



12 Input/12 Output Discrete Embedded TTL I/O Module with Pulse Width Modulation and DeviceLogix

Cat. No. 1799-D12G12GL

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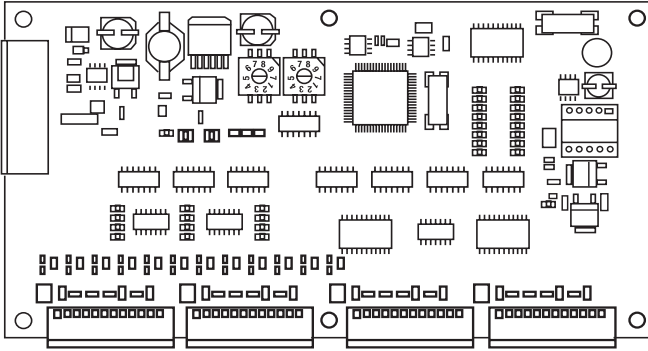
About the Module

The 12 Input/12 Output Discrete Embedded TTL I/O Module is a 24-point board with four pulse width modulation (PWM) outputs. Inputs and outputs are transistor-transistor logic (TTL) compatible. TTL indicates logic voltage levels from 0 to 5V dc (low voltage < 1V dc; high voltage > 2V dc).

The module uses DeviceLogix technology. DeviceLogix is a local logic capability that lets you control outputs and manage status information within the device.

The module communicates via a DeviceNet network.

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



31568-M

Your package contains:

- one I/O module
- these installation instructions
- one DeviceNet 5-position, open-style plug with 2 locking screws (catalog number 1799-DNETSCON)

Optional Hardware

Order all mating connectors and mounting hardware separately.

Option	Quantity	Catalog Number	Supplier
12-position I/O connector (2 pieces)	1	1799-12SPCON	Rockwell Automation
Hex stand-off, M3, 1 cm (1/4 in.) Minimum length 1 cm (1/4 in.)	6	N/A	Local purchase
Screw, Pan Head, #6	6	N/A	Local purchase

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. *Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls* (Publication SGI-1.1 available from your local Rockwell Automation sales office or online at <http://literature.rockwellautomation.com>) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.





In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

<p>WARNING</p> 	<p>Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.</p>
<p>IMPORTANT</p>	<p>Identifies information that is critical for successful application and understanding of the product.</p>
<p>ATTENTION</p> 	<p>Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.</p>
<p>SHOCK HAZARD</p> 	<p>Labels may be located on or inside the equipment (e.g., drive or motor) to alert people that dangerous voltage may be present.</p>
<p>BURN HAZARD</p> 	<p>Labels may be located on or inside the equipment (e.g., drive or motor) to alert people that surfaces may be dangerous temperatures.</p>

ATTENTION

Environment and Enclosure



This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC publication 60664-1), at altitudes up to 2000 meters without derating.

This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbance.

This equipment is supplied as open type equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings that are required to comply with certain product safety certifications.

NOTE: See NEMA Standards publication 250 and IEC publication 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure. Also, see the appropriate sections in this publication, as well as the Allen-Bradley publication 1770-4.1, Industrial Automation Wiring and Grounding Guidelines, for additional installation requirements pertaining to this equipment.

Install the Module

To install the module, you must do the following:

- Set the node address.
- Mount the module.
- Connect the module to the DeviceNet network and to your I/O.
- Communicate with the module.
- Configure module parameters.
- Configure DeviceLogix parameters.

ATTENTION**Prevent Electrostatic Discharge**

This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
- Wear an approved grounding wriststrap.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- If available, use a static-safe workstation.
- When not in use, store the equipment in appropriate static-safe packaging.

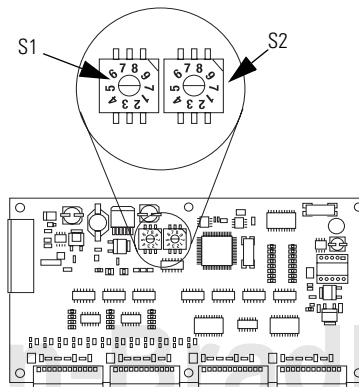
Set the Node Address

Set the node address using the rotary switches or a DeviceNet software configuration tool such as RSNetWorx for DeviceNet.

The two switches are S1 and S2:

Switch Label	Function
S1	MSD - Most Significant Digit
S2	LSD - Least Significant Digit

Use the following illustration to help you locate the switches.



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

TIP

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.

To set the node address, do the following:

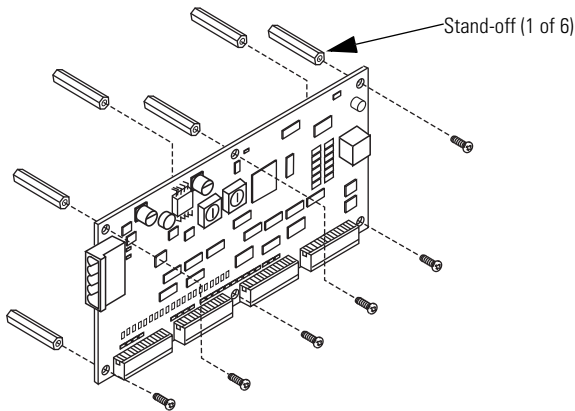
1. Use a small blade screwdriver to rotate the switches.
2. Line up the small arrow on the switch with the number setting you wish to use.

Mount the Module

Use the following illustration to help you mount the module.

You can mount the board in an enclosure with pre-tapped holes.

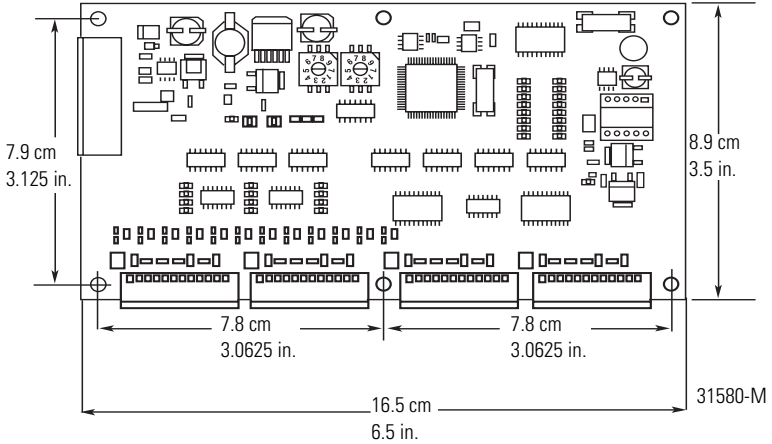
Use the table on page 2 as a guide when purchasing mounting hardware.



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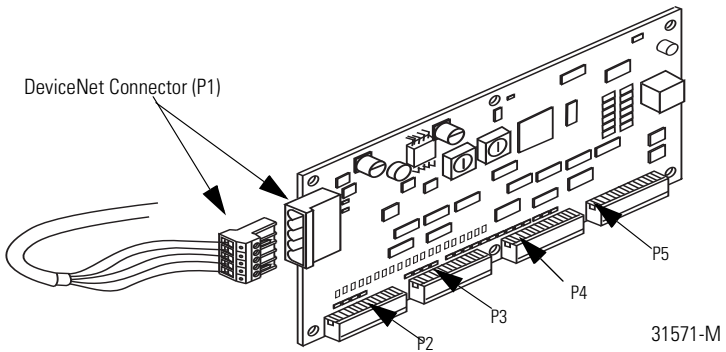
1. Place the six stand-offs behind the module.
2. Align the holes on the module with the stand-offs.
3. Place the screws through the module into the stand-offs and tighten.

Module Dimensions



Connect the Module

Use the following illustrations and tables to help you connect the DeviceNet and I/O connectors to the module.



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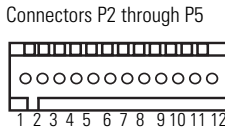
I/O cabling must be less than 6 m (19.7 ft).

TIP

If necessary to guard against excessive vibration, tighten the two screws on the DeviceNet connector (P1) to a maximum torque of 0.79 N-m (7 in-lbs).

I/O Connector Pin Assignments

The following illustration depicts the pin number assignments of the I/O connectors (P2 through P5).



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I/O Connector Signals

The following table identifies the signal for each pin number on the I/O connectors (P1 through P5).

Pin	Description	Function	Comments
1	Common Field Power	0V dc return	Field power minus
2	First Input	Input	
3	First Output	Output	
4	5V dc Field Power	+5V dc field	68 mA per connector
5	Second Output	Output	
6	PWM Signal	Output	Requires Enable Set
7	Second Input	Input	
8	Third Output	Output	
9	Third Input	Input	
10	Not Used	Not Used	Not Used
11	Not Used	Not Used	Not Used
12	Not Used	Not Used	Not Used

I/O Connector Inputs and Outputs

The following table identifies the inputs and outputs for connectors P2 through P5.

Pin	Connector			
	P5	P4	P3	P2
1	Common	Common	Common	Common
2	Input 0	Input 3	Input 6	Input 9
3	Output 0	Output 4	Output 8	Output 12
4	+5V dc	+5V dc	+5V dc	+5V dc
5	Output 1	Output 5	Output 9	Output 13
6	PWM 1	PWM 2	PWM 3	PWM 4
7	Input 1	Input 4	Input 7	Input 10
8	Output 2	Output 6	Output 10	Output 14
9	Input 2	Input 5	Input 8	Input 11

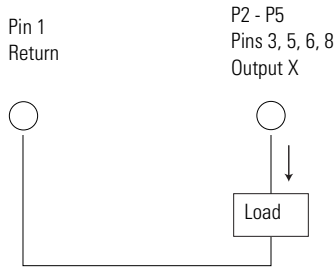
DeviceNet Connector Pin Assignment

The following table identifies the signal for each pin number on the DeviceNet connector.

Pin	Description	Function	Color
1	V-	-24V dc	Black
2	CAN_L	DeviceNet-specific	Blue
3	Shield	Not Used	Not Used
4	CAN_H	DeviceNet-specific	White
5	V+	+24V dc	Red

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

Use the following wiring diagram to connect the module outputs. The module outputs provide 5V TTL level signals.

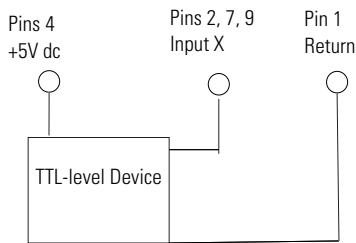


Connect the Field Input Device to the I/O Connector (P1)

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.

Use the following wiring diagram to connect the module inputs.



Communicate with the Module

The module exchanges I/O data with the master on DeviceNet through cyclic, polled, or change-of-state messaging.

Messaging Type	Description
Cyclic	The module produces and consumes I/O data cyclically at the rate configured by the master on the DeviceNet network.
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	I/O data is produced 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.

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

I/O Connection Type	Consumes	Produces
Cyclic	3 Bytes	6 Bytes
Polled	3 Bytes	6 Bytes
Change-of-State	3 Bytes	6 Bytes

Refer to the following table for the word/bit definitions for the 1799-12G12GL boards

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Produced 0	I7	I6	I5	I4	I3	I2	I1	I0
Produced 1	Reserved	Logic Enabled	Reserved	Reserved	I11	I10	I9	I8
Produced 2	O7 PWM Enabled 1	O6	O5	O4	O3 PWM Enabled 0	O2	O1	O0
Produced 3	O15 PWM Enabled 3	O14	O13	O12	O11 PWM Enabled 2	O10	O9	O8
Produced 4	NetOut 7	NetOut 6	NetOut 5	NetOut 4	NetOut 3	NetOut 2	NetOut 1	NetOut 0
Produced 5	NetOut 15	NetOut 14	NetOut 13	NetOut 12	NetOut 11	NetOut 10	NetOut 9	NetOut 8
Consumed 0	O7	O6	O5	O4	O3	O2	O1	O0
Consumed 1	O15	O14	O13	O12	O11	O10	O9	O8
Consumed 2	PWM 7	PWM 6	PWM 5	PWM 5	PWM 4	PWM 3	PWM 2	PWM 1

Where: I = Input; O = Output; PWM = Pulse Width Modulation

PWM 0 through 7 = Pulse Width Modulation percent value

Configure Module Parameters

The module has 11 parameters that are configurable through a DeviceNet software configuration tool such as RSNetWorx for DeviceNet. The DeviceNet configuration tool requires an electronic data sheet (EDS) to configure the module's parameters.

You can find the EDS file on the ODVA Web site (www.odva.org).

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

Parameter	Description
AutoBaud	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.
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 will have when the output idle state is set to use idle value.

Parameter	Description
Output Fault Value	Controls the value that outputs will have when the output fault state is set to 'use fault value.'
Consumed I/O Assembly	Lets you select size of consumed data.
Network Status Override	Lets local logic override output behavior when the module is not online.
Comm Status Override	Allows local logic to override output behavior when communications is faulted or idled.
Quick Start	Disables Autobaud, decreasing startup time.

Configure DeviceLogix Parameters

Use the Function Block Editor supplied with RSNetWorx for DeviceNet software to configure DeviceLogix parameters.

TIP

For more information on using the Function Block Editor, refer to the DeviceLogix User Manual, publication ACIG-UM001, as well as the online help supplied with RSNetWorx for DeviceNet software.

Configure the DeviceLogix parameters listed in the following table:

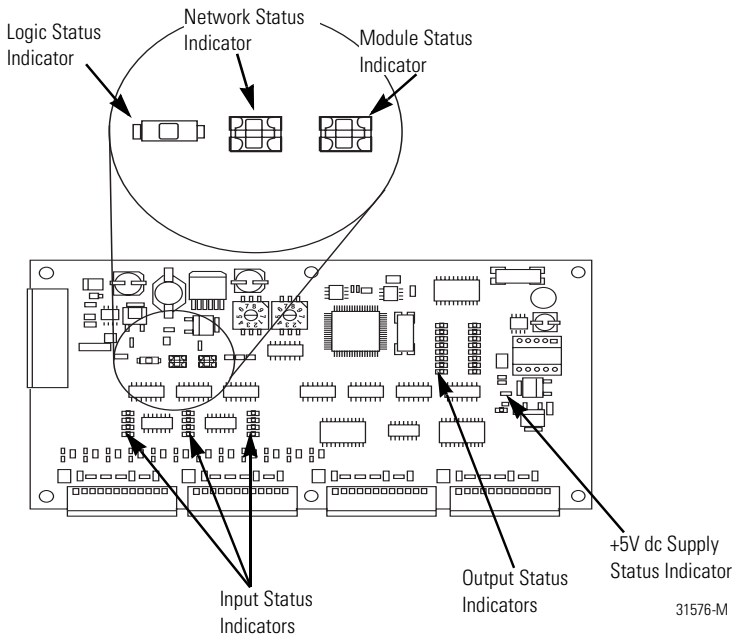
Parameter	Selection
Function Blocks Supported	Boolean Latches Timers Counters
Maximum Number of Function Blocks in a Configuration	72
Function Block Processing Time	2 msec/24 blocks 4 msec/28 blocks 6 msec/72 blocks
Network Input Bits	32
Network Output Bits	16

Parameter	Selection
Available Status Bits	Explicit Message Connection Polled Connection Change-of-State/Cyclic Connection Change-of-State/Cyclic Fault Network Fault Minor Module Fault
Logic Status Indicators	None Solid Green Flashing Green Logic Disabled Logic Enabled Local Forces Applied and Logic Enabled
Consumed I/O Assembly	The amount of data the module consumes over the DeviceNet network (0 - 4 bytes)

Troubleshoot with the Indicators

These module indicators are shown below.

- Module status indicator
- Network status indicator
- DeviceLogix status indicator
- Input status indicators
- Output status indicators
- 5V dc supply power indicator



Board Status Indicator (MOD)

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

Network Status Indicator (NET)

Indication	Status
None	Not on line <ul style="list-style-type: none"> • Device has not completed duplicate MAC ID test yet • Device may not be powered yet
Green Blinking Solid	On line/connected (Group 2 device only) the device is allocated to a master On line/no connections
Red Blinking Solid	Connection timed out Failed communication: A duplicate node address exists or module is at the wrong baud rate

DeviceLogix Status Indicator (DS1)

Indication	Status
None	DeviceLogix disabled
Green Solid Blinking	DeviceLogix enabled Input or Output force (forced value) active

Inputs and Outputs Status Indicators

Indication	Status
None	No power Input or output point off
Yellow	Input or output point on

+5V dc Supply Power Indicator

Indication	Status
Green	5V I/O power
None	No power

Specifications

Input Specifications	Maximum	Minimum
Inputs per block	12 TTL compatible	
Off-State Voltage	0.8V dc	-
Current	0.6 mA	-
On-State Voltage	5.1V dc	2.4V dc
Current	10 μ A	0 μ A
Output Specifications		
Outputs Per Block	12 TTL, 24 mA	
Output Auxiliary Voltage	5V supply, 5.1V	4.8 V dc
Current		-
On-State Voltage Drop	250 mV	-
On-State Current	24 mA	-
Board Current (all outputs on)	450 mA	-
Surge Current - for 10ms, repeatable every 2s (individual outputs)	24 mA	-
General Specifications		
DeviceNet Power Voltage	25V dc	11V dc
Current	450 mA	-
DeviceNet Power Circuit Type	Class 2	
I/O Wire Length	6 M 19.7 ft	-

General Specifications (continued)	
LED Indicators	Board Status - red/green Network Status - red/green DeviceLogix Status - green Input Point LED - yellow Output Point LED - yellow 5V I/O supply - green
Approximate Dimensions Millimeters (Inches)	165.1 mm x 88.9 mm x 3.53 mm (6.5 in. x 3.5 in. x 0.14 in.)
Operational Temperature	IEC 60068-2-1 (Test Ad, Operating Cold), IIEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): -20...70 °C (14...158 °F)
Storage Temperature	IEC 60068-2-1 (Test Ab, Un-packaged Non-operating Cold), IEC 60068-2-2 (Test Bb, Un-packaged Non-operating Dry Heat), IEC 60068-2-14 (Test Na, Un-packaged Non-operating Thermal Shock): -40... 85 °C (-40...185 °F)
Relative Humidity	IEC 60068-2-30 (Test Db, Un-packaged Non-operating Damp Heat): 5...95% non-condensing
Vibration	IEC 60068-2-6 (Test Fc, Operating): 5g @ 10-500Hz
Operating Shock	IEC 60068-2-27 (Test Ea, Unpackaged Shock): 30g
Non-Operating Shock	IEC 60068-2-27 (Test Ea, Unpackaged Shock): 50g
Emissions	CISPR 11: Group 1, Class A
ESD Immunity	IEC 61000-4-2: 8 kV indirect contact discharges
Radiated RF Immunity	IEC 61000-4-3: 10V/m with 1kHz sine-wave 80%AM from 30MHz...2000 MHz 10V/m with 200Hz 50% Pulse 100%AM at 900 MHz 10V/m with 200Hz 50%Pulse 100% AM at 1890 MHz

General Specifications (continued)	
EFT/B Immunity	IEC 61000-4-4: ±2kV at 2.5kHz on signal ports ±2kV at 5kHz on communications ports
Surge Transient Immunity	IEC 61000-4-5: ±2kV line-earth (CM) on communications ports
Conducted RF Immunity	IEC 61000-4-6: 10Vrms with 1kHz sine-wave 80%AM from 150kHz...80MHz
Enclosure Type Rating	None (open-style)
5V Supply Voltage Ranges	4.8...5.1V 0...5.1V dc
Supply Power/Current Ratings	Isolated outputs limited to 1 volt-ampere in each ungrounded output line
Power Consumption	11.25 VA dc
Power Dissipation	11.25 VA dc @ 70 °C, approximate minimum enclosure size 229 mm x 165 mm x 127 mm (9 in. x 6.5 in. x 5 in.)
Isolation Voltage (continuous-voltage withstand rating)	50V continuous Tested to withstand 2000V dc for 60 seconds
Conductors Wire Size	I/O: 20 AWG (0.5mm ²)...26 AWG (0.13mm ²) solid or stranded copper wire rated at 75 °C or greater 1.2 mm (3/64 in.) insulation maximum. DeviceNet: 14 AWG (2.5mm ²)...22 AWG (0.25mm ²) solid or stranded copper wire rated at 75 °C or greater 1.2 mm (3/64 in.) insulation maximum. (Refer to publication DNET-UM072).
Wiring Category ^{1,2}	2 - on signal ports 2 - on communications ports
Wire Type	Copper

¹ Use this Conductor Category information for planning conductor routing. Refer to Publication 1770-4.1, Industrial Automation Wiring and Grounding Guidelines.

² Use this Conductor Category information for planning conductor routing as described in the appropriate System Level Installation Manual.

Certifications

Certifications: ¹ (when product is marked)	<table border="0"> <tr> <td data-bbox="405 233 469 256">c-UR-us</td> <td data-bbox="469 233 891 272">UL Recognized Component Industrial Control Equipment, certified for US and Canada</td> </tr> <tr> <td data-bbox="405 272 426 295">CE</td> <td data-bbox="469 272 891 440"> European Union 89/336/EEC EMC Directive, compliant with: EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions EN 61131-2; Programmable Controllers (Clause 8, Zone A & B) </td> </tr> <tr> <td data-bbox="405 440 455 462">C-Tick</td> <td data-bbox="469 440 891 479">Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions</td> </tr> <tr> <td data-bbox="405 479 447 501">ODVA</td> <td data-bbox="469 479 891 516">ODVA conformance tested to DeviceNet specifications</td> </tr> </table>	c-UR-us	UL Recognized Component Industrial Control Equipment, certified for US and Canada	CE	European Union 89/336/EEC EMC Directive, compliant with: EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions EN 61131-2; Programmable Controllers (Clause 8, Zone A & B)	C-Tick	Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions	ODVA	ODVA conformance tested to DeviceNet specifications
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C-Tick	Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions								
ODVA	ODVA conformance tested to DeviceNet specifications								
Note: In order to comply with CE Low Voltage Directives (LVD), you must use either a NEC Class 2, a Safety Extra Low Voltage (SELV) or a Protected Extra Low Voltage (PELV) power supply to power this adapter. A SELV supply cannot exceed 30V rms, 42.4V peak or 60V dc under normal conditions and under single fault conditions. A PELV supply has the same rating and is connected to protected earth.									

¹ See the Product Certification link at www.ab.com for Declarations of Conformity, Certificates, and other certification details.

DeviceNet is a trademark of Open DeviceNet Vendor Association (ODVA).
 RSNetWorx for DeviceNet and DeviceLogix are trademarks of Rockwell Automation

Notes:

Notes:

Allen-Bradley Auto

Rockwell Automation Support

Rockwell Automation provides technical information on the web to assist you in using its products. At <http://support.rockwellautomation.com>, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration and troubleshooting, we offer TechConnect Support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit <http://support.rockwellautomation.com>.

Installation Assistance

If you experience a problem with a hardware module within the first 24 hours of installation, please review the information that's contained in this manual. You can also contact a special Customer Support number for initial help in getting your module up and running:

United States	1.440.646.3223 Monday – Friday, 8am – 5pm EST
Outside United States	Please contact your local Rockwell Automation representative for any technical support issues.

New Product Satisfaction Return

Rockwell tests all of its products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned:

United States	Contact your distributor. You must provide a Customer Support case number (see phone number above to obtain one) to your distributor in order to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for return procedure.

www.rockwellautomation.com

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