

# M91-2-R2C

12/24 VDC, 10 pnp/npn digital inputs, 2 analog inputs, 3 high-speed counter/shaft encoder inputs, 6 relay outputs, I/O expansion port, RS232/RS485 port plus CANbus

<b>Power supply</b>	12VDC or 24VDC
Permissible range	10.2VDC to 28.8VDC with less than 10% ripple
Maximum current consumption	180mA@24VDC (pnp inputs) 260mA@24VDC (npn inputs) 220mA@12VDC (pnp inputs) 330mA@12VDC (nnp inputs)
<b>Digital inputs</b>	10 pnp (source) or npn (sink) inputs. See Note 1.
Nominal input voltage	12VDC or 24VDC. See Notes 2 and 3.
Input voltages for pnp (source):	
For 12VDC	0-3VDC for Logic '0' 8-15.6VDC for Logic '1'
For 24VDC	0-5VDC for Logic '0' 17-28.8VDC for Logic '1'
Input voltages for npn (sink):	
For 12VDC	8-15.6VDC/<1.2mA for Logic '0' 0-3VDC/>3mA for Logic '1'
For 24VDC	17-28.8VDC/<2mA for Logic '0' 0-5VDC/>6mA for Logic '1'
Input current	4mA@12VDC 8mA@24VDC
Input impedance	3KΩ
Response time (except high-speed inputs)	10mS typical
Galvanic isolation	None
Input cable length	Up to 100 meters, unshielded
<b>High-speed counter</b>	Specifications below apply when inputs are wired for use as a high-speed counter input/shaftencoder. See Notes 4 and 5.
Resolution	16-bit
Input freq.	10kHz max.
Minimum pulse	40μs

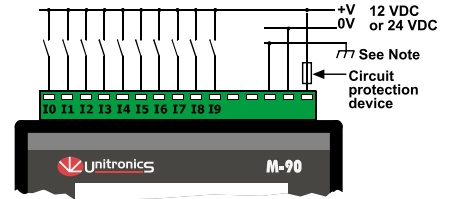
**Notes:**

- All 10 inputs can be set to pnp (source) or npn (sink) via a single jumper and appropriate wiring.
- All 10 inputs can function in 12 VDC or 24 VDC; set via a single jumper and appropriate wiring.
- nnp (sink) inputs use voltage supplied from the controller's power supply.
- Inputs #0, #2 and #4 can each function as either high-speed counter or as part of a shaft encoder. In each case, high-speed input specifications apply. When used as a normal digital input, normal input specifications apply.
- Inputs #1, #3 and #5 can each function as either counter reset, or as a normal digital input; in either case, specifications are those of a normal digital input. These inputs may also be used as part of a shaft encoder. In this case, high-speed input specifications apply.

**Warnings:**

- Unused pins should not be connected. Ignoring this directive may damage the controller.
- Improper use of this product may severely damage the controller.
- Refer to the controller's User Guide regarding wiring considerations.
- Before using this product, it is the responsibility of the user to read the product's User Guide and all accompanying documentation.

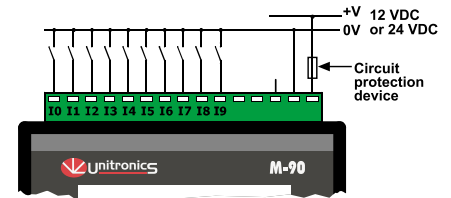
**Power supply, pnp (source) inputs**



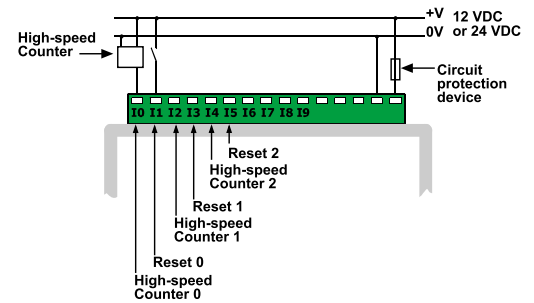
**Note:**

To avoid electromagnetic interference, mount the controller in a metal panel/cabinet and earth the power supply. Earth the power supply signal to the metal using a wire whose length does not exceed 10cm. If your conditions do not permit this, do not earth the power supply.

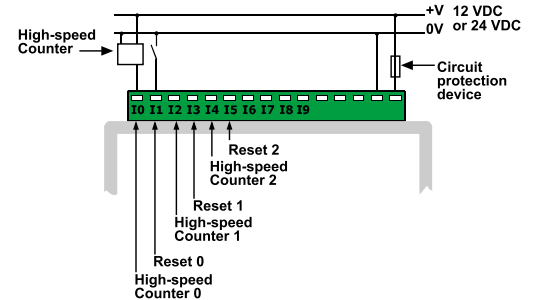
**nnp (sink) inputs**



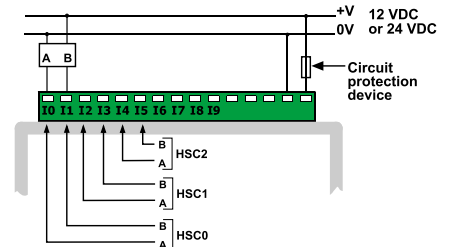
**pnp (source) high-speed counter**



**nnp (sink) high-speed counter**



**Shaft encoder**

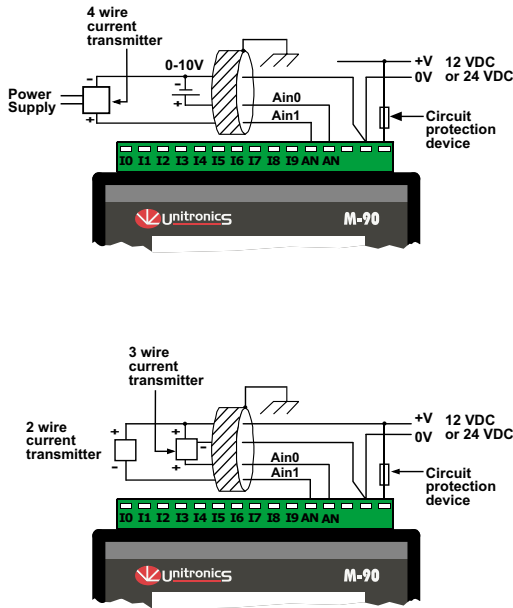


<b>Analog Inputs</b>	Two 10-bit, multi-range inputs: 0-10V 0-20mA, 4-20mA
Conversion method	Successive approximation
Input impedance	>100KΩ for voltage 500Ω for current
Galvanic isolation	None
Resolution (except 4-20mA)	10-bit (1024 units)
Resolution at 4-20mA	204 to 1023 (820 units)
Conversion time	Synchronized to scan time
Absolute max. rating	±15V
Full scale error	± 2 LSB
Linearity error	± 2 LSB
Status indication	Yes, see Note

Note:

The analog value can also indicate when the input is functioning out of range. If an analog input deviates above the permissible range, its value will be 1024.

**Voltage / Current connection**

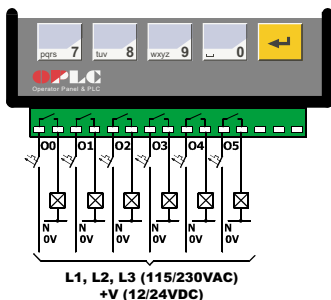


Notes:

- a. Shields should be connected at the signals' source.
- b. The 0V signal of the analog input must be connected to the controller's 0V.

<b>Digital outputs</b>	6 relay outputs, 230VAC/ 12/24VDC
Output type	SPST-NO relay
Type of relay	Takamisawa (Fujitsu) JY-12H-K, or NAIS (Matsushita) JQ1A-12V or OMRON G6B-1114P-12VDC
Isolation	by relay
Output current	5A max. (resistive load) 1A max. (inductive load)
Max. frequency	10Hz
Contact protection	External precautions required

**Relay Outputs**



<b>Display</b>	STN, LCD display
Illumination	LED yellow-green backlight
Display size	2 lines, 16 characters long
Character size	5 x 8 matrix, 2.95 x 5.55mm

<b>Keypad</b>	Sealed membrane
Number of keys	15

<b>PLC program</b>	
Ladder Code Memory (virtual)	36K
Memory Bits (coils)	256
Memory Integers (Registers)	256
Timers	64
Execution time	12µsec. for bit operations
Database	1024 integers (indirect access)
HMI displays	80 user-designed displays
HMI variables	64 HMI variables are available to conditionally display and modify text, numbers, dates, times & timer values. The user can also create a list of up to 120 variable text displays, totaling up to 2K.

<b>RS232/RS485 serial port</b>	Used for: <ul style="list-style-type: none"> <li>• Application Download/Upload</li> <li>• Application Testing (Debug)</li> <li>• Connect to GSM or standard telephone modem:                             <ul style="list-style-type: none"> <li>- Send/receive SMS messages</li> <li>- Remote access programming</li> </ul> </li> <li>• RS485 Networking</li> </ul>
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<b>RS232</b> (see note)	1 port
Galvanic isolation	None
Voltage limits	±20V

<b>RS485</b> (see note)	1 port
Input voltage	-7 to +12V differential max.
Cable type	Shielded twisted pair, in compliance with EIA RS485
Galvanic isolation	None
Baud rate	110 – 57600 bps
Nodes	Up to 32

Note:  
RS232/RS485 is determined by jumper settings and wiring as described in the document "M91 RS485 Port Settings" packaged with the controller.

<b>I/O expansion port</b>	Up to 64 additional I/Os, including digital & analog I/Os, RTD and more.
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<b>CANbus port</b>	Up to 63 nodes
Baud rate range	10Kbps - 1Mbps
Cable length	Up to 150m for 12VDC network Up to 1000m for 24VDC network

**CANbus connection**



<b>Miscellaneous</b>	
Clock (RTC)	Real-time clock functions (Date and Time).
Battery back-up	7 years typical battery back-up for RTC and system data.
Weight	310g (10.9 oz.)
Operational temperature	0 to 50°C (32 to 122°F)
Storage temperature	-20 to 60°C (-4 to 140°F)
Relative Humidity (RH)	5% to 95% (non-condensing)
Mounting method	DIN-rail mounted (IP20/NEMA1) Panel mounted (IP65/NEMA4X)

The tables below show how to set a specific jumper to change the functionality of the controller. To open the controller and access the jumpers, refer to the directions at the end of these specifications.

**Important:**

Incompatible jumper settings and wiring connections may severely damage the controller.

**JP1**  
Digital inputs type

To use as	JP1
npn (sink)	A
pnp (source)*	B

**JP2**  
Digital inputs voltage

To use as	JP2
12VDC	A
24VDC*	B

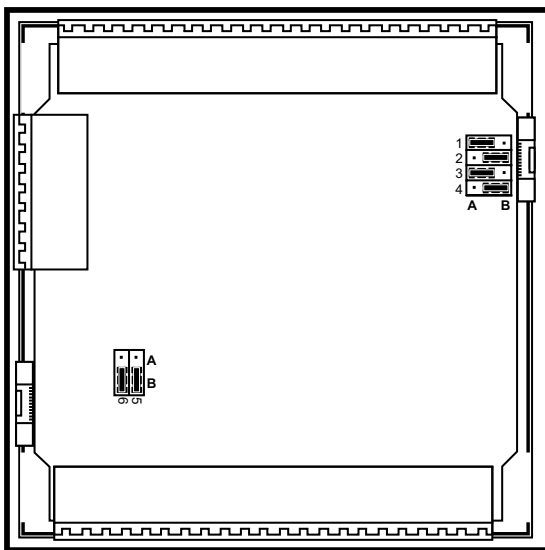
\*Default factory setting

**JP5, JP6**  
Power supply voltage

Range	JP5	JP6
10.2 to 15.6VDC	A	A
15.6 to 28.8VDC*	B	B

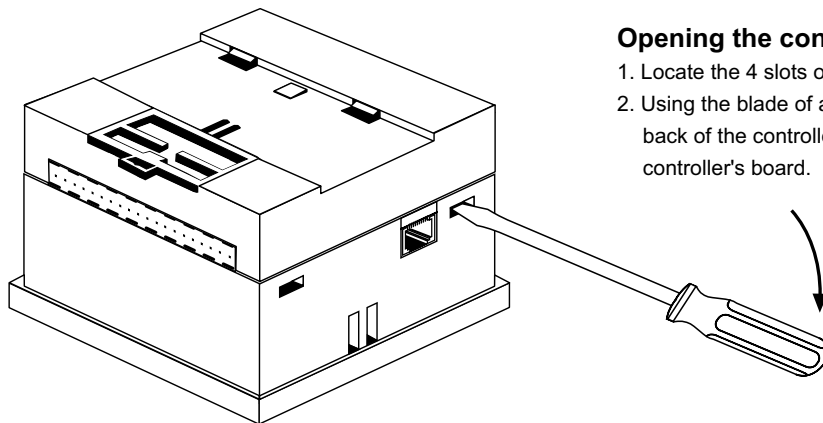
**JP3, JP4**  
Analog inputs type

To use as	JP3 for analog input #0	JP4 for analog input #1
Voltage input*	A	A
Current input	B	B



**In this figure, the jumper settings will cause the controller to function as follows:**

- Digital inputs: npn, 24VDC inputs
- Analog input #0: Voltage input
- Analog input #1: Current input
- Power supply: 24VDC



**Opening the controller enclosure**

1. Locate the 4 slots on the sides of the enclosure
2. Using the blade of a flat-bladed screwdriver, gently pry off the back of the controller as shown in the figure below, exposing the controller's board.

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