



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 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	8 relay
Discrete output voltage	5...125 V DC 5...250 V AC
Discrete output current	2 A

Complementary

Discrete I/O number	16
Number of I/O expansion module	<= 7 with <= 92 discrete output(s) for relay output
Supply voltage limits	19.2...28.8 V
Inrush current	<= 35 A
Power consumption in W	<= 22.5 W at 24 V
Power supply output current	0.52 A at 5 V for expansion bus 0.45 A at 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 analog input
Permitted overload on inputs	+/- 30 V DC for analog input with 5 min maximum +/- 15 V DC for analog input permanent
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 4.5 mA for fast input
Input impedance	3.4 kOhm for input 4.9 kOhm for fast input 100 kOhm for analog input
Response time	5 µs turn-on operation for fast input 5 µs turn-off operation for fast input 10 ms turn-on operation for output 35 µs turn-off operation for input; I2...I5 terminal 35 µs turn-on operation for input; I2...I5 terminal 100 µs turn-on operation for input; I8...I15 terminal 100 µs turn-off operation for input; I8...I15 terminal 10 ms turn-off operation for output
Configurable filtering time	0 ms for input 12 ms for input 3 ms for input
Output voltage limits	125 V DC 277 V AC
Current per output common	8 A
Absolute accuracy error	+/- 1 % of full scale for analog input
Electrical durability	Inductive AC-15, (cos phi = 0.35) 240 V / 120 VA : 100000 cycles Resistive DC-12, 24 V / 48 W : 100000 cycles

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Resistive AC-12, 120 V / 240 VA : 100000 cycles
 Inductive AC-15, (cos phi = 0.35) 240 V / 36 VA : 300000 cycles
 Resistive AC-12, 120 V / 80 VA : 300000 cycles
 Inductive (L/R = 7 ms) DC-13, 24 V / 24 W : 100000 cycles
 Resistive DC-12, 24 V / 16 W : 300000 cycles
 Inductive (L/R = 7 ms) DC-13, 24 V / 7.2 W : 300000 cycles
 Inductive AC-14, (cos phi = 0.7) 240 V / 240 VA : 100000 cycles
 Inductive AC-15, (cos phi = 0.35) 120 V / 60 VA : 100000 cycles
 Inductive AC-14, (cos phi = 0.7) 240 V / 72 VA : 300000 cycles
 Inductive AC-15, (cos phi = 0.35) 120 V / 18 VA : 300000 cycles
 Resistive AC-12, 240 V / 480 VA : 100000 cycles
 Inductive AC-14, (cos phi = 0.7) 120 V / 120 VA : 100000 cycles
 Resistive AC-12, 240 V / 160 VA : 300000 cycles
 Inductive AC-14, (cos phi = 0.7) 120 V / 36 VA : 300000 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 640 kB for system memory RAM
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 0.7 ms for other instruction
Execution time per instruction	0.2 µs Boolean
Ext time for event task	60 µs response time
Application structure	1 configurable freewheeling/cyclic master task 1 cyclic auxiliary task 8 interrupt tasks
Maximum size of object areas	512 %M memory bits 8000 %MW memory words 512 %KW constant words 255 %TM timers 255 %C counters
Realtime clock	With
Clock drift	<= 30 s/month at 25 °C
Regulation loop	Adjustable PID regulator up to 14 simultaneous loops
Control signal type	A/B signal at 50 kHz for fast input (HSC mode) Single phase signal at 100 kHz for fast input (HSC mode) Pulse/direction signal at 100 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	USB port with connector mini B USB 2.0 Non isolated serial link "serial 1" with connector RJ45 and interface RS485 Non isolated serial link "serial 2" with connector RJ45 and interface RS232/RS485
Supply	Serial 1 serial link supply at 5 V 200 mA
Transmission rate	1.2...115.2 kbit/s (115.2 kbit/s by default) for bus length of 15 m - communication protocol: RS485 1.2...115.2 kbit/s (115.2 kbit/s by default) for bus length of 3 m - communication protocol: RS232 480 Mbit/s - communication protocol: USB
Communication port protocol	USB port : USB protocol - SoMachine-Network Non isolated serial link : Modbus protocol master/slave - RTU/ASCII or SoMachine-Network
Communication service	Modbus master Modbus slave
Local signalling	1 LED red for module error (ERR) 1 LED green for PWR 1 LED green for RUN 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	Mini B USB 2.0 connector for a programming terminal Terminal block, 3 terminal(s) for connecting the 24 V DC power supply Connector, 4 terminal(s) for analogue inputs

	Removable spring terminal block, 10 terminal(s) for inputs Removable spring terminal block, 11 terminal(s) for outputs
Cable length	<= 10 m shielded cable for fast input <= 30 m unshielded cable for input <= 30 m unshielded cable for output
Insulation	500 V AC between fast input and internal logic Non-insulated between inputs Non-insulated between analogue inputs 500 V AC between output and internal logic 500 V AC between input and internal logic Non-insulated between analogue input and internal logic 500 V AC between output groups
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
Product weight	0.264 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	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 GHz...3 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	2 kV for power lines conforming to EN/IEC 61000-4-4 2 kV for relay output conforming to EN/IEC 61000-4-4 1 kV for Ethernet line conforming to EN/IEC 61000-4-4 1 kV for serial link conforming to EN/IEC 61000-4-4 1 kV for I/O conforming to EN/IEC 61000-4-4
Surge withstand	1 kV for power lines (DC) 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 2 kV for relay output 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 1 kV for shielded cable in common 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 power lines (AC) in differential mode conforming to EN/IEC 61000-4-5 1 kV for relay output in differential mode conforming to EN/IEC 61000-4-5
Resistance to conducted disturbances, induced by radio frequency fields	10 Vrms (0.15...80 MHz) conforming to EN/IEC 61000-4-6 3 Vrms (0.1...80 MHz) conforming to Marine specification (LR, ABS, DNV, GL) 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)
Electromagnetic emission	Conducted emissions conforming to EN/IEC 55011 power lines (AC), 0.15...0.5 MHz : 79 dBµV/m QP/66 dBµV/m AV Conducted emissions conforming to EN/IEC 55011 power lines (AC), 0.5...300 MHz : 73 dBµV/m QP/60 dBµV/m AV Conducted emissions conforming to EN/IEC 55011 power lines, 10...150 kHz : 120...69 dBµV/m QP Conducted emissions conforming to EN/IEC 55011 power lines, 150 kHz...1.5 MHz : 79...63 dBµV/m QP Conducted emissions conforming to EN/IEC 55011 power lines, 1.5...30 MHz : 63 dBµV/m QP Radiated emissions conforming to EN/IEC 55011 class A 10 m, 30...230 MHz : 40 dBµV/m QP Radiated emissions conforming to EN/IEC 55011 class A 10 m, 230 MHz...1 GHz : 47 dBµV/m QP
Immunity to microbreaks	10 ms
Ambient air temperature for operation	-10...55 °C for horizontal installation -10...35 °C for 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	3.5 mm (vibration frequency: 5...8.4 Hz) on symmetrical rail 3 gn (vibration frequency: 8.4...150 Hz) on symmetrical rail 3.5 mm (vibration frequency: 5...8.4 Hz) on panel mounting 3 gn (vibration frequency: 8.4...150 Hz) on panel mounting
Shock resistance	10 gn (test wave duration: 11 ms)