



### Main

Range of product	Modicon M221
Product or component type	Logic controller
[Us] rated supply voltage	24 V DC
Discrete input number	8, discrete input 4 fast input conforming to IEC 61131-2 Type 1
Analogue input number	2 at 0...10 V
Discrete output type	Transistor
Discrete output number	8 transistor 2 fast output
Discrete output voltage	24 V DC
Discrete output current	0.5 A

### Complementary

Discrete I/O number	16
Maximum number of I/O expansion module	7 for relay output
Supply voltage limits	20.4...28.8 V
Inrush current	35 A
Maximum power consumption in W	22 W at 24 V (with max number of I/O expansion module) 3.2 W at 24 V (without I/O expansion module)
Power supply output current	0.52 A 5 V for expansion bus 0.49 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	100 kOhm for analog input 3.4 kOhm for input 4.9 kOhm for fast input
Response time	35 µs turn-off, I2...I5 terminal(s) for input 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 5 µs turn-on, turn-off, Q0...Q1 terminal(s) for output 50 µs turn-on, turn-off, Q2...Q3 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	4 A
Output frequency	100 KHz for fast output (PWM/PLS mode) at Q0...Q1 5 KHz for output at Q2...Q3 0.1 KHz for output at Q4...Q6

The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric Industries SAS nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein.

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	20000000 cycles for transistor output
Maximum tungsten load	<12 W for output and fast output
Protection type	Short-circuit and overload protection with automatic reset Short-circuit protection on output 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 lithium non-rechargeable, battery life: 4 year(s)
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 0.7 ms for other instruction
Execution time per instruction	0.2 µs Boolean
Exct time for event task	60 µs response time
Application structure	1 cyclic auxiliary task 1 configurable freewheeling/cyclic master task 8 interrupt tasks
Maximum size of object areas	8000 %MW memory words 255 %C counters 512 %KW constant words 255 %TM timers 512 %M memory bits
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 PLS Frequency generator
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 RS485 interface Non isolated serial link serial 2 with RJ45 connector and RS232/RS485 interface
Supply	(serial 1)serial link supply: 5 V, <200 mA
Transmission rate	1.2...115.2 kbit/s (115.2 kbit/s by default) for bus length of 15 m for RS485 1.2...115.2 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
Communication service	Modbus slave Modbus master
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 (red) for BAT 1 LED (green) for SL1 1 LED (green) for SL2 1 LED per channel (green) for I/O state
Electrical connection	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 Removable spring terminal block, 10 terminal(s) for inputs Removable spring terminal block, 11 terminal(s) for outputs

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 Between output groups at 500 V AC Non-insulated between analogue input and internal logic Non-insulated between analogue inputs Between fast output and internal logic at 500 V AC Non-insulated between outputs
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	70 mm
Net weight	0.264 kg

## Environment

Standards	EN/IEC 61131-2 EN/IEC 61010-2-201 EN/IEC 60664-1
Product certifications	ABS CSA LR RCM CULus DNV-GL EAC IACS E10
Environmental characteristic	Ordinary and hazardous location
Resistance to electrostatic discharge	8 kV in air conforming to EN/IEC 61000-4-2 4 kV on contact conforming to EN/IEC 61000-4-2
Resistance to electromagnetic fields	10 V/m 80 MHz...1 GHz conforming to EN/IEC 61000-4-3 3 V/m 1.4 GHz...2 GHz conforming to EN/IEC 61000-4-3 1 V/m 2...2.7 GHz conforming to EN/IEC 61000-4-3
Resistance to magnetic fields	30 A/m 50/60 Hz conforming to EN/IEC 61000-4-8
Resistance to fast transients	2 kV (power lines) conforming to EN/IEC 61000-4-4 2 kV (relay output) conforming to EN/IEC 61000-4-4 1 kV (I/O) conforming to EN/IEC 61000-4-4 1 kV (Ethernet line) conforming to EN/IEC 61000-4-4 1 kV (serial link) conforming to EN/IEC 61000-4-4
Surge withstand	2 kV power lines (AC) common mode conforming to EN/IEC 61000-4-5 2 kV relay output common mode conforming to EN/IEC 61000-4-5 1 kV I/O common mode conforming to EN/IEC 61000-4-5 1 kV shielded cable common mode conforming to EN/IEC 61000-4-5 0.5 kV power lines (DC) differential mode conforming to EN/IEC 61000-4-5 1 kV power lines (AC) differential mode conforming to EN/IEC 61000-4-5 1 kV relay output differential mode conforming to EN/IEC 61000-4-5 0.5 kV power lines (DC) common mode conforming to EN/IEC 61000-4-5
Resistance to conducted disturbances	10 V 0.15...80 MHz conforming to EN/IEC 61000-4-6 3 V 0.1...80 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	<p>Conducted emissions - test level: 79 dB<math>\mu</math>V/m QP/66 dB<math>\mu</math>V/m AV ( power lines (AC)) at 0.15...0.5 MHz conforming to EN/IEC 55011</p> <p>Conducted emissions - test level: 73 dB<math>\mu</math>V/m QP/60 dB<math>\mu</math>V/m AV ( power lines (AC)) at 0.5...300 MHz conforming to EN/IEC 55011</p> <p>Conducted emissions - test level: 120...69 dB<math>\mu</math>V/m QP ( power lines) at 10...150 kHz conforming to EN/IEC 55011</p> <p>Conducted emissions - test level: 63 dB<math>\mu</math>V/m QP ( power lines) at 1.5...30 MHz conforming to EN/IEC 55011</p> <p>Radiated emissions - test level: 40 dB<math>\mu</math>V/m QP class A ( 10 m) at 30...230 MHz conforming to EN/IEC 55011</p> <p>Conducted emissions - test level: 79...63 dB<math>\mu</math>V/m QP ( power lines) at 150...1500 kHz conforming to EN/IEC 55011</p> <p>Radiated emissions - test level: 47 dB<math>\mu</math>V/m QP class A ( 10 m) at 200...1000 MHz conforming to EN/IEC 55011</p>
Immunity to microbreaks	10 ms
Ambient air temperature for operation	-10...55 °C (horizontal installation) -10...35 °C (vertical installation)
Ambient air temperature for storage	-25...70 °C
Relative humidity	10...95 %, without condensation (in operation) 10...95 %, without condensation (in storage)
IP degree of protection	IP20 with protective cover in place
Pollution degree	<= 2
Operating altitude	0...2000 m
Storage altitude	0...3000 m
Vibration resistance	<p>3.5 mm at 5...8.4 Hz on symmetrical rail</p> <p>3.5 mm at 5...8.4 Hz on panel mounting</p> <p>1 gn at 8.4...150 Hz on symmetrical rail</p> <p>1 gn at 8.4...150 Hz on panel mounting</p>
Shock resistance	147 m/s <sup>2</sup> for 11 ms

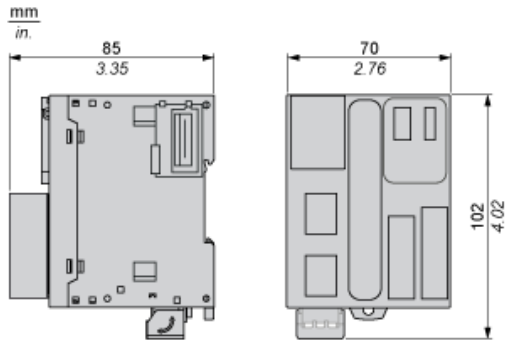
## Packing Units

Package 1 Weight	420.000 g
Package 1 Height	108.000 mm
Package 1 width	100.000 mm
Package 1 Length	126.000 mm

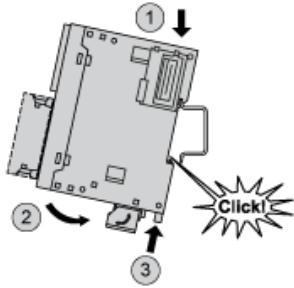
## Offer Sustainability

Sustainable offer status	Green Premium product
REACH Regulation	<a href="#">REACH Declaration</a>
EU RoHS Directive	Pro-active compliance (Product out of EU RoHS legal scope) <a href="#">EU RoHS Declaration</a>
Mercury free	Yes
RoHS exemption information	<a href="#">Yes</a>
China RoHS Regulation	<a href="#">China RoHS Declaration</a>
Environmental Disclosure	<a href="#">Product Environmental Profile</a>
Circularity Profile	<a href="#">End Of Life Information</a>
WEEE	The product must be disposed on European Union markets following specific waste collection and never end up in rubbish bins
PVC free	Yes

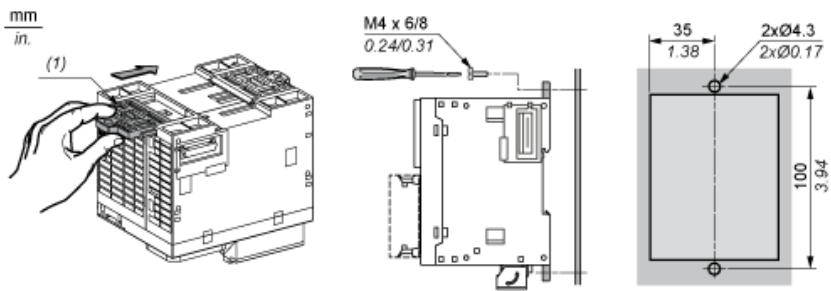
Dimensions



Mounting on a Rail



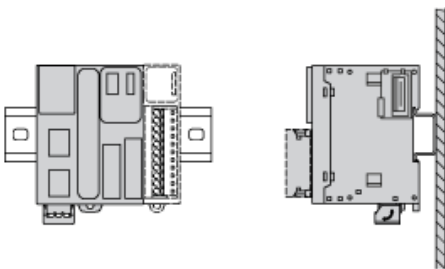
Direct Mounting on a Panel Surface



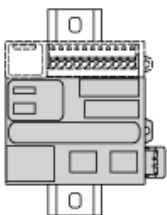
(1) Install a mounting strip

Mounting

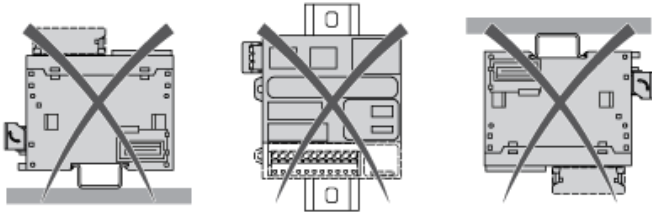
Correct Mounting Position



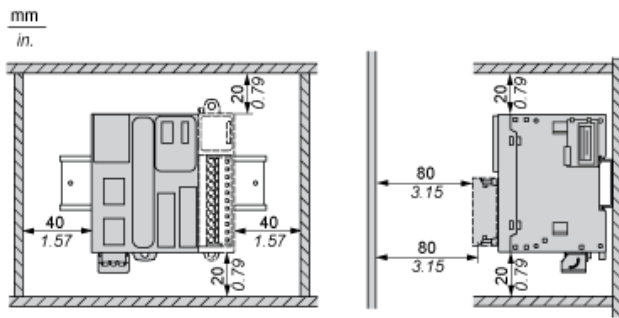
Acceptable Mounting Position



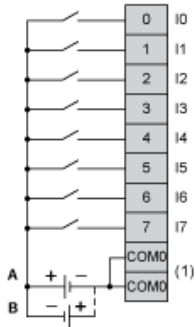
## Incorrect Mounting Position



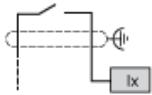
## Clearance



## Digital Inputs

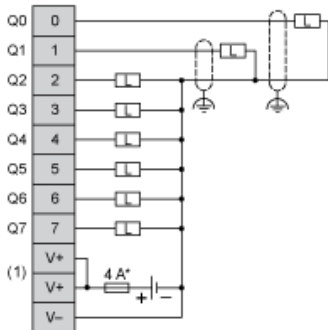


- (1) The COM0 terminals are connected internally.  
A : Sink wiring (positive logic).  
B : Source wiring (negative logic).

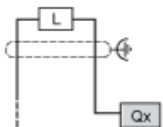


Ix I0, I1, I6, I7

## Digital Outputs



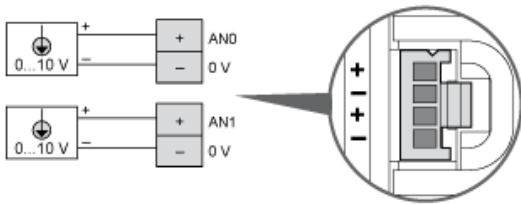
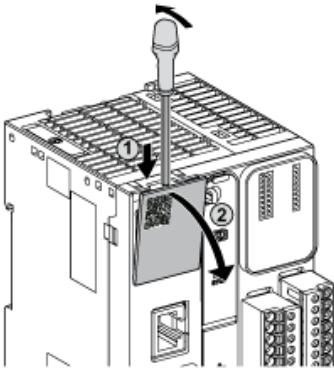
- (\*) Type T fuse  
(1) The V+ terminals are connected internally.



Qx Q0, Q1

## Analog Inputs

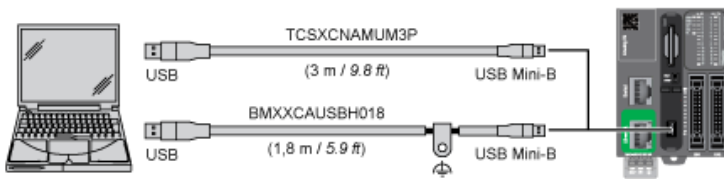




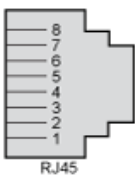
The (-) poles are connected internally.

Pin	Wire Color
AN0 / AN1	Red
0 V	Black

## USB Mini-B Connection



## SL1 Connection

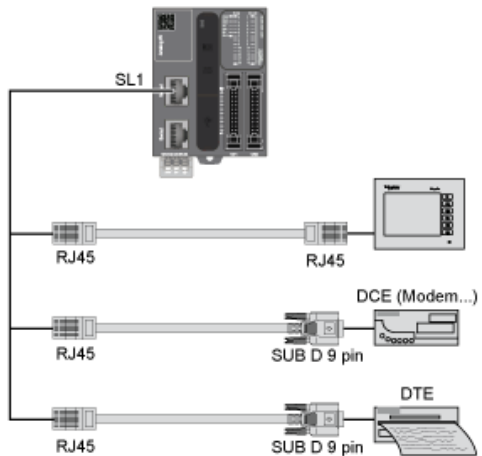


SL1

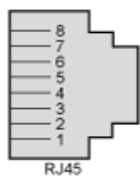
N °	RS 232	RS 485
1	RxD	N.C.
2	TxD	N.C.
3	RTS	N.C.
4	N.C.	D1
5	N.C.	D0
6	CTS	N.C.
7	N.C.*	5 Vdc
8	Common	Common

N.C.: not connected

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



## SL2 Connection

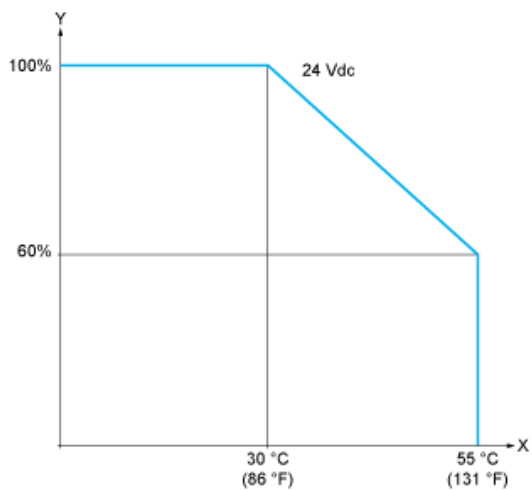


N °	RS 485
1	N.C.
2	N.C.
3	N.C.
4	D1
5	D0
6	N.C.
7	N.C.
8	Common

N.C.: not connected

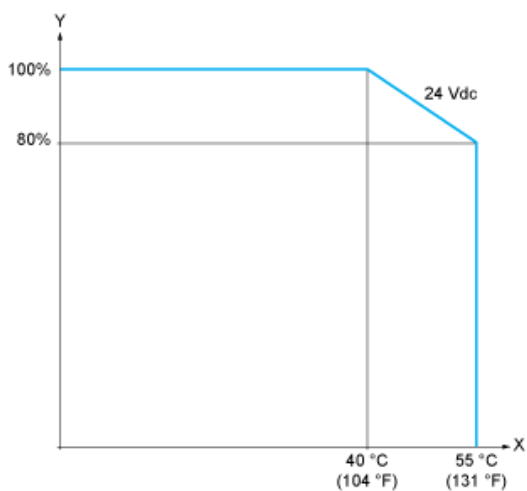
Derating Curves

Embedded Digital Inputs



X : Ambient temperature  
Y : Input simultaneous ON ratio

Embedded Digital Outputs



X : Ambient temperature  
Y : Output simultaneous ON ratio