



## *Installation Instructions*

# FLEX Ex Bus Isolator and Flexbus Connector

(Cat. No. 1797-BIC, -CEC)

### **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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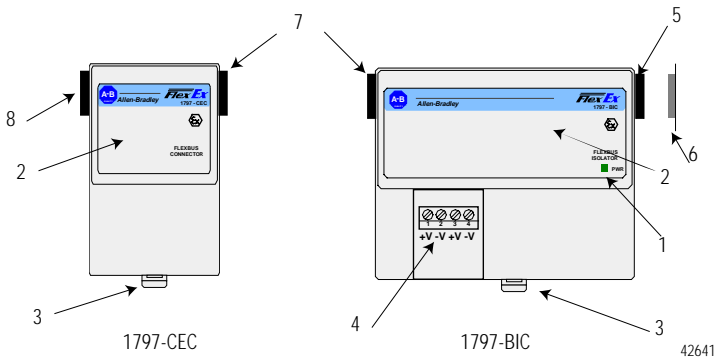
Throughout this manual we use notes to make you aware of safety considerations.

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### Important User Information

<p><b>WARNING</b></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><b>IMPORTANT</b></p>	<p>Identifies information that is critical for successful application and understanding of the product.</p>
<p><b>ATTENTION</b></p> 	<p>Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you:</p> <ul style="list-style-type: none"> <li>• identify a hazard</li> <li>• avoid a hazard</li> <li>• recognize the consequence</li> </ul>
<p><b>SHOCK HAZARD</b></p> 	<p>Labels may be located on or inside the drive to alert people that dangerous voltage may be present.</p>
<p><b>BURN HAZARD</b></p> 	<p>Labels may be located on or inside the drive to alert people that surfaces may be dangerous temperatures.</p>



Use the FLEX Ex™ bus isolator to interconnect standard FLEX I/O™ modules to intrinsically safe FLEX Ex modules in the same I/O group.

Component Identification	
1	Indicators
2	Label
3	Module locking tab
4	Removable power connector
5	FLEX Ex backplane connector
6	FLEX Ex backplane connector cover
7	Master backplane connector
8	FLEX I/O backplane connector

## Product Features

- Provides an IS-compatible mechanism to separate two sections of the backplane allowing IS and non-IS field-device wiring to the same I/O group
- Converts hazardous power to IS-safe power to run one side of the bus receiver/transmitter circuitry and IS-safe FLEX Ex backplane power to slave side modules
- Up to eight FLEX Ex modules may be attached to the slave side

## Intermixed Systems

The bus isolator modules, 1797-BIC and -CEC, allow you to configure FLEX Ex modules and FLEX I/O modules on the DIN rail when attached to the same adapter and grouped together on appropriate sides of the bus isolator module. This highly flexible, cost-effective solution combines intrinsically safe and non-intrinsically safe systems.

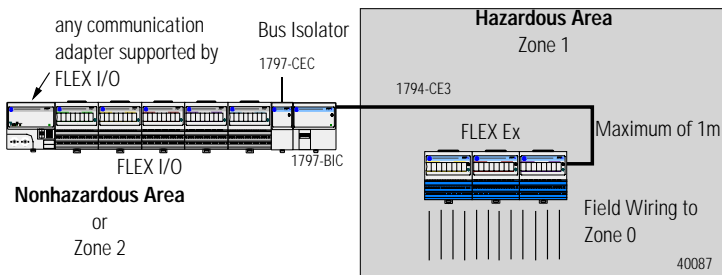
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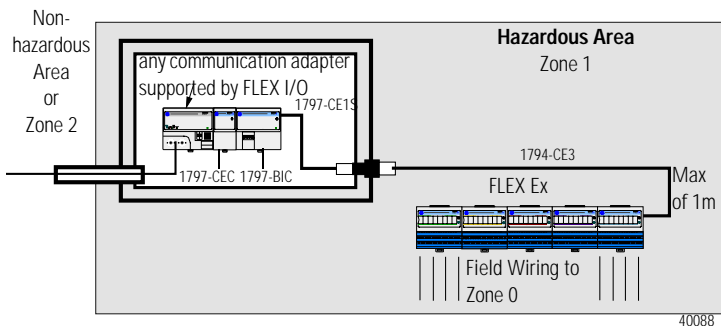
Intermixed systems can be configured for use in the:

- safe area much like traditional IS and I/O systems
- hazardous and safe control equipment where the distance of physical separation is short
- FLEX Ex I/O with communication adapters that are not intrinsically safe

### Mixing Systems in the Safe Area



### Mixing Systems in the Hazardous Area



**Note:** A maximum of one 1794-CE1 cable or one 1794-CE3 cable can be attached onto the 1797-BIC module.

Use the appropriate connection on the explosion-proof enclosure:

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**For Metric Threads on the Connector:**

<b>Part Number</b>	<b>Manufacturer</b>
RS-FEED.M	Pepperl+Fuchs
07-9109-99979XP1	Bartec

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**For NPT Threads on the Connector:**

<b>Part Number</b>	<b>Manufacturer</b>
RS-FEED.NPT	Pepperl+Fuchs
07-9199-99979XP1	Bartec

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## Module Installation

**ATTENTION**



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.

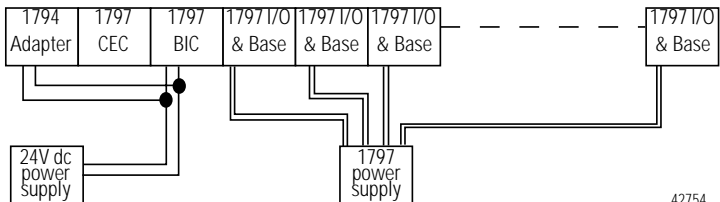
These Products are grounded through the DIN rail to the dedicated intrinsic safety ground. Use zinc plated yellow-chromate steel DIN rail to assure proper grounding. The use of other DIN rail materials (e.g. aluminum, plastic, etc.) that can corrode, oxidize, or are poor conductors, can result in improper or intermittent grounding.

Make certain that you only connect the FLEX Ex backplane connector to other intrinsically safe system modules to maintain the integrity of the intrinsically-safe backplane.

**ATTENTION**



For proper operation, cycle power to the 1797-BIC at the same time power is cycled to the associated adapter.

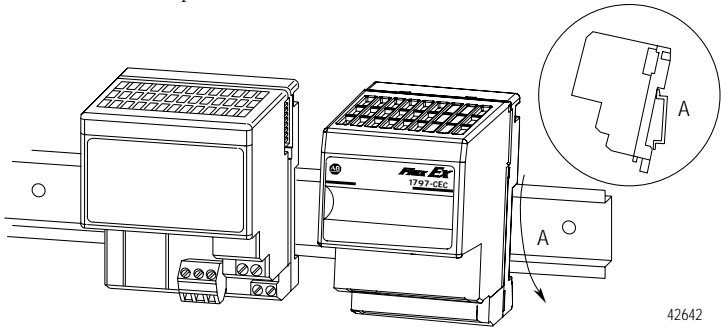


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## 1797-CEC Module Installation

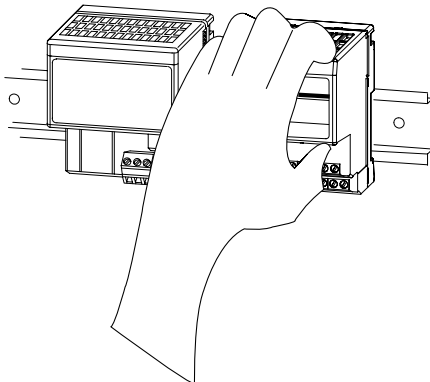
The 1797-CEC module mounts on a DIN rail. It connects to an adapter or another FLEX I/O module. **Note:** If using this module with FLEX I/O modules, do not mount between FLEX I/O modules. Mount the 1797-CEC module to the right of FLEX I/O modules. To mount this module:

1. Remove the cover plug (if used) in the male connector of the unit to which you are connecting this module.
2. Position the module on the 35 x 7.5mm DIN rail **A** (A-B pt. no. 199-DR1).
3. Rotate the module onto the DIN rail with the top of the rail hooked under the lip on the rear of the module.



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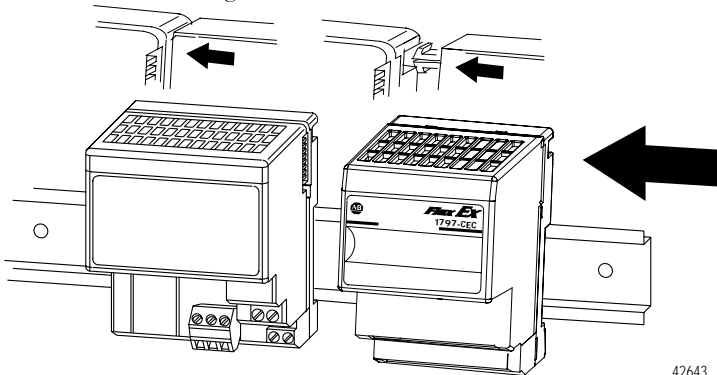
4. Press down to lock the module on the DIN rail.



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If the module does not lock in place, use a screwdriver of similar device to move the locking tab down, press the module flush with the DIN rail and release the locking tab to lock the module in place.

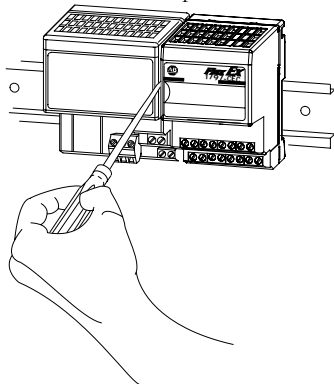
5. Firmly push the module into the adjacent module/terminal base until the units lock together.



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6. To remove the 1797-CEC module, you must work from the right side and remove one module at a time. To disengage a module from its neighbor, place a common flat-bladed screwdriver between the two modules and turn 1/4 turn to separate the modules.



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7. Then slide the module away from its left neighbor, and release the locking lever to remove the module from the DIN rail.

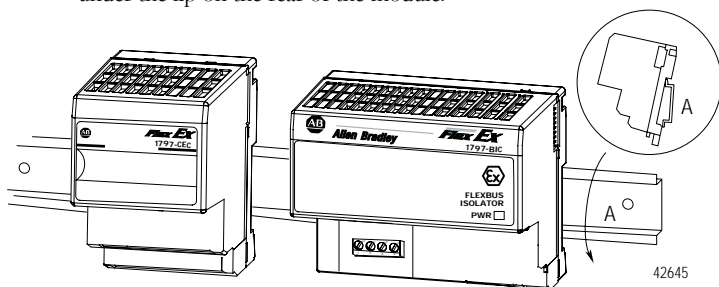
### 1797-BIC Module Installation

The 1797-BIC module mounts on a DIN rail. It connects to a 1797-CEC module.

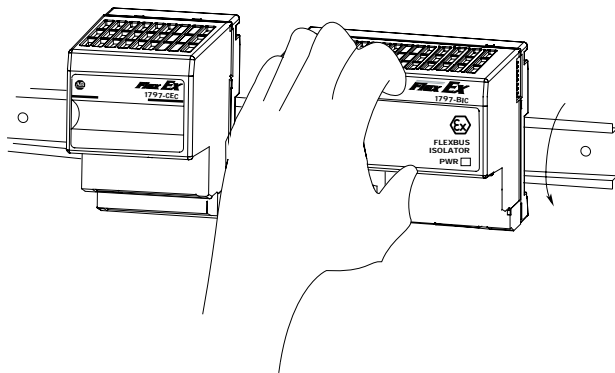
1. Remove the cover plug (if used) in the male connector of the unit to which you are connecting this module.
2. Position the module on the 35 x 7.5mm DIN rail **A** (A-B pt. no. 199-DR1).

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3. Rotate the module onto the DIN rail with the top of the rail hooked under the lip on the rear of the module.

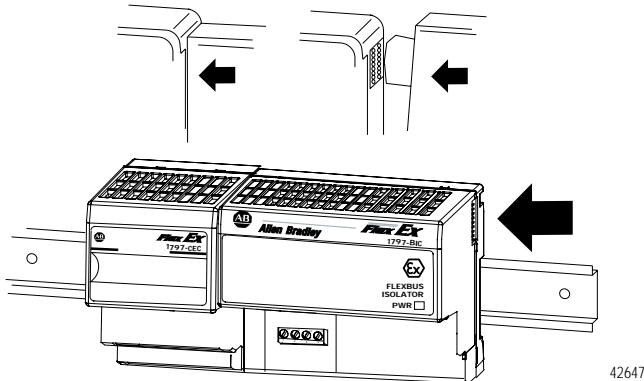


4. Press down to lock the module on the DIN rail.



If the module does not lock in place, use a screwdriver of similar device to move the locking tab down, press the module flush with the DIN rail and release the locking tab to lock the module in place.

- Firmly push the module into the adjacent module/terminal base until the units interconnect.



- Install DIN rail locks (supplied with the 1797-BIC module) to meet shock and vibration specifications as listed on page 19.
- To remove the 1797-BIC, remove the DIN rail locks and then slide the module away from its left neighbor, and release the locking lever to remove the module from the DIN rail.

**WARNING**

Do not remove the 1797-CEC or -BIC under power. Remove these modules under power will break the electrical backplane (flexbus) connections. This can cause personal injury or property damage by:

- sending an erroneous signal to your system's field devices causing unintended machine motion
- causing an explosion in a hazardous environment
- breaking communication to modules beyond this module

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### Installation in Zone 1

The 1797-CEC and -BIC must not be exposed to the environment. These modules have a protection factor of IP20. Provide a suitable metal enclosure.

**WARNING**



The 1797-BIC cannot be used as an associated apparatus after its FLEX Ex backplane connector has been exposed to non-intrinsically safe signals.

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### Installation in Zone 22

When the modules are installed in Zone 22, the following cabinets must be used: IVK-ISRPI-V16LC; IVK-ISRPI-V8HYW; or IVK-ISRPI-V8LC. These cabinets can be purchased from:

Pepperl+Fuchs GmbH  
Königsberger Allee 85-87, D-68307  
Mannheim, Germany  
Attn: PA Sales Dept.  
Kirsten Becker  
Telephone +49 776 1298  
www.pepperl-fuchs.com

The IS-RPI cabinets (type IVK2-ISRPI-V8LC, IVK2-ISRPI-V8HYW, or IVK2-ISRPI-V16LC) ensures the basic protection for the intrinsically safe apparatus of the IS-RPI system for use in Zone 22. It corresponds with category 3D according to RL 94/9 EG and with the type label marked with the following information:

Pepperl+Fuchs GmbH  
68301 Mannheim  
IVK2-ISRPI-V8LC (or IVK2-ISRPI-V8HYW or  
IVK2-ISRPI-V16LC)  
⊕ II 3D IP54 T 70°C  
CE  
Serial (manufacturing) number  
Model

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## Electrostatic Charge

Protect the system against electrostatic charge. Post a sign near this module: **Attention! Avoid electrostatic charge.** For your convenience, a sign which can be cut out is included in this installation instruction.

## Removal and Insertion Under Power

**WARNING**

These modules are designed so you can **remove and insert them under power**. However, take special care when removing or inserting modules in an active process. I/O attached to any module being removed or inserted can change states due to its input/output signal changing conditions.

If you insert or remove the terminal base while backplane 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.

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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

The 1797-BIC is tested to meet the Council Directive 89/336/EEC Electromagnetic Compatibility (EMC) as amended by 92/31/EC and 93/68/EEC, by applying the following standards:

- EN 61000-6-4:2001, Electromagnetic Compatibility (EMC) - Part 6-4: Generic Standard for Industrial Environments (Class A)
- EN 61000-6-2:2001, Electromagnetic Compatibility (EMC) - Part 6-2: Generic Standards - Immunity for Industrial Environments
- EN61326-1997 + A1-A2, Electrical Equipment For Measurement, Control, and Laboratory Use - Industrial EMC Requirements

## **ATEX Directive**

The 1797-BIC is tested to meet the Council Directive 94/9/EC (ATEX) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres by applying the following standards:

- EN50014:1997 + A1-A2, Electrical Apparatus for Potentially Explosive Atmospheres
- EN50020:1994, Electrical Apparatus for Potentially Explosive Atmospheres - Intrinsic Safety “i”
- EN50281-1-1:1998 + A1, Electrical Apparatus for Use in the Presence of Combustible Dust - Part 1-1: Protection by Enclosure

The 1797-CEC is tested to meet the Council Directive 94/9 EC (ATEX) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres by applying the following standards:

- EN50021:1999, Electrical Apparatus for Potentially Explosive Atmospheres - Type of Protection “n”

## **FM Compliance**

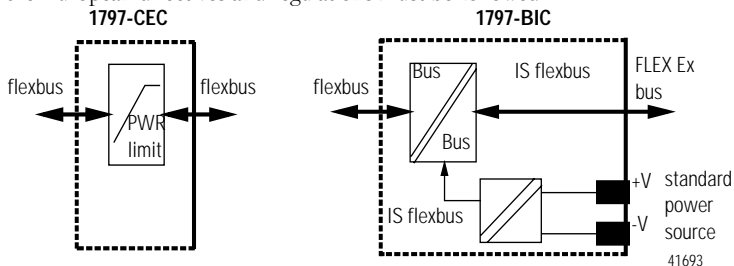
If this product has the FM mark, it has been designed, evaluated, tested, and certified to meet the following standards:

- FM C1. No.3600:1998, Electrical Equipment for Use in Hazardous (Classified) Locations General Requirements
- FM C1. No.3610:1999, Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III Division 1 Hazardous (Classified) Locations
- FM C1. No.3615:1989, Explosionproof Electrical Equipment General Requirements
- FM C1. No.3810:1989, 1995, Electrical and Electronic Test, Measuring and Process Control Equipment
- ANSI/NEMA 250, 1991, Enclosures for Electrical Equipment

## Inputs/Outputs

Do not apply any non-intrinsically safe signals to the FLEX Ex backplane connector.

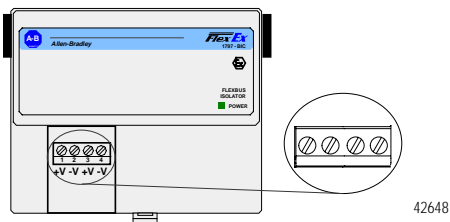
When using as an intrinsically safe electrical apparatus according to EN50020, the European directives and regulations must be followed.



## Wiring

### ATTENTION

When connecting wiring, torque terminal screws to 7-9 inch-pounds.



### WARNING

Make certain that you power this device with normal 24V dc. Do not use an intrinsically safe power supply, such as the 1797-PS2E or -PS2N, to power this module.

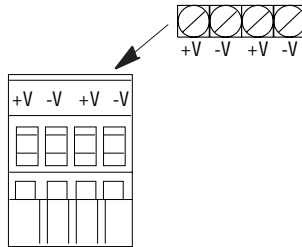


If you connect or disconnect wiring while the field-side power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

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1. Apply +V and -V power (24V dc) to the adapter through a removable terminal block.



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Screw terminals and spring terminals are provided.

2. Strip the +V and -V wires to a length so no bare conductor shows after inserting the wires into position (+V, -V).
3. If you are using the spring terminals of the plug, insert a screwdriver into the slot and *carefully* pry until the spring clamp opens to accept the wire.
4. Connect either a 1797-TB3 module, a 1794-CE1 or a 1794-CE3 cable onto the FLEX Ex backplane connector of the 1797-BIC module.

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### ATTENTION



The FLEX Ex backplane connector cover must remain in place until a FLEX Ex terminal base or cable is connected to the 1797-BIC module.

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## Indicators

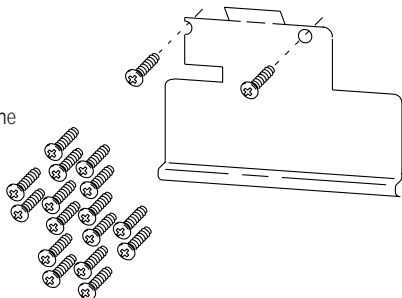
The 1797-BIC module provides a LED indicating power has been applied to the module.



## About the Mounting Kit

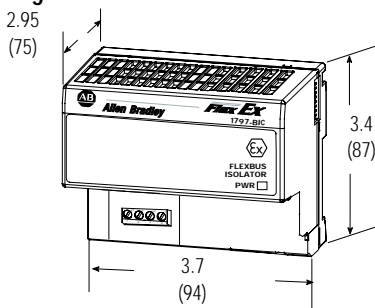
Use the optional 1794-NM1 mounting kit to mount your system on a panel or wall without a DIN rail.

1794-NM1  
Mounting Kit with  
18 screws (2 screws for the  
adapter and 2 screws for  
each module)



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## 1797-BIC Mounting Dimensions



Inches  
(Millimeters)

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### ATTENTION



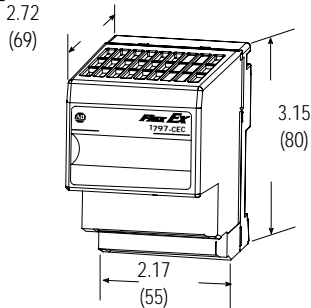
The DIN rail or mounting bracket must be appropriately connected to the dedicated intrinsic safety ground.

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## Repair

The 1797-BIC is not field-repairable. Any attempt to open the module will void its warranty and the IS certification. If repair is necessary, return the module to the manufacturer.

## 1797-CEC Mounting Dimensions



Inches  
(Millimeters)

41413

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**ATTENTION**



The DIN rail or mounting bracket must be appropriately connected to the dedicated intrinsic safety ground.

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## Repair

The 1797-CEC is not field-repairable. Any attempt to open the module will void its warranty. If repair is necessary, return the module to the manufacturer.


**1797-BIC Specifications**

I/O Module Capacity	8 FLEX Ex modules <sup>1</sup>
Indicators	Power green
Isolation Path Flexbus to Flexbus Flexbus Slave Side to Power Supply	Galvanic to DIN EN50020 Galvanic to DIN EN50020
Power Consumption	18V - 32V dc @ 0.15A
Power Source Failure Maximum Input	$U_m = 253V$ ac
Power Dissipation	2.1W
Thermal Dissipation	7.2 BTU/hr
IS Module Type	[EEx ib] IIC
Conductor Wire Size	12 gauge (4mm <sup>2</sup> ) stranded maximum 3/64in (1.2mm) insulation maximum
Weight	Approximately 200g
Environmental Conditions	
Operational Temperature	-20 to 70°C (-4 to 158°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)
Relative Humidity	5 to 95% noncondensing
Shock Operating	Tested 30g peak acceleration, 11 (±1)ms pulse width
Non-Operating	Tested 30g peak acceleration, 11 (±1)ms pulse width
Vibration	Tested 5g @ 10-500Hz per IEC 68-2-6
Output (Intrinsically Safe) (16 pin male and female flexbus connector) CENELEC	$U_o \leq 5.75V$ dc $I_o \leq 400mA$ $P_o \leq 2.05W$ $L_o \leq 100\mu H$ $C_o \leq 39\mu F$
Output (Intrinsically Safe) (16 pin male and female flexbus connector) FM	$V_i \leq 5.75V$ dc $I_t \leq 398.25mA$ $C_a \leq 39.67\mu F$ $L_a \leq 210\mu H$

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### 1797-BIC Specifications (Continued)

Agency Certification	
CENELEC	II (2)G [EEx ib] IIC II (2D)
FM	Nonincendure, use for Class I, Division 2 Groups A-D or Class I, Zone 2 Group IIC Provides intrinsically safe outputs to Class I, Division 1 Groups A-D or Class I, Zone 1 Group IIC
Certificates	
CENELEC	DMT 00 ATEX E056
FM	FM Certificate Number 3010810 
Declaration of Conformity	
Directive 94/9 EC	Zone 2 II 3G EEx nA IIC T4 X

- 1 A total of eight I/O modules can be attached to a 1794 FLEX I/O adapter. The 1797-CEC and -BIC are not included in this number. In intermixed systems, the number of 1797 FLEX Ex I/O modules (attached onto the 1797-BIC) plus the number of 1794 FLEX I/O modules (connected between the adapter and the 1797-CEC) cannot exceed eight.

**1797-CEC Specifications**

Indicators	Not applicable
Weight	Approximately 100g
Environmental Conditions	
Operational Temperature	-20 to 70°C (-4 to 158°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)
Relative Humidity	5 to 95% noncondensing
Shock Operating	Tested 30g peak acceleration, 11 (±1)ms pulse width
Non-Operating	Tested 30g peak acceleration, 11 (±1)ms pulse width
Vibration	Tested 5g @ 10-500Hz per IEC 68-2-6
Agency Certification	
FM	Nonincendure, use for Class I, Division 2 Groups A-D or Class I, Zone 2 Group IIC
Certificates	
FM	FM Certificate Number 3010810 
Declaration of Conformity	
Directive 94/9 EC	Zone 2 II 3G EEx nA IIC T4 X

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### CENELEC Information

The isolator type 1797-BIC/\* is an associated apparatus according to EN 50020. If the isolator is connected to intrinsically safe circuits the applicable national local construction, installation and operating regulations must be heeded (in Germany DIN EN 50020, DIN VDE 0165).

### FM Information

Diagram 1

Nonhazardous or Hazardous  
(Classified) Location  
Class I, Zone 2, Group IIC or  
Class I, Division 2, Groups A-D

Nonhazardous or Hazardous  
(Classified) Location  
Class I, Zone 1, Group IIC or  
Class I, Division 1, Groups A-D

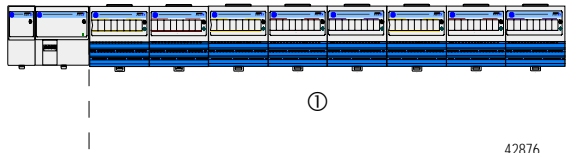
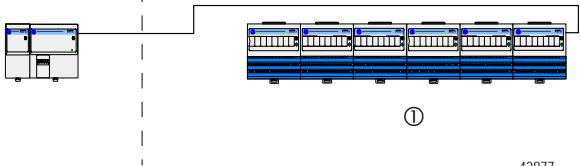


Diagram 2

Nonhazardous or Hazardous  
(Classified) Location  
Class I, Zone 2, Group IIC or  
Class I, Division 2, Groups A-D

Nonhazardous or Hazardous  
(Classified) Location  
Class I, Zone 1, Group IIC or  
Class I, Division 1, Groups A-D



Isolator	Restriction
1797-BIC and -CEC	Maximum of 8 I/O modules <sup>Ⓞ</sup>

Ⓞ I/O module capacitance value is cumulative.  $C_i$  (total) =  $C_i$  (I/O module 1) +  $C_i$  (I/O module 2) + ... $C_i$  (I/O module 8).  $C_i$  (total) must be less than 65F. The limitation of eight I/O modules per isolator is a functional limitation. Refer to table 2 of the appropriate I/O Modules sections in this document (1797-6.5.6).

## Application

The isolator type 1797-BIC/\* functions as a galvanic isolation barrier for signals between a non-intrinsic backplane bus and an intrinsic safe backplane bus. The isolator must be installed in a safe or Zone 2 area.

## Cover Plug for IS Backplane Bus

The 16-pole male connector for the FLEX Ex IS backplane bus is provided with a cover plug. The cover plug can only be removed when a 1797-TB3 terminal base, a 1794-CE1 or a 1794-CE3 cable is connected. The connection must not be connected to any signals which exceed the intrinsically safe values of the IS backplane.

## Power Supply

The isolator is powered via a removable terminal connector with a dc-voltage between 18V and 32V. Due to a failure in the power supply a maximum voltage  $U_m$  of 253V ac is permitted.

### IMPORTANT

For detailed certification information, refer to the FLEX Ex System Certification Reference Manual, publication 1797-6.5.6.

**Attention: Avoid electrostatic charge.**

## Rockwell Automation Support

Rockwell Automation provides technical information on the web to assist you in using our 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 our 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.

ControlNet is a trademark of ControlNet International.

ControlNet Ex is a trademark of Rockwell Automation.

[www.rockwellautomation.com](http://www.rockwellautomation.com)

### Corporate Headquarters

Rockwell Automation, 777 East Wisconsin Avenue, Suite 1400, Milwaukee, WI, 53202-5302 USA, Tel: (1) 414.212.5200, Fax: (1) 414.212.5201

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Europe: Rockwell Automation SA/NV, Vorstlaan/Boulevard du Souverain 36-BP 3A/B, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640  
Asia Pacific: Rockwell Automation, 27/F Citicorp Centre, 18 Whitfield Road, Causeway Bay, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

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