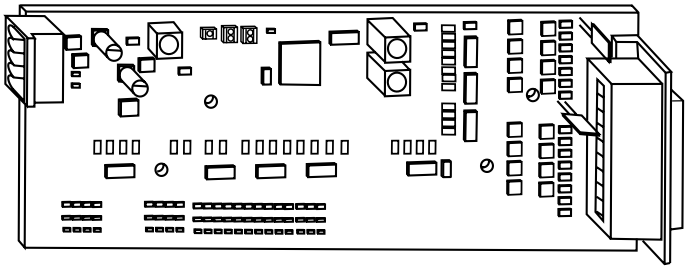
Installation Instructions

16 Input/16 Output Discrete Embedded I/O Boards

(Cat. No. 1799-D16U16V, -D16U16VL, -D16U16B & -D16U16BL)



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The 1799 I/O board (Cat. No. 1799-D16U16V, -D16U16VL, -D16U16B & -D16U16BL) is a 32-point I/O board which communicates via a DeviceNet™ network.

This board has 16 inputs and 16 outputs. Inputs are 24V dc sourcing (PNP) or sinking (NPN). Outputs are self-protected 24V dc sourcing (1799-D16U16B, -D16U16BL) or sinking (1799-D16U16V, -D16U16VL).

Publication 1799-IN004B-EN-P - December 2000

European Communities (EC) Directive Compliance

If this product has the CE mark it is approved for installation within the European Union and EEA regions. It has been designed and tested to meet the following directives.

EMC Directive

This product is tested to meet the Council Directive 89/336/EC Electromagnetic Compatibility (EMC) by applying the following standards, in whole or in part, documented in a technical construction file:

- EN 50081-2 EMC — Generic Emission Standard, Part 2 — Industrial Environment
- EN 50082-2 EMC — Generic Immunity Standard, Part 2 — Industrial Environment

This product is intended for use in an industrial environment.

Low Voltage Directive

This product is tested to meet Council Directive 73/23/EEC Low Voltage, by applying the safety requirements of EN 61131-2 Programmable Controllers, Part 2 - Equipment Requirements and Tests. For specific information required by EN 61131-2, see the appropriate sections in this publication, as well as the Allen-Bradley publication Industrial Automation Wiring and Grounding Guidelines For Noise Immunity, publication 1770-4.1.

This equipment is classified as open equipment and must be mounted in an enclosure during operation to provide safety protection.

ATTENTION

Before handling this board, be certain you are grounded to prevent any electrostatic discharge.

Package Contents

Your package contains:

- one 1799 I/O Board
- installation instructions

Optional Hardware

All mating connectors and mounting hardware must be ordered separately. The table below identifies the different connector and hardware options.

Option	Catalog Number	Third Party Supplier & Part Number
2 DIN rail brackets (4 screws)	1799-BRKD	N/A
clear plastic cover (4 stand-offs, 4 screws)	1799-COV32	N/A
mounting plate (4 screws)	1799-MP32	N/A
5-position, open-style plug for DeviceNet (2 locking screws)	1799-DNETSCON	DeviceNet Buyer's Guide at http://www.odva.org
50-pin, D-sub I/O mating connector - solder cup	1799-DSSCON	Amphenol Corp. - 777DF-D50P ITT Cannon - DDM50PK127
50-pin, D-sub I/O mating connector - header and crimp pins	1799-DSCCON	Tyco Electronics - 205212-1 (header) Tyco Electronics - 66506-4 (pins) EBY Co. - DR50-P02-0S (header only)

Install Your Board

To install the board you must:

- Set the node address
- Mount the board (brackets, mounting plate, plastic cover)
- Connect the board (DeviceNet, I/O)
- Communicate with your board
- Configure the parameters

More detailed information about each of these steps is in the following procedures.

Set the Node Address

Valid node addresses are **00** to **63**.

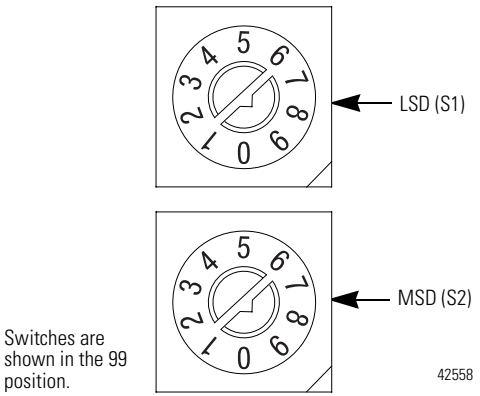
Set the node address using the rotary switches or a DeviceNet software configuration tool like **RS**NetWorx for DeviceNet™. Setting the switches between **64** and **99** lets the software have address control.

Each board is shipped with the node address set to **63** in the board's memory. The rotary switches are set for position **99** at shipment. The switches are located near the center of the board. The two switches are:

- MSD (most significant digit)
- LSD (least significant digit)

To reset the node address, use a small blade screwdriver to rotate the switches. Line up the small arrow on the switch with the number setting you wish to use.

The rotary switches are read at board power up only. Settings between 64 and 99 cause the board to use the last valid node address stored in the board's memory. Example: The last setting was 40. If a change is made to 68, and then you power up, the address will default to 40.

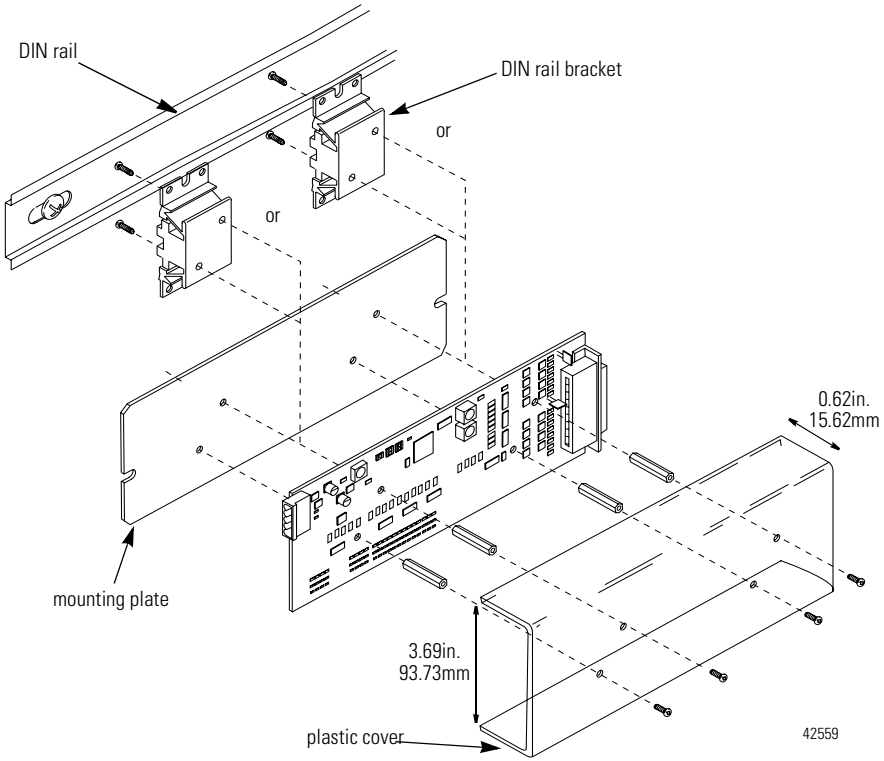


The board is equipped with AutoBaud detect. AutoBaud lets the board detect the baud rate on your DeviceNet network and automatically adjusts to that rate. The board is shipped with AutoBaud enabled.

Mount the Board and Optional Cover

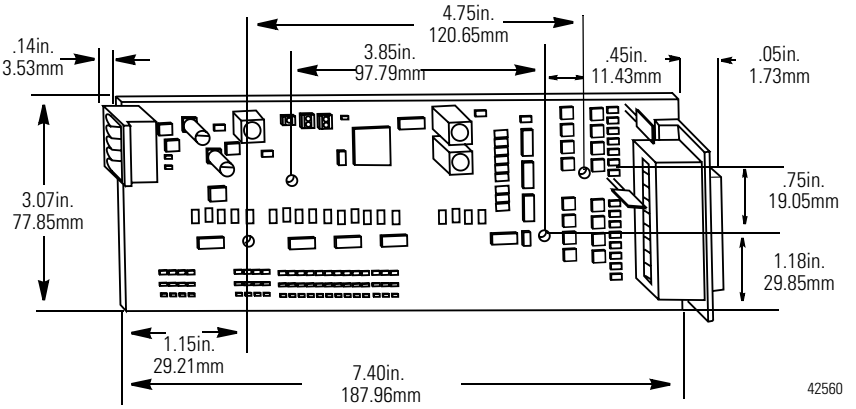
Use the following picture to help you mount the board to a DIN rail using DIN rail brackets (1799-BRKD) or to a mounting plate (1799-MP32). The board can also be mounted in an enclosure with pre-tapped holes, which accommodate M3 x 0.5mm screws. If using the clear plastic cover (1799-COV32), please reference the following instructions:

1. Place the four stand-offs onto the mounting screws and tighten.
2. Align the holes on the cover with the stand-offs.
3. Place the screws through the cover into the stand-offs and tighten.

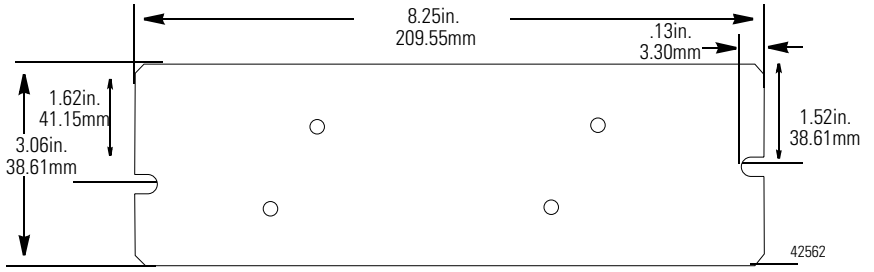


Note: With the addition of the cover, the width of the board increases from 3.07" to 3.69" and the height increases from 0.75" to 1.38".

Board Dimensions

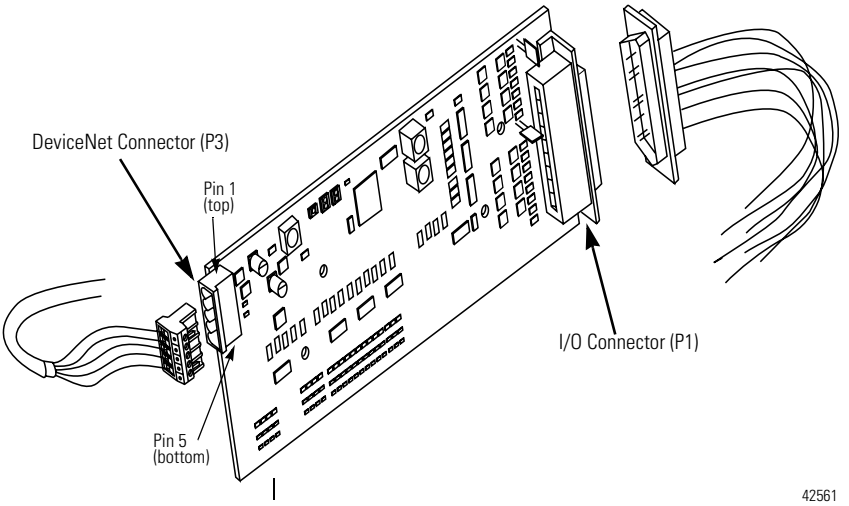


Mounting Plate Dimensions (front view)

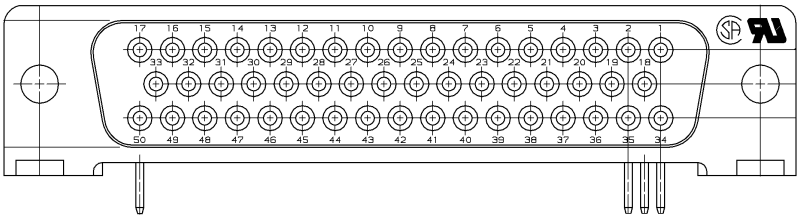


Connect the Board

Use the following pictures and tables to help you connect the DeviceNet and I/O connectors to the board.



The following illustration depicts the pin number assignments of the I/O connector P(1).



The following tables identify the signal for each pin number on the I/O connector and the DeviceNet wire insulation colors.

P1 I/O Connector

Pin	Signal	Pin	Signal	Pin	Signal
1	Output 15	18	Output 13	34	Output 12
2	Output 9	19	Output 8	35	Output 14
3	Output 11	20	Output 10	36	GRP 1 Return
4	+24Vdc-GRP 1	21	Input 1	37	Input 0
5	+24Vdc-GRP 1	22	Common In GRP 0	38	Input 2
6	Input 3	23	Input 6	39	Input 4
7	Input 5	24	Not Used	40	Input 7
8	GRP 0 Return	25	Input 11	41	Input 10
9	Output 4	26	Input 9	42	Input 8
10	+24Vdc-GRP 0	27	Input 14	43	Common In GRP 1
11	Output 5	28	Input 12	44	Input 13
12	Output 7	29	Output 6	45	Input 15
13	Output 0	30	Not Used	46	Not Used
14	Output 1	31	Not Used	47	Not Used
15	+24Vdc-GRP 0	32	Not Used	48	Not Used
16	Output 2	33	Not Used	49	Not Used
17	Output 3			50	Not Used

P3 DeviceNet Connector

Pin	Insulation Colors
1	Black
2	Blue
3	Shield
4	White
5	Red

ATTENTION

- For maximum noise immunity, input cable return wires must be properly terminated.
- When inputs are connected in loopback, return wires should be connected together.
- I/O cable length should be less than 30 meters (98.43 feet).

Auxiliary Power Specifications

The power source used to supply the auxiliary power to the outputs must be one of the following:

- a 10-30V dc Class 2 Power Supply

or

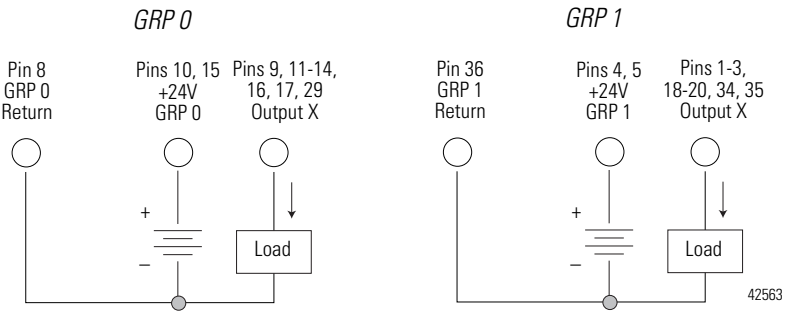
- a 10-30V dc UL Listed or Recognized Power Supply with isolated outputs limited to 200 volt-amperes in each ungrounded output line. This condition requires that the board and power source be mounted in a suitable ultimate enclosure with proper spacings maintained.

Connect the Field Output Device to the I/O Connector (P1)

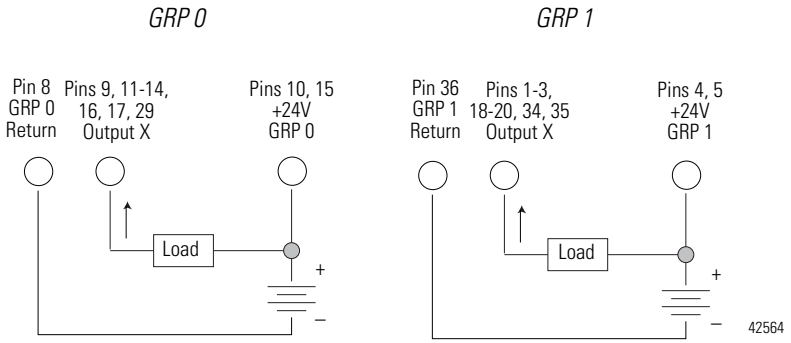
The outputs on these boards are isolated in two groups of eight, with each group requiring 24V dc power and 24V dc ground. Outputs 0 through 7 are powered from +24V GRP 0 and return power via GRP 0 Return. Outputs 8 through 15 are powered from +24V GRP 1 and return power via GRP 1 Return.

The 1799-D16U16B and -D16U16BL boards have outputs which supply current to your field output device (sourcing outputs). The 1799-D16U16V and -D16U16VL boards have outputs which receive current from your field output device (sinking outputs). Use the wiring diagrams below to connect both groups of outputs on these boards.

1799-D16U16B & - D16U16BL Outputs (Sourcing)



1799-D16U16V & D16U16VL Outputs (Sinking)



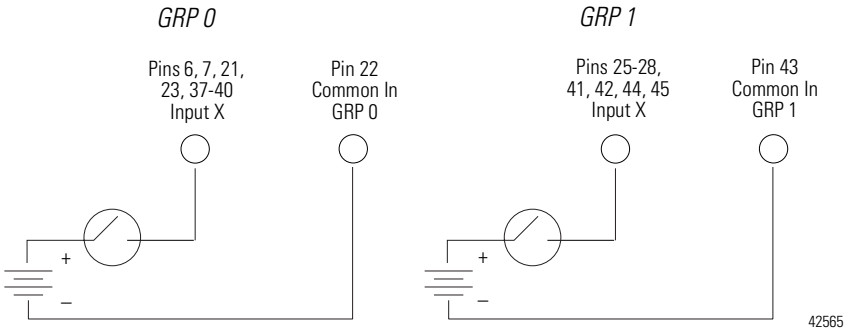
Connect the Field Input Device to the I/O Connector (P1)

The inputs on these boards are isolated in two groups of eight, with each group providing a separate common signal. Inputs 0 through 7 share the Common In GRP 0 signal. Inputs 8 through 15 share the Common In GRP 1 signal.

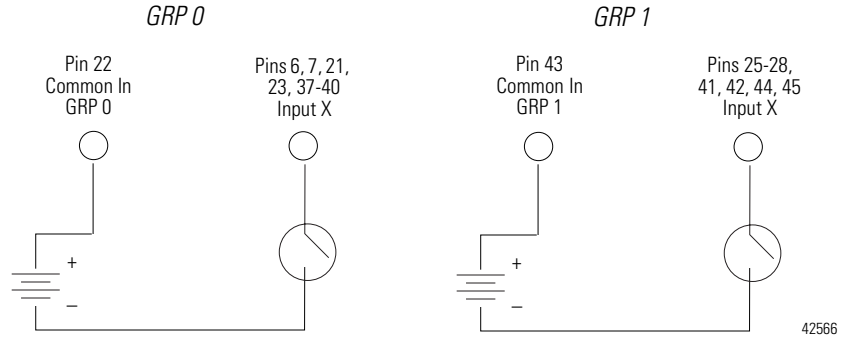
The 1799-D16U16B, -D16U16BL, -D16U16V, and -D16U16VL boards have universal inputs which allow operation with either sourcing or sinking input devices. The universal feature lets you configure the inputs as either sinking or sourcing. Use the following wiring diagrams to connect each group of inputs on the boards.

IMPORTANT All field input devices in each group of eight must be of the same type, either sinking or sourcing. The board will not operate if the types are mixed.

Inputs (Sourcing)



Inputs (Sinking)



Communicate with Your Board

This board's I/O is exchanged with the master on DeviceNet through a cyclic, polled or change-of-state connection.

The board consumes and produces I/O data as follows:

I/O Connection Type	Consumes	Produces
Cyclic	2 Bytes	3 Bytes
Polled	2 Bytes	3 Bytes
Change-of-State	2 Bytes	3 Bytes

Cyclic - the board will produce and consume its I/O cyclically at the rate configured by the master on DeviceNet.

Polled - the master initiates communication by sending its polled I/O message to the board. The board consumes the message, updates any outputs and produces a response containing the input data.

Change-of-State - a production occurs when an input changes. A heartbeat production occurs if no input condition change occurs within the expected packet rate. This heartbeat production tells the master that the board is alive and ready to communicate. Consumption occurs when data changes and the master produces new output data to the board.

Refer to the table below for the word/bit definitions:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Produced 0	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0
Produced 1	Input 15	Input 14	Input 13	Input 12	Input 11	Input 10	Input 9	Input 8
Produced 2	Reserved						OFLT 1	OFLT 0
Consumed 0	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Output 0
Consumed 1	Output 15	Output 14	Output 13	Output 12	Output 11	Output 10	Output 9	Output 8

Where: OFLT 0 = Output Fault on one or more outputs in GRP 0
OFLT 1 = Output Fault on one or more outputs in GRP 1

Configure the Parameters

The 1799 I/O boards have eight parameters that are configurable through a DeviceNet software configuration tool like **RS**NetWorx for DeviceNet. The DeviceNet configuration tools require an Electronic Data Sheet (EDS) for the 1799 I/O boards in order to configure the module's parameters. The EDS file can be found at the ODVA Web site (http://www.odva.org).

Use the descriptions in the table below to help you configure the parameters.

Parameter	Description
Baud Rate	Controls the board's data rate.
Auto-Baud	Enables the board to match the network's data rate. When enabled, Baud Rate parameter is ignored.
Input Off-to-On Filter Time	Controls the amount of time the input must be in the 'on' state before the board reports the input as 'on.'
Input On-to-Off Filter Time	Controls the amount of time the input must be in the 'off' state before the board reports the input as 'off.'
Output Idle State	Controls the state of each output when the DeviceNet master is in an idle state.

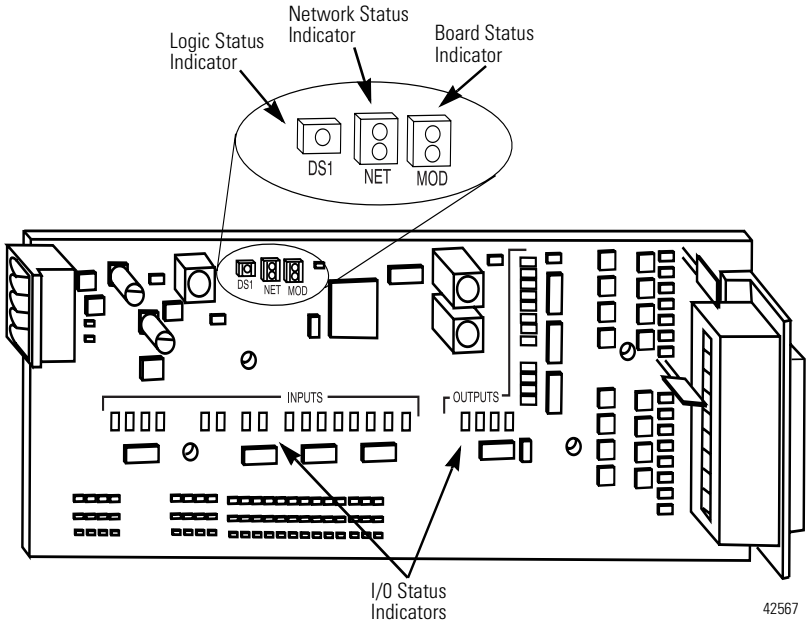
Parameter	Description
Output Fault State	Controls the state of each output when the board loses communication with the DeviceNet master.
Output Idle Value	Controls the value that outputs take on when the output idle state is set to 'use idle value.'
Output Fault Value	Controls the value that outputs take on when the output fault state is set to 'use fault value.'

The DeviceLogix™ capable boards, 1799-D16U16BL and -D16U16VL, have additional parameters which are described in the DeviceLogix configuration tool documentation.

Troubleshoot with the Indicators

This board has the following indicators, shown in the picture below:

- Board status indicator
- Network status indicator
- Logic status
- I/O status indicators



Board Status Indicator (labeled MOD)

Indication	Status
None	No Power
Green Blinking Solid	 Needs commissioning Device operational
Red Blinking Solid	 Minor fault Critical fault

Network Status Indicator (labeled NET)

Indication	Status
None	Not On-line
Green Blinking Solid	 On-line/No connections On-line/Connected
Red Blinking Solid	 Connection timed out Failed communication: A duplicate node address exists or module is at the wrong baud rate.

DeviceLogix Status Indicator (labeled DS1)

Indication	Status
None	Logic disabled
Green Solid Blinking	 Logic enabled Local forces applied and local logic enabled

I/O Status Indicators (labeled Inputs and Outputs)

Indication	Status
None	Input or output point off
Yellow	Input or output point on

Technical Support

For additional troubleshooting information on the 1799 Embedded I/O Boards, access Rockwell Automation's technical support services at 440.646.5800 or on the Web at http://www.ab.com.

Specifications

16 Input/16 Output Board - Cat. No. 1799-D16U16B, -D16U16BL, -D16U16V & -D16U16VL		
Input Specification	**Max.**	**Min.**
Inputs per block	16 Sinking or Sourcing, Type 1 + compatible	
Off-State Voltage Current	 5V dc 1.5mA	 - -
On-State Voltage Current	 30V dc 6mA	 10V dc 2mA
Output Specification		
Outputs per block	16 Sinking or Sourcing, 0.5A, Short Circuit Protected, Pilot Duty	
Output Auxiliary Voltage	30V	10V
On-State Voltage Drop	250mV	-
On-State Current	0.5A	-
Off-State Leakage	65μA	-
Board Current (all outputs on)	8.0A	-
Surge Current - for 10ms, repeatable every 2s (individual outputs)	1.0A	
General Specifications		
DeviceNet Power Voltage Current	 25V dc 125mA	 11V dc -
DeviceNet Power Circuit Type	 Class 2	
Auxiliary Power Voltage Current	 30V dc 8A (all outputs on)	 10V dc 30mA (all outputs off)
LED Indicators	Board Status - red/green Network Status - red/green DeviceLogix Status - green Input Point LED - yellow Output Point LED -yellow	
Wire Gauge I/O	 20 AWG	 24 AWG
Dimensions inches (millimeters)	0.75H x3.07W x 7.45D (19.05H x77.85W x 189.33D)	

General Specifications cont.	
Environmental Conditions	
Operational Temperature	-10 to 70° C (14 to 131° F)
Storage Temperature	-40 to 85° C (-40 to 185° F)
Relative Humidity	5 to 95% non-condensing
Shock Operating	30g
Non-Operating	50g
Vibration	5g @ 10-50 H_z
Agency Certifications (When product or packaging is marked)	c UL us CE marked for all applicable directives C-Tick marked for all applicable acts DeviceNet conformance tested

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