Modicon M241 logic controllers
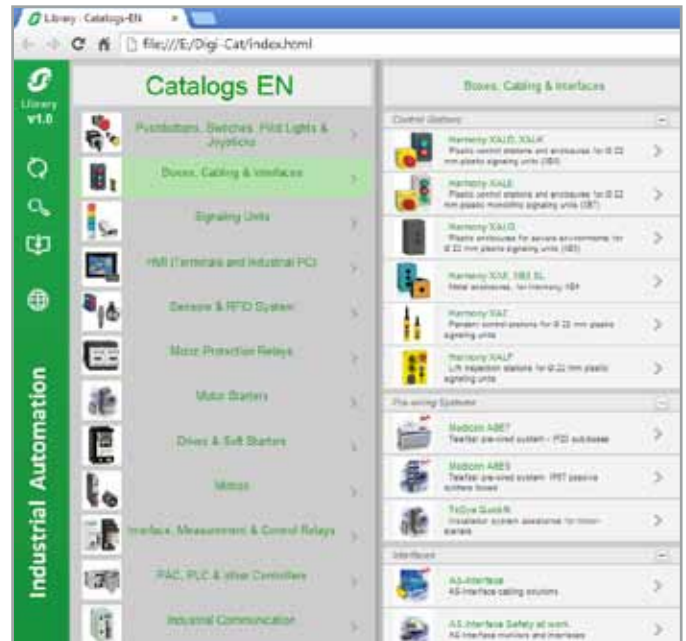
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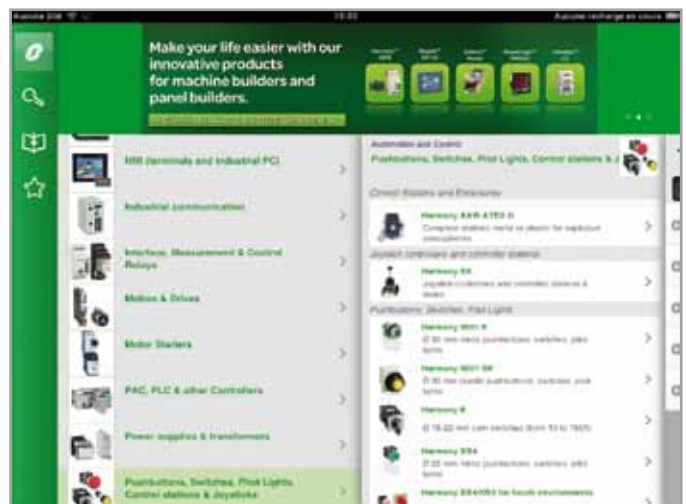
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General contents

Page 2

		Control of simple motion / Control of control loops		
Applications		Control of simple motion / 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	With removable screw terminal block		
I/O extension		□ 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: Modbus TCP (client & server), Modbus TCP slave, dynamic DHCP Client Configuration, Programming, download monitoring. Updated firmware, data exchange - NGVL and IEC VAR ACCESS, WEB server, IP Ethernet adapter SNMP network management.MIB2, FTP file transfer		
	CANopen	1 CANopen port on TM241CE**C**24● controllers (1 screw terminal block): 63 slaves, 252 TPDO/ 252 RPDO		
	Serial link	2 serial link ports: □ 1 port SL1 (RJ 45), RS232/485 with +5 V supply □ 1 port SL2 (screw terminal) RS485		
Functions	Process control	PID		
	Counting	8 high-speed counter (HSC) inputs, 200 kHz frequency		
	Position control	4 position control outputs: □ P/D, CW and CCW pulse train (PTO) with trapezoidal profile and S curve (▲), 100 kHz frequency □ pulse width modulation (PWM) □ frequency generator (FG)		

Options	■ Cartridges	□ 3 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		

	Number of cartridge slots	1		
	■ Communication modules	□ 1 Ethernet port Modicon TM4 module with switch function and 4 integrated ports for TM241C24● □ 1 Modicon TM4 module for slave Profibus DP link		
Mounting		Mounting on ⊏⊐ symmetrical rail or panel		
Software programming		With SoMachine software (please refer to our website www.schneider-electric.com)		
Controller type	with serial links	**TM241C24R**	**TM241C24T**	**TM241C24U**
	with embedded Ethernet port and serial links	**TM241CE24R**	**TM241CE24T**	**TM241CE24U**
	with embedded Ethernet and CANopen ports, and serial links	**TM241CEC24R**	**TM241CEC24T**	**TM241CEC24U**
Pages		10		

▲ *Available: 4th quarter 2014.*

Page 3

		Control of simple motion / Control of control loops		
Applications		Control of simple motion / 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	With removable screw terminal block		
I/O extension		□ 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● and TM241CE40● controllers: Modbus TCP (client & server), Modbus TCP slave, dynamic DHCP Client Configuration, Programming, download monitoring. Updated firmware, data exchange - NGVL and IEC VAR ACCESS, WEB server, IP Ethernet adapter SNMP network management. MIB2, FTP file transfer		
	CANopen	–		
	Serial link	2 serial link ports: □ 1 port SL1 (RJ 45), RS232/485 with +5 V supply □ 1 port SL2 (screw terminal) RS485		
Functions	Process control	PID		
	Counting	8 high-speed counter (HSC) inputs, 200 kHz frequency		
	Position control	4 position control outputs: □ P/D, CW and CCW pulse train (PTO) with trapezoidal profile and S curve (▲), 100 kHz frequency □ pulse width modulation (PWM) □ frequency generator (FG)		

Options	■ Cartridges	□ 3 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		

	Number of cartridge slots	2		
	■ Communication modules	□ 1 Ethernet port Modicon TM4 module with switch function and 4 integrated ports for TM241C24● □ 1 Modicon TM4 module for slave Profibus DP link		
Mounting		Mounting on ⊏⊐ symmetrical rail or panel		
Software programming		With SoMachine software (please refer to our website www.schneider-electric.com)		
Controller type	with serial links	**TM241C40R**	**TM241C40T**	**TM241C40U**
	with embedded Ethernet port and serial links	**TM241CE40R**	**TM241CE40T**	**TM241CE40U**
	with embedded Ethernet and CANopen ports, and serial links	–	–	–
Pages		10		

▲ *Available: 4th quarter 2014.*

Modicon M241 logic controllers
General presentation

M241 logic controller with 24 I/O

M241 logic controller with 40 I/O

QRcode example :
QRcode for access to the technical data sheet for
TM241CEC24R logic controller

SoMachine 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 and web 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, CANopen fieldbus for distributed architectures, advanced position control functions (high-speed counters and pulse train outputs for servo motor control).
- Functions embedded in the Modicon TM3 expansion: functional safety modules, motor-starter control module and remote expansion system.
- Functions embedded in the Modicon TM4 communication modules.

■ The processing power and the memory size of M241 controllers are ideal for targeting performance applications.

■ The application is created quickly thanks to the intuitive nature and power of the SoMachine programming software. It also makes it easy to retrieve existing applications in the Modicon M221, M238 and M258 ranges automatically, maximizing use of the investment already made.

Key features

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 each M241 controller.

□ A slot for an SD memory card (Secure Digital card) is available on each M241 controller.

A slot integrated in each M241 controller can take up to 2 cartridges of the following types:
□ analog input or output expansion cartridges
□ application cartridges: hoisting or packaging *(1)*

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

Embedded communication

M241 logic controllers have up to 5 integrated communication ports:
□ Ethernet with embedded Web server function
□ CANopen (master)
□ 2 serial links
□ Programming port

Embedded functions

□ PID control
□ 8 high-speed counter (HSC) inputs, 200 kHz frequency
□ 4 position control outputs for:
- P/D, CW and CCW pulse train (PTO) with trapezoidal profile and S curve, 100 kHz frequency
- pulse width modulation (PWM)
- frenquency generator (FG)

### Processing power

□ Execution speed: 22 ns/boolean instruction
□ Program: 128 K boolean instructions
□ DualCore CPU
□ RAM: 64 MB
□ Flash memory: 128 MB

Programming

M241 logic controllers are programmed with SoMachine software (please refer to our website www.schneider-electric.com).

(1) Use only one Application cartridge (inserted into the left slot of the Modicon M241controllers).

SD memory card

Analog I/O cartridges

Application cartridges

Communication modules   *M241 logic controller*
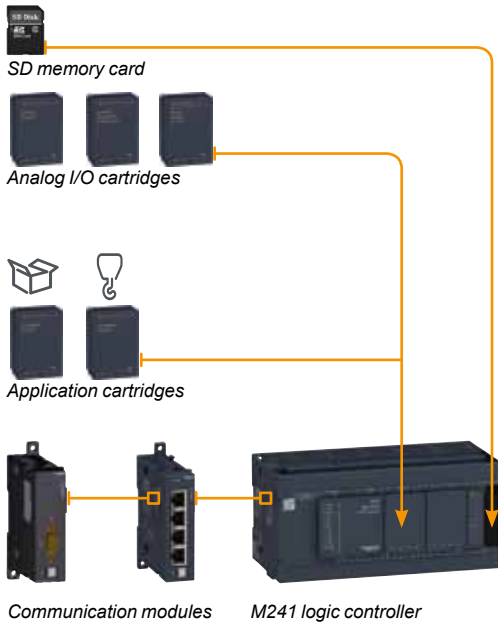
Options for Modicon M241 controllers

Memory card

The **TMASD1** SD memory card, 256 MB capacity, is available for:
□ backup and application transfer
□ data logging
□ firmware updating

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

3 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 two dedicated analog inputs for control of a load cell.
□ The **TMC4PACK01** Packaging application cartridge has two dedicated analog inputs for temperature control on packaging machines. .
Use of an application cartridge provides direct access to Application Function Blocks via the SoMachine software.

Communication modules *(1)*

2 communication module models are available:
□ The **TM4ES4** Ethernet switch module ; it offers on controllers without embedded Ethernet, an Ethernet connection with 4 ports.
□ 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.

■ Ethernet switch module

The **TM4ES4** module is a 4-port Ethernet interface (10/100 Mbps, MDI/MDIX) with the following protocols: Modbus TCP (Client/Server), Ethernet IP (adapter), UDP, TCP, SNMP and SoMachine.
□ The **TM4ES4** module is ready for use as soon as it is connected to the communication bus of M241 controllers.
□ This module is used to add the Ethernet function to TM241C24● and TM241C40● controllers without embedded Ethernet port while offering the additional functionality of an Ethernet switch.
□ When connected to logic controllers with embedded Ethernet port type TM241CE24●●● and TM241CE40●●● it is a 4 port stand-alone switch: the communication between the TM4ES4 module and the Modicon M241 controller is not done automatically by the bus connector.

■ Profibus DP slave module

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

(1) For association rules between ModiconTM4 communication modules and Modicon M241 logic controllers, see page 12.

Modicon M241 logic controllers
Communication option for Bluetooth® wireless connection

TCSWAAC13FB Bluetooth® adapter

M241 logic controller

Communication option for Bluetooth® wireless connection

The Bluetooth® wireless connection enables complete freedom of movement within a radius of 10 m *(32.81 ft.)* around the controller.

For its M241 controllers Schneider Electric offers the **TCSWAAC13FB** Bluetooth® adapter to perform the following functions:
□ commissioning
□ monitoring

Schneider Electric
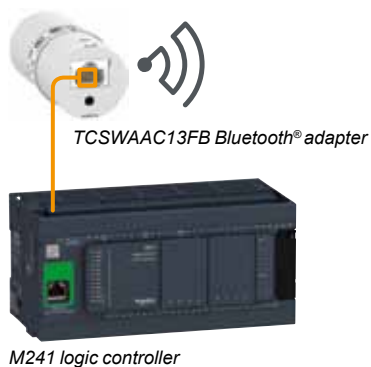
Modicon M241 logic controllers
I/O expansions with Modicon TM3 expansion modules

I/O extensions with Modicon TM3 modules
Modicon TM3 expansion modules (please refer to our website www.schneider-electric.com)

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 264 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 or speed sensor signals. They are also capable of controlling variable speed drives or any device equipped with a current or voltage input.
□ Expert modules for control of TeSys motor starters which simplify wiring up the control section due to connection with RJ45 cables.
□ Functional Safety modules which simplify wiring and can be configured in the SoMachine 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 whole range of Modicon M221, M241 and M251 logic controllers, meaning that the model of controller can be revised without changing expansion module.
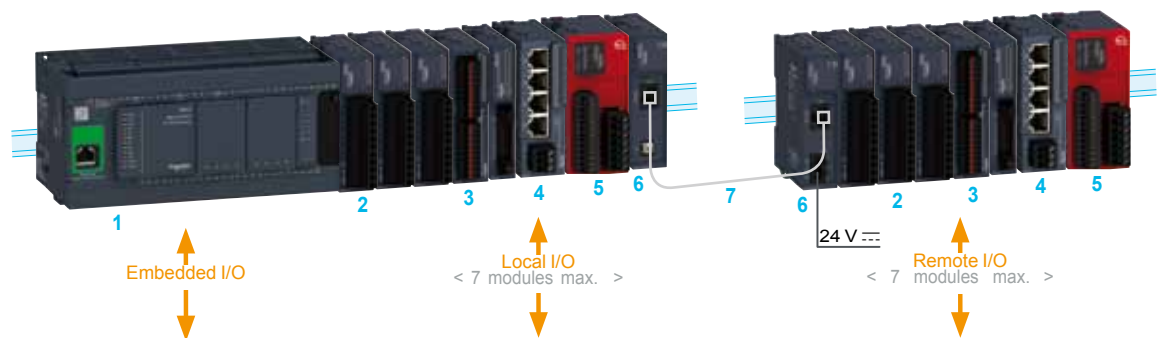
1 M241 logic controller.
2 Modicon TM3 digital I/O modules.
3 Modicon TM3 analog I/O modules *(1)*.
4 Modicon TM3 expert module: control of TeSys motor starters.
5 Modicon TM3 functional safety modules.
6 Modicon TM3 bus expansion module (transmitter and receiver).
7 TM3 bus expansion cable.

(1) Compatibility of expansion module offers: the majority of Modicon TM2 expansion modules can be used with M241 logic controllers. However, adding a Modicon TM2 expansion module in a configuration can increase expansion module execution times by a few milliseconds. The compatibility between Modicon TM2 expansion modules and M241 logic controllers is specified on page 24.

Modicon M241 logic controllers
Embedded communication

Embedded communication

M241 logic controllers have up to 5 embedded communication ports:
□ Two 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 Ethernet RJ 45 port (10/100 Mbps, MDI/MDIX) with Modbus TCP (Client/Server), Ethernet IP (adapter), UDP, TCP, SNMP and SoMachine protocols.

□ Each M241 controller has an embedded web server and FTP server. As well as the default address based on the MAC address, it is possible to assign a controller IP address 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 allows to filter IP addresses accessing the controller and to lock each communication protocol.

Connection cables and accessories for Ethernet network:

Communication on CANopen

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

□ Architectures based on CANopen 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 SoMachine software and can also be used to import standard description files in EDS format.

CANopen connection cables and accessories:

Serial links

Each 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 power supply is available on the RJ 45 connector which allows the use of a Magelis **XBTN** or **XBTRT** HMI, the **TCSWAAC13FB** Bluetooth® communication adapter or other devices.
□ The serial link is configured as RS 485.

Embedded in both links are the two main protocols used in the market :
- Modbus ASCII/RTU Master or Slave
- ASCII character string

Connection cables and accessories for serial link:

Programming port with power off charging function

The programming port, equipped with a mini-B USB connector, is embedded on each M241 controller; it is dedicated to communication with a PC equipped with SoMachine for:
□ programming
□ debugging
□ maintenance
In addition, it offers the ability to upload an application program or update the firmware without the controller being supplied with power from another source.

1 Embedded Ethernet on TM241CE●●● controllers
2 TM4PDSP1 communication module (Profibus bus)

1 TM241C24●●/TM241C40●● controllers
2 TM4ES4 (Ethernet) communication module
3 TM4PDSP1 communication module (Profibus bus)
4 TM241CE●●● controllers (with embedded Ethernet)

Modicon M241 logic controllers
Modicon M241 logic controllers
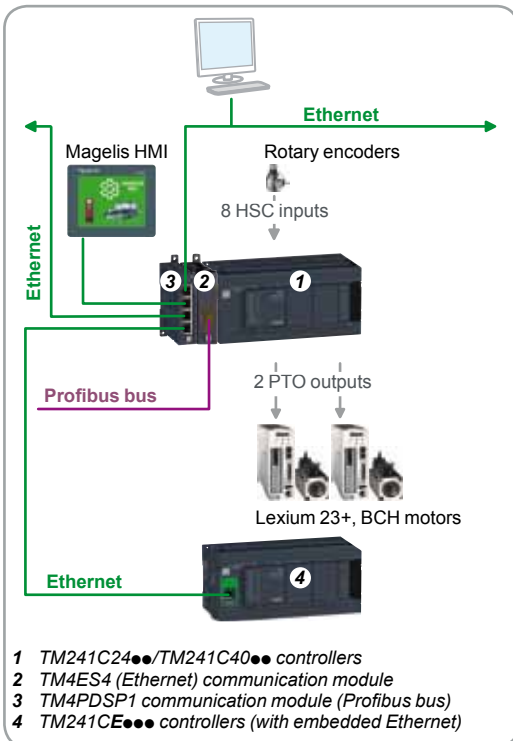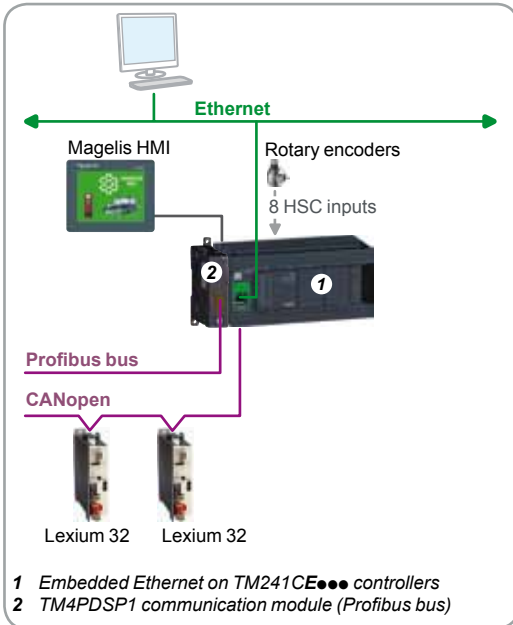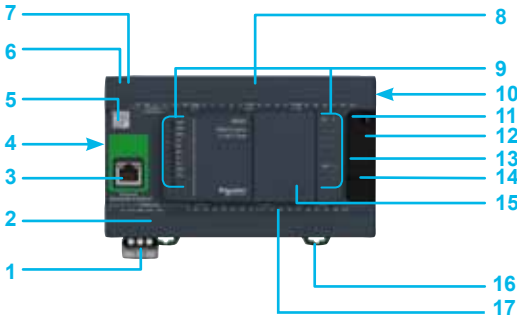
M241 controller 24 I/O
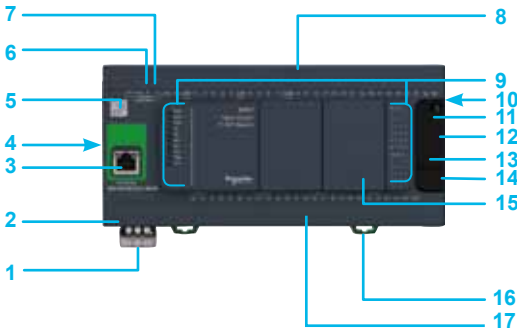
M241 controller 40 I/O

Description

M241 controllers

1 Removable screw terminal block, 3 terminals for connecting the 24 V ⎓ or the 100-240 V ∿ 50/60 Hz power supply (depending on model).

2 On TM241CE**C**●●● controllers: connector for linking to the CANopen bus (screw terminal block).

3 On TM241C**E**●●● controllers: RJ 45 connector for Ethernet network, with exchange rate and activity LED.

4 TM4 bus connector: communication bus for connecting to the TM4●●● communication modules.

5 Controller technical documentation QR code.

6 SL1 serial link port (RS 232 or RS 485): RJ 45 connector.

7 SL2 serial link port (RS485): screw terminal blocks.

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, SD memory card)
   - the status of the embedded communication ports (CANopen bus, serial links, Ethernet)
   - the status of the I/O

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

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

11 Run/Stop switch.

12 SD memory card slot.

13 Backup battery slot.

14 Mini-B USB connector for connecting a programming port.

15 Slot(s) for I/O cartridge(s) or application cartridge(s): one slot on TM241C●24, two slots on TM241C●40.

16 Locking clip on ⌐⌐ symmetrical rail.

17 Connection of relay/transistor logic outputs: removable screw terminal blocks *(1)*.

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

Characteristics of M241 logic controllers

Conformity

■ Certification

☐ CE, cULus Listing Mark, C-Tick, EAC, LR, ABS, DNV and GL *(1)*

■ 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

Environment 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...2000 m (0...6561 ft).

☐ Storage altitude: 0...3000 m (0...9842 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 marine: 5…13.2 Hz (amplitude 1.0 mm/*0.04 in.*); 13.2...100 Hz (acceleration 0.7 g).

Supply characteristics

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

☐ Voltage limit (ripple included): 19.2...28.8 V ⎓/85...264 V ∿

☐ Immunity to micro-cuts (class PS-2): 10 ms

☐ Max. consumption: 45 W.

(1) Marine certifications LR, ABS, DNV and GL: pending.

References

Modicon M241 logic controllers (1)

No. of logic I/O	Logic inputs	Logic outputs	Embedded communication ports (2)			Reference	Weight kg/*lb*
			Ethernet (RJ 45)	CANopen master (screw terminal block)	Serial links (RJ 45 and screw terminal block)		
■ 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*

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 Connected on screw terminal block	**TMC4AI2**	0.025/ *0.055*
	2 analog outputs (16-bit resolution) configurable as: - 0…10 V voltage - 0…20 mA/4…20 mA current Connected on screw terminal block	**TMC4AQ2**	0.025/ *0.055*
	2 inputs (14-bit resolution) configurable for temperature probes: - Thermocouple/PT100/PT1000/Ni100/Ni1000 Connected on screw terminal block	**TMC4TI2**	0.025/ *0.055*
Cartridges for specific application (3)	Hoisting application: 2 analog inputs for a load cell Connected on screw terminal block	**TMC4HOIS01**	0.025/ *0.055*
	Packaging application: 2 analog inputs Connected on screw terminal block	**TMC4PACK01**	0.025/ *0.055*
SD memory card	Application backup and program transfer Capacity: 256 MB	**TMASD1**	0.004/ *0.009*

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

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

(3) Use only one Application cartridge (inserted into the left slot of the Modicon M241controllers).

TM241C24R

TM241C40R

TM241CEC24U

TM241CE24R

TM241CE40T

TM241CE40U

TMC4AI2   TMC4AQ2

TMC4TI2

TMC4HOIS01 TMC4PACK01

TMASD1

TCSXCNAMUM3P

References

Spare 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 a M241 logic controller (1 x SL2, 6 x I/O, 1 x CANopen)	**TMAT4CSET**	0.127/ *0.280*
Set of terminal blocks for connecting the power supply	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 element Schneider reference. If necessary spare parts, use only a Panasonic BR2032 battery type.		

Programming software

Designation	Used for	Reference
SoMachine software	M241 logic controllers	**please refer to our website www.schneider-electric.com**

Expansion modules

Description	Used for	Reference
Modicon TM3 expansion modules	M241 logic controllers	**please refer to our website www.schneider-electric.com**

Communication modules

Description	Used for	Reference
Modicon TM4 communication modules	Ethernet port module , Profibus DP slave module	See page 13

Cordsets

Designation	For use From	To	Length m/*ft*	Reference	Weight kg/*lb*
Programming cables	PC USB port	USB mini-B port on M221, M241, M251 and M258 controllers	3/ *0.98*	**TCSXCNAMUM3P** *(1)*	0.065/ *0.143*
			1,8/ *5,90*	**BMXXCAUSBH018**	0.065/ *0.143*
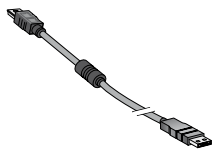
(1) Unshielded cable without grounding. To be used only for temporary connections. For permanent connections, use the reference BMXXCAUSBH018 programming cable.

Modicon M241 logic controllers
Communication modules
Modicon TM4 communication modules
for Modicon M241 and Modicon M251logic controllers

Modicon TM4 Communication modules

Modicon M241 logic controller

Modicon M251 logic controller

Presentation
Applications

The Modicon TM4 offer enhances the connectivity for Modicon M241 and M251 logic controllers.
Two communication module models are available:
□ The **TM4ES4** Ethernet switch module (offering, only on controllers without embedded Ethernet, 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: Modbus TCP (Client/Server), Ethernet IP (adapter), UDP, TCP, SNMP and SoMachine.
□ The **TM4ES4** module is ready for use as soon as it is connected to the communication bus of M241 controllers.
□ This module is used to add the Ethernet function to TM241C24● and TM241C40● controllers without embedded Ethernet port while offering the additional functionality of an Ethernet switch.
□ When connected to logic controllers with embedded Ethernet port type TM241CE24●●●, TM241CE40●●●, or on a TM251M**ES**● controller it is a 4 port stand-alone switch: the communication between the TM4ES4 module and the Modicon M241 and M251 controllers is not done automatically by the bus connector.

■ Profibus DP slave module

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

Association rules

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

□ On controllers without embedded Ethernet port (TM241C24●●● and TM241C40●●●): it is possible to add one **TM4ES4** module with the Ethernet port function and two **TM4ES4** modules with the switch function while respecting the maximum number of 3 **TM4** modules .
□ On controllers with embedded Ethernet port (TM241CE●● and TM251●●●): it is possible to add 3 modules **TM4ES4** with switch function while respecting the number of 3 **TM4** modules.
□ **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.

Description
■ **TM4ES4** Ethernet switch module

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

■ **TM4PDPS1** Profibus DP slave module

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

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Modicon M241 logic controllers
Communication modules
Modicon TM4 communication modules
for Modicon M241 and Modicon M251logic controllers

TM4ES4

TM4PDPS1
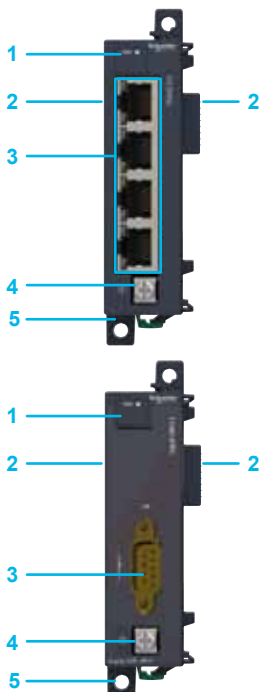
References

Options for Modicon M241 and M251 logic controllers

Designation	Description	Reference	Weight kg/*lb*
Communication modules	Multi-port Ethernet interface equipped with four RJ 45 connectors (10/100 Mbps, MDI/MDIX)	**TM4ES4** *(1)*	0.110/ *0.243*
	Slave connection on the Profibus DP bus, equipped with a 9-way SUB-D connector	**TM4PDPS1**	0.110/ *0.243*

(1) Can be used as an Ethernet port or as a standalone switch according to controller model and configuration.
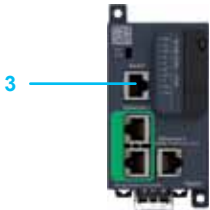
Modicon M241 logic controllers
Serial links
Modbus protocols, character mode

Presentation

RS 232/RS 485 serial links offer a simple solution to the communication needs of machines.
Modbus and ASCII standard communication protocols are used to connect numerous equipment items such as: HMIs, printers, energy meters, variable speed drives, motor starters, remote I/O (RIO), etc.

Description

Modicon **M241** logic controllers have the following on their upper surface:
1 A "Serial 1" serial link port with an RJ45 connector delivering a 5 V/200 mA power supply which allows the use of a Magelis HMI, the Bluetooth® communication adapter or other devices.
2 A 2nd "Serial 2" serial link port (with connection on screw terminals).

Controller Type	Embedded Ports	
	"Serial 1" port, RJ45 connector	"Serial 2" port, connection on screw terminals
TM241●●●●	RS 232/RS 485 with 5V (200 mA) power supply for HMI or Bluetooth communication adaptor (item **1**)	RS 485 (item **2**)

Modicon **M251** logic controllers have on their front a serial link port with an RJ45 connector delivering a 5 V/200 mA power supply which allows the use of a Magelis HMI, the Bluetooth® communication adapter or other devices.
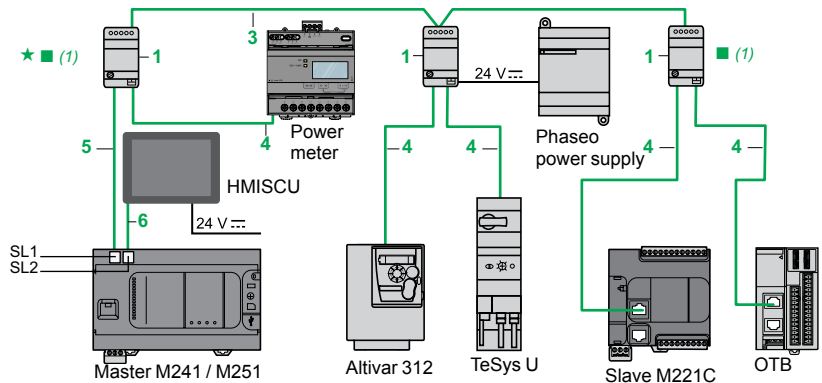**3** A serial link port (RJ 45 connector (RS 232 or RS 485).

Modbus serial link wiring system

Non-isolated bus
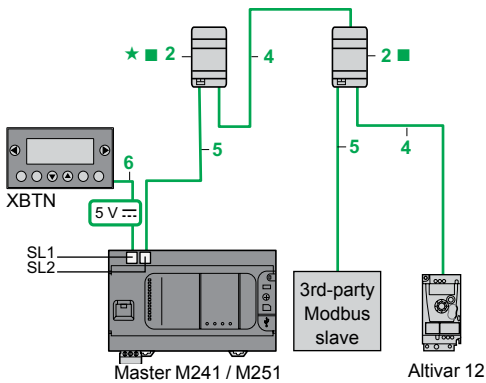
- Total length of cables between M241/M251 and ATV12: ≤ 30 m (98.425 ft)
- Length of cable **4**: ≤ 10 m (32.808 ft)
★ Line polarization active. ■ Line termination

Isolated bus (recommended for bus > 10 m *(32.808 ft)*)

- Total length of cables between isolation boxes **1**: ≤ 1000 m (3280.840 ft)
- Length of drop cables **4** or **5**: ≤ 10 m (32.808 ft)
★ Line polarization active. ■ Line termination
(1) Box powered by the logic controller.

References

Tap-off and adaptor components for RS 485 serial link

Designation	Description	Item	Length	Unit reference	Weight kg/ *lb*
T-junction and isolation box Screw terminals for trunk cable 2 x RJ45 for tap-off	□ Isolation of the RS 485 link *(1)* □ Line termination (RC 120 Ω, 1nF) □ Line pre-polarization (2 R 620 Ω) □ 24 V --- power supply (screw terminals) or 5 V --- power supply (via RJ45) □ Mounting on 35 mm (1.378 in.) ⌐⌐	1	–	**TWDXCAISO**	0.100/ *0.220*
T-junction box 1 x RJ45 for trunk cable 2 x RJ45 for tap-off	□ Line termination (RC 120 Ω, 1nF) □ Line pre-polarization (2 R 620 Ω) □ Mounting on 35 mm (1.378 in.) ⌐⌐	2	–	**TWDXCAT3RJ**	0.080/ *0.176*

(1) Line isolation recommended for line distances > 10 m (32.808 ft).

TWDXCAISO TWDXCAT3RJ

Schneider Electric

Modicon M241 logic controllers
Serial links
Modbus protocols, character mode

References (continued)					
Designation	**Description**	**Item**	**Length m/ft**	**Reference**	**Weight kg/ lb**
Tap-off and adaptor components for RS 485 serial link					
Modbus splitter box Screw terminals for trunk cable 10 x RJ45 for tap-off	□ Mounting on 35 mm (1.378 in.) ⌐, on plate or panel	–	–	**LU9GC3**	0.500/ 1.102
T-junctions 2 x RJ45 for trunk cable	1 integrated cable with RJ45 connector for tap-off dedicated to Altivar variable speed drive	–	0.3/ 0.98	**VW3A8306TF03**	–
			1/ 3.28	**VW3A8306TF10**	–
Passive T-junction box	□ 1-channel line extension and tap-off on screw terminals □ Line termination	–	–	**TSXSCA50**	0.520/ 1.146
RS 232C/RS 485 line converter	□ Max. data rate 19.2 Kbps, No modem signals □ 24 V ⎓/20 mA power supply □ Mounting on 35 mm (1.378 in.)	–	–	**XGSZ24**	0.100/ 0.220
Cables and cordsets for RS 232 serial link					
RS 485 double shielded twisted pair trunk cables	Modbus serial link, supplied without connector	3	100/ 328.08	**TSXCSA100**	5.680/ 11.023
			200/ 656.16	**TSXCSA200**	10.920/ 24.074
			500/ 1640.42	**TSXCSA500**	30.000/ 66.139
Modbus RS 485 cordsets	2 x RJ45 connectors	4	0.3/ 0.98	**VW3A8306R03**	0.030/ 0.066
			1/ 3.28	**VW3A8306R10**	0.050/ 0.110
			3/ 9.84	**VW3A8306R30**	0.150/ 0.331
	1 x RJ 45 connector and 1 end with flying leads	5	1/ 3.28	**TWDXCAFJ010**	0.060/ 0.132
			3/ 9.84	**VW3A8306D30**	0.150/ 0.331
Cordsets: used from M241 (SL1), M251 controllers to Magelis HMI	2 x RJ45 connectors Compatible with: □ Com Port 1 on XBTN200/N400/R400/RT500 (1) □ Com Port 1 on XBTRT511 and HMISTO/STU/SCU □ Com Port 2 on XBTGT2●●0...7●●0 and HMIGTO	6	2.5/ 8.202	**XBTZ9980**	0.230/ 0.507
		6	10/ 32.81	**XBTZ9982**	–
	1 x RJ45 connector and 1 x 25-way SUB-D connector Compatible with: □ Com Port 1 on XBTN410/N410 and XBTR410/R411	–	2.5/ 8.20	**XBTZ938**	0.210/ 0.463
	1 x RJ45 connector and 1 x 9-way SUB-D connector Compatible with: □ Com Port 1 on XBTGT2●●0...7●●0	–	2.5/ 8.20	**XBTZ9008**	–
Cordsets: used from M241 (SL2) controllers to Magelis HMI	1 x RJ45 connector and stripped wires Compatible with: □ Com Port 1 on XBTRT511 and HMISTO/STU/SCU □ Com Port 2 on XBTGT2●●0...7●●0 and HMIGTO	–	3/ 9.84	**VW3A8306D30**	0.150/ 0.331
Line end adapter Sold in packs of 2	For RJ45 connector R = 120 Ω, C = 1 nf	–	–	**VW3A8306RC**	0.200/ 0.441
Cordsets for RS 232 serial link					
Cordset for DTE terminal (printer) (2)	Serial link for Data Terminal Equipment (DTE) 1 x RJ45 connector and 1 x 9-way female SUB-D connector		3/ 9.84	**TCSMCN3M4F3C2**	0.150/ 0.331
Cordset for DCE terminal (modem, converter)	Serial link for point to point device (DCE) 1 x RJ45 connector and 1 x 9-way male SUB-D connector		3/ 9.84	**TCSMCN3M4M3S2**	0.150/ 0.331

(1) If the terminal is equipped with a 25-way SUB-D connector, you will also need to order the **TSXCTC07** 25-way female / 9-way male SUB-D adaptor.
(2) Can only be connected to the controller SL or SL1 ports in order to supply the Magelis terminal with power.

LU9GC3

TSXSCA50

XGSZ24

Presentation

Schneider Electric has selected CANopen for its machines and installations because of its wealth of functions and its resulting benefits in the automation world.
This decision was based on the general acceptance of CANopen, and the fact that CANopen products are increasingly used in control system architectures.
CANopen is an open network supported by more than 400 companies worldwide, and promoted by CAN in Automation (CiA).
CANopen conforms to standards EN 50325-4 and ISO 15745-2.
Schneider Electric is heavily involved in working groups, which are important for machine and installation architectures, systems and products.
□ The bus uses a double shielded twisted pair on which, with Modicon M241 and Modicon M251 logic controllers, a maximum of 63 devices are connected by daisy-chaining or by tap junctions.

□ Each end of the bus must be fitted with a line terminator. On M241 controllers, this line terminator is already integrated on the master side and can be disconnected using a switch located next to the CAN connector.

CANopen port on M241 and M251 controllers

Type	M241: screw terminals M251: 9-way SUB-D
Standards	DS 301 V4.02, DR 303-1
Class	M10

Data rate								
Max. length (m / *ft.*)	**20/** *65.62*	**40/** *131.23*	**100/** *328.08*	**250/** *820.21*	**500/** *1640.42*	**1000/** *3280.84*	**2500/** *8202.1*	**5000/** *16404.2*
Data rate (Kbps)	1000	800	500	250	125	50	20	10
Number of slaves	63 slaves max. with limit of: 252 RPDOs and 252 TPDOs							

Description

CANopen port on M241 and M251 controllers

The underside of Modicon **TM241CEC●●●** logic controllers has:
1 a connector for linking to the CANopen bus (screw terminals).
2 a CANopen line termination switch.

The front of the Modicon **TM251MESC** logic controller has:
3 a connector for linking to the CANopen bus (9-way SUB-D).

1
2

TM241CEC●●● controllers

3
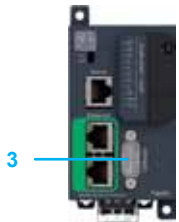
TM251MESC controller

CANopen connection architecture

Ethernet

TM251MESC

TM241CEC●●●

CANopen

CANopen

Altivar 312   Lexium 32   Modicon OTB

Altivar 32   Lexium 32   Altivar 71   Lexium 32

Modicon TM7 (IP 67)

Schneider Electric

Modicon M241 logic controllers
CANopen architecture

CANopen standard taps and connectors

Designation	Description	Item	Length m/*ft*	Unit reference	Weight kg/*lb*
IP20 CANopen tap junction	Line termination : 4 SUB-D ports. Screw terminals for connecting the trunk cables	**1**	–	**TSXCANTDM4**	0.196/*0.432*
IP 20 CANopen connectors 9-way female SUB-D Line end adapter switch	Right-angle	**2**	–	**TSXCANKCDF90T**	0.046/*0.101*
	Straight *(for connection to the Altivar IMC integrated controller card)*	**2**	–	**TSXCANKCDF180T**	0.049/*0.108*
	Right-angle with 9-way SUB-D for connecting a PC or diagnostic tool	**2**	–	**TSXCANKCDF90TP**	0.051/*0.112*
IP 20 CANopen tap junction for Altivar and Lexium 32	2 RJ45 ports	**3**	–	**VW3CANTAP2**	0.250/*0.551*
Daisy chain taps	Equipped with: □ 2 sets of spring terminals for daisy chain connection of the CANopen bus □ 1 preassembled cordset with RJ45 connector for connecting the drive	–	0.6/*1.97*	**TCSCTN026M16M**	–
	Equipped with: □ 2 RJ45 connectors for daisy chain connection of the CANopen bus □ 1 preassembled cordset with RJ45 connector for connecting the drive	–	0.3/*0.98*	**TCSCTN023F13M03**	–
CANopen line terminators	For RJ45 connector Sold in lots of 2	–	–	**TCSCAR013M120**	–
	For screw terminal connector Sold in lots of 2	–	–	**TCSCAR01NM120**	–

IP 20 standard cables and preassembled cordsets

Designation	Description		Item	Length m/*ft*	Unit reference	Weight kg/*lb*
CANopen cables (2 x AWG 22 2 x AWG 24)	For standard environment *(1)*, CE marking: Low smoke. Zero halogen. Non flame propagating (IEC 60332-1)		**5**	50/*164.042*	**TSXCANCA50**	4.930/*10.869*
				100/*328.08*	**TSXCANCA100**	8.800/*19.401*
				300/*984.25*	**TSXCANCA300**	24.560/*54.146*
	For standard environment *(1)*, UL certification, CE marking: Flame-retardant (IEC 60332-2)		**5**	50/*164.04*	**TSXCANCB50**	3.580/*7.893*
				100/*328.08*	**TSXCANCB100**	7.840/*17.284*
				300/*984.25*	**TSXCANCB300**	21.870/*48.215*
	For harsh environment *(1)* or mobile installation, CE marking: Low smoke. Zero halogen. Non flame propagating (IEC 60332-1). Oil-resistant		**5**	50/*164.04*	**TSXCANCD50**	3.510/*7.738*
				100/*328.08*	**TSXCANCD100**	7.770/*17.130*
				300/*984.25*	**TSXCANCD300**	21.700/*47.840*
CANopen preassembled cordsets	Cordsets with one 9-way female SUB-D connector at each end	For standard environment *(1)*, CE marking: Low smoke. Zero halogen. Non flame propagating (IEC 60332-1)	**6**	0.3/*0.98*	**TSXCANCADD03**	0.091/*0.201*
				1/*3.28*	**TSXCANCADD1**	0.143/*0.315*
				3/*9.84*	**TSXCANCADD3**	0.295/*0.650*
				5/*16.40*	**TSXCANCADD5**	0.440/*0.970*
		For standard environment *(1)*, UL certification, CE marking: Flame-retardant (IEC 60332-2)	**6**	0.3/*0.98*	**TSXCANCBDD03**	0.086/*0.190*
				1/*3.28*	**TSXCANCBDD1**	0.131/*0.289*
				3/*9.84*	**TSXCANCBDD3**	0.268/*0.591*
				5/*16.40*	**TSXCANCBDD5**	0.400/*0.882*
	Cordsets with one 9-way female SUB-D connector and one RJ45 connector		**4**	0.5/*1.64*	**TCSCCN4F3M05T**	0.100/*0.220*
				1/*3.28*	**TCSCCN4F3M1T**	0.100/*0.220*
				3/*9.843*	**VW3M3805R010** *(2)*	0.100/*0.220*
				1/*3.281*	**VW3M3805R030** *(2)*	0.300/*0.661*
				3/*9.84*	**TCSCCN4F3M3T**	0.160/*0.353*
	Cordsets with two 9-way SUB-D connectors, one male and one female		–	0.5/*1.64*	**TLACDCBA005**	0.100/*0.220*
				1.5/*4.92*	**TLACDCBA015**	0.120/*0.265*
				3/*9.84*	**TLACDCBA030**	0.190/*0.419*
				5/*16.40*	**TLACDCBA050**	0.350/*0.772*
	Preassembled cordsets with one RJ 45 connector at each end		**7**	0.3/*0.984*	**VW3CANCARR03**	0.100/*0.220*
				1/*3.281*	**VW3CANCARR1**	0.100/*0.220*
Adapter for Altivar 71 drive	One RJ45 connector at each end		–	–	**VW3CANA71**	0.100/*0.220*

Taps and IP 67 accessories

Please consult the **Modicon TM7** offer: interface blocks (IP 67) for distributed I/O on the CANopen bus   **please refer to our website www.schneider-electric.com**

(1) Standard environment: no particular environmental constraints, operating temperature between + 5°C and + 60°C (+ 41°F and + 140°F), and in fixed installations.
Harsh environment: resistance to hydrocarbons, industrial oils, detergents, solder splashes, relative humidity up to 100%, saline atmosphere, significant temperature variations, operating temperature between - 10°C and + 70°C (+ 14°F and +158°F), or in mobile installations.
(2) Cordset equipped with a line terminator.

TSXCANTDM4

VW3CANTAP2

TSXCAN KCD F90T

TSXCAN KCD F180T

TSXCANKCD F90TP

TCSCAR013M120

VW3CANA71

Modicon M241 logic controllers
Ethernet Modbus/TCP network
For Modicon M221, M241 and M251 logic controllers
and TM4ES4 Ethernet switch module

Presentation

The embedded Ethernet communication ports in each Modicon M221, M241 and M251 logic controller and in the Modicon TM4ES4 communication module optimise integration in factory network architectures.

Modicon M221, M241 and M251 controllers can easily be integrated in typical architectures:
- □ **machine to devices** (variable speed drives, remote I/O modules, operator dialogue terminals) with the I/O Scanner function
- □ **machine to machine** with the NGVL 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 safely:
- □ program, monitor a controller or download an application
- □ access device parameters (variable speed drives for example)

A simple web browser can be used to access machines anytime anywhere, using a tablet or smartphone, for example, using the web servers embedded in Modicon M241 and M251 controllers.
Safety can be enhanced by the use of VPN modems (see our partner programme).

The Modbus TCP/IP 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 purchase of a licence.
This protocol can easily be combined with any product supporting a standard TCP/IP communication stack.
The specifications can be downloaded free of charge from the following address: www.modbus.org.

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 presently 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 the 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 digitisation.

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 recognised as a fieldbus by the international standard IEC/EN 61158. They also comply with the "national Chinese standard" managed by ITEI.

Schneider Electric

Modicon M241 logic controllers
Ethernet Modbus/TCP network
For Modicon M221, M241 and M251 logic controllers
and TM4ES4 Ethernet switch module

Preconfigured Web server

Viewer Web server

Web servers

Preconfigured Web server

Using a simple Internet browser available on PC, smartphone or tablet, this server authorizes the following "ready-to-use" functions:
- With no prior programming
  - Display of the I/O states
  - Controller diagnostics, and of its expansion and communication modules
  - Communication port diagnostics
  - I/O Scanner function diagnostics
  - Maintenance and configuration functions (Ethernet IP, firewall, etc.)
- After configuration
  - Viewing data values
  - Viewing the evolution of those data values over time (oscilloscope function)

Viewer Web server

The SoMachine programming software is used to create customised pages for viewing and monitoring devices. These pages can also be accessed on any mobile device such as a tablet or smartphone with any operating system (iOS, Android, Windows).

Description of Ethernet services

Network Global Variable List (NGVL)
The NGVL protocol allows a controller to share data with other controllers on a local Ethernet network (LAN) or subscribe to data published by other controllers which support the NGVL protocol and thus allowing, for example, synchronisation between control platforms.

I/O Scanner
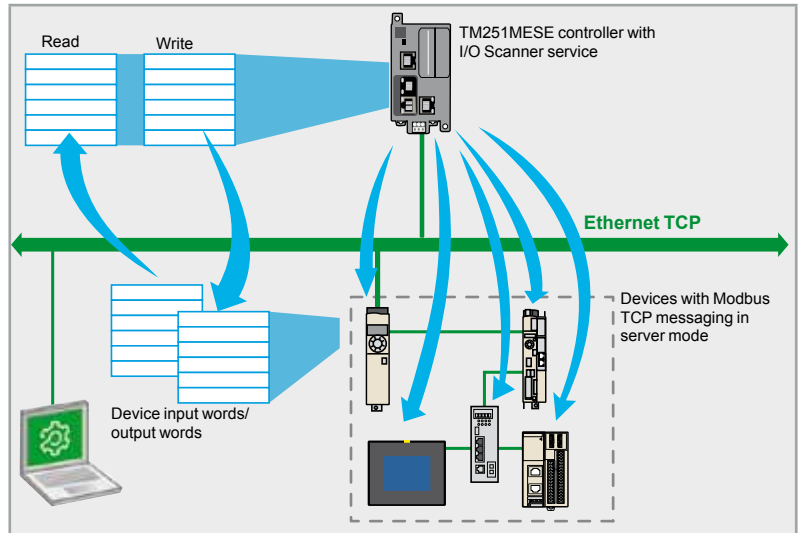
The Modbus TCP I/O Scanner service is used to manage the exchange of remote I/O states on the Ethernet network after a simple configuration operation, with no need for special programming.
I/O Scanner is performed transparently by means of read/write requests in accordance with the Modbus client/server protocol on the TCP profile.
This principle of Scanner via a standard protocol enables a device with the I/O Scanner service to communicate with any device supporting Modbus TCP messaging in server mode (slave Modbus TCP). The M251MESE I/O Scanner system supports up to 64 devices (one Modbus request per device).

Modicon M241 logic controllers
Ethernet Modbus/TCP network
For Modicon M221, M241 and M251 logic controllers
and TM4ES4 Ethernet switch module

Description of Ethernet services *(continued)*

Slave Modbus TCP
This function can be used to create a dedicated I/O table in the controller, which can be accessed via the Modbus TCP protocol and by a controller with the Modbus TCP I/O Scanner function.

Fast Device Replacement (FDR)
This service uses standard address management technologies (BOOTP, DHCP) and the TFTP (Trivial File Transfer Protocol) file management service, in order to simplify maintenance of Ethernet products.
The FDR service is used to replace a device with a new device; the faulty device is detected, reconfigured and automatically rebooted by the system.

Access to files via FTP (File Transfer Protocol)
This service provides access to the controller files from, for example, a PC (FTP client) and is used to exchange files such as application programs, data, etc.
This service can be accessed even if the controller has no application program in its memory.

Dynamic Host Configuration Protocol (DHCP)
This protocol can be used to assign an address to a controller (client DHCP/BOOTP) automatically. This address can be:
□ Fixed and determined either in the SoMachine software or included in a post-configuration file
□ Assigned by a controller with the DHCP server or BOOTP server function (such as the TM251MESE controller).

SNMP (Simple Network Management Protocol)
From a network management station, the SNMP protocol is used to monitor and control the Ethernet architecture components, meaning problems are diagnosed quickly.

The SNMP protocol is used to access configuration and management objects that are contained in the device MIBs (Management Information Bases).

Modicon M241 and M251 controllers support the "MIB 2 Standard" SNMP network management interface. This interface accesses a first level of network management; it enables the manager to identify the devices making up the architecture and retrieve general information about configuration and operation of the Ethernet Modbus/TCP interfaces.

IP address filter (Whitelisting)
IP addresses that are authorised to access the controller can be loaded in the controller from either an SD card or an FTP client.

Locking communication protocols
Not only SoMachine, NetManage *(1)*, SNMP communication protocols but also Modbus, WEB and FTP servers can be locked individually in the SoMachine software.
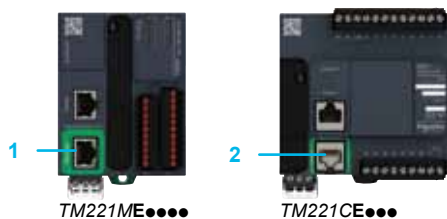
(1) The NetManage function can automatically detect which controllers are present on the network. It also offers the option of straightforward connection to any controller present on the network in order to identify it physically by means of a visual or audible message and modify its parameters or manage the resident application.

Schneider Electric

Modicon M241 logic controllers
Ethernet Modbus/TCP network
For Modicon M221, M241 and M251 logic controllers
and TM4ES4 Ethernet switch module

Transparent Ready class and Functions

	Logic controllers			
	TM221ME●●● TM221CE●●●	TM241CE●●● TM241C●●● + TM4ES4	TM251MESSC	TM251MESE
Transparent Ready class	A10	B20		
Internet protocol version	IP V4			
Ethernet services				
Programming, downloading, monitoring	■	■	■	■
Firmware update	–	■	■	■
Client and server Modbus TCP	■	■	■	■
Slave Modbus TCP	■	■	■	■
Ethernet IP (adapter)	–	■	■	■
Data exchange: NVGL and IEC VAR ACCESS	–	■	■	■
WEB server	–	■	■	■
MIB2 SNMP network management	–	■	■	■
Modbus TCP I/O Scanner	–	–	–	■
FTP file transfer	–	■	■	■
Client DHCP dynamic configuration	■	■	■	■
Server DHCP dynamic configuration	–	–	–	■
FDR faulty device replacement	–	–	–	■
SMS, emails	Availabilyy : 4th quarter 2014	–	–	–
Safety functions				
IP address filter (Whitelisting)	–	■	■	■
Locking communication protocols	■	■	■	■
Locking IP address routing	–	–	–	■

■ function created

Ethernet ports on logic controllers and the communication module

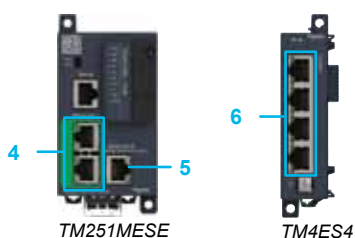*TM221ME●●●●*   *TM221CE●●●*

M221 logic controllers

1 On **TM221ME●●●●** controllers: RJ 45 connector for Ethernet network, with exchange rate and activity LED.

2 On **TM221CE●●●** controllers: RJ 45 connector for Ethernet network, with exchange rate and activity LED.

TM241CE●●●

M241 logic controllers

3 On **TM241CE●●●** controllers: RJ 45 connector for Ethernet network, with exchange rate and activity LED.
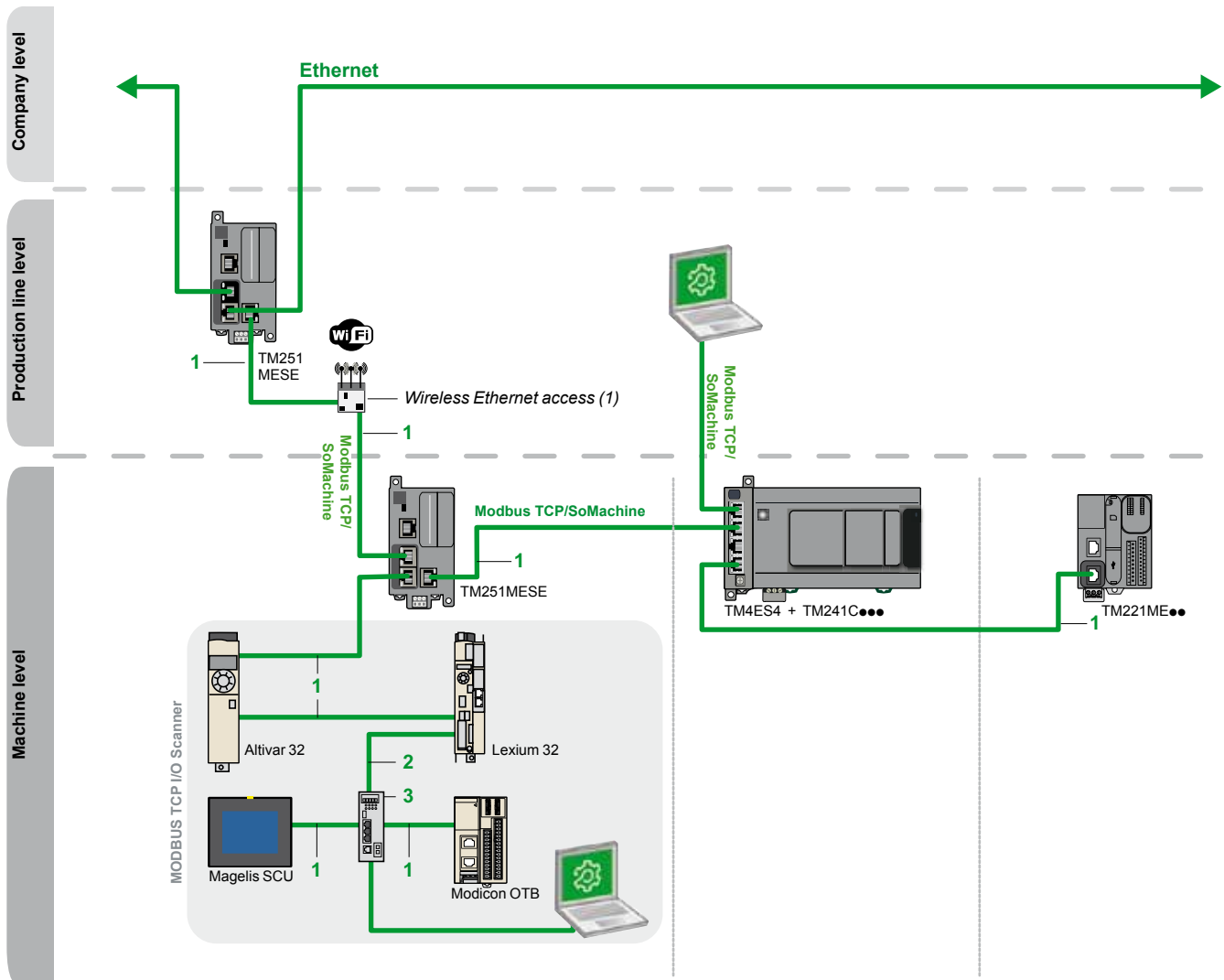

TM251MESE   *TM4ES4*

M251 logic controllers

4 On **TM251MESE and TM251MESC** controllers: 2 connectors connected by an RJ 45 internal switch for "Machine or Factory" Ethernet network, with exchange rate and activity LED.

5 On **TM251MESE** controller: RJ 45 connector for "fieldbus" Ethernet 2 network, with exchange rate and activity LED. The Ethernet 2 network can be used with the Modbus TCP I/O Scanner function.

TM4ES4 Ethernet switch communication module

6 4 RJ 45 connectors for Ethernet 2 network, with exchange rate and activity LED.

Modicon M241 logic controllers
Ethernet Modbus/TCP network
For Modicon M221, M241 and M251 logic controllers
and TM4ES4 Ethernet switch module

Communication architecture on Ethernet network

NB: *The ports on M251 controllers and the TM4ES4 communication module cannot be used to create redundant architectures.*
(1) Wireless Ethernet access, see our partner programme.
Items 1, 2 and **3**: *see references on next page.*

Shielded copper connection cables

ConneXium shielded connection cables are available in two versions to meet the requirements of the various current standards and approvals:
■ **EIA/TIA 568 shielded twisted pair cables for CE market**
These cables conform to:
□ EIA/TIA-568 standard, category CAT 5E
□ IEC 11801/EN 50173-1 standard, class D
Their fire resistance conforms to:
□ NF C32-070 standard, class C2
□ IEC 322/1 standards
□ Low Smoke Zero Halogen (LSZH)
■ **EIA/TIA 568 shielded twisted pair cables for UL market**
These cables are:
□ CEC type FT-1
□ NEC type CM
A new range of **ConneXium** fully shielded preassembled cables has been specially designed for use in harsh industrial environments. These cables combine a category 5E shielded cable and RJ 45 connectors reinforced with a metal profile.

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References

Modicon M241 logic controllers
Ethernet Modbus/TCP network
For Modicon M221, M241 and M251 logic controllers
and TM4ES4 Ethernet switch module

TCSEC●3M3M●●S4

References

EIA/TIA 568 shielded twisted pair cables for CE market

Description	End fittings	Item	Type	Length m/ft	Reference	Weight kg/lb
Straight-through copper cables CE compatible	2 RJ 45 connectors For connection to terminal devices (DTE)	1	standard	2/6.56	**490NTW00002**	–
				5/16.40	**490NTW00005**	–
				12/39.37	**490NTW00012**	–
				40/131.23	**490NTW00040**	–
				80/262.47	**490NTW00080**	–
		1	ruggedised	1/3.28	**TCSECE3M3M1S4**	–
				2/6.56	**TCSECE3M3M2S4**	–
				3/9.84	**TCSECE3M3M3S4**	–
				5/16.40	**TCSECE3M3M5S4**	–
				10/32.81	**TCSECE3M3M10S4**	–

Shielded twisted pair cables for UL market

Description	End fittings	Item	Type	Length m/ft	Reference	Weight kg/lb
Straight-through copper cables UL compatible	2 RJ 45 connectors For connection to terminal devices (DTE)	1	standard	2/6.56	**490NTW00002U**	–
				5/16.40	**490NTW00005U**	–
				12/39.37	**490NTW00012U**	–
				40/131.23	**490NTW00040U**	–
				80/262.47	**490NTW00080U**	–
		1	ruggedised	1/3.28	**TCSECU3M3M1S4**	–
				2/6.56	**TCSECU3M3M2S4**	–
				3/9.84	**TCSECU3M3M3S4**	–
				5/16.40	**TCSECU3M3M5S4**	–
				10/32.81	**TCSECU3M3M10S4**	–

Do it Yourself copper cable and connectors

The **ConneXium** "Do it Yourself" offer consists of 2 connector references (M12 and RJ 45) and 1 cable reference - 300 m (*984.252 ft*) reel - enabling Ethernet 10/100 Mbps network cables to be made up in situ. The maximum length of cables made up in this way is 80 m (*262.467 ft.*). They are assembled using only a knife and wire cutters (no special tool is required).

Description	Characteristics	Item	Length m/ft	Reference	Weight kg/lb
Ethernet copper cable 2 shielded twisted pairs 24 AWG	Conforms to the standards and approval listed above	2	300/984.25	**TCSECN300R2**	–
RJ 45 connector	Conforms to EIA/TIA-568-D	2	–	**TCSEK3MDS**	–

TCSESU053FN0

ConneXium unmanaged switches, 3, 4 and 5 ports, twisted pair and optical fibre

Description	Interfaces	Item	Reference	Weight kg/lb
ConneXium unmanaged switches	3 x 10BASE-T/100BASE-TX ports (copper cable), RJ 45 shielded connectors	3	**TCSESU033FN0**	0.113/ 0.249
	■ 4 x 10BASE-T/100BASE-TX ports (copper cable), RJ 45 shielded connectors ■ 1 x 100BASE-FX port (multimode optical fibre), duplex SC connector	3	**TCSESU043F1N0**	0.120/ 0.265
	5 x 10BASE-T/100BASE-TX ports (copper cable), RJ 45 shielded connectors	3	**TCSESU053FN0**	0.113/ 0.249

*Other wiring components are available, please consult the **ConneXium** offer on our website www.schneider-electric.com.*

Modicon M241 logic controllers
Expansion modules
Compatibility of Modicon TM2 expansion modules with
Modicon M221, M241 and M251 logic controllers

Compatibility

Modicon TM2 expansion modules		Logic controllers			
		M221	**M221 Book**	**M241**	**M251**
Digital modules	TM2DDI8DT				
	TM2DDI16DT				
	TM2DDI16DK				
	TM2DDI32DK				
	TM2DAI8DT				
	TM2DDO8UT				
	TM2DDO8TT				
	TM2DDO16UK				
	TM2DDO16TK				
	TM2DDO32UK				
	TM2DDO32TK				
	TM2DRA8RT				
	TM2DRA16RT				
	TM2DMM8DRT				
	TM2DMM24DRF				
Analog modules	TM2AMI2HT				
	TM2AMI2LT				
	TM2AMI4LT				
	TM2AMI8HT				
	TM2ARI8LRJ				
	TM2ARI8LT				
	TM2ARI8HT				
	TM2AMO1HT				
	TM2AVO2HT				
	TM2AMM3HT				
	TM2ALM3LT				
	TM2AMM6HT				
Expert modules (counter modules)	TM200HSC206DT				
	TM200HSC206DF				

Compatible (green)

Not **compatible** (grey)

Note: The expansion and communication module range **TWD●●●●●** is not compatible with Modicon M221, M241, M251 logic controller offer.

Configuration

Modicon TM2 digital I/O modules connect to Modicon M221, M221 Book, M241 and M251 logic controllers according to the general rules for the Modicon TM3 system: a maximum of 7 local I/O modules *(1)*; this can be increased to 14 modules *(1)* using Modicon TM3 bus expansion modules (transmitter and receiver): local I/O + remote I/O.

☐ The maximum number of Modicon TM2 expansion modules can be reduced by the number of transistor outputs or relay outputs used (see the table below).
☐ If more transistor or relay outputs are required than the maximum number given in the table, use Modicon TM3 bus expansion modules (transmitter and receiver). In this case, 7 Modicon TM2 modules can be connected to the right of the **TM3XREC1** receiver module without limiting the number of outputs.

Configuration limits	Logic controllers									TM241/ TM251
	TM221									
	C16R CE16R	**C16T CE16T**	**C24R CE24R**	**C24T CE24T**	**C40R CE40R**	**C40T CE40T**	**M16R ME16R M16RG ME16RG**	**M16T ME16T M16TG ME16TG**	**M32TK ME32TK**	**TM241●●●● TM251●●●●**
Maximum number of Modicon TM2 module (local) transistor outputs directly connected to the controller *(2)*	54	67	71	89	113	143	216	*(3)*		
Maximum number of Modicon TM2 module (local) relay outputs directly connected to the controller *(2)*	23	29	30	38	48	61	92	98	97	*(3)*

(1) Excluding TM2●●●24●● and TM2●●●32●● modules: a maximum of 3 local I/O modules and 6 modules in total using TM3 bus expansion modules.
(2) If using bus expansion modules: maximum number of Modicon TM2 module relay or transistor outputs installed between the controller and the TM3XTRA1 transmitter module (local outputs).
(3) Up to 7 ModiconTM2 modules regardless of the number of outputs used.

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