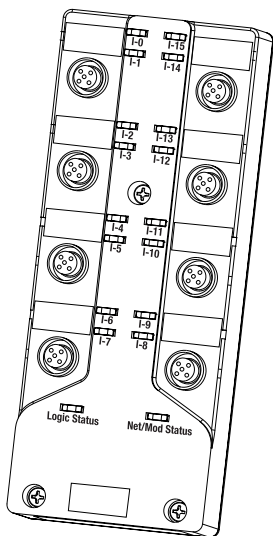




## Installation Instructions

# ArmorBlock MaXum 16 Input Module with Complete Diagnostics

(Cat. No. 1792D-16BVT0CD)



30723-M

This ArmorBlock MaXum™ I/O module (Cat. No. 1792D-16BVT0CD) is a stand-alone 24V dc I/O product which communicates via a DeviceNet™ network. The sealed housing of this module requires no enclosure.

This model has 16 inputs accessed through Y splitter cables. Inputs are 24V dc and are software selectable for PNP (sourcing) or NPN (sinking) devices. The default is sinking. Diagnostic features included are short circuit and open wire detection reported to the point level. This product also supports DeviceLogix.

## Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of these products must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards. In no event will Rockwell Automation be responsible or liable for indirect or consequential damage resulting from the use or application of these products.

Any illustrations, charts, sample programs, and layout examples shown in this publication are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Rockwell Automation does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley publication SGI-1.1, *Safety Guidelines for the Application, Installation and Maintenance of Solid-State Control* (available from your local Rockwell Automation office), describes some important differences between solid-state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

Reproduction of the contents of this copyrighted publication, in whole or part, without written permission of Rockwell Automation, is prohibited.

Throughout this publication, notes may be used to make you aware of safety considerations. The following annotations and their accompanying statements help you to identify a potential hazard, avoid a potential hazard, and recognize the consequences of a potential hazard:

**ATTENTION**

Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.

**WARNING**

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.

**IMPORTANT**

Identifies information that is critical for successful application and understanding of the product.

### 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.

#### ATTENTION



This equipment is supplied as "enclosed" equipment. It should not require additional system enclosure when used in locations consistent with the enclosure type ratings stated in the Specifications section of this publication. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings, beyond what this product provides, that are required to comply with certain product safety certifications.

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.

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### Package Contents

Your package contains:

- 1 ArmorBlock MaXum Module
- Installation Instructions

(Please note: Cable bases are ordered and shipped separately.)

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## Install Your ArmorBlock MaXum I/O Module

To install the module:

- Set the node address
  - Mount the module to the cable base
  - Connect the cord sets
  - Communicate with the module
- 

### Preventing 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:

#### ATTENTION



- 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

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

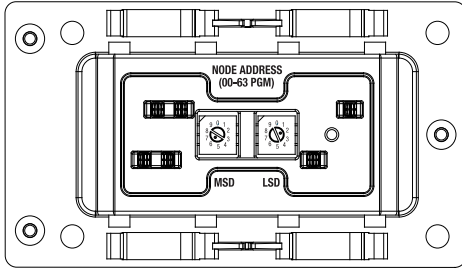
Set the node address using the rotary switches, DeviceNetManager™, RSNetWorx for DeviceNet™, or other software configuration tool. Setting the switches between **64** to **99** lets the software have address control.

Each module is shipped set for node address **63**. The switches are located on the underside of the module. 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 black dot on the switch with the number setting you wish to use.

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



Bottom View of Module

Example: Node address is set at 62 (see small black dots).

30703

The module is equipped with AutoBaud detect. AutoBaud lets the module read the settings already in use on your DeviceNet network and automatically adjusts to follow those settings.

## Mount the Module to the Cable Base

This module mounts to the following cable bases:

- 1792D-CBFM for KwikLink™ flat media installation
- 1792D-CB12 for 12mm drop cable installation
- 1792D-CB18 for round media trunk connection
- or other optional cable base assembly

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### IMPORTANT

The cable base should already be installed. See publication 1792D-IN009 for more information on installing the cable base.

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To mount the module to the cable base:

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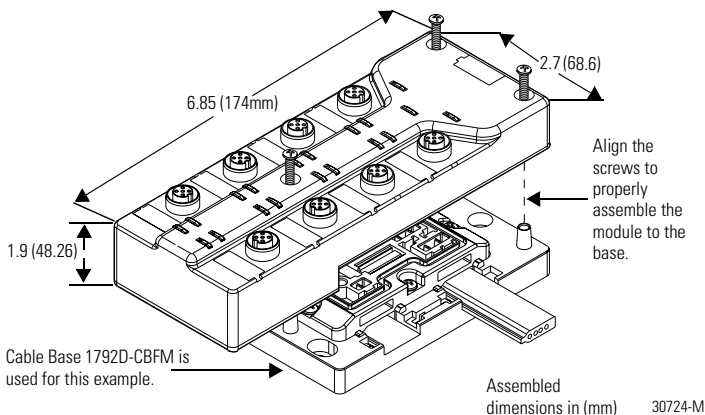
### IMPORTANT

Proper alignment of the screws is necessary to complete the connections between the module contacts and the cable contacts.

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1. Position the module over the mounted cable base. Align the three captive screws in the module with the accepting receptacles in the base.
2. Tighten the screws to secure the module to the base.

**Note:** Dimensions change according to the cable base and module combination used.



## Connect the Input Cord Sets to the MaXum Module

### WARNING



If you connect or disconnect wiring while the field-side power is on, an electrical arc can occur. This can cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

### WARNING

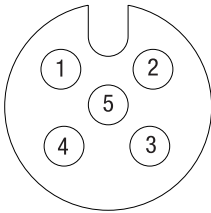


Use supply wires suitable for 30°C above surrounding ambient.

This module uses 5 pole micro (12mm) style PCB mounted connectors.

Eight micro caps cover the connectors on your module. Remove the caps and connect your cables to the appropriate ports. This product has two inputs per connector. Use a “Y” splitter cable for access to all input connections.

Use the micro caps to cover and seal unused ports. A pinout diagram for the connectors is shown next.



**Input Micro-Connector**

(View into Socket)

Pin 1 Sensor Source Voltage A

Pin 2 Input B

Pin 3 Return Logic Ground<sup>1</sup>

Pin 4 Input A

Pin 5 Sensor Source Voltage B

<sup>1</sup>Logic Ground is approximately 0.4V above DeviceNet V-measured at the module.

41452

Use Rockwell Automation Y-cables 879D-F4ACDM5-x, where x=length in meters (0M3, 1, 2, 3, 5, 10). Please refer to publication C114-CA001 for other Rockwell Automation cables and cord sets offerings.

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**IMPORTANT**

If the devices (sensors) connected to the input connections require Class 2 power to operate, the DeviceNet connections of this equipment must be powered by a Class 2 source.

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**WARNING**



When used in a Class I, Division 2, hazardous location, this equipment must be mounted in a suitable enclosure with proper wiring method that complies with the governing electrical codes.

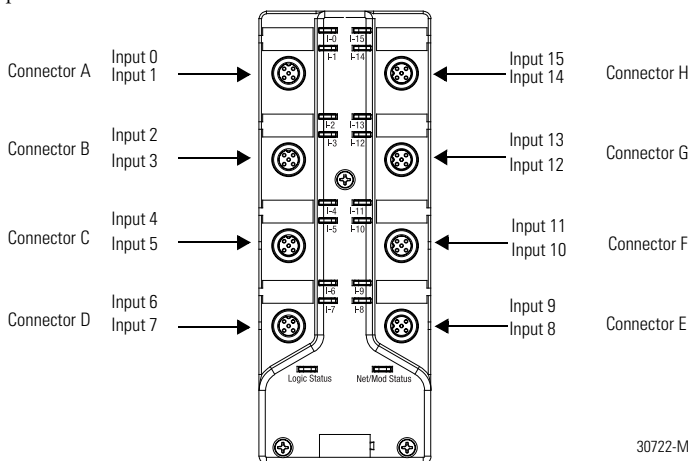
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**ATTENTION**

- Make sure all connectors and caps are securely tightened to properly seal the connections against leaks and maintain IP67 requirements.
- For maximum noise immunity, input and output cable return wires must be properly terminated. When inputs and outputs are connected in loopback, return wires should be connected together.
- I/O cable length should be less than 30 meters.

Input connectors for this module are shown below.

**DeviceNet Cable****WARNING**

If you connect or disconnect the DeviceNet cable with power applied to this module or any device on the network, an electrical arc can occur. This could cause an explosion in hazardous location installations.

Be sure that power is removed or the area is nonhazardous before proceeding.

DeviceNet cables are described in the installation publications for the cable base of your choice. Refer to the following publications:

- 1792D-IN009 ArmorBlock MaXum Cable Base Installation Guide
- DN-6.7.2 DeviceNet Cable Planning and Installation Manual

## Communicate With Your ArmorBlock MaXum Module

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

The module consumes and produces input data as follows:

Type of I/O Connections	Consumes	Produces
Cyclic	0 Byte	6 Bytes
Polled	0 Byte	6 Bytes
Change-of-State	0 Byte	6 Bytes

**Cyclic** - allows configuration of the block as an I/O client. The block will produce its I/O cyclically at the rate configured.

**Polled** - a master initiates communication by sending its polled I/O message to the module. The 16 input module scans the inputs and fault bits producing a response that reflects their status.

**Change of State** - productions occur when an input changes or a fault condition occurs. If no input or fault condition change occurs within the expected packet rate, a heartbeat production occurs. This heartbeat production tells the scanner module that the module is alive and ready to communicate.

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

Bit	07	06	05	04	03	02	01	00
<b>Produced 0</b>	In 7	In 6	In 5	In 4	In 3	In 2	In 1	In 0
<b>Produced 1</b>	In 15	In 14	In 13	In 12	In 11	In 10	In 9	In 8
<b>Produced 2</b>	ISC-7	ISC-6	ISC-5	ISC-4	ISC-3	ISC-2	ISC-1	ISC-0
<b>Produced 3</b>	ISC-15	ISC-14	ISC-13	ISC-12	ISC-11	ISC-10	ISC-9	ISC-8
<b>Produced 4</b>	OW-7	OW-6	OW-5	OW-4	OW-3	OW-2	OW-1	OW-0
<b>Produced 5</b>	OW-15	OW-14	OW-13	OW-12	OW-11	OW-10	OW-9	OW-8

Where: I = Input    ISC = Input Short Circuit in Sensor Source Voltage    OW = Off Wire

**Note:** If you are using DeviceLogix, please refer to publication no. 1792-TD001 for the alternate I/O assemblies for DeviceLogix.

Byte	Bit	Description
<b>Produced 0</b>	00-07	Input status bits: When the bit is set (1), the input is on. Bit 00 = input 0, bit 01 = input 1, bit 02 = input 2, bit 03 = input 3, bit 04 = input 4, bit 05 = input 5, bit 06 = input 6, bit 07 = input 7.
<b>Produced 1</b>	00-07	Input status bits: Bit 00 = input 8, bit 01 = input 9, bit 02 = input 10, bit 03 = input 11, bit 04 = input 12, bit 05 = input 13, bit 06 = input 14, bit 07 = input 15.
<b>Produced 2</b>	00-07	Sensor source voltage, input short circuit (ISC): Fault bits are set (1) when the sensor source voltage is faulted. Bit 00 is ISC-0 = a short circuit for input 0 Bit 01 is ISC-1 = a short circuit for input 1 Bit 02 is ISC-2 = a short circuit for input 2 Bit 03 is ISC-3 = a short circuit for input 3 Bit 04 is ISC-4 = a short circuit for input 4 Bit 05 is ISC-5 = a short circuit for input 5 Bit 06 is ISC-6 = a short circuit for input 6 Bit 07 is ISC-7 = a short circuit for input 7
<b>Produced 3</b>	00-07	Sensor source voltage, input short circuit (ISC): Fault bits are set (1) when the sensor source voltage is faulted. Bit 00 is ISC-8 = a short circuit for input 8 Bit 01 is ISC-9 = a short circuit for input 9 Bit 02 is ISC-10 = a short circuit for input 10 Bit 03 is ISC-11 = a short circuit for input 11 Bit 04 is ISC-12 = a short circuit for input 12 Bit 05 is ISC-13 = a short circuit for input 13 Bit 06 is ISC-14 = a short circuit for input 14 Bit 07 is ISC-15 = a short circuit for input 15
<b>Produced 4</b>	00-07	Off-Wire fault (OW): Bit 00 is OW-0 = an off-wire fault for output 0 Bit 01 is OW-1 = an off-wire fault for output 1 Bit 02 is OW-2 = an off-wire fault for output 2 Bit 03 is OW-3 = an off-wire fault for output 3 Bit 04 is OW-4 = an off-wire fault for output 4 Bit 05 is OW-5 = an off-wire fault for output 5 Bit 06 is OW-6 = an off-wire fault for output 6 Bit 07 is OW-7 = an off-wire fault for output 7
<b>Produced 5</b>	00-07	Off-Wire fault (OW): Bit 00 is OW-8 = an off-wire fault for output 8 Bit 01 is OW-9 = an off-wire fault for output 9 Bit 02 is OW-10 = an off-wire fault for output 10 Bit 03 is OW-11 = an off-wire fault for output 11 Bit 04 is OW-12 = an off-wire fault for output 12 Bit 05 is OW-13 = an off-wire fault for output 13 Bit 06 is OW-14 = an off-wire fault for output 14 Bit 07 is OW-15 = an off-wire fault for output 15

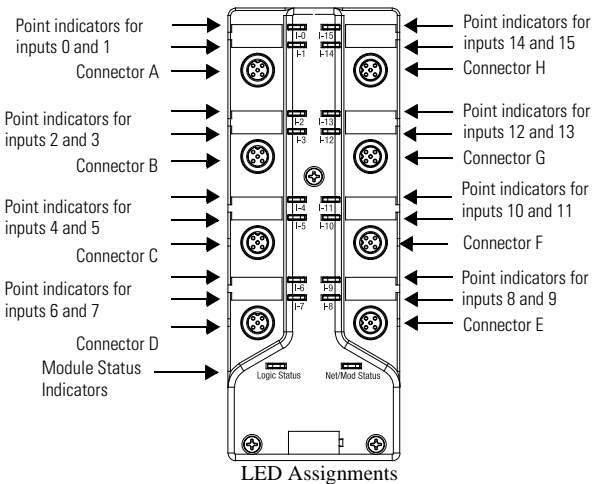
Where: I = Input    ISC = Input Short Circuit in Sensor Source Voltage    OW = Off Wire

The DeviceNet Network uses advanced network technology, producer/consumer communication, to increase network functionality and throughput. Visit our website at <http://www.ab.com/networks> for producer/consumer technology information and updates.

### Troubleshoot with the Indicators

This module has the following indicators:

- Network and Module status indicator
- Logic status indicator
- Individual point status indicators for inputs 0 through 15



30722-M

The following table describes network and module status indicators.

#### Net/Mod Status Indicator

Indicator	Status
Off	No power or auto bauding
Flashing Green/Off	On line but not connected
Solid Green	On line, link OK, connected
Flashing Red	Recoverable fault - module configuration error
	I/O connection fault - one or more I/O connections in the timed-out state

**Net/Mod Status Indicator**

Indicator	Status
Solid Red	Unrecoverable fault
	Communication failure - duplicate node address present or incorrect baud rate
Green to Red to Off	At powerup only - LED test

The following table describes logic status indicators.

**Logic Status Indicators**

State	Status
Off	Logic is disabled
Solid Green	Logic is enabled
Flashing Green	Local forces are applied and local logic is enabled

The following table describes individual I/O status indicators.

**I/O Status Indicators**

Function	Module Status Indicator	Point Indicator	Condition
Inputs	Green Green Module status blink red Module Status blink red	None Yellow Red <sup>1</sup> Blink Red <sup>1</sup>	No valid input Valid input Short on input A or B Off-Wire on input A or B

<sup>1</sup>The top LED of the pair associated with a connector will provide the diagnostic indicator. Individual diagnostic information is produced over DeviceNet.

For more information on indications see the Technical Data publication 1792-TD001.

**Specifications**

<b>16 Input Module - Cat. No. 1792D-16BVT0CD</b>		
Input Specifications	Max.	Min.
Inputs per block	16 - 3 wire or dry contact PNP or NPN devices or 8 - 4 wire PNP or NPN devices	
Sensor Source Current (per input)	50mA	
On-state Voltage - Sinking	25V dc	10V dc
On-state Voltage - Sourcing	(SSV-10)V dc	-
On-state Current	10mA	2mA
Off-state Voltage - Sinking	5V dc	-

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### 16 Input Module - Cat. No. 1792D-16BVTOCD

Off-state Voltage - Sourcing	25V dc	(SSV -5)V dc
Off-state Current	1.5mA	-
Off-Wire Sense Current	0.5mA	-

#### General Specifications

Indicators	Net/Mod Status - red/green Logic Status - green Point LED - yellow/orange/red	
Communication Rate	<ul style="list-style-type: none"> <li>• 125Kbps @ 500 meters(1600 feet) for thick cable, flat media length 375 meters</li> <li>• 250Kbps @ 200 meters(600 feet) for thick cable, flat media length 150 meters</li> <li>• 500Kbps @ 100 meters (330 feet) for thick cable, flat media length 75 meters</li> </ul>	
DeviceNet Power Voltage Current	25V dc max 60mA max (no sensors)	11V dc min up to 1.6A 900mA(16 sensors @50mA per sensor)
Dimensions (assembled to base) inches - (Millimeters)	1.9H x 2.7W x6.85D (48.26)H x (68.6)W x (174)D	
Operational Temperature	IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): -25 to 60°C (-13 to 140°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): -25 to 80°C (-13 to 176°F)	
Wiring Category	Use 14-22 AWG wire with insulation Temperature rating of 75°C min. See Publication DN-6.7.2	
DeviceNet Conductors Category	2 <sup>1,2</sup>	
Relative Humidity	IEC 60068-2-30 (Test Db, Un-packaged Non-operating Damp Heat): 5 to 100% non-condensing	
Shock	IEC60068-2-27 (Test Ea Unpackaged shock): Operating 30g Non-operating 50g	
Vibration	IEC60068-2-6 (Test Fc, Operating): 10g @ 10-500Hz	
Emissions	CISPR 11: Group 1, Class A	
ESD Immunity	IEC 61000-4-2: 6kV contact discharges 8kV air discharges	
Enclosure Type Rating	Meets IP67	
Radiated RF Immunity	IEC 61000-4-3: 10V/m with 1kHz sine-wave 80%AM from 30MHz to 2000MHz 10V/m with 200Hz 50% Pulse 100%AM at 900MHz	



<b>16 Input Module - Cat. No. 1792D-16BVTOCD</b>											
<b>General Specifications (cont.)</b>											
EFT/B Immunity	IEC 61000-4-4: ±4kV at 2.5kHz on signal ports ±4kV at 2.5kHz on power ports ±2kV at 5kHz on communications ports										
Surge Transient Immunity	±500V line-line(DM) and ±500V line-earth(CM) on signal ports ±2kV line-earth (CM) on shielded ports ±1kV line-line(DM) and ±2kV line-earth(CM) on power ports										
Conducted RF Immunity	IEC 61000-4-6: 10Vrms with 1kHz sine-wave 80%AM from 150kHz to 80MHz										
Certifications (when product is marked)	<table border="0"> <tr> <td>CSA</td> <td>CSA Certified Process Control Equipment</td> </tr> <tr> <td>CSA</td> <td>CSA Certified Process Control Equipment for Class I, Division 2 Group A,B,C,D Hazardous Locations</td> </tr> <tr> <td>CE<sup>3</sup></td> <td>European Union 89/336/EEC EMC Directive, compliant with: EN 61000-6-4; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity</td> </tr> <tr> <td>C-Tick<sup>3</sup></td> <td>Australian Radiocommunications Act, compliant with: AS/NZS 2064; Industrial Emissions</td> </tr> <tr> <td>ODVA</td> <td>ODVA conformance tested to DeviceNet specifications</td> </tr> </table>	CSA	CSA Certified Process Control Equipment	CSA	CSA Certified Process Control Equipment for Class I, Division 2 Group A,B,C,D Hazardous Locations	CE <sup>3</sup>	European Union 89/336/EEC EMC Directive, compliant with: EN 61000-6-4; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity	C-Tick <sup>3</sup>	Australian Radiocommunications Act, compliant with: AS/NZS 2064; Industrial Emissions	ODVA	ODVA conformance tested to DeviceNet specifications
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C-Tick <sup>3</sup>	Australian Radiocommunications Act, compliant with: AS/NZS 2064; Industrial Emissions										
ODVA	ODVA conformance tested to DeviceNet specifications										
Technical Data (user information)	Publication 1792-TD001										

1. You use this conductor category information for planning conductor routing as described in the system level installation manual.
2. See publication 1770-4.1, "Programmable Controller Wiring and Grounding Guidelines."
3. See the Product Certification link at [www.ab.com](http://www.ab.com) for Declarations of Conformity, Certificates, and other certification details.

This product has been tested at an Open DeviceNet Vendor Association, Inc. (ODVA) authorized independent test laboratory and found to comply with ODVA Conformance Test. Please contact the ODVA website (<http://www.odva.org>) for listing of products tested by ODVA independent test labs for further details.

# Hazardous Location Approval

<p><b>The following information applies when operating this equipment in hazardous locations:</b></p>	<p><b>Informations sur l'utilisation de cet équipement en environnements dangereux :</b></p>
<p>Products marked "CL I, DIV 2, GP A, B, C, D" are suitable for use in Class I Division 2 Groups A, B, C, D, Hazardous Locations and nonhazardous locations only. Each product is supplied with markings on the rating nameplate indicating the hazardous location temperature code. When combining products within a system, the most adverse temperature code (lowest "T" number) may be used to help determine the overall temperature code of the system. Combinations of equipment in your system are subject to investigation by the local Authority Having Jurisdiction at the time of installation.</p>	<p>Les produits marqués "CL I, DIV 2, GP A, B, C, D" ne conviennent qu'à une utilisation en environnements de Classe I Division 2 Groupes A, B, C, D dangereux et non dangereux. Chaque produit est livré avec des marquages sur sa plaque d'identification qui indiquent le code de température pour les environnements dangereux. Lorsque plusieurs produits sont combinés dans un système, le code de température le plus défavorable (code de température le plus faible) peut être utilisé pour déterminer le code de température global du système. Les combinaisons d'équipements dans le système sont sujettes à inspection par les autorités locales qualifiées au moment de l'installation.</p>

<p style="text-align: center;"><b>WARNING</b></p> 	<p><b>EXPLOSION HAZARD</b></p> <ul style="list-style-type: none"> <li>Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous.</li> <li>Do not disconnect connections to this equipment unless power has been removed or the area is known to be nonhazardous. Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product.</li> <li>Substitution of components may impair suitability for Class I, Division 2.</li> <li>If this product contains batteries, they must only be changed in an area known to be nonhazardous.</li> </ul>	<p style="text-align: center;"><b>AVERTISSEMENT</b></p> 	<p><b>RISQUE D'EXPLOSION</b></p> <ul style="list-style-type: none"> <li>Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher l'équipement.</li> <li>Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher les connecteurs. Fixer tous les connecteurs externes reliés à cet équipement à l'aide de vis, loquets coulissants, connecteurs filetés ou autres moyens fournis avec ce produit.</li> <li>La substitution de composants peut rendre cet équipement inadapté à une utilisation en environnement de Classe I, Division 2.</li> <li>S'assurer que l'environnement est classé non dangereux avant de changer les piles.</li> </ul>
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