# V200-18-E1B Snap-in I/O Module

The V200-18-E1B 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
- 3 analog inputs

- Before using this product, it is the responsibility of the user to read and understand this document and any accompanying documentation.
- All examples and diagrams shown herein 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 in accordance with local and national standards and regulations.
- Only qualified service personnel should open this device or carry out repairs.

## User safety and equipment protection guidelines

This document is intended to aid trained and competent personnel in the installation of this equipment as defined by the European directives for machinery, low voltage, and EMC. Only a technician or engineer trained in the local and national electrical standards should perform tasks associated with the device's electrical wiring.

Symbols are used to highlight information relating to the user's personal safety and equipment protection throughout this document. When these symbols appear, the associated information must be read carefully and understood fully.

| Symbol | Meaning | Description |
|---|---|---|
|  | Danger | The identified danger causes physical and property damage. |
|  | Warning | The identified danger can cause physical and property damage. |
| *Caution* | Caution | Use caution. |

- Failure to comply with appropriate safety guidelines can result in severe personal injury or property damage. Always exercise proper caution when working with electrical equipment.

- Check the user program before running it.
- Do not attempt to use this device with parameters that exceed permissible levels.
- Install an external circuit breaker and take appropriate safety measures against short-circuiting in external wiring.
- To avoid damaging the system, do not connect / disconnect the device when the power is on.

*Caution*

- Ascertain that terminal blocks are properly secured in place.

## 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.

- Provide proper ventilation by leaving at least 10mm of space between the top and bottom edges of the device and the enclosure walls.
- Do not place in water or let water leak onto the unit.
- Do not allow debris to fall inside the unit during installation.

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

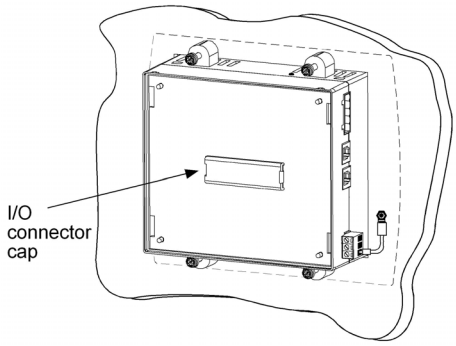
### Installing a Snap-in I/O Module

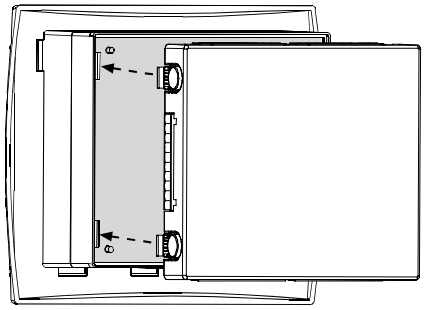
You can install a Snap-in I/O Module both before and after mounting the controller.

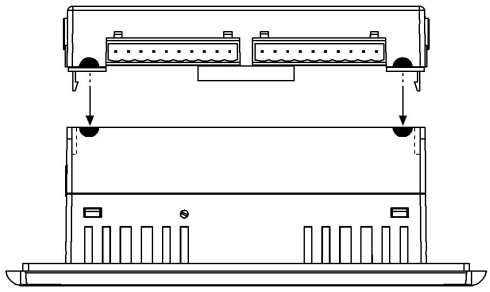
- Turn off the power before installing I/O modules.

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.

### 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.

- Unused pins should not be connected. Ignoring this directive may damage the device.
- Do not connect the 'Neutral' or 'Line' signal of the 110/220VAC to the device's 0V pin.
- Double-check all wiring before turning on the power supply.

### Wiring Procedures

Use crimp terminals for wiring; use 26-12 AWG wire (0.13 mm $^2$–3.31 mm$^2$) for all wiring purposes.

1. Strip the wire to a length of 7±0.5mm (0.250–0.300 inches).
2. Unscrew the terminal to its widest position before inserting a wire.
3. Insert the wire completely into the terminal to ensure that a proper connection can be made.
4. Tighten enough to keep the wire from pulling free.

- To avoid damaging the wire, do not exceed a maximum torque of 0.5 N·m (5 kgf·m).
- Do not use tin, solder, or any other substance on stripped wire that might cause the wire strand to break.
- Install at maximum distance from high-voltage cables and power equipment.

### I/O Wiring—General

- Input or output cables should not be run through the same multi-core cable or share the same wire.
- Allow for voltage drop and noise interference with input lines used over an extended distance. Use wire that is properly sized for the load.

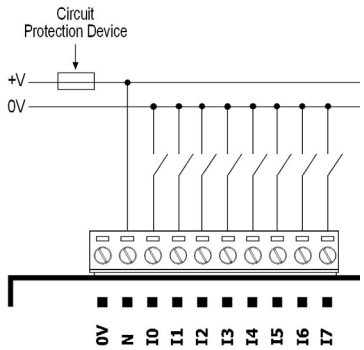
## Digital Inputs

Each group of 8 inputs has a common signal. Each group can be used as either pnp (source) or npn (sink), when appropriately wired as shown in the following figures.

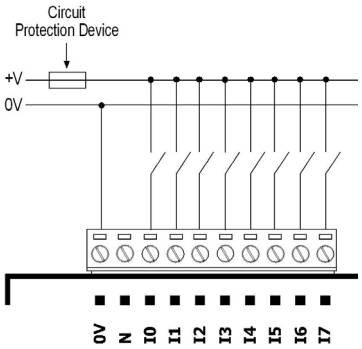
Inputs I0 and I2 can be used as normal digital inputs, high-speed counters, or as part of a shaft encoder.
Inputs I1 and I3 can be used as normal digital inputs, high-speed counter resets, or as part of a shaft encoder.

- The 0V signal of the inputs is isolated from the controller's 0V signal.
- Each group of inputs has its own 0V signal.
- The inputs' 0V and N signals are internally shorted on each connector.

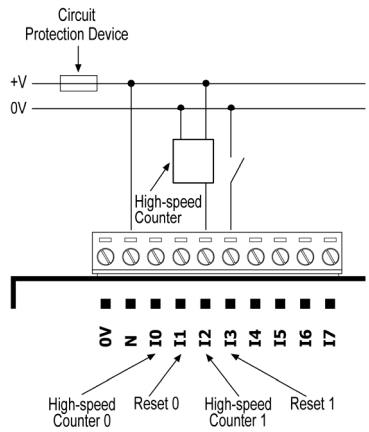
npn (sink) digital input wiring



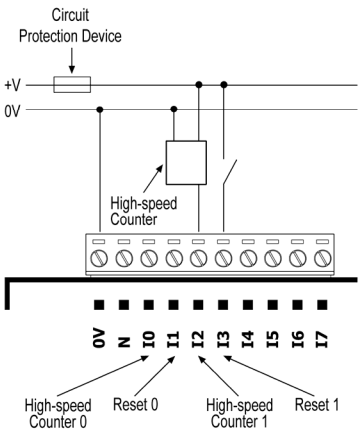

pnp (source) digital input wiring



npn (sink) high-speed counter

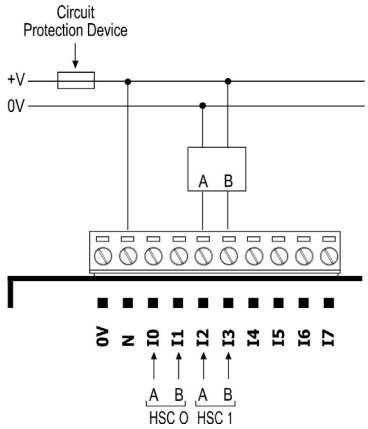



pnp (source) high-speed counter

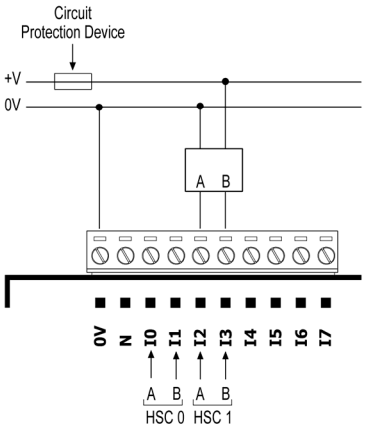



Inputs I0, I1, and I2, I3 can be used as shaft encoders as shown below.

npn (sink) shaft encoder wiring




pnp (source) shaft encoder wiring



## Digital Outputs

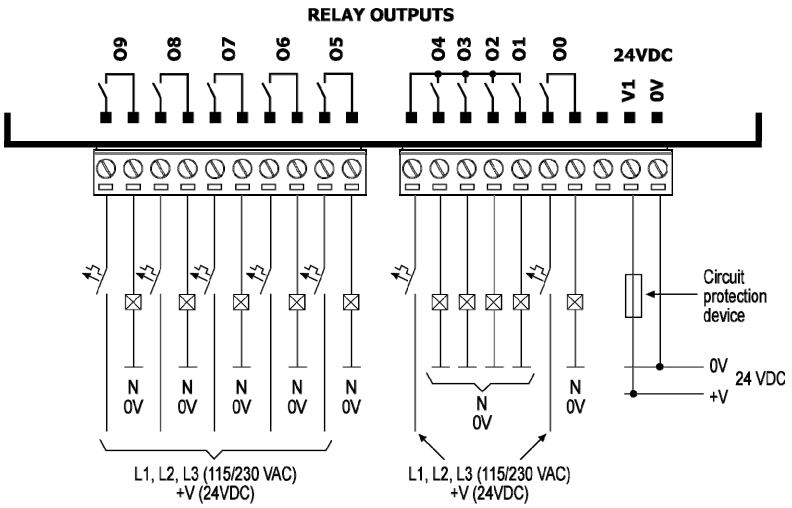
### Wiring Power Supplies

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

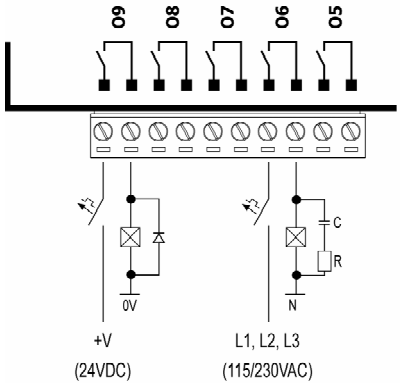
- The 0V signal of the relay outputs is isolated from the controller’s 0V signal.




### 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:

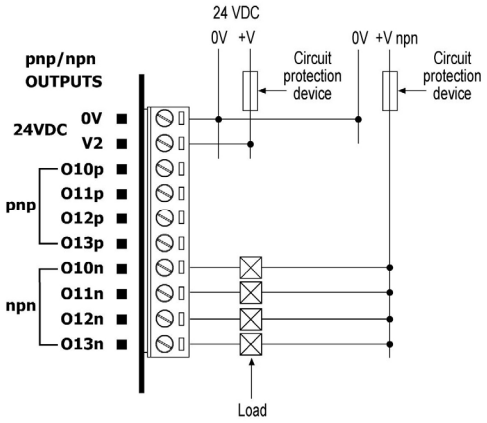
- a clamping diode in parallel with each inductive DC load,
- an RC snubber circuit in parallel with each inductive AC load.



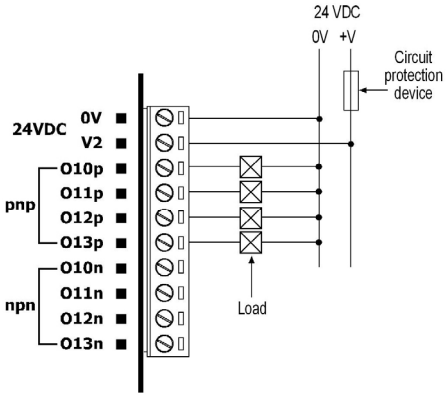
## Transistor Outputs

- 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.

npn (sink)



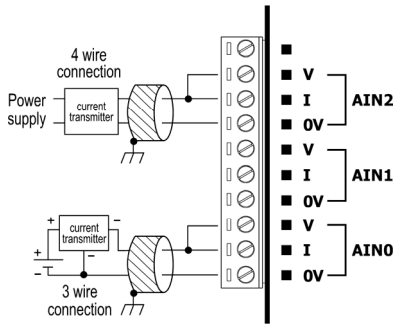

pnp (source)



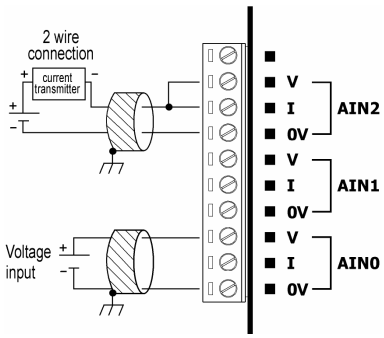

## Analog Inputs

- 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.

current




current/voltage



## V200-18-E1B Technical Specifications

**Digital Inputs**

| | |
|---|---|
| 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'<br>17-28.8VDC for Logic '1' |
| npn (sink) | 17-28.8VDC for Logic '0'<br>0-5VDC for Logic '1' |
| Input current | 6mA@24VDC for inputs #4 to #15<br>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 |

**Notes:**

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.
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.

**Relay Outputs**

| | |
|---|---|
| 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 ).<br>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 6. |
| Outputs' power supply | |
| Nominal operating voltage | 24VDC |
| Operating voltage | 20.4 to 28.8VDC |
| Max. current consumption | 90mA@24VDC |

**Notes:**

3. Outputs #1, #2, #3, and #4 share a common signal. All other outputs have individual contacts.

**Transistor Outputs**

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

**Notes:**

4. Outputs #12 and Output #13 may be used as high-speed outputs

| | |
|---|---|
| **Analog Inputs** | |
| Number of inputs | 3 (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 | >100KΩ—voltage<br>500Ω—current |
| Galvanic isolation | None |
| Absolute maximum rating | ±15V—voltage<br>±30mA—current |
| Full-scale error | ±2 LSB (0.2%) |
| Linearity error | ±2 LSB (0.2%) |

**Notes:**

5. Note that the range of each I/O is defined both by wiring and within the controller's software.

| | |
|---|---|
| **Environmental** | 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) |
| **Dimensions** | |
| Size (WxHxD) | 138x23x123mm (5.43x0.9x4.84") |
| Weight | 222g (7.8 oz) |

## About Unitronics

Unitronics has been producing PLCs, automation software and accessory devices since 1989.

Unitronics' OPLC controllers combine full-function PLCs and HMI operating panels into single, compact units. These HMI + PLC devices are programmed in a single, user-friendly environment. Our clients save I/O points, wiring, space, and programming time; elements that translate directly into cost-efficiency.

Unitronics supports a global network of distributors and sales representatives, as well as a U.S. subsidiary.

For more information regarding Unitronics products, contact your distributor or Unitronics headquarters via email: export@unitronics.com.



5410-1032-4

# V200-18-E2B Snap-in I/O Module

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

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|  | Warning | The identified danger can cause physical and property damage. |
| *Caution* | Caution | Use caution. |

- Failure to comply with appropriate safety guidelines can result in severe personal injury or property damage. Always exercise proper caution when working with electrical equipment.

- Check the user program before running it.
- Do not attempt to use this device with parameters that exceed permissible levels.
- Install an external circuit breaker and take appropriate safety measures against short-circuiting in external wiring.
- To avoid damaging the system, do not connect / disconnect the device when the power is on.

*Caution*

- Ascertain that terminal blocks are properly secured in place.

## 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.

- Provide proper ventilation by leaving at least 10mm of space between the top and bottom edges of the device and the enclosure walls.
- Do not place in water or let water leak onto the unit.
- Do not allow debris to fall inside the unit during installation.

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

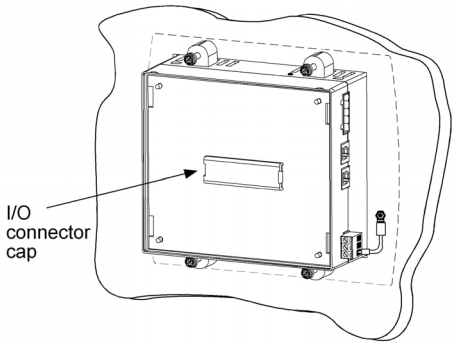
## Installing a Snap-in I/O Module

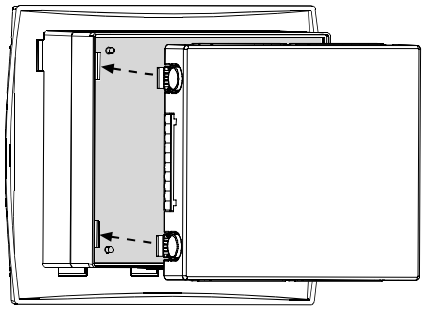
You can install a Snap-in I/O Module both before and after mounting the controller.

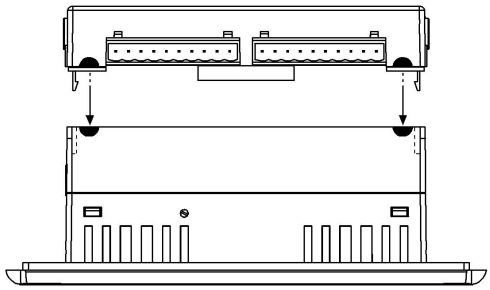
- Turn off the power before installing I/O modules.

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.

## 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.

- Unused pins should not be connected. Ignoring this directive may damage the device.
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1. Strip the wire to a length of 7±0.5mm (0.250–0.300 inches).
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- Install at maximum distance from high-voltage cables and power equipment.

### I/O Wiring—General

- Input or output cables should not be run through the same multi-core cable or share the same wire.
- Allow for voltage drop and noise interference with input lines used over an extended distance. Use wire that is properly sized for the load.

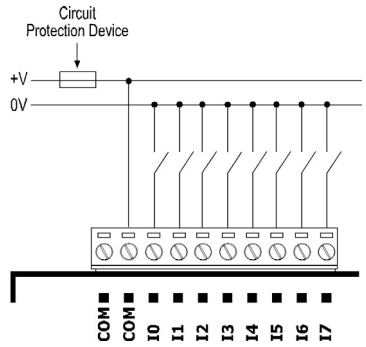
### Digital Inputs

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.

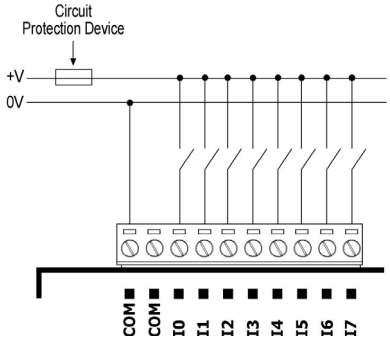
Inputs I0 and I2 can be used as normal digital inputs, as high-speed counters, or as part of a shaft encoder. Inputs I1 and I3 can be used as normal digital inputs, as high-speed counter resets, or as part of a shaft encoder.

- The common signals of each group are internally shorted on each connector.

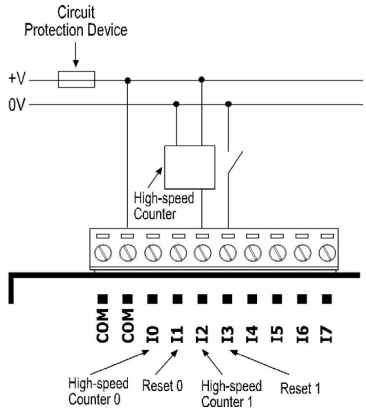
npn (sink) digital input wiring



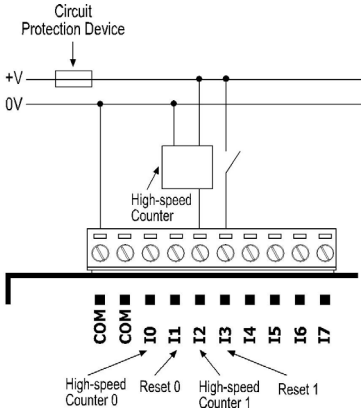

pnp (source) digital input wiring




npn (sink) high-speed counter

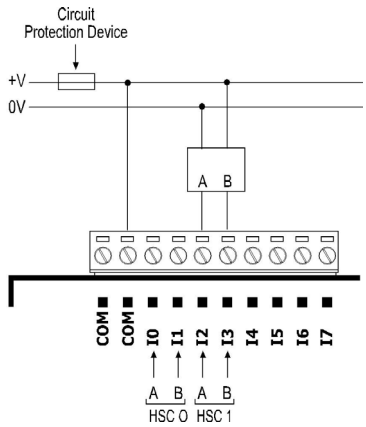



pnp (source) high-speed counter

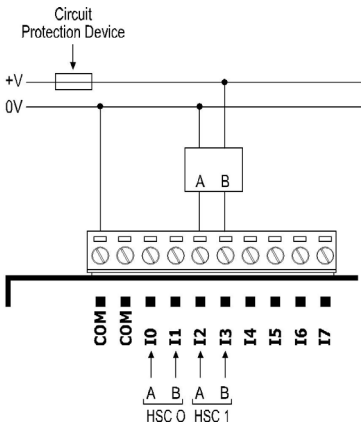



Inputs I0, I1, and I2, I3 can be used as shaft encoders as shown below.

npn (sink) shaft encoder wiring




pnp (source) shaft encoder wiring



## Digital Outputs

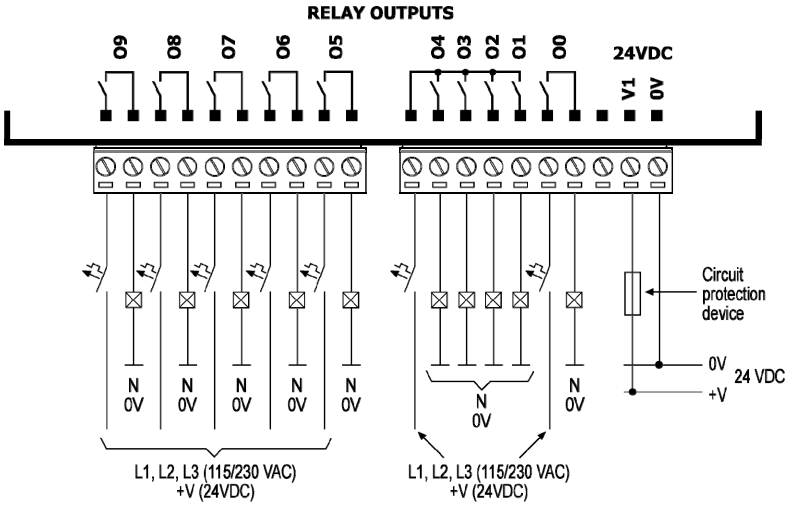
### Wiring Power Supplies

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

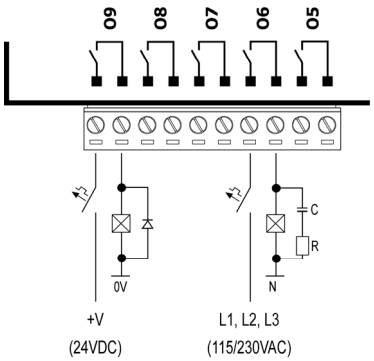
- The 0V signal of the relay outputs is isolated from the controller’s 0V signal.




### 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:

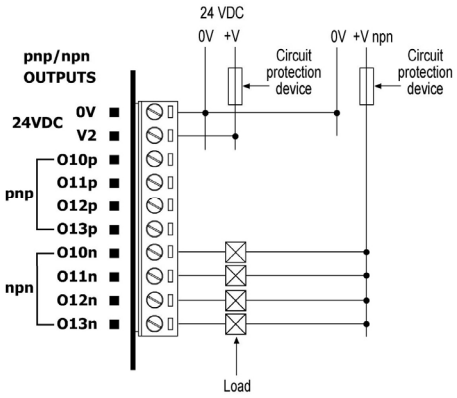
- a clamping diode in parallel with each inductive DC load,
- an RC snubber circuit in parallel with each inductive AC load.



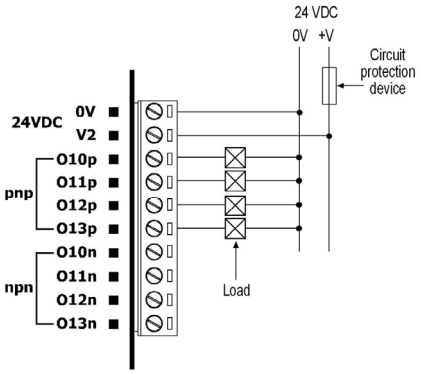
## Transistor Outputs

- 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.

npn (sink)



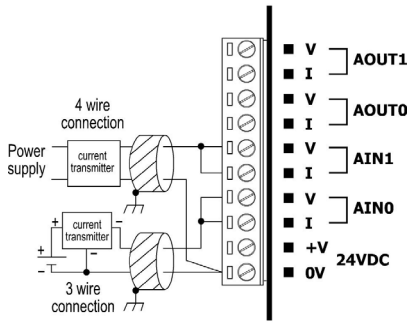

pnp (source)



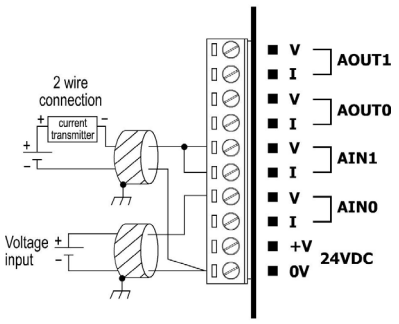

## Analog Inputs

- 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.

current




current/voltage



## Analog Outputs

### Wiring the Analog Outputs' Power Supply

1. Connect the "positive" cable to the "+V" terminal, and the "negative" to the "0V" terminal.

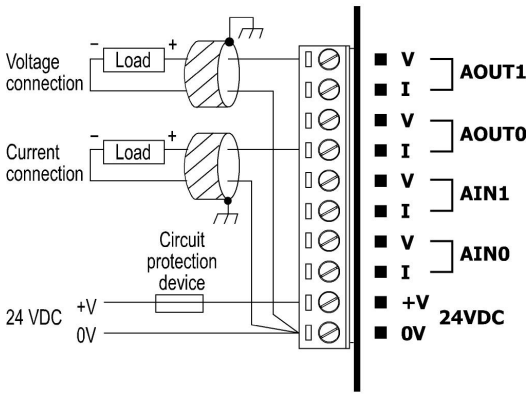
- The analog 0V signal must be the same 0V used by the controller's power supply.
- A non-isolated power supply can be used provided that a 0V signal is connected to the chassis.
- Do not connect the 'Neutral' or 'Line' signal of the 110/220VAC to the device's 0V pin.
- In the event of voltage fluctuations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

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.

current/voltage



## V200-18-E2B Technical Specifications

**Digital Inputs**

| | |
|---|---|
| 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'<br>17-28.8VDC for Logic '1' |
| npn (sink) | 17-28.8VDC for Logic '0'<br>0-5VDC for Logic '1' |
| Input current | 6mA@24VDC for inputs #4 to #15<br>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 |

**Notes:**

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.
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.

**Relay Outputs**

| | |
|---|---|
| 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 ).<br>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 5. |
| Outputs' power supply | |
| Nominal operating voltage | 24VDC |
| Operating voltage | 20.4 to 28.8VDC |
| Max. current consumption | 90mA@24VDC |

**Notes:**

3. Outputs #1, #2, #3, and #4 share a common signal. All other outputs have individual contacts.

**Transistor Outputs**

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

**Notes:**

4. Outputs #12 and Output #13 may be used as high-speed outputs

**Analog Inputs**

| | |
|---|---|
| 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 | >100KΩ—voltage<br>500Ω—current |
| Galvanic isolation | None |
| Absolute maximum rating | ±15V—voltage<br>±30mA—current |
| Full-scale error | ±2 LSB (0.2%) |
| Linearity error | ±2 LSB (0.2%) |

| | |
|---|---|
| **Analog Outputs** | |
| Number of outputs | 2 (single-ended) |
| Output range | 0-10V, 0-20mA, 4-20mA. See Note 5. |
| Resolution (except at 4-20mA) | 12-bit (4096 units) |
| Resolution at 4-20mA | 819 to 4095 (3277 units) |
| Conversion time | Synchronized to scan time. |
| Load impedance | 1kΩ minimum—voltage<br>500Ω maximum—current |
| Galvanic isolation | None |
| Linearity error | ±0.1% |
| Operational error limits | ±0.2% |

**Notes:**

5. Note that the range of each I/O is defined both by wiring and within the controller's software.

| | |
|---|---|
| **Environmental** | 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) |

| | |
|---|---|
| **Dimensions** | |
| Size (WxHxD) | 138x23x123mm (5.43x0.9x4.84") |
| Weight | 231g (8.13 oz) |

## About Unitronics

Unitronics has been producing PLCs, automation software and accessory devices since 1989.

Unitronics' OPLC controllers combine full-function PLCs and HMI operating panels into single, compact units. These HMI + PLC devices are programmed in a single, user-friendly environment. Our clients save I/O points, wiring, space, and programming time; elements that translate directly into cost-efficiency.

Unitronics supports a global network of distributors and sales representatives, as well as a U.S. subsidiary.

For more information regarding Unitronics products, contact your distributor or Unitronics headquarters via email: export@unitronics.com.



**5410-1042-7**

# V200-18-E3XB Snap-in I/O Module

The V200-18-E3XB plugs directly into the back of compatible Unitronics OPLCs, creating a self-contained PLC unit with a local I/O configuration.

Features

- 18 isolated digital inputs, includes 2 H.S.C inputs, type pnp/npn (source/sink)
- 15 isolated relay outputs
- 2 isolated pnp/npn (source/sink) transistor outputs, includes 2 H.S. outputs
- 4 isolated analog/PT100/TC inputs
- 4 isolated analog outputs

- Before using this product, it is the responsibility of the user to read and understand this document and any accompanying documentation.
- All examples and diagrams shown herein 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 in accordance with local and national standards and regulations.
- Only qualified service personnel should open this device or carry out repairs.

## User safety and equipment protection guidelines

This document is intended to aid trained and competent personnel in the installation of this equipment as defined by the European directives for machinery, low voltage, and EMC. Only a technician or engineer trained in the local and national electrical standards should perform tasks associated with the device's electrical wiring.

Symbols are used to highlight information relating to the user's personal safety and equipment protection throughout this document. When these symbols appear, the associated information must be read carefully and understood fully.

| Symbol | Meaning | Description |
|---|---|---|
|  | Danger | The identified danger causes physical and property damage. |
|  | Warning | The identified danger can cause physical and property damage. |
| *Caution* | Caution | Use caution. |

- Failure to comply with appropriate safety guidelines can result in severe personal injury or property damage. Always exercise proper caution when working with electrical equipment.

- Check the user program before running it.
- Do not attempt to use this device with parameters that exceed permissible levels.
- Install an external circuit breaker and take appropriate safety measures against short-circuiting in external wiring.
- To avoid damaging the system, do not connect / disconnect the device when the power is on.

*Caution*

- Ascertain that terminal blocks are properly secured in place.

## 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.

- Provide proper ventilation by leaving at least 10mm of space between the top and bottom edges of the device and the enclosure walls.
- Do not place in water or let water leak onto the unit.
- Do not allow debris to fall inside the unit during installation.

## Wiring

- Do not touch live wires.

- Unused pins should not be connected. Ignoring this directive may damage the device.
- Do not connect the 'Neutral' or 'Line' signal of the 110/220VAC to the device's 0V pin.
- Double-check all wiring before turning on the power supply.

### Wiring Procedures

Use crimp terminals for wiring; use 26-12 AWG wire (0.13 mm $^2$–3.31 mm$^2$) for all wiring purposes.

1. Strip the wire to a length of 7±0.5mm (0.250–0.300 inches).
2. Unscrew the terminal to its widest position before inserting a wire.
3. Insert the wire completely into the terminal to ensure that a proper connection can be made.
4. Tighten enough to keep the wire from pulling free.

- To avoid damaging the wire, do not exceed a maximum torque of 0.5 N·m (5 kgf·cm).
- Do not use tin, solder, or any other substance on stripped wire that might cause the wire strand to break.
- Install at maximum distance from high-voltage cables and power equipment.

### I/O Wiring—General

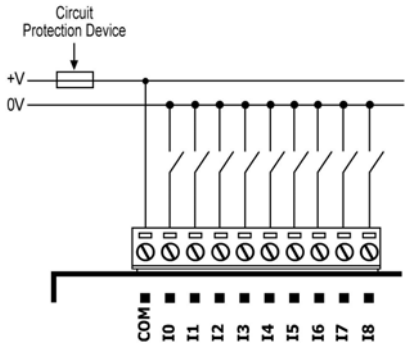
- Input or output cables should not be run through the same multi-core cable or share the same wire.
- Allow for voltage drop and noise interference with input lines used over an extended distance. Use wire that is properly sized for the load.

## Digital Inputs

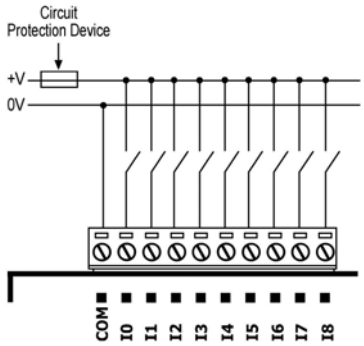
Each group of 9 inputs has a common signal. Each group can be used as either pnp (source) or npn (sink), when appropriately wired as shown in the following figures.

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.

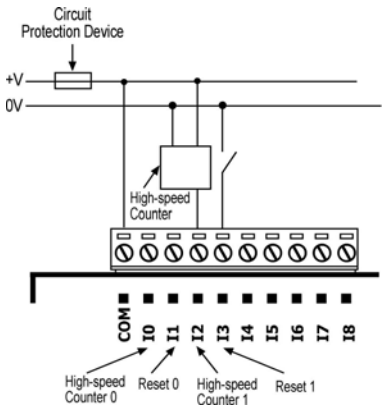
npn (sink) digital input wiring



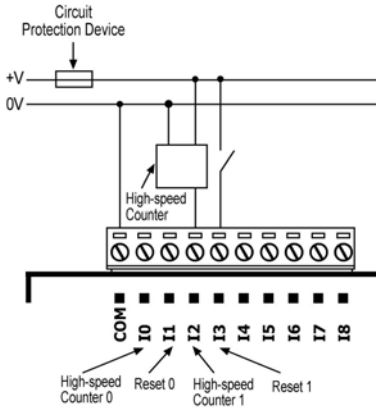

pnp (source) digital input wiring




npn (sink) high-speed counter

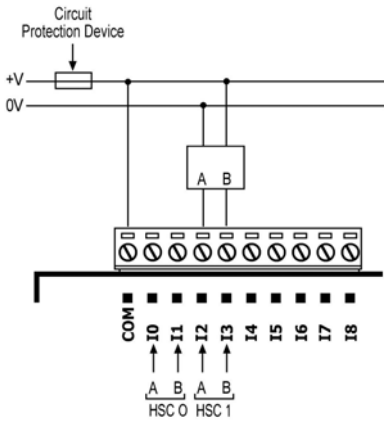



pnp (source) high-speed counter

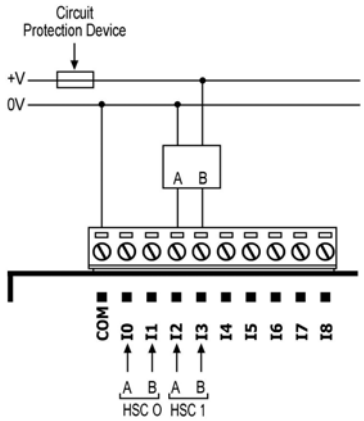



Inputs I0, I1, and I2, I3 can be used as shaft encoders as shown below.

npn (sink) shaft encoder wiring




pnp (source) shaft encoder wiring



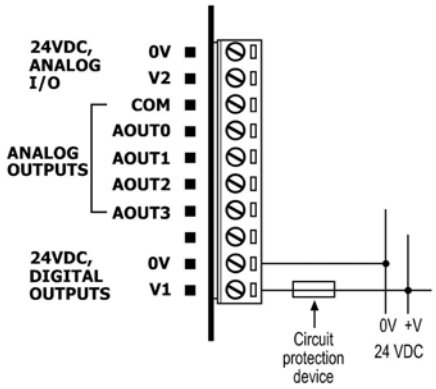
## Digital Outputs

### Wiring Power Supplies

Use a 24VDC power supply for both relay and transistor outputs.

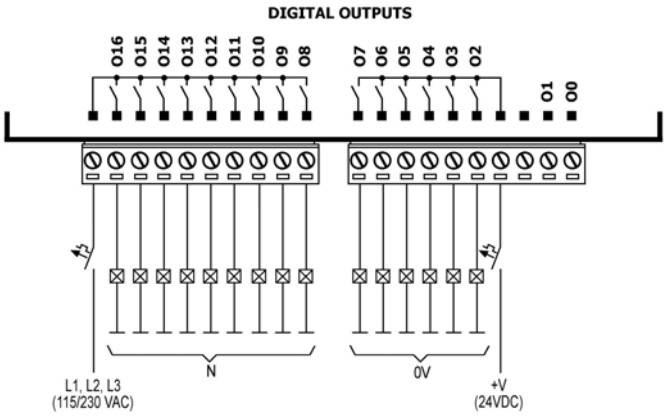
1. Connect the "positive" lead to the "V1" terminal, and the “negative” lead to the "0V" terminal.

- In the event of voltage fluctuations or non-conformity to voltage power supply specifications, connect the device to a regulated power supply




### Relay Outputs

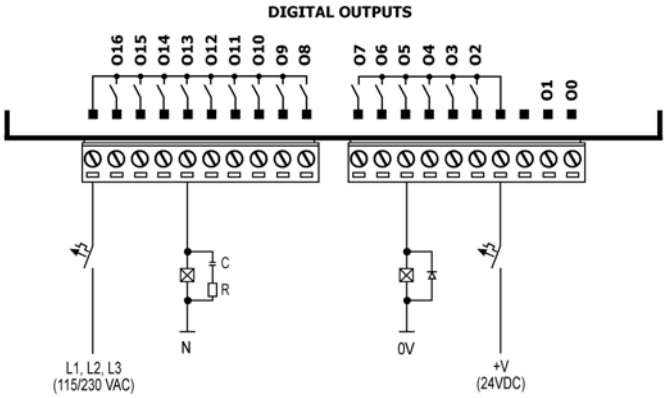
- Each output can be wired separately to either AC or DC as show below.
- The 0V signal of the relay outputs is isolated from the controller’s 0V signal.




### 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:

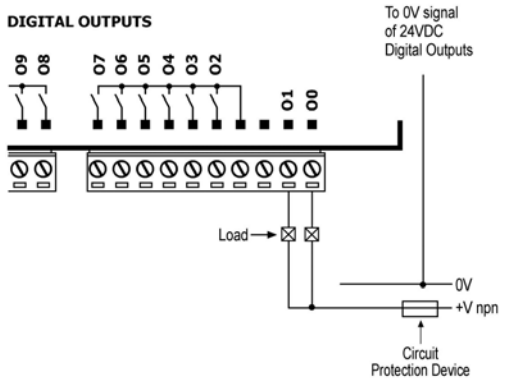
- a clamping diode in parallel with each inductive DC load,
- an RC snubber circuit in parallel with each inductive AC load.



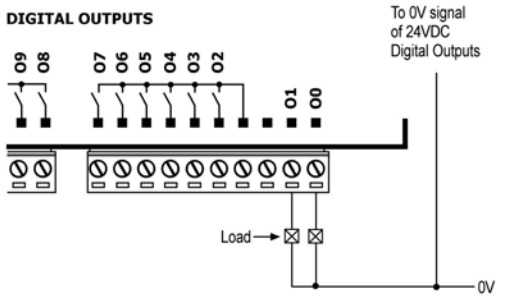
## Transistor Outputs

- Each output can function as either npn or pnp, in accordance with jumper settings and wiring. Open the device and set the jumpers according to the instructions beginning on page 8.
- The 0V signal of the transistor outputs is isolated from the controller's 0V signal.

npn (sink)




pnp (source)



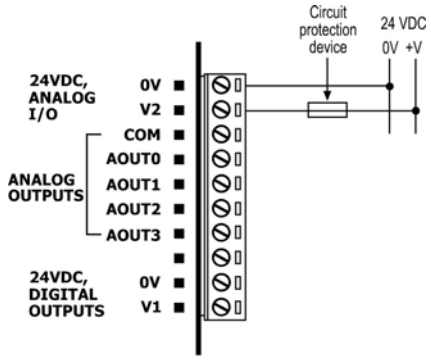

## Analog I/O Power Supplies

Use a 24VDC power supply for all analog input and output modes.

1. Connect the "positive" cable to the "V2" terminal, and the "negative" to the "0V" terminal.

- In the event of voltage fluctuations or non-conformity to voltage power supply specifications, connect the device to a regulated power supply.
- Since the analog I/O power supply is isolated, the controller's 24VDC power supply may also be used to power the analog I/Os.

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



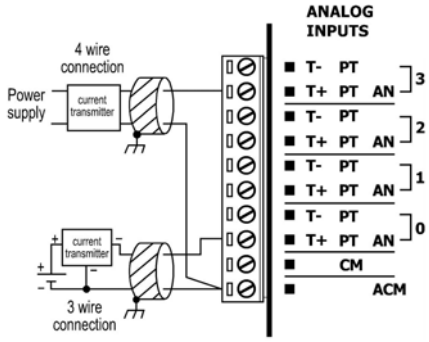
## Analog / PT100 / TC Inputs

- Each input may be set as either analog, RTD, or thermocouple. To set an input:
  - Use the appropriate wiring as shown below.
  - Open the device and set the jumpers according to the instructions beginning on page 8.
- Shields should be connected at the signal source.
- In order to function correctly, the analog power supplies must be wired as shown on page 5.
- To ensure proper performance, a warm-up period of a half an hour is recommended.

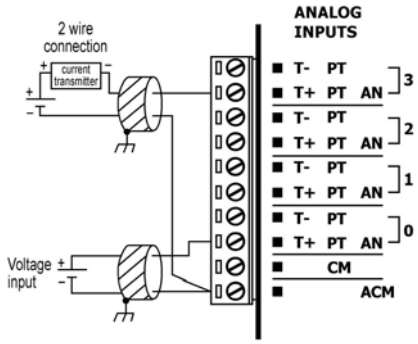
### Analog Inputs

- Inputs may be wired to work with either current or voltage.
- When set to current/voltage, all inputs share a common ACM signal.

current




current/voltage

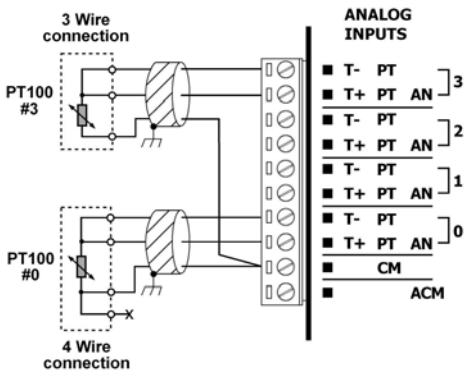



### RTD Inputs

1. Wire one lead of each RTD input to the common signal (CM) as shown below.

- 4 wire PT100 can be used by leaving one of the sensor leads unconnected.

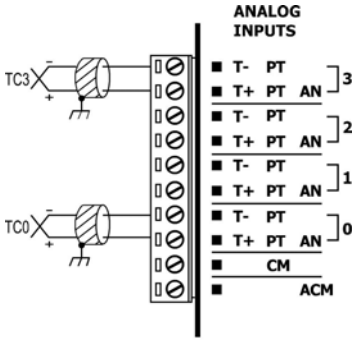
PT100



## Thermocouple Inputs

- Supported thermocouple types include B, E, J, K, N, R, S, and T, in accordance with software and jumper settings. See table Thermocouple Input Ranges, on page 15.
- Inputs may be set to mV by software settings (Hardware Configuration); note that in order to set mV inputs, thermocouple jumper settings are used.

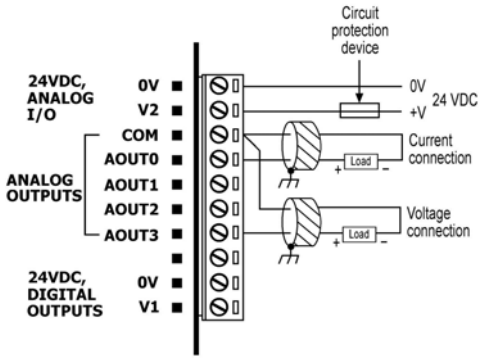
Thermocouple




## Analog Outputs

- Shields should be earthed, connected to the earth of the cabinet.
- An output can be wired to either current or voltage.
  - Use the appropriate wiring as shown below.
  - Open the device and set the jumpers according to the instructions beginning on page 8.
- To ensure proper performance, a warm-up period of a half an hour is recommended.

current/voltage



## Changing Jumper Settings

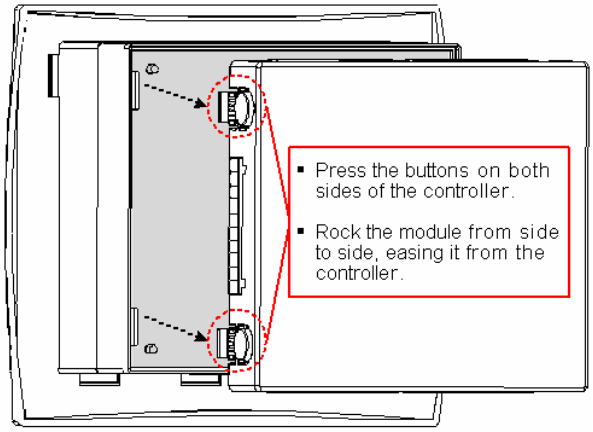
To access the jumpers, you must remove the snap-in I/O module from the controller, and then remove the module's PCB board. Before you begin, turn off the power supply, disconnect and dismount the controller.

- Before performing these actions, touch a grounded object to discharge any electrostatic charge.
- Avoid touching the PCB board directly by holding the PCB board by its connectors.

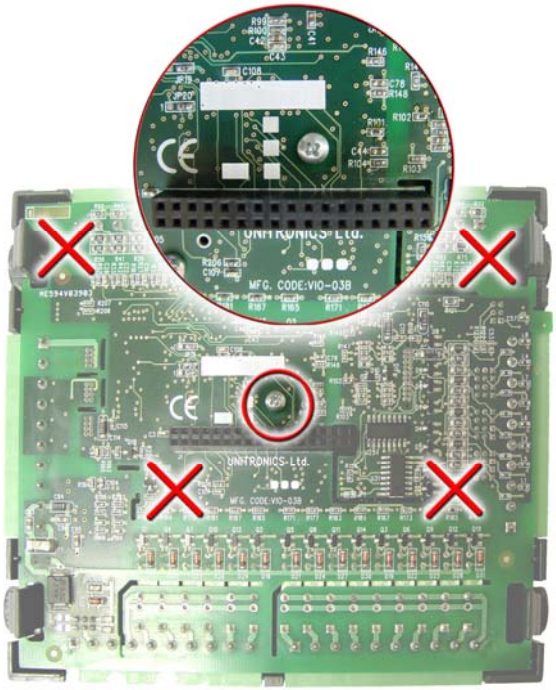
### Accessing the Jumpers

First, remove the snap-in module.

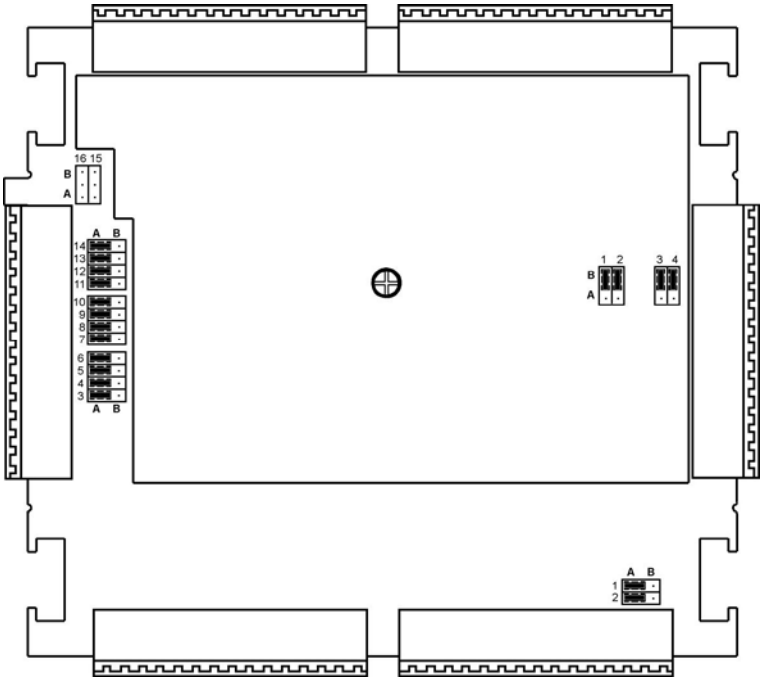
1. Locate the 4 buttons on the sides of the module, two on either side. Press the 2 buttons on either side of the module as shown, and hold them down to open the locking mechanism.
2. Gently rock the module from side to side, easing the module from the controller.




3. Using a Philips screwdriver, remove the center screw, shown in the figure below, from the module's upper PCB board. **Do not remove any other screws**.
4. Holding the PCB board by its edges, gently lift it out of the module.



Select the desired function by changing the jumper settings according to the figure and tables shown below.




**Bottom PCB board**

Note that Jumpers #15 & 16 are not used

## Analog Input Jumpers

| | Jumper # | Voltage* | Current | T/C or mV | PT100 |
|---|---|---|---|---|---|
| **Analog input 3** | 14 | A | B | B | A |
| | 13 | A | B | B | A |
| | 12 | A | A | B | B |
| **Analog input 2** | 11 | A | B | B | A |
| | 10 | A | B | B | A |
| | 9 | A | A | B | B |
| **Analog input 1** | 8 | A | B | B | A |
| | 7 | A | B | B | A |
| | 6 | A | A | B | B |
| **Analog input 0** | 5 | A | B | B | A |
| | 4 | A | B | B | A |
| | 3 | A | A | B | B |

## Digital Output Jumpers

| | Jumper # | PNP* | NPN |
|---|---|---|---|
| **Digital Output 0** | 1 | A | B |
| **Digital Output 1** | 2 | A | B |

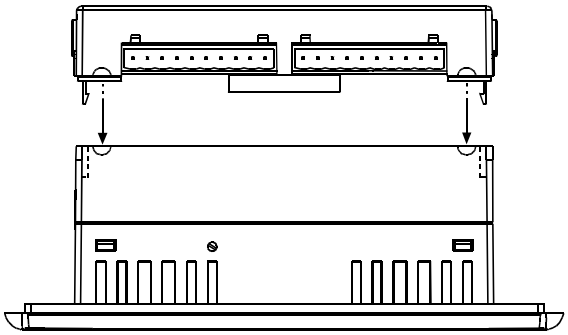
**Analog Output Jumpers**

| | | Jumper # | Current | Voltage* |
|---|---|---|---|---|
| **Top PCB board** | **Analog Output 0** | 1 | A | B |
| | **Analog Output 1** | 2 | A | B |
| | **Analog Output 2** | 3 | A | B |
| | **Analog Output 3** | 4 | A | B |

* Default factory setting

**Reassembling the controller**

1. Return the PCB board to the module and secure the center screw.
2. Next, reinstall the module. Line the circular guidelines on the controller up with the guidelines on the Snap-in I/O 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.



## V200-18-E3XB Technical Specifications

**Digital Inputs**

| | |
|---|---|
| Number of inputs | 18 (in two groups) |
| Input type | pnp (source) or npn (sink) |
| Galvanic isolation | |
| Digital inputs to bus | Yes |
| Digital inputs to digital inputs in same group | No |
| Group to group, digital inputs | Yes |
| Nominal input voltage | 24VDC |
| Input voltage | |
| pnp (source) | 0-5VDC for Logic '0'<br>17-28.8VDC for Logic '1' |
| npn (sink) | 17-28.8VDC for Logic '0'<br>0-5VDC for Logic '1' |
| Input current | 6mA@24VDC for inputs #4 to #17<br>8.8mA@24VDC for inputs #0 to #3 |
| Response time | 10mSec typical |
| High speed inputs | Specifications below apply when these inputs are wired for use as a high-speed counter input/shaft encoder. See Notes 1 and 2. |
| Resolution | 32-bit |
| Frequency | 10kHz maximum |
| Minimum pulse width | 40µs |

**Notes:**

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.
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.

---

**Digital Outputs**

**Digital Output's Power Supply**

| | |
|---|---|
| Nominal operating voltage | 24VDC |
| Operating voltage | 20.4 to 28.8VDC |
| Quiescent current | 20mA@24VDC. |
| Max. current consumption | 85mA@24VDC. See Note 3. |
| Galvanic isolation | |
| Digital power supply to bus | Yes |
| Digital power supply to relay outputs | Yes |
| Digital power supply to transistor outputs | No |

**Notes:**

3. Maximum current consumption does not provide for PNP output requirements. The additional current requirement of PNP outputs must be added.

**Relay Outputs**

| | |
|---|---|
| Number of outputs | 15 relays (in two groups). See Note 4. |
| Output type | SPST-NO (Form A) |
| Isolation | By relay |
| Type of relay | Tyco PCN-124D3MHZ or compatible |
| Outputs' power supply | See Digital Output's Power Supply above |
| Galvanic isolation | |
| Relay outputs to bus | Yes |
| Group to group, relay outputs | Yes |
| Relay to transistor outputs | Yes |
| Output current | 3A maximum per output (resistive load)<br>8A maximum total for common (resistive load) |
| Rate voltage | 250VAC / 30VDC |
| Minimun load | 1mA@5VDC |
| Life expectancy | 100k operations at maximum load |
| Response time | 10mS (typical) |
| Contact protection | External precautions required (see Increasing Contact Life Span, p.4) |

**Notes:**

4. Outputs #2,3,4,5,6 and 7 share a common signal. Outputs #8,9,10,11,12,13,14,15 and 16 share a common signal

**Transistor Outputs**

| | |
|---|---|
| Number of outputs | 2, high-speed. Each can be individually set as pnp (source) or npn (sink) via wiring and jumper settings. See Note 5. |
| Output type | pnp: P-MOSFET (open drain)<br>npn: N-MOSFET (open drain) |
| Galvanic isolation | |
| Transistor outputs to bus | Yes |
| Transistor outputs to transistor outputs | No |
| Transistor outputs to relay outputs | Yes |
| Output current | pnp: 0.5A maximum per output<br>npn: 50mA maximum per output |
| Maximum frequency | Resistive load<br>pnp: 2kHz<br>npn: 50kHz<br>Inductive load<br>0.5Hz |
| ON voltage drop | pnp: 0.5VDC maximum<br>npn: 0.4VDC maximum |
| Short circuit protection | Yes (pnp only) |
| pnp (source) power supply | See Digital Output's Power Supply above |
| npn (sink) power supply | |
| operating voltage | 3.5V to 28.8VDC,<br>unrelated to the voltage of either the I/O module or the controller |

**Notes:**

5. Both transistor outputs may be used as high-speed outputs.

| | |
|---|---|
| **Analog I/O's Power Supply** | |
| Nominal operating voltage | 24VDC |
| Operating voltage | 20.4 to 28.8VDC |
| Quiescent current | 70mA@24VDC |
| Max. current consumption | 130mA@24VDC |
| Galvanic isolation | |
| Analog power supply to bus | Yes |
| Analog power supply to analog inputs | Yes |
| Analog power supply to analog outputs | Yes |

| | |
|---|---|
| **Analog/ PT100/ TC Inputs** | |
| Number of inputs | 4 |
| Type of input | Set via appropriate wiring and jumper settings. |
| **Analog Inputs Power Supply** | |
| Galvanic isolation | |
| Analog/PT/TC inputs to bus | Yes |
| Analog/PT/TC inputs to analog outputs | Yes |
| Analog /PT/TC inputs to Analog /PT/TC inputs | No |
| **Analog inputs** | |
| Input range | 0-10V, 0-20mA , 4-20mA |
| Power supply | See Analog I/O's Power Supply above |
| Conversion method | Succesive approximation |
| Resolution at 0-10V, 0-20mA | 14-bit (16384 units). See Note 6. |
| Resolution at 4-20mA | 3277 to 16384 (13107 units). See Note 6. |
| Conversion time | Synchronized to cycle time |
| Input impedance | >1MΩ—voltage<br>121.5Ω—current |
| Absolute maximum rating | ±20V—voltage<br>±40mA—current |
| Full-scale error | ±0.4% |
| Linearity error | ±0.04% |
| Status indication | Yes. See Note 7. |

**Notes:**

6. 12 or 14-bit resolution may be selected via software.

7. The analog value can indicate faults as shown below:

| Value | Possible Cause |
|---|---|
| 16384 | Input value deviates **slightly above** the input range |
| 32767 | -Input value deviates **greatly above** or **below** the input range<br>-Power supply disconnected |

**PT100 inputs**

| | |
|---|---|
| Input range | -200 to 600°C/-328 to 1100°F. 1 to 320Ω. See Note 8. |
| Conversion method | Voltage to frequency |
| Resolution | 0.1°C/0.1°F |
| Conversion time | 200mS minimum per channel, depending on software filter type |
| Input impedance | >10MΩ |
| Auxillary current for PT100 | 150µA typical |
| Full-scale error | ±0.4% |
| Linearity error | ±0.04% |
| Status indication | Yes. See Note 9. |

**Notes:**

8. The device can also measure resistance with the range of 1-320 Ω at a resolution of 0.1 Ω.
9. The analog value can indicate faults as shown below:

| Value | Possible Cause |
|---|---|
| 32767 | - Sensor is not connected to input<br>- Value exceeds permissible range<br>- Power supply disconnected |
| -32767 | Sensor is short-circuited |

**Thermocouple inputs**

| | |
|---|---|
| Input range | As shown in the table on page 15. See Note 10. |
| Conversion method | Voltage to frequency |
| Resolution | 0.1°C/0.1°F maximum |
| Conversion time | 100mS minimum per channel, depending on software filter type |
| Input impedance | >10MΩ |
| Cold junction compensation | Local, automatic |
| Cold junction compensation error | ±1.5°C / ±2.7°F maximum |
| Absolute maximum rating | ±0.6VDC |
| Full-scale error | ±0.4% |
| Linearity error | ±0.04% |
| Warm-up time | ½ hour typically, ±1°C/±1.8°F repeatability |
| Status indication | Yes. See Note 11. |

**Notes:**

10. The device can also measure voltage within the range of -5 to 56mV, at a resolution of 0.01mV. The device can also measure raw value frequency at a resolution of 14-bits(16384)
11. The analog value can indicate faults as shown below:

| Value | Possible Cause |
|---|---|
| 32767 | - Sensor is not connected to input<br>- Sensor value exceeds the maximum value<br>- Power supply disconnected |
| -32767 | Sensor value is under the minimum value |

**Table 1: Thermocouple input ranges**

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

**Analog Outputs**

| | |
|---|---|
| Number of outputs | 4 (single-ended) |
| Output range | 0-10V, 4-20mA. See Note 12. |
| Resolution | 12-bit (4096 units) |
| Conversion time | Synchronized to scan time. |
| Load impedance | 1kΩ minimum—voltage<br>500Ω maximum—current |
| Galvanic isolation | |
| Analog outputs to bus | Yes |
| Analog outputs to Analog/PT/TC inputs | Yes |
| Analog outputs to analog outputs | No |
| Linearity error | ±0.1% |
| Operational error limits | ±0.2% |

**Notes:**

12. Note that the range of each I/O is defined by wiring, jumper settings, and within the controller's software.

| | |
|---|---|
| **Environmental** | IP20 / NEMA1 |
| Operating temperature | 0° to 45°C (32° to 113°F) |
| Storage temperature | -20° to 60° C (-4° to 140°F) |
| Relative Humidity (RH) | 5% to 90% (non-condensing) |
| Dimensions (WxHxD) | 138x23x123mm (5.43x0.9x4.84") |
| Weight | 279g (9.87 oz) |

## About Unitronics

Unitronics has been producing PLCs, automation software and accessory devices since 1989.

Unitronics' OPLC controllers combine full-function PLCs and HMI operating panels into single, compact units. These HMI + PLC devices are programmed in a single, user-friendly environment. Our clients save I/O points, wiring, space, and programming time; elements that translate directly into cost-efficiency.

Unitronics supports a global network of distributors and sales representatives, as well as a U.S. subsidiary.

For more information regarding Unitronics products, contact your distributor or Unitronics headquarters via email: export@unitronics.com.



5410-1082-9

# V200-18-E4XB Snap-in I/O Module

The V200-18-E4XB plugs directly into the back of compatible Unitronics OPLCs, creating a self-contained PLC unit with a local I/O configuration.

Features

- 18 isolated digital inputs, includes 2 H.S.C inputs, type pnp/npn (source/sink)
- 15 isolated pnp (source) outputs
- 2 isolated pnp/npn (source/sink) transistor outputs, includes 2 H.S. outputs
- 4 isolated analog/PT100/TC inputs
- 4 isolated analog outputs

- Before using this product, it is the responsibility of the user to read and understand this document and any accompanying documentation.
- All examples and diagrams shown herein 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 in accordance with local and national standards and regulations.
- Only qualified service personnel should open this device or carry out repairs.

## User safety and equipment protection guidelines

This document is intended to aid trained and competent personnel in the installation of this equipment as defined by the European directives for machinery, low voltage, and EMC. Only a technician or engineer trained in the local and national electrical standards should perform tasks associated with the device's electrical wiring.

Symbols are used to highlight information relating to the user's personal safety and equipment protection throughout this document. When these symbols appear, the associated information must be read carefully and understood fully.

| Symbol | Meaning | Description |
|---|---|---|
|  | Danger | The identified danger causes physical and property damage. |
|  | Warning | The identified danger can cause physical and property damage. |
| *Caution* | Caution | Use caution. |

- Failure to comply with appropriate safety guidelines can result in severe personal injury or property damage. Always exercise proper caution when working with electrical equipment.

- Check the user program before running it.
- Do not attempt to use this device with parameters that exceed permissible levels.
- Install an external circuit breaker and take appropriate safety measures against short-circuiting in external wiring.
- To avoid damaging the system, do not connect / disconnect the device when the power is on.

*Caution*

- Ascertain that terminal blocks are properly secured in place.

## 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.

- Provide proper ventilation by leaving at least 10mm of space between the top and bottom edges of the device and the enclosure walls.
- Do not place in water or let water leak onto the unit.
- Do not allow debris to fall inside the unit during installation.

## Wiring

- Do not touch live wires.

- Unused pins should not be connected. Ignoring this directive may damage the device.
- Do not connect the 'Neutral' or 'Line' signal of the 110/220VAC to the device's 0V pin.
- Double-check all wiring before turning on the power supply.

### Wiring Procedures

Use crimp terminals for wiring; use 26-12 AWG wire (0.13 mm $^2$–3.31 mm$^2$) for all wiring purposes.

1. Strip the wire to a length of 7±0.5mm (0.250–0.300 inches).
2. Unscrew the terminal to its widest position before inserting a wire.
3. Insert the wire completely into the terminal to ensure that a proper connection can be made.
4. Tighten enough to keep the wire from pulling free.

- To avoid damaging the wire, do not exceed a maximum torque of 0.5 N·m (5 kgf·cm).
- Do not use tin, solder, or any other substance on stripped wire that might cause the wire strand to break.
- Install at maximum distance from high-voltage cables and power equipment.

### I/O Wiring—General

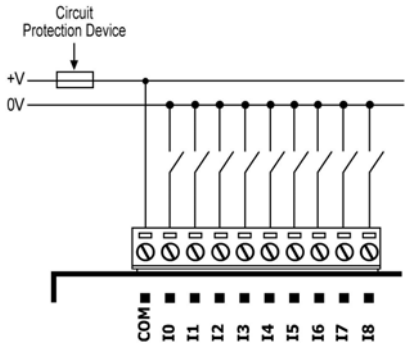
- Input or output cables should not be run through the same multi-core cable or share the same wire.
- Allow for voltage drop and noise interference with input lines used over an extended distance. Use wire that is properly sized for the load.

## Digital Inputs

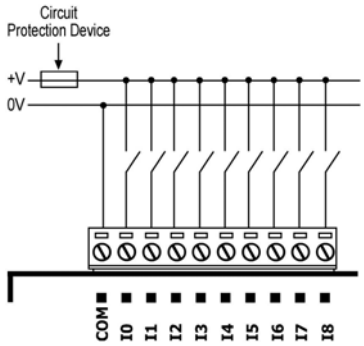
Each group of 9 inputs has a common signal. Each group can be used as either pnp (source) or npn (sink), when appropriately wired as shown in the following figures.

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.

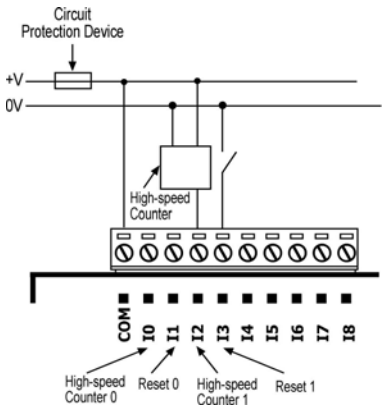
npn (sink) digital input wiring



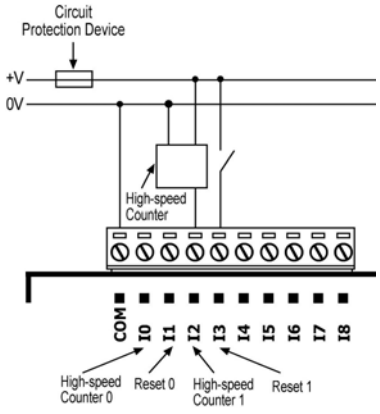

pnp (source) digital input wiring




npn (sink) high-speed counter

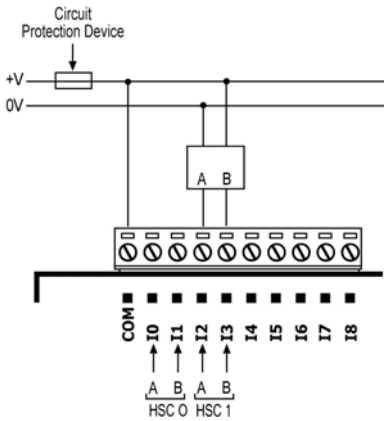



pnp (source) high-speed counter

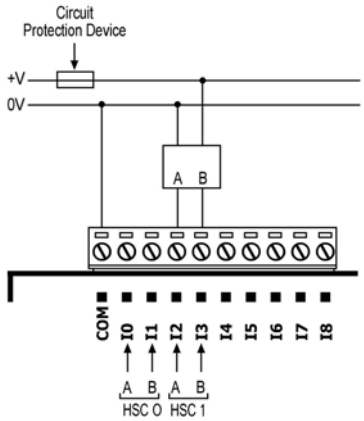



Inputs I0, I1, and I2, I3 can be used as shaft encoders as shown below.

npn (sink) shaft encoder wiring




pnp (source) shaft encoder wiring



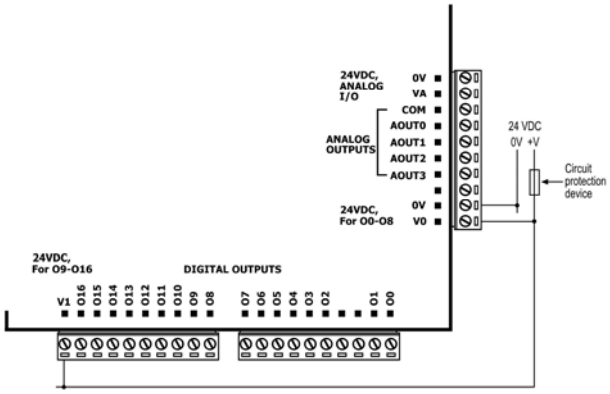
## Digital Outputs

### Wiring Power Supplies

Use a 24VDC power supply for all digital outputs.

1. Connect the "positive" lead to the "V0" and "V1" terminal, and the “negative” lead to the common "0V" terminal.

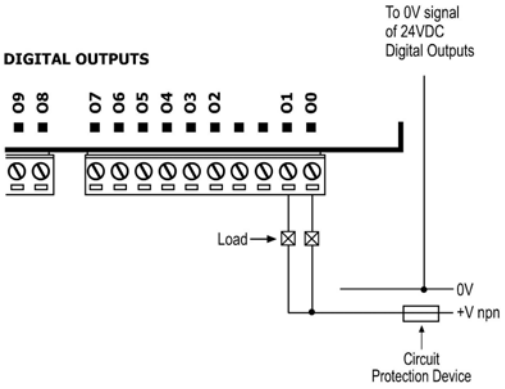
- V0 provides the power supply for Outputs #0, 1, 2, 3, 4, 5, 6, 7, and 8.
- V1 provides the power supply for Outputs #9, 10, 11, 12, 13, 14, 15, and 16.
- In the event of voltage fluctuations or non-conformity to voltage power supply specifications, connect the device to a regulated power supply.



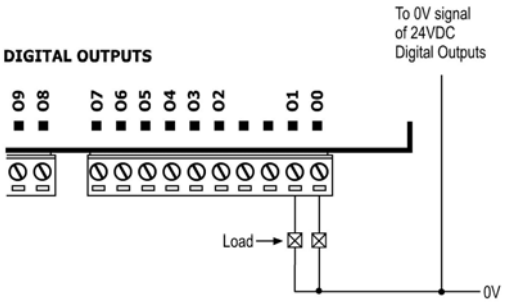

### Transistor Outputs

- Outputs 0 and 1 can function as either npn or pnp, in accordance with jumper settings and wiring. Open the device and set the jumpers according to the instructions beginning on page 8.
- Outputs 2 to 16 function as pnp only.
- The 0V signal of the transistor outputs is isolated from the controller’s 0V signal.

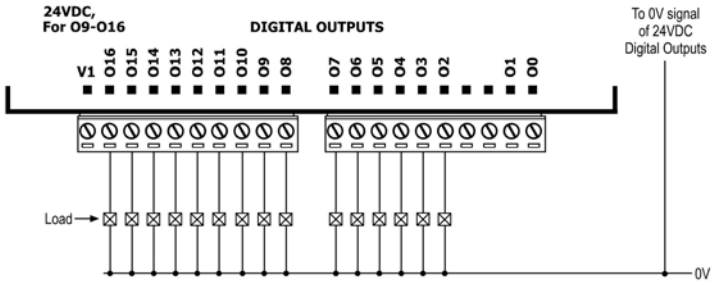
npn (sink)




pnp (source)



pnp (source)



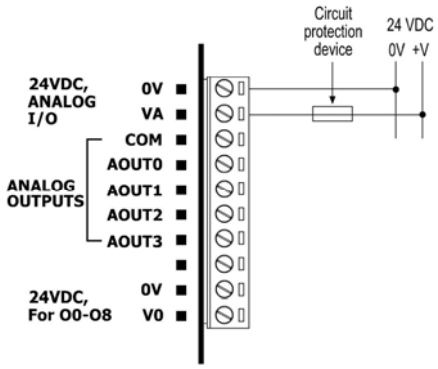

## Analog I/O Power Supplies

Use a 24VDC power supply for all analog input and output modes.

1. Connect the "positive" cable to the "VA" terminal, and the “negative” to the "0V" terminal.

- In the event of voltage fluctuations or non-conformity to voltage power supply specifications, connect the device to a regulated power supply.
- Since the analog I/O power supply is isolated, the controller’s 24VDC power supply may also be used to power the analog I/Os.

The 24VDC power supply must be turned on and off simultaneously with the controller’s power supply.



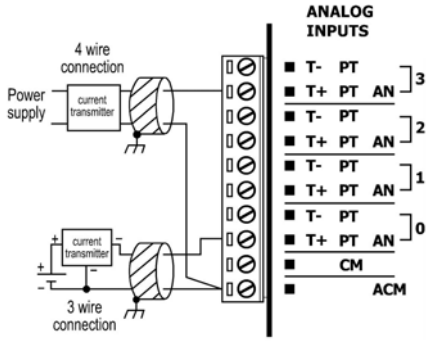
## Analog / PT100 / TC Inputs

- Each input may be set as either analog, RTD, or thermocouple. To set an input:
  - Use the appropriate wiring as shown below.
  - Open the device and set the jumpers according to the instructions beginning on page 8.
- Shields should be connected at the signal source.
- In order to function correctly, the analog power supplies must be wired as shown on page 5.
- To ensure proper performance, a warm-up period of a half an hour is recommended.

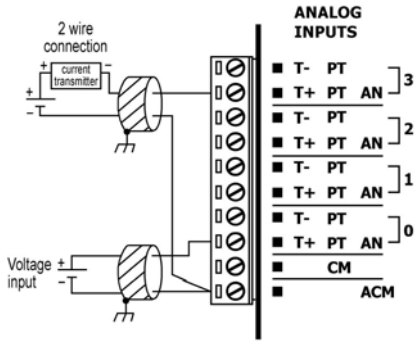
### Analog Inputs

- Inputs may be wired to work with either current or voltage.
- When set to current/voltage, all inputs share a common ACM signal.

current




current/voltage

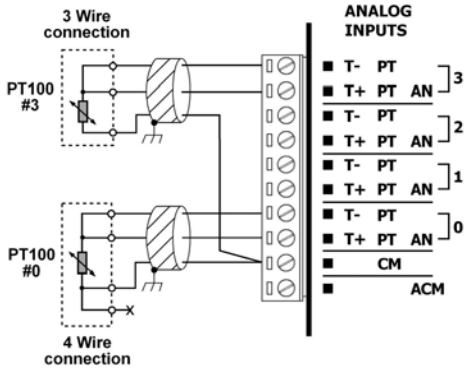



### RTD Inputs

1. Wire one lead of each RTD input to the common signal (CM) as shown below.

- 4 wire PT100 can be used by leaving one of the sensor leads unconnected.

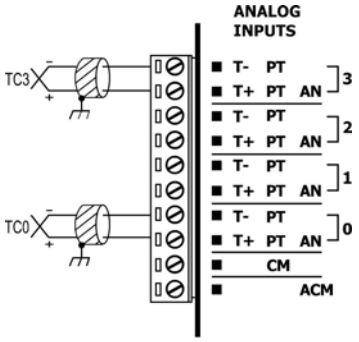
PT100



## Thermocouple Inputs

- Supported thermocouple types include B, E, J, K, N, R, S, and T, in accordance with software and jumper settings. See table Thermocouple Input Ranges, on page 15.
- Inputs may be set to mV by software settings (Hardware Configuration); note that in order to set mV inputs, thermocouple jumper settings are used.

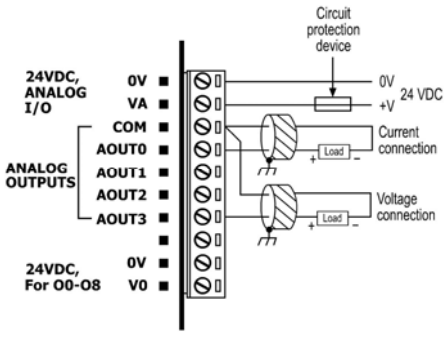
Thermocouple




## Analog Outputs

- Shields should be earthed, connected to the earth of the cabinet.
- An output can be wired to either current or voltage.
  - Use the appropriate wiring as shown below.
  - Open the device and set the jumpers according to the instructions beginning on page 8.
- To ensure proper performance, a warm-up period of a half an hour is recommended.

current/voltage



## Changing Jumper Settings

To access the jumpers, you must remove the snap-in I/O module from the controller, and then remove the module's PCB board. Before you begin, turn off the power supply, disconnect and dismount the controller.

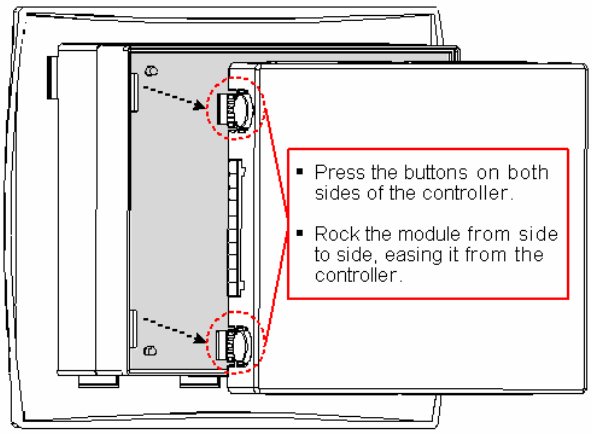
- Before performing these actions, touch a grounded object to discharge any electrostatic charge.
- Avoid touching the PCB board directly by holding the PCB board by its connectors.

### Accessing the Jumpers

First, remove the snap-in module.

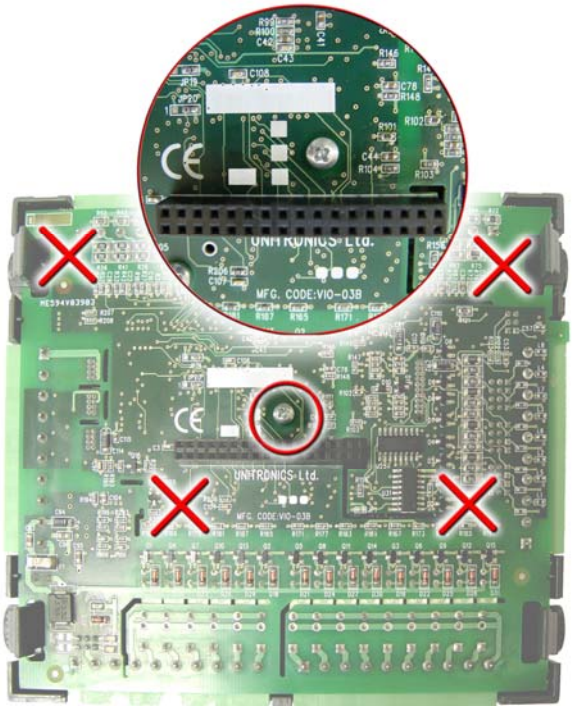
1. Locate the 4 buttons on the sides of the module, two on either side. Press the 2 buttons on either side of the module as shown, and hold them down to open the locking mechanism.

2. Gently rock the module from side to side, easing the module from the controller.

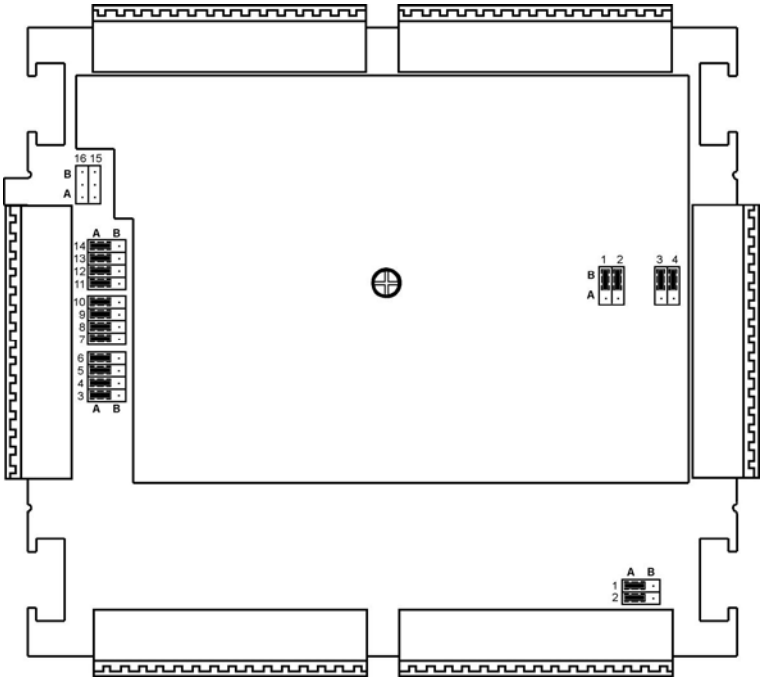



3. Using a Philips screwdriver, remove the center screw, shown in the figure below, from the module's upper PCB board. **Do not remove any other screws**.

4. Holding the PCB board by its edges, gently lift it out of the module.



Select the desired function by changing the jumper settings according to the figure and tables shown below.




**Bottom PCB board**

Note that Jumpers #15 & 16 are not used

## Analog Input Jumpers

| | Jumper # | Voltage* | Current | T/C or mV | PT100 |
|---|---|---|---|---|---|
| **Analog input 3** | 14 | A | B | B | A |
| | 13 | A | B | B | A |
| | 12 | A | A | B | B |
| **Analog input 2** | 11 | A | B | B | A |
| | 10 | A | B | B | A |
| | 9 | A | A | B | B |
| **Analog input 1** | 8 | A | B | B | A |
| | 7 | A | B | B | A |
| | 6 | A | A | B | B |
| **Analog input 0** | 5 | A | B | B | A |
| | 4 | A | B | B | A |
| | 3 | A | A | B | B |

## Digital Output Jumpers

| | Jumper # | PNP* | NPN |
|---|---|---|---|
| **Digital Output 0** | 1 | A | B |
| **Digital Output 1** | 2 | A | B |

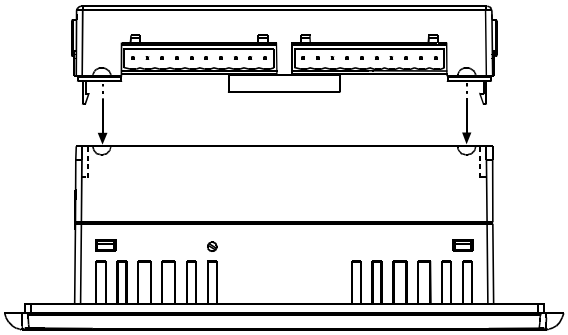
**Analog Output Jumpers**

| | | Jumper # | Current | Voltage* |
|---|---|---|---|---|
| **Top PCB board** | **Analog Output 0** | 1 | A | B |
| | **Analog Output 1** | 2 | A | B |
| | **Analog Output 2** | 3 | A | B |
| | **Analog Output 3** | 4 | A | B |

* Default factory setting

**Reassembling the controller**

1. Return the PCB board to the module and secure the center screw.
2. Next, reinstall the module. Line the circular guidelines on the controller up with the guidelines on the Snap-in I/O 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.



## V200-18-E4XB Technical Specifications

**Digital Inputs**

| | |
|---|---|
| Number of inputs | 18 (in two groups) |
| Input type | pnp (source) or npn (sink) |
| Galvanic isolation | |
| Digital inputs to bus | Yes |
| Digital inputs to digital inputs in same group | No |
| Group to group, digital inputs | Yes |
| Nominal input voltage | 24VDC |
| Input voltage | |
| pnp (source) | 0-5VDC for Logic '0'<br>17-28.8VDC for Logic '1' |
| npn (sink) | 17-28.8VDC for Logic '0'<br>0-5VDC for Logic '1' |
| Input current | 8.8mA@24VDC for inputs #0 to #3<br>6mA@24VDC for inputs #4 to #17 |
| Response time | 10mSec typical for outputs #0 to #3<br>2mSec typical for outputs #4 to #17 |
| High speed inputs | Specifications below apply when these inputs are wired for use as a high-speed counter input/shaft encoder. See Notes 1 and 2. |
| Resolution | 32-bit |
| Frequency | 10kHz maximum |
| Minimum pulse width | 40µs |

**Notes:**

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.
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.

---

**Digital Outputs**

| | |
|---|---|
| **Digital Output's Power Supply** | See Note 3. |
| Nominal operating voltage | 24VDC |
| Operating voltage | 20.4 to 28.8VDC |
| Quiescent current | 20mA@24VDC. |
| Max. current consumption | 80mA@24VDC. See Note 4. |
| Galvanic isolation | |
| Digital power supply to bus | Yes |
| Digital power supply to transistor outputs | No |

**Notes:**

3. V0 provides the power supply for Outputs #0, 1, 2, 3, 4, 5, 6, 7 and 8.
   V1 provides the power supply for Outputs #9, 10, 11,12, 13, 14, 15 and 16.
   V0 and V1 share a common 0V signal.
4. Maximum current consumption does not provide for pnp output requirements. The additional current requirement of pnp outputs must be added.

**Transistor Outputs**

| | |
|---|---|
| Number of outputs | 17 (in two groups). See Note 5. |
| Output type | |
| Outputs #0 and #1 | pnp: P-MOSFET (open drain)<br>npn: N-MOSFET (open drain)<br>Each can be individually set as pnp (source) or npn (sink) via wiring and jumper settings |
| Outputs #2 to #16 | pnp: P-MOSFET (open drain) |
| Galvanic isolation | |
| Transistor outputs to bus | Yes |
| Transistor outputs to transistor outputs | No |
| Group to group | No |
| Output current | pnp: 0.5A maximum per output, total maximum current for each group: 3A.<br>npn: 50mA maximum per output |
| Maximum frequency | Resistive load<br>20Hz<br>Inductive load<br>0.5Hz |
| High-speed output maximum frequency (resistive load). See Note 6 | pnp: 2kHz<br>npn: 50kHz |
| ON voltage drop | pnp: 0.5VDC maximum<br>npn: 0.4VDC maximum |
| Short circuit protection | Yes (pnp only) |
| pnp (source) power supply | See Digital Output's Power Supply above |
| npn (sink) power supply | |
| operating voltage | 3.5V to 28.8VDC,<br>unrelated to the voltage of either the I/O module or the controller |

**Notes:**

5. Outputs #0, 1, 2, 3, 4, 5, 6, 7 and 8 share a common power signal. Outputs #8,9,10,11,12,13,14,15 and 16 share a common power signal. All outputs share a common 0V signal.
6. Output #0 and 1 may be used as high-speed outputs.

---

**Analog I/O's Power Supply**

| | |
|---|---|
| Nominal operating voltage | 24VDC |
| Operating voltage | 20.4 to 28.8VDC |
| Quiescent current | 70mA@24VDC |
| Max. current consumption | 130mA@24VDC |
| Galvanic isolation | |
| Analog power supply to bus | Yes |
| Analog power supply to analog inputs | Yes |
| Analog power supply to analog outputs | Yes |

| | |
|---|---|
| **Analog/ PT100/ TC Inputs** | |
| Number of inputs | 4 |
| Type of input | Set via appropriate wiring and jumper settings. |
| **Analog Inputs Power Supply** | |
| Galvanic isolation | |
| Analog/PT/TC inputs to bus | Yes |
| Analog/PT/TC inputs to analog outputs | Yes |
| Analog /PT/TC inputs to Analog /PT/TC inputs | No |
| **Analog inputs** | |
| Input range | 0-10V, 0-20mA , 4-20mA |
| Power supply | See Analog I/O's Power Supply above |
| Conversion method | Succesive approximation |
| Resolution at 0-10V, 0-20mA | 14-bit (16384 units). See Note 7. |
| Resolution at 4-20mA | 3277 to 16383 (13107 units). See Note 7. |
| Conversion time | Synchronized to cycle time |
| Input impedance | >1MΩ—voltage<br>121.5Ω—current |
| Absolute maximum rating | ±20V—voltage<br>±40mA—current |
| Full-scale error | ±0.4% |
| Linearity error | ±0.04% |
| Status indication | Yes. See Note 8 |

**Notes:**

7. 12 or 14-bit resolution may be selected via software.
8. The analog value can indicate faults as shown below:

| Value | Possible Cause |
|---|---|
| 16384 | Input value deviates **slightly above** the input range |
| 32767 | -Input value deviates **greatly above** or **below** the input range<br>-Power supply disconnected |

**PT100 inputs**

| | |
|---|---|
| Input range | -200 to 600°C/-328 to 1100°F. 1 to 320Ω. See Note 9. |
| Conversion method | Voltage to frequency |
| Resolution | 0.1°C/0.1°F |
| Conversion time | 200mS minimum per channel, depending on software filter type |
| Input impedance | >10MΩ |
| Auxillary current for PT100 | 150µA typical |
| Full-scale error | ±0.4% |
| Linearity error | ±0.04% |
| Status indication | Yes. See Note 10. |

**Notes:**

9. The device can also measure resistance with the range of 1-320 Ω at a resolution of 0.1 Ω.
10. The analog value can indicate faults as shown below:

| Value | Possible Cause |
|---|---|
| 32767 | - Sensor is not connected to input<br>- Value exceeds permissible range<br>- Power supply disconnected |
| -32767 | Sensor is short-circuited |

**Thermocouple inputs**

| | |
|---|---|
| Input range | As shown in the table on page 15. See Note 11. |
| Conversion method | Voltage to frequency |
| Resolution | 0.1°C/0.1°F maximum |
| Conversion time | 100mS minimum per channel, depending on software filter type |
| Input impedance | >10MΩ |
| Cold junction compensation | Local, automatic |
| Cold junction compensation error | ±1.5°C / ±2.7°F maximum |
| Absolute maximum rating | ±0.6VDC |
| Full-scale error | ±0.4% |
| Linearity error | ±0.04% |
| Warm-up time | ½ hour typically, ±1°C/±1.8°F repeatability |
| Status indication | Yes. See Note 12. |

**Notes:**

11. The device can also measure voltage within the range of -5 to 56mV, at a resolution of 0.01mV. The device can also measure raw value frequency at a resolution of 14-bits(16384)
12. The analog value can indicate faults as shown below:

| Value | Possible Cause |
|---|---|
| 32767 | - Sensor is not connected to input<br>- Sensor value exceeds the maximum value<br>- Power supply disconnected |
| -32767 | Sensor value is under the minimum value |

**Table 1: Thermocouple input ranges**

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

**Analog Outputs**

| | |
|---|---|
| Number of outputs | 4 (single-ended) |
| Output range | 0-10V, 4-20mA. See Note 13. |
| Resolution | 12-bit (4096 units) |
| Conversion time | Synchronized to scan time. |
| Load impedance | 1kΩ minimum—voltage<br>500Ω maximum—current |
| Galvanic isolation | |
| Analog outputs to bus | Yes |
| Analog outputs to Analog/PT/TC inputs | Yes |
| Analog outputs to analog outputs | No |
| Linearity error | ±0.1% |
| Operational error limits | ±0.2% |

**Notes:**

13. Note that the range of each I/O is defined by wiring, jumper settings, and within the controller's software.

| | |
|---|---|
| **Environmental** | IP20 / NEMA1 |
| Operating temperature | 0° to 45°C (32° to 113°F) |
| Storage temperature | -20° to 60°C (-4° to 140°F) |
| Relative Humidity (RH) | 5% to 90% (non-condensing) |
| Dimensions (WxHxD) | 138x23x123mm (5.43x0.9x4.84") |
| Weight | 262g (9.25 oz) |

## About Unitronics

Unitronics has been producing PLCs, automation software and accessory devices since 1989.

Unitronics' OPLC controllers combine full-function PLCs and HMI operating panels into single, compact units. These HMI + PLC devices are programmed in a single, user-friendly environment. Our clients save I/O points, wiring, space, and programming time; elements that translate directly into cost-efficiency.

Unitronics supports a global network of distributors and sales representatives, as well as a U.S. subsidiary.

For more information regarding Unitronics products, contact your distributor or Unitronics headquarters via email: export@unitronics.com.



5410-1091-5

# V200-18-E5B Snap-in I/O Module

The V200-18-E5B plugs directly into the back of compatible Unitronics OPLCs, creating a self-contained PLC unit with a local I/O configuration.

Features

- 18 isolated digital inputs, includes 2 H.S.C inputs, type pnp/npn (source/sink)
- 15 isolated pnp (source) outputs
- 2 isolated pnp/npn (source/sink) transistor outputs, includes 2 H.S. outputs
- 3 analog inputs

- Before using this product, it is the responsibility of the user to read and understand this document and any accompanying documentation.
- All examples and diagrams shown herein 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 in accordance with local and national standards and regulations.
- Only qualified service personnel should open this device or carry out repairs.

## User safety and equipment protection guidelines

This document is intended to aid trained and competent personnel in the installation of this equipment as defined by the European directives for machinery, low voltage, and EMC. Only a technician or engineer trained in the local and national electrical standards should perform tasks associated with the device's electrical wiring.

Symbols are used to highlight information relating to the user's personal safety and equipment protection throughout this document. When these symbols appear, the associated information must be read carefully and understood fully.

| Symbol | Meaning | Description |
|---|---|---|
|  | Danger | The identified danger causes physical and property damage. |
|  | Warning | The identified danger can cause physical and property damage. |
| *Caution* | Caution | Use caution. |

- Failure to comply with appropriate safety guidelines can result in severe personal injury or property damage. Always exercise proper caution when working with electrical equipment.

- Check the user program before running it.
- Do not attempt to use this device with parameters that exceed permissible levels.
- Install an external circuit breaker and take appropriate safety measures against short-circuiting in external wiring.
- To avoid damaging the system, do not connect / disconnect the device when the power is on.

*Caution*

- Ascertain that terminal blocks are properly secured in place.

## 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.

- Provide proper ventilation by leaving at least 10mm of space between the top and bottom edges of the device and the enclosure walls.
- Do not place in water or let water leak onto the unit.
- Do not allow debris to fall inside the unit during installation.

## Wiring

- Do not touch live wires.

- Unused pins should not be connected. Ignoring this directive may damage the device.
- Do not connect the 'Neutral' or 'Line' signal of the 110/220VAC to the device's 0V pin.
- Double-check all wiring before turning on the power supply.

### Wiring Procedures

Use crimp terminals for wiring; use 26-12 AWG wire (0.13 mm $^2$–3.31 mm$^2$) for all wiring purposes.

1. Strip the wire to a length of 7±0.5mm (0.250–0.300 inches).
2. Unscrew the terminal to its widest position before inserting a wire.
3. Insert the wire completely into the terminal to ensure that a proper connection can be made.
4. Tighten enough to keep the wire from pulling free.

- To avoid damaging the wire, do not exceed a maximum torque of 0.5 N·m (5 kgf·cm).
- Do not use tin, solder, or any other substance on stripped wire that might cause the wire strand to break.
- Install at maximum distance from high-voltage cables and power equipment.

### I/O Wiring—General

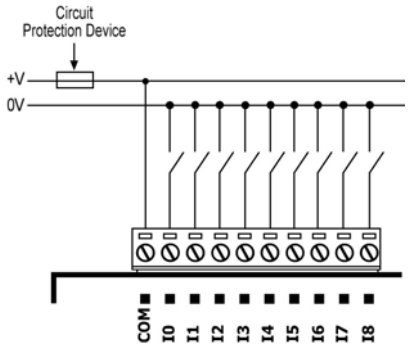
- Input or output cables should not be run through the same multi-core cable or share the same wire.
- Allow for voltage drop and noise interference with input lines used over an extended distance. Use wire that is properly sized for the load.

## Digital Inputs

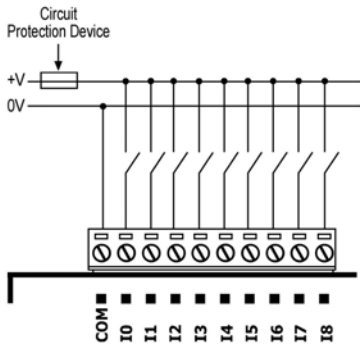
Each group of 9 inputs has a common signal. Each group can be used as either pnp (source) or npn (sink), when appropriately wired as shown in the following figures.

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.

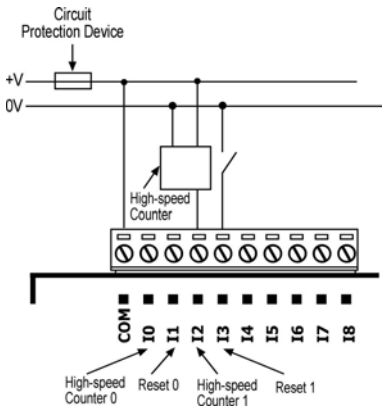
npn (sink) digital input wiring



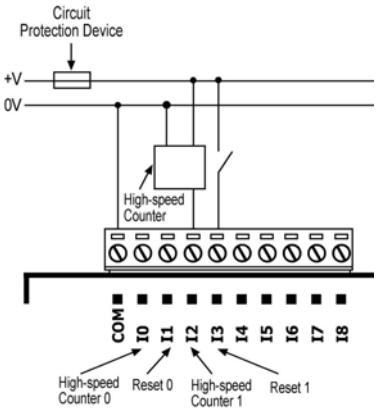

pnp (source) digital input wiring




npn (sink) high-speed counter

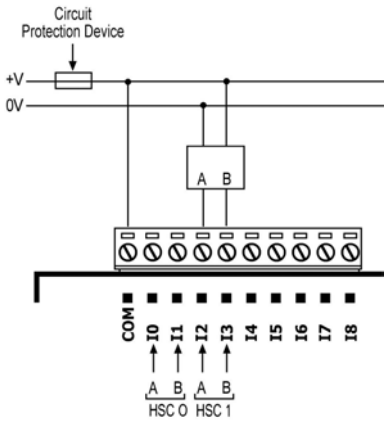



pnp (source) high-speed counter

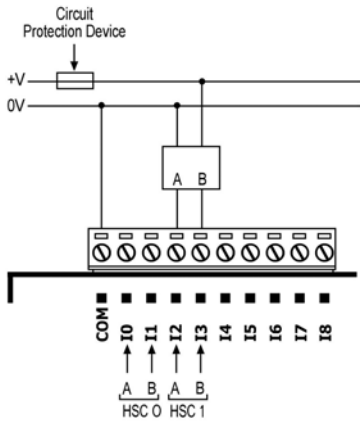



Inputs I0, I1, and I2, I3 can be used as shaft encoders as shown below.

npn (sink) shaft encoder wiring




pnp (source) shaft encoder wiring



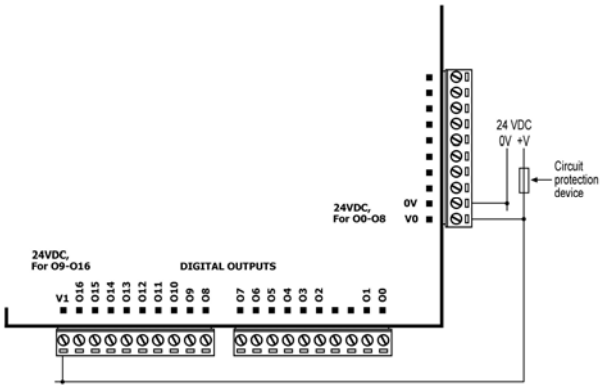
## Digital Outputs

### Wiring Power Supplies

Use a 24VDC power supply for all digital outputs.

1. Connect the "positive" lead to the "V0" and "V1" terminal, and the “negative” lead to the common "0V" terminal.

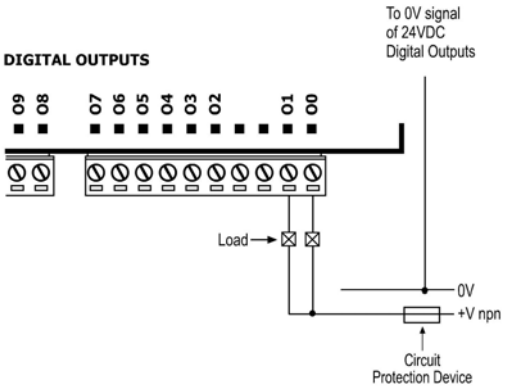
- V0 provides the power supply for Outputs #0, 1, 2, 3, 4, 5, 6, 7, and 8.
- V1 provides the power supply for Outputs #9, 10, 11, 12, 13, 14, 15, and 16.
- In the event of voltage fluctuations or non-conformity to voltage power supply specifications, connect the device to a regulated power supply.



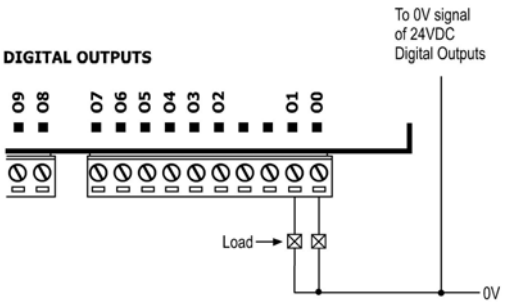

### Transistor Outputs

- Outputs 0 and 1 can function as either npn or pnp, in accordance with jumper settings and wiring. Open the device and set the jumpers according to the instructions beginning on page 6.
- Outputs 2 to 16 function as pnp only.
- The 0V signal of the transistor outputs is isolated from the controller’s 0V signal.

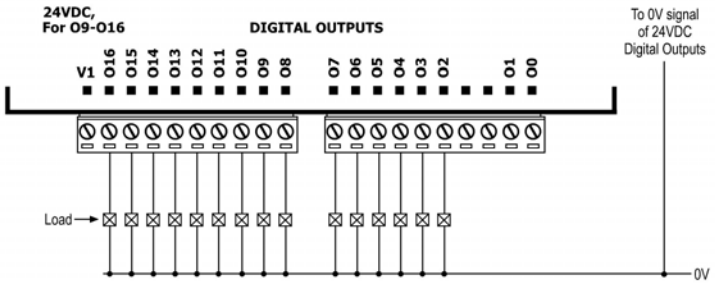
npn (sink)




pnp (source)



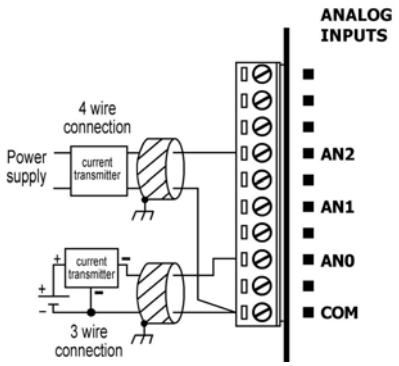
pnp (source)



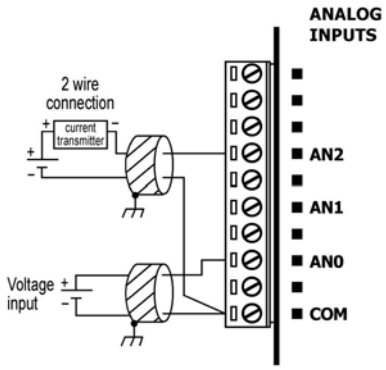

## Analog Inputs

- Shields should be connected at the signal source.
- To set the inputs:
  - Use the appropriate wiring as shown below.
  - Open the device and set the jumpers according to the instructions beginning on page 6.
- Inputs may be wired to work with either current or voltage.
- All inputs share a common COM signal.

current




current/voltage



## Changing Jumper Settings

To access the jumpers, you must remove the snap-in I/O module from the controller, and then remove the module's PCB board. Before you begin, turn off the power supply, disconnect and dismount the controller.

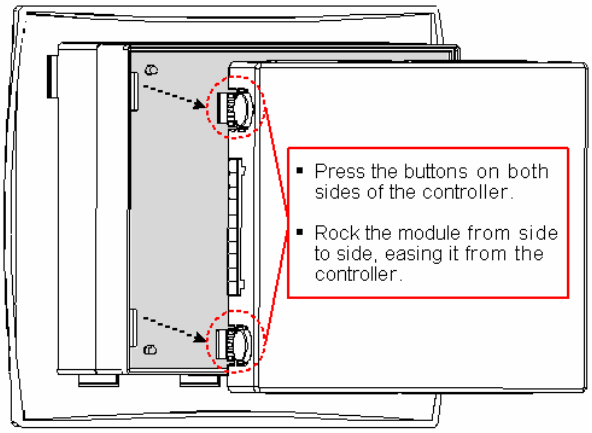
- Before performing these actions, touch a grounded object to discharge any electrostatic charge.
- Avoid touching the PCB board directly by holding the PCB board by its connectors.

### Accessing the Jumpers

First, remove the snap-in module.

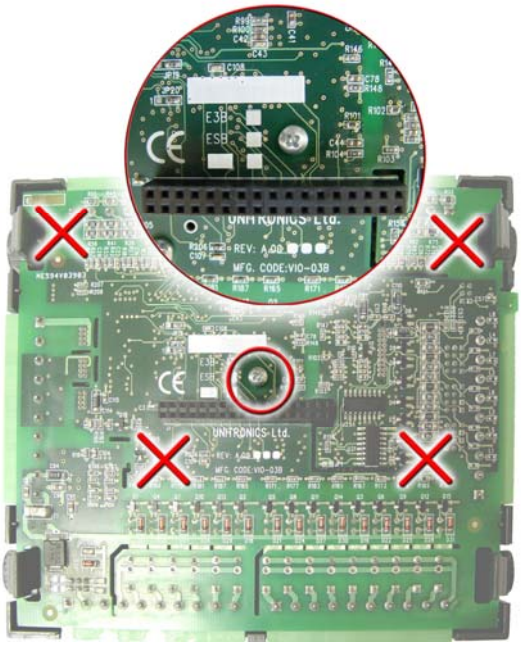
1. Locate the 4 buttons on the sides of the module, two on either side. Press the 2 buttons on either side of the module as shown, and hold them down to open the locking mechanism.

2. Gently rock the module from side to side, easing the module from the controller.

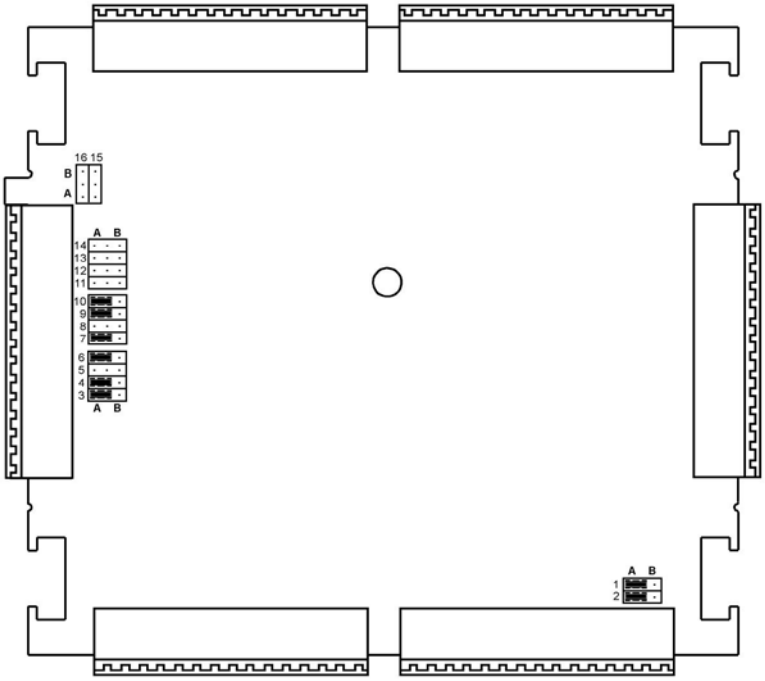



3. Using a Philips screwdriver, remove the center screw, shown in the figure below, from the module's upper PCB board. **Do not remove any other screws**.

4. Holding the PCB board by its edges, gently lift it out of the module.



Select the desired function by changing the jumper settings according to the figure and tables shown below.




### Analog Input Jumpers

| | Jumper # | Voltage* | Current |
|---|---|---|---|
| **Analog input 2** | 10 | A | B |
| | 9 | A | A |
| **Analog input 1** | 7 | A | B |
| | 6 | A | A |
| **Analog input 0** | 4 | A | B |
| | 3 | A | A |

### Digital Output Jumpers

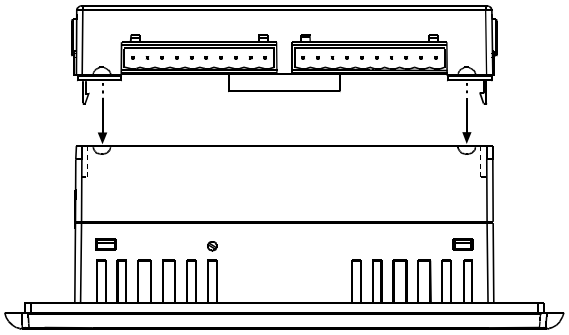
| | Jumper # | PNP* | NPN |
|---|---|---|---|
| **Digital Output 0** | 1 | A | B |
| **Digital Output 1** | 2 | A | B |

Note that Jumpers #5, 8, 11, 12, 13, 14, 15 & 16 are not used

* Default factory setting

**Reassembling the controller**

1. Return the PCB board to the module and secure the center screw.
2. Next, reinstall the module. Line the circular guidelines on the controller up with the guidelines on the Snap-in I/O 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.



## V200-18-E5B Technical Specifications

**Digital Inputs**

| | |
|---|---|
| Number of inputs | 18 (in two groups) |
| Input type | pnp (source) or npn (sink) |
| Galvanic isolation | |
| Digital inputs to bus | Yes |
| Digital inputs to digital inputs in same group | No |
| Group to group, digital inputs | Yes |
| Nominal input voltage | 24VDC |
| Input voltage | |
| pnp (source) | 0-5VDC for Logic '0'<br>17-28.8VDC for Logic '1' |
| npn (sink) | 17-28.8VDC for Logic '0'<br>0-5VDC for Logic '1' |
| Input current | 8.8mA@24VDC for inputs #0 to #3<br>6mA@24VDC for inputs #4 to #17 |
| Response time | 10mSec typical for outputs #0 to #3<br>2mSec typical for outputs #4 to #17 |
| High speed inputs | Specifications below apply when these inputs are wired for use as a high-speed counter input/shaft encoder. See Notes 1 and 2. |
| Resolution | 32-bit |
| Frequency | 10kHz maximum |
| Minimum pulse width | 40µs |

**Notes:**

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.
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.

---

**Digital Outputs**

| | |
|---|---|
| **Digital Output's Power Supply** | See Note 3. |
| Nominal operating voltage | 24VDC |
| Operating voltage | 20.4 to 28.8VDC |
| Quiescent current | 20mA@24VDC. |
| Max. current consumption | 80mA@24VDC. See Note 4. |
| Galvanic isolation | |
| Digital power supply to bus | Yes |
| Digital power supply to transistor outputs | No |

**Notes:**

3. V0 provides the power supply for Outputs #0, 1, 2, 3, 4, 5, 6, 7 and 8.
   V1 provides the power supply for Outputs #9, 10, 11,12, 13, 14, 15 and 16.
   V0 and V1 share a common 0V signal.
4. Maximum current consumption does not provide for pnp output requirements.
   The additional current requirement of pnp outputs must be added.

**Transistor Outputs**

| | |
|---|---|
| Number of outputs | 17 (in two groups). See Note 5. |
| Output type | |
| Outputs #0 and #1 | pnp: P-MOSFET (open drain)<br>npn: N-MOSFET (open drain)<br>Each can be individually set as pnp (source) or npn (sink) via wiring and jumper settings |
| Outputs #2 to #16 | pnp: P-MOSFET (open drain) |
| Galvanic isolation | |
| Transistor outputs to bus | Yes |
| Transistor outputs to transistor outputs | No |
| Group to group | No |
| Output current | pnp: 0.5A maximum per output, total maximum current for each group: 3A.<br>npn: 50mA maximum per output |
| Maximum frequency | Resistive load<br>20Hz<br>Inductive load<br>0.5Hz |
| High-speed output maximum frequency (resistive load). See Note 6 | pnp: 2kHz<br>npn: 50kHz |
| ON voltage drop | pnp: 0.5VDC maximum<br>npn: 0.4VDC maximum |
| Short circuit protection | Yes (pnp only) |
| pnp (source) power supply | See Digital Output's Power Supply above |
| npn (sink) power supply | |
| operating voltage | 3.5V to 28.8VDC,<br>unrelated to the voltage of either the I/O module or the controller |

**Notes:**

5. Outputs #0, 1, 2, 3, 4, 5, 6, 7 and 8 share a common power signal. Outputs #8,9,10,11,12,13,14,15 and 16 share a common power signal. All outputs share a common 0V signal.
6. Output #0 and 1 may be used as high-speed outputs.

| | |
|---|---|
| **Analog Inputs** | |
| Number of inputs | 3 (single-ended) |
| Type of input | Set via appropriate wiring and jumper settings. |
| Galvanic isolation | None |
| Input range | 0-10V, 0-20mA , 4-20mA |
| Conversion method | Succesive approximation |
| Resolution at 0-10V, 0-20mA | 10-bit (1024 units) |
| Resolution at 4-20mA | 204 to 1023 (820 units) |
| Conversion time | Synchronized to cycle time |
| Input impedance | >100kΩ—voltage |
| | 500Ω—current |
| Absolute maximum rating | ±15V—voltage |
| | ±30mA—current |
| Full-scale error | ±2 LSB (0.2%) |
| Linearity error | ±2 LSB (0.2%) |
| **Environmental** | IP20 / NEMA1 |
| Operating temperature | 0° to 45°C (32° to 113°F) |
| Storage temperature | -20° to 60°C (-4° to 140°F) |
| Relative Humidity (RH) | 5% to 90% (non-condensing) |
| Dimensions (WxHxD) | 138x23x123mm (5.43x0.9x4.84”) |
| Weight | 186.3g (6.57 oz) |

## About Unitronics

Unitronics has been producing PLCs, automation software and accessory devices since 1989.

Unitronics' OPLC controllers combine full-function PLCs and HMI operating panels into single, compact units. These HMI + PLC devices are programmed in a single, user-friendly environment. Our clients save I/O points, wiring, space, and programming time; elements that translate directly into cost-efficiency.

Unitronics supports a global network of distributors and sales representatives, as well as a U.S. subsidiary.

For more information regarding Unitronics products, contact your distributor or Unitronics headquarters via email: export@unitronics.com.



5410-1110-5

# V200-18-E6B Snap-in I/O Module

The V200-18-E6B plugs directly into the back of compatible Unitronics OPLCs, creating a self-contained PLC unit with a local I/O configuration.

Features

- 18 isolated digital inputs configurable to type pnp/npn (source/sink), includes 2 shaft encoder inputs.
- 15 isolated relay outputs.
- 2 isolated pnp/npn (source/sink) transistor outputs, includes 2 high-speed outputs.
- 5 analog inputs, includes 2 inputs configurable to RTD or thermocouple.
- 2 isolated analog outputs.

- Before using this product, it is the responsibility of the user to read and understand this document and any accompanying documentation.
- All examples and diagrams shown herein 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 in accordance with local and national standards and regulations.
- Only qualified service personnel should open this device or carry out repairs.

## User safety and equipment protection guidelines

This document is intended to aid trained and competent personnel in the installation of this equipment as defined by the European directives for machinery, low voltage, and EMC. Only a technician or engineer trained in the local and national electrical standards should perform tasks associated with the device's electrical wiring.

Symbols are used to highlight information relating to the user's personal safety and equipment protection throughout this document. When these symbols appear, the associated information must be read carefully and understood fully.

| Symbol | Meaning | Description |
|---|---|---|
|  | Danger | The identified danger causes physical and property damage. |
|  | Warning | The identified danger can cause physical and property damage. |
| *Caution* | Caution | Use caution. |

- Failure to comply with appropriate safety guidelines can result in severe personal injury or property damage. Always exercise proper caution when working with electrical equipment.

- Check the user program before running it.
- Do not attempt to use this device with parameters that exceed permissible levels.
- Install an external circuit breaker and take appropriate safety measures against short-circuiting in external wiring.
- To avoid damaging the system, do not connect / disconnect the device when the power is on.

*Caution*

- Ascertain that terminal blocks are properly secured in place.

## 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.

- Provide proper ventilation by leaving at least 10mm of space between the top and bottom edges of the device and the enclosure walls.
- Do not place in water or let water leak onto the unit.
- Do not allow debris to fall inside the unit during installation.

## Wiring

- Do not touch live wires.

- Unused pins should not be connected. Ignoring this directive may damage the device.
- Do not connect the 'Neutral' or 'Line' signal of the 110/220VAC to the device's 0V pin.
- Double-check all wiring before turning on the power supply.

### Wiring Procedures

Use crimp terminals for wiring; use 26-12 AWG wire (0.13mm $^2$–3.31mm$^2$) for all wiring purposes.

1. Strip the wire to a length of 7±0.5mm (0.250–0.300 inches).
2. Unscrew the terminal to its widest position before inserting a wire.
3. Insert the wire completely into the terminal to ensure that a proper connection can be made.
4. Tighten enough to keep the wire from pulling free.

- To avoid damaging the wire, do not exceed a maximum torque of 0.5 N·m (5 kgf·cm).
- Do not use tin, solder, or any other substance on stripped wire that might cause the wire strand to break.
- Install at maximum distance from high-voltage cables and power equipment.

### I/O Wiring—General

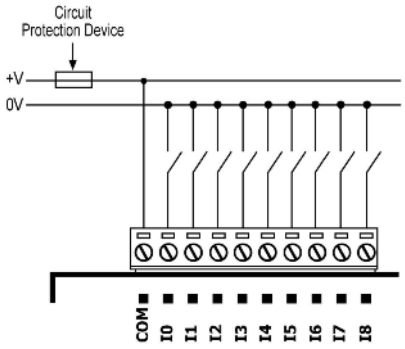
- Input or output cables should not be run through the same multi-core cable or share the same wire.
- Allow for voltage drop and noise interference with input lines used over an extended distance. Use wire that is properly sized for the load.

## Digital Inputs

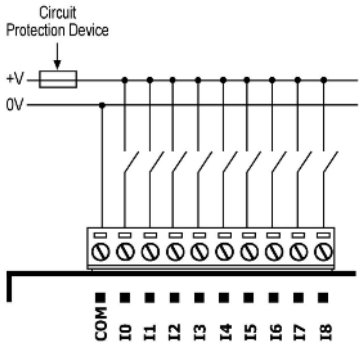
Each group of 9 inputs has a common signal. Each group can be used as either pnp (source) or npn (sink), when appropriately wired as shown in the following figures.

- 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.

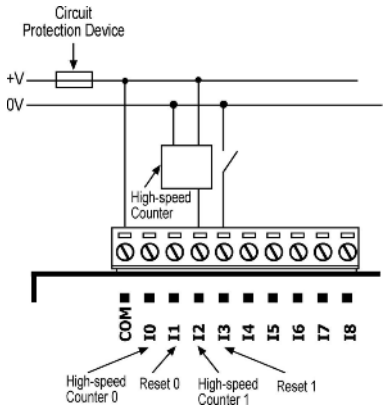
npn (sink) digital input wiring



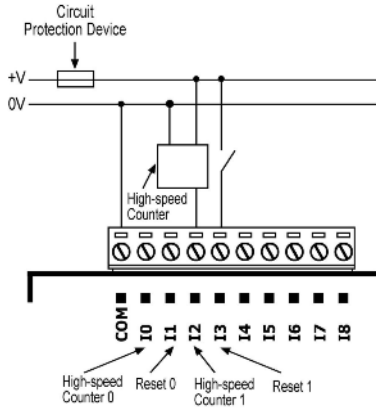

pnp (source) digital input wiring




npn (sink) high-speed counter

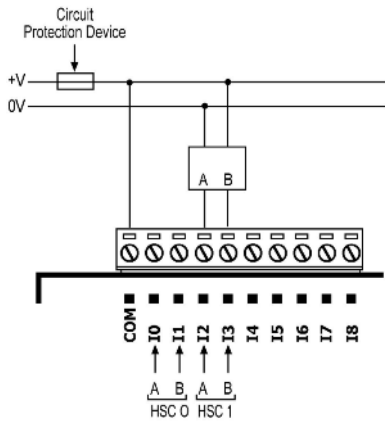



pnp (source) high-speed counter

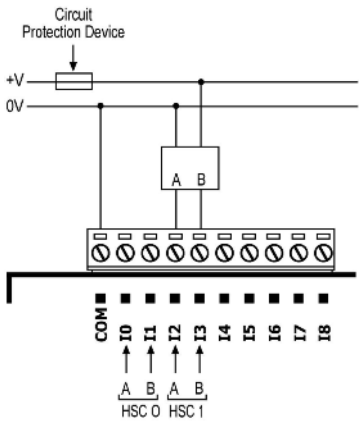



Inputs I0, I1, and I2, I3 can be used as shaft encoders as shown below.

npn (sink) shaft encoder wiring




pnp (source) shaft encoder wiring



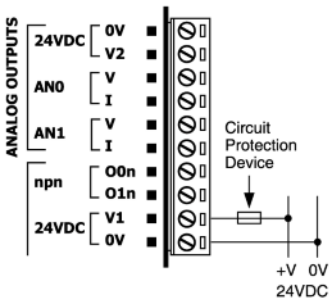
## Digital Outputs

### Wiring Power Supplies

Use a 24VDC power supply for both relay and transistor outputs.

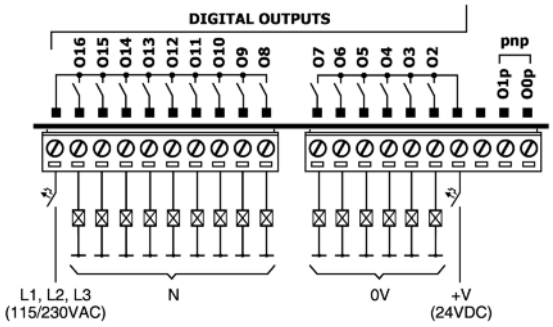
1. Connect the "positive" lead to the "V1" terminal, and the “negative” lead to the "0V" terminal.

- In the event of voltage fluctuations or non-conformity to voltage power supply specifications, connect the device to a regulated power supply.




### Relay Outputs

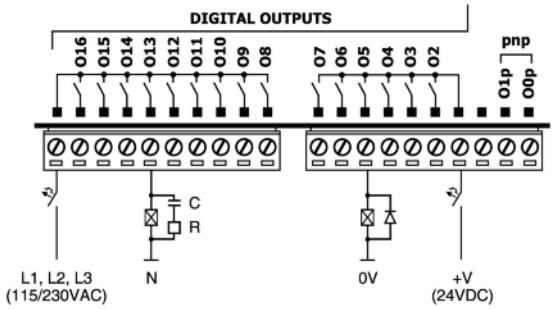
- Each group can be wired separately to either AC or DC as show.
- The 0V signal of the relay outputs is isolated from the controller’s 0V signal.




### 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:

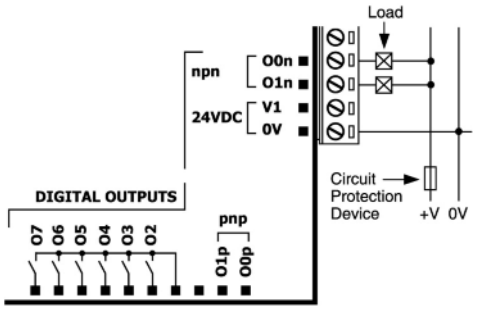
- a clamping diode in parallel with each inductive DC load,
- an RC snubber circuit in parallel with each inductive AC load.



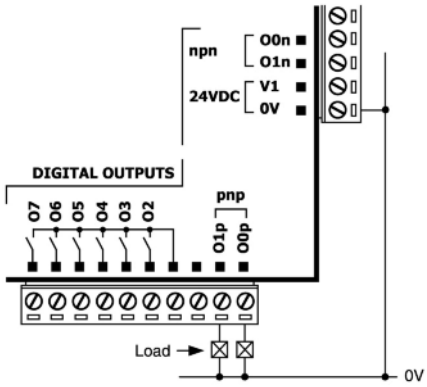
### Transistor Outputs

- 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.

npn (sink)




pnp (source)




## Analog Inputs

5 analog inputs:

- Inputs 0 to 2 can be wired to work with either current or voltage.
- Inputs 3 and 4 can function as either analog, RTD, or thermocouple, when appropriately wired as shown in the following figures.

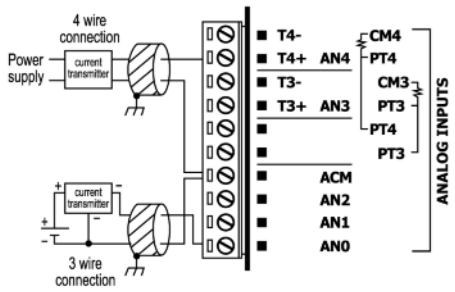
To configure an input, open the device and set the jumpers according to the instructions beginning on page 8.

Shields should be connected at the signal source.

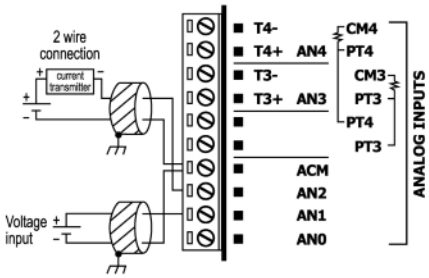
### Analog Inputs

- When set to current/voltage, all inputs share a common ACM signal, which must be connected to the 0V of the controller.

current

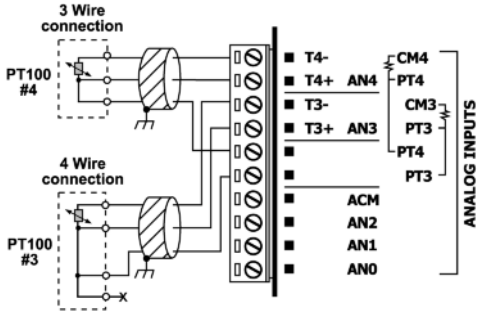



current/voltage



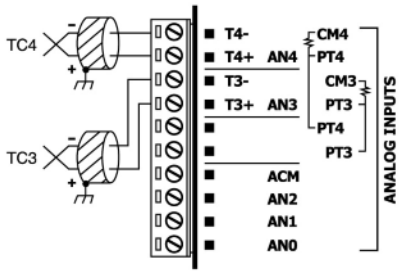
## RTD Inputs

- PT100 (Sensor 3): use both inputs related to CM3 signal.
- PT100 (Sensor 4): use both inputs related to CM4 signal.
- 4 wire PT100 can be used by leaving one of the sensor leads unconnected.




## Thermocouple Inputs

- Supported thermocouple types include B, E, J, K, N, R, S, and T, in accordance with software and jumper settings. See table, Thermocouple Input Ranges, on page 15.
- Inputs may be set to mV by software settings (Hardware Configuration); note that in order to set mV inputs, thermocouple jumper settings are used.
- To ensure proper performance, a warm-up period of a half an hour is recommended.



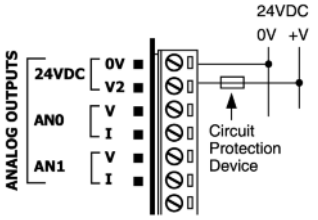
## Analog Outputs Power Supply

Use a 24VDC power supply for all analog output modes.

1. Connect the "positive" cable to the "V2" terminal, and the “negative” to the "0V" terminal.

- In the event of voltage fluctuations or non-conformity to voltage power supply specifications, connect the device to a regulated power supply.
- Since the analog I/O power supply is isolated, the controller’s 24VDC power supply may also be used to power the analog I/Os.

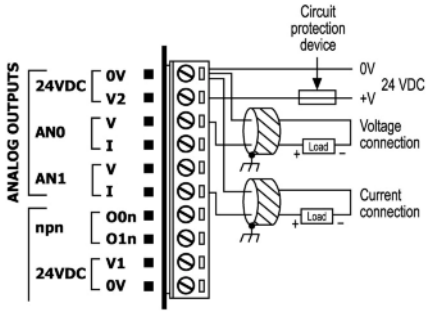
The 24VDC power supply must be turned on and off simultaneously with the controller’s power supply.




## Analog Outputs

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

current/voltage



## Changing Jumper Settings

To access the jumpers, you must remove the snap-in I/O module from the controller, and then remove the module's PCB board.

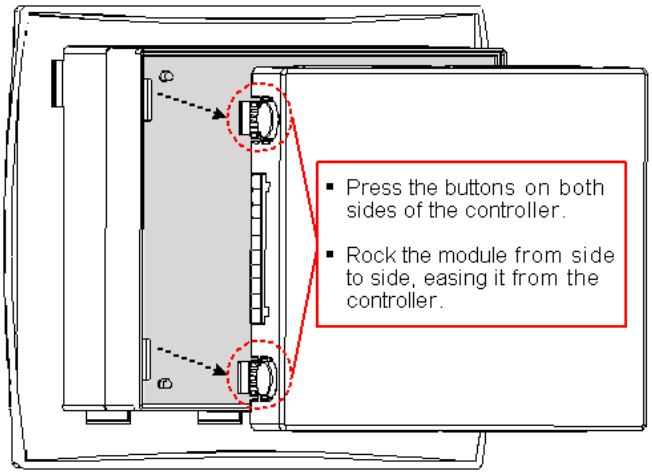
- Before you begin, turn off the power supply, disconnect and dismount the controller.
- Before performing these actions, touch a grounded object to discharge any electrostatic charge.
- Avoid touching the PCB board directly by holding the PCB board by its connectors.

### Accessing the Jumpers

First, remove the snap-in module.

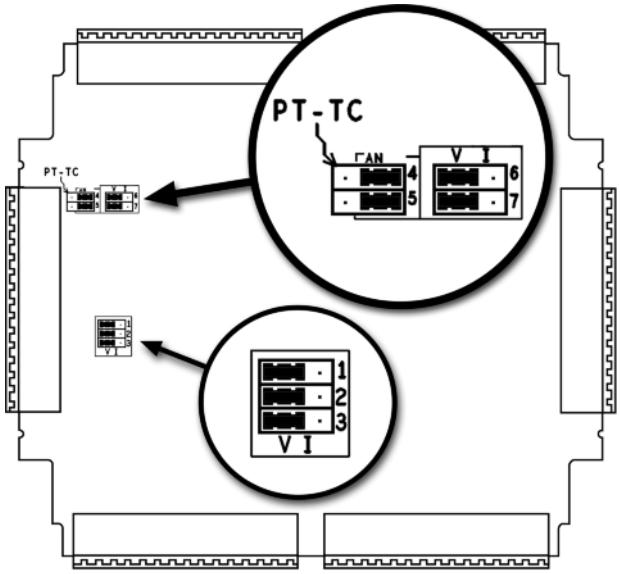
1. Locate the 4 buttons on the sides of the module, 2 on either side. Press the 2 buttons on either side of the module as shown, and hold them down to open the locking mechanism.

2. Gently rock the module from side to side, easing the module from the controller.




3. Using a Philips screwdriver, remove the center screw from the module's PCB board.

Select the desired function by changing the jumper settings according to the figure and tables shown below.




| | Jumper # | Voltage* | Current |
|---|---|---|---|
| **Analog input 0** | 3 | V | I |
| **Analog input 1** | 2 | V | I |
| **Analog input 2** | 1 | V | I |

| | Jumper # | Voltage* | Current | T/C or mV | PT100 |
|---|---|---|---|---|---|
| **Analog input 3** | 5 | AN | AN | PT-TC | PT-TC |
| | 7 | V | I | V | V |
| **Analog input 4** | 4 | AN | AN | PT-TC | PT-TC |
| | 6 | V | I | V | V |

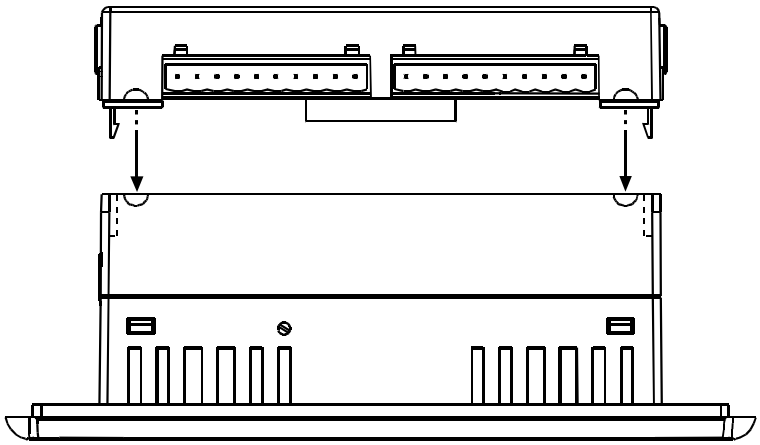
* Default factory setting

## Reassembling the controller

1. Return the PCB board to the module and secure the center screw.

2. Next, reinstall the module. Line the circular guidelines on the controller up with the guidelines on the Snap-in I/O 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.



# V200-18-E6B Technical Specifications

**Digital Inputs**

| | |
|---|---|
| Number of inputs | 18 (in two groups) |
| Input type | pnp (source) or npn (sink) |
| Galvanic isolation | |
| Digital inputs to bus | Yes |
| Digital inputs to digital inputs in same group | No |
| Group to group, digital inputs | Yes |
| Nominal input voltage | 24VDC |
| Input voltage | |
| pnp (source) | 0-5VDC for Logic '0'<br>17-28.8VDC for Logic '1' |
| npn (sink) | 17-28.8VDC for Logic '0'<br>0-5VDC for Logic '1' |
| Input current | 6mA@24VDC for inputs 4 to 17<br>8.8mA@24VDC for inputs 0 to 3 |
| Response time | 10mSec typical |
| High-speed inputs | Specifications below apply when these inputs are wired for use as a high-speed counter input/shaft encoder. See Notes 1 and 2. |
| Resolution | 32-bit |
| Frequency | 10kHz maximum |
| Minimum pulse width | 40µs |

**Notes:**

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.
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.

---

**Digital Outputs**

**Digital Output's Power Supply**

| | |
|---|---|
| Nominal operating voltage | 24VDC |
| Operating voltage | 20.4 to 28.8VDC |
| Quiescent current | 5mA@24VDC. |
| Max. current consumption | 85mA@24VDC. See Note 3. |
| Galvanic isolation | |
| Digital power supply to bus | Yes |
| Digital power supply to relay outputs | Yes |
| Digital power supply to transistor outputs | No |

**Notes:**

3. Maximum current consumption does not provide for pnp output requirements. The additional current requirement of pnp outputs must be added.

**Relay Outputs**

| | |
|---|---|
| Number of outputs | 15 relays (in two groups). See Note 4. |
| Output type | SPST-NO (Form A) |
| Isolation | By relay |
| Type of relay | Tyco PCN-124D3MHZ or compatible |
| Outputs' power supply | See Digital Output's Power Supply page 11. |
| Galvanic isolation | |
| Relay outputs to bus | Yes |
| Group to group, relay outputs | Yes |
| Relay to transistor outputs | Yes |
| Output current | 3A maximum per output (resistive load)<br>8A maximum total for common (resistive load) |
| Rate voltage | 250VAC / 30VDC |
| Minimun load | 1mA@5VDC |
| Life expectancy | 100k operations at maximum load |
| Response time | 10mS (typical) |
| Contact protection | External precautions required (see Increasing Contact Life Span, p.4) |

**Notes:**

4. Outputs 2, 3, 4, 5, 6 and 7 share a common signal. Outputs 8, 9, 10, 11, 12, 13, 14, 15 and 16 share a common signal.

**Transistor Outputs/H.S.O.**

| | |
|---|---|
| Number of outputs | 2, high-speed. Each can be individually wired as pnp (source) or npn (sink). |
| Output type | pnp: P-MOSFET (open drain)<br>npn: N-MOSFET (open drain) |
| Galvanic isolation | |
| Transistor outputs to bus | Yes |
| Transistor outputs to transistor outputs | No |
| Transistor outputs to relay outputs | Yes |
| Output current | pnp: 0.5A maximum per output<br>npn: 50mA maximum per output |
| Maximum frequency | Resistive load<br>pnp: 0.5kHz<br>npn: 50kHz<br>Inductive load<br>0.5Hz |
| ON voltage drop | pnp: 0.5VDC maximum<br>npn: 0.4VDC maximum |
| Short circuit protection | Yes (pnp only) |
| Voltage reference | |
| pnp (source) | See Digital Output's Power Supply page 11 |
| npn (sink) | 3.5V to 28.8VDC, unrelated to the voltage of either the I/O module or the controller |

**Analog/RTD/TC Inputs**

| | |
|---|---|
| Number of inputs | 5 |
| Type of input | Set via appropriate wiring and jumper settings. See Note 5. |
| Isolation | None |

**Analog Inputs**

| | AN0-AN2 (10-bit) | AN3-AN4 (14-bit) |
|---|---|---|
| Input range | 0-10V, 0-20mA , 4-20mA | 0-10V, 0-20mA , 4-20mA |
| Conversion method | Succesive approximation | Voltage to frequency |
| Normal mode | | |
| Resolution, except 4-20mA | 10-bit (1024 units) | 14-bit (16384 units) |
| Resolution at 4-20mA | 204-1023 (820 units) | 3277 to 16384 (13107 units) |
| Conversion time | Synchronized to scan time | 100mSec minimum per input (according to filter type) |
| Fast Mode | | |
| Resolution, except 4-20mA | — | 12-bit (4096 units) |
| Resolution at 4-20mA | — | 819 to 4095 (3277 units) |
| Conversion time | — | 30mSec minimum per input (according to filter type) |
| Input impedance | >100kΩ—voltage<br>500Ω—current | 12.77kΩ —voltage<br>37Ω —current |
| Absolute maximum rating | ±15V—voltage<br>±30mA, 15V—current | ±15V—voltage<br>±30mA, 1.1V—current |
| Full-scale error | ±3 LSB (0.3%) | ±0.4% |
| Linearity error | ±3 LSB (0.3%) | ±0.04% |
| Status indication | Yes. See Note 6. | Yes. See Note 7. |

**Notes:**

5. Inputs 0 to 2 may be wired to work with either current or voltage.
   Inputs 3 and 4 can function as either analog, RTD, or thermocouple.
6. The analog value can indicate a fault:

| Value: 10-bit | Possible Cause |
|---|---|
| 1024 | Deviates above the input range |

7. The analog value can indicate faults:

| Value: 12-bit | Value: 14-bit | Possible Cause |
|---|---|---|
| -1 | -1 | Deviates slightly below the input range |
| 4096 | 16384 | Deviates slightly above the input range |
| 32767 | 32767 | Deviates greatly above or below the input range |

**RTD Inputs**

| | |
|---|---|
| Input range | -200 to 600°C/-328 to 1100°F. 1 to 320Ω. See Note 8. |
| RTD type | PT100 |
| Temperature coefficient α | 385/392 |
| Conversion method | Voltage to frequency |
| Resolution | 0.1°C/0.1°F |
| Conversion time | 300mS minimum per channel, depending on software filter type |
| Input impedance | >10MΩ |
| Auxillary current for PT100 | 150µA typical |
| Full-scale error | ±0.4% |
| Linearity error | ±0.04% |
| Status indication | Yes. See Note 9. |

**Notes:**

8. The device can also measure resistance with the range of 1-320Ω at a resolution of 0.1Ω.
9. The analog value can indicate faults:

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

**Thermocouple Inputs**

| | |
|---|---|
| Input range | See Note 10. |
| Conversion method | Voltage to frequency |
| Resolution | 0.1°C/0.1°F maximum |
| Conversion time | 100mS minimum per channel, depending on software filter type |
| Input impedance | >10MΩ |
| Cold junction compensation | Local, automatic |
| Cold junction compensation error | ±1.5°C/±2.7°F maximum |
| Absolute maximum rating | ±0.6VDC |
| Full-scale error | ±0.4% |
| Linearity error | ±0.04% |
| Warm-up time | ½ hour typically, ±1°C/±1.8°F repeatability |
| Status indication | None |

**Notes:**

10. The device can also measure voltage within the range of -5 to 56mV, at a resolution of 0.01mV. The device can also measure raw value frequency at a resolution of 14-bits (16384). Input ranges are shown in the following table:

**Table 1: Thermocouple input ranges**

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

**Analog Outputs**

**Analog Output's Power Supply**

| | |
|---|---|
| Nominal operating voltage | 24VDC |
| Operating voltage | 20.4 to 28.8VDC |
| Quiescent current | 30mA@24VDC |
| Max. current consumption | 80mA@24VDC |
| Galvanic isolation | |
| Analog power supply to bus | Yes |
| Analog power supply to analog outputs | No |

**Analog Outputs**

| | |
|---|---|
| Number of outputs | 2 (single-ended) |
| Output range | 0-10V, 4-20mA. See Note 11. |
| Resolution | 12-bit (4096 units) |
| Conversion time | Synchronized to scan time |
| Load impedance | 1kΩ minimum—voltage<br>500Ω maximum—current |
| Galvanic isolation | |
| Analog outputs to bus | Yes |
| Analog output to analog output | No |
| Linearity error | ±0.1% |
| Operational error limits | ±0.2% |

**Notes:**

11. Note that the range of each I/O is defined by wiring and within the controller's software.

| | |
|---|---|
| **Environmental** | 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) | 10% to 95% (non-condensing) |
| Dimensions (WxHxD) | 138x23x123mm (5.43x0.9x4.84") |
| Weight | 140g (4.94oz) |

## About Unitronics

Unitronics has been producing PLCs, automation software and accessory devices since 1989.

Unitronics' OPLC controllers combine full-function PLCs and HMI operating panels into single, compact units. These HMI + PLC devices are programmed in a single, user-friendly environment. Our clients save I/O points, wiring, space, and programming time; elements that translate directly into cost-efficiency.

Unitronics supports a global network of distributors and sales representatives, as well as a U.S. subsidiary.

For more information regarding Unitronics products, contact your distributor or Unitronics headquarters via email: export@unitronics.com.



DSP-V200-E6B 06/08

# V200-18-E46B **Snap-in I/O Module**

The V200-18-E46B plugs directly into the back of compatible Unitronics OPLCs, creating a self-contained PLC unit with a local I/O configuration.

Features

- 18 isolated digital inputs configurable to type pnp/npn (source/sink), includes 2 shaft encoder inputs.
- 15 isolated relay outputs.
- 2 isolated pnp/npn (source/sink) transistor outputs, includes 2 high-speed outputs.
- 9 analog inputs.
- 2 isolated analog outputs.

- Before using this product, it is the responsibility of the user to read and understand this document and any accompanying documentation.
- All examples and diagrams shown herein 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 in accordance with local and national standards and regulations.
- Only qualified service personnel should open this device or carry out repairs.

## User safety and equipment protection guidelines

This document is intended to aid trained and competent personnel in the installation of this equipment as defined by the European directives for machinery, low voltage, and EMC. Only a technician or engineer trained in the local and national electrical standards should perform tasks associated with the device's electrical wiring.

Symbols are used to highlight information relating to the user's personal safety and equipment protection throughout this document. When these symbols appear, the associated information must be read carefully and understood fully.

| Symbol | Meaning | Description |
|---|---|---|
|  | Danger | The identified danger causes physical and property damage. |
|  | Warning | The identified danger can cause physical and property damage. |
| *Caution* | Caution | Use caution. |

- Failure to comply with appropriate safety guidelines can result in severe personal injury or property damage. Always exercise proper caution when working with electrical equipment.

- Check the user program before running it.
- Do not attempt to use this device with parameters that exceed permissible levels.
- Install an external circuit breaker and take appropriate safety measures against short-circuiting in external wiring.
- To avoid damaging the system, do not connect / disconnect the device when the power is on.

*Caution*

- Ascertain that terminal blocks are properly secured in place.

## 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.

- Provide proper ventilation by leaving at least 10mm of space between the top and bottom edges of the device and the enclosure walls.
- Do not place in water or let water leak onto the unit.
- Do not allow debris to fall inside the unit during installation.

## Wiring

- Do not touch live wires.

- Unused pins should not be connected. Ignoring this directive may damage the device.
- Do not connect the 'Neutral' or 'Line' signal of the 110/220VAC to the device's 0V pin.
- Double-check all wiring before turning on the power supply.

### Wiring Procedures

Use crimp terminals for wiring; use 26-12 AWG wire (0.13mm $^2$–3.31mm$^2$) for all wiring purposes.

1. Strip the wire to a length of 7±0.5mm (0.250–0.300 inches).
2. Unscrew the terminal to its widest position before inserting a wire.
3. Insert the wire completely into the terminal to ensure that a proper connection can be made.
4. Tighten enough to keep the wire from pulling free.

- To avoid damaging the wire, do not exceed a maximum torque of 0.5 N·m (5 kgf·cm).
- Do not use tin, solder, or any other substance on stripped wire that might cause the wire strand to break.
- Install at maximum distance from high-voltage cables and power equipment.

### I/O Wiring—General

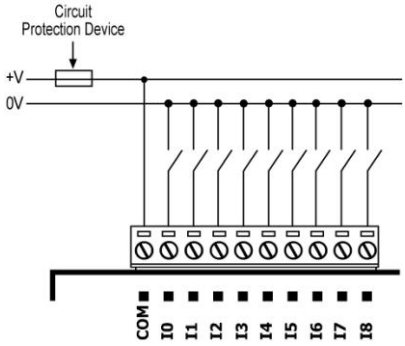
- Input or output cables should not be run through the same multi-core cable or share the same wire.
- Allow for voltage drop and noise interference with input lines used over an extended distance. Use wire that is properly sized for the load.

## Digital Inputs

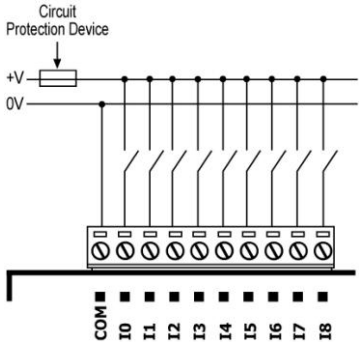
Each group of 9 inputs has a common signal. Each group can be used as either pnp (source) or npn (sink), when appropriately wired as shown in the following figures.

- 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.

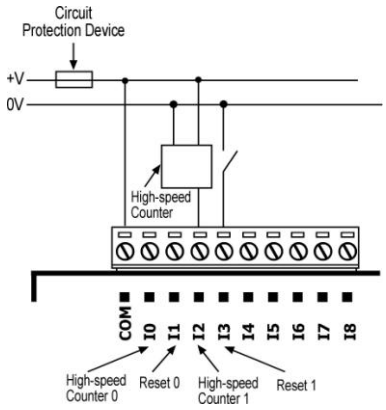
npn (sink) digital input wiring



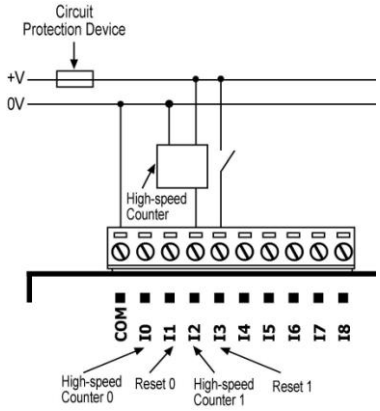

pnp (source) digital input wiring



npn (sink) high-speed counter

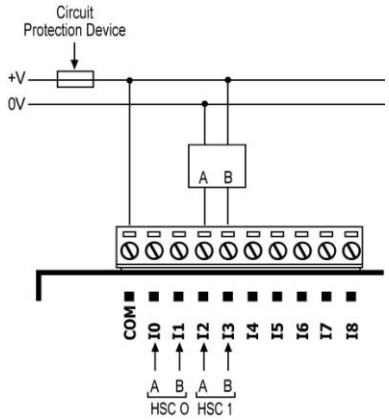



pnp (source) high-speed counter

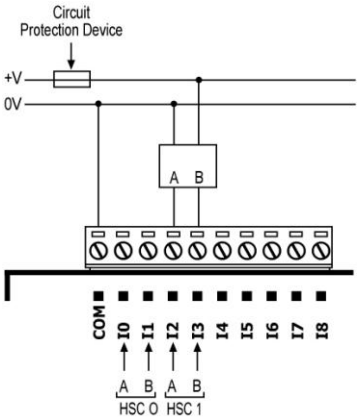



Inputs I0, I1, and I2, I3 can be used as shaft encoders as shown below.

npn (sink) shaft encoder wiring




pnp (source) shaft encoder wiring



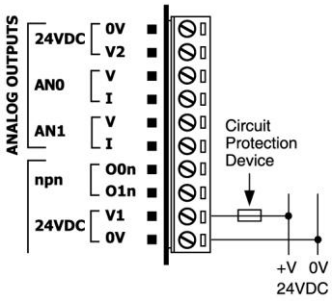

## Digital Outputs

### Wiring Power Supplies

Use a 24VDC power supply for both relay and transistor outputs.

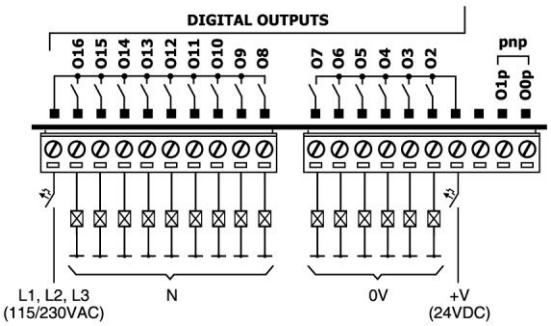
1. Connect the "positive" lead to the "V1" terminal, and the “negative” lead to the "0V" terminal.

- In the event of voltage fluctuations or non-conformity to voltage power supply specifications, connect the device to a regulated power supply.



## Relay Outputs

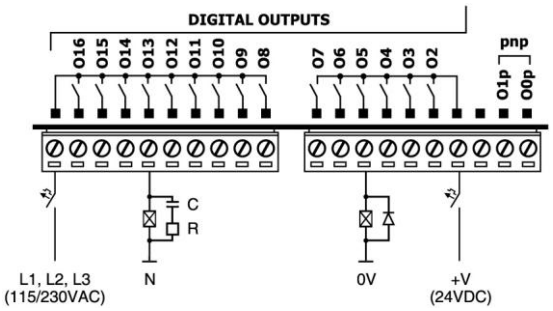
- Each group can be wired separately to either AC or DC as show.
- The 0V signal of the relay outputs is isolated from the controller's 0V signal.




## 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:

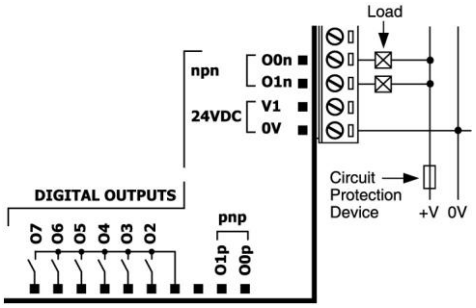
- a clamping diode in parallel with each inductive DC load,
- an RC snubber circuit in parallel with each inductive AC load.



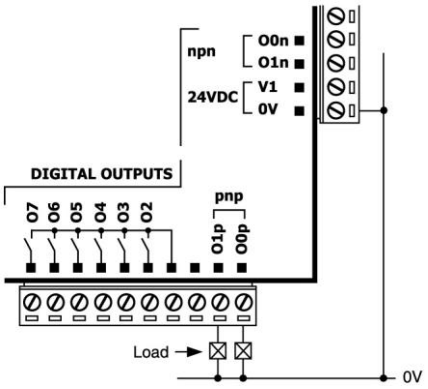

## Transistor Outputs

- 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.

npn (sink)




pnp (source)



## Analog Inputs

9 analog inputs, which can be wired to work with either current or voltage:

- Inputs 0 to 2 are 10-bit.
- Inputs 3 to 8 are 12 to 14-bit.

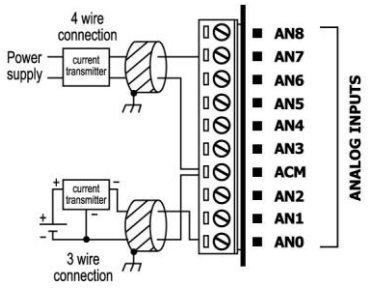
To configure an input, open the device and set the jumpers according to the instructions beginning on page 6.

Shields should be connected at the signal source.

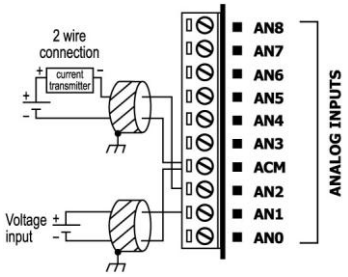
### Analog Inputs

- All inputs share a common ACM signal, which must be connected to the 0V of the controller.

current




current/voltage



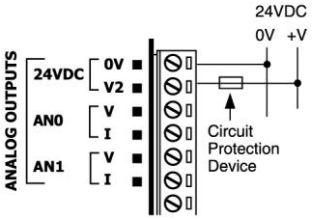

## Analog Outputs Power Supply

Use a 24VDC power supply for all analog output modes.

1. Connect the "positive" cable to the "V2" terminal, and the “negative” to the "0V" terminal.

- In the event of voltage fluctuations or non-conformity to voltage power supply specifications, connect the device to a regulated power supply.
- Since the analog I/O power supply is isolated, the controller’s 24VDC power supply may also be used to power the analog I/Os.

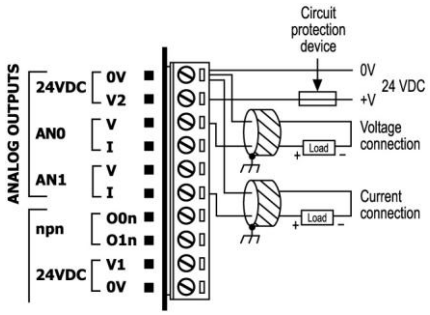
The 24VDC power supply must be turned on and off simultaneously with the controller’s power supply.



## Analog Outputs

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

current/voltage




## Changing Jumper Settings

To access the jumpers, you must remove the snap-in I/O module from the controller, and then remove the module's PCB board.

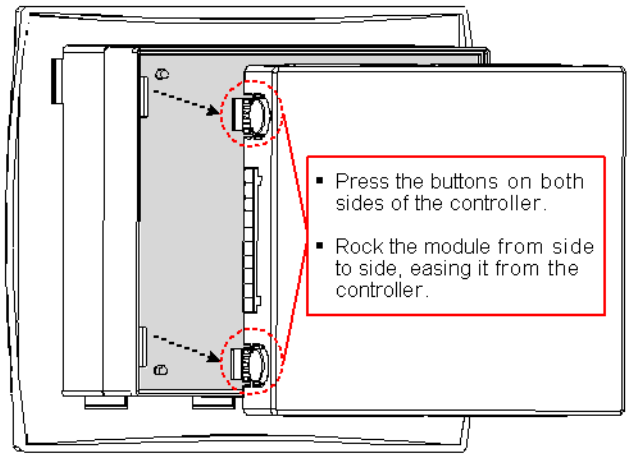
- Before you begin, turn off the power supply, disconnect and dismount the controller.
- Before performing these actions, touch a grounded object to discharge any electrostatic charge.
- Avoid touching the PCB board directly by holding the PCB board by its connectors.

### Accessing the Jumpers

First, remove the snap-in module.

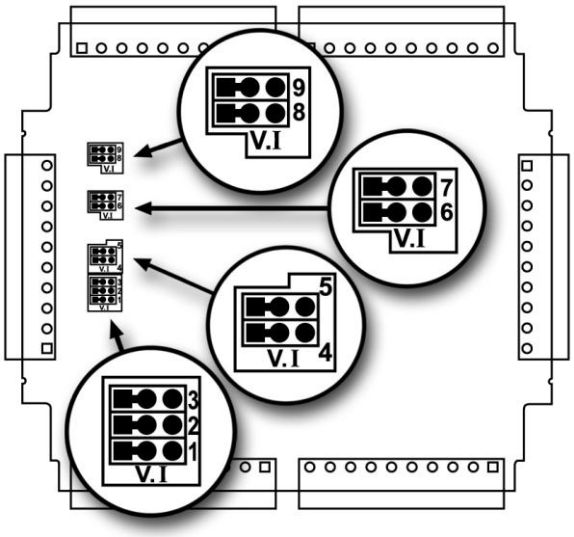
1. Locate the 4 buttons on the sides of the module, 2 on either side. Press the 2 buttons on either side of the module as shown, and hold them down to open the locking mechanism.

2. Gently rock the module from side to side, easing the module from the controller.




3. Using a Philips screwdriver, remove the center screw from the module's PCB board.

Select the desired function by changing the jumper settings according to the figure and tables shown below.




| | Jumper # | Voltage* | Current |
|---|---|---|---|
| **Analog input 0** | 1 | V | I |
| **Analog input 1** | 2 | V | I |
| **Analog input 2** | 3 | V | I |
| **Analog input 3** | 4 | V | I |
| **Analog input 4** | 5 | V | I |
| **Analog input 5** | 6 | V | I |
| **Analog input 6** | 7 | V | I |
| **Analog input 7** | 8 | V | I |
| **Analog input 8** | 9 | V | I |

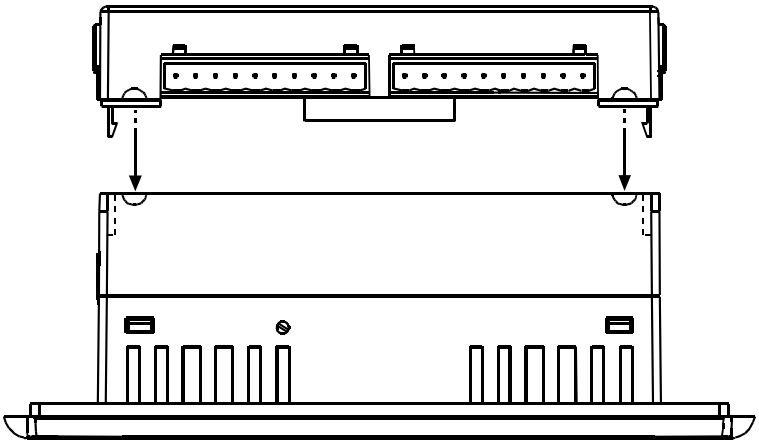
* Default factory setting

## Reassembling the controller

1. Return the PCB board to the module and secure the center screw.

2. Next, reinstall the module. Line the circular guidelines on the controller up with the guidelines on the Snap-in I/O 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.



# V200-18-E46B Technical Specifications

**Digital Inputs**

| | |
|---|---|
| Number of inputs | 18 (in two groups) |
| Input type | pnp (source) or npn (sink) |
| Galvanic isolation | |
| Digital inputs to bus | Yes |
| Digital inputs to digital inputs in same group | No |
| Group to group, digital inputs | Yes |
| Nominal input voltage | 24VDC |
| Input voltage | |
| pnp (source) | 0-5VDC for Logic '0'<br>17-28.8VDC for Logic '1' |
| npn (sink) | 17-28.8VDC for Logic '0'<br>0-5VDC for Logic '1' |
| Input current | 8.8mA@24VDC for inputs 0 to 3<br>6mA@24VDC for inputs 4 to 17 |
| Response time | 10mSec typical |
| High-speed inputs | Specifications below apply when these inputs are wired for use as a high-speed counter input/shaft encoder. See Notes 1 and 2. |
| Resolution | 32-bit |
| Frequency | 10kHz maximum |
| Minimum pulse width | 40µs |

**Notes:**

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.
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.

---

**Digital Outputs**

**Digital Output's Power Supply**

| | |
|---|---|
| Nominal operating voltage | 24VDC |
| Operating voltage | 20.4 to 28.8VDC |
| Quiescent current | 5mA@24VDC. |
| Max. current consumption | 85mA@24VDC. See Note 3. |
| Galvanic isolation | |
| Digital power supply to bus | Yes |
| Digital power supply to relay outputs | Yes |
| Digital power supply to transistor outputs | No |

**Notes:**

3. Maximum current consumption does not provide for pnp output requirements. The additional current requirement of pnp outputs must be added.

**Relay Outputs**

| | |
|---|---|
| Number of outputs | 15 relays (in two groups). See Note 4. |
| Output type | SPST-NO (Form A) |
| Isolation | By relay |
| Type of relay | Tyco PCN-124D3MHZ or compatible |
| Outputs' power supply | See Digital Output's Power Supply page 11. |
| Galvanic isolation | |
| Relay outputs to bus | Yes |
| Group to group, relay outputs | Yes |
| Relay to transistor outputs | Yes |
| Output current | 3A maximum per output (resistive load)<br>8A maximum total for common (resistive load) |
| Rate voltage | 250VAC / 30VDC |
| Minimun load | 1mA@5VDC |
| Life expectancy | 100k operations at maximum load |
| Response time | 10mS (typical) |
| Contact protection | External precautions required (see Increasing Contact Life Span, p.4) |

**Notes:**

4. Outputs 2, 3, 4, 5, 6 and 7 share a common signal. Outputs 8, 9, 10, 11, 12, 13, 14, 15 and 16 share a common signal.

**Transistor Outputs/H.S.O.**

| | |
|---|---|
| Number of outputs | 2, high-speed. Each can be individually wired as pnp (source) or npn (sink). |
| Output type | pnp: P-MOSFET (open drain)<br>npn: N-MOSFET (open drain) |
| Galvanic isolation | |
| Transistor outputs to bus | Yes |
| Transistor outputs to transistor outputs | No |
| Transistor outputs to relay outputs | Yes |
| Output current | pnp: 0.5A maximum per output<br>npn: 50mA maximum per output |
| Maximum frequency | Resistive load<br>pnp: 0.5kHz<br>npn: 100kHz<br>Inductive load<br>0.5Hz |
| ON voltage drop | pnp: 0.5VDC maximum<br>npn: 0.4VDC maximum |
| Short circuit protection | Yes (pnp only) |
| Voltage reference | |
| pnp (source) | See Digital Output's Power Supply page 11 |
| npn (sink) | 3.5V to 28.8VDC, unrelated to the voltage of either the I/O module or the controller |

**Notes:**

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

**Analog Inputs**

| | |
|---|---|
| Number of inputs | 9 |
| Type of input | Set via appropriate wiring and jumper settings. |
| Isolation | None |

**Analog Inputs**

| | AN0-AN2 (10-bit) | AN3-AN8 (12-14-bit) |
|---|---|---|
| Input range | 0-10V, 0-20mA , 4-20mA | 0-10V, 0-20mA , 4-20mA |
| Conversion method | Succesive approximation | Voltage to frequency |
| Normal mode | | |
| Resolution, except 4-20mA | 10-bit (1024 units) | 14-bit (16383 units) |
| Resolution at 4-20mA | 204-1023 (820 units) | 3277 to 16383 (13107 units) |
| Conversion time | Synchronized to scan time | 100mSec minimum per input (according to filter type) |
| Fast Mode | | |
| Resolution, except 4-20mA | — | 12-bit (4096 units) |
| Resolution at 4-20mA | — | 819 to 4095 (3277 units) |
| Conversion time | — | 20mSec minimum per input (according to filter type) |
| Input impedance | >100kΩ—voltage<br>500Ω—current | 12.77kΩ —voltage<br>37Ω —current |
| Absolute maximum rating | ±15V—voltage<br>±30mA, 15V—current | ±15V—voltage<br>±30mA, 1.1V—current |
| Full-scale error | ±3 LSB (0.3%) | ±0.5% |
| Linearity error | ±3 LSB (0.3%) | ±0.04% |
| Status indication | Yes. See Note 6. | Yes. See Note 7. |

**Notes:**

6. The analog value can indicate a fault:

| Value: 10-bit | Possible Cause |
|---|---|
| 1024 | Deviates above the input range |

7. The analog value can indicate faults:

| Value: 12-bit | Value: 14-bit | Possible Cause |
|---|---|---|
| -1 | -1 | Deviates slightly below the input range |
| 4096 | 16384 | Deviates slightly above the input range |
| 32767 | 32767 | Deviates greatly above or below the input range |

**Analog Outputs**

**Analog Output's Power Supply**

| | |
|---|---|
| Nominal operating voltage | 24VDC |
| Operating voltage | 20.4 to 28.8VDC |
| Quiescent current | 30mA@24VDC |
| Max. current consumption | 80mA@24VDC |
| Galvanic isolation | |
| Analog power supply to bus | Yes |
| Analog power supply to analog outputs | No |

**Analog Outputs**

| | |
|---|---|
| Number of outputs | 2 (single-ended) |
| Output range | 0-10V, 4-20mA. See Note 8. |
| Resolution | 12-bit (4096 units) |
| Conversion time | Synchronized to scan time |
| Load impedance | 1kΩ minimum—voltage<br>500Ω maximum—current |
| Galvanic isolation | |
| Analog outputs to bus | Yes |
| Analog output to analog output | No |
| Linearity error | ±0.1% |
| Operational error limits | ±0.2% |

**Notes:**

8. Note that the range of each I/O is defined by wiring and within the controller's software.

| | |
|---|---|
| **Environmental** | 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) | 10% to 95% (non-condensing) |
| Dimensions (WxHxD) | 138x23x123mm (5.43x0.9x4.84") |
| Weight | 140g (4.94oz) |