

Modicon M241 logic controllers

Catalogue
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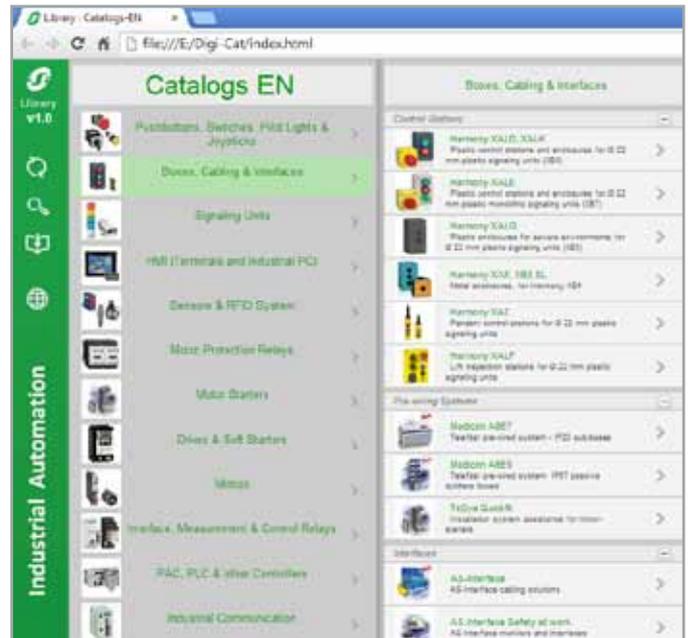
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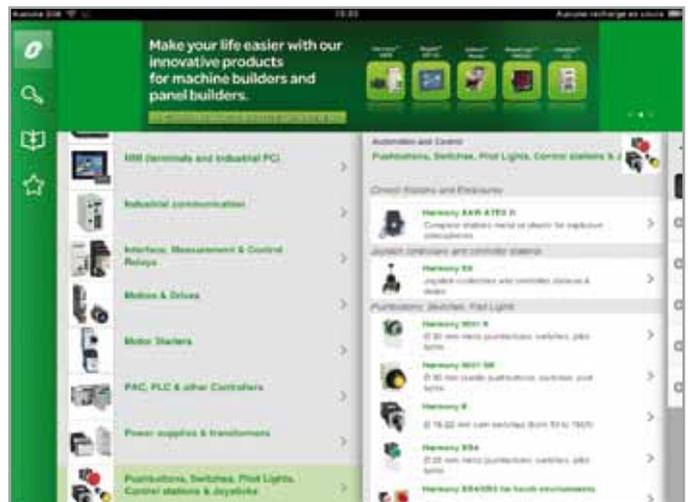
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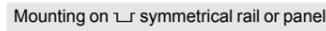
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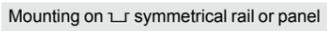
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Applications		Control of simple motion Control of control loops		
				
Supply voltage		100-240 V ~	24 V ☐	
Inputs/Outputs		24 logic inputs/outputs		
<ul style="list-style-type: none"> ■ Logic inputs/outputs □ No. and type of inputs □ No. and type of outputs Connection of logic inputs/outputs 		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
		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
		With removable screw terminal block		
I/O extension		<ul style="list-style-type: none"> □ 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		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		
		1 CANopen port on TM241CEC24● controllers (1 screw terminal block): 63 slaves, 252 TPDO/252 RPDO		
		2 serial link ports: <ul style="list-style-type: none"> □ 1 port SL1 (RJ 45), RS232/485 with +5 V supply □ 1 port SL2 (screw terminal) RS485 		
Functions		PID		
		8 high-speed counter (HSC) inputs, 200 kHz frequency		
		4 position control outputs: <ul style="list-style-type: none"> □ 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		<ul style="list-style-type: none"> ■ Cartridges □ 3 I/O expansion cartridges: <ul style="list-style-type: none"> - with 2 voltage/current analog inputs - with 2 inputs for temperature probes - with 2 voltage/current analog outputs □ 2 application cartridges: <ul style="list-style-type: none"> - for control of hoisting applications - for control of packaging applications 		
		1		
		<ul style="list-style-type: none"> □ 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		TM241C24R	TM241C24T	TM241C24U
with serial links		TM241CE24R	TM241CE24T	TM241CE24U
with embedded Ethernet port and serial links		TM241CEC24R	TM241CEC24T	TM241CEC24U
with embedded Ethernet and CANopen ports, and serial links				
Pages		10		

▲ Available: 4th quarter 2014.

Applications		Control of simple motion Control of control loops		
				
Supply voltage		100-240 V ~	24 V ☐	
Inputs/Outputs		40 logic inputs/outputs		
<ul style="list-style-type: none"> ■ Logic inputs/outputs □ No. and type of inputs □ No. and type of outputs Connection of logic inputs/outputs 		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
		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
		With removable screw terminal block		
I/O extension		<ul style="list-style-type: none"> □ 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		1 Ethernet port on TM241CE40● and TM241CEC40● 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		
		-		
		2 serial link ports: <ul style="list-style-type: none"> □ 1 port SL1 (RJ 45), RS232/485 with +5 V supply □ 1 port SL2 (screw terminal) RS485 		
Functions		PID		
		8 high-speed counter (HSC) inputs, 200 kHz frequency		
		4 position control outputs: <ul style="list-style-type: none"> □ 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		<ul style="list-style-type: none"> ■ Cartridges □ 3 I/O expansion cartridges: <ul style="list-style-type: none"> - with 2 voltage/current analog inputs - with 2 inputs for temperature probes - with 2 voltage/current analog outputs □ 2 application cartridges: <ul style="list-style-type: none"> - for control of hoisting applications - for control of packaging applications 		
		2		
		<ul style="list-style-type: none"> □ 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		TM241C40R	TM241C40T	TM241C40U
with serial links		TM241CE40R	TM241CE40T	TM241CE40U
with embedded Ethernet port and serial links				
with embedded Ethernet and CANopen ports, and serial links				
Pages		10		

▲ Available: 4th quarter 2014.

Compatibility of offers

Modicon M241 logic controllers

- > Modicon TM3 expansion modules
- > Modicon TM2 expansion modules
- > Modicon TM4 communication modules
- > SoMachine software



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)
 - frequency generator (FG)

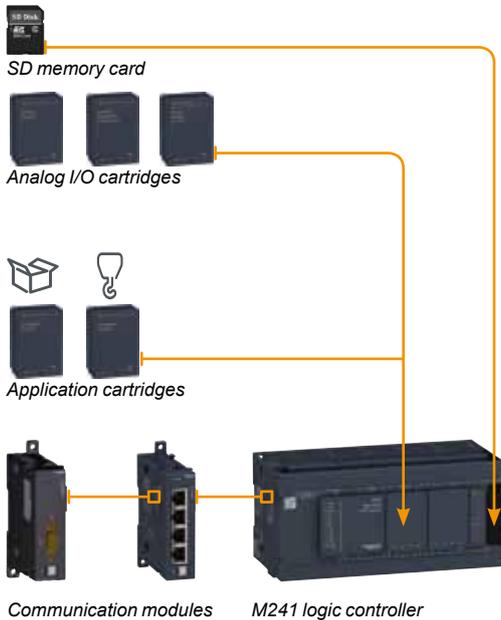
Processing power

- 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 M241 controllers).



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.

[See page 12.](#)

■ 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

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



Modicon M241 logic controllers

I/O expansions with Modicon TM3 expansion modules

I/O extensions with Modicon TM3 modules

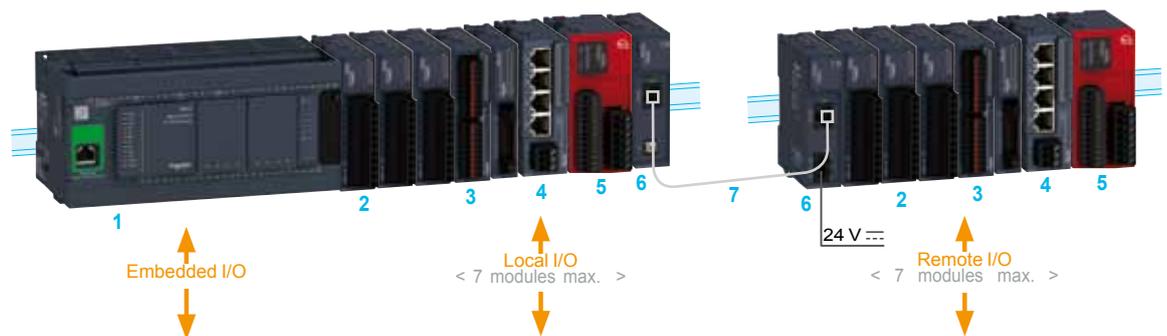
Modicon TM3 expansion modules (please refer to our website www.schneider-electric.com)

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.

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

TM241CE●●● 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: see page 18.

Communication on CANopen

TM241CEC●●● 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: see page 16.

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

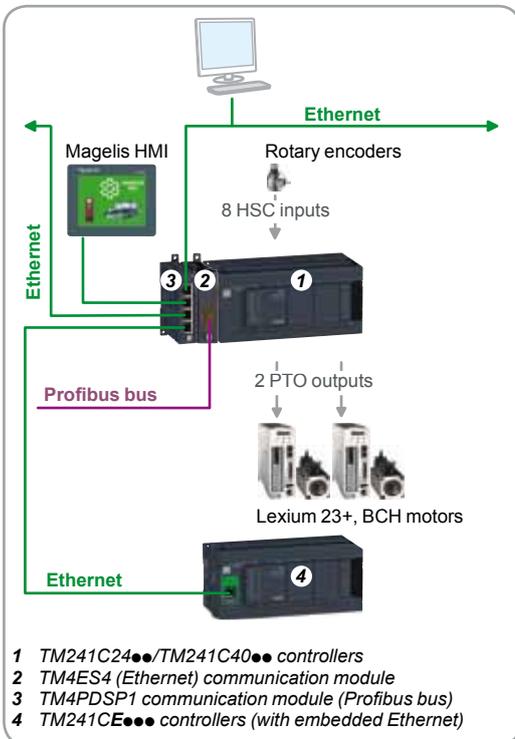
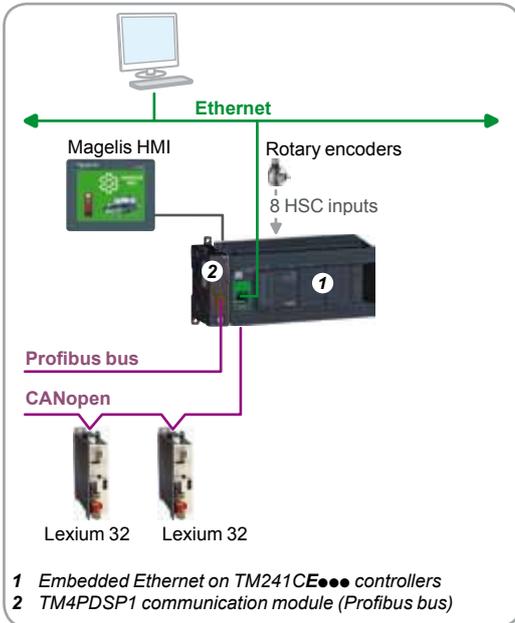
Connection cables and accessories for serial link: see page 15.

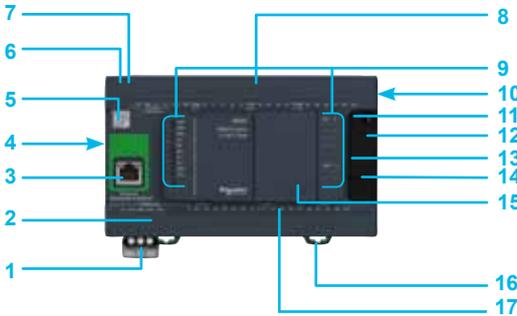
Programming port with power off charging function

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:

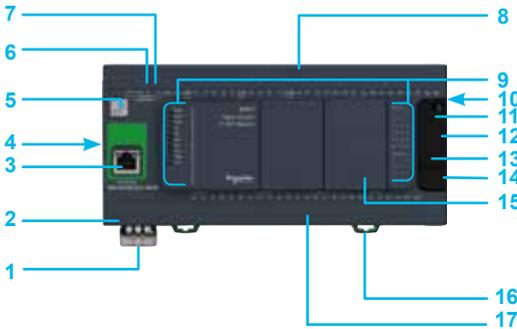
- programming
- debugging
- maintenance

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.





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 $\overline{\text{DC}}$ or the 100-240 V \sim 50/60 Hz power supply (depending on model).
 - 2 On TM241CE $\bullet\bullet\bullet$ controllers: connector for linking to the CANopen bus (screw terminal block).
 - 3 On TM241CE $\bullet\bullet\bullet$ controllers: RJ 45 connector for Ethernet network, with exchange rate and activity LED.
 - 4 TM4 bus connector: communication bus for connecting to the TM4 $\bullet\bullet\bullet$ 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 $\overline{\text{DC}}$ 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 \bullet 24, two slots on TM241C \bullet 40.
 - 16 Locking clip on \perp 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 $\overline{\text{DC}}$ or 100-240 V \sim 50/60Hz

- Voltage limit (ripple included): 19.2...28.8 V $\overline{\text{DC}}$ /85...264 V \sim
- Immunity to micro-cuts (class PS-2): 10 ms
- Max. consumption: 45 W.

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



TM241C24R



TM241C40R



TM241CEC24U



TM241CE24R



TM241CE40T



TM241CE40U



TMC4AI2



TMC4AQ2



TMC4TI2



TMC4HOIS01



TMC4PACK01



TMASD1

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 $\overline{\text{---}}$ 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 $\overline{\text{---}}$ 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 $\overline{\text{---}}$ power supply							
24 inputs/ outputs	14 sink/source 24 V $\overline{\text{---}}$ 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
40 inputs/ outputs	14 sink/source 24 V $\overline{\text{---}}$ 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 $\overline{\text{---}}$ 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
			1	–	1 + 1	TM241C40U	0.620/ 1.367
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

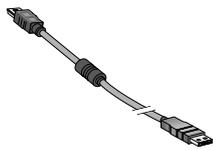
(1) Modular M241 controllers are supplied with:

- 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 M241 controllers).

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



TCSXCNAMUM3P

(1) Unshielded cable without grounding. To be used only for temporary connections. For permanent connections, use the reference BMXXCAUSBH018 programming cable.

Compatibility of offers

Modicon TM4 communication modules

- > Modicon M241 logic controllers
- > Modicon M251 logic controllers



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 TM251MES● 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 \perp 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 \perp symmetrical rail.



Modicon M241 logic controllers

Communication modules

Modicon TM4 communication modules

for Modicon M241 and Modicon M251 logic 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

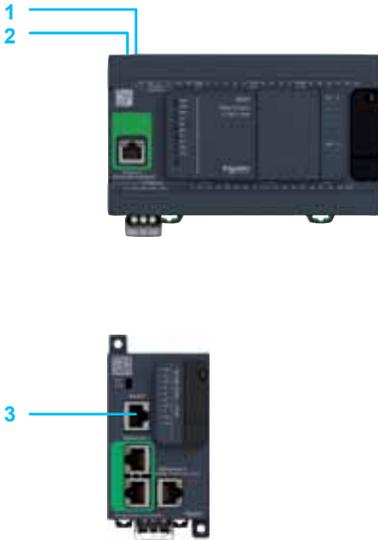
Modbus protocols, character mode

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 adaptor or other devices.
- 2 A 2nd "Serial 2" serial link port (with connection on screw terminals).

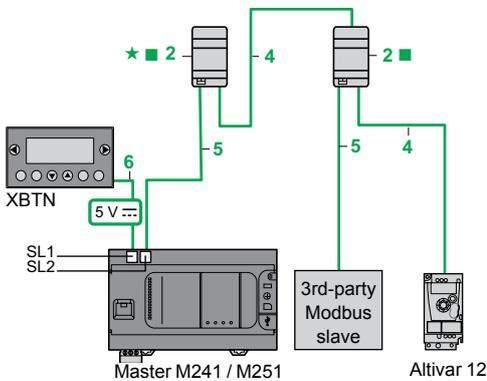
Controller Type	Embedded Ports	
	"Serial 1" port, RJ45 connector	"Serial 2" port, connection on screw terminals
TM241●●●●	RS 232/RS 485 with 5V (200 mA) power supply for HMI or Bluetooth communication adaptor (item 1)	RS 485 (item 2)

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 adaptor or other devices.

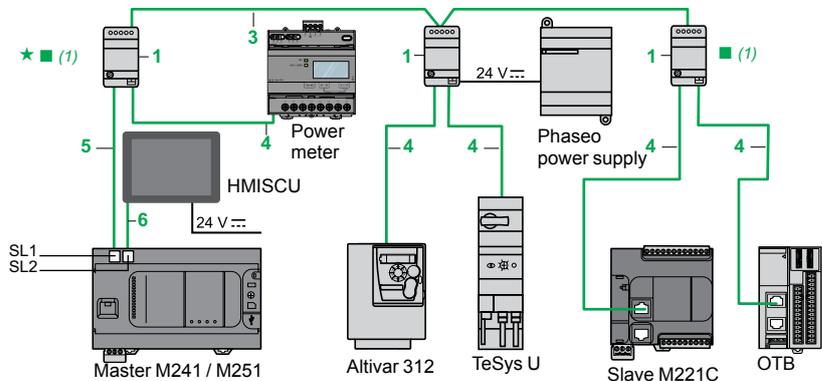
- 3 A serial link port (RJ 45 connector (RS 232 or RS 485)).

Modbus serial link wiring system

Non-isolated bus



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



- 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

- 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



TWDXCAISO TWDXCAT3RJ

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	<input type="checkbox"/> Isolation of the RS 485 link (1) <input type="checkbox"/> Line termination (RC 120 Ω, 1nF) <input type="checkbox"/> Line pre-polarization (2 R 620 Ω) <input type="checkbox"/> 24 V $\overline{\text{---}}$ power supply (screw terminals) or 5 V $\overline{\text{---}}$ power supply (via RJ45) <input type="checkbox"/> Mounting on 35 mm (1.378 in.) \perp	1	—	TWDXCAISO	0.100/ 0.220
T-junction box 1 x RJ45 for trunk cable 2 x RJ45 for tap-off	<input type="checkbox"/> Line termination (RC 120 Ω, 1nF) <input type="checkbox"/> Line pre-polarization (2 R 620 Ω) <input type="checkbox"/> Mounting on 35 mm (1.378 in.) \perp	2	—	TWDXCAT3RJ	0.080/ 0.176

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



LU9GC3



TSXSCA50



XGSZ24

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	<input type="checkbox"/> Mounting on 35 mm (1.378 in.) \perp , on plate or panel Screw terminals for trunk cable 10 x RJ45 for tap-off	–	–	LU9GC3	0.500/ 1.102
T-junctions	1 integrated cable with RJ45 connector for tap-off	–	0.3/ 0.98	VW3A8306TF03	–
	2 x RJ45 for trunk cable		1/ 3.28	VW3A8306TF10	–
Passive T-junction box	<input type="checkbox"/> 1-channel line extension and tap-off on screw terminals <input type="checkbox"/> Line termination	–	–	TSXSCA50	0.520/ 1.146
RS 232C/RS 485 line converter	<input type="checkbox"/> Max. data rate 19.2 Kbps, No modem signals <input type="checkbox"/> 24 V $\overline{\text{---}}$ /20 mA power supply <input type="checkbox"/> 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	6	2.5/ 8.202	XBZT9980	0.230/ 0.507
	Compatible with:				
	<input type="checkbox"/> Com Port 1 on XBTN200/N400/R400/RT500 (1)	6	10/ 32.81	XBZT9982	–
	<input type="checkbox"/> Com Port 1 on XBTRT511 and HMISTO/STU/SCU				
	<input type="checkbox"/> Com Port 2 on XBTGT2●●0...7●●0 and HMIGTO				
	1 x RJ45 connector and 1 x 25-way SUB-D connector	–	2.5/ 8.20	XBZT9938	0.210/ 0.463
	Compatible with:				
	<input type="checkbox"/> Com Port 1 on XBTN410/N410 and XBTR410/R411				
	1 x RJ45 connector and 1 x 9-way SUB-D connector	–	2.5/ 8.20	XBZT9908	–
	Compatible with:				
	<input type="checkbox"/> Com Port 1 on XBTGT2●●0...7●●0				
Cordsets: used from M241 (SL2) controllers to Magelis HMI	1 x RJ45 connector and stripped wires	–	3/ 9.84	VW3A8306D30	0.150/ 0.331
	Compatible with:				
	<input type="checkbox"/> Com Port 1 on XBTRT511 and HMISTO/STU/SCU				
	<input type="checkbox"/> Com Port 2 on XBTGT2●●0...7●●0 and HMIGTO				
Line end adapter	For RJ45 connector	–	–	VW3A8306RC	0.200/ 0.441
	Sold in packs of 2 R = 120 Ω , C = 1 nf				
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.

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:

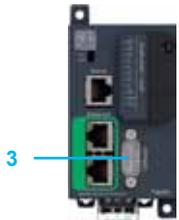
- 1 a connector for linking to the CANopen bus (screw terminals).
- 2 a CANopen line termination switch.

The front of the Modicon **TM251MESC** logic controller has:

- 3 a connector for linking to the CANopen bus (9-way SUB-D).

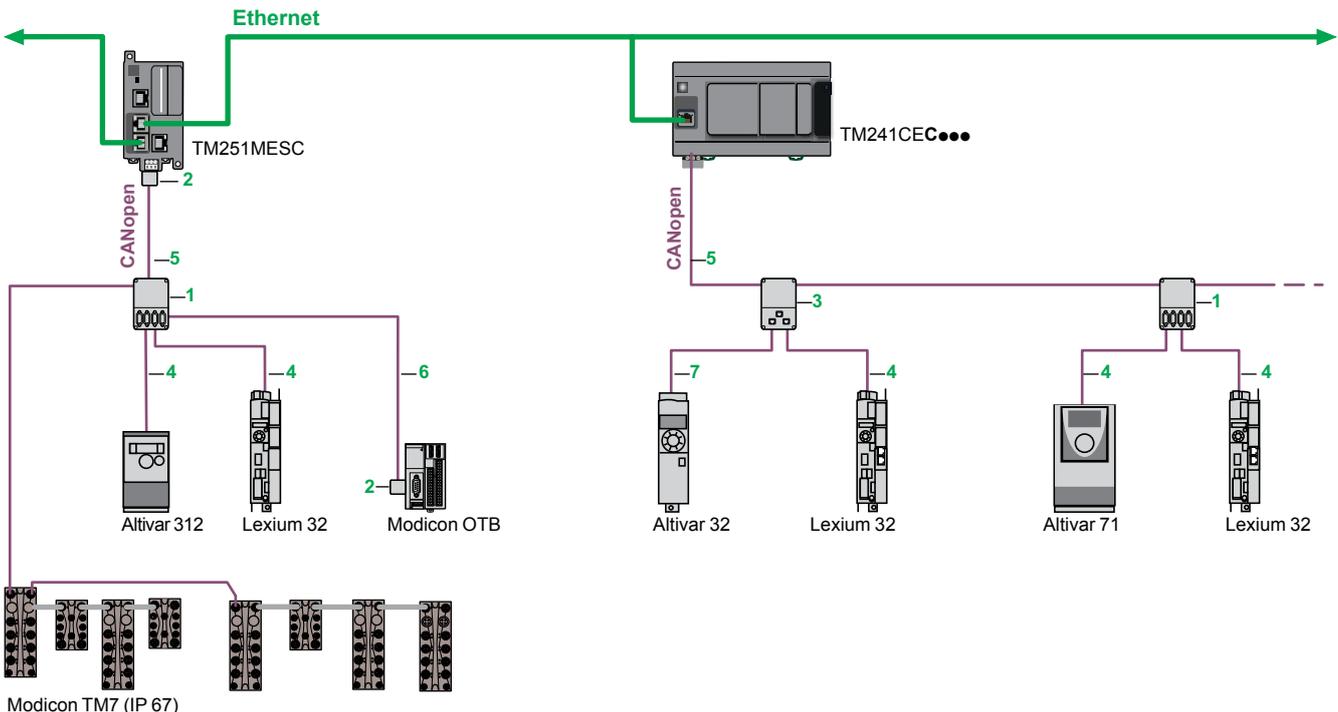


TM241CEC●●● controllers



TM251MESC controller

CANopen connection architecture



References

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	–



TSXCANTDM4



VW3CANTAP2

TSXCAN
KCD F90TTSXCAN
KCD F180TTSXCANKCD
F90TP

TCSCAR013M120



VW3CANA71

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		
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	
		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	
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](http://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.

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.

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

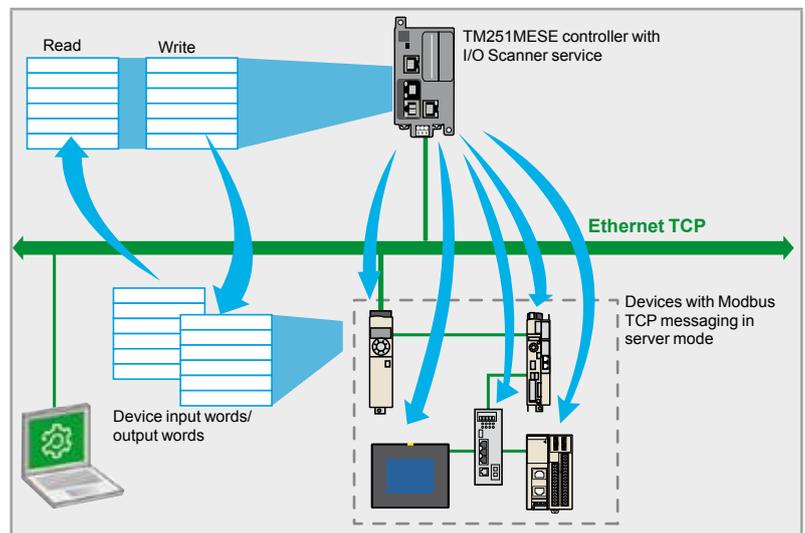
The SoMachine programming software is used to create customised pages for viewing and monitoring devices. These pages can also be accessed on any mobile device such as a tablet or smartphone with any operating system (iOS, Android, Windows).

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.

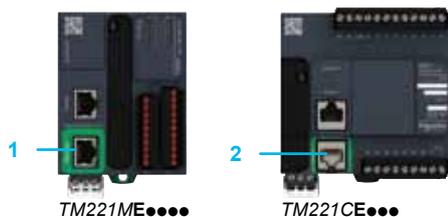
(1) The NetManage function can automatically detect which controllers are present on the network. It also offers the option of straightforward connection to any controller present on the network in order to identify it physically by means of a visual or audible message and modify its parameters or manage the resident application.

Transparent Ready class and Functions

	Logic controllers			
	TM221ME●●● TM221CE●●●	TM241CE●●● TM241C●●● + TM4ES4	TM251MESCC	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	Availability : 4 th 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



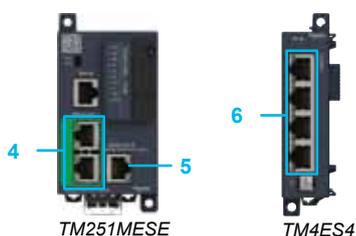
M221 logic controllers

- 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.



M241 logic controllers

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



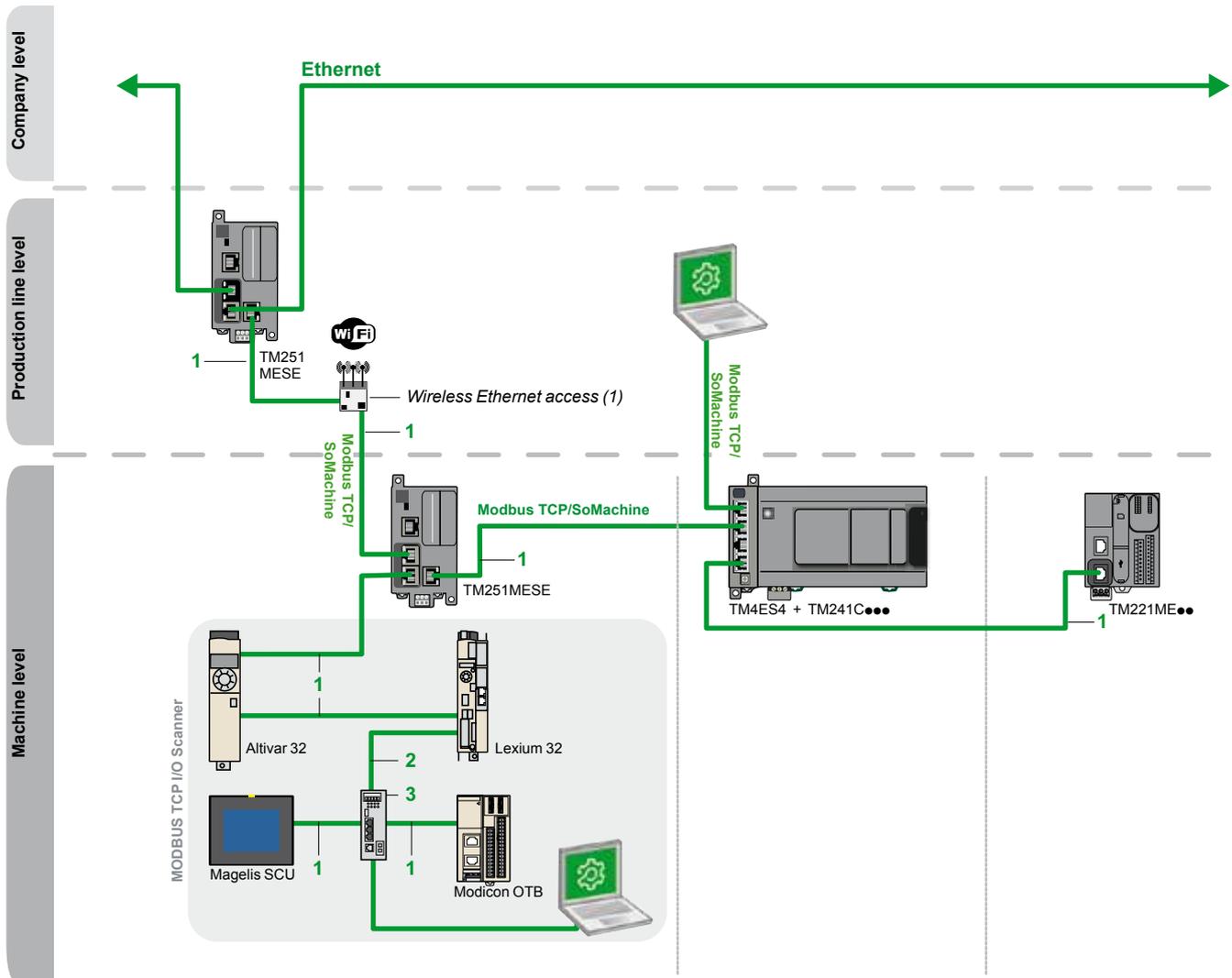
M251 logic controllers

- 4 On **TM251MESE** and **TM251MESCC** 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.

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.

Modicon M241 logic controllers

Ethernet Modbus/TCP network

For Modicon M221, M241 and M251 logic controllers and TM4ES4 Ethernet switch module

References

EIA/TIA 568 shielded twisted pair cables for C€ market

Description	End fittings	Item	Type	Length m/ft	Reference	Weight kg/lb
Straight-through copper cables C€ 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	–



TCSEC●3M3M●●S4

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	–

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.



TCSESU053FN0

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

Not compatible

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									
	TM221									TM241/ TM251
	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 Modicon TM2 modules regardless of the number of outputs used.

X			
490NTW00002	23	TM4PDPS1	13
490NTW00002U	23	TMASD1	10
490NTW00005	23	TMAT2PSET	11
490NTW00005U	23	TMAT4CSET	11
490NTW00012	23	TMC4AI2	10
490NTW00012U	23	TMC4AQ2	10
490NTW00040	23	TMC4HOIS01	10
490NTW00040U	23	TMC4PACK01	10
490NTW00080	23	TMC4TI2	10
490NTW00080U	23	TSXCANCA100	17
		TSXCANCA300	17
		TSXCANCA50	17
		TSXCANCADD03	17
B		TSXCANCADD1	17
BMXCAUSBH018	11	TSXCANCADD3	17
		TSXCANCADD5	17
L		TSXCANCB100	17
LU9GC3	15	TSXCANCB300	17
		TSXCANCB50	17
T		TSXCANCBDD03	17
TCSCAR013M120	17	TSXCANCBDD1	17
TCSCAR01NM120	17	TSXCANCBDD3	17
TCSCCN4F3M05T	17	TSXCANCBDD5	17
TCSCCN4F3M1T	17	TSXCANCD100	17
TCSCCN4F3M3T	17	TSXCANCD300	17
TCSCTN023F13M03	17	TSXCANCD50	17
TCSCTN026M16M	17	TSXCANKCDF90T	17
TCSECE3M3M10S4	23	TSXCANKCDF180T	17
TCSECE3M3M1S4	23	TSXCANKCDF90TP	17
TCSECE3M3M2S4	23	TSXCANTDM4	17
TCSECE3M3M3S4	23	TSXCSA100	15
TCSECE3M3M5S4	23	TSXCSA200	15
TCSECN300R2	23	TSXCSA500	15
TCSECU3M3M10S4	23	TSXSCA50	15
TCSECU3M3M1S4	23	TWDXCAFJ010	15
TCSECU3M3M2S4	23	TWDXCAISO	14
TCSECU3M3M3S4	23	TWDXCAT3RJ	14
TCSECU3M3M5S4	23		
TCSEK3MDS	23	V	
TCSESU033FN0	23	VW3A8306D30	15
TCSESU043F1N0	23	VW3A8306R03	15
TCSESU053FN0	23	VW3A8306R10	15
TCSMCN3M4F3C2	15	VW3A8306R30	15
TCSMCN3M4M3S2	15	VW3A8306RC	15
TCSXCNAMUM3P	11	VW3A8306TF03	15
TLACDCBA005	17	VW3A8306TF10	15
TLACDCBA015	17	VW3CANA71	17
TLACDCBA030	17	VW3CANCARR03	17
TLACDCBA050	17	VW3CANCARR1	17
TM241C24R	10	VW3CANTAP2	17
TM241C24T	10	VW3M3805R010	17
TM241C24U	10	VW3M3805R030	17
TM241C40R	10		
TM241C40T	10	X	
TM241C40U	10	XBTZ9008	15
TM241CE24R	10	XBTZ938	15
TM241CE24T	10	XBTZ9980	15
TM241CE24U	10	XBTZ9982	15
TM241CE40R	10	XGSZ24	15
TM241CE40T	10		
TM241CE40U	10		
TM241CEC24R	10		
TM241CEC24T	10		
TM241CEC24U	10		
TM4ES4	13		

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