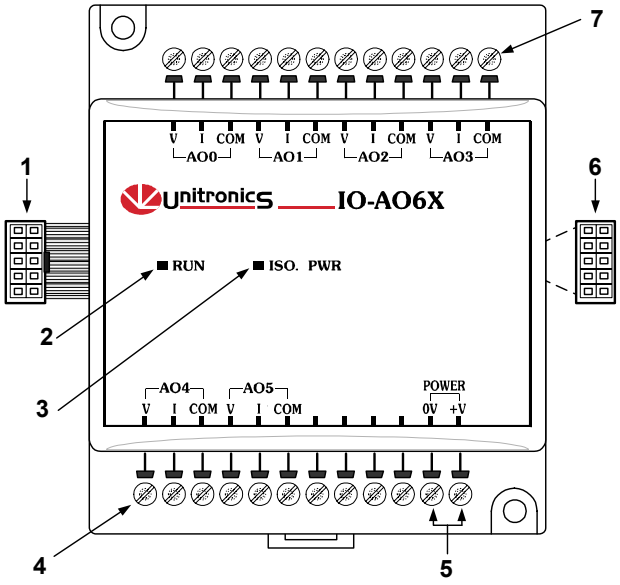
IO-AO6X I/O Expansion Module 6 Isolated Analog Outputs

The IO-AO6X is an I/O Expansion Module that can be used in conjunction with specific Unitronics OPLC controllers.

The module offers 6 12-bit isolated outputs; functioning at 0-10V, 0-20mA, and 4-20mA.

The interface between the module and the OPLC is provided by an adapter.

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



	Component identification
1	Module-to-module connector
2	Communication status indicator
3	Isolated power supply indicator
4	Output connection points, AO4-AO5
5	Connection points for power supply to analog unit
6	Module-to-module connector port
7	Output connection points, AO0-AO3

- 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

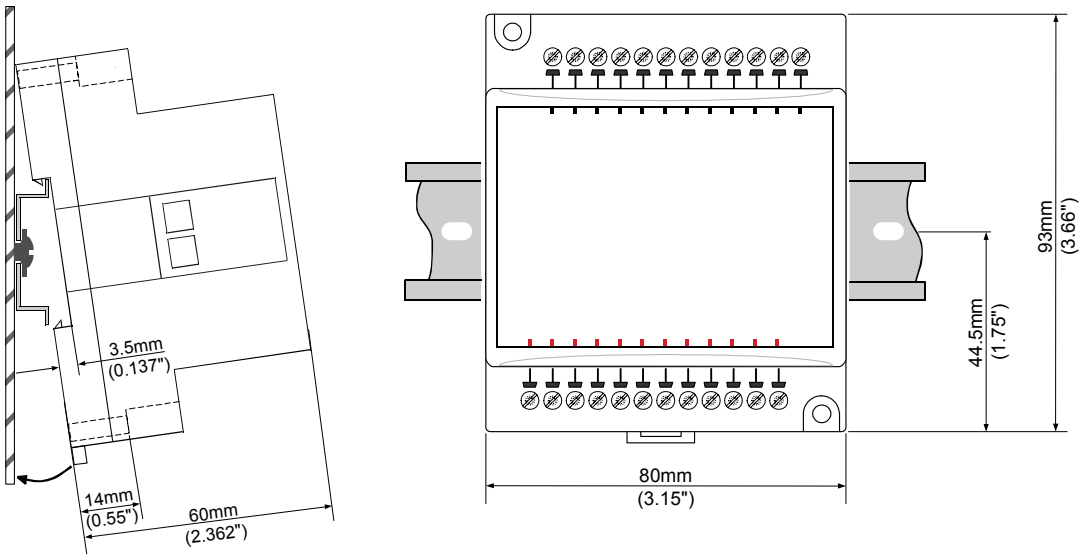
- Do not install in areas with: excessive or conductive dust, corrosive or flammable gas, moisture or rain, excessive heat, regular impact shocks or excessive vibration.

- 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

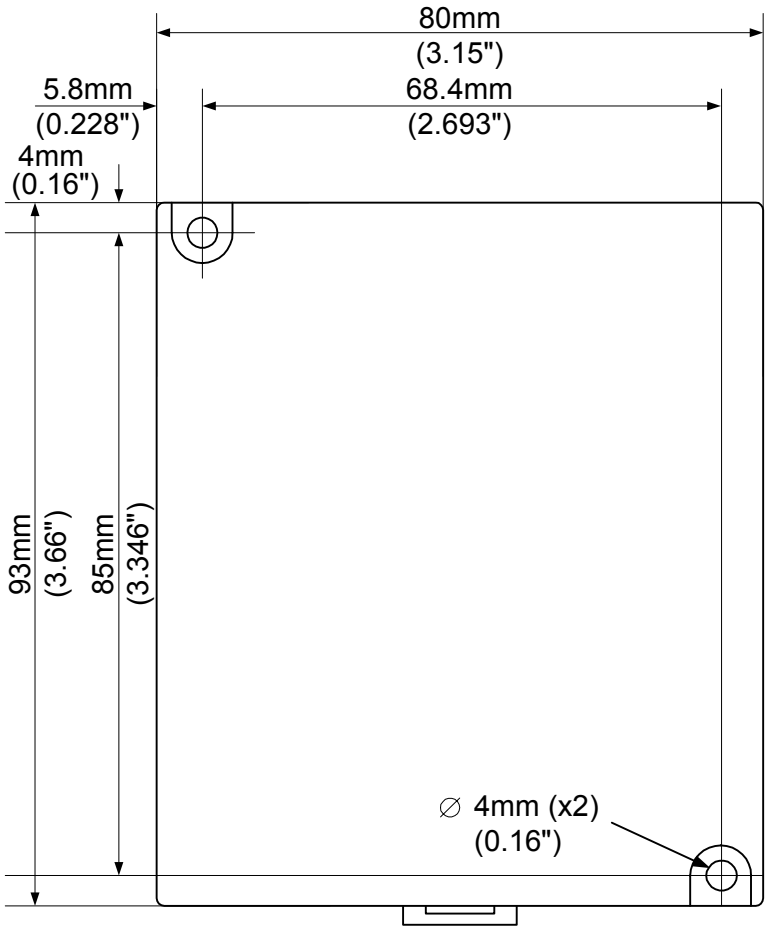
DIN-rail mounting

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.


80mm
(3.15")
5.8mm
(0.228")
68.4mm
(2.693")
4mm
(0.16")
93mm
(3.66")
85mm
(3.346")
∅ 4mm (x2)
(0.16")

Connecting Expansion Modules

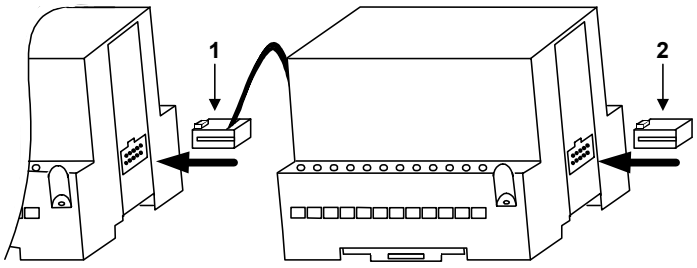
An adapter provides the interface between the OPLC and an expansion module. To connect the I/O module to the adapter or to another module:

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.
- 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.

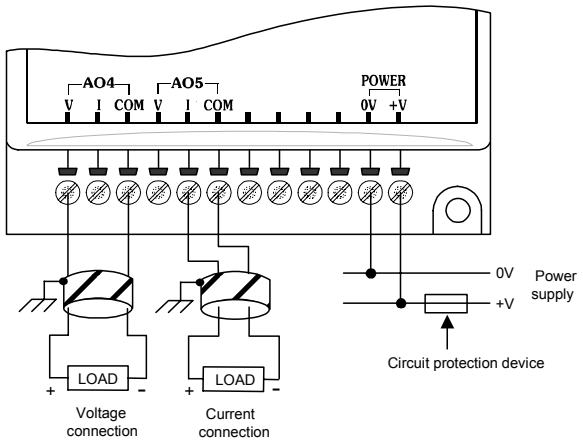
- To avoid damaging the wire, do not exceed a maximum torque of 0.5 N·m (5 kgf·m).
- Do not use tin, solder, or any other substance on stripped wire that might cause the wire strand to break.
- Install at maximum distance from high-voltage cables and power equipment.

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.

Analog Outputs

- Shields should be earthed, connected to the earth of the cabinet.
- Do not connect unused outputs.
- An output can be wired to either current or voltage.
- Do not use current and voltage from the same source channel.
- The outputs' COM signals are internally shorted.



Wiring the Analog Outputs' 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.
- 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.

IO-AO6X Technical Specifications

Max. current consumption	32mA maximum from the adapter's 5VDC
Typical power consumption	29mA @ 5VDC
Status indicator	
(RUN)	Green LED: —Lit when a communication link is established between module and OPLC. —Blinks when the communication link fails.
Isolated power indicator (ISO. PWR)	Green LED: —Lit when the isolated power supply is on.
Isolation	
Channel to bus	Yes
Channel to power supply	Yes
Channel to channel	No
Analog Outputs	
Number of outputs	6 (single-ended)
Output range	0-10V, 0-20mA, 4-20mA. See Note 1.
Resolution (except at 4-20mA)	12-bit (4096 units)
Resolution at 4-20mA	819 to 4095 (3277 units)
Load impedance	1kΩ minimum—voltage 500Ω maximum—current. See Note 2.
Conversion time	2 mSec, synchronized to expansion communication.
Linearity error	±0.1%
Operational error limits	±0.2%
Analog Power Supply	24VDC
Permissible range	20.4 to 28.8VDC
Max. current consumption	170mA@24VDC
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 (WxHxD)	80mm x 93mm x 60mm (3.15 x 3.66 x 2.362")
Weight	159g (5.6oz.)
Mounting	Either onto a 35mm DIN-rail or screw- mounted.

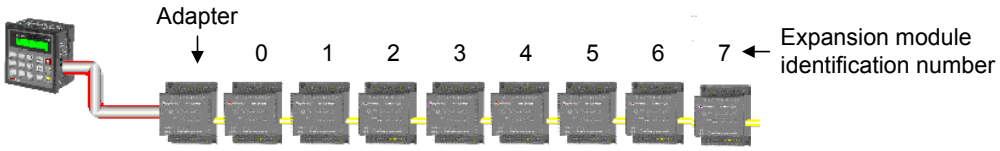
Notes:

1. Note that the range of each I/O is defined both by wiring and within the controller's software.
2. When an analog output is set to use current, the output must be connected **before** the power is turned on.

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 M90 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:

$$32 + x \bullet 16 + y$$

Examples

- Input #3, located on expansion module #2 in the system, will be addressed as I 67, 67 = 32 + 2 • 16 + 3
- Output #4, located on expansion module #3 in the system, will be addressed as O 84, 84 = 32 + 3 • 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 M90 OPLC will be addressed as I 149, 149 = 32 + 7 • 16 + 5

About Unitronics

Unitronics Industrial Automation Systems 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.

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