### Power supply

**12VDC or 24VDC**

**Permissible range:** 10.2VDC to 28.8VDC with less than 10% ripple

**Maximum current consumption:**
- 180mA@24VDC (pnp inputs)
- 250mA@24VDC (npp inputs)
- 220mA@12VDC (pnp inputs)
- 330mA@12VDC (npp inputs)

### Digital inputs

10 pnp (source) or npp (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 npp (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>8mA for Logic ‘1’

**Input current:**
- 4mA@12VDC
- 8mA@24VDC

**Input impedance:** 3KΩ

**Response time (except high-speed inputs):** 10μS typical

**Galvanic isolation:** None

**Input cable length:** Up to 100 meters, unshielded

### High-speed counter

Specifications below apply when inputs are wired for use as a high-speed counter input/encoder. See Notes 4 and 5.

**Resolution:** 16-bit

**Input freq.:** 10kHz max.

**Minimum pulse:** 40μS

**Notes:**
1. All 10 inputs can be set to pnp (source) or npp (sink) via a single jumper and appropriate wiring.
2. All 10 inputs can function in 12 VDC or 24 VDC, set via a single jumper and appropriate wiring.
3. pnp (sink) inputs use voltage supplied from the controller’s power supply.
4. Inputs #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.
5. When used as a normal digital input, normal 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.
Analog Inputs
Two 10-bit, multi-range inputs: 0-10V, 0-20mA, 4-20mA
Conversion method Successive approximation
Input impedance >100KΩ for voltage
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

Digital outputs
6 relay outputs, 230VAC/12/24VDC
Output type SPST-NO relay
Type of relay Takamisawa (Fujitsu) JY-12H-K, or NAIS (Matsushita) JO1A-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

Display
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

Keypad
Sealed membrane
Number of keys 15

PLC program
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.

RS232/RS485 serial port
Used for:
- Application Download/Upload
- Application Testing (Debug)
- Connect to GSM or standard telephone modem:
  - Send/receive SMS messages
  - Remote access programming
  - RS485 Networking

RS232 (see note) 1 port
Galvanic isolation None
Voltage limits ±20V
RS485 (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.

I/O expansion port
Up to 64 additional I/Os, including digital & analog I/Os, RTD and more.

CANbus port
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

Miscellaneous
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**

<table>
<thead>
<tr>
<th>To use as</th>
<th>JP1</th>
</tr>
</thead>
<tbody>
<tr>
<td>nnp (sink)</td>
<td>A</td>
</tr>
<tr>
<td>pnp (source)*</td>
<td>B</td>
</tr>
</tbody>
</table>

### JP5, JP6
**Power supply voltage**

<table>
<thead>
<tr>
<th>Range</th>
<th>JP5</th>
<th>JP6</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.2 to 15.6VDC</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>15.6 to 28.8VDC*</td>
<td>B</td>
<td>B</td>
</tr>
</tbody>
</table>

### JP2
**Digital inputs voltage**

<table>
<thead>
<tr>
<th>To use as</th>
<th>JP2</th>
</tr>
</thead>
<tbody>
<tr>
<td>12VDC</td>
<td>A</td>
</tr>
<tr>
<td>24VDC*</td>
<td>B</td>
</tr>
</tbody>
</table>

### JP3, JP4
**Analog inputs type**

<table>
<thead>
<tr>
<th>To use as</th>
<th>JP3 for analog input #0</th>
<th>JP4 for analog input #1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage input*</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Current input</td>
<td>B</td>
<td>B</td>
</tr>
</tbody>
</table>

*Default factory setting

---

In this figure, the jumper settings will cause the controller to function as follows:
- Digital inputs: nnp, 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.

---

Unitronics reserves the right to revise this publication from time to time and to amend its contents and related hardware and software at any time. Technical updates (if any) may be included in subsequent editions (if any). Unitronics product sold hereunder can be used with certain products of other manufacturers at the user’s sole responsibility.

M91-2-R2C 04/04 5409-0240-4