



Main

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|---------------------------|--|
| Commercial Status | Commercialised |
| Range of product | Modicon M221 |
| Product or component type | Logic controller |
| [Us] rated supply voltage | 100...240 V AC |
| Discrete input number | 9 discrete input conforming to IEC 61131-2 Type 1 including 4 fast input |
| Analogue input number | 2 at input range: 0...10 V |
| Discrete output type | Relay normally open |
| Discrete output number | 7 relay |
| Discrete output voltage | 5...250 V AC 5...125 V DC |
| Discrete output current | 2 A |

Complementary

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|--------------------------------|--|
| Discrete I/O number | 16 |
| Number of I/O expansion module | <= 4 with <= 24 discrete output(s) for relay output <= 4 with <= 104 discrete output(s) for transistor output |
| Supply voltage limits | 85...264 V |
| Network frequency | 50/60 Hz |
| Inrush current | <= 40 A |
| Power consumption in VA | <= 46 VA at 100...240 V |
| 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 analog input |
| Permitted overload on inputs | +/- 15 V DC for analog input permanent +/- 30 V DC for analog input with 5 min maximum |
| Voltage state1 guaranteed | >= 15 V for input |
| Current state 1 guaranteed | >= 2.5 mA for input |
| Voltage state 0 guaranteed | <= 5 V for input |
| Current state 0 guaranteed | <= 1 mA for input |
| Discrete input current | 7 mA for input |
| Input impedance | 100 kOhm for analog input 3.4 kOhm for discrete input |
| Response time | 10 ms turn-off operation for output 10 ms turn-on operation for output 5 µs turn-off operation for fast input 5 µs turn-on operation for fast input 100 µs turn-off operation for input; I8...I15 terminal 100 µs turn-on operation for input; I8...I15 terminal 35 µs turn-off operation for input; I2...I5 terminal 35 µs turn-on operation for input; I2...I5 terminal |
| Configurable filtering time | 12 ms for input 3 ms for input 0 ms for input |
| Output voltage limits | 277 V AC 125 V DC |
| Current per output common | 6 A at COM 1 terminal 8 A at COM 0 terminal |

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 |
| Electrical durability | Inductive (L/R = 7 ms) DC-13, 24 V / 7.2 W : 300000 cycles Inductive (L/R = 7 ms) DC-13, 24 V / 24 W : 100000 cycles Resistive DC-12, 24 V / 16 W : 300000 cycles Resistive DC-12, 24 V / 48 W : 100000 cycles Inductive AC-14, (cos phi = 0.7) 240 V/ 72 VA : 300000 cycles Inductive AC-14, (cos phi = 0.7) 120 V/ 36 VA : 300000 cycles Inductive AC-14, (cos phi = 0.7) 240 V/ 240 VA : 100000 cycles Inductive AC-14, (cos phi = 0.7) 120 V/ 120 VA : 100000 cycles Inductive AC-15, (cos phi = 0.35) 240 V / 36 VA : 300000 cycles Inductive AC-15, (cos phi = 0.35) 120 V/ 18 VA : 300000 cycles Inductive AC-15, (cos phi = 0.35) 240 V / 120 VA : 100000 cycles Inductive AC-15, (cos phi = 0.35) 120 V/ 60 VA : 100000 cycles Resistive AC-12, 240 V/ 160 VA : 300000 cycles Resistive AC-12, 120 V / 80 VA : 300000 cycles Resistive AC-12, 240 V/ 480 VA : 100000 cycles Resistive AC-12, 120 V / 240 VA : 100000 cycles |
| Switching frequency | 20 switching operations/minute with maximum load |
| Mechanical durability | >= 20000000 cycles for relay output |
| Minimum load | 10 mA at 5 V DC for relay output |
| Reset time | 1 s |
| Memory capacity | 256 kB for program with 10000 instructions |
| Data backed up | 256 kB built-in flash memory for backup of programs |
| Data storage equipment | 2 GB SD card optional |
| Battery type | BR2032 lithium non-rechargeable, battery life: 4 yr |
| 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 |
| Clock drift | <= 30 s/month at 25 °C |
| Regulation loop | Adjustable PID regulator up to 14 simultaneous loops |
| Control signal type | Single phase signal at 100 kHz for fast input (HSC mode) Pulse/Direction signal at 100 kHz for fast input (HSC mode) A/B signal at 50 kHz for fast input (HSC mode) |
| Counting input number | 4 fast input (HSC mode) (counting frequency: 100 kHz), counting capacity: 32 bits |
| Integrated connection type | Non isolated serial link "serial 2" with connector RJ45 and interface RS232/RS485 Non isolated serial link "serial 1" with connector RJ45 and interface RS485 USB port with connector mini B USB 2.0 |
| Supply | Serial serial link supply at 5 V 200 mA |
| Transmission rate | 480 Mbit/s - communication protocol: USB 1.2...115.2 kbit/s (115.2 kbit/s by default) for bus length of 3 m - communication protocol: RS232 1.2...115.2 kbit/s (115.2 kbit/s by default) for bus length of 15 m - communication protocol: RS485 |
| Communication port protocol | Non isolated serial link : Modbus protocol master/slave - RTU/ASCII or SoMachine-Network USB port : USB protocol - SoMachine-Network |
| Local signalling | 1 LED per channel green for I/O state 1 LED green for SL2 1 LED green for SL1 1 LED red for BAT 1 LED green for SD card access (SD) 1 LED red for module error (ERR) 1 LED green for RUN 1 LED green for PWR |
| Electrical connection | Mini B USB 2.0 connector for a programming terminal Connector, 4 terminal(s) for analogue inputs Terminal block, 3 terminal(s) for connecting the 24 V DC power supply Removable screw terminal block for outputs Removable screw terminal block for inputs |
| Cable length | <= 30 m unshielded cable for output <= 10 m shielded cable for fast input <= 30 m unshielded cable for input |

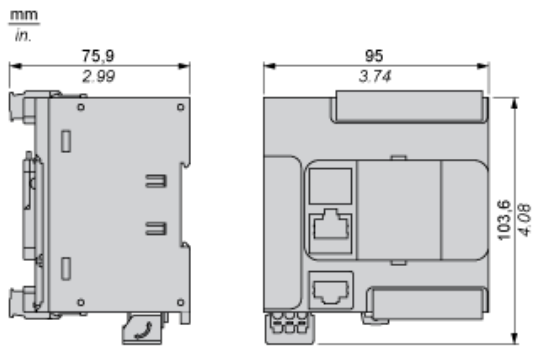
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|---------------------|---|
| Insulation | Non-insulated between analogue inputs Non-insulated between analogue input and internal logic 500 V AC between output groups 500 V AC between output and internal logic Non-insulated between inputs 500 V AC between fast input and internal logic 500 V AC between input and internal logic |
| Marking | CE |
| Sensor power supply | 24 V DC at 250 mA supplied by the controller |
| Mounting support | Plate or panel with fixing kit Top hat type TH35-7.5 rail conforming to IEC 60715 Top hat type TH35-15 rail conforming to IEC 60715 |
| Height | 70 mm |
| Depth | 70 mm |
| Width | 95 mm |
| Product weight | 0.346 kg |

Environment

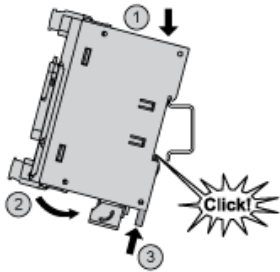
| | |
|---|---|
| Standards | EN/IEC 61131-2 EN/IEC 61010-2-201 |
| Product certifications | CSA CULus IACS E10 RCM |
| Resistance to electrostatic discharge | 4 kV on contact conforming to EN/IEC 61000-4-2 8 kV in air conforming to EN/IEC 61000-4-2 |
| Resistance to electromagnetic fields | 1 V/m (2 GHz...3 GHz) conforming to EN/IEC 61000-4-3 3 V/m (1.4 GHz...2 GHz) conforming to EN/IEC 61000-4-3 10 V/m (80 MHz...1 GHz) conforming to EN/IEC 61000-4-3 |
| Resistance to magnetic fields | 30 A/m at 50...60 Hz conforming to EN/IEC 61000-4-8 |
| Resistance to fast transients | 1 kV for serial link conforming to EN/IEC 61000-4-4 1 kV for Ethernet line conforming to EN/IEC 61000-4-4 1 kV for I/O conforming to EN/IEC 61000-4-4 2 kV for relay output conforming to EN/IEC 61000-4-4 2 kV for power lines conforming to EN/IEC 61000-4-4 |
| Surge withstand | 1 kV for relay output in differential mode conforming to EN/IEC 61000-4-5 1 kV for power lines (AC) in differential mode conforming to EN/IEC 61000-4-5 0.5 kV for power lines (DC) in differential mode conforming to EN/IEC 61000-4-5 1 kV for shielded cable in common mode conforming to EN/IEC 61000-4-5 1 kV for I/O in common mode conforming to EN/IEC 61000-4-5 2 kV for relay output in common mode conforming to EN/IEC 61000-4-5 2 kV for power lines (AC) in common mode conforming to EN/IEC 61000-4-5 1 kV for power lines (DC) in common mode conforming to EN/IEC 61000-4-5 |
| Resistance to conducted disturbances, induced by radio frequency fields | 10 Vrms (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) 3 Vrms (0.1...80 MHz) conforming to Marine specification (LR, ABS, DNV, GL) 10 Vrms (0.15...80 MHz) conforming to EN/IEC 61000-4-6 |
| Electromagnetic emission | Radiated emissions conforming to EN/IEC 55011 class A 10 m, 230 MHz...1 GHz : 47 dB μ V/m QP Radiated emissions conforming to EN/IEC 55011 class A 10 m, 30...230 MHz : 40 dB μ V/m QP Conducted emissions conforming to EN/IEC 55011 power lines, 1.5...30 MHz : 63 dB μ V/m QP Conducted emissions conforming to EN/IEC 55011 power lines, 150 kHz...1.5 MHz : 79...63 dB μ V/m QP Conducted emissions conforming to EN/IEC 55011 power lines, 10...150 kHz : 120...69 dB μ V/m QP Conducted emissions conforming to EN/IEC 55011 power lines (AC), 0.5...300 MHz : 73 dB μ V/m QP/60 dB μ V/m AV Conducted emissions conforming to EN/IEC 55011 power lines (AC), 0.15...0.5 MHz : 79 dB μ V/m QP/66 dB μ V/m AV |
| Immunity to microbreaks | 10 ms |
| Ambient air temperature for operation | -10...35 °C for vertical installation -10...55 °C for horizontal installation |
| Ambient air temperature for storage | -25...70 °C |
| Relative humidity | 10...95 % without condensation in storage 10...95 % without condensation in operation |
| 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 | 3 gn (vibration frequency: 8.4...150 Hz) on panel mounting 3.5 mm (vibration frequency: 5...8.4 Hz) on panel mounting 3 gn (vibration frequency: 8.4...150 Hz) on symmetrical rail 3.5 mm (vibration frequency: 5...8.4 Hz) on symmetrical rail |
| Shock resistance | 10 gn (test wave duration:11 ms) |

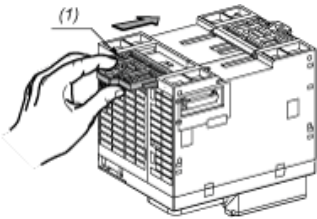
Dimensions



Mounting on a Rail

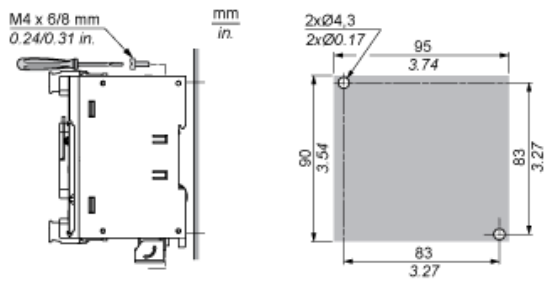


Direct Mounting on a Panel Surface



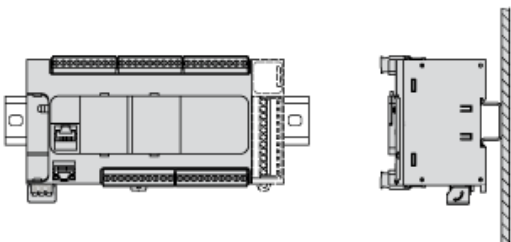
(1) Install a mounting strip

Mounting Hole Layout

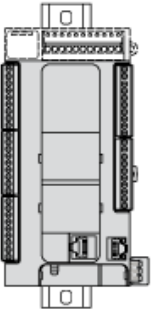


Mounting

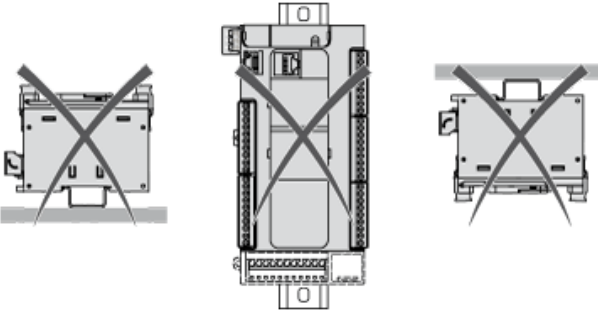
Correct Mounting Position



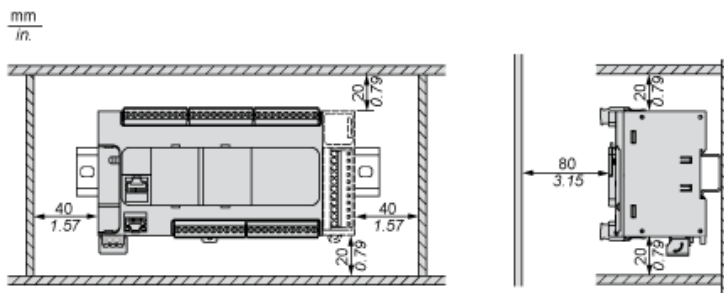
Acceptable Mounting Position



Incorrect Mounting Position

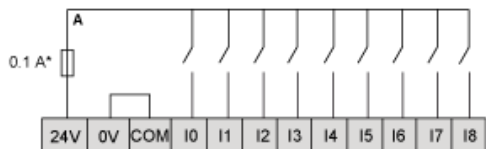


Clearance



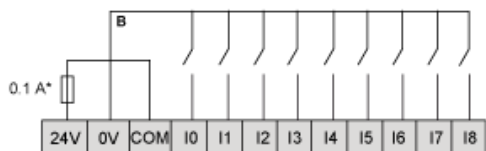
Digital Inputs

Wiring Diagram (Positive Logic)



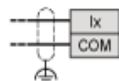
(* Type T fuse

Wiring Diagram (Negative Logic)



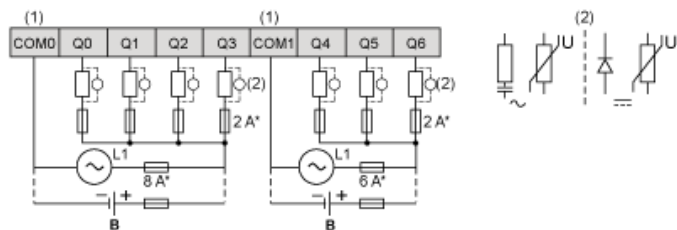
(* Type T fuse

Connection of the Fast Inputs



Relay Outputs

Positive Logic (Sink)

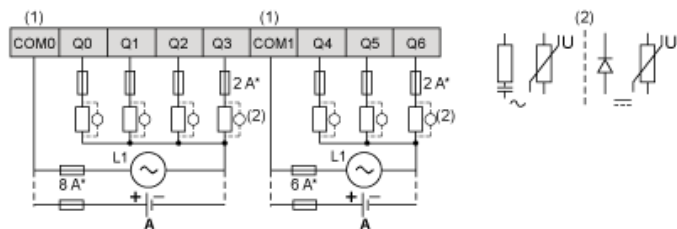


(* Type T fuse

(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

Negative Logic (Source)

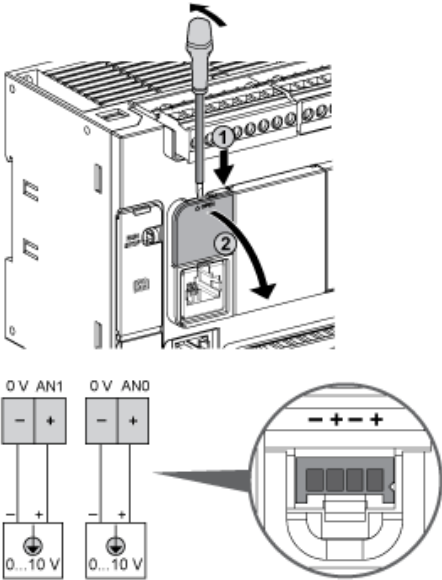


(* Type T fuse

(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

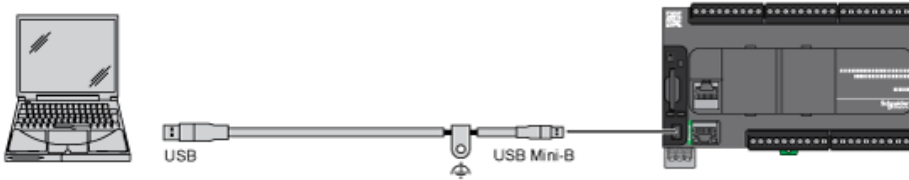
Analog Inputs



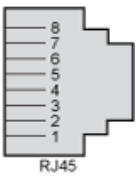
The (-) poles are connected internally.

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

USB Mini-B Connection



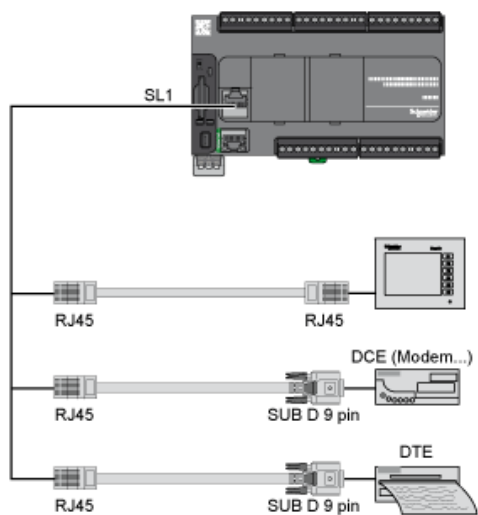
SL1 Connection



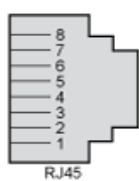
SL1

| N ° | RS 232 | RS 485 |
|-----|--------|---------|
| 1 | RxD | N.C. |
| 2 | TxD | N.C. |
| 3 | RTS | N.C. |
| 4 | N.C. | D1 (A+) |
| 5 | N.C. | D0 (B-) |
| 6 | CTS | N.C. |
| 7 | N.C. | 5 Vdc |
| 8 | Common | Common |

N.C.: not connected



SL2 Connection

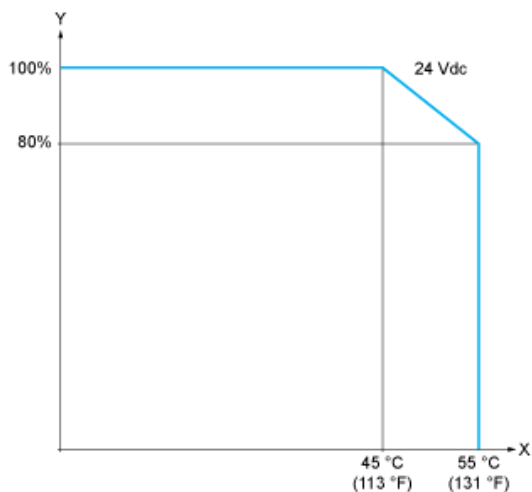


| N ° | RS 485 |
|-----|---------|
| 1 | N.C. |
| 2 | N.C. |
| 3 | N.C. |
| 4 | D1 (A+) |
| 5 | D0 (B-) |
| 6 | N.C. |
| 7 | N.C. |
| 8 | Common |

N.C.: not connected

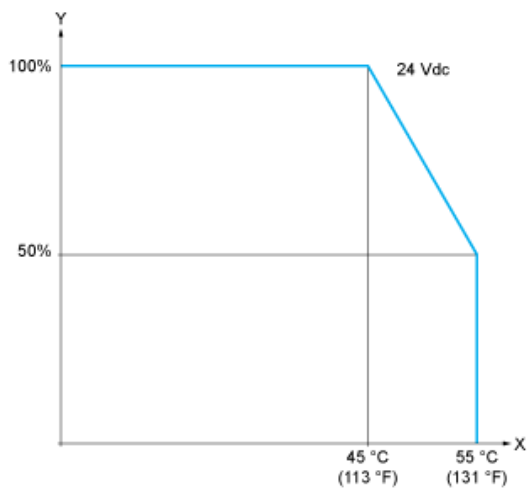
Derating Curves

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