V120-12-R2C
Graphic Operator Panel & Programmable Logic Controller

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, 2 RS232/RS485 ports, CANbus

### Power supply

- **12VDC or 24VDC**
- **Permissible range:** 10.2VDC to 28.8VDC with less than 10% ripple
- **Maximum current consumption:**
  - 230mA@24VDC (pnp inputs)
  - 310mA@24VDC (nnp inputs)
  - 330mA@12VDC (pnp inputs)
  - 360mA@12VDC (nnp inputs)

### Digital inputs

- **10 pnp (source) or nnp (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 nnp (sink):**
  - **For 12VDC:** 8-15.6VDC/1.2mA for Logic ‘0’
  - 0-3VDC/3mA for Logic ‘1’
  - **For 24VDC:** 0-5VDC/6mA for Logic ‘0’
  - 17-28.8VDC/2mA 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/ shaft encoder. See Notes 4 and 5.**
- **Resolution:** 32-bit
- **Input frequency:** 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. pnp (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: According to filter
- 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

- 4 wire current transmitter
- 12 VDC or 24 VDC
- Circuit protection device

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

- 3 wire current transmitter
- 12 VDC or 24 VDC
- Circuit protection device

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
- 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

- L1, L2, L3 (115/230VAC)

Graphic Display

- STN, LCD display
- Illumination backlight: LED, yellow-green, software-controlled
- Display resolution: 128x64 pixels

Keypad

- Number of keys: 16
- Sealed membrane

Program

- Ladder Code Memory: 192K
- Memory Bits (coils): 2048
- Memory Integers (registers): 1600
- Long Integers (32 bit): 256
- Double Word (32 bit unsigned): 64
- Floats: 24
- Timers: 192
- Counters: 24
- Data Tables: 120K (RAM) / 64K (FLASH)
- HMI displays: Up to 255

RS232/RS485 serial ports

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

RS232 (see note)

- 2 ports
- Galvanic isolation: None
- Voltage limits: ±20V

RS485 (see note)

- 2 ports
- 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. Refer to the controller’s User Guide regarding communications.

I/O expansion port

- Up to 128 additional I/Os, including digital & analog I/Os, RTD and more.

CANbus port

- Up to 63 nodes
- Baud rate range: 20Kbps - 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.
- Battery: Coin type, 3V lithium battery, CR2450
- Weight: 320g (11.3 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>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>

*Default factory setting

### 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>

### Diagram
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’s enclosure
1. Turn power off before opening the controller.
2. Locate the 4 slots on the sides of the enclosure.
3. 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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