



# ControlNet Adapter Module

1747-ACN15, 1747-ACNR15

## What This Document Describes

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## User Manual and Other Related Documentation

For detailed information on how to use the ControlNet Adapter Module, refer to the ControlNet Adapter Module User Manual, publication 1747-UM003A-EN-P.

For detailed information on planning and installing your ControlNet system, refer to the following publications:

<b>Publication</b>	<b>Publication Number</b>
ControlNet Adapter User Manual	1747-UM003A-EN-P
ControlNet Cable System Component List	AG-2.2
ControlNet Cable System Planning and Installation Manual	1786-6.2.1
ControlNet Coax Tap Installation Instructions	1786-IN007A-EN-P
ControlNet Network Access Cable Installation Instructions	1786-2.6
ControlNet Repeater Installation Instructions	1786-5.13
Industrial Automation Wiring and Grounding Guidelines	1770-4.1

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## 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, publication 1770-4.1.

Open style devices must be provided with environmental and safety protection by proper mounting in enclosures designed for specific application conditions. See NEMA Standards publication 250 and IEC publication 529, as applicable, for explanations of the degrees of protection provided by different types of enclosure.

## Module Description and Features

The 1747-ACN15 and -ACNR15 adapters control 1746 remote I/O on the ControlNet network. The ControlNet network is a communication architecture that allows the exchange of messages between ControlNet products compliant with the CI specification.

The adapters support multiple scheduled connections to individual modules or rack scheduled connections to a group of modules. Up to 64 scheduled connections per adapter are possible with a maximum of 251 input words and/or 249 output words supported per scheduled connection. An adapter can control up to 30 slots of 1746 I/O (3 chassis max.).

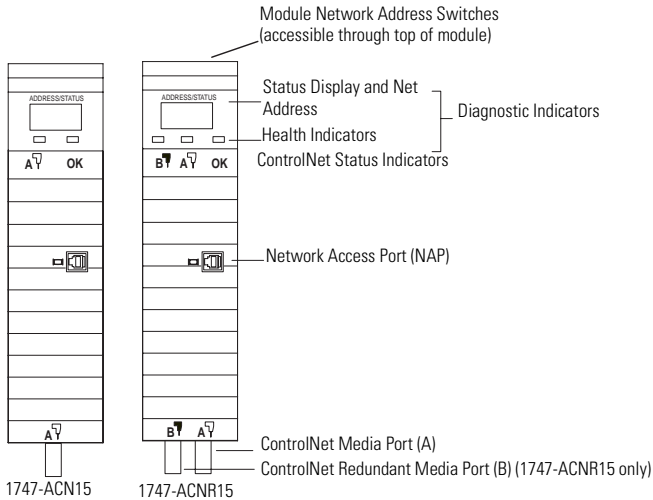
The 1747-ACN15 and -ACNR15 adapters features include:

- high-speed data transfer
- diagnostic messages
- local communication network access through the network access port (NAP)
- redundant media (1747-ACNR15 only)
- unscheduled messaging
- multicast outputs
- PLC-5 ControlNet hot backup

## Hardware Components

The adapter module consists of the following major components, as shown in the following figure:

- ControlNet status and health indicators
- status display and network address
- network access port (NAP)
- ControlNet connectors (one on 1747-ACN15; two on 1747-ACNR15)
- module net address switch assemblies (on top of module)



## Diagnostic Indicators

Health indicators are located on the front panel of the adapter module. They indicate both normal operation and error conditions in your remote I/O system.

An alphanumeric display (net address/status) provides status code indications when an error occurs during initialization or operation.

A complete description of the diagnostic indicators and status display and how to use them for troubleshooting is explained on page 14.

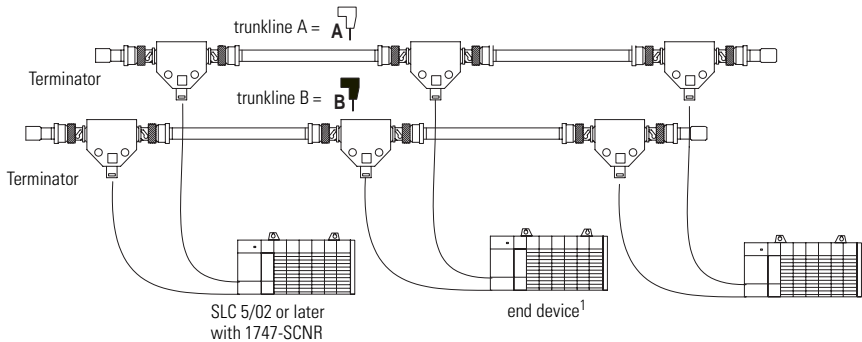
## Network Access Port (NAP)

The network access port provides a bidirectional electrical interface for programming, maintenance, and I/O monitoring devices in both redundant and non-redundant connections. How to connect programming terminals to the network using the NAP is described on page 12.

## ControlNet Connectors

Cable connection to the module is through standard BNC connectors on the front of the module, as shown below.

### Example of a Redundant System



1. End device supporting redundant cabling is a 1747-ACNR15.

Refer to the *ControlNet Cable System Planning and Installation User Manual*, Publication 1786-6.2.1 for more information.

## Network Address Switch Assemblies

You must set two switch assemblies to configure your adapter module with its unique network address. You access these switches through the top of the module. The following figure shows the location of the switches. These switches are read on power-up to establish the network address of the module. Network address switch settings are described on page 7.

## Determining Power Requirements

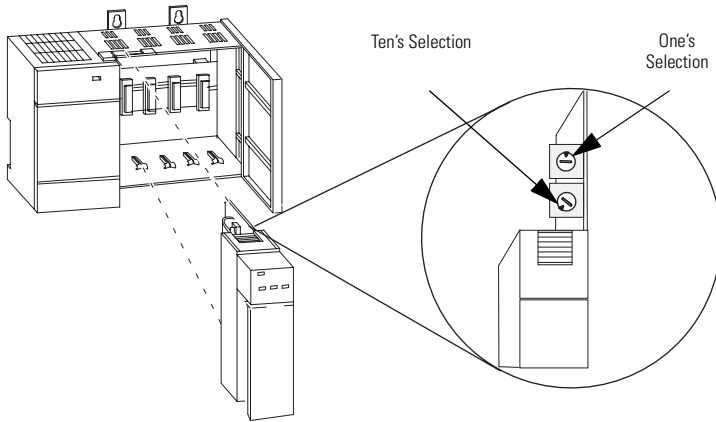
The ControlNet adapter module requires a maximum backplane current of 900mA at 5VDC. Remember to add this amount to other current requirements for your I/O chassis.

## Setting the Network Address Switches

The switches on the top of the adapter module determine the network address of the adapter. The two switches are:

- the ten's switch
- the one's switch

The combination of these switches allows selection of network addresses from 01 to 99.

**TIP**

00 is an invalid number.



## Installing the Adapter Module in the Chassis

After you set the appropriate switch assemblies for your adapter module, follow these procedures for installation.

Refer to the *Industrial Controller Wiring and Grounding Guidelines* publication 1770-4.1 for proper grounding and wiring methods to use when installing your module.

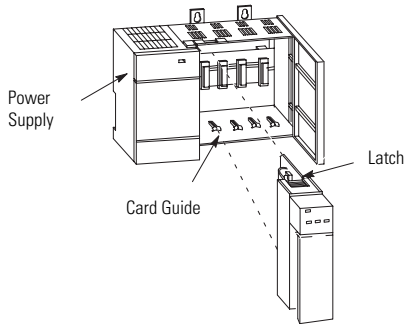
**WARNING**



If you insert or remove the ControlNet Adapter 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.

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1. Remove power from the I/O chassis before inserting (or removing) the module.
2. Align the circuit board with the chassis card guide in the left slot.



3. Slide the module into the chassis until the top and bottom latches are latched.
4. Press firmly and evenly to seat the module in its backplane connectors. To remove the module, press the releases at the top and bottom of the module and pull it out.

**ATTENTION**



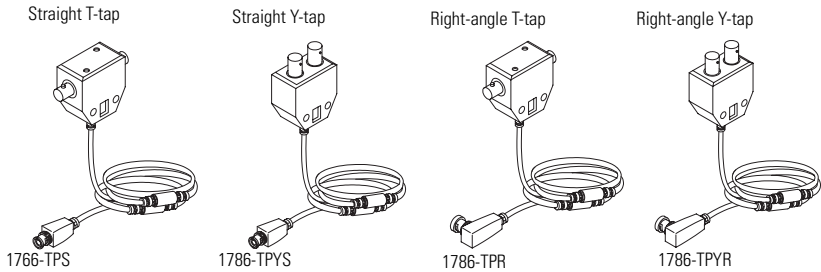
Do not force the module into the backplane connector. If you cannot seat the module with firm pressure, check the alignment. Forcing the module can damage the backplane connector or the module.

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## Connecting Your Adapter to the ControlNet Network

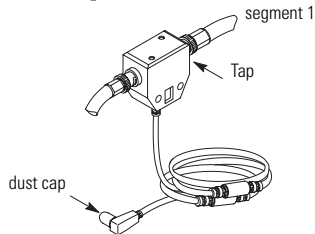
Connect your 1747-ACN15 or -ACNR15 adapter module to a ControlNet network via taps, as shown below:



### IMPORTANT

Taps contain passive electronics and must be purchased from Rockwell Automation for the network to function properly.

1. Remove the tap's dust cap (located on the straight or right angle connector).



If your node supports:	Connect the tap's straight or right angle connector:
Non-redundant media	to the <b>channel A</b> connector on the 1747-ACN15 or 1747-ACNR15 (channel B on the 1747-ACNR15 is not used) <sup>(1)</sup>
Redundant media	<ul style="list-style-type: none"> <li>• from <b>trunkline A to channel A</b> on the 1747-ACN15</li> <li>• from <b>trunkline B to channel B</b> on the 1747-ACNR15</li> </ul>

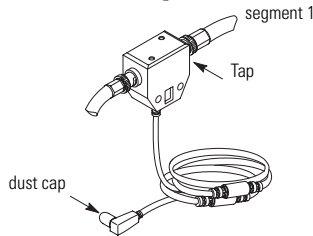
<sup>(1)</sup> While both channels are active, we recommend using channel A for non-redundant media.

### ATTENTION



Do not allow any metal portions of the tap to contact any conductive material. If you disconnect the tap from the adapter, place the dust cap back on the straight or right angle connector to prevent the connector from accidentally contacting a metallic grounded surface.

2. Remove and discard the dust caps from the adapter BNC jacks.

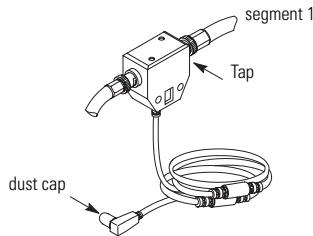


**ATTENTION**

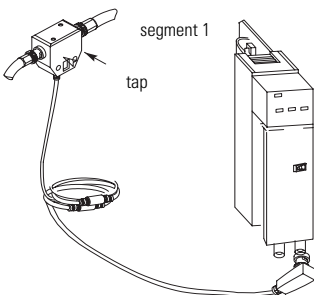


Do not allow any metal portions of the tap to contact any conductive material. If you disconnect the tap from the adapter, place the dust cap back on the straight or right angle connector to prevent the connector from accidentally contacting a metallic grounded surface.

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3. Remove and discard the dust caps from the adapter BNC jacks.
4. Connect this tap's straight or right angle connector to the BNC connector on the adapter.

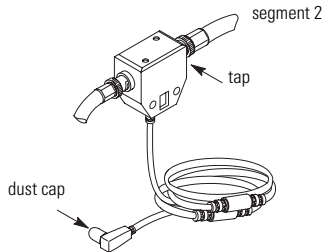


**IMPORTANT**

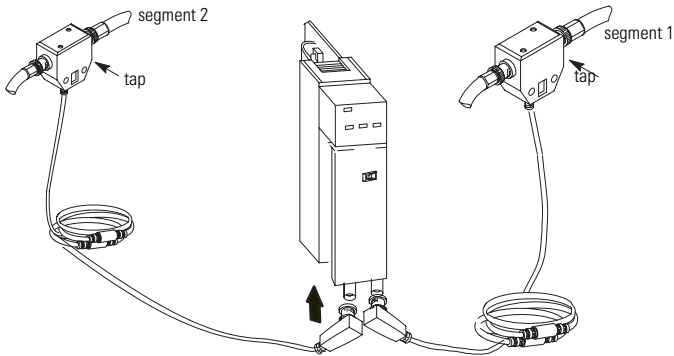
To prevent inadvertent reversal of the top connections (resulting in incorrect LED displays and troubleshooting), check the tap drop cable for a label indicating the attached segment before making your connection.

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- For redundant adapters (1747-ACNR15), remove (and save) the dust cap located on the straight or right angle connector of the designated tap on the second segment (segment 2).



- Connect this tap's straight or right angle connector to the BNC connector on the adapter.

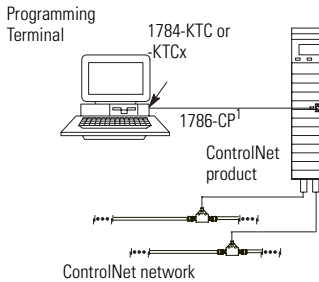


- After terminating your segments, connect the node to the network.

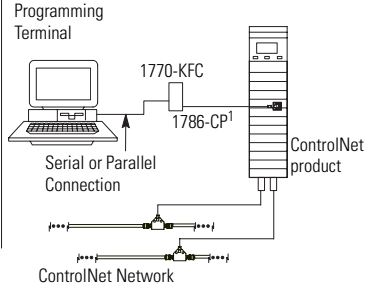
## Connecting Programming Terminals to the Network via the NAP

You can connect programming terminals to the ControlNet network by connecting to the network access port (NAP). Two methods are shown below.

### Using 1784-KTC or -KTCx communication card and NAP



### Using 1770-KFC communication interface and NAP



1. The 1786-CP cable can be plugged into any ControlNet product's NAP to provide programming capability on the ControlNet network. A programming terminal connected through this cable is counted as a node and must have a unique address.

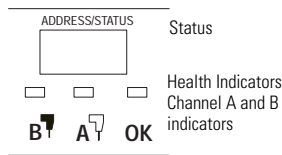
### ATTENTION



Use the 1786-CP cable when connecting a programming terminal to the network through NAPs. Using a commercially available RJ-style cable could result in possible network failures.

## Powerup Sequence

There are three health indicators on the module. The indicator on the right (labeled “OK”) is the general module health indicator. The indicator in the middle (labeled “A”) is the health indicator for cable A. On the 1747-ACNR15, the indicator on the left (labeled “B”) is the health indicator for cable B. Also, the alphanumeric display can display module status. The following describes the normal power-up sequence for the adapter module.



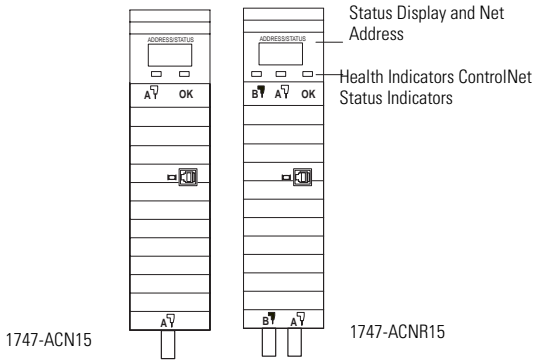
1. Apply power to the chassis - notice that the A and B indicators are off, the OK indicator is red, and the status window indicates “POST” (Power On Self Test).
2. After “POST”, the status window displays the sequence “0000”, “1111”, “2222”, through “9999”. During this time, the A and B indicators are off and the OK indicator appears amber.
3. The series and revision levels are then displayed in the status window. A series A revision level B module would display “A/B”. During this time, the A and B indicators are off and the OK indicator appears amber.
4. After the operating system is loaded and initialized, the status window and the indicators indicate the status of the module and its connections to the cable(s). If the module address is not zero and a valid ControlNet connection is made to either channel A or B, then the status window toggles between “ACTV” (Active) and the module node address (“A#02” equals node address number 2). If there are no active connections, the status window displays “IDLE”.
5. If there is a hardware problem of any kind, the health indicator turns red and the status window toggles between “FATL” and either one or two numbers. The “FATL” indicates that there was a fatal error, and the numbers indicate the error code.

## Troubleshooting With the Status Indicators and Status Display

The module has indicators on the front panel as shown below. These indicators consist of:

- health indicators
- status indicators
- display of status and address

Use these indicators to troubleshoot the module.



The following tables describe how to use the indicators to troubleshoot your module.

### Health Indicators and Display Mnemonics

OK LED	Display	Description	Probable Cause	Recommended Action
Off	None	Module is not communicating.	Power supply fault.	Check power supply, and seat adapter firmly in chassis.
Off	None	Module is not communicating.	Defective adapter.	Replace adapter.
Off	POST	Adapter is running Power On Self Test.	None	None
Amber	0000 through 9999	Adapter is running Power On Self Test.	None	None
Amber	A/A	Adapter is displaying Series and Revision level.	None	None

OK LED	Display	Description	Probable Cause	Recommended Action
Solid Red	FATL Number Number	Module is not communicating.	The adapter has either failed a hardware test, or gone into a state from which it cannot recover. The two numbers following the FATL describe the problem in detail.	Document the two numbers. Power cycle the adapter. Contact Technical Support at 440.646.6800.
Flashing Red	A#00 ERR	Module is not communicating.	The node address switches are set to 00 which is not valid.	Power the adapter off, remove the adapter from the chassis, change the node address switch to something other than 00, replace the adapter in the chassis, and apply power.
Flashing Red	DUP NODE	Module is not communicating.	The adapter has detected a duplicated node address on the network.	Correct the duplicate node address problem.
Flashing Red	CPU OVER	Module is not communicating.	The ControlNet configuration has overloaded the central processing unit in the adapter.	Reduce load on adapter by removing some connections or increasing the connection RPI values.
Flashing Green	IDLE	Module is working properly, but there are no active connections.	None	None
Flashing Green	NET ERR	Module is not communicating.	The adapter has detected a cable fault and is attempting to recover. The adapter is sending the three "I'm alive!" packets.	None, check cable if problem persists.
Solid Green	ACTV A#XX	Module is working properly.	None	None
Solid Green	BOOT A#XX	Module is on network, but not supporting any connections.	The main code in the module has failed, or the main code is being updated.	Update the main code with the latest Series and Revision code.
Off	CODE UPDT A#XX	Firmware update mode.	Adapter firmware is being updated via ControlFlash update utility.	None

## ControlNet Status Indicators

- steady - indicator is on continuously in the defined state.
- alternating - the two indicators alternate between the two defined states at the same time (applies to both indicators viewed together). The two indicators are always in opposite states, out of phase.
- flashing - the indicator alternates between the two defined states (applies to each indicator viewed independent of the other). If both indicators are flashing, they must flash together, in phase.

<b>A<sup>1</sup> and B<sup>1</sup></b>	<b>Cause</b>	<b>Action</b>
Off	No power	None or power up
Steady red	Faulted unit	Cycle power If fault persists, contact Technical Support at 440.646.6800.
Alternating red/green	Self-test	None
Alternating red/off	Incorrect node configuration	Check network address and other ControlNet configuration parameters
<b>A<sup>1</sup> or B<sup>1</sup></b>	<b>Cause</b>	<b>Action</b>
Off	Channel disabled	Program network for redundant media, if required
Steady green	Normal operation	None
Flashing green/off	Temporary errors	None; unit will self-correct
	Listen only	Cycle power
Flashing red/off	Media fault	Check media for broken cables, loose connectors, missing terminators, etc.
	No other nodes present on network	Add other nodes to the network
Flashing red/green	Incorrect network configuration	Cycle power or reset unit If fault persists, contact Technical Support at 440.646-6800.



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## The following information applies when operating this equipment in hazardous locations:

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.

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### WARNING



### EXPLOSION HAZARD

- Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous.
  - 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.
  - Substitution of components may impair suitability for Class I, Division 2.
  - If this product contains batteries, they must only be changed in an area known to be nonhazardous.
-

### Informations sur l'utilisation de cet équipement en environnements dangereux :

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.

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#### AVERTISSEMENT



#### RISQUE D'EXPLOSION

- Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher l'équipement.
  - 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.
  - La substitution de composants peut rendre cet équipement inadapté à une utilisation en environnement de Classe 1, Division 2.
  - S'assurer que l'environnement est classé non dangereux avant de changer les piles.
-

## Specifications

Description	Specification
Module Location	1746 I/O chassis, leftmost slot
Interconnect Cable	Quad shield RG-6 coaxial cable - Refer to the ControlNet Cable System manual (pub. no. 1786-6.2.1) for more information
Power Dissipation	5 Watts
Thermal Dissipation	17.06 BTU/hr
Backplane Current	900 mA at 5V
Environmental Conditions Operational Temperature Storage Temperature Relative Humidity	+0° to +60°C (+32° to +140°F) -40° to +85°C (-40° to +185°F) 5% to 95% (without condensation)
Product Certifications (when product or packaging is marked)	<ul style="list-style-type: none"> <li data-bbox="434 711 966 760">  UL Listed Industrial Control Equipment for use in Class I, Div 2 Hazardous Locations UL Listed Industrial Control Equipment for use in Hazardous Locations, Certified for Canada         </li> <li data-bbox="434 760 966 808">  Marked for all applicable directives         </li> <li data-bbox="434 808 966 857">  Marked for all applicable acts         </li> </ul>

This product must be mounted within a suitable system enclosure to prevent personal injury resulting from accessibility to live parts. The interior of this enclosure must be accessible only by the use of a tool.

This industrial control equipment is intended to operate in a Pollution Degree 2 environment, in overvoltage category II applications, (as defined in IEC publication 664A) at altitudes up to 2000 meters without derating.

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