




# unitronics V200-18-E2B Snap-In Input-Output Modules User Guide

[Home](#) » [UNITRONICS](#) » unitronics V200-18-E2B Snap-In Input-Output Modules User Guide 

## Contents

- [1 unitronics V200-18-E2B Snap-In Input-Output Modules](#)
- [2 Features](#)
- [3 General Description](#)
- [4 Environmental Considerations](#)
- [5 Installing / Removing the Snap-in I/O Module](#)
- [6 Removing a Snap-in I/O Module](#)
- [7 Wiring Procedure](#)
- [8 Wiring Guidelines](#)
- [9 Earthing the product](#)
- [10 Digital Outputs](#)
- [11 Transistor Outputs](#)
- [12 Analog Inputs](#)
- [13 Analog Outputs](#)
- [14 Output Wiring](#)
- [15 Documents / Resources](#)
  - [15.1 References](#)
- [16 Related Posts](#)



**unitronics V200-18-E2B Snap-In Input-Output Modules**



The V200-18-E2B plugs directly into the back of compatible Unitronics OPLCs, creating a self-contained PLC unit with a local I/O configuration.

## Features

- 16 isolated digital inputs, including 2 high-speed counter inputs, type pnp/npn (source/sink)
- 10 isolated relay outputs
- 4 isolated pnp/npn (source/sink) transistor outputs, including 2 high-speed outputs
- 2 analog inputs
- 2 analog outputs

## General Description

The Snap-in I/O plugs directly into the back of compatible Unitronics PLCs, creating a self-contained PLC unit with a local I/O configuration. Detailed Installation Guides containing the I/O wiring diagrams for these models, technical specifications, and additional documentation are located in the Technical Library in the Unitronics website: <https://unitronicsplc.com/support-technical-library/>

## Alert Symbols and General Restrictions

When any of the following symbols appear, read the associated information carefully.

### Symbol/Meaning/Description

**Danger:** The identified danger causes physical and property damage.

**Warning:** The identified danger could cause physical and property damage.

**Caution:** Use caution.

- Before using this product, the user must read and understand this document.
- All examples and diagrams are intended to aid understanding, and do not guarantee operation. Unitronics accepts no responsibility for actual use of this product based on these examples.
- Please dispose of this product according to local and national standards and regulations.
- Only qualified service personnel should open this device or carry out repairs.
- Failure to comply with appropriate safety guidelines can cause severe injury or property damage.
- Do not attempt to use this device with parameters that exceed permissible levels.
- To avoid damaging the system, do not connect/disconnect the device when power is on.

## Environmental Considerations

Do not install in areas with: excessive or conductive dust, corrosive or flammable gas, moisture or rain, excessive heat, regular impact shocks or excessive vibration, in accordance with the standards given in the product's technical specification sheet.

- Do not place in water or let water leak onto the unit.
- Do not allow debris to fall inside the unit during installation.
- Ventilation: 10mm space required between controller's top/bottom edges & enclosure walls.
- Install at maximum distance from high-voltage cables and power equipment.

## UL Compliance

The following section is relevant to Unitronics' products that are listed with the UL.

**The following models:** V200-18-E1B, V200-18-E2B, V200-18-E6B, V200-18-E6BL are UL listed for Hazardous Locations.

**The following models:** V200-18-E1B, V200-18-E2B, V200-18-E3B, V200-18-E3XB, V200-18-E46B, V200-18-E46BL, V200-18-E4B, V200-18-E4XB, V200-18-E5B, V200-18-E6B, V200-18-E6BL, V200-18-ECB, V200-18-ECXB, V200-18-ESB are UL listed for Ordinary Location.

## UL Ratings, Programmable Controllers for Use in Hazardous Locations, Class I, Division 2, Groups A, B, C and D

These Release Notes relate to all Unitronics products that bear the UL symbols used to mark products that have been approved for use in hazardous locations, Class I, Division 2, Groups A, B, C and D.

**Caution:** This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D, or Non-hazardous locations only.

- Input and output wiring must be in accordance with Class I, Division 2 wiring methods and in accordance with the authority having jurisdiction.
- WARNING—Explosion Hazard—substitution of components may impair suitability for Class I, Division 2.
- WARNING – EXPLOSION HAZARD – Do not connect or disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
- WARNING – Exposure to some chemicals may degrade the sealing properties of material used in Relays.
- This equipment must be installed using wiring methods as required for Class I, Division 2 as per the NEC and/or CEC.

**Relay Output Resistance Ratings:** The products listed below contain relay outputs: V200-18-E1B, V200-18-E2B.

- When these specific products are used in hazardous locations, they are rated at 3A res, when these specific products are used in non-hazardous environmental conditions, they are rated at 5A res, as given in the product's specifications.

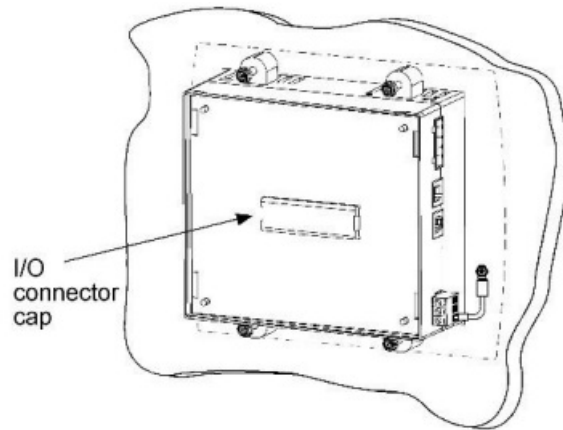
## Installing / Removing the Snap-in I/O Module

### Installing a Snap-in I/O Module

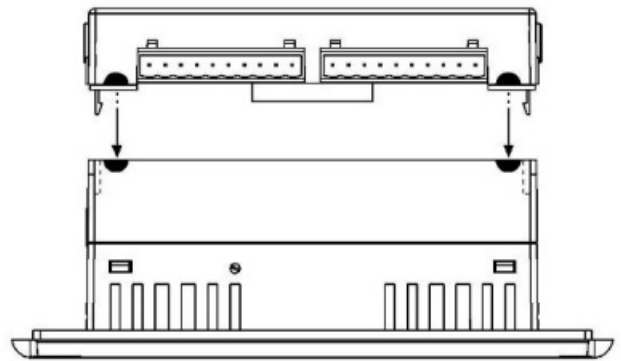
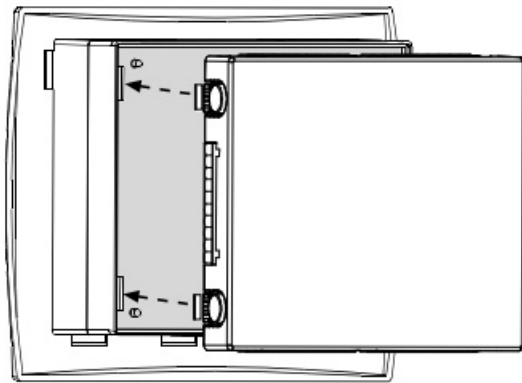
You can install a Snap-in I/O Module both before and after mounting the controller.

- Turn off the power before installing I/O modules.

**Note:** the protective cap covering the I/O connector shown in the accompanying figure. This cap must cover the connector whenever a Snap-in I/O Module is not attached to the controller. You must remove this cap before installing a module.

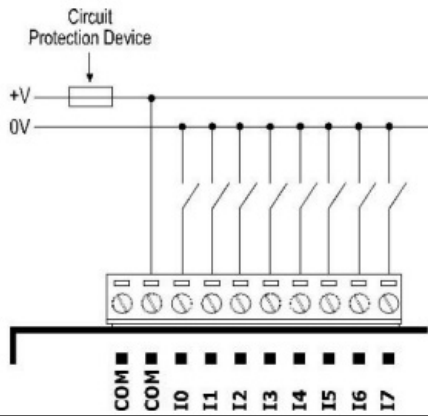


1. Pry the cap off using the blade of a screwdriver.
2. Line the circular guidelines on the controller up with the guidelines on the module as shown below.
3. Apply even pressure on all 4 corners until you hear a distinct 'click'.

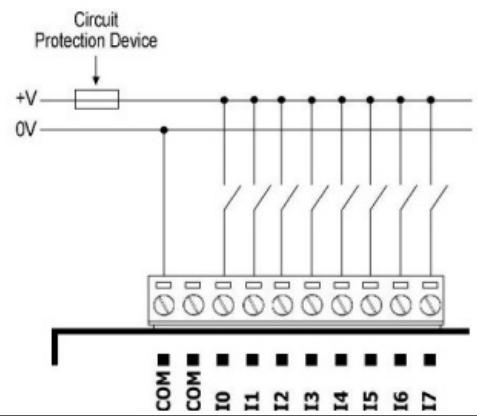


The module is now installed. Check that all sides and corners are correctly aligned.

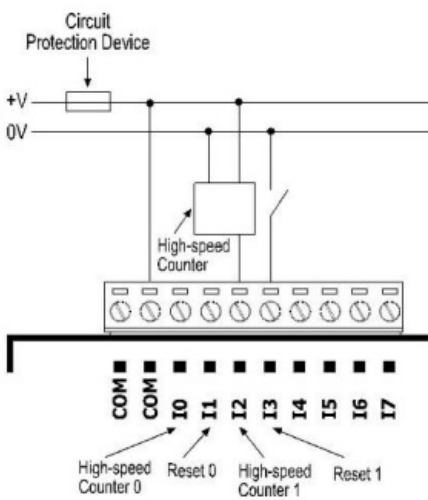
npn (sink) digital input wiring



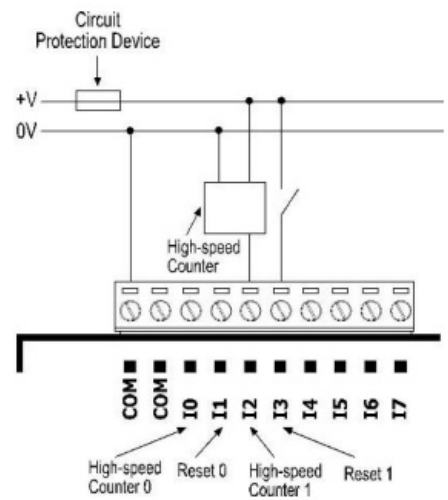
pnp (source) digital input wiring



npn (sink) high-speed counter

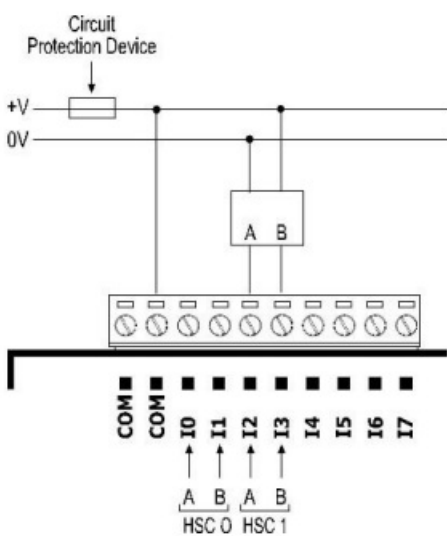


pnp (source) high-speed counter

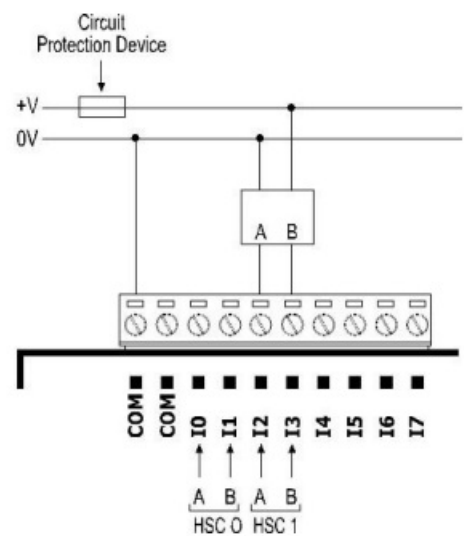


Inputs I0, I1, and I2, I3 can be used as shaft encoders as shown below

npn (sink) shaft encoder wiring



pnp (source) shaft encoder wiring



## Removing a Snap-in I/O Module

1. Press the buttons on the sides of the module and hold them down to open the locking mechanism.
2. Gently rock the module from side to side, easing the module from the controller.
3. Replace the protective cap on the connector.

## Wiring

- Do not touch live wires.
- This equipment is designed to operate only in SELV/PELV/Class 2/Limited Power environments.
- All power supplies in the system must include double insulation. Power supply outputs must be rated as SELV/PELV/Class 2/Limited Power.
- Do not connect either the 'Neutral' or 'Line' signal of the 110/220VAC to device's 0V pin.
- All wiring activities should be performed while power is OFF.
- Use over-current protection, such as a fuse or circuit breaker, to avoid excessive currents into the power supply connection point.
- Unused points should not be connected (unless otherwise specified). Ignoring this directive may damage the device.
- Double-check all wiring before turning on the power supply.
- To avoid damaging the wire, do not exceed a maximum torque of:
  - Controllers offering a terminal block with pitch of 5mm: 0.5 N·m (5 kgf·cm).
  - Controllers offering a terminal block with pitch of 3.81mm: 0.2 N·m (2 kgf·cm).
- Do not use tin, solder, or any substance on stripped wire that might cause the wire strand to break.
- Install at maximum distance from high-voltage cables and power equipment.

## Wiring Procedure

### Use crimp terminals for wiring

- Controllers offering a terminal block with pitch of 5mm: 26-12 AWG wire (0.13 mm<sup>2</sup> – 3.31 mm<sup>2</sup>).
- Controllers offering a terminal block with pitch of 3.81mm: 26-16 AWG wire (0.13 mm<sup>2</sup> – 1.31 mm<sup>2</sup>).
  - Strip the wire to a length of 7±0.5mm (0.270–0.300").
  - Unscrew the terminal to its widest position before inserting a wire.
  - Insert the wire completely into the terminal to ensure a proper connection.
  - Tighten enough to keep the wire from pulling free.

## Wiring Guidelines

- Use separate wiring ducts for each of the following groups:
  - **Group 1:** Low voltage I/O and supply lines, communication lines.
  - **Group 2:** High voltage Lines, Low voltage noisy lines like motor driver outputs.Separate these groups by at least 10cm (4"). If this is not possible, cross the ducts at a 90° angle.
- For proper system operation, all 0V points in the system should be connected to the system 0V supply rail.
- Product-specific documentation must be fully read and understood before performing any wiring.

Allow for voltage drop and noise interference with input lines used over an extended distance. Use wire that is properly sized for the load.

## Earthing the product

To maximize system performance, avoid electromagnetic interference as follows:

- Use a metal cabinet.
- Connect the 0V and functional ground points (if exist) directly to the earth ground of the system.
- Use the shortest, less than 1m (3.3 ft.) and thickest, 2.08mm<sup>2</sup> (14AWG) min, wires possible.

## Digital Inputs

- Each group of 8 inputs has two common signals. Each group can be used as either pnp (source) or npn (sink), when appropriately wired as shown in the following figures.
- Inputs I0 and I2 can be used as normal digital inputs, as high-speed counters, or as part of a shaft encoder.
- Inputs I1 and I3 can be used as normal digital inputs, as high-speed counter resets, or as part of a shaft encoder.
  - The common signals of each group are internally shorted on each connector.

Inputs I0, I1, and I2, I3 can be used as shaft encoders as shown below.

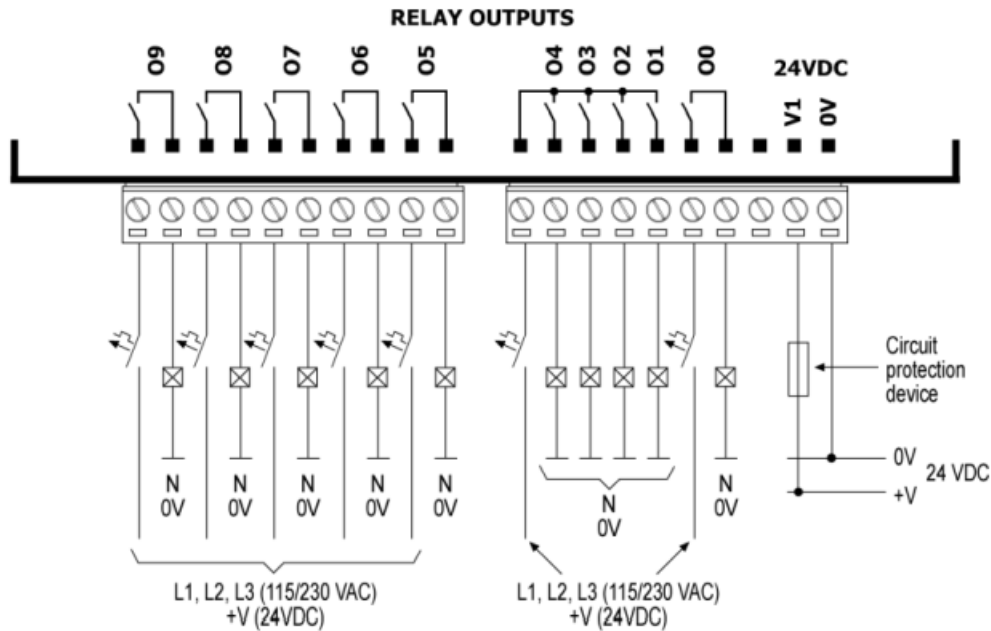
## Digital Outputs

### Wiring Power Supplies

1. Connect the “positive” lead to the “V1” terminal for the relay outputs, to the “V2” terminal for the transistor outputs.
2. In both cases, connect the “negative” lead to the “0V” terminal of each output group.
  - In the event of voltage fluctuations or non-conformity to voltage power supply specifications, connect the device to a regulated power supply.
  - Do not connect the ‘Neutral’ or ‘Line’ signal of the 110/220VAC to the device’s 0V pin.

## Relay Outputs

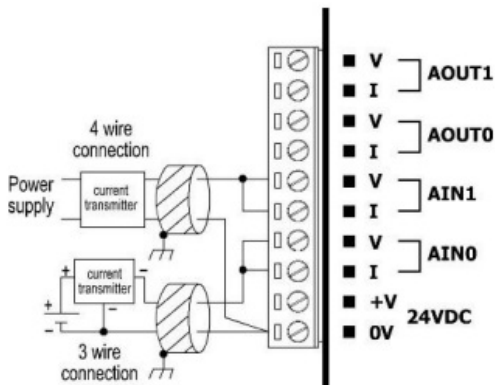
- The 0V signal of the relay outputs is isolated from the controller’s 0V signal.



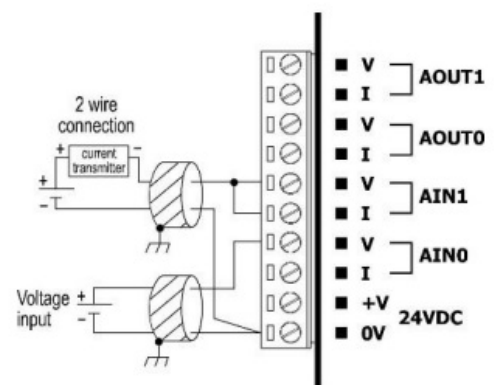
### Increasing Contact Life Span

To increase the life span of the relay output contacts and protect the device from potential damage by reverse EMF, connect:

current



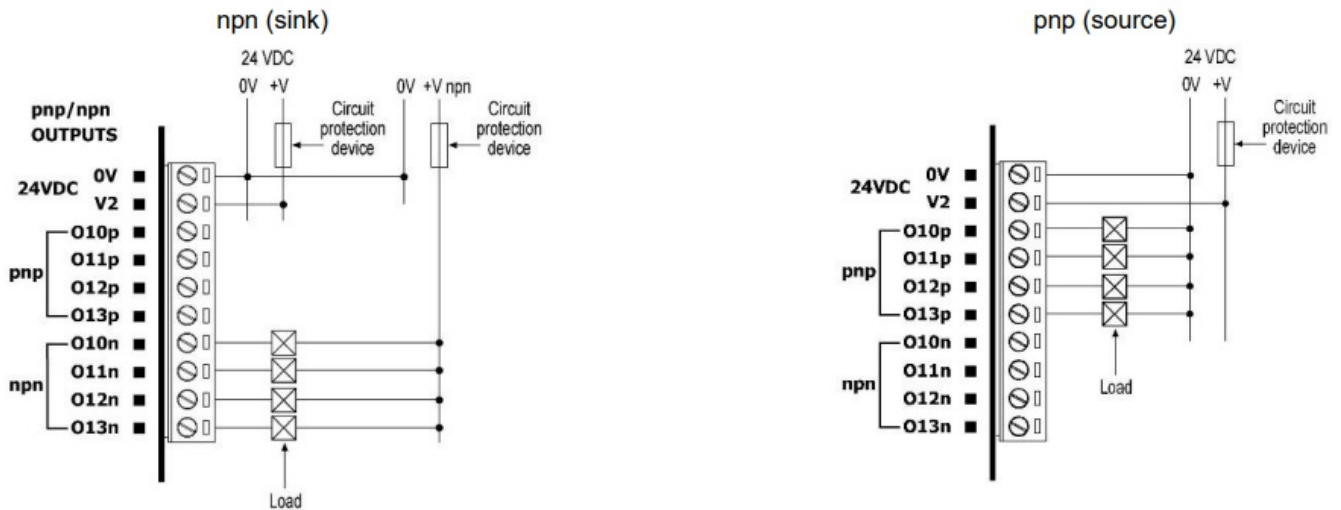
current/voltage



- a clamping diode in parallel with each inductive DC load,
- an RC snubber circuit in parallel with each inductive AC load.



## Transistor Outputs

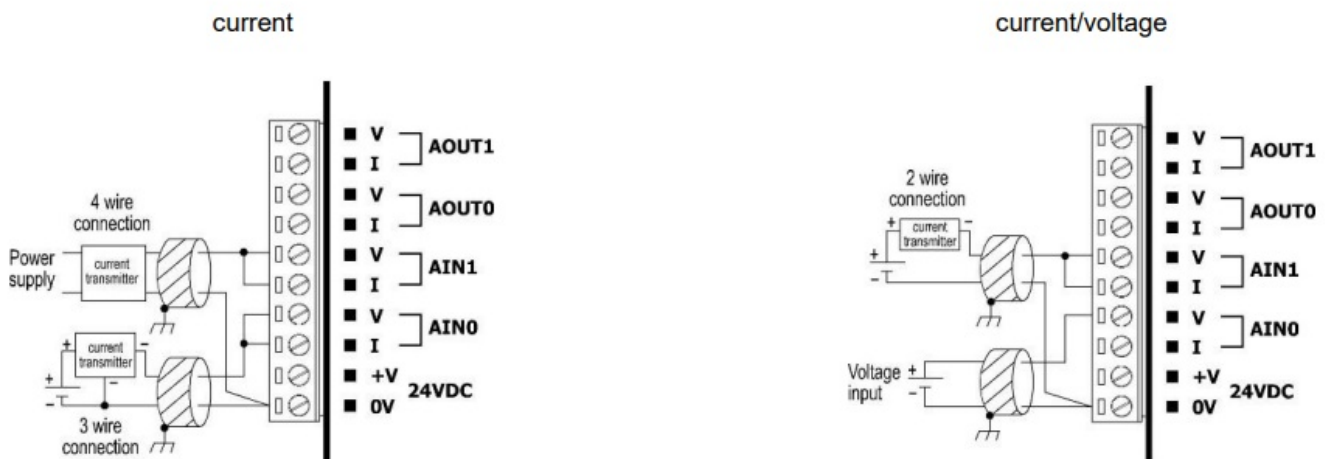


- Each output can be wired separately as either npn or pnp.
- The 0V signal of the transistor outputs is isolated from the controller's 0V signal.

## Analog Inputs

- Shields should be connected at the signal source.
- Inputs may be wired to work with either current or voltage.
- Note that the analog input's 0V signal must be the same 0V used by the controller's power supply.

## Analog Outputs

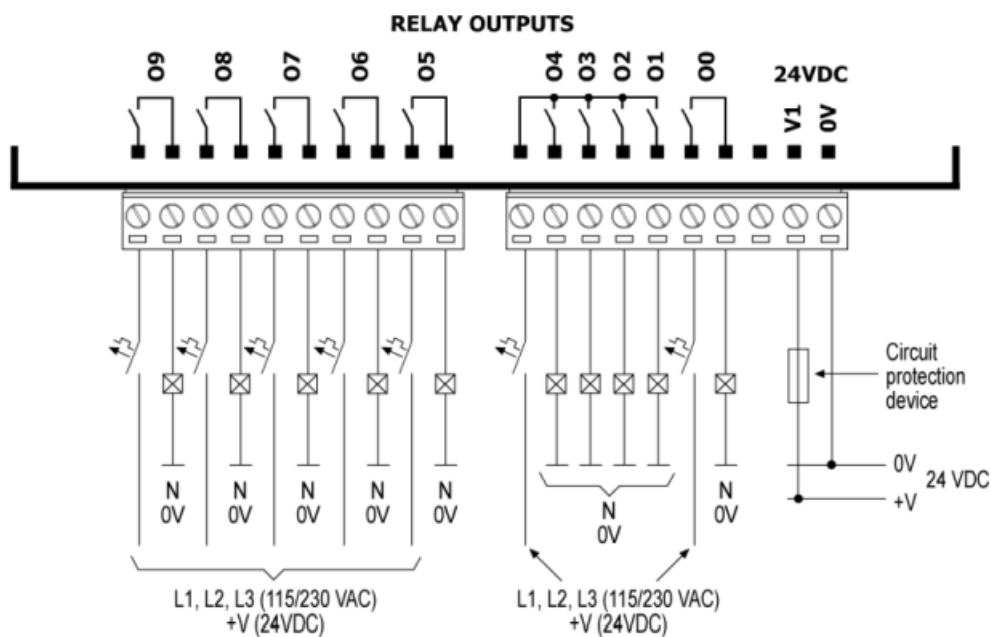


## Wiring the Analog Outputs' Power Supply

1. Connect the "positive" cable to the "+V" terminal, and the "negative" to the "0V" terminal.
  1. The analog 0V signal must be the same 0V used by the controller's power supply.
  2. A non-isolated power supply can be used provided that a 0V signal is connected to the chassis.
  3. Do not connect the 'Neutral' or 'Line' signal of the 110/220VAC to the device's 0V pin.
  4. In the event of voltage fluctuations or non-conformity to voltage power supply specifications, connect the device to a regulated power supply.

**WARNING:** The 24VDC power supply must be turned on and off simultaneously with the controller's power supply.

## Output Wiring



- Shields should be earthed, connected to the earth of the cabinet.
- An output can be wired to either current or voltage.
- Do not use current and voltage from the same source channel.

### V200-18-E2B Technical Specifications

<b><u>Digital Inputs</u></b>	
Number of inputs	16 (in two groups)
Input type	pnp (source) or npn (sink), set by wiring.
Galvanic isolation	Yes
Nominal input voltage	24VDC
Input voltage	
pnp (source)	0-5VDC for Logic '0' 17-28.8VDC for Logic '1'
npn (sink)	17-28.8VDC for Logic '0' 0-5VDC for Logic '1'
Input current	6mA@24VDC for inputs #4 to #15 8.8mA@24VDC for inputs #0 to #3
Response time	10mSec typical
High speed inputs	Specifications below apply. See Notes 1 and 2.

Resolution	32-bit
Frequency	10kHz maximum
Minimum pulse width	40µs
<b>Notes:</b>	
<p>1. 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.</p> <p>2. Inputs #1 and #3 can each function as either counter reset, or as a normal digital input; in either case, its 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.</p>	
<b>Relay Outputs</b>	
Number of outputs	10. See Note 3.
Output type	SPST-NO relay (Form A)
Isolation	By relay
Type of relay	Panasonic JQ1AP-24V, or compatible
Output current	5A maximum (resistive load ). 8A maximum for common signal. See Note 3.
Rated voltage	250VAC / 30VDC
Minimum load	1mA@5VDC
Life expectancy	50k operations at maximum load
Reponse time	10mS (typical)
Contact protection	External precautions required . See Increasing Contact Life Span, page <a href="#">5</a> .
Outputs' power supply	
Nominal operating voltage	24VDC
Operating voltage	20.4 to 28.8VDC
Max. current consumption	90mA@24VDC
<b>Notes:</b>	
3. Outputs #1, #2, #3, and #4 share a common signal. All other outputs have individual contacts.	

<b><u>Transistor Outputs</u></b>	
Number of outputs	4. Each can be individually wired as pnp (source) or npn (sink).
Output type	pnp: P-MOSFET (open drain) npn: open collector
Galvanic isolation	Yes
Output current	pnp: 0.5A maximum (per output) Total current: 2A maximum (per group) npn: 50mA maximum (per output) Total current: 150mA maximum (per group)
Maximum frequency	20Hz (resistive load) 0.5Hz (inductive load)
High speed output maximum frequency (resistive load).	pnp: 2kHz npn: 50kHz
ON voltage drop	pnp: 0.5VDC maximum npn: 0.85VDC maximum See Note 4
Short circuit protection	Yes (pnp only)
Power supply	
operating voltage	20.4 to 28.8VDC
nominal operating voltage	24VDC
nnp (sink) power supply	
operating voltage	3.5V to 28.8VDC, unrelated to the voltage of either the I/O module or the controller


<b><u>Notes:</u></b>	
4. Outputs #12 and Output #13 may be used as high-speed outputs	
<b><u>Analog Inputs</u></b>	
Number of inputs	2 (single-ended)
Input range	0-10V, 0-20mA , 4-20mA. See Note 5.
Conversion method	Successive approximation
Resolution (except at 4-20mA)	10-bit (1024 units)
Resolution at 4-20mA	204 to 1023 (820 units)
Conversion time	Synchronized to scan time
Input impedance	>100K $\Omega$ —voltage 500 $\Omega$ —current
Galvanic isolation	None
Absolute maximum rating	$\pm 15\text{V}$ —voltage $\pm 30\text{mA}$ —current
Full-scale error	$\pm 2$ LSB (0.2%)
Linearity error	$\pm 2$ LSB (0.2%)

<b><u>Analog Outputs</u></b>	
Number of outputs	2 (single-ended)
Output range	0-10V, 0-20mA, 4-20mA. See Note 5.
Resolution (except at 4-20mA) Resolution at 4-20mA	12-bit (4096 units) 819 to 4095 (3277 units)
Conversion time	Synchronized to scan time.
Load impedance	1k $\Omega$ minimum—voltage 500 $\Omega$ maximum—current
Galvanic isolation	None
Linearity error	$\pm 0.1\%$
Operational error limits	$\pm 0.2\%$
<b><u>Notes:</u></b>	
5. Note that the range of each I/O is defined both by wiring and within the controller's software.	
<b><u>Environmental</u></b>	IP20 / NEMA1
Operating 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)
<b><u>Dimensions</u></b>	
Size (WxHxD)	138x23x123mm (5.43x0.9x4.84")
Weight	231g (8.13 oz)

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References

-  [Technical library- about PLC Controllers, HMI panels, automation & control](#)