

V120-22-UN2

Graphic Operator Panel & Programmable Logic Controller

12/24VDC, 12 pnp/npn digital inputs, 2 universal inputs*, 2 high-speed counter/shaft encoder inputs, 12 transistor outputs, 2 high-speed 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 | 130mA@24VDC (pnp inputs) 230mA@24VDC (nnp inputs) 240mA@12VDC (pnp inputs) 280mA@12VDC (nnp inputs) |
| Digital inputs | 12 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 | 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 npn (sink): | |
| For 12VDC | 8-15.6VDC/<1.2mA for Logic '0' 0-3VDC/>3mA for Logic '1' |
| For 24VDC | 17-28.8VDC/<2mA for Logic '0' 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 | 32-bit |
| Input frequency | 10kHz max. |
| Minimum pulse | 40μs |

Notes:

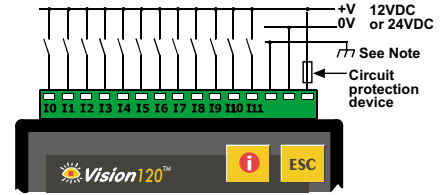
- All 12 inputs can be set to pnp (source) or npn (sink) via a single jumper and appropriate wiring.
- All 12 inputs can function in 12 VDC or 24 VDC; set via a single jumper and appropriate wiring.
- nnp (sink) inputs use voltage supplied from the controller's power supply.
- Inputs #0 and #2 can each 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.
- Inputs #1 and #3 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.

* Certain inputs can function as normal digital inputs, analog inputs, RTD inputs or thermocouple inputs, in accordance with jumper settings and wiring connections.

Warnings:

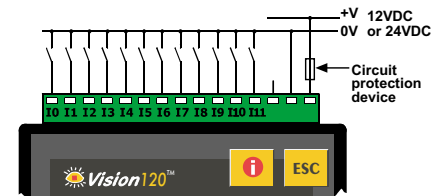
- Unused pins should not be connected. Ignoring this directive may damage the controller.
- Improper use of this product may severely damage the controller.
- Refer to the controller's User Guide regarding wiring considerations.
- Before using this product, it is the responsibility of the user to read the product's User Guide and all accompanying documentation.

Power supply, pnp (source) inputs

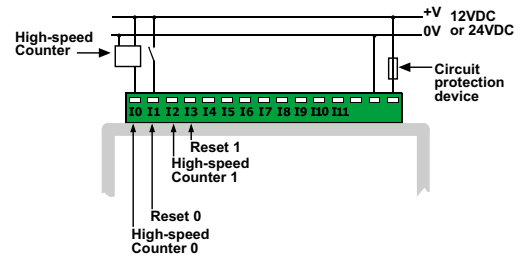


Note:
To avoid electromagnetic interference, mount the controller in a metal panel/cabinet and earth the power supply. Earth the power supply signal to the metal using a wire whose length does not exceed 10cm. If your conditions do not permit this, do not earth the power supply.

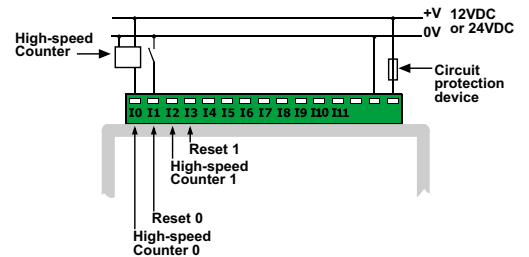
nnp (sink) inputs



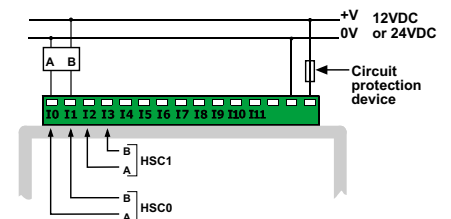
pnp (source) high-speed counter



nnp (sink) high-speed counter



Shaft encoder



Universal Inputs

| Analog Inputs | Two 14-bit, multi-range inputs: 0-10V, 0-20mA, 4-20mA See Note 1 |
|----------------------------|--|
| Conversion method | Voltage to Frequency |
| Input impedance | >400KΩ for voltage 500Ω for current |
| Isolation | None |
| Resolution (except 4-20mA) | 14-bit (16384 units) |
| Resolution at 4-20mA | 3277 to 16383 (13107 units) |
| Conversion time | 100mSec minimum (according to filter type) |
| Absolute max. rating | ±15V for voltage ±30mA for current |
| Linearity error | 0.04% max. of full scale |
| Error limit | 0.4% of input value |
| Status indication | Yes, see Note 2 |

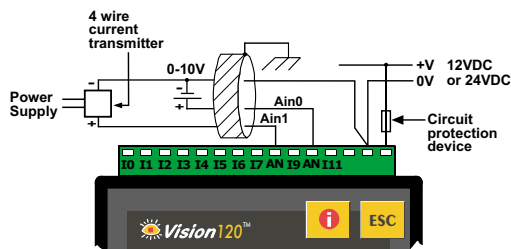
Notes:

1. Inputs #8 and #10 can each function as an analog input, related to signal 0V, in accordance with jumper settings and wiring connections.

2. The analog value can also indicate faults, as shown below:

| Value | Possible Cause |
|-------|---|
| -1 | Input value deviates slightly below the input range. |
| 16384 | Input value deviates slightly above the input range |
| 32767 | Input value deviates greatly above or below the input range. |

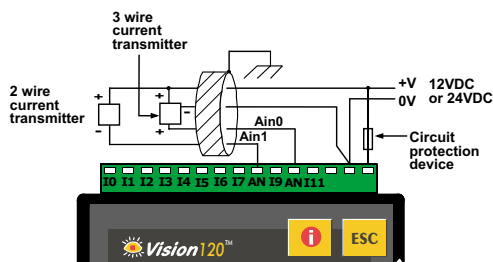
Voltage / Current connection



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.

| Thermocouple inputs | 2 differential inputs. See Note 1. |
|----------------------------------|--|
| Input type | Thermocouple |
| Input ranges | As shown in the table below |
| Isolation | None |
| Conversion method | Voltage to Frequency |
| Resolution | 0.1°C / 0.1°F |
| Conversion time | 100mSec minimum (according to filter type) |
| Input impedance | >10MΩ |
| Cold junction compensation | local, automatic |
| Cold junction compensation error | ±1.5°C / ±2.7°F maximum |
| Absolute maximum rating | ±0.6 VDC |
| Linearity error | 0.04% max. of full scale |
| Error limit | 0.4% of input value |
| Status indication | None |
| Warm-up time | ½ hour typically, ±1°C / ±1.8°F repeatability |

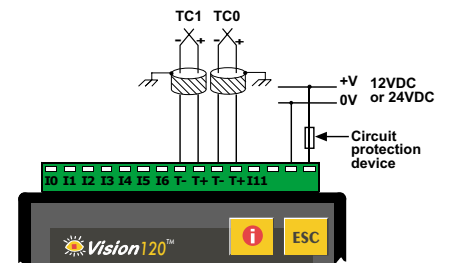
Notes:

- 1. Thermocouple #0: use Input #10 as positive input & Input #9 as negative input.
Thermocouple #1: use Input #8 as positive input & Input #7 as negative input.
To use inputs as thermocouple, set the relevant jumpers and use appropriate wiring.

Table 1: Input Ranges

| Type | Temperature range | Wire color | |
|------|------------------------------------|-------------------|--------------------|
| | | ANSI (USA) | BS 1843 (UK) |
| mV | -5 to 56mV | - | - |
| B | 200 to 1820°C (300 to 3276°F) | + Grey - Red | + None - Blue |
| E | -200 to 750°C (-328 to 1382°F) | + Violet - Red | + Brown - Blue |
| J | -200 to 760°C (-328 to 1400°F) | + White - Red | + Yellow - Blue |
| K | -200 to 1250°C (-328 to 2282°F) | + Yellow - Red | + Brown - Blue |
| N | -200 to 1300°C (-328 to 2372°F) | + Orange - Red | + Orange - Blue |
| R | 0 to 1768°C (32 to 3214°F) | + Black - Red | + White - Blue |
| S | 0 to 1768°C (32 to 3214°F) | + Black - Red | + White - Blue |
| T | -200 to 400°C (-328 to 752°F) | + Blue - Red | + White - Blue |

Thermocouple connection



Note:

Shields should be connected at the signals' source.

| | |
|-----------------------------|---|
| RTD inputs | Two PT100 inputs. See Note 1. |
| Input ranges | -200 to 600°C (-328 to 1100°F) 1 to 320 ohms |
| Isolation | None |
| Measurement resolution | 0.1°C / 0.1°F |
| Conversion method | Voltage to Frequency |
| Conversion time | 200mSec minimum (according to filter type) |
| Input impedance | >10MΩ |
| Auxiliary current for PT100 | 150μA typical |
| Linearity error | 0.04% max. of full scale |
| Error limit | 0.4% of input value |
| Status indication | Yes, see Note 2 |

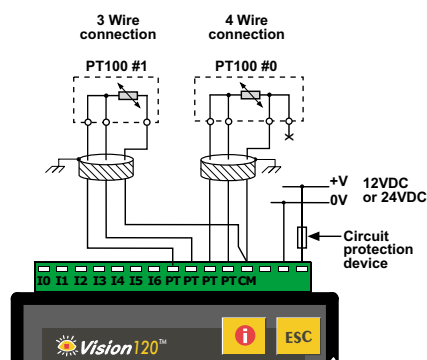
Notes:

- PT100 #0: use Input #9 & Input #10, related to CM signal (Input #11).
PT100 #1: use Input #7 & Input #8, related to CM signal (Input #11).
To use inputs as PT100, set the relevant jumpers and use appropriate wiring.

- The analog value can also indicate faults, as shown below:

| Value | Possible Cause |
|--------|--|
| 32767 | Sensor is not connected to input, or value exceeds the permissible range |
| -32767 | Sensor is short-circuited |

PT100 connection



Note:

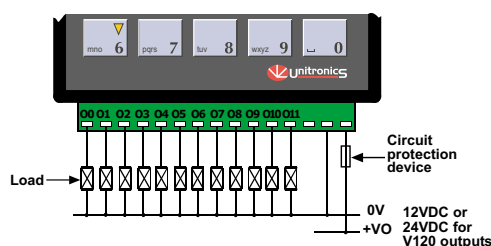
- Shields should be connected at the signals' source.
- 4 wire PT100 can be used by leaving one of the sense leads unconnected.

| | |
|-------------------------------------|---|
| 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) See Note 1. |
| 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:

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

Transistor 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 | |
| Application memory | 448K |
| 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 |
| Execution time | 0.8μs for bit operations |

| | |
|---------------------------------|---|
| RS232/RS485 serial ports | Used for: <ul style="list-style-type: none"> Application Download/Upload Application Testing (Debug) Connect to GSM or standard telephone modem: <ul style="list-style-type: none"> 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 xpansion port | Up to 128 additional I/Os, including digital & analog I/Os, RTD and more. |
| Miscellaneous | |
| Clock (RTC) | Real-time clock functions (Date and time). |
| Battery back-up | 7 years typical battery back-up for RTC and system data. |
| Battery | Coin type, 3V lithium battery, CR2450 |
| Weight | 280g (9.87 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 a specific input. 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.

JP3, JP4, JP5, JP11, JP12
Input #9 and Input #10 (universal input no. 0)

| To use as | JP3 for Input #10 | JP4 for Input #10 | JP5 for Input #9 | JP11 for Input #9 | JP12 for Input #10 |
|--|----------------------|----------------------|---------------------|----------------------|-----------------------|
| Normal digital inputs | A | B | A | B | B |
| Thermocouple input* (See Note 1) | B | A | B | B | B |
| PT100 input (See Note 2) | B | A | B | A | B |
| Analog input - voltage (see Note 4) | B | B | A See Note 3 | B See Note 3 | A |
| Analog input - current (see Note 4) | B | B | A See Note 3 | B See Note 3 | B |

Notes:

1. Thermocouple input is between Input #10 (T+) and Input #9 (T-).
2. PT100 input is connected to Input #9 and Input #10, related to CM signal (Input #11).
3. When using Input #10 as analog input, Input #9 can be used as a normal digital input.
4. Analog inputs are related to signal 0V.

JP2, JP6, JP7, JP10, JP13
Input #7 and Input #8 (universal input no. 1)

| To use as | JP2 for Input #7 | JP6 for Input #8 | JP7 for Input #8 | JP10 for Input #7 | JP13 for Input #8 |
|--|---------------------|---------------------|---------------------|----------------------|----------------------|
| Normal digital inputs | A | A | B | B | B |
| Thermocouple input* (See Note 1) | B | B | A | B | B |
| PT100 input (See Note 2) | B | B | A | A | B |
| Analog input - voltage (see Note 4) | A See Note 3 | B | B | B See Note 3 | A |
| Analog input - current (see Note 4) | A See Note 3 | B | B | B See Note 3 | B |

Notes:

1. Thermocouple input is between Input #8 (T+) and Input #7 (T-).
2. PT100 input is connected to Input #7 and Input #8, related to CM signal (Input #11).
3. When using Input #8 as analog input, Input #7 can be used as a normal digital input.
4. Analog inputs are related to signal 0V.

JP1
Input #11

| To use as | JP1 |
|----------------------------|-----|
| Normal digital input* | A |
| CM signal for PT100 inputs | B |

*Default factory setting

V120-22-UN2 I/O Jumper Settings

JP8
Input type (for all digital inputs) -
 see Note 1

| To use as | JP8 |
|----------------|-----|
| npn (sink) | A |
| pnnp (source)* | B |

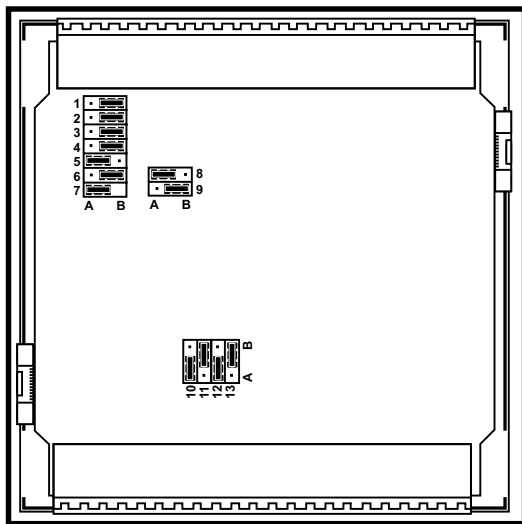
JP9
Input voltage (for all digital inputs) -
 see Note 1

| To use as | JP9 |
|-----------|-----|
| 12VDC | A |
| 24VDC* | B |

Note:

- Inputs# 0-6, and #7-11 when these are set as normal digital inputs.

*Default factory setting



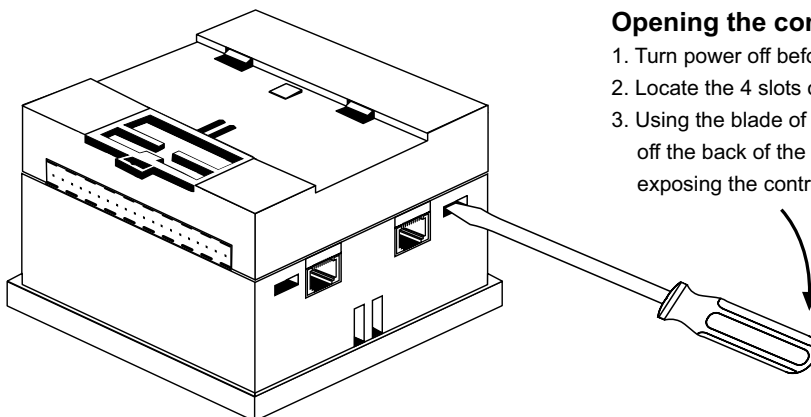
In this figure, the jumper settings will cause the inputs to function as follows:

Universal Input #0 (Input #10): Voltage input, related to 0V

Universal Input #1 (Input #7 and Input #8): PT100 input, related to the CM signal (Input#11)

Input#9: Normal npn, 24VDC digital input

Input#0 to Input #6: npn, 24VDC digital inputs. (Note that these inputs can only function as normal digital inputs.)



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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