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

High-speed counter

Resolution 16-bit
Input freq. 10kHz max.
Minimum pulse 40µs

Notes:
1. All 10 inputs can be set to pnp (source) or nnp (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. nnp (sink) inputs use voltage supplied from the controller’s power supply.
4. 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.
5. 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.
Analog Inputs
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.

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.

Digital outputs
6 relay outputs, 230VAC/12/24VDC
Output type
SPST-NO relay
Type of relay
Takamisawa (Fujitsu) JY-12H-K, or
NAIS (Matsushita) JQA1-12V 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

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
12usec. 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.

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
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

Miscellaneous
Clock (RTC)
Date and time-year 2000 compliant.
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>npn (source)*</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>

*Default factory setting

### 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>

### 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>

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.

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