

V120-22-UA2

Graphic Operator Panel & Programmable Logic Controller

24VDC, 12 pnp/npn digital inputs, 2 universal inputs*, high-speed counter/shaft encoder input, 10 transistor outputs, 2 analog outputs, I/O expansion port, 2 RS232/RS485 ports

| | |
|--|---|
| Power supply | 24VDC |
| Permissible range | 20.4VDC to 28.8VDC with less than 10% ripple |
| Maximum current consumption | 210mA@24VDC (pnp inputs) 315mA@24VDC (npn inputs) |
| Digital inputs | 12 pnp (source) or npn (sink) inputs. See Note 1. |
| Nominal input voltage | 24VDC. See Note 2. |
| Input voltages for pnp (source) | 0-5VDC for Logic '0' 17-28.8VDC for Logic '1' |
| Input voltages for npn (sink) | 17-28.8VDC/<2mA for Logic '0' 0-5VDC/>6mA for Logic '1' |
| Input current | 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 Note 3 and 4. |
| Resolution | 32-bit |
| Input frequency | 10kHz max. |
| Minimum pulse | 40μs |

Notes:

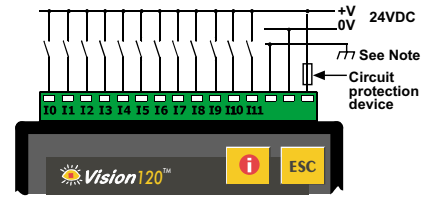
- All 12 inputs can be set to pnp (source) or npn (sink) via a single jumper and appropriate wiring.
- nnp (sink) inputs use voltage supplied from the controller's power supply.
- Input #0 can function as either high-speed counter or as part of a shaft encoder. In each case, high-speed input specifications apply. When used as a normal digital input, normal input specifications apply.
- Input #1 can function as either counter reset, or as a normal digital input; in either case, specifications are those of a normal digital input.
This input 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 or thermocouple inputs, in accordance with jumper settings and wiring connections.

Warnings:

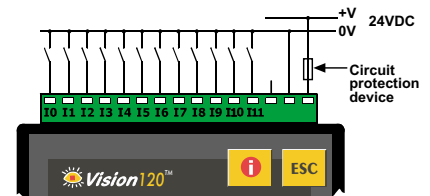
- Unused pins should not be connected. Ignoring this directive may damage the controller.
- Improper use of this product may severely damage the controller.
- Refer to the controller's User Guide regarding wiring considerations.
- Before using this product, it is the responsibility of the user to read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

Power supply, pnp (source) inputs

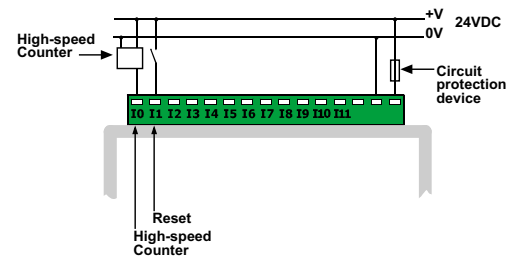


Note:
To avoid electromagnetic interference, mount the controller in a metal panel/cabinet and earth the power supply. Earth the power supply signal to the metal using a wire whose length does not exceed 10cm. If your conditions do not permit this, do not earth the power supply.

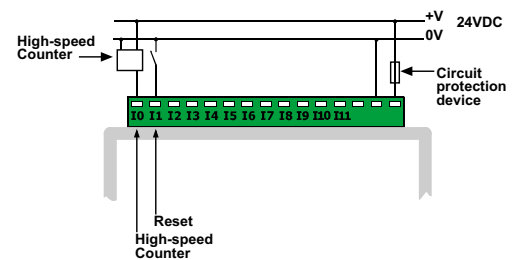
nnp (sink) inputs



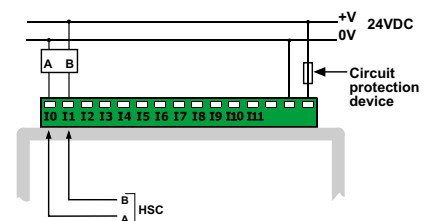
pnp (source) high-speed counter



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 |

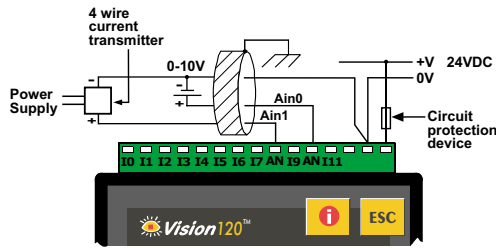
Notes:

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. |

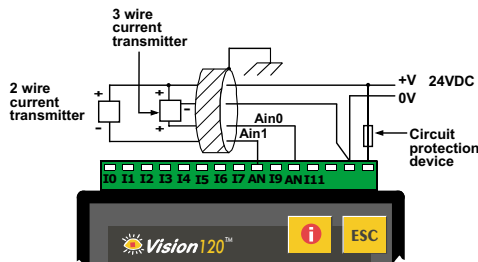
Voltage / Current connection



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 |

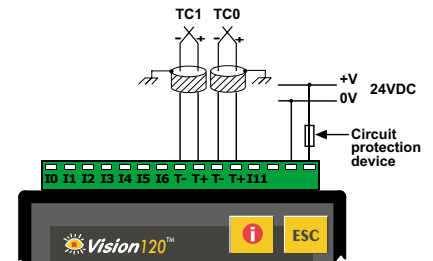
Notes:

- 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:

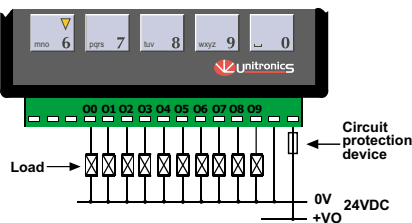
Shields should be connected at the signals' source.

| | |
|-------------------------------------|---|
| Digital outputs | 10 pnp (source) outputs 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 | 20.4 to 28.8VDC |
| Nominal operating voltage | 24VDC |

Note:

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

Digital Outputs connection

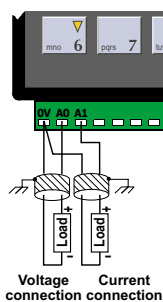


| | |
|--------------------------|---|
| Analog outputs | Two 12-bit analog outputs: 0-10V, 4-20mA, See note 1. |
| Load impedance | 1k Ω minimum—voltage 500 Ω maximum—current |
| Galvanic isolation | None |
| Resolution | 12-bit (4096 units) |
| Conversion time | Synchronized to scan time |
| Linearity error | $\pm 0.1\%$ |
| Operational error limits | $\pm 0.2\%$ |

Note:

1. Each analog output range is defined by wiring, jumpers and within the controller's software.

Analog outputs connection



Notes:

- a. Shields should be earthed, connected to the earth of the cabinet.
- b. The 0V signal of the analog outputs must be the same 0V used by the controller's power supply.

| | |
|------------------------|---|
| 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 | 0.8 μ s 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 | ± 20 V |
| 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) | 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. (9.8oz) |
| 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 or analog output. 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.

JP2, JP3, JP6, JP8
Input #9 and Input #10 (universal input no. 0)

| To use as | JP2 for Input#10 | JP3 for Input#9 | JP6 for Input#10 | JP8 for Input#10 |
|--|---------------------|--------------------|---------------------|---------------------|
| Normal digital inputs | A | A | A | B |
| Thermocouple input* (See Note 1) | B | B | A | B |
| Analog input - voltage (see Note 3) | B | A See Note 2 | B | A |
| Analog input - current (see Note 3) | B | A See Note 2 | B | B |

Notes:

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

JP4, JP5, JP7, JP9
Input#7 and Input#8 (universal input no. 1)

| To use as | JP4 for Input#8 | JP5 for Input#7 | JP7 for Input#8 | JP9 for Input#8 |
|--|--------------------|--------------------|--------------------|--------------------|
| Normal digital inputs | A | A | A | B |
| Thermocouple input* (See Note 1) | B | B | A | B |
| Analog input - voltage (see Note 3) | B | A See Note 2 | B | A |
| Analog input - current (see Note 3) | B | A See Note 2 | B | B |

Notes:

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

JP10
Input type (for all digital inputs) -
 see Note 1

| To use as | JP10 |
|---------------|------|
| npn (sink) | A |
| pnp (source)* | B |

Note:

1. Inputs# 0-6, input #11 and #7-10 when these are set as normal digital inputs.

*Default factory setting

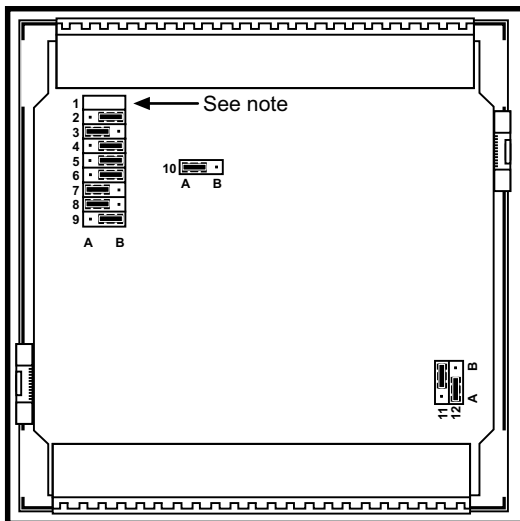
JP12
Analog output #0

| To use as | JP12 |
|-----------|------|
| Voltage* | A |
| Current | B |

JP11
Analog output #1

| To use as | JP11 |
|-----------|------|
| Voltage* | A |
| Current | B |

*Default factory setting



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

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

Universal Input #1 (Input #7 and Input #8): Termocouple input

Input#9: Normal npn, 24VDC digital input

Input#0 to Input #6 and input #11: npn, 24VDC digital inputs.

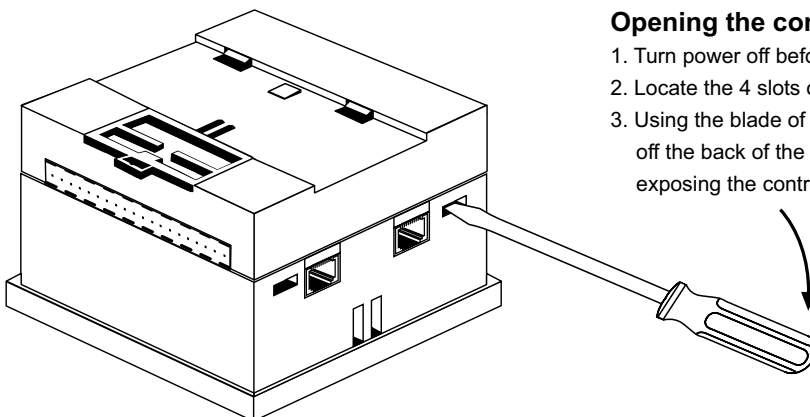
(Note that these inputs can only function as normal digital inputs.)

Analog output #0: Voltage output

Analog output #1: Current output

Note:

Jumper #1 is reserved - do not use.



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.

Unitronics reserves the right to revise this publication from time to time and to amend its contents and related hardware and software at any time.

Technical updates (if any) may be included in subsequent editions (if any).

Unitronics product sold hereunder can be used with certain products of other manufacturers at the user's sole responsibility.