Product data sheet
Characteristics

TM221C16R
logic controller, Modicon M221, 16 IO, 7 relay outputs, 100â€¦240V AC



Main

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
Analogue input number	2 at 0...10 V
Discrete output type	Relay normally open
Discrete output number	7 relay
Discrete output voltage	5...125 V DC 5...250 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	85…264 V
Network frequency	50/60 Hz
Inrush current	40 A
Maximum power consumption in VA	46 VA at 100...240 V with max number of I/O expansion module 31 VA at 100...240 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, I2...I5 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, 240 V, 480 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, 120 V, 18 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
Control signal type	Single phase Frequency meter Dual phase (quadrature) Dual phase (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)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

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	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
Insulation	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
Marking	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
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	RCM[RETURN]ABS[RETURN]LR[RETURN]DNV-GL[RETURN]EAC[RETURN]cULus[RETURN
Environmental characteristic	Ordinary and hazardous location
Resistance to electrostatic discharge	8 KV in air conforming to IEC 61000-4-2 4 KV on contact conforming to IEC 61000-4-2
Resistance to electromagnetic fields	10 V/M 80 MHz...1 GHz conforming to IEC 61000-4-3 3 V/M 1.4 GHz...2 GHz conforming to IEC 61000-4-3 1 V/M 2...2.7 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 disturbances	10 V 0.15...80 MHz conforming to 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 spec

Electromagnetic emission	Conducted emissions - test level: 79 dBµV/m QP/66 dBµV/m AV (power lines (AC)) at 0.15…0.5 M Conducted emissions - test level: 73 dBµV/m QP/60 dBµV/m AV (power lines (AC)) at 0.5…300 M Conducted emissions - test level: 120...69 dBµV/m QP (power lines) at 10…150 kHz conforming Conducted emissions - test level: 63 dBµV/m QP (power lines) at 1.5…30 MHz conforming to IEC Radiated emissions - test level: 40 dBµV/m QP class A (10 m) at 30…230 MHz conforming to IEC Conducted emissions - test level: 79...63 dBµV/m QP (power lines) at 150…1500 kHz conforming Radiated emissions - test level: 47 dBµV/m QP class A (10 m) at 200…1000 MHz conforming to I
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	3.5 mm at 5…8.4 Hz on symmetrical rail 3.5 mm at 5…8.4 Hz on panel mounting 1 gn at 8.4…150 Hz on symmetrical rail 1 gn at 8.4…150 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

Offer Sustainability

Recyclability potential, in %	0
Total lifecycle Carbon footprint	78 kg CO2 eq.
Carbon footprint of the manufacturing phase [A1 to A3]	11.102144169944033
Carbon footprint of the manufacturing phase [A1 to A3]	11 kg CO2 eq.
Carbon footprint of the distribution phase [A4]	0.6869216485302384
Carbon footprint of the distribution phase [A4]	0.7 kg CO2 eq.
Carbon footprint of the installation phase [A5]	0.005100009556700557
Carbon footprint of the installation phase [A5]	0 kg CO2 eq.
Carbon footprint of the use phase [B2, B3, B4, B6]	65.71929521021859
Carbon footprint of the use phase [B2, B3, B4, B6]	66 kg CO2 eq.
Mercury free	Yes
Sustainable packaging	No
Carbon footprint of the end-of-life phase [C1 to C4]	0.6535249198975186
Carbon footprint of the end-of-life phase [C1 to C4]	0.7 kg CO2 eq.
Environmental Disclosure	Product Environmental Profile

Total lifecycle Carbon footprint	78
Packaging made with recycled cardboard	Yes
Packaging without single use plastic	No
SCIP Number	Db4bbd5b-c14f-4e05-90f0-9ef8d1e54486
REACh Regulation	Reference contains Substances of Very High Concern above the threshold
EU RoHS Directive	Compliant By Exemption
California proposition 65	WARNING: This product can expose you to chemicals including: Lead and lead compounds, w
PVC free	Yes
End of life manual availability	End Of Life Information
Take-back	No
WEEE Label	The product must be disposed on European Union markets following specific waste collection a

Contractual warranty

Warranty (in months)	18

Product Life Status : Commercialised