91-19-R1
12/24 VDC, 10 pnp/npn digital inputs, 1 analog input, 3 high-speed counter/ shaft encoder inputs, 6 relay outputs, I/O expansion port, RS232

**Power supply**
- 12VDC or 24VDC
- Permissible range: 10.2VDC to 28.8VDC with less than 10% ripple
- Maximum current consumption:
  - 180mA@24VDC (pnp inputs)
  - 260mA@24VDC (nnp inputs)
  - 220mA@12VDC (pnp inputs)
  - 330mA@12VDC (nnp inputs)

**Digital inputs**
- 10 pnp (source) or nnp (sink) inputs. See Note 1.
- Nominal input voltage: 12VDC or 24VDC.
- Input voltages for pnp (source):
  - For 12VDC: <3VDC for Logic ‘0’
  - >8VDC for Logic ‘1’
  - <5VDC for Logic ‘0’
  - >17VDC for Logic ‘1’
- Input voltages for nnp (sink):
  - For 12VDC: >8VDC/<1.2mA for Logic ‘0’
  - <3VDC/3mA for Logic ‘1’
  - >17VDC/<2mA for Logic ‘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

**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.
- 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.

**Shaft encoder**
- High-speed Counter
- Reset 2
- High-speed Counter 2
- Reset 1
- High-speed Counter 1
- Reset 0
- High-speed Counter 0

**npn (sink) inputs**
- Circuit protection device
- High-speed Counter
- Reset 2
- High-speed Counter 2
- Reset 1
- High-speed Counter 1
- Reset 0
- High-speed Counter 0

**pnp (source) high-speed counter**
- Circuit protection device
- High-speed Counter
- Reset 2
- High-speed Counter 2
- Reset 1
- High-speed Counter 1
- Reset 0
- High-speed Counter 0

**npn (sink) high-speed counter**
- Circuit protection device
- High-speed Counter
- Reset 2
- High-speed Counter 2
- Reset 1
- High-speed Counter 1
- Reset 0
- High-speed Counter 0
Analogue Input

- **10-bit, multi-range input:** 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 connection

![Voltage connection diagram]

**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 connections

![Current connections diagram]

**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

- **Output type:** SFP3-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)
- **Max. frequency:** 10Hz
- **Contact protection:** External precautions required

**Relay Outputs**

![Relay Outputs diagram]

**Display**

- **Type:** 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**

- **Type:** Sealed membrane
- **Number of keys:** 15

**PLC program**

- **Words:** 2048
- **Integers/Registers:** 256
- **Timers:** 64
- **Execution time:** 12μsec. for bit operations
- **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 serial port**

- **Usage:**
  - Application Download/Upload
  - Application Testing (Debug) mode
  - Connect to GSM or standard telephone modem:
    - Send/receive SMS messages
    - Remote access programming
  - RS485 Networking via adapter: up to 32 nodes

**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:** 310g (10.9 oz.)
- **Operational temperature:** 0 to 50°C (32 to 122°F)
- **Storage temperature:** -20 to 60°C (+4 to 140°F)
- **Mounting method:** Din-rail mounted (IP20/IECNA1)
  - Panel mounted (IP65/NEMA4X)

**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.
Jumpers Settings

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>npn (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**
Analog input type

<table>
<thead>
<tr>
<th>To use as</th>
<th>JP3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage input*</td>
<td>A</td>
</tr>
<tr>
<td>Current input</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: npn, 24VDC inputs
- Analog input: Voltage 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.