IO-DI8-TO8, IO-DI8-TO8-L   I/O Expansion Modules 8 Inputs, 8 Outputs

The IO-DI8-TO8 and IO-DI8-TO8-L are I/O expansion modules that can be used in conjunction with specific Unitronics OPLC controllers.

The modules are identical except for their voltage specifications: IO-DI8-TO8 runs at 24 VDC; IO- DI8-TO8-L at 12 VDC.

Both modules offer 8 digital inputs, type pnp/npn (source/sink), and 8 pnp (source) transistor outputs.

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

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

Component identification

1	Module-to-module connector
2	Status indicators
3	Connection points for power supply to outputs
4	Output connection points
5	Module-to-module connector port
6	Input connection points
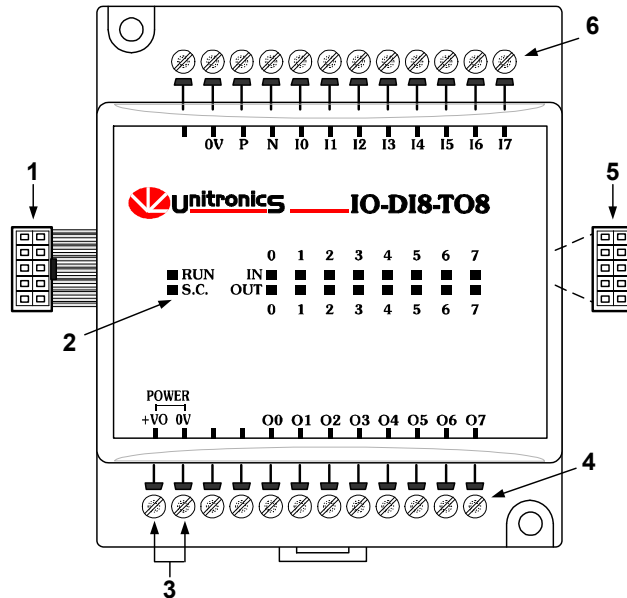
- Before using this product, it is the responsibility of the user to read and understand this document and any accompanying documentation.

- 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.
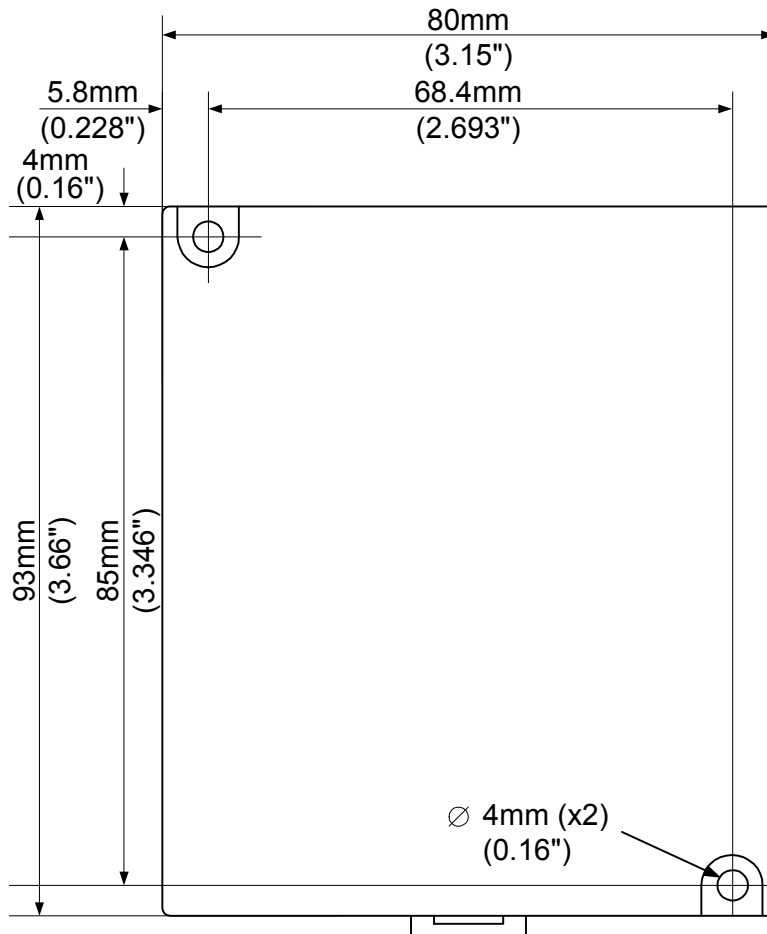
Mounting the Module

DIN-rail mounting
Snap the device onto the DIN rail as shown below; the module will be squarely situated on the DIN rail.
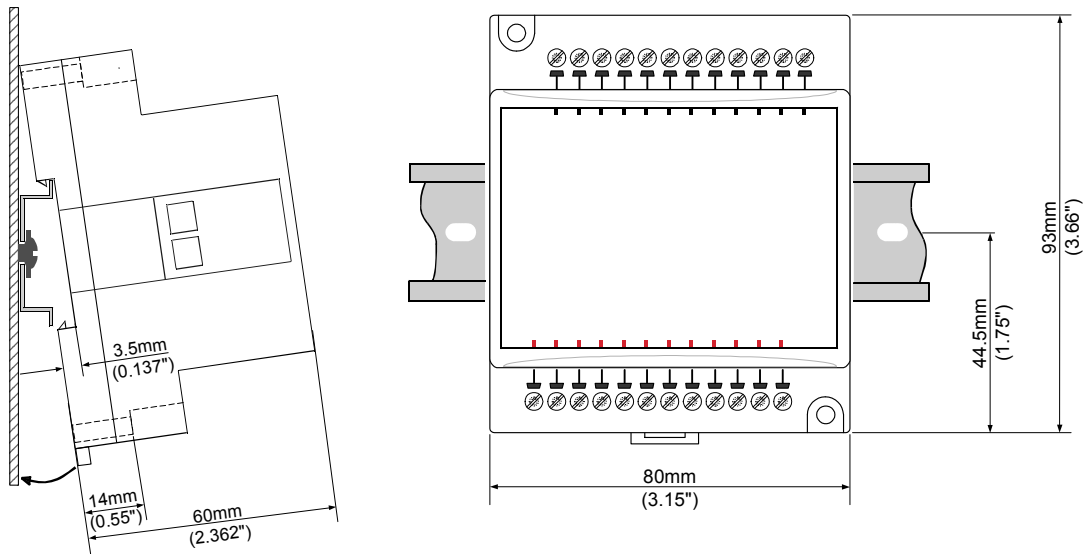
Screw-Mounting
The figure on the next page is drawn to scale. It may be used as a guide for screw-mounting the module.
Mounting screw type: either M3 or NC6-32.

80mm
(3.15")

68.4mm
(2.693")

5.8mm
(0.228")

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
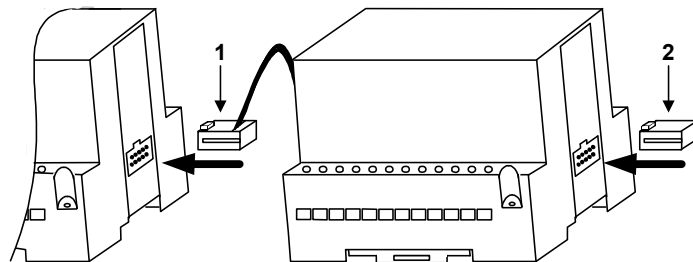
Wiring

⚡   ■   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.
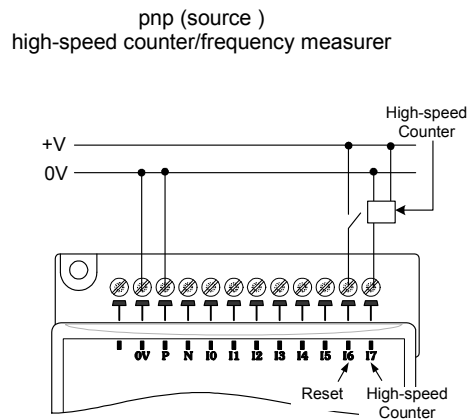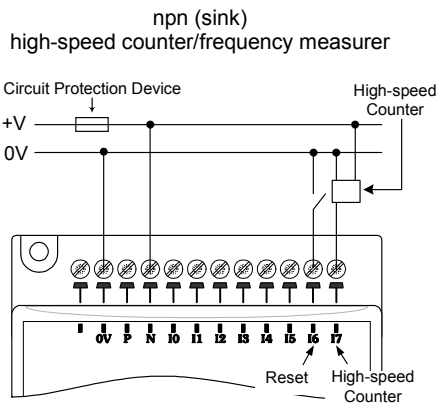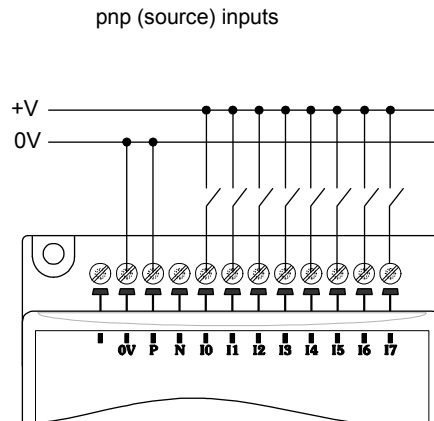
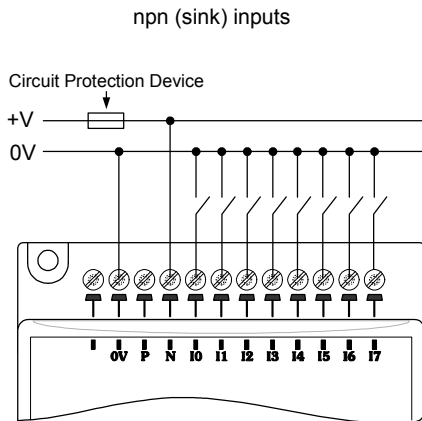4.   Tighten enough to keep the wire from pulling free.

■   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/output lines used over an extended distance. Use wire that is properly sized for the load.

■   The adapter and I/O signals must be connected to the same 0V signal.

Digital I/Os

■   Inputs may be wired as either pnp (source) or npn (sink) inputs.

npn (sink) inputs

pnp (source) inputs

npn (sink)
high-speed counter/frequency measurer

pnp (source)
high-speed counter/frequency measurer

Wiring the Output's Power Supply

Wiring DC supply
1.   Connect the "positive" cable to the "+V0"
     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.

Outputs
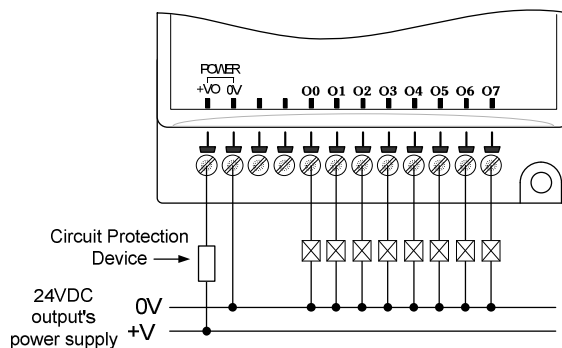
IO-DI8-TO8, IO-DI8-TO8-L Technical Specifications

Max. current consumption	70mA maximum from the adapter's 5VDC
Typical power consumption	0.15W @ 5VDC
Status indicator	
(RUN)	Green LED: —Lit when a communication link is established between module and OPLC. —Blinks when the communication link fails.

Inputs

Number of inputs	8 (in one group)
Input type	pnp (source) or npn (sink)
Galvanic isolation	None
Status indicators	
(IN)	Green LEDs—Lit when the corresponding input is active. See Note 1.
Nominal input voltage	24VDC for IO-DI8-TO8, 12VDC for IO-DI8-TO8-L

Input voltage	IO-DI8-TO8	IO-DI8-TO8-L
pnp (source)	0-5VDC for Logic '0' 17-28.8VDC for Logic '1'	0-3VDC for Logic '0' 8-15.6V for Logic '1'
npn (sink), voltage/current	17-28.8VDC/<1.1 mA for Logic '0' 0-5VDC/>4.3mA for Logic '1'	8-15.6VDC/<1.1 mA for Logic '0' 0-3VDC/>4.3mA for Logic '1'
Input current	6mA@24VDC	6mA@12VDC

Response time	10mSec typical
Input #7	The specifications below apply when this input is wired for use as a high-speed counter input/frequency measurer. See Notes 2 and 3.
Resolution	16-bit
Frequency	5kHz maximum
Minimum pulse width	80µs

Outputs

Number of outputs	8 pnp (source)
Output type	P-MOSFET (open drain) for both 24VDC and 12VDC outputs
Galvanic isolation	None
Output current	0.5A maximum (per output) Total current: 3A maximum (all outputs)
Maximum frequency	20Hz (resistive load) 0.5 Hz (inductive load)
Short circuit protection	Yes
Status Indicators	
(OUT)	Red LEDs—Lit when the corresponding output is active.
(S.C)	Red LED—Lit when an output's load short-circuits. See Note 4 below.
Voltage	
Operating voltage	10.2 to 28.8VDC
Nominal operating voltage	12/24VDC

Environmental

|	
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	141g (4.9oz.)
Mounting	Either onto a 35mm DIN-rail or screw- mounted.

Notes:
1. The inputs' LEDs light up only when communication link is established between module and OPLC.
2. Input #7 can function either as a high-speed counter, a frequency measurer, or as a normal digital input. When Input #7 is used as a normal digital input, normal input specifications apply.
3. Input #6 can function either as the counter's reset, or as a normal digital input; in either case, its specifications are those of a normal digital input.
4. When an output is connected to a load that short-circuits, that output turns off and the S.C. LED lights up on the module. The short circuit is also identified by the software program within the controller connected to the module. Within the M90 OPLC, for example, SB 5 turns ON. SI 5 contains a bitmap indicating the module containing the affected output. For more information, refer to the on-line help supplied with the controller.

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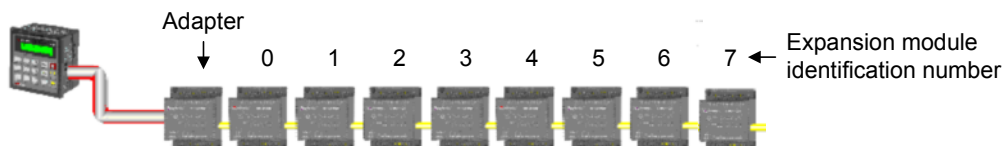
The formula below is used to assign addresses for I/O modules used in conjunction with the OPLC.

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, $149 = 32 + 7 \cdot 16 + 5$

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, Unitronics headquarters via email: export@unitronics.com, or visit the Unitronics website at http://www.unitronics.com/.