



M100: 16 I/O



M100: 24 I/O



M100: 32 I/O and 40 I/O

Description

M100 logic controllers (TM100C●●●●)

1 Fixed screw terminal block, 3 terminals for connecting the 110...220 V ∿ power supply

2 Behind the removable cover:
- USB mini-B connector for connecting a PC equipped with EcoStruxure Machine Expert-Basic software
- Run/Stop switch

3 Slot for the Micro SD memory card

4 Serial link (RS 485): connector on fixed screw terminal block

5 Controller technical documentation QR code

6 Connection of 24 V ⎓ digital inputs on fixed screw terminal blocks *(1)*

7 LED display block showing:
- the status of the controller and its components (Micro SD memory card)
- serial link status
- I/O status

8 Connection of relay digital outputs: on fixed screw terminal blocks *(2)*

9 Clip for locking on 35 mm/*1.38 in*. DIN rail

10 Sensor power supply 24 V ⎓ output

(1) Number of digital inputs according to model: see next page.
(2) Number of digital outputs according to model: see next page.

Easy Modicon M100
Logic controllers

Easy Modicon M100 logic controllers *(1)*

Number of digital I/O	Digital inputs	Digital outputs	Embedded communication ports *(2)*	Reference	Weight kg *lb*
			Serial link		
110...220 V ∿ power supply					
16 I/O	9 sink/source 24 V ⎓ inputs, including 3 regular inputs, 2 high-speed inputs for HSC and 4 fast inputs for FC	7 relay outputs	1	**TM100C16RN**	0.295 *0.650*
24 I/O	14 sink/source 24 V ⎓ inputs, including 8 regular inputs, 2 high-speed inputs for HSC and 4 fast inputs for FC	10 relay outputs	1	**TM100C24RN**	0.331 *0.730*
32 I/O	20 sink/source 24 V ⎓ inputs, including 14 regular inputs, 2 high-speed inputs for HSC and 4 fast inputs for FC	12 relay outputs	1	**TM100C32RN**	0.409 *0.902*
40 I/O	24 sink/source 24 V ⎓ inputs, including 18 regular inputs, 2 high-speed inputs for HSC and 4 fast inputs for FC	16 relay outputs	1	**TM100C40RN**	0.409 *0.902*

PF142059

TM100C16RN

PF142060

TM100C24RN

PF142061

TM100C32RN

PF142062

TM100C40RN

Programming software

Designation	For use with	Reference
EcoStruxure Machine Expert – Basic	Easy Modicon M100 logic controllers. PC should be equipped with Windows 10 or Windows 7 or 8 (32-bit or 64-bit)	*Download this software on Schneider Electric Global website*

EcoStruxure Machine Expert – Basic software

(1) Easy Modicon M100 controllers are supplied with:
- *fixed screw terminal blocks for connecting the I/O*
- *a fixed screw terminal block for connecting the power supply*
- *a fixed screw terminal block for the serial link*

(2) Each Easy Modicon M100 logic controller has an embedded USB mini-B programming port.

Life Is On | Schneider Electric

Learn more about our products at
www.schneider-electric.com

Design: Schneider Electric
Photos: Schneider Electric

Schneider Electric Industries SAS
Head Office
35, rue Joseph Monier - CS 30323
F-92500 Rueil-Malmaison Cedex
France

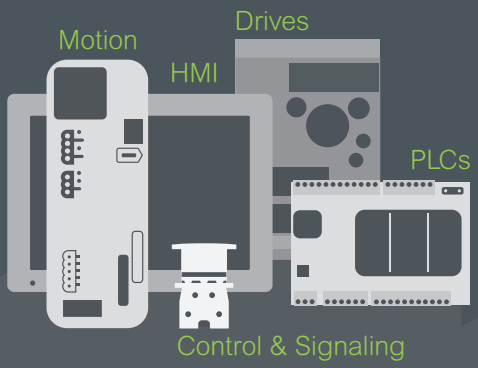
DIA3ED2140907EN
November 2019 - V3.1

Catalog | December 2021

Introducing the Easy Series

Essential automation & control products

When just enough is just right!



Easy Modicon M200

Logic controllers 2-axis motion control, for simple machines up to 196 I/O

www.se.com

Life Is On Schneider Electric

Contents

Easy Modicon™ M200
Logic controllers 2-axis motion control, for simple machines up to 196 I/O

Easy Modicon M200

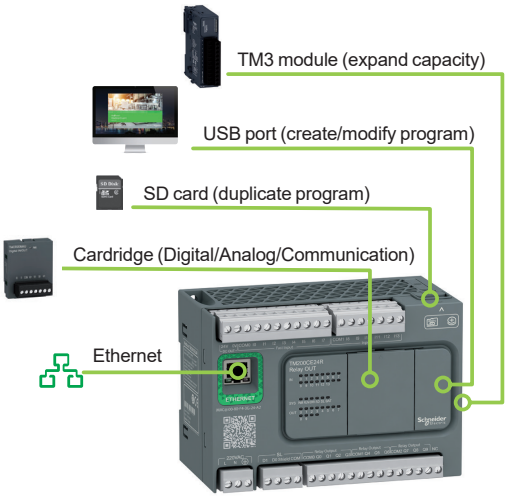
Logic controllers 2-axis motion control, for simple machines up to 196 I/O

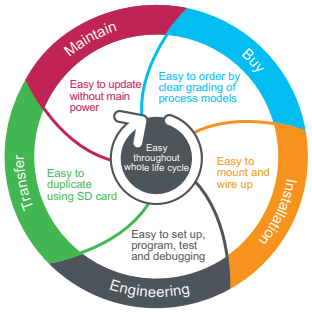
A user-oriented range of products

Compatibility of offers

Easy Modicon M200 logic controllers

- Modicon TM3 expansion modules
- TMCR2 cartridge
- EcoStruxure Machine Expert – Basic software





Example: QR coder for TM200C16T

In the modern industry world, being agile, adaptive and fast responding to the market needs are core values persuited by small and medium machine manufactures. Easy™ Series is the answer to your eager voice.

A user-oriented range of products

The Easy Modicon M200 range of logic controllers has been designed to meet various customer requirements, specifically on the 3 following key points:

Fit for purpose

Designed for simple machines, the particularly small dimensions of Easy Modicon M200 logic controllers are ideal for fitting in wall-mounted and floor-standing control system enclosures .

- Easy Modicon M200 controllers have an embedded Ethernet port (for models with TM200CE●●● references) meaning they can easily be integrated into control system architectures, for remote control and maintenance of machines by means of applications for tablets and PCs .
- The Easy Modicon M200 (TM200C●●●● references) offer provides excellent connection capacity and customization options using I/O or communication cartridges without increasing the controller size or additional wiring .
- Modicon TM3 expansion module offer enhance the digital and analog I/O capacity of Easy Modicon M200 logic controller to a larger scale, thus make possible of more application scenarios .
- The functions embedded in Easy Modicon M200 controllers minimize the cost of the machine: Modbus serial link, USB port dedicated to programming, and simple position control functions (high-speed counters and pulse train outputs with trapezoidal profile and S curve).
- EcoStruxure Machine Expert – Basic programming software is intuitive, making it quick to create applications.

Easy throughout the whole life cycle

- Easy to order thanks to the “just enough” number of references
- Easy to mount and wire up
- Easy to set up and program thanks to EcoStruxure Machine Expert – Basic software
- Easy to test and debug thanks to the standard USB port and removable terminal blocks
- Easy to duplicate without special skills using the Micro SD memory card
- Easy to maintain and update with its removable terminal block, USB downloading without mains power, and Micro SD memory card
- Easy to access information by scanning the QRcode carved on the front of the controller, linked to the real-time web datebase of the dedicated product model, with characteristics, dignostics, maintenance, connections, etc .

Robustness

- Inputs designed to help protect against overvoltage
- Transistor outputs monitored to help protect against short-circuits
- DC power supply monitored to help protect against reverse polarity
- Coated electronics for enhanced robustness in polluted environments

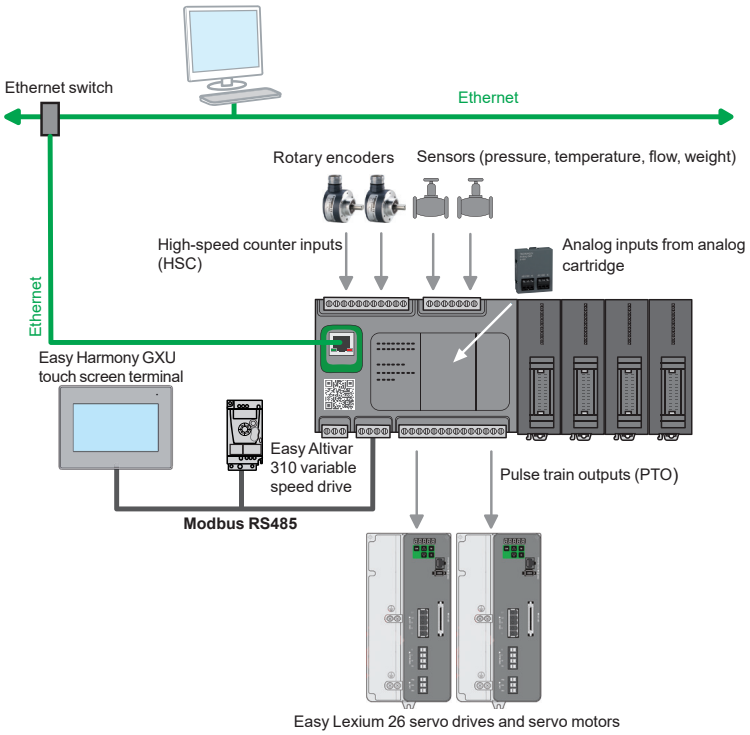
Easy Modicon M200

Logic controllers 2-axis motion control, for simple machines up to 196 I/O

Applications

Applications

The right level of flexibility to suit your scalable needs without frills: the range embeds the characteristics that a user might expect of a small PLC; attributes chosen dedicatedly are neat and enough to cover simple machine .



Typical application architecture employing Easy series solution

Typical applications: repetitive machines

The Easy Modicon M200 logic controller has been designed to be used in the following sectors and for the following repetitive machines:

Textiles

- Spining machine
- Drawing frame
- Carding machine

Machine tools

- Grinding machine
- Punching machine
- Draw bench

Packaging

- Vertical or horizontal form fill seal machines (VFFS or HFFS)
- Labeling machine

HVAC

- Exchange station
- Air cooling system
- Water-cooling screw machine

Pumping

- Pumping station
- Pressure filter machine

Lift

- Elevator
- Stereo-garage
- Escalator
- Construction lift

Easy Modicon M200

Logic controllers 2-axis motion control, for simple machines up to 196 I/O

Software

Easy Modicon M200: A user-oriented range of products

EcoStruxure Machine Expert – Basic simplifies every step in the design and commissioning of your machines

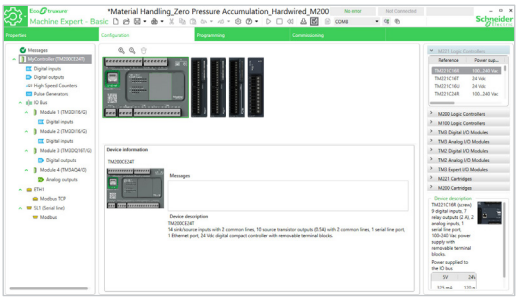
Intuitive machine programming with EcoStruxure Machine Expert – Basic

EcoStruxure Machine Expert® is the universal programming software for machines automated by MachineStruxure controllers. Simple navigation that requires only fewer clicks delivers a more efficient engineering process.

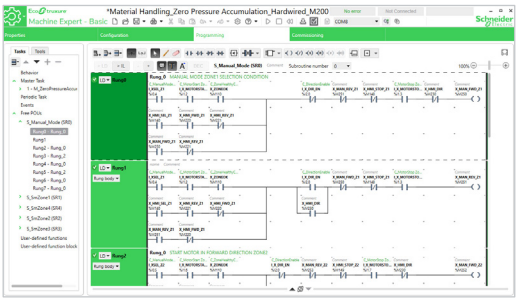
> In order to reduce complexity we offer EcoStruxure Machine Expert – Basic, a simplified engineering tool for the new controller Easy Modicon M200.

> All programming, visualization, and commissioning are handled in just one intuitive tool that is available as a free download.

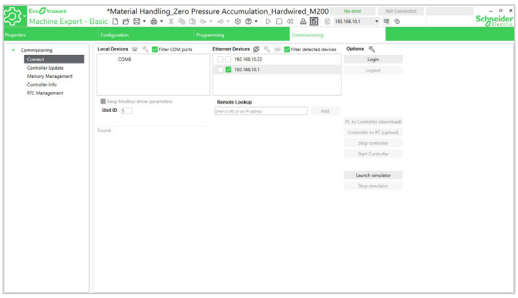
Configuration



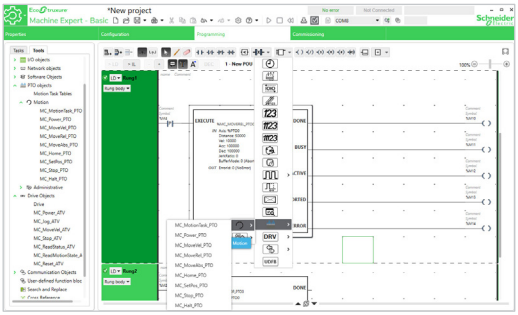
Programming



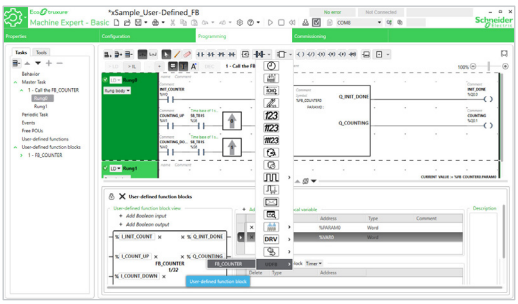
Commissioning



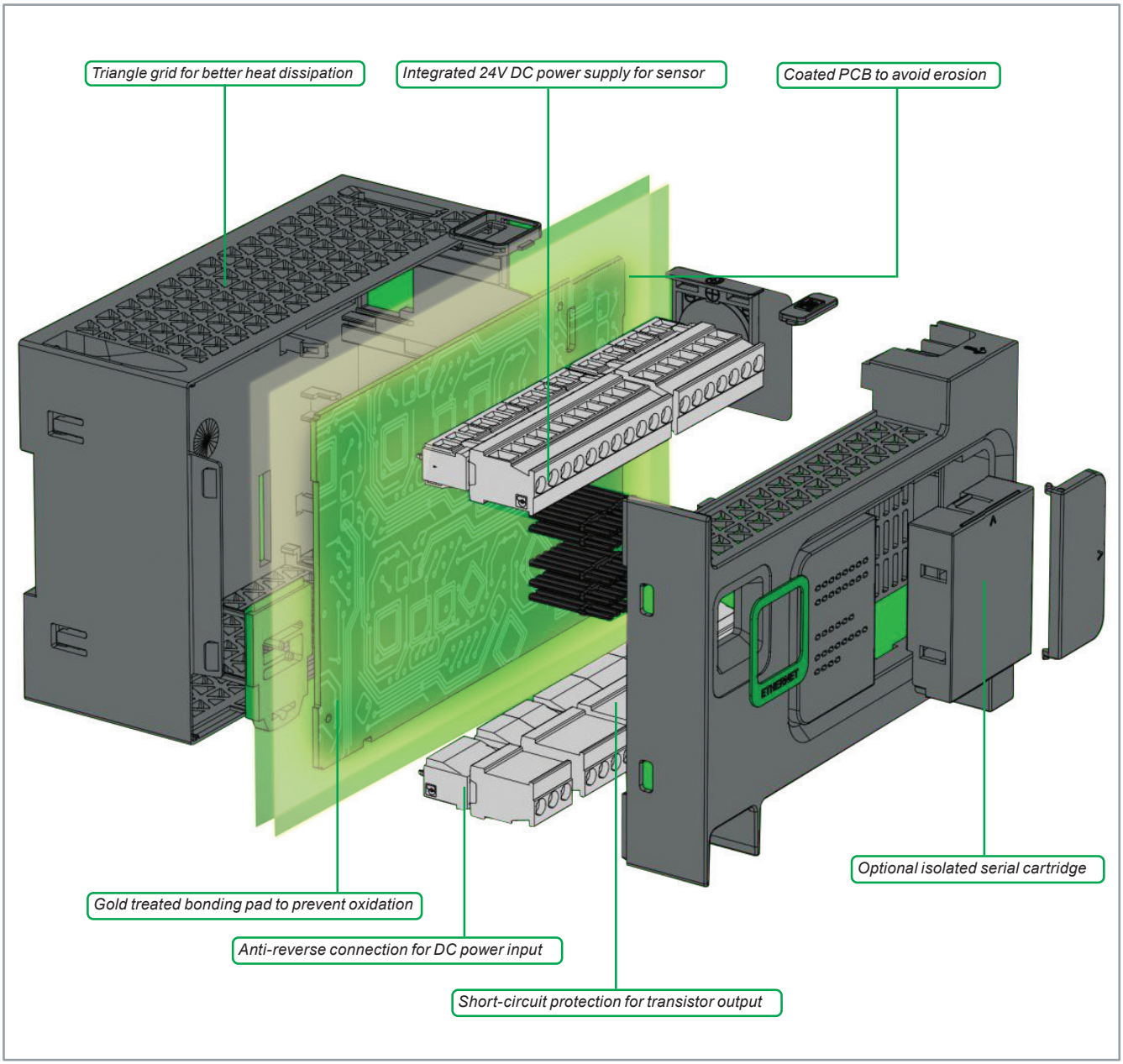
PTO Function Block



User Defined Function Block



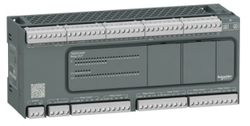
Quality guaranteed to face various challenges in harsh environment



Life Is On Schneider Electric

Easy Modicon M200

Logic controllers 2-axis motion control, for simple machines up to 196 I/O

Applications		**Control of simple machines**											
													
Supply voltage		100-240 V ∿	24 V ⎓	24 V ⎓	100-240 V ∿	24 V ⎓	24 V ⎓	100-240 V ∿	24 V ⎓	24 V ⎓	100-240 V ∿	24 V ⎓	24 V ⎓	100-240 V ∿
Inputs/outputs	■ Logic inputs/outputs	**16 logic I/O**			**24 logic I/O**			**32 logic I/O**			**40 logic I/O**			**60 logic I/O**
	□ No. and type of inputs	9 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs and 4 fast inputs for FC			14 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs and 4 fast inputs for FC			20 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs and 4 fast inputs for FC			24 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs and 4 fast inputs for FC			36 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs and 4 fast inputs for FC
	□ No. and type of outputs	7 relay outputs	7 source transistor outputs, including 2 fast outputs	7 sink transistor outputs, including 2 fast outputs	10 relay outputs	10 source transistor outputs, including 2 fast outputs	10 sink transistor outputs, including 2 fast outputs	12 relay outputs	12 source transistor outputs, including 2 fast outputs	12 sink transistor outputs, including 2 fast outputs	16 relay outputs	16 source transistor outputs, including 2 fast outputs	16 sink transistor outputs,including 2 fast outputs	24 relay outputs
	□ Connection of the logic I/O	On removable screw terminal block												
I/O extension	Max. number of I/O expansion modules that can be connected	4x Modicon TM3 expansion modules, along with limited number of outputs.												
	Maximum number of transistor outputs	130	137	137	130	140	140	132	144	144	132	148	148	132
	Maximum number of relay outputs	71	64	64	74	64	64	76	64	64	80	64	64	88
Embedded communication	Ethernet link	1 Ethernet port on TM200CE●●● controllers: □ Modbus/TCP communication (client & server), □ Server Modbus/TCP, □ DHCP Client dynamic configuration, □ Programming, Downloading, Monitoring, □ EtherNet/IP adapter												
	Serial link	1 serial link RS 485 with + 5 V supply												
Embedded functions	Process control	PID												
	Counting	4 high-speed counter inputs (HSC), 100 kHz frequency												
	Fast input	4 fast inputs for external or interrupt task												
	Position control	Position control (PTO), with trapezoidal profile and S curve able to control either: □ 2 axes in “pulse direction” (P/D) mode □ 1 axis in CW/CCW mode												
		PWM												
		PLS												
Format	4 controller sizes: (W x H x D)	110 x 70 x 90 mm *4.33 x 2.76 x 3.55 in.*			130 x 70 x 90 mm *5.12 x 2.76 x 3.55 in.*			175 x 70 x 90 mm *6.89 x 2.76 x 3.55 in.*			175 x 70 x 90 mm *6.89 x 2.76 x 3.55 in.*			225 x 70 x 90 mm *8.86 x 2.76 x 3.55 in.*
Options	■ Cartridges	□ 1 digital I/O expansion cartridge □ 5 analog I/O expansion cartridges □ 2 additional serial link communication cartridge *(1)*												
	Number of cartridge slots	1			1			2			2			2
Mounting		Mounting on ⊥ symmetrical rail or panel with specific mounting kit TMAM2												
Software programming		With EcoStruxure Machine Expert – Basic software (2)												
Logic controller type		**Easy Modicon M200**												
	Controllers without Ethernet port	**TM200C16R**	**TM200C16T**	**TM200C16U**	**TM200C24R**	**TM200C24T**	**TM200C24U**	**TM200C32R**	**TM200C32T**	**TM200C32U**	**TM200C40R**	**TM200C40T**	**TM200C40U**	**TM200C60R**
	Controllers with embedded Ethernet port	**–**	**–**	**–**	**TM200CE24R**	**TM200CE24T**	**TM200CE24U**	**TM200CE32R**	**–**	**–**	**TM200CE40R**	**TM200CE40T**	**TM200CE40U**	**–**
Pages		41076/6												

(1) Each controller can support 1 communication cartridge maximum.
(2) EcoStruxure Machine Expert – Basic for M100/M200 logic controller could be activated with the special code “ulck8loca” in the software settings. Download this software from global website.

Easy Modicon M200

Logic controllers 2-axis motion control, for simple machines up to 196 I/O

Main features, Embedded communication

Main features

Processing power

- Execution speed: 0.2 µs/Boolean instruction
- Program: 10 K list instructions
- Number of words: 8,000%MW
- Number of internal bits: 1024%M
- Retain memory: 3,000 words (%MW0 to %MW2999)
- Application structure:
  - master task: 1 task configurable as freewheeling or cyclic
  - auxiliary task: 1 task configurable as timer cycle interrupt
  - interrupt task: 4 external tasks tripped by fast inputs and 4 high-speed counters

Supply characteristics

- Two power supplies are available (depending on the model):
  24 V DC or 100 . 240 V AC
- Voltage limit (ripple included): 20.4...28.8 V DC/85...264 V AC (50/60Hz)
- Max. consumption:
  - 61-74 VA for AC power supply
  - 18 W for DC power supply

Connection of the embedded I/O

On removable screw terminal blocks at intervals of 5.08 mm /*0.2 in* ; 24 V DC sensor power output provided by the controller (TM200C●●R models only):

- 250 mA for 16 and 24 I/O
- 300 mA for 32, 40 and 60 I/O

Environmental characteristics

- Degree of protection: IP 20 with protective cover in place
- Ambient operating temperature:0...55 °C/*32...131 °F*
- Storage temperature: -25...70 °C/*-13...158 °F*
- Relative humidity: 5...95% (non-condensing)
- Operating altitude: 0...2,000 m/*0...6,560 ft*
- Storage altitude: 0...3,000 m/ *0...9,843 ft*
- Vibration resistance: IEC/EN 61131-2 panel mounting or mounted on a top hat section rail (DIN rail)

Product certification and conformity to standards

- CE certification
- Conformity to the main national and international standards concerning electronic industrial control devices (IEC/EN 61131-2, UL 508, and IEC/EN 61010-2-201)

Embedded communication

M200 logic controllers have 3 types of integrated communication port:

- Ethernet (depending on the model)
- RS 485 embedded serial link
- Mini-USB programming port

Communication on Ethernet network

TM200CE●●● controllers have an embedded RJ 45 Ethernet port (10/100 Mbps, MDI/MDIX) with Modbus TCP (8 servers/1 client) .
As well as the default address based on the MAC address, a controller IP address can be assigned via a DHCP server or via a BOOTP server .

- The Ethernet port also offers application uploading, updating, and debugging functions when the controller is supplied with power .
- The integrity of applications is maintained by cybersecurity functions .
- A firewall allows each communication protocol to be locked.

Serial links

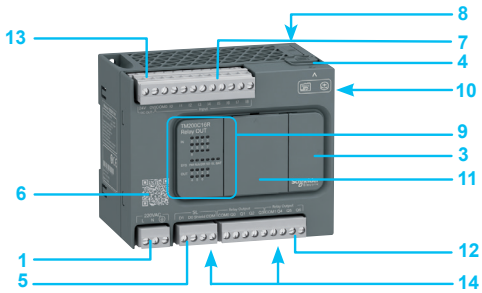
Each TM200C●●● controller has an embedded RS 485 serial link. This serial link also provides the functionality for loading, updating and development when the controller is powered up. The two main commercially-available protocols are embedded in this link:

- Modbus ASCII/RTU Master or Slave
- Character string (ASCII)

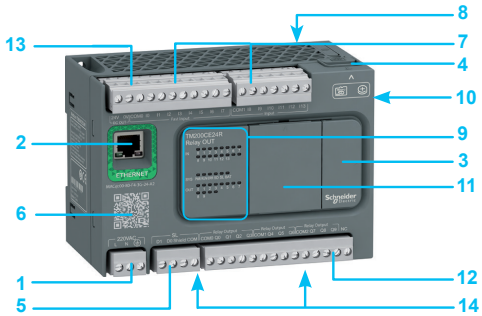
Easy Modicon M200

Logic controllers 2-axis motion control, for simple machines up to 196 I/O

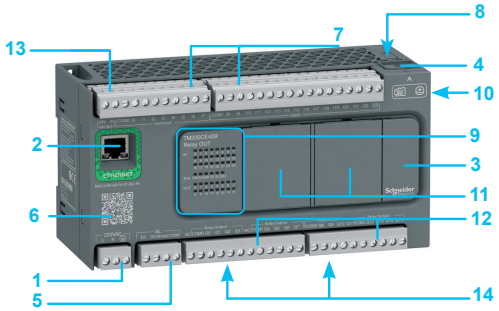
Description, Programming



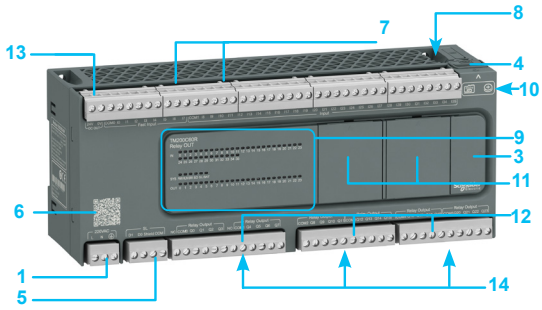
M200: 16 I/O



M200: 24 I/O and Ethernet port



M200: 32 I/O and Ethernet port
M200: 40 I/O and Ethernet port



M200: 60 I/O port

Consult catalog ref DIA3ED2181201EN

Description

M200 logic controllers (TM200C●●●)

1 Removable screw terminal block, 3 terminals for connecting the 24 V DC or the 100 . 240 V AC power supply (depending on the model)

2 On TM200CE●●● controllers: RJ45 connector for Ethernet network, with exchange rate and activity LED

3 Behind the removable cover:
- USB mini-B connector for connecting a PC equipped with the EcoStruxure Machine Expert – Basic software
- Run/Stop switch

4 Slot for Micro SD memory card

5 Serial link (RS 485): connector on removable screw terminal block

6 Controller technical documentation QR code

7 Connection of 24 V DC digital inputs on removable screw terminal blocks *(1)*

8 On top of the controller: slot for RTC battery

9 LED display block showing:
- the status of the controller and its components (battery, Micro SD memory card)
- serial link status
- I/O status

10 On the side of the controller: TM3 bus connector for the link with a Modicon TM3 expansion module

11 Slot(s) for I/O cartridge(s) or communication cartridge:
- one on M200 controllers with 16 and 24 I/O
- two on M200 controllers with 32, 40 and 60 I/O

12 Connection of relay or transistor (depending on the model) digital outputs: on removable screw terminal blocks *(2)*

13 Sensor power supply 24 V DC output (TM200CE●●R or TM200C●●R models only)

14 Clip for locking on 35 mm/*1.38 in* .DIN rail

Programming

Easy Modicon M200 controllers are programmed with EcoStruxure Machine Expert – Basic software *(3)* .

EcoStruxure Machine Expert – Basic software

EcoStruxure Machine Expert – Basic programming software is a neat tool designed to develop projects on Easy Modicon M200 and Easy Modicon M100 logic controllers. It offers a modern interface, and programming with power off charging function. So that getting started is user-friendly, fast and convienent:

- Simplified interface helps you find the information you need in two or three clicks maximum
- Enginerring process is efficient due to the functions available, including the FB (Function Block) and UDFB (User-Defined Function Block)
- Ability to upload an application program or the firmware without the controller being powered by another source

EcoStruxure Machine Expert – Basic software runs on the following configurations:

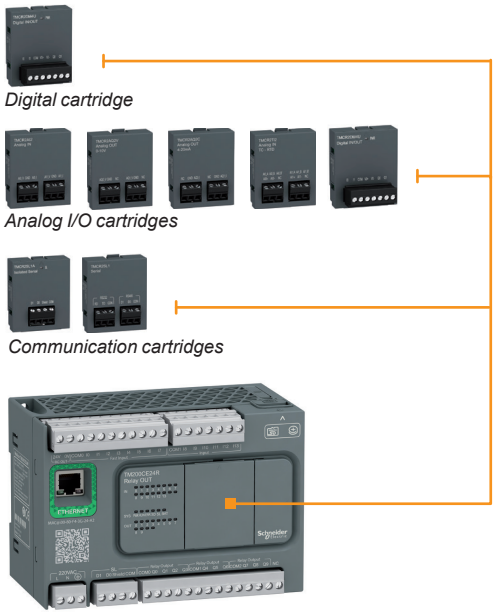
- Microsoft Windows® 7 Professional Edition 32-bit and 64-bit, Microsoft Windows® 8 Professional Edition 32-bit and 64-bit, Microsoft Windows® 8 .1 32-bit and 64-bit, Microsoft Windows® 10
- 1 GHz Premium processor, 1 GB hard disk, and 1 GB RAM minimum
- Recommended minimum screen resolution of 1280 x 800 pixels

(1) Number of digital inputs according to model: see next page.
(2) Number of digital outputs according to model: see next page.
(3) Available as a free download from our website and accessible with serial number "ulck8loca".

Easy Modicon M200

Logic controllers 2-axis motion control, for simple machines up to 196 I/O

Options, I/O expansion modules

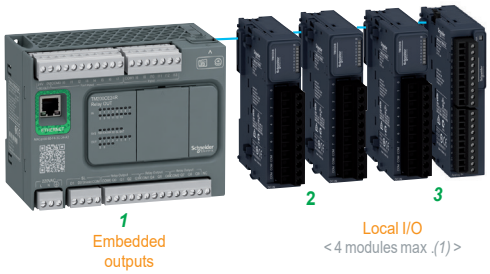


Digital cartridge

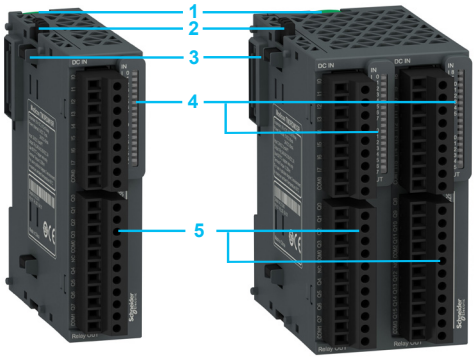
Analog I/O cartridges

Communication cartridges

Easy Modicon M200 logic controller



1 Easy Modicon M200 logic controller
2 Modicon TM3 digital I/O modules
3 Modicon TM3 analog I/O modules (1)



TM3RDM16R *TM3RDM32R*

Options for Easy Modicon M200 logic controllers

Cartridges

Depending on the controller size, one or two cartridges can be inserted on the front of Easy Modicon M200 controllers without increasing the dimensions:

- 1 cartridge for controllers with 16 and 24 I/O
- 2 cartridges for controllers with 32, 40 and 60 I/O

3 types of cartridges are offered:

- Digital I/O cartridges
  - **TMCR2DM4U** for 2 digital inputs and 2 transistor sink outputs
- Analog I/O cartridges
  - **TMCR2AI2** for 2 analog inputs that can be configured as voltage or current
  - **TMCR2TI2** for 2 temperature inputs
  - **TMCR2AQ2V** for 2 voltage analog outputs
  - **TMCR2AQ2C** for 2 current analog outputs
  - **TMCR2AM3** for 2 analog inputs and 1 analog output
- Communication cartridges
  - **TMCR2SL1** cartridge providing additional serial port terminals for connection of a printer, barcode reader, etc .
  - **TMCR2SL1A** cartridge providing additional isolated serial link
  - Each controller can support one TMCR2SL1 or TMCR2SL1A serial link maximum .

I/O expansion with Modicon TM3 expansion modules

Modicon TM3 expansion modules

The capacity of M200 logic controllers can be enhanced with the Modicon TM3 expansion module offer:

- Digital I/O modules can be used to create configurations with up to 196 digital I/O. These modules are available with the same connections as the controllers .
- Analog I/O modules can be used to create configurations with up to 32 analog I/O and are designed to receive, amongst other things, position, temperature, and speed sensor signals .They are also capable of controlling variable speed drives or any other device equipped with a current or voltage input .

For more information, please refer to Modicon TM3 catalog ref .DIA3ED2140109EN or consult Modicon TM3 offer on our global website .

Modicon TM3R digital I/O modules

Modicon TM3R digital I/O modules, consist of 2 types of mixed input/output modules, are specially designed and only applicable for Modicon M200 logic controller .

1 Clip for locking on ⊔ symmetrical rail .
2 Adjacent module locking catch.
3 TM3 bus connectors (one on each side to provide continuity of the link between connected modules .
4 LED display block for the module channels and diagnostics.
5 Input or output channel terminal blocks.

Number of logic I/O	inputs	Number and type of outputs	References
16 inputs/outputs	8 sink/source 24 V DC inputs	8 relay outputs, 2 A	**TM3RDM16R**
32 inputs/outputs	16 sink/source 24 V DC inputs	16 relay outputs, 2 A	**TM3RDM32R**

(1) Depending on type of Modicon TM3 module used, see page 14

Easy Modicon M200

Logic controllers 2-axis motion control, for simple machines up to 196 I/O

Ethernet Modbus/TCP network

Easy Modicon M200 logic controller

Presentation

Easy Modicon M200 controllers can easily be integrated in typical architectures:

- **machine to devices** (variable speed drives, remote I/O modules, operator dialog terminals) with the I/O Scanner function
- **machine to supervision** with the Modbus Client/Server function

Ethernet also brings transparency to the factory, in particular - thanks to the firewall functions - making it possible from any point on the network to:

- program or monitor a controller, or download an application
- access device parameters (variable speed drives for example)

The Modbus/TCP protocol

Modbus has been the industry communication standard since 1979 .
During the internet revolution, Modbus was combined with Ethernet Modbus/TCP to form Modbus/TCP, a completely open Ethernet protocol .The development of a connection to Modbus/TCP does not require any proprietary component, nor the purchase of a licence .
This protocol can easily be combined with any product supporting a standard Modbus/TCP communication stack.

Modbus/TCP, simple and open

- The Modbus application layer is simple and universally familiar with its 9 million installed connections .
- Thousands of manufacturers have already implemented this protocol .Many have already developed a Modbus/TCP connection and numerous products are currently available .
- The simplicity of Modbus/TCP enables any fieldbus device, such as an I/O module, to communicate on Ethernet without the need for a powerful microprocessor or a lot of internal memory .

Modbus/TCP, high performance

Thanks to the simplicity of its protocol and fast speed of 100 Mbps, the performance of Modbus/TCP is excellent. This type of network can therefore be used in realtime applications such as I/O digitization .

Modbus/TCP, a standard

- The application protocol is identical on Modbus serial link and Modbus/TCP: messages can be routed from one network to the other without converting the protocol .
- Since Modbus operates on the TCP higher layer, users benefit from IP routing, thus enabling devices located anywhere in the world to communicate without worrying about the distance between them .
-

Modbus and Modbus/TCP are recognized as a fieldbus by the international standard IEC/EN 61158 .They also comply with the Chinese national standard managed by ITEI .

Transparent Ready class and functions

	TM200CE●●● Logic controllers
Transparent Ready class	A10
Internet protocol version	IP V4
Ethernet services	
Programming, downloading, monitoring	
Client and server Modbus TCP	
Slave Modbus TCP	
Client DHCP dynamic configuration	

Function created

Easy Modicon M200

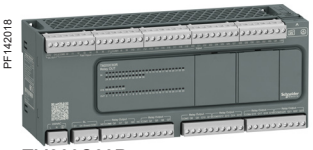
Logic controllers 2-axis motion control, for simple machines up to 196 I/O

TM200C16R

TM200CE24R

TM200CE32R

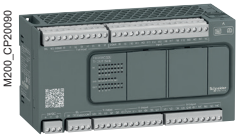
TM200C40R



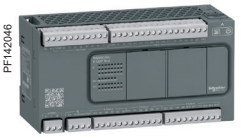
TM200C60R

TM200C16U

TM200C24U



TM200C32U



TM200C40U

TM200CE40T

Easy Modicon M200 logic controllers *(1)*

Number of digital I/O	W x H x D (mm/*in.*)	Digital inputs	Digital outputs	Embedded communication ports *(2)*		Reference	Weight kg *lb*
				Ethernet (RJ 45)	Serial link		
100...240 V AC power supply							
16 I/O	110 x 70 x 90/ *4.33 x 2.76 x 3.55*	9 sink/source 24 V ⎓ inputs inc .1 regular input, 4 high-speed inputs for HSC, 4 fast inputs for FC	7 relay outputs	–	1	**TM200C16R**	0 359 *0.791*
24 I/O	130 x 70 x 90/ *5.12 x 2.76 x 3.55*	14 sink/source 24 V DC inputs inc .6 regular inputs, 4 high-speed inputs for HSC, and 4 fast inputs for FC	10 relay outputs	–	1	**TM200C24R**	0 405 *0.893*
				1	1	**TM200CE24R**	0 413 *0.911*
32 I/O	175 x 70 x 90/ *6.89 x 2.76 x 3.55*	20 sink/source 24 V DC inputs inc .12 regular inputs, 4 high-speed inputs for HSC, 4 fast inputs for FC	12 relay outputs	–	1	**TM200C32R**	0 504 *1.111*
				1	1	**TM200CE32R**	0 512 *1.129*
40 I/O	175 x 70 x 90/ *6.89 x 2.76 x 3.55*	24 sink/source 24 V DC inputs inc .16 regular inputs, 4 high-speed inputs for HSC, 4 fast inputs for FC	16 relay outputs	–	1	**TM200C40R**	0 504 *1.111*
				1	1	**TM200CE40R**	0 512 *1.129*
60 I/O	225 x 70 x 90/ *8.86 x 2.76 x 3.55*	36 sink/source 24 V DC inputs inc .28 regular inputs, 4 high-speed inputs for HSC, 4 fast inputs for FC	24 relay outputs	–	1	**TM200C60R**	0 700 *1.543*
24 V DC power supply							
16 I/O	110 x 70 x 90/ *4.33 x 2.76 x 3.55*	9 sink/source 24 V DC inputs inc .1 regular input, 4 high-speed inputs for HSC, 4 fast inputs for FC	7 sink outputs inc. 5 regular transistor outputs, 2 fast outputs (PWM/PLS/PTO)	–	1	**TM200C16U**	0 339 *0.747*
			7 source outputs inc .5 regular transistor outputs, 2 fast outputs (PWM/PLS/PTO)	–	1	**TM200C16T**	0 365 *0.805*
24 I/O	130 x 70 x 90/ *5.12 x 2.76 x 3.55*	14 sink/source 24 V DC inputs inc .6 regular inputs, 4 high-speed inputs for HSC, 4 fast inputs for FC	10 sink outputs inc. 8 regular transistor outputs, 2 fast outputs (PWM/PLS/PTO)	–	1	**TM200C24U**	0 382 *0.842*
				1	1	**TM200CE24U**	0 391 *0.862*
			10 source outputs, inc . 8 regular transistor outputs, 2 fast outputs (PWM/PLS/PTO)	–	1	**TM200C24T**	0 416 *0.917*
				1	1	**TM200CE24T**	0 424 *0.935*
32 I/O	175 x 70 x 90/ *6.89 x 2.76 x 3.55*	20 sink/source 24 V DC inputs inc .4 high-speed inputs, 4 fast inputs for FC	12 sink transistor outputs inc .2 fast outputs (PWM/ PLS/PTO)	1	1	**TM200C32U**	0 468 *1.032*
			12 source transistor outputs, inc .2 fast outputs (PWM/PLS/PTO)	1	1	**TM200C32T**	0 522 *1.151*
40 I/O	175 x 70 x 90/ *6.89 x 2.76 x 3.55*	24 sink/source 24 V DC inputs, inc . 16 regular inputs, 4 high-speed inputs for HSC, 4 fast inputs for FC	16 sink outputs inc .14 regular transistor outputs, 2 fast outputs (PWM/PLS/PTO)	–	1	**TM200C40U**	0 468 *1.032*
				1	1	**TM200CE40U**	0 483 *1.065*
			16 source outputs, inc . 14 regular transistor outputs, 2 fast outputs (PWM/PLS/PTO)	–	1	**TM200C40T**	0 522 *1.151*
				1	1	**TM200CE40T**	0 523 *1.153*

(1) Easy Modicon M200 controllers are supplied with:
- *removable screw terminal blocks for connecting the I/O*
- *a removable screw terminal block for connecting the power supply*
- *a removable screw terminal block for the serial link*

(2) Each Easy Modicon M200 logic controller has an embedded USB mini-B programming port.

Easy Modicon M200

Logic controllers 2-axis motion control, for simple machines up to 196 I/O


PF142029
TMCR2DM4U


PF142024
TMCR2AI2


PF142025
TMCR2TI2


PF142026
TMCR2AQ2V


PF142027
TMCR2AQ2C


PF142028
TMCR2SL1

Options for Easy Modicon M200 logic controllers *(1)*

Description	Details	Unit reference	Weight kg *lb*
Digital I/O cartridges	2 digital inputs 2 transistor sink outputs Connection via screw terminal block	**TMCR2DM4U**	0 023 *0.051*
Analog I/O cartridges	2 analog inputs (12-bit resolution) configurable as: - 0…10 V voltage - 0…20 mA/4…20 mA current Connection via screw terminal block	**TMCR2AI2**	0 025 *0.055*
	2 analog inputs (12-bit resolution) 0…10V/ 0…5V/ 0…20mA / 4…20mA 1 analog output (12-bit resolution) 0…10V/ 0…5V/ 0…20mA / 4…20mA Connection via screw terminal block	**TMCR2AM3**	0 024 *0.053*
	2 temperature inputs (12 or 14-bit resolution depending on input signal) type K, J, R, S, B, E, T, N, C, PT100, PT1000, NI100, NI1000 Connection via screw terminal block	**TMCR2TI2**	0 025 *0.055*
	2 analog outputs (12-bit resolution) 0…10 V voltage Connection via screw terminal block	**TMCR2AQ2V**	0 025 *0.055*
	2 analog outputs (12-bit resolution) 4…20 mA current Connection via screw terminal block	**TMCR2AQ2C**	0 025 *0.055*
Communication cartridges	1 additional RS232C or RS485 serial link on screw terminal block	**TMCR2SL1**	0 025 *0.055*
	1 additional isolated RS485 serial link on screw terminal block	**TMCR2SL1A**	0 014 *0.031*

Separate parts for Easy Modicon M200 logic controllers

Description	Details	Sold in lots of	Unit reference	Weight kg *lb*
Cartridge cover	Allows IP 20 protection	4	**TMARCOVER**	–
RTC battery	–	1	**TMARBAT1**	–


TMARCOVER

Replacements parts for Easy Modicon M200 logic controllers

Description	Details	Sold in lots of	Unit reference	Weight kg *lb*
Set of terminal blocks for connecting the I/O on M200 controllers	3-way terminal block for power supply connection	5	**TMARTB3**	–
	4-way terminal block for serial link connection	5	**TMARTB4**	–


TMARTB3

Programming software

Designation	For use with	Reference
EcoStruxure Machine Expert – Basic	Easy Modicon M200 logic controllers . PC should be equipped with Windows 10 or Windows 7 or 8 (32-bit or 64-bit)	*Download this software from our website*

Expansion modules

Description	For use with	Reference
Modicon TM3 expansion modules	Easy Modicon M200 logic controllers	*See our list of compatible expansion modules on pages 14 and 15, or refer to refer to Modicon TM3 catalog ref. DIA3ED2140109EN*

(1) One cartridge for controllers with 16 and 24 I/O. Two cartridges maximum for controllers with 32, 40 and 60 I/O, only one of which can be a communication cartridge.

Easy Modicon M200

Logic controllers 2-axis motion control, for simple machines up to 196 I/O

Product compatibility, Configuration limits

Compatibility

Cartridge			Easy modicon M200 logic controller												
Type	**Reference**	**Number and type of I/O**	**TM200C16R**	**TM200C16U**	**TM200C16T**	**TM200C24R TM200CE24R**	**TM200C24U TM200CE24U**	**TM200C24T TM200CE24T**	**TM200C32R TM200CE32R**	**TM200C32U**	**TM200C32T**	**TM200C40R TM200CE40R**	**TM200C40U TM200CE40U**	**TM200C40T TM200CE40T**	**TM200C60R**
Digital I/O cartridge	**TMCR2DM4U**	2 digital inputs + 2 transistor sink outputs													
Analog I/O cartridge	**TMCR2AI2**	2 voltage/current inputs													
	TMCR2AM3	2 voltage/current inputs + 1 voltage/current output													
	TMCR2TI2	2 temperature inputs													
	TMCR2AQ2V	2 voltage outputs													
	TMCR2AQ2C	2 current outputs													
	TMCR2SL1	1 RS485 serial link													
	TMCR2SL1A	1 isolated RS485 serial link													

Possible to insert 2 cartridges
Possible to insert 1 cartridge

Modicon TM3 expansion modules			Easy modicon M200 logic controller												
Type	**Reference**	**Number and type of I/O**	**TM200C16R**	**TM200C16U**	**TM200C16T**	**TM200C24R TM200CE24R**	**TM200C24U TM200CE24U**	**TM200C24T TM200CE24T**	**TM200C32R TM200CE32R**	**TM200C32U**	**TM200C32T**	**TM200C40R TM200CE40R**	**TM200C40U TM200CE40U**	**TM200C40T TM200CE40T**	**TM200C60R**
Digital module	**TM3DI8**	8 x 24 V ⎓ sink/source inputs													
	TM3DI16	16 x 24 V ⎓ sink/source inputs													
	TM3DI32K	32 x 24 V ⎓ sink/source inputs													
	TM3DQ8R	8 x 24 V ⎓ /240 V a relay outputs													
	TM3DQ8T	8 x 24 V ⎓ source transistor outputs													
	TM3DQ8U	8 x 24 V ⎓ sink transistor outputs													
	TM3DQ16R	16 x 24 V ⎓ /240 V ∿ relay outputs													
	TM3DQ16T	16 x 24 V ⎓ source transistor outputs													
	TM3DQ16U	16 x 24 V ⎓ sink transistor outputs													
	TM3DQ32TK	32 x 24 V ⎓ source transistor outputs													
	TM3DQ32UK	32 x 24 V ⎓ sink transistor outputs													
	TM3DM8R	4 x 24 V ⎓ sink/source inputs + 4 x 24 V ⎓ /240 V ∿ relay outputs													
	TM3DM24R	16 x 24 V ⎓ sink/source inputs + 8 x 24 V ⎓ /240 V ∿ relay outputs													
	TM3RDM16R	8 x 24 V ⎓ sink/source inputs + 8 x 24 V ⎓ /240 V ∿ relay outputs													
	TM3RDM32R	16 x 24 V ⎓ sink/source inputs + 16 x 24 V ⎓ /240 V ∿ relay outputs													
Analog module	**TM3AI2H**	2 voltage/current inputs													
	TM3AI4	4 voltage/current inputs													
	TM3TI4	4 voltage/current or temperature inputs													
	TM3AI8	8 voltage/current inputs													
	TM3TI8T	8 temperature inputs													
	TM3AQ2	2 voltage/current outputs													
	TM3AQ4	4 voltage/current outputs													
	TM3TM3	2 voltage/current or temperature inputs + 1 voltage/current outputs													
	TM3AM6	4 voltage/current inputs + 2 voltage/current outputs													

Possible to combine, up to 4 modules

Configuration of I/O modules

Modicon TM3 digital I/O modules connect to Easy Modicon M200 logic controllers with a maximum of 4 local I/O modules .
The maximum number of Modicon TM3 expansion modules can be reduced by the number of transistor outputs or relay outputs used (see the table below) .

Configuration limits	Easy modicon M200 logic controller												
	TM200C16R	**TM200C16U**	**TM200C16T**	**TM200C24R TM200CE24R**	**TM200C24U TM200CE24U**	**TM200C24T TM200CE24T**	**TM200C32R TM200CE32R**	**TM200C32U**	**TM200C32T**	**TM200C40R TM200CE40R**	**TM200C40U TM200CE40U**	**TM200C40T TM200CE40T**	**TM200C60R**
Maximum number of transistor outputs directly connected to the logic controller	132	139	139	132	142	142	132	144	144	132	148	148	132
Maximum number of relay outputs directly connected to the logic controller	71	64	64	74	64	64	76	64	64	80	64	64	88

For more information on TM3 expansion modules, please visit Schneider Electric global website www.schneider-electric.com

Easy Modicon M200

Logic controllers 2-axis motion control, for simple machines up to 196 I/O

Product reference index

Life Is On | Schneider Electric

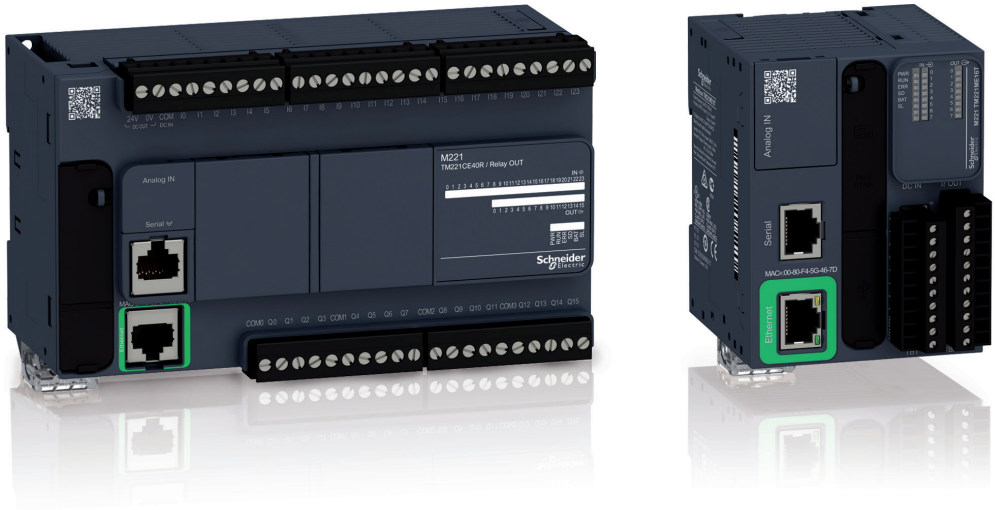
Learn more about our products at
www.se.com

Design: Schneider Electric
Photos: Schneider Electric

Schneider Electric Industries SAS
Head Office
35, rue Joseph Monier - CS 30323
F-92500 Rueil-Malmaison Cedex
France

DIA3ED2140906EN
December 2021 - V7.1

Catalog | July 2020



Modicon M221

Programmable logic controller for hardwired architectures

schneider-electric.com

Life Is On Schneider Electric

Modicon

Discover Modicon

Industrial Edge control for IIoT

Modicon IIoT-native edge controllers manage complex interfaces across assets and devices or directly into the cloud, with embedded safety and cybersecurity. **Modicon** provides performance and scalability for a wide range of industrial applications up to high-performance multi-axis machines and high-available redundant processes.

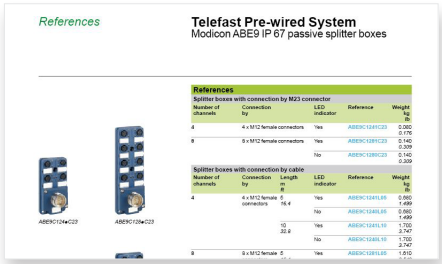
Explore our offer

- **Modicon** HVAC Controllers
- **Modicon** PLC
- **Modicon** Motion Controllers
- **Modicon** PAC
- **Modicon** I/O
- **Modicon** Networking
- **Modicon** Power Supply
- **Modicon** Wiring
- **Modicon** Safety

Life Is On | Schneider Electric

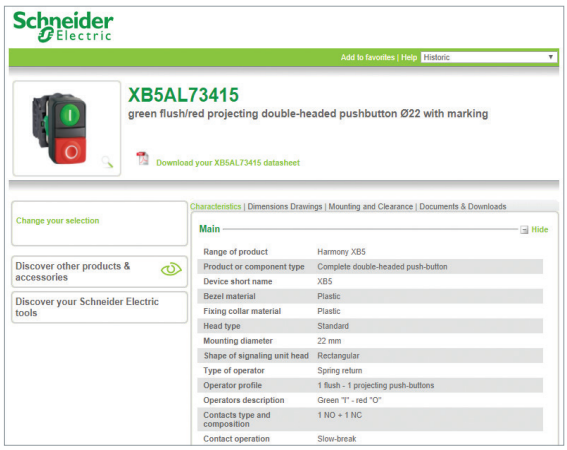
Quick access to product information

Get technical information about your product

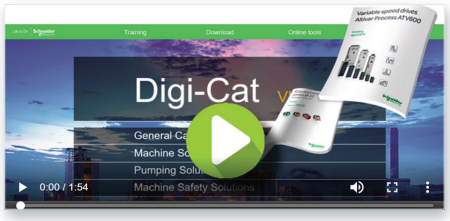


Each commercial reference presented in a catalog contains a hyperlink. Click on it to obtain the technical information of the product:

- Characteristics, Dimensions and drawings, Mounting and clearance, Connections and schemas, Performance curves
- Product image, Instruction sheet, User guide, Product certifications, End of life manual

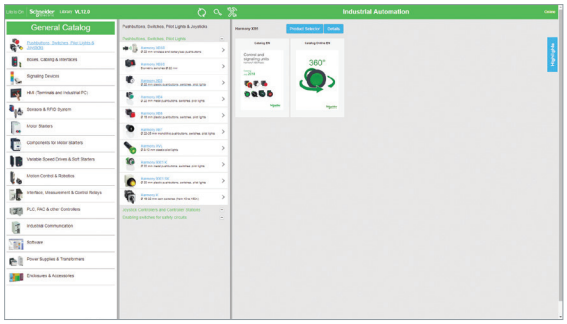


Find your catalog



> With just 3 clicks, you can reach the Industrial Automation and Control catalogs, in both English and French

> Download Digi-Cat with this link

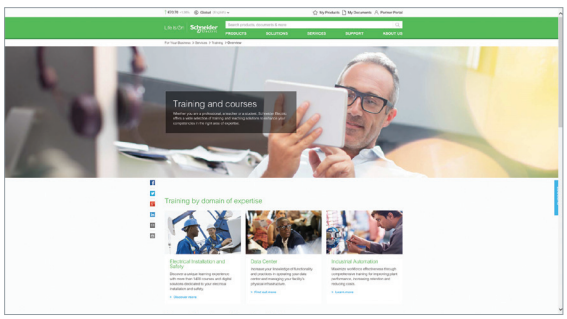


- Updated quarterly
- Embeds product selectors and configurators, 360° images, training centers
- Optimized search by commercial reference

Select your training

> Find the right Training for your needs on our Global website

> Locate the training center with the selector tool, using this link



Life Is On Schneider Electric

General content

Modicon™ M221
Programmable logic controller for hardwired architectures

To be competitive in today's digital era, machine builders must be innovative. Smart machines, those that are better connected, more flexible, more efficient, and safe, are enabling machine builders to innovate in ways never before possible.

EcoStruxure, Schneider Electric's open, IoT-enabled architecture and platform, offers powerful solutions for the digital era. As part of this, EcoStruxure Machine brings powerful opportunities for machine builders and OEMs, empowering them to offer smart machines and compete in the new, digital era.

EcoStruxure Machine brings together key technologies for product connectivity and edge control on premises, and cloud technologies to provide analytics and digital services. EcoStruxure Machine helps you bring more innovation and added value to your customers throughout the entire machine life cycle.

Innovation at Every Level for Machines is full systems across three layers:

– Connected products
Our connected products for measuring, actuating, device level monitoring, and control adhere to open standards to provide unmatched integration opportunities and flexibility

– Edge Control
We are IIoT-ready with a proven set of tested and validated reference architectures that enable the design of end-to-end open, connected, and interoperable systems based on industry standards. Ethernet and OPC UA facilitates IT/OT convergence meaning machine builders reap benefits from web interfaces and cloud.

– Apps, Analytics & Services
Seamless integration of machines to the IT layer allows the collection and aggregation of data ready for analysis – for machine builders and end users alike this means increased uptime and the ability to find information faster for more efficient operations and maintenance.

These levels are completely integrated from shop floor to top floor. And we have cloud offers and end-to-end cybersecurity wrapped around.

EcoStruxure Machine makes it easier for OEMs/ machine builders to offer their customers smarter machines. The advent of smart machines is driven by the changing needs of end users:

– Evolving workforce
– Reducing costs
– Dynamic markets
– Shorter life cycles
– Prioritizing safety and cybersecurity

EcoStruxure Machine provides one solution for the whole machine life cycle:

– With Smart Design & Engineering the time to market is reduced by up to 30% using our automated engineering and the simulation capabilities
– During Commissioning & Operation of the machine, resources such as energy, material and loss can be improved, and with seamless integration to the IT world efficiency can be improved by up to 40%
– Smart Maintenance & Services reduces the time for corrective actions up to 50%

EcoStruxure™ Innovation At Every Level **Machine**

* The Schneider Electric industrial software business and AVEVA have merged to trade as AVEVA Group plc, a UK listed company. The Schneider Electric and Life is On trademarks are owned by Schneider Electric and are being licensed to AVEVA by Schneider Electric.

Modicon M221

Programmable logic controller for hardwired architectures

Controllers for industrial machines

Applications	Type	**Logic controller**			**Logic/Motion controller**	**Motion controller**
	Specification	For hardwired architectures	For performance-demanding applications	For modular and distributed architectures	IIoT ready for performance machines	For automating machines/lines with 0 - 130 servo or robot axes
						
Performance		0.2 µs/inst	22 ns/inst	22 ns/inst	3...5 ns/inst	0.5...2 ns/inst
Memory		640 KB RAM, 2 MB Flash	64 MB RAM, 128 MB Flash	64 MB RAM, 128 MB Flash	192 MB RAM, 256 MB Flash	128 KB to 256 KB NV RAM 512 MB DDR2 to 1 GB DDR3L
Supply voltage		24 V ⎓ or 100...240 V ∿	24 V ⎓ or 100...240 V ∿	24 V ⎓	24 V ⎓	24 V ⎓
Communication fieldbus and networks	Embedded	■ EtherNet/IP ■ RS 232/RS 485 serial link ■ USB mini-B programming port	■ Ethernet ■ CANopen (master) and SAE J1939 ■ 2 serial links ■ USB mini-B programming port	■ EtherNet/IP ■ CANopen (master) and SAE J1939 ■ Serial link ■ USB mini-B programming port	■ EtherNet/IP ■ Sercos III ■ Modbus TCP ■ Serial link ■ USB mini-B programming port	■ EtherNet/IP ■ Sercos III ■ CANopen ■ Profibus ■ Profinet ■ EtherCAT
	Optional	■ 1 Serial Line	■ Ethernet ■ Profibus DP	■ Ethernet ■ Profibus DP	■ Ethernet ■ CANopen	■ CANopen ■ Profibus DP ■ RT-Ethernet
Embedded I/O	Input types	Up to 40 logic inputs Up 2 analog inputs	Up to 24 logic inputs	–	4 fast digital inputs	Up to 20 digital inputs Up to 16 touch probe inputs Up to 4 interrupt inputs Up to 2 analog inputs
	Output types	Up to 16 relay outputs Up to 16 tansistor outputs	Up to 16 tansistor outputs	–	4 fast digital outputs	Up to 16 digital outputs Up to 2 analog outputs
Synchronized axes		–	–	–	Up to 16 synchronized axes	Up to 130 synchronized axes
Configuration software		EcoStruxure Machine Expert-Basic *(1)*	EcoStruxure Machine Expert V1.1 *(2)*	EcoStruxure Machine Expert V1.1 *(2)*	EcoStruxure Machine Expert V1.1	EcoStruxure Machine Expert V1.1 *(2)*
Compatible expansion I/O module ranges (consult the catalog**)**						
	● Local I/O	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	–
	● Remote I/O	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	–
	● Distributed I/O on Ethernet	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN) ● Modicon TM5 (DIA3ED2131204EN)	● Modicon TM3 (DIA3ED2140109EN) ● Modicon TM5 (DIA3ED2131204EN)	● Modicon TM3 (DIA3ED2140109EN) ● Modicon TM5 (DIA3ED2131204EN)	● Modicon TM5 (DIA3ED2131204EN)
	● Distributed I/O on CANopen	–	–	–	● Modicon TM5 (DIA3ED2131204EN) ● Modicon TM7 (DIA3ED2140405EN)	● Modicon TM5 (DIA3ED2131204EN) ● Modicon TM7 (DIA3ED2140405EN)
	● Distributed I/O on Sercos	–	–	–	● Modicon TM5 (DIA3ED2131204EN)	● Modicon TM5 (DIA3ED2131204EN)
	Safety I/O	Modicon TM3 (DIA3ED2140109EN)	Modicon TM3 (DIA3ED2140109EN)	Modicon TM3 (DIA3ED2140109EN)	Modicon TM3 (DIA3ED2140109EN) Modicon TM5 (DIA3ED2131204EN) Modicon TM7 (DIA3ED2140405EN)	Modicon TM5 (DIA3ED2131204EN) Modicon TM7 (DIA3ED2140405EN)
Controller range		**Modicon M221/M221 Book**	**Modicon M241**	**Modicon M251**	**Modicon M262**	**LMC Eco, LMC Pro2**
More details in catalog		DIA3ED2140106EN	DIA3ED2140107EN	DIA3ED2140108EN	DIA3ED2180503EN	DIA7ED2160303EN

(1) Formerly named SoMachine Basic.
(2) Formerly named SoMachine, EcoStruxure Machine Expert merges both former software ranges, SoMachine and SoMachine Motion.

Modicon M221
Programmable logic controller for hardwired architectures

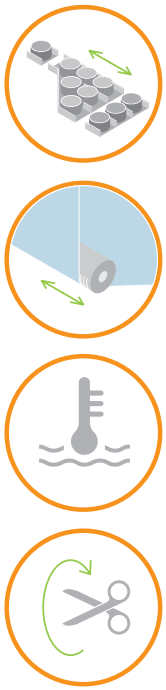
Empowering industrial OEMs for the digital era

To be competitive in today's digital era, machine builders must be innovative. Smart machines, those that are better connected, more flexible, more efficient, and safe, are enabling machine builders to innovate in ways never before possible.

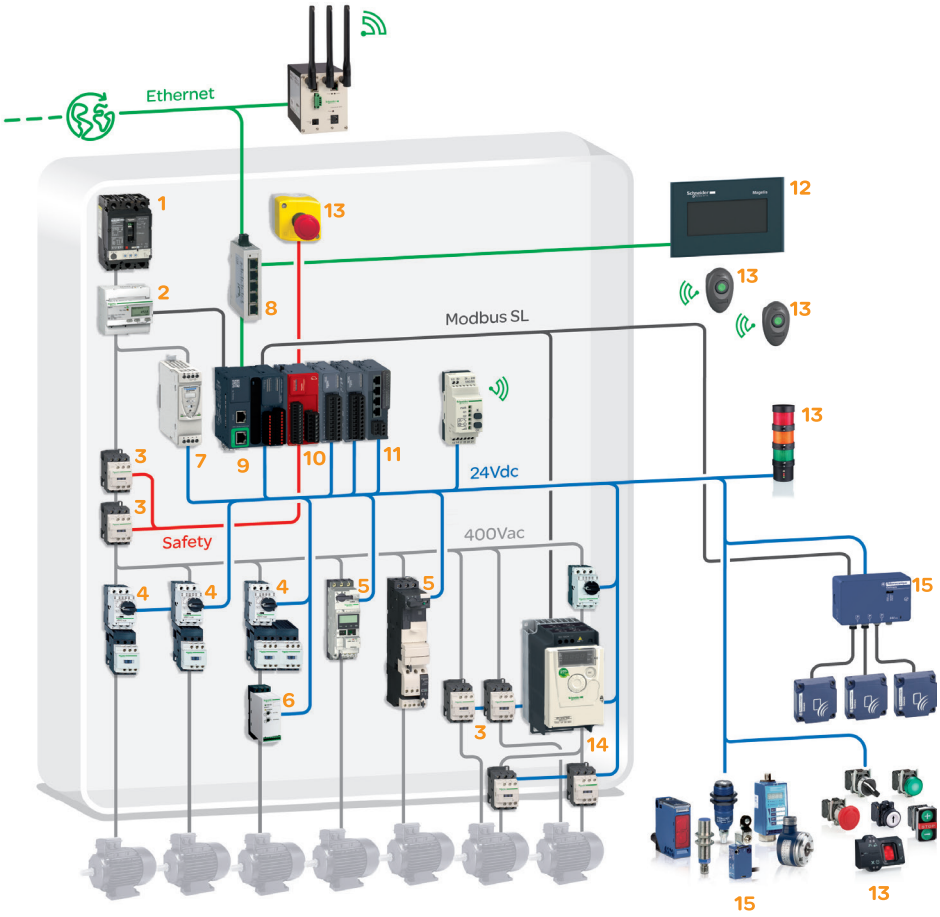
- EcoStruxure™ Machine, our open, interoperable, IoT-enabled system architecture helps you build smarter machines and equipment faster, making your business more efficient, profitable, and sustainable
- EcoStruxure Machine brings together key technologies for product connectivity and edge control on premises, and cloud technologies to provide analytics and digital services
- EcoStruxure Machine helps you bring more innovation and added value to your customers throughout the entire machine life cycle

Ready-to-use architectures and function blocks

Tested, Validated, and Documented Architectures (TVDAs) are just one of the ways we help you reduce design time.
Whether your machines are simple or complex, Application Function Blocks (AFBs) make system design fast and easy.



Application Function Blocks (AFB)



1 POWERPACT circuit breaker
2 Energy meter Acti9 iEM310 iEM310
3 TeSys D contactor
4 TeSys GV2P motor circuit-breaker
5 TeSys U starter-controller
6 Multi9 circuit-breaker C60N
7 Phaseo power supply 24 V ⎓
8 Ethernet switch (unmanaged)
9 **Modicon M221 Book logic controller**
10 Modicon TM3 safety I/O module, digital/analog I/O modules
11 Modicon TM3 TeSys motor starter module
12 Magelis display
13 Harmony signalling and control devices
14 Altivar 312 variable speed drive
15 Telemecanique sensors: limit switches and inductive sensors

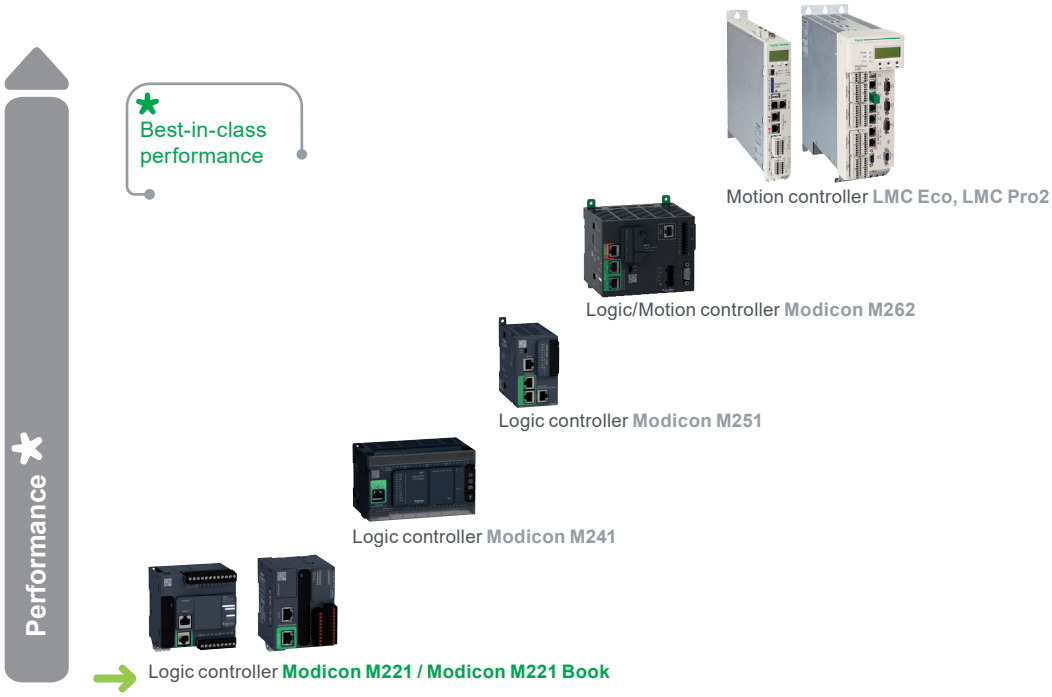
Modicon M221

Programmable logic controller for hardwired architectures

Fastest and smallest logic controllers on the market

Flexible and scalable machine control

The ranges of Modicon ™ controllers provide flexible and scalable machine control. Ethernet connectivity, USB port for programming, and an embeded web server: it's all included.



From logic to motion control, the Modicon range offers flexibility and scalability to suit your needs

Modicon M221: the small yet powerful logic controller for hardwired solutions

Everything you need is embedded

The Modicon M221 offers best-in-class performance.
Available also in book format, the Modicon M221 requires minimal installation and offers tremendous versatility.

Modicon M221 Book and a broad choice of I/O extension modules

> SD card, Run/Stop switch, USB port, 2 analog inputs, serial line, Ethernet and serial line, cartridge extension (on standard version): it's all **embedded**.
> Thanks to its high degree of **flexibility**, it's very easy to add additional modules (safety modules, Counter module, Tesys motor starter module, extensive line of analog and digital modules, ...), and to create distributed I/O islands over Ethernet network, keeping everything in **just one configuration**

Modicon M221

Programmable logic controller for hardwired architectures

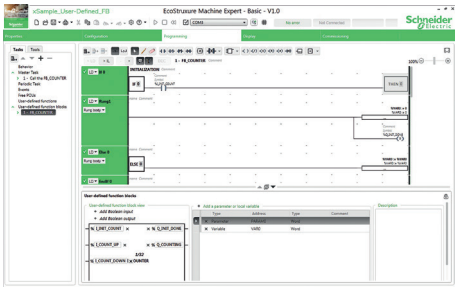
Modicon M221: the small yet powerful logic controller for hardwired solutions

EcoStruxure Machine Expert - Basic simplifies every step in the design and commissioning of your machines

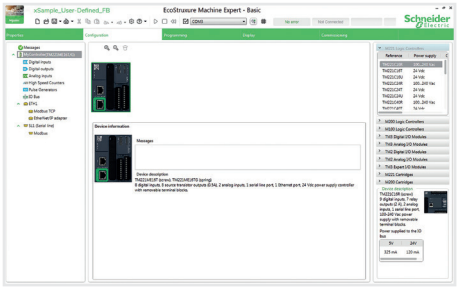
Intuitive machine programming with EcoStruxure Machine Expert - Basic

EcoStruxure Machine Expert - Basic is the universal programming software for machines automated by Modicon M221 logic controllers. Simple navigation that requires only fewer clicks delivers a more efficient engineering process.

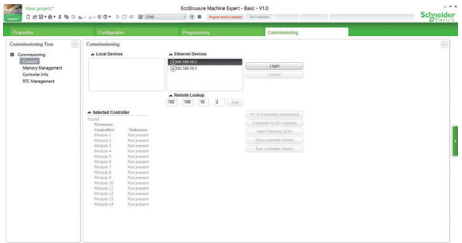
> All programming, visualization, and commissioning are handled in just one intuitive tool that is available as a free download.
> No training required



Programming



Configuration



Commissioning

Connected everywhere

For simplified maintenance, commissioning, and uploads/downloads, simply connect anytime, anywhere.

> Modem and router offer
> QRcode on the front of the controller

Customization and services

Our experts help you every step of the way, from perfecting machine design to on-site services of the finished machine. Global support, 24/7 hotline services, and replacement parts centers around the world enable you to deliver superior customer support and satisfaction.

Achieve benchmark performance
while increasing profitability

Modicon M221

Programmable logic controller for hardwired architectures

Applications		**Control of simple machines**								**Control of simple machines**		
												
Supply voltage		100-240 V ∿	24 V ⎓	24 V ⎓	100-240 V ∿	24 V ⎓	24 V ⎓	100-240 V ∿	24 V ⎓	24 V ⎓	24 V ⎓	24 V ⎓
Inputs/outputs	■ Logic inputs/outputs	**16 logic I/O**			**24 logic I/O**			**40 logic I/O**			**16 logic I/O**	**16 logic I/O**	**32 logic I/O**
	□ No. and type of inputs	9 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs	9 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs	9 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs	14 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs	14 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs	14 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs	24 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs	24 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs	24 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs	8 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs	8 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs	16 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs
	□ No. and type of outputs	7 relay outputs	7 source transistor outputs, inc. 2 high-speed outputs	7 sink transistor outputs, inc. 2 high-speed outputs	10 relay outputs	10 source transistor outputs, inc. 2 high-speed outputs	10 sink transistor outputs, inc. 2 high-speed outputs	16 relay outputs	16 source transistor outputs, inc. 2 high-speed outputs	16 sink transistor outputs, inc. 4 high-speed outputs	8 relay outputs	8 source transistor outputs, inc. 2 high-speed outputs	16 source transistor outputs, inc. 2 high-speed outputs
	□ Connection of the logic I/O	On removable screw terminal block									On removable screw terminal block or spring terminal block *(1)*		On HE 10 connector (with the Telefast Modicon ABE7 pre-wired system: connection cables and sub-bases)
	■ Analog inputs	2 x 0…10 V analog inputs									2 x 0…10 V analog inputs		
	□ Connection of analog inputs	On dedicated removable connector									On dedicated removable connector		
I/O extension	Max. number of I/O expansion modules that can be connected /with bus expansion modules	□ 7 Modicon TM3 expansion modules, along with limited number of outputs. □ 14 Modicon TM3 expansion modules with the use of bus expansion modules (transmitter and receiver), along with limited number of outputs. □ Possible use of Modicon TM2 expansion modules with restrictions.									□ 7 Modicon TM3 expansion modules, along with limited number of outputs. □ 14 Modicon TM3 expansion modules with the use of bus expansion modules (transmitter and receiver), along with limited number of outputs. □ Possible use of Modicon TM2 expansion modules with restrictions.		
Embedded communication	Ethernet link	1 Ethernet port on TM221C**E●●●** controllers: Modbus TCP communication (client & server), slave Modbus TCP, DHCP Client dynamic configuration, programming, downloading, monitoring, EtherNet/IP adapter									1 Ethernet port on TM221M**E●●●** controllers: Modbus TCP communication (client & server), slave Modbus TCP, DHCP Client dynamic configuration, programming, downloading, monitoring. EtherNet/IP adapter		
	Serial link	1 serial link port (RJ 45 connector) RS 232/RS 485 with + 5 V supply									1 serial link port (RJ 45 connector) RS 232/RS 485 with + 5V supply 1 additional serial link port on TM221M●●● controllers (RJ 45) RS 485		
Embedded functions	Process control	PID									PID		
	Counting	Up to 4 high-speed counter inputs (HSC), 100 kHz frequency									Up to 4 high-speed counter inputs (HSC), 100 kHz frequency		
	Position control	Position control (PTO), with trapezoidal profile and S curve able to control either:									Position control (PTO), with trapezoidal profile and S curve able to control either:		
		□ 2 axes in “pulse direction” (P/D) mode □ 1 axis in CW/CCW mode								□ 4 axes in “pulse direction” (P/D) mode □ 2 axes in CW/CCW mode	□ 2 axes in “pulse direction” (P/D) mode □ 1 axis in CW/CCW mode		
Format	W x H x D	3 controller sizes:									1 size only:		
		95 x 90 x 70 mm *3.74 x 3.54 x 2.75 in.*			110 x 90 x 70 mm *4.33 x 3.54 x 2.75 in.*			163 x 90 x 70 mm *6.41 x 3.54 x 2.75 in.*			70 x 90 x 70 mm *2.75 x 3.54 x 2.75 in.*		
Options	■ Cartridges	□ 3 analog I/O expansion cartridges □ 1 additional serial link communication cartridge □ 3 application cartridges - for control of hoisting applications - for control of packaging applications - for control of conveying applications									–		
	Number of cartridge slots	1						2			–		
	■ Display unit	TMH2GDB remote graphic display: visualization and monitoring									TMH2GDB remote graphic display: visualization and monitoring		
Mounting		Mounting on ⊔ symmetrical rail or panel with specific mounting kit TMAM2									Mounting on ⊔ symmetrical rail or panel with specific mounting kit TMAM2		
Software programming		With EcoStruxure Machine Expert - Basic software									With EcoStruxure Machine Expert - Basic software		
Logic controller type	Controllers without Ethernet port	**Modicon M221**									**Modicon M221 Book**		
		TM221C16R	**TM221C16T**	**TM221C16U**	**TM221C24R**	**TM221C24T**	**TM221C24U**	**TM221C40R**	**TM221C40T**	**TM221C40U**	**TM221M16R** **TM221M16RG** *(1)*	**TM221M16T** **TM221M16TG** *(1)*	**TM221M32TK**
	Controllers with embedded Ethernet port	**TM221CE16R**	**TM221CE16T**	**TM221CE16U**	**TM221CE24R**	**TM221CE24T**	**TM221CE24U**	**TM221CE40R**	**TM221CE40T**	**TM221CE40U**	**TM221ME16R** **TM221ME16RG** *(1)*	**TM221ME16T** **TM221ME16TG** *(1)*	**TM221ME32TK**
Pages		22									23		

(1) Spring terminal block on references ending in the letter G.

Modicon M221

Programmable logic controller for hardwired architectures

General presentation

16 I/O channels

24 I/O channels

40 I/O channels

Modicon M221 *logic controllers (standard format)*

16 I/O channels

32 I/O channels

Modicon M221 Book *logic controllers*

Presentation

Applications

Modicon **M221** and **M221 Book** logic controllers are designed for simple machines. They can optimize the size of wall-mounted and floor-standing control system enclosures due to their compact dimensions.

- The controllers are available in 2 formats:
  - Modicon **M221** controllers (TM221C●●●● references) offer excellent connection capacity and customization options without increasing the controller size, using I/O, communication, or application cartridges.
  - Modicon **M221 Book** controllers (TM221M●●● references) offer very small dimensions and a wide choice of connections.
- M221 and M221 Book controllers have an embedded Ethernet port meaning they can be easily integrated in control system architectures, for remote control and maintenance of machines using applications for smartphones, tablets, and PCs.
- The wealth of functions embedded in M221 and M221 Book controllers minimizes the cost of the machine:
  - Functions embedded in the controller: Modbus serial link, USB port dedicated to programming, and simple position control functions (high speed counters and pulse train outputs trapezoidal and S-curve profile)
  - Functions embedded in Modicon TM3 extensions: functional safety modules, motor-starter control module, and remote expansion system
  - Functions embedded in the dedicated display unit
- The application is created quickly thanks to the intuitive nature of the EcoStruxure Machine Expert - Basic programming software, which also has embedded configuration of the display unit and extensions, including the functional safety modules.

Main functions

Modicon TM221C●●●	Modicon TM221M●●●
w x h x d (mm/*in.*)	
□ 16 I/O: 95 x 90 x 70 / *3.74 x 3.54 x 2.75* □ 24 I/O: 110 x 90 x 70 / *4.33 x 3.54 x 2.75* □ 40 I/O: 163 x 90 x 70 / *6.41 x 3.54 x 2.75*	□ 16 I/O: 70 x 90 x 70 / *2.75 x 3.54 x 2.75* □ 32 I/O: 70 x 90 x 70 / *2.75 x 3.54 x 2.75*
Supply voltage	
24 V ⎓ or 100..240 V ∿ 50/60 Hz	24 V ⎓
Connection of the embedded I/O	
On removable screw terminal blocks at intervals of 5.08 mm *(0.20 in.)* 24 V/0.25 A power supply provided by the controller for sensor inputs on TM221C●●R models	16 I/O: On removable screw or spring terminal blocks at intervals of 3.81 mm *(0.15 in.)* 32 I/O: On HE10 connectors with HE 10 cables/bare wires or Telefast ABE7 connection sub-bases *(1)*
Analog inputs	
2 embedded inputs on each TM221M●●● and TM221C●●● controller	
Embedded Ethernet communication	
Yes on TM221C**E**●●	Yes on TM221M**E**●●
Serial link	
1 embedded link	1 or 2 embedded links
Cartridges	
1 slot for 1 or 2 cartridges: □ I/O cartridge (analog inputs or outputs, temperature inputs) □ communication cartridge (serial link) or application cartridges (hoisting, conveying, and packaging)	–

Hardware characteristics

M221 and M221 Book controllers each have an embedded:

- Run/Stop switch
- slot for an industrial SD memory card
- QR code for direct access to its technical documentation

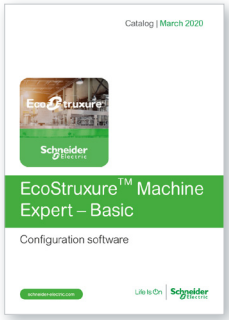
(1) Telefast Modicon ABE7 pre-wired system to be ordered separately. Refer to the catalog ref. DIA3ED2160602EN or our website www.schneider-electric.com

Modicon M221

Programmable logic controller for hardwired architectures

General presentation, options for Modicon M221 and M221 Book logic controllers

EcoStruxure Machine Expert - Basic software



Please consult catalog Ref. DIA3ED2181201EN

TMASD1 industrial SD memory card

M221

M221 Book

Analog I/O cartridges

Communication cartridge

Application cartridges

M221

Presentation

Embedded communication

M221 and M221 Book logic controllers have three types of integrated communication port:

- Ethernet
- RS 232/RS 485 serial link
- USB mini-B programming port

Embedded functions

Each Modicon M221 and M221 Book logic controller has the following integrated functions:

- Analog (PID control)
- Counting: Up to 4 high speed counters (HSC), 100 kHz frequency

Controllers with transistor logic outputs (source or sink) are equipped with 2 or 4 high speed counters *(1)* supporting pulse generation functions.

- Position control (PTO), with trapezoidal and S-curve profile able to control either:
  - 2 or 4 axes in pulse direction (P/D) mode
  - 1 or 2 axes in CW/CCW mode

  These outputs can be associated with event-triggered inputs to feed back homing and capture information. A “Motiontask” function block (one per axis) associated with a command table can be used to program and preview intuitively all the movements of an axis in the EcoStruxure Machine Expert - Basic software.
- Pulse width modulation (PWM)
- Pulse generator (PLS)
- Frequency generator (FREQGEN)

Processing power

- Execution speed: 0.2 µs/Boolean instruction
- Program: 10 Boolean Kinstructions
- Number of words: 8,000. Number of internal bits: 1,024
- RAM: 640 K (256 K for internal variables and 256 K for application and client data)
- Flash memory: 2 MB (including 256 K for backing up the client application and data in the event of a power outage)

Programming

Modicon M221 and M221 Book logic controllers are programmed using EcoStruxure Machine Expert - Basic software downloadable from our website www.schneider-electric.com

Options

Memory card

The **TMASD1** industrial SD memory card, with 256 MB capacity, is available for Modicon M221 and M221 Book logic controllers. It is used for:

- backing up and transferring applications
- loading firmware
- duplicating applications between controllers
- data logging

Cartridges

One or two cartridges can be inserted on the front of TM221C●●● controllers without increasing the dimensions.

Three types of cartridge are offered:

- Analog I/O cartridges
  - **TMC2AI2** for 2 analog inputs, which can be configured as voltage or current
  - **TMC2AQ2V** for 2 voltage analog outputs
  - **TMC2AQ2C** for 2 current analog outputs
  - **TMC2TI2** for 2 temperature inputs
- Communication cartridge
  - **TMC2SL1** providing additional serial link port terminals for connection via a printer, barcode reader, etc.
- Application cartridges
  - **TMC2HOIS01** for hoisting applications with two dedicated analog inputs for controlling a load cell
  - **TMC2PACK01** for packaging applications with two dedicated analog inputs for controlling the temperature on a packaging machine
  - **TMC2CONV01** for conveyor system applications with a serial link

  Use of an application cartridge provides direct access to application examples via the EcoStruxure Machine Expert - Basic software.

(1) 4 high-speed outputs on TM221C●40U, 2 high-speed outputs on TM221●●16T, TM221C●24T, TM221C●40T, TM221C●16U, TM221C●24U.

Modicon M221

Programmable logic controller for hardwired architectures

Remote graphic display unit for Modicon M221 and M221 Book logic controllers

TMH2GDB remote graphic display unit

M221

M221 Book

TMH2GDB remote graphic display unit

Presentation

The **TMH2GDB** remote graphic display unit is an HMI dedicated to M221 and M221 Book logic controllers. It is mounted on the front panel of a wall-mounted or floor-standing enclosure (degree of protection IP 65) or, using mounting brackets, at the back of an enclosure on a panel or symmetrical rail.

The **TMH2GDB** display unit is ready to use: the main application parameters can be accessed, with no prior programming, as soon as it is connected to the logic controller. Customized dialog pages can, however, be easily created using predefined templates in the EcoStruxure Machine Expert - Basic software dedicated to Modicon M221 and M221 Book logic controllers.

The **TMH2GDB** remote graphic display unit is a multifunction display unit that runs alongside your machine throughout its life cycle:

- During debugging: reading the states and values of variables and providing complete diagnostics of the controller configuration
- During installation: options for setting the time and configuring the communication ports
- During runtime: an operator interface created in the EcoStruxure Machine Expert - Basic software can be used to (for example):
  - display information in the form of text, values, bargraphs, or gages
  - perform machine control actions
  - enter or modify data
  - customize buttons on the front panel
- During maintenance: the page displaying alarm messages is permanently accessible by pressing a single key. Alarm messages are stored and time-tagged in a page of the log. An icon, which is always visible, flags up the presence of at least one alarm message. Access to each page and modification of its values can be protected by a password.

Main characteristics

- Backlit monochrome STN LCD 60 x 40 mm *(2.36 x 1.57 in.)*
- 5 lines of 20 to 35 characters, depending on the type of page
- Title block at the top of the page
- Title block at the bottom of the page
- 10 languages available: English, French, Czech, German, Italian, Japanese, Portuguese, Simplified Chinese, Spanish, and Turkish
- Up to 4 customizable service keys
- 100 HMI pages maximum
- Dimensions on the front panel of the machine (w x h x d): 80 x 126 x 19.2 mm *(3.15 x 4.96 x 0.75 in)*

Conformity

- CE, cULus Listing Mark

Environmental characteristics

- Ambient operating temperature: -15...+ 50 °C *(5…122 °F)*

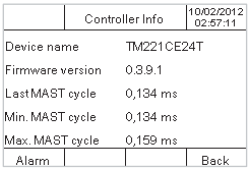
Power supply characteristics

- 5 V ⎓ (200 mA) supplied directly by the controller
- Max. consumption: 1 W

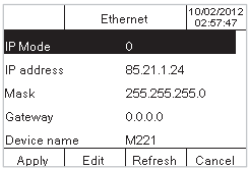
Modicon M221

Programmable logic controller for hardwired architectures

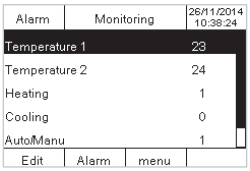
Remote graphic display unit for Modicon M221 and M221 Book logic controllers



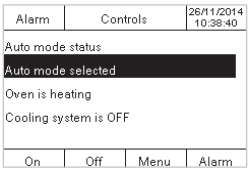
Debugging: Controller information



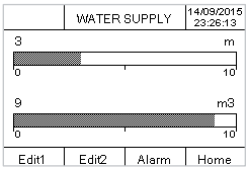
Debugging: Configuring communication



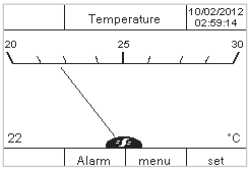
HMI: Monitoring



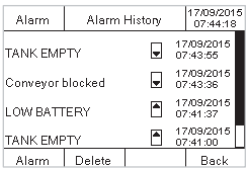
HMI: Control panel



HMI: Bargraph



HMI: Gage



HMI: Alarm display

Examples of screens

TMH2GDB remote graphic display unit (continued)

Installation and setup

The **TMH2GDB** remote graphic display unit is mounted in a 22 mm *(0.87 in.)* diameter hole and is connected to the SL or SL1 serial link on Modicon M221 and M221 Book logic controllers with the **XBTZ9980** and **VW3A1104R10** cable, which also supplies it with power (*no other Modbus slave equipment must be connected on this link) (1)*.

The debug screens, including those for setting the time and configuring the communication ports, are already configured and available as soon as the display unit is connected to the logic controller *(2)*.

The HMI (runtime) pages and alarm pages are created and configured very easily in the EcoStruxure Machine Expert - Basic programming software, from predefined pages:

- “Alarm display” template
- “Menu” template
- “Monitoring” template
- “Control panel” template
- “Bargraph” template (1 or 2 bars)
- “Gage” template

These pages constitute part of the controller application. They are transferred to and stored in the M221 and M221 Book logic controller memory, no transfer is necessary between the PC and the **TMH2GDB** graphic display unit. The latter is operational as soon as it is connected to the serial port on the logic controller.

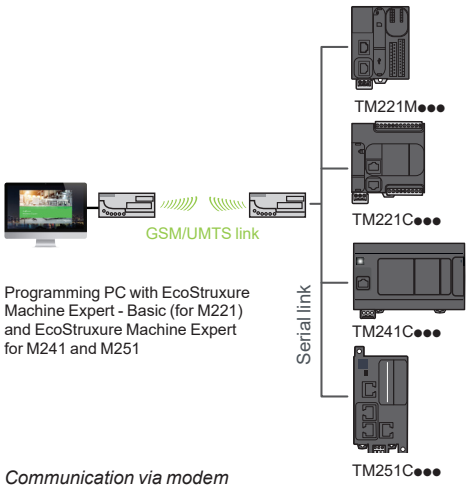
The Home page can be selected by programming. Each HMI and alarm page can be displayed by navigating the front panel using the keys or called by a program. Alarm pages can also be displayed on a red background.
The HMI pages can be created in several languages, the language displayed on the graphic display unit can then be selected by the operator in the display configuration menu.

(1) Neither the serial link on the TMC2SL1 cartridge, nor the SL2 embedded serial link, can be used to connect the graphic display unit.
(2) When the controller has no application program, only the product reference and the controller firmware version are accessible. The controller firmware version must be V1.3 or later.

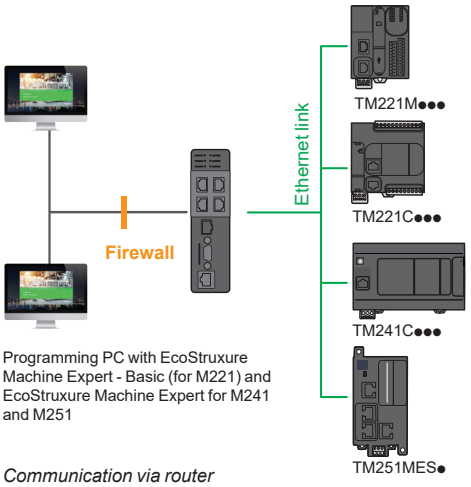
Modicon M221

Programmable logic controller for hardwired architectures

Communication via modem and router



Communication via modem



Communication via router

Communication via modem and router

The communication via modem and router offer is dedicated to the following applications:

- Synchronization between remote machines; direct data exchange between controllers
- Remote maintenance; access to the controller via the EcoStruxure Machine Expert - Basic programming software
- Remote control and monitoring of machines; receipt of information and sending commands on GSM/UMTS phone *(1)*

This offer comprises a **Schneider Electric** modem, a GSM/UMTS modem, and an **eWon** VPN router.

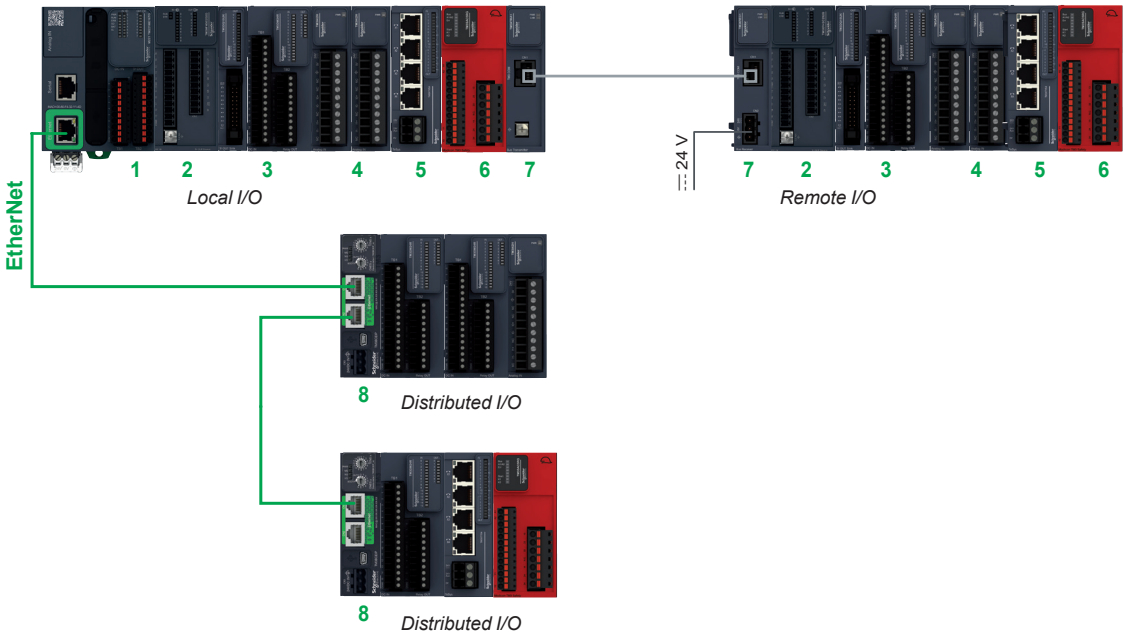
(1) Global System Mobile (2G)/Universal Mobile Telecommunications System (3G)

Modicon M221

Programmable logic controller for hardwired architectures

I/O extensions with Modicon TM3 expansion modules

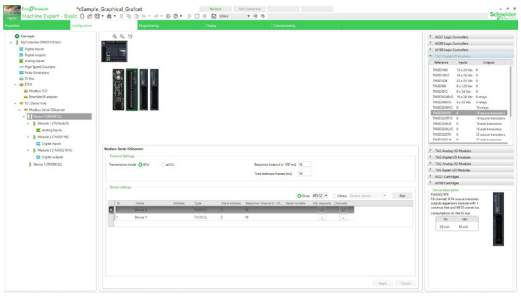
Extended I/O with Modicon TM3 I/O system



1 Modicon M221 Logic controller (TM221C**E●●** or TM221M**E●●**)

Modicon TM3 I/O system (2…8)

2 TM3 Expert counter module
3 TM3 Digital I/O module
4 TM3 Analog I/O module
5 TM3 Expert module for controlling TeSys motor starters
6 TM3 Functional safety module
7 TM3 Bus expansion module (transmitter and receiver) and bus expansion cable
8 TM3 Bus Coupler (2x bus couplers are allowed)



Bus couplers configuration

Modicon TM3 expansion modules

- The capacity of M221 and M221 Book logic controllers can be enhanced with the Modicon TM3 expansion module offer *(1)*:
  - Digital I/O modules that can be used to create configurations with up to 488 digital I/O. These modules are available with the same connections as the controllers.
  - Analog I/O modules that can be used to create configurations with up to 114 analog I/O and are designed to receive, amongst other things, position, temperature, and speed sensor signals. They are also capable of controlling variable speed drives or any other device equipped with a current or voltage input.
  - Expert modules for high-speed counting (24 V ⎓ inputs), and event counting with or without event management on fast inputs/thresholds/stop.
  - Expert module for control of TeSys motor-starters, connected with RJ 45 cables to simplify wiring up the control section.
  - Functional safety modules that simplify wiring and can be configured in the EcoStruxure Machine Expert - Basic software *(2)*.

Modicon TM3 Bus coupler

- M221 controller allows to connect up to 2x Modicon TM3 Bus Couplers on serial communication or on an Ethernet (Modbus/TCP) communication.
  The configuration is done thanks to Ecostruxure Machine Expert - Basic software. The TM3 bus port located on the right-hand side of the Modicon M221 controller allows connection of any of the TM3 expansion modules for local, remote, or distributed I/O configurations:
  - Local I/O: 7x Modicon TM3 expansion modules (max. configuration)
  - Remote I/O: + 7x remote modules (equals 14x TM3 modules: 7x local + 7x remote)
  - Distributed I/O: up to 2x TM3 Bus Couplers, allowing 3x TM3 I/O modules by Bus Coupler

(1) Please consult catalog Ref. DIA3ED2140109EN
(2) Please consult catalog Ref. DIA3ED2180701EN

DIA3ED2140109EN

DIA3ED2180701EN

Modicon M221

Programmable logic controller for hardwired architectures

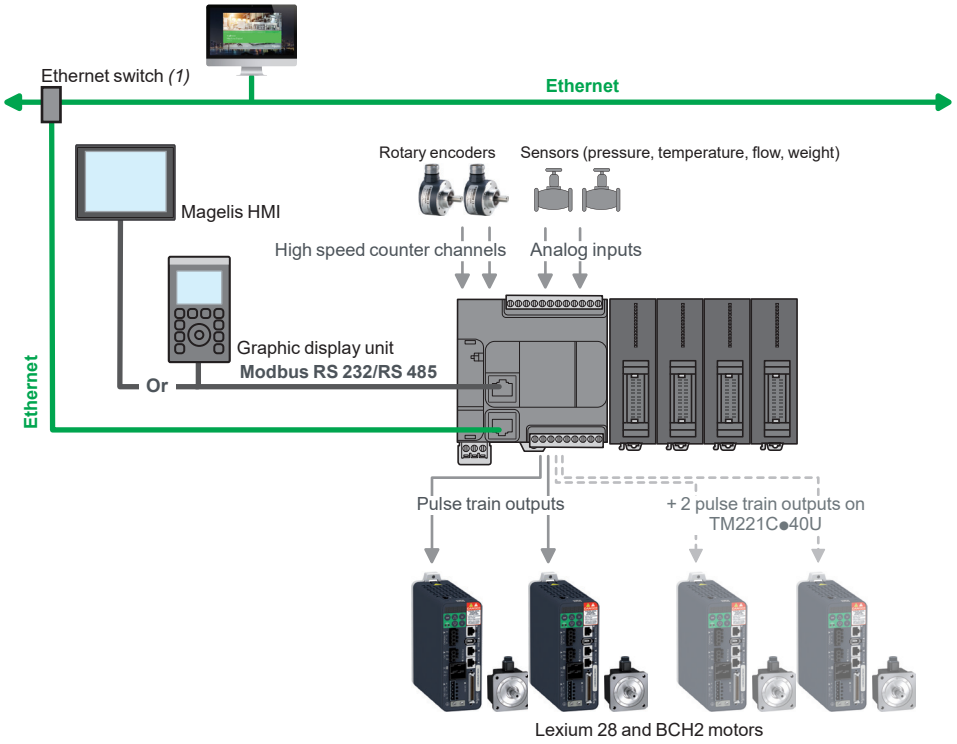
Control architecture

Control architecture for standalone machines

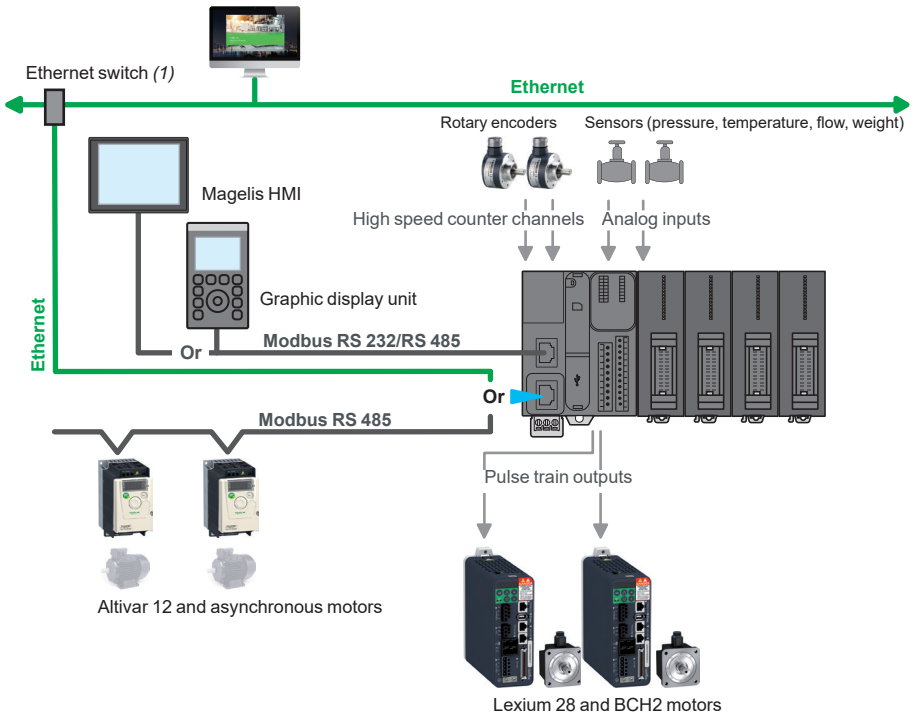
Typical applications: repetitive machines

- Packaging: recycling machines
- Textile-clothing machines
- Commercial equipment: automatic wash units, advertising hoardings, etc.
- Construction/service sector: access and entry control for automated systems
- Other sectors: woodworking, agriculture, fish farming, incubators, swimming pools, etc.

■ M221 (TM221C●●●●) controllers



■ M221 Book (TM221M●●●) controllers



(1) Only use one switch, as Hubs are not compatible.

Modicon M221

Programmable logic controller for hardwired architectures

Embedded communication Characteristics

Embedded communication

Communication on Ethernet network

TM221CE●●● and TM221ME●●● controllers have an embedded RJ 45 Ethernet port (10/100 Mbps, MDI/MDIX) with Modbus TCP (Client/Server and IOScanner), and Ethernet IP (adapter) protocols.

- As well as the default address based on the MAC address, it is possible to assign the controller IP address via a DHCP server or via a BOOTP server.
- The Ethernet port also offers the same application upload/download, update, and debug functions when the controller is supplied with power.
- A firewall can be used to lock each communication protocol.

For connection cables and accessories for Industrial Ethernet network, consult the catalog ref. DIA3ED2160105EN

Serial links

- Each TM221C●●● controller has an embedded serial link that can be configured as RS 232 or RS 485. A 5 V/200 mA power supply is available on the RJ 45 connector, which then supplies the **TMH2GDB** display unit or Magelis **XBTN** or **XBTRT** HMI.
- Each TM221M●●● controller has one or two embedded serial links.
  - The SL1 serial link, found on each M221 Book controller, can be configured as RS 232 or RS 485. A 5 V/200 mA power supply is available on the RJ 45 connector, which then supplies the **TMH2GDB** display unit, Magelis **XBTN** or **XBTRT** HMI, or other device.
  - The SL2 serial link, found on TM221M16●●●, TM221M24●●● and TM221M40●●● controllers only, is configured as RS 485.

Serial links also offer application upload/download, update, and debug functions when the controller is supplied with power. Embedded in both links are the three main commercially-available protocols:

- Modbus ASCII/RTU Master or Slave
- ASCII character string
- Modbus Serial IOScanner

For connection cables and accessories for serial link, consult the catalog ref. DIA3ED2160106EN

Software programming with power off charging function

The programming port, equipped with a USB mini-B connector, is embedded in each M221 and M221 Book controller; it is dedicated to communication with a PC equipped with EcoStruxure Machine Expert - Basic for programming, debugging, and maintenance.

In addition, it offers the ability to load an application program or update the firmware without the controller being powered by another source.

Characteristics of M221 and M221 Book logic controllers

- Certifications: CE, UL Listing Mark, CSA, RCM, EAC, LR, ABS, DNV - GL
- Standards: IEC/EN 61131-2 (Edition 2 2007), UL 508 (UL 61010-2-201), ANSI/ISA 12.12.01-2007, CSA C22.2 No. 213, No. 142, E61131-2, and IACS E10

Environment

- Ambient operating temperature: - 10...+ 55 °C *(14...+ 131 °F)*
- Storage temperature: - 25...+ 70 °C *(- 13...+ 158 °F)*
- Relative humidity: 10...95% (non-condensing)

Operating altitude:

- 0...2,000 m *(0...6,562 ft)*: complete specification for temperature and insulation
- 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 V ⎓/1,000 m *(3,280 ft)*
- Storage altitude: 0...3,000 m *(0...9,842 ft)*

- Immunity to mechanical stress (vibrations):
- 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)

Power supply

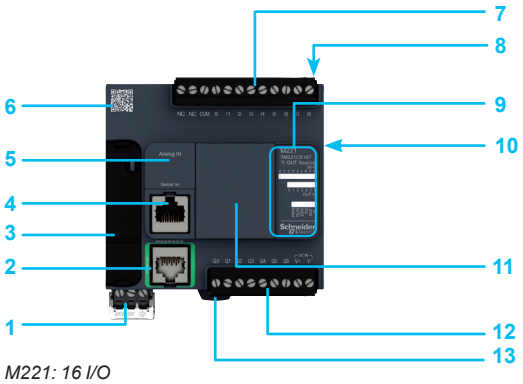
Two power supply types are available depending on the M221 controller model: 24 V ⎓ or 100-240 V ∿ 50/60 Hz

- Voltage limit (including ripple): 19.2...28.8 V ⎓/85...264 V ∿
- Immunity to micro-cuts (class PS-2): 10 ms
- Max. consumption:
- TM221 powered with AC, depending on model: 31…41 VA without expansion modules, 46…70 VA with maximum expansion module configuration
- TM221 powered with DC, depending on model: 3.2…4.9 W without expansion modules, 10…23 W with maximum expansion module configuration

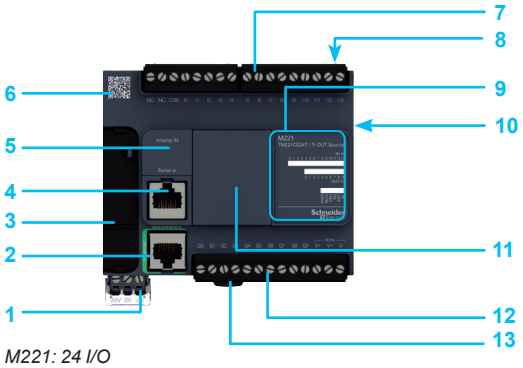
Modicon M221

Programmable logic controller for hardwired architectures

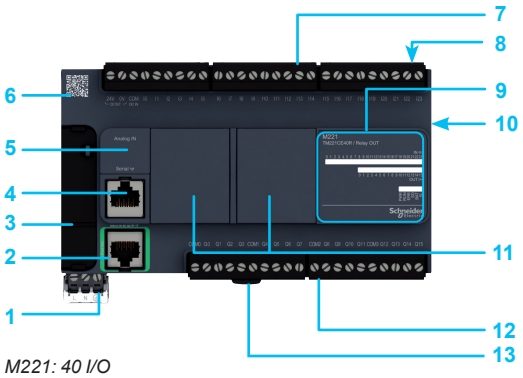
Modicon M221 logic controllers



M221: 16 I/O



M221: 24 I/O



M221: 40 I/O

TMH2GDB

Description

M221 logic controllers (TM221C●●●)

1 Removable screw terminal block, 3 terminals for connecting the 24 V ⎓ or 100-240 V ∿ power supply (depending on the model)
2 On TM221CE●●● controllers: RJ 45 connector for Ethernet network, with activity and exchange speed LED indicator
3 Behind the removable cover:
- Mini-B USB connector for connecting a PC equipped with EcoStruxure Machine Expert - Basic software
- Slot for the industrial SD memory card
- Run/Stop switch

4 Serial link port (RS 232 or RS 485): RJ 45 connector
5 Behind a flap: dedicated removable connector for two analog inputs
6 QR code for access to the controller technical documentation
7 Connection of 24 V ⎓ logic inputs on removable screw terminal blocks *(1)*
8 On top of the controller: slot for backup battery
9 LED display block showing:
- the status of the controller and its components (battery, industrial SD memory card)
- the status of the serial link
- the status of the embedded I/O

10 On the side of the controller: TM3 bus connector for the link with a Modicon TM3 expansion module
11 Slot(s) for I/O cartridge(s), communication cartridge, or application cartridge(s): one on M221 controllers with 16 and 24 I/O, two on M221 controllers with 40 I/O
12 Connection of relay/transistor logic outputs: on removable screw terminal blocks *(1)*
13 Clip for locking on ⊔ symmetrical rail

(1) Removable screw terminal blocks equipped with screw terminals, supplied with M221 controller.

Graphic display unit TMH2GDB

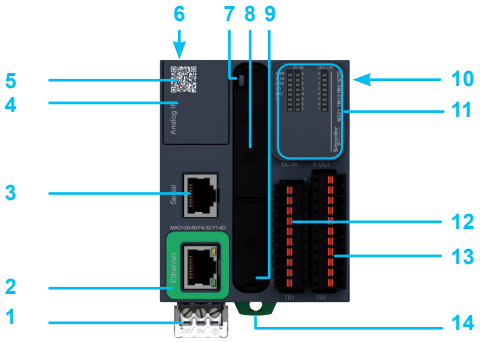
1 Control screen: backlit STN graphic screen, two-tone (white/red)
2 Ten command buttons, two of which can be customized with the option of identifying associated functions
3 Rotary navigation and control wheel

On the back of the display unit:
4 Mounting system consisting of locking nut, seal, and anti-rotation tee
5 RJ 45 connector for the cable connecting the graphic display unit to the Modicon M221/M221 Book logic controller

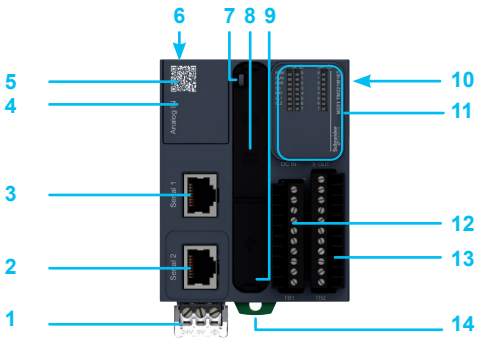
Modicon M221

Programmable logic controller for hardwired architectures

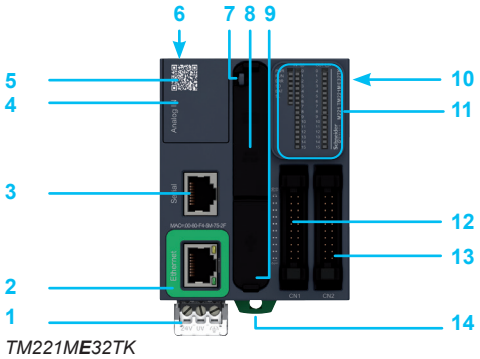
Modicon M221 Book logic controllers



TM221ME16TG



TM221M16T



TM221ME32TK

Description

M221 Book logic controllers (TM221M●●●)

1 Removable screw terminal block, 3 terminals for connecting the 24 V ⎓ supply
2 On TM221ME16●● and TM221ME32●● controllers: RJ 45 connector for Ethernet network, with activity and exchange speed LED indicator
On TM221M16●● and TM221M32●● controllers: RJ 45 connector for SL2 serial link
3 SL1 serial link port (RJ 45 connector)
4 Behind the removable cover: removable connector for two analog inputs
5 QR identification code for the controller technical documentation
6 Backup battery slot

Behind the removable cover: 7, 8, and 9
7 Slot for the industrial SD memory card
8 Run/Stop switch
9 Mini-B USB connector for connecting a PC equipped with EcoStruxure Machine Expert - Basic software

10 TM3 bus connector for linking to a Modicon TM3 expansion module
11 LED display block showing:
- the status of the controller and its components (battery, industrial SD memory card)
- the status of the serial links
- the status of the I/O

12 Connection of 24 V ⎓ logic inputs:
- on 16-channel controllers: removable screw or spring terminal blocks *(1)*
- on 32-channel controllers: HE10 connector

13 Connection of relay/transistor logic outputs:
- on 16-channel controllers: removable screw or spring terminal blocks *(1)*
- on 32-channel controllers: HE10 connector

14 Clip for locking on ⎍ symmetrical rail

(1) Removable terminal blocks equipped with screw or spring-type terminals depending on controller type. Terminal blocks supplied with M221 Book controller.

TMH2GDB

Graphic display unit TMH2GDB

1 Control screen: backlit STN graphic screen, two-tone (white/red)
2 Ten command buttons, two of which can be customized with the option of identifying associated functions
3 Rotary navigation and control wheel

On the back of the display unit:
4 Mounting system consisting of locking nut, seal, and anti-rotation tee
5 RJ 45 connector for the cable connecting the graphic display unit to the Modicon M221/M221 Book logic controller

Modicon M221

Programmable logic controller for hardwired architectures

Modicon M221 logic controllers

TM221C16R, TM221C16T, TM221C16U

TM221CE16R, M221CE16T, TM221CE16U

TM221C24R, M221C24T, TM221C24U

TM221CE24R, TM221CE24T, TM221CE24U

TM221C40R, TM221C40T, TM221C40U

TM221CE40R, TM221CE40T, TM221CE40U

TMC2AI2

TMC2AQ2V

TMC2AQ2C

TMC2TI2

TMC2SL1

TMC2PACK01

TMC2HOIS01

TMC2CONV01

References

Modicon M221 logic controllers *(1)*

Number of logic I/O	Logic inputs	Logic outputs	Analog inputs	Integrated communication ports *(2)*		Reference	Weight kg/*lb*
				Ethernet (RJ 45)	Serial link (RJ 45)		
■ **100-240 V ∿** power supply							
16 inputs/outputs	9 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs	7 relay outputs	2 x 0…10 V inputs	–	1	TM221C16R	0.346 *0.763*
				1	1	TM221CE16R	0.346 *0.763*
24 inputs/outputs	14 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs	10 relay outputs	2 x 0…10 V inputs	–	1	TM221C24R	0.395 *0.871*
				1	1	TM221CE24R	0.395 *0.871*
40 inputs/outputs	24 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs	16 relay outputs	2 x 0…10 V inputs	–	1	TM221C40R	0.456 *1.005*
				1	1	TM221CE40R	0.456 *1.005*
■ **24 V ⎓** power supply							
16 inputs/outputs	9 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs	7 source transistor outputs, inc. 2 high-speed outputs	2 x 0…10 V inputs	–	1	TM221C16T	0.346 *0.763*
				1	1	TM221CE16T	0.346 *0.763*
24 inputs/outputs	14 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs	10 source transistor outputs, inc. 2 high-speed outputs	2 x 0…10 V inputs	–	1	TM221C24T	0.395 *0.871*
				1	1	TM221CE24T	0.395 *0.871*
40 inputs/outputs	24 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs	16 source transistor outputs, inc. 2 high-speed outputs	2 x 0…10 V inputs	–	1	TM221C40T	0.456 *1.005*
				1	1	TM221CE40T	0.456 *1.005*
16 inputs/outputs	9 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs	7 sink transistor outputs, inc. 2 high-speed outputs	2 x 0…10 V inputs	–	1	TM221C16U	0.558 *1.230*
				1	1	TM221CE16U	0.626 *1.380*
24 inputs/outputs	14 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs	10 sink transistor outputs, inc. 2 high-speed outputs	2 x 0…10 V inputs	–	1	TM221C24U	0.770 *1.698*
				1	1	TM221CE24U	0.570 *1.257*
40 inputs/outputs	24 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs	16 sink transistor outputs, inc. 4 high-speed outputs	2 x 0…10 V inputs	–	1	TM221C40U	0.630 *1.389*
				1	1	TM221CE40U	0.780 *1.720*

Options for Modicon TM221C●●●● logic controllers *(3)*

Description	Function		Reference	Weight kg/*lb*
I/O cartridges	2 analog inputs (12-bit resolution) configurable as: - 0…10 V voltage - 0…20 mA/4…20 mA current Screw terminal version		TMC2AI2	0.025 *0.055*
	2 analog outputs (12-bit resolution) 0…10 V voltage Screw terminal version		TMC2AQ2V	0.025 *0.055*
	2 analog outputs (12-bit resolution) 4…20 mA current Screw terminal version		TMC2AQ2C	0.025 *0.055*
	2 temperature inputs (12-bit resolution) type K, J, R, S, B, E, T, N, C, PT100, PT1000, NI100, NI1000 Screw terminal version		TMC2TI2	0.025 *0.055*
Communication cartridge	1 additional serial link on screw terminal block		TMC2SL1 *(4)*	0.025 *0.055*
Cartridges for specific application	Hoisting application	2 analog inputs	TMC2HOIS01	0.025 *0.055*
	Packaging application	2 analog inputs	TMC2PACK01	0.025 *0.055*
	Conveyor system application	1 serial link	TMC2CONV01 *(4)*	0.025 *0.055*

(1) M221 controllers are supplied with:
- *removable screw terminal blocks for connecting the I/O*
- *a removable screw terminal block for connecting the power supply*
- *a button cell backup battery (BR2032)*
- *a cable for connecting the analog inputs*

(2) Each M221 logic controller has an embedded USB mini-B programming port.
(3) One cartridge for controllers with 16 and 24 I/O. Two cartridges maximum for controllers with 40 I/O, only one of which can be a communication cartridge.
(4) Just one cartridge per controller.

Modicon M221

Programmable logic controller for hardwired architectures

Modicon M221 Book logic controllers

TM221M16RG

TM221M16T

TM221ME16RG

TM221ME16T

TM221M16TG

TM221M32TK

TM221ME32TK

References

Modicon M221 Book logic controllers *(1)*

24 V ⎓ power supply

No. of logic I/O	Logic inputs	Logic outputs	Analog inputs	Embedded communication ports *(2)*			Terminal block for I/O conn. Interval *(mm/in.)*	Reference	Weight kg/*lb*
				Ethernet (RJ 45)	Serial link SL1 (RJ 45)	Serial link SL2 (RJ 45)			
16 inputs/ outputs	8 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs	8 relay outputs	2 x 0…10 V inputs	–	1	1	Screw (3.81/*0.15*)	TM221M16R	0.264 *0.582*
				–	1	1	Spring (3.81/*0.15*)	TM221M16RG	0.264 *0.582*
				1	1	–	Screw (3.81/*0.15*)	TM221ME16R	0.264 *0.582*
				1	1	–	Spring (3.81/*0.15*)	TM221ME16RG	0.264 *0.582*
		8 source transistor outputs, inc. 2 high-speed outputs	2 x 0…10 V inputs	–	1	1	Screw (3.81/*0.15*)	TM221M16T	0.264 *0.582*
				–	1	1	Spring (3.81/*0.15*)	TM221M16TG	0.264 *0.582*
				1	1	–	Screw (3.81/*0.15*)	TM221ME16T	0.264 *0.582*
				1	1	–	Spring (3.81/*0.15*)	TM221ME16TG	0.264 *0.582*
32 inputs/ outputs	16 sink/source 24 V ⎓ inputs, inc. 4 high-speed inputs	16 source transistor outputs, inc. 2 high-speed outputs	2 x 0…10 V inputs	–	1	1	HE 10 connector	TM221M32TK	0.270 *0.595*
				1	1	–	HE 10 connector	TM221ME32TK	0.270 *0.595*

(1) M221 Book controllers are supplied with:
- *removable terminal blocks (screw or spring-type depending on controller model) for connecting the I/O*
- *a removable screw terminal block for connecting the power supply*
- *a button cell backup battery (BR2032)*
- *a cable for connecting the analog inputs*

(2) Each M221 Book logic controller has an embedded USB mini-B programming port.

Modicon M221

Programmable logic controller for hardwired architectures

Options, separate parts

TMH2GDB

ZB5AZ905

A9A15151

DX1AP52

XBTZ9980

TMASD1

TMAHOL02

References

Remote graphic display unit, mounting accessories, cable

Designation	Description	Unit reference	Weight kg/*lb*
Remote graphic display unit	□ For data display and modification *(1)* □ Contains 1 bezel key ZB5AZ905	TMH2GDB	0.170 *0.37*
Tightening tool	For tightening the cover on Ø 22 mm unit	ZB5AZ905	0.016 *0.04*
Mounting plate for ⊔ symmetrical rail (Sold in lots of 4)	For clipping onto 35 mm *(1.378 in.)* symmetrical rail (1 hole Ø 22 mm *(0.87 in.)*)	A9A15151	0.040 *0.09*
Metal bracket for panel mounting, threaded (Sold in lots of 10)	1 hole Ø 22 mm *(0.87 in.)* Mounted using 2 screws, 7 mm *(0.28 in.) diameter*	DX1AP52	0.065 *0.014*
Connecting cables Used between TMH2GDB remote display unit and M221/ M221 Book logic controller	Equipped with an RJ 45 connector at each end Length: 2.5 m *(8.2 ft)*	XBTZ9980	0.230 *0.51*
	Equipped with an RJ 45 connector at each end Length: 1 m *(3.28 ft)*	VW3A1104R10	*0.050* *0.110*

Option

Industrial SD memory card	Application backup and program transfer Capacity: 256 MB	TMASD1	0.004 *0.009*

Separate parts

Designation	Description	Unit reference	Weight kg/*lb*
Mounting kit Sold in lots of 10	For plate or panel mounting of M221 and M221 Book controllers	TMAM2	0.065 *0.143*

Replacement parts

Designation	Description	Reference	Weight kg/*lb*
Set of terminal blocks for connecting the power supply on M221 and M221 Book logic controllers	8 removable screw terminal blocks	TMAT2PSET	0.127 *0.280*
Set of terminal blocks for connecting the I/O on M221 controllers	Removable screw terminal connectors: 8 different connectors for equipping a TM221C●●●● logic controller (8 x I/O)	TMAT2CSET	0.127 *0.280*
Set of terminal blocks for connecting the I/O on M221 Book controllers	4 x 10-way and 4 x 11-way removable terminal blocks with screw terminals	TMAT2MSET	0.127 *0.280*
	4 x 10-way and 4 x 11-way removable terminal blocks with spring terminals	TMAT2MSETG	0.127 *0.280*
Set of battery holders	2 spare battery holders for M221 and M221 Book controllers	TMAHOL02	0.130 *0.286*
Backup battery	The battery supplied with each controller is not available as a spare part in the Schneider catalog. If a replacement part is needed, use a Panasonic battery type BR2032 only.		

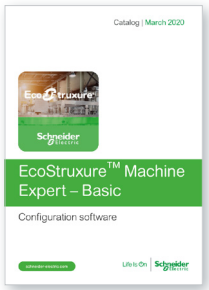
(1) Compatible only with M221 and M221 Book logic controllers whose firmware is version V1.3 or later. HMI pages can be configured with SoMachine Basic from version V1.3.

Modicon M221

Programmable logic controller for hardwired architectures

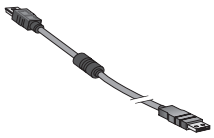
Programming software, expansion modules, connection cables

EcoStruxure Machine Expert - Basic software



DIA3ED2180701EN

DIA3ED2140109EN



TCSXCNAMUM3P

References

Programming software

Description	For use with	Reference
EcoStruxure Machine Expert - Basic *(1)*	For Modicon M221 and M221 Book logic controllers	Only available as a download from our website www.schneider-electric.com

Modicon TM3 I/O system

Description	For use with	Reference
Modicon TM3 expansion modules *(2)*	For Modicon M221 and M221 Book logic controllers	Please consult our catalogue ref. DIA3ED2140109EN
Modicon TM3 Ethernet Bus Coupler *(2)*	For Modicon M221 and M221 Book logic controllers	Please consult our catalogue ref. DIA3ED2140109EN

Connection cables

Description	Use	Length	Reference	Weight kg/*lb*
Programming cordsets	From the PC USB port to the USB mini-B port on M221 and M221 Book controllers	3 m *(0.98 ft)*	**TCSXCNAMUM3P** *(3)*	0.065 *0.143*
		1.8 m *(5.90 ft)*	**BMXXCAUSBH018**	0.065 *0.143*
Cable for connecting the analog inputs embedded in M221 and M221 Book controllers	Equipped with 1 dedicated removable connector at one end and bare wires at the other end	1 m *(3.28 ft)*	**TMACBL1**	0.024 *0.053*

(1) Please consult catalog Ref. DIA3ED2140109EN
(2) Please consult catalog Ref. DIA3ED2180701EN
(3) Unshielded, non-grounded cable. Only for use on temporary connections. For permanent connections, use cable reference BMXXCAUSBH018.

Modicon M221

Programmable logic controller for hardwired architectures

Product reference index

Life Is On | Schneider Electric

Learn more about our products at
www.schneider-electric.com

Design: Schneider Electric
Photos: Schneider Electric

Schneider Electric Industries SAS
Head Office
35, rue Joseph Monier - CS 30323
F-92500 Rueil-Malmaison Cedex
France

DIA3ED2140106EN
July 2020 - V8.0

Modicon M241 Logic controllers

Catalog

June 2019

Schneider Electric

Modicon

Discover Modicon

Industrial Edge control for IIoT

Modicon IIoT-native edge controllers manage complex interfaces across assets and devices or directly into the cloud, with embedded safety and cybersecurity. **Modicon** provides performance and scalability for a wide range of industrial applications up to high-performance multi-axis machines and high-available redundant processes.

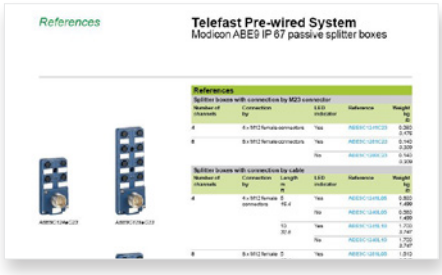
Explore our offer

- **Modicon** HVAC Controllers
- **Modicon** PLC
- **Modicon** Motion Controllers
- **Modicon** PAC
- **Modicon** I/O
- **Modicon** Networking
- **Modicon** Power Supply
- **Modicon** Wiring
- **Modicon** Safety

Life Is On | Schneider Electric

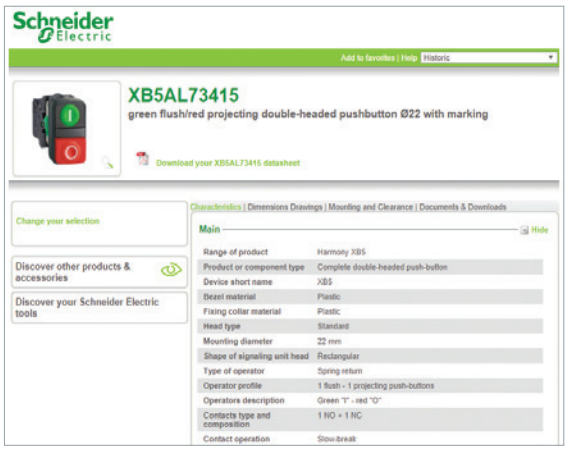
Quick access to product information

Get technical information about your product



Each commercial reference presented in a catalog contains a hyperlink. Click on it to obtain the technical information of the product:

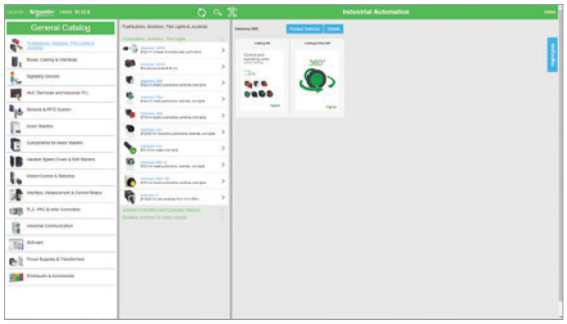
- Characteristics, Dimensions and drawings, Mounting and clearance, Connections and schemas, Performance curves
- Product image, Instruction sheet, User guide, Product certifications, End of life manual



Find your catalog

> With just 3 clicks, you can reach the Industrial Automation and Control catalogs, in both English and French

> Download Digi-Cat with this link



- Updated quarterly
- Embeds product selectors and configurators, 360° images, training centers
- Optimized search by commercial reference

Select your training

> Find the right Training for your needs on our Global website

> Locate the training center with the selector tool, using this link

Life Is On Schneider Electric

General content

Modicon™ M241 logic controllers

Modicon TM4 communication modules

Products reference index

To be competitive in today's digital era, machine builders must be innovative. Smart machines, those that are better connected, more flexible, more efficient, and safe, are enabling machine builders to innovate in ways never before possible.

EcoStruxure, Schneider Electric's open, IoT-enabled architecture and platform, offers powerful solutions for the digital era. As part of this, EcoStruxure Machine brings powerful opportunities for machine builders and OEMs, empowering them to offer smart machines and compete in the new, digital era.

EcoStruxure Machine brings together key technologies for product connectivity and edge control on premises, and cloud technologies to provide analytics and digital services. EcoStruxure Machine helps you bring more innovation and added value to your customers throughout the entire machine life cycle.

Innovation at Every Level for Machines is full systems across three layers:

– Connected products
Our connected products for measuring, actuating, device level monitoring, and control adhere to open standards to provide unmatched integration opportunities and flexibility

– Edge Control
We are IIoT-ready with a proven set of tested and validated reference architectures that enable the design of end-to-end open, connected, and interoperable systems based on industry standards. Ethernet and OPC UA facilitates IT/OT convergence meaning machine builders reap benefits from web interfaces and cloud.

– Apps, Analytics & Services
Seamless integration of machines to the IT layer allows the collection and aggregation of data ready for analysis – for machine builders and end users alike this means increased uptime and the ability to find information faster for more efficient operations and maintenance.

These levels are completely integrated from shop floor to top floor. And we have cloud offers and end-to-end cybersecurity wrapped around.

EcoStruxure Machine makes it easier for OEMs/ machine builders to offer their customers smarter machines. The advent of smart machines is driven by the changing needs of end users:

– Evolving workforce
– Reducing costs
– Dynamic markets
– Shorter life cycles
– Prioritizing safety and cybersecurity

EcoStruxure Machine provides one solution for the whole machine life cycle:

– With Smart Design & Engineering the time to market is reduced by up to 30% using our automated engineering and the simulation capabilities

– During Commissioning & Operation of the machine, resources such as energy, material and loss can be improved, and with seamless integration to the IT world efficiency can be improved by up to 40%

– Smart Maintenance & Services reduces the time for corrective actions up to 50%

EcoStruxure™ Innovation At Every Level **Machine**

* The Schneider Electric industrial software business and AVEVA have merged to trade as AVEVA Group plc, a UK listed company. The Schneider Electric and Life is On trademarks are owned by Schneider Electric and are being licensed to AVEVA by Schneider Electric.

Modicon M241 Logic controllers
Controllers for industrial machines

Applications	Type	**Logic controller**				**Logic/Motion controller**	**Motion controller**
	Specification	For hardwired architectures	For performance-demanding applications		For modular and distributed architectures	IIoT ready for performance machines	For automating machines/lines with 0 - 130 servo or robot axes
							
Performance		0.2 µs/inst	22 ns/inst		22 ns/inst	3...5 ns/inst	0.5...2 ns/inst
Memory		640 KB RAM, 2 MB Flash	64 MB RAM, 128 MB Flash		64 MB RAM, 128 MB Flash	256 MB RAM, 256 MB Flash	128 KB to 256 KB NV RAM 512 MB DDR2 to 1 GB DDR3L
Supply voltage		24 V ⎓ or 100...240 V ∿	24 V ⎓ or 100...240 V ∿		24 V ⎓	24 V ⎓	24 V ⎓
Communication fieldbus and networks	Embedded	■ EtherNet/IP ■ RS 232/RS 485 serial link ■ USB mini-B programming port	■ Ethernet ■ CANopen (master) and SAE J1939 ■ 2 serial links ■ USB mini-B programming port		■ EtherNet/IP ■ CANopen (master) and SAE J1939 ■ Serial link ■ USB mini-B programming port	■ EtherNet/IP ■ Sercos III ■ Modbus TCP ■ Serial link ■ USB mini-B programming port	■ EtherNet/IP ■ Sercos III ■ CANopen ■ Profibus ■ Profinet ■ EtherCAT
	Optional	■ 1 Serial Line	■ Ethernet ■ Profibus DP		■ Ethernet ■ Profibus DP	■ Ethernet ■ CANopen	■ CANopen ■ Profibus DP ■ RT-Ethernet
Embedded I/O	Input types	Up to 40 logic inputs Up 2 analog inputs	Up to 24 logic inputs		–	4 fast digital inputs	Up to 20 digital inputs Up to 16 touch probe inputs Up to 4 interrupt inputs Up to 2 analog inputs
	Output types	Up to 16 relay outputs Up to 16 tansistor outputs	Up to 16 tansistor outputs		–	4 fast digital outputs	Up to 16 digital outputs Up to 2 analog outputs
Synchronized axes		–	–		–	Up to 16 synchronized axes	Up to 130 synchronized axes
Configuration software		EcoStruxure Machine Expert-Basic *(1)*	EcoStruxure Machine Expert V1.1 *(2)*		EcoStruxure Machine Expert V1.1 *(2)*	EcoStruxure Machine Expert V1.1	EcoStruxure Machine Expert V1.1 *(2)*
Compatible expansion I/O module ranges (consult the catalog**)**							
	● Local I/O	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)		● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	–
	● Remote I/O	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)		● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	–
	● Distributed I/O on Ethernet	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN) ● Modicon TM5 (DIA3ED2131204EN)		● Modicon TM3 (DIA3ED2140109EN) ● Modicon TM5 (DIA3ED2131204EN)	● Modicon TM3 (DIA3ED2140109EN) ● Modicon TM5 (DIA3ED2131204EN)	● Modicon TM5 (DIA3ED2131204EN)
	● Distributed I/O on CANopen	–	–		–	● Modicon TM5 (DIA3ED2131204EN) ● Modicon TM7 (DIA3ED2140405EN)	● Modicon TM5 (DIA3ED2131204EN) ● Modicon TM7 (DIA3ED2140405EN)
	● Distributed I/O on Sercos	–	–		–	● Modicon TM5 (DIA3ED2131204EN)	● Modicon TM5 (DIA3ED2131204EN)
	Safety I/O	Modicon TM3 (DIA3ED2140109EN)	Modicon TM3 (DIA3ED2140109EN)		Modicon TM3 (DIA3ED2140109EN)	Modicon TM3 (DIA3ED2140109EN) Modicon TM5 (DIA3ED2131204EN) Modicon TM7 (DIA3ED2140405EN)	Modicon TM5 (DIA3ED2131204EN) Modicon TM7 (DIA3ED2140405EN)
Controller range		**Modicon M221/M221 Book**	**Modicon M241**		**Modicon M251**	**Modicon M262**	**LMC Eco, LMC Pro2**
More details in catalog		DIA3ED2140106EN	DIA3ED2140107EN		DIA3ED2140108EN	DIA3ED2180503EN	DIA7ED2160303EN

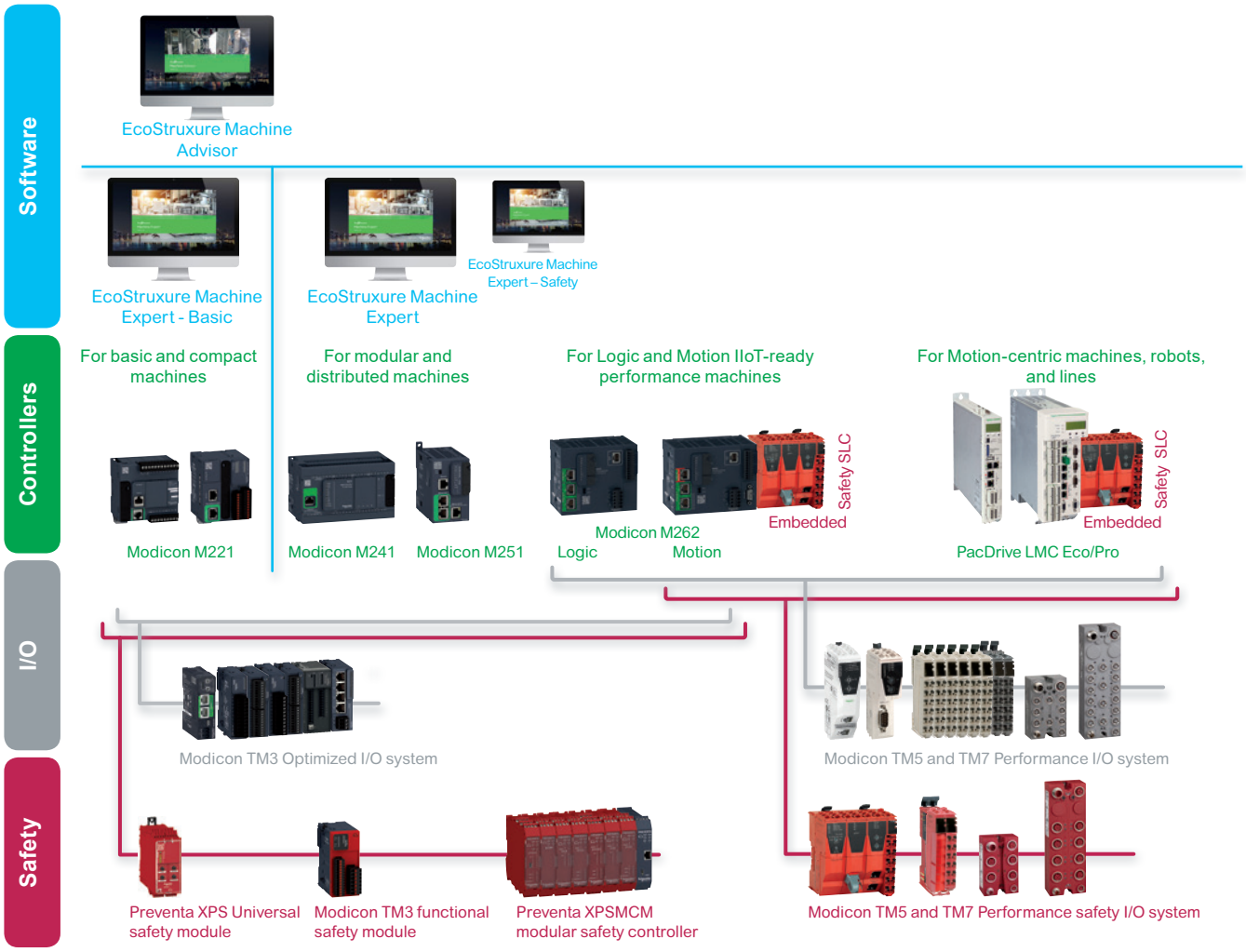
(1) Formerly named SoMachine Basic.
(2) Formerly named SoMachine, EcoStruxure Machine Expert merges both former software ranges, SoMachine and SoMachine Motion.

More technical information on www.schneider-electric.com

Modicon M241 Logic controllers

Machine Automation

Machine Automation



Machine control

> From basic to motion- and robot-centric machines with the PacDrive 3 offer, Modicon controllers and solutions bring a consistent and scalable response to achieving flexibility, performance, productivity, and digitization.

The scalability and consistency of I/O ranges allow you to select the right offer depending on your needs

> Modicon TM3 Optimized I/O system for more compact and modular machines
> Modicon TM5 for more performance-demanding machines, with Modicon TM7 for harsh environments; Both Performance I/O ranges (Modicon TM5 and TM7) allow safety functions to be implemented using the Modicon TM5CSLC safety logic controller

Embedded Safety provides holistic solutions to Modicon M262 and PacDrive LMC controllers, increasing overall safety demand in Machine Automation

> Preventa XPS Universal safety modules cover a wide range of safety functions, suitable for small applications with 4-5 safety functions, with diagnostic information provided to controllers via a single wire connection
> Modicon TM3 safety functional modules are suitable for small applications covering E-Stop functions and diagnostics via TM3 bus
> Preventa XPSMCM modular safety controllers are suitable for medium size applications with up to 20 safety functions and diagnostics via Modbus TCP, EtherNet/IP, EtherCAT, or Profinet

All these devices are managed within a single software, EcoStruxure Machine Expert, a powerful and collaborative engineering environment

> **EcoStruxure Machine Expert – Safety** optional addon for programming safety logic controllers
> **EcoStruxure Machine Expert – Basic** software for programming Modicon M221 logic controllers: an intuitive standalone environment accessible to basic skilled technicians
> **EcoStruxure Machine Advisor** is a cloud-based services platform designed for machine builders to track machines in operation worldwide, monitor performance data, and resolve exceptional events, while reducing support costs by up to 50%

Machine Automation

Comprehensive Schneider offers for machine builders

> Lexium servo drives, motors, and robotics are designed to control applications ranging from a single independent axis up to high-performance synchronized multi-axis machines requiring high-speed and precise positioning and movements

Robotics

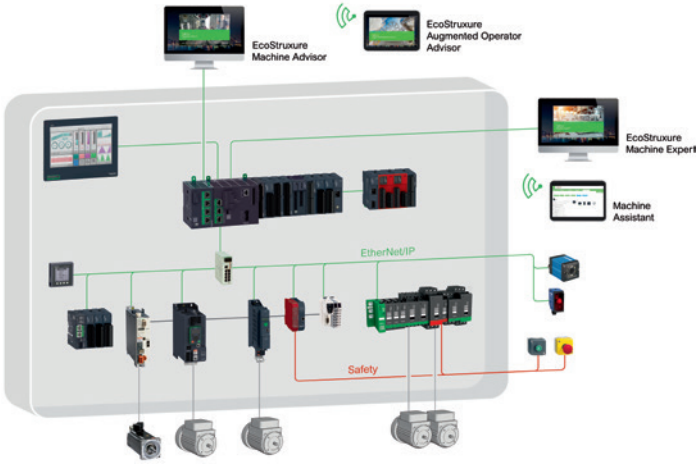
Integrated drives

Servo Drives & Motors

Steppers Drives & Motors

> The Lexium offer is designed for a broad range of motion-centric machines in applications such as Packaging, Material Handling, Material Working, Food and Beverage, and Electronics

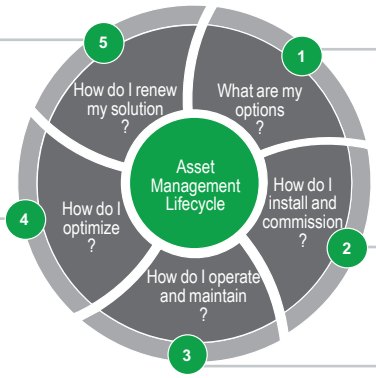
> Schneider Electric has developed Tested Validated & Documented Architectures (TVDA) applicable for generic machine control applications as well as for dedicated segment applications such as Packaging, Material Working, Material Handling, Hoisting, Pumping, or generic Machine Control applications



Choose Schneider Electric to help secure your investment and benefit from worldwide services at every step of your project

Renew
Being your expert to control and renew your aging equipment at the right time and at optimal cost

Optimize
Identifying how you can get even more out of your equipment and further improve your return on investment



Plan
Discussing your maintenance policy and needs arising from it

Install
Delivering services to help ensure your equipment is set up reliably and starts to operate efficiently from day one

Operate
Providing services to support you during normal operations as well as during maintenance breaks and in unexpected situations
Collaborating to maximize your uptime and performance as well as become more proactive in operations

> From planning and inception to modernization, we help ensure optimal technical and business performance. Our field service engineers combine 30+ years of manufacturer-level experience with the latest technology to bring innovation to every level of our offer, and every step of your project.

> Our machine control dedicated services empower you to maximize your business infrastructure and face increasingly stringent demands on productivity, safety, equipment availability, and performance optimization.

Modicon M241 logic controllers

Applications		**Control of simple movements** **Control of control loops**		
				
Supply voltage		100-240 V ∿	24 V ⎓	
Inputs/outputs	■ Logic inputs/outputs	**24 logic inputs/outputs**		
	□ No. and type of inputs	14 sink/source 24 V ⎓ inputs, inc. 8 high-speed inputs	14 sink/source 24 V ⎓ inputs, inc. 8 high-speed inputs	14 sink/source 24 V ⎓ inputs, inc. 8 high-speed inputs
	□ No. and type of outputs	10 outputs: with 4 source transistor high-speed outputs and 6 relay outputs	10 source transistor outputs, inc. 4 high-speed outputs	10 sink transistor outputs, inc. 4 high-speed outputs
	Connection of logic inputs/outputs	On removable screw terminal block		
I/O expansion		□ 7 Modicon TM3 expansion modules □ 14 Modicon TM3 expansion modules with the use of bus expansion modules (transmitter and receiver) □ Possible use of Modicon TM2 expansion modules with restrictions		
Embedded communication	Ethernet link	1 Ethernet port on **TM241CE24●** and **TM241CEC24●** controllers: □ Protocols: Modbus TCP Client/Server, slave Modbus TCP, EtherNet/IP Adapter/Originator, OPC UA Server *(1)*. □ Services: firmware update, data exchange - NGVL and IEC VAR ACCESS, WEB Server, MIB2 SNMP network management, FTP file transfer, FTP Client/Server, SNMP Client/Server V1 & V2, SQL Client, Email library, DHCP Client dynamic configuration, programming, downloading, monitoring, SNTP Client, DNS Client. □ Services on **TM241CE24●** controllers: Modbus TCP Scanner Manager and EtherNet/IP Scanner Manager, email sending and receipt		
	CANopen link	On **TM241CEC24●** controllers: 1 port for CANopen fieldbus (1 screw terminal block) with CANopen Master and SAE J1939 Request Manager protocols		
	Serial link	2 serial link ports: □ 1 SL1 port (RJ 45), RS 232/RS 485 with +5 V supply □ 1 SL2 port (screw terminal block), RS 485		
Function	Control	PID		
	Counting	8 high-speed counter (HSC) inputs, 200 kHz frequency and 6 to 8 standard counter inputs, 1 kHz frequency		
	Position control	4 high-speed position control outputs, 100 kHz frequency and 4 transistor standard position control outputs, 1 kHz frequency: □ pulse train (PTO) P/D, CW and CCW, 100 kHz frequency □ pulse width modulation (PWM) □ frequency generator (FG)		
Options	■ Cartridges	□ 3 analog I/O expansion cartridges: - with 2 voltage/current analog inputs - with 2 inputs for temperature probes - with 2 voltage/current analog outputs □ 2 application cartridges: - for control of hoisting applications - for control of packaging applications		
		1 slot for cartridge on the controller		
	■ Communication modules	□ 1 Ethernet port Modicon TM4 module with switch function and 4 embedded ports □ 1 Modicon TM4 module for slave Profibus DP link		
Mounting		Mounting on ⊥ symmetrical rail or panel		
Software programming		With EcoStruxure Machine Expert V1.1, consult catalog Ref. DIA3ED2180701EN		
Controller type	with serial links	**TM241C24R**	**TM241C24T**	**TM241C24U**
	with embedded Ethernet port and serial links	**TM241CE24R**	**TM241CE24T**	**TM241CE24U**
	with embedded Ethernet port, CANopen port and serial links	**TM241CEC24R**	**TM241CEC24T**	**TM241CEC24U**
Page		16		

(1) OPC UA function which can be activated on request.

Applications		**Control of simple movements** **Control of control loops**		
				
Supply voltage		100-240 V ∿	24 V ⎓	
Inputs/outputs	■ Logic inputs/outputs	**40 logic inputs/outputs**		
	□ No. and type of inputs	24 sink/source 24 V ⎓ inputs inc. 8 high-speed inputs	24 sink/source 24 V ⎓ inputs inc. 8 high-speed inputs	24 sink/source 24 V ⎓ inputs inc. 8 high-speed inputs
	□ No. and type of outputs	16 outputs: with 4 source transistor high-speed outputs and 12 relay outputs	16 source transistor outputs inc. 4 high-speed outputs	16 sink transistor outputs inc. 4 high-speed outputs
	Connection of logic inputs/outputs	On removable screw terminal block		
I/O expansion		□ 7 Modicon TM3 expansion modules □ 14 Modicon TM3 expansion modules with the use of bus expansion modules (transmitter and receiver) □ Possible use of Modicon TM2 expansion modules with restrictions		
Embedded communication	Ethernet link	1 Ethernet port on **TM241CE40●** controllers: □ Protocols: Modbus TCP Client/Server, slave Modbus TCP, EtherNet/IP Adapter/Originator, OPC UA Server *(1)*. □ Services: firmware update, data exchange - NGVL and IEC VAR ACCESS, WEB Server, MIB2 SNMP network management, FTP file transfer, FTP Client/Server, SNMP Client/Server V1 & V2, SQL Client, Email library, DHCP Client dynamic configuration, programming, downloading, monitoring, SNTP Client, DNS Client. □ Services on **TM241CE40●** controllers: Modbus TCP Scanner Manager and EtherNet/IP Scanner Manager, email sending and receipt		
	CANopen link	–		
	Serial link	2 serial link ports: □ 1 SL1 port (RJ 45), RS 232/RS 485 with +5 V supply □ 1 SL2 port (screw terminal block), RS 485		
Function	Control	PID		
	Counting	8 high-speed counter (HSC) inputs, 200 kHz frequency and 6 to 8 standard counter inputs, 1 kHz frequency		
	Position control	4 high-speed position control outputs, 100 kHz frequency and 4 transistor standard position control outputs, 1 kHz frequency: □ pulse train (PTO) P/D, CW and CCW, 100 kHz frequency □ pulse width modulation (PWM) □ frequency generator (FG)		
Options	■ Cartridges	□ 3 analog I/O expansion cartridges: - with 2 voltage/current analog inputs - with 2 inputs for temperature probes - with 2 voltage/current analog outputs □ 2 application cartridges: - for control of hoisting applications - for control of packaging applications		
		2 slots for cartridge on the controller		
	■ Communication modules	□ 1 Ethernet port Modicon TM4 module with switch function and 4 embedded ports □ 1 Modicon TM4 module for slave Profibus DP link		
Mounting		Mounting on ⊥ symmetrical rail or panel		
Software programming		With EcoStruxure Machine Expert V1.1, consult catalog Ref. DIA3ED2180701EN		
Controller type	with serial links	**TM241C40R**	**TM241C40T**	**TM241C40U**
	with embedded Ethernet port and serial links	**TM241CE40R**	**TM241CE40T**	**TM241CE40U**
	with embedded Ethernet port, CANopen port and serial links	**–**	**–**	**–**
Page		16		

Modicon M241 logic controllers
General presentation

M241 logic controller with 24 I/O

M241 logic controller with 40 I/O

DIA3ED2140109EN

DIA3ED2180701EN

Example of a QRcode:
QRcode for access to the TM241CEC24R logic controller technical documentation

EcoStruxure Machine Expert V1.1 software

Presentation

Applications

Modicon M241 logic controllers are designed for high-performance compact machines incorporating speed and position control functions.
They have an embedded Ethernet port offering FTP Client/Server, Web Server and SQL Client and OPC UA Server services, meaning they can easily be integrated in control system architectures for remote monitoring and maintenance of machines by means of applications for smartphones, tablets and PCs.

- The wealth of embedded functions minimizes the cost of the machine:
  - Functions embedded in the controller: Modbus serial link, USB port dedicated to programming, Ethernet I/O Scanner, CANopen and SAE J1939 fieldbus for distributed architectures and advanced position control functions (high-speed counters and pulse train outputs for controlling servo motors.
  - Functions embedded in Modicon TM3 extensions *(1)*: functional safety modules, motor-starter control module and remote expansion system.
  - Functions embedded in Modicon TM4 communication modules.
- The processing power and the memory size of M241 controllers are ideal for targeting high-performance applications.
- SoMachine's programming software is powerful and intuitive, making it quick to create applications. Existing applications in Modicon M221, M238 and M258 ranges can also be retrieved easily, thus protecting the investment already made.

Main functions

M241 logic controllers come in 2 formats (w x h x d):

- controllers with 24 I/O: 150 x 90 x 95 mm *(5.90 x 3.54 x 3.74 in.)*
- controllers with 40 I/O: 190 x 90 x 95 mm *(7.48 x 3.54 x 3.74 in.)*

- Inputs and outputs embedded in M241 controllers are connected on removable screw terminal blocks, supplied with the controllers.
- A Run/Stop switch is available on every M241 controller.
- A slot for an industrial SD memory card (Secure Digital card) is available on every M241 controller.

A slot integrated in every M241 controller can take up to 2 cartridges of the following types:

- Analog input or output expansion cartridges
- Application cartridges: hoisting or packaging

Every M241 logic controller has a QR code for direct access to its technical documentation.

Embedded communication

M241 logic controllers incorporate up to 5 communication ports:

- Ethernet with embedded Web server function
- CANopen: CANopen (master) and SAE J1939 (Request Manager)
- 2 serial links
- USB mini-B programming port

Embedded functions

- PID control
- 8 high-speed counter (HSC) inputs, 200 kHz frequency and 6 to 8 standard counter inputs, 1 kHz frequency
- 4 high-speed position control outputs, 100 kHz frequency and 4 standard position control outputs, 1 kHz frequency for:
  - pulse train (PTO) P/D, CW and CCW
  - pulse width modulation (PWM)
  - frequency generator (FG)
- 4 PTO/HSC configurable expert channels and up to 14 or 16 single HSC channels depending on the chosen configuration and the controller type (for more details, see the user guide for Modicon M241 logic controllers)

Processing power

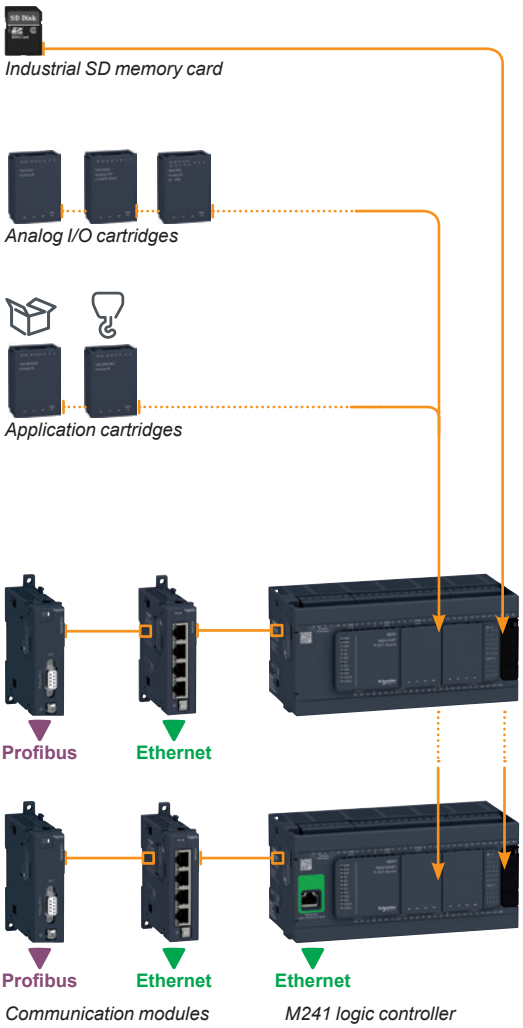
- Execution speed: 22 ns/Boolean instruction with 128 K Boolean instructions in the program
- DualCore processor
- Program size: 8 MB for application and symbols.
- RAM: 64 MB
- Flash memory: 128 MB

Programming

Modicon M241 logic controllers are programmed with EcoStruxure Machine Expert V1.1, consult catalog DIA3ED2180701EN.

(1) Consult catalog Ref. DIA3ED2140109EN.
(2) Consut le catalog Ref. DIA3ED2180701EN.

Modicon M241 logic controllers
Options for Modicon M241 controllers



Options for Modicon M241 controllers

Memory card

The **TMASD1** industrial SD memory card, 256 MB capacity, is available for:
- backing up and transferring applications
- data logging
- firmware updates

Cartridges for Modicon M241 controller

Up to 2 cartridges (depending on controller model) can be inserted on the M241 controller front panel without increasing its dimensions.

■ I/O cartridges

Three input or output cartridges are available:
- **TMC4AI2** cartridge for 2 analog inputs which can be configured as voltage or current
- **TMC4AQ2** cartridge for 2 analog outputs which can be configured as voltage or current
- **TMC4TI2** cartridge for 2 inputs which can be configured for temperature probes

■ Application cartridges

2 cartridges are available:
- The **TMC4HOIS01** Hoisting application cartridge has 2 dedicated analog inputs for control of a load cell.

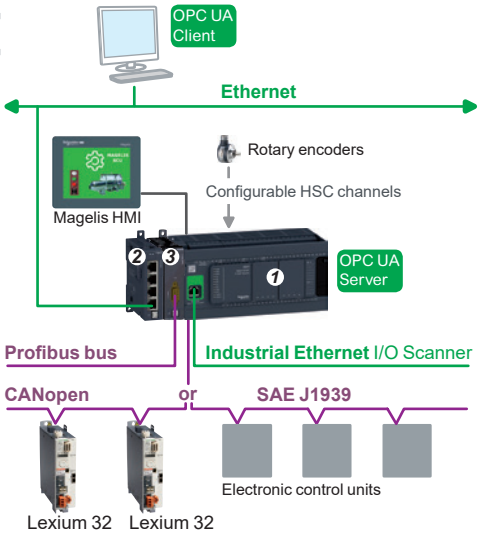
The **TMC4PACK01** Packaging application cartridge has 2 analog inputs dedicated to temperature control on packaging machines.
Use of an Application cartridge provides direct access to Application Function Blocks via EcoStruxure Machine Expert V1.1 software.

Communication modules *(1)*

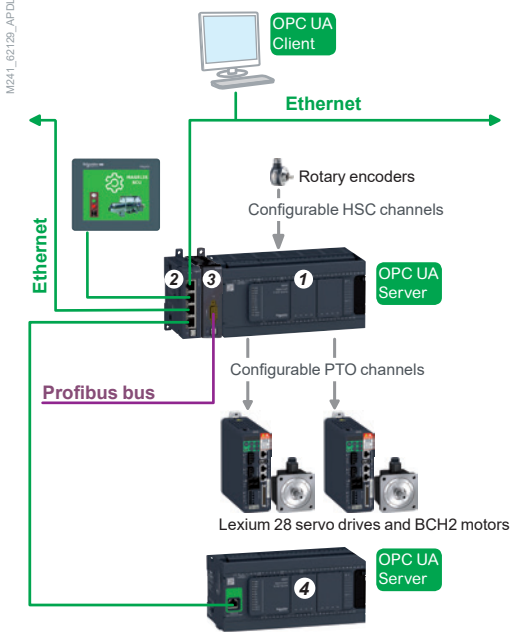
2 communication module models are dedicated to Modicon M241 logic controllers:
- The **TM4ES4** Ethernet switch module:
  - provides an Ethernet connection with 4 ports on controllers without embedded Ethernet
  - provides a second Ethernet connection with 4 ports on controllers with embedded Ethernet (except on TM241CEC24●)
- The **TM4PDPS1** Profibus DP slave module

Modicon TM4 communication modules are assembled by simple interlocking on the left-hand side of the controllers and a bus expansion connector is used to distribute data and the power supply.
Up to 3 communication modules can be added on the left of M241 logic controllers.
See **page 18.**

(1) For rules for combining Modicon TM4 communication modules and Modicon M241 logic controllers, see page 18.



*1 Embedded Ethernet on TM241C**E**●●● controllers*
2 TM4ES4 (Ethernet) communication module
3 TM4PDSP1 (Profibus bus) communication module



1 TM241C24●●/TM241C40●● controllers
2 TM4ES4 (Ethernet) communication module
3 TM4PDSP1 (Profibus bus) communication module
*4 TM241C**E**●●● controllers (with embedded Ethernet)*

Embedded communication

M241 logic controllers have up to 5 embedded communication ports:
- 2 serial links: SL1 (RJ 45) and SL2 (screw terminal block) and a programming port (USB mini-B) on each controller.
- An Ethernet port (RJ 45) or an Ethernet port (RJ 45) and a CANopen port depending on the controller model.

Communication on Ethernet network

TM241C**E**●●● controllers have an embedded RJ 45 Ethernet port (10/100 Mbps, MDI/MDIX) with Modbus TCP Client/Server, EtherNet/IP Adapter/Originator, I/O Scanner, UDP, TCP, SQL Client, SNMP Client/Server V1 and V2, OPC UA Server, SNTP Client, DNS Client and EcoStruxure Machine protocols.

- Every M241 controller has an embedded web server and FTP Client/Server server. As well as the default address based on the MAC address, a controller IP address can be assigned via a DHCP server or via a BOOTP server.
- The Ethernet port also offers the same uploading, updating and debugging functions as the programming port (USB mini-B) when the controller is supplied with power.
- A firewall is used to filter the IP addresses that are authorized to access the controller and to lock each communication protocol.
- The embedded Ethernet port is optimized for connecting field devices (variable speed drives, distributed I/O, etc.), RJ 45 type, with EtherNet/IP Scanner, Modbus TCP I/O Scanner, EtherNet Modbus TCP Client/Server, EtherNet/IP Originator and Adapter, UDP, TCP, SNMP Client/Server V1 and V2, OPC UA Server, SNTP Client, DNS Client and EcoStruxure Machine services.
  - EtherNet/IP Scanner can be used to connect up to 16 slave devices managed by the controller in 10 ms (1024 input words + 1024 output words).
  - Modbus TCP I/O Scanner can be used to connect up to 64 slave devices managed by the controller in 64 ms.
- On TM241CE●●● controllers an optional second Ethernet link is possible by using the TM4ES4 module optimized for “Machine” or “Factory” network connection (4 RJ 45 connectors).

Connection cables and accessories for Ethernet network: please consult our catalog DIA3ED2160105EN.

Communication on CANopen

TM241CE**C**24● controllers have an embedded CANopen port for master CANopen communication.
The link can be configured between 20 Kbps and 1 Mbps and supports up to 63 slaves.

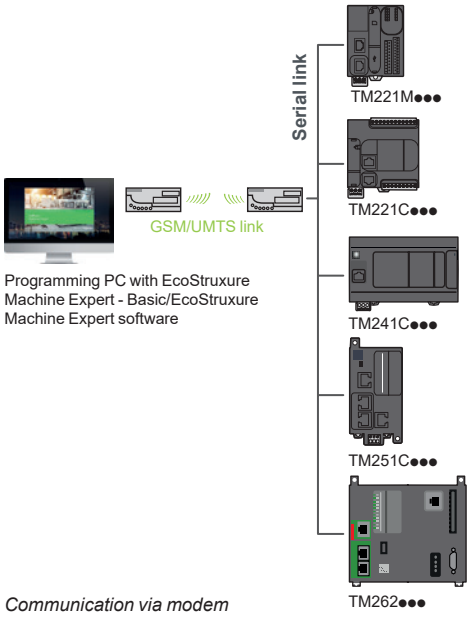
- Architectures based on CANopen are used to distribute I/O modules as close to the sensors and actuators as possible, thus reducing wiring costs and times, and to communicate with different devices such as variable speed drives, servo drives, etc.
- The CANopen configurator is integrated in the EcoStruxure Machine Expert V1.1 software and can also be used to import standard description files in EDS format.

CANopen connection cables and accessories: please consult our catalog ref. DIA3ED2160104EN.

Communication on SAE J1939 network

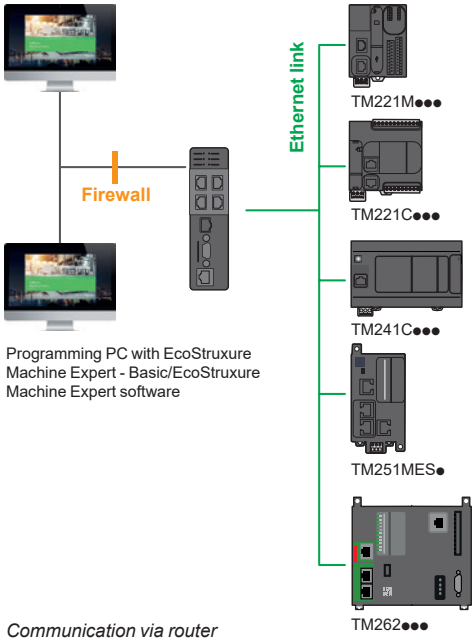
The SAE J1939 protocol is available on the CANopen port of TM241CE**C**24● logic controllers.
The SAE J1939 protocol is mainly used in the commercial vehicles sector to communicate with the various electronic control units embedded in the same vehicle such as the engine, transmission, braking system, retarder and dashboard, etc.

Modicon M241 logic controllers
Embedded communication
Communication via modem and router



Programming PC with EcoStruxure Machine Expert - Basic/EcoStruxure Machine Expert software

Communication via modem



Programming PC with EcoStruxure Machine Expert - Basic/EcoStruxure Machine Expert software

Communication via router

Embedded communication

Serial links

Every M241 controller has 2 embedded serial links.

- The SL1 serial link can be configured as RS 232 or RS 485. In addition, a 5 V/200 mA voltage is available on the RJ 45 connector, which can therefore power a Magelis **XBTN** or **XBTRT** HMI or the **TCSWAAC13FB** Bluetooth® communication adapter, or other devices.
- The SL2 serial link is configured as RS 485.

These 2 links incorporate the 2 most commonly used protocols on the market:

- Master or Slave Modbus ASCII/RTU
- Character string (ASCII)

Connection cables and accessories for serial link: please consult our catalog DIA3ED2160106EN.

Programming port with power off charging function

The programming port, equipped with a USB mini-B connector, is embedded in every M241 controller; it is dedicated to communication with a PC equipped with SoMachine for:

- programming
- debugging
- maintenance

In addition, it offers the ability to load an application program or update the firmware without the controller being powered by another source.

Communication via modem and router

The communication via modem and router offer is dedicated to the following applications:

- Synchronization between remote machines; direct data exchange between controllers.
- Remote maintenance; access to the controller via the SoMachine programming software.
- Remote control and monitoring of machines; receipt of information and sending commands on GSM/UMTS phone *(1)*.

This offer comprises a Schneider Electric modem, GSM/UMTS modem and a VPN router made by eWon.

For modem and router, please consult our website www.schneider-electric.com

(1) Global System Mobile (2G)/Universal Mobile Telecommunications System (3G).

Modicon M241 logic controllers
I/O expansion with Modicon TM3 expansion modules

I/O expansion with Modicon TM3 modules

Modicon TM3 expansion modules

The capacity of M241 logic controllers can be enhanced with the Modicon TM3 expansion module offer:

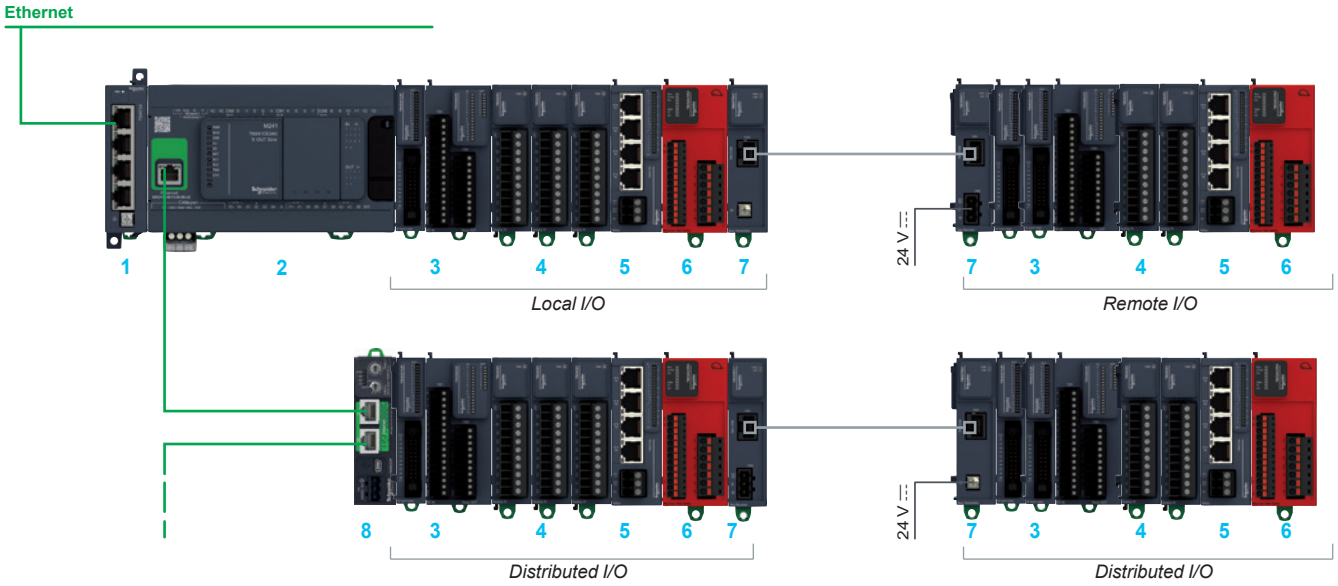
- Digital I/O modules which can be used to create configurations with up to 488 digital I/O. These modules are available with the same connections as the controllers.
- Analog I/O modules which can be used to create configurations with up to 114 analog I/O and are designed to receive, amongst other things, position, temperature, and speed sensor signals. They are also capable of controlling variable speed drives or any other device equipped with a current or voltage input.
- Expert modules for controlling TeSys motor starters which simplify wiring up the control section due to connection with RJ 45 cables.
- Functional safety modules which simplify wiring and can be configured in the EcoStruxure Machine Expert V1.1 software.

In addition, the TM3 expansion system is flexible due to the possibility of remotely locating some of the TM3 modules in the enclosure or another cabinet, up to 5 meters (*16.404 ft*) away, using a bus expansion system.

The Modicon TM3 expansion system is common to the ranges of Modicon M221, M241 and M251 logic controllers, and Modicon M262 Logic/Motion controller, meaning that the controller model can be upgraded without changing expansion module.

I/O configuration

EcoStruxure Machine Expert software is used to configure the local and remote I/O and distributed I/O islands.



1 TM4ES4 Ethernet switch communication module
2 Modicon TM241CE●● logic controller
3 Digital I/O modules
4 Analog I/O modules
5 Expert module for controlling TeSys motor starters
6 Functional safety modules
7 Bus expansion modules (transmitter and receiver) and bus expansion cable
8 TM3BC bus coupler module

Local I/O

Maximum configuration: 7 Modicon TM3 expansion modules associated with a Modicon M241 logic controller.

Remote I/O

Maximum configuration : 14 Modicon TM3 expansion modules (7 local modules + 7 remote modules) with Modicon TM3 bus expansion modules (transmitter module and receiver module).

The transmitter and receiver bus expansion modules can be used to:

- increase the number of expansion modules that can be connected to a Modicon M241 logic controller from 7 to 14.
- locate Modicon TM3 expansion modules remotely, up to 5 m (*16.40 ft*) away

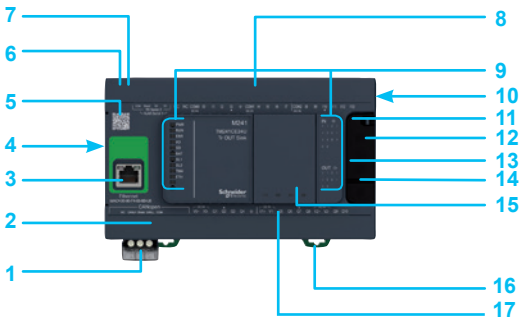
The transmitter module and receiver module are physically connected by a bus expansion cable, reference **VDIP184546●●●**, or any other Cat 5E, F/UT cable.

Distributed I/O configuration

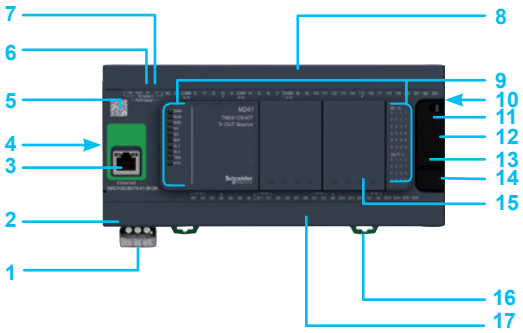
The Modicon TM3BC bus coupler module is used to create distributed I/O islands on the Ethernet network.

- The bus coupler module is connected via an isolated RJ45/RJ45 cable.
- Maximum configuration: 14 Modicon TM3 expansion modules (7 modules + 7 modules) with the Modicon TM3 bus expansion system (transmitter module and receiver module).

(1) Compatibility of expansion module offers: the majority of Modicon TM2 expansion modules can be used with M241 logic controllers. Nonetheless, adding a Modicon TM2 expansion module to a configuration can increase the expansion module execution times by as much as a few milliseconds. The compatibility of Modicon TM2 expansion modules with M241 logic controllers is described in detail on our website www.schneider-electric.com.



M241 controllers with 24 I/O



M241 controllers with 40 I/O

Description

M241 controllers

1 Removable screw terminal block, 3 terminals for connecting the 24 V ⎓ or 100-240 V ∿ supply (depending on the model).
2 On TM241CE**C**24● controllers: a connector for linking to the CANopen and SAE J1939 machine bus (screw terminal block).
3 On TM241C**E**●●● controllers: RJ 45 connector for Ethernet network connection, with exchange and activity speed LED indicator.
4 TM4 bus connector: communication bus for linking to TM4●●● communication modules.
5 QR code for access to the controller technical documentation.
6 SL1 serial link port (RS 232 or RS 485): RJ 45 connector.
7 SL2 serial link port (RS 485): screw terminal block.
8 Connection of 24 V ⎓ logic inputs: removable screw terminal blocks *(1)*.
9 LED display block showing:
- the status of the controller and its components (battery, industrial SD memory card)
- the status of the embedded communication ports (CAN, serial links, Ethernet)
- the status of the embedded I/O

10 TM3 bus connector for linking to a Modicon TM3 expansion module.

Behind the removable cover: 11, 12, 13, 14, 15

11 Run/Stop switch.
12 Slot for the industrial SD memory card.
13 Backup battery slot.
14 A USB mini-B connector for a programming terminal.
15 Slot(s) for I/O cartridge(s) or application cartridge(s):
- one slot on TM241C●24
- two slots on TM241C●40

16 Clip for locking on ⊔ symmetrical rail.
17 Connection of relay/transistor logic outputs: on removable screw terminal blocks *(1)*.

(1) Removable terminal blocks equipped with screw terminals. Terminal blocks supplied with controller.

Characteristics of M241 logic controllers

Conformity

■ Certifications

□ CE, cULus Listing Mark, C-Tick, EAC, LR, ABS, DNV and GL.
□ ODVA and Achilles.

■ Standards

□ IEC/EN 61131-2 (Edition 2 2007), UL 508 (UL 61010-2-201), ANSI/ISA 12.12.01-2007, CSA C22.2 No. 213, No. 142, E61131-2 and IACS E10.

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 V⎓/1,000 m (150 V⎓/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/*0.14 in.*); 8.4...150 Hz (acceleration 1 g)
- For merchant navy: 5…13.2 Hz (amplitude 1.0 mm/*0.04 in.*); 13.2...100 Hz (acceleration 0.7 g)

Supply characteristics

2 power supply types are available depending on the M241 controller model: 24 V ⎓ or 100-240 V∿ 50/60 Hz.

□ Voltage limit (including ripple): 19.2...28.8 V ⎓/85...264 V ∿
□ Immunity to micro-cuts (class PS-2): 10 ms
□ Max. consumption: 45 W

Modicon M241 logic controllers
M241 logic controllers, options


TM241C24R


TM241C40R


TM241CEC24U


TM241CE24R


TM241CE40T


TM241CE40U

References

Modicon M241 logic controllers *(1)*

No. of logic inputs/ outputs	Logic inputs	Logic outputs	Embedded communication ports *(2)* Ethernet (RJ 45)	CANopen (screw terminal block): CANopen/ SAE J1939	Serial links (RJ 45 and screw terminal block)	Reference	Weight kg *lb*
■ **100-240 V ∿** power supply							
24 inputs/ outputs	14 sink/source 24 V ⎓ inputs, inc. 8 high-speed inputs	10 outputs: with 4 source transistor high-speed outputs and 6 relay outputs	–	–	1 + 1	TM241C24R	0.530 *1.168*
			1	–	1 + 1	TM241CE24R	0.530 *1.168*
			1	1	1 + 1	TM241CEC24R	0.530 *1.168*
40 inputs/ outputs	24 x 24 V ⎓ inputs, inc. 8 high-speed inputs	16 outputs: with 4 source transistor high-speed outputs and 12 relay outputs	–	–	1 + 1	TM241C40R	0.620 *1.367*
			1	–	1 + 1	TM241CE40R	0.620 *1.367*
■ **24 V ⎓** power supply							
24 inputs/ outputs	14 sink/source 24 V ⎓ inputs, inc. 8 high-speed inputs	10 source transistor outputs, inc. 4 high-speed outputs	–	–	1 + 1	TM241C24T	0.530 *1.168*
			1	–	1 + 1	TM241CE24T	0.530 *1.168*
			1	1	1 + 1	TM241CEC24T	0.530 *1.168*
	14 sink/source 24 V ⎓ inputs, inc. 8 high-speed inputs	10 sink transistor outputs, inc. 4 high-speed outputs	–	–	1 + 1	TM241C24U	0.530 *1.168*
			1	–	1 + 1	TM241CE24U	0.530 *1.168*
			1	1	1 + 1	TM241CEC24U	0.530 *1.168*
40 inputs/ outputs	24 sink/source 24 V ⎓ inputs, inc. 8 high-speed inputs	16 source transistor outputs, inc. 4 high-speed outputs	–	–	1 + 1	TM241C40T	0.620 *1.367*
			1	–	1 + 1	TM241CE40T	0.620 *1.367*
	24 sink/source 24 V ⎓ inputs, inc. 8 high-speed inputs	16 sink transistor outputs inc. 4 high-speed outputs	–	–	1 + 1	TM241C40U	0.620 *1.367*
			1	–	1 + 1	TM241CE40U	0.620 *1.367*


TMC4AI2


TMC4AQ2


TMC4TI2


TMC4HOIS01


TMC4PACK01

Options for Modicon M241 logic controllers

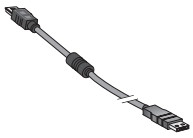
Designation	Description	Reference	Weight kg *lb*
I/O cartridges	2 analog inputs (12-bit resolution) configurable as: - 0…10 V voltage - 0…20 mA/4…20 mA current Screw terminal version	TMC4AI2	0.025 *0.055*
	2 analog outputs (12-bit resolution) configurable as: - 0…10 V voltage - 0…20 mA/4…20 mA current Screw terminal version	TMC4AQ2	0.025 *0.055*
	2 inputs (14-bit resolution) configurable for RTD, TC temperature probes Screw terminal version	TMC4TI2	0.025 *0.055*
Cartridges for specific application	Hoisting application: 2 analog inputs for a load cell Screw terminal version	TMC4HOIS01	0.025 *0.055*
	Packaging application: 2 analog inputs Screw terminal version	TMC4PACK01	0.025 *0.055*
Industrial SD memory card	Application backup and program transfer Capacity: 256 MB	TMASD1	0.004 *0.009*


TMASD1

(1) M241 controllers are supplied with:
- *removable terminal blocks (screw terminals) for connecting the I/O at intervals of 3.81 mm (0.15 in.)*
- *a removable terminal block for connecting the power supply at intervals of 5.08 mm (0.2 in.)*
- *a button cell backup battery (BR2032)*

(2) Every M241 logic controller has an embedded USB mini-B programming port.

Modicon M241 logic controllers
Options, separate parts, programming software, connection cables



TCSXCNAMUM3P

References

Replacement parts

Designation	Description	Unit reference	Weight kg / lb
Set of connectors for connecting the I/O	Removable connectors with screw terminals: 8 different connectors for equipping an M241 logic controller (1 x SL2, 6 x I/O, 1 x CANopen)	TMAT4CSET	0.127 *0.280*
Set of power supply terminal blocks	8 removable terminal blocks with screw terminals	TMAT2PSET	0.127 *0.280*
Backup battery	The battery supplied with each controller is not available as a separate part in the Schneider catalog. If a replacement part is needed, only use a Panasonic battery type BR2032.		

Programming software

Designation	Use	Version	Reference
EcoStruxure Machine Expert software	For M241 logic controllers	V1.1	Please consult our catalog DIA3ED2180701EN

Expansion modules

Designation	Use	Reference
Modicon TM3 expansion modules	For M241 logic controllers	Please consult our catalog DIA3ED2140109EN

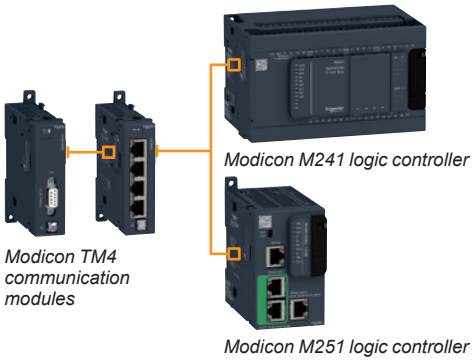
Communication modules

Designation	Use	Reference
Modicon TM4 communication modules	Ethernet port module, slave Profibus DP module	See page 19

Connection cables

Designation	Use from	to	Length	Reference	Weight kg / lb
Programming cables	PC USB port	USB mini-B port on M221, M241, M251 and M258 controllers	3 m *(0.98 ft)*	TCSXCNAMUM3P *(1)*	0.065 *0.143*
			1.8 m *(5.90 ft)*	BMXXCAUSBH018	0.065 *0.143*

(1) Unshielded, non-grounded cable. Only for use on temporary connections. For permanent connections, use cable reference BMXXCAUSBH018.



Presentation

Applications

The Modicon TM4 communication module offer is dedicated to Modicon M241 and Modicon M251 logic controllers, increasing the options for connection.
Two communication module models are available:

- The TM4ES4 Ethernet switch module, offering an Ethernet connection with 4 ports
- The TM4PDPS1 Profibus DP slave module

■ Ethernet switch module

The TM4ES4 module is a 4-port Ethernet interface (10/100 Mbps, MDI/MDIX) with the following protocols: Ethernet Modbus TCP Client/Server, Ethernet/IP Adapter, UDP, TCP, SNMP, OPC UA Server and EcoStruxure Machine.

- The TM4ES4 module is ready for use as soon as it is connected to the communication bus of M241 and M251 controllers.
- This module is used to add the Ethernet function to TM241C24● and TM241C40● controllers without an embedded Ethernet port, while offering an additional Ethernet switch function.
- Connected on controllers with embedded Ethernet port type TM241CE24●●● or TM241CE40●●●, it can constitute a second Ethernet link for the “Machine” or “Factory” network.
- Connected on controllers with an embedded Ethernet port type TM241CE●●● or on a TM251MES● controller, it can also constitute an autonomous switch with four ports: communication between the TM4ES4 module and the Modicon M241 and M251 controllers is not automatically enabled by the bus connector.

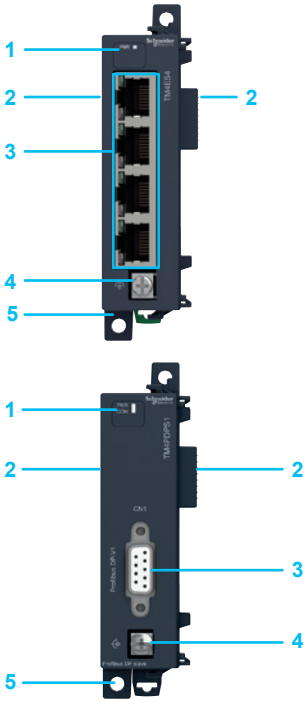
■ Slave Profibus DP module

The TM4PDPS1 communication module can be used to configure a slave connection on the Profibus DP bus.

Rules for combination

Up to 3 communication modules (in total) can be added on the left of M241 and M251 logic controllers, in order to increase their options for connection to the Ethernet and Profibus networks.

- TM241C24●●●, TM241C40●●●, TM241CE24●●● and TM241CE40●●● controllers can all be provided with a TM4ES4 module with the Ethernet port function and 2 TM4ES4 modules with the autonomous switch function while complying with the maximum number of 3 TM4 modules in total.
- TM241CEC24● and TM251●●● controllers can be provided with 3 TM4ES4 modules with the autonomous switch function while complying with the maximum number of 3 TM4 modules in total.
- TM4 communication modules are assembled by simply clipping them onto the left-hand side of M241 and M251 controllers, and a bus expansion connector is used to distribute data and power.



Description

■ **TM4ES4** Ethernet switch module

1 Power on LED indicator.
2 Bus connector (1 on each side).
3 4 RJ 45 connectors for Ethernet network, with exchange and activity speed LED indicator.
4 Screw terminal for the functional ground (FG) connection.
5 Locking clip on ⊥ symmetrical rail.

■ **TM4PDPS1** slave Profibus DP module

1 Power on LED indicator.
2 Bus connector (1 on each side).
3 9-way SUB-D connector for connection to the Profibus DP bus.
4 Screw terminal for the functional ground (FG) connection.
5 Locking clip on ⊥ symmetrical rail.

References

TM4ES4

TM4PDPS1

Options for M241 logic controllers

Designation	Description	Reference	Weight kg *lb*
Communication modules	Ethernet switch module with switch function and 4 embedded ports Equipped with 4 RJ 45 connectors (10/100 Mbps, MDI/MDIX)	TM4ES4 *(1)*	0.110 *0.243*
	Slave Profibus DP module Equipped with a 9-way SUB-D connector	TM4PDPS1	0.110 *0.243*

(1) Can be used as an Ethernet port or an autonomous switch depending on the controller model and configuration.

Compatibility

Ethernet services of embedded Ethernet ports

Configuration	Ethernet port embedded on M241 controllers											Ethernet ports embedded on TM4ES4 module *(without modifying the firmware)*							
	EtherNet/IP Originator I/O Scanner	EtherNet/IP Adapter	Modbus TCP Client I/O Scanner	Modbus TCP Server	Slave Modbus TCP	OPC UA Server	FTP Server	Viewer Web	NGVL	Web system	DHCP Server	EtherNet/IP Adapter	Modbus TCP Server	Slave Modbus TCP	OPC UA Server	FTP Server	Viewer Web	NGVL	Web system	Switch function only
TM241C controllers + TM4ES4 module configured with EcoStruxure Machine Expert												■	■	■	■	■	■	■	■	
TM241C24 controllers + TM4ES4 module not configured with EcoStruxure Machine Expert													■			■	■	■	■	
TM241CE controllers + TM4ES4 module configured with EcoStruxure Machine Expert	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
TM241CE controllers + TM4ES4 module not configured with EcoStruxure Machine Expert	■	■	■	■	■	■	■	■	■	■	■									■

■ Service offered

Modicon M241 logic controllers
Product reference index

www.schneider-electric.com/Machine control solutions

Schneider Electric Industries SAS

Head Office
35, rue Joseph Monier
F-92500 Rueil-Malmaison
France

Design: Schneider Electric
Photos: Schneider Electric

June 2019-V5.1

DIA3ED2140107EN

Modicon M251 logic controllers

Catalog

June 2019

Schneider Electric

Modicon

Discover Modicon

Industrial Edge control for IIoT

Modicon IIoT-native edge controllers manage complex interfaces across assets and devices or directly into the cloud, with embedded safety and cybersecurity. **Modicon** provides performance and scalability for a wide range of industrial applications up to high-performance multi-axis machines and high-available redundant processes.

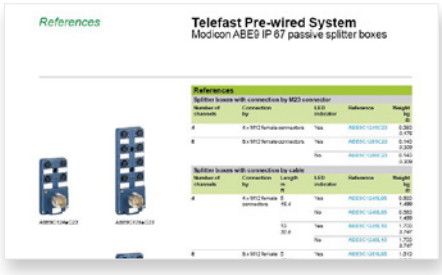
Explore our offer

- **Modicon** HVAC Controllers
- **Modicon** PLC
- **Modicon** Motion Controllers
- **Modicon** PAC
- **Modicon** I/O
- **Modicon** Networking
- **Modicon** Power Supply
- **Modicon** Wiring
- **Modicon** Safety

Life Is On | Schneider Electric

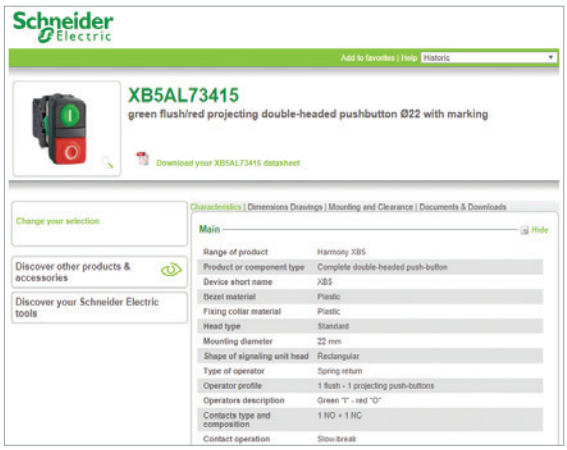
Quick access to product information

Get technical information about your product



Each commercial reference presented in a catalog contains a hyperlink. Click on it to obtain the technical information of the product:

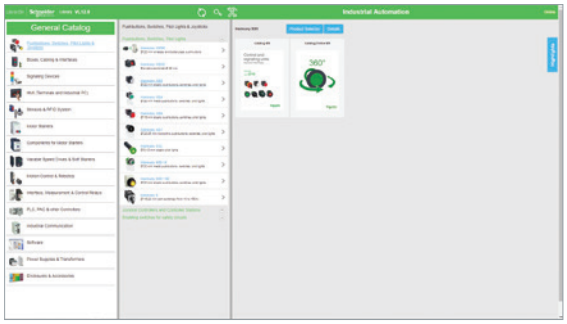
- Characteristics, Dimensions and drawings, Mounting and clearance, Connections and schemas, Performance curves
- Product image, Instruction sheet, User guide, Product certifications, End of life manual



Find your catalog

> With just 3 clicks, you can reach the Industrial Automation and Control catalogs, in both English and French

> Download Digi-Cat with this link



- Updated quarterly
- Embeds product selectors and configurators, 360° images, training centers
- Optimized search by commercial reference

Select your training

> Find the right Training for your needs on our Global website

> Locate the training center with the selector tool, using this link

Life Is On Schneider Electric

General content

Modicon™ M251 logic controllers

Modicon TM4 communication modules

Products reference index

To be competitive in today's digital era, machine builders must be innovative. Smart machines, those that are better connected, more flexible, more efficient, and safe, are enabling machine builders to innovate in ways never before possible.

EcoStruxure, Schneider Electric's open, IoT-enabled architecture and platform, offers powerful solutions for the digital era. As part of this, EcoStruxure Machine brings powerful opportunities for machine builders and OEMs, empowering them to offer smart machines and compete in the new, digital era.

EcoStruxure Machine brings together key technologies for product connectivity and edge control on premises, and cloud technologies to provide analytics and digital services. EcoStruxure Machine helps you bring more innovation and added value to your customers throughout the entire machine life cycle.

Innovation at Every Level for Machines is full systems across three layers:

– Connected products
Our connected products for measuring, actuating, device level monitoring, and control adhere to open standards to provide unmatched integration opportunities and flexibility

– Edge Control
We are IIoT-ready with a proven set of tested and validated reference architectures that enable the design of end-to-end open, connected, and interoperable systems based on industry standards. Ethernet and OPC UA facilitates IT/OT convergence meaning machine builders reap benefits from web interfaces and cloud.

– Apps, Analytics & Services
Seamless integration of machines to the IT layer allows the collection and aggregation of data ready for analysis – for machine builders and end users alike this means increased uptime and the ability to find information faster for more efficient operations and maintenance.

These levels are completely integrated from shop floor to top floor. And we have cloud offers and end-to-end cybersecurity wrapped around.

EcoStruxure Machine makes it easier for OEMs/ machine builders to offer their customers smarter machines. The advent of smart machines is driven by the changing needs of end users:

– Evolving workforce
– Reducing costs
– Dynamic markets
– Shorter life cycles
– Prioritizing safety and cybersecurity

EcoStruxure Machine provides one solution for the whole machine life cycle:

– With Smart Design & Engineering the time to market is reduced by up to 30% using our automated engineering and the simulation capabilities

– During Commissioning & Operation of the machine, resources such as energy, material and loss can be improved, and with seamless integration to the IT world efficiency can be improved by up to 40%

– Smart Maintenance & Services reduces the time for corrective actions up to 50%

EcoStruxure™ Innovation At Every Level **Machine**

* The Schneider Electric industrial software business and AVEVA have merged to trade as AVEVA Group plc, a UK listed company. The Schneider Electric and Life is On trademarks are owned by Schneider Electric and are being licensed to AVEVA by Schneider Electric.

Modicon M251 logic controllers
Controllers for industrial machines

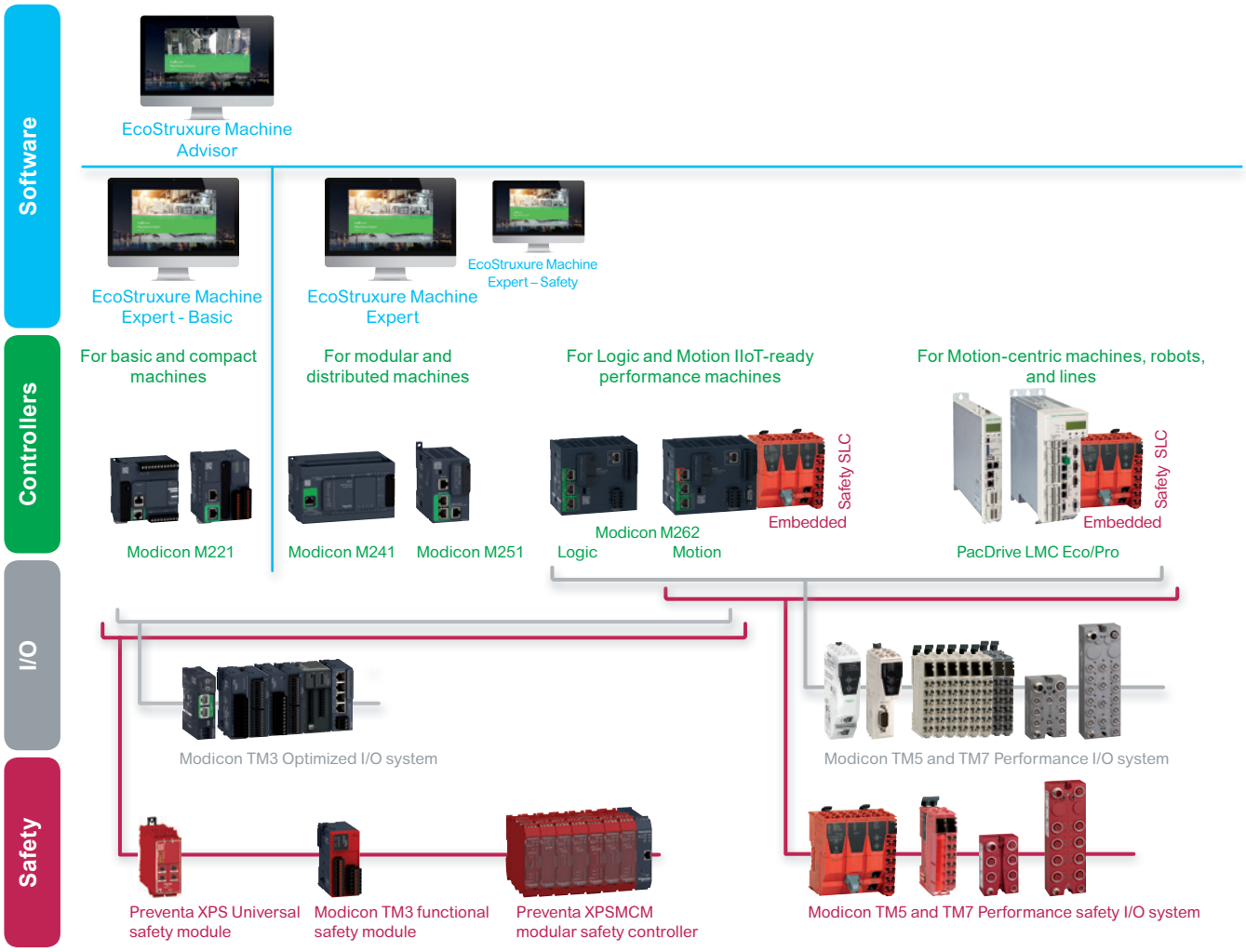
Applications	Type	**Logic controller**			**Logic/Motion controller**	**Motion controller**
	Specification	For hardwired architectures	For performance-demanding applications	For modular and distributed architectures	IIoT ready for performance machines	For automating machines/lines with 0 - 130 servo or robot axes
						
Performance		0.2 µs/inst	22 ns/inst	22 ns/inst	3...5 ns/inst	0.5...2 ns/inst
Memory		640 KB RAM, 2 MB Flash	64 MB RAM, 128 MB Flash	64 MB RAM, 128 MB Flash	256 MB RAM, 256 MB Flash	128 KB to 256 KB NV RAM 512 MB DDR2 to 1 GB DDR3L
Supply voltage		24 V ⎓ or 100...240 V ∿	24 V ⎓ or 100...240 V ∿	24 V ⎓	24 V ⎓	24 V ⎓
Communication fieldbus and networks	Embedded	■ EtherNet/IP ■ RS 232/RS 485 serial link ■ USB mini-B programming port	■ Ethernet ■ CANopen (master) and SAE J1939 ■ 2 serial links ■ USB mini-B programming port	■ EtherNet/IP ■ CANopen (master) and SAE J1939 ■ Serial link ■ USB mini-B programming port	■ EtherNet/IP ■ Sercos III ■ Modbus TCP ■ Serial link ■ USB mini-B programming port	■ EtherNet/IP ■ Sercos III ■ CANopen ■ Profibus ■ Profinet ■ EtherCAT
	Optional	■ 1 Serial Line	■ Ethernet ■ Profibus DP	■ Ethernet ■ Profibus DP	■ Ethernet ■ CANopen	■ CANopen ■ Profibus DP ■ RT-Ethernet
Embedded I/O	Input types	Up to 40 logic inputs Up 2 analog inputs	Up to 24 logic inputs	–	4 fast digital inputs	Up to 20 digital inputs Up to 16 touch probe inputs Up to 4 interrupt inputs Up to 2 analog inputs
	Output types	Up to 16 relay outputs Up to 16 tansistor outputs	Up to 16 tansistor outputs	–	4 fast digital outputs	Up to 16 digital outputs Up to 2 analog outputs
Synchronized axes		–	–	–	Up to 16 synchronized axes	Up to 130 synchronized axes
Configuration software		EcoStruxure Machine Expert-Basic *(1)*	EcoStruxure Machine Expert V1.1 *(2)*	EcoStruxure Machine Expert V1.1 *(2)*	EcoStruxure Machine Expert V1.1	EcoStruxure Machine Expert V1.1 *(2)*
Compatible expansion I/O module ranges (consult the catalog**)**						
	● Local I/O	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	–
	● Remote I/O	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	–
	● Distributed I/O on Ethernet	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN) ● Modicon TM5 (DIA3ED2131204EN)	● Modicon TM3 (DIA3ED2140109EN) ● Modicon TM5 (DIA3ED2131204EN)	● Modicon TM3 (DIA3ED2140109EN) ● Modicon TM5 (DIA3ED2131204EN)	● Modicon TM5 (DIA3ED2131204EN)
	● Distributed I/O on CANopen	–	–	–	● Modicon TM5 (DIA3ED2131204EN) ● Modicon TM7 (DIA3ED2140405EN)	● Modicon TM5 (DIA3ED2131204EN) ● Modicon TM7 (DIA3ED2140405EN)
	● Distributed I/O on Sercos	–	–	–	● Modicon TM5 (DIA3ED2131204EN)	● Modicon TM5 (DIA3ED2131204EN)
	Safety I/O	Modicon TM3 (DIA3ED2140109EN)	Modicon TM3 (DIA3ED2140109EN)	Modicon TM3 (DIA3ED2140109EN)	Modicon TM3 (DIA3ED2140109EN) Modicon TM5 (DIA3ED2131204EN) Modicon TM7 (DIA3ED2140405EN)	Modicon TM5 (DIA3ED2131204EN) Modicon TM7 (DIA3ED2140405EN)
Controller range		**Modicon M221/M221 Book**	**Modicon M241**	**Modicon M251**	**Modicon M262**	**LMC Eco, LMC Pro2**
More details in catalog		DIA3ED2140106EN	DIA3ED2140107EN	DIA3ED2140108EN	DIA3ED2180503EN	DIA7ED2160303EN

(1) Formerly named SoMachine Basic.
(2) Formerly named SoMachine, EcoStruxure Machine Expert merges both former software ranges, SoMachine and SoMachine Motion.

More technical information on www.schneider-electric.com

Modicon M251 logic controllers
Machine Automation

Machine Automation



Machine control

> From basic to motion- and robot-centric machines with the PacDrive 3 offer, Modicon controllers and solutions bring a consistent and scalable response to achieving flexibility, performance, productivity, and digitization.

The scalability and consistency of I/O ranges allow you to select the right offer depending on your needs

> Modicon TM3 Optimized I/O system for more compact and modular machines
> Modicon TM5 for more performance-demanding machines, with Modicon TM7 for harsh environments; Both Performance I/O ranges (Modicon TM5 and TM7) allow safety functions to be implemented using the Modicon TM5CSLC safety logic controller

Embedded Safety provides holistic solutions to Modicon M262 and PacDrive LMC controllers, increasing overall safety demand in Machine Automation

> Preventa XPS Universal safety modules cover a wide range of safety functions, suitable for small applications with 4-5 safety functions, with diagnostic information provided to controllers via a single wire connection
> Modicon TM3 safety functional modules are suitable for small applications covering E-Stop functions and diagnostics via TM3 bus
> Preventa XPSMCM modular safety controllers are suitable for medium size applications with up to 20 safety functions and diagnostics via Modbus TCP, EtherNet/IP, EtherCAT, or Profinet

All these devices are managed within a single software, EcoStruxure Machine Expert, a powerful and collaborative engineering environment

> **EcoStruxure Machine Expert – Safety** optional addon for programming safety logic controllers
> **EcoStruxure Machine Expert – Basic** software for programming Modicon M221 logic controllers: an intuitive standalone environment accessible to basic skilled technicians
> **EcoStruxure Machine Advisor** is a cloud-based services platform designed for machine builders to track machines in operation worldwide, monitor performance data, and resolve exceptional events, while reducing support costs by up to 50%

Machine Automation

Comprehensive Schneider offers for machine builders

> Lexium servo drives, motors, and robotics are designed to control applications ranging from a single independent axis up to high-performance synchronized multi-axis machines requiring high-speed and precise positioning and movements

Robotics

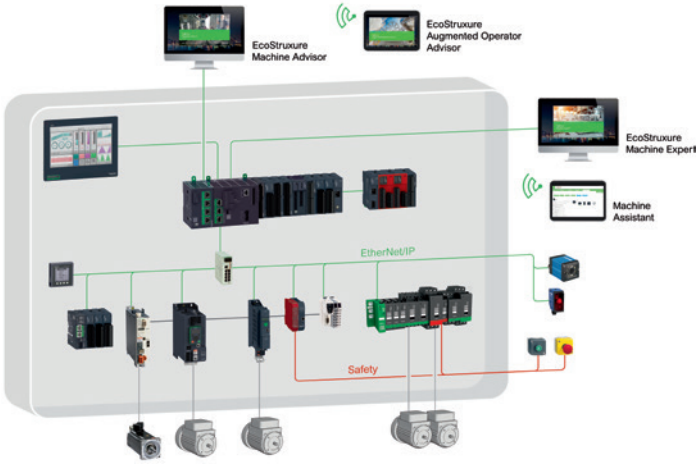
Integrated drives

Servo Drives & Motors

Steppers Drives & Motors

> The Lexium offer is designed for a broad range of motion-centric machines in applications such as Packaging, Material Handling, Material Working, Food and Beverage, and Electronics

> Schneider Electric has developed Tested Validated & Documented Architectures (TVDA) applicable for generic machine control applications as well as for dedicated segment applications such as Packaging, Material Working, Material Handling, Hoisting, Pumping, or generic Machine Control applications



Choose Schneider Electric to help secure your investment and benefit from worldwide services at every step of your project

Renew
Being your expert to control and renew your aging equipment at the right time and at optimal cost

Optimize
Identifying how you can get even more out of your equipment and further improve your return on investment

Plan
Discussing your maintenance policy and needs arising from it

Install
Delivering services to help ensure your equipment is set up reliably and starts to operate efficiently from day one

Operate
Providing services to support you during normal operations as well as during maintenance breaks and in unexpected situations
Collaborating to maximize your uptime and performance as well as become more proactive in operations

> From planning and inception to modernization, we help ensure optimal technical and business performance. Our field service engineers combine 30+ years of manufacturer-level experience with the latest technology to bring innovation to every level of our offer, and every step of your project.

> Our machine control dedicated services empower you to maximize your business infrastructure and face increasingly stringent demands on productivity, safety, equipment availability, and performance optimization.

Modicon M251 logic controllers

Applications		**Controlling modular machines on distributed architectures**
		
Supply voltage		24 V ⎓
I/O expansion		□ 7 Modicon TM3 expansion modules □ 14 Modicon TM3 expansion modules with the use of bus expansion modules (transmitter and receiver) □ Possible use of Modicon TM2 expansion modules with restrictions.
Embedded communication	Ethernet link	■ Ethernet 1: 2 ports connected by a switch, “Machine” or “Factory” (2 RJ 45 connectors) ■ Ethernet 2: 1 “fieldbus” Ethernet port (1 RJ 45 connector with Industrial Ethernet manager service (EtherNet/IP and TCP I/O Scanner) □ Protocols: Modbus TCP Client/Server, slave Modbus TCP, EtherNet/IP Adapter, EtherNet/IP Originator (Ethernet port 2), OPC UA Server *(1)*. □ Services: firmware update, data exchange - NGVL and IEC VAR ACCESS, WEB Server, MIB2 SNMP network management, FTP file transfer. FTP Client/Server, SNMP Client/Server, SQL (Client), Email library, email sending and receipt, DHCP Client dynamic configuration, programming, downloading, monitoring, SNMP Client/Server V1 & V2, SNTP Client, DNS Client.
	CANopen link	–
	Serial link	■ 1 serial link port (RJ 45) RS 232/RS 485 with +5 V supply
Options	Communication modules	■ 1 Ethernet port module with switch function and 4 embedded ports ■ 1 module for slave Profibus DP link
Mounting		Mounting on ⊔ symmetrical rail or panel
Software programming		EcoStruxure Machine Expert V1.1, consult catalog DIA3ED2180701EN
Controller type		**TM251MESE**
Page		17

(1) OPC UA function which can be activated on request.

Controlling modular machines on distributed architectures		
		
24 V ⎓		
□ 7 Modicon TM3 expansion modules □ 14 Modicon TM3 expansion modules with the use of bus expansion modules (transmitter and receiver) □ Possible use of Modicon TM2 expansion modules with restrictions.		
■ Ethernet: 2 ports connected by a switch, “Machine” or “Factory” (2 RJ 45 connectors) □ Protocols: Modbus TCP Client/Server, slave Modbus TCP, EtherNet/IP Adapter, OPC UA Server *(1)*. □ Services: firmware update, data exchange - NGVL and IEC VAR ACCESS, WEB Server, MIB2 SNMP network management, FTP file transfer. FTP Client/Server, SNMP Client/Server, SQL (Client), Email library, email sending and receipt, DHCP Client dynamic configuration, programming, downloading, monitoring, SNMP Client/Server V1 & V2, SNTP Client, DNS Client.		
■ 1 port for CANopen fieldbus (1 x 9-way SUB-D connector) with CANopen (Master) and SAE J1939 Request Manager protocols		
■ 1 serial link port (RJ 45) RS 232/RS 485 with +5 V supply		
■ 1 Ethernet port module with switch function and 4 embedded ports ■ 1 module for slave Profibus DP link		
Mounting on ⊔ symmetrical rail or panel		
EcoStruxure Machine Expert V1.1, consult catalog DIA3ED2180701EN		
TM251MESC		
17		

Modicon M251 logic controllers
General presentation

TM251MESE

TM251MESC

DIA3ED2140109EN

DIA3ED2180701EN

Example of a QRcode:
QRcode for access to the TM251MESC logic controller technical documentation

EcoStruxure Machine Expert V1.1 software

Presentation

Applications

Modicon M251 controllers offer an innovative, high-performance solution in the field of modular machines and distributed architectures.
Thanks to their compact dimensions, they can optimize the size of wall-mounted and floor standing control system enclosures.
Since Modicon M251 controllers have no embedded I/O, field devices such as variable speed drives and remote I/O are connected on either the CANopen and SAE J1939 machine buses, or over the Ethernet network.
Modicon M251 controllers have an embedded Ethernet port offering FTP Client/Server, Web Server, SQL Client, SNMP Client/Server V1 and V2, OPC UA Server, SNTP Client and DNS Client services, meaning they can easily be integrated in control system architectures for remote monitoring and maintenance of machines by means of applications for smartphones, tablets and PCs.
The wealth of embedded functions minimizes the cost of the machine:

- Functions embedded in the controller: Modbus serial link, USB port dedicated to programming, Ethernet I/O Scanner, CANopen and SAE J1939 fieldbuses for distributed architectures and advanced position control functions (PLCopen libraries).
- Functions embedded in Modicon TM3 expansion modules *(1)*: functional safety modules, motor-starter control module and remote expansion system.
- Functions embedded in Modicon TM4 communication modules.

The processing power and the memory size of M251 controllers are ideal for targeting high-performance applications.
EcoStruxure Machine Expert V1.1 programming software *(2)* is powerful and intuitive, making it quick to create applications. Existing applications in Modicon M221, M238 and M258 ranges can also be retrieved easily, thus protecting the investment already made.

Main functions

- Both Modicon M251 logic controllers come in an identical format (w x h x d): 54 x 90 x 95 mm (2.13 x 3.54 x 3.74 in.)
- Modicon M251 controllers have no embedded I/O but can be combined with Modicon TM3 expansion modules.
- Every M251 controller has a Run/Stop switch.
- A slot for an industrial SD memory card (Secure Digital card) is available on every M251 controller.
- Every M251 controller has a QR code for direct access to its technical documentation.

Embedded communication

M251 logic controllers incorporate up to 5 communication ports:

- The **TM251MESE** controller incorporates:
  - an “Ethernet 1” *(3)* network with 2 RJ 45 ports connected by an internal switch, this network being mainly for communication between machines or to your factory network
  - an **“**Ethernet 2**”** *(3)* network with an RJ 45 port, optimized for connecting field devices (variable speed drives, distributed I/O, etc.) by means of the Ethernet I/O Scanner service (Industrial Ethernet Manager). This port can also be connected to a factory network.
- The **TM251MESC** controller incorporates:
  - an **“**Ethernet” *(3)* network with 2 RJ 45 ports connected by an internal switch, this network being mainly for communication between machines or to your factory network
  - a CANopen port (CANopen master/SAE J1939 Request Manager) for connecting field devices (variable speed drives, distributed I/O, etc.)
- Moreover, both these M251 logic controllers incorporate:
  - a serial link port
  - a programming port

Processing power

- Execution speed: 22 ns/Boolean instructions
- Program: 128 K Boolean instructions
- DualCore processor
- RAM: 64 MB Flash memory: 128 MB
- Program size: 8 MB for application and symbols

Programming

Modicon M251 logic controllers are programmed with EcoStruxure Machine Expert V1.1, consult catalog DIA3ED2180701EN.

(1) Consult catalog DIA3ED2140109EN.
(2) Consult catalog DIA3ED2180701EN.
(3) Ethernet with embedded Web server function.

Communication modules *M251 logic controller*

Options for Modicon M251 controllers

Memory card

The **TMASD1** industrial SD memory card, 256 MB capacity, is available for:
- application backup
- program transfer
- data logging
- firmware update

Communication modules *(1)*

2 communication module models are dedicated to Modicon M251 logic controllers:
- the **TM4ES4** Ethernet switch module
- the **TM4PDPS1** slave Profibus DP module

Modicon TM4 communication modules are assembled by simple interlocking on the left-hand side of the controllers and a bus expansion connector is used to distribute data and the power supply.
Up to 3 communication modules can be added on the left of M251 logic controllers.

See page 18.

■ Ethernet switch module

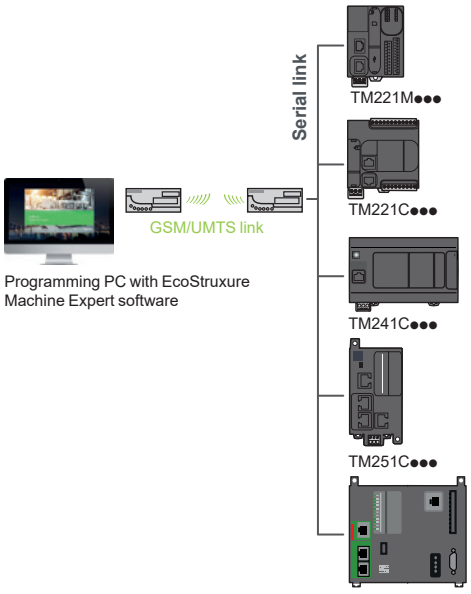
- The TM4ES4 module is a 4-port Ethernet interface (10/100 Mbps, MDI/MDIX) with the following protocols: Ethernet Modbus TCP (Client/Server), EtherNet/IP (Adapter/Originator), UDP, TCP, SNMP and EcoStruxure Machine.
- Clipped onto the left-hand side of a Modicon M251 controller, it consists of an autonomous switch with 4 ports, supplied by the Modicon M251 controller.

■ Slave PROFIBUS DP module

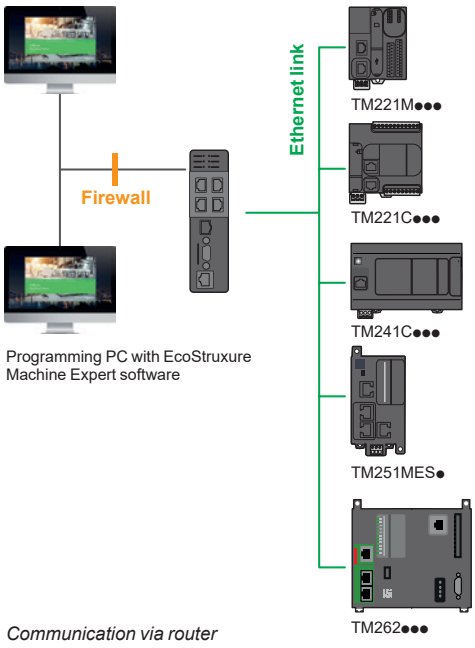
- The **TM4PDPS1** communication module can be used to configure a Master connection on the PROFIBUS DP bus.

(1) For rules for combining Modicon TM4 communication modules and Modicon M251 logic controllers, see page 18.

Modicon M251 logic controllers
Communication via modem and router



Communication via modem



Communication via router

Communication via modem and router

The communication via modem and router offer is dedicated to the following applications:

- Synchronization between remote machines; direct data exchange between controllers.
- Remote maintenance; access to the controller via the EcoStruxure Machine Expert V1.1. programming software.
- Remote control and monitoring of machines; receipt of information and sending commands on a GSM/UMTS phone *(1)*.

This offer comprises a Schneider Electric modem, GSM/UMTS modem and a VPN router made by eWon.
For the modem and router, please consult our website

(1) Global System Mobile (2G)/Universal Mobile Telecommunications System (3G).

Modicon M251 logic controllers
I/O expansion with Modicon TM3 expansion modules

I/O expansion with Modicon TM3 modules

Modicon TM3 expansion modules

Modicon M251 logic controllers have no embedded I/O, yet can still take Modicon TM3 expansion modules for connecting sensors and actuators locally:

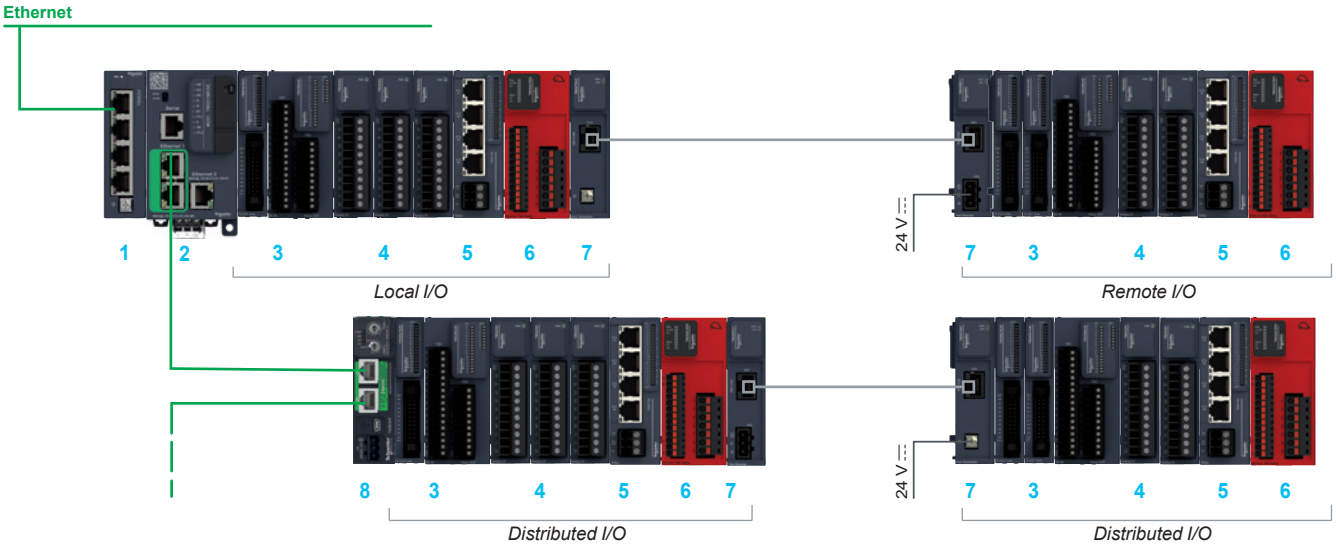
- digital I/O modules for creating configurations with up to 488 digital I/O
- analog I/O modules for creating configurations with up to 114 analog I/O, to receive the signals from, for example, position, temperature, and speed sensors and also capable of controlling variable speed drives or any other device with a current or voltage input
- expert modules for controlling TeSys motor-starters, connected with RJ 45 cordsets to simplify wiring the control section
- functional safety modules which simplify wiring and can be configured in the EcoStruxure Machine Expert V1.1. software

In addition, the Modicon TM3 expansion system is flexible due to the possibility of remotely locating some of the Modicon TM3 modules in the enclosure or another cabinet, up to 5 meters (16.404 ft) away, using a bus expansion system.

The Modicon TM3 expansion system is common to the ranges of Modicon M221, M241 and M251 logic controllers, and Modicon M262 Logic/Motion controller meaning that applications can be upgraded without changing expansion module.

I/O configuration

EcoStruxure Machine Expert software is used to configure the local and remote I/O and distributed I/O islands.



1 TM4ES4 Ethernet switch communication module
2 Modicon *TM251MESE* logic controller
3 Digital I/O modules
4 Analog I/O modules
5 Expert module for controlling TeSys motor starters
6 Functional safety modules
7 Bus expansion modules (transmitter and receiver) and bus expansion cable
8 TM3BC bus coupler module

Local I/O

Maximum configuration: 7 Modicon TM3 expansion modules associated with a Modicon M251 logic controller.

Remote I/O

Maximum configuration : 14 Modicon TM3 expansion modules (7 local modules + 7 remote modules) with Modicon TM3 bus expansion modules (transmitter module and receiver module).

The transmitter and receiver bus expansion modules can be used to:

- increase the number of expansion modules that can be connected to a Modicon M25 logic controller from 7 to 14
- locate Modicon TM3 expansion modules remotely, up to 5 m (*16.40 ft*) away

The transmitter module and receiver module are physically connected by a bus expansion cable, reference **VDIP184546●●●**, or any other Cat 5E, F/UT cable.

Distributed I/O

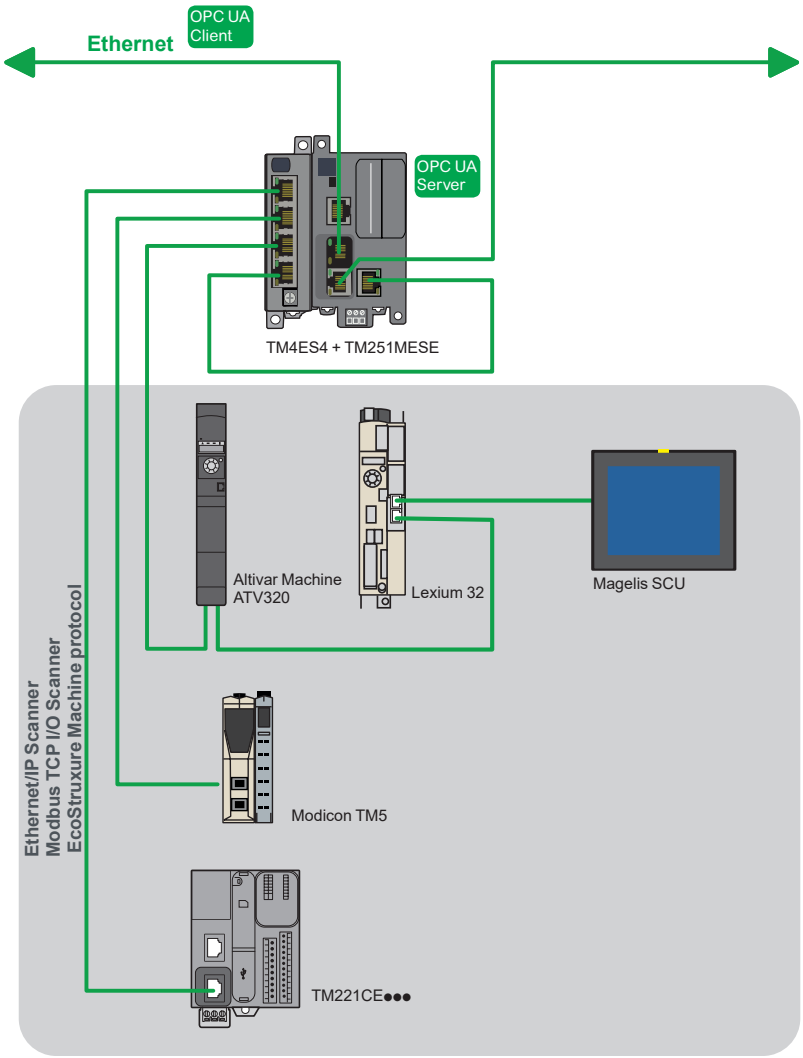
The Modicon TM3BC bus coupler module is used to create distributed I/O islands on the Ethernet network.

- The bus coupler module is connected via an isolated RJ45/RJ45 cable.
- Maximum configuration: 14 Modicon TM3 expansion modules (7 modules + 7 modules) with the Modicon TM3 bus expansion system (transmitter module and receiver module).

(1) Compatibility of expansion module offers: the majority of Modicon TM2 expansion modules can be used with M251 logic controllers. Nonetheless, inserting a Modicon TM2 expansion module in a configuration can increase the expansion module execution times by as much as a few milliseconds. The compatibility of Modicon TM2 expansion modules with M251 logic controllers is described in detail on our website www.schneider-electric.com.

Modicon M251 logic controllers
Embedded communication

Embedded communication
Control architecture for modular machines on Ethernet network



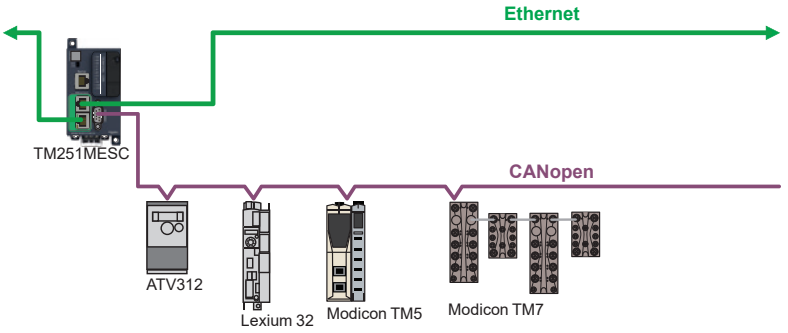
M251 controllers have 2 embedded Ethernet ports connected by an RJ 45 switch (10/100 Mbps, MDI/MDIX) with the Modbus TCP, EtherNet/IP, UDP, TCP, SNMP and EcoStruxure Machine on Ethernet protocols. These ports are specifically for communication between machines or to your factory network. These ports are marked “Ethernet” or “Ethernet 1”.

- Every M251 controller has an embedded web server and FTP (Client/Server) server. As well as the default address based on the MAC address, a controller IP address can be assigned via a DHCP server or via a BOOTP, SQL Client and SNMP (Client/Server) server.
- Ethernet ports also offer the same upload/download, update and debug functions as the programming port (USB mini-B) when the controller is supplied with power.
- A firewall is used to filter the IP addresses that are authorized to access the controller and to lock each communication protocol.
- **TM251MESE** controllers have, in addition to the 2 embedded “Ethernet and Ethernet 1” ports, an optimized “Ethernet 2” port for connecting field devices (variable speed drives, distributed I/O, etc.), RJ 45 type, with EtherNet/IP Scanner, Modbus TCP I/O Scanner, Ethernet Modbus TCP Client/Server, EtherNet/IP Originator and Adapter, UDP, TCP, SNMP and EcoStruxure Machine services.
  - EtherNet/IP Scanner can be used to connect up to 16 slave devices managed by the controller in 10 ms (1024 input words + 1024 output words).
  - Modbus TCP I/O Scanner can be used to connect up to 64 slave devices managed by the controller in 64 ms.

Connection cables and accessories for Industrial Ethernet network: please consult our catalog DIA3ED2160105EN.

Embedded communication *(continued)*

Control architecture for modular machines on CANopen bus



TM251MESC controllers have an embedded master CANopen port.

- The link can be configured between 20 Kbps and 1 Mbps, and supports up to 63 slaves with 252 TPDO (1008 words) and 252 RPDO (1008 words).
- CANopen-based architectures can be used to distribute I/O modules as close to the sensors and actuators as possible, thus reducing wiring costs and times, and to communicate with different devices such as variable speed drives, servo drives, etc.
- The CANopen configurator is integrated in the EcoStruxure Machine Expert V1.1 software and can also be used to import standard description files in EDS format.

CANopen connection cables and accessories: please consult our catalog DIA3ED2160104EN.

Communication on SAE J1939 network

The SAE J1939 protocol is available on the CANopen port of the TM251MESC logic controller.

The SAE J1939 protocol is mainly used in the commercial vehicles sector to communicate with the various electronic control units embedded in the same vehicle such as the engine, transmission, braking system, retarder and dashboard, etc.

Serial link

Every M251 controller has an embedded serial link that can be configured as RS 232 or RS 485.
In addition, a 5 V/200 mA voltage is available on the RJ 45 connector, which can therefore power a Magelis **XBTN** or **XBTRT** HMI or the **TCSWAAC13FB** Bluetooth® communication adapter, or other devices.
This link incorporates the two most commonly used protocols on the market:

- Master or Slave Modbus ASCII/RTU
- Character string (ASCII)

Connection cables and accessories for serial link: please consult catalog DIA3ED2160106EN.

Programming port with power off charging function

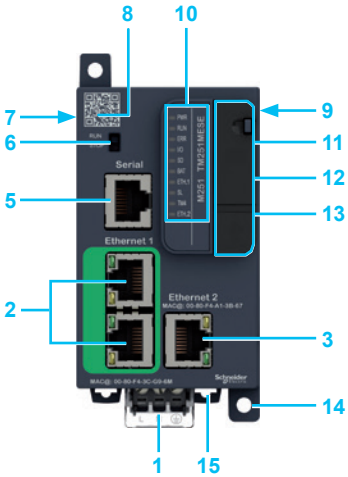
The programming port, equipped with a USB mini-B connector, is embedded in every M251 controller; it is dedicated to communication with a PC equipped with EcoStruxure Machine Expert V1.1 for:

- programming
- debugging
- maintenance

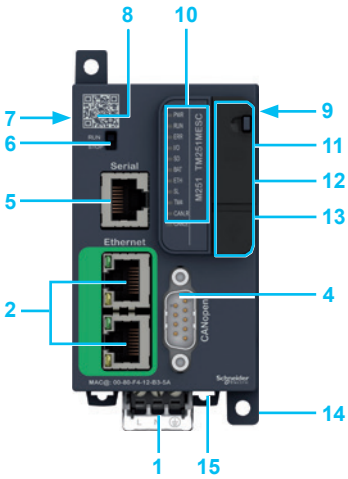
In addition, it offers the ability to load an application program or update the firmware without the controller being powered by another source.

Modicon M251 logic controllers

Modicon M251 logic controllers



TM251MESE controller



TM251MESC controller

Description

M251 controllers

1 Removable screw terminal block, 3 terminals for connecting the 24 V ⎓ supply.
2 2 RJ 45 connectors connected by an internal switch for “Machine” or “Factory” Ethernet network, with exchange and activity speed LED indicator.
3 On **TM251MESE** controller: RJ 45 connector for “fieldbus” Ethernet 2 network with exchange and activity speed LED indicator.
4 On **TM251MESC** controller: a connector for linking to the CANopen and SAE J1939 machine bus (9-way SUB-D).
5 SL serial link port (RS 232 or RS 485): RJ 45 connector.
6 Run/Stop switch.
7 TM4 bus connector: communication bus for linking to TM4●●● communication modules.
8 QR code for access to the controller technical documentation.
9 Modicon TM3 bus connector for linking to a Modicon TM3 expansion module.
10 LED display block showing: the status of the controller and its components (battery, industrial SD memory card), the status of the embedded communication ports (Ethernet 1 and 2, CANopen, serial link).

Behind the removable cover 11, 12, 13

11 Slot for the industrial SD memory card.
12 Backup battery slot.
13 A USB mini-B connector for a programming terminal.
14 Lugs for panel mounting, with screws.
15 Clip for locking on ⊥⌐ symmetrical rail.

Characteristics of M251 logic controllers

Conformity

■ Certifications

- ☐ CE, cULus Listing Mark, C-Tick, EAC, LR, ABS, DNV and GL.
- ☐ ODVA and Achilles.

■ 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.

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 V⎓/1,000 m (150 V⎓/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 characteristics

- ☐ 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

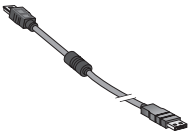
Modicon M251 logic controllers

M251 logic controllers, options, separate parts, programming software, connection cables

TM251MESE

TM251MESC

TMASD1



TCSXCNAMUM3P

References

Modicon M251 logic controllers *(1)*

Designation	Embedded communication ports				Reference	Weight kg *lb*
	Ethernet 1 "Machine" or "Factory" (RJ 45)	**Ethernet 2 "Fieldbus"** (RJ 45)	**CAN**open (9-way SUB-D): CANopen and SAE J1939	**Serial link** (RJ 45)		
24 V ⎓ power supply						
M251 logic controllers	2 (connected by a switch)	1	–	1	TM251MESE	0.220 *0.485*
	2 (connected by a switch)	–	1	1	TM251MESC	0.220 *0.485*

Options for Modicon M251 logic controllers

Designation	Description	Reference	Weight kg *lb*
Industrial SD memory card	Application backup and program transfer Capacity: 256 MB	TMASD1	0.004 *0.009*

Replacement parts

Designation	Description	Reference	Weight kg *lb*
Set of power supply terminal blocks	8 removable terminal blocks with screw terminals	TMAT2PSET	0.127 *0.280*
Backup battery	The battery supplied with each controller is not available as a separate part in the Schneider Electric catalog. If a replacement part is needed, only use a Panasonic battery type BR2032.		

Programming software

Designation	Use	Version	Reference
EcoStruxure Machine Expert software	For Modicon M251 logic controllers	V1.1	Please consult our catalog DIA3ED2180701EN

Expansion modules

Designation	Use	Reference
Modicon TM3 expansion modules	For Modicon M251 logic controllers	Please consult our catalogue DIA3ED2140109EN

Communication modules

Designation	Use	Reference
Modicon TM4 communication modules	Ethernet switch module, slave Profibus DP module	See page 18

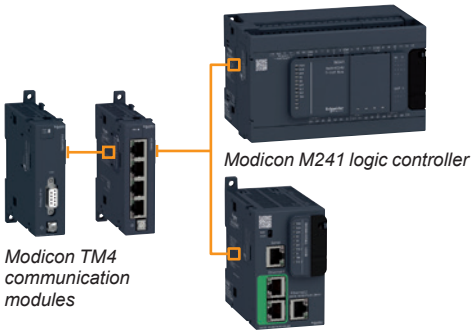
Connection cables

Designation	Use		Length	Reference	Weight kg *lb*
	from	**to**			
Programming cables	PC USB port	USB mini-B port on M251 controllers	3 m *(0.98 ft)*	TCSXCNAMUM3P *(3)*	0.065 *0.143*
			1.8 m *(5.90 ft)*	BMXXCAUSBH018	0.065 *0.143*

(1) M251 controllers are supplied with:
- *a removable screw terminal block for connecting the power supply*
- *a BR2032 button cell backup battery*

(2) Every M251 logic controller has an embedded USB mini-B programming port.
(3) Unshielded, non-grounded cable. Only for use on temporary connections. For permanent connections, use cable reference BMXXCAUSBH018.

Modicon M251 logic controllers
Modicon TM4 communication modules



Presentation

Applications

The Modicon TM4 communication module offer is dedicated to Modicon M241 and Modicon M251 logic controllers, increasing the options for connection.
Two communication module models are available:
- The TM4ES4 Ethernet switch module, offering an Ethernet connection with 4 ports
- The TM4PDPS1 Profibus DP slave module

■ Ethernet switch module

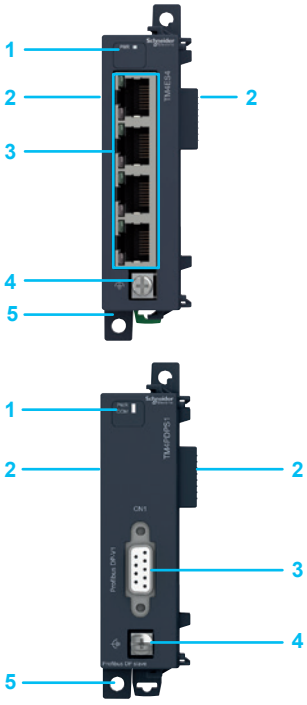
The TM4ES4 module is a 4-port Ethernet interface (10/100 Mbps, MDI/MDIX) with the following protocols: Ethernet Modbus TCP Client/Server, Ethernet/IP Adapter, UDP, TCP, SNMP, OPC UA Server and EcoStruxure Machine.
- The TM4ES4 module is ready for use as soon as it is connected to the communication bus of M241 and M251 controllers.
- This module is used to add the Ethernet function to TM241C24● and TM241C40● controllers without an embedded Ethernet port, while offering an additional Ethernet switch function.
- Connected on controllers with embedded Ethernet port type TM241CE24●●● or TM241CE40●●●, it can constitute a second Ethernet link for the “Machine” or “Factory” network.
- Connected on controllers with an embedded Ethernet port type TM241CE●●● or on a TM251MES● controller, it can also constitute an autonomous switch with four ports: communication between the TM4ES4 module and the Modicon M241 and M251 controllers is not automatically enabled by the bus connector.

■ Slave Profibus DP module

The TM4PDPS1 communication module can be used to configure a slave connection on the Profibus DP bus.

Rules for combination

Up to 3 communication modules (in total) can be added on the left of M241 and M251 logic controllers, in order to increase their options for connection to the Ethernet and Profibus networks.
- TM241C24●●●, TM241C40●●●, TM241CE24●●● and TM241CE40●●● controllers can all be provided with a TM4ES4 module with the Ethernet port function and 2 TM4ES4 modules with the autonomous switch function while complying with the maximum number of 3 TM4 modules in total.
- TM241CEC24● and TM251●●● controllers can be provided with 3 TM4ES4 modules with the autonomous switch function while complying with the maximum number of 3 TM4 modules in total.
- TM4 communication modules are assembled by simply clipping them onto the left-hand side of M241 and M251 controllers, and a bus expansion connector is used to distribute data and power.



Description

■ **TM4ES4** Ethernet switch module

1 Power on LED indicator.
2 Bus connector (1 on each side).
3 4 RJ 45 connectors for Ethernet network, with exchange and activity speed LED indicator.
4 Screw terminal for the functional ground (FG) connection.
5 Locking clip on ⊔ symmetrical rail.

■ **TM4PDPS1** slave Profibus DP module

1 Power on LED indicator.
2 Bus connector (1 on each side).
3 9-way SUB-D connector for connection to the Profibus DP bus.
4 Screw terminal for the functional ground (FG) connection.
5 Locking clip on ⊔ symmetrical rail.

References

TM4ES4

TM4PDPS1

Options for M251 logic controllers			
Designation	**Description**	**Reference**	**Weight kg** ***lb***
Communication modules	Ethernet switch module with switch function and 4 embedded ports Equipped with 4 RJ 45 connectors (10/100 Mbps, MDI/MDIX)	TM4ES4 *(1)*	0.110 *0.243*
	Slave Profibus DP module Equipped with a 9-way SUB-D connector	TM4PDPS1	0.110 *0.243*

(1) Can be used as an Ethernet port or an autonomous switch depending on the controller model and configuration.

Modicon M251 logic controllers
Product reference index

www.schneider-electric.com/Machine control solutions

Schneider Electric Industries SAS

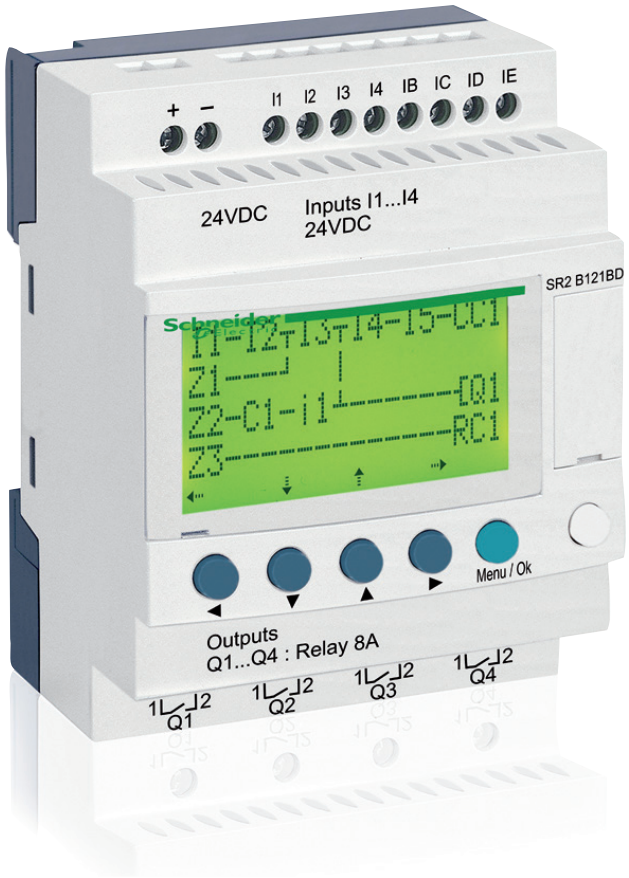
Head Office
35, rue Joseph Monier
F-92500 Rueil-Malmaison
France

Design: Schneider Electric
Photos: Schneider Electric

June 2019-V6.1

DIA3ED2140108EN

Catalog | January 2022



Zelio Logic

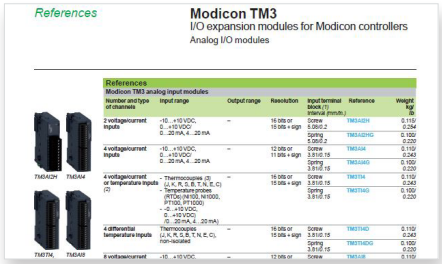
Smart relays

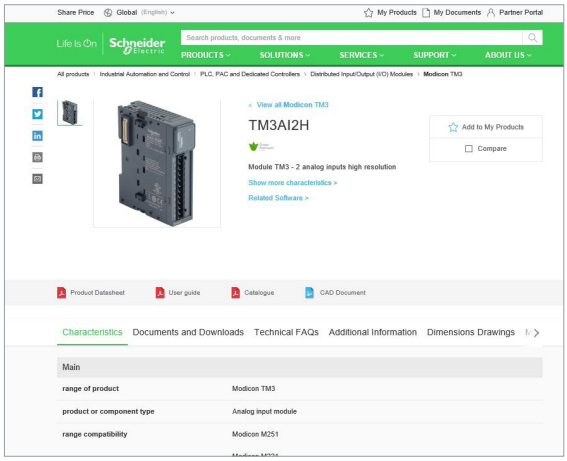
www.se.com

Life Is On Schneider Electric

Quick access to product information

Get technical information about your product

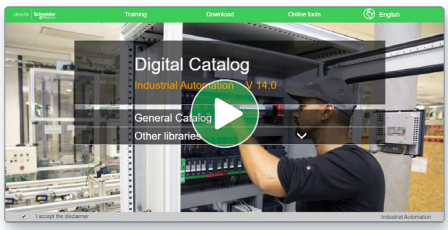


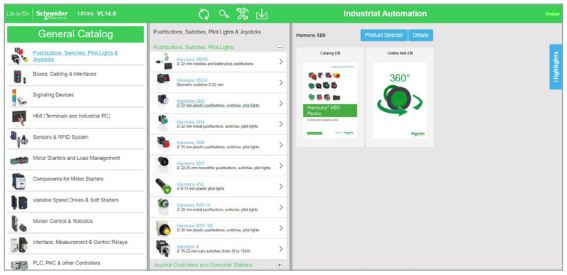


Each commercial reference presented in a catalog contains a hyperlink. Click on it to obtain the technical information of the product:

- Characteristics, Dimensions and drawings, Mounting and clearance, Connections and schemas, Performance curves
- Product image, Instruction sheet, User guide, Product certifications, End of life manual

Find your catalog



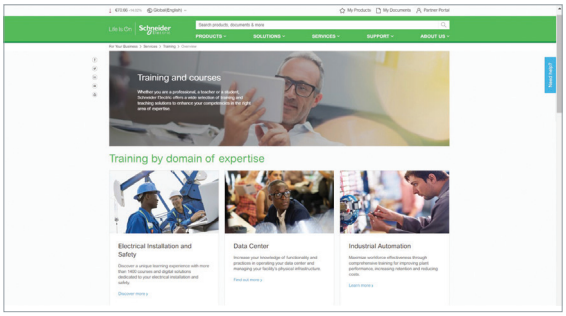


> With just 3 clicks, you can access the Industrial Automation and Control catalogs, in both English and French

> Consult digital automation catalogs at Digi-Cat Online

- Up-to-date catalogs
- Embedded product selectors,360° pictures
- Optimized search by commercial references

Select your training



> Find the right Training for your needs on our Global website

> Locate the training center with the selector tool, using this link

Life Is On Schneider Electric

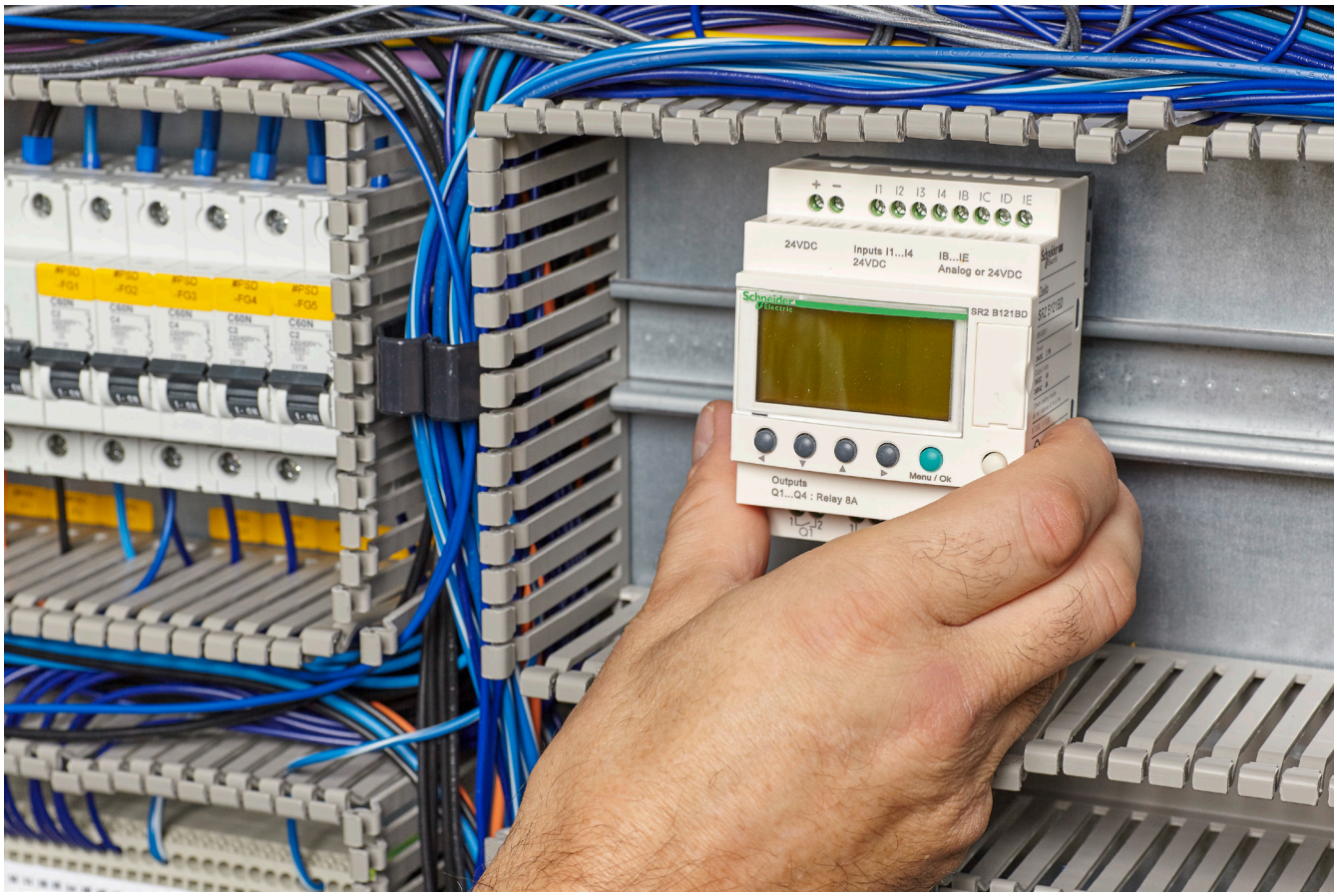
Contents

Zelio Logic
Smart relays

Product reference index

Zelio Logic
Smart relays for simple automation solutions

Step into an intuitive world!



Designed for the management of simple automation systems, Zelio Logic smart relays, with their unique combination of value for money and ease of use, provide a real alternative to solutions based on hard-wired logic or dedicated cards.

Simple to select, install, and program, Zelio Logic is suitable for all your applications.

Zelio Logic is a flexible solution, offering you the choice of two ranges:

> Compact versions with fixed configurations

> Modular versions that allow the use of extension modules with two programming languages (FBD or ladder).

Life Is On Schneider Electric

Zelio Logic
Smart relays for simple automation solutions

Advantages

Higher performance

> Two times more programming memory and more function blocks by simply updating the firmware

Greater functionality

> PID function for HVAC applications and 2G/3G modems

> 24 VDC module inputs compatible with NTC temperature probes (programmable in FBD language)

Greater efficiency, less engineering time

> Free software and firmware downloadable from the Schneider Electric website

> Get to grips with the software in less than an hour, simplified tool-free programming in ladder, FBD, and SFC languages for small applications

> Access to the program and modification of settings on integrated display

More flexibility - Easy design, maintenance, and commissioning

> Range of compact and modular smart relays and extension modules

> Programmable logic: a smart alternative to hard-wired logic or dedicated cards

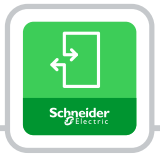
System components

Color HMI

The Harmony Small Panel HMISTO705 is recommended for Zelio Logic smart relays: 4.3" color touch screen + EcoStruxure™ Operator Terminal Expert programming software

Zelio Logic smart relay
> Compact
> With or without display

Zelio Logic communication module
> GSM/UMTS modem



Zelio Soft 2 programming software (downloadable from our website)

Zelio Logic smart relay
> Modular
> With display

Zelio Logic I/O extension modules
> Analog I/O
> Discrete I/O

Zelio Logic communication modules
> GSM/UMTS modem
> Modbus serial link
> Ethernet Modbus/TCP

Zelio Logic
Compact smart relays

Product type	**Compact smart relays**												
													
Supply voltage	24 V ∿		48 V ∿	100…240 V ∿			12 V ⎓		24 V ⎓		
Number of I/O	12	20	20	10	12	20	12	20	10	12	20
Number of discrete inputs (including analog inputs)	8 (0)	12 (0)	12 (0)	6 (0)	8 (0)	12 (0)	8 (4)	12 (6)	6 (0)	8 (4)	12 (2), 12 (6)
Number of "relay"/"transistor" outputs	4/0	8/0	8/0	4/0	4/0	8/0	4/0	8/0	4/0	4/0, 0/4	8/0, 0/8
With display, with clock Programming language	**SR2B●●1B** FBD *(1)* or ladder		–	**SR2B●●●1FU** FBD *(1)* or ladder			**SR2B●●1JD** FBD *(1)* or ladder		**SR2B●●●BD** FBD *(1)* or ladder		
With display, without clock Programming language	–		**SR2A201E** Ladder only *(2)*	**SR2A●●●1FU** Ladder only *(2)*			–		**SR2A●●●BD** Ladder only *(2)*		
Without display, with clock Programming language	**SR2E●●1B** FBD *(1)* or ladder		–	**SR2E●●●1FU** FBD *(1)* or ladder			–		**SR2E●●●BD** FBD *(1)* or ladder		
Without display, without clock Programming language	–		–	**SR2D●●●1FU** Ladder only *(2)*			–		**SR2D●●●BD** Ladder only *(2)*		
Programming software (see page 20)	"Zelio Soft 2" **ESR2SFT01** (downloadable from our website)			"Zelio Soft 2" **ESR2SFT01** (downloadable from our website)							
Connection accessories (see page 20) – **Serial link cable**	**SR2CBL01**			**SR2CBL01**							
Connection accessories (see page 20) – **USB connecting cable**	**SR2USB01**			**SR2USB01**							
Connection accessories (see page 20) – **Connecting cable for HMI terminals**	**SR2CBL09** for Harmony terminals **HMISTO705** *(2)*			**SR2CBL09** for Harmony terminals **HMISTO705** *(2)*							
Connection accessories (see page 20) – **Bluetooth interface**	**SR2BTC01**			**SR2BTC01**							
Memory cartridge (see page 20)	**SR2MEM02** (⚠ incompatible with SR2COM01)			**SR2MEM02** (⚠ incompatible with SR2COM01)							
"Discovery" packs (see page 18)	–			**SR2PACK●FU**			–		**SR2PACK●BD**		
Modem communication interface (see page 35)	**SR2COM01**			**SR2COM01** (for SR2B and SR2E)			**SR2COM01**		**SR2COM01** (for SR2B and SR2E)		
GSM/UMTS modem (see page 35)	**SR2MOD02**			**SR2MOD02**			**SR2MOD02**		**SR2MOD02**		
Alarm management software (see page 35)	"Zelio Logic Alarm" **ESR2SFT02** (downloadable from our website)			"Zelio Logic Alarm" **ESR2SFT02** (downloadable from our website)							
Converters (thermocouple types J and K, Pt100 probes, and voltage/current)	–			–			**RM●●●●BD**: Refer to the Harmony Analog catalog Ref. DIA5ED2210501EN				
Power supplies for DC control circuit	–			Refer to the Modicon Power Supply catalog Ref. DIA3ED2170401EN and our website www.se.com							
References	**SR2●●●1B**		**SR2A201E**	**SR2●●●1FU**			**SR2B●●1JD**		**SR2●●●●BD**		
Page	16 and 17		16	16 and 17			16		16 and 17		

(1) FBD: Function block diagram.
(2) The Harmony HMISTO705 terminals cannot be used on logic modules that only use the LADDER language.

Zelio Logic

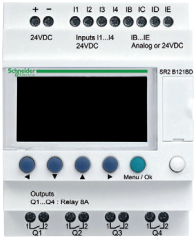
Modular smart relays
I/O extension modules
Network communication extension modules

Product type	**Modular smart relays**						
							
Supply voltage	24 V ∿		100...240 V ∿		12 V ⎓	24 V ⎓	
Number of I/O	10	26	10	26	26	10	26
Number of discrete inputs (including analog inputs)	6 (0)	16 (0)	6 (0)	16 (0)	16 (6)	6 (4)	16 (6)
Number of "relay"/"transistor" outputs	4/0	10/0	4/0	10/0	10/0	4/0, 0/4	10/0, 0/10
With display, with clock	Yes				Yes		
Programming language	FBD *(1)* or LADDER				FBD *(1)* or LADDER		
Programming software (see page 20)	"Zelio Soft 2" **ESR2SFT01** (downloadable from our website)				"Zelio Soft 2" **ESR2SFT01** (downloadable from our website)		
Connection accessories (see page 20) – **Serial link cable**	**SR2CBL01**				**SR2CBL01**		
Connection accessories (see page 20) – **USB connecting cable**	**SR2USB01**				**SR2USB01**		
Connection accessories (see page 20) – **Connecting cable for HMI terminals**	**SR2CBL09** for Harmony terminals **HMISTO705**				**SR2CBL09** for Harmony terminals **HMISTO705**		
Connection accessories (see page 20) – **Bluetooth interface**	**SR2BTC01**				**SR2BTC01**		
Memory cartridge (see page 20)	**SR2MEM02** (⚠ incompatible with SR2COM01)				**SR2MEM02** (⚠ incompatible with SR2COM01)		
"Discovery" packs (see page 18)	–		**SR3PACK●BD**		–	**SR3PACK●BD**	
Modem communication interface (see page 35)	**SR2COM01**				**SR2COM01**		
GSM/UMTS modem (see page 35)	**SR2MOD02**				**SR2MOD02**		
Alarm management software (see page 35)	"Zelio Logic Alarm" **ESR2SFT02** (downloadable from our website)				"Zelio Logic Alarm" **ESR2SFT02** (downloadable from our website)		
Converters (thermocouple types J and K, Pt100 probes, and voltage/current)	–				**RM●●●●BD:** Refer to the Harmony Analog catalog Ref. DIA5ED2210501EN		
Power supplies for DC control circuit	–				Refer to the Modicon Power Supply catalog Ref. DIA3ED2170401EN and our website www.se.com		
References	**SR3B●●1B**		**SR3B●●1FU**		**SR3B261JD**	**SR3B●●●BD**	
Page	18		18		18	18	

Corresponding extension module type	**Discrete I/O extension modules**								**Network communication extension modules**		**I/O extension modules**	
									Modbus serial link (server)	**Ethernet port (server)**	**Analog**	**Discrete**
								or 	and		or	
Number of I/O	6	10	14	6	10	14	6	10	14	■ Number of words: □ 4 (inputs) □ 4 (outputs) □ 4 (clock) □ 1 (status)	■ Number of words: □ 4 (inputs) □ 4 (outputs) □ 4 (clock) □ 1 (status)	4	6	10	14
Type and number of discrete inputs (or analog inputs)	4 (0)	6 (0)	8 (0)	4 (0)	6 (0)	8 (0)	4 (0)	6 (0)	8 (0)			0 (2)	4 (0)	6 (0)	8 (0)
Type and number of relay outputs (or analog outputs)	2 (0)	4 (0)	6 (0)	2 (0)	4 (0)	6 (0)	2 (0)	4 (0)	6 (0)			0 (2)	2 (0)	4 (0)	6 (0)
References	**SR3XT●●●B**			**SR3XT●●●FU**			**SR3XT●●●JD**			**SR3MBU01BD**	**SR3NET01BD**	**SR3XT43BD**	**SR3XT●●●BD**		
Page	19			19			19			29		31	19		

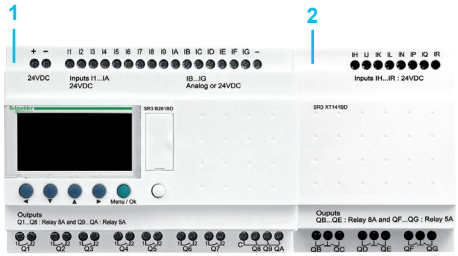
(1) FBD: Function block diagram

Zelio Logic
Compact and modular smart relays

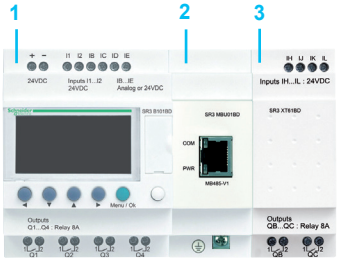


Zelio Logic compact smart relay

Combination of modular smart relays and extension modules



1 Modular Zelio Logic smart relay (10 or 26 I/O)
2 Discrete (6, 10, or 14 I/O) or analog (4 I/O) I/O extension module



1 Modular Zelio Logic smart relay (10 or 26 I/O)
2 Modbus serial link or Ethernet Modbus/TCP network communication extension modules
3 Discrete (6, 10, or 14 I/O) or analog (4 I/O) I/O extension module

⚠ *Observe the order of assembly above when using a Modbus server or Ethernet server network communication extension module and a discrete or analog I/O extension module.*
An I/O extension module cannot be inserted before a network communication extension module.

Presentation

Zelio Logic smart relays are designed for use in small automated systems. They are used in both the industrial and commercial sectors.

■ **For industry:**
- automation of small finishing, production, assembly, or packaging machines
- small automated systems operating at 48 V ∿ (hoisting application, etc.)
- decentralized automation of ancillary equipment for large and medium-sized machines (in the textile, plastics, materials processing sectors, etc.)
- automation systems for agricultural machinery (irrigation, pumping, greenhouses, etc.)

■ **For the commercial/building sectors:**
- automation of barriers, roller shutters, access control
- automation of lighting systems
- automation of compressors and air conditioning systems
- etc.

Their compact size and ease of setup make them a competitive alternative to solutions based on cabled logic or specific cards.

■ **Programming**
Simple programming, backed up by the universal nature of the languages, meets the requirements of automation specialists and the needs of electricians.
Programming can be performed:
- locally, using the buttons on the Zelio Logic smart relay (ladder language)
- on a PC using “Zelio Soft 2” software

When using a PC, programming can be performed either in ladder language or in function block diagram (FBD) language (see page 10).

The LCD display unit backlight *(1)* is activated by pressing one of the six programming buttons on the Zelio Logic smart relay or by programming with “Zelio Soft 2” software (e.g. flashing when diagnosing a malfunction).

The clock has a lithium battery, which gives it an independent operating time of 10 years. Data backup (preset values and current values) is provided by an EEPROM Flash memory (with the same lifetime as the smart relay).

Compact smart relays

Compact smart relays meet requirements for simple automation systems.
The number of I/O can be:
- 12 or 20 I/O, supplied with 24 V ∿ or 12 V ⎓ power
- 20 I/O, supplied with 48 V ∿ power
- 10, 12, or 20 I/O, supplied with 100…240 V ∿, or 24 V ⎓ power

Modular smart relays and extension modules

The number of I/O for modular smart relays can be:
- 26 I/O, supplied with 12 V ⎓ power
- 10 or 26 I/O, supplied with 24 V ∿, 100…240 V ∿, or 24 V ⎓ power

To improve performance and flexibility, Zelio Logic modular smart relays can take extension modules to obtain a maximum of 40 I/O.
- Modbus serial link or Ethernet Modbus/TCP network communication extension modules, supplied with 24 V ⎓ power via the Zelio Logic smart relay at the same voltage
- Analog I/O extension module with 4 I/O, supplied with 24 V ⎓ power via the Zelio Logic smart relay at the same voltage
- Discrete I/O extension modules with 6, 10, or 14 I/O, supplied with power via the Zelio Logic smart relay at the same voltage

(1) LCD: Liquid crystal display

Connecting cable

Bluetooth interface

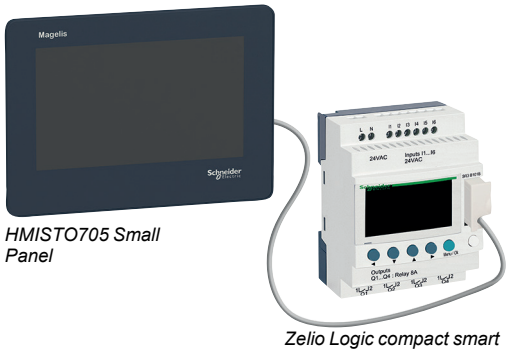
Memory cartridge

Modbus serial link communication extension module

Ethernet Modbus/TCP communication extension module

Modem communication interface

GSM/UMTS modem



HMISTO705 Small Panel

Zelio Logic compact smart relay + SR2CBL09 cable

Communication

Cabled and wireless programming tools

■ These programming tools allow the Zelio Logic smart relay to be connected to a PC running “Zelio Soft 2” software:

□ Cable connection:
- SR2USB01 cable to USB port

or
- SR2CBL01 cable to 9-way serial port

□ Wireless connection:
- SR2BTC01 Bluetooth interface

■ Memory cartridge

The Zelio Logic smart relay can take a backup memory cartridge that allows the application program to be copied to another Zelio Logic smart relay (it is only possible to load and update the firmware with the SR2MEM02 memory cartridge).
- The memory cartridge also enables a backup copy of the program to be saved prior to replacing the product.
- When used with a smart relay without display or buttons, the copy of the program contained in the cartridge is automatically transferred to the Zelio Logic smart relay on power-up.

Modbus serial link and Ethernet Modbus/TCP communication extension modules

The Modbus serial link and Ethernet Modbus/TCP network communication extension modules allow connection to automation system equipment such as display units or PLCs (see page 22).

Modem communication interface

The “modem communication interface” offer in the Zelio Logic range includes:
- an SR2COM01 modem communication interface connected between a Zelio Logic smart relay and a modem
- an SR2MOD02 GSM/UMTS *(1)* modem
- “Zelio Logic Alarm” software

This offer is designed for monitoring or remote control of machines or installations that operate without personnel.

The Modem communication interface, supplied with 12…24 V ⎓ power, enables messages, phone numbers, and calling conditions to be stored (see page 32).

HMI terminal

The Harmony HMISTO Small Panel offers added value to the equipment by enabling the creation of eye-catching dialog screens.

□ It has a color screen.

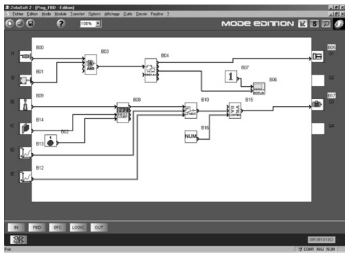
□ It connects directly to the front panel of the smart relay in the memory cartridge slot via a special cable (SR2CBL09).

□ It is configured using EcoStruxure Operator Terminal Expert software *(2)*. Exchanges with the smart relay are simplified using the SL In and SL Out data exchange blocks in “Zelio Soft 2” software (FBD language only). 24 words can be exchanged in each direction.

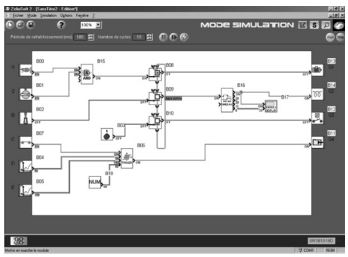
(1) Global System Mobile (2G)/Universal Mobile Telecommunications System (3G)
(2) Visit EcoStruxure Operator Terminal Expert on our website.

Zelio Logic

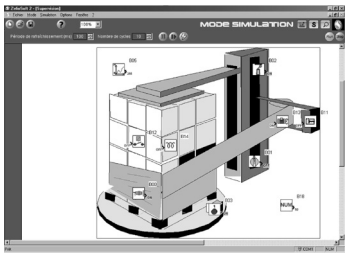
Compact and modular smart relays
"Zelio Soft 2" programming software



Programming in FBD language



Simulation mode



Supervision window

"Zelio Soft 2" for PC – version 5.1 *(1)*

"Zelio Soft 2" software enables:

- programming in ladder language or function block diagram (FBD) language (see page 12)
- simulation, monitoring, and supervision
- uploading and downloading of programs
- print-out of customized files
- automatic program compilation
- online help

Consistency checks and application languages

"Zelio Soft 2" monitors applications by means of its consistency check function.
An indicator turns red at the slightest input error (ladder language). The problem can be located by simply clicking the mouse.
"Zelio Soft 2" software allows users to switch between the six available languages (English, French, German, Italian, Portuguese, and Spanish) at any time and edit the application file in the selected language.

Inputting messages for display on Zelio Logic

"Zelio Soft 2" software allows text function blocks to be configured, which can then be displayed on Zelio Logic smart relays that have a display.

Program testing

Two test modes are provided:

- **Simulation** mode in "Zelio Soft 2" is used to test a program without a Zelio Logic smart relay, i.e. to:
  - enable discrete inputs
  - display output status
  - vary the voltage of the analog inputs
  - enable the programming buttons
  - simulate the application program in real time or in accelerated time
  - display the different active program elements dynamically in red

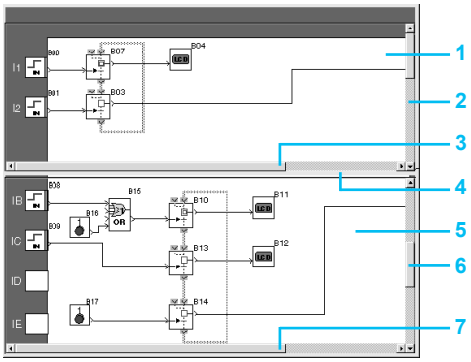
- **Monitoring** mode is used to test the program executed by the smart relay, i.e. to:
  - display the program "online"
  - force inputs, outputs, auxiliary relays, and current function block values
  - adjust the date and time
  - switch from STOP mode to RUN mode and vice versa

In simulation or monitoring mode, the supervision window allows users to view the status of the smart relay I/O within the application environment (diagram or image).

(1) These functions exist for versions ≥ V 5.1.

Zelio Logic

Compact and modular smart relays
"Zelio Soft 2" programming software



Structure of a split wiring sheet

User interfaces

"Zelio Soft 2" software (versions ≥ 4.1) improves the ease of use of user interfaces for the following functions:

"Split wiring sheet" function (ladder and FBD language)

The wiring sheet can be split into two to allow two separate parts of the wiring sheet to be displayed on the same screen.
This can be used to:

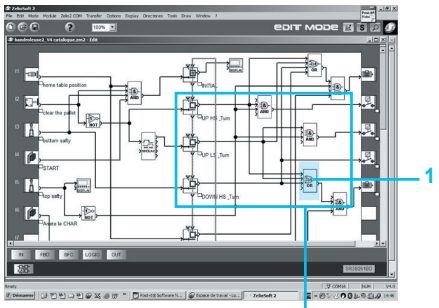
- Display the required function blocks in the top and bottom parts of the screen
- Move the split bar as required
- Connect the function blocks between the two parts of the wiring sheet

The split wiring sheet is structured as follows:

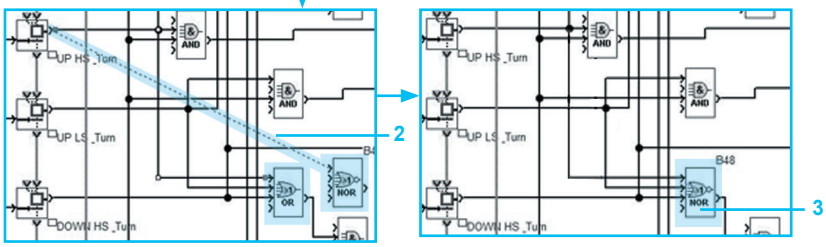
1 View of top part
2 Top window vertical scroll bar
3 Top window horizontal scroll bar
4 Split bar
5 View of bottom part
6 Bottom window vertical scroll bar
7 Bottom window horizontal scroll bar

"Replace function block" function (FBD language)

This function allows a block to be replaced without losing the input and output connections.
E.g. replacing an "OR" block with a "NOR" block



1 "OR" block to be replaced



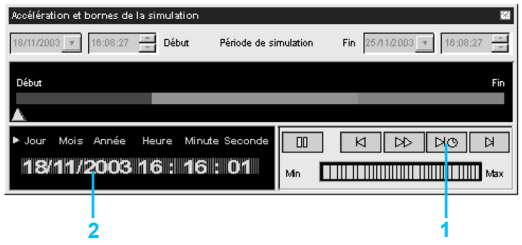
2 Move the links to the new "NOR" block

3 Delete the "OR" block and position the "NOR" block in its place

"Time Prog simulation" (ladder and FBD languages)

Ladder or FBD program simulation mode allows the program to be debugged by simulating it on the software workshop host computer.
A function allows the time on the simulator clock to be modified by setting it to 3 s before the start of the next event.

The "Next event" button 1 is used to modify the simulator clock 2.



"Acceleration and simulation terminals" window

Zelio Logic
Compact and modular smart relays
"Zelio Soft 2" programming software

Ladder language

Definitions


Text function block


Timer


Up/down counter


Fast counter


Analog comparator


Clock


Auxiliary relay


Counter comparator


LCD backlight


Daylight saving time change


Output coil


Message

Ladder language enables a ladder program to be written with elementary functions, elementary function blocks, and derived function blocks, as well as with contacts, coils, and variables.
The contacts and coils can be annotated. Text can be placed freely within the graphic.

■ **Ladder diagram input modes**

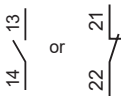
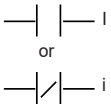
"Zelio input" mode allows users who have programmed the Zelio Logic smart relay directly on the device to achieve the same ease of use, even when using the software for the first time.
"Ladder input" mode, which is more intuitive, is very user-friendly and incorporates many additional features.
Two types of symbol can be used in ladder programming language:
- ladder symbols
- electrical symbols

"Ladder input" mode also allows the creation of mnemonics and comments associated with each program line.
Instant switching from one input mode to the other is possible at any time, simply by clicking the mouse.
Up to 240 *(1)* ladder diagram lines can be programmed, with 5 contacts and 1 coil per program line.

■ **Functions**

- 16 text function blocks
- 28 *(1)* timers, each of which can be configured from among 11 different types (1/10 second to 9,999 hours)
- 28 *(1)* up/down counters from 0 to 32,767
- 1 fast counter (1 kHz)
- 16 analog comparators
- 8 clocks, each with 4 channels
- 56 *(1)* auxiliary relays
- 8 counter comparators
- LCD screen with programmable backlight
- automatic daylight saving time changeover
- variety of functions: coil latching (Set/Reset), impulse relay, contactor
- 28 message blocks (with modem communication interface, see page 32)

Functions

Position	Electrical diagram	Ladder language	Comment
Contact			I corresponds to the real state of the contact wired to the smart relay input. i corresponds to the inverse state of the contact wired to the smart relay input.
Standard coil			The coil is energized when the contacts to which it is connected are closed.
Latch coil (Set)			The coil is energized (set) when the contacts to which it is connected are closed. It remains energized even if the contacts are no longer closed.
Unlatch coil (Reset)			The coil is de-energized (reset) when the contacts to which it is connected are closed. It remains de-energized even if the contacts are no longer closed.

(1) Possible using version V5.0 and above of "Zelio Soft 2" provided that the SR2COM01 communication module is not used. If this module is used, 16 timers, 16 counters, and 32 auxiliary relays are available and the program is limited to 120 ladder diagram lines.

Zelio Logic
Compact and modular smart relays
"Zelio Soft 2" programming software

Function block language (FBD/Grafcet SFC/logic functions) *(1)*

Definition:

FBD language allows graphical programming based on the use of predefined function blocks. It provides the use of 36 pre-programmed functions for counting, time delay, timing, switching threshold definition (e.g. temperature regulation), pulse generation, time programming, multiplexing, and display. There are also 7 SFC functions and 6 logic functions.

Pre-programmed functions

Zelio Logic smart relays provide a high processing capacity, up to 500 *(2)* function blocks, including 36 pre-programmed functions:

TIMER AC
Timer. Function A/C (ON-delay and OFF-delay)

TIMER BH
Timer. Function BH (adjustable pulsed signal)

TIMER Li
Pulse generator (ON-delay, OFF-delay)

TIMER BW
Timer. Function BW (pulse on rising/falling edge)

TIMER AC
Timer. Function A/C with external preset adjustment (ON-delay and OFF-delay)

TIMER BH
Timer. Function BH with external preset adjustment (adjustable pulsed signal)

TIMER Li
Pulse generator with external preset adjustment (ON-delay, OFF-delay)

BISTABLE
Impulse relay function

SET–RESET
Bistable latching – Priority assigned to either SET or RESET function

BOOLEAN
Allows logic equations to be created between connected inputs

CAM
Cam programmer

PRESET COUNT
Up/down counter

UP DOWN COUNT
Up/down counter with external preset

PRESET H-METER
Hour counter (hour, minute preset)

TIME PROG
Time programmer, weekly and annual

GAIN
Allows conversion of an analog value by change of scale and offset

TRIGGER
Defines an activation zone with hysteresis

MUX
Multiplexing functions on 2 analog values

COMP IN ZONE
Zone comparison (Min. ≤ Value ≤ Max.)

ADD/SUB
Add and/or subtract function

MUL/DIV
Multiply and/or divide function

TEXT
Display of 4 digital and analog data, date, time, messages for Human-Machine interface

DISPLAY
Display of digital and analog data, date, time, messages for Human-Machine interface

COM
Sending of messages with communication interface (see page 32)

COMPARE
Comparison of 2 analog values using the operands =, >, <, ≤, ≥, ≠

STATUS
Access to smart relay status

ARCHIVE
Storage of 2 values simultaneously

SPEED COUNT
Fast counting up to 1 kHz

CAN
Analog-to-digital converter

CNA
Digital-to-analog converter

SL In
Input of a word via serial link

SL Out
Output of a word via serial link

SUNTRACK
Tracks the sun's position

SUNRISE/SUNSET
Outputs the sunrise and sunset times

PID
Temperature, level, flow rate, or pressure control functions

THERMISTOR
NTC temperature probe input

SFC functions (GRAFCET)

RESET-INIT
Reset initial step

INIT STEP
Initial step

STEP
SFC step

DIV-OR 2
Divergence to OR

CONV-OR 2
Convergence to OR

DIV-AND 2
Divergence to AND

CONV-AND 2
Convergence to AND

Logic functions

AND
AND function

OR
OR function

NAND
NOT AND function

NOR
NOT OR function

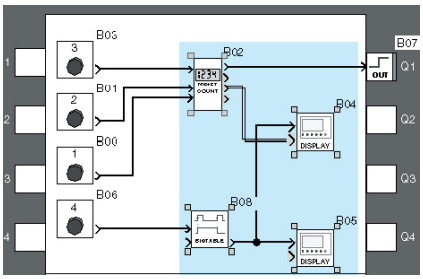
XOR
Exclusive OR function

NOT
NOT function

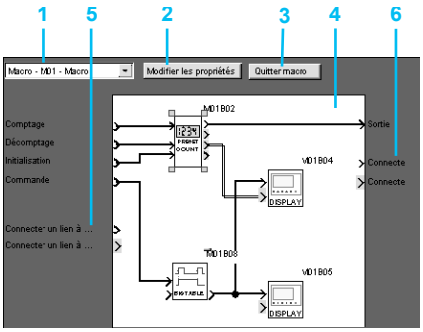
(1) FBD: Function block diagram. SFC: Sequential function chart
(2) Possible in version V5.0 or above of "Zelio Soft 2"

Function block language (FBD/Grafcet SFC/logic functions) (continued)

Macro function

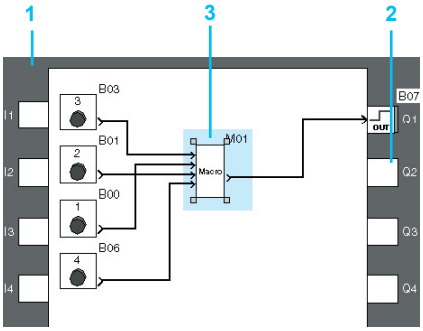


Creating a macro



Inside a macro

1 Select macro
2 Edit properties
3 Return to external view of a macro
4 Internal function block in the macro
5 Non-connected inputs
6 Non-connected outputs



External view of a macro

1 Input connections
2 Output connection
3 Macro function block

A macro is a group of function blocks. It is characterized by its number, name, links, internal function blocks (255 max.) and its I/O connections.

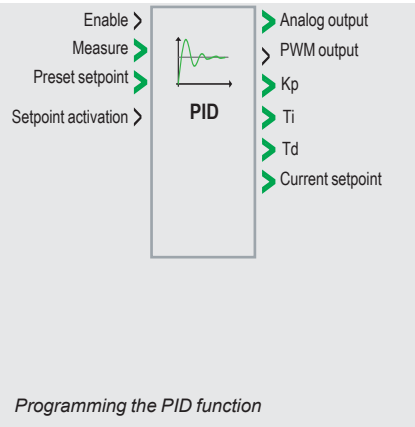
Seen from the outside, a macro behaves like a function block with inputs and/or outputs likely to be connected to links.
Once created, a macro can be manipulated like a function block:

■ Macro characteristics:
□ The maximum number of macros is 64.
□ A dedicated macro password can be used to protect their content.
□ A macro can be edited/duplicated.
□ A macro's comments can be edited.

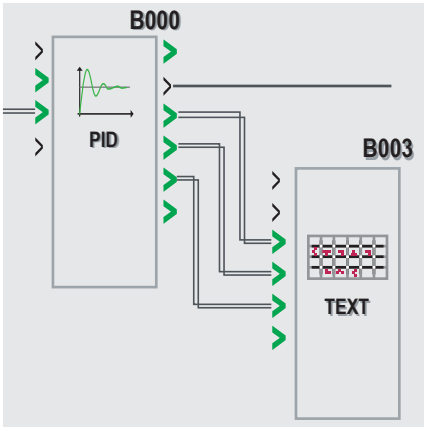
■ Macro properties:
A "Macro Properties" dialog box is used to enter or modify the properties of a macro.
The properties of a macro are as follows:
□ Macro name (optional)
□ Block symbol, which may be:
- an identifier
- an image

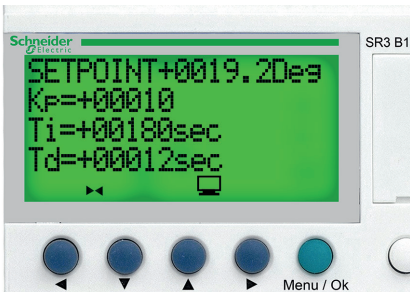
□ Name of inputs
□ Name of outputs

PID function



Programming the PID function





Modifying parameters (Kp, Ti, Td) using the programming and parameter setting buttons

Presentation
The PID function block is used to program simple temperature, level, or pressure control functions. Two types of output enable adaptation to the most common actuators available on the market:
□ Analog output, requiring the use of a modular smart relay and an analog I/O extension module
□ PWM output, enabling the integrated outputs in any smart relay to be used. Depending on the period set for PWM, and to help extend service life, a smart relay equipped with transistor outputs is recommended.

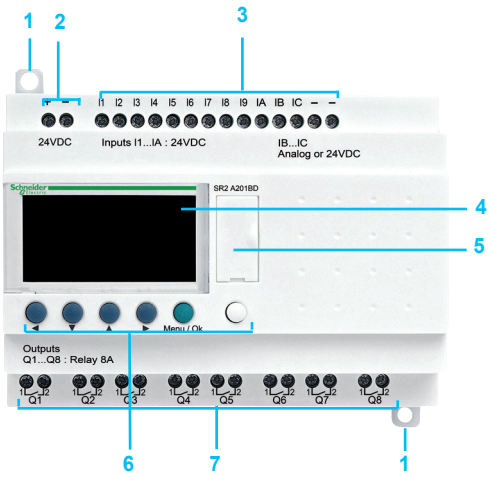
Programming
PID function blocks are available in FBD language. To help with tuning, default parameters are available for several typical applications (flow, level, pressure, temperature). These parameters can be modified.

Tuning
The TEXT and DISPLAY function blocks are used to help tune the control parameters (Kp, Ti, Td) without using Zelio Soft 2: the parameters can be modified directly using the buttons on the front of the smart relay and the display.

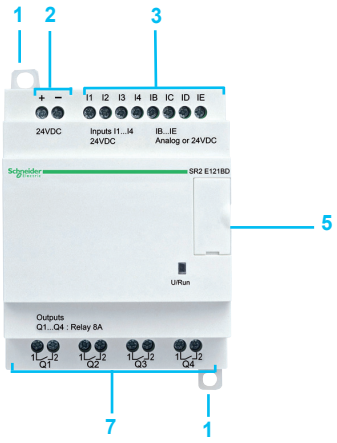
Zelio Logic
Compact and modular smart relays

Compact smart relays

With display – 10, 12, and 20 I/O



Without display – 10, 12, and 20 I/O

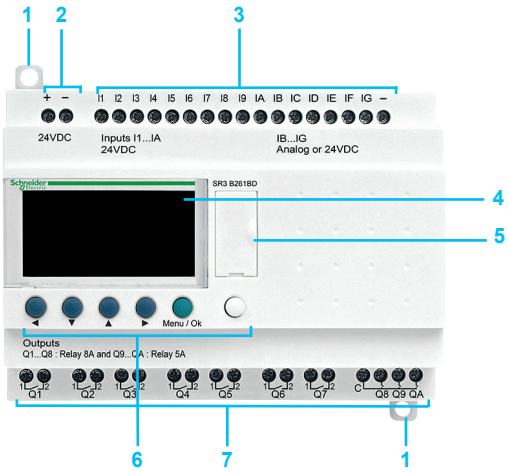


Zelio Logic compact smart relay front panels comprise:

1 Two retractable mounting lugs
2 Two power supply terminals
3 Terminals for connecting the inputs
4 Backlit LCD display with 4 lines of 18 characters
5 Slot for memory cartridge or connection to PC, modem communication interface, HMI terminal (Harmony Small Panel), or Bluetooth interface
6 6 buttons for programming and parameter entry
7 Terminals for connecting the outputs

Modular smart relays

With display – 10 and 26 I/O

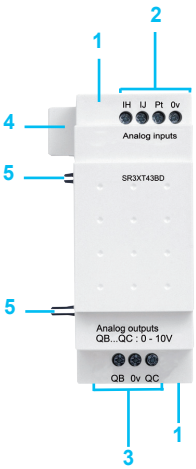


Zelio Logic modular smart relay front panels comprise:

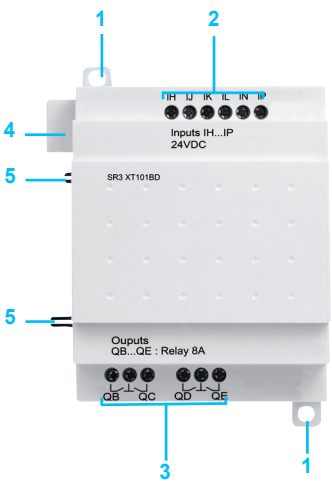
1 Two retractable mounting lugs
2 Two power supply terminals
3 Terminals for connecting the inputs
4 Backlit LCD display with 4 lines of 18 characters
5 Slot for memory cartridge or connection to PC, modem communication interface, HMI terminal (Harmony Small Panel), or Bluetooth interface
6 6 buttons for programming and parameter entry
7 Terminals for connecting the outputs

Discrete I/O extension modules

6 discrete I/O



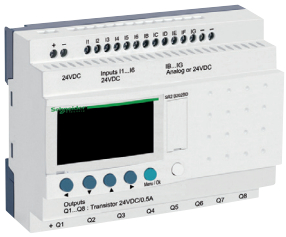
10 and 14 discrete I/O



Discrete I/O extension module front panels comprise:

1 Two retractable mounting lugs
2 Terminals for connecting the inputs
3 Terminals for connecting the outputs
4 Connector for connection to the Zelio Logic smart relay (powered via the Zelio Logic smart relay)
5 Locating pegs

Zelio Logic
Compact smart relays



SR2A201BD

"Zelio Soft 2" software

SR2PACK●●●

Modem communication interface

Compact smart relays with display

Number of I/O	Discrete inputs	Including 0-10 V ⎓ analog inputs	Relay outputs	Transistor outputs	Clock	Reference	Weight kg/ *lb*
24 V ∿ power supply							
12	8	0	4	0	Yes	SR2B121B	0.250 *0.551*
20	12	0	8	0	Yes	SR2B201B	0.380 *0.838*
48 V ∿ power supply							
20	12	0	8	0	No	SR2A201E *(1)*	0.380 *0.838*
100…240 V ∿ power supply							
10	6	0	4	0	No	SR2A101FU *(1)*	0.250 *0.551*
12	8	0	4	0	Yes	SR2B121FU	0.250 *0.551*
20	12	0	8	0	No	SR2A201FU *(1)*	0.380 *0.838*
					Yes	SR2B201FU	0.380 *0.838*
12 V ⎓ power supply							
12	8	4	4	0	Yes	SR2B121JD	0.250 *0.551*
20	12	6	8	0	Yes	SR2B201JD	0.380 *0.838*
24 V ⎓ power supply							
10	6	0	4	0	No	SR2A101BD *(1)*	0.250 *0.551*
12	8	4	4	0	Yes	SR2B121BD *(2)*	0.250 *0.551*
			0	4	Yes	SR2B122BD *(2)*	0.220 *0.485*
20	12	2	8	0	No	SR2A201BD *(1)*	0.380 *0.838*
		6	8	0	Yes	SR2B201BD *(2)*	0.380 *0.838*
			0	8	Yes	SR2B202BD *(2)*	0.280 *0.617*

"Zelio Soft 2" software

See page 20.

Accessories

See page 20.

Compact "discovery" packs

Pack contents:
Compact smart relays with display **SR2B●●●●●** + PC connecting cable SR2USB01

Number of I/O	Pack contents (references)	Reference	Weight kg/ *lb*
100…240 V ∿ power supply			
12	SR2B121FU + SR2USB01	SR2PACKFU	0.700 *1.543*
20	SR2B201FU + SR2USB01	SR2PACK2FU	0.850 *1.874*
24 V ⎓ power supply			
12	SR2B121BD + SR2USB01	SR2PACKBD *(2)*	0.700 *1.543*
20	SR2B201BD + SR2USB01	SR2PACK2BD *(2)*	0.700 *1.543*

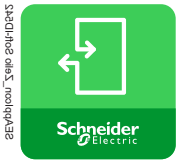
Modem communication interface

12…24 V ⎓ power supply

Description	Reference
Modem communication interface	See page 32

(1) Programming in ladder language only
(2) The 0-10 V ⎓ analog inputs on SR2B●●●BD compact smart relays can be connected to NTC (negative temperature coefficient) temperature probes. See probes on page 21.

SR2E121BD



"Zelio Soft 2" software

Modem communication interface

Compact smart relays without display

Number of I/O	Discrete inputs	Including 0-10 V ⎓ analog inputs	Relay outputs	Transistor outputs	Clock	Reference	Weight kg/ *lb*
24 V ∿ power supply							
12	8	0	4	0	Yes	SR2E121B	0.220 *0.485*
20	12	0	8	0	Yes	SR2E201B	0.350 *0.772*
100…240 V ∿ power supply							
10	6	0	4	0	No	SR2D101FU *(1)*	0.220 *0.485*
12	8	0	4	0	Yes	SR2E121FU	0.220 *0.485*
20	12	0	8	0	No	SR2D201FU *(1)*	0.350 *0.772*
					Yes	SR2E201FU	0.350 *0.772*
24 V ⎓ power supply							
10	6	0	4	0	No	SR2D101BD *(1)*	0.220 *0.485*
12	8	4	4	0	Yes	SR2E121B *(2)*	0.220 *0.485*
20	12	2	8	0	No	SR2D201BD *(1)*	0.350 *0.772*
		6	8	0	Yes	SR2E201BD *(2)*	0.350 *0.772*

"Zelio Soft 2" software

See page 20.

Accessories

See page 20.

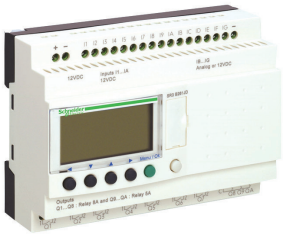
Modem communication interface

12…24 V ⎓ power supply

Description	Reference
Modem communication interface	See page 32

(1) Programming in ladder language only
(2) The 0-10 V ⎓ analog inputs on SR2E●●●BD compact smart relays can be connected to NTC (negative temperature coefficient) temperature probes. See probes on page 21.

Zelio Logic
Modular smart relays



SR3B261B

"Zelio Soft 2" software

SR3PACK●●●

Modular smart relays with display

Number of I/O	Discrete inputs	Including 0-10 V ⎓ analog inputs	Relay outputs	Transistor outputs	Clock	Reference	Weight kg/ *lb*
24 V ∿ power supply							
10	6	0	4	0	Yes	**SR3B101B**	0.250 *0.551*
26	16	0	10 *(1)*	0	Yes	**SR3B261B**	0.400 *0.882*
100…240 V ∿ power supply							
10	6	0	4	0	Yes	**SR3B101FU**	0.250 *0.551*
26	16	0	10 *(1)*	0	Yes	**SR3B261FU**	0.400 *0.882*
12 V ⎓ power supply							
26	16	6	10 *(1)*	0	Yes	**SR3B261JD**	0.400 *0.882*
24 V ⎓ power supply							
10	6	4	4	0	Yes	**SR3B101BD** *(2)*	0.250 *0.551*
			0	4	Yes	**SR3B102BD** *(2)*	0.220 *0.485*
26	16	6	10 *(1)*	0	Yes	**SR3B261BD** *(2)*	0.400 *0.882*
			0	10	Yes	**SR3B262BD** *(2)*	0.300 *0.661*

"Zelio Soft 2" software

See page 20.

Accessories

See page 20.

Modular "discovery" packs

Pack contents:
Modular smart relays with display **SR3B●●●●** + PC connecting cable **SR2USB01**

Number of I/O	Pack contents (references)	Reference	Weight kg/ *lb*
100…240 V ∿ power supply			
10	SR3B101FU + SR2USB01	**SR3PACKFU**	0.700 *1.543*
26	SR3B261FU + SR2USB01	**SR3PACK2FU**	0.850 *1.874*
24 V ⎓ power supply			
10	SR3B101BD *(2)* + SR2USB01	**SR3PACKBD** *(2)*	0.700 *1.543*
26	SR3B261BD *(2)* + SR2USB01	**SR3PACK2BD** *(2)*	0.850 *1.874*

(1) Including 8 outputs with maximum current of 8 A and 2 outputs with maximum current of 5 A.
***Note**: The Zelio Logic smart relay and its associated extension modules must have an identical voltage to be able to operate together.*
(2) The 0-10 V ⎓ analog inputs on SR3B●●●BD modular smart relays can be connected to NTC (negative temperature coefficient) temperature probes. See probes on page 21.

Zelio Logic
Modular smart relays

Modbus serial link communication extension module

Ethernet Modbus/TCP communication extension module

Communication extension module *(1)*

24 V ⎓ power supply (via SR3B…BD smart relays)

Used for	Communication ports	Reference
SR3B●●1BD and SR3B●●2BD Zelio Logic modular smart relays	Modbus RS485 serial link (RJ45)	See page 22
	Ethernet Modbus/TCP (RJ45)	See page 22

Analog I/O extension module *(2)*

24 V ⎓ power supply (via Zelio Logic SR3B…BD smart relay)

Number of I/O	Inputs	Including ⎓		Including Pt100	0-10 V ⎓ output	Reference
		0-10 V	0-20 mA			
4	2	Up to 2	Up to 2	Up to 1	2	See page 30

Discrete I/O extension modules

Number of I/O	Discrete inputs	Relay outputs	Reference	Weight kg/ *lb*
24 V ∿ power supply (via Zelio Logic SR3B●●●B smart relays)				
6	4	2	**SR3XT61B**	0.125 *0.276*
10	6	4	**SR3XT101B**	0.200 *0.441*
14	8	6 *(3)*	**SR3XT141B**	0.220 *0.485*
100-240 V ∿ power supply (via Zelio Logic SR3B●●●FU smart relays)				
6	4	2	**SR3XT61FU**	0.125 *0.276*
10	6	4	**SR3XT101FU**	0.200 *0.441*
14	8	6 *(3)*	**SR3XT141FU**	0.220 *0.485*
12 V ⎓ power supply (via Zelio Logic SR3B261JD smart relay)				
6	4	2	**SR3XT61JD**	0.125 *0.276*
10	6	4	**SR3XT101JD**	0.200 *0.441*
14	8	6 *(3)*	**SR3XT141JD**	0.220 *0.485*
24 V ⎓ power supply (via Zelio Logic SR3B●●●BD smart relays)				
6	4	2	**SR3XT61BD**	0.125 *0.276*
10	6	4	**SR3XT101BD**	0.200 *0.441*
14	8	6 *(3)*	**SR3XT141BD**	0.220 *0.485*

SR3XT141JD

Modem communication interface *(4)*

12…24 V ⎓ power supply

Description	Reference
Modem communication interface	See page 32

Modem communication interface

(1) See page 22.
(2) See page 30.
(3) Including 4 outputs with maximum current of 8 A and 2 outputs with maximum current of 5 A.
(4) See page 32.
***Note**: The Zelio Logic smart relay and its associated extension modules must have an identical voltage to be able to operate together.*

Zelio Soft 2

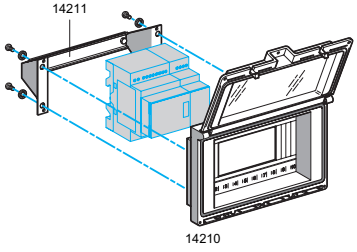
HMISTO705

SR2USB01

SR2CBL09

SR2BTC01

SR2MEM02



Modicon regulated switch mode power supply ABLM1A24012

Programming

Description	Use	Reference	Weight kg/ *lb*
“Zelio Soft 2” software			
Programming software “Zelio Soft 2”, multilingual	For PC and 32-bit and 64-bit operating systems compatible with Windows 7, 8.1, and 10 This software was previously supplied on CD. It is now supplied as a free download available on our website.	Free download from our website	
HMI			
Harmony Small Panel with color TFT touch screen	4.3” color screen 26 MB application memory capacity Programmed using EcoStruxure Operator Terminal Expert	**HMISTO705** *(1) (3)*	0.220 *0.485*
Connection accessories			
Connecting cables Length: 3 m *(9.84 ft)* For use with “Zelio Soft 2”	Between the PC (9-way SUB-D connector) and the Zelio Logic smart relay (programming port connector)	**SR2CBL01**	0.150 *0.331*
	Between the PC (USB connector) and the Zelio Logic smart relay (programming port connector)	**SR2USB01**	0.100 *0.220*
Connecting cables Length: 2.5 m *(8.2 ft)*	Between the Harmony Small Panel HMISTO705 (9-way removable screw terminal block) and the Zelio Logic smart relays (programming port connector)	**SR2CBL09**	-
Bluetooth interface for Zelio Logic smart relays	Between the PC (wireless link) and the Zelio Logic smart relay. Range of 10 m *(32.8 ft)* (class 2)	**SR2BTC01**	0.015 *0.033*
Memory cartridges *(2)*			
EEPROM memory cartridges	For firmware (software embedded in the smart relay) version ⩽ 2.4	**SR2MEM01**	0.010 *0.022*
	For firmware (software embedded in the smart relay) version ⩾ 3.0	**SR2MEM02**	0.010 *0.022*

Mounting accessories

Description/use	Mounting capacity	Reference	Weight kg/ *lb*
Dust- and damp-proof enclosure with split blanking plate arrangement, equipped with an IP55 dust- and damp-proof window with hinged flap for mounting through a door	- 1 or 2 SR2 smart relays with 10 or 12 I/O - or 1 SR2 smart relay with 20 I/O - or 1 SR3 smart relay with 10 I/O + 1 I/O extension module with 6, 10 or 14 I/O - 1 SR3 smart relay with 26 I/O + 1 I/O extension module with 6 I/O	**14210**	0.350 *0.772*
Mounting bracket and symmetrical mounting rail	For mounting enclosure **14210** through a door panel	**14211**	0.210 *0.463*

Online documentation available

User Manuals for direct programming on the Zelio Logic smart relay (in English, French, German, Italian, Portuguese, or Spanish): downloadable from our website.

Regulated switch mode power supplies

Input voltage	Nominal output voltage	Reference
100…240 V ∼ (50/60 Hz)	5 V ⎓, 12 V ⎓, or 24 V ⎓	Refer to the Modicon Power Supply catalog Ref. DIA3ED2170401EN

Converters

Description	Reference
Converters for thermocouples types J and K, Pt100 probes, and voltage/current	Refer to the Harmony Analog catalog Ref. DIA5ED2210501EN

(1) The SR2CBL09 cable used to connect an HMISTO705 panel to a smart relay must be equipped with a shunt between the terminals marked CTS and RTS. This shunt is included on all cables leaving the factory after June 2017 (date code 1722).
(2) The use of memory cartridge SR2MEM02 to load the program is not compatible with the SR2COM01 modem communication interface.
(3) The Harmony HMISTO705 terminals cannot be used on logic modules that only use the LADDER language.

Measurement accessories (1)

Designation	Description	Cable length m (ft)	Unit reference	Sold in lots of... (2)	Weight kg/ lb
Temperature control with NTC probe. The NTC (negative temperature coefficient) probe is a thermistor, i.e. a passive temperature sensor. Its resistance changes with the temperature, decreasing as the temperature rises and vice versa.					
Multi-purpose NTC probes					
	■ IP68 ■ Equipped with 2 conductor cables for controller side	1.5 (4.92)	TM1STNTCRN52015	8	0.1448 0.320
		3 (9.84)	TM1STNTCRN52030	5	0.1808 0.400
		5 (16.4)	TM1STNTCRN52050	4	0.228 0.500
	■ IP67 ■ Equipped with 2 conductor cables for controller side	1.5 (4.92)	TM1STNTCRN61515	8	0.1048 0.230
		3 (9.84)	TM1STNTCRN61530	5	0.1258 0.280
		5 (16.4)	TM1STNTCRN61550	4	0.1648 0.360
	■ FAST ■ IP67 ■ Equipped with 2 conductor cables for controller side	1.5 (4.92)	TM1STNTCSF44015	8	0.1448 0.320
		3 (9.84)	TM1STNTCSF44030	5	0.1758 0.390
	■ IP68 ■ Equipped with 2 conductor cables for controller side	1.5 (4.92)	TM1STNTCSN62015	8	0.1448 0.320
		3 (9.84)	TM1STNTCSN62030	5	0.1758 0.390
		5 (16.4)	TM1STNTCSN62050	4	0.2328 0.510
NTC probes with wrist strap, for pipes					
	■ IP68 ■ Equipped with 2 conductor cables for controller side ■ Equipped with wrist strap	1.5 (4.92)	TM1STNTNTC62015	8	0.1528 0.340
		3 (9.84)	TM1STNTNTC62030	5	0.1808 0.400
NTC probes for wall mounting					
	■ For external air temperature: -50…100 °C (-58…212 °F) ■ IP65 ■ Wall mounting	-	TM1STNTCW69755	1	0.114 0.25
	■ For internal (ambient) air temperature: -25…40 °C (-13…104 °F) ■ IP30 ■ Mounting on internal wall	-	TM1STNTCWN75750	1	0.064 0.141

(1) The TM1 probes presented on this page are type NTC 10 kOhm at 25 °C B3435 (25/85).
Other types of probe can be used, as per the table below:

Probe type	Measurement range	
	°C	°F
NTC 10 kOhm at 25 °C B3435 (25/85)	-50…+150	-58…+302
NTC 10 kOhm at 25 °C B3984 (25/85)	-55…+60	-67…+140
NTC 1,000 kOhm at 25 °C B4608 (25/85)	+10…+300	+50…+572
KTY 81 210/220/221/222/250	-55…+150	-67…+302
PT 500	-200…+850	-328…+1,562

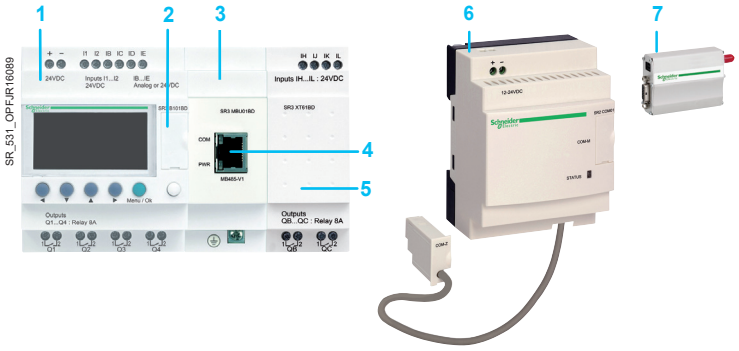
(2) The value indicated is the number of products supplied when ordering a reference.

Zelio Logic
Communication

Presentation

In order to communicate with their environment, Zelio Logic compact and modular smart relays and their extension modules are equipped with various types of communication port.

- Compact and modular smart relays feature a serial link port for connecting a PC, the modem communication interface, a memory cartridge slot, or an HMI terminal. This port uses a dedicated Zelio Logic communication protocol.
- Zelio Logic modular smart relay extension modules feature:
  - 1 RS 485 serial link port using the Modbus protocol on the **SR3MBU01BD** extension module
  - 1 Ethernet Modbus/TCP 10/100 base T port on the **SR3NET01BD** extension module



1 Modular smart relay (10 or 26 I/O)
2 Serial link port, Zelio Logic connector
3 Modbus server or Ethernet server communication extension module
4 RJ45 connector for Modbus serial link or Ethernet Modbus/TCP network connection
5 Discrete (6, 10, or 14 I/O) or analog (4 I/O) I/O extension module
6 Modem communication interface
7 GSM/UMTS modem

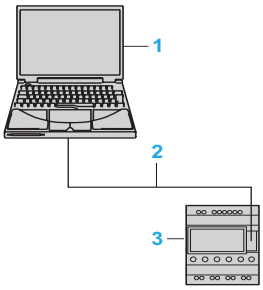
⚠ *Observe the order of assembly above when using a Modbus serial link (server) or Ethernet Modbus/TCP (server) network communication extension module and a discrete or analog I/O extension module.*
An I/O extension module cannot be inserted before the Modbus serial link (server) or Ethernet Modbus/TCP (server) network communication extension module.

Communication ports on Zelio Logic smart relays and their extension modules

	Smart relay serial link port	Modbus serial link port on **SR3MBU01BD** extension module	Ethernet Modbus/TCP port on **SR3NET01BD** extension module	Modem communication interface port
	Physical layer			
	Proprietary	**RS 485**	**10/100 base T**	**RS 232**
Smart relays	**Connector**			
	Zelio Logic	**RJ45**	**RJ45**	**Dedicated Zelio**
Compact	All types (connection and isolation via SR2CBL01 or SR2USB01 cable)	–	–	All SR2B●●●●● and SR2E●●●●● smart relays with clock (see page 35)
Modular	All types (connection and isolation via SR2CBL01 or SR2USB01 cable)	All SR3B●●●BD smart relays with 24 V ⎓ power supply	All SR3B●●●BD smart relays with 24 V ⎓ power supply	All types (see page 35)

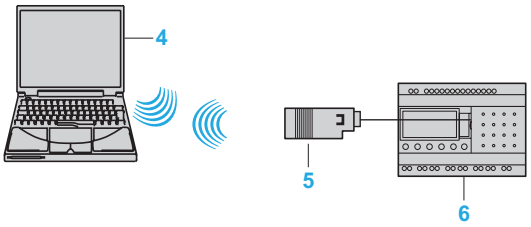
Description

Wired connection



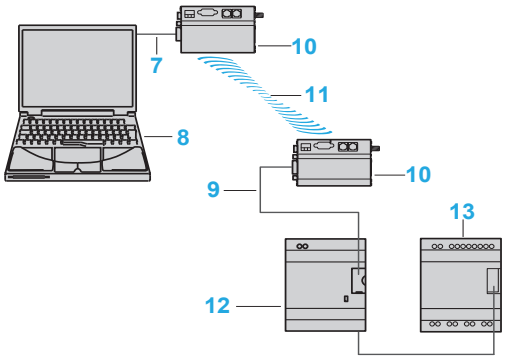
1 Programming PC
2 USB cable (SR2USB01) or serial link cable (SR2CBL01) *(1)*
3 Zelio Logic compact or modular smart relay

Wireless connection



4 Programming PC with integrated Bluetooth technology *(1)*
5 Bluetooth interface (SR2BTC01) for Zelio Logic smart relay *(1)*
6 Zelio Logic compact or modular smart relay

Modem link



7 PC-modem connecting cable (SR1CBL03)
8 Programming PC
9 Modem interface connecting cable included with SR2COM01*(1)*
10 Data transmission/reception modem (SR2MOD02) *(1)*
11 Phone or radio link
12 Communication interface (SR2COM01)
13 Zelio Logic compact or modular smart relay

(1) See page 20.

Zelio Logic
Communication
Modbus serial link communication protocol

SR_531_CPF_JR16052

Modbus serial link network communication extension module

Presentation

The Modbus communication protocol is the client/server type.
Two exchange methods are possible:

- Request/response:
  - The client sends a request to a specific server.
  - The server waits for a response from the polled client.
- Broadcast:
  - The Client broadcasts a request to all server stations on the bus. These stations execute the command without transmitting a response.

Zelio Logic modular smart relays are connected to the Modbus network via the Modbus server network communication extension module. This extension module is a server that is not electrically isolated.
The Modbus server network communication extension module must be connected to an SR3B●●●BD modular smart relay with a 24 V ⎓ power supply.

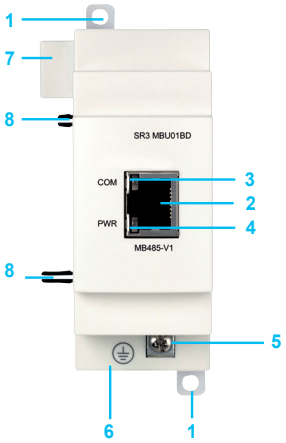
Configuration

The Modbus server network communication extension module can be configured:

- locally, using the buttons on the smart relay *(1)*
- on a PC using “Zelio Soft 2” software (see page 10)

When using a PC, programming can be performed either in ladder language or in function block diagram (FBD) language (see page 12).

Description



The Modbus server network communication extension module **SR3MBU01BD** comprises:

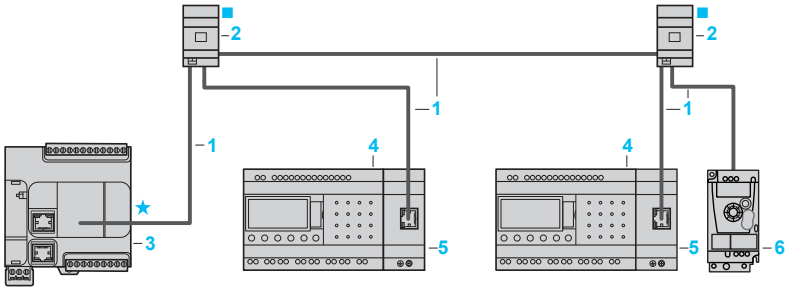
1 Two retractable mounting lugs
2 A Modbus network connection (RJ45 shielded female connector)
3 A communication LED (COM)
4 A power LED (PWR)
5 A screw terminal block for the protective ground connection
6 Spring for clip-on mounting on 35 mm/*1.38 in.* rail
7 Connector for connection to the Zelio Logic smart relay (powered via the Zelio Logic smart relay)
8 Locating pegs

(1) Programming via the buttons on the front panel of the smart relay is only possible in ladder language.

Zelio Logic
Communication
Modbus serial link communication protocol

Connection examples

Example 1

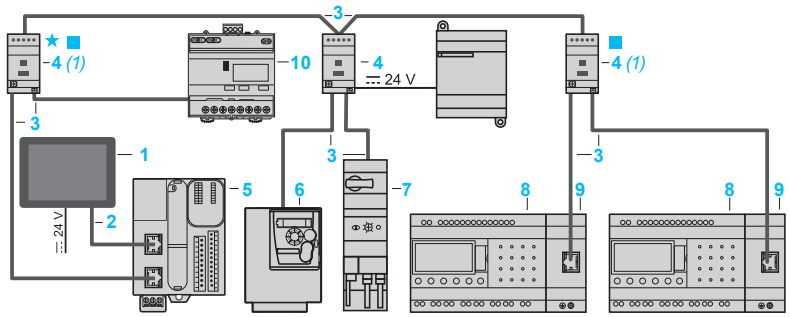


- Total length of cables between M221 and Altivar 12: ⩽ 30 m (98 ft)
- Length of cable 3: ⩽ 10 m (33 ft)
★ Line polarization active ■ Line terminator

1 Modbus RS485 cordsets (**VW3A8306R●●** extension cables)
2 Junction box **TWDXCAT3RJ** (1x RJ45 for trunk cable, 2x RJ45 for drop)
3 Client Modicon logic controller **TM221C●●●** equipped with communication cartridge **TMC2SL1** *(1)*
4 Modular smart relay **SR3B●●●BD**
5 Modbus communication extension module **SR3MBU01BD**
6 Altivar 12 drive

(1) Polarization must be enabled in the Client Modicon M221.

Example 2



- Total length of cables between isolation boxes 4: ⩽ 1,000 m (3,281 ft)
- Length of drop cables 3: ⩽ 10 m (33 ft)
★ Line polarization active ■ Line terminator

1 Client display unit **HMISCU**
2 Controller to Harmony HMI cordsets
3 Modbus RS485 cordsets (**VW3A8306R●●** extension cables)
4 Serial link tap isolation box **TWDXCAISO** (1x RJ45 for trunk cable, 2x RJ45 for drop) **5** Client Modicon logic controller **TM221M●●●** *(Network server connected to serial link port SERIAL1)*
6 Altivar 312 drive
7 TeSys U motor starter controller
8 Modular smart relay **SR3B●●●BD**
9 Modbus communication extension module **SR3MBU01BD**
10 Power meter **IEM31**

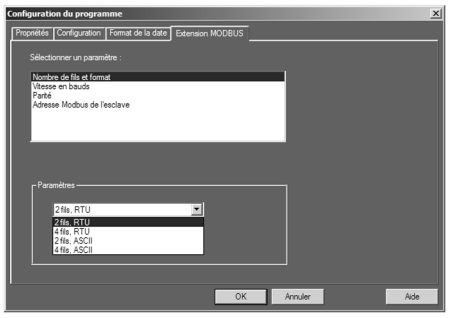
(1) Box powered by the logic controller

Function description

- The Modbus server network communication extension module is connected to a 2-wire or 4-wire Modbus network *(1)*.
- The maximum length between two **TWDXCAISO** taps configured as line terminators is 1,000 m/*3,281 ft* (9600 baud max., AWG 26).
- A maximum of 32 servers can be connected to the Modbus network, or a maximum of 247 servers with repeaters.
- The connection cable and its RJ45 male connectors must be shielded.
- The module ⏚ terminal must be connected directly to the protective ground.

(1) Refer to the Quick Reference Guide supplied with the product.

Zelio Logic
Communication
Modbus serial link communication protocol



Software workshop parameter entry window

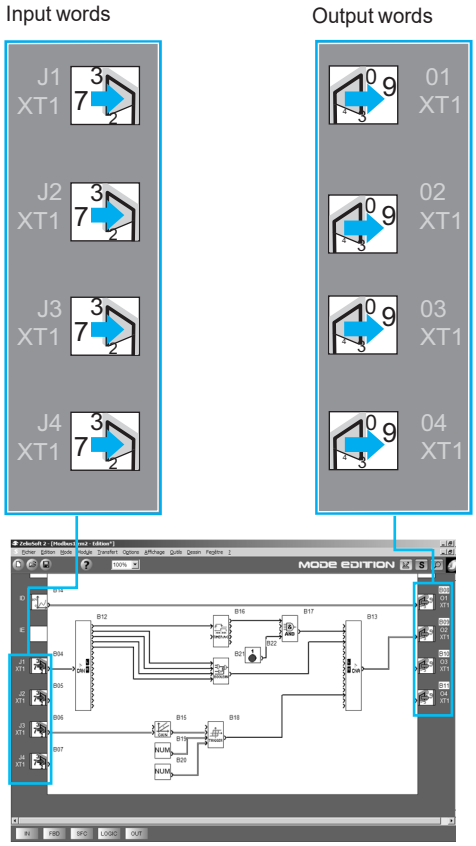
Parameter entry

Parameters can be entered either using “Zelio Soft 2” software, or directly using the buttons on the Zelio Logic smart relay *(1)*.
When the “RUN” command is issued, the Zelio Logic smart relay initializes the Modbus server network communication extension module in a configuration previously defined in the basic program.

The Modbus server network communication extension module has 4 parameters:
- number of UART wires and Modbus frame format
- transmission speed
- parity
- Modbus extension module network address

The default parameter settings are as follows: 2-wire, RTU, 19,200 baud, even parity, address 1.

Parameters	Options
Number of wires	2 or 4
Frame format	RTU or ASCII
Transmission speed (baud)	1200, 2400, 4800, 9600, 19,200, 28,800, 38,400, 57,600
Parity	None, even, odd
Network address	1 to 247



FBD program editing window

Addressing Modbus exchanges

Ladder programming

In ladder mode, the 4 data words (16 bits) to be exchanged cannot be accessed by the application. Transfers with the Client are implicit and are carried out in a way that is totally transparent.

Modbus exchanges	Code	Number of words
Image of smart relay I/O	Read 03	4
Clock words	Read/Write 16, 06, or 03	4
Status words	Read 03	1

Function block diagram (FBD) programming

In FBD mode, the 4 input data words (16 bits) (J1XT1 to J4XT1) and the 4 output data words (O1XT1 to O4XT1) can be accessed by the application. Conversion function blocks are used to:
- break down a word type input (16 bits) into 16 separate “bit” type outputs using the CAN (analog-to-digital conversion) function e.g. to break down a J1XT1 to J4XT1 type input and copy these status values to discrete outputs
- compose a word type output (16 bits) from 16 separate “bit” type outputs using the CNA (digital-to-analog conversion) function e.g. to transfer the status value of discrete inputs or the status of a function to an O1XT1 to O4XT1 type output

Modbus exchanges	Code	Number of words
Input words	Read/Write 16, 06, or 03	4
Output words	Read 03	4
Clock words	Read/Write 16, 06, or 03	4
Status words	Read 03	1

(1) Programming via the buttons on the front panel of the smart relay is only possible in ladder language.

Ethernet (server) network communication extension module

Presentation

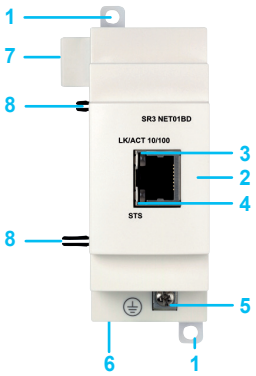
The **SR3NET01BD** extension module is used to communicate over Ethernet via the Modbus/TCP protocol in server mode. It must be connected to an **SR3B●●●BD** smart relay with a 24 V ⎓ power supply.

Configuration

This extension module is configured on a PC using “Zelio Soft 2” software (see page 10).
Programming on the PC is performed in function block diagram (FBD) language (see page 12).

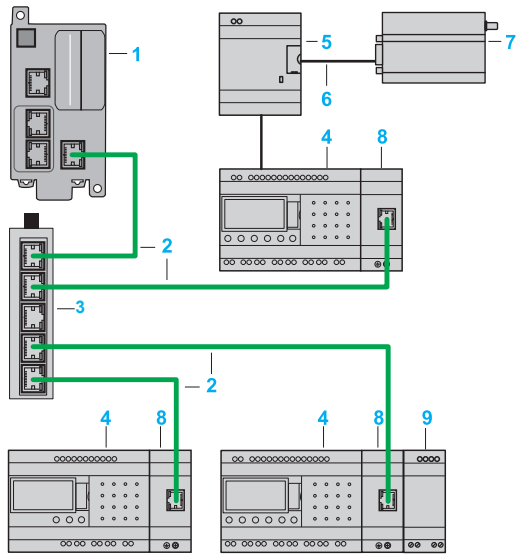
Description

The Ethernet Modbus/TCP network communication extension module **SR3NET01BD** comprises:



1 Two retractable mounting lugs
2 An Ethernet network connection (RJ45 shielded female connector)
3 A communication LED (LK/ACT 10/100)
4 A status LED (STS)
5 A screw terminal block for the protective ground connection
6 Spring for clip-on mounting on 35 mm/*1.38 in.* rail
7 Connector for connection to the Zelio Logic smart relay (powered via the Zelio Logic smart relay)
8 Locating pegs

Connection example

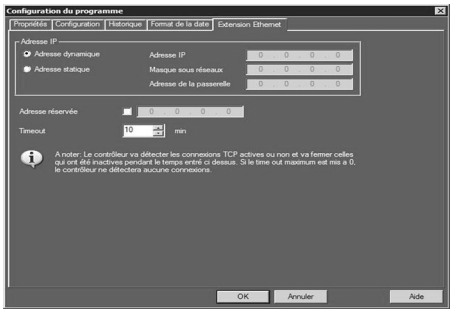


1 Modicon logic controller **TM251MESE**
2 Ethernet network (**490NTW000●●** cordsets)
3 Modicon switch **MCSESU●●●**
4 Zelio Logic modular smart relay **SR3B●●●BD**
5 Communication interface **SR2COM01**
6 Connecting cable **SR2CBL07** (included with modem communication interface)
7 GSM modem
8 Ethernet server network communication extension module **SR3NET01BD**
9 Analog I/O extension module **SR3XT43BD**

Function description

- The Ethernet Modbus/TCP network communication extension module is connected to a LAN.
- The maximum length between two devices is 100 m/*328 ft.*
- The connection cable must be at least category 5, and its RJ45 male connectors must be shielded.
- The ⏚ terminal must be connected directly to the protective ground.

Zelio Logic
Communication
Ethernet Modbus/TCP network



Ethernet extension module configuration window

Parameter entry

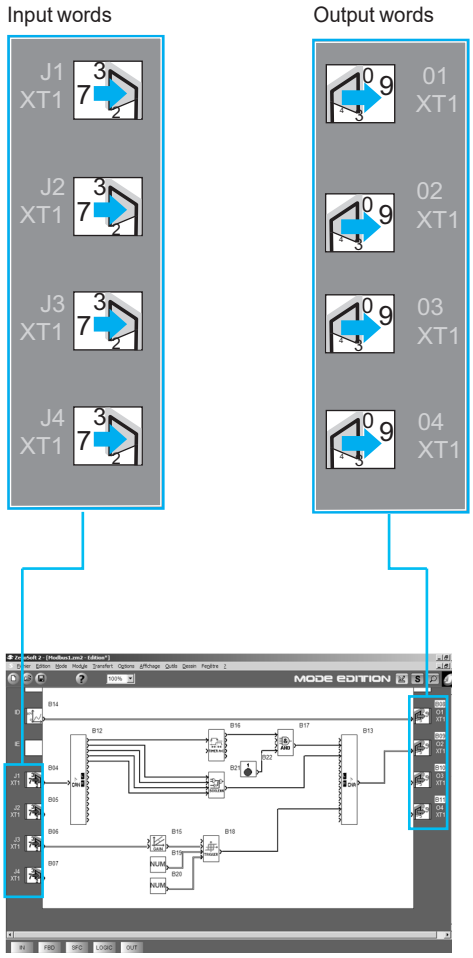
Parameters can be entered using “Zelio Soft 2” software.
When the “RUN” command is issued, the Zelio Logic smart relay initializes the Ethernet Modbus/TCP network communication extension module in a configuration previously defined in the basic program.

The Ethernet Modbus/TCP network communication extension module has 6 parameters:
- type of addressing (dynamic or static)
- IP address
- subnet mask
- gateway address
- reserved address
- time out

Addressing Ethernet exchanges

Function block diagram (FBD) programming

In FBD mode, the 4 input data words (16 bits) (J1XT1 to J4XT1) and the 4 output data words (O1XT1 to O4XT1) can be accessed by the application.
Conversion function blocks are used to:
- break down a word type input (16 bits) into 16 separate “bit” type outputs using the CAN (analog-to-digital conversion) function e.g. to break down a J1XT1 to J4XT1 type input and copy these status values to discrete outputs
- compose a word type output (16 bits) from 16 separate “bit” type outputs using the CNA (digital-to-analog conversion) function e.g. to transfer the status value of discrete inputs or the status of a function to an O1XT1 to O4XT1 type output



FBD program editing window

Ethernet exchanges	Code	Number of words
Input words	Read/Write 16, 06, or 03	4
Output words	Read 03	4
Clock words	Read/Write 16, 06, or 03	4
Status words	Read 03	1

SR3MBU01BD

SR3NET01BD

MCSESU053FN0

TWDXCAT3RJ

TWDXCAISO

Modbus serial link and Ethernet Modbus/TCP network communication extension modules

For use with	Communication ports	Reference	Weight kg/*lb*
Modular smart relays SR3B●●1BD and SR3B●●2BD	Serial link (RJ45)	SR3MBU01BD	0.110 *0.242*
	Ethernet (RJ45)	SR3NET01BD *(1)*	0.110 *0.242*

Connection accessories

Designation	Description	Network	Reference	Weight kg/*lb*
Modicon unmanaged Ethernet switch	□ 5 copper ports □ Certified CE, UL, and RCM	Ethernet TCP/IP	MCSESU053FN0	0.125 *0, 275*
Junction boxes	□ Screw terminals for trunk cable □ 2x RJ45 connectors for tap link □ Isolation of RS 485 serial link □ Polarization and line termination □ 24 V ⎓ power supply □ Mounting on ⎍ rail (35 mm/*1.38 in.*)	Modbus serial link	TWDXCAISO	0.100 *0.220*
	□ 3x RJ45 connectors □ Polarization and line termination □ Mounting on ⎍ rail (35 mm/*1.38 in.*)	Modbus serial link	TWDXCAT3RJ	0.080 *0.176*
Line terminator	□ For RJ45 connector □ R = 120 Ω, C = 1 nf	Modbus serial link	VW3A8306RC	0.200 *0.440*

Designation	Description	Network	Length m/*ft*	Reference	Weight kg/*lb*
T-junctions	□ 2x RJ45 connectors □ 1 integrated cable with RJ45 connector	Modbus serial link	0.3/*0.98*	VW3A8306TF03	0.190 *0.418*
			1/*3.28*	VW3A8306TF10	0.210 *0.462*
RS 485 extension cables	□ 2x RJ45 connectors	Modbus serial link	0.3/*0.98*	VW3A8306R03	0.030 *0.066*
			1/*3.28*	VW3A8306R10	0.050 *0.110*
			3/*9.84*	VW3A8306R30	0.150 *0.330*
Straight-through shielded twisted pair extension cables	□ 2x RJ45 connectors	Ethernet Modbus/TCP	2/*6.56*	490NTW00002 *(2)*	–
			5/*16.4*	490NTW00005 *(2)*	–
			12/*39*	490NTW00012 *(2)*	–
			40/*131*	490NTW00040 *(2)*	–
			80/*262*	490NTW00080 *(2)*	–

(1) Can only be used in FBD language.
(2) Cable compliant with EIA/TIA-568 Category 5 and IEC 1180/EN 50173 Class D.
*For UL and CSA 22.1 approved cables, add the letter **U** at the end of the reference.*

Zelio Logic
Analog I/O extension module

Analog I/O extension module for modular smart relays

Presentation

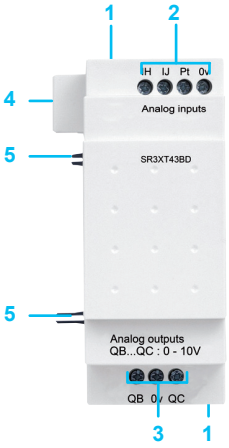
Modular smart relays and analog I/O extension modules

To improve performance and flexibility, Zelio Logic modular smart relays can take analog I/O extension modules with 10-bit resolution.
The inputs accept 0-10 V, 0-20 mA, and Pt100 signals.

Using a Zelio Logic modular smart relay with a 24 V ⎓ power supply in conjunction with an analog I/O extension module with 4 I/O makes it possible to obtain up to 30 I/O, including 8 analog inputs and 2 analog outputs.

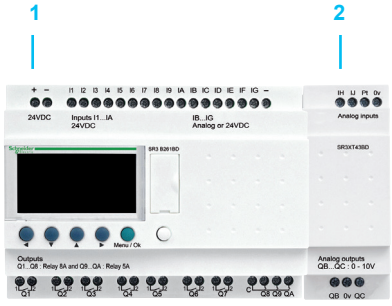
The analog I/O extension module works with SR3●●●BD smart relays with a 24 V ⎓ power supply.

Description

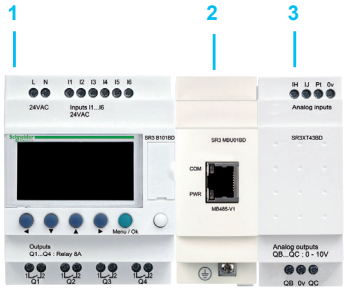


The analog I/O extension module front panel comprises:
1 Two retractable mounting lugs
2 Terminals for connecting the inputs
3 Terminals for connecting the outputs
4 Connector for connection to the smart relay (powered via the smart relay)
5 Locating pegs

Combination of modular smart relays and extension modules



1 Modular smart relay (10 or 26 I/O)
2 Analog I/O extension module (4 I/O)



1 Modular smart relay (10 or 26 I/O)
2 Modbus serial link or Ethernet Modbus/TCP network communication extension modules
3 Analog I/O extension module (4 I/O)

⚠ Observe the order of assembly above when using a network communication extension module and an analog I/O extension module.
An I/O extension module cannot be inserted before a network communication extension module.

Zelio Logic
Analog I/O extension module

SR3XT43BD

Analog I/O extension module

24 V ⎓ power supply (via SR3B●●●BD smart relays)

Number of I/O	Number of inputs	Including 0-10 V	Including 0-20 mA	Including Pt100	0-10 V output	Reference	Weight kg/*lb*
4	2	2 max.	2 max.	1 max.	2	SR3XT43BD *(1)*	0.110/ *0.243*

(1) Can only be used in FBD language.

Zelio Logic
Modem communication interface

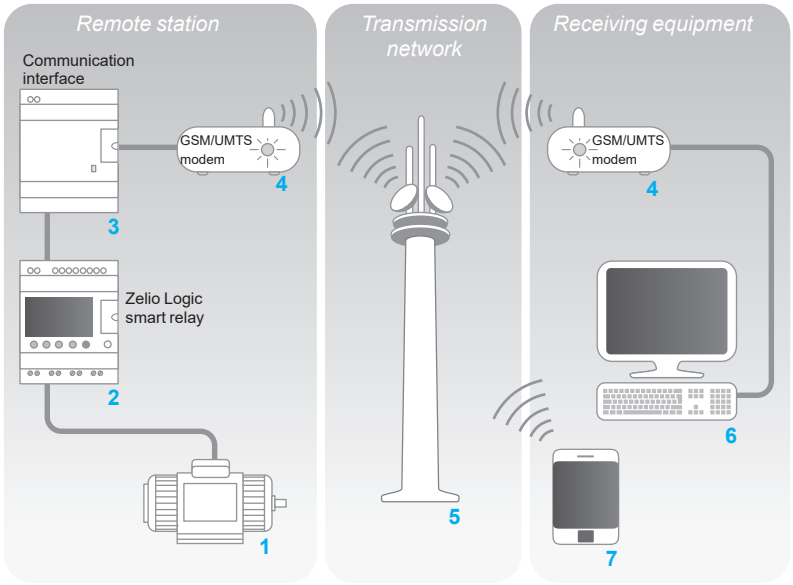
Modem communication interface

GSM/UMTS modem (1)

Presentation

The communication products in the Zelio Logic range are primarily designed for monitoring or remote control of machines or installations that operate without personnel.
Examples:
- monitoring of lift pumps, livestock buildings (ventilation, feed level, etc.), refrigeration units, car washes
- alarm in the event of failure of industrial or domestic heating boilers
- remote control of lighting: parking lots, warehouses
- remote control and monitoring of escalators, public transport
- refuse compactor full alert

The communication range comprises:
- a communication interface connected between a smart relay and a modem
- A GSM/UMTS modem *(1)*
- "Zelio Logic Alarm" software



The system comprises:
- A *remote station*, machine, or installation to be monitored **1**: control is achieved using a Zelio Logic smart relay with clock from the SR●B●●●●● or SR2E●●●●● range **2** via its inputs and outputs. The smart relay is connected via a communication interface **3** to a GSM/UMTS modem *(1)* **4**.
- The GSM/UMTS telephone *transmission network* **5** provided by different telecommunications operators
- A monitoring or control *receiver device*, which may be either of the following:
  - A PC **6** equipped with a GSM/UMTS modem
  - A GSM/UMTS phone **7**

Note: *The majority of modems built into PCs can be used.*

Various combinations are possible between the types of modem used on the *remote station*, the type of *receiver device* (PC + modems or phone), and the type of GSM/UMTS network available.
The type of architecture selected will therefore mainly depend on whether there is a need to send SMS messages or not (see page 35).

(1) GSM = Global System Mobile (2G). UMTS = Universal Mobile Telecommunications System (3G). The versions of modem communicating on the UMTS network (3G) are reserved for certain countries. Please contact our Customer Care Center.

Presentation (continued)

Smart relay (*remote station*)

As on an independent machine or installation, the smart relay is used for control *(1)*.
It contains the application program created using “Zelio Soft 2”.
The smart relay can be selected from the various models in the Zelio Logic range:
- according to the supply voltage
- with 10, 12, 20, or 26 I/O (up to 40 I/O with discrete extension module)
- with or without display
- with clock

Modem communication interface (*remote station*)

The modem communication interface allows messages, phone numbers, and calling conditions to be stored.
When the calling conditions are met, the messages, as well as any values to be sent, are date-stamped and stored in the interface.
The modem communication interface scales analog values to the physical values (degrees, bar, Pascal, etc.) required by the user.

GSM/UMTS modem

GSM/UMTS modems can be used on both the *remote station* and PC-type *receiver devices* (if the PC is not equipped with an internal modem). This modem automatically adapts to the available network by prioritizing the GSM network, which offers the greatest functionality. If there is only a UMTS network available, there will be reduced functionality (see the table on page 35).

In order to exploit the capabilities associated with the the communication modem, the modems are equipped with data SIM cards. Voice SIM cards may also be used but some functions will not be available (see the table on page 35).

“Zelio Logic Alarm” alarm management software *(PC type receiver device)*

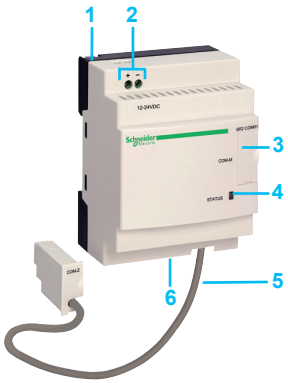
This software is used to:
- receive, classify, and export diagnostic alarm messages
- read or remotely force the status of program elements (inputs, outputs, auxiliary relays, timer or counter values, etc.)
- send control instructions (RUN, STOP, setting the time of the smart relay, etc.)
- send specific instructions (modifying access rights, recipients, etc.)

Note: This software can only be used on GSM networks (2G).

(1) Zelio Logic smart relays (see page 8)

Description

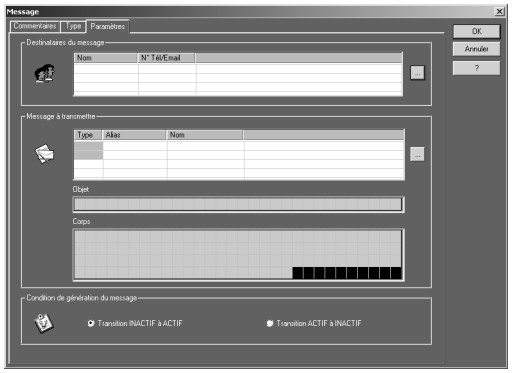
The SR2COM01 modem communication interface comprises:



1 Retractable mounting lugs
2 12…24 V ⎓ power supply terminal block
3 Slot for connection to modem or PC
4 Interface status LED indicator
5 Cable for connecting to the smart relay
6 Spring clip for clip-on mounting on a 35 mm *(1.38 in.)* rail

Zelio Logic
Modem communication interface

Functions



Message parameter entry window

Sending alarms

This function is used to send an alarm message to a *receiver device*.
When the calling condition is met, a message is sent to one or several phone numbers or e-mail addresses.
Types of message:
- alarm message on a PC with modem and "Zelio Logic Alarm" software
- SMS message *(1)* on a GSM/UMTS phone
- e-mail via SMS *(1) (2)*

One or all of these solutions can be selected simultaneously.
The *remote station* to be monitored initiates the call.
The phone line is only used while the alarm message is being transmitted.
Up to 28 messages can be used.
These messages consist of:
- a 160-character text, which may contain discrete and/or analog values (counter values, analog input voltages that can be scaled, etc.)
- 1 to 10 recipient phone numbers/e-mail addresses

Receiving commands

This function allows the status or the value of a program element to be modified from the *receiver device*.
The operator initiates the call using the *receiver device* (PC or phone). It is then possible to force the status of the discrete and/or analog value of each of the 28 messages.

Remote dialog using "Zelio Soft 2"

This function enables use of the Transfer, Monitoring, and Diagnostics modes available in "Zelio Soft 2" via the *transmission network* instead of via the physical link (SR2USB01 or SR2CBL01 cable) between the device (*remote station*) and the PC (*receiver device*).
It is then possible to:
- transfer a program created on a PC to the *remote station*
- transfer a program installed on the *remote station* to the PC
- modify the receiver device phone numbers/e-mail addresses and the alarm sending conditions from the PC
- update the firmware of the smart relay and the modem communication interface
- display and modify discrete and analog values
- perform diagnostics on the smart relay and modem communication interface

(1) Requires the use of a GSM/UMTS modem on the remote station side.
(2) Check with the transmission network operator that the e-mail by SMS service is available.

Functions available depending on the hardware architecture and/or type of SIM card

Function	Remote station device				
	GSM network (2G)				UMTS network (3G)
	Type of SIM card				
	Data	Data and voice		Voice	
		Data number	Voice number		
Send alarm/receive command with GSM/UMTS phone	■	■	■	■	■
Send alarm/receive command with PC equipped with "Zelio Logic Alarm" software *(1)*	■	■			
Transfer program, update firmware, monitoring *(1)*	■	■			
Send alarm via e-mail	■	■	■	■	

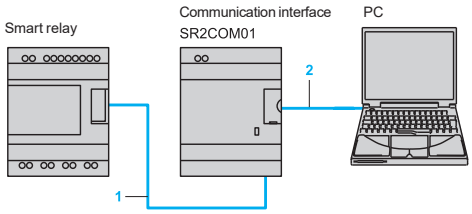
■ Functions available
Functions not available

Note: *Commands cannot be sent by e-mail.*

(1) When using a GSM/UMTS modem on the PC side, it is essential that the SIM card has a data number.

Zelio Logic
Modem communication interface

Installation setup



There are two steps involved in setting up the installation or machine to be monitored:

Connection for programming the smart relay and interface

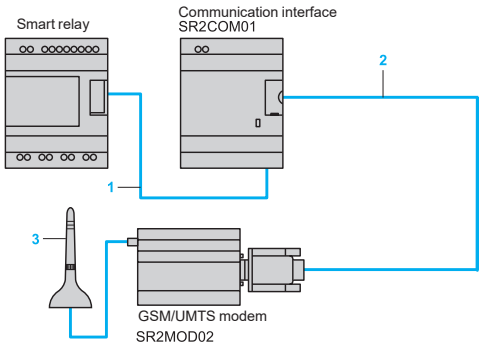
1 Interface cable marked COM-Z
2 SR2USB01 or SR2CBL01 cable

After having powered-up the smart relay and the interface, the application program can be transferred in order to simultaneously:

- load the automation system program into the smart relay
- load the alarm conditions, messages, and phone numbers into the interface

This operation can also be carried out remotely using “Transfer” mode, after having established the connections described below.

⚠ *The use of memory cartridge SR2MEM01 or SR2MEM02 to load the program is not compatible with the SR2COM01 modem communication interface.*



Connections for operation

1 Interface cable marked COM-Z
2 SR2CBL07 cable supplied with the interface
3 Antenna included with modem

References

SR2COM01

SR2MOD02

SR2CBL07

Modem communication interface

Description	For use with	Power supply	Reference	Weight kg/*lb*
Modem communication interface (including SR2CBL07 cable)	**SR●B●●●●●** **SR2E●●●●●**	12…24 V ⎓	SR2COM01	0.200 *0.441*

Modem

Description	Supply voltage	Reference	Weight kg/*lb*
GSM/UMTS modem *(1)* including: □ power supply cable (1.5 m/*4.92 ft*) □ antenna with cable (2.5 m/*8.2 ft*) □ mounting on ⊥ rail (assembled with GSM/UMTS modem) □ 2 lugs for plate mounting	12…24 V ⎓	SR2MOD02 *(2)*	0.335 *0.739*

Software

Description	Use Compatibility	Reference
Zelio Logic Alarm This software was previously supplied on CD. It is now supplied as a free download available on our website.	For PC and 32-bit and 64-bit operating systems compatible with Windows 7, 8.1, and 10	Free download from our website

Connection accessories

Description	Composition/Use	Length m/*ft*	Reference	Weight kg/*lb*
Connecting cables	9-way SUB-D/9-way SUB-D connectors Between Modem and PC	1.8/*5.906*	SR1CBL03	0.110 *0.243*
	Special Zelio/9-way SUB-D connector Between communication interface and modem	0.5/*1.640*	SR2CBL07 *(3)*	0.050 *0.110*

(1) Global System Mobile (2G)/Universal Mobile Telecommunications System (3G). The versions of modem communicating on the UMTS network (3G) are reserved for certain countries. Please contact our Customer Care Center for more information.
(2) Not recommended for Japan.
(3) Spare part (cable included as standard with SR2COM01 communication interface).

Zelio Logic
Smart relays
Product reference index

Life Is On | Schneider Electric

Learn more about our products at
www.se.com

Design: Schneider Electric
Photos: Schneider Electric

Schneider Electric Industries SAS
Head Office
35, rue Joseph Monier - CS 30323
F-92500 Rueil-Malmaison Cedex
France

DIA3ED2111202EN
January 2022 - V4.0

Catalog | May 2021

EcoStruxure™ Machine Expert

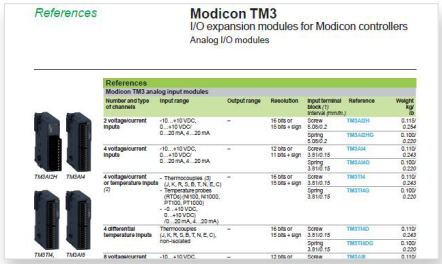
Software for developing, configuring, and commissioning the entire machine in a single software environment

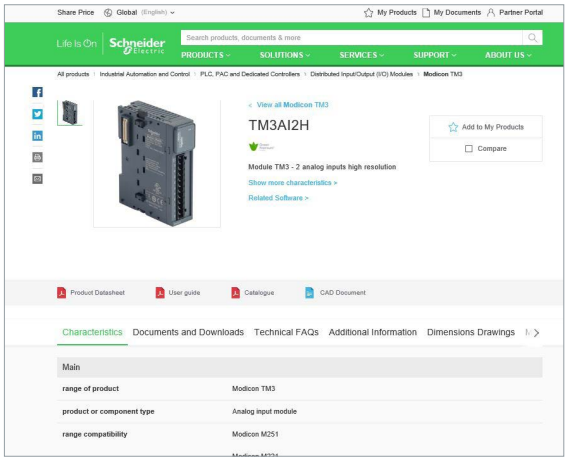
www.se.com

Life Is On Schneider Electric

Quick access to product information

Get technical information about your product

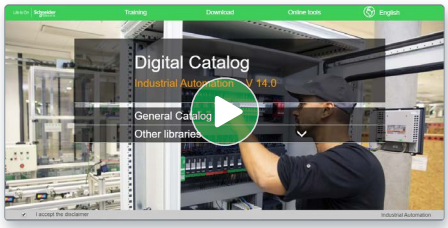




Each commercial reference presented in a catalog contains a hyperlink. Click on it to obtain the technical information of the product:

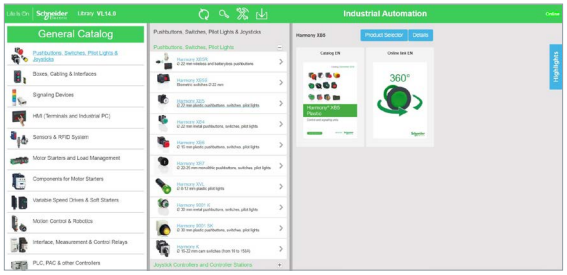
- Characteristics, Dimensions and drawings, Mounting and clearance, Connections and schemas, Performance curves
- Product image, Instruction sheet, User guide, Product certifications, End of life manual

Find your catalog



> With just 3 clicks, you can access the Industrial Automation and Control catalogs, in both English and French

> Consult digital automation catalogs at Digi-Cat Online

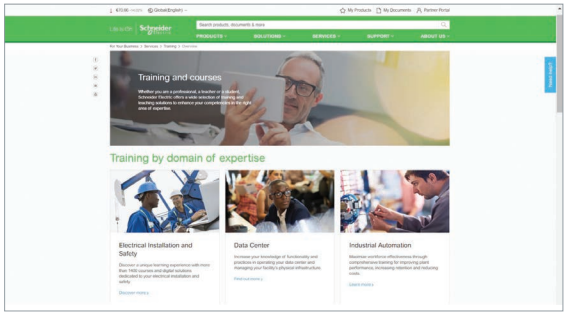


- Up-to-date catalogs
- Embedded product selectors,360° pictures
- Optimized search by commercial references

Select your training

> Find the right Training for your needs on our Global website

> Locate the training center with the selector tool, using this link



Life Is On Schneider Electric

General content

EcoStruxure™ Machine Expert
A single software environment to automate machines

To be competitive in today's digital era, machine builders must be innovative. Smart machines, those that are better connected, more flexible, more efficient, and safe, are enabling machine builders to innovate in ways never before possible.

EcoStruxure, Schneider Electric's open, IoT-enabled architecture and platform, offers powerful solutions for the digital era. As part of this, EcoStruxure Machine brings powerful opportunities for machine builders and OEMs, empowering them to offer smart machines and compete in the new, digital era.

EcoStruxure Machine brings together key technologies for product connectivity and edge control on premises, and cloud technologies to provide analytics and digital services. EcoStruxure Machine helps you bring more innovation and added value to your customers throughout the entire machine life cycle.

Innovation at Every Level for Machines is full systems across three layers:

– Connected products
Our connected products for measuring, actuating, device level monitoring, and control adhere to open standards to provide unmatched integration opportunities and flexibility

– Edge Control
We are IIoT-ready with a proven set of tested and validated reference architectures that enable the design of end-to-end open, connected, and interoperable systems based on industry standards. Ethernet and OPC UA facilitates IT/OT convergence meaning machine builders reap benefits from web interfaces and cloud.

– Apps, Analytics & Services
Seamless integration of machines to the IT layer allows the collection and aggregation of data ready for analysis – for machine builders and end users alike this means increased uptime and the ability to find information faster for more efficient operations and maintenance.

These levels are completely integrated from shop floor to top floor. And we have cloud offers and end-to-end cybersecurity wrapped around.

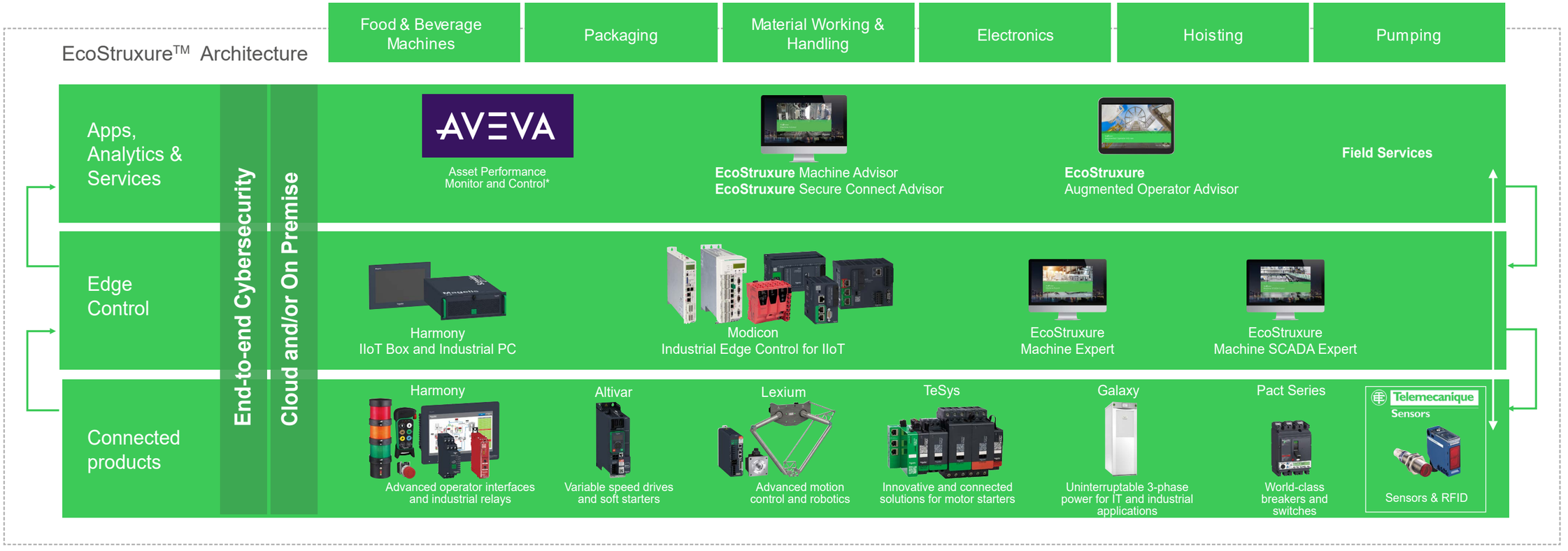
EcoStruxure Machine makes it easier for OEMs/ machine builders to offer their customers smarter machines. The advent of smart machines is driven by the changing needs of end users:

– Evolving workforce
– Reducing costs
– Dynamic markets
– Shorter life cycles
– Prioritizing safety and cybersecurity

EcoStruxure Machine provides one solution for the whole machine life cycle:

– With Smart Design & Engineering the time to market is reduced by up to 30% using our automated engineering and the simulation capabilities
– During Commissioning & Operation of the machine, resources such as energy, material and loss can be improved, and with seamless integration to the IT world efficiency can be improved by up to 40%
– Smart Maintenance & Services reduces the time for corrective actions up to 50%

EcoStruxure™ Machine



* The Schneider Electric industrial software business and AVEVA have merged to trade as AVEVA Group plc, a UK listed company. The Schneider Electric and Life is On trademarks are owned by Schneider Electric and are being licensed to AVEVA by Schneider Electric.

EcoStruxure Machine Expert

A single software environment to automate machines

Controllers for industrial machines

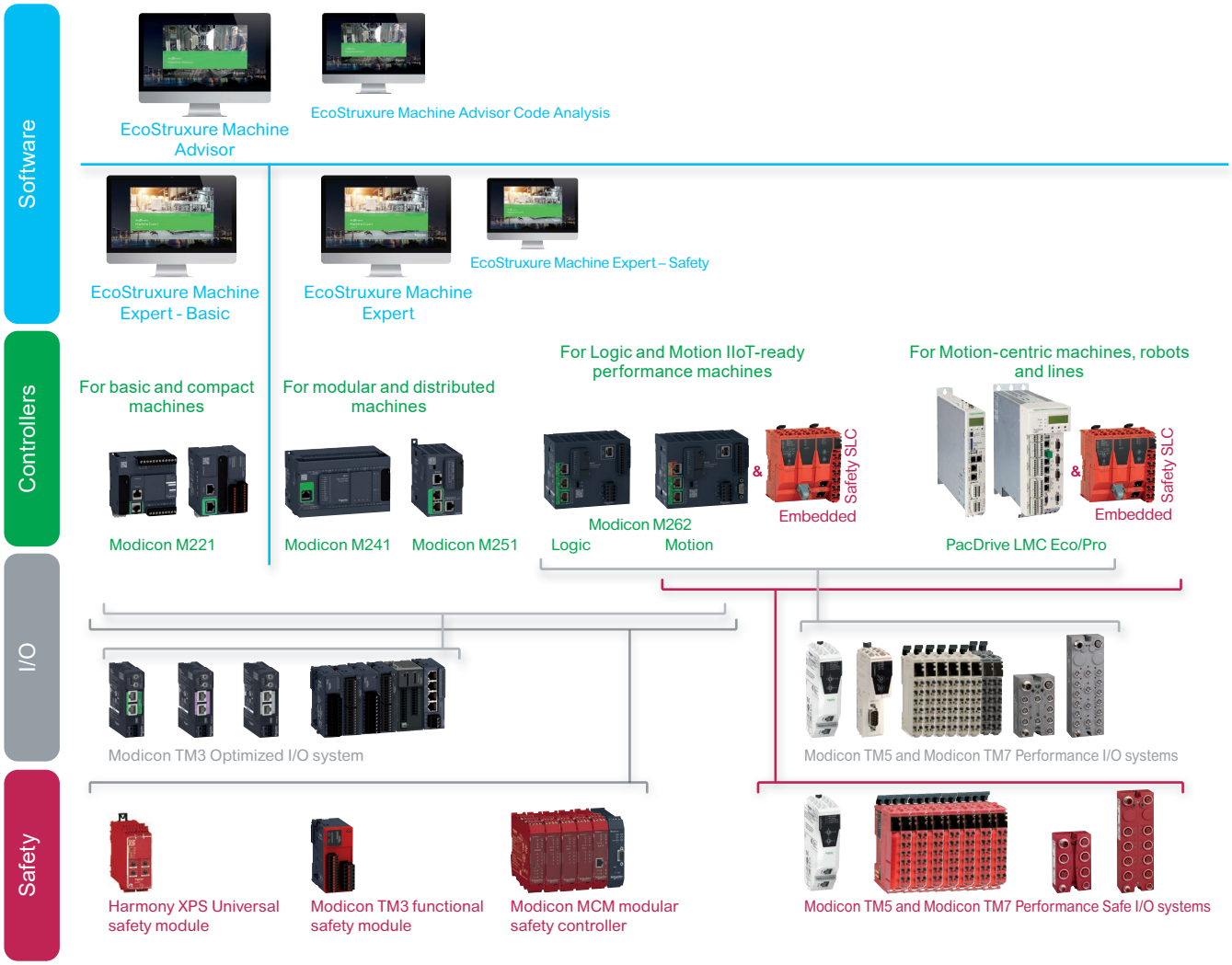
Applications	Type	**Logic controller**			**Logic/motion controller**	**Motion controller**
	Specification	For hardwired architectures	For performance-demanding applications	For modular and distributed architectures	IIoT ready for performance machines	For automating machines/lines with 0 - 130 servo or robot axes
						
Performance		0.2 µs/inst	22 ns/inst	22 ns/inst	3...5 ns/inst	0.5...2 ns/inst
Memory		640 KB RAM, 2 MB Flash	64 MB RAM, 128 MB Flash	64 MB RAM, 128 MB Flash	192 MB RAM, 256 MB Flash	128 KB to 256 KB NV RAM, 512 MB DDR2 to 1 GB DDR3L
Supply voltage		24 V ⎓ or 100...240 V ∿	24 V ⎓ or 100...240 V ∿	24 V ⎓	24 V ⎓	24 V ⎓
Communication fieldbus and networks	Embedded	■ EtherNet/IP Adapter ■ Modbus TCP ■ RS 232/RS 485 Serial Line ■ USB mini-B programming port	■ EtherNet/IP ■ Modbus TCP ■ CANopen (master) and SAE J1939 ■ Serial Line ■ USB mini-B programming port	■ EtherNet/IP ■ Modbus TCP ■ CANopen (master) and SAE J1939 ■ Serial Line ■ USB mini-B programming port	■ EtherNet/IP ■ Modbus TCP ■ Sercos III ■ Serial Line ■ USB mini-B programming port	■ EtherNet/IP ■ Sercos III ■ CANopen ■ Profibus ■ Profinet ■ EtherCAT
	OPC Unified Architecture (OPC UA)	–	■ Server	■ Server	■ Server (encrypted) ■ Client (encrypted) (depending on reference)	■ Server (encrypted) ■ Client (encrypted)
	Optional	■ 1 Serial Line	■ Ethernet ■ Profibus DP	■ Ethernet ■ Profibus DP	■ Ethernet, EtherNet/IP Adapter ■ CANopen Master	■ CANopen ■ Profibus DP ■ RT-Ethernet
Embedded I/O	Input types	Up to 40 logic inputs 2 analog inputs	Up to 24 logic inputs	–	4 fast digital inputs	Up to 20 digital inputs Up to 16 touch probe inputs Up to 4 interrupt inputs Up to 2 analog inputs
	Output types	Up to 16 relay outputs Up to 16 tansistor outputs	Up to 16 tansistor outputs	–	4 fast digital outputs	Up to 16 digital outputs Up to 2 analog outputs
Synchronized axes		–	–	–	Up to 24 synchronized axes	Up to 130 synchronized axes
Configuration software		EcoStruxure Machine Expert-Basic	EcoStruxure Machine Expert			
Compatible expansion I/O module ranges (Consult the catalog)						
	● Local I/O	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	–
	● Remote I/O	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	–
	● Distributed I/O on Ethernet	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN) ● Modicon TM5 (DIA3ED2131204EN)	● Modicon TM3 (DIA3ED2140109EN) ● Modicon TM5 (DIA3ED2131204EN)	● Modicon TM3 (DIA3ED2140109EN) ● Modicon TM5 (DIA3ED2131204EN)	● Modicon TM5 (DIA3ED2131204EN)
	● Distributed I/O on CANopen	–	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN) ● Modicon TM5 (DIA3ED2131204EN) ● Modicon TM7 (DIA3ED2140405EN)	● Modicon TM3 (DIA3ED2140109EN) ● Modicon TM5 (DIA3ED2131204EN) ● Modicon TM7 (DIA3ED2140405EN)
	● Distributed I/O on Sercos	–	–	–	● Modicon TM5 (DIA3ED2131204EN)	● Modicon TM5 (DIA3ED2131204EN)
	● Distributed I/O on Modbus Serial Line	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	–
	● Safety I/O	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN)	● Modicon TM3 (DIA3ED2140109EN) ● Modicon TM5 (DIA3ED2131204EN) ● Modicon TM7 (DIA3ED2140405EN)	● Modicon TM5 (DIA3ED2131204EN) ● Modicon TM7 (DIA3ED2140405EN)
Controller range		**Modicon M221/M221 Book**	**Modicon M241**	**Modicon M251**	**Modicon M262**	**PacDrive LMC Eco, LMC Pro2**
More details in catalog		DIA3ED2140106EN	DIA3ED2140107EN	DIA3ED2140108EN	DIA3ED2180503EN	DIA7ED2160303EN

EcoStruxure Machine Expert

A single software environment to automate machines

Machine Automation

Machine Automation



Machine control

> From basic to motion- and robot-centric machines with the PacDrive 3 offer, Modicon controllers and solutions bring a consistent and scalable response to achieving flexibility, performance, productivity and digitization.

The scalability and consistency of I/O ranges allow you to select the right offer depending on your needs

> Modicon TM3 Optimized I/O system for more compact and modular machines
> Modicon TM5 for more performance-demanding machines, with Modicon TM7 for harsh environments: Both Performance I/O ranges (Modicon TM5 and Modicon TM7) allow safety functions to be implemented using Modicon TM5CSLC safety logic controller

Embedded Safety provides holistic solutions to Modicon M262 and PacDrive 3 LMC controllers, increasing overall safety demand in Machine Automation

> Harmony XPS Universal safety modules cover a wide range of safety functions, suitable for small applications with 4-5 safety functions, with diagnostic information provided to controllers via a single wire connection
> Modicon TM3 safety functional modules are suitable for small applications covering E-Stop functions and diagnostics via TM3 I/O bus
> Modicon MCM modular safety controllers are suitable for medium size applications with up to 64 dual channel safety functions and diagnostics via Modbus TCP, Modbus RTU, EtherNet/IP, CANopen, EtherCAT and Profibus

All of those devices are managed within a single software, **EcoStruxure Machine Expert**, a powerful and collaborative engineering environment

> EcoStruxure Machine Expert – Safety: an optional addon for programming safety logic controllers
> EcoStruxure Machine Expert – Basic: a software for programming Modicon M221 logic controllers, an intuitive standalone environment accessible to basic skilled technicians
> EcoStruxure Machine Advisor: a cloud-based services platform designed for machine builders to track machines in operation worldwide, monitor performance data and resolve exceptional events, while reducing support costs by up to 50%

EcoStruxure Machine Expert

A single software environment to automate machines

Machine Automation

Machine Automation

Comprehensive Schneider offers for machine builders

> Lexium servo drives, motors and robotics are designed to control applications ranging from a single independent axis up to high-performance synchronized multi-axis machines requiring high-speed and precise positioning and movements

Robotics

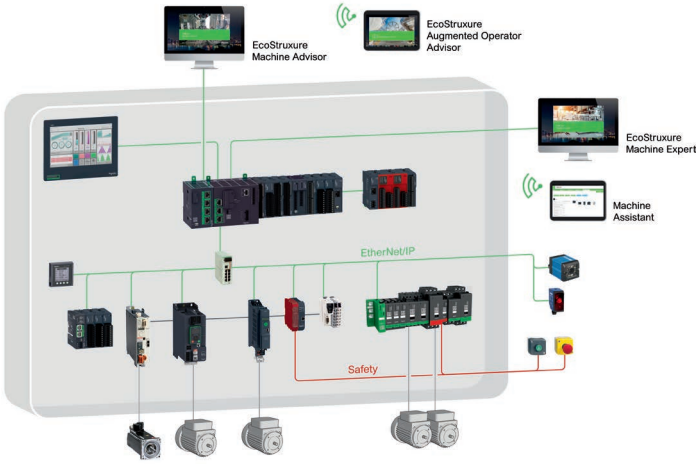
Integrated drives

Servo Drives & Motors

Steppers Drives & Motors

> The Lexium offer is designed for a broad range of motion-centric machines in applications such as Packaging, Material Handling, Material Working, Food and Beverage and Electronics

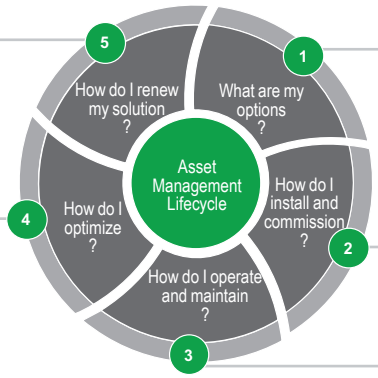
> Schneider Electric has developed Tested Validated & Documented Architectures (TVDA) applicable for generic machine control applications as well as for dedicated segment applications such as Packaging, Material Working, Material Handling, Hoisting, Pumping, or generic Machine Control applications



Choose Schneider Electric to help secure your investment and benefit from worldwide services at every step of your project

Renew
Being your expert to control and renew your aging equipment at the right time and at optimal cost

Optimize
Identifying how you can get even more out of your equipment and further improve your return on investment



Plan
Discussing your maintenance policy and needs arising from it

Install
Delivering services to help ensure your equipment is set up reliably and starts to operate efficiently from day one

Operate
Providing services to support you during normal operations as well as during maintenance breaks and in unexpected situations
Collaborating to maximize your uptime and performance as well as become more proactive in operations

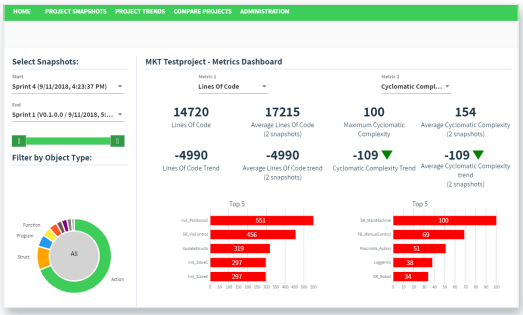
> From planning and inception to modernization, we help ensure optimal technical and business performance. Our field service engineers combine 30+ years of manufacturer-level experience with the latest technology to bring innovation to every level of our offer and every step of your project.

> Our machine control dedicated services empower you to maximize your business infrastructure and face increasingly stringent demands on productivity, safety, equipment availability and performance optimization.

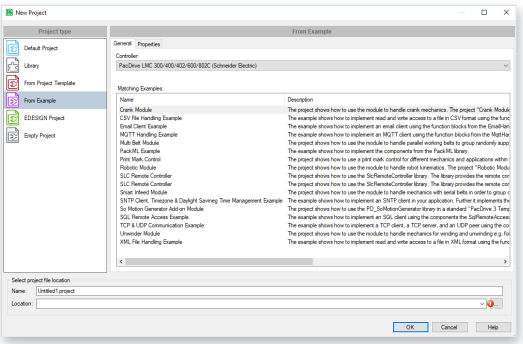
EcoStruxure™ Machine Expert

A single software environment to automate machines

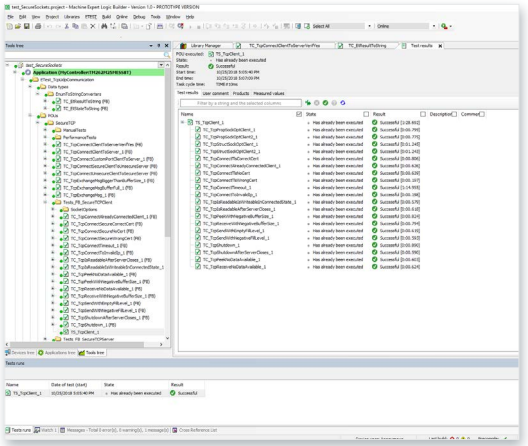
EcoStruxure Machine Expert V2.0 programming software



Cloud based code analysis



New project



ETEST result view

Presentation

EcoStruxure Machine Expert software V2.0

EcoStruxure Machine Expert V2.0 is the machine builder's solution software for developing, configuring, and commissioning the entire machine in a single software environment, including logic control, motion control, remote IO systems, safety programing, motor control, and related network automation functions.

EcoStruxure Machine Expert is a single software environment with:

- **One** software package
- **One** project file
- **One** connection
- **One** download operation

EcoStruxure Machine Expert is a software environment covering the full engineering lifecycle:

- Version management
- Testing
- Deployment
- Diagnostics and remote services
- In addition Machine Expert interfaces with various engineering tools via open interfaces

It supports all the IEC 61131-3 languages, integrated fieldbus configurators, expert diagnostic and debugging functions, motion design as well as multiple capabilities for commissioning, maintenance and visualization.
EcoStruxure Machine Expert is the new name and the next release of the three-engineering software: **SoMachine** and **SoMachine Motion** and **SoSafe Programmable**, now merged into one single environment.

EcoStruxure Machine Expert introduces innovative features for efficient machine development:

- Collaborative work with SVN client
- New IIoT standard libraries (MQTTs, HTTPs, JSON...) to connect the controller to web APIs our cloud services like EcoStruxure Machine Advisor or third party systems. Project examples and function templates help the usage of these technologies.
- Machine code analysis to improve coding efficiency, code quality coding consistency in teams and now uses cloud technology to store the evolution of your code quality:
  - Check code convention using standard or customized rules
  - Understand the DNA of the code with structured graphical code exploration and identify critical sections in the code
  - Get metrics with quality indicators
- Machine Advisor Code Analysis is a cloud based service. It helps you to track deviations from your code quality over the life time of the application. Find more information on our website.
- New Functional view in the project tree to program machines in a modular way
- Python programming language interface:
  - Increase Programming Efficiency, by automating development and project generation
  - Integrate **Machine Expert** in the company's individual environment and automatize workflows
- ETEST framework for higher quality of application code, thanks to automated IEC software unit test
- Import projects from **SoMachine** and **SoMachine Motion** software
- Import projects from **SoSafe Programmable** software
- New HTML5 browser responsive documentation accessible offline or online from any smart device with an internet connection

HMI programming

EcoStruxure Machine Expert V2.0 embeds:

- Vijeo Designer to program a wide range of Harmony industrial HMI
- A Webvisu editor to design and program a visualization screens that are running on the controller's runtime. A controller Webvisu can be accessed remotely via any web browser on many different devices (computers, tablets…)

EcoStruxure Machine Expert
A single software environment to automate machines

Presentation

Configured controllers with EcoStruxure Machine Expert V1.1 software

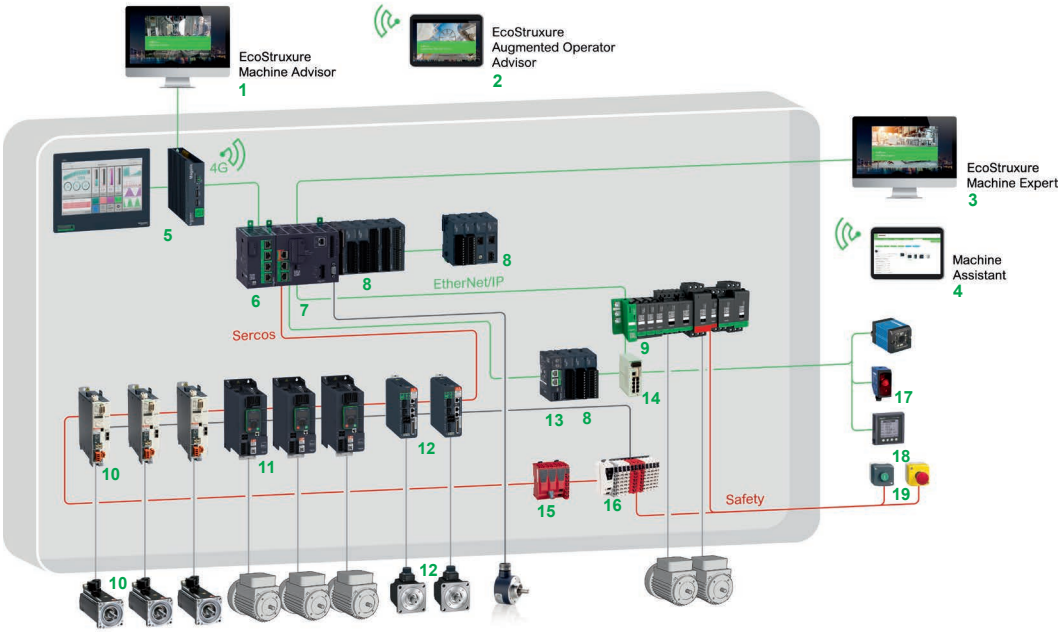
- **Motion controllers**: PacDrive 3 LMC Eco/LMC Pro/LMC pro2 (catalog ref. DIA7ED2160303EN)
- **Logic controllers**
  - Modicon M241 (catalog ref. DIA3ED2140107EN)
  - Modicon M251 (catalog ref. DIA3ED2140108EN)
- **Logic/Motion controller:** Modicon M262 (catalog ref. DIA3ED2180503EN)
- **HMI controllers:** Harmony SCU (catalog ref. DIA5ED2130505EN)

Configured devices with EcoStruxure Machine Expert V2.0 software

Devices can be easily inserted to the project from the Hardware catalog window using simple drag & drop.

- **Servo drives**: Lexium 28, Lexium 32, Lexium 52 stand-alone, Lexium 62 multi axis, Lexium SD3
- **Integrated drives**: Lexium ILA/ILE/ILS, Lexium 62 ILM, Lexium 32i, Lexium 62 ILD detached
- **Robotics**: Lexium STS Scara robots, Lexium T/P Delta robots, Lexium PAS/CAS/TAS/MAX Cartesian robots
- **I/O systems**
  - Modicon TM3: I/O modules and bus coupler (catalog ref. DIA3ED2140109EN)
  - Modicon TM5: IP20 I/O modules, and fieldbus interface module (catalog ref. DIA3ED2131204EN)
  - Modicon TM7: IP67 I/O blocks (catalog ref. DIA3ED2140405EN)
- **Safety logic controllers**: Modicon TM5CSLC
- **HMI**: Harmony GTO standard panels, Harmony GK advanced Touchscreen/Keyboard panels, Harmony XBTGH advanced held panels, Harmony GTU high performance modular HMI, Harmony STO compact panels
- **Variable speed drives**: Altivar Machine ATV320, Altivar Machine ATV340, Altivar Machine ATV600, Altivar Process ATV900, Altivar 71
- **Sensors**: RFID sensors XG, Vision sensors XUW
- **Battery-less and wireless pushbuttons:** Harmony XB5R /XB4R (Ø 22 mm)
- **Connected load management system:** Tesys island

Managed architecture with EcoStruxure Machine Expert V2.0 software

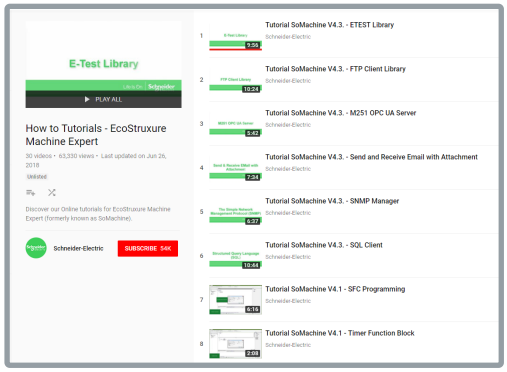


Solution breakdown

1 EcoStruxure Machine Advisor Digital Services for machines
2 Ecostruxure Augmented operator Advisor Augmented reality for instant diagnosis and contactless maintenance
3 EcoStruxure Machine Expert Software
4 Machine Assistant Programmation guide (part of Ecostruxure machine Expert software)
5 Harmony iPC Touchscreen display and IIoT Edge Box
6 Modicon TMSES4 smart communication module
7 Modicon M262 Logic / Motion controller
8 Modicon TM3 Expansion modules (digital, analog and Expert I/O)
9 TeSys island Digital multifunctional load management solution
10 Lexium 32 Servo drives and BMH/BSH servo motors
11 Altivar Machine ATV340 Variable speed drive
12 Lexium 28 Servo drives and BCH2 servo motors
13 Modicon TM3 Ethernet bus coupler
14 Modicon Switch Managed switch
15 Modicon TM5 Safety logic controller
16 Modicon TM5 Sercos interface module and I/O modules (digital, analog and safety I/O)
17 Telemecanique Photoelectric Sensors
18 PowerLogic Power Meter
19 Harmony® XB5 Plastic pushbutton and Emergency stop

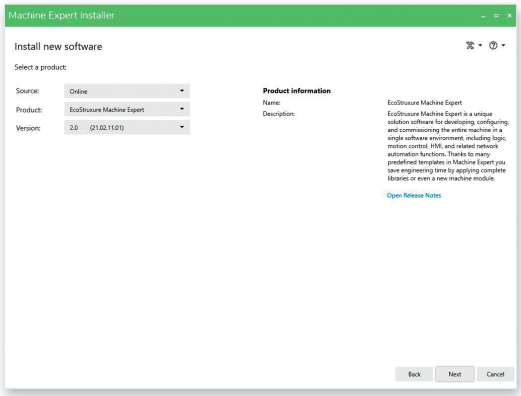
EcoStruxure Machine Expert

A single software environment to automate machines



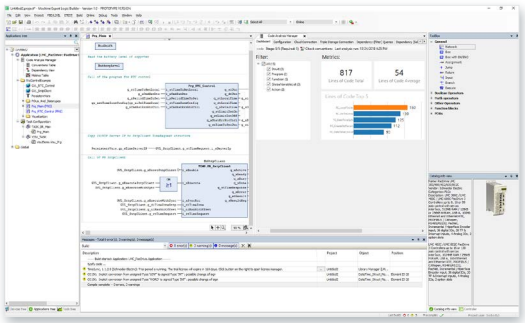
Video tutorials on YouTube

Video tutorials onYoutube



Schneider Electric Installer

Download installer



Logic Builder

Functions

Related functions configured with EcoStruxure Machine Expert V2.0 software

Hardware related functions can be configured:

- Discrete, analog I/O: from simple IO to sophisticated features like controller to controller communication.
- High speed counter (HSC) inputs
- High speed outputs:
  - Pulse width modulation (PWM)
  - Pulse generator (PLS)
  - Pulse train output (PTO)
  - Frequency generator
- Communication ports (Ethernet, Sercos, serial links):
  - Ethernet: EtherNet/IP, Modbus TCP client and server, Exchange table
  - Sercos bus
  - Serial links: Modbus RTU or ASCII, ASCII protocol, Display
  - The Modbus Serial IO Scanner and Modbus TCP IO Scanner protocols are used to automatically configure an Altivar variable speed drive, other Schneider devices, or a generic device.

Learning, Training and Examples

From the help menu, several tools and links help you to get started with EcoStruxure Machine Expert. This section provides content access to both beginners and advanced users to learn how to use and take advantage of the software:

Discover:

- Project examples and their documentation
- Project templates
- How to guides
- Video tutorials to be consulted on YouTube

Project management

The project management function is used to:

- Create a new project from scratch or by using project templates or examples
- Open a project from the PC (hard disk, CD-ROM, USB flash drive, etc.)
- Retrieve a project from a controller (logic, safety, motion or motor controller) or a servo drive
- Open a project from former SoMachine or SoMachine Motion versions
- Open a Twido or M221 project using conversion tools
- Print a project as a customized report

It is possible to define additional project specific information properties (company & creator details, project protection information, application information…), attach documents and custom or configuration pictures.
The software also supports automatic versioning.

Installation

EcoStruxure Machine Expert software can be installed directly from the cloud.
Either perform a full installation or select the components you need.
Machine Expert Installer downloads the required components only, from Schneider Electric website.
Offline installation from a local folder is also possible.

Application Function Block (AFB) libraries for dedicated solutions

EcoStruxure Machine Expert includes application function block libraries for selected machines. Their simple configuration speeds up design, commissioning, installation, and troubleshooting.
These libraries cover the following applications:

- Packaging
- Hoisting
- Handling
- Pumping
- Material working

and more ...

EcoStruxure Machine Expert
A single software environment to automate machines

Characteristics (Depending on the controller capabilities)

Feature		Description
IEC 61131-3 programming languages		■ IL (Instruction List) ■ LD (Ladder Diagram) ■ SFC (Sequential Function Chart) ■ ST (Structured Text) ■ FBD (Function Block Diagram) ■ CFC (Continous Function Chart)
Programming services		■ Multi-tasking: Cyclic, Fast, Event ■ Functions (Func) and Function Blocks (FBs) ■ Data Unit Types (DUTs) ■ On-line changes ■ Watch windows ■ Graphical monitoring of variables (trace) ■ Breakpoints, step-by-step execution ■ Simulation ■ Visualization for application and machine set-up ■ “ETEST” automated unit testing system to improve the quality of the application
HMI-based services		■ Graphics libraries containing more than 4,000 2D and 3D objects ■ Simple drawn objects (points, lines, rectangles, ellipses, etc.) ■ Preconfigured objects (button, switch, bargraph, etc.) ■ Recipes (32 groups of 256 recipes with max 1,024 ingredients) ■ Action tables ■ Printing ■ Java scripts ■ Multimedia file support: wav, png, jpg, emf, bmp ■ Variable trending
Motion control	For PacDrive controllers	■ Motion design (cam editor/motion, intelligent line shaft, software motion generator…) ■ Ready to use function blocks for motion applications like:  Multi-belt  Smart infeed  Unwinder  Crank  Robotics and more ...
PLCopen MC		■ PLCopen Motion Control Function Blocks Motion and drive function block libraries for variable speed drives, servo drives, and stepper drives ■ Visualization screens for commissioning
Global services		■ User access and profile ■ Project documentation printing ■ Project comparison (control) ■ Variable sharing based on publish/subscribe mechanism ■ Library version management ■ Machine energy efficiency monitoring

EcoStruxure Machine Expert

A single software environment to automate machines

Characteristics (Depending on the controller capabilities)

Feature	Description
Integrated Fieldbus configurators	■ Fieldbus - EtherNet/IP - Modbus TCP - Modbus Serial link - Sercos - CANopen (supported CANopen protocols: J1939, CANmotion) - EtherCAT - PROFINET - PROFIBUS
Connectivity services and networks	■ FTP Client library - The controller can send or get files to/from a FTP server on the network ■ Encrypted Secure FTPs server - Some controllers also have an embedded FTPs server ■ SQL Client library - To read or write in the databases from the controller ■ Machine to cloud connectivity - MQTT Handling (Message Queue Telemetry Transport) - JSON (JavaScript Object Notation), a lightweight data-interchange format ■ HTTPs library - To access to web services/servers, call APIs and push data to cloud services in a secure, simple and standard way ■ Secured Email library - To send and receive emails with attachments to/from the controller ■ SNMP Manager (Simple Network Management Protocol) - To control or read information about SNMP devices on the network ■ TCP/UDP library ■ SNTP (Simple Network Time Protocol) Client function blocks for synchronizing the clock with other systems ■ OPC UA Server embedded in the controller - For direct communication with OPC UA clients ■ File Format utility library - For reading and writing XML (eXtended Markup Language) and CSV (Character Separated Values) files - To simplify and standardize communication between the controller and external systems
Expert and solutions libraries	■ PLCopen function blocks for motion control. Examples: MC_MoveAbsolute, MC_CamIn, ServoDrive, etc. ■ **Packaging** function blocks. Examples: analog film tension control, rotary knife, unwinder, AutoTune etc.. ■ **PackML** library (Packaging Machine Language) ■ **Material handling**: tracking, turntable, conveyor, multi belt, smart infeed, etc. ■ Hoisting functions: - Hoisting function blocks: anti-sway, anti-crab, hoisting position synchronization, etc. - Application template for industrial crane ■ Pumping application: - Pumping function blocks: cavitation protection, friction loss, PID, stage/destage functions, etc. - Application template for booster ■ Material working and processing: application templates, rotary knife, flying shear, temperature monitoring, etc.

EcoStruxure Machine Expert

A single software environment to automate machines

Characteristics (Depending on the controller capabilities)

Feature	Description
Advanced software development	■ Source Code Management with **Subversion** (SVN) for collaborative work on the same project ■ Import/Export in PLC Open format ■ **Machine code analysis** - It analyzes the application code with semantic web technologies which understand the DNA of the code and identify code pain-points to rework - Store the result of your code analysis to a cloud repository and follow the evolution of your code quality over the time ■ **Python** programming interface to automate development tasks and project generation ■ **Functional View** to develop a machine project (code and devices) into modules and reuse them
Software Tools	Software tools are installed with EcoStruxure Machine Expert to assist Machine Builders at every step of the machine lifecycle: > Design & engineering, > Commissioning & operation, > Maintenance & service ■ **Controller assistant** - Manage the firmware and application without opening EcoStruxure Machine Expert - Create images and backup of the controller ■ **Machine Expert Installer** - To install, modify, update and uninstall EcoStruxure Machine Expert software suite ■ **License manage**r - Activate and manage licenses for all Schneider Electric licensed products - Support registration and license transfer ■ **Software Update** - Online notification of all available updates and news about the installed Schneider Electric software products - Download and install updates, patches, and extensions from the web ■ **Diagnostics** - Be informed of the machine status, including save operations, device parameters, the state of the I/O, and a graphic view of the Sercos ring architecture ■ **Device assistant** - Firmware manager for Lexium servo drives ■ **Logic Builder Diff Viewer** - A tool to differentiate 2 source codes ■ **Motion Sizer** - A tool for CAM design and power unit dimensioning Includes a product selector feature out of more than 13000 products (Drives, Motors, and Gearboxes)
Transparency – FDT/DTM	EcoStruxure Machine Expert is a FDT (Field Device Tool) container and supports standard DTM (Device Type Manager) files. This allows any device having a DTM to be configured inside EcoStruxure Machine Expert software, and reduces the number of tools to use to configure a machine.

EcoStruxure Machine Expert

A single software environment to automate machines

Download installer

Presentation

EcoStruxure Machine Expert software V2.0

EcoStruxure Machine Expert software V2.0 can be downloaded and installed for free, using the Schneider Electric installer.
At the end of a 42-days trial period, a license is required to continue to use EcoStruxure Machine Expert.

- Some maintenance features remain available and free of access and do not require a license
- EcoStruxure Machine Expert software is available in 9 languages: English, French, German, Italian, Japanese, Portuguese, Simplified Chinese, Spanish, and Turkish
- Operating systems for engineering PC: Microsoft Windows® 8.1 Professional 64-bit, Microsoft Windows® 10 Professional 64-bit
- Documentation is supplied in electronic format: complete online help with complementary documentation in pdf version

Software licenses description

	Free (No license)	**STANDARD** license	**PROFESSIONAL** license
Basic maintenance tools Open project, save, program offline, compile, download program, view online status Maintenance tools…	☑	☑	☑
STANDARD programming features Debug/breakpoints, variable forcing, pause, online change, manage project archive, Web visu, offline documentation ... ETEST limited, J1939, OPC UA server. Expert libraries…	Trial *(1)*	☑	☑
Advanced features Collaborative Work (SVN), ETEST full	Trial *(1)*	Trial *(1)*	☑
Code Analysis full	Trial *(1)*	Trial *(1)*	Trial *(1)*
Robotic libraries and toolbox	Trial *(1)*	–	☑
Machine Safety maintenance Former SoSafe Programmable maintenance software	☑	☑	☑
Machine safety development Former SoSafe Programmable software	Trial *(1)*	Trial (then EcoStruxure Machine Expert – Safety license is requested)	Trial (then EcoStruxure Machine Expert – Safety license is requested)
HMI design Vijeo Designer	Trial *(1)*	☑	☑

(1) Trial period lasts 42 days.

EcoStruxure Machine Expert

A single software environment to automate machines

Modicon TM5CSLC●00FS safety logic controller

Presentation

EcoStruxure Machine Expert – Safety

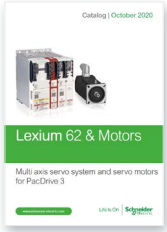
EcoStruxure Machine Expert – Safety (former SoSafe programmable software) is the software addon to program Modicon TM5CSLC●00FS safety logic controllers *(1)*. This addon is to be installed inside the Machine Expert Installer.
Apart from the maintenance features, a dedicated license is required to program this controller.

- Modicon TM5CSLC●00FS safety logic controllers are suitable for safety applications requiring distributed safety connected to physical input/output devices over Sercos common network and certified up to EN ISO 13849-1 PLe Category 4, and EN/IEC 62061 SIL3.
- They can be added to PacDrive 3 or in a Modicon M262 Logic/Motion controller architectures.
- The architectures comprises a PacDrive LMC motion controller or a Modicon M262 Motion controller (Sercos bus masters) and Modicon TM5CSLC safety logic controller (Sercos slave interface).
- Modicon TM5CSLC safety logic controller manages the safety-related application over the Sercos network.
- Input/outputs are connected to Sercos network with the use of Modicon TM5 Sercos interface module.
- Programming: Each hardware component is defined within EcoStruxure Machine Expert environment such as the controller, Modicon TM5 *(1)* and Modicon TM7 *(2)* safety I/O modules, Lexium 62 safety servo drives *(3)*, and Lexium 62 ILM integrated drives with optional safety module *(4)*. The application program and configuration of the safety hardware is managed within the EcoStruxure Machine Expert - Safety editor.

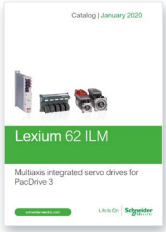
(1) Please refer to catalog Ref DIA3ED2131204EN
(2) Please refer to catalog Ref DIA3ED2140405EN
(3) Please refer to catalog Ref DIA7ED2160305EN
(4) Please refer to catalog Ref DIA7ED2160306EN

DIA3ED2131204EN

DIA3ED2140405EN



DIA7ED2160305EN



DIA7ED2160306EN

EcoStruxure Machine Expert
A single software environment to automate machines

Reference

Software installation

Description	References
Digital installation	Downloadable from our website

Software licenses *(1)*

Designation	Supported controllers	License type	Reference /number (Type)	
			Printed license	Digital license
EcoStruxure Machine Expert software V2.0	■ PacDrive 3 LMC Eco, LMC Pro and LMC Pro2 motion controllers ■ Modicon M241 and Modicon M251 logic controllers ■ Modicon M262 Logic/ Motion controller ■ Harmony SCU HMI controller	**STANDARD** licenses	**ESEEXPCZZSPMZZ** /1 (Single)	**ESEEXPCZZSPAZZ** /1 (Single)
			ESEEXPCZZTPMZZ /10 (Team)	**ESEEXPCZZTPAZZ** /10 (Team)
		PROFESSIONAL licenses	**ESECAPCZZSPMZZ** /1 (Single)	**ESECAPCZZSPAZZ** /1 (Single)
			ESECAPCZZTPMZZ /10 (Team)	**ESECAPCZZTPAZZ** /10 (Team)
			ESECAPCZZEPMZZ /100 (Site)	**ESECAPCZZEPAZZ** /100 (Site)
			ESECAPCZZEPTZZ /100 (Floating License)	**ESECAPCZZEPBZZ** /100 (Floating License)

Software addons *(1)*

> **SQL gateway license**: To activate the standalone "SQL Gateway" tool – Independent from any **STANDARD** or **PROFESSIONAL** license

The machine can access a database remotely and read or write data with SQL syntax: the controller configured with EcoStruxure Machine Expert has an integrated SQL Client for connecting to one or more databases via the SQL gateway. The SQL gateway runs on Microsoft Windows and is available in 9 languages: English, French, German, Italian, Japanese, Portuguese, Simplified Chinese, Spanish, and Turkish. It includes 42 days trial.

Designation	Reference /number (Type)	
	Printed license	Digital license
License for a single SQL gateway To connect one or more controllers to one or more databases	**SOMSQLCZZSPMZZ** /1 (Single)	**SOMSQLCZZSPAZZ** /1 (Single)

> **SVN Client license for STANDARD license owners**: Included in EcoStruxure Machine Expert **PROFESSIONAL** license

SVN acts as a control system for tracking changes to files, folders and directories. It is used to assist in recovering data and recording the history of changes made over time.
In addition to detailed recordings of changes and metadata for files and folders, Subversion's features include:
- Easy implementation of new network functions
- Consistent storage and handling of text and binary files
- Efficient creation of branches and tags
- Easy use with programming languages

Designation	Reference /number (Type)	
	Printed license	Digital license
License to enable SVN integration tool For EcoStruxure Machine Expert **STANDARD** license owners	**ESESVNCZZTPMZZ** /10 (Team)	**ESESVNCZZTPAZZ** /10 (Team)

> **Machine Advisor Code Analysis addon**: For **STANDARD** or **PROFESSIONAL** license owners

Machine builders can track and improve the quality of their applications over their lifetime and avoid regression or deviation using Machine Advisor Code Analysis. It provides software and cloud tools to analyze, understand and improve machine application code thanks to:
- Graphical representation of the "code DNA"
- Visualize code complexity and metrics
- Check and avoid coding rules violations

The frame work is integrated inside EcoStruxure Machine Expert and the analysis results are processed and stored on the cloud. The programmer can improve his application and also share the results to his team members.

Designation	Reference
Machine Advisor Code Analysis addon license For EcoStruxure Machine Expert **STANDARD** or **PROFESSIONAL** license owners. With this one year validity addon license, users can: - Upload, analyze and monitor the results of one project inside the cloud portal - Multiple users can access the cloud portal and their company projects - Use all code analysis features (unlimited Convention tables, Dependency view and Metrics table) inside EcoStruxure Machine Expert desktop software for up to 100 computers	Downloadable from our website

(1) Commercial licenses are available in two formats:
- *Printed license: delivered by regular mail with ID authorization.*
- *Digital license: delivered by e-mail after registering with Schneider Electric Customer Care Center.*

EcoStruxure Machine Expert
A single software environment to automate machines

Reference

Software addons *(continued) (1)*

> **ETEST full license for STANDARD license**: Included in EcoStruxure Machine Expert **PROFESSIONAL** license

EcoStruxure Machine Expert integrates ETEST, a powerful innovative tool for improving the IEC program quality of your projects and helping to avoid potential setbacks throughout the life cycle of the machine.
The ETEST tool is used to program unit tests simply within a EcoStruxure Machine Expert project and to enhance the robustness of the application program.
In the **STANDARD** license, ETEST framework is available but users are limited to program a maximum number of 5 test cases objects.

The ETEST full license addon allows **STANDARD** license owners to program unlimited number of ETEST test cases.
The **PROFESSIONAL** license owners can program unlimited number of ETEST test cases objects.

Designation	Reference /number (Type)	
	Printed license	Digital license
License to enable the full ETEST features For EcoStruxure Machine Expert **STANDARD** license owners	ESEETTCZZTPMZZ /10 (Team)	ESEETTCZZTPAZZ /10 (Team)

> **Software license to program TM5CSLC●00FS safety logic controller**: Additional to EcoStruxure Machine Expert **STANDARD** or **PROFESSIONAL** licenses

Designation	Enable device	Reference /number (Type)	
		Printed license	Digital license
EcoStruxure Machine Expert – Safety Creates complex logical conditions using logical functions and safety functions, such as muting, timer, counters, Emergency stop, light curtain etc. via a graphic configuration interface. Can be installed from the Machine Installer.	Modicon TM5CSLC●00FS safety logic controller	ESESAACZZSPMZZ /1 (Single)	ESESAACZZSPAZZ /1 (Single)
		ESESAACZZTPMZZ /10 (Team)	ESESAACZZTPAZZ /10 (Team)
		ESESAACZZEPMZZ /100 (Entity)	ESESAACZZEPAZZ /100 (Entity)
		ESESAACZZEPTZZ /100 (Floating License)	ESESAACZZEPBZZ /100 (Floating License)
AS-Interface Safety Gateway Networking solution for connecting simple field I/O devices in discrete manufacturing and process applications using a single 2-conductor cable. AS-Interface Gateway gathers data from the AS-Interface network.	Modicon TM5CSLC●00FS safety logic controller	ESESADCZZSPMZZ /1 (Single)	ESESADCZZSPAZZ /1 (Single)
		ESESADCZZTPMZZ /10 (Team)	ESESADCZZTPAZZ /10 (Team)
		ESESADCZZEPMZZ /100 (Entity)	ESESADCZZEPAZZ /100 (Entity)
		ESESADCZZEPTZZ /100 (Floating License)	ESESADCZZEPBZZ /100 (Floating License)

(1) Commercial licenses are available in two formats:
- *Printed license: delivered by regular mail with ID authorization.*
- *Digital license: delivered by e-mail after registering with Schneider Electric Customer Care Center.*

EcoStruxure™ Machine Expert

A single software environment to automate machines

Product reference index

Life Is On | Schneider Electric

Learn more about our products at
www.se.com

Design: Schneider Electric
Photos: Schneider Electric

Schneider Electric Industries SAS
Head Office
35, rue Joseph Monier - CS 30323
F-92500 Rueil-Malmaison Cedex
France

DIA3ED2180701EN
May 2021 - V2.0