**Power supply**
- 12VDC or 24VDC

<table>
<thead>
<tr>
<th>Permissible range</th>
<th>10.2VDC to 28.8VDC with less than 10% ripple</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum current consumption</td>
<td>80mA@24VDC (pnp inputs)</td>
</tr>
<tr>
<td></td>
<td>140mA@12VDC (pnip inputs)</td>
</tr>
<tr>
<td></td>
<td>170mA (nnp inputs)</td>
</tr>
</tbody>
</table>

**Digital inputs**
- 12 pnp (source) or nnp (sink) inputs. See Note 1.

<table>
<thead>
<tr>
<th>Nominal input voltage</th>
<th>12VDC or 24VDC. See Notes 2 and 3.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltages for pnp (source):</td>
<td></td>
</tr>
<tr>
<td>For 12VDC</td>
<td>0-3VDC for Logic ‘0’</td>
</tr>
<tr>
<td></td>
<td>8-15.6VDC for Logic ‘1’</td>
</tr>
<tr>
<td>For 24VDC</td>
<td>0-5VDC for Logic ‘0’</td>
</tr>
<tr>
<td></td>
<td>17-28.8VDC for Logic ‘1’</td>
</tr>
<tr>
<td>Input voltages for nnp (sink):</td>
<td></td>
</tr>
<tr>
<td>For 12VDC</td>
<td>8-15.6VDC&lt;1.2mA for Logic ‘0’</td>
</tr>
<tr>
<td></td>
<td>0-3VDC/&gt;3mA for Logic ‘1’</td>
</tr>
<tr>
<td>For 24VDC</td>
<td>17-28.8VDC&lt;2mA for Logic ‘0’</td>
</tr>
<tr>
<td></td>
<td>0-5VDC/&gt;6mA for Logic ‘1’</td>
</tr>
<tr>
<td>Input impedance</td>
<td>4mA@12VDC</td>
</tr>
<tr>
<td></td>
<td>8mA@24VDC</td>
</tr>
<tr>
<td>Response time (except high-speed inputs)</td>
<td>10mS typical</td>
</tr>
<tr>
<td>Galvanic isolation</td>
<td>None</td>
</tr>
<tr>
<td>Input cable length</td>
<td>Up to 100 meters, unshielded</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Resolution</th>
<th>16-bit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input freq.</td>
<td>10kHz max.</td>
</tr>
<tr>
<td>Minimum pulse</td>
<td>40μs</td>
</tr>
</tbody>
</table>

**pnp (source) inputs**

**nnp (sink) inputs**

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

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

**Shaft encoder**

**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.
Digital outputs
- 12 pnp (source) outputs
- 12VDC or 24VDC

Output type
- P-MOSFET (open drain)

Isolation
- None

Output current
- 0.5A max.
- Total current: 3A max.

Max. frequency for normal outputs
- 50Hz (resistive load)
- 0.5Hz (inductive load)

High speed output maximum frequency
- 2kHz (resistive load)

Short circuit protection
- Yes

Short indication
- by software

On voltage drop
- 0.5VDC maximum

Power supply for outputs
- Operating voltage: 10.2 to 28.8VDC
- Nominal operating voltage: 12VDC or 24VDC

Note:
1. Output #0 and Output #1 may be used as high-speed outputs.

Outputs connection

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

RS232 (see note)
- 1 port

RS485 (see note)
- 1 port

Input voltage
- -7 to +12V differential max.

Cable type
- Shielded twisted pair, in compliance with EIA 485

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.

Miscellaneous
- Clock (RTC)
  - Date and time-year 2000 compliant.

Battery back-up
- 7 years typical battery back-up for RTC and system data.

Weight
- 266g (9.37 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)

Display
- STN, LCD display

Illumination
- LED yellow-green backlight

Display size
- 1 line, 16 characters long

Character size
- 5 x 7 matrix, 3.07 x 5.73mm

Keypad
- Sealed membrane

Number of keys
- 15

PLC program
- Ladder Code Memory (virtual):
  - 24K
- 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:
  - 50 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.
The tables below show how to set a specific jumper to change the functionality of the inputs. 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.

### JP8
**Input type (for all digital inputs)**

<table>
<thead>
<tr>
<th>To use as</th>
<th>JP8</th>
</tr>
</thead>
<tbody>
<tr>
<td>npn (sink)</td>
<td>A</td>
</tr>
<tr>
<td>pnp (source)*</td>
<td>B</td>
</tr>
</tbody>
</table>

### JP9
**Input voltage (for all digital inputs)**

<table>
<thead>
<tr>
<th>To use as</th>
<th>JP9</th>
</tr>
</thead>
<tbody>
<tr>
<td>12VDC</td>
<td>A</td>
</tr>
<tr>
<td>24VDC*</td>
<td>B</td>
</tr>
</tbody>
</table>

*Default factory setting

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In this figure, the jumper settings will cause the inputs to function as npn, 24VDC digital inputs

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**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.