

## EX-A1 I/O Expansion Module Adapter

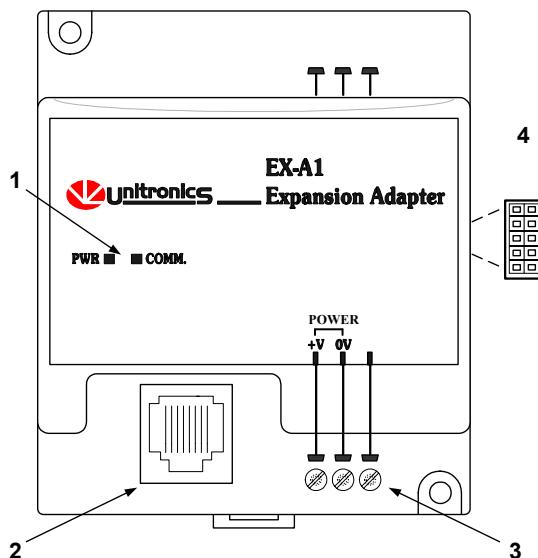
The EX-A1 interfaces between a variety of I/O expansion modules and specific Unitronics' OPLCs.

A single adapter can be connected to up to 8 expansion modules.

The EX-A1 may either be snap-mounted on a DIN rail, or screw-mounted onto a mounting plate.

### Component identification

1	Status indicators
2	OPLC to EX-A1 connection port
3	Power supply connection points
4	EX-A1 to expansion module connection port



- 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.

**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.

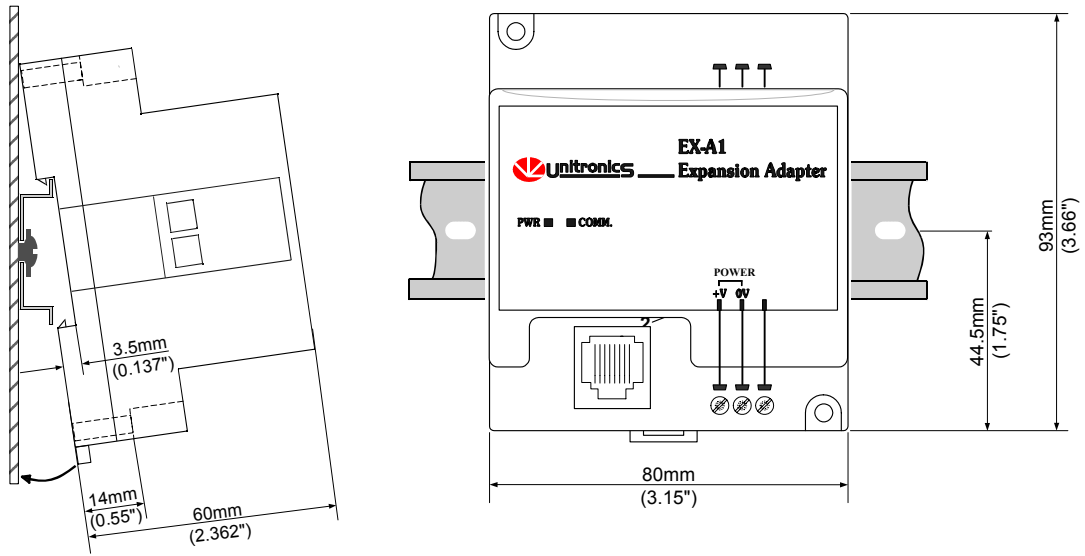


- Leave a minimum of 10mm space for ventilation between the top and bottom edges of the device and the enclosure walls.
- Do not place in water or let water leak onto the unit.
- Do not allow debris to fall inside the unit during installation.

**Mounting the Module**

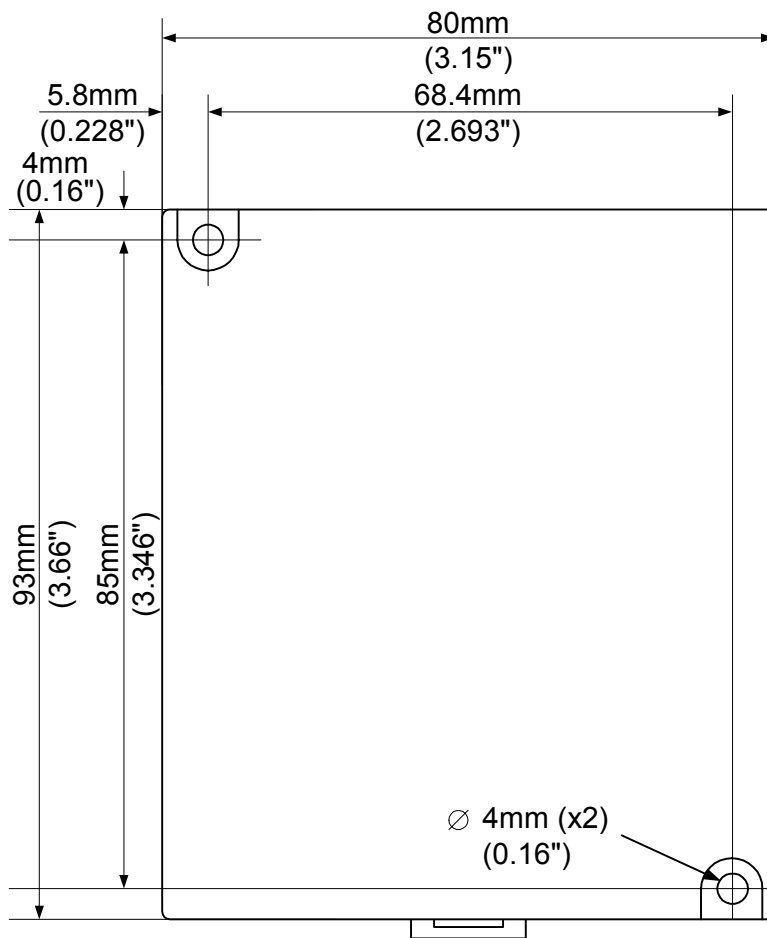
**DIN-rail mounting**

Snap the device onto the DIN rail as shown below; the module will be squarely situated on the DIN rail.



**Screw-Mounting**

The figure on the next page is drawn to scale. It may be used as a guide for screw-mounting the module.  
 Mounting screw type: either M3 or NC6-32.

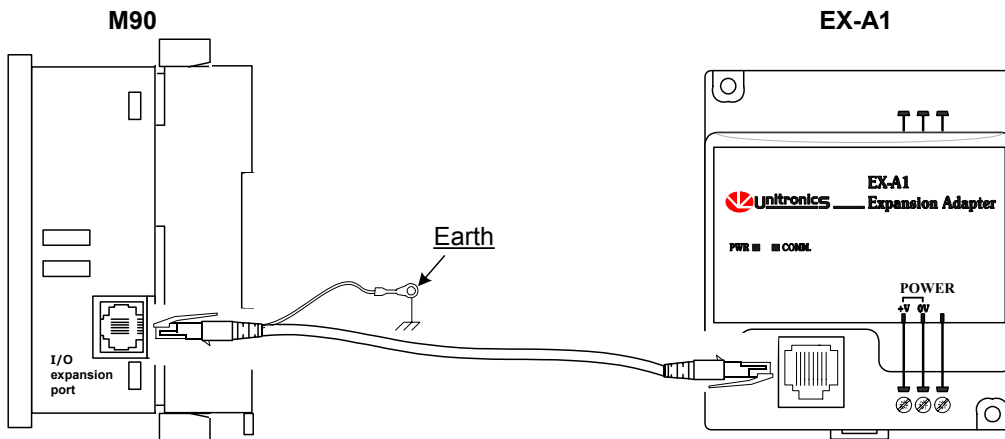


**Connecting the OPLC to the EX-A1**

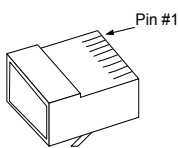
An OPLC, such as the M90 micro-OPLC, is connected to the EX-A1 adapter as shown below, via a category 5 shielded twisted pair cable (CAT 5, STP), terminated by RJ45 connectors. The cable provided with the EX-A1 is one meter long; cables of other lengths are available by separate order.

Note that the cable must be earthed on the M90 side, via the yellow-green wire.

To avoid damaging the system, do not connect or disconnect the device when the power is on.

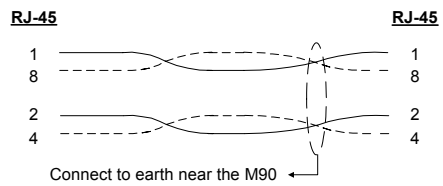


Shielded RJ45 connector pin-out



RJ-45 pin #	signal
1	D -
8	D +
2	CK-
4	CK+
3	0V
6	0V

Cable description



### Connecting Expansion Modules

An adapter provides the interface between the OPLC and an expansion module. To connect the I/O module to the adapter or to another module:

1. Push the module-to-module connector into the port located on the right side of the device.

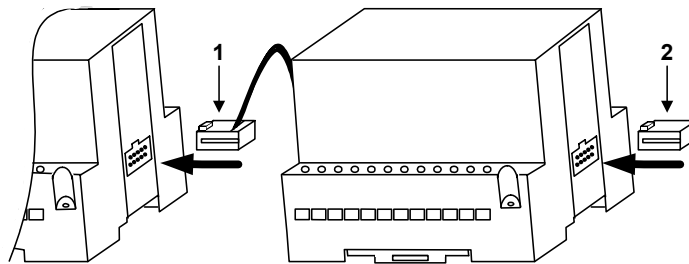
Note that there is a protective cap provided with the adapter. This cap covers the port of the **final** I/O module in the system.



- To avoid damaging the system, do not connect or disconnect the device when the power is on.

#### Component identification

1	Module-to-module connector
2	Protective cap



### Wiring



- Do not touch live wires.



- Unused pins should not be connected. Ignoring this directive may damage the device.
- Double-check all wiring before turning on the power supply.
- 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.
- Double-check all the wiring before turning on the power supply.

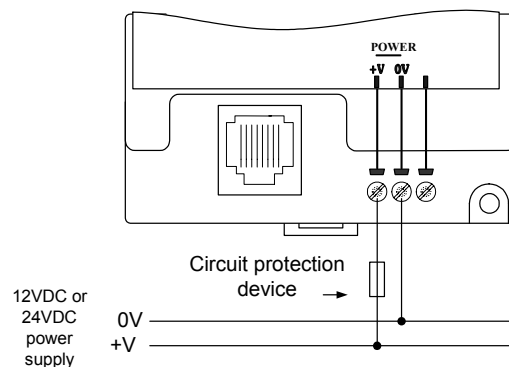
#### Wiring Procedures

Use crimp terminals for wiring; use 26-12 AWG wire (0.13 mm<sup>2</sup>–3.31 mm<sup>2</sup>) 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.

**Wiring Power Supply**

1. Connect the "positive" cable to the "+V" terminal, and the "negative" to the "0V" terminal.
- A non-isolated power supply can be used provided that a 0V signal is connected to the chassis.
  - Note that both the OPLC and the EX-A1 must be connected to the same power supply.

**EX-A1 Technical Specifications**

I/O module capacity	Up to 8 I/O modules can be connected to a single adapter.
Power supply	12VDC or 24VDC (see Notes 1 and 2)
Permissible range	10.2 to 28.8VDC
Max. current consumption	650mA @ 12VDC; 350mA @ 24VDC
Typical power consumption	4W
Current supply for I/O modules	1A max. from 5V (see Note 3)
Galvanic isolation	None
Status indicators	
(PWR)	Green LED—Lit when power is supplied.
(COMM.)	Green LED—Lit when communication is established.

<b>Environmental</b>	IP20/NEMA1
Operating temperature	0° to 50° C (32 to 122°F)
Storage temperature	-20° to 60° C (-4 to 140°F)
Relative Humidity (RH)	5% to 95% (non-condensing)
Dimensions (WxHxD)	80mm x 93mm x 60mm (3.15" x 3.66" x 2.362")
Weight	125g (4.3oz.)
Mounting	Either onto a 35mm DIN-rail or screw-mounted.

**Notes:**

1. Both the OPLC and the EX-A1 must be connected to the same power supply. The EX-A1 and the OPLC must be turned on and off simultaneously.
2. The 12VDC power supply is supported by versions V2.00 and later.
3. Example: 2 I/O-DI8-TO8 units consume a maximum of 140mA of the 5VDC supplied by the EX-A1.

### Accessories

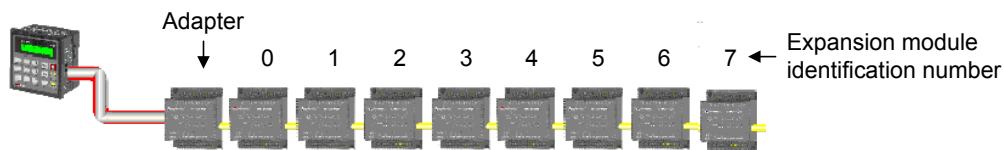
EX1-CA050	0.5 meter communication cable
EX1-CA100*	1 meter communication cable
EX1-CA200	2 meter communication cable
EX1-CA400	4 meter communication cable
IO-CAP	Protective cap, used to cover the connection port of the final I/O module in the system

\*EX1-CA100 is provided with the EX-A1 adapter; other cables are available by separate order.

### Addressing I/Os on Expansion Modules

Inputs and outputs located on I/O expansion modules that are connected to an OPLC are assigned addresses that comprise a letter and a number. The letter indicates whether the I/O is an input (I) or an output (O). The number indicates the I/O's location in the system. This number relates to both the position of the expansion module in the system, and to the position of the I/O on that module.

Expansion modules are numbered from 0-7 as shown in the figure below.



The formula below is used to assign addresses for I/O modules used in conjunction with the OPLC.

X is the number representing a specific module's location (0-7). Y is the number of the input or output on that specific module (0-15).

The number that represents the I/O's location is equal to:

$$32 + x \cdot 16 + y$$

#### Examples

- Input #3, located on expansion module #2 in the system, will be addressed as I 67,  
 $67 = 32 + 2 \cdot 16 + 3$
- Output #4, located on expansion module #3 in the system, will be addressed as O 84,  
 $84 = 32 + 3 \cdot 16 + 4$ .

EX90-DI8-RO8 is a stand-alone I/O module. Even if it is the only module in the configuration, the EX90-DI8-RO8 is always assigned the number 7.

Its I/Os are addressed accordingly.

#### Example

- Input #5, located on an EX90-DI8-RO8 connected to an OPLC will be addressed as I 149,  $149 = 32 + 7 \cdot 16 + 5$

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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.

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