

› Millenium PLC

DC Power Supply

With/without display

- › Highly visible tricolor (green, white, orange) LCD display with 6 lines of 24 characters
- › Blind version: LED indication (Power / Status)
- › Expansion modules (up to 12 expansions)
- › Compatible with all the functions blocks available on the software
- › Wide operating temperature range (-20 °C → +55 °C)
- › Embedded Ethernet + Webserver
- › Modbus TCP (RS485 optional interface)
- › CrouzetSoft programming Ladder / FBD / SFC
- › Ladder front panel programming



MXB12SD1ET
without display



MXD12SD1ET
with display

Selection Guide				
Power supply	Inputs	Outputs	Without display	With display
12 → 24 V $\overline{\text{DC}}$	8 digital (including 4 analog & 4 High Speed)	4 relays - 8 A	MXB12RD7ET	MXD12RD7ET
24 V $\overline{\text{DC}}$	8 digital (including 4 analog & 4 High Speed)	4 solid state 0,5 A (including PWM)	MXB12SD1ET	MXD12SD1ET

Expansions & Interfaces		
Digital Expansions (same power supply as base)	Description	Part-number
MXR	12 → 24 V $\overline{\text{DC}}$, 8 DI, 8 DO relay outputs, 70 mm	MXR16D7
MXR	12 → 24 V $\overline{\text{DC}}$, 4 DI, 4 DO relay outputs, 35 mm	MXR08D7
MXS	24 V $\overline{\text{DC}}$, 8 DI, 8 DO Solid State Relay, 70 mm	MXS16D1
MXS	24 V $\overline{\text{DC}}$, 4 DI, 4 DO Solid State Relay, 35 mm	MXS08D1
Analog Expansions (can be independantly supplied)		
MXA	12 → 24 V $\overline{\text{DC}}$, 2 Analog (V/mA) inputs, 35 mm	MXAI02D7
MXA	12 → 24 V $\overline{\text{DC}}$, 2 RTD inputs, 35 mm	MXAI02PD7
Other Compatible Expansions		
Digital Expansions	See page 6	
Interfaces	Description	Part-number
	SD Memory Interface	MIMEMSD
	Modbus RS485 Interface (with polarization)	MI485P
	Modbus RS485 Interface (without polarization)	MI485

Codification BASE	M	X	D	12	R	U1	ET	Codification EXPANSION	M	X	R	16	U1
	M: Millenium	X: Expandable	Display D: With B: Without	Input/Output 08 / 04	S: Static Output R: Relay Output AI: Analog Input AO: Analog Output	Power Supply U1: 24 V $\overline{\text{DC}}$ U3: 110-240 V $\overline{\text{AC}}$ D1: 24 V $\overline{\text{DC}}$ D7: 12-24 V $\overline{\text{DC}}$	ET: Ethernet		M: Millenium	X: Expandable	S: Static Output R: Relay Output AI: Analog Input AO: Analog Output	Input/Output 16: 08 / 08 08: 04 / 04 02: 02 / 00 00 / 02	Power Supply U1: 24 V $\overline{\text{DC}}$ U3: 110-240 V $\overline{\text{AC}}$ D1: 24 V $\overline{\text{DC}}$ D7: 12-24 V $\overline{\text{DC}}$

You have a project ? Contact us on www.crouzet.com

Description:

The Millenium is the latest product in Crouzet's Millenium series. This is a compact, networked, and communicative PLC. Its flexible deployment and extensive configuration options with various extensions make it suitable for a wide range of applications.

Accompanied by powerful, intuitive software, it will support you throughout your automation needs.

For more information about **Millenium**: please visit www.crouzet.com

MX*12RD7ET (12 → 24 V_{DC})MX*12SD1ET (24 V_{DC})

General Features

Ethernet Modbus TCP/IP (Client///Server)*	Yes (16 IP range /// 24 words + 16 bits)
* Client possible only with FBD programming language	
Modbus RTU RS485 (Client /// Server)*	Yes via interface MI485 or MI485P
* Client possible only with FBD programming language	
Webserver	Yes (Front face display, PLC status, Diagnosis, Run/stop, Update application, Download datalogs)
Datalog	On SD card* - 24 data channel (Not compatible with Modbus RTU RS485 interface) * SD card not included

Power Supply

Nominal voltage	12 → 24 V _{DC}	24 V _{DC}
Operating limits	10,8 → 28,8 V _{DC}	20,4 → 28,8 V _{DC}
Max. absorbed power	2W @ 12 V _{DC} 3W @ 28,8 V _{DC}	1,5W @ 20,4 V _{DC} 1,5W @ 28,8 V _{DC}
Immunity to micro power cuts	1 ms	
Power supply earthing	None	
Reverse polarity protection	Yes	
Power Monitoring	Yes Voltage value available through the Function Block "FB Status"	

Inputs

Used as Digital Inputs

Input voltage	0-28,8 V _{DC}	
Input current	I1...I4 ≈ 0,24 mA @ 10,8 V _{DC} ≈ 0,27 mA @ 12 V _{DC} ≈ 0,45 mA @ 20,4 V _{DC} ≈ 0,53 mA @ 24 V _{DC} ≈ 0,64 mA @ 28,8 V _{DC} I5...I8 ≈ 1,13 mA @ 10,8 V _{DC} ≈ 1,31 mA @ 12 V _{DC} ≈ 2,55 mA @ 20,4 V _{DC} ≈ 3,07 mA @ 24 V _{DC} ≈ 3,78 mA @ 28,8 V _{DC}	I1...I4 ≈ 0,45 mA @ 20,4 V _{DC} ≈ 0,53 mA @ 24 V _{DC} ≈ 0,64 mA @ 28,8 V _{DC} I5...I8 ≈ 2,55 mA @ 20,4 V _{DC} ≈ 3,07 mA @ 24 V _{DC} ≈ 3,78 mA @ 28,8 V _{DC}
Input impedance	(I1...I4): 40 KΩ (I5...I8): 13,4 KΩ	
Logic 1 voltage threshold	> 8,5 V _{DC}	> 12 V _{DC}
Making current at logic state 1	0,19 mA (I1...I4) 0,79 mA (I5...I8)	0,27 mA (I1...I4) 1,31 mA (I5...I8)
Logic 0 voltage threshold	< 5 V _{DC}	
Release current at logic state 0	0,11 mA (I1...I4) 0,29 mA (I5...I8)	
Response time	1 to 2 cycle time (normal input)	
Sensor type	Contact or 3-wire PNP	
Input type	Resistive	
Conforming to IEC/EN 61131-2	Type 1	
Isolation between power supply and inputs	None	
Isolation between inputs	None	
Protection against polarity inversions	Yes	
Status indicator	On Display (LCD) Only on LCD base	
Cable length	≤100m (Shielded)	

	MX*12RD7ET (12 → 24 V $\overline{\text{---}}$)	MX*12SD1ET (24 V $\overline{\text{---}}$)
Used as High Speed Inputs		
Quantity	4 High-Speed inputs -> from I5 to I8	
Input voltage	From 12 V $\overline{\text{---}}$ to 24 V $\overline{\text{---}}$	24 V $\overline{\text{---}}$
Voltage tolerance	From 10,8 V $\overline{\text{---}}$ to 28,8 V $\overline{\text{---}}$	From 20,4V to 28,8 V $\overline{\text{---}}$
Input impedance	13,4 K Ω	
Logic 1 voltage threshold	$\geq 8,5$ Vc (with duty cycle 50/50)	≥ 12 Vc (with duty cycle 50/50)
Making current at logic state 1	> 1 mA	> 1,5 mA
Logic 0 voltage threshold	≤ 5 Vc (with duty cycle 50/50)	
Release current at logic state 0	< 0,1 mA	
Maximum counting frequency	▪ 4 independent counters: 5 kHz* ▪ Function: Up, Down, Cumul, Dir, Independant & Codeur Ph, Ph2, Indexed * with Ton / Toff = 50% $\pm$ 5%	
Cable length	$\leq$ 100m (shield twist cable)	
Used as Analog Inputs		
Quantity	4 analogs inputs -> from I1 to I4	
Measuring range	0 V $\overline{\text{---}}$ → 10 V $\overline{\text{---}}$ 0 V $\overline{\text{---}}$ → V power supply	
Input impedance	40 K Ω	
Maximum value without destruction	28,8 V $\overline{\text{---}}$ Max	
Input type	Resistive	
Resolution	12 bits at maximum input voltage (10 bits at 10V)	
Value of LSB	7 mV	
Conversion time	Controller cycle time	
Maximum error at 25 °C (77 °F)	$\pm$ 5% of full scale at 25 °C	
Maximum error at 55 °C (131 °F)	$\pm$ 6,5% of full scale at 55 °C	
Repeat accuracy at 55 °C	$\pm$ 2%	
Isolation between analog channel and power supply	None	
Protection against polarity inversions	Yes	
Potentiometer control	10 K Ω max.	
Cable length	Max. 10 m (shield twist cable)	
Outputs		
Relay Outputs		
Quantity	4 relays outputs, from O1 to O4 (Normally open)	N/A
Max. breaking voltage	250 V $\sim$ 30 V $\overline{\text{---}}$	N/A
Max. Breaking current	8 A @ 230 V $\sim$ (resistive) 8A @ 30 V $\overline{\text{---}}$ (resistive)	N/A
Mechanical life	1x 10 ⁷	N/A
Electrical durability	Resistive load at 85 °C: 8 A, 250 V $\sim$, 50 K Cycles	N/A
Minimum switching capacity	100 mA (at minimum voltage of 12V)	N/A
Maximum operating rate	10Hz	N/A
Voltage for withstanding shocks	2kV	N/A
Response time	Make = 1 cycle time + 8 ms Release = 1 cycle time + 5 ms	N/A
Isolation between power supply and outputs	Yes	N/A
Isolation between outputs	Yes	N/A
Built-in protections	▪ Against short-circuits: None ▪ Against over voltages and overloads: None	N/A
Status indicator	On LCD screen (Only on PLC with display)	N/A
Cable length	$\leq$ 30 meter	N/A

	MX*12RD7ET (12 → 24 V $\overline{\text{---}}$)	MX*12SD1ET (24 V $\overline{\text{---}}$)
Static (transistor - Sourcing) Outputs		
Quantity	N/A	4 static outputs -> from O1 to O4
PWM solid state outputs*	N/A	4
Breaking voltage	N/A	10 to 28,8 V $\overline{\text{---}}$
Nominal voltage	N/A	12 / 24 V $\overline{\text{---}}$
Nominal current	N/A	0,5 A
Max. breaking current	N/A	0,625 A
Voltage drop	N/A	< 2V for I=0,5A
Min. load	N/A	10 mA
Response time	N/A	Make = 1 cycle time + 60 μ s max Release = 1 cycle time + 60 μ s max
Built-in protections - Short circuit proof	N/A	Yes
Built-in protections - Over load protection	N/A	Yes
Built-in protections - Over voltage protection	N/A	Yes
Built-in protections - Short circuit current limitation	N/A	Internally protected (Max 1,7 A per output)
Polarity inversion protection	N/A	Yes
Isolation between power supply and outputs	N/A	None
Isolation between outputs	N/A	None
Wiring	N/A	PNP
Status indicator	N/A	On LCD screen (Only on PLC with display)
Cable length	N/A	Max. 30 meter
PWM frequency	N/A	20Hz -> 1,8kHz
PWM cyclic ratio	N/A	0 -> 100%
PWM accuracy at 120 Hz	N/A	<2%
PWM accuracy at 500 Hz	N/A	<2%
Communication		
Ethernet connection	Type RJ45, 10/100 Mbit/s, MDI/MDIX	
Ethernet LED indicator	Green LED	
Addressing	Static or dynamic (DHCP server / Auto IP)	
Protocol supported	Discovery (PLC on network detection) CrouzetSoft communication via Ethernet (SSL/TLS) MODBUS TCP Server MODBUS TCP Client (FBD only)	
Cable length	Maximun length between 2 devices: 100 m / 3937 inch	
Ethernet earthing	Yes, refer to the installation guide supplied with the product	
Processing Characteristics		
Programming software	CrouzetSoft	
Maximum Number of I/O	24 DI + 20 DO + 8 AI + 8 AO	
Program size function blocks (FBD)	▪ Function blocks: typically 1000 blocks ▪ Macro blocks: 127 max. (255 blocks per macro and on main program)	
Number of lines in Ladder	250 lines	
LCD display	▪ MXD: Display with 6 lines of 24 characters ▪ Backlight 3 colors: White, Green, Orange ▪ MXB: No display. Power/Status LED indicator	
Programming method	Function blocks / SFC (Grafcet) or Ladder	
Program memory	Flash	
Data memory	2 k octets	
Back-up time in the event of power failure	▪ Program and settings in the controller: 10 years ▪ Data memory: 10 years	
Cycle time	▪ FBD: 14 → 200 ms (typically 20 ms) ▪ Ladder: typically 20 ms	
Response time	Input acquisition time: + 1 to 2 cycle times	

	MX*12RD7ET (12 → 24 V $\overline{\text{---}}$)	MX*12SD1ET (24 V $\overline{\text{---}}$)
Clock data retention	10 years (lithium battery) at 25 °C (77 °F)	
Clock drift	Typ. ± 2 s/day at 25 °C	
Timer block accuracy	0,5% ± 2 cycle times	
Start up time on power up	< 5 s	
Self tests	▪ Test firmware integrity (checksum memory) ▪ Stability of the internal power supply ▪ Check the conformity of the device configuration with the configuration in the application program.	

General & Environment Characteristics

Certifications	CE, cULus	
Environmental certifications	REACH, ROHS	
Conformity with the EMC directive (in accordance with 2014/53/UE)	IEC/EN 61000-6-1 (Residential, commercial, and light-industrial environments) IEC/EN 61000-6-2 (Industrial) IEC/EN 61000-6-3 (Residential, commercial, and light-industrial environments) IEC/EN 61000-6-4 (Industrial)	
Earthing	No	
Protection rating	In accordance with IEC/EN 60529: ▪ IP40 on front panel ▪ IP20 on terminal block	
Overvoltage category	2 in accordance with IEC/EN 60664-1	
Pollution	Degree: 2 in accordance with IEC/EN 61131-2	
Max operating Altitude (m)	Operation: 2000 Transport: 3000	
Mechanical resistance	Immunity to vibrations IEC/EN 60068-2-6, test Fc Immunity to shock IEC/EN 60068-2-27, 15 g peak, 11 ms duration	
Resistance to electrostatic discharge	IEC 61000-4-2 Level III (AD: ± 8 KV and CD: ± 4 KV), Criteria B	
Resistance to HF interference	Immunity to radiated electrostatic fields IEC 61000-4-3 Electrical fast transients IEC 61000-4-4 Surge IEC 61000-4-5 Conducted Susceptibility IEC 61000-4-6, Voltage dips As per IEC61131 -2	
Conducted and radiated emissions	CISPR11 Class B	
Operating temperature	-20 → +55 °C (-4 → 131 °F)	
Storage temperature	-30 → +70 °C (-22 → 158 °F)	
Relative humidity	10-95% no condensing	
Screw terminals connection capacity	▪ Euro type terminal ▪ Wire Size 1 x 24 to 12 (AWG) ▪ Solid wire Range: 1*2,5 mm² or 2*1,5 mm² ▪ Flexible wire Range: 1*2,5 mm² or 2*1,5 mm²	
Screw tightening Torque	0,4 N. m. (3,54 lb. in) (Including earth terminal)	
Clearance and creepage	IEC 60664, IEC 61131-2, IEC 61010	

Mechanical Specifications

Mounting type	Base / Din-Rail Mounting	
Housing material	Polycarbonate	
Housing Color	Light Gray RAL 7035 (sole black RAL9011)	
Dimensions (W x H x D) (mm)	72 x 90 x 63,1 for bases with display 72 x 90 x 61,1 for bases without display	
Weight (g)	225 for bases with display 195 for bases without display	203 for bases with display 172 for MXB for bases without display
Enclosure type	4 M	
DIN Rail mounting	Mounting in 35 mm symmetrical DIN rail (see installation sheet of instructions), compatible with modular enclosures	
Panel Mounting	Flat panel mounting by screws (see installation sheet of instructions)	

MX*12RD7ET (12 → 24 V_{DC})

MX*12SD1ET (24 V_{DC})

Other Expansions Capabilities

Compatible expansion only if supplied with same 24 V_{DC} Power Supply than base

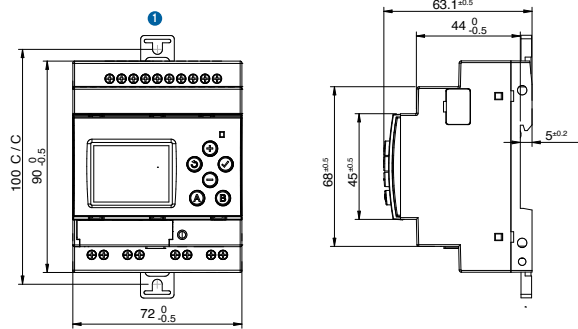
MXA	24 V _{DC} , 2 Analog (V/mA) outputs, 35 mm MXAO02D1
MXR	24 V _{AC} , 4 DI, 4 relays outputs, 35 mm MXR08U1
Digital expansions Relay	24 V _{AC} , 8 DI, 8 relays outputs, 70 mm MXR16U1

Product Dimensions

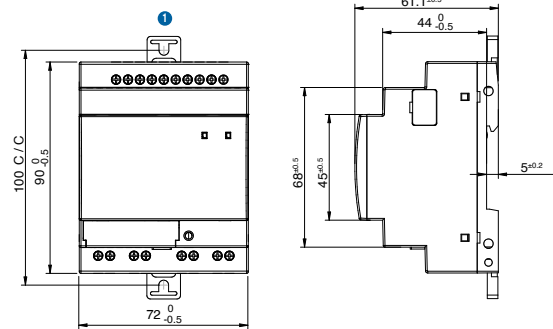
Front and Side

24 V_{DC} / 12 → 24 V_{DC}

With display - version 70 mm



Without display - version 70 mm



1 Fixing Bracket

Electronic & Wiring Diagrams

Inputs

Digital Inputs (DC Voltage)

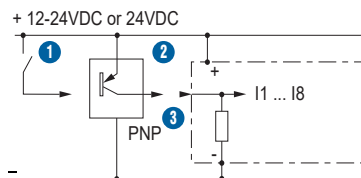
MXD12RD7ET, MXB12RD7ET → Inputs I1...I8

MXD12SD1ET, MXB12SD1ET → Inputs I1...I8

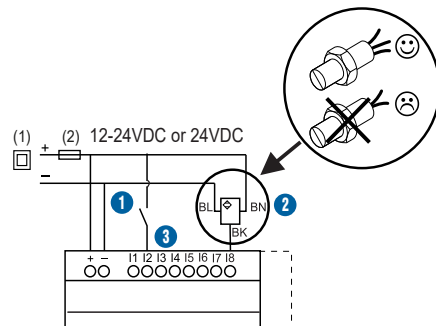
Electronic Diagram

Wiring Diagram

I1 ... I8 0/1



- 1 Contact
- 2 3-wire PNP sensor
- 3 Digital Input



- (1) Isolated source
- (2) 1A quick blowing fuse, circuit breaker, or circuit protector
- BN : Brown cable of the 3-Wire PNP sensor
- BL : Blue cable of the 3-Wire PNP sensor
- BK : Black cable of the 3-Wire PNP sensor

Inputs

High-Speed Inputs (Wiring of 3-wire PNP sensors)

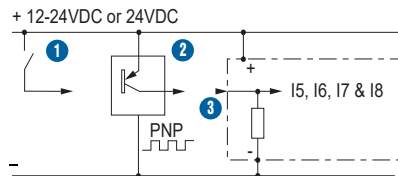
MXD12RD7ET, MXB12RD7ET → Inputs I5....I8

MXD12SD1ET, MXB12SD1ET → Inputs I5....I8

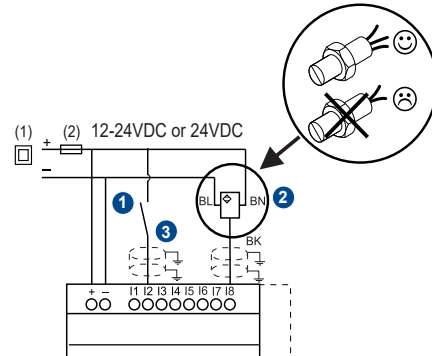
Electronic Diagram

Wiring Diagram

I5, I6, I7 & I8



- ① Contact
- ② 3-wire PNP sensor
- ③ Digital Input



- (1) Isolated source
- (2) 1A quick blowing fuse, circuit breaker, or circuit protector
- BN : Brown cable of the 3-Wire PNP sensor
- BL : Blue cable of the 3-Wire PNP sensor
- BK : Black cable of the 3-Wire PNP sensor

Inputs

High-Speed Inputs(Wiring of Encoders)

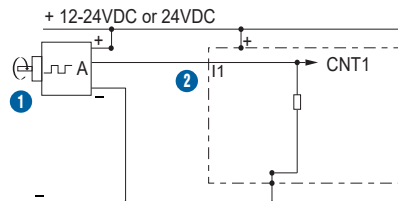
MXD12RD7ET, MXB12RD7ET → Inputs I5....I8

MXD12SD1ET, MXB12SD1ET → Inputs I5....I8

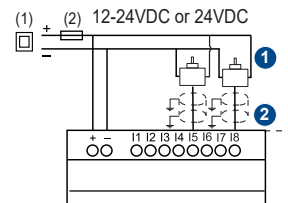
Electronic Diagram

Wiring Diagram

I5, I6, I7 & I8



- ① Encoder
- ② High-speed Input



- (1) Isolated source
- (2) 1A quick blowing fuse, circuit breaker, or circuit protector

Inputs

Analog Inputs

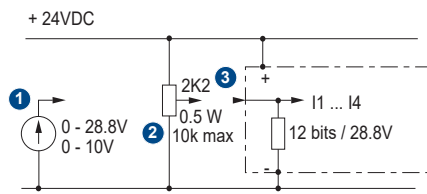
MXD12RD7ET, MXB12RD7ET → Inputs I1....I4

MXD12SD1ET, MXB12SD1ET → Inputs I1....I4

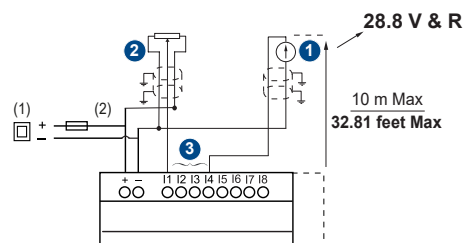
Electronic Diagram

Wiring Diagram

I1 ... I4 U



- ① 0-10V/0-28,8V
- ② Potentiometer
- ③ Analog Input



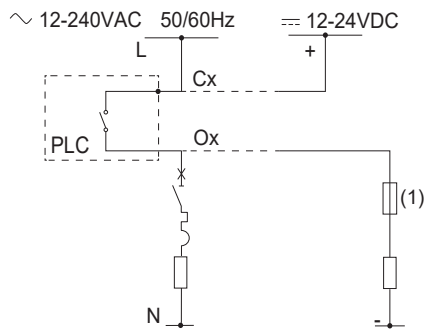
- (1) Isolated source
- (2) 1A quick blowing fuse, circuit breaker, or circuit protector

Outputs

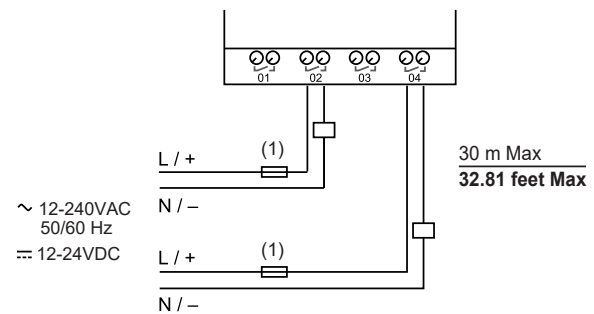
Relay Outputs

MXD12RD7ET, MXB12RD7ET

Electronic Diagram



Wiring Diagram



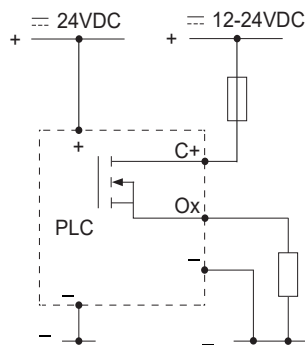
(1) Fuse, circuit breaker or current protector as per relay rating.
For 8A relay use 8A circuit breaker or current protector.
For 5A relay use 5A circuit breaker or current protector.

Outputs

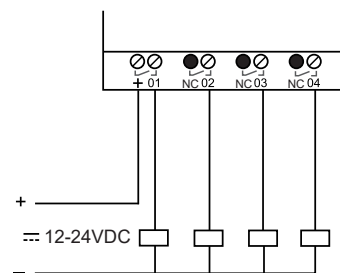
Static / PWM Outputs

MXD12SD1ET, MXB12SD1ET

Electronic Diagram



Wiring Diagram



Warning :

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