



Main

Range of product	Modicon M238 logic controller
Product or component type	Compact base
Product specific application	-
Discrete I/O number	24
Discrete input number	8 fast input conforming to EN/IEC 61131-2 type 1 6 input conforming to EN/IEC 61131-2 type 1
Discrete input voltage	24 V
Discrete input voltage type	DC
Discrete output number	6 output 4 fast output
Discrete output voltage	24 V DC
Number of I/O expansion module	7
[Us] rated supply voltage	24 V DC
Memory description	Internal RAM 1000 kB
Data backed up	Variables of type retain and retain persistent optional battery lithium thionyl chloride (TSXPLP01) 1 year Variables of type retain and retain persistent internal battery 3 days 22 hrs 10 yr
Mounting support	35 mm symmetrical DIN rail Panel

Complementary

Discrete input logic	Sink or source (positive/negative) input Positive logic (sink) fast input
Number of common point	4 fast input 2 output 1 input 1 fast output
Sensor power supply	19.2...30 V DC
Voltage state1 guaranteed	>= 15 V input/fast input
Current state 1 guaranteed	>= 2 mA input/fast input
Voltage state 0 guaranteed	<= 5 V input/fast input
Current state 0 guaranteed	<= 1.5 mA input/fast input
Discrete input current	8 mA fast input 10.4 mA input
Input impedance	3 kOhm fast input 2.3 kOhm input
Response time	300 ns fast input 3 ms input 0.25 ms fast output < 1 ms output
Configurable filtering time	4 ms fast input 2 ms fast input 1 ms fast input 0.4 ms fast input 0.004 ms fast input
Anti bounce filtering	4 ms configurable input/fast input 12 ms configurable input/fast input 1.5 ms configurable input/fast input 0 ms configurable input/fast input

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Input frequency	<= 100 kHz input <= 100 kHz fast input (normal mode) <= 100 kHz fast input (counter mode)
Cable length	<= 30 m shielded cable fast output (normal mode) <= 30 m output <= 30 m input <= 30 m fast input (normal mode) <= 10 m shielded cable fast input (counter mode) <= 10 m fast output (PWM or PTO mode)
Isolation between channels and internal logic	500 V DC
Isolation between channels	None input 500 V for output and fast output 500 V for group of 2 fast inputs
Discrete output logic	Positive logic (source)/negative logic (sink)
Output voltage limits	19.2...30 V
Discrete output current	20...500 mA output <= 500 mA fast output (normal mode) <= 100 mA fast output (PWM mode) <= 100 mA fast output (PTO mode)
Output frequency	<= 20 kHz fast output (PWM mode) <= 100 kHz output <= 100 kHz fast output (PTO mode)
Absolute accuracy error	1 % of full scale fast output (PTO mode) 1 % of full scale cyclic ratio 20...80% fast output (PWM mode)
Leakage current	0.05 mA output <= 2 mA fast output
[Ures] residual voltage	<= 2 V output and fast output
Tungsten load	<= 3 W output and fast output
Short-circuit protection	With output and fast output
Overvoltage protection	With output and fast output
Overload protection	With output and fast output
Input/Output number	<= 248 HE-10 connector with I/O expansion module <= 192 spring terminal block with I/O expansion module <= 136 removable screw terminal block with I/O expansion module
Supply voltage limits	19.2...28.8 V
Inrush current	<= 35 A
Power consumption in W	<= 17.2 W
Insulation resistance	> 10 MOhm at 500 V, between supply and earth terminals > 10 MOhm at 500 V, between I/O and earth terminals
Exact time for 1 Kinstruction	0.3 ms 70 % Boolean + 30 % fixed arithmetic
Execution time per instruction	7.25 µs arithmetic REAL floating by operation 5111 µs arithmetic REAL floating +, -, x operations 0.971 µs Boolean 0.648 µs arithmetic REAL floating LD and ST 0.506 µs arithmetic DINT double-word +, -, x operations 0.459 µs arithmetic DINT double-word LD and ST 0.439 µs arithmetic INT word +, -, x operations 0.42 µs arithmetic INT word LD and ST
Exct time for event task	0.95 ms arithmetic DINT double-word >= 0.75 ms arithmetic INT word <= 1.75 ms arithmetic REAL floating
System overhead	0.9 ms master task (I/O) 0.35 ms master task (advanced counting) 0.2 ms master task (PTO) 0.15 ms master task (simple counting) 0.15 ms master task (PWM, frequency meter)
Input output assignment	Reading/Writing I/O on extension modules Reading/Writing I/O on CANopen bus Reading/Writing I/O on base
Application structure	1 configurable freewheeling/cyclic master task 2 configurable freewheeling/cyclic/event auxiliary tasks 32 levels of priority between tasks 4 interrupt tasks
Realtime clock	With 10 s/month at 25 °C

Integrated connection type	CANopen removable screw terminal block CANopen 1 isolated serial link female RJ45 Modbus master/slave RTU/ASCII, character mode or SoMachine-Network RS232/RS485 1.2...38.4 kbit/s (19.2 kbit/s by default) 1 isolated serial link female RJ45 Modbus master/slave RTU/ASCII or SoMachine-Network RS485 1.2...115.2 kbit/s (115.2 kbit/s by default)
Supply	Serial link supply 5 V 200 mA
CANopen feature profile	DR 303-1 DS 301 V4.02
Transmission rate	800 kbit/s 50 m CANopen 500 kbit/s 100 m CANopen 50 kbit/s 1000 m CANopen 425 kbit/s 125 m CANopen 250 kbit/s 250 m CANopen 125 kbit/s 500 m CANopen 1000 kbit/s 20 m CANopen
Positioning functions	PWM/PTO 2 100 kHz
Counting input number	8 100 kHz 32 bits
Complementary function	Event processing PID
Marking	CE
Local signalling	1 LED SL2 1 LED SL1 1 LED PWR 1 LED per channel I/O state 1 LED module error (ERR) 1 LED CAN RUN 1 LED CAN ERR 1 LED Batt 1 LED RUN
Electrical connection	1 removable screw terminal block for connecting the 24 V DC power supply 1 removable screw terminal block (7 terminals) for connecting the sensors (inputs) 1 removable screw terminal block (6 terminals) for connecting the 6 preactuators (output) 1 removable screw terminal block (5 terminals) for connection to the CANopen bus 1 removable screw terminal block (12 terminals) for connecting the sensors (fast inputs) 1 removable screw terminal block (10 terminals) for connecting the 4 preactuators (fast output) 1 connector mini B USB 2.0 for a programming terminal
Product weight	0.595 kg

Environment

Immunity to microbreaks	10 ms
Dielectric strength	500 V for 1 minute, between supply and earth terminals 500 V for 1 minute, between I/O and earth terminals
Class	Class M20 <= 16 CANopen
Product certifications	CSA CTick GOST UL
Ambient air temperature for operation	-10...55 °C
Ambient air temperature for storage	-40...70 °C
Relative humidity	95 % without condensation
IP degree of protection	IP20
Pollution degree	<= 2
Operating altitude	0...2000 m
Storage altitude	0...3000 m
Vibration resistance	1 gn 3.5 mm (f= 5...150 Hz)
Shock resistance	15 gn for 11 ms
Height	118 mm
Depth	86 mm
Width	157 mm

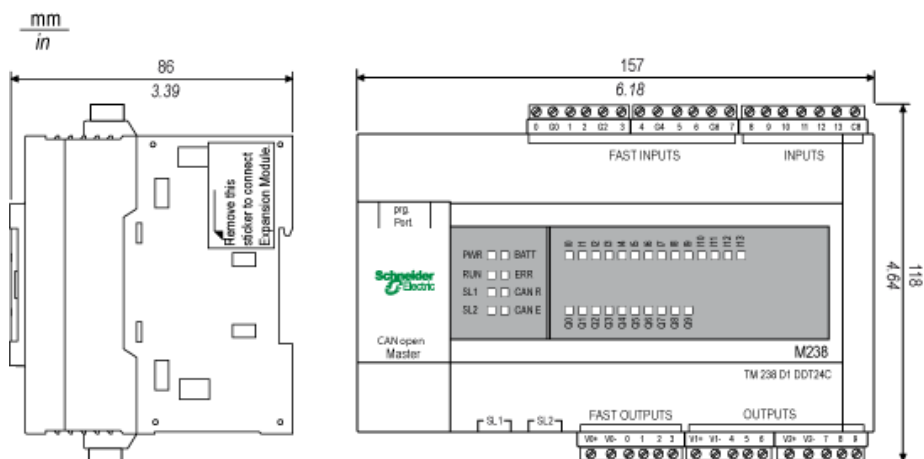
Offer Sustainability

Sustainable offer status

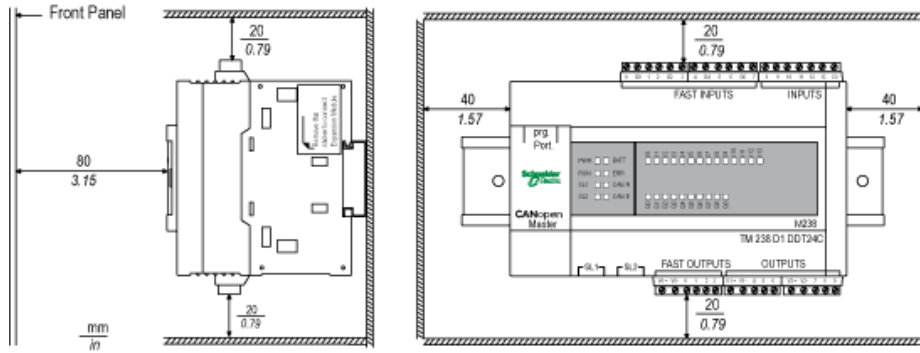
Not Green Premium product

Modicon M238 Logic Controller

Dimensions

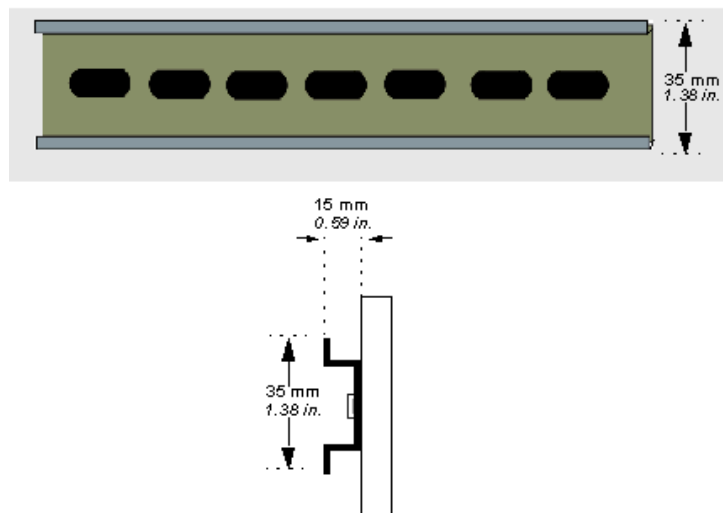


Clearance



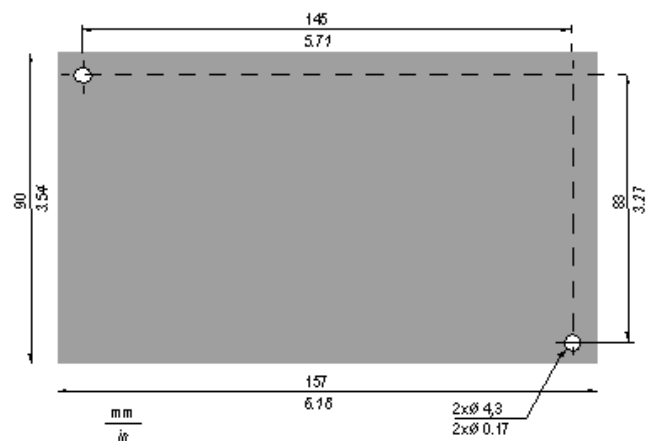
Mounting on a DIN Rail

Dimensions of the DIN Rail

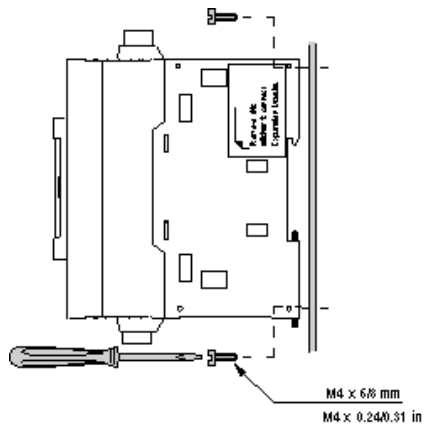


Mounting on a Metallic Panel

Mounting Holes



Mounting the Modicon M238 Logic Controller on a Metallic Panel



Wiring Requirements

Rules for Removable Screw Terminal Block

	mm ²	0,2...1,5	0,25...1,5	0,2...1	0,2...1,5	0,25...1
AWG	24...14	24...14	26...16	24...14	24...16	20...14

		N.m	0,6
		lb-in	5,3

Use copper conductors only.

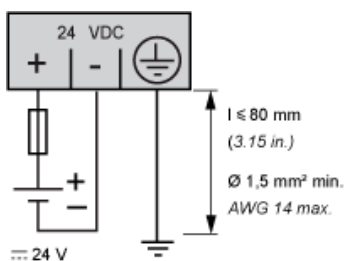
Rules for Removable Spring Terminal Block

	mm ²	0,2...1,5	0,25...1,5	0,25...1
AWG	24...14	24...14	24...16	20...14

Use copper conductors only.

DC Power Supply

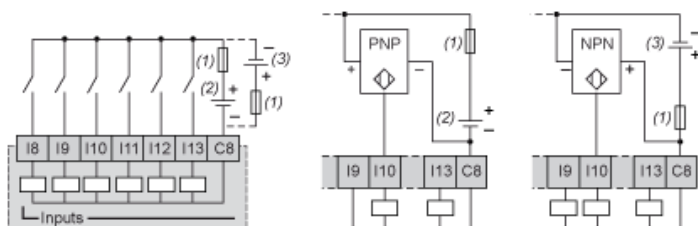
Wiring Diagram



Use an external fast-blow fuse 2 A type F (UL recognized and CSA approved).

Regular Inputs

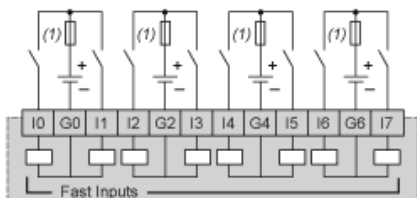
Wiring Diagram



- (1) Fast-blow fuse 0.5 A
- (2) Sink input (positive logic)
- (3) Source input (negative logic)

Fast Inputs

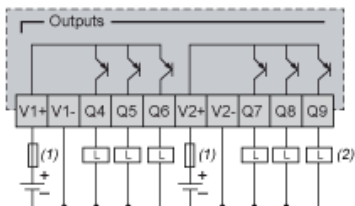
Wiring Diagram



- (1) Fast-blow fuse 0.5 A

Regular Outputs

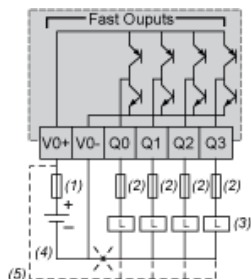
Wiring Diagram



- (1) Fast-blow fuse 2 A
- (2) Protection for inductive load

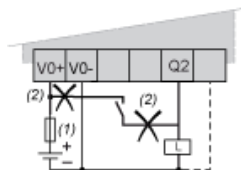
Fast Outputs

Wiring Diagram



- (1) 2 A fast-blow fuse
- (2) Fast-blow fuse: 0.5 A in standard use / 0.1 A in PTO use
- (3) Protection for inductive load
- (4) Positive logic output wiring
- (5) Negative logic output wiring

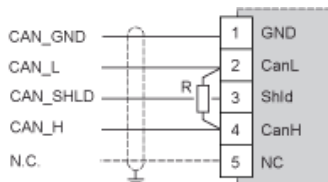
Example of an incorrect wiring on Q2:



- (1) 2 A fast-blow fuse
- (2) Incorrect wiring

CANopen Connection

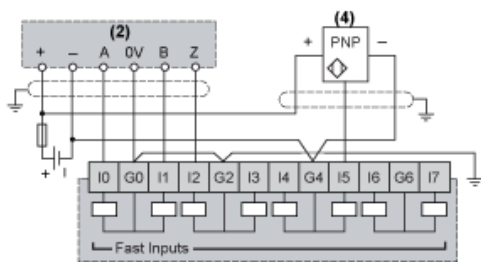
Wiring Diagram



R Line termination resistor (120 Ω)

Wiring Diagram Examples for 1 Encoder on Fast Inputs

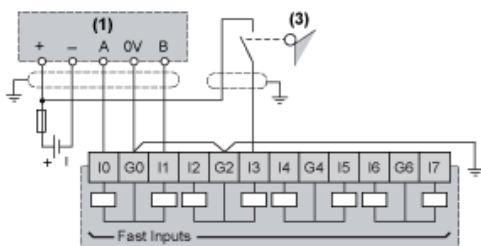
Incremental Encoder with Phase-Shifted Signals with TDC and 3-Wire PNP Detector



- (2) Dual-phase encoder with index
- (4) PNP sensor

Use a 0.5 A fast-blow fuse.

Incremental Encoder with Phase-Shifted Signals without TDC and Electromechanical Sensor

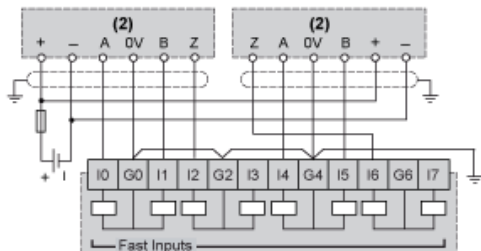


- (1) Dual-phase encoder without index
- (3) Limit switch

Use a 0.5 A fast-blow fuse.

Wiring Diagram Examples for 2 Encoders on Fast Inputs

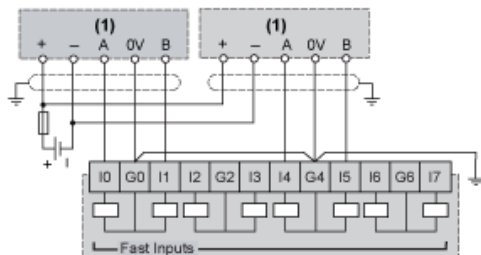
Incremental Encoders with Phase-Shifted Signals with TDC



- (2) Dual-phase encoder with index

Use a 0.5 A fast-blow fuse.

Incremental Encoders with Phase-Shifted Signals without TDC



- (1) Dual-phase encoder without index

Use a 0.5 A fast-blow fuse.