Specifications





# controller M221 16 IO transistor PNP Ethernet

TM221CE16T

EAN Code: 3606480648762

#### Main

Range Of Product	Modicon M221	
Product Or Component Type	Logic controller	
[Us] Rated Supply Voltage	24 V DC	
Discrete Input Number	9, discrete input 4 fast input conforming to IEC 61131-2 Type 1	
Analogue Input Number	2 at 010 V	
Discrete Output Type	Transistor	
Discrete Output Number	7 transistor 2 fast output	
Discrete Output Voltage	24 V DC	
Discrete Output Current	0.5 A	

## Complementary

Complementary		
Discrete I/O Number	16	
Maximum Number Of I/O Expansion Module	4 (local I/O-Architecture) 11 (remote I/O-Architecture)	
Supply Voltage Limits	20.428.8 V	
Inrush Current	35 A	
Maximum Power Consumption In W	11 W at 24 V (with max number of I/O expansion module) 4.6 W at 24 V (without I/O expansion module)	
Power Supply Output Current	0.325 A 5 V for expansion bus 0.15 A 24 V for expansion bus	
Discrete Input Logic	Sink or source (positive/negative)	
Discrete Input Voltage	24 V	
Discrete Input Voltage Type	DC	
Analogue Input Resolution	10 bits	
Lsb Value	10 mV	
Conversion Time	1 ms per channel + 1 controller cycle time for analogue input analog input	
Permitted Overload On Inputs	+/- 30 V DC for 5 min (maximum) for analog input +/- 13 V DC (permanent) for analog input	
Voltage State 1 Guaranteed	>= 15 V for input	
Voltage State 0 Guaranteed	<= 5 V for input	
Discrete Input Current	7 mA for discrete input 5 mA for fast input	
Input Impedance	<ul><li>3.4 kOhm for discrete input</li><li>100 kOhm for analog input</li><li>4.9 kOhm for fast input</li></ul>	

Response Time	35 μs turn-off, 1215 terminal(s) for input 5 μs turn-on, 10, 11, 16, 17 terminal(s) for fast input 35 μs turn-on, other terminals terminal(s) for input 5 μs turn-off, 10, 11, 16, 17 terminal(s) for fast input 100 μs turn-off, other terminals terminal(s) for input 5 μs turn-on, turn-off, Q0Q1 terminal(s) for output 50 μs turn-on, turn-off, Q2Q3 terminal(s) for output 300 μs turn-on, turn-off, other terminals terminal(s) for output	
Configurable Filtering Time	0 ms for input 3 ms for input 12 ms for input	
Discrete Output Logic	Positive logic (source)	
Maximum Current Per Output Common	3.5 A	
Output Frequency	100 kHz for fast output (PWM/PLS mode) at Q0Q1 5 kHz for output at Q2Q3 0.1 kHz for output at Q4Q6	
Absolute Accuracy Error	+/- 1 % of full scale for analog input	
Maximum Leakage Current	0.1 mA for transistor output	
Maximum Voltage Drop	<1 V	
Mechanical Durability	2000000 cycles for transistor output	
Maximum Tungsten Load	<12 W for output and fast output	
Protection Type	Overload and short-circuit protection at 1 A	
Reset Time	1 s automatic reset	
Memory Capacity	256 kB for user application and data RAM with 10000 instructions 256 kB for internal variables RAM	
Data Backed Up	256 kB built-in flash memory for backup of application and data	
Data Storage Equipment	2 GB SD card (optional)	
Battery Type	BR2032 or CR2032X lithium non-rechargeable	
Backup Time	1 year at 25 °C (by interruption of power supply)	
Execution Time For 1 Kinstruction	n 0.3 ms for event and periodic task	
Execution Time Per Instruction	0.2 μs Boolean	
Exct Time For Event Task	60 µs response time	
Maximum Size Of Object Areas	512 %M memory bits 255 %C counters 512 %KW constant words 255 %TM timers 8000 %MW memory words	
Realtime Clock	With	
Clock Drift	<= 30 s/month at 25 °C	
Regulation Loop	Adjustable PID regulator up to 14 simultaneous loops	
Positioning Functions	Position PTO 2 axe(s)pulse/direction mode (100 kHz) Position PTO 1 axe(s)CW/CCW mode (100 kHz)	
Function Available	PWM Frequency generator PLS	
Counting Input Number	4 fast input (HSC mode) at 100 kHz 32 bits	
Counter Function	Single phase A/B Pulse/direction	
Integrated Connection Type	USB port with mini B USB 2.0 connector Non isolated serial link serial 1 with RJ45 connector and RS232/RS485 interface Ethernet with RJ45 connector	

Supply (serial)serial link supply: 5 V, <200 mA		
Transmission Rate	1.2115.2 kbit/s (115.2 kbit/s by default) for bus length of 15 m for RS485 1.2115.2 kbit/s (115.2 kbit/s by default) for bus length of 3 m for RS232 480 Mbit/s for USB	
Communication Port Protocol	USB port: USB - SoMachine-Network Non isolated serial link: Modbus master/slave - RTU/ASCII or SoMachine-Network Ethernet	
Port Ethernet	10BASE-T/100BASE-TX 1 port with 100 m copper cable	
Communication Service	Modbus TCP client DHCP client Modbus TCP slave device Modbus TCP server Ethernet/IP adapter	
Local Signalling	1 LED (green) for PWR 1 LED (green) for RUN 1 LED (red) for module error (ERR) 1 LED (green) for SD card access (SD) 1 LED (gred) for BAT 1 LED per channel (green) for I/O state 1 LED (green) for SL Ethernet network activity (green) for ACT Ethernet network link (yellow) for Link (Link Status)	
Electrical Connection	removable screw terminal block for inputs removable screw terminal block for outputs terminal block, 3 terminal(s) for connecting the 24 V DC power supply connector, 4 terminal(s) for analogue inputs Mini B USB 2.0 connector for a programming terminal	
Maximum Cable Distance Between Devices	Shielded cable: <10 m for fast input Unshielded cable: <30 m for output Unshielded cable: <30 m for digital input Unshielded cable: <1 m for analog input Shielded cable: <3 m for fast output	
Insulation	Between input and internal logic at 500 V AC Between fast input and internal logic at 500 V AC Non-insulated between inputs Between output and internal logic at 500 V AC Non-insulated between analogue input and internal logic Non-insulated between analogue inputs	
Marking	CE	
Mounting Support	Top hat type TH35-15 rail conforming to IEC 60715 Top hat type TH35-7.5 rail conforming to IEC 60715 plate or panel with fixing kit	
Height	90 mm	
Depth	70 mm	
Width	95 mm	
Net Weight	0.346 kg	

## Environment

Standards	IEC 61131-2 UL 508 CAN/CSA C22.2 No. 213 IACS E10 ANSI/ISA 12-12-01
Product Certifications	EAC DNV-GL RCM ABS cULus LR CE UKCA cULus HazLoc

Life Is On Schneider

Environmental Characteristic	Ordinary and hazardous location	
Resistance To Electrostatic	$\frac{1}{2}$ kV/ in air conforming to IEC 61000 4.2	
Discharge	8 kV in air conforming to IEC 61000-4-2 4 kV on contact conforming to IEC 61000-4-2	
Resistance To Electromagnetic	10 V/m 80 MHz1 GHz conforming to IEC 61000-4-3	
Fields	3 V/m 1.4 GHz2 GHz conforming to IEC 61000-4-3	
	1 V/m 22.7 GHz conforming to IEC 61000-4-3	
Resistance To Magnetic Fields	30 A/m 50/60 Hz conforming to IEC 61000-4-8	
Resistance To Fast Transients	2 kV (power lines) conforming to IEC 61000-4-4	
	2 kV (relay output) conforming to IEC 61000-4-4	
	1 kV (I/O) conforming to IEC 61000-4-4	
	1 kV (Ethernet line) conforming to IEC 61000-4-4 1 kV (serial link) conforming to IEC 61000-4-4	
Surge Withstand	2 kV power lines (AC) common mode conforming to IEC 61000-4-5	
	2 kV relay output common mode conforming to IEC 61000-4-5	
	1 kV I/O common mode conforming to IEC 61000-4-5	
	1 kV shielded cable common mode conforming to IEC 61000-4-5	
	0.5 kV power lines (DC) differential mode conforming to IEC 61000-4-5	
	1 kV power lines (AC) differential mode conforming to IEC 61000-4-5	
	1 kV relay output differential mode conforming to IEC 61000-4-5	
	0.5 kV power lines (DC) common mode conforming to IEC 61000-4-5	
Resistance To Conducted	10 V 0.1580 MHz conforming to IEC 61000-4-6	
Disturbances	3 V 0.180 MHz conforming to Marine specification (LR, ABS, DNV, GL)	
	10 V spot frequency (2, 3, 4, 6.2, 8.2, 12.6, 16.5, 18.8, 22, 25 MHz) conforming to	
	Marine specification (LR, ABS, DNV, GL)	
Electromagnetic Emission	Conducted emissions - test level: 79 dBµV/m QP/66 dBµV/m AV ( power lines (AC))	
	at 0.150.5 MHz conforming to IEC 55011	
	Conducted emissions - test level: 73 dBµV/m QP/60 dBµV/m AV ( power lines (AC))	
	at 0.5300 MHz conforming to IEC 55011	
	Conducted emissions - test level: 12069 dBµV/m QP ( power lines) at 10150 kHz	
	conforming to IEC 55011	
	Conducted emissions - test level: 63 dBµV/m QP (power lines) at 1.530 MHz	
	conforming to IEC 55011	
	Radiated emissions - test level: 40 dBµV/m QP class A ( 10 m) at 30…230 MHz	
	conforming to IEC 55011	
	Conducted emissions - test level: 7963 dBµV/m QP ( power lines) at 1501500	
	kHz conforming to IEC 55011	
	Radiated emissions - test level: 47 dBµV/m QP class A ( 10 m) at 200…1000 MHz	
	conforming to IEC 55011	
mmunity To Microbreaks	10 ms	
Ambient Air Temperature For	-1055 °C (horizontal installation)	
Operation	-1035 °C (vertical installation)	
Ambient Air Temperature For Storage	-2570 °C	
Relative Humidity	1095 %, without condensation (in operation)	
	1095 %, without condensation (in operation)	
p Degree Of Protection	IP20 with protective cover in place	
Pollution Degree	<= 2	
Operating Altitude	02000 m	
Storage Altitude	03000 m	
Vibration Resistance	3.5 mm at 58.4 Hz on symmetrical rail	
	3.5 mm at 58.4 Hz on panel mounting	
	1 gn at 8.4150 Hz on symmetrical rail	
	1 gn at 8.4150 Hz on panel mounting	
Shock Resistance	147 m/s² for 11 ms	

## **Packing Units**

Unit Type Of Package 1	PCE
Number Of Units In Package 1	1
Package 1 Height	10.6 cm

Package 1 Width	14.0 cm
Package 1 Length	13.9 cm
Package 1 Weight	300.0 g
Unit Type Of Package 2	S04
Number Of Units In Package 2	20
Package 2 Height	30 cm
Package 2 Width	40 cm
Package 2 Length	60 cm
Package 2 Weight	6.983 kg
Unit Type Of Package 3	P12
Number Of Units In Package 3	240
Package 3 Height	105.0 cm
Package 3 Width	120.0 cm
Package 3 Length	80.0 cm
Package 3 Weight	156 kg

## **Contractual warranty**

Warranty

18 months

## Sustainability Screen

**Green Premium<sup>TM</sup> label** is Schneider Electric's commitment to delivering products with best-inclass environmental performance. Green Premium promises compliance with the latest regulations, transparency on environmental impacts, as well as circular and low-CO<sub>2</sub> products.

**Guide to assessing product sustainability** is a white paper that clarifies global eco-label standards and how to interpret environmental declarations.

Learn more about Green Premium >

Guide to assess a product's sustainability >



Transparency RoHS/REACh

#### Well-being performance

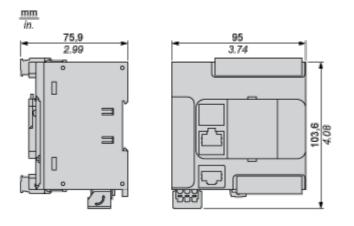


### **Certifications & Standards**

Reach Regulation	REACh Declaration	
Eu Rohs Directive	Pro-active compliance (Product out of EU RoHS legal scope)	
China Rohs Regulation	China RoHS declaration	
Environmental Disclosure	Product Environmental Profile	
Weee	The product must be disposed on European Union markets following specific waste collection and never end up in rubbish bins	
Circularity Profile	End of Life Information	

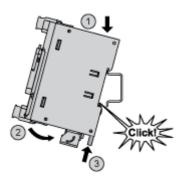
### **Dimensions Drawings**

#### Dimensions

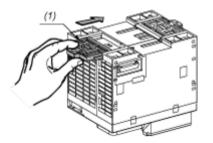


Mounting and Clearance

#### Mounting on a Rail

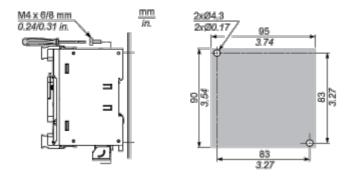


#### **Direct Mounting on a Panel Surface**



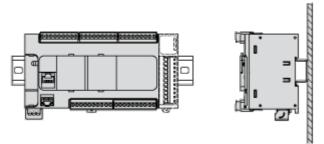
(1) Install a mounting strip

#### **Mounting Hole Layout**

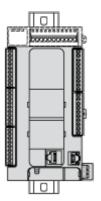


Mounting

**Correct Mounting Position** 

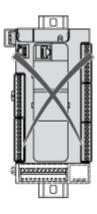


#### Acceptable Mounting Position



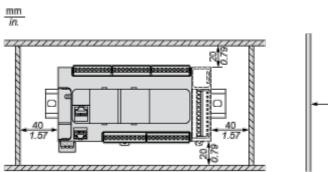
#### **Incorrect Mounting Position**

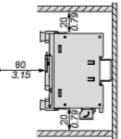






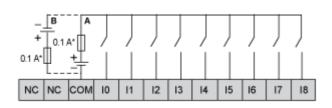
Clearance





Connections and Schema

#### **Digital Inputs**



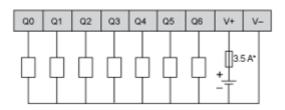
- (\*) Type T fuse
- (A) Sink wiring (positive logic).
- (B) Source wiring (negative logic).

#### **Connection of the Fast Inputs**



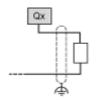
10, 11, 16, 17

Transistor Outputs



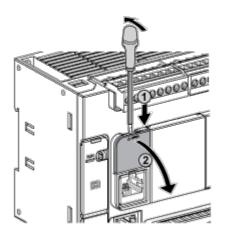
(\*) Type T fuse

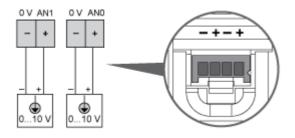
#### **Connection of the Fast Outputs**



Q0, Q1

#### Analog Inputs





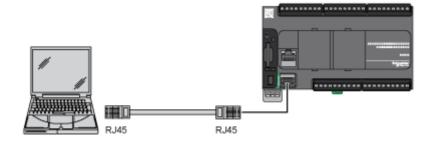
The (-) poles are connected internally.

Pin	Wire Color
0 V	Black
AN1	Red
0 V	Black
AN0	Red

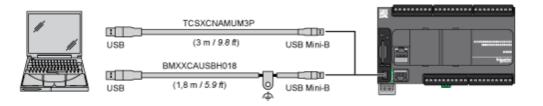
**Ethernet Connection** 



Pin N°	Signal
1	TD+
2	TD-
3	RD+
4	-
5	-
6	RD-
7	-
8	-



#### USB Mini-B Connection

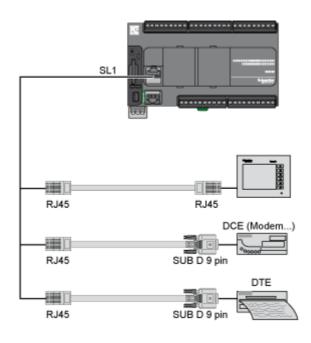




SL1		
Ν°	RS 232	RS 485
1	RxD	N.C.
2	TxD	N.C.
3	RTS	N.C.
4	N.C.	D1
5	N.C.	D0
6	стѕ	N.C.
7	N.C*.	5 Vdc
8	Common	Common

N.C.: not connected

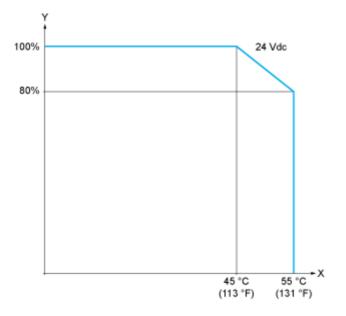
 $^{\star}$  : 5 Vdc delivered by the controller. Do not connect.



Performance Curves

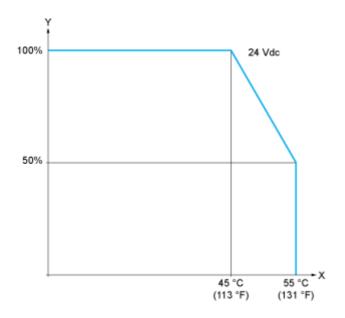
#### **Derating Curves**

#### Embedded Digital Inputs (No Cartridge)



- X: Ambient temperature
- Y: Input simultaneous ON ratio

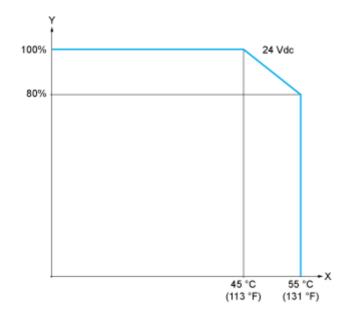
#### Embedded Digital Inputs (with Cartridge)



- X: Ambient temperature
- Y: Input simultaneous ON ratio

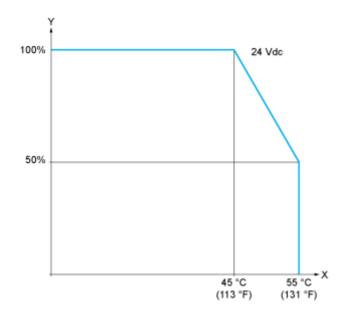
#### **Derating Curves**

#### Embedded Digital Outputs (No Cartridge)



- X: Ambient temperature
- Y: Output simultaneous ON ratio

#### **Embedded Digital Outputs (with Cartridge)**



- X: Ambient temperature
- Y: Output simultaneous ON ratio