

Modicon M221 logic controllers

Catalog

January 2015



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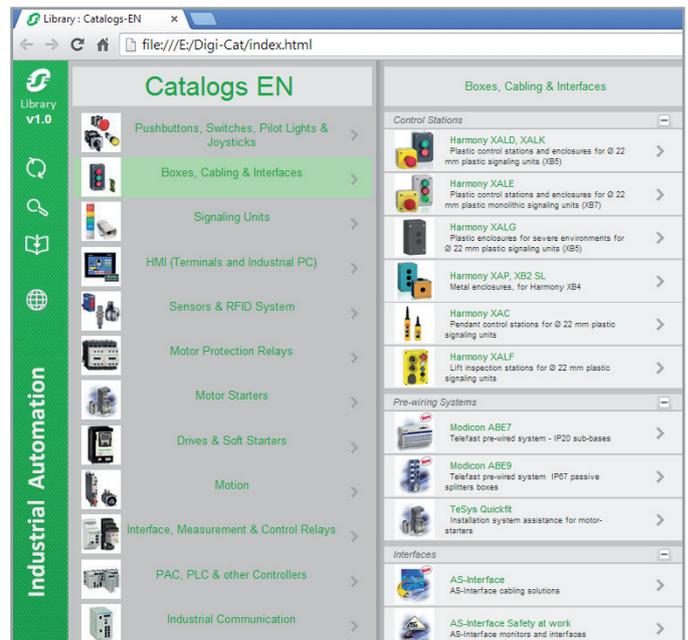
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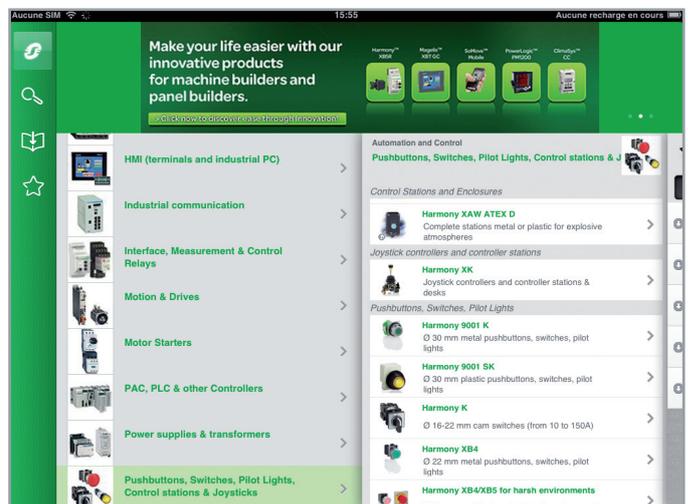
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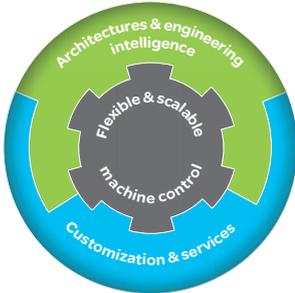
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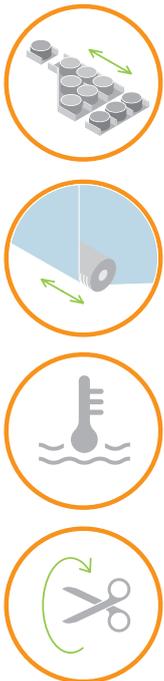


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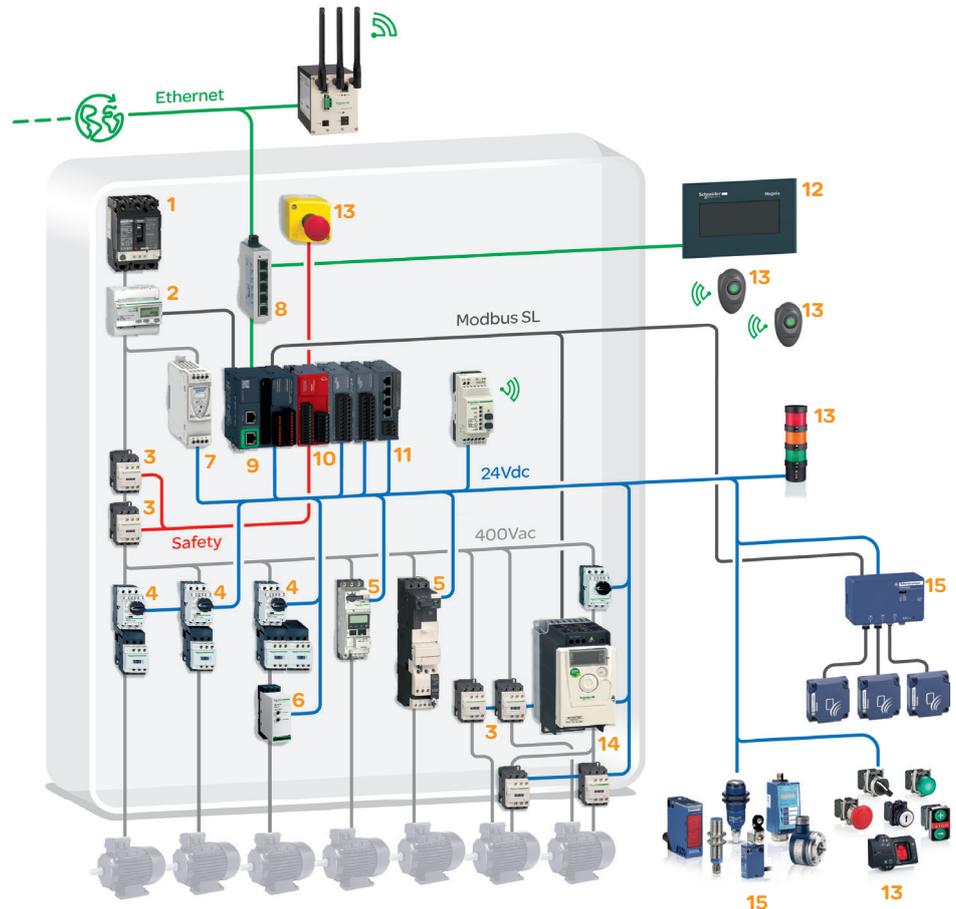
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Ready-to-use architectures and function blocks

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



Application Function Blocks (AFB)



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

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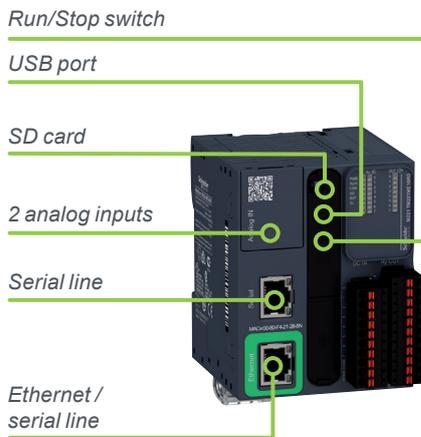


From logic to motion control, the Modicon range offers flexibility and scalability to suit your needs

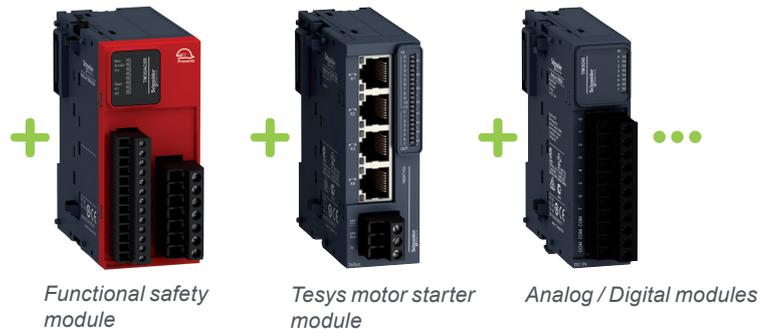
Modicon M221: the small yet powerful logic controller for hardwired solutions

Everything you need is embedded

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



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



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

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

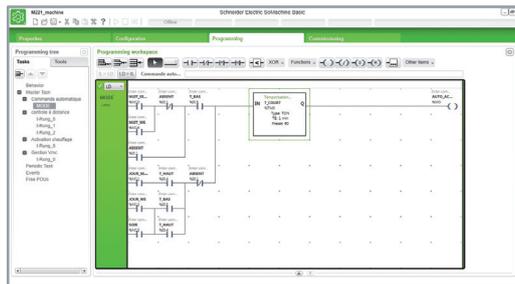
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SoMachine® is the universal programming software for machines automated by MachineStruxure controllers. Simple navigation that requires only fewer clicks delivers a more efficient engineering process.

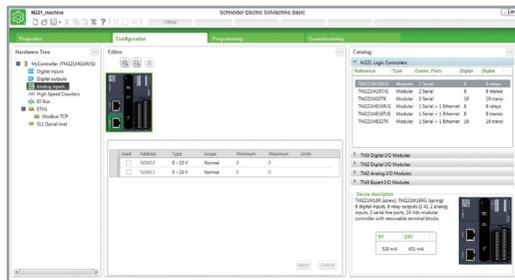
- > In order to reduce complexity we offer SoMachine Basic, a simplified engineering tool for the new controller Modicon M221.
- > All programming, visualization, and commissioning are handled in just one intuitive tool that is available as a free download.
- > No training required



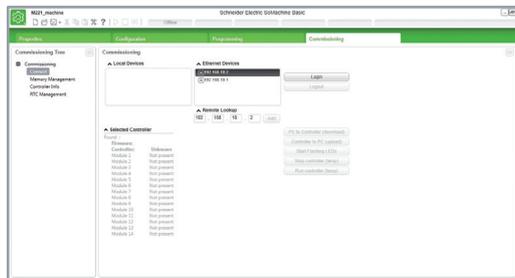
SoMachine simplifies every step in the design and commissioning of your machines



Programming



Configuration



Commissioning

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- > Application for mobile phone & smartphone
- > Bluetooth® communication



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Achieve benchmark performance
while increasing profitability



Make the most of your energySM

Modicon M221 and M221 Book logic controllers

Applications

Control of simple machines



Supply voltage	100-240 V ~ 24 V ---
Inputs/outputs	<ul style="list-style-type: none"> Logic inputs/outputs <ul style="list-style-type: none"> No. and type of inputs No. and type of outputs Connection of logic I/O Analog inputs <ul style="list-style-type: none"> Connection of analog inputs
I/O extension	Max. number of I/O expansion modules that can be connected with bus expansion modules
Embedded communication	<ul style="list-style-type: none"> Ethernet link Serial link
Functions	<ul style="list-style-type: none"> Process control Counting Position control
Format	W x H x D
Options	<ul style="list-style-type: none"> Cartridges <ul style="list-style-type: none"> Number of cartridge slots Display unit
Mounting	
Software programming	
Logic controller type	<ul style="list-style-type: none"> Controllers without Ethernet port Controllers with embedded Ethernet port

100-240 V ~ 24 V ---	100-240 V ~ 24 V ---	100-240 V ~ 24 V ---
16 logic I/O	24 logic I/O	40 logic I/O
9 sink/source 24 V --- inputs, inc. 4 high-speed inputs	9 sink/source 24 V --- inputs, inc. 4 high-speed inputs	14 sink/source 24 V --- inputs, inc. 4 high-speed inputs
7 relay outputs	7 source transistor outputs, inc. 2 high-speed outputs	10 relay outputs
With removable screw terminal block		
2 x 0...10 V analog inputs		
On dedicated removable terminal block		
<ul style="list-style-type: none"> 7 Modicon TM3 expansion modules, along with limited number of outputs (Please refer to SoMAchine programming software catalogue (n° DIA3ED2140110FR) on our website www.schneider-electric.com) 14 Modicon TM3 expansion modules with the use of bus expansion modules (transmitter and receiver), along with limited number of outputs (Please refer to SoMAchine programming software catalogue (n° DIA3ED2140110FR) on our website www.schneider-electric.com) Possible use of Modicon TM2 expansion modules with restrictions. 		
1 Ethernet port on TM221CE●●● controllers: Modbus TCP communication (client & server), Modbus TCP slave, Dynamic DHCP client Configuration, Programming, downloading, monitoring		
1 serial link port (RJ 45 connector) RS232/485 with + 5 V supply		
PID		
Up to 4 high-speed counter inputs (HSC), 100 kHz frequency		
<ul style="list-style-type: none"> On TM221C●●T and TM221CE●●T controllers only: <ul style="list-style-type: none"> pulse width modulation (PWM) pulse generator (PLS) 2 P/D pulse train outputs (PTO) with trapezoidal profile and S curve, 100 kHz frequency 		
3 controller sizes:		
95 x 90 x 70 mm/ 3.74 x 3.54 x 2.75 in.	110 x 90 x 70 mm/ 4.33 x 3.54 x 2.75 in.	163 x 90 x 70 mm/ 6.41 x 3.54 x 2.75 in.
<ul style="list-style-type: none"> 3 analog I/O expansion cartridges 1 additional serial link communication cartridge 3 application cartridges <ul style="list-style-type: none"> for control of hoisting applications for control of packaging applications for control of conveying applications 		
1	1	2
TMH2GDB remote graphic display: visualization and monitoring		
Mounting on ┘ symmetrical rail or panel with specific mounting kit TMAM2		
With SoMachine Basic software (Please refer to SoMAchine programming software catalogue (n° DIA3ED2140110FR) on our website www.schneider-electric.com)		
Modicon M221		
TM221C16R	TM221C16T	TM221C24R
TM221CE16R	TM221CE16T	TM221CE24R
TM221C24T	TM221C40R	TM221C40T
TM221CE24T	TM221CE40R	TM221CE40T
16		

Control of simple machines



24 V ---	24 V ---	24 V ---
16 logic I/O	16 logic I/O	32 logic I/O
8 sink/source 24 V --- inputs, inc. 4 high-speed inputs	8 sink/source 24 V --- inputs, inc. 4 high-speed inputs	16 sink/source 24 V --- inputs, inc. 4 high-speed inputs
8 relay outputs	8 source transistor outputs, inc. 2 high-speed outputs	16 source transistor outputs, inc. 2 high-speed outputs
With removable screw terminal block or spring terminal block (1)		To HE 10 connector (with the Modicon Telefast ABE7 pre-wired system: connection cables and sub-bases)
2 x 0...10 V analog inputs		
On dedicated removable terminal block		
<ul style="list-style-type: none"> 7 Modicon TM3 expansion modules, along with limited number of outputs (Please refer to SoMAchine programming software catalogue (n° DIA3ED2140110FR) on our website www.schneider-electric.com) 14 Modicon TM3 expansion modules with the use of bus expansion modules (transmitter and receiver), along with limited number of outputs (Please refer to SoMAchine programming software catalogue (n° DIA3ED2140110FR) on our website www.schneider-electric.com) Possible use of Modicon TM2 expansion modules with restrictions. 		
1 Ethernet port on TM221ME●●● controllers: Modbus TCP (client & server), Modbus TCP slave, dynamic DHCP client Configuration, Programming, downloading, monitoring		
1 serial link port (RJ 45 connector) RS232/485 with + 5 V supply		
1 additional serial link port on TM221M●●● controllers (RJ 45 connector) RS485		
PID		
Up to 4 high-speed counter inputs (HSC), 100 kHz frequency		
<ul style="list-style-type: none"> On TM221M16T/TG, TM221ME16T/TG, TM221M32TK and TM221ME32TK controllers only: <ul style="list-style-type: none"> pulse width modulation (PWM) pulse generator (PLS) 2 P/D pulse train outputs (PTO) with trapezoidal profile and S curve, 100 kHz frequency 		
1 size only:		
70 x 90 x 70 mm/ 2.75 x 3.54 x 2.75 in.		
-		
-		
TMH2GDB remote graphic display: visualization and monitoring		
Mounting on ┘ symmetrical rail or panel with specific mounting kit TMAM2		
With SoMachine Basic software (Please refer to SoMAchine programming software catalogue (n° DIA3ED2140110FR) on our website www.schneider-electric.com)		
Modicon M221 Book		
TM221M16R	TM221M16T	TM221M32TK
TM221ME16R	TM221ME16T	TM221ME32TK
TM221M16RG (1)	TM221M16TG (1)	
TM221ME16RG (1)	TM221ME16TG (1)	
17		

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

Modicon M221 and M221 Book logic controllers

General presentation

Compatibility of offers

Modicon M221 and M221 Book logic controllers

- Modicon TM3 expansion modules
- Modicon TM2 expansion modules
- SoMachine Basic software



16 I/O channels



24 I/O channels



40 I/O channels

Modicon M221 logic controllers (standard format)



16 I/O channels



32 I/O channels

Modicon M221 Book logic controllers

Presentation

Applications

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

- The controllers are available in 2 formats:
 - Modicon **M221** controllers (references TM221C●●●●) offer excellent connection capacity and customization options without increasing the controller size, using I/O, communication or application cartridges.
 - Modicon **M221 Book** controllers (references TM221M●●●●) offer very small dimensions and a wide choice of connections.
- M221 and M221 Book controllers have an embedded Ethernet port meaning they can easily be integrated in control system architectures, for remote control and maintenance of machines using applications for smartphones, tablets and PCs.
- The wealth of functions embedded in M221 and M221 Book controllers minimizes the cost of the machine:
 - Functions embedded in the controller: Modbus serial link, USB port dedicated to programming and simple position control functions (high-speed counters and pulse train outputs with trapezoidal profile and S curve).
 - Functions embedded in Modicon TM3 extensions: Functional safety modules, motor-starter control module and remote expansion system.
 - Functions embedded in the dedicated display unit.
- The application is created quickly thanks to the intuitive nature of the SoMachine Basic programming software, which also has embedded configuration of the display unit and extensions, including the functional safety modules. This software environment makes it easy to retrieve Twido range applications, maximizing use of the investment already made. Applications can thus easily be ported to any of the Modicon logic controllers: M241, M251 and M258.

Main functions

Modicon TM221C●●●●	Modicon TM221M●●●●
w x h x d	
<ul style="list-style-type: none"> □ 16 I/O: 95 x 90 x 70 mm (3.74 x 3.54 x 2.75 in) □ 24 I/O: 110 x 90 x 70 mm (4.33 x 3.54 x 2.75 in) □ 40 I/O: 163 x 90 x 70 mm (6.41 x 3.54 x 2.75 in) 	<ul style="list-style-type: none"> □ 16 I/O: 70 x 90 x 70 mm (2.75 x 3.54 x 2.75 in) □ 32 I/O: 70 x 90 x 70 mm (2.75 x 3.54 x 2.75 in)
Supply voltage	
24 V $\overline{\text{---}}$ or 100..240 V \sim 50/60 Hz	24 V $\overline{\text{---}}$
Connection of the embedded I/O	
On removable screw terminal blocks at intervals of 5.08 mm (0.20 in) 24 V/0.25 A power supply provided by the controller for sensor inputs on TM221C●●●R models	16 I/O: On removable screw or spring terminal blocks at intervals of 3.81 mm (0.15 in) 32 I/O: On HE10 connectors with HE 10 cables/bare wires or Telefast ABE7 connection sub-bases (1)
Analog inputs	
2 embedded inputs on each TM221M●●●● and TM221C●●●● controller	
Embedded Ethernet communication	
Yes on TM221CE●●	Yes on TM221ME●●
Serial link	
1 embedded link	1 to 2 embedded links
Cartridges	
One slot for 1 or 2 cartridges depending on the controller model: I/O cartridge (analog inputs or outputs, temperature inputs), communication cartridge (serial link) or application cartridges (hoisting, conveying and packaging).	–
Hardware characteristics	
M221 and M221 Book controllers each have an embedded: <ul style="list-style-type: none"> □ Run/Stop switch □ Slot for industrial SD memory card □ QR code for direct access to its technical documentation 	

(1) Telefast Modicon ABE7 pre-wired system to be ordered separately (see page 21).



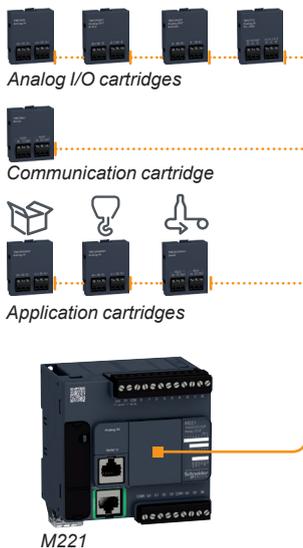
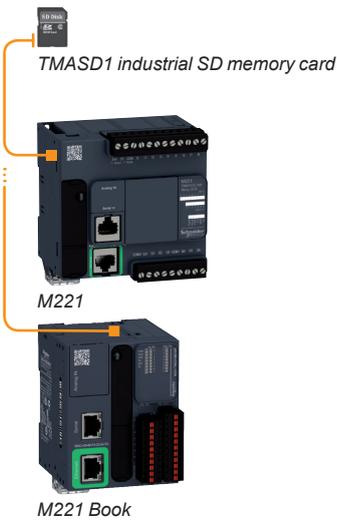
Example of a QR code:
QR code for access to the TM221M16R logic controller technical documentation

Modicon M221 and M221 Book logic controllers

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



SoMachine Basic software



Presentation

Embedded communication

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

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

These communication ports are described on page 15.

Embedded functions

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

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

TM221C●●T, TM221CE●●T, TM221M16T●, TM221ME16T●, TM221M32TK and TM221ME32TK controllers integrate the position control function with:

- Pulse width modulation (PWM)
- Pulse generator (PLS)
- 2 P/D pulse train channels (PTO) with trapezoidal profile and S curve, 100 kHz frequency

Processing power

- Execution speed: 0,2 μs/Boolean instruction
- Program: 10 Boolean Kinstructions
- Number of words: 8000
- Number of internal bits: 1024
- RAM: 640 K
- Flash memory: 2 MB

Programming

Modicon M221 and M221 Book logic controllers are programmed with the SoMachine Basic software ([See on our web site www.schneider-electric.com](http://www.schneider-electric.com)). SoMachine Basic is an integral component of the SoMachine software. SoMachine Basic is available on CD and also as a download from our website: www.schneider-electric.com

Options

Memory card

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

It is used for:

- Backing up and transferring applications
- Loading firmware
- Duplicating applications between controllers

Cartridges

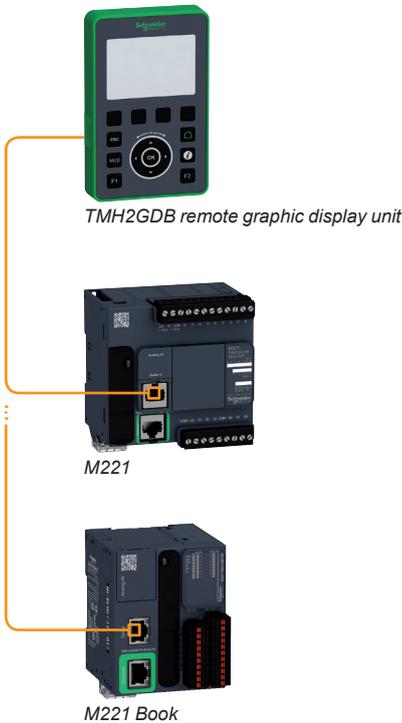
One or two cartridges can be inserted on the front of TM221C●●● controllers without increasing the dimensions.

Three types of cartridge are offered:

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

Modicon M221 and M221 Book logic controllers

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



TMH2GDB remote graphic display unit

Presentation

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

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

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

- During debugging: Reading the states and value of variables and providing complete diagnostics of the controller configuration.
- During installation: Options for setting the time and configuring the communication ports.
- During operation: An operator interface created in the SoMachine Basic software can be used to (for example):
 - Display information in the form of text, values, bargraphs or gauges
 - Perform machine control actions
 - Enter or modify data
 - Customize buttons on the front panel
- During maintenance: The page displaying alarm messages is permanently accessible by pressing a single key. Alarm messages are stored and time-tagged in a page of the log. An icon, which is always visible, flags up the presence of at least one alarm message. Access to each page and modification of its values can be protected by a password.

Main characteristics

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

Conformity

- CE, cULus Listing Mark

Environment characteristics

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

Supply characteristics

- 5 V $\bar{\text{DC}}$ (200 mA) directly by the controller
- Max. consumption: 1 W

Modicon M221 and M221 Book logic controllers

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

Controller Info		10/02/2012 02:57:11
Device name	TM221CE24T	
Firmware version	0.3.9.1	
LastMAST cycle	0,134 ms	
Min.MAST cycle	0,134 ms	
Max. MAST cycle	0,159 ms	
Alarm		Back

Debugging: Controller information

Ethernet		10/02/2012 02:57:47
IP Mode	0	
IP address	85.21.1.24	
Mask	255.255.255.0	
Gateway	0.0.0.0	
Device name	M221	
Apply		Edit Refresh Cancel

Debugging: Configuring communication

Alarm		Monitoring	26/11/2014 10:38:24
Temperature 1	23		
Temperature 2	24		
Heating	1		
Cooling	0		
AutoManu	1		
Edit		Alarm	menu

HMI: Monitor

Alarm		Controls	26/11/2014 10:38:40
Auto mode status			
Auto mode selected			
Oven is heating			
Cooling system is OFF			
On		Off	Menu Alarm

HMI: Control panel

Target °C		10/02/2012 02:59:08
23 °C		
Min = 20 Max = 30		
Edit		Alarm -1 +1

HMI: Bargraph

Temperature		10/02/2012 02:59:14
Alarm		menu set

HMI: Gauge

Alarm		Alarm History	25/11/2014 13:43:44
switching heat/cool 13:43:27			
target reached 25/11/2014 13:43:25			
switching heat/cool 25/11/2014 13:43:11			
target reached 25/11/2014 13:43:05			
Alarm		Delete	Back

HMI: Alarm display

Examples of screens

TMH2GDB remote graphic display unit (continued)

Setup

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

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

The HMI (runtime) pages and alarm pages are created and configured very easily in the SoMachine Basic programming software (3), from predefined pages:

- "Alarm display" template
- "Menu" template
- "Monitor" template
- "Control panel" template
- "Bargraph" template
- "Gauge" template

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

(1) Neither the serial link on the TMC2SL1 cartridge, nor the SL2 embedded serial link, can be used to connect the graphic display unit.

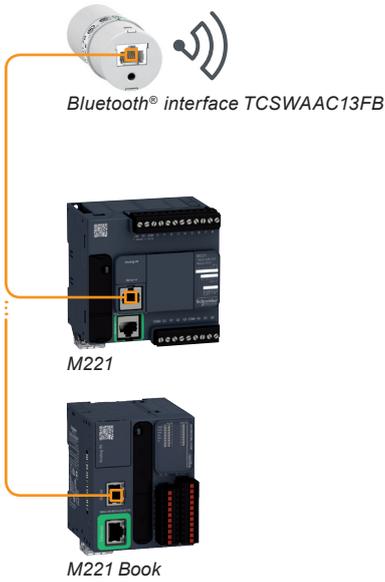
(2) When the controller has no application program, only the product reference and the controller firmware version are accessible. The controller firmware version must be V1.3 or later.

(3) Possible from version V1.3 of SoMachine Basic.

Modicon M221 and M221 Book logic controllers

Communication via Bluetooth® wireless connection

Communication via modem and router



Communication via Bluetooth® wireless connection

The Bluetooth® wireless connection enables complete freedom of movement within a radius of 10 m (32.808 ft) around the controller.

For its M221 and M221 Book controllers Schneider Electric offers the Bluetooth® interface TCSWAAC13FB so they can perform the following functions:

- Commissioning
- Monitoring
- Up/downloading

Bluetooth® interface TCSWAAC13FB (supplied with cordsets for connection to the controller) (see page 20).



Communication via modem and router

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

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

This offer comprises 2 Schneider Electric modems (PSTN modem, GSM modem) and a VPN router made by and commercialized by eWon.

Modems, router and connection cables (see page 30).

Modicon M221 and M221 Book logic controllers

I/O extensions with Modicon TM3 expansion modules

I/O extensions with Modicon TM3 modules

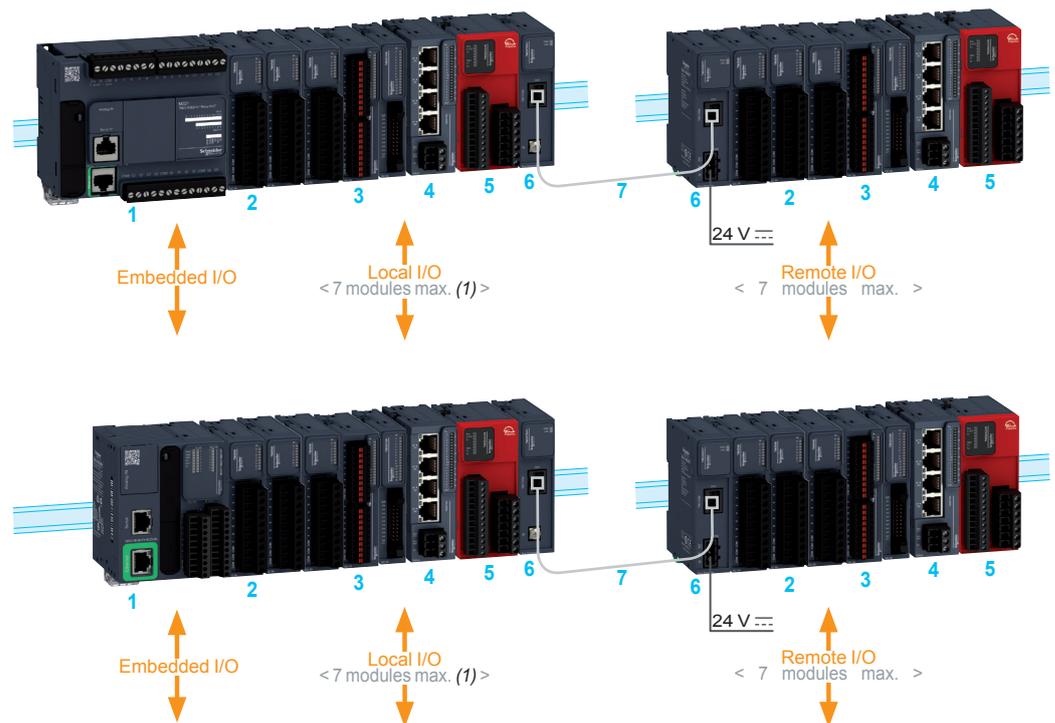
Modicon TM3 expansion modules

The capacity of M221 and M221 Book logic controllers can be enhanced with the Modicon TM3 expansion module offer:

- Digital I/O modules which can be used to create configurations with up to 488 digital I/O. These modules are available with the same connections as the controllers.
- Analog I/O modules which can be used to create configurations with up to 114 analog I/O and are designed to receive, amongst other things, position, temperature, and speed sensor signals. They are also capable of controlling variable speed drives or any other device equipped with a current or voltage input.
- Expert module for control of TeSys motor-starters, connected with RJ 45 cables to simplify wiring up the control section.
- Functional safety modules which simplify wiring and can be configured in the SoMachine Basic 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 controller model can be upgraded without changing extension.



- 1 Modicon M221/M221 Book logic controller
- 2 Modicon TM3 digital I/O modules
- 3 Modicon TM3 analog I/O modules (2)
- 4 Modicon TM3 expert module: For controlling TeSys motor-starters
- 5 Modicon TM3 functional safety modules
- 6 Modicon TM3 bus expansion modules (transmitter and receiver)
- 7 TM3 bus expansion cable

(1) Depending on type of TM3 module used.

(2) Compatibility of expansion module offers: The majority of Modicon TM2 expansion modules can be used with M221 and M221 Book logic controllers. Nonetheless, adding a Modicon TM2 expansion module to a configuration can increase the expansion module execution times by as much as a few milliseconds. The compatibility between Modicon TM2 expansion modules and each M221 or M221 Book logic controller is specified on page 32.

Modicon M221 and M221 Book logic controllers

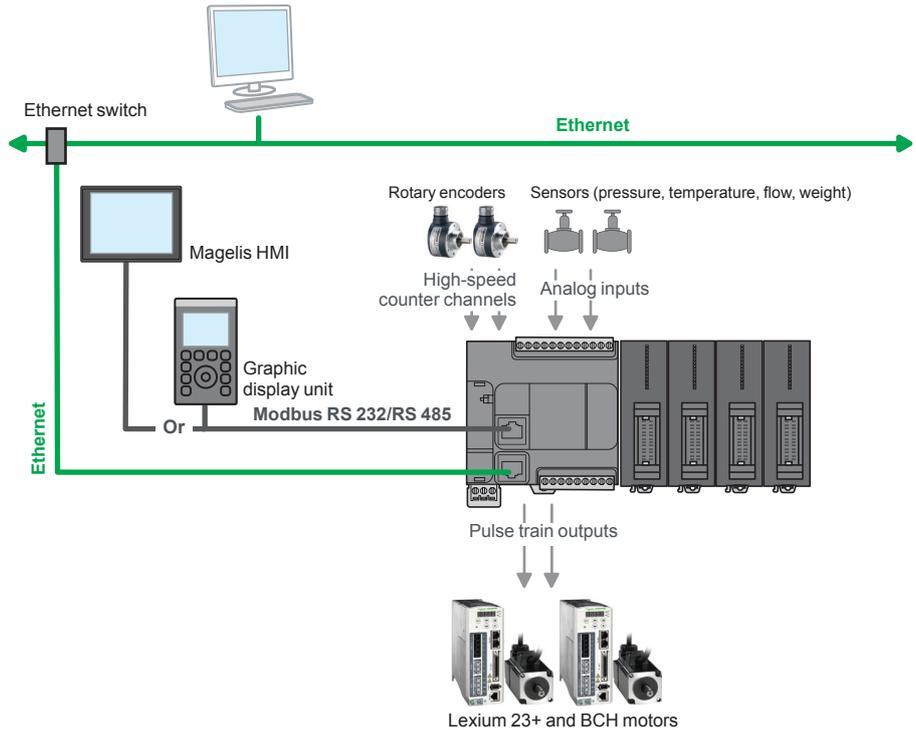
Control architecture

Control architecture for standalone machines

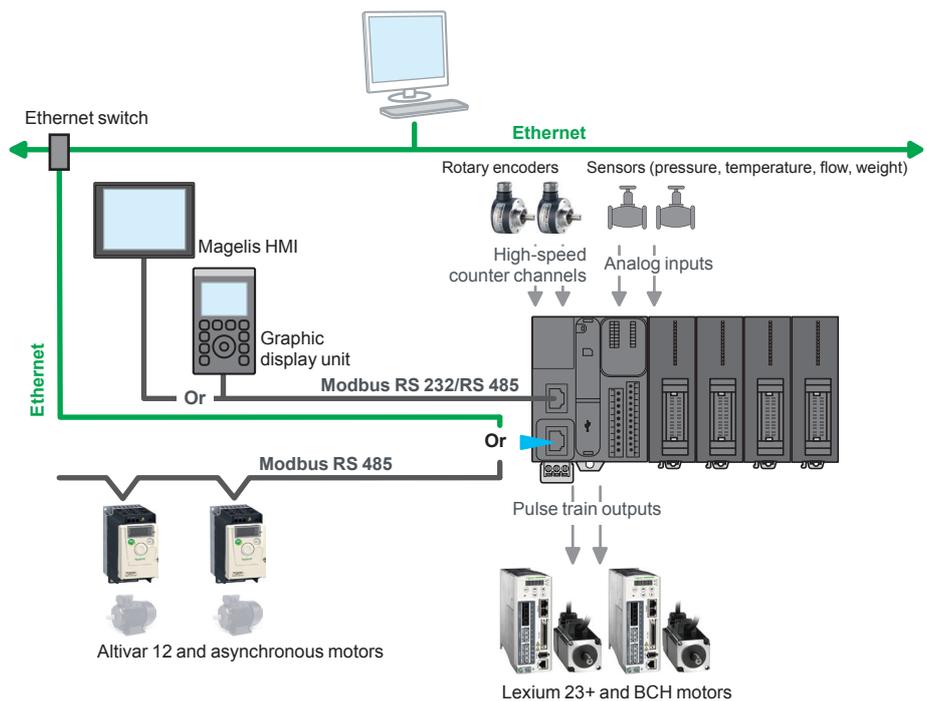
Typical applications: Repetitive machines

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

■ M221 (TM221C●●●●) controllers



■ M221 Book (TM221M●●●●) controllers



Modicon M221 and M221 Book logic controllers

Embedded communication, Characteristics

Embedded communication

Communication on Ethernet network

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

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

Connection cables and accessories for Ethernet network: See page 24.

Serial links

- Each TM221C●●● controller has an embedded serial link that can be configured as RS 232 or RS 485. A 5 V/200 mA power supply is available on the RJ 45 connector which then supplies the **TMH2GDB** display unit, a Magelis **XBTN** or **XBTRT** HMI or the Bluetooth® **TCSWAAC13FB** communication adapter.
- Each TM221M●●● controller has one or two embedded serial links.
- The SL1 serial link, found on every M221 Book controller, can be configured as RS 232 or RS 485. In addition, a 5 V/200 mA voltage is available on the RJ 45 connector which then supplies the **TMH2GDB** display unit, an **XBTN** or **XBTRT** Magelis HMI or the Bluetooth® **TCSWAAC13FB** communication adapter or other devices.
- The SL2 serial link, found on TM221M16●●●, TM221M24●●● and TM221M40●●● controllers only, is configured as RS 485.

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

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

Connection cables and accessories for serial link: See page 22.

Software programming with power off charging function

The programming port, equipped with a USB mini-B connector, is embedded in each M221 and M221 Book controller; it is dedicated to communication with a PC equipped with SoMachine Basic for programming, debugging, and maintenance. In addition, it offers the ability to load an application program or update the firmware without the controller being powered by another source.

Characteristics of M221 and M221 Book logic controllers

Conformity

■ Certifications

- CE, UL Listing Mark, CSA, RCM, 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: - 25...+ 70°C (- 13...+ 158°F)
- Relative humidity: 10...95% (non-condensing)
- Operating altitude:
 - 0...2,000 m (0...6,562 ft): Complete specification for temperature and exposure
 - 2,000...4,000 m (6,562...13,123 ft):
 - Temperature derating: + 1°C/400 m (+ 1.8°F/1,312 ft)
 - Insulation losses: 150 V---/1,000 m (150 V---/3,280 ft)
 - Storage altitude: 0...3,000 m (0...9,842 ft)
 - Immunity to mechanical stress (vibrations):
 - For 1131: 5...8.4 Hz (amplitude 3.5 mm/0.138 in); 8.4...150 Hz acceleration 1 g)
 - For merchant navy: 5...13.2 Hz (amplitude 1.0 mm/0.039 in); 13.2...100 Hz (acceleration 0.7 g)

Supply characteristics

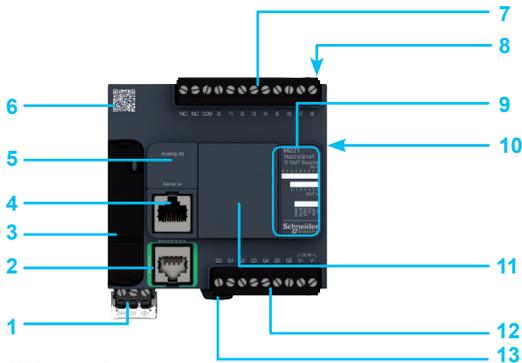
Two power supply types are available depending on M221 controller model: 24 V --- or 100-240 V ~ 50/60 Hz.

- Voltage limit (including ripple): 19.2...28.8 V ---/85...264 V ~
- Immunity to micro-cuts (class PS-2): 10 ms
- Max. consumption: 17.2 W

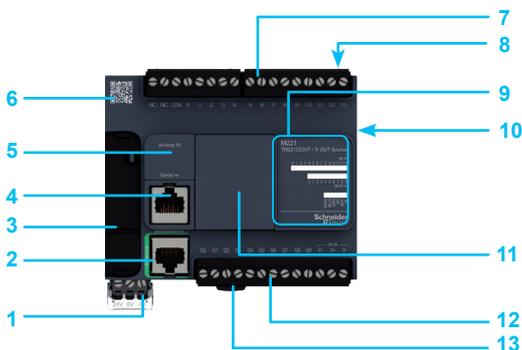
(1) LR, ABS, DNV and GL marine certifications: Pending.

Modicon M221 and M221 Book logic controllers

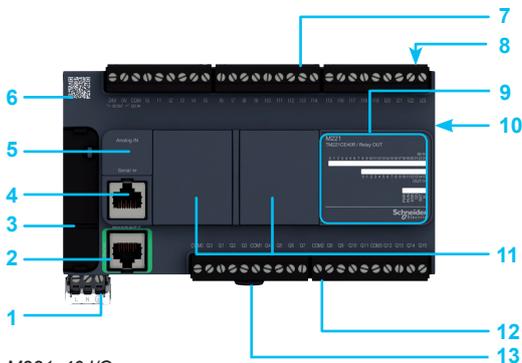
Modicon M221 logic controllers



M221: 16 I/O



M221: 24 I/O



M221: 40 I/O



TMH2GDB

Description

M221 (TM221C●●●) logic controllers

- 1 Removable screw terminal block, 3 terminals for connecting the 24 V $\overline{\text{DC}}$ or 100-240 V \sim supply (depending on the model).
- 2 On TM221CE●●● controllers: RJ 45 connector for Ethernet network, with exchange and activity speed LED indicator.
- 3 Behind the removable cover:
 - Mini-B USB connector for connecting a PC equipped with the SoMachine Basic software
 - Slot for the Industrial SD memory card
 - Run/Stop switch
- 4 Serial link port (RS 232 or RS 485): RJ 45 connector.
- 5 Behind a flap: Dedicated removable connector for two analog inputs.
- 6 QR code for access to the controller technical documentation.
- 7 Connection of 24 V $\overline{\text{DC}}$ logic inputs on removable screw terminal blocks (1).
- 8 On top of the controller: Slot for backup battery.
- 9 LED display block showing:
 - The status of the controller and its components (battery, Industrial SD memory card)
 - The status of the serial link
 - The status of the embedded I/O
- 10 On the side of the controller: TM3 bus connector for linking to a Modicon TM3 expansion module.
- 11 Slot(s) for I/O cartridge(s), communication cartridge or application cartridge(s): One on M221 controllers with 16 and 24 I/O, two on M221 controllers with 40 I/O.
- 12 Connection of relay/transistor logic outputs: On removable screw terminal blocks (1).
- 13 Clip for locking on \perp symmetrical rail.

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

Graphic display unit TMH2GDB

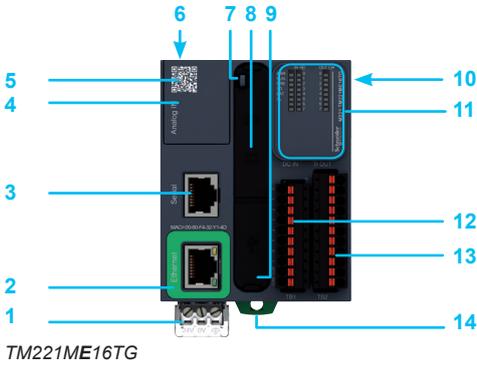
- 1 Monitoring screen: Backlit STN graphic screen, two-tone (white/red).
- 2 Ten command buttons, two of which are customizable with the option of identifying the associated functions.
- 3 Rotary navigation and command button.

On the back of the display unit:

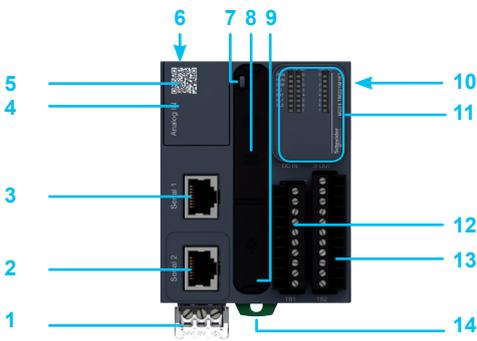
- 4 Mounting system consisting of locking nut, seal and anti-rotation tee.
- 5 RJ 45 connector for the cordset connecting the graphic display unit to the Modicon M221/M221 Book logic controller.

Modicon M221 and M221 Book logic controllers

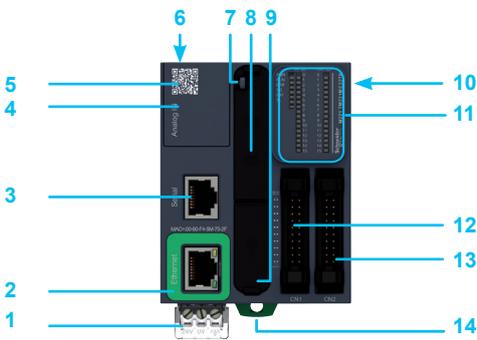
Modicon M221 Book logic controllers



TM221ME16TG



TM221M16T



TM221ME32TK



TMH2GDB

Description

M221 Book logic controllers (TM221M●●●)

- 1 Removable screw terminal block, 3 terminals for connecting the 24 V $\bar{\text{c}}$ supply.
 - 2 On TM221ME16●● and TM221ME32●● controllers: RJ 45 connector for Ethernet network, with exchange and activity speed LED indicator. On TM221M16●● and TM221M32●● controllers: RJ 45 connector for SL2 serial link.
 - 3 SL1 serial link port (RJ 45 connector).
 - 4 Behind the removable cover: Dedicated removable connector for two analog inputs.
 - 5 QR identification code for the controller technical documentation.
 - 6 Backup battery slot.
- Behind the removable cover: 7, 8 and 9.
- 7 Slot for the Industrial SD memory card.
 - 8 Run/Stop switch.
 - 9 Mini-B USB connector for connecting a PC equipped with the SoMachine Basic software.
 - 10 TM3 bus connector for linking to a Modicon TM3 expansion module.
 - 11 LED display block showing:
 - The status of the controller and its components (battery, Industrial SD memory card)
 - The status of the serial link
 - The status of the I/O
 - 12 Connection of 24 V $\bar{\text{c}}$ logic inputs:
 - On 16-channel controllers: Screw or spring-type removable terminal blocks (1)
 - On 32-channel controllers: HE10 connector
 - 13 Connection of relay/transistor logic outputs.
 - On 16-channel controllers: Screw or spring-type removable terminal blocks (1)
 - On 32-channel controllers: HE10 connector
 - 14 Clip for locking on \perp symmetrical rail.

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

Graphic display unit TMH2GDB

Description: See page 16

Modicon M221 and M221 Book logic controllers

Modicon M221 logic controllers



TM221C16R
TM221C16T



TM221CE16R
TM221CE16T



TM221C24R
TM221C24T



TM221CE24R
TM221CE24T



TM221C40R
TM221C40T



TM221CE40R
TM221CE40T



TMC2AI2



TMC2AQ2V



TMC2AQ2C



TMC2TI2



TMC2SL1



TMC2PACK01



TMC2HOIS01



TMC2CONV01

References

Modicon M221 logic controllers (1)

Number of logic I/O	Logic inputs	Logic outputs	Analog inputs	Integrated communication ports (2)		Reference	Weight kg/lb
				Ethernet (RJ 45)	Serial link (RJ 45)		
■ 100-240 V a power supply							
16 inputs/outputs	9 sink/source 24 V $\overline{\text{---}}$ inputs, inc. 4 high-speed inputs	7 relay outputs	2 x 0...10 V inputs	–	1	TM221C16R	0.346/0.763
				1	1	TM221CE16R	0.346/0.763
24 inputs/outputs	14 sink/source 24 V $\overline{\text{---}}$ inputs, inc. 4 high-speed inputs	10 relay outputs	2 x 0...10 V inputs	–	1	TM221C24R	0.395/0.871
				1	1	TM221CE24R	0.395/0.871
40 inputs/outputs	24 sink/source 24 V $\overline{\text{---}}$ inputs, inc. 4 high-speed inputs	16 relay outputs	2 x 0...10 V inputs	–	1	TM221C40R	0.456/1.005
				1	1	TM221CE40R	0.456/1.005
■ 24 V $\overline{\text{---}}$ power supply							
16 inputs/outputs	9 sink/source 24 V $\overline{\text{---}}$ inputs, inc. 4 high-speed inputs	7 source transistor outputs, inc. 2 high-speed outputs	2 x 0...10 V inputs	–	1	TM221C16T	0.346/0.763
				1	1	TM221CE16T	0.346/0.763
24 inputs/outputs	14 sink/source 24 V $\overline{\text{---}}$ inputs, inc. 4 high-speed inputs	10 source transistor outputs, inc. 2 high-speed outputs	2 x 0...10 V inputs	–	1	TM221C24T	0.395/0.871
				1	1	TM221CE24T	0.395/0.871
40 inputs/outputs	24 sink/source 24 V $\overline{\text{---}}$ inputs, inc. 4 high-speed inputs	16 source transistor outputs, inc. 2 high-speed outputs	2 x 0...10 V inputs	–	1	TM221C40T	0.456/1.005
				1	1	TM221CE40T	0.456/1.005

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

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

(1) M221 controllers are supplied with:

- Removable screw terminal blocks for connecting the I/O
- A removable screw terminal block for connecting the power supply
- A button cell backup battery (BR2032)
- A cordset for connecting the analog inputs

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

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

Modicon M221 and M221 Book logic controllers

Modicon M221 Book logic controllers



TM221M16RG



TM221M16T



TM221ME16RG



TM221ME16T



TM221M16TG



TM221M32TK



TM221ME32TK

References									
Modicon M221 Book logic controllers (1)									
24 V $\bar{\text{---}}$ power supply									
No. of logic I/O	Logic inputs	Logic outputs	Analog inputs	Embedded communication ports (2)			Term. block conn. Thread (mm/in)	Reference	Weight kg/lb
				Ethernet (RJ 45)	Serial link SL1 (RJ 45)	Serial link SL2 (RJ 45)			
16 inputs/ outputs	8 sink/source 24 V $\bar{\text{---}}$ inputs, inc. 4 high-speed inputs	8 relay outputs	2 x 0...10 V inputs	–	1	1	screw (3.81/0.15)	TM221M16R	0.264/ 0.582
				–	1	1	spring (3.81/0.15)	TM221M16RG	0.264/ 0.582
				1	1	–	screw (3.81/0.15)	TM221ME16R	0.264/ 0.582
16 inputs/ outputs	8 sink/source 24 V $\bar{\text{---}}$ inputs, inc. 4 high-speed inputs	8 source transistor outputs, inc. 2 high-speed outputs	2 x 0...10 V inputs	–	1	1	screw (3.81/0.15)	TM221M16T	0.264/ 0.582
				–	1	1	spring (3.81/0.15)	TM221M16TG	0.264/ 0.582
				1	1	–	screw (3.81/0.15)	TM221ME16T	0.264/ 0.582
16 inputs/ outputs	8 sink/source 24 V $\bar{\text{---}}$ inputs, inc. 4 high-speed inputs	8 source transistor outputs, inc. 2 high-speed outputs	2 x 0...10 V inputs	1	1	–	spring (3.81/0.15)	TM221ME16TG	0.264/ 0.582
				–	1	1	HE 10 connector	TM221M32TK	0.270/ 0.595
32 inputs/ outputs	16 sink/source 24 V $\bar{\text{---}}$ inputs, inc. 4 high-speed inputs	16 source transistor outputs, inc. 2 high-speed outputs	2 x 0...10 V inputs	1	1	–	HE 10 connector	TM221ME32TK	0.270/ 0.595
				–	1	1	HE 10 connector	TM221M32TK	0.270/ 0.595

(1) M221 Book controllers are supplied with:

- Removable terminal blocks (screw or spring-type depending on controller model) for connecting the I/O
- A removable screw terminal block for connecting the power supply
- A button cell backup battery (BR2032)
- A cordset for connecting the analog inputs

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

Modicon M221 and M221 Book logic controllers

Options, separate parts, programming software, connection cables



TMH2GDB



ZB5AZ905



A9A15151



DX1AP52



XBTZ9980



TMASD1

References

Remote graphic display unit, mounting accessories, cordset

Designation	Description	Unit reference	Weight kg/lb
Remote graphic display unit	<input type="checkbox"/> For data display and modification (1) <input type="checkbox"/> Contains 1 bezel key ZB5AZ905	TMH2GDB	0.170/ 0.37
Tightening tool	For tightening the cover on Ø 22 mm unit	ZB5AZ905	0.016/ 0.04
Mounting plate for symmetrical rail (Sold in lots of 4)	For clipping onto 35 mm (1.378 in) symmetrical rail (1 hole Ø 22 mm (0.87 in))	A9A15151	0.040/ 0.09
Metal support for panel mounting, threaded (Sold in lots of 10)	1 hole Ø 22 mm (0.87 in) Mounted using 4 screws with diameter 7 mm (0.28 in)	DX1AP52	0.065/ 0.014
Cordset	Used between TMH2GDB remote display unit and M221/M221 Book logic controller Equipped with an RJ 45 connector at each end Length: 2.5 m (8.202 ft)	XBTZ9980	0.230/ 0.51

Option

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

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

Replacement parts

Designation	Description	Reference	Weight kg/lb
Set of terminal blocks for connecting the power supply on M221 and M221 Book logic controllers	8 removable screw terminal blocks	TMAT2PSET	0.127/ 0.280
Set of terminal blocks for connecting the I/O on M221 controllers	Removable connectors with screw terminals: 8 different connectors for equipping a TM221C●●●● logic controller (8 x I/O)	TMAT2CSET	0.127/ 0.280
Set of terminal blocks for connecting the I/O on M221 Book controllers	4 x 10-way and 4 x 11-way removable terminal blocks with screw terminals	TMAT2MSET	0.127/ 0.280
	4 x 10-way and 4 x 11-way removable terminal blocks with spring terminals	TMAT2MSETG	0.127/ 0.280

Backup battery The battery supplied with each controller is not available as a spare part in the Schneider catalog. If a replacement part is needed, only use a Panasonic battery type BR2032.

Programming software

Designation	For use	Reference
SoMachine Basic	Modicon M221 and M221 Book logic controllers	See on our web site www.schneider-electric.com

Expansion modules

Designation	For use	Reference
Modicon TM3 expansion modules	Modicon M221 and M221 Book logic controllers	See on our web site www.schneider-electric.com

Cordsets

Designation	For use	Length m/ft.	Reference	Weight kg/lb
Programming cordsets	From the PC USB port to the USB mini-B port on M221 and M221 Book controllers	3/0.98	TCSXCNAMUM3P (2)	0.065/ 0.143
		1.8/5.90	BMXXCAUSBH018	0.065/ 0.143
Cordset for connecting the analog inputs embedded in M221 and M221 Book controllers	Equipped with 1 dedicated removable connector at one end and bare wires at the other end	1/3.28	TMACBL1	0.024/ 0.053



TCSXCNAMUM3P

Connection accessory

Designation	Description	Reference	Weight kg/lb
Universal Bluetooth® interface (UBI)	Kit consisting of: <ul style="list-style-type: none"> <input type="checkbox"/> A Universal Bluetooth® interface (UBI) <input type="checkbox"/> An RJ 45/mini-DIN cordset (1 m/3.28 ft long) <input type="checkbox"/> An RJ 45/RJ 45 cordset (1 m/3.28 ft long) <input type="checkbox"/> A fixing clamp for installation inside the electrical enclosure <input type="checkbox"/> A CD with configuration software and user manual 	TCSWAAC13FB	0.320/ 0.705



TCSWAAC13FB



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

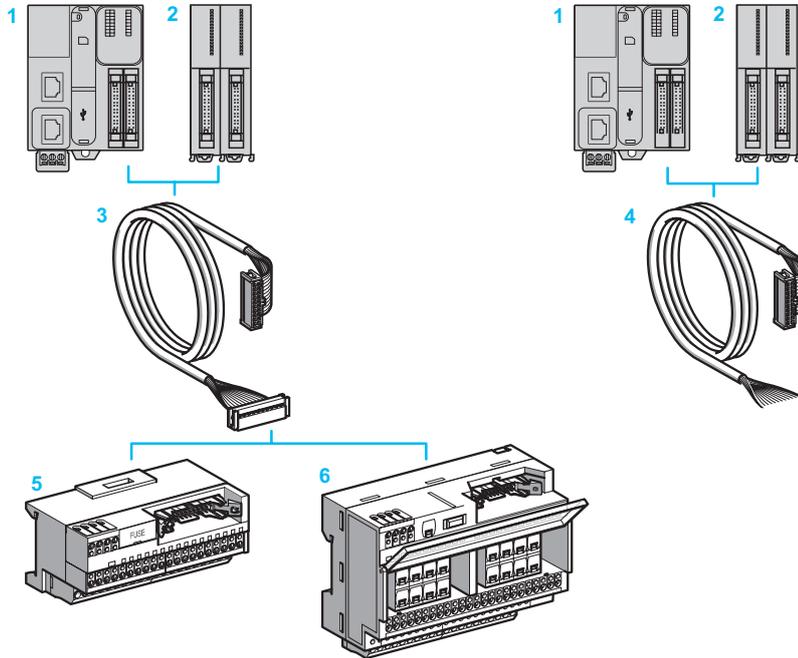
(2) Unshielded, non-grounded cable. Only for use on temporary connections. For permanent connections, use cable reference BMXXCAUSBH018.

Modicon M221 and M221 Book logic controllers

Telefast pre-wired system with Modicon ABE7 for M221 Book controllers

Telefast pre-wired system with Modicon ABE 7

For 32-channel Modicon M221 Book logic controller and Modicon TM3 digital I/O expansion modules



Possible combinations:

- (1 or 2) + 3 + (5 or 6)
- (1 or 2) + 4

- 1 32-channel Modicon M221 Book logic controllers (TM221M32TK, TM221ME32TK), equipped with HE 10 connectors.
- 2 Digital I/O modules (TM3D...K) with 16 or 32 I/O, equipped with HE 10 connectors.
- 3 ABFT20E... cordsets, equipped with an HE 10 connector at each end.
- 4 TWDFCW... cordsets, equipped with an HE 10 connector at one end and flying leads at the other end for direct connections to sensors, preactuators and terminal blocks.
- 5 16-channel sub-base for input expansion modules.
- 6 16-channel sub-base for output expansion modules.

Combinations of Modicon ABE7 sub-bases with M221 Book controllers and Modicon TM3 expansion modules

		Modicon M221 Book logic controllers	Modicon TM3 I/O expansion modules		
			Sink/source digital inputs	Source transistor outputs	Sink transistor outputs
		TM221M32TK TM221ME32TK	TM3DI16K TM3DI32K	TM3DQ16TK TM3DQ32TK	TM3DQ16UK TM3DQ32UK
16-channel sub-bases	Miniature passive	ABE7E16EPN20 (1) ABE7E16SPN20 (2) ABE7E16SPN22 (2)	ABE7E16EPN20	ABE7E16SPN20 ABE7E16SPN22	Use TWDFCW... cordsets
	2 A relay	ABE7E16SRM20 (2)	–	ABE7E16SRM20	Use TWDFCW... cordsets

compatible

- (1) Compatible with inputs only.
(2) Compatible with outputs only.

References

Sub-bases		Number and type of channels	Compatibility	LED on each chnnl	Fuse	Reference	Weight kg/lb					
16 inputs	Sink 24 V $\overline{\text{---}}$	TM221M32TK/ME32TK, TM3DI...K	No	No	ABE7E16EPN20	0.430/ 0.948						
						16 outputs	Source 24 V $\overline{\text{---}}$	TM221M32TK/ME32TK, TM3DQ...TK	No	No	ABE7E16SPN20	0.450/ 0.992
												Yes
	Relay 24 V $\overline{\text{---}}$ / 250 V \sim , 2 A	TM221M32TK/ME32TK, TM3DQ...TK	No	No	ABE7E16SRM20	0.430/ 0.948						

Cordsets		Designation	Compatibility	Connection method	Gauge/ CSA mm ²	Length m/ft.	Reference	Weight kg/lb
Cordsets for digital I/O	TM221M32TK, TM221ME32TK, TM3DI16K, TM3DI32K, TM3DQ16TK, TM3DQ32TK	HE 10 20-way	20-way HE 10	AWG 28 0.08 mm ²	0.5/1.64	ABFT20E050	0.060/ 0.132	
					1/3.28	ABFT20E100	0.080/ 0.176	
					2/6.56	ABFT20E200	0.140/ 0.309	
	TM221M32TK, TM221ME32TK, TM3DI16K, TM3DI32K, TM3DQ16TK, TM3DQ32TK, TM3DQ16UK, TM3DQ32UK	HE 10 20-way	Flying leads	AWG 22 0.035 mm ²	3/9.84	TWDFCW30K	0.405/ 0.893	
					5/16.40	TWDFCW50K	0.670/ 1.477	



ABE7E16EPN20



ABE7E16SRM20

Modicon M221 and M221 Book logic controllers

Serial links

Modbus protocols, character mode

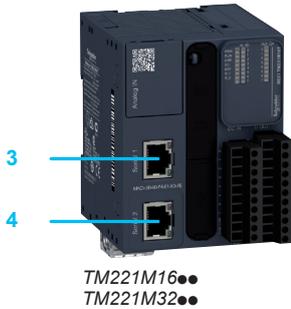
Presentation

RS 232/RS 485 serial links offer a simple solution to the communication needs of compact 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 M221 logic controllers with 16, 24 or 40 I/O have the following on the front panel:
 - 1 A serial link port with an RJ45 connector delivering a voltage of 5 V (200 mA) to supply an HMI or Bluetooth® adaptor with power.
 - 2 A slot for a 2nd serial link port (with connection on screw terminals) by inserting the **TMC2SL1** communication cartridge or the **TMC2CONV01** application cartridge (1).
- Modicon M221 Book logic controllers with 16 or 32 I/O have the following on the front panel:
 - 3 A serial link port with an RJ45 connector delivering a voltage of 5 V (200 mA) to supply an HMI or Bluetooth® adaptor with power.
 - 4 A 2nd serial port also equipped with an RJ45 connector for **TM221M16●●** and **TM221M32●●** controllers (controllers without embedded Ethernet).

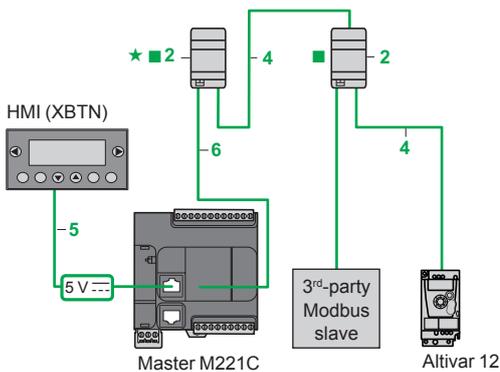


Controller Type	Embedded Ports		Optional Port (1 max. per controller)
	"Serial" or "Serial 1" port, RJ45 connector	"Serial 2" port, RJ45 connector	On TMC2SL1 or TMC2CONV01 option cartridges, connection on screw terminals
TM221C●●●●	RS 232/RS 485 with 5 V (200 mA) power supply for HMI or Bluetooth communication adaptor (items 1/3)	–	RS 232/RS 485 (item 2)
TM221M●●●●		RS 485 (item 4)	–
TM221ME●●●●		–	–

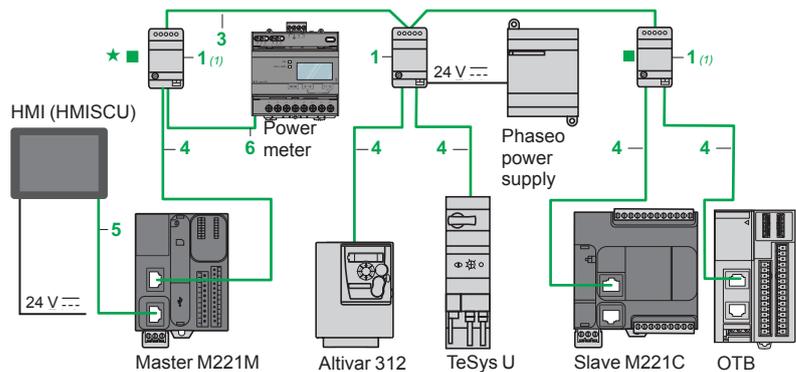
(1) TM221C40●●●● controllers have 2 slots for a cartridge; only one cartridge, TMC2SL1 or TMC2CONV01, can be used per controller. The other slot remains available for an analog I/O cartridge or an application cartridge.

Modbus serial link wiring system

Non-isolated bus



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



- Total length of cables between M221 and ATV 12: ≤ 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

Tap-off and adaptor components for RS 485 serial link							
Designation	Description	Item	Length m/ft.	Unit reference	Weight kg/lb		
 TWDXCAISO	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	
 TWDXCAT3RJ	Modbus splitter box Screw terminals for trunk cable 10 x RJ45 for tap-off	<input type="checkbox"/> Mounting on 35 mm (1.378 in.) \perp , 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	–	0.3/0.984 1/3.281	VW3A8306TF03 VW3A8306TF10	– –	
 TSXSCA50	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.) \perp	–	–	XGSZ24	0.100/ 0.220	
Cables and cordsets for RS 232 serial link							
 LU9GC3	RS 485 double shielded twisted pair trunk cables	Modbus serial link, supplied without connector	3	100/ 328.064	TSXCSA100	5.680/ 12.522	
			200/ 656.168	TSXCSA200	10.920/ 24.074		
			500/ 1640.420	TSXCSA500	30.000/ 66.139		
 TSXSCA50	Modbus RS 485 cordsets	2 x RJ45 connectors	4	0.3/0.984 1/3.281	VW3A8306R03 VW3A8306R10	0.030/ 0.066 0.050/ 0.110	
			3/9.840	VW3A8306R30	0.150/ 0.331		
			1 x RJ45 connector and 1 end with flying leads	6	1/3.281	TWDXCAFJ010	0.060/ 0.132
			3/9.843	VW3A8306D30	0.150/ 0.331		
			1 x RJ45 connector and 1 x 25-way SUB-D connector	5	2.5/8.202	XBTZ9980	0.230/ 0.507
 XGSZ24	Controller to Magelis HMI cordsets	Compatible with: <input type="checkbox"/> Com Port 1 on XBTN200/N400/R400/RT500 (2) <input type="checkbox"/> Com Port 1 on XBTRT511/HMISTO/STU/SCU <input type="checkbox"/> Com Port 2 on XBTGT2●●0...7●●0 and HMIGTO	5	10/32.81	XBTZ9982	–	
			1 x RJ45 connector and 1 x 25-way SUB-D connector	–	2.5/8.202	XBTZ938	0.210/ 0.463
			Compatible with: <input type="checkbox"/> Com Port 1 on XBTN410/N410 and XBTR410/R411	–	2.5/8.202	XBTZ9008	–
 VW3A8306D30	TMC2SL1 cartridge to Magelis HMI cordsets	1 x RJ45 connector and stripped wires Compatible with: <input type="checkbox"/> Com Port 1 on XBTRT511/HMISTO/STU/SCU <input type="checkbox"/> Com Port 2 on XBTGT2●●0...7●●0 and HMIGTO	–	3/9.843	VW3A8306D30	0.150/ 0.331	
			1 x RJ45 connector and 1 x 9-way SUB-D connector	–	2.5/8.202	XBTZ9008	–
 VW3A8306RC	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							
 TCSMCN3M4F3C2	Cordset for DTE terminal (printer) (3)	Serial link for Data Terminal Equipment (DTE) 1 x RJ45 connector and 1 x 9-way female SUB-D connector	3/9.843	TCSMCN3M4F3C2	0.150/ 0.331		
			3/9.843	TCSMCN3M4M3S2	0.150/ 0.331		
 TCSMCN3M4M3S2	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	3/9.843	TCSMCN3M4M3S2	0.150/ 0.331		
			3/9.843	TCSMCN3M4M3S2	0.150/ 0.331		

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

(2) Can only be connected to the controller SL or SL1 ports in order to supply the Magelis terminal with power.

(3) 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.

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.

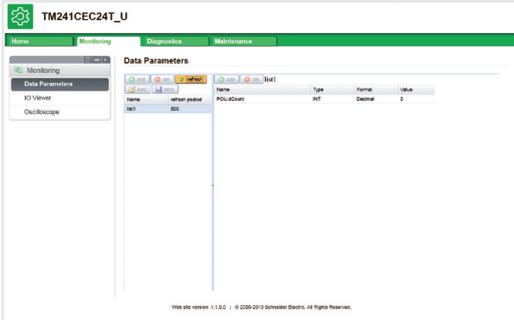
Modbus/TCP, a standard

- 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.

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

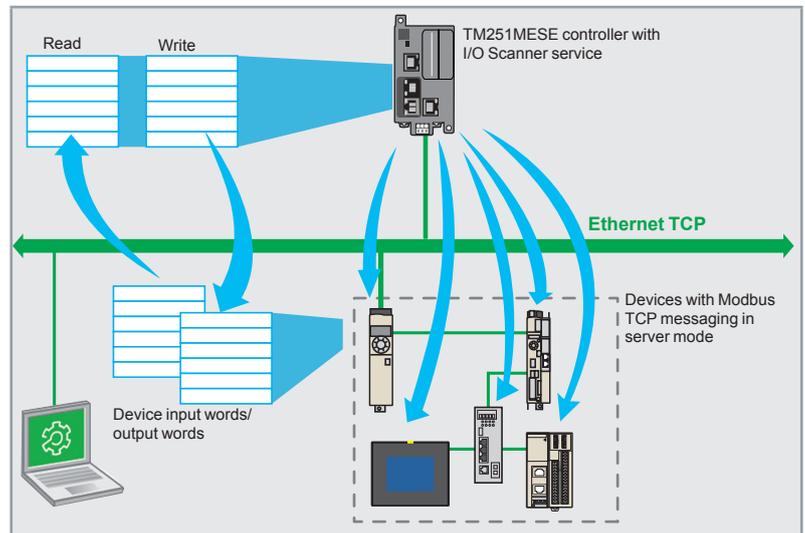
The SoMachine programming software is used to create customised pages for viewing and monitoring devices. These pages can also be accessed on any mobile device such as a tablet or smartphone with any operating system (iOS, Android, Windows).

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).

Ethernet Modbus/TCP network

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



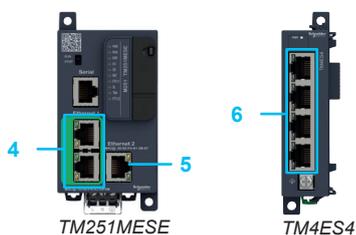
M221 logic controllers

- 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 **TM251MESSC** 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.

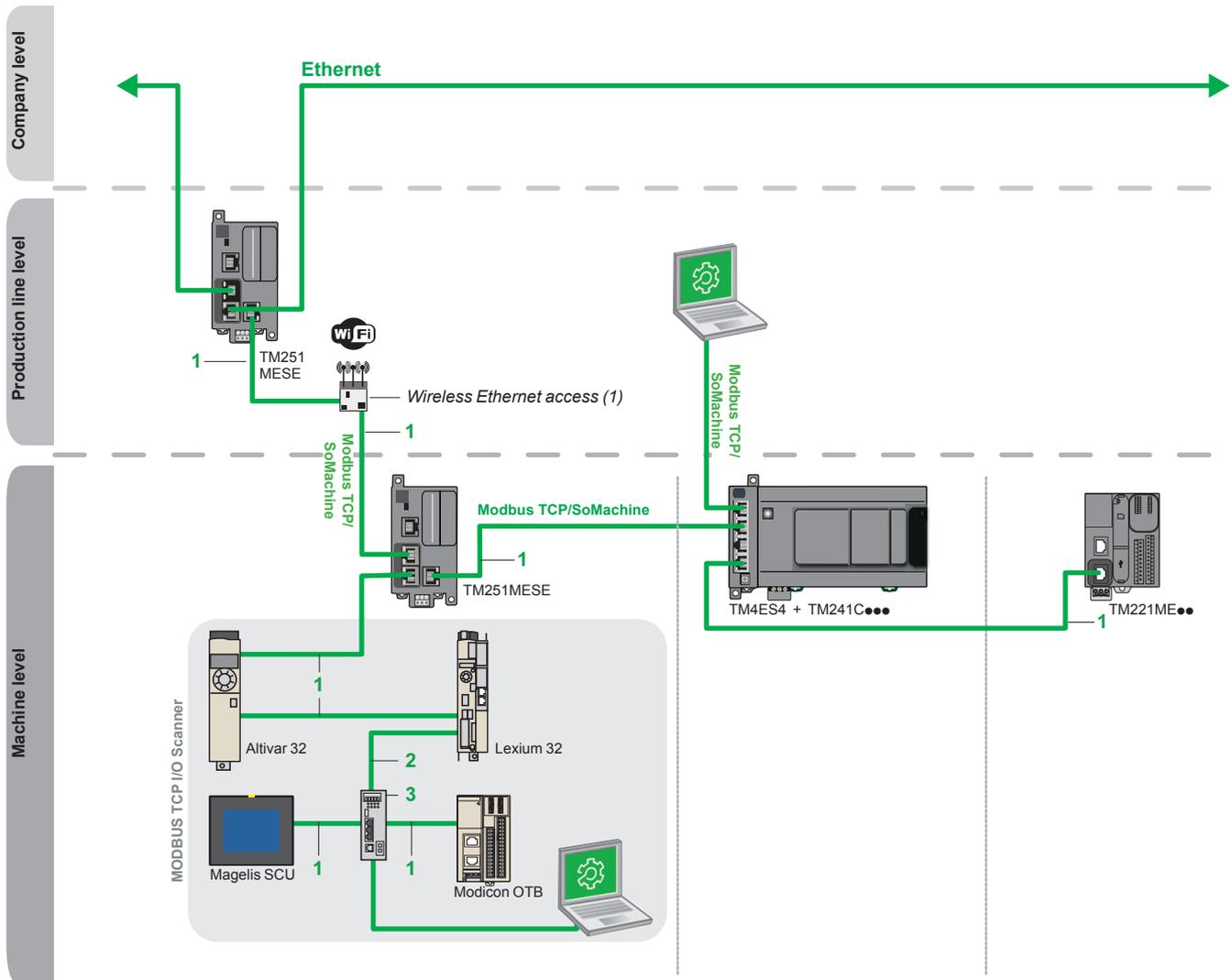
TM4ES4 Ethernet switch communication module

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

Ethernet Modbus/TCP network

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

Ethernet Modbus/TCP network

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

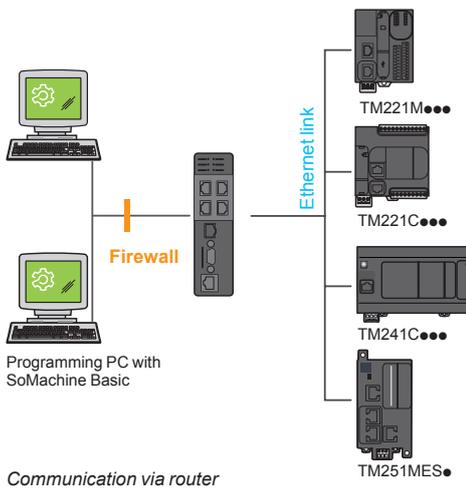
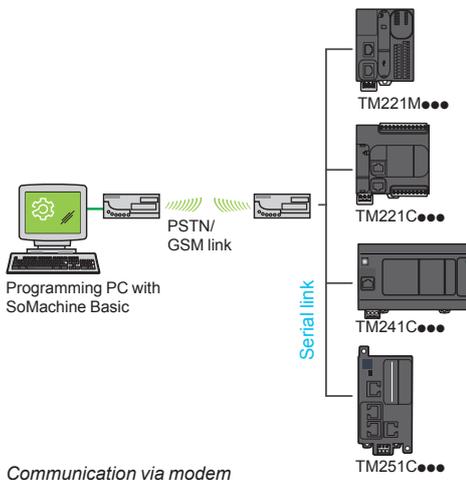
Other wiring components are available, please consult the **ConneXium** offer on our website www.schneider-electric.com.



TCSESU053FN0

Communication via modem and router

For Modicon M221, M221 Book, M241 and M251 logic controllers



Presentation

The communication via modems and routers offer is dedicated to the following applications:

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

This offer comprises 2 Schneider Electric modems (PSTN and GSM) and a VPN router made by Ewon®. Setting up this router requires installation of two configuration software programs.

PSTN and GSM modems

Both these modems can either be used on the machine or connected to the PC if it does not have a modem. On the machine side, they are then connected to the logic controller SL or SL1 serial port (1). On the PC side, they use a USB port.

VPN router

The eWON Cosy is an industrial VPN router designed to offer easy remote access, via the Internet.

On the machine side, it is connected to the controller Ethernet port. The router establishes a secure VPN connection via the plant LAN. This is an outgoing connection compatible with the firewalls. Remote users can only access the machine's LAN, not the customer's LAN.

(1) Modems cannot be connected to either the logic controller SL2 port or the **TMC2SL1** cartridge.

Applications

	Modems		Router
	SR2MOD01	SR2MOD03	Ewon Cosy 141
Type of connection between logic controller and modem/router	Serial link	Serial link	Ethernet
Remote maintenance	<input type="checkbox"/> Monitoring via the protocol for programming and writing variables (1) <input type="checkbox"/> Application transfer/download <input type="checkbox"/> Online program modification (writing code)	TM221 (2)	TM241, TM251
Remote data logging	File reading/writing	—	TM241, TM251
Synchronization between machines	Modbus exchanges	TM221, TM241, TM251	—
Remote control	Receipt/sending of "SMS"	—	—
	Viewer Web server (HTTP)	—	TM241, TM251
	OPC communication (4) (on Modbus protocol)	—	—
		TM221, TM241, TM251 (3)	
		TM221, TM241, TM251	

Logic controller supporting the application

(1) Including "Run/stop, Init".

(2) Modbus ASCII.

(3) Modicon M241 and M251: included in function blocks; M221: only with template.

(4) The OPC (Object Linking and Embedding for Process Control) standard defines communication between Windows applications and the hardware/software used regularly in the field of process control (e.g.: controllers). The OPC standard describes a coherent and universal way of accessing field data in the factory devices.

Communication via modem and router

For Modicon M221, M221 Book, M241 and M251 logic controllers



SR2MOD01



SR2MOD03



Ewon Cosy 141



TSXCUSB232

Modems

Designation	Composition	Reference	Weight kg/lb
PSTN modem	<ul style="list-style-type: none"> ■ Type SIXNET VT-MODEM-5-WW ■ Supplied with a telephone cable 2 m (6.562 ft) long ■ Supply voltage: 12...24 V ~ 	SR2MOD01	0.265/ 0.584
GSM modem	<ul style="list-style-type: none"> ■ Quad band type 900/1800 MHz, 850/1900 MHz ■ Supplied with: <ul style="list-style-type: none"> □ A power supply cable 1.5 m (4.921 ft) long □ A magnetic GSM 4-band aerial SMA-M with 2.5 m (8.202 ft) long cable ■ Mounted on 5 panel or rail ■ Supply voltage: 12...24 V ~ 	SR2MOD03	0.335/ 0.739

Connection components for modem link

Designation	For use Composition	Cable type	Reference	Weight kg/lb
Connecting cables	<ul style="list-style-type: none"> ■ Between modem and M221, M221 Book, M241 and M251 logic controllers ■ Equipped with an RJ 45 connector and a 9-way male SUB-D connector, 3 m (9.843 ft) long 	4 wires: RX, TX, RTS, CTS	TCSMCN3M4M3S2	0.150/ 0.331
	<ul style="list-style-type: none"> ■ Between Modem and PC ■ Equipped with 2 x 9-way male SUB-D connectors, 1.8 m (5.906 ft) long 		SR1CBL03	0.110/ 0.243
USB-RS232 converter	<ul style="list-style-type: none"> ■ For PC not equipped with a 9-way SUB-D connector ■ Equipped with a USB connector and a 9-way SUB-D connector, cable length: 0.4 m (1.31 ft) 		TSXCUSB232	0.145/ 0.320

Router

Designation	Composition	Reference
Ewon Cosy 141 (partner offer)	<ul style="list-style-type: none"> ■ VPN internet ■ 4 x Ethernet LAN 10/100 MB switch, 1 x Ethernet WAN 10/100 MB, 1 x RS 232/485 9-way SUB-D ■ Supply voltage: 12...24 V ~ ■ Mounted on 1-rail 	Visit our partner's website http://www.ewon.biz/en/home.html

Connection components for router link

For connecting the router and logic controller, use Ethernet cables type 490NTW●●●● and TCSEC●●●● (see page 29).

Programming software

Designation	Compatibility with logic controllers	Reference
SoMachine Basic	M221 and M221 Book	Please refer to SoMachine programming software catalogue
SoMachine	M241 and M251	(n° DIA3ED2140110FR) on our website www.schneider-electric.com

Expansion modules

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

Compatibility		Logic controllers			
Modicon TM2 expansion modules		M221	M221 Book	M241	M251
Digital modules	TM2DDI8DT	Compatible	Compatible	Compatible	Compatible
	TM2DDI16DT	Compatible	Compatible	Compatible	Compatible
	TM2DDI16DK	Compatible	Compatible	Compatible	Compatible
	TM2DDI32DK	Compatible	Compatible	Compatible	Compatible
	TM2DAI8DT	Compatible	Compatible	Compatible	Compatible
	TM2DDO8UT	Compatible	Compatible	Compatible	Compatible
	TM2DDO8TT	Compatible	Compatible	Compatible	Compatible
	TM2DDO16UK	Compatible	Compatible	Compatible	Compatible
	TM2DDO16TK	Compatible	Compatible	Compatible	Compatible
	TM2DDO32UK	Compatible	Compatible	Compatible	Compatible
	TM2DDO32TK	Compatible	Compatible	Compatible	Compatible
	TM2DRA8RT	Compatible	Compatible	Compatible	Compatible
	TM2DRA16RT	Compatible	Compatible	Compatible	Compatible
	TM2DMM8DRT	Compatible	Compatible	Compatible	Compatible
	TM2DMM24DRF	Compatible	Compatible	Compatible	Compatible
Analog modules	TM2AMI2HT	Compatible	Compatible	Compatible	Compatible
	TM2AMI2LT	Compatible	Compatible	Compatible	Compatible
	TM2AMI4LT	Compatible	Compatible	Compatible	Compatible
	TM2AMI8HT	Compatible	Compatible	Compatible	Compatible
	TM2ARI8LRJ	Compatible	Compatible	Compatible	Compatible
	TM2ARI8LT	Compatible	Compatible	Compatible	Compatible
	TM2ARI8HT	Compatible	Compatible	Compatible	Compatible
	TM2AMO1HT	Compatible	Compatible	Compatible	Compatible
	TM2AVO2HT	Compatible	Compatible	Compatible	Compatible
	TM2AMM3HT	Compatible	Compatible	Compatible	Compatible
	TM2ALM3LT	Compatible	Compatible	Compatible	Compatible
	TM2AMM6HT	Compatible	Compatible	Compatible	Compatible
Expert modules (counter modules)	TM200HSC206DT	Not compatible	Not compatible	Not compatible	Not compatible
	TM200HSC206DF	Not compatible	Not compatible	Not compatible	Not compatible

Compatible

Not compatible

Note: The expansion and communication module range TWD●●●●● is not compatible with Modicon M221 / M221 Book / 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).

Note:

- Modicon TM2 expansion modules can not be connected to the Modicon TM3 bus expansion modules (transmitter and receiver modules).
- 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).

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 logic controller	54	67	71	89	113	143	216	(2)		
Maximum number of Modicon TM2 module (local) relay outputs directly connected to the logic controller	23	29	30	38	48	61	92	98	97	(2)

(1) Excluding Modicon TM2●●●24●● and TM2●●●32●● modules: a maximum of 3 local I/O modules.

(2) Up to 7 Modicon TM2 modules regardless of the number of outputs used.

Schneider Electric Industries SAS

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

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