IO-DI16, IO-DI16-L I/O Expansion Modules 16 Digital Inputs

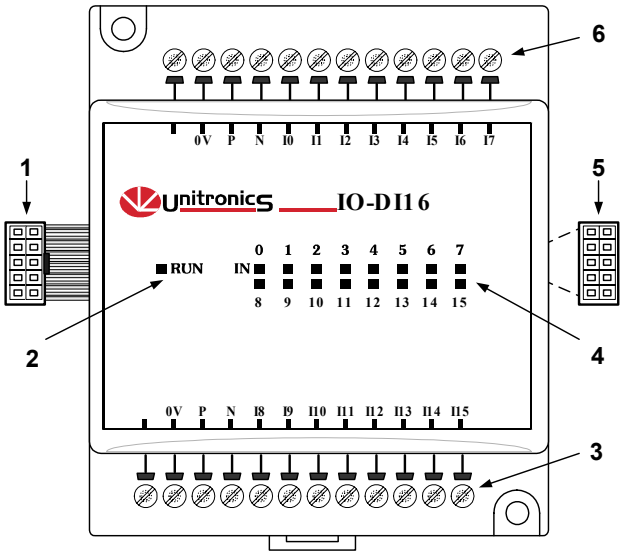
The IO-DI16 and IO-DI16-L are I/O expansion modules that can be used in conjunction with specific Unitronics OPLC controllers.

The modules are identical except for their input specifications: IO-DI16 uses 24 VDC; IO-DI16-L uses 12 VDC.

Each module offers 16 digital inputs in 2 groups, type pnp/npn (source/sink).

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	Communication status indicator
3	Input connection points: I8-I15
4	Input status indicators
5	Module-to-module connector port
6	Input connection points: I0-I7

- 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

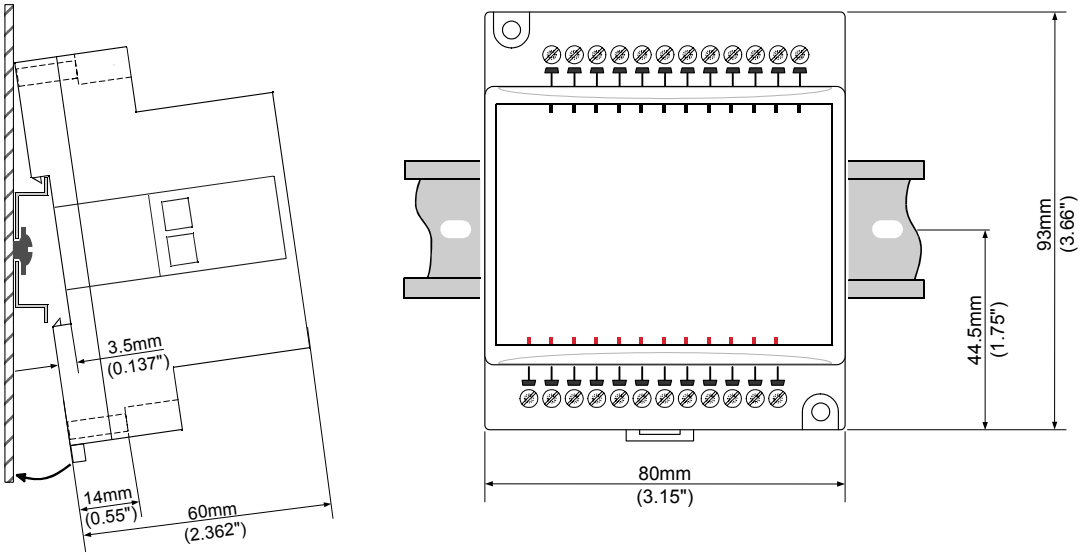
- Do not install in areas with: excessive or conductive dust, corrosive or flammable gas, moisture or rain, excessive heat, regular impact shocks or excessive vibration.

- 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

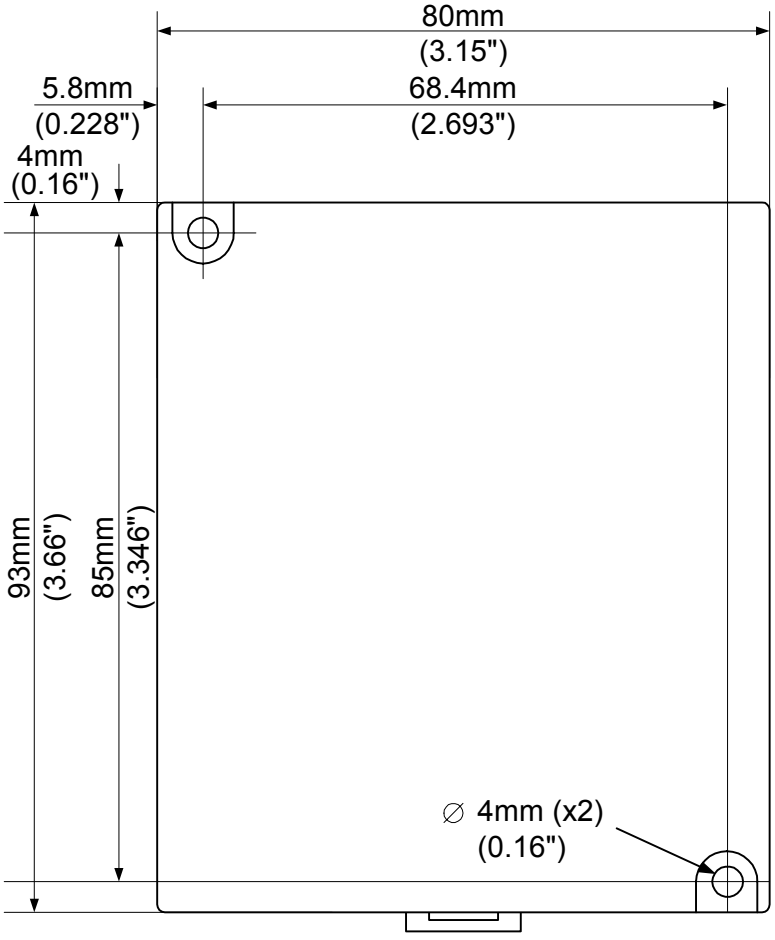
DIN-rail mounting

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

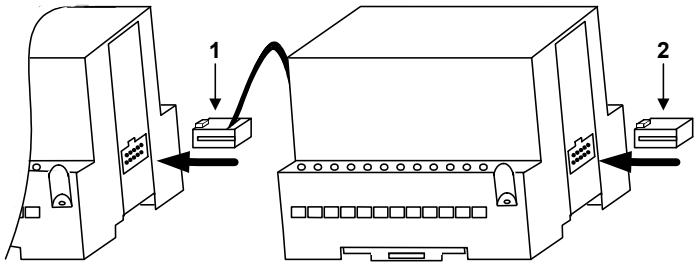
An adapter provides the interface between the OPLC and an expansion module. To connect the I/O module to the adapter or to another module:

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.

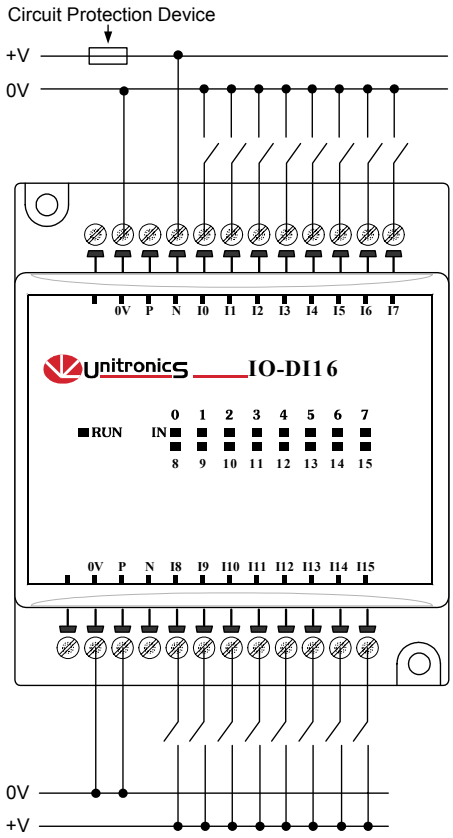
I/O Wiring—General

- 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.
- The adapter and input signals must be connected to the same 0V signal.

Digital Inputs

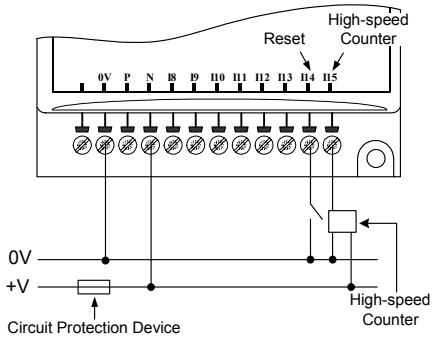
- Each group of inputs may be wired as either pnp (source) or npn (sink) inputs.

npn (sink) input wiring
(shown in top group of inputs)

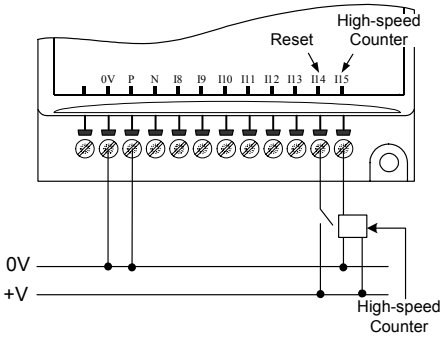


high-speed counter/frequency measurer

npn (sink)



pnp (source)



pnp (source) input wiring
(shown in bottom group of inputs)

IO-DI16, IO-DI16-L Technical Specifications

Max. current consumption	75mA maximum from the adapter's 5VDC	
Typical power consumption	0.2W @ 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	16 (in two groups)	
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-DI16, 12VDC for IO-DI16-L	
Input voltage	IO-DI16	IO-DI16-L
pnp (source)	0-5VDC for Logic '0' 17-28.8VDC for Logic '1'	0-3VDC for Logic '0' 8-15.6VDC 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 #15	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	
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.	

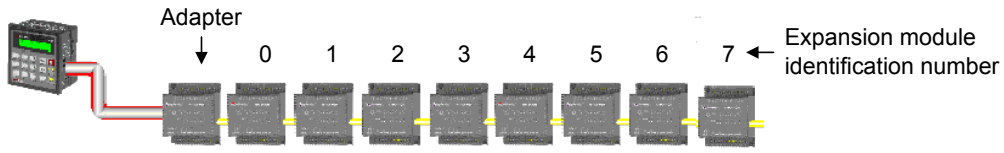
Notes:

1. The inputs' LEDs light up only when communication link is established between module and OPLC.
2. Input #15 can function either as a high-speed counter, a frequency measurer, or as a normal digital input. When Input #15 is used as a normal digital input, normal input specifications apply.
3. Input #14 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.

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:

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

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 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.

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/.



Under no circumstances will Unitronics be liable or responsible for any consequential damage that may arise as a result of installation or use of this equipment, and is not responsible for problems resulting from improper or irresponsible use of this device.

No part of this document may be used for any purpose other than for the purposes specifically indicated herein nor may it be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and/or recording, for any purpose without written permission from Unitronics.

The information appearing in this document is for general purposes only. Unitronics makes no warranty of any kind with regard to the information appearing in this document, including, but not limited to, 0implied warranties of merchantability and/or fitness for a particular use or purpose. Unitronics assumes no responsibility for the results, direct and/or indirect, of any misuse of the information appearing in this document nor for any use of the Unitronics products referred to herein in any manner deviating from the recommendations made in this document. Unitronics assumes no responsibility for the use of any parts, components, or other ancillary appliances including circuitry other than as recommended hereunder or other than that embodied in the Unitronics product.

Unitronics retains all rights to its proprietary assets including, but not limited to its software products which are copyrighted and shall remain the property of Unitronics. Copyright protection claimed includes all Forms and matters of copyrightable materials and information legally allowed including but not limited to material generated from the software programs which are displayed on the screen of the Unitronics products such as styles, templates, icons, screen displays, looks, etc. Duplication and/or any unauthorized use thereof are strictly prohibited without prior written permission from Unitronics.

All brand or product names are used for identification purpose only and may be trademarks or registered trademarks of their respective holders.

Unitronics reserves the right to revise this publication from time to time and to amend its contents and related hardware and software at any time. Technical updates (if any) may be included in subsequent editions (if any).

Unitronics product sold hereunder can be used with certain products of other manufacturers at the user's sole responsibility.

KLINKMANN

Helsinki
tel. +358 9 540 4940
automation@klinkmann.fi

St. Petersburg
tel. +7 812 327 3752
klinkmann@klinkmann.spb.ru

Moscow
tel. +7 495 641 1616
moscow@klinkmann.spb.ru

Yekaterinburg
tel. +7 343 287 19 19
yekaterinburg@klinkmann.spb.ru

Samara
tel. +7 846 273 95 85
samara@klinkmann.spb.ru

Kiev
tel. +38 044 495 33 40
klinkmann@klinkmann.kiev.ua

Riga
tel. +371 6738 1617
klinkmann@klinkmann.lv

Vilnius
tel. +370 5 215 1646
post@klinkmann.lt

Tallinn
tel. +372 668 4500
klinkmann.est@klinkmann.ee

Minsk
tel. +375 17 200 0876
minsk@klinkmann.com