# V120-12-R1 Graphic **O**perator Panel & **P**rogrammable **L**ogic **C**ontroller

## 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, 2 RS232/RS485 ports

| 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 (npn inputs) |
| | 330mA@12VDC (pnp inputs) |
| | 360mA@12VDC (npn inputs) |
| | |
| **Digital inputs** | 10 pnp (source) or npn (sink) inputs. See Note 1. |
| Nominal input voltage | 12VDC or 24VDC. See Notes 2 and 3. |
| Input voltages for pnp (source): | |
| For 12VDC | <3VDC for Logic '0' |
| | >8VDC for Logic '1' |
| For 24VDC | <5VDC for Logic '0' |
| | >17VDC for Logic '1' |
| Input voltages for npn (sink): | |
| For 12VDC | >8VDC/<1.2mA for Logic '0' |
| | <3VDC/>3mA for Logic '1' |
| For 24VDC | >17VDC/<2mA for Logic '0' |
| | <5VDC/>6mA for Logic '1' |
| Input current | 4mA@12VDC |
| | 8mA@24VDC |
| Input impedance | 3K$\Omega$ |
| 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 | 32-bit |
| Input frequency | 10kHz max. |
| Minimum pulse | 40µs |

Notes:
1. All 10 inputs can be set to pnp (source) or npn (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. npn (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.

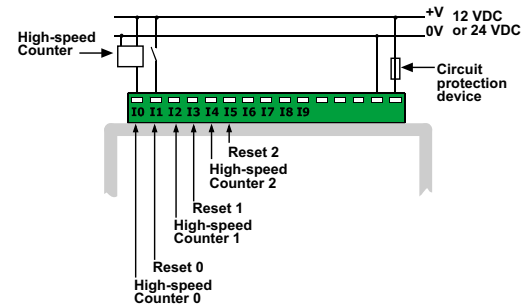**Power supply, pnp (source) inputs**
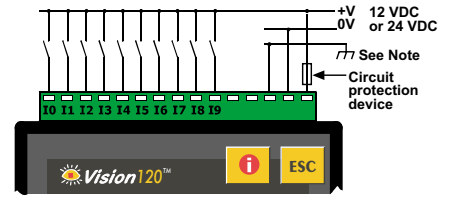


Note:
To avoid electromagnetic interference, mount the controller in a metal panel/cabinet and earth the power supply. Earth the power supply signal to the metal using a wire whose length does not exceed 10cm. Using a wire longer than 10cm will cause signal interference.
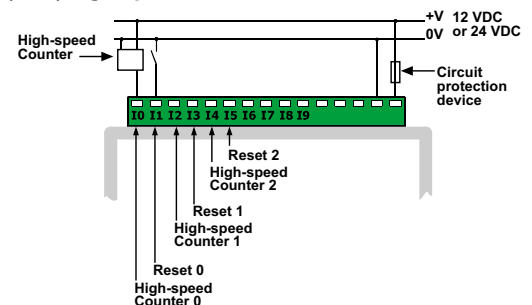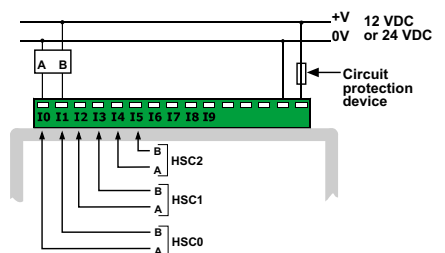
**npn (sink) inputs**
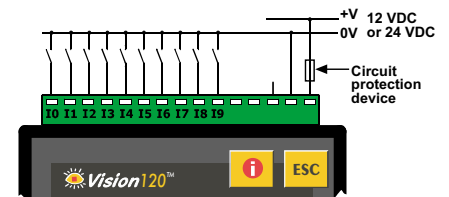


**pnp (source) high-speed counter**



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



**Shaft encoder**

| Analog 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 | 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.
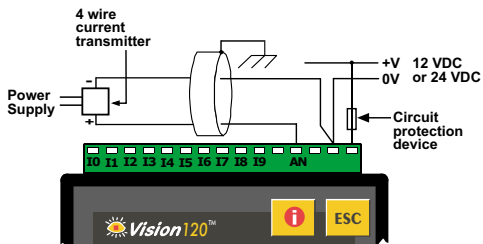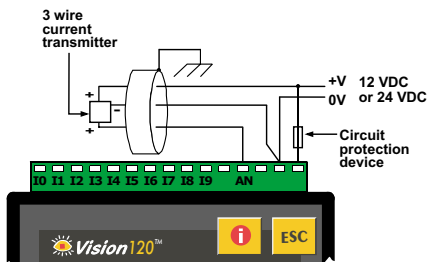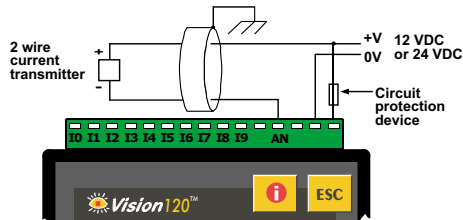
### Voltage connection
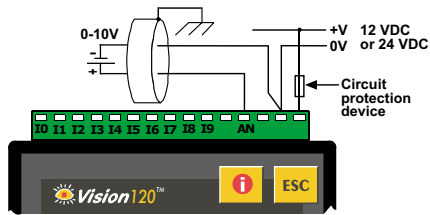


Notes:
a. Shields should be connected at the signals' source.
b. The 0V signal of the analog input must be connected to the controller's 0V.

### Current connections



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) 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
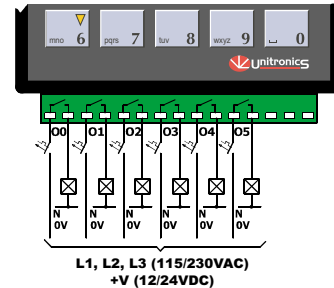


| Graphic Display | STN, LCD display |
|---|---|
| Illumination backlight | LED, yellow-green, software-controlled |
| Display resolution | 128x64 pixels |

| Keypad | Sealed membrane |
|---|---|
| Number of keys | 16 |

| Program | |
|---|---|
| Ladder Code Memory | 96K |
| Memory Bits (coils) | 1024 |
| Memory Integers (registers) | 1024 |
| Long Integers (32 bit) | 256 |
| Double Word (64 bit unsigned) | 64 |
| Timers | 128 |
| HMI displays | Up to 255 |

| RS232/RS485 serial ports | 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) | 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. |
|---|---|

| 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/ 1) 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**

| To use as | JP1 |
|---|---|
| npn (sink) | A |
| pnp (source)* | B |

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

| Range | JP5 | JP6 |
|---|---|---|
| 10.2 to 15.6VDC | A | A |
| 15.6 to 28.8VDC* | B | B |

**JP2**
**Digital inputs voltage**

| To use as | JP2 |
|---|---|
| 12VDC | A |
| 24VDC* | B |

**JP3**
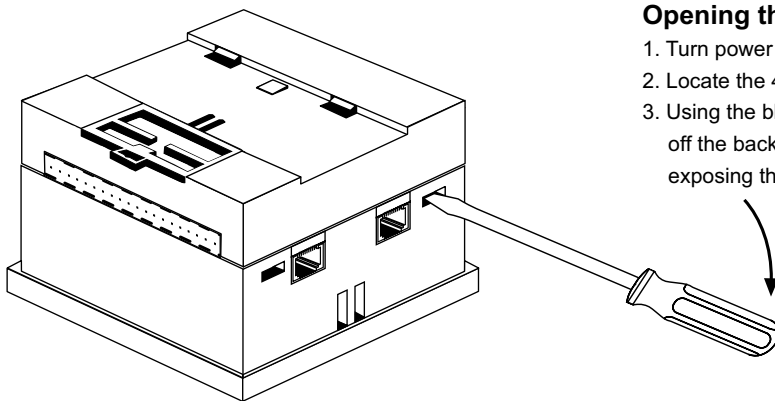**Analog input type**

| To use as | JP3 |
|---|---|
| Voltage input* | A |
| Current input | B |

*Default factory setting
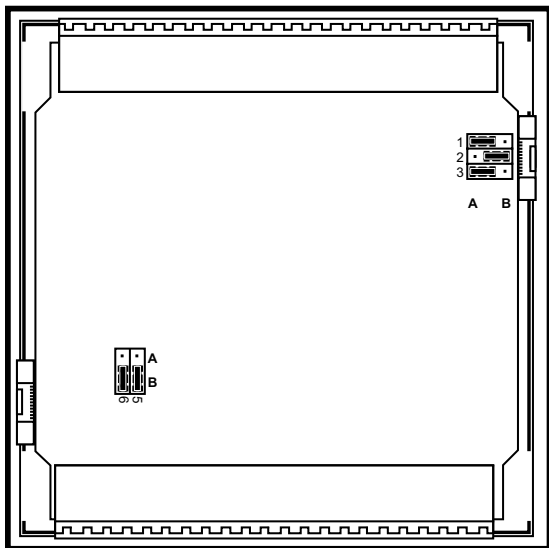


**In this figure, the jumper settings will cause the controller to function as follows:**
Digital inputs: npn, 24VDC inputs
Analog input: Voltage input
Power supply: 24VDC

**Opening the controller'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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