Specifications





logic controller, Modicon M221, 16 IO, 7 relay outputs, 100…240V AC

TM221C16R

Main

Range of product	Modicon M221
product or component type	Logic controller
[Us] rated supply voltage	100240 V AC
Discrete input number	9, discrete input conforming to IEC 61131-2 Type 1
Analogue input number	2 at 010 V
Discrete output type	Relay normally open
Discrete output number	7 relay
Discrete output voltage	5125 V DC 5250 V AC
Discrete output current	2 A

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	85264 V
Network frequency	50/60 Hz
Inrush current	40 A
Maximum power consumption in VA	46 VA at 100240 V with max number of I/O expansion module 31 VA at 100240 V without I/O expansion module
Power supply output current	0.325 A 5 V for expansion bus 0.12 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	3.4 kOhm for discrete input
	100 kOhm for analog input 4.9 kOhm for fast input
Response time	35 μs turn-off, I2I5 terminal(s) for input
	10 ms turn-on for output
	10 ms turn-off for output
	5 μs turn-on, I0, I1, I6, I7 terminal(s) for fast input 35 μs turn-on, other terminals terminal(s) for input
	5 μs turn-off, I0, I1, I6, I7 terminal(s) for fast input
	100 µs turn-off, other terminals terminal(s) for input
Configurable filtering time	0 ms for input
	3 ms for input 12 ms for input
Output voltage limits	125 V DC 277 V AC
Maximum current per output common	6 A at COM 1 7 A at COM 0
Absolute accuracy error	+/- 1 % of full scale for analog input
Electrical durability	100000 cycles AC-12, 120 V, 240 VA, resistive
	100000 cycles AC-12, 120 V, 240 VA, resistive
	300000 cycles AC-12, 120 V, 80 VA, resistive
	300000 cycles AC-12, 240 V, 160 VA, resistive
	100000 cycles AC-15, cos phi = 0.35, 120 V, 60 VA, inductive 100000 cycles AC-15, cos phi = 0.35, 240 V, 120 VA, inductive
	300000 cycles AC-15, cos phi = 0.35, 240 V, 120 VA, inductive
	300000 cycles AC-15, cos phi = 0.35, 240 V, 36 VA, inductive
	100000 cycles AC-14, cos phi = 0.7, 120 V, 120 VA, inductive
	100000 cycles AC-14, cos phi = 0.7, 240 V, 240 VA, inductive
	300000 cycles AC-14, cos phi = 0.7, 120 V, 36 VA, inductive
	300000 cycles AC-14, cos phi = 0.7, 240 V, 72 VA, inductive 100000 cycles DC-12, 24 V, 48 W, resistive
	300000 cycles DC-12, 24 V, 16 W, resistive
	100000 cycles DC-13, 24 V, 24 W, inductive (L/R = 7 ms)
	300000 cycles DC-13, 24 V, 7.2 W, inductive (L/R = 7 ms)
Switching frequency	20 switching operations/minute with maximum load
Mechanical durability	20000000 cycles for relay output
Minimum load	1 mA at 5 V DC for relay output
Protection type	Without protection at 5 A
Reset time	1 s
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	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 %KW constant words
• • • • • • • • •	512 %M memory bits
	255 %C counters
	8000 %MW memory words 255 %TM timers
Realtime clock	With
Clock drift	<= 30 s/month at 25 °C
Regulation loop	Adjustable PID regulator up to 14 simultaneous loops
- •	

Counting input number	4 fast input (HSC mode) at 100 kHz 32 bits
counter function	Single phase
	Frequency meter
	Dual phase (quadrature)
	Dual phase (pulse/direction)
ntegrated connection type	USB port with mini B USB 2.0 connector
	Non isolated serial link serial 1 with RJ45 connector and RS485 interface
	Non isolated serial link serial 2 with RJ45 connector and RS232/RS485 interface
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
ocal 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 (red) for BAT
	1 LED (green) for SL1
	1 LED (green) for SL2
	1 LED per channel (green) for I/O state
lectrical 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	Shielded cable: <10 m for fast input
levices	Unshielded cable: <30 m for output
	Unshielded cable: <30 m for digital input
	Unshielded cable: <1 m for analog input
nsulation	Between input and internal logic at 500 V AC
	Non-insulated between analogue input and internal logic
	Non-insulated between analogue inputs
	Between supply and ground at 1500 V AC
	Between sensor power supply and ground at 500 V AC
	Between input and ground at 500 V AC
	Between output and ground at 1500 V AC
	Between supply and internal logic at 2300 V AC
	Between sensor power supply and internal logic at 500 V AC Between output and internal logic at 2300 V AC
	Between Ethernet terminal and internal logic at 500 V AC
	Between supply and sensor power supply at 2300 V AC
narking	CE
Sensor power supply	24 V DC at 250 mA supplied by the controller
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
leight	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	RCM	
	ABS	
	LR DNV-GL	
	EAC	
	cULus	
	CE	
	UKCA	
	cULus HazLoc	
Environmental characteristic	Ordinary and hazardous location	
Resistance to electrostatic	8 kV in air conforming to IEC 61000-4-2	
discharge	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 30230 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	
Immunity to microbreaks	10 ms	
Ambient air temperature for operation	-1055 °C (horizontal installation) -1035 °C (vertical installation)	
Ambient air temperature for storage	-2570 °C	
Relative humidity	1095 %, without condensation (in operation)	
	1095 %, without condensation (in storage)	
IP 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 sanel mounting	
	1 gn at 8.4150 Hz on symmetrical rail	
	1 gn at 8.4150 Hz on panel mounting	

Shock resistance

98 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	162 kg

Sustainability Screen Premium

Green PremiumTM 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-CO₂ 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

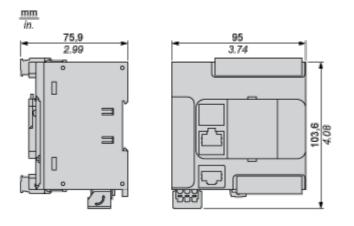
Mercury Free
Rohs Exemption Information Yes
Pvc Free

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

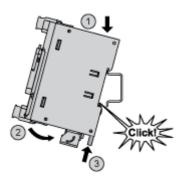
Dimensions Drawings

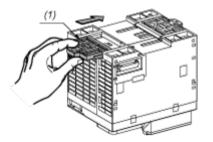
Dimensions



Mounting and Clearance

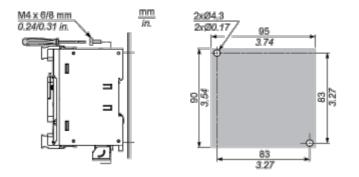
Mounting on a Rail





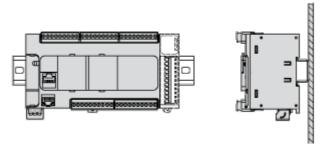
(1) Install a mounting strip

Mounting Hole Layout

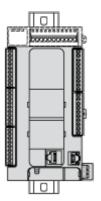


Mounting

Correct Mounting Position

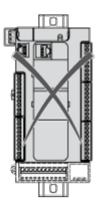


Acceptable Mounting Position



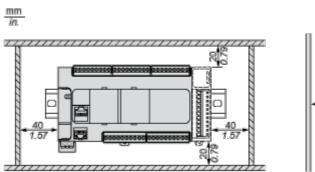
Incorrect Mounting Position

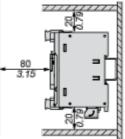






Clearance

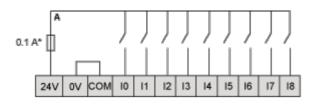




Connections and Schema

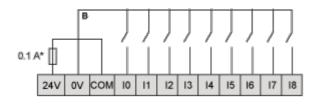
Digital Inputs

Wiring Diagram (Positive Logic)



(*) Type T fuse

Wiring Diagram (Negative Logic)



(*) Type T fuse

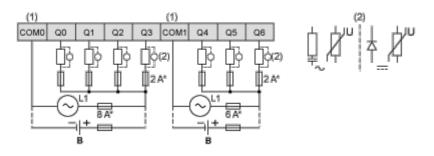
Connection of the Fast Inputs



10, 11, 16, 17

Relay Outputs

Negative Logic (Sink)



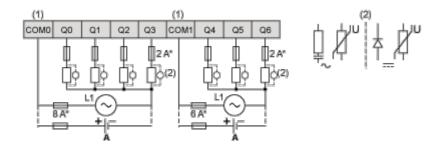
(*) Type T fuse

(1) The COM1 and COM2 terminals are not connected internally.

(2) To improve the life time of the contacts, and to protect from potential inductive load damage, you must connect a free wheeling diode in parallel to each inductive DC load or an RC snubber in parallel of each inductive AC load

B Sink wiring (negative logic)

Positive Logic (Source)



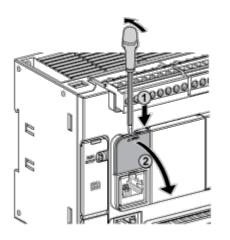
(*) Type T fuse

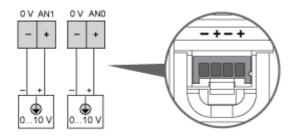
(1) The COM1 and COM2 terminals are not connected internally.

(2) To improve the life time of the contacts, and to protect from potential inductive load damage, you must connect a free wheeling diode in parallel to each inductive DC load or an RC snubber in parallel of each inductive AC load

A Source wiring (positive logic)

Analog Inputs

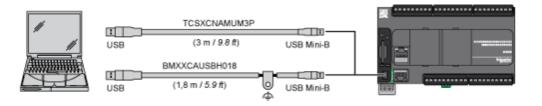




The (-) poles are connected internally.

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

USB Mini-B Connection

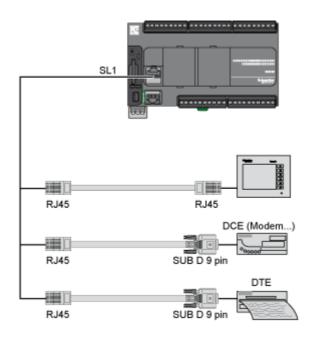


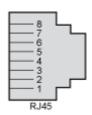


SL1		
Ν°	RS 232	RS 485
1	RxD	N.C.
2	TxD	N.C.
3	RTS	N.C.
4	N.C.	D1
5	N.C.	D0
6	стѕ	N.C.
7	N.C*.	5 Vdc
8	Common	Common

N.C.: not connected

 * : 5 Vdc delivered by the controller. Do not connect.





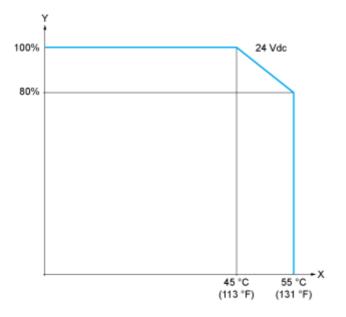
N°	RS 485
1	N.C.
2	N.C.
3	N.C.
4	D1
5	D0
6	N.C.
7	N.C.
8	Common

N.C.: not connected

Performance Curves

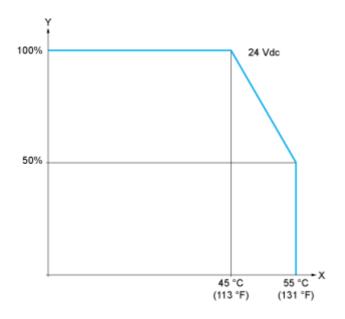
Derating Curves

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