



FLEX I/O ControlNet Adapter Modules

Cat. No. 1794-ACN15, ACN15K, -ACNR15 and -ACNR15K, Series B

(Modules with a K in the last position of the catalog number are conformally coated to meet noxious gas requirements of ISA/ANSI-71.040 1985 Class G3 Environment.)

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://www.ab.com/manuals/gi>) 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 we use notes to make you aware of safety considerations.

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.

ATTENTION 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
- recognize the consequence

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.

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.

WARNING



When you insert or remove the module while backplane power is on, or connect or disconnect the ControlNet cable with power applied to the 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.

WARNING



If you connect or disconnect wiring while the field side power is on, 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.

ATTENTION



FLEX I/O is grounded through the DIN rail to chassis ground. Use zinc plated yellow-chromate steel DIN rail to assure proper grounding. The use of other DIN rail materials (e.g. aluminum, plastic, etc.) that can corrode, oxidize, or are poor conductors, can result in improper or intermittent grounding.

ATTENTION



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:

- 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.

European Hazardous Location Approval

The following adapters are European Zone 2 approved: 1794-ACN15/C, -ACN15K/C, -ACNR15/C and -ACNR15K/C.

European Zone 2 Certification (The following applies when the product bears the EEx Marking)

This equipment is intended for use in potentially explosive atmospheres as defined by European Union Directive 94/9/EC.

The LCIE (Laboratoire Central des Industries Electriques) certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of Category 3 equipment intended for use in potentially explosive atmospheres, given in Annex II to this Directive. The examination and test results are recorded in confidential report No. 28 682 010.

Compliance with the Essential Health and Safety Requirements has been assured by compliance with EN 50021.



IMPORTANT

Observe the following additional Zone 2 certification requirements.

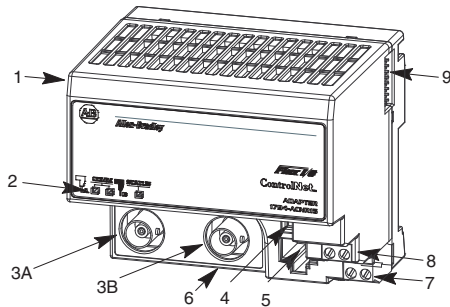
- This equipment is not resistant to sunlight or other sources of UV radiation.
- The secondary of a current transformer shall not be open-circuited when applied in Class I, Zone 2 environments.
- Equipment of lesser Enclosure Type Rating must be installed in an enclosure providing at least IP54 protection when applied in Class I, Zone 2 environments.
- This equipment shall be used within its specified ratings defined by Allen-Bradley.
- Provision shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 40% when applied in Class I, Zone 2 environments

North American Hazardous Location Approval

The following adapters are North American Hazardous Location approved: 1794-ACN15/C, -ACN15K/C, -ACNR15/C and -ACNR15K/C.

The following information applies when operating this equipment in hazardous locations:		Informations sur l'utilisation de cet équipement en environnements dangereux :	
<p>Products marked "CL1, 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 "CL1, 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>WARNING</p> 	<p>EXPLOSION HAZARD</p> <ul style="list-style-type: none"> 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. 	<p>AVERTISSEMENT</p> 	<p>RISQUE D'EXPLOSION</p> <ul style="list-style-type: none"> 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 inadapte à une utilisation en environnement de Classe I, Division 2. S'assurer que l'environnement est classé non dangereux avant de changer les piles.

ControlNet Adapter, Cat. No. 1794-ACN15 and 1794-ACNR15



Component Identification	
1	ControlNet Adapter Module
2	Indicators
3A	ControlNet network cable BNC connector A
3B	ControlNet network cable BNC connector B (1794-ACNR15 only)
4	ControlNet Node selection thumbwheel switches
5	ControlNet programming terminal connector port
6	Module locking tab
7	+24V dc connections
8	24V common connections
9	Flexbus connector

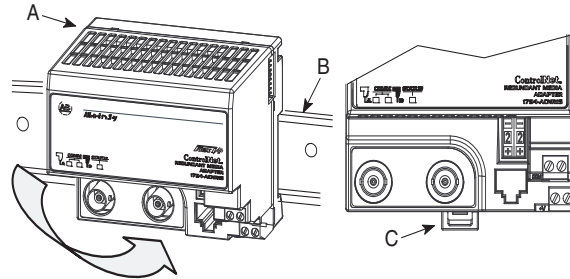
1794-ACN15(K) and 1794-ACNR15(K) Series C, Firmware 4.1, of the FLEX I/O ControlNet Single and Redundant adapters allow the 1794-ACN15(K) and 1794-ACNR15(K) to talk with the 1794-OB32 module. (Previous versions of the 1794-ACN15 and -ACNR15 adapters would not properly communicate with the new 1794-OB32 module.)

This version of the 1794-ACN15(K) and -ACNR15(K) adapters changed how the adapter firmware is displayed in RSNetwork for ControlNet (Rev 3.0 and earlier). Previous versions of the adapters displayed an alpha for the firmware version

(C/F = major firmware revision C [3] , minor firmware revision F [6]). This current release will display the firmware revision numerically. (Ex. 4.1 = major firmware revision 4, minor firmware revision 1). The Series remains unchanged as Series C.

Customers using RSNetwork for ControlNet (Revision 3.21 or later) will see all current and previous versions of 1794-ACN15 and -ACNR15 adapter firmware displayed numerically.

Installing Your ControlNet Adapter Module



ATTENTION



During mounting of all devices, be sure that all debris (metal chips, wire strands, etc.) is kept from falling into the module. Debris that falls into the module could cause damage on power up.

Mounting on a DIN rail before installing the Terminal Base Units

- Position the ControlNet adapter module (A) on a 35 x 7.5mm DIN rail (B) at a slight angle.
- Hook the lip on the rear of the adapter onto the top of the DIN rail, and rotate the adapter module onto the rail.
- Press the adapter module down onto the DIN rail until flush. Locking tab C will snap into position and lock the adapter module to the DIN rail.
- If the adapter module does not lock in place, use a screwdriver or similar device to move the locking tab down while pressing the adapter module flush onto the DIN rail, and release the locking tab to lock the adapter module in place. If necessary, push up on the locking tab to lock.
- Connect the adapter wiring as shown under "Wiring" later in this document.

Panel/Wall Mounting

If mounting this adapter to a panel or wall, refer to publication 1794-5.13, "Panel Mounting Kit, Cat. No. 1794-NM1."

Mounting (or Replacing) the Adapter on an Existing System

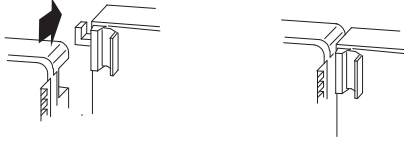
- Disconnect any wiring jumpered to the adjacent terminal base.
- Disconnect the BNC connector(s) from the front of the adapter

WARNING



If you connect or disconnect the ControlNet 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 installations. Be sure that power is removed or the area is nonhazardous before proceeding.

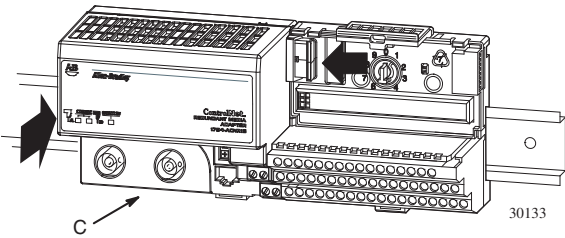
- Open the module latching mechanism and remove the module from the base unit to which the adapter will be attached.
- Push the flexbus connector toward the right side of the terminal base to unplug the backplane connection.
- Release the locking tab and remove the adapter module.
- Before installing the new adapter, notice the notch on the right rear of the adapter. This notch accepts the hook on the terminal base unit. The notch is open at the bottom. The hook and adjacent connection point keep the terminal base and the adapter tight together, reducing the possibility of a break in communication over the backplane.



- Complete the adapter mounting as shown below.

Push down and in at the same time to lock the adapter to the DIN rail.

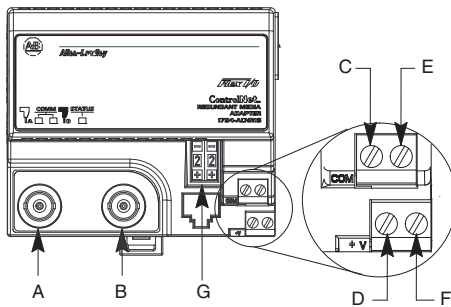
If the adapter does not lock in place, use a screwdriver or similar device to move the locking tab down while pressing the adapter flush onto the DIN rail, and release the locking tab to lock the adapter module in place. If necessary, push up on the locking tab to lock.



When the adapter is locked onto the DIN rail, **gently** push the flexbus connector into the adapter to complete the backplane

- Reinstall the module in the adjacent terminal base unit.

Connecting Wiring



- Connect the ControlNet network cable to connector, terminal A.
- 1794-ACNR15 only - Connect the redundant ControlNet network cable to connector B.

WARNING



If you connect or disconnect the ControlNet 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 installations. Be sure that power is removed or the area is nonhazardous before proceeding.

ATTENTION

When connecting wiring, torque terminal screws C, D, E and F to 7 pound-inches (0.8Nm).



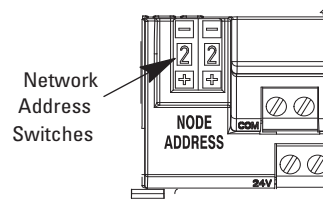
- Connect +V dc power to the left side of the lower connector, terminal D.

ATTENTION

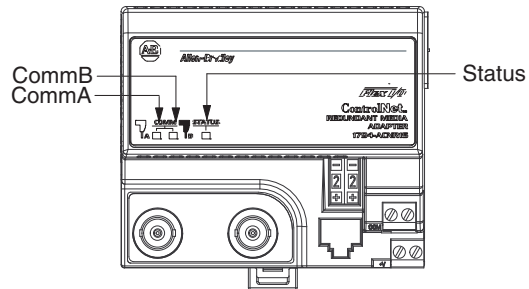
Power wiring must be less than 9.8 ft. (3 meters) in length.



- Connect -V common to the left side of the upper connector, terminal C.
- Connections E and F are used to pass +V dc power (F) and -V common (E) to the next module in the series (if required).
- Set the network address using the 2-button thumbwheel switch G. Valid settings range from 01 to 99. Press either the + or - buttons to change the number.



Indicators



LED Indications	Probable Cause
Comm A and Comm B Simultaneously	
Off	No power, or reset
Red	Adapter inoperative
Red/Green - flashing alternately	Adapter self-test
Red/Off - flashing alternately	Bad node configuration (duplicate address)
Comm A or Comm B (individually)	
Off	Channel disabled
Green	Channel operational
Flashing Green/Off	Temporary network errors
Flashing Red/Off	Cable fault, broken cable, redundancy warning
Flashing Red/Green	Bad network configuration

LED Indications	Probable Cause
Status Indicator	
Off	No power
Flashing Green	On-line but not connected
Green	On-line, link okay, connected
Flashing Red	I/O module removed, wrong I/O module inserted, FLASH program update in progress
Red	Critical - adapter failure

Specifications

Specifications - Cat. No. 1794-ACN15 and -ACNR15	
I/O Capacity	8 modules
Input Voltage Rating	24V dc nominal 19.2V to 31.2 V dc (includes 5% ac ripple)
Current Draw	450mA maximum; 330mA @ 24V dc
Inrush Current	23A for 2ms
Communication Rate	5M bps
Indicators	I/O Status - red/green Comm A - red/green Comm B - red/green
Flexbus Output Current	640mA maximum
Isolation Voltage	Tested at 850V dc for 1s between user power and flexbus
Power Dissipation	4.6W maximum @ 19.2V dc
Terminal Screw Torque	7 pound-inches (0.8Nm)
Dimensions	3.4H x 3.7W x 2.7D inches 87H x 94W x 69D mm

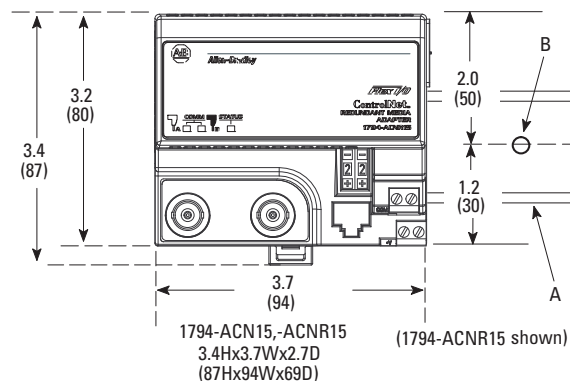
General Specifications

Environmental Conditions	
Operating 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): 0 to 55°C (32 to 131°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 to 85°C (-40 to 185°F)
Relative Humidity	IEC 60068-2-30 (Test Db, Un-packaged Non-operating Damp Heat): 5 to 95% non-condensing
Vibration	IEC60068-2-6 (Test Fc, Operating): 5g @ 10-500Hz
Shock	IEC60068-2-27 (Test Ea, Unpackaged shock): Operating 30g Non-operating 50g
Emissions	CISPR 11: Group 1, Class A (with appropriate enclosure)
ESD Immunity	IEC 61000-4-2: 4kV contact discharges 8kV air discharges
Radiated RF Immunity	IEC 61000-4-3: 10V/m with 1kHz sine-wave 80%AM from 30MHz to 1000MHz 10V/m with 200 50% Pulse 100% AM at 900MHz
EFT/B Immunity	IEC 61000-4-4: ±2kV at 5kHz on communication ports
Surge Transient Immunity	IEC 61000-4-5: ±2kV line-earth(CM) on shielded ports
Conducted RF Immunity	IEC 61000-4-6: 10Vrms with 1kHz sine-wave 80%AM from 150kHz to 30MHz
Enclosure Type Rating	None (open-style)
Conductors Wire Size	22-12AWG (0.34mm ² -2.5mm ²) stranded copper wire rated at 75°C or higher 3/64 inch (1.2mm) insulation maximum
Category ¹	2

ControlNet Cable	Belden RG-6/U
Certifications (when product is marked) ²	cULus UL Listed Industrial Control Equipment, certified for US and Canada UL UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations cUL UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, certified for Canada CSA CSA certified Process Control Equipment CSA CSA certified for Class I, Division 2, Groups A, B, C and D Hazardous locations EEx² European Union 94/9/EEC ATEX Directive, compliant with: EN 50021; Potentially Explosive Atmospheres, Protection "n" (Zone 2) CE² 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-Tick² Australian Radiocommunications Act compliant with AS/NZS CISPR 11, Industrial Emissions

- You use this category information for planning conductor routing as described in Allen-Bradley publication 1770-4.1, Industrial Automation Wiring and Grounding Guidelines.
- For the latest up-to-date information, see the Product Certification link at www.ab.com for Declarations of Conformity, Certificates and other certification details. For notification of any additional release notes, refer to www.ab.com/manuals/.

Mounting Dimensions



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