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LISTEN.
THINK.
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FLEXI/O AND FLEX EX

SELECTION GUIDE





ALLEN-BRADLEY • ROCKWELL SOFTWARE

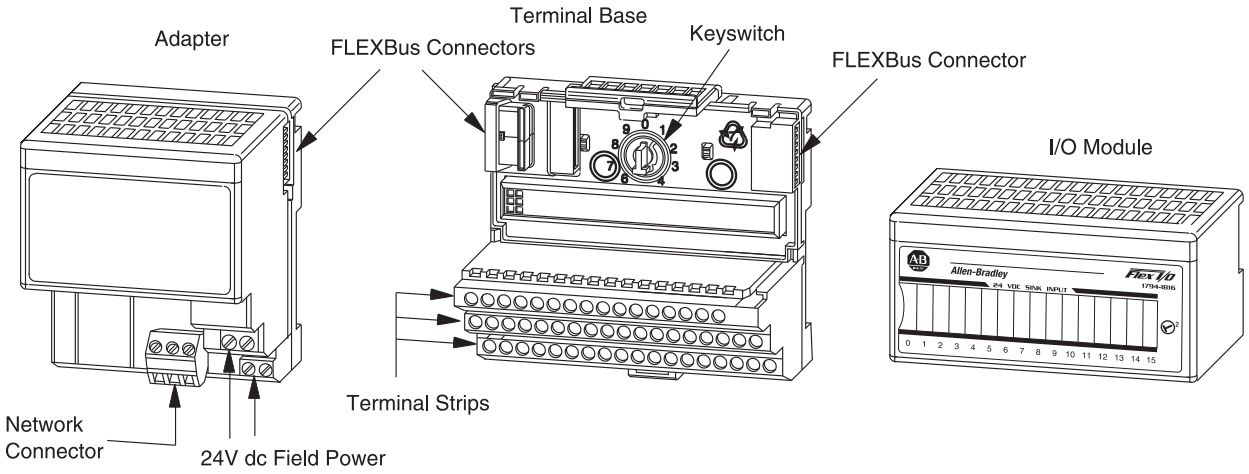
Rockwell Automation

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FLEX I/O Overview

FLEX I/O offers:

FLEX I/O complements all of our processor platforms and acts as local I/O for FlexLogix controllers, creating a tightly integrated control and I/O solution.



Flexible, low-cost, modular I/O for distributed applications. FLEX I/O offers all the functions of larger, rack-based I/O without the space requirements. Independently select the I/O, termination style, and network to meet your application needs.

Two separate connection terminals for field power let you daisy-chain power connections to adjacent terminal bases.

One adapter communicates with up to eight I/O modules. Allows connection to:

- 256 digital input/output points, or
- 96 analog input/output points, or
- mix of I/O to meet your needs.

Modularity of FLEX I/O system provides choice of network and ease of expansion.

The wiring terminations are done almost entirely on the terminal base.

Terminal base termination selection includes screw-clamp, spring-clamp, and cage-clamp to wire directly to 2-, 3-, or 4-wire devices. Additional options of D-shell, knife disconnect, and fused are available.

Adjustable keyswitch prevents incorrect module insertion into a preconfigured terminal base.

Terminal bases can be exchanged without moving other bases in your system.

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If desired, connect individual power supplies to each base to isolate modules.

Plug the I/O module into the terminal base to connect the I/O bus and field devices.

Remove and insert modules under power. No direct wiring to the module enables you to change modules without disturbing field wiring or system power.

Mix and match I/O modules. Wide variety of digital, analog, and specialty modules.

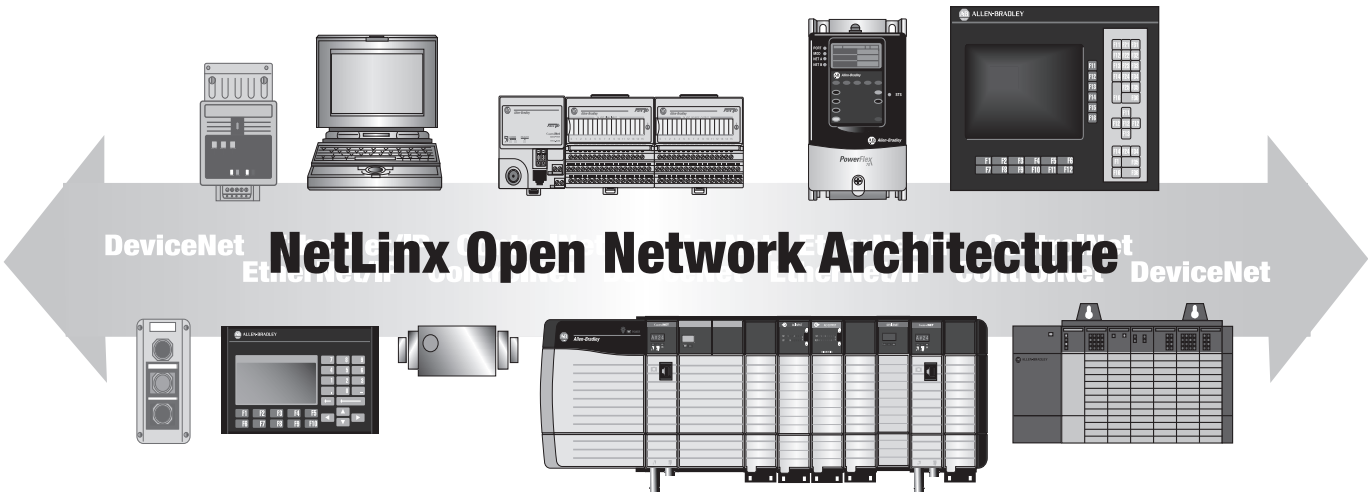
Conformal coating available in select FLEX I/O products.

Each FLEX I/O system contains at least one adapter, terminal base, and I/O module. You can power the system with a FLEX power supply (1794-PS13 or -PS3) or any other compatible power source. Use the terminal block on the terminal base to wire your field devices directly. Wiring directly saves you:

- installation and testing time
- multiple, long wiring runs and external terminal blocks
- control cabinet panel space

FLEX I/O provides additional savings if system problems develop. Combining your field-wiring terminations and the I/O interface into the same location saves you time and money by making your system easier to maintain and troubleshoot. Additionally, the full-featured FLEX I/O system lets you, in non-hazardous location, remove and insert modules under backplane power without disrupting your system.

Your FLEX I/O system can communicate on EtherNet/IP, ControlNet, DeviceNet, and many other open networks including, but not limited, to Remote I/O, PROFIBUS DP, and Interbus-S. Adapters and other components are available for adding to your system as your specific application requirements change.



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FLEX I/O General Specifications

The following specifications apply to all FLEX I/O adapters, modules, and terminal bases. For all other specifications, refer to the specific product catalog number sections in this selection guide.

✦

Operating Temperature	0…55 °C (32…131 °F)
Non-Operating Temperature	-40…85 °C (-40…185 °F)
Relative Humidity	5…95% non-condensing
Shock, Operating⌘✶	30 g peak acceleration, 11(±1) ms pulse width✶
Shock, Non-Operating⌘	50 g peak acceleration, 11(±1) ms pulse width
Vibration	Tested 5 g @ 10…500 Hz per IEC 68-2-6❄
Wire Size	22…12 AWG (0.34 mm^2…2.5 mm^2) stranded copper wire rated at 75 °C or higher 3/64 in (1.2 mm) insulation max.❄
Certifications‡	UL Listed Industrial Control Equipment UL Listed for Class I, Division 2 Groups A, B, C, D Hazardous Locations CE Marked for all applicable directives CE / ATEXT CSA Certified Process Control Equipment for Class I, Division 2 Group A, B, C, D Hazardous Locations C-Tick Marked for all applicable acts Marine Certification SIL 2 Certification ODVA ControlNet

✶ 1794-OW8 = 12 g peak acceleration, 11(±1) ms pulse width.
❄ 1794-OW8 = Tested 2 g @ 10…500 Hz per IEC 68-2-6.
‡When product is marked.
§See the CE Marking - Declaration of Conformity (DoC) web site for details and a list of certified products.
♣See the Certification for Marine and Off-shore Applications web site for details and a list of certified products.
➤See the SIL 2 web site for details and a list of certified products.
⌘To maintain these specifications, you must use DIN Rail locks.
✦For all other specifications including environmetal, refer to the product sections in this Selection Guide.

Conformal Coated Flex I/O

Selected products in the FLEX I/O product line are available conformally coated as standard, stocked product. Catalog numbers of conformally coated product will include the designation “K” in the last position before the series identifier.

For example: A 1794 IB16/A Module with conformal coating would have the catalog number 1794 IB16K/A.

FLEX I/O’s Conformal Coating meets or exceeds the following standards:

- ANSI / ISA-S71.04-1985; Class G1, G2 and G3 Environments
- CEI IEC 6065A-4; Class 1 and 2 Environments
- UL 746E
- MIL-1-46058C to ASTM-G21; (Tropicalization and fungicide)

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These standards specify common emissions and classify their concentration levels in a number of industrial processes. Just a few of the common reactive agents A-B's Conformal Coating protects against are:

H2S – Hydrogen sulfide

SO2, SO3 – Sulfur dioxide

CnHn – Hydrocarbons

NOx – Oxides of nitrogen

CI2 – Wet Chlorine / Dry Chlorine

NH3 – Ammonia

The following is a list of the conformally coated FLEX I/O products available:

- 1794-ACN15
- 1794-ACNR15
- 1794-ADN
- 1794-ASB
- 1794-IE8
- 1794-IB16
- 1794-IRT8
- 1794-IJ2
- 1794-OB16P
- 1794-OE4
- 1794-OW8
- 1794-TB3
- 1794-TB3G
- 1794-TBN
- 1794-IA8
- 1794-OA8
- 1794-OB8EP

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Specifying a FLEX I/O System

Follow these steps as you specify your FLEX I/O system:

✓	Step	See Page
	1 Select a communication adapter Choose the network for your operating system.	NetLinx Architecture 7 Select a Network 8
	2 Select I/O modules based on field devices • location of the device • your application • number of points needed • number of points available per module • number of modules Or use Integrated Architecture Builder available free at www.ab.com/logix/iab.	Digital 16 Analog 36 Counter 57
	3 Select a terminal base Choose an appropriate terminal base for your modules.	Cross Reference 67 Specifications 69 Wiring Diagrams 70
	4 Select power supplies and ensure sufficient power for the communication adapter and modules If power consumption exceeds the maximum for a single power supply, install additional power supplies.	Requirements and Sizing 81
	5 Determine mounting requirements Determine whether to panel mount or DIN Rail mount the FLEX I/O system and at what orientation (horizontal or vertical).	Mounting 82 Extender Cables 83 Mounting Kit 84 DIN-Rail Locks 84 Label Kit 84
	6 Select software Based on the system design, determine the software products you need to configure and program your application.	Select Software 85 RSLogix 5 Software 86 RSLogix 500 Software 86 RSLogix 5000 Software 86 Network Configuration 87 RSWire Software 88 ABECAD Software 88

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Step 1 - Select:

- *a communication adapter based on the appropriate network*



Selecting FLEX I/O Communication Adapters

A FLEX I/O adapter module interfaces FLEX I/O modules to an I/O scanner port across a communication network. The FLEX I/O adapter module contains a built-in power supply that converts 24V dc to 5V dc for the backplane to power the FLEX I/O modules.

Your 1794 FLEX I/O system can communicate on:

- EtherNet/IP
- ControlNet, single media or redundant
- DeviceNet
- Many other open networks including, but not limited to Remote I/O, PROFIBUS DP, and others from Encompass partners

NetLinx Architecture

NetLinx™ open network architecture is the Rockwell Automation strategy of using open networking technology for seamless, top-floor to shop-floor integration. In the NetLinx architecture — EtherNet/IP, ControlNet, and DeviceNet — speak a common language and share a universal set of communication services. NetLinx architecture, part of the Integrated Architecture, seamlessly integrates all the components in an automation system from the simplest device to the Internet — helping you to improve flexibility, reduce installation costs, and increase productivity.

- EtherNet/IP is an open industrial networking standard that supports implicit and explicit messaging and uses commercial, off-the-shelf Ethernet equipment and physical media.
- ControlNet allows intelligent, high-speed control devices to share the information required for supervisory control, work-cell coordination, operator interface, remote device configuration, programming, and troubleshooting.
- DeviceNet offers high-speed access to plant-floor data from a broad range of plant-floor devices and a significant reduction in wiring.

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Selecting a Network

You can configure your system for information exchange between a range of field devices and a specific scanner. You select the communication adapters for the networks that meet your needs:

Application Requirements	Network✶	Select
• Plant management (material handling • Configuration, data collection, and control on a single, high-speed network • Time-critical applications with no established schedule • Data sent regularly • Internet/Intranet connection	EtherNet/IP	1794-AENT
• High-speed transfer of time-critical data between controllers and I/O devices • Deterministic and repeatable data delivery • Media redundancy	ControlNet	1794-ACN15 or -ACNR15
• Connections of low-level devices to plant floor controllers • More diagnostics for improved data collection and fault detection • Less wiring and reduced start-up time than a traditional, hard-wired system	DeviceNet	1794-ADN
• Connections to the FlexLogix system	—	1794-FLA
• Connections to existing Remote I/O networks	Remote I/O	1794-ASB or -ASB2
• Connections to existing PROFIBUS DP networks	PROFIBUS DP	1794-APB

✶ Communication adapters and other components are available for adding to your system as your specific application requirements change. For more information, go to www.rockwellautomation.com/encompass and search for products under the platform FLEX I/O.

Conformal Coated Products

Conformal coated versions of standard modules have the letter K in the last position of the catalog number, before the series designation. For more information, refer to the FLEX I/O Conformal Coating Brochure publication 1794-BR017.

	Conformal Coated Description
1794-ACN15K	ANSI / ISA-S71.04-1985, Class G1, G2, and G3 environments CEI IEC 6065A-4 Class 1 and 2 environments UL 746E
1794-ACNR15K	
1794-ADNK	
1794-ASBK	

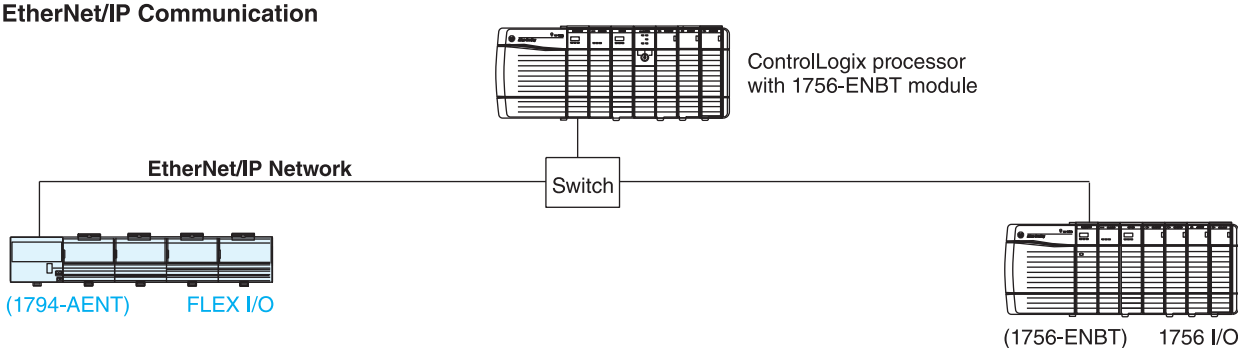
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EtherNet/IP Network

Ethernet Industrial Protocol (EtherNet/IP) is an open industrial networking standard that supports implicit messaging (real-time I/O messaging), explicit messaging (messaging exchange), or both and uses commercial off-the-shelf Ethernet communication chips and physical media.

The 1794-AENT is intended for communicating between FLEX I/O and a ControlLogix controller via EtherNet/IP.

EtherNet/IP Communication



	1794-AENT
I/O Module Capacity	8
Communication Rate	10/100 Mbps
Power Consumption (W) at 24V	9.6 W
Power Dissipation, Max.	7.3 W @ 24V dc
Thermal Dissipation	24.9 BTU/hr @ 24.0V dc
Power Supply 24V Current Load (mA)	450
Power Supply Input Voltage, Nom.	24V dc
Operating Voltage Range	19.2…31.2V dc (includes 5% ac ripple)
Ethernet Interface	RJ-45 Cat. 5
Dimensions (HxWxD), Metric	87 x 94 x 69 mm
Dimensions (HxWxD), Imperial	3.4 x 3.7 x 2.7 in
Certifications	(when product is marked)✶

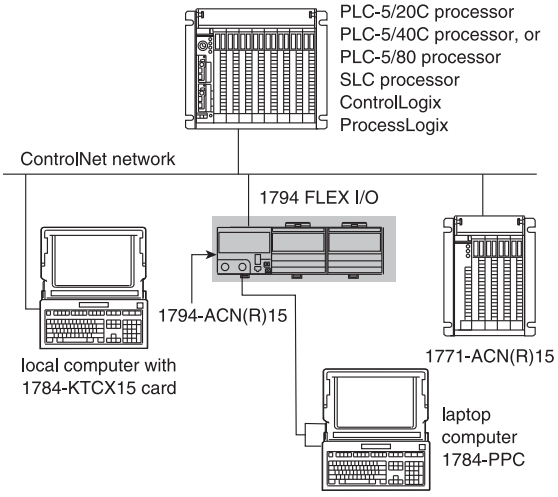
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ControlNet Network

ControlNet is a real-time control network that provides high-speed transport of both time-critical I/O and interlocking data and messaging data, including upload/download of programming and configuration data on a single physical media link. The ControlNet network's highly efficient data transfer capability significantly enhances I/O performance and peer-to-peer communication in any system or application where it is used.

The 1794-ACNR15 adapter is capable of accepting redundant ControlNet cable media. The 1794-ACN15 is a non-redundant version.

The following illustration shows the FLEX I/O platform on a ControlNet network.



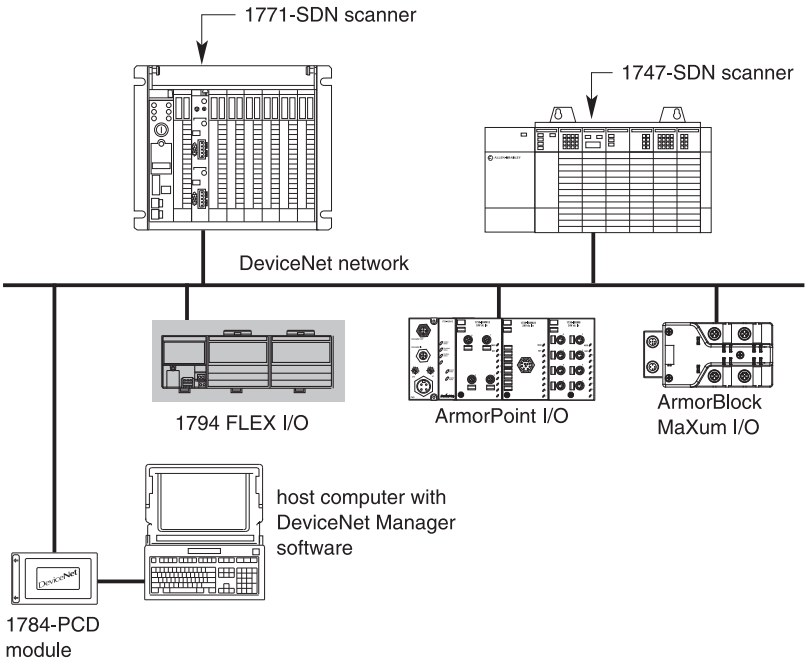
	1794-ACN15 **1794-ACNR15**
I/O Module Capacity	8
Communication Rate	5 Mbps
Power Consumption (W) at 24V	7.9 W
Inrush Current at 24V	23 A for 2 ms
Power Dissipation, Max.	4.6 W @ 19.2V dc
Thermal Dissipation	15.7 BTU/hr @ 19.2V dc
Power Supply 24V Current Load (mA)	330
Power Supply 24V Output Current, Max.	450 mA
Power Supply Input Voltage, Nom.	24V dc
Operating Voltage Range	19.2…31.2V dc (includes 5% ac ripple)
ControlNet Cable	Allen-Bradley RG-6/U Quad Shield Coax, Part No. 1786-RG6 (standard-PVC CM-CL2) or 1786-RG6F/A (high-flex)
Isolation Voltage	Tested at 850V dc for 1 s, user power to system
Dimensions (HxWxD), Metric	87 x 94 x 69 mm (1794-ACN15) 87 x 94 x 69 mm (1794-ACNR15)
Dimensions (HxWxD), Imperial	3.4 x 3.7 x 2.7 in (1794-ACN15) 3.4 x 3.7 x 2.7 in (1794-ACNR15)
Certifications	UL CSA Class I Division 2 certified Groups A, B, C, D certified LCIE Class I Zone 2 Group IIC certified CE ControlNet

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DeviceNet Network

The DeviceNet network is an open low-level network that provides connections between simple industrial devices (such as sensors and actuators) and higher-level devices (such as PLCs and computers). The DeviceNet network uses the proven Common Industrial Protocol (CIP) to provide the control, configure, and data collection capabilities for industrial devices. The DeviceNet network is a flexible network that works with devices from multiple vendors.

The following illustration shows the FLEX I/O platform on a DeviceNet network.



	1794-ADN
I/O Module Capacity	8
Communication Rate	125 Kbps 250 Kbps 500 Kbps
Power Consumption (W) at 24V	7.9 W
Inrush Current at 24V	23 A for 2 ms
Power Dissipation, Max.	4.6 W @ 19.2V dc
Thermal Dissipation	15.7 BTU/hr @ 19.2V dc
Power Supply 24V Current Load (mA)	330
Power Supply 24V Output Current, Max.	450 mA
Power Supply Input Voltage, Nom.	24V dc
Operating Voltage Range	19.2…31.2V dc (includes 5% ac ripple)
DeviceNet Cable	Allen-Bradley part no. 1485C-P1-Cxxx. Refer to publication DN-2.5 for more information. Extended Local Cable: 1794-CE1 (0.3 m) or 1794-CE3 (0.9 m)
Isolation Voltage	Tested at 850V dc for 1 s, user power to system
Dimensions (HxWxD), Metric	87 x 68 x 69 mm
Dimensions (HxWxD), Imperial	3.4 x 2.7 x 2.7 in
Certifications	UL CSA Class I Division 2 certified Groups A, B, C, D certified LCIE Class I Zone 2 Group IIC certified CE DeviceNet

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Other Communication Options

Communication adapters and other components are available for adding to your system as your specific application requirements change.

The 1794-FLA is an extended-local adapter for the FlexLogix controller. For more information, refer to the *FlexLogix Selection Guide*, publication 1794-SG001.

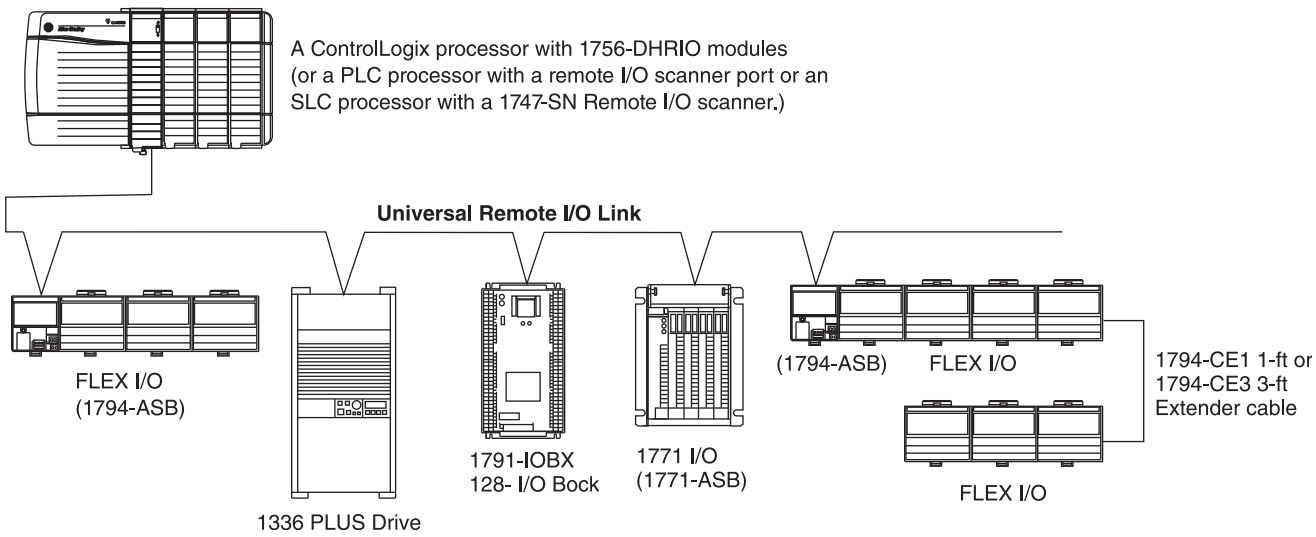
	1794-FLA✶
I/O Module Capacity	8
Power Consumption (W) at 24V	6.5 W(250 mA)
Thermal Dissipation	25.6 BTU/hr @ 19.2V dc
Power Supply Input Voltage, Nom.	24V dc
Operating Voltage Range	19.2…31.2 V dc (includes 5% ac ripple)
Certifications	UL Listed Industrial Control Equipment CE marked for all applicable directives CSA Certified Process Control Equipment for Class I, Division 2, Groups A,B,C,D or Nonhazardous Locations C-Tick marked for all applicable acts

✶The 1794-FLA is a bus extender *and* adapter.

Other Networks - Remote I/O

The 1794-ASB and -ASB2 adapters provide connection to the Remote I/O network. The 1794-ASB2 supports only two FLEX I/O modules. The 1794-ASBLT is only for use with classic PLC 5/15 or PLC 5/25 processors.

DO NOT use these Remote I/O adapters (1794-ASB, Series E; 1794-ASBK, Series E, 1794-ASB2, Series D; 1794-ASB2K, Series D) with the Classic PLC-5/15 or PLC-5/25 processors. Improper operation of the remote I/O may result.



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	1794-ASB	1794-ASB2	1794-ASBLT✶
I/O Module Capacity	8	2	8
Communication Rate	57.6 Kbps 115.2 Kbps 230.4 Kbps	57.6 Kbps 115.2 Kbps 230.4 Kbps	57.6 Kbps, 115.2 Kbps, 230.4 Kbps NOTE: PLC5/15 and PLC5/25 can only support 57.6 kbps
Power Consumption (W) at 24V	7.9 W	4.2 W	7.9 W
Inrush Current at 24V	23 A for 2 ms	23 A for 2 ms	23 A for 2 ms
Power Dissipation, Max.	4.6 W @ 19.2V dc	3.4 W @ 19.2V dc	4.6 W @ 19.2V dc
Thermal Dissipation	15.7 BTU/hr @ 19.2V dc	11.6 BTU/hr @ 19.2V dc	1.7 BTU/hr @ 31.2V dc max
Power Supply 24V Current Load (mA)	330	175	330
Power Supply Input Voltage, Nom.	24V dc	24V dc	24V dc
Operating Voltage Range	19.2…31.2V dc (includes 5% ac ripple)	19.2…31.2V dc (includes 5% ac ripple)	19.2…31.2V dc (includes 5% ac ripple)
Cable Type	Remote I/O: Belden 9463 or equivalent as specified in A-B Approved Vendor List, publication ICCG-2.2 A-B pin connector part no. 942029-03	Remote I/O: Belden 9463 or equivalent as specified in A-B Approved Vendor List, publication ICCG-2.2 A-B pin connector part no. 942029-03	Remote I/O: Belden 9463 or equivalent as specified in A-B Approved Vendor List, publication ICCG-2.2 A-B pin connector part no. 942029-03
Isolation Voltage	Tested at 850V dc for 1 s, user power to system	Tested at 850V dc for 1 s, user power to system	50V (continuous), Basic Insulation Type Routine tested at 850V dc for 1 s, between user power and system
Dimensions (HxWxD), Metric	87 x 68 x 69 mm	87 x 68 x 69 mm	87 x 69 x 69 mm
Dimensions (HxWxD), Imperial	3.4 x 2.7 x 2.7 in	3.4 x 2.7 x 2.7 in	3.4 x 2.7 x 2.7 in
Certifications	UL CSA Class I Division 2 certified Groups A, B, C, D certified LCIE Class I Zone 2 Group IIC certified C-Tick CE	UL CSA Class I Division 2 certified Groups A, B, C, D certified LCIE Class I Zone 2 Group IIC certified C-Tick CE	(when product is marked)❄

✶ Only for use with Classic PLC 5/15 or PLC 5/25 processors.

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Other Networks - PROFIBUS DP

Use the 1794-APB adapter to connect to an existing PROFIBUS DP network.

	1794-APB
I/O Module Capacity	8
Communication Rate	57.6 Kbps; 115.2 Kbps; 230.4 Kbps
Power Consumption (W) at 24V	7.9 W
Inrush Current at 24V	23 A for 2 ms
Power Dissipation, Max.	5.3 W @ 19.2V dc
Thermal Dissipation	17.9 BTU/hr @ 19.2V dc
Power Supply 24V Current Load (mA)	450
Power Supply Input Voltage, Nom.	24V dc
Operating Voltage Range	19.2…31.2V dc (includes 5% ac ripple)
PROFIBUS Connector	9-pin D-shell
Cable Type	PROFIBUS: Standard drop cable
Isolation Voltage	Tested at 850V dc for 1 s, user power to system
Dimensions (HxWxD), Metric	87 x 68 x 69 mm
Dimensions (HxWxD), Imperial	3.4 x 2.7 x 2.7 in
Certifications	UL Listed Industrial Control Equipment UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations CSA Certified Process Control Equipment for Class I, Division 2 Group A, B, C, D Hazardous Locations CE European Union 89/336/EEC EMC Directive, compliant with: EN 50081-2, Industrial Emissions; EN 50082-2, Industrial Immunity; EN 61326, Meas./Control/Lab., Industrial Requirements; 61000-6-2, Industrial Immunity C-Tick: Australian Radiocommunications Act, compliant with: AS/NZS 2064; Industrial Emissions✶

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

Our Encompass partners offer adapters for connecting to RS-232/422/485, Serial/DF1, and Modbus. For details, go to www.rockwellautomation.com/encompass and search for products under the platform FLEX I/O.

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Step 2 - Select:

• *I/O modules*

Selecting FLEX I/O Modules

The FLEX I/O module plugs into the terminal base, connecting to the I/O bus and field devices. Since there is no direct wiring to the I/O module, you can remove and insert modules under backplane power, enabling you to change modules without disturbing field wiring, other I/O modules, or FLEX backplane power. This eliminates costly downtime and the inefficiencies of restarting a system.

The choices and flexibility you have with I/O types range from digital and analog to temperature and motion control. FLEX I/O allows you to use as many as eight terminal bases per adapter which can provide a maximum of 256 digital I/O points or 96 analog channels per adapter. You can mix and match digital and analog I/O with mounting and wiring options, supplying you with a successful distributed system solution.

This flexibility gives you the following choices of I/O signal types:

- Digital: ac and dc voltage signals
- Analog: current or voltage
- Relay: normally open, 2 A capability
- Protected outputs: non-latching, latching, and with diagnostics
- Temperature: thermocouple or RTD
- Motion: high-speed counters, flow metering, and totalization
- Combo modules: combination of input and output capability
- Intrinsic Safety (IS): use FLEX Ex I/O in hazardous areas to connect to field devices

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Digital I/O Modules

Digital I/O modules interface with field devices such as:

- pushbutton and limit switches

- on/off actuators such as motor starters, pilot lights, and annunciators

- relay contacts

Features

- Modules are available in different densities ranging from 8 to 32 points.
- Digital I/O modules cover a wide electrical range:
  - 120V ac: Input/Output and Isolated Input/Output, 8 and 16 point
  - 220V ac: Input/Output, 8 point
  - 24V dc: Input/Output/Combination, Sink/Source, Protected, Electronically Fused, Diagnostic, 8, 16, and 32 point
  - 48V dc: Sink Input/Source Output, 16 point
  - Relay: Sink/Source, 8 point
- Isolated inputs and outputs can be used in applications such as motor control centers where individual control transformers are used.
- Protected outputs (P) have *electronic protection* which acts to shut the output down in reaction to a short circuit, overload, or over-temperature condition. Recovery from shutdown is automatic upon removal of the output fault. No fault status is provided to the processor.
- Electronic Fused (EP) module acts to open the output when a fault occurs. The "fuse" can be reset by operating a pushbutton, via software, or by cycling the input power. Fault status is provided to the processor.
- Diagnostic (D) modules detect, indicate, and report to the processor the following faults:
  - open input or output field devices or wiring
  - shorted output field devices
  - shorted input or output wiring
  - reverse polarity of user supply wiring
- Selectable input filter times from <1 to 60 ms.
- LED for each channel indicating status of:
  - corresponding input device
  - output signal

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Digital I/O Module Summary

Cat. No.	Description	Number of Inputs	Number of Outputs	Terminal Base Unit
AC Modules				
1794-IA8	FLEX I/O 120V ac 8 Input Module	8	—	**1794-TBN,** 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TBKD✶.
1794-IA8I	FLEX I/O 120V ac 8 Isolated Input Module	8		**1794-TBN,** 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TBKD❄
1794-IA16	FLEX I/O 120V ac 16 Input Module	16		**1794-TB3,** 1794-TB3S, 1794-TBN❄‡
1794-IM8	FLEX I/O 220V ac 8 Input Module	8		**1794-TBN**❄
1794-OA8	FLEX I/O 120V ac 8 Output Module	—	8	**1794-TBNF,** 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TBN, 1794-TBKD❄
1794-OA8I	FLEX I/O 120V ac 8 Isolated Output Module		8	**1794-TBNF,** 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TBN, 1794-TBKD❄
1794-OA16	FLEX I/O 120V ac 16 Output Module		16	**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TBN, 1794-TBKD❄§
1794-OM8	FLEX I/O 220V ac 8 Output Module		8	**1794-TBNF,** 1794-TBN❄
DC Modules				
1794-IB8	FLEX I/O 24V dc 8 Sink Input Module	8	—	**1794-TB3,** 1794-TB3S❄
1794-IB16	FLEX I/O 24V dc 16 Sink Input Module	16		**1794-TB3,** 1794-TB3S❄
1794-IB16D	FLEX I/O 24V dc 16 channel digital input module with diagnostics	16		**1794-TB32,** 1794-TB32S❄
1794-IB32	FLEX I/O 24V dc 32 Input Module	32		**1794-TB32,** 1794-TB32S❄
1794-IV16	FLEX I/O 24V dc 16 Source Input Module	16		**1794-TB2,** 1794-TB3, 1794-TB3S, 1794-TBKD❄
1794-IB10XOB6	FLEX I/O 24V dc 10 Input/6 2 A Output Combo Module	10	6	**1794-TB3,** 1794-TB3S❄
1794-IB16XOB16P	FLEX I/O 24V dc 16 Input/16 Protected Output Module	16	16	**1794-TB32,** TB32S❄
1794-IC16	FLEX I/O 48V dc 16 Sink Input Module	16	—	**1794-TB3,** 1794-TB3S❄
1794-OB8	FLEX I/O 24V dc 8 Source Output Module	—	8	**1794-TB2,** 1794-TB3, 1794-TB3S, 1794-TBKD❄
1794-OB8EP	FLEX I/O 24V dc Electronically Protected 8 Output Module		8	**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TBN, 1794-TBKD❄
1794-OB16	FLEX I/O 24V dc 16 Source Output Module		16	**1794-TB2,** 1794-TB3, 1794-TB3S, 1794-TBKD❄
1794-OB16D	FLEX I/O 24V dc 16 channel digital output module with diagnostics		16	**1794-TB3,** 1794-TB3S, 1794-TBKD❄
1794-OB16P	FLEX I/O 24V dc 16 Protected Source Output Module		16	**1794-TB2,** 1794-TB3, 1794-TB3S, 1794-TBKD❄
1794-OB32P	FLEX I/O 24V dc 32 Protected Source Output Module		32	**1794-TB32,** 1794-TB32S❄
1794-OV16	FLEX I/O 24V dc 16 Sink Output Module		16	**1794-TB3,** 1794-TB3S❄
1794-OV16P	FLEX I/O 24V dc 16 Protected Sink Output Module		16	**1794-TB3,** 1794-TB3S❄
1794-OC16	FLEX I/O 48V dc 16 Source Output Module		16	**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TBKD❄
Relay Modules				
1794-OW8	FLEX I/O 24V dc 8 Relay Sink/Source Output Module		8	**1794-TBNF**, 1794-TBN, 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TBKD❄

✶Recommended terminal base is in bold text
❄Recommended terminal base is in bold text.
‡Auxiliary terminal strips are required when using the 1794-TBN for the 1794-IA16 and 1794-IA16.
§Auxiliary terminal strips are required when using the 1794-TBN for the 1794-OA16 and 1794-IA16.

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Conformal coated versions of standard modules have the letter K in the last position of the catalog number, before the series designation.

	Conformal Coated Description
1794-IA8K	ANSI / ISA-S71.04-1985, Class G1, G2, and G3 environments CEI IEC 6065A-4 Class 1 and 2 environments UL 746E
1794-IB16K	
1794-OA8K	
1794-OB16PK	
1794-OB8EPK	ANSI / ISA-S71.04-1985, Class G1, G2, and G3 environments CEI IEC 6065A-4 Class 1 and 2 environments UL 746E
1794-ACN15	—
1794-ACNR15	—
1794-ADN	—
1794-ASB	—
1794-IE8	—
1794-IB16	—
1794-IRT8	—
1794-OB16	—
1794-OE4	—
1794-OW8	—
1794-TB3	—
1794-TB3G	—
1794-TBN	—
1794-IA8	—
1794-OA8	—
1794-OB8EP	—
1794-IJ2	—

Input Filter Times - AC Modules

Filter Times for Inputs	Maximum Times (ms)			
	OFF to ON		ON to OFF	
	1794-IA8, -IA8I	1794-IA16, -IM8	1794-IA8, -IA8I	1794-IA16, -IM8
Filter Time 0 (default)	8.4✶	7.5	26.4❄	26.5
1	8.6	8	26.6	27
2	9	9	27	28
3	10	10	28	29
4	12	12	30	31
5	16	16	34	35
6	24	24.5	42	44
7	40	42	58	60.5

✶OFF to ON filter is 8 ms.
❄ON to OFF filter is 26 ms.

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Selecting Input Filter Times for Digital Modules

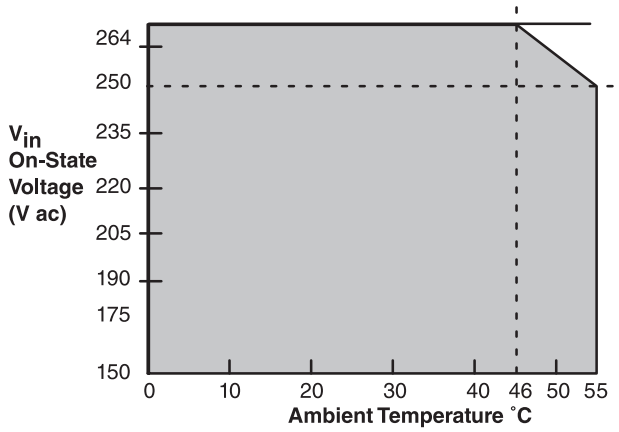
Input filter times can be set to the following values (EtherNet I/P, ControlNet, and DeviceNet only):

Input Filter Times - AC Modules				
Filter Times for Inputs	Maximum Times (ms)			
	OFF to ON		ON to OFF	
	1794-IA8, -IA8I	1794-IA16, -IM8	1794-IA8, -IA8I	1794-IA16, -IM8
Filter Time 0 (default)	8.4✶	7.5	26.4❄	26.5
1	8.6	8	26.6	27
2	9	9	27	28
3	10	10	28	29
4	12	12	30	31
5	16	16	34	35
6	24	24.5	42	44
7	40	42	58	60.5

✶OFF to ON filter is 8 ms.
❄ON to OFF filter is 26 ms.

Input Filter Times - DC Modules	
Filter Times for Inputs	Maximum Times (ms)
	OFF to ON and ON to OFF
	1794-IB8, -IB16, -IB32, -IV16, -IC16, -IB10XOB6, -IB16XOB16P
Filter Time 0 (default)	0.25
1	0.5
2	1
3	2
4	4
5	8
6	16
7	32

Derating Curve



The area within the curve represents the safe operating range for the module under various conditions of user supplied 220V ac supply voltages and ambient temperatures.

= All mounting positions (including normal horizontal, vertical, inverted horizontal) safe operating range.

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FLEX I/O Digital AC Input Modules

1794-IA8 accepts 8 inputs from 120V ac field input devices that can have off-state leakage as high as 2.5 mA. For noisy input signals, all input modules can be programmed with filter times from 10...60 ms.

1794-IA8I provides 8 isolated inputs with the same specifications as the 1794-IA8.

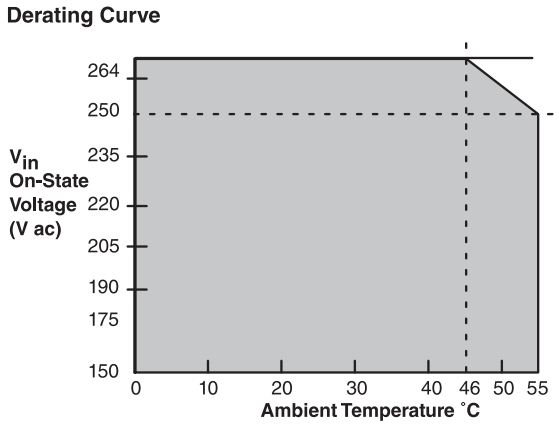
1794-IA16 is the 16 input version of the 1794-IA8.

1794-IM8 is the 220V ac version of the 1794-IA8.

	1794-IA8	1794-IA8I	1794-IA16	1794-IM8
Voltage, On-State Input, Nom.	120V ac	120V ac, isolated	120V ac	220V ac
Terminal Base Unit	**1794-TBN,** 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TBKD✶.	**1794-TBN,** 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TBKD❄	**1794-TB3,** 1794-TB3S, 1794-TBN❄§	**1794-TBN**❄
Current, On-State Input, Nom.	12 mA @ 120V ac, 60 Hz	12 mA @ 120V ac, 60 Hz	12 mA @ 120V ac, 60 Hz	10 mA @ 220V ac, 60 Hz
Input Impedance, Nom.	10.6 kΩ	10.6 kΩ	10 kΩ	22.3 kΩ
Voltage, On-State Input, Min.	65V ac	65V ac	74V ac	159V ac
Voltage, Off-State Input, Max.	43V ac	43V ac	20V ac	40V ac
Current, On-State Input, Min.‡	7.1 mA♣➤⌘✦❖	7.1 mA♣➤⌘✦❖	5.5 mA @ 74V ac, 47 Hz♣➤⌘✦❖	5.3 mA @ 159V ac, 47 Hz♣➤⌘✦❖
Current, Off-State Input, Max.	2.9 mA	2.9 mA	2.9 mA	2.6 mA
Power Dissipation, Max.	4.5 W @ 132V ac	4.5 W @ 132V ac	6.4 W @ 132V ac	4.7 W @ 264V ac
Thermal Dissipation, Max.	15.3 BTU/hr @ 132V ac	15.3 BTU/hr @ 132V ac	21.8 BTU/hr @ 132V ac	16.2 BTU/hr @ 264V ac
Dimensions (HxWxD), Metric	46 x 94 x 53 mm	46 x 94 x 53 mm	46 x 94 x 53 mm	46 x 94 x 53 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.1 in	1.8 x 3.7 x 2.1 in	1.8 x 3.7 x 2.1 in	1.8 x 3.7 x 2.1 in
Isolation Voltage	120V continuous Tested to 2150V dc for 1 s and 1250V ac for 60 s, I/O to system (No isloation between individual channels)	120V continuous Tested to 2150V dc for 1 s and 1250V ac for 60 s, I/O to system and I/O to I/O	120V continuous Tested to 2150V dc for 1 s and 1250V ac for 60 s, I/O to system (No isloation between individual channels)	Tested at 2600V dc for 1 s, I/O to system (No isolation between individual channels)

✶Recommended terminal base is in bold text
❄Recommended terminal base is in bold text.
§Auxiliary terminal strips are required when using the 1794-TBN for the 1794-IA16 and 1794-IA16.
♣AC inputs compatible with proximity switches with leakage ratings of I
➤leak
⌘ < 2.5 mA and I
✦on
❖ min = 5 mA.

1794-IM8 Derating Curve



The area within the curve represents the safe operating range for the module under various conditions of user supplied 220V ac supply voltages and ambient temperatures.

= All mounting positions (including normal horizontal, vertical, inverted horizontal) safe operating range.

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FLEX I/O Digital AC Output Modules

1794-OA8 provides 8 120V ac 1/2 Amp outputs that can be used up to 1 Amp with limitations.

1794-OA8I is the isolated version of the 1794-OA8.

1794-OA16 provides 16 1/4 Amp outputs with specified limitations when used at 1/2 Amp.

1794-OM8 provides 8 220V ac outputs rated at 1/2 Amp each.

These modules are not fused. External channel fusing or use of fused terminal bases (TBNF) is required with the - point modules.

	1794-OA8	1794-OA8I	1794-OA16	1794-OM8
Voltage, On-State Output, Nom.	120V ac	120V ac, isolated	120V ac	220V ac
Terminal Base Unit✶	**1794-TBNF**, 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TBN, 1794-TBKD	**1794-TBNF**, 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TBN, 1794-TBKD	**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TBN, 1794-TBKD❄	**1794-TBNF**, 1794-TBN
Current, On-State Output, Min.	5 mA per output	5 mA per output	5 mA per output	5 mA per output
Current, On-State Output, Max.	500 mA per output @ 55 °C (sufficient to operate an A-B Bulletin 500 NEMA size 3 motor starter) 750 mA per output @ 35 °C 1.0 A on 4 nonadjacent outputs and 500 mA on the remaining 4 outputs @ 30 °C	500 mA per output @ 55 °C (sufficient to operate an A-B Bulletin 500 NEMA size 3 motor starter) 750 mA per output @ 35 °C 1.0A on 4 nonadjacent outputs and 500 mA on the remaining 4 outputs @ 30 °C	500 mA per output @ 55 °C‡♣	500 mA @ 55 °C❖
Current, On-State Output, per Module	4.0 A (8 outputs @ 500 mA)	4.0 A (8 outputs @ 500 mA)	4.0 A (16 outputs @ 250 mA)	4.0 A (8 outputs @ 500 mA)❖
Leakage Current, Off-State Output, Max	2.25 mA	2.25 mA	2.25 mA	2.5 mA
Voltage Drop, On-State Output, Max.	1.0V @ 0.5 A	1.0V @ 0.5 A	1.5V @ 0.5 A	1.5 V @ 0.5 A
Output Surge Current, Max.	7 A for 45 ms, repeatable every 8 s	7 A for 45 ms, repeatable every 8 s	7 A for 40 ms, repeatable every 8 s	7 A for 40 ms, repeatable every 8 s
Voltage, On-State Output, Min.✦	85V ac	85V ac	85V ac	159V ac
Voltage, On-State Output, Nom.✦	120V ac	120V ac	120V ac	220V ac
Voltage, On-State Output, Max.✦	132V ac	132V ac	132V ac	264V ac
Power Dissipation, Max.	4.1 W @ 0.5 A 6.3 W @ 0.75 A 6.3 W @ 1.0 A	4.1 W @ 0.5 A 6.3 W @ 0.75 A 6.3 W @ 1.0 A	4.7 W @ 0.5 A	5 W @ 0.5 A
Thermal Dissipation	14.0 BTU/hr @ 0.5 A 21.1 BTU/hr @ 0.75 A 21.4 BTU/hr @ 1.0 A	14.0 BTU/hr @ 0.5 A 21.1 BTU/hr @ 0.75 A 21.4 BTU/hr @ 1.0 A	16.1 BTU/hr @ 0.5 A	17.1 BTU/hr @ 0.5 A
Dimensions (HxWxD), Metric	46 x 94 x 53 mm	46 x 94 x 53 mm	46 x 94 x 53 mm	46 x 94 x 53 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.1 in	1.8 x 3.7 x 2.1 in	1.8 x 3.7 x 2.1 in	1.8 x 3.7 x 2.1 in
Isolation Voltage	120V continuous Tested to 2150V dc for 1 s and 1250V ac for 60 s, I/O to system (No isolation between individual channels)	120V continuous Tested to 2150V dc for 1 s and 1250V ac for 60 s, channel to channel, I/O to system	120V continuous Tested to 2150V dc for 1 s and 1250V ac for 60 s, I/O to system (No isolation between individual channels)	Tested at 2600V dc for 1 s, I/O to system (No isolation between individual channels)

✶Recommended terminal base is in bold text.
❄Auxiliary terminal strips are required when using the 1794-TBN for the 1794-OA16 and 1794-IA16.
‡If using 0.5 A outputs, alternate wiring so that no two 0.5 A outputs are adjacent. See the 1794-OA16 derating curve for mounting other than normal horizonal.
❖See the 1794-OM8 derating curve.
§Below 50 mA the voltage drop across the module will be higher and the voltage waveform may have some small oscillation (less than 5V).
♣If using 0.5 A outputs, alternate wiring so that no two 0.5 A outputs are adjacent. See the 1794-OA16 derating curve for mounting other than normal horizontal.
➤See the 1794-OM8 derating curve.
⌘1794-OA8I also tested for isolation between channels.
✦The external ac supply voltage must be capable of a 50 A surge for 1/2 cycle at power-up.
Note: The output signal delay, OFF to ON or ON to OFF is 1/2 cycle maximum.
Modules have a yellow status indicator for each channel. These indicators are driven from the logic-side circuitry.
Module outputs are not fused. Fusing of individual outputs is required. If applicable, the 1794-TBNF is recommended, otherwise you must provide external fusing. The following fuses are recommended:

- 1794-OA8, -OA8I - Use 1.6 A, 250V Slow-Blow, Littelfuse pt. no. 23901.6; San-o SD6-1.6 A; AB pt. no. 94171304. The 1794-TBNF comes with SD6-1.6 A fuses installed.
- 1794-OA16 - Use 2.5 A, 150V MQ2 normal fuse.
- 1794-OM8 - Use 0.8 A, 250V MQ4 normal fuse.

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FLEX I/O Digital AC Output Modules

1794-OA8 provides 8 120V ac 1/2 Amp outputs that can be used up to 1 Amp with limitations.

1794-OA8I is the isolated version of the 1794-OA8.

1794-OA16 provides 16 1/4 Amp outputs with specified limitations when used at 1/2 Amp.

1794-OM8 provides 8 220V ac outputs rated at 1/2 Amp each.

These modules are not fused. External channel fusing or use of fused terminal bases (TBNF) is required with the - point modules.

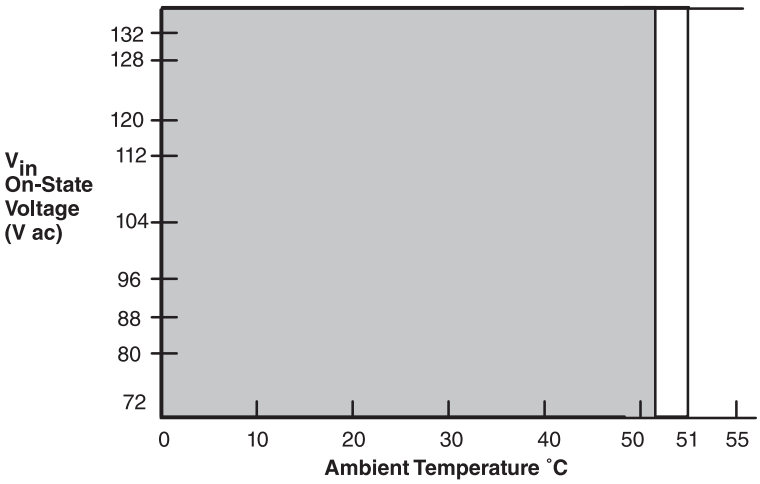
	1794-OA8	1794-OA8I	1794-OA16	1794-OM8
Voltage, On-State Output, Nom.	120V ac	120V ac, isolated	120V ac	220V ac
Terminal Base Unit✶	**1794-TBNF**, 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TBN, 1794-TBKD	**1794-TBNF**, 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TBN, 1794-TBKD	**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TBN, 1794-TBKD❄	**1794-TBNF**, 1794-TBN
Current, On-State Output, Min.	5 mA per output	5 mA per output	5 mA per output	5 mA per output
Current, On-State Output, Max.	500 mA per output @ 55 °C (sufficient to operate an A-B Bulletin 500 NEMA size 3 motor starter) 750 mA per output @ 35 °C 1.0 A on 4 nonadjacent outputs and 500 mA on the remaining 4 outputs @ 30 °C	500 mA per output @ 55 °C (sufficient to operate an A-B Bulletin 500 NEMA size 3 motor starter) 750 mA per output @ 35 °C 1.0A on 4 nonadjacent outputs and 500 mA on the remaining 4 outputs @ 30 °C	500 mA per output @ 55 °C‡♣	500 mA @ 55 °C❖
Current, On-State Output, per Module	4.0 A (8 outputs @ 500 mA)	4.0 A (8 outputs @ 500 mA)	4.0 A (16 outputs @ 250 mA)	4.0 A (8 outputs @ 500 mA)❖
Leakage Current, Off-State Output, Max	2.25 mA	2.25 mA	2.25 mA	2.5 mA
Voltage Drop, On-State Output, Max.	1.0V @ 0.5 A	1.0V @ 0.5 A	1.5V @ 0.5 A	1.5 V @ 0.5 A
Output Surge Current, Max.	7 A for 45 ms, repeatable every 8 s	7 A for 45 ms, repeatable every 8 s	7 A for 40 ms, repeatable every 8 s	7 A for 40 ms, repeatable every 8 s
Voltage, On-State Output, Min.✦	85V ac	85V ac	85V ac	159V ac
Voltage, On-State Output, Nom.✦	120V ac	120V ac	120V ac	220V ac
Voltage, On-State Output, Max.✦	132V ac	132V ac	132V ac	264V ac
Power Dissipation, Max.	4.1 W @ 0.5 A 6.3 W @ 0.75 A 6.3 W @ 1.0 A	4.1 W @ 0.5 A 6.3 W @ 0.75 A 6.3 W @ 1.0 A	4.7 W @ 0.5 A	5 W @ 0.5 A
Thermal Dissipation	14.0 BTU/hr @ 0.5 A 21.1 BTU/hr @ 0.75 A 21.4 BTU/hr @ 1.0 A	14.0 BTU/hr @ 0.5 A 21.1 BTU/hr @ 0.75 A 21.4 BTU/hr @ 1.0 A	16.1 BTU/hr @ 0.5 A	17.1 BTU/hr @ 0.5 A
Dimensions (HxWxD), Metric	46 x 94 x 53 mm	46 x 94 x 53 mm	46 x 94 x 53 mm	46 x 94 x 53 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.1 in	1.8 x 3.7 x 2.1 in	1.8 x 3.7 x 2.1 in	1.8 x 3.7 x 2.1 in
Isolation Voltage	120V continuous Tested to 2150V dc for 1 s and 1250V ac for 60 s, I/O to system (No isolation between individual channels)	120V continuous Tested to 2150V dc for 1 s and 1250V ac for 60 s, channel to channel, I/O to system	120V continuous Tested to 2150V dc for 1 s and 1250V ac for 60 s, I/O to system (No isolation between individual channels)	Tested at 2600V dc for 1 s, I/O to system (No isolation between individual channels)

✶Recommended terminal base is in bold text.
❄Auxiliary terminal strips are required when using the 1794-TBN for the 1794-OA16 and 1794-IA16.
‡If using 0.5 A outputs, alternate wiring so that no two 0.5 A outputs are adjacent. See the 1794-OA16 derating curve for mounting other than normal horizonal.
❖See the 1794-OM8 derating curve.
§Below 50 mA the voltage drop across the module will be higher and the voltage waveform may have some small oscillation (less than 5V).
♣If using 0.5 A outputs, alternate wiring so that no two 0.5 A outputs are adjacent. See the 1794-OA16 derating curve for mounting other than normal horizontal.
➤See the 1794-OM8 derating curve.
⌘1794-OA8I also tested for isolation between channels.
✦The external ac supply voltage must be capable of a 50 A surge for 1/2 cycle at power-up.
Note: The output signal delay, OFF to ON or ON to OFF is 1/2 cycle maximum.
Modules have a yellow status indicator for each channel. These indicators are driven from the logic-side circuitry.
Module outputs are not fused. Fusing of individual outputs is required. If applicable, the 1794-TBNF is recommended, otherwise you must provide external fusing. The following fuses are recommended:

- 1794-OA8, -OA8I - Use 1.6 A, 250V Slow-Blow, Littelfuse pt. no. 23901.6; San-o SD6-1.6 A; AB pt. no. 94171304. The 1794-TBNF comes with SD6-1.6 A fuses installed.
- 1794-OA16 - Use 2.5 A, 150V MQ2 normal fuse.
- 1794-OM8 - Use 0.8 A, 250V MQ4 normal fuse.

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1794-OA16 Derating Curve



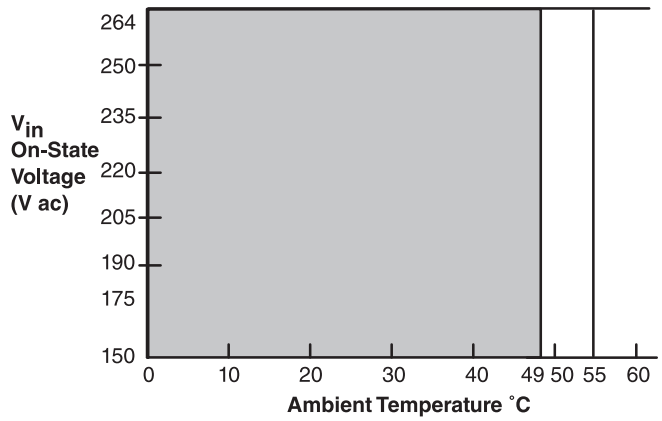
The area within the curve represents the safe operating range for the module under various conditions of user supplied 120V ac supply voltages and ambient temperature.

= Normal mounting safe operating range

= Other mounting positions (including inverted horizontal, vertical) safe operating range

included

1794-OM8 Derating Curve



The area within the curve represents the safe operating range for the module under various conditions of user supplied 220V ac supply voltages and ambient temperatures.

= Normal mounting safe operating range

= Other mounting positions (including inverted horizontal, vertical) safe operating range

included

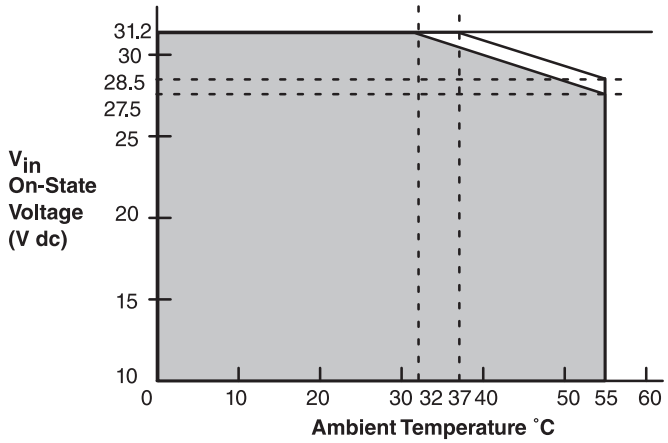
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FLEX I/O Digital DC Input Modules

	1794-IB8 & 1794-IB16	1794-IB32	1794-IV16	1794-IC16
Voltage, On-State Input, Min.	10V dc, sinking	19.2V dc, sinking	10V dc, sourcing	30V dc, sinking
Voltage, On-State Input, Nom.	24V dc	24V dc	24V dc	48V dc
Voltage, On-State Input, Max.	31.2V dc	31.2V dc	31.2V dc	60V dc
Terminal Base Unit	**1794-TB3,** 1794-TB3S✶	**1794-TB32,** 1794-TB32S✶	**1794-TB2,** 1794-TB3, 1794-TB3S, 1794-TBKD✶	**1794-TB3,** 1794-TB3S✶
Current, On-State Input, Nom.	8 mA @ 24V dc	4.1 mA @ 24V dc	8 mA @ 24V dc	5.0 mA at 48V dc
Current, On-State Input, Max.	11 mA	6.0 mA	11 mA	11.0 mA
Input Impedance, Max.	4.6 kΩ	6.0 kΩ	4.7 kΩ	11 kΩ
Voltage, On-State Input, Min.	10V dc	19.2V dc	10V dc	30V dc
Voltage, Off-State Input, Max.	5.0V dc	5.0V dc	5.0V dc	10.0V dc
Current, On-State Input, Min.	2.0 mA	2.0 mA	2.0 mA	2.0 mA
Current, Off-State Input, Max.	1.5 mA	1.5 mA	1.5 mA	1.5 mA
Power Dissipation, Max.	3.1 W @ 31.2V dc❄	6.0 W @ 31.2V dc	5.7 W @ 31.2V dc	6.4 W @ 60V dc
Thermal Dissipation, Max.	11.9 BTU/hr @ 31.2V dc‡	20.5 BTU/hr @ 31.2V dc	19.4 BTU/hr @ 31.2V dc	21.9 BTU/hr @ 60V dc
Dimensions (HxWxD), Metric	46 x 94 x 53 mm‡	45.7 x 94.0 x 53.3 mm	46 x 94 x 53 mm	46 x 94 x 53 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.1 in‡	1.8 x 3.7 x 2.1 in	1.8 x 3.7 x 2.1 in	1.8 x 3.7 x 2.1 in
Isolation Voltage	Tested at 850V dc for 1 s, I/O to system (No isolation between individual channels)	Tested at 2121V dc for 1 s, I/O to system (No isolation between individual channels)	Tested at 2121V dc for 1 s, I/O to system (No isolation between individual channels)	Tested at 1900V dc for 1 s, I/O to system (No isolation between individual channels)

✶Recommended terminal base is in bold text.
❄6.1 W @ 31.2V dc for 1794-IB16.
‡20.8 BTU/hr @ 31.2V dc for 1794-IB16.
Note: Do not put the 1794-IB8 module next to an output module in 8-point compact addressing with the 1794-ASB2/C or -ASB/D.
Modules have a yellow status indicator for each channel. These indicators are driven from the customer field-side input device.

1794-IB16 Derating Curve



The area within the curve represents the safe operating range for the module under various conditions of user supplied 24V dc supply voltages and ambient temperatures.

= Normal mounting safe operating range included

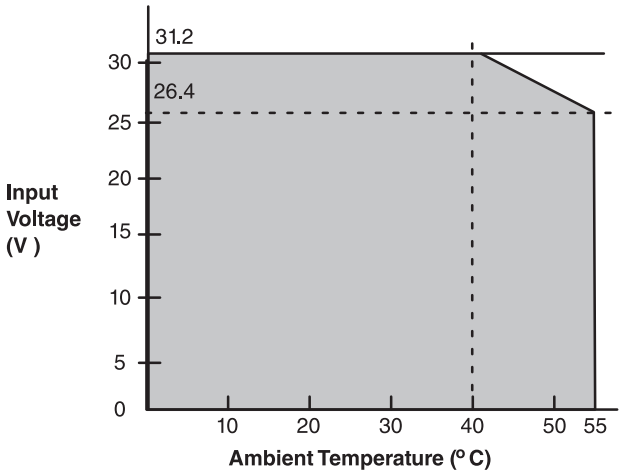
= Other mounting positions (including inverted horizontal, vertical) safe operating range

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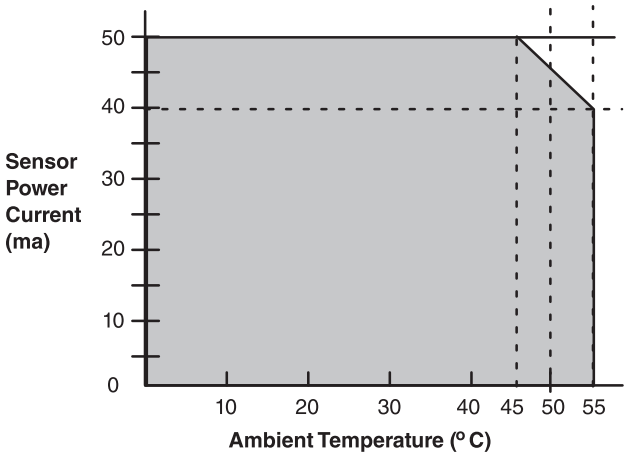
1794-IB16D Derating Curve

Derating Curves

1794-IB16D Input Voltage

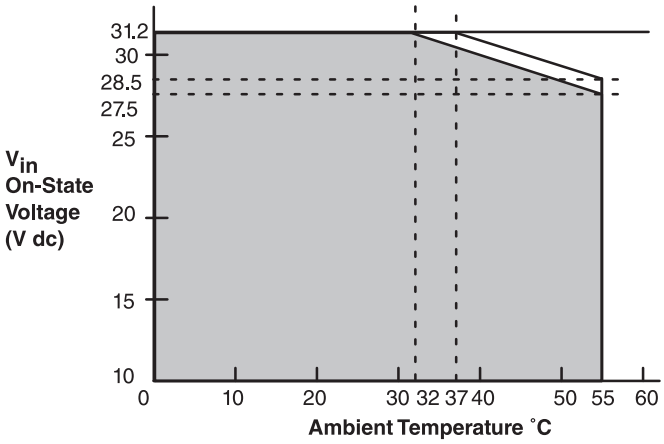


Sensor Power



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1794-IB32 Derating Curve



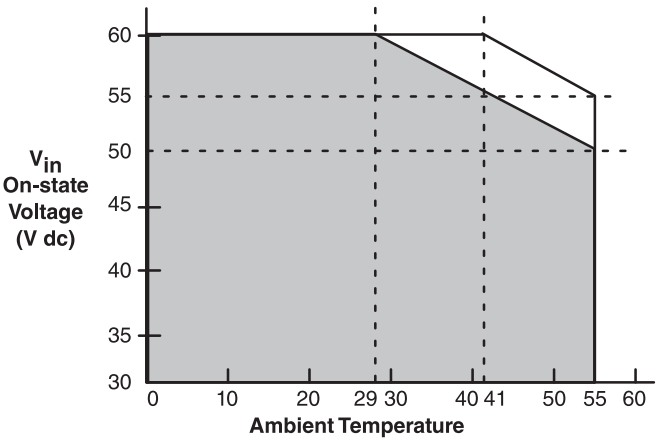
The area within the curve represents the safe operating range for the module under various conditions of user supplied 24V dc supply voltages and ambient temperatures.

= Normal mounting safe operating range included

= Other mounting positions (including inverted horizontal, vertical) safe operating range

1794-IC16 Derating Curve

Derating Curve



The area within the curve represents the safe operating range for the module under various conditions of user supplied 48V dc supply voltages and ambient temperature.

= Normal mounting safe operating range included

= Other mounting positions (including inverted horizontal) safe operating range

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FLEX I/O Digital DC Output Modules

1794-OB8 and 1794-OB16 provide 16 sourcing 1/2 Amp outputs (8 for the 1794-OB8) over a wide 10...31.2V dc input voltage range.

1794-OV16 is the sinking version of the 1794-OB16.

1794-OC16 is the 48V dc version of the 1794-OB16.

These modules are not fused. External fusing is strongly recommended or use protected output modules.

	1794-OB8§	1794-OB16§	1794-OV16§	1794-OC16§
Voltage, On-State Output, Nom.	24V dc, sourcing	24V dc, sourcing	24V dc, sinking	48V dc, sourcing
Voltage, On-State Output, Min.	10V dc	10V dc	10V dc	30V dc
Voltage, On-State Output, Max.	31.2V dc	31.2V dc	31.2V dc	60V dc @ 45 °C 55V dc @ 55 °C
Voltage Drop, On-State Output, Max.	0.5V dc	0.5V dc	0.2V dc	1.0V dc @ 0.5A
Terminal Base Unit	**1794-TB2,** 1794-TB3, 1794-TB3S, 1794-TBKD✶	**1794-TB2,** 1794-TB3, 1794-TB3S, 1794-TBKD✶	**1794-TB3,** 1794-TB3S✶	**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TBKD✶
Current, On-State Output, Min.	1.0 mA per channel	1.0 mA per channel	1.0 mA per channel	2.0 mA per channel
Current, On-State Output, Max.	500 mA per channel, 4 A per module	500 mA per channel, 8 A per module	500 mA per channel, 8 A per module	500 mA per channel, 8 A per module
Leakage Current, Off-State Output, Max	0.5 mA	0.5 mA	0.5 mA	1.0 mA
Output Surge Current, Max.	2 A for 50 ms, repeatable every 2 s	2 A for 50 ms, repeatable every 2 s	2 A for 50 ms, repeatable every 2 s	4A for 10 ms, repeatable every 2 s
Output Delay Time, OFF to ON, Max.	0.5 ms	0.5 ms	0.5 ms	0.5 ms❄
Output Delay Time, ON to OFF, Max.	1.0 ms	1.0 ms	1.0 ms	1.0 ms @ 25 °C 2.0 ms @ 55 °C‡
External DC Supply Voltage Range	10…31.2V dc (5% ac ripple)	10…31.2V dc (5% ac ripple)	10…31.2V dc (5% ac ripple)	30…60V dc (5% ac ripple)
External DC Supply Current Range	10…35 mA	20…65 mA	20…65 mA	13…27 mA
Power Dissipation, Max.	3.3 W @ 31.2V dc	5.3 W @ 31.2V dc	4.2W @ 31.2V dc	3.7 W @ 60V dc
Thermal Dissipation, Max.	11.2 BTU/hr @ 31.2V dc	18.1 BTU/hr @ 31.2V dc	14.3 BTU/hr @ 31.2V dc	12.6 BTU/hr @ 60V dc
Dimensions (HxWxD), Metric	46 x 94 x 53 mm	46 x 94 x 53 mm	46 x 94 x 53 mm	46 x 94 x 53 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.1 in	1.8 x 3.7 x 2.1 in	1.8 x 3.7 x 2.1 in	1.8 x 3.7 x 2.1 in
Isolation Voltage	50V continuous, I/O to system Tested to 850V dc for 1 s, I/O to system (No isolation between individual channels)	50V continuous, I/O to system Tested to 850V dc for 1 s, I/O to system (No isolation between individual channels)	50V continuous Tested 1770Vdc for 60 sec, I/O to system (No isloation between individual channels)	75V continuous, I/O to system Tested to 1900V dc for 1 s, I/O to system (No isolation between individual channels)

✶Recommended terminal base is in bold text.
❄Off/On delay is the time from a valid output "on" signal to output energization.
‡On/Off delay is the time from a valid output "off" signal to output de-energization.§ Module outputs are not fused. Fusing of outputs is recommended. If fusing is desired, you must provide external fusing. For 1794-OB8, -OB16, and -OV16 use SAN-O MQ4-800 mA fuse.
For 1794-OC16 use 2 A, 150V ac MQ2 normal fuse.

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Digital DC Protected Output Modules

1794-OB16P provides 16 sourcing 1/2 Amp outputs self-protected against shorts, overloads, and over temperature. The faulted output will automatically return when the fault is removed. No feedback to the processor is provided.

1794-OB8EP provides 8 sourcing 2 Amp outputs with electronic fuse type of overload protection, which opens when overloaded. The fuse can be 'reset' several ways. Fault status is provided to the processor.

1794-OB32P provides 32 self-protected sourcing 1/2 Amp outputs in 2 groups of 16 outputs. Separate voltage sources can be used with each group.

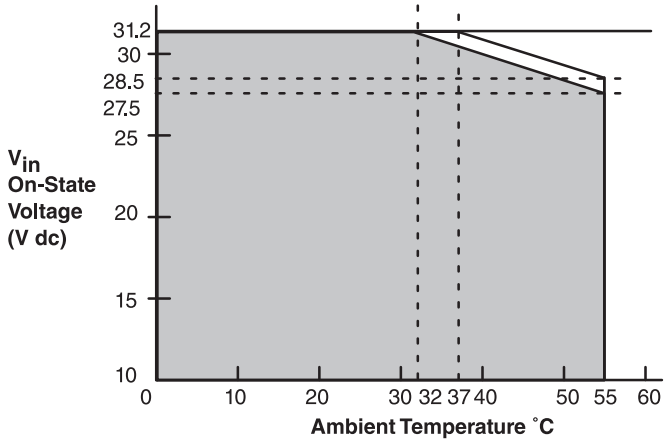
1794-OV16P is the sinking version of the 1794-OB16P.

	1794-OB16P	1794-OB8EP	1794-OB32P	1794-OV16P
Voltage, On-State Output, Nom.	24V dc, sourcing	24V dc, sourcing	24V dc, sourcing	24V dc, sinking
Voltage, On-State Output, Min.	10V dc	19.2V dc	10V dc	10V dc
Voltage, On-State Output, Max.	31.2V dc✶	31.2V dc	31.2V dc	31.2V dc
Voltage Drop, On-State Output, Max.	0.5V dc	0.2V dc	0.5V dc	0.2V dc
Terminal Base Unit	**1794-TB2,** 1794-TB3, 1794-TB3S, 1794-TBKD❄	**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TBN, 1794-TBKD❄	**1794-TB32,** 1794-TB32S❄	**1794-TB3,** 1794-TB3S❄
Current, On-State Output, Min.§	1.0 mA per channel	1.0 mA per channel	1.0 mA per channel	1.0 mA per channel
Current, On-State Output, Max.	500 mA per channel, 8 A per module	2.0 A per channel, 10 A per module	500 mA per channel; 14 A per module (6 A total for channels 0…15; 8 A total for channels 16…31)	500 mA per channel, 8 A per module
Leakage Current, Off-State Output, Max	0.5 mA	0.5 mA	0.5 mA	0.5 mA
Output Surge Current, Max.	1.5 A for 50 ms, repeatable every 2 s	4 A for 10 ms, repeatable every 3 s‡	2 A for 50 ms, repeatable every 2 s	2 A for 50 ms, repeatable every 2 s
External DC Supply Voltage Range	10…31.2V dc (5% ac ripple)	19.2…31.2V dc (5% ac ripple)	10…31.2V dc (5% ac ripple)	10…31.2V dc (5% ac ripple)
External DC Supply Current Range	25…75 mA	20…35 mA	103…273 mA	20…65 mA
Power Dissipation, Max.	5.0 W @ 31.2V dc	5.5 W @ 31.2V dc	5.3 W @ 31.2V dc	4.2 W @ 31.2V dc
Thermal Dissipation, Max.	17.0 BTU/hr @ 31.2V dc	18.8 BTU/hr @ 31.2V dc	18.1 BTU/hr @ 31.2V dc	14.3 BTU/hr @ 31.2V dc
Dimensions (HxWxD), Metric	46 x 94 x 53 mm	46 x 94 x 53 mm	45.7 x 94.0 x 53.3 mm	46 x 94 x 53 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.1 in	1.8 x 3.7 x 2.1 in	1.8 x 3.7 x 2.1 in	1.8 x 3.7 x 2.1 in
Isolation Voltage	50V (continuous), Basic Insulation Type Type tested at 2121V dc for 60 s, between field side and system No isolation between individual channels	50V continuous, I/O to system Tested to 850V dc for 1 s, I/O to system (No isolation between individual channels)	50V continuous, I/O to system Tested to 2150V ac for 1 s, I/O to system (No isolation between individual channels)	50V continuous Tested 1770Vdc for 60 sec, I/O to system (No isloation between individual channels)

✶See 1794-OB16P Derating Curve
❄Recommended terminal base is in bold text.
‡See 1794-OB8EP Output Minimum Surge chart.

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1794-OB16P Derating Curve



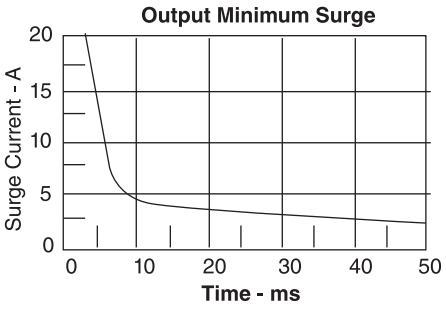
The area within the curve represents the safe operating range for the module under various conditions of user supplied 24V dc supply voltages and ambient temperatures.

= Normal mounting safe operating range

= Other mounting positions (including inverted horizontal, vertical) safe operating range

included

1794-OB8EP Output Minimum Surge



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FLEX I/O Digital DC Diagnostic Modules

1794-IB16D is the diagnostic version of the 1794-IB16.

1794-OB16D is the diagnostic version of the 1794-OB16.

The modules can detect open wire, short circuit, and reverse polarity of external power. When a fault is detected, the module turns on the module fault LED, the corresponding channel's red LED, and sets the corresponding module error bit (open wire, short circuit, or reverse power bit). The reporting function provides the results of the diagnostics as bits in the data table.

The modules can detect open wire, short-circuit, and reverse polarity of external power. When a fault is detected, the module turns on the module fault LED, the corresponding channel's red LED, and sets the module error open wire, short-circuit, or reverse power error bit. The reporting function provides the results of the diagnostics as bits in its data table.

The modules have 16 bi-color channel status indicators and one red module status indicator. These indicators are driven from the customer field side power.

	1794-IB16D
Voltage, On-State Input, Min.	10V dc, sinking
Voltage, On-State Input, Nom.	24V dc
Voltage, On-State Input, Max.	31.2V dc✶
Voltage, Off-State Input, Max.	5.0V dc
Current, On-State Input, Nom.	8.2 mA at 24V dc
Current, On-State Input, Max.	12.1 mA @ 31.2V dc
Current, On-State Input, Max.	12.1 mA @ 31.2V dc
Terminal Base Unit	**1794-TB32,** 1794-TB32S❄
Input Impedance, Max.	3.1 kΩ
Current, On-State Input, Min.	2.0 mA at 10 dc
Current, Off-State Input, Max.	1.5 mA
Power Dissipation, Max.	8.5 W @ 31.2V dc
Thermal Dissipation, Max.	29 BTU/hr @ 31.2V dc
Detect Reverse Polarity Voltage	=2,5100
Sensor Voltage Drop	2.2V dc max
Current, Sensor Source, Max.	50 mA max
Dimensions (HxWxD), Imperial	=4,1070043
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.1 in
Isolation Voltage	Tested at 2121V dc for 1 s, I/O to system (No isolation between individual channels)

✶See 1794-IB16D Input Voltage Derating chart.
❄Recommended terminal base is in bold text.

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	1794-OB16D
Voltage, On-State Output, Min.	10V dc, sourcing
Voltage, On-State Output, Max.	31.2V dc
Voltage Drop, On-State Output, Max.	0.5V dc @ 0.5 A
Terminal Base Unit	**1794-TB3,** 1794-TB3S, 1794-TBKD✶
Current, On-State Output, Min.§	2.0 mA per channel
Current, On-State Output, Max.	500 mA per channel 8 A per module
Leakage Current, Off-State Output, Max	0.5 mA
Output Surge Current, Max.	2 A for 50 ms, repeatable every 2 s
External DC Supply Voltage Range	10…31.2V dc (5% ac ripple)
External DC Supply Current Range	56…78 mA
Power Dissipation, Max.	4.8 W @ 31.2V dc
Thermal Dissipation, Max.	16.4 BTU/hr @ 31.2V dc
Short Circuit Protection	Thermal shutdown (auto reset) Detection condition: when external power active, output signal active, and output port voltage less than 2V
Short Circuit Protection	Thermal shutdown (auto reset) Detection condition: when external power active, output signal active, and output port voltage less than 2V
Open Wire Detect, Off-State Leakage Current	0.1 mA - When external power active and output signal inactive
Detect Reverse Polarity Voltage	10V min.: Module must detect if the reverse polarity external power supply voltage is greater than the value
Current, Sensor Source, Max.	Yes
Dimensions (HxWxD), Metric	=2,1070042
Dimensions (HxWxD), Metric	45.7 x 94.0 x 53.3 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.1 in
Isolation Voltage	50V continuous, I/O to system Tested to 2121V dc for 1 s, I/O to system (No isolation between individual channels)

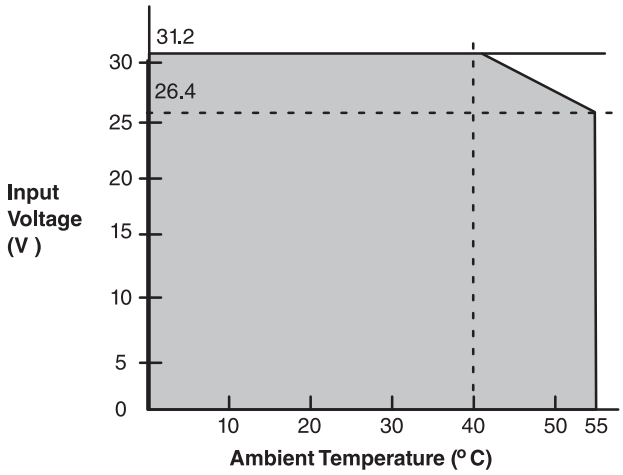
✶Recommended terminal base is in bold text.

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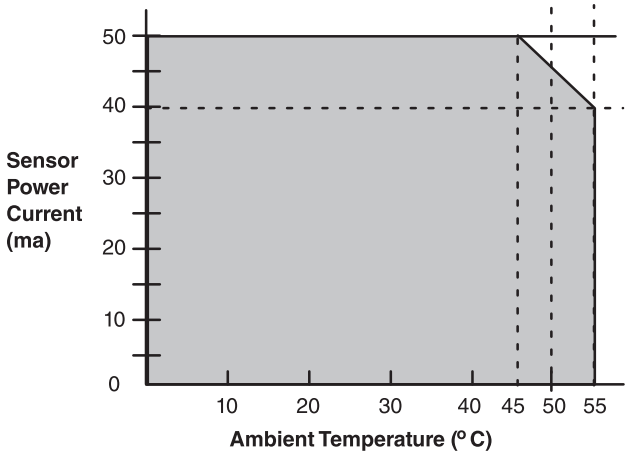
Derating Curves 1794-IB16D Input Voltage

Derating Curves

1794-IB16D Input Voltage



Sensor Power



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FLEX I/O Digital DC Combination Modules

The 1794-IB16XOB16P has ouptputs that are self-protected against shorts, overloads, and over temperature similar to the OB16P. The 1794-IB10XOB6 requires the use of external fusing for individual outputs.

	1794-IB10XOB6♣	**1794-IB16XOB16P➤**
Terminal Base Unit	**1794-TB3**, 1794-TB3S✶	**1794-TB32**, TB32S✶
Isolation Voltage	50V (continuous), Basic Insulation Type Type tested at 1250V ac for 60 s, between field side and system Routine tested at 2121V dc for 1 s, between field side and system No isolation between individual channels	50V, Basic Insulation type Tested to 2121V dc for 1 s, system to I/O and inputs to outputs
Power Dissipation, Max.	6.0 W @ 31.2V dc	7.0 W @ 31.2V dc
Thermal Dissipation, Max.	20.3 BTU/hr @ 31.2V dc	23.9 BTU/hr @ 31.2V dc
Number of Inputs	10	16
Voltage, On-State Input, Min.	10V dc	10V dc❄
Voltage, On-State Input, Nom.	24V dc	24V dc
Voltage, On-State Input, Max.	31.2V dc	31.2V dc❄
Current, On-State Input, Min.	2.0 mA	2.0 mA
Current, On-State Input, Nom.	8.0 mA @ 24V dc	8.8 mA @ 24V dc
Current, On-State Input, Max.	11.0 mA	12.1 mA
Voltage, Off-State Input, Max.	5.0V dc	5.0V dc
Current, Off-State Input, Max.	1.5 mA	1.5 mA
Input Impedance, Max.	4.8 kΩ	2.5 kΩ
Number of Outputs	6	16
Voltage, On-State Output, Min.	10V dc	10V dc‡
Voltage, On-State Output, Nom.	24V dc	24V dc
Voltage, On-State Output, Max.	31.2V dc	31.2V dc‡
Voltage Drop, On-State Output, Max.	1V dc @ 2 A 0.5V dc @ 1 A	0.5V dc @ 0.5 A
Current, On-State Output, Min.	1.0 mA per channel	1.0 mA per channel
Current, On-State Output, Max.	2.0 A per channel 10 A per module	0.5 A per channel 8 A per module
Voltage, Off-State Output, Max.	31.2V dc	31.2V dc
Leakage Current, Off-State Output, Max	0.5 mA	0.5 mA
Output Delay Time, OFF to ON, Max.	0.5 ms§	0.5 ms
Output Delay Time, ON to OFF, Max.	1.0 ms§	1.0 ms
Output Surge Current, Max.	4 A for 50 ms, repeatable every 2 s	1.5 A for 50 ms, repeatable every 2 s
Dimensions (HxWxD), Metric	46 x 94 x 53 mm	45.7 x 94.0 x 53.3 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.1 in	1.8 x 3.7 x 2.1 in
External DC Supply Voltage Range	10…31.2V dc (includes 5% ac ripple)	10…31.2V dc (includes 5% ac ripple)
External DC Supply Current Range	8 mA @ 10V dc 15 mA @ 19.2V dc 19 mA @ 24V dc 25 mA @ 31.2V dc	78 mA @ 10V dc

✶Recommended terminal base is in bold text.
❄Refer to derating curve.
‡Refer to the Derating Curve.
§Output off-to-on or on-to-off delay is the time from the module issuing an output on or off until the output actually turns on or off.♣ Module outputs are not fused. Fusing is recommended. If fusing is desired, you must supply external fusing. Use SAN-O MQ4-3A or Littelfuse 235-003.
➤ Outputs are electronically protected against overloads and shorts.

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FLEX I/O Digital Contact Output Module (Relay) — 1794-OW8

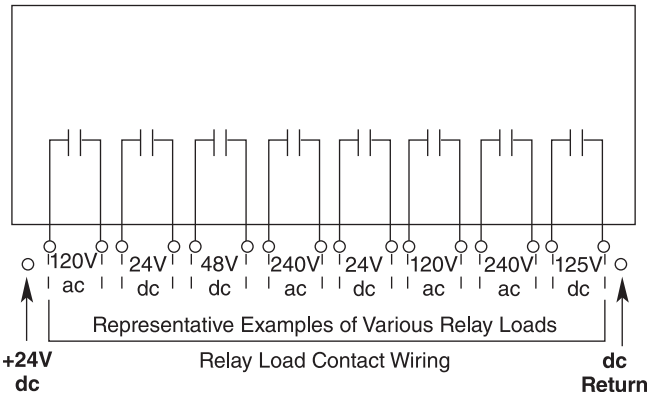
The 1794-OW8 module provides 8 isolated Form A (normally open) contacts capable of switching up to 2 A at up to 230V ac and 125V dc.

Do not attempt to increase load current or wattage capability beyond the maximum rating by connecting two or more outputs in parallel. The slightest variation in relay switching time may cause one relay to momentarily switch the total load current. Apply only +24V dc power to the power terminals on the terminal base. Make certain that all relay wiring is properly connected before applying any power to the module.

Total current draw through the terminal base unit is limited to 10 A. Separate power connections to the terminal base unit may be necessary.

The use of external fuses or a fused terminal base is required for individual outputs.

Simplified Schematic of Relay Module



Load power can be obtained from a variety of sources, and can range from +5V dc to 240V ac. Make certain that only 24V dc is applied to the module power terminals on the module terminal base.

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	1794-OW8
Number of Outputs	8
Terminal Base Unit	**1794-TBNF**, 1794-TBN, 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TBKD✶
External DC Supply Voltage Range	19.2…31.2V dc (includes 5% ac ripple)
External DC Supply Current Range	125 mA, max
Leakage Current, Off-State Output, Max	1 mA @ 240V ac (through a snubber)
Output Delay Time, OFF to ON, Max.	10 ms❄
Output Delay Time, ON to OFF	10 ms‡
Relay Output Current Rating, Resistive	2.0 A @ 5…30V dc (at rated power) 0.5 A @ 48V dc (at rated power) 0.25 A @ 125V dc (at rated power) 2.0 A @ 125V ac (at rated power) 2.0 A @ 240V ac (at rated power)
Relay Output Current Rating, Inductive	2.0 A @ 5…30V dc; L/R = 7 ms (at rated power) 0.5 A @ 48V dc; L/R = 7 ms (at rated power) 0.25 A @ 125V dc; L/R = 7 ms (at rated power) 2.0 A @ 125V ac; 15 A make; PF = cos Θ = 0.4 (at rated power) 2.0 A @ 240V ac; 15 A make; PF = cos Θ = 0.4 (at rated power)
Contact Resistance, Initial	30 mΩ
Switching Frequency (Hz)	0.3 Hz, (1 operation every 3 s)
Bounce Time, Mean	1.2 ms
Contact Load, Min.	100 µA @ 100 mV dc
Mechanical Life	100,000 operations at rated loads
Power Dissipation, Max.	5.5 W @ 31.2V dc
Thermal Dissipation, Max.	18.8 BTU/hr @ 31.2V dc
Dimensions (HxWxD), Metric	69 x 55 x 80 mm
Dimensions (HxWxD), Imperial	2.72 x 2.17 x 3.15 in
Fusing	3.0 A, 250V ac slow blow fuse (Littelfuse part number 239003)

✶Recommended terminal base is in bold text.
❄Time from valid output on signal to relay energization by module.
‡Time from valid output off signal to relay deenergization by module.

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Analog, Thermocouple, and RTD I/O Modules

Choose analog, thermocouple, and/or RTD I/O modules when you need:

- **Individually configurable channels** allow the module to be used with a variety of sensors.
- **On-line configuration.** Modules can be configured in RUN mode using programming software or the control program. This allows you to change configuration while the system is operating.
- **Selectable input filters** on many modules allow you to select from several different filter frequencies for each channel that best meets the performance needs of your application. Lower filter settings provide greater noise rejection and resolution. Higher filter settings provide faster performance. *Note: Isolated analog modules have four filter selections; the thermocouple module has ten; and the combined RTD/thermocouple module has eight.*
- **Ability to direct output device operation during an abnormal condition.** Each channel of the output module can be individually configured to hold its last value or assume a user-defined value on either a run-to-program or run-to-fault condition. This feature allows you to set the condition of your analog devices, and therefore your control process, which may help to ensure a reliable shutdown.
- **Selectable response to broken input sensor.** This feature provides feedback to the controller that a field device is not connected. This allows you to specify corrective action based on the channel condition.
- **Single-ended or differential inputs depending on module.** Analog modules have single-ended inputs while isolated analog and temperature modules have differential inputs. Single-ended voltage sensors reduce costs. Differential inputs are more expensive, but are typically more noise immune.
- **Over- and under-range detection and indication** are available with most modules. This eliminates the need to test values in the control program. While standard analog modules have limited diagnostics, temperature and isolated analog modules provide over-range, under-range, and wire-off diagnostics with alarm bits.
- **On-board scaling** is performed by the temperature modules and is user configurable for either °C, °F, °K, Ohms, or mV. This eliminates the need to scale the data in the user program.
- **Accuracy and resolution varies by module** and the associated application. Specifications are given for each module at it's operational conditions.
- **Internal calibration is performed** in the analog modules (1794-IE8, -OE4, and -IE4XOE2). User calibration is recommended (yearly) for isolated analog and temperature modules. All modules come factory calibrated.

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Analog Module Summary

Cat. No.	Description	Number of Inputs	Number of Outputs	Terminal Base Unit
1794-IE8	FLEX I/O 24V dc Selectable Analog 8 Input Module	8	N/A	**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TB3T, 1794-TB3TS✶
1794-IE8H	FLEX I/O HART Enabled Analog 8 Input Module	8 single-ended		1794-TB3G or 1794-TB3GS
1794-IE12♠	FLEX I/O 12 Input Analog Module❄	12 single-ended		1794-TB3G or 1794-TB3GS
1794-IF4I	FLEX I/O 24V dc Source Isolated Analog 4 Input Module	4		**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TB3T, 1794-TB3TS, 1794-TBN✶
1794-IR8	FLEX I/O 24V dc RTD Input Module	8		**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TB3T, 1794-TB3TS✶
1794-IRT8	FLEX I/O 24V dc Thermocouple/RTD/mV Input Module	8		**1794-TB3G,** 1794-TB3GS✶
1794-IT8	FLEX I/O 24V dc Thermocouple/mV Input Module	8		**1794-TB3T,** 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3TS✶‡
1794-IE4XOE2	FLEX I/O 24V dc 4 Input/2 Output Analog Combo Module	4	2 single-ended with selectable channel configuration	**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TB3T, 1794-TB3TS✶
1794-IE8XOE4♠	FLEX I/O 24V dc 8 Input/4 Output Analog Combo Module❄	8 single-ended	4 single-ended	1794-TB3G or 1794-TB3GS
1794-IF2XOF2I	FLEX I/O 24V dc 2 Input/2 Output Isolated Analog Combo Module	2	2 isolated outputs with selectable channel configuration	**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TB3T, 1794-TB3TS, 1794-TBN✶
1794-OE4	FLEX I/O 24V dc Selectable Analog 4 Output Module	NA	4	**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TB3T, 1794-TB3TS, 1794-TBN✶
1794-OE8H♠	FLEX I/O HART Enabled Analog Output Module		8 single-ended	1794-TB3G or 1794-TB3GS
1794-OE12	FLEX I/O Output Analog Module❄		12 single-ended	1794-TB3G or 1794-TB3GS
1794-OF4I	FLEX I/O 24V dc Source Isolated Analog 4 Output Module		4	**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TB3T, 1794-TB3TS, 1794-TBN✶

✶Recommended terminal base is in bold text.
❄Is not supported by 1747-SN or 1747-BSN for use on RIO with SLC's.
‡You can use a 1794-TB2, 1794-TB3, or 1794-TB3S for mV inputs only.
♠Do not exceed length of 30 m (100 ft) for signal cabling.

Conformal coated versions of standard modules have the letter K in the last position of the catalog number, before the series designation. For more information, refer to the FLEX I/O Conformal Coating Brochure publication 1794-BR017.

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FLEX I/O Analog Input Modules

Cat. No.	Input Signal Range	Accuracy Drift w/Temp.	External DC Supply Current, Nom.	Power Dissipation, Max.	Thermal Dissipation, Max.
1794-IE8✶	4…20 mA 0…20 mA ±10V 0…10V	Current Input: 0.0407% Full Scale/ºC Voltage Input: 0.0428% Full Scale/°C	60 mA @ 24V dc	3 W @ 31.2V dc	10.2 BTU/hr @ 31.2V dc
1794-IE8H	4…20 mA	0.05%/°C of output signal range	295 mA @ 24V dc	3.9 W	13.5 BTU/hr
1794-IE12	4…20 mA (user configurable) 0…20 mA (user configurable)	Current Input: 0.004% Full Scale/°C Voltage Input: 0.004% Full Scale/°C	30 mA @ 24V dc; 45 mA @ 10.0V dc	1.2 W @ 31.2V dc; 1.1 W @ 24V dc; 0.9 W @ 10.0V dc	—
1794-IF4I✶	4…20 mA 0…20 mA ±10V 0…10V ±5V 0…5V	Current Input: 0.0038% Full Scale/°C Voltage Input: 0.0028% Full Scale/°C	80 mA @ 24V dc	2.0 W @ 31.2V dc	6.9 BTU/hr @ 31.2V dc
1794-IR8✶❄	1…433 Ω❄	—	140 mA @ 24V dc	3 W @ 31.2V dc	10.2 BTU/hr @ 31.2V dc
1794-IRT8✶❄	-40…+100 mV dc for thermocouples 0…325 mV dc for RTDs 0…500 Ω for resistance range❄		85 mA @ 24V dc	3 W @ 31.2V dc	10.2 BTU/hr @ 31.2V dc
1794-IT8✶❄	±76.5 mV❄		150 mA @ 24V dc	3 W @ 31.2V dc	10.2 BTU/hr @ 31.2V dc
1794-IE8XOE4	4…20 mA (user configurable) 0…20 mA (user configurable)	Current Input or Output: 0.004% Full Scale @ 25 °C Voltage Input or Output: 0.004% Full Scale @ 25 °C	140 mA @ 24V dc; 280 mA @ 10.0V dc	3.0 W @ 31.2V dc; 2.3 W @ 24V dc; 2.0 W @ 10.0V dc	—
1794-OE8H	—	0.010% per °C of output signal range	255 mA @ 24V dc	6.1 W	20.8 BTU/hr
1794-IE4XOE2✶	4…20 mA 0…20 mA ±10V 0…10V	Current Input: 0.0407% Full Scale/ºC Voltage Input: 0.0428% Full Scale/°C Current Output: 0.0069% Full Scale/°C Voltage Output: 0.0045% Full Scale/°C	70 mA @ 24V dc	4.0 W @ 31.2V dc	13.6 BTU/hr @ 31.2V dc
1794-IF2XOF2I✶	4…20 mA 0…20 mA ±10V 0…10V ±5V 0…5V	Current Input: 0.0038% Full Scale/°C Voltage Input: 0.0028% Full Scale/°C Current Output: 0.0025% Full Scale/°C Voltage Output: 0.0012% Full Scale/°C	150 mA @ 24V dc	3.3 W @ 31.2V dc	11 BTU/hr @ 31.2V dc

✶ Each module's channel is individually selectable or as a group of four.
❄ For the accuracy calculation, refer to the module's user manual.

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1794-IE8 24V dc Selectable Analog 8 Input Module

The 1794-IE8 is a voltage/current measurement module that works with a variety of input sensors to measure input voltage in ±10V range or input current in the 0 to 20 mA range. Each channel is individually configurable for the desired input range. Use the 1794-IE8 with 2-, 3-, and 4-wire input sensor field devices.

Only connect either a voltage input or a current input per channel, not both.

Use caution to prevent ground loops when using a common ground, since the channels are not isolated.

	1794-IE8
Current Input, Maximum Overload	32 mA, single channel, continuous
Voltage Input, Maximum Overload	30V, single channel, continuous
Input Resolution	12 bits - Unipolar, 11 bits + sign - Bipolar 5.13 µA/Cnt 2.56 mV/Cnt - Unipolar 5.13 mV/Cnt - Bipolar
Input Impedance	Current Input: 238 Ω Voltage Input: 100 kΩ
Input Resistance	Current Input: 238 Ω Voltage Input: 200 kΩ
Data Format	16-bit 2's complement, left-justified
Input Conversion Type	Successive approximation
Input Conversion Rate	256 µs all channels
Normal Mode Rejection Ratio	Current Input: -3 dB @ 9 Hz; -20 dB/decade -15.3 dB @ 50 Hz -16.8 dB @ 60 Hz Voltage Input: -3 dB @ 17 Hz; -20 dB/decade -10 dB @ 50 Hz -11.4 dB @ 60 Hz
Calibration	None required
Step Response to 63% of FS, Input	Current Input: 18.2 ms Voltage Input: 9.4 ms
Dimensions (HxWxD), Metric	46 x 94 x 53 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.1 in
Accuracy	Current Input: 0.20% Full Scale @ 25 °C Voltage Input: 0.20% Full Scale @ 25 °C✶

✶Includes offset, gain, non-linearity and repeatability error terms

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1794-IE8H HART Enabled Analog 8 Input Module

The 1794-IE8H is a HART enabled analog input module that works with HART enabled input sensors with input current in the 0 to 20 mA range. Use the 1794-IE8H with 2 or 3 wire tramsmitters. This module provides wire-off detection on a per-channel basis. The HART analog modules can only be used on ControlNet or EtherNet/IP networks with one HART field device per channel.

	1794-IE8H
Voltage Input, Maximum Overload	—
Current Input, Maximum Overload	—
Isolation Voltage	50V (continuous), Basic Insulation Type Routine tested at 850V dc for 1 s, between field side and system No isolation between individual channels
Input Resolution	16 bits
Input Resistance	—
Data Format	Configurable
Input Conversion Type	—
Input Conversion Rate	10 ms (50 Hz) / 8.33 ms (60 Hz)
Normal Mode Rejection Ratio	—
Step Response to 63% of FS, Input	80 ms to 99% of FS
Calibration	—
Dimensions (HxWxD), Metric	46 x 94 75 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.95 in
Resolution	16 bit unipolar 15 bit + bipolar
Accuracy	Current Input: 0.1% Full Scale @ 20 °C (68 °F)

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1794-IE12 24V dc Selectable Analog 12 Input Module

The 1794-IE12 is a voltage or current measurement module that measures inupt voltage in a ±10V range or current in the 0-20 MA range. Each channel is individually configurable and the out-of-range notification is by channel.

	1794-IE12
Voltage Input, Maximum Overload	30V continuous, single channel
Current Input, Maximum Overload	32 mA continuous, single channel
Isolation Voltage	50V (continuous), Basic Insulation Type Type tested at 850V dc for 60 s, between field side and system No isolation between individual channels
Input Resolution	320 µV/cnt 0.641 µA/cnt
Input Resistance	—
Data Format	16 bit, 2's complement
Input Conversion Type	Successive Approximation
Input Conversion Rate	8.0 ms all channels
Normal Mode Rejection Ratio	Voltage/Current Terminal: -3 dB @ 0.05 Hz; -20 db/decade -52 db @ 50 Hz; -54 db @ 60 Hz Voltage/Current Terminal with Quick Step: -3 dB @ 1.5 Hz; -20 db/decade -29 db @ 50 Hz; -31 db @ 60 Hz
Step Response to 63% of FS, Input	Current or Voltage Input: 1.3 s (0.09 s with Quick Step)
Calibration	—
Dimensions (HxWxD), Metric	—
Dimensions (HxWxD), Imperial	—
Resolution	16 bit unipolar 15 bit + bipolar
Accuracy	Current Input: 0.1% Full Scale @ 25 °C Voltage Input: 0.1% Full Scale @ 25 °C✶

✶Includes offset, gain, nonlinearity, and repeatability error terms.

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1794-IF4I 24V dc Source Isolated Analog 4 Input Module

The 1794-IF4I is an input module with channel-to-channel isolation that works with a variety of input sensors to measure input voltage in ±10V range or input current in the 0 to 20 mA range. Each channel is individually configurable for the desired input range. Use the 1794-IF4I with 2-, 3-, and 4-wire input sensor field devices.

Only connect either a voltage input or a current input per channel, not both.

	1794-IF4I
Voltage Input, Maximum Overload	30V, single channel, continuous
Current Input, Maximum Overload	32 mA, single channel, continuous
Isolation Voltage	120V (continuous, when used with 1794-TB2, -TB3, -TB3S, -TB3T, or -TB3TS), Basic Insulation Type 250V (continuous, when used with 1794-TBN), Basic Insulation Type Tested to 1500Vac for 60s and 2550Vdc for 1s between channel to channel, channel to user, channel to system, and user power to system
Input Resolution	16 bits - Unipolar, 15 bits + sign - Bipolar 0.320 µA/Cnt - Unipolar 0.640 µA/Cnt - Bipolar 0.156 mV/Cnt - Unipolar 0.313 mV/Cnt - Bipolar
Input Resistance	Current Input: <100 Ω✶Voltage Input: >10 MΩ
Data Format	2's complement 2's complement percent binary offset binary
Input Conversion Type	Sigma Delta
Input Conversion Rate	2.5/5.0/7.5 ms all channels
Normal Mode Rejection Ratio	-3 dB @ 12 Hz (300 Hz conversion rate) -80.0 dB @ 50 Hz (300 Hz conversion rate)
Step Response to 63% of FS, Input	Current or Voltage Input: 1200 Hz conversion rate = 0.6 ms 600 Hz conversion rate = 6.7 ms 300 Hz conversion rate = 13.4 ms 150 Hz conversion rate = 26.7 ms
Calibration	Factory calibrated
Dimensions (HxWxD), Metric	46 x 94 x 53 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.1 in
Resolution	16 bit unipolar 15 bit + bipolar
Accuracy	Current Input: 0.1% Full Scale @ 25 °C Voltage Input: 0.1% Full Scale @ 25 °C❄

✶If 24V dc is removed from the module, input resistance = 10 kΩ.

❄Includes offset, gain, non-linearity and repeatability error terms.

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1794-IR8 24V dc RTD Input Module

The 1794-IR8 is a temperature-measuring module that accepts 2-, and 3-wire RTDs. Use the 1794-IR8 in applications where channel fast-update rate is not required. If you need channel fast-update rates, use the 1794-IRT8 module.

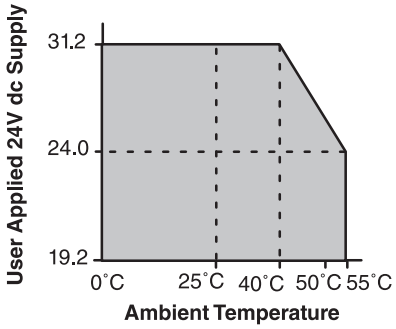
	1794-IR8
Input Resolution	16 bits across 435 Ω
Normal Mode Rejection Ratio	60 dB @ 60 Hz for A/D filter cutoff @ 15 Hz
Sensors Supported	Resistance: 100 Ω Pt μ = 0.00385 Euro (-200…+870 °C) 100 Ω Pt μ = 0.003916 U.S. (-200…+630 °C) 200 Ω Pt μ = 0.00385 Euro (-200…+630 °C) 500 Ω Pt μ = 0.00385 U.S. (-200…+630 °C) 100 Ω Nickel μ = 0.00618 (-60…+250 °C) 120 Ω Nickel μ = 0.00672 (-60…+250 °C) 200 Ω Nickel μ = 0.00618 (-60…+250 °C) 500 Ω Nickel μ = 0.00618 (-60…+250 °C) 10 Ω Copper μ = 0.00427 (-200…+260 °C)
Data Format	Left justified 16-bit 2's complement or offset binary
Settling Time	100% of final value available at system throughput rate
Accuracy✶	Enhanced Mode (typical): 0.01% Full Scale (low humidity) without calibration Normal Mode (max): 0.05% Full Scale (low humidity) without calibration
Common Mode Rejection Ratio	-120 db @ 60 Hz -100 db @ 50 Hz with A/D filter cutoff @ 10 Hz
Common Mode Voltage	0V between channels (common return)
System Throughput	Enhanced Mode: Programmable from 56 ms/channel to 650 ms/channel 650 ms (1 channel scanned) 2.925 s (8 channels scanned) Normal Mode: Programmable from 28 ms/channel to 325 ms/channel 325 ms (1 channel scanned) 2.6 s (8 channels scanned)
Settling Time	100% of final value available at system throughput rate
Open RTD Detection	Out of range upscale reading
Open Circuit Detection Type	Available at system throughput rate
Overvoltage Capability	35V dc, 25V ac continuous @ 25 °C 250V peak transient
Channel Bandwidth	dc to 2.62 Hz (-3 dB)
RTD Excitation Current	718.39 μA
RFI Immunity	Error of <1% of range at 10V/m, 27…1000 MHz
Dimensions (HxWxD), Metric	49 x 94 x 53 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.1 in
Input Offset Drift with Temperature	1.5 mΩ /°C max
Gain Drift with Temperature	Normal mode: 20 ppm/ °C max. Enhanced mode: 10 ppm/ °C max.

✶ This number is based on the hardware of the module only. Additional errors are introduced depending on the sensor used, environment, and other factors. Contact tecnical support for more information.

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1794-IR8 Derating Curve

Derating Curve



Safe operating area

The area within the curve represents the safe operating range for the module under various conditions of user supplied 24V dc supply voltages and ambient temperatures.

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1794-IRT8 24V dc Thermocouple/RTD Input Module

The 1794-IRT8 is a high-speed, high-accuracy temperature/mV measuring module that accepts thermcouple inputs, 2-, 3-, and 4-wire RTD inputs, and mV source inputs.

The 1794-IRT8 offers the following:

- wire-off, over-range, and under-range detection
- good common mode rejection
- usage with long thermocouple wiring
- effective in noisy environments
- usage with grounded or ungrounded thermocouples
- more stability with ambient temperature changes than with the 1794-IR8 and the 1794-IT8

Release of Series B version provides capability to work with grounded thermocouples

Use cold junction compensators (cat. no. 1794-CJC2) in thermocouple mode. Two cold junction compensators are shipped with the 1794-IRT8.

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	1794-IRT8
Input Resolution	14 bits
Supported RTD Types	Resistance: 100 Ω Pt μ = 0.00385 Euro (-200…+870 °C) 100 Ω Pt μ = 0.003916 U.S. (-200…+630 °C) 200 Ω Pt μ = 0.00385 Euro (-200…+400 °C) 200 Ω Pt μ = 0.003916 U.S. (-200…+400 °C) 100 Ω Nickel μ = 0.00618 (-60…+250 °C) 120 Ω Nickel μ = 0.00672 (-80…+320 °C) 200 Ω Nickel μ = 0.00618 (-60…+200 °C) 10 Ω Copper μ = 0.00427 (-200…+260 °C)
Supported Thermocouple Types	Type B: 300…1800 °C (572…3272 °F) Type E: -270…1000 °C (-454…1832 °F) Type J: -210…1200 °C (-346…2192 °F) Type K: -270…1372 °C (-454…2502 °F) Type TXK/XK (L):-200…800 °C (-328…1472 °F) Type N: -270…1300 °C (-454…2372 °F) Type R: -50…1768 °C (-58…3214 °F) Type S: -50…1768 °C (-58…3214 °F) Type T: -270…400 °C (-454…752 °F)
Accuracy	0.05% of full range in mV mode with filtering selected Hardware only = 0.10% of full range in mV mode
Common Mode Rejection Ratio	-80 dB @ 5V peak-to-peak 50-60 Hz
Common Mode Input Range	Series A: ±4V Series B: ±15V
System Throughput	7.4 ms - mV 8.0 ms - Ω - 2-wire 10.0 ms - Ω - 3-wire 10.4 ms - Ω - 4-wire 8.0 ms - 2-wire RTD (°F) 10.4 ms - 4-wire RTD (°F) 8.8 ms - 2-wire RTD (°C), (°K) 10.8 ms - 4-wire RTD (°C), (°K) 9.8 ms - 3-wire RTD (°F) 10.0 ms - 3-wire RTD (°C), (°K) 8.0 ms - Thermocouples (°F) 8.8 ms - Thermocouples (°C), (°K)✶
Open Circuit Detection Type	Series A: RTD and TC modes - Open Input - Module defaults to max value Series B: RTD mode - Open Input - Module defaults to max value Series B: TC mode - Open Input - Module defaults to min value
Excitation Current	630 μA
Overvoltage Capability	Series A: 7V dc continuous @ 25 °C Series B: 15V dc continuous @ 25 °C
Open Input Detection Time	0…3.8 s for Series A revision D or earlier Immediate detection (max 2 scans) for Series A revision E or later immediate detection (max 2 scans) for Series B

✶For max throughput short circuit all unused channels.

	1794-IRT8
Cold Junction Compensation Range	0…70 °C for firmware Series A revision D or earlier -20…100 °C for firmware Series A revision E or later -20…100 °C for firmware Series B
Cold Junction Compensation	A-B Cold Junction Compensator Kit, 1794-CJC2✶
Data Format	°C (implied decimal point XXX.X) °F (implied decimal point XXX.X) °K (implied decimal point XXX.X) -32767…+32767 0…65535 0…5000 (Ω mode) (implied decimal point XXX.X) -4000…+10000 (mV mode) (implied decimal point XXX.XX)
RFI Immunity	—
Dimensions (HxWxD), Metric	46 x 94 x 53 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.1 in
Overall Drift with Temperature, Max.	Series A: 150 ppm/°C of span Series B: 50 ppm/°C of span

✶Kit supplied with the module and contains 2 compensators.

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1794-IT8 24V dc Thermocouple/mV Input Module

The 1794-IT8 module is a temperature/mV measuring module that accepts inputs from a variety of thermcouples and from the mV source in the range of ±76.5 mV. Choose the 1794-IT8 module when you need the following:

- A cost effective module.

Applications that don't require high accuracy or high speed.

Support for grounded or ungrounded thermocouples.

Use cold junction compensators (cat. no. 1794-CJC2) in thermocouple mode. Two cold junction compensators are shipped with the 1794-IT8 module. This module is suitable to work with grounded thermocouples, if certain guidelines are followed. Refer to the module's user manual for more information.

The FLEX I/O cold junction compensator kit, containing two compensators, is included with the 1794-IT8 modules. You can order additional compensators using the above catalog number.

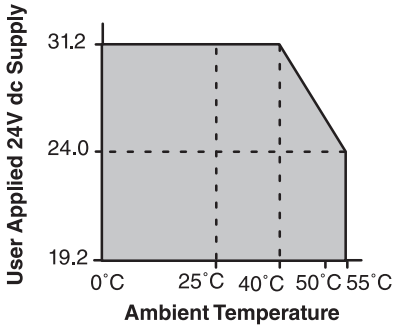
	1794-IT8
Input Resolution	16 bits (2.384 µV typical)
Supported Thermocouple Types	Type B: 300…1800 °C (572…3272 °F) Type C: 0…2315 °C (32…4199 °F) Type E: -270…1000 °C (-454…1832 °F) Type J: -210…1200 °C (-346…2192 °F) Type K: -270…1372 °C (-454…2502 °F) Type N: -270…1300 °C (-454…2372 °F) Type R: -50…1768 °C (-58…3214 °F) Type S: -50…1768 °C (-58…3214 °F) Type T: -270…400 °C (-454…752 °F) Type TXK/XK (L): -200…800 °C (-328…1472 °F)
Data Format	16-bit 2's complement or offset binary (unipolar)
Accuracy✶	With Filter (max): 0.025% Full Scale @ 24 °C (±0.5 °C) Without Filter (max): 0.05% Full Scale @ 24 °C (±0.5 °C)
Common Mode Rejection Ratio	-115 dB @ 60 Hz; -100 dB @ 50 Hz
Normal Mode Rejection Ratio	60 dB @ 60 Hz
Common Mode Input Range	±10V
System Throughput	325 ms (1 channel scanned), programmable to 28 ms 2.6 s (8 channels scanned), programmable to 224 ms
Settling Time	100% of final value available at system throughput rate
Open Circuit Detection Type	Out of range reading (upscale)
Open Input Detection Time	Available at system throughput rate
Overvoltage Capability	35V dc, 25V ac continuous @ 25 °C 250V peak transient
Channel Bandwidth	0…2.62 Hz (-3 dB)
RFI Immunity	Error of <1% of range at 10V/m, 27…1000 MHz
Input Offset Drift with Temperature	+6 µV/°C max
Gain Drift with Temperature	10 ppm/°C max
Overall Drift with Temperature, Max.	50 ppm/°C of span
Dimensions (HxWxD), Metric	1.8 x 3.7 x 2.1 mm
Dimensions (HxWxD), Imperial	46 x 94 x 53 in
Cold Junction Compensation Range	0…70 °C
Cold Junction Compensation	A-B Cold Junction Compensation Kit, 1794-CJC2❄

✶ This accuracy is based on the hardware of the module only. Refer to the user manual for the complete error calculation procedure.
❄Kit supplied with the module and contains 2 compensators.

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1794-IT8 Derating Curve

Derating Curve



Safe operating area

The area within the curve represents the safe operating range for the module under various conditions of user supplied 24V dc supply voltages and ambient temperatures.

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1794-IE4XOE2 24V dc 4 Input/2 Output Analog Combo Module

The 1794-IE4XOE2 is a combination module with 4 inputs and 2 outputs. Inputs can be configured individually for different modes. Inputs accept signals from a variety of inputs sensors (2-, 3-, and 4-wire) in the range of ±10V or 0 to 20 mA. Outputs are also individually configurable for different modes. Outputs produce signals in the range of ±10V or 0 to 20 mA.

	1794-IE4XOE2
Calibration	None required
Input Conversion Type	Successive approximation
Input Conversion Rate	256 µs all channels
Input Resolution	12 bits - Unipolar, 11 bits + sign - Bipolar 5.13 µA/Cnt 2.56 mV/Cnt - Unipolar 5.13 mV/Cnt - Bipolar
Data Format	16-bit 2's complement, left-justified
Step Response to 63% of FS, Input	Current Input: 18.2 ms Voltage Input: 9.4 ms
Accuracy	Current Input: 0.20% Full Scale @ 25 °C Voltage Input: 0.20% Full Scale @ 25 °C Current Output: 0.425% Full Scale @ 25 °C Voltage Output: 0.133% Full Scale @ 25 °C✶
Accuracy Drift w/Temp.	Current Input: 0.0407% Full Scale/°C Voltage Input: 0.0428% Full Scale/°C Current Output: 0.0069% Full Scale/°C Voltage Output: 0.0045% Full Scale/°C
Normal Mode Rejection Ratio	Current Input: -3 dB @ 9 Hz; -20 dB/decade -15.3 dB @ 50 Hz -16.8 dB @ 60 Hz Voltage Input: -3 dB @ 17 Hz; -20 dB/decade -10 dB @ 50 Hz -11.4 dB @ 60 Hz
Input Impedance	Current Input: 238 Ω Voltage Input: 100 kΩ
Voltage Input, Maximum Overload	30V, single channel, continuous
Output Resolution	12 bits + sign 5.13 µA/Cnt 2.56 mV/Cnt
Data Format	16-bit 2's complement, left-justified
Output Conversion Type	Pulse Width Modulation
Output Conversion Rate	1.024 ms all channels
Step Response to 63% of FS, Output	Current or Voltage Output: 24 ms
Dimensions (HxWxD), Metric	46 x 94 x 53 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.1 in
Current Load on Voltage Output, Max.	3 mA
Resistive Load on Current Output	15…750 Ω

✶Includes offset, gain, non-linearity and repeatability error terms

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1794-IE8XOE4 24V dc 8 Input/4 Output Analog Combo Module

The 1794-IE8XOE4 is a combination module with 8 inputs and 4 outputs. Inputs can be configured individually for different modes, as can outputs. Inputs accept signals from 2, 3, and 4 wire input sensors in the ranges of ±10V or 0 to 20 mA. Outputs produce signals in the range of ±10V or 0 to 20 mA.

	1794-IE8XOE4
Calibration	None required
Input Conversion Type	Successive Approximation
Input Conversion Rate	8.0 ms all channels
Input Resolution	stbUCString::convert: Character with charcode: "913" met
Data Format	16 bit, 2's complement
Step Response to 63% of FS, Input	Current or Voltage Input: 1.3 s (0.09 s with Quick Step)
Accuracy	Current Input or Output: 0.1% Full Scale @ 25 °C Voltage Input or Output: 0.1% Full Scale @ 25 °C✶
Accuracy Drift w/Temp.	Current Input or Output: 0.004% Full Scale @ 25 °C Voltage Input or Output: 0.004% Full Scale @ 25 °C
Normal Mode Rejection Ratio	Voltage/Current Terminal: -3 dB @ 0.05 Hz; -20 db/decade -52 db @ 50 Hz; -54 db @ 60 Hz Voltage/Current Terminal with Quick Step: -3 dB @ 1.5 Hz; -20 db/decade -29 db @ 50 Hz; -31 db @ 60 Hz
Input Impedance	Voltage Input: Greater than 1 megohm Current Input: Less than 100 ohms❄
Voltage Input, Maximum Overload	30V, single channel, continuous
Output Resolution	stbUCString::convert: Character with charcode: "913" met
Data Format	16 bit, 2's complement
Output Conversion Type	Digital-to-Analog Converter
Output Conversion Rate	—
Step Response to 63% of FS, Output	~70% 1st convert; 96% 2nd convert; 100% 3rd convert
Dimensions (HxWxD), Metric	94.0 x 94.0 x 53.3 mm (with module installed in base)
Dimensions (HxWxD), Imperial	3.7 x 3.7 x 2.1 in (with module installed in base)
Current Load on Voltage Output, Max.	3 mA max
Resistive Load on Current Output	0…750 Ω over full power supply range

✶Includes offset, gain, non-linearity and repeatability error terms
❄If 24V dc is removed from the module, input resistance = 10 K ohms.

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1794-IF2XOF2I 24V dc 2 Input/2 Output Isolated Analog Combo Module

The 1794-IF2XOF2I is a combination module with 2 inputs and 2 outputs with isolated, individually-configurable channels. Inputs accept signals from a variety of input sensors (2-, 3-, and 4-wire) in the range of ±10V or ±20 mA. Outputs produce signals in the range of ±10V or 0 to 20 mA.

Only connect either a voltage input or a current input per channel, not both.

	1794-IF2XOF2I
Calibration	Factory calibration
Input Conversion Type	Sigma Delta
Isolation Voltage	120V continuous (when used with 1794-TB3, 1794-TB3S, 1794-TB2, 1794-TB3T, or 1794-TB3TS) 250V continuous (when used with -TBN) Tested at 1500V ac for 60 s and 2550V dc for 1 s, channel to channel, I/O to system.
Input Conversion Rate	2.5/5.0/7.5 ms all channels
Input Resolution	16 bits - Unipolar, 15 bits + sign - Bipolar 0.320 µA/Cnt - Unipolar 0.640 µA/Cnt - Bipolar 0.156 mV/Cnt - Unipolar 0.313 mV/Cnt - Bipolar
Data Format	2's complement 2's complement percent binary offset binary
Step Response to 63% of FS, Input	Current or Voltage Input: 1200 Hz conversion rate = 0.6 ms 600 Hz conversion rate = 6.7 ms 300 Hz conversion rate = 13.4 ms 150 Hz conversion rate = 26.7 ms
Accuracy	Current Input: 0.1% Full Scale @ 25 °C Voltage Input: 0.1% Full Scale @ 25 °C Current Output: 0.1% Full Scale @ 25 °C Voltage Output: 0.1% Full Scale @ 25 °C✶
Accuracy Drift w/Temp.	Current Input: 0.0038% Full Scale/°C Voltage Input: 0.0028% Full Scale/°C Current Output: 0.0025% Full Scale/°C Voltage Output: 0.0012% Full Scale/°C
Normal Mode Rejection Ratio	-3 dB @ 12 Hz (300 Hz conversion rate) -80.0 dB @ 50 Hz (300 Hz conversion rate)
Voltage Input, Maximum Overload	30V, single channel, continuous
Output Resolution	15 bits + sign 0.656 µA/Cnt 0.320 mV/Cnt
Data Format	2's complement 2's complement percent binary offset binary
Output Conversion Type	Digital to analog converter
Output Conversion Rate	2.5/5.0 ms
Dimensions (HxWxD), Metric	46 x 94 x 53 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.1 in
Current Load on Voltage Output, Max.	3 mA
Resistive Load on Current Output	0…750 Ω

✶Includes offset, gain, non-linearity and repeatability error terms.

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FLEX I/O Analog Output Modules

Cat. No.	Number of Outputs	Output Signal Range	External DC Supply Current, Nom.	Power Dissipation, Max.	Thermal Dissipation, Max.
1794-OE4	4 single-ended with selectable channel configuration	4…20 mA 0…20 mA ±10V 0…10V	70 mA @ 24V dc✶	4.5 W @ 31.2V dc	15.3 BTU/hr @ 31.2V dc
1794-OE8H	8 single-ended isolated with selectable channel configuration	4…20 mA (user configurable) 0…20 mA (user configurable)	255 mA @ 24V dc	6.1 W	20.8 BTU/hr
1794-OE12	12 single-ended isolated with selectable channel configuration	0 mA output until module is configured 4…20 mA (user configurable) 0…20 mA (user configurable)	320 mA @ 24V dc; 720 mA @ 10.0V dc	4.0 W @ 31.2V dc; 4.3 W @ 24V dc; 4.0 W @ 10.0V dc	—
1794-OF4I	4 isolated with selectable channel configuration	4…20 mA 0…20 mA ±10V 0…10V ±5V 0…5V	210 mA @ 24V dc	4.7 W @ 31.2V dc	16 BTU/hr @ 31.2V dc
1794-IE8XOE4	4 single-ended isolated with selectable channel configuration	—	140 mA @ 24V dc; 280 mA @ 10.0V dc	3.0 W @ 31.2V dc; 2.3 W @ 24V dc; 2.0 W @ 10.0V dc	—
1794-IE4XOE2	2 single-ended with selectable channel configuration	4…20 mA 0…20 mA ±10V 0…10V	70 mA @ 24V dc	4.0 W @ 31.2V dc	13.6 BTU/hr @ 31.2V dc
1794-IF2XOF2I	2 isolated outputs with selectable channel configuration	4…20 mA 0…20 mA ±10V 0…10V ±5V 0…5V	150 mA @ 24V dc	3.3 W @ 31.2V dc	11 BTU/hr @ 31.2V dc

✶Not including outputs.

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1794-OE4 24V dc Selectable Analog 4 Output Module

The 1794-OE4 module has 4 output, non-isolated, individually-configurable channels. Outputs are capable of driving the field devices that require a voltage of ±10V or a current of 0 to 20 mA.

	1794-OE4
Output Resolution	12 bits + sign 5.13 µA/Cnt 2.56 mV/Cnt
Output Resolution	12 bits + sign 5.13 µA/Cnt 2.56 mV/Cnt
Data Format	16-bit 2's complement, left-justified
Output Conversion Type	Pulse Width Modulation
Output Conversion Rate	1.024 ms all channels
Step Response to 63% of FS, Output	Voltage Output: 24 ms
Current Load on Voltage Output, Max.	3 mA
Resistive Load on Current Output	15…750 Ω
Accuracy	Current Output: 0.425% Full Scale @ 25 °C Voltage Output: 0.133% Full Scale @ 25 °C✶.
Accuracy Drift w/Temp.	Current Output: 0.0069% Full Scale/°C Voltage Output: 0.0045% Full Scale/°C
Calibration	None required
Isolation Voltage	50V continuous, I/O to system Tested to 850V dc for 1 s, I/O to system (No isolation between individual channels)
Power Dissipation, Max.	4.5 W @ 31.2V dc
Thermal Dissipation, Max.	15.3 BTU/hr @ 31.2V dc
Dimensions (HxWxD), Metric	46 x 94 x 53 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.1 in
Wire Size	0.34... 2.5 mm² (22...12 AWG) solid or stranded shielded copper wire rated at 75 °C (167 °F) or greater 1.2 mm (3/64 in.) insulation max
Wiring Category	2 - on signal ports 2 - on power ports❄

✶Includes offset, gain, non-linearity and repeatability error terms
❄Use this Conductor Category information for planning conductor routing. Refer to Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

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1794-OF4I 24V dc Source Isolated Analog 4 Output Module

The 1794-OF4I modules provides 4 isolated outputs for 2-, 3-, and 4-wire output devices that use voltage in the range of ±10V or 0 to 20 mA current.

	1794-OF4I
Output Resolution	15 bits + sign 0.656 µA/Cnt 0.320 mV/Cnt
Isolation Voltage	120V continuous (when used with 1794-TB2, -TB3, -TB3S, -TB3T, or -TB3TS) 250V continuous (when used with 1794-TBN) Tested to 1500V ac for 60 s and 2550V dc for 1 s, channel to channel, I/O to system
Output Signal Range	4…20 mA 0…20 mA ±10V 0…10V ±5V 0…5V
Data Format	2's complement 2's complement percent binary offset binary
Output Conversion Type	Digital to analog converter
Output Conversion Rate	2.5/5.0 ms
Step Response to 63% of FS, Output	Current or Voltage Output: < 25 µs
Current Load on Voltage Output, Max.	3 mA
Resistive Load on Current Output	0…750 Ω
Accuracy	Current Output: 0.1% Full Scale @ 25 °C Voltage Output: 0.1% Full Scale @ 25 °C✶
Accuracy Drift w/Temp.	Current Output: 0.0025% Full Scale/°C Voltage Output: 0.0012% Full Scale/°C
Calibration	Factory calibrated
Power Dissipation, Max.	4.7 W @ 31.2V dc
Thermal Dissipation, Max.	16 BTU/hr @ 31.2V dc
Dimensions (HxWxD), Metric	46 x 94 x 53 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.1 in
Wire Size	0.34... 2.5 mm² (22...12 AWG) solid or stranded shielded copper wire rated at 75 °C (167 °F) or greater 1.2 mm (3/64 in.) insulation max
Wiring Category	2 - on signal ports 3 - on power ports❄

✶Includes offset, gain, non-linearity and repeatability error terms.
❄Use this Conductor Category information for planning conductor routing. Refer to Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

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1794-OE8H HART Enabled Analog 8 Ouput Module

The 1794-OE8H is a HART enabled analog output module that works with HART enabled field devices that use current in the 0 to 20 mA range. Use with 2 or 3 wire devices. This module provides wire-off detection on a per-channel basis. This module can only be used on ControlNet or EtherNet/IP networks. One HART field device per channel.

	1794-OE8H
Output Resolution	13 bits
Isolation Voltage	50V (continuous), Basic Insulation Type Routine tested at 850V dc for 1 s, between field side and system No isolation between individual channels
Output Signal Range	4…20 mA (user configurable) 0…20 mA (user configurable)
Data Format	Configurable
Output Conversion Type	—
Output Conversion Rate	10 ms for all channels
Step Response to 63% of FS, Output	13 ms to 99% of FS / 115 ms during HART comms
Current Load on Voltage Output, Max.	0…22 mA @ > 15V
Resistive Load on Current Output	0…680 Ω @ 22 mA, 0…770 Ω @ 20 mA
Accuracy	0.1% Full Scale @ 20 °C (68 °F)
Accuracy Drift w/Temp.	0.010% per °C of output signal range
Calibration	—
Power Dissipation, Max.	6.1 W
Thermal Dissipation, Max.	20.8 BTU/hr
Dimensions (HxWxD), Metric	46 x 94 x 75 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.95 in
Wire Size	0.34... 2.5 mm^2 (22...12 AWG) solid or stranded shielded copper wire rated at 75 °C (167 °F) or greater 1.2 mm (3/64 in.) insulation max
Wiring Category	2 - on signal ports 2 - on power ports✶

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

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1794-OE12 24V dc Selectable Analog 12 Output Module

1794-OE12 module is a High Density analog output module, capable of providing current in the range of 0 to 20mA or voltage in the range of +/-10V, depending on the user configuration. Out of Range status bit exists for each channel.

	1794-OE12
Output Resolution	stbUCString::convert: Character with charcode: "913" met
Isolation Voltage	50V (continuous), Basic Insulation Type Type tested at 850V dc for 60 s, between field side and system No isolation between individual channels
Output Signal Range	0 mA output until module is configured 4…20 mA (user configurable) 0…20 mA (user configurable)
Data Format	Configurable
Output Conversion Type	Digital-to-Analog Converter
Output Conversion Rate	—
Step Response to 63% of FS, Output	~70% 1st convert; 96% 2nd convert; 100% 3rd convert
Current Load on Voltage Output, Max.	3 mA max
Resistive Load on Current Output	0…750 Ω over full power supply range
Accuracy	Current Output: 0.1% Full Scale @ 25 °C Voltage Output: 0.1% Full Scale @ 25 °C
Accuracy Drift w/Temp.	Current Output: 0.004% Full Scale/°C Voltage Output: 0.004% Full Scale/°C
Calibration	None required
Power Dissipation, Max.	4.0 W @ 31.2V dc; 4.3 W @ 24V dc; 4.0 W @ 10.0V dc
Thermal Dissipation, Max.	—
Dimensions (HxWxD), Metric	94.0 x 94.0 x 53.3 mm (with module installed in base)
Dimensions (HxWxD), Imperial	3.7 x 3.7 x 2.1 in (with module installed in base)
Wire Size	0.34... 2.5 mm^2 (22...12 AWG) solid or stranded shielded copper wire rated at 75 °C (167 °F) or greater 1.2 mm (3/64 in.) insulation max
Wiring Category	2 - on signal ports 2 - on power ports✶

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

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FLEX I/O Counter Modules

Ask these three questions when deciding on which counter module would best fit your application:

What is the application?

What field devices, signal levels, and signal type are being connected to the counter module?

What is the desired counter module?

Choosing the Correct Counter Module for Your Application

Cat. No.	Description	Applications	Network Compatibility	Number of Inputs — Number of Outputs	External DC Supply Current, Nom.	Power Dissipation, Max.	Thermal Dissipation, Max.
1794-IJ2	FLEX I/O 24V dc 2 Input Frequency Module	Any application requiring rotational control including turbine generators, motors, drives, gears, shafts, etc.	All networks supported by FLEX I/O	2 — 2	220 mA @ 19.2V dc; 180 mA @ 24V dc; 140 mA @ 31.2V dc	4.6 W @ 31.2V dc	15.6 BTU/hr @ 31.2V dc
1794-VHSC	FLEX I/O 24V dc 2 Channel Very High Speed Counter Module	Typical applications include packaging, material handling, flow monitoring, cut-to-length, motor speed control and monitoring.	Supported on ControlNet (1794-ACN15, -ACNR15) or EtherNet I/P (1794-AENT) networks only. Also supported on FlexLogix.	2 — 2	100 mA @ 24V dc✶	5 W @ 31.2V dc	17.1 BTU/hr @ 31.2V dc
1794-ID2	FLEX I/O 24V dc 2 Input Pulse Counter Module	Typical applications include quantity counting, positioning, and speed calculations.	All networks supported by FLEX I/O	2 Inputs Only	150 mA @ 12V dc 75 mA @ 24V dc	5 W @ 26.4V dc	17.1 BTU/hr @ 26.4V dc
1794-IP4	FLEX I/O 12/24V dc 4 Input Pulse Counter Module	Typical applications include counting pulses from flow meters and density meters. Quantity counting and speed calculations are examples of other applications.		4 Inputs Only	150 mA @ 12V dc 75 mA @ 24V dc	5 W @ 26.4V dc	17.1 BTU/hr @ 26.4V dc

✶Does not represent power required to supply the inputs or outputs.

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	Conformal Coated Description
1794-IJ2K	ANSI / ISA-S71.04-1985, Class G1, G2, and G3 environments CEI IEC 6065A-4 Class 1 and 2 environments UL 746E

1794-IJ2 24V dc 2 Input Frequency Module

The 1794-IJ2 is essentially a tachometer with the capability of reporting frequency, acceleration, and direction. Outputs are activated by alarms. Input devices range from magnetic pickup to flowmeters, to incremental encoders to proximity detectors.
This intelligent I/O module is designed to perform high-speed frequency algorithms. The module provides 2 frequency inputs, 2 gate inputs, and 2 outputs. The frequency inputs are capable of accepting frequencies up to 32KHz. The module accepts and returns binary data.
The 1794-IJ2 measures frequency over a user-specified time interval. A frequency calculation can start *before* the time interval has elapsed, if a user-specified number of frequency input pulses have occurred.
The module's primary target is high-speed, accurate frequency measurement. As such, a high-speed internal clock is synchronized with the frequency input to count over a user-selected sampling time or a user-defined number of frequency input pulses.
Power to the module is supplied from the external power supply. All power for input devices (24V dc) is supplied by the I/O module. Outputs are used to set alarms depending on the input conditions.

The 1794-IJ2 module accepts the following frequency inputs:

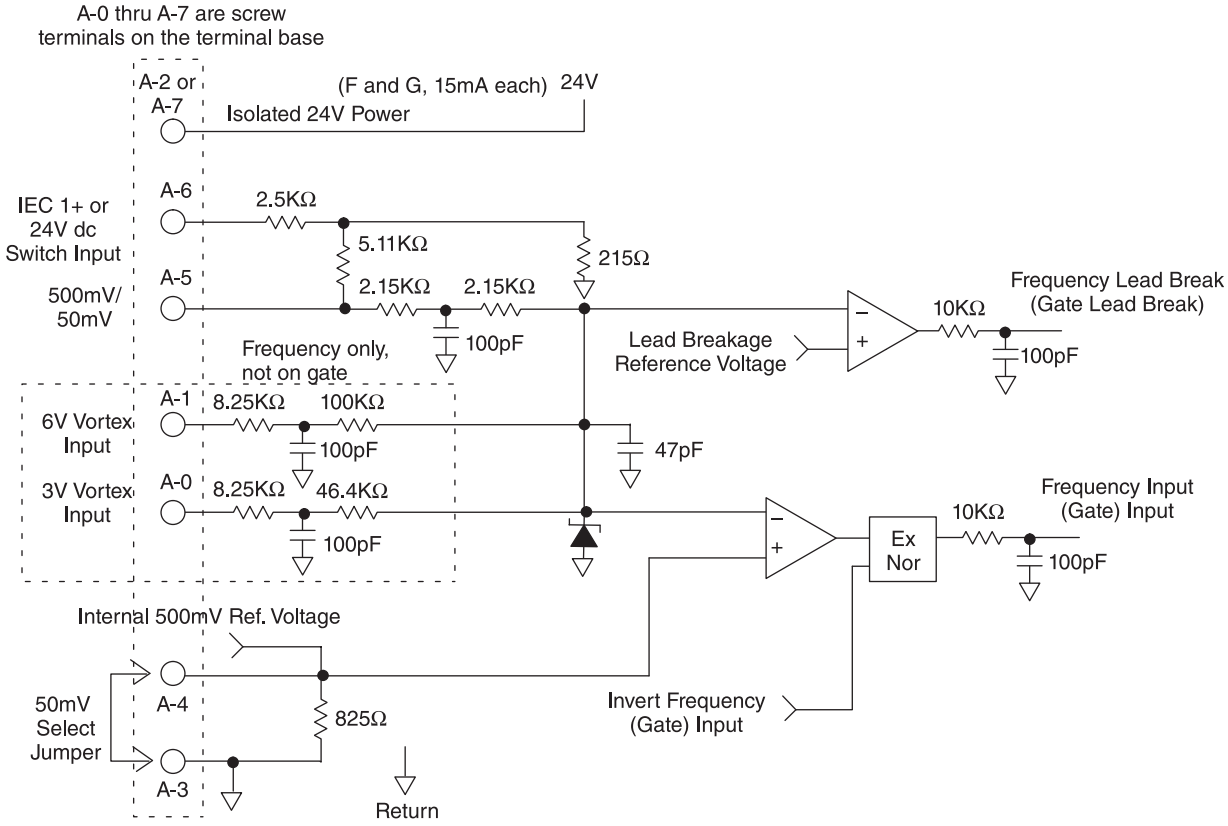
- 24V dc IEC1+ proximity switch as defined by standard IEC 1131-2
- 24V dc contact switch with wire off capability
- 500 mV ac magnetic pickup
- 50 mV ac magnetic pickup
- 6V ac vortex
  - 3V ac vortex

The 1794-IJ2 module accepts the following gate inputs:

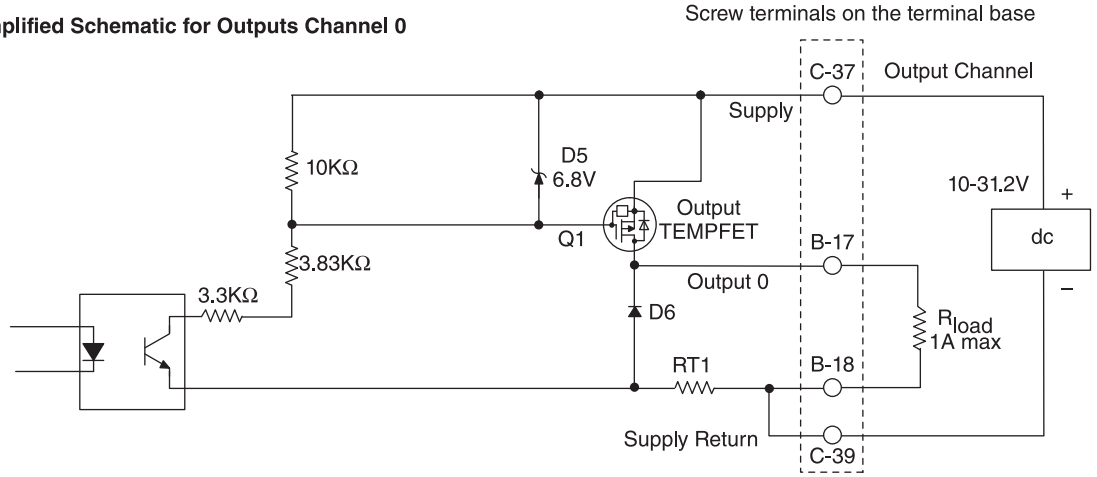
- 24V dc IEC1+ proximity switch as defined by standard IEC 1131-2
- 24V dc contact switch
- 500 mV ac magnetic pickup
- 50 mV ac magnetic pickup

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Simplified Schematic for Frequency Input Channel 0



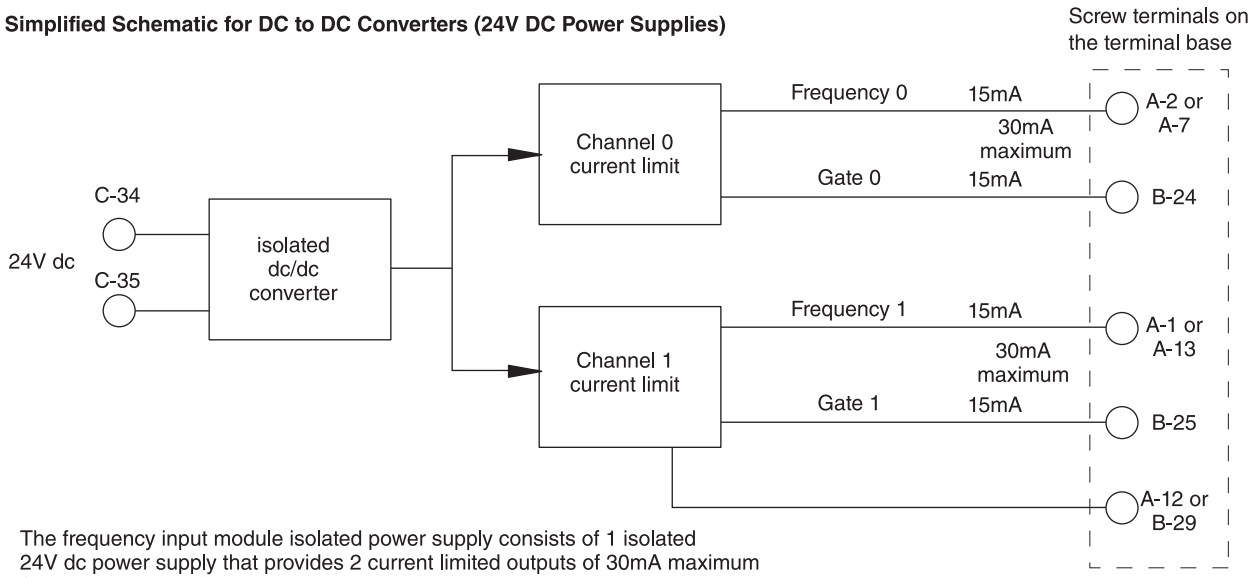
Simplified Schematic for Outputs Channel 0



Customer supplied power, ranging from +10V to +31.2V dc, is connected internally to the power output transistor. When an output is turned on, current flows into the source out of the drain, through the load connected to the ground of the customer supply (customer return). Diode D6 protects the power output transistors from damage due to inductive loads. Output Q1 is a thermally protected FET and will turn off @ 3A (approximately). After an output goes into thermal shutdown, you must fix the cause of the shutdown and toggle the outputs ON and OFF to reenergize the output. RT1 protects D6 and Q1 if power supply polarity is reversed.

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Simplified Schematic for DC to DC Converters (24V DC Power Supplies)



The frequency input module isolated power supply consists of 1 isolated 24V dc power supply that provides 2 current limited outputs of 30mA maximum (1 for each channel).

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	1794-IJ2
Processing Time	≤4 ms
Input Frequency, Max.	1…32 kHz w/sine wave; 1…32 kHz w/square wave input
Frequency Value, Max.	32,767 or 3,276.7 (dependent on range)
Input Pulse Width	20 µs min
Voltage, On-State Input, Min.	10V (24V IEC+1 proximity, encoder input or switch inputs)
Voltage, On-State Input, Nom.	24V dc
Voltage, On-State Input, Max.	Limited to isolated 24V dc power supply
Current, On-State Input, Min.	2.0 mA
Current, On-State Input, Nom.	9.0 mA
Current, On-State Input, Max.	10.0 mA
Voltage, Off-State Input, Max.	5.0V dc on 24V dc IEC1+ Terminal
Current, Off-State Input, Max.	1.5 mA into 24V dc IEC1+ Terminal
Wire-Off Detection	0.4 mA for proximity, encoder, or contact switch with 50 kW shunt resistor
Impedance, Frequency Input	>5 kΩ for 50 mV extended magnetic pickup >5 kΩ for 500 mV magnetic pickup >10 kΩ for 3V vortex flowmeter >10 kΩ for 6V vortex flowmeter >2.5 kΩ for 24V dc IEC1+ proximity or encoder input >2.5 kΩ for 24V dc contact switch input
Impedance, Gate Input	>5 kΩ for 50 mV extended magnetic pickup >5 kΩ for 500 mV magnetic pickup >2.5 kΩ for 24V dc IEC1+ proximity or encoder input >2.5 kΩ for 24V dc contact switch input
Output Voltage Source	Customer supplied
Voltage, On-State Output, Min.	10V dc
Voltage, On-State Output, Nom.	24V dc
Voltage, On-State Output, Max.	31.2V dc
Current, On-State Output, Min.	1.0 mA per output
Current, On-State Output, Max.	1.0 A per channel sourced out of module✶
Output Surge Current, Max.	2 A for 50 ms, repeatable every 2 s
Voltage Drop, On-State Output, Max.	0.9V dc @ 1 A
Dimensions (HxWxD), Metric	46 x 94 x 53 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.1 in
Output Control	Outputs individually assignable to: Frequency,% full scale, or acceleration alarm
Output Switching Time	Triggered by frequency alarm or acceleration alarm Turn On: < 0.5 ms Turn Off: < 1 ms

✶Current Limited: All outputs can be on simultaneously without derating.

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1794-VHSC 24V dc 2 Channel Very High Speed Counter Module

A counter module has two incremental quadrature encoder interfaces each with three inputs (A, B, and Z). Each input module has ± inputs for connection to pulse transmitters with complementary or non-complementary signals.
The counter can count pulses of one or two pulse trains for up/down counting and detection of a selectable number of edges (X1, X2, X4). Each of the two counters has an upper limit of 1MHz, a 24-bit counter register, a preset register, and a latch register.
Power to the module is supplied from an external 24V power supply. The 1794-VHSC has two outputs that can be configured for overlapping, multiple windows, and/or pulse width modulation.

When using ControlNet systems, this module must be used with 1794-ACN15 or -ACNR15 Series B or later ControlNet adapters. When using EtherNet/IP systems, this module must be used with a 1794-AENT/A module with firmware at revision 2.xx or later, along with a FlexLogix local controller.

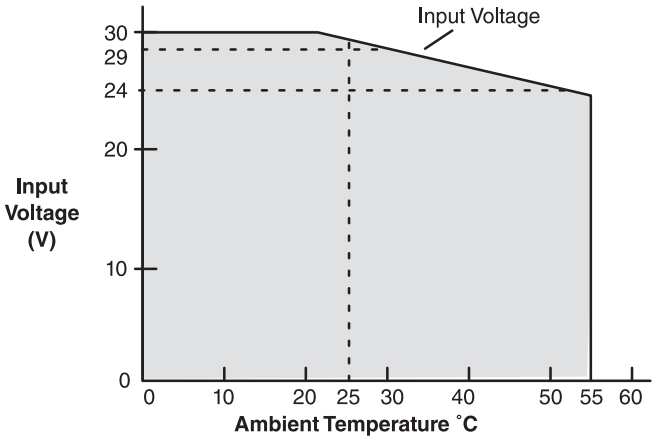
	1794-VHSC
Input Groups	2 groups of A/A, B/B, and Z/Z pairs with 5V dc or 15…24V dc terminations
Input Frequency, Max.	1.0 MHz counter and encoder X1 (no filters) 500 kHz encoder X2 (no filters) 250 kHz encoder X4 (no filters)
Voltage, On-State Input, Min.	5V dc terminations: >2.6V dc 15…24V dc terminations: >12.5V dc
Voltage, On-State Input, Max.	5V dc terminations: ±6V 15…24V dc terminations: Refer to derating curve
Voltage, Off-State Input, Min.	5V dc terminations: ≤1.25V dc 15…24V dc terminations: ≤1.8V dc
Current, On-State Input, Min.	>5 mA
Current, Off-State Input, Max.	≤0.250 mA
Input Filter Selections	5: Off, 10 µs, 100 µs, 1.0 ms, 10.0 ms per A/B/Z group
Output Control	Outputs can be tied to 8 compare windows
Output Supply Voltage Range	5…7V dc or 10…31V dc
Leakage Current, Off-State Output, Max	≤0.3 mA
Voltage Drop, On-State Output, Max.	5V operation - 0.5 A 12…24V operation - 1.0 A
Current, On-State Output, Max.	5V operation - 0.5 A 12…24V operation - 1.0 A
Current per Output Pair, Max.	5V operation - 0.9 A 12…24V operation - 4.0 A
Short Circuit Current	5V operation - 0.9V dc @ 0.5 A✶ 12…24V operation - 0.9V dc @ 1.0 A
Dimensions (HxWxD), Metric	45.7 x 94.0 x 53.3 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.1 in
Output Delay Time, OFF to ON	25 µs (load dependent)
Output Delay Time, ON to OFF	150 µs (load dependent)

✶Outputs are short circuit protected and turned off until power is cycled.

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1794-VHSC Derating Curve

Derating Curve



The area within the curve represents the safe operating range for the module under various conditions of user supplied 24V dc supply voltages and ambient temperatures. This includes all possible mounting positions, including inverted horizontal.

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1794-ID2 24V dc 2 Input Pulse Counter Module

The 1794-ID2 module is a 2-channel counter used in applications where pulse counting is required. Typical input devices include quadrature incremental encoders with or without reference and/or gate function and pulse transmitters. You can use one or two pulse trains.

	1794-ID2
Input Pulse Width	Each signal condition must be stable for at least 2 ms to be recognized
Input Groups	2 groups of A, B, Z, G inputs
Counting Frequency (kHz), Max.	100
Cable Type	Input: Belden 8761
Wiring Category	2✶
Conductor Length, Max	1000 ft (304.8 m)
Dimensions (HxWxD), Metric	46 x 94 x 53 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.1 in
Input Signal Range	3 mA @ 6V dc 9 mA @ 12V dc 15 mA @ 24V dc

✶Use this conductor category information for planning conductor routing. Refer to publication 1770-4.1, Industrial Automation Wiring and Grounding Guidelines.

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1794-IP4 12/24V dc 4 Input Pulse Counter Module

The pulse counter modules perform high-speed scaling, calculation operations for various industrial applications. Some sample applications include:

- quantity counting
- speed calculation
- flow monitoring

All the input devices for the pulse counter module should be able to provide the input signal of 6V amplitude. The 1794-IP4 has a 6V minimum threshold for an input ON condition and a maximum 3V threshold for an input OFF condition. The region between 3V and 6V is a transitional one and therefore requires input signals to pass cleanly through that region, otherwise module operation cannot be guaranteed.

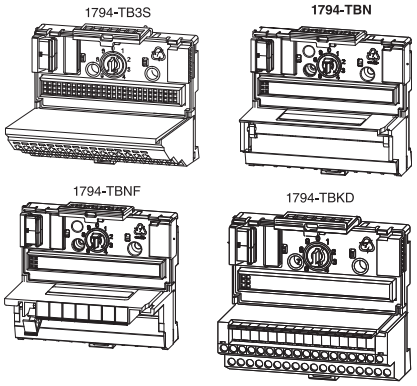
	1794-IP4
Counting Frequency (kHz), Max.	100✶
Input Frequency, Max.	100
Input Signal Range	3 mA @ 6V dc 9 mA @ 12V dc 15 mA @ 24V dc
Dimensions (HxWxD), Metric	46 x 94 x 53 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.1 in
Overflow	Max. period is 65 ms when 1 MHz internal clock selected; Max. period = 6.5 ms when 10 MHz internal clock selected

✶Each signal condition must be stable for at least 2 ms to be recognized.

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Step 3 - Select:

- *the appropriate terminal base unit for your module and system*



Selecting a Terminal Base Unit

Each FLEX I/O module requires a terminal base unit that snaps onto the DIN Rail to the right of the I/O adapter. The terminal bases provide terminal connection points for I/O wiring and plug together to form the backplane. They are available with screw or spring terminations.

General Specifications

Cat. No.❄	Description	Purpose
1794-TB2	FLEX I/O 2-Wire Cage-Clamp Terminal Base Unit	A generic version of the 1794-TB3 below
1794-TB3	FLEX I/O 3-Wire Cage-Clamp Terminal Base Unit	Primarily intended for use with input modules when using 3-wire input proximity switches — can also be used with output modules
1794-TB3S	FLEX I/O 3-Wire Spring-Clamp Terminal Base Unit	A spring clamp version of the cage clamp 1794-TB3 above — provides faster, simpler wire installation
1794-TB32	FLEX I/O 32-Point Cage-Clamp Terminal Base Unit	A 32-point version of the 1794-TB3 to be used with 32-point digital modules and 1794-IB16D
1794-TB32S	FLEX I/O 32-Point Spring-Clamp Terminal Base Unit	A spring clamp version of the 1794-TB32
1794-TB3G	FLEX I/O 3-Wire Grounded Cage-Clamp Terminal Base Unit	A screw clamp terminal base unit with individual grounding used with certain analog modules
1794-TB3GS	FLEX I/O 3-Wire Grounded Spring-Clamp Terminal Base Unit	A spring clamp version of the 1794-TB3G
1794-TB3T	FLEX I/O Cage-Clamp Temperature Terminal Base Unit	Required with the 1794-IT8 module (when used in thermocouple mode) — also provides chassis ground connections for the 1794-IR8 and analog modules
1794-TB3TS	FLEX I/O Spring-Clamp Temperature Terminal Base Unit	A spring clamp version of the 1794-TB3T
1794-TBKD	Proposed Product: FLEX I/O Cage-Clamp Terminal Base Unit	A spring clamp version of the 1794-TB3T
1794-TBN	FLEX I/O Screw-Clamp Terminal Base Unit	Provides screw terminals to accept larger gauge wires plus cover for I/O wiring
1794-TBNF✶	FLEX I/O Screw-Clamp Fused Terminal Base Unit	Provides eight 5 x 20 mm fuses, screw terminals, plus a cover for I/O wiring — shipped with fuses for the 1794-OA8 module; can be used to fuse the 1794-OM8 and -OW8 modules with a replacement fuse (see the installation instructions)

✶Contains eight 5x20 mm fuses (one for each even-numbered terminal - 0 through 14 on row B). Shipped with 1.6 A, 250V ac Slow Blow fuses suitable for 1794-OA8 ac output module. Refer to individual installation instructions for fusing recommendations for other modules. Littelfuse PN23901.6, A-B PN94171304, SAN-O PNSD6-1.6A.
❄Isolation Voltage, Channel to Channel is determined by the inserted module.

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Conformal coated versions of standard modules have the letter K in the last position of the catalog number, before the series designation.

	Conformal Coated Description
1794-TB3K	ANSI / ISA-S71.04-1985, Class G1, G2, and G3 environments CEI IEC 6065A-4 Class 1 and 2 environments UL 746E
1794-TB3GK	
1794-TBNK	

The following table illustrates the recommended FLEX I/O terminal base unit(s) for each module. Many terminal base units can be used with most modules, but auxiliary terminal strips may be required.

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FLEX I/O Product	Cat. No.	Terminal Base Unit
120V ac Input Modules	1794-IA8	**1794-TBN,** 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TBKD✶.
	1794-IA8I	**1794-TBN,** 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TBKD❄
	1794-IA16	**1794-TB3,** 1794-TB3S, 1794-TBN❄‡
220V ac Input Module	1794-IM8	**1794-TBN**❄
120V ac Output Modules	1794-OA8	**1794-TBNF,** 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TBN, 1794-TBKD❄
	1794-OA8I	**1794-TBNF,** 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TBN, 1794-TBKD❄
	1794-OA16	**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TBN, 1794-TBKD❄§
220V ac Output Module	1794-OM8	**1794-TBNF,** 1794-TBN❄
24V dc Input Modules	1794-IB8	**1794-TB3,** 1794-TB3S❄
	1794-IB16	**1794-TB3,** 1794-TB3S❄
	1794-IB16D	**1794-TB32,** 1794-TB32S❄
	1794-IB32	**1794-TB32,** 1794-TB32S❄
	1794-IV16	**1794-TB2,** 1794-TB3, 1794-TB3S, 1794-TBKD❄
24V dc Input/Output Modules	1794-IB10XOB6	**1794-TB3,** 1794-TB3S❄
	1794-IB16XOB16P	**1794-TB32,** TB32S❄
48V dc Input Module	1794-IC16	**1794-TB3,** 1794-TB3S❄
24V dc Output Modules	1794-OB8	**1794-TB2,** 1794-TB3, 1794-TB3S, 1794-TBKD❄
	1794-OB8EP	**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TBN, 1794-TBKD❄
	1794-OB16	**1794-TB2,** 1794-TB3, 1794-TB3S, 1794-TBKD❄
	1794-OB16D	**1794-TB3,** 1794-TB3S, 1794-TBKD❄
	1794-OB16P	**1794-TB2,** 1794-TB3, 1794-TB3S, 1794-TBKD❄
	1794-OB32P	**1794-TB32,** 1794-TB32S❄
	1794-OV16	**1794-TB3,** 1794-TB3S❄
	1794-OV16P	**1794-TB3,** 1794-TB3S❄
48V dc Output Module	1794-OC16	**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TBKD❄
Relay Module	1794-OW8	**1794-TBNF**, 1794-TBN, 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TBKD❄
24V dc Analog Input Modules	1794-IE8	**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TB3T, 1794-TB3TS❄
	1794-IF4I	**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TB3T, 1794-TB3TS, 1794-TBN❄
	1794-IR8	**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TB3T, 1794-TB3TS❄
	1794-IRT8	**1794-TB3G,** 1794-TB3GS❄
	1794-IT8	**1794-TB3T,** 1794-TB2, 1794-TB3, 1794-TB3S, 1794-TB3TS❄♣
24V dc Analog Input/Output Modules	1794-IE4XOE2	**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TB3T, 1794-TB3TS❄
	1794-IF2XOF2I	**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TB3T, 1794-TB3TS, 1794-TBN❄
24V dc Analog Output Modules	1794-OE4	**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TB3T, 1794-TB3TS, 1794-TBN❄
	1794-OF4I	**1794-TB3,** 1794-TB2, 1794-TB3S, 1794-TB3T, 1794-TB3TS, 1794-TBN❄
Counter Modules	1794-IJ2	**1794-TB3G,** 1794-TB3GS❄
	1794-VHSC	**1794-TB3G,** 1794-TB3GS❄➤❄
	1794-ID2	**1794-TB3,** 1794-TB3S, 1794-TBN, 1794-TBNF❄⌘
	1794-IP4	**1794-TB3,** 1794-TB3S, 1794-TBN, 1794-TBNF❄⌘
SCANport Module	1203-FB1	1203-FB1

✶Recommended terminal base is in bold text
❄Recommended terminal base is in bold text.
‡Auxiliary terminal strips are required when using the 1794-TBN for the 1794-IA16 and 1794-IA16.
§Auxiliary terminal strips are required when using the 1794-TBN for the 1794-OA16 and 1794-IA16.
♣You can use a 1794-TB2, 1794-TB3, or 1794-TB3S for mV inputs only.
➤For use with 1794-ACN15, 1794-ANCR15, and 1794-AENT only.
⌘Auxiliary terminal strips are required when using the 1794-TBN or 1794-TBNF for this catalog number.

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General Specifications

Cat. No.❄	Connections	Termination Type	Used in Applications	Current Capacity, Max.	Dimensions (HxWxD), Metric Dimensions (HxWxD), Imperial	Wire Size	Wiring Category	Certifications
1794-TB2	16 I/O; 18 common; 2 +V		Up to 132V ac/156V dc	10	94 x 94 x 69 mm 3.7 x 3.7 x 2.7 in	22…12 AWG (0.34 mm²…2.5 mm²) stranded copper wire rated at 75 °C or higher 3/64 in (1.2 mm) insulation max.	2‡	UL, CSA, CE: Class I Division 2 certified Groups A, B, C, D certified Class I Zone 2 Group IIC certified
1794-TB3	16 I/O; 18 common; 18 +V							
1794-TB3S							Module dependent‡	
1794-TB32	32 I/O; 8 common; 8 +V		Up to 31.2V dc					
1794-TB32S								
1794-TB3G	36 I/O; 2 common; 2 +V; 10 chassis ground						2‡	
1794-TB3GS							Module dependent‡	
1794-TB3T	16 I/O; 10 common; 4 +V; 8 chassis ground; 2 sets of CJC to be used with temperature modules		Up to 132V ac/156V dc				2‡	
1794-TB3TS							Module dependent‡	
1794-TBN	16 I/O; 2 common; 2 +V❄		264V ac/dc					
1794-TBNF✶								

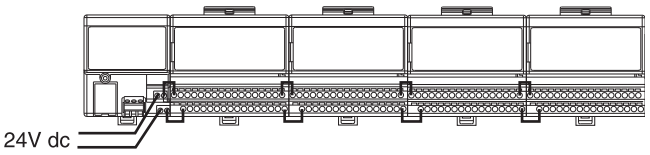
✶Contains eight 5x20 mm fuses (one for each even-numbered terminal - 0 through 14 on row B). Shipped with 1.6 A, 250V ac Slow Blow fuses suitable for 1794-OA8 ac output module. Refer to individual installation instructions for fusing recommendations for other modules. Littelfuse PN23901.6, A-B PN94171304, SAN-O PNSD6-1.6A.
❄Isolation Voltage, Channel to Channel is determined by the inserted module.‡Use this conductor category information for planning conductor routing. Refer to publication 1770-4.1, "Industrial Automation Wiring and Grounding Guidelines."

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Wiring Diagrams

1794-TB2, -TB3, and -TB3S

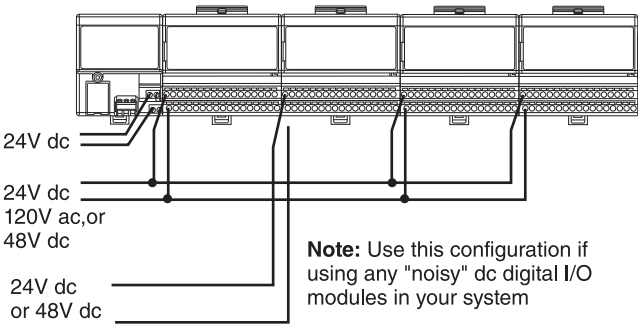
Daisy-chaining Using Adapter Power Supply



Wiring when total current draw is less than 10A

Use this method when wiring all digital modules and total current draw through terminal base units is less than 10A.

Individually Powered from Separate Power Supply



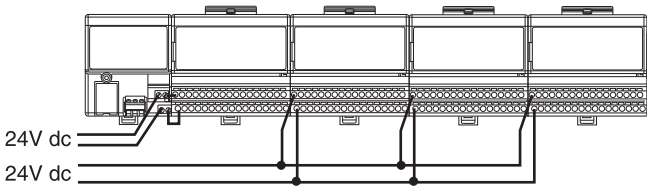
Note: Use this configuration if using any "noisy" dc digital I/O modules in your system

Thermocouple Module wiring is separate from digital wiring.

Wiring when total current draw is greater than 10A

Separate power supply can be brought in on last module in chain if necessary. Make sure you do not jumper to adapter if using this method.

Combination Daisy-chain and Separate Power Supply



Use this method when wiring both digital and analog modules. Analog modules must be wired separated from "noisy" digital modules.

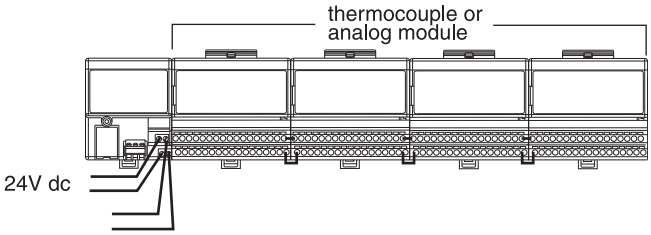
Total current draw through any base unit must not be greater than 10A

Separate power supply can be brought in on last module in chain if necessary. Make sure you do not jumper to adapter if using this method.

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1794-TB3T and -TB3TS

Daisy-chaining Using Adapter Power Supply

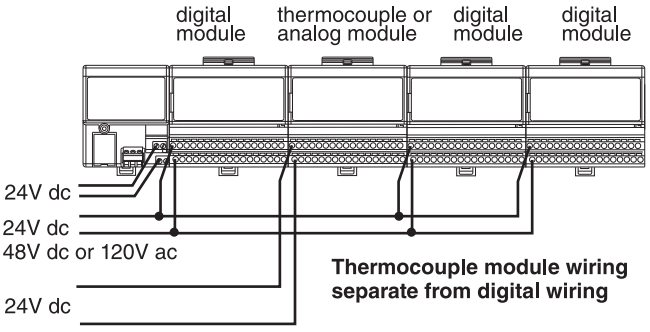


Note: All modules must be analog or thermocouple modules for this configuration.

Use this method when wiring all analog modules and total current draw through terminal base units is less than 10A.

Wiring when total current draw is less than 10A

Daisy-chaining with a Separate Power Supply



Note: Use this configuration if using any "noisy" dc digital I/O modules in your system.

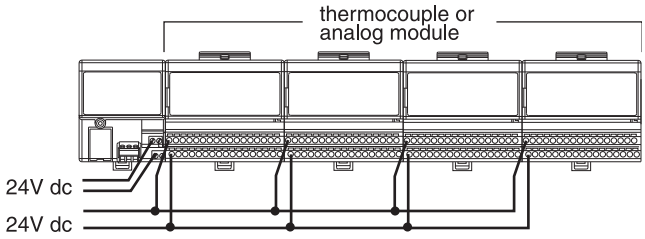
Wiring when total current draw is greater than 10A

Separate power supply can be brought in on last module in chain if necessary. Make sure you do not jumper to adapter if using this method.

Use this method when mixing digital modules and analog modules and total current draw through terminal base units is greater then 10A.

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Individually Powered from Separate Power Supply

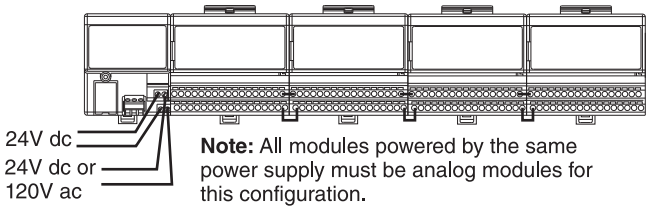


Note: All modules must be analog modules in this configuration.

Total current draw through any base unit must not be greater than 10A.

Separate power supply can be brought in on last module in chain if necessary. Make sure you do not jumper to adapter if using this method.

Combination Daisychain and Separate Power Supply



Note: All modules powered by the same power supply must be analog modules for this configuration.

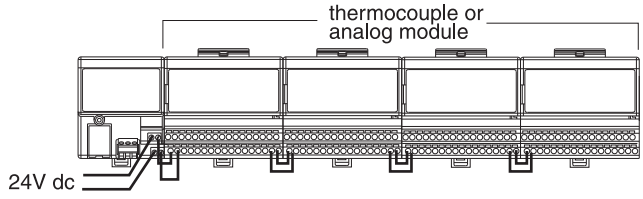
Use this method when wiring both digital and analog modules. Analog modules must be wired separately from "noisy" digital modules

Wiring when total current draw is less than 10A.

Separate power supply can be brought in on last module in chain if necessary. Make sure you do not jumper to adapter if using this method.

1794-TB3G and -TB3GS

Daisy-chaining Using Adapter Power Supply



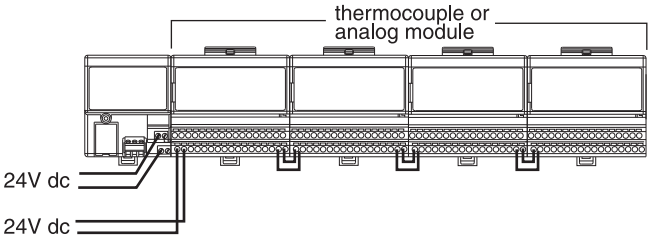
Note: All modules must be analog or thermocouple modules for this configuration.

Use this method when wiring all analog modules and total current draw through terminal base units is less than 10A.

Wiring when total current draw is less than 10A

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Daisy-chaining with a Separate Power Supply



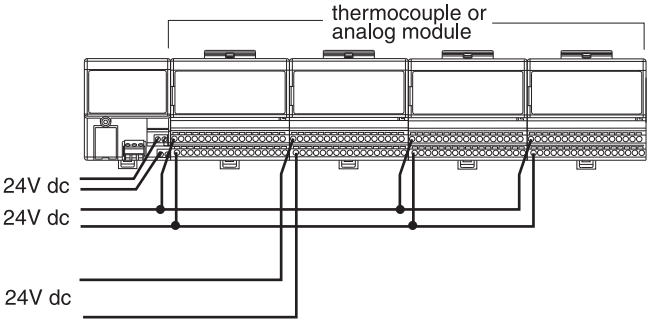
Note: All modules must be analog or thermocouple modules for this configuration.

Wiring when total current draw is less than 10A

Separate power supply can be brought in on last module in chain if necessary. Make sure you do not jumper to adapter if using this method.

Use this method when wiring thermocouple or analog modules and total current draw through terminal base units is greater than 10A.

Individually Powered from Separate Power Supply

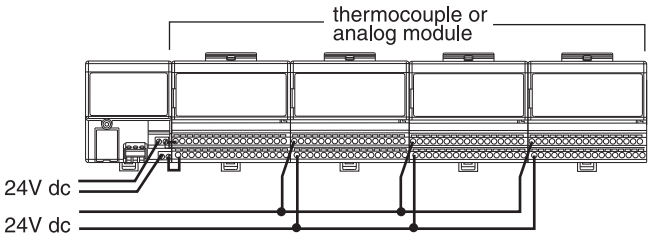


Wiring when total current draw is greater than 10A

Separate power supply can be brought in on last module in chain if necessary. Make sure you do not jumper to adapter if using this method.

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Combination Daisy-chain and Separate Power Supply



Note: All modules powered by the same power supply must be thermocouple or analog modules for this configuration.

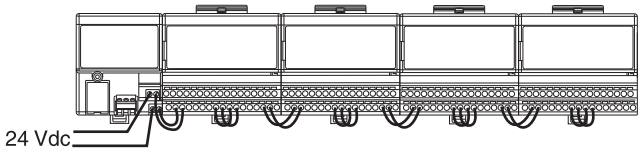
Total current draw through any base unit must not be greater then 10A

Separate power supply can be brought in on last module in chain if necessary. Make sure you do not jumper to adapter if using this method.

Use this method to balance current draw if necessary.

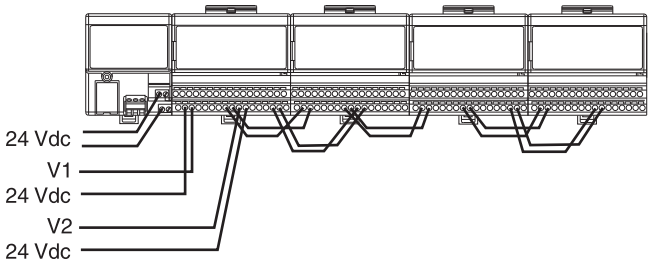
1734-TB32 and -TB32S

Daisy-chaining Using Adapter Power Supply



Use this method of wiring when total current draw is less than 10A and separate power is not needed for the adapter and the two I/O groups available with 32-pt I/O.

Daisy-chaining with a Separate Power Supply

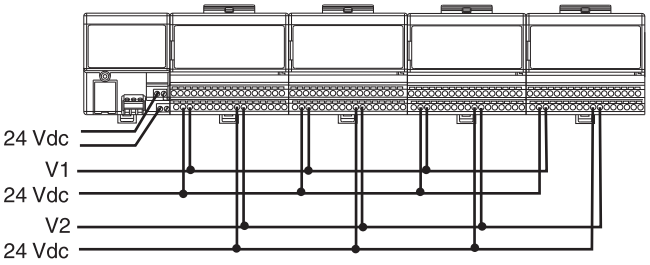


Use this method of wiring when total current draw of V1 and V2 is **less** than 10A each and separate power is desired for the two I/O groups available with 32-pt I/O. The Adapter 24 Vdc can be separate as shown or can be connected to either V1 or V2.

The V1 and/or V2 power can be brought in on the last module in the chain if necessary.

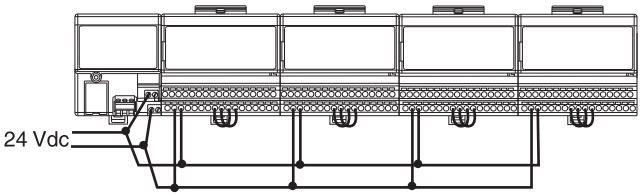
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Individually Powerd from Separate Power Supply

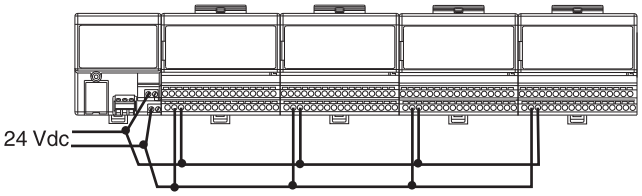


Use this method of wiring when total current draw of V1 and V2 is **less** than 10A each and separate power is desired for the two I/O groups available with 32-pt I/O. The Adapter 24 Vdc can be separate as shown or can be connected to either V1 or V2.

The V1 and/or V2 power can be brought in on the last module in the chain if necessary.



Use this method of wiring when separate power is not need for the adapter and the two I/O groups available with 32-pt I/O. Total current draw of a module's V1 plus V2 power must be less than 10A.

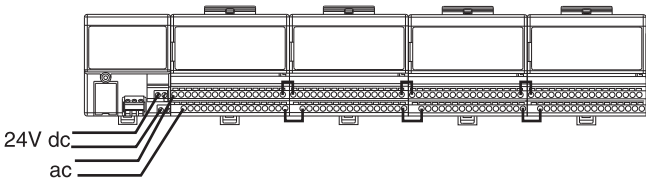


Use this method of wiring when separate power is not need for the adapter and the two I/O groups available with 32-pt I/O, and total current draw of a module's V1 plus V2 power more than 10A.

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1794-TBN and -TBNF

Daisy-chaining with a Separate Power Supply



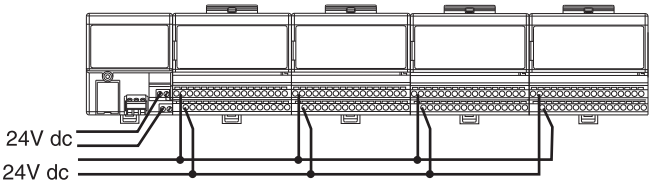
Note: All modules must be thermocouple or analog modules for this configuration.

Wiring when total current is less than 10A

Use this method when wiring all ac digital modules and total current draw through terminal base units is less than 10A.

Separate power supply can be brought in on last module in chain if necessary. Make sure you do not jumper to adapter if using this method.

Individually Powered from Separate Power Supply



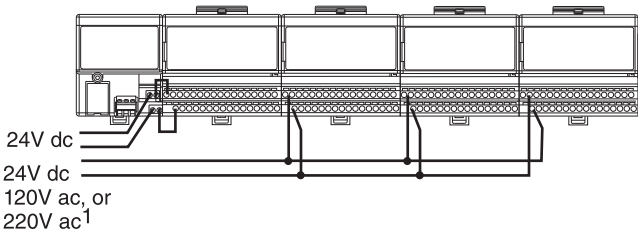
Wiring when total current is greater than 10A

Separate power supply can be brought in on last module in chain if necessary. Make sure you do not jumper to adapter if using this method.

[1] = voltage depends on type of module.

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Combination Daisychain and Separate Power Supply



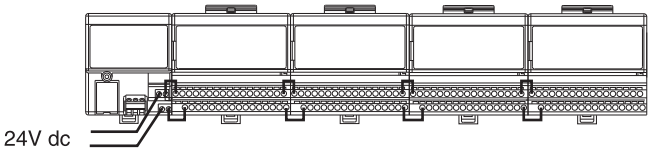
Separate power supply can be brought in on last module in chain if necessary. Make sure you do not jumper to adapter if using this method.

1 = voltage depends on type of module.

Use this method when wiring both digital and analog modules. Analog modules must be wired separately from "noisy" digital modules.

1794-TBN and -TBNF Alternate Wiring

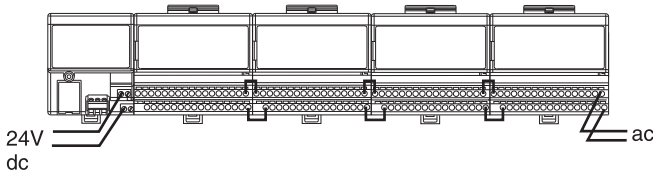
Daisy-chaining Using Adapter Power Supply



Wiring when total current draw is less than 10A

Use this method when wiring all digital modules or all analog modules when total current draw through terminal base units is less than 10A.

Daisy-chaining with a Separate Power Supply



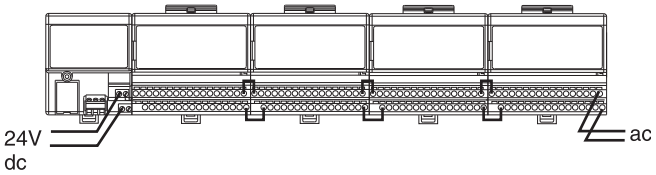
Wiring when total current is less than 10A

Use this method when wiring all ac digital modules and total current draw through terminal base units is less than 10A.

Separate power supply can be brought in on last module in chain if necessary. Make sure you do not jumper to adapter if using this method.

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Daisy-chaining with a Separate Power Supply

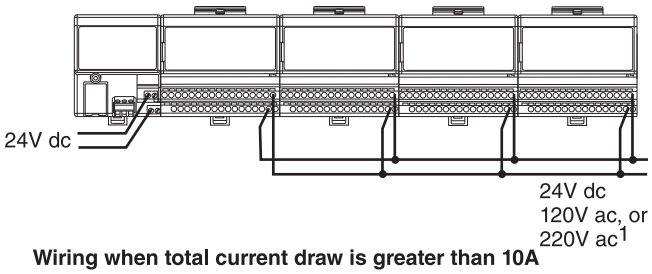


Wiring when total current is less than 10A

Use this method when wiring all ac digital modules and total current draw through terminal base units is less than 10A.

Separate power supply can be brought in on last module in chain if necessary. Make sure you do not jumper to adapter if using this method.

Individually Powered from Separate Power Supply

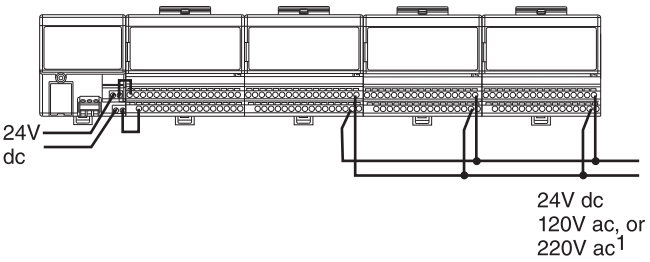


Wiring when total current draw is greater than 10A

Separate power supply can be brought in on last module in chain if necessary. Make sure you do not jumper to adapter if using this method.

1 = voltage depends on type of module.

Combination Daisychain and Separate Power Supply



1 = voltage depends on type of module.

Separate power supply can be brought in on last module in chain if necessary. Make sure you do not jumper to adapter if using this method.

Use this method when wiring both digital and analog modules. Analog modules must be wired separately from "noisy" digital modules.

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Step 4 - Select:

- *if power consumption exceeds the maximum for a single power supply, install additional power supplies*

Selecting a Power Supply

The I/O modules are interfaced to the I/O link through an I/O adapter module with a built-in 24V dc input power supply. The I/O modules receive power from the adapter/power supply through the backplane. The 120V ac to 24V dc power supply (1794-PS13 or -PS3) is also available for powering the adapter/power supply. (When providing power for the 1794-FLA extended-local I/O FlexLogix adapter, treat the adapter as a communication adapter, not as an I/O module.)

Cat. No.	Power Supply Input Voltage, Nom.	Power Supply Input Power	Apparent Input Power, Max.	Transformer Load, Max.	Output Current, Max.	Dimensions (HxWxD), Metric	Dimensions (HxWxD), Imperial	Output Voltage, Nom.
1794-PS3	120V/220V ac	86 W	205 VA	250 VA	3.0 A✶	87 x 94 x 69 mm	3.4 x 3.7 x 2.7 in	+24V dc
1794-PS13	120V/220V ac	36 W	53 VA	90 VA	1.3 A	87 x 68 x 69 mm	3.4 x 2.7 x 2.7 in	+24V dc

✶Horizontal mount; 2.8 A all other mounting.

Power Supply Definitions

Module Supply Voltage — This is typically either 120V ac or 24V dc nominal voltage that is supplied from an external power source wired to the module terminal base.

FLEXBus Current — This is the logic current consumed by the module. The FLEX adapter provides a 5V dc supply via it's internal connector through the successive module terminal base connectors to which it is attached. FLEXBus current consumed by a module has **NO** affect on the sizing of the FLEX I/O power supply.

FLEX I/O chassis FLEXBus current is limited by what current the adapter 5V dc can support across the terminal base internal FLEXBus connectors. FLEX I/O 1794-ASB, -ACN15, and -ACNR15 adapters can supply a maximum of 640 mA at 5V dc. Since no more than eight FLEX I/O modules can be connected to an adapter, no combination of eight FLEX I/O modules will ever draw more than the adapter can supply.

The 1794-PS13 power supply is capable of supplying a maximum of 1.3 A at 24V dc. The output surge current is sufficient to drive four adapters with a surge of 23 A for 2 ms each operating at 24V dc.

The 1794-PS3 power supply is capable of supplying a maximum of 3 A✶ at 24V dc. The output surge current is sufficient to drive six adapters with a surge of 23 A for 2 ms each operating at 24V dc.

Non-Allen-Bradley dc power supplies can also be used, but should operate within the specifications for the devices they are powering. Size the power supply by calculating the total current consumed by summing the currents for each of the modules used for the power supply operating voltage applied.

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Digital Input Modules require supplied 24V dc (19.2…3.12V dc) and consume the currents listed in the module specifications.

Digital Output Module require supplied 24V dc (19.2…3.12V dc) and consume the currents listed in the module specifications plus the total current consumed by their loads. The load current is limited by the maximum load current and surge listed.

Combination Digital Modules have a combination of inputs and outputs. The current load should be determined as described for the combined input and output specifications listed.

Analog Input Modules require supplied 24V dc (19.2…3.12V dc) and consume the currents listed in the module specifications. In addition, adequate power must be supplied to the 1794-IE8 and -IF4I transmitters to deliver input terminal voltage or drive 20 mA into the input impedance listed. This power source may be the same as the module power and can be included in the power supply calculation.

Analog Output Modules require supplied 24V dc (19.2…3.12V dc) and consume the currents listed plus the total current consumed by their loads. The load current is limited by maximum current or resistive load permitted per channel.

Combination Analog Modules have a combination of analog inputs and outputs. The current load should be determined as described previously for the combined module and output specifications listed. The output load current is limited by the maximum current or resistive load permitted per channel. In addition, adequate power must be supplied to the 1794-IE8 and -IF4I transmitters to deliver input terminal voltage or drive 20 mA into the input impedance listed. This power source may be the same as the module power and can be included in the power supply calculation.

Counter Modules require module power, transmitter input power, and in some cases output load power. If output load power is required, use a separate power supply for output load power for noise immunity.

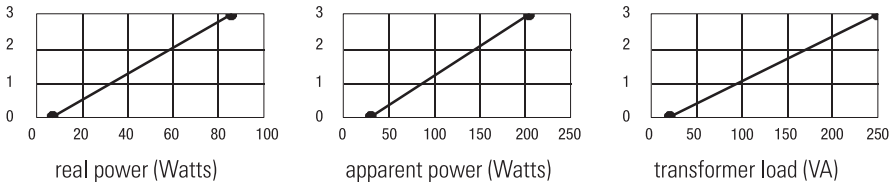
⋆This refers to horizontal mounting: 2.8 A maximum for all other mountings. Refer to the derating current in the installation instructions for that module.

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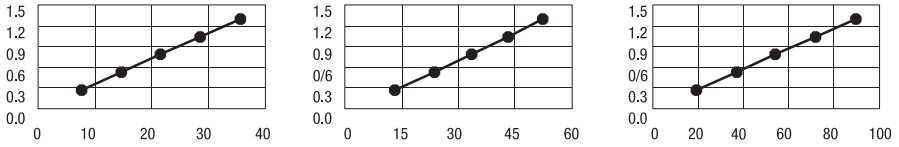
Power Requirements and Transformer Sizing

- Use the real power value in watts for determining the amount of heat dissipation you will have inside the enclosure.
- Use the apparent power value in VA for estimating power distribution sizing.
- Use the transformer load value in VA of each power supply plus all other loads on a transformer to determine the required transformer size.

1794-PS3 ac/dc output current load



1794-PS13 ac/dc output current load (Amps)



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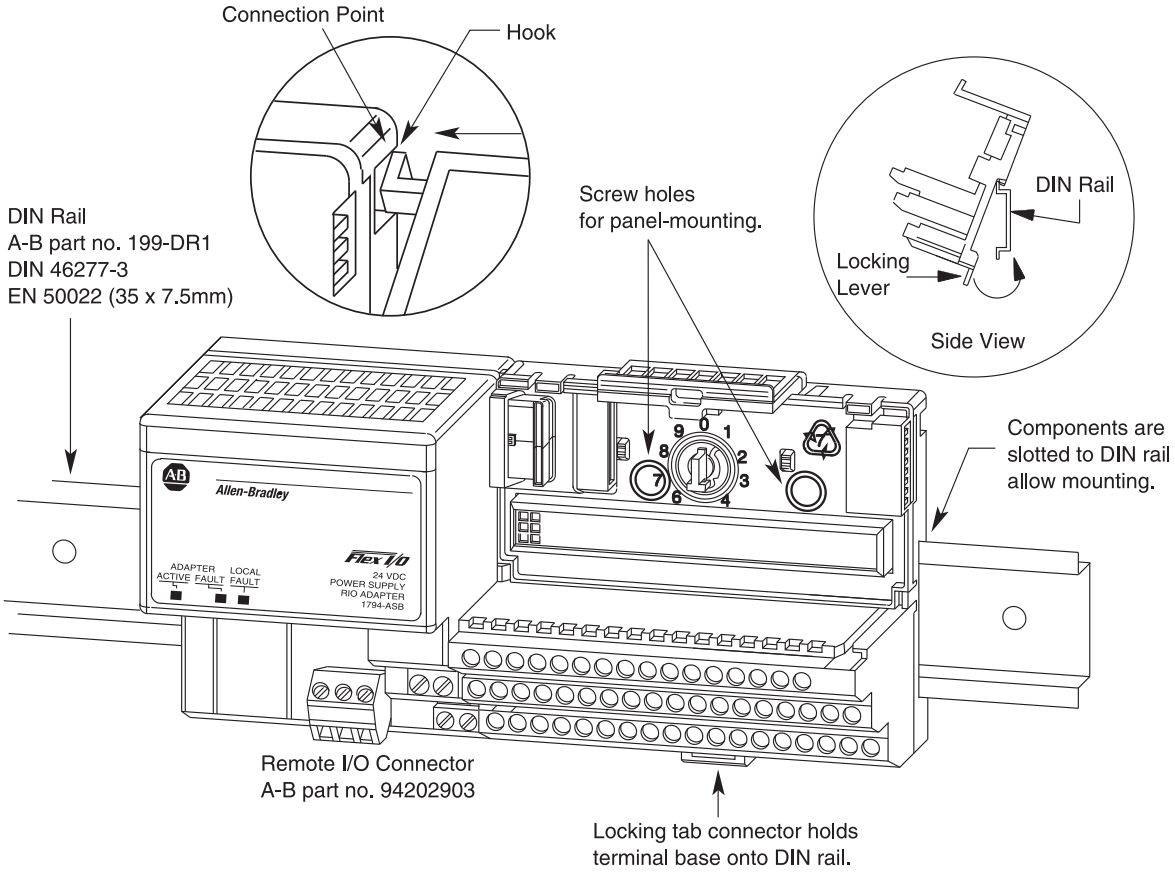
Step 5 - Select:

- *panel mount or DIN Rail mount*
- *appropriate number of panels or DIN Rails based on the number of modules and the physical requirements*
- *one end cap per controller system*

Mounting the FLEX I/O System

You can horizontally or vertically mount the FLEX I/O or FLEX Ex system on a standard 35 mm DIN Rail. The adapter and terminal base easily snap on the DIN Rail by hand. Use a flat-blade screwdriver to remove components from the DIN Rail.

Screw holes allow you to horizontally or vertically panel-mount your system in an enclosure. Maintain at least 25mm (1 inch) of air space around you Flex I/O system. Maintain at least 25 mm (1 inch) air space around your FLEX I/O system installation.



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When properly installed, FLEX I/O and FLEX Ex are grounded through the DIN Rail to chassis ground. Use zinc-plated, yellow-chromated steel DIN Rail to assure proper grounding. Using other DIN Rail materials (e.g. aluminum, plastic, etc.) which can corrode, oxidize, or are poor conductors can result in improper or intermittent platform grounding.

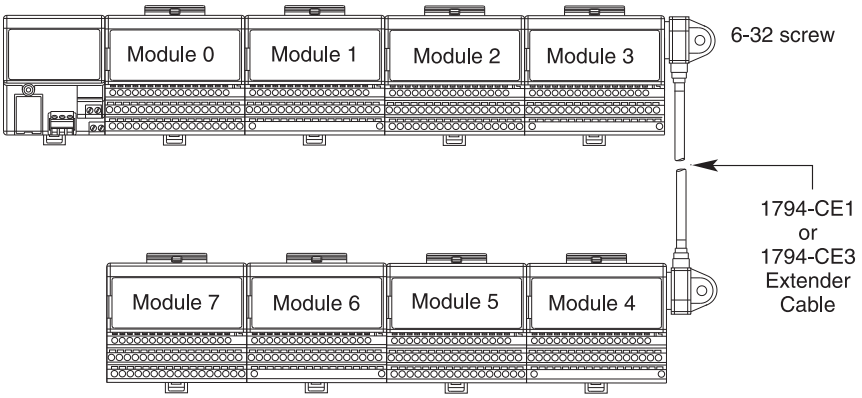
If installing FLEX I/O or FLEX Ex on non-recommended DIN Rail materials, use the mounting holes provided in each terminal base or a 1794-NM1 mounting kit with approved mounting bracket. Use mounting screws with star washers to provide the FLEX I/O or FLEX Ex platform with a chassis ground connection that is not likely to be affected by shock, vibration, or oxidation over time.

The hook (on the terminal base) and adjacent connection point (on the communication adapter) keep the terminal bases tight together. These components are capable of maintaining a reliable connection in case of shock and/or vibration. Refer to the environmental conditions informations in each module's specifications.

1794-CE1 and -CE3 Extender Cables

Use the optional 1794-CE1 (0.3m, 1ft) or 1794-CE3 (0.9m, 3ft) extender cable (one per system) to arrange your system in two rows or split your system into horizontal and vertical orientation. The cable can be used between any module or between adapters and modules.

These cables are also used to connect the 1794-FLA to a FlexLogix controller for an extended loacl FLEX rail.

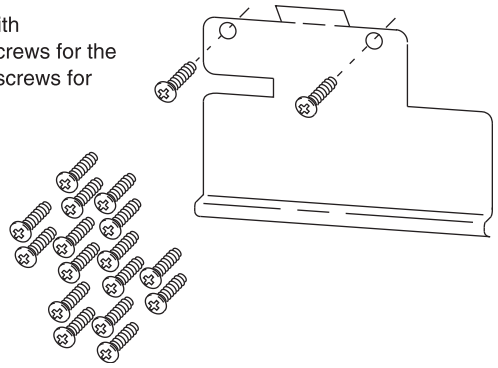


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1794-NM1 FLEX I/O Mounting Kit

Use the optional 1794-NM1 FLEX I/O mounting kit to mount your FLEX I/O system on a panel without a DIN Rail.

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



1492-EA35 DIN Rail Locks

When you use FLEX I/O modules in a high-vibration installation, and particularly when mounting the modules vertically, we recommend using DIN-rail locks. (AB pt. no. 1492-EA35).

1794-LBL FLEX I/O Label Kit

Use the label kit to tailor the label on your FLEX I/O terminal base unit to meet your needs. The label kit includes a diecut drawing and label sheet with five labels.

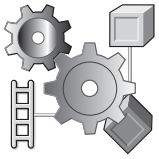
1794-N2 FLEX I/O Dummy Filler Module

This module is used to fill in an otherwise empty slot (terminal base with no I/O module). It contains no electronics.

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Step 6 - Select:

- *the appropriate bundle of RSLogix5, RSLogix500, or RSLogix 5000 Enterprise series software*
- *other software packages for your application*



Selecting Software

Your selection of modules and network configuration determines what software packages you need to configure and program your system.

If you have a:	With this scanner:	You need:	Order this catalog number:
1794-AENT	ControlLogix FlexLogix CompactLogix	RSLinx RSLogix 5000	9357-ENETL3 individually 9357-ANETL3 combined 9355-WAB100ENE 9324-RLD300ENE✶
1794-ACN15 or -ACNR15	PLC-5	RSNetWorx for ControlNet RSLinx RSLogix5	9357-CNETL3 9355-WAB100ENE 9324-RL5300ENE
	ControlLogix FlexLogix	RSNetWorx for ControlNet RSLinx RSLogix 5000	9357-CNETL3 9355-WAB100ENE 9324-RLD300ENE✶
	SLC	RSNetWorx for ControlNet RSLinx RSLogix500	9357-CNETL3 9355-WAB100ENE 9324-RL0300ENE
1794-ADN	PLC-5	RSNetWorx for DeviceNet RSLinx RSLogix5	9357-DNETL3 9355-WAB100ENE 9324-RL5300ENE
	ControlLogix FlexLogix CompactLogix	RSNetWorx for DeviceNet RSLinx RSLogix 5000	9357-DNETL3 9355-WAB100ENE 9324-RLD300ENE✶
	SLC	RSNetWorx for DeviceNet RSLinx RSLogix500	9357-DNETL3 9355-WAB100ENE 9324-RL0300ENE
1794-ASB or -ASB2	PLC-5	RSLinx RSLogix5	9355-WAB100ENE 9324-RL5300ENE
	ControlLogix	RSLinx RSLogix 5000	9355-WAB100ENE 9324-RLD300ENE✶
	SLC	RSLinx RSLogix500	9355-WAB100ENE 9324-RL0300ENE
1794-APB	PLC-5 ControlLogix SLC	Available through third party (SST Woodhead).	

✶Order RSLogix 5000 bundled with RSNetWorx and RSLinx with cat. no. 9324-RLD300NXENE.

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RSLogix 5 Programming Software

RSLogix 5 programming software is designed to work with PLC-5 family of controllers. RSLogix 5 software is an IEC 61131-3 compliant software package that offers relay ladder, structured text, function block diagram, and sequential function chart editors for you to develop application programs.

RSLogix 500 Software Requirements

Description	Value
Personal Computer	Pentium 100 MHz minimum
Software Requirements	Microsoft Windows 98, Microsoft Windows NT (version 4.0 or later SP5), or Windows XP
RAM	64 Mbytes of RAM minimum
Hard Disk Space	43 Mbytes of free hard disk space (or more based on application requirements)
Video Requirements	VGA or higher-resolution
Other	Microsoft Internet Explorer 6.0 Windows 2000 ready

RSLogix 500 Programming Software

The RSLogix 500 ladder logic programming package helps you maximize performance, save project development time, and improve productivity. Supporting Allen-Bradley's MicroLogix families of processors and SLC 500, RSLogix 500 was the first FLEX programming software to offer unbeatable productivity with an industry-leading user interface.

RSLogix 500 Software Requirements

Description	Value
Personal Computer	Pentium 100 MHz minimum
Software Requirements	Microsoft Windows 98, Microsoft Windows NT (version 4.0 or later SP5), or Windows XP
RAM	64 Mbytes of RAM minimum
Hard Disk Space	43 Mbytes of free hard disk space (or more based on application requirements)
Video Requirements	VGA or higher-resolution
Other	Microsoft Internet Explorer 3.0 Windows 2000 ready

RSLogix 5000 Programming Software

RSLogix 5000 Enterprise series software is designed to work with Rockwell Automation's Logix platforms and the Logix5000 family of controllers. RSLogix 5000 Enterprise series software is an IEC 61131-3 compliant software package that offers relay ladder, structured text, function block diagram, and sequential function chart editors for you to develop application programs. RSLogix 5000 Enterprise series software also includes axis configuration and programming support for motion control.

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RSLogix 5000 Software Requirements

Description	Value
Personal Computer	Pentium II 450 MHz minimum 733 MHz recommended
Software Requirements	Microsoft Windows NT version 4.0 with Service Pack 6A or greater Microsoft Windows 2000 with Service Pack 1 recommended
RAM	128 Mbytes of RAM minimum 256 Mbytes of RAM recommended
Hard Disk Space	100 Mbytes of free hard disk space (or more based on application requirements)
Video Requirements	256-color VGA graphics adapter 800 x 600 minimum resolution (1024 x 768 recommended)
Other	Microsoft Internet Explorer 6.0 Windows 2000 ready

Network Configuration Software

RSNetWorx software for DeviceNet or ControlNet is the configuration tool for your chosen network. RSNetWorx software lets you create a graphical representation of your network configuration and configure the parameters that define your network.

Each network scanner has its own scan list and memory mapping. This information is stored in the configuration files in the scanner. When changes are made to the scan lists, RSNetWorx software automatically calculates network bandwidth for the entire network, as well as the bandwidth used by each network component.

RSLinx software is the communication package that provides the link between the scanner and the application software (RSNetWorx and RSLogix).

RSNetWorx Software Requirements

Description	Value
Personal Computer	IBM compatible 120 MHz minimum Pentium recommended
Software Requirements	Microsoft Windows 98, or Windows NT version 6.0 with Service Pack 2 or greater, or Microsoft Windows 2000 with Service Pack 1 or greater
RAM	32 Mbytes of RAM minimum 48 Mbytes of RAM recommended
Hard Disk Space	65 ... 460 Mbytes of free hard disk space (or more based on application requirements)
Video Requirements	16-color VGA graphics adapter 640 x 480 or greater resolution (256-color 800 x 600 minimum for optimal resolution)

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RSWire Software

RSWire software is an application that runs on top of AutoCAD software to produce schematics with simultaneous manufacturing and support documentation. Use this software to help you integrate project schematics and panel layouts.

ABECAD Software

ABECAD software is a library of AutoCAD drawings of Allen-Bradley products. It includes many product drawings and an easy to use selection utility. You can download ABECAD software from www.ab.com or install it from the RAISE cd-rom. To obtain the RAISE cd-rom, request publication 6219-NP from your local salesperson or distributor.

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Summary

As you select devices for your FLEX I/O system, keep in mind:

✓	Step	Remember to Select
	1 Select a communication adapter Choose the network for your operating system.	• the appropriate communication network and related adapter
	2 Select I/O devices based on field devices • location of the device • number of points needed • appropriate catalog number • number of points available per module • number of modules	• I/O modules
	3 Select a terminal base Choose an appropriate terminal base for your modules.	• the appropriate terminal base unit(s) for your modules
	4 Select power supplies and ensure sufficient power for the communication adapter and modules If power consumption exceeds the maximum for a single power supply, install additional power supplies.	• additional power supplies as necessary
	5 Determine mounting requirement Determine whether to panel mount or DIN Rail mount the FLEX I/O system.	• panel mount or DIN Rail mount • appropriate number of panels or DIN Rail based on the number of modules and the physical locations of those modules
	6 Select software Based on the system design, determine the software products you need to configure and program your application.	• software necessary to configure and program your I/O modules

Related Documentation

Additional user documentation presents information according to the tasks you perform and the programming environment you use. Refer to the table below for information on 1794 FLEX I/O publications.

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FLEX I/O Related Publications✶

	Cat. No.	Description	Installation Instructions	User Manual
Adapters	1794-AENT	FLEX I/O 24V dc EtherNet/IP Adapter	1794-5.14	—
	1794-ACN15	FLEX I/O 24V dc ControlNet Media Adapter	1794-IN101	
	1794-ACNR15	FLEX I/O 24V dc ControlNet Redundant Media Adapter		
	1794-ADN	FLEX I/O 24V dc DeviceNet Media Adapter	1794-IN099	1794-6.5.5
	1794-ASB2	FLEX I/O 24V dc Remote I/O Adapter❄	1794-IN098	1794-6.5.9
	1794-ASB	FLEX I/O 24V dc Remote I/O Adapter‡		
Bases	1794-TB3	FLEX I/O 3-Wire Cage-Clamp Terminal Base Unit	1794-IN092	—
	1794-TB3S	FLEX I/O 3-Wire Spring-Clamp Terminal Base Unit		
	1794-TB3T	FLEX I/O Cage-Clamp Temperature Terminal Base Unit		
	1794-TB3TS	FLEX I/O Spring-Clamp Temperature Terminal Base Unit		
	1794-TB3G	FLEX I/O 3-Wire Grounded Cage-Clamp Terminal Base Unit		
	1794-TB3GS	FLEX I/O 3-Wire Grounded Spring-Clamp Terminal Base Unit		
	1794-TBN	FLEX I/O Screw-Clamp Terminal Base Unit		
	1794-TBNF	FLEX I/O Screw-Clamp Fused Terminal Base Unit		
	1203-FB1	FLEX I/O SCANport Terminal Base	1203-5.7	
AC	1794-IA8	FLEX I/O 120V ac 8 Input Module	1794-IN102	
	1794-IA8I	FLEX I/O 120V ac 8 Isolated Input Module		
	1794-IA16	FLEX I/O 120V ac 16 Input Module		
	1794-IM8	FLEX I/O 220V ac 8 Input Module	1794-5.57	
	1794-OA8	FLEX I/O 120V ac 8 Output Module	1794-IN103	
	1794-OA8I	FLEX I/O 120V ac 8 Isolated Output Module		
	1794-OA16	FLEX I/O 120V ac 16 Output Module		
	1794-OM8	FLEX I/O 220V ac 8 Output Module	1794-5.10	
DC	1794-IB8	FLEX I/O 24V dc 8 Sink Input Module	1794-IN093	
	1794-IB16	FLEX I/O 24V dc 16 Sink Input Module		
	1794-IB16D	FLEX I/O 24V dc 16 channel digital input module with diagnostics	1794-IN096	1794-UM061
	1794-IB32	FLEX I/O 24V dc 32 Input Module	1794-IN093	—
	1794-IV16	FLEX I/O 24V dc 16 Source Input Module	1794-IN095	
	1794-IB10XOB6	FLEX I/O 24V dc 10 Input/6 2 A Output Combo Module	1794-IN083	
	1794-IB16XOB16P	FLEX I/O 24V dc 16 Input/16 Protected Output Module		
	1794-IC16	FLEX I/O 48V dc 16 Sink Input Module	1794-IN094	
	1794-OB8	FLEX I/O 24V dc 8 Source Output Module		
	1794-OB8EP	FLEX I/O 24V dc Electronically Protected 8 Output Module		
	1794-OB16	FLEX I/O 24V dc 16 Source Output Module		
	1794-OB16D	FLEX I/O 24V dc 16 channel digital output module with diagnostics		1794-UM061
	1794-OB16P	FLEX I/O 24V dc 16 Protected Source Output Module		—
	1794-OB32P	FLEX I/O 24V dc 32 Protected Source Output Module		
	1794-OV16	FLEX I/O 24V dc 16 Sink Output Module	1794-IN095	
	1794-OV16P	FLEX I/O 24V dc 16 Protected Sink Output Module		
	1794-OC16	FLEX I/O 48V dc 16 Source Output Module	1794-5.54	

✶Contact your local A-B distributor for information on ordering any of the above publications.
For electronic copies of these publications, go to http://www.ab.com/literature
❄Up to 2 modules.
‡Up to 8 modules.

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FLEX I/O Related Publications (Continued)✶

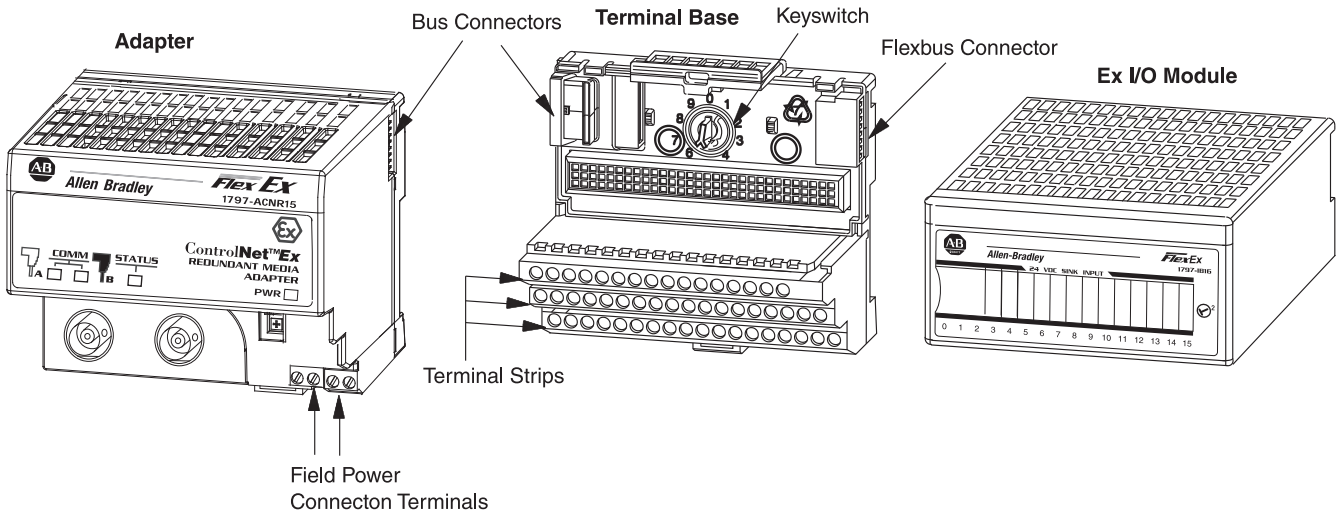
	Cat. No.	Description	Installation Instructions	User Manual
Analog	1794-IE8	FLEX I/O 24V dc Selectable Analog 8 Input Module	1794-IN100	1794-6.5.2
	1794-OE4	FLEX I/O 24V dc Selectable Analog 4 Output Module		
	1794-IE4XOE2	FLEX I/O 24V dc 4 Input/2 Output Analog Combo Module		
Isolated Analog	1794-IF4I	FLEX I/O 24V dc Source Isolated Analog 4 Input Module	1794-IN038	1794-6.5.8
	1794-OF4I	FLEX I/O 24V dc Source Isolated Analog 4 Output Module	1794-IN037	
	1794-IF2XOF2I	FLEX I/O 24V dc 2 Input/2 Output Isolated Analog Combo Module	1794-IN039	
Relay	1794-OW8	FLEX I/O 24V dc 8 Relay Sink/Source Output Module	1794-IN019	—
Specialty	1794-IR8	FLEX I/O 24V dc RTD Input Module	1794-IN021	1794-6.5.4
	1794-IRT8	FLEX I/O 24V dc Thermocouple/RTD/mV Input Module	1794-IN050	1794-6.5.12
	1794-IT8	FLEX I/O 24V dc Thermocouple/mV Input Module	1794-IN021	1794-6.5.7
	1203-FM1	FLEX I/O SCANport Module	1203-5.8ML	—
Counters	1794-IJ2	FLEX I/O 24V dc 2 Input Frequency Module	1794-IN049	1794-6.5.11
	1794-VHSC	FLEX I/O 24V dc 2 Channel Very High Speed Counter Module	1794-5.67	1794-UM010
	1794-ID2	FLEX I/O 24V dc 2 Input Pulse Counter Module	1794-IN063	1794-6.5.15
	1794-IP4	FLEX I/O 12/24V dc 4 Input Pulse Counter Module	1794-IN064	1794-6.5.16
Power Supply	1794-PS13	FLEX I/O Power Supply Module	1794-IN069	—
Accessories	1794-CE1	FLEX I/O 1 ft Extender Cable	1794-5.12	
	1794-CE3	FLEX I/O 3 ft Extender Cable		
	1794-NM1	FLEX I/O Panel Mounting Kit	1794-2.13	

✶Contact your local A-B distributor for information on ordering any of the above publications.
For electronic copies of these publications, go to http://www.ab.com/literature
❄Up to 2 modules.
‡Up to 8 modules.

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About FLEX Ex

FLEX Ex offers:



FLEX Ex leverages advanced technologies allowing the application to move to a distributed architecture in the hazardous area. We have taken our experience gained with the standard FLEX I/O system and used it to create an intrinsically safe system with the same look, feel, and ease of use.

Mounts without purged or explosion-proof enclosures in the hazardous area. FLEX Ex is a modular I/O system that eliminates the need for Intrinsic Safety (IS) barriers/isolators or long wiring runs to the control cabinet.

One adapter communicates with up to eight I/O modules. Allows connection to:

- 128 digital inputs/outputs, or
- 64 analog inputs, or
- mix to meet your needs.

Redundant media ControlNet adapter communicates with up to eight I/O modules and can be mounted in the hazardous area.

Adjust the keyswitch to prevent incorrect module insertion into a preconfigured terminal base.

Exchange terminal bases without moving other bases in your system.

Connect FLEX Ex power supplies to the terminal base that provides power to the I/O modules and field devices. No additional power supplies are needed.

Plug the I/O module into the terminal base. Use the module to connect to the I/O bus and field devices.

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Remove and insert modules under power. No direct wiring to the module enables you to change modules without disturbing field wiring or system power.

Mix and match I/O modules. Wide variety of digital, analog, temperature, frequency, and HART modules.

FLEXbus Isolator allows connection to standard FLEX I/O adapters and I/O thus providing a choice of other networks.

Conformal coating on all modules meets the noxious gas requirement of ISA-S71.04-1985 severity level G3 for hydrogen sulfide, sulfur dioxide, chlorine, nitrogen dioxide, hydrogen flouride, ammonia, and ozone.

FLEX Ex combines a terminal strip and intrinsic-safety isolation with an I/O interface. Use the terminal strip on the terminal base to wire your field devices directly. The FLEX Ex design also offers these features:

- modularity for distributed IS systems
- all of the features of a larger, rack-based system
- installation near the field devices to reduce wiring costs and complexity
- terminations for field wiring eliminating the need for marshalling or extra terminal strips
- ControlNet-based networking solution in the hazardous area with ControlNet Ex products
- DIN-rail mounting

FLEX Ex provides additional value if system problems develop. The terminal base lets you remove and insert I/O modules under power without rewiring or disrupting your system. Combining your field-wiring terminations, IS isolation, and the I/O interface into the same location saves you time, money, and makes your system easier to maintain and troubleshoot. Additional benefits include:

- galvanic isolation between the I/O backplane, input circuitry, and power supply
- dual-fault protection IS circuits provide the highest fault tolerance
- I/O circuitry provides full IS field-device protection
- the modules themselves are IS protected for installation in hazardous environments

FLEX Ex modules may be removed and inserted while operating under power. Network module maintenance and cable connections can be made in the hazardous area while the system is in operation and the area is hazardous.

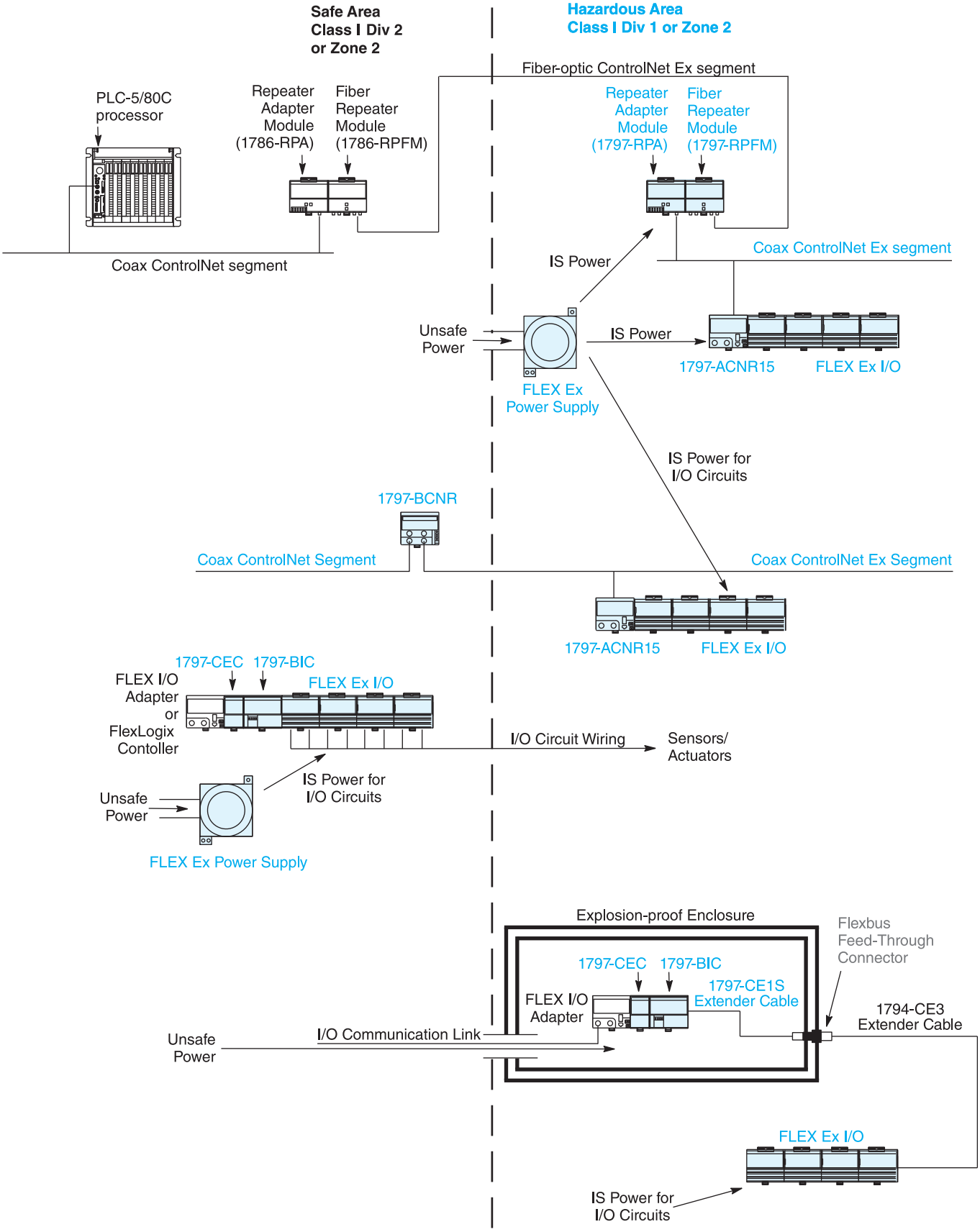
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Typical Configurations

The following are *typical configurations* of FLEX Ex I/O in an intrinsically safe system:

- FLEX Ex I/O modules are interfaced through a ControlNet Ex I/O adapter module to a coax ControlNet segment that is confined to the hazardous area. This coax ControlNet Ex segment is interfaced through a ControlNet Ex coax drop repeater module and ControlNet Ex fiber media port adapter to a fiber-optic ControlNet segment, which is fed through from the safe area. A FLEX Ex power supply powers the repeater module, fiber media port adapter, ControlNet Ex I/O adapter module, and I/O modules individually. This configuration is best for long distances and a large number of nodes.
- The FLEX Ex ControlNet barrier allows connection to a ControlNet Ex I/O adapter module in the hazardous area via coax directly from the safe area. The barrier is mounted in the safe area. This is more economical for intermediate distances and nodes.
- Sensors and actuators in a hazardous area can be connected to FLEX Ex I/O modules, which are connected through a bus isolator module and connector to a FLEX I/O adapter in a safe area thus allowing connectivity to DeviceNet, ControlNet, Universal Remote I/O, and EtherNet/IP. This configuration may be most economical for low-point applications or when networks other than ControlNet are required.
- FLEX Ex I/O modules in a hazardous area can be connected through an extender cable to a FLEXBus feed-through connector in an explosion-proof enclosure. Inside the enclosure, the feed-through connector is connected through a FLEX Ex extender cable, and then a bus isolator module and connector, to a FLEX I/O adapter.

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Entity-Based Architecture

Entity parameters provide a system of quantifying and matching safe levels for voltage, current, inductance, and capacitance when connecting intrinsically safe field devices and system devices together.

Configuration of the FLEX Ex system is based on the entity parameter method. Using entity parameters allows high system flexibility in matching field and system devices. This provides maximum utility to the IS system designer and installer. For more information, refer to the FLEX Ex System Certification Reference Manual, publication 1797-6.5.6.

Hazardous Area Designation

A hazardous area is designated as any location in which a combustible material is or may be present in the atmosphere in sufficient concentration to produce an ignitable mixture.

The North American method identifies these areas by Class, Division, and Group while the IEC (CENELEC) designates these areas by Zone and Gas Group.

Recently, North America has adopted the Zone method of identifying hazardous locations as an option to the Division method.

Class Designation

Class identifies the type of hazardous atmosphere.

Class I	Gas or vapor
Class II	Dust
Class III	Fiber or flying (no group designation)

Division/Zone Designations

Division/Zone identifies the likelihood of a hazardous atmosphere being present.

	Division Method (North America)	IEC Standard Zone Method
Ignitable mixture present continuously (long periods)	Division 1	Zone 0 (Zone 20-Dust)
Ignitable mixture present intermittently		Zone 1 (Zone 21-Dust)
Ignitable mixture is not normally present	Division 2	Zone 2 (Zone 22-Dust)

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Gas/Dust Groups

Hazardous locations are grouped according to their ignition properties.

Typical Gas	North American Gas Group	IEC Gas Group
Acetylene	A	IIC
Hydrogen	B	
Ethylene	C	IIB
Propane	D	IIA
Methane✶	D✶	I
Metal Dust	E	—
Coal Dust	F	
Grain Dust	G	

✶Mining applications under jurisdiction of MSHA.

Use in North American Hazardous Locations

FLEX Ex modules are rated for installation in Class I Division 1 & 2, Groups A-D hazardous areas. They are also rated to connect to field devices that are located in Class I, II, or III, Groups A-G hazardous areas.

If FLEX Ex components are to be installed in a Class II or III location in your application, you must mount them in a suitable, dust-proof enclosure with the appropriate connectors, glans, and seals. For example, a NEMA 9 enclosure may be appropriate. The FLEX Ex modules are rated to connect to devices located in Class II or III locations.

FLEX Ex modules are rated for installation in North American Class I Zone 1 & 2, Groups IIC, IIB, & IIA hazardous areas. They are also rated to connect to field devices that are located in North American Class I Zone 0, 1, & 2, Groups IIC, IIB, & IIA hazardous areas.

As always, observe local code requirements when applying your FLEX Ex application. For more information, refer to the FLEX Ex System Certification Reference Manual, publication 1797-6.5.6.

Use in CENELEC Hazardous Locations

FLEX Ex modules are rated for installation in European Zones 1, 2 and 22. They are also rated to connect to field devices that are located in European Zones 0, 1, 2, 21 and 22 hazardous areas. The FLEX Ex power supplies (1797-PS1E and -PS2E2) are rated for use in Zone 1 and 22.

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If FLEX Ex components are to be installed in a European Zone method dust or fiber location in your application, you must mount them in an approved, dust-proof enclosure with the appropriate connectors, glans, and seals. Pepperl+Fuchs have three cabinets that are approved for use with FLEX Ex components in Zone 22 applications: IVK2-ISRPI-V8LC; IVK2-ISRPI-V8HYW; and IVK2-ISRPI-V16LC. P+F has offices in Twinsburg, Ohio, USA, and Mannheim, Germany. See their website at www.pepperl-fuchs.com.

As always, observe local code requirements when applying your FLEX Ex application. For more information, refer to the FLEX Ex System Certification Reference Manual, publication 1797-6.5.6.

Certifications and Certificate Numbers

Cat. No.	Certifications	Certificates
1797-ACNR15	CENELEC: Class I Division 1 Groups A...D T4 UL, C-UL: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib IIC T4 Class II Division 1 Groups E, F, G; Class III✶ FM: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib IIC T4 INMETRO: BR-Ex ib IIB/IIC T4	CENELEC DMT 99 ATEX E 008 X UL, C-UL 99.19699 FM 3009806
1797-RPA	CENELEC: II (1) 2G EEx ia/ib IIB/IIC T4 UL, C-UL: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib IIC T4 Class II Division 1 Groups E, F, G(1); Class III✶ FM: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib IIC T4 INMETRO: BR-Ex ib IIB/IIC T4	CENELEC DMT 99 ATEX E 011 X UL, C-UL 99.19699 FM 3009806
1797-RPFM	CENELEC: II (1) 2G EEx ia/ib IIB/IIC T4 UL, C-UL: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib [ia] IIC T4 Class II Division 1 Groups E, F, G(1); Class III✶ FM: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib IIC T4 INMETRO: BR-Ex ib IIB/IIC T4	CENELEC DMT 99 ATEX E 011 X UL, C-UL 99.19699 FM 3009806
1797-BIC	CENELEC: II (2) G [EEx ib] IIC II (2D) FM: Nonincendive, 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 INMETRO: BR-Ex ib IIB/IIC T4	DMT 00 ATEX E056 Declaration of Conformity Directive 94/9 EC Zone 2 II 3G EEx nA IIC T4 X FM 3010810
1797-CEC	FM: Nonincendure, use for Class I, Division 2 Groups A…D or Class I, Zone 2 Group IIC	Declaration of Conformity Directive 94/9 EC Zone 2, II 3G EEx nA IIC T4 X FM 3010810
1797-BCNR	CENELEC: II (2) G [EEx ib] IIC UL, C-UL: Class I Division 1 Groups A...D T4 Class II Division 1 Groups E, F, G; Class III	CENELEC DMT99 ATEX E065X II (2) G(EEx ib) IIC II 3G EEx nA IIC T4 X

✶For UL, C-UL Class II Division 1 Groups E, F, G and Class III, modules must be installed in a UL listed Type 4, 4X, 6, 6P, 9, 12, or 12K enclosure.

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Cat. No.	Certifications	Certificates
1797-IBN16	CENELEC: II (1) 2G EEx ia/ib IIB/IIC T4 II (1D) (2D) UL, C-UL: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib[ia] IIC T4 Class II Division 1 Groups E, F, G(1); Class III✶ FM: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib/[ia] IIC T4 INMETRO: BR-Ex ib IIB/IIC T4	CENELEC DMT 98 ATEX E 013 X UL, C-UL 99.19699 FM 3009806
1797-OB4D	CENELEC: II (1) 2G EEx ia/ib IIB/IIC T4 II (1D) (2D) UL, C-UL: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib[ia] IIC T4 Class II Division 1 Groups, E, F, G; Class III FM: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib/[ia] IIC T4 INMETRO: BR-Ex ib IIB/IIC T4	CENELEC DMT 98 ATEX E 040 X UL, C-UL 99.19699 FM 3009806
1797-IE8	CENELEC: II (1) 2G EEx ia/ib IIB/IIC T4 II (1D) (2D) UL, C-UL: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib/[ia] IIC T4 Class II Division 1 Groups E, F, G; Class III FM: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib/[ia] IIC T4 INMETRO: BR-Ex ib IIB/IIC T4	CENELEC DMT 98 ATEX E 020 X UL, C-UL 99.19699, Class I Division 1 Hazardous FM 3009806
1797-IE8H	CENELEC: II (1) 2G EEx ia/ib IIB/IIC T4 II (1D) (2D) UL, C-UL: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib/[ia] IIC T4 Class II Division 1 Groups E, F, G; Class III FM: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib/[ia] IIC T4	CENELEC DMT 98 ATEX E 020 X UL, C-UL 99.19699 FM 3009806
1797-IE8NF	CENELEC: II (1) 2G EEx ia/ib IIB/IIC T4 II (1D) (2D) UL, C-UL: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib/[ia] IIC T4 Class II Division 1 Groups E, F, G; Class III FM: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib/[ia] IIC T4	CENELEC DMT 98 ATEX E 020 X UL, C-UL 99.19699, Class I Division 1 Hazardous FM 3009806 1797-IE8NF
1797-IRT8	CENELEC: II (1) 2G EEx ia/ib IIB/IIC T4 II (1D) (2D) UL, C-UL: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib/[ia] IIC T4 Class II Division 1 Groups E, F, G; Class III FM: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib/[ia] IIC T4 INMETRO: BR-Ex ib IIB/IIC T4	CENELEC DMT 98 ATEX E 023 X UL, C-UL 99.19699 FM 3009806
1797-OE8	CENELEC: II (1) 2G EEx ia/ib IIB/IIC T4 II (1D) (2D) UL, C-UL: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib/[ia] IIC T4 Class II Division 1 Groups E, F, G; Class III FM: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib/[ia] IIC T4 INMETRO: BR-Ex ib IIB/IIC T4	CENELEC DMT 00 ATEX E 042 X UL, C-UL 99.19699, Class I Division 1 Hazardous FM 3009806
1797-OE8H	CENELEC: II (1) 2G EEx ia/ib IIB/IIC T4, II (1D)(2D)	CENELEC: II (1) 2G EEx ia/ib IIB/IIC T4 II (1D) (2D) UL, C-UL: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib/[ia] IIC T4 Class II Division 1 Groups E, F, G; Class III FM: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib/[ia] IIC T4
1797-IJ2	CENELEC: II (1) 2G EEx ia/ib IIB/IIC T4 II (1D) (2D) UL, C-UL: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib/[ia] IIC T4 Class II Division 1 Groups E, F, G; Class III FM: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib/[ia] IIC T4 INMETRO: BR-Ex ib IIB/IIC T4	CENELEC DMT 98 ATEX E 033 X UL, C-UL 99.19699 FM 3009806

✶For UL, C-UL Class II Division 1 Groups E, F, G and Class III, modules must be installed in a UL listed Type 4, 4X, 6, 6P, 9, 12, or 12K enclosure.

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Cat. No.	Certifications	Certificates
1797-TB3	CENELEC: II 2G EEx ia IIC T4 UL, C-UL: Class I Division 1 & 2 Groups A...D T4 Class I Zone 1 & 2 AEx ia IIC T4 Class II Division 1 Groups E, F, G; Class III✶ FM: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib [ia] IIC T4 INMETRO: BR-Ex ib IIB/IIC T4	CENELEC DMT 98 ATEX E 012 X UL, C-UL 99.19699 FM 3009806
1797-TB3S	CENELEC: II 2G EEx ia IIC T4 UL, C-UL: Class I Division 1 & 2 Groups A...D T4 Class I Zone 1 & 2 AEx ia IIC T4 Class II Division 1 Groups E, F, G; Class III✶ FM: Class I Division 1 Groups A...D T4 Class I Zone 1 AEx ib [ia] IIC T4 INMETRO: BR-Ex ib IIB/IIC T4	CENELEC DMT 98 ATEX E 012 X UL, C-UL 99.19699 FM 3009806
1797-PS1N	UL, C-UL: Class I Division 1 Groups A...D Class II Division 1 Groups E, F, G; Class III FM: Mounting - Class I Division 1 Groups B...D T4 IS Power - Class I Division 1 Groups A...D T4 Class I Zone 1 AEx [ib] IIC	UL, C-UL UL File Number E197983 C-UL-US
1797-PS1E	CENELEC: Series A - EEx de [ib] IIC T4 Series B - II 2G EEx de [ib] IIC T4 II 3D IP54 T90 °C INMETRO: BR-Ex ib IIB/IIC T4	—
1797-PS2N2	UL, C-UL: Class I Division 1 Groups B…D T4 Class I Division 2 Groups A…D T4 FM: Mounting - Class I Division 1 Groups B…D T4, Class I Division 2, Groups A…D, T4, Class I Zone 1 IIC IS Power - Class I Division 1&2 Groups A…G T4 Class I Zone 1 AEx [ib] IIC	UL, C-UL 99.19699 FM 3009806
1797-PS2E2	CENELEC: II 2G EEx de [ib] IIC T4 II 3D IP54 T90 °C INMETRO: BR-Ex ib IIB/IIC T4	BVS 98.D.2055X

✶For UL, C-UL Class II Division 1 Groups E, F, G and Class III, modules must be installed in a UL listed Type 4, 4X, 6, 6P, 9, or 12K enclosure.

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FLEX Ex I/O Environmental Specifications

The following environmental specifications apply to all FLEX Ex I/O adapters, modules, and terminal bases.

Operating Temperature	-20…70 °C (-4…158 °F)
Non-Operating Temperature	-40…85 °C (-40…185 °F)
Relative Humidity	5…95% non-condensing
Shock, Operating	15 g peak acceleration, 11 (±1) ms pulse width
Shock, Non-Operating	15 g peak acceleration, 11 (±1) ms pulse width
Vibration	2 g @ 10…500 Hz per IEC 68-2-6

Specifying a FLEX Ex I/O System

Follow these steps as you specify your FLEX Ex I/O system:

✓	Step	See Page
	1 Select an adapter and distribution method Choose an adapter and fiber hub or coax barrier to distribute FLEX Ex into the hazardous area. Or, choose a bus isolator pair to connect to various networks.	Selecting an Adapter 102 Selecting a Fiber Hub 105 Selecting a Coax Barrier 107 Selecting a Bus Isolator 109
	2 Determine the I/O devices • location of the device • number of points needed • appropriate catalog number • number of points available per module • number of modules	Digital I/O Modules 112 Analog I/O Modules 116 Temperature I/O Module 120 Counter I/O Module 124
	3 Select a terminal base Choose an appropriate terminal base for your modules.	Specifications 127
	4 Select power supplies and ensure sufficient power for the communication adapter and modules If power consumption exceeds the maximum for a single power supply, install additional power supplies.	Selecting a Supply 128 Understanding System Planning 129 Assigning Power Supplies 131 Hazardous Area Installation 132 Specifications 134
	5 Select optional accessories Choose appropriate accessories to enhance your system.	Extender Cables 135 ControlNet BNC Boot 136 Trunk Insulator & Marker Kit 136 ControlNet Ex Taps 136
	6 Determine mounting requirement Determine whether to panel mount or DIN Rail mount the FLEX Ex I/O system.	Mounting Requirements 139
	7 Select software Based on the system design, determine the software products you need to configure and program your application.	Software Products 141 Programming Software 141 Network Configuration Software 141

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Step 1 - Select:

- *the communication adapter for the ControlNet Ex network*
  the coax barrier to distribute into hazardous areas

Selecting a Communication Adapter and Distribution Method

The diagnostic capabilities and determinism of the ControlNet network make it an ideal choice for distributing I/O into hazardous area applications.

The redundant media ControlNet Ex communications adapter (1797-ACNR15) is high-speed and capable of communicating with as many a 8 I/O modules for up to 128 I/O points.

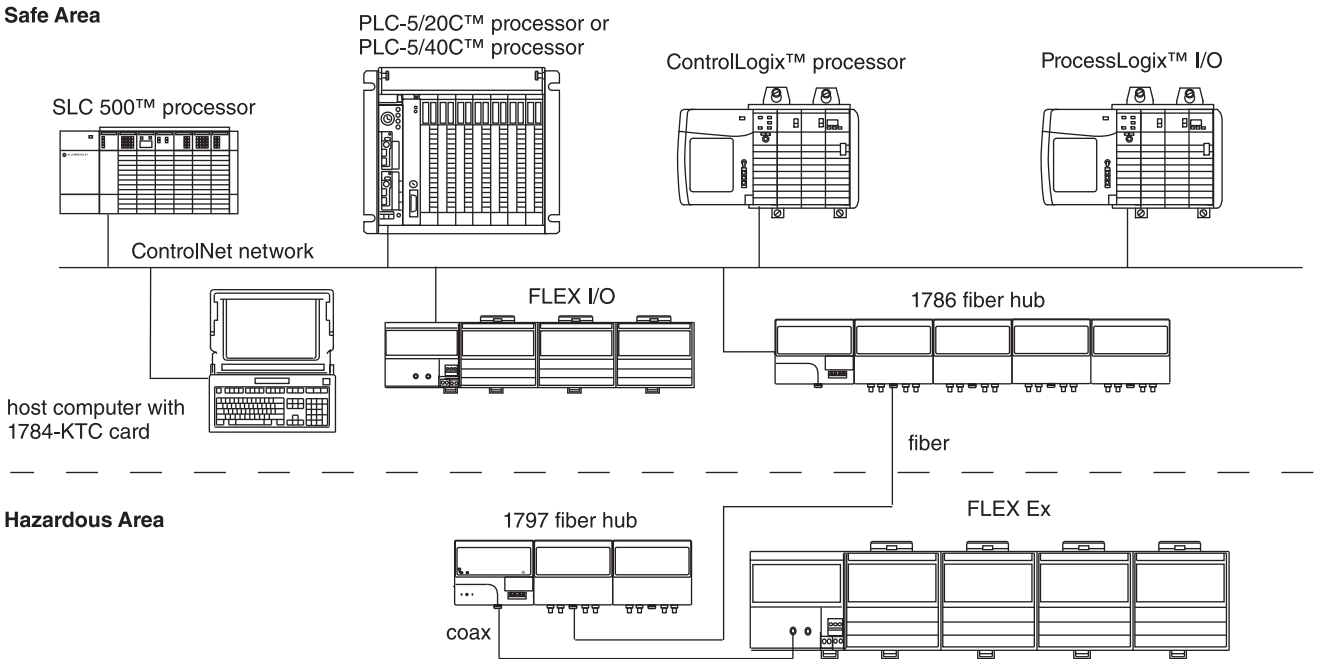
The ControlNet Ex segment in the hazardous area must be protected from other ControlNet segments in safe areas. Isolation can be achieved via two approaches: by converting coax to fiber with a pair of fiber hubs/repeaters or by using a coax barrier.

The combination of a ControlNet fiber hub (1786-RPA and -RPFM) and a ControlNet Ex fiber hub (1797-RPA and -RPFM) allows for flawless, high-speed, deterministic data flow and messaging between hazardous and safe areas. This combination functions as an intrinsically safe isolator between hazardous and safe areas and can provide long-distance communication up to three kilometers. It is best for longer distance and largest number of adapters and I/O points.

An intrinsically safe network and I/O system installed in the hazardous area allows your data to be gathered at its origin and transported out of the area with the minimum amount of wiring. Cable penetrations into the hazardous area, cable trays, and conduit are all drastically reduced.

Cat. No.	Description	Intrinsically Safe Module Type	Intrinsically Safe Media Type	Intrinsically Safe Output Characteristics	Intrinsically Safe Power Supply (V, -V)	See page:
1797-ACNR15	Dual Media ControlNet Ex 1.5 Adapter	EEx ib IIB/IIC T4, AEx ib IIC T4, Class I Division 1 Groups A…D T4	EEx ib IIB/IIC T4, AEx ib IIC T4, Class I, Division 1 Groups A…G T4	16 pin male and female FlexBus connector: Uo ≤ 5.8V dc Io ≤ 400 mA Po ≤ 2.16W Lo ≤ 10 µH Co ≤ 65 µF	Ui ≤ 9.5V dc Ii ≤ 1 A Pi ≤ 9.5 W Li = Negligible Ci ≤ 120 nF	104
1797-RPA	ControlNet Ex Coax Drop Repeater Module	EEx ib IIB/IIC T4, AEx ib IIC T4, Class I Division 1 Groups A…D T4	EEx ib IIB/IIC T4, AEx ib IIC T4, Class I, Division 1 Groups A…G T4	16 pin male and female FlexBus connector: Uo ≤ 5.8V dc Io ≤ 400 mA Po ≤ 2.16W Lo ≤ 10 µH Co ≤ 65 µF	Ui ≤ 9.5V dc Ii ≤ 1A Pi ≤ 9.5W Li = Negligible Ci ≤ 120 nF	105
1797-RPFM	ControlNet Ex 3 km Fiber Media Port Adapter	EEx ib IIB/IIC T4, AEx ib IIC T4, Class I Division 1 & 2 Groups A…D T4	EEx ia IIB/IIC T4, AEx ia IIC T4, Class I, II, III Division 1 & 2 Groups A…G T4	30 pin male TTL bus connector Uo ≤ 5.4V Io ≤ 201 mA Po ≤ 1.1 W Lo ≤ 0.45 mH Co ≤ 71 µF	——	106
1797-BCNR	Redundant ControlNet Barrier Module	——	——	——	——	107
1797-BIC	Bus Isolator Module	——	——	——	——	109
1797-CEC	Flexbus Connector Module	——	——	——	——	109

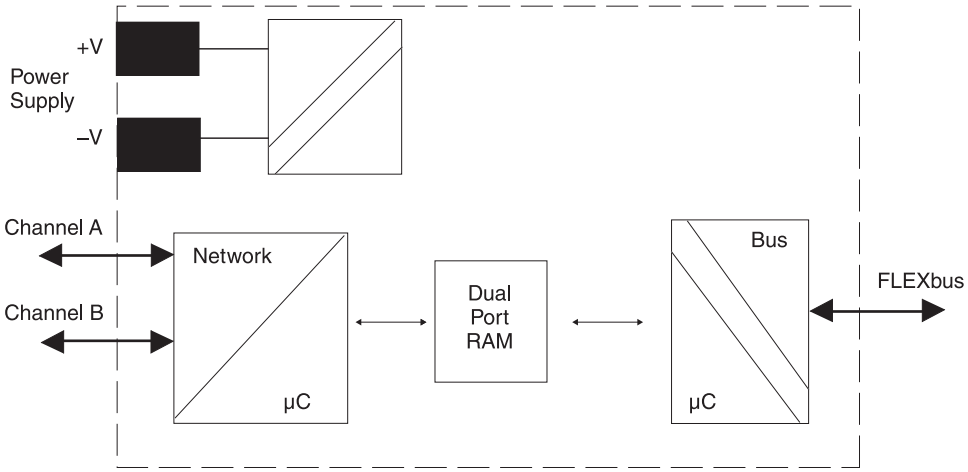
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1797-ACNR15 Dual Media ControlNet Ex 1.5 Adapter

The 1797-ACNR15 interfaces FLEX Ex I/O modules to a coax segment of a ControlNet Ex I/O link. It provides power to the backplane to run bus interface circuitry aboard I/O modules and is capable of dual ControlNet Ex cable media.

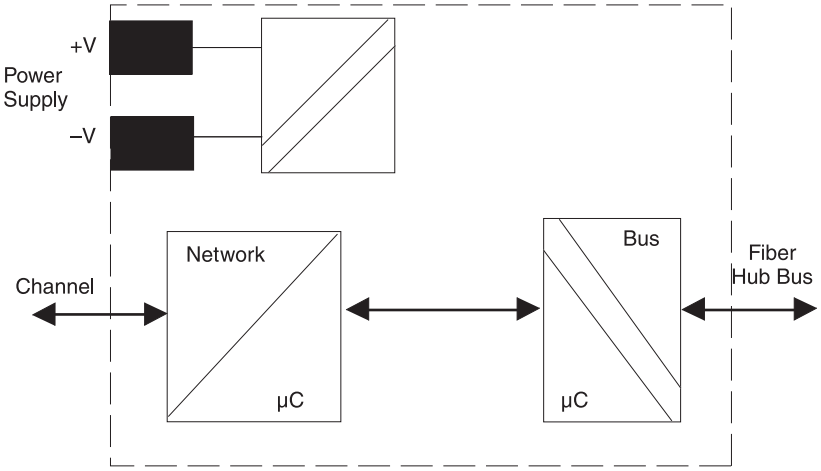


	1797-ACNR15
I/O Module Capacity	8
Communication Interface	Quad-shield RG-6 coax
Communication Rate	5 Mbps
Noxious Gas Exposure	Tested to severity level G3, ISA-S71.04-1985
Power Dissipation	8.5 W
Dimensions (HxWxD), Metric	94 x 94 x 91 mm
Dimensions (HxWxD), Imperial	3.7 x 3.7 x 3.58 in
Weight, Metric	0.2 kg
Thermal Dissipation	29 BTU/hr

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1797-RPA ControlNet Ex Coax Drop Repeater Module

The 1797-RPA functions as part of the fiber repeater hub within the hazardous area to extend the length of the ControlNet Ex segments to interlink systems all operating within the area. It functions as the intelligent starter block for a multiport repeater and is configured with at least one media adapter.

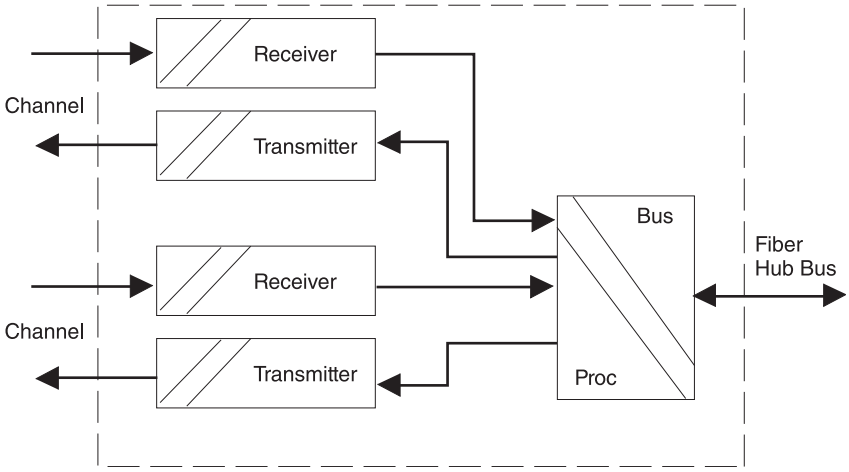


	1797-RPA
Fiber Media Port Adapter Capacity	2
ControlNet Cable	Quad-shield RG-6 coax
Communication Rate	5 Mbps
Noxious Gas Exposure	Tested to severity level G3, ISA-S71.04-1985
Power Dissipation	8.5 W
Dimensions (HxWxD), Metric	94 x 94 x 91 mm
Dimensions (HxWxD), Imperial	3.7 x 3.7 x 3.58 in
Weight, Metric	0.2 kg
Thermal Dissipation	29 BTU/hr

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1797-RPFM ControlNet Ex 3 km Fiber Media Port Adapter

The 1797-RPFM (part of the fiber repeater hub) functions as a non-intelligent fiber to backplane conversion device and converts glass fiber infrared LED media signals to backplane signals for use by the 1797-RPA repeater module.



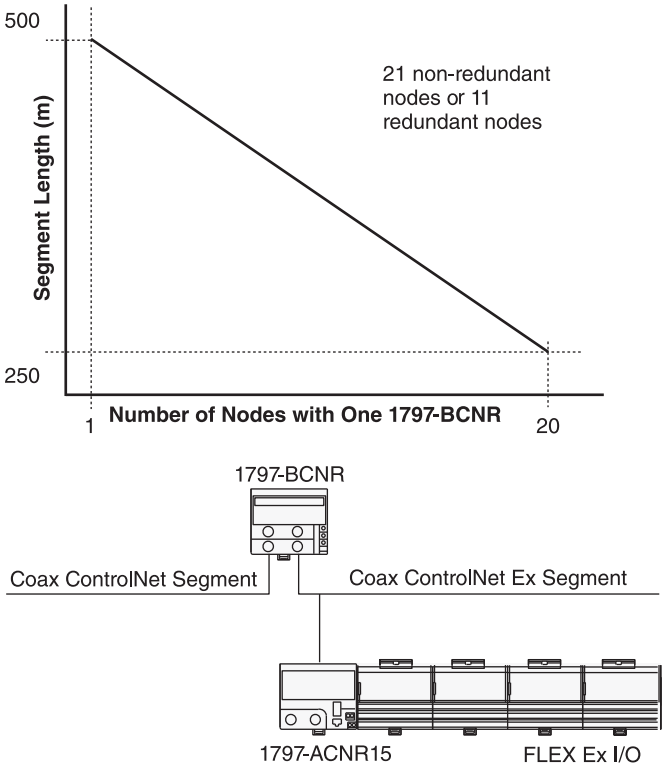
	1797-RPFM
Communication Interface	Fiber optic cable
Fiber Type	62.5/125 mm
Fiber Termination Type	ST (plastic or ceramic)
Communication Rate	5 Mbps
Noxious Gas Exposure	Tested to severity level G3, ISA-S71.04-1985
Power Dissipation	Included in 1797-RPA
Dimensions (HxWxD), Metric	94 x 94 x 91 mm
Dimensions (HxWxD), Imperial	3.7 x 3.7 x 3.58 in
Weight, Metric	0.1 kg
Thermal Dissipation	Included in 1797-RPA

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1797-BCNR Coax Barrier Module

The redundant media ControlNet coax barrier (1797-BCNR) isolates the ControlNet segment in the safe area from that in the hazardous area. It allows connection into the hazardous area without converting to/from fiber media. The barrier can support up to 20 adapters and distances up to 500 meters. Thus, it addresses intermediate size applications in a highly cost-effective manner. The barrier can be mounted in safe, Division 2 or Zone 2 areas.

When using a 1797-BCNR, the total allowable length of a segment containing standard RG-6 quad-shield cable depends on the number of taps in your segment. There is no minimum trunk-cable section length requirement. The maximum allowable length of a segment that contains a 1797-BCNR is 500m (1640 ft) with two taps connected. Each additional tap decreases the maximum length of the segment according to the chart. The maximum number of taps allowed on a segment is 20 with a maximum length of 250m (820 ft).



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	1797-BCNR
ControlNet Ex System Characteristics	Uo = 7 V Io = 55 mA @ 52 KHz Po = negligible
Non Ex ControlNet Characteristics	Un = 5V Um = 253V ac I = not defined P = not defined
ControlNet Communication Rate	5 M bit/s5 Mbps
Transmission Attenuation	-7.84 dB
Noxious Gas Exposure	—
Dimensions (HxWxD), Metric	7 x 10 x 9 cm
Dimensions (HxWxD), Imperial	2.76 x 3.94 x 3.55 in
Weight, Metric	200 g
IS Module Type	EEx [ib] IIC

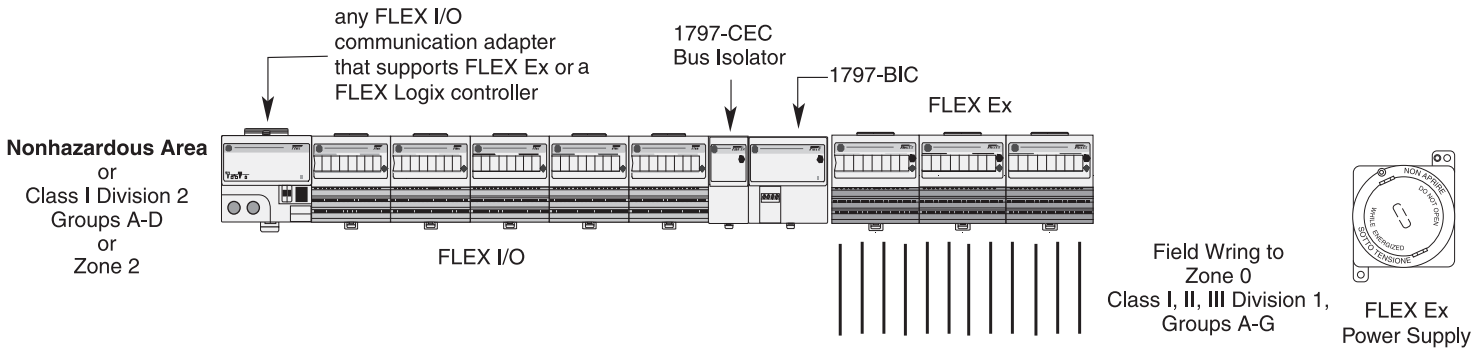
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1797-BIC Bus Isolator Module and 1797-CEC Flexbus Connector

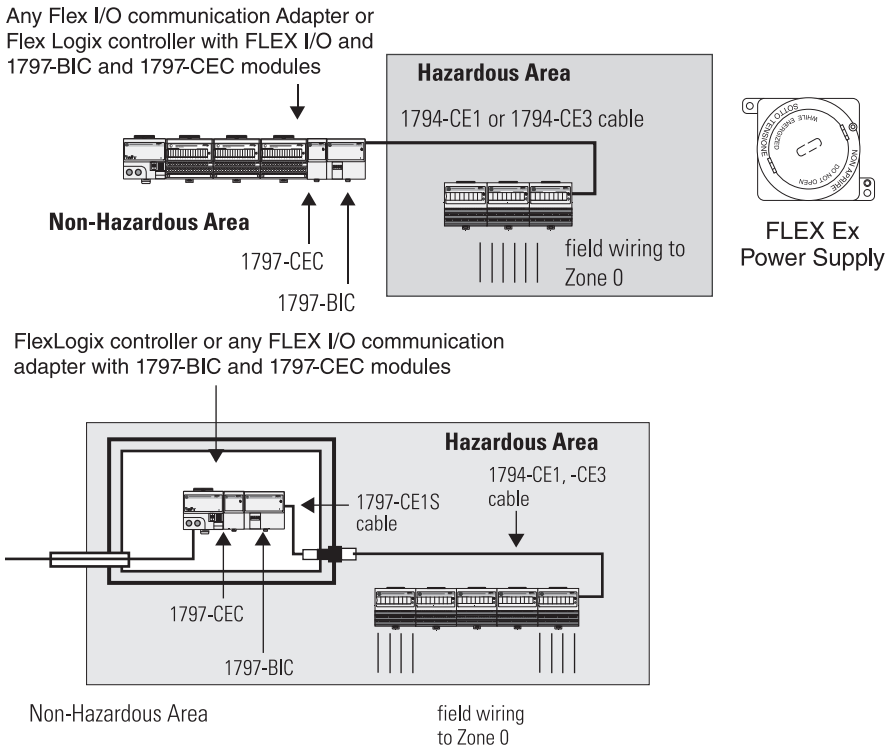
The bus isolator modules, 1797-BIC and -CEC, allow you to configure FLEX Ex modules and FLEX I/O modules on the DIN Rail when attached to the same adapter and grouped together on appropriate sides of the bus isolator module. This highly flexible, cost-effective solution combines intrinsically safe and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

Intermixed system 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
- for use with FlexLogix on its local rail, however cannot be used with the 1794-FLA adapter (secondary rail)



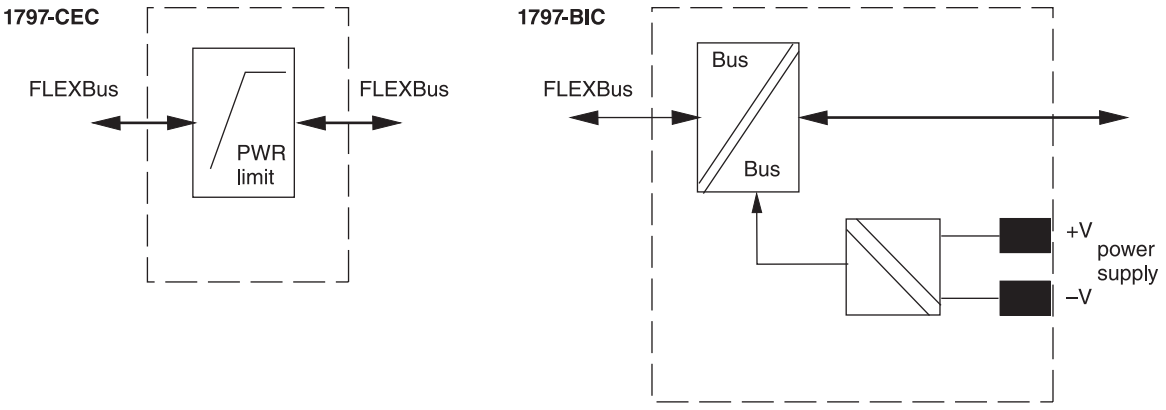
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The 1797-BIC and -CEC modules provide an IS-compatible mechanism to separate two sections of the backplane, allowing IS and non-IS field-device wiring to the same I/O group. It converts hazardous power to IS-safe power to run one side of the bus receiver/transmitter circuitry and IS-safe power to slave side modules. A total of eight I/O modules (1794 FLEX or 1797 FLEX Ex) may be attached to the adapter.

When combining 1794 FLEX and 1797 FLEX Ex I/O, the 1794 FLEX I/O modules are placed to the left of the 1797-BIC and -CEC modules while the 1797 FLEX Ex I/O modules are placed on the right.

➲ **IMPORTANT: A FLEX Ex power supply (1797-PSxxx) must be used to power the 1797 FLEX Ex I/O regardless of where they are located.**

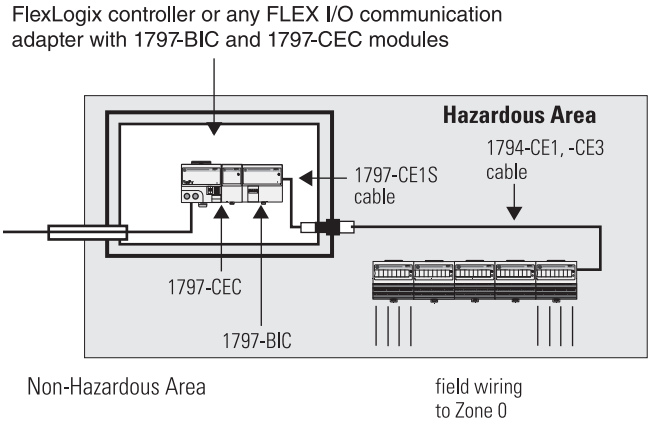


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	1797-BIC
I/O Module Capacity	8✶
Isolation Voltage	System to System and System Slave Side to Power Supply: Galvanic to DIN EN 50020
Power Consumption, Max.	0.15 A @ 18…32V dc
Power Source Failure, Maximum Input	U_m = 253V ac
Noxious Gas Exposure	Tested to severity level G3, ISA-S71.04-1985
Power Dissipation	2.1 W
Thermal Dissipation	7.2 BTU/hr
Dimensions (HxWxD), Metric	87 x 94 x 75 mm
Dimensions (HxWxD), Imperial	3.4 x 3.7 x 2.95 in
Weight, Metric	0.2 kg
IS Module Type	[EEx ib] IIC

✶8 FLEX Ex modules. Note that a total of eight I/O modules can be attached to a 1794 FLEX I/O adapter. The 1797-BIC and 1797-CEC 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.

Use the optional Bus Isolator 1797-CE1S (0.3m, 1 ft) or 1797-CE3S (0.9m, 3 ft) extender cable to mix systems in the hazardous area within a purged or explosion-proof enclosure.



FLEXBus Feed Throughs



For Metric Threads on the Connector	
Part Number	**Manufacturer**
RS-FEED.M	Pepperl+Fuchs
For NPT Threads on the Connector	
Part Number	**Manufacturer**
RS-FEED.NPT	Pepperl+Fuchs
Agency Certification	CENELEC: EEx d IIC T6IBEx U 98 ATEX 1033U FM: Approved per J.I. 3002937

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Step 2 - Select:

• *I/O modules*

Selecting FLEX Ex I/O Modules

FLEX Ex follows a producer/consumer model for remote I/O. Input modules produce data for the system. Controllers, output modules, and intelligent modules produce and consume data. The producer/consumer model multicasts data. This means that multiple nodes can consume the same data at the same time from a single device.

FLEX Ex I/O modules offer 4 through 16 I/O each. You can plug together a maximum of eight FLEX Ex I/O modules with a FLEX Ex I/O adapter, for a maximum of 128 I/O per assembly.

Mix and match digital and analog I/O to meet your application needs.

Digital I/O Modules

Digital I/O modules have digital I/O circuits that interface to on/off sensors (pushbottons and limit switches) and actuators (motor starters, pilot lights, and annunciators).

These outputs are controlled by the PLC controller while the inputs control the state of corresponding bits in the PLC.

Features

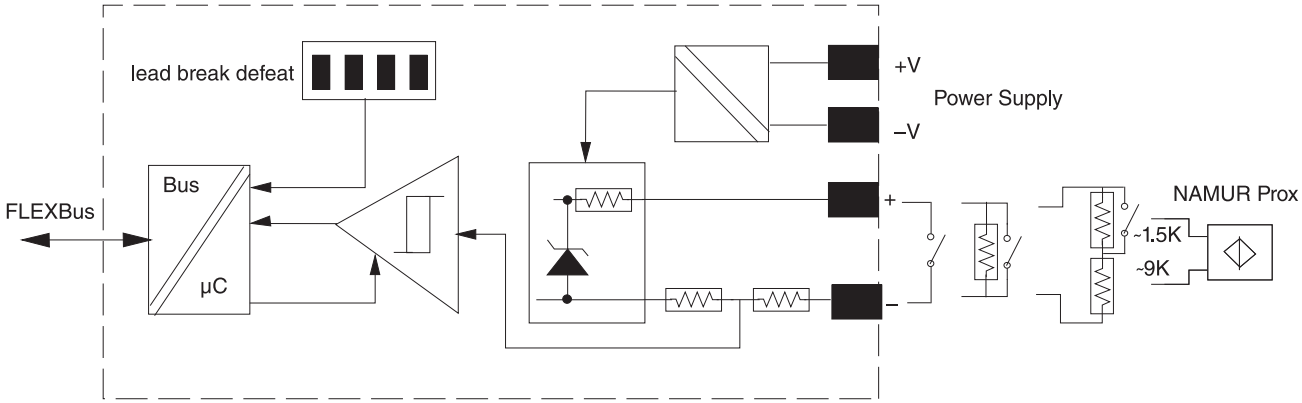
- Modules detect, indicate, and report the following faults:
  - open input or output field devices or wiring
  - shorted output field devices
  - shorted input or output wiring
- Selectable input filter times from <1 to 33 ms.
- LED for each channel indicating status of:
  - corresponding input device
  - output signal

Cat. No.	Description	Number of Inputs	Number of Outputs	Terminal Base Unit
1797-IBN16	16 pt Non-Isolated NAMUR Input Module	16	—	1797-TB3, 1797-TB3S
1797-OB4D	24V dc 4 pt Non-Isolated Source Output Module	—	4	

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1797-IBN16 16 pt Non-Isolated NAMUR Input Module

- Fault detection, fault bits in data table and LED (per channel) blinking red (1 Hz)
- Lead brekage defeat on four-channel group basis via module DIP switch selection
- Fault detection can be disabled via data table
- Programmable digital input filtering 1...33 ms (OFF to ON and ON to OFF)
- All modules updated to flexbus ≤ 500 µs
- Compatible with NAMUR sensors and dry contacts



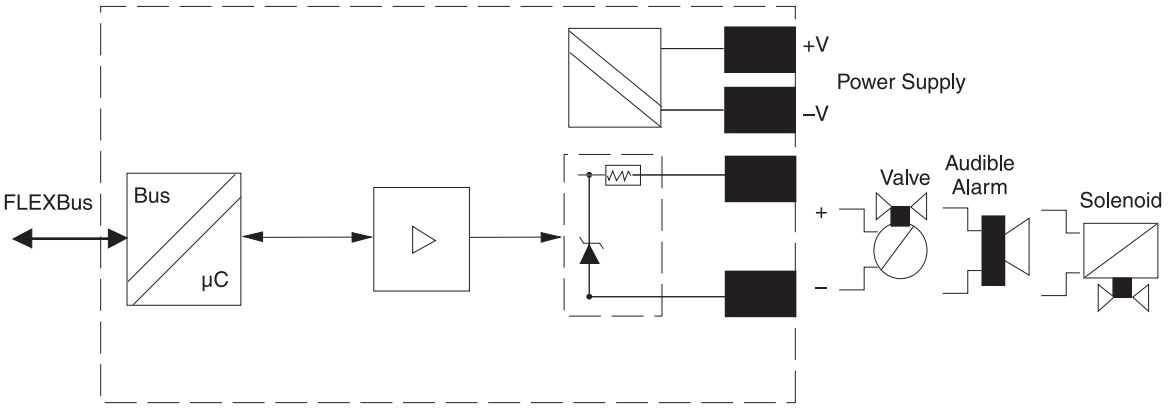
	1797-IBN16
Number of Inputs	16
Input Type	DIN19234, NAMUR compatible
Current, On-State Input, Min.	2.1 mA
Current, Off-State Input, Max.	1.2 mA
Hysteresis	0.2 mA
Input Frequency, Max.	1000 Hz
Input Pulse Width	> 500 µs, on or off
Load Voltage, Max.	U/V = 7.5V dc
Short Circuit Current	7.5 mA
Short Circuit Threshold Current	> 6 mA
Lead Breakage Threshold Current	< 0.35 mA
Input Delay Time, OFF to ON	1 ms, 2 ms, 3 ms, 5 ms, 9 ms, 17 ms, 33 ms✶
Input Delay Time, ON to OFF	1 ms, 2 ms, 3 ms, 5 ms, 9 ms, 17 ms, 33 ms❄
Intrinsically Safe Input Type	EEx ia IIB/IIC T4, AEx ia IIC T4, Class I, II, III Division 1 Groups A…G T4
Intrinsically Safe Input Characteristics	16 pin male and female FlexBus connector: Ui ≤ 5.8V dc Ii ≤ 400 mA Li = Negligible Ci = Negligible
Noxious Gas Exposure	Tested to severity level G3, ISA-S71.04-1985
FLEX Ex Power Consumption (W) at 24V	2.8
Power Dissipation	2.8 W
Dimensions (HxWxD), Metric	46 x 94 x 75 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.95 in
Weight, Metric	0.2 kg
Thermal Dissipation, Max.	9.6 BTU/hr

✶1 ms default - selectable through output image table (see "Setting Input Filter Times").
❄1 ms default - selectable through output image table.

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1797-OB4D 24V DC 4 pt Non-Isolated Source Output Module

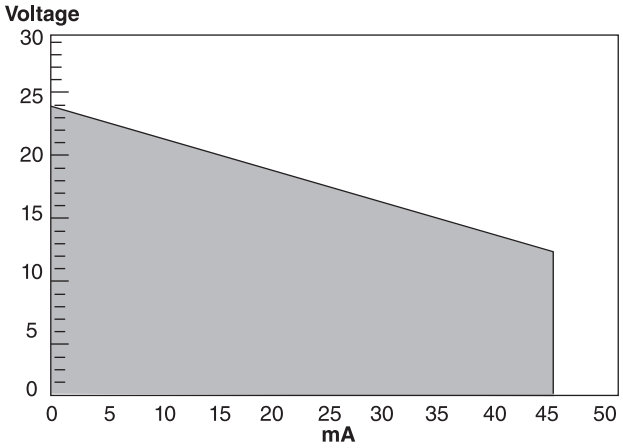
- 4 output channels referenced to a single supply
- Yellow LED to indicate output state, output ON = LED ON
- Fault indication, signal to the backplane and LED (per channel) blinking red for fault
- Output wire-off detection
- Output wire-off detection on per channel basis via module data bit
- Electronically short-circuit protected, fault reported to controller
- All channels updated from the backplane every 2 ms
- Output fault state programmable



	1797-OB4D
Number of Outputs	4
Output Load Range	30…5000 Ω
Fault Detection	Fault bits in data table and LED (per channel) blinking red (1 Hz)
Protection	Lead break, overload, short circuit
Output Delay Time, OFF to ON, Max.	≤ 1.2 ms
Output Delay Time, ON to OFF, Max.	≤1.2 ms
Intrinsically Safe Output Type	EEx ia IIB/IIC T4, AEx ia IIC T4, Class I, II, III Division 1 & 2 Groups A…G T4
Intrinsically Safe Output Characteristics	16 pin male and female FlexBus connector: Ui ≤ 5.8V dc Ii ≤ 400 mA Li = Negligible Ci ≤ 1.35 µF
Noxious Gas Exposure	Tested to severity level G3, ISA-S71.04-1985
FLEX Ex Power Consumption (W) at 24V	7.5
Power Dissipation	5 W
Dimensions (HxWxD), Metric	46 x 94 x 75 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.95 in
Weight, Metric	0.2 kg
Thermal Dissipation, Max.	17.07 BTU/hr

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1797-OB4D Output Voltage/Current Capability



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Analog I/O Modules

Choose analog I/O modules when you need:

- **Configurable channels** allow the module to be used with a variety of sensors.
- **On-board scaling** eliminates the need to scale the data in the controller. Controller processing time and power are preserved for more important tasks, such as I/O control, communications, or other user-driven functions.
- **On-line configuration.** Modules can be configured in the RUN mode using the programming software or the control program. This allows you to change configuration while the system is operating. For example, the input filter for a particular channel could be changed, or a channel could be disabled based on a batch condition.
- **Over- and under-range detections and indications** eliminates the need to test values in the control program, saving valuable processing power of the controller. In addition, since alarms are handled by the module, the response is faster and only a single bit needs to be monitored to determine if an error condition has occurred.
- **Ability to direct output device operation during an abnormal condition.** Each channel of the output module can be individually configured to hold its last value or assume a user-defined value on either a run-to-program or run-to-fault condition. This feature allows you to set the condition of your analog devices, and therefore your control process, which may help to ensure a reliable shutdown.
- **Selectable input filters** allows you to select from several different filter frequencies for each channel that best meets the performance needs of your application based on environmental limitations. Lower filter settings provide greater noise rejection and resolution. Higher filter settings provide faster performance.
- **Selectable response to broken input sensor.** This feature provides feedback to the controller that a field device is not connected or operating properly. This allows you to specify corrective action based on the bit or channel condition.

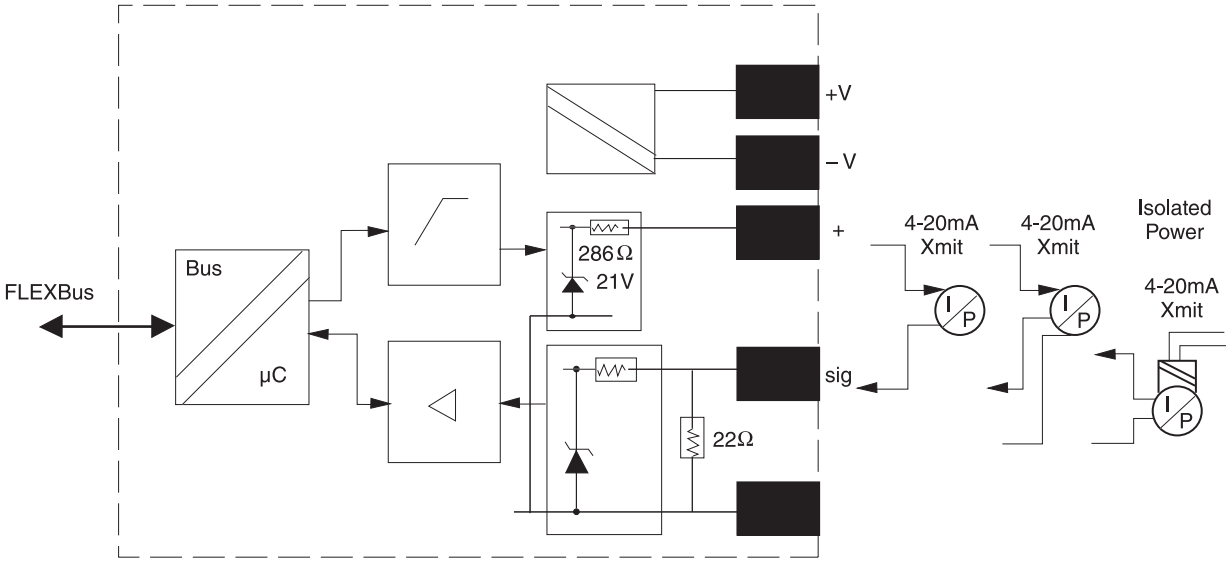
Cat. No.	Description	Number of Inputs	Number of Outputs	Terminal Base Unit
1797-IE8	8 pt 16 bit Single-Ended Non-Isolated Analog Input Module	8	—	1797-TB3, 1797-TB3S
1797-IE8H	8 pt 16 bit Single-Ended Non-Isolated Analog Input Module with HART capability			
1797-IE8NF	8 pt 16 bit Single-Ended Non-Isolated Analog Input Module with Noise Filter			
1797-IRT8	8 pt 16 bit Non-Isolated RTD Thermocouple/mV Input Module			
1797-OE8	8 pt 13 bit Single-Ended Non-Isolated Analog Output Module	—	8	
1797-OE8H	8 pt 16 bit Single-Ended Non-Isolated Analog Input Module with HART capability			

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FLEX Ex I/O Analog Input Modules

1797-IE8, -IE8H (HART), and -IE8NF (With Noise Filter) 8 pt 16 Bit Single-Ended Non-Isolated Analog Input Modules

- Eight single-ended input channels referenced to a single common
- 3-wire input for 2- and 3-wire transmitters
- Functional data: normal input
  input current = 4...20 mA, full-current range
  0...22 mA to allow for over and underrange indication
- Wire-off detection, signal to the backplane and LED (per channel) blinking red for fault
- Wire-off detection on per channel basis via module data bits
- Input filter cutoff programmable
- Resolution: 16 bits
- Accuracy: 0.1%
- The 1797-IE8 is typically used to act on change-of-state and high-speed applications. It is not compatible with HART handheld devices.
- The 1797-IE8NF has additional hardware filtering that damps out spurious signals and can be used for slower changing, steady-state processes. It has slower sampling than the 1797-IE8 (100 ms versus 1 ms). It is compatible with HART handheld devices.
- The 1797-IE8H is similar to the 1797-IE8NF with real time data table updates. It also supports pass-through of HART commands as unscheduled ControlNet messages. It is compatible with FDT software packages.



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	1797-IE8	1797-IE8H	1797-IE8NF
Input Resolution	16 bits	16 bits	16 bits
Input Signal Range	0…20 mA	0…20 mA	0…20 mA
Transfer Characteristics, Accuracy	0.1% of output signal range at 20 °C (68 °F)	0.1% of output signal range at 20 °C (68 °F)	0.1% of output signal range at 20 °C (68 °F)
Transfer Characteristics, Temperature Drift	0.005%/°C of output signal range	0.05%/°C of output signal range	0.005%/°C of output signal range
Functional Data Range	> 15V @ 22 mA > 21.5V @ 0 mA	> 17V @ 22 mA > 23V @ 0 mA	> 15V @ 22 mA > 21.5V @ 0 mA
Data Format	Configurable	Configurable	Configurable
Step Response to 99% of Full Scale	4 ms	80 ms	80 ms
Update Time, Module from Adapter	200…1600 µs	200…1600 µs	200…1600 µs
Noxious Gas Exposure	Tested to severity level G3, ISA-S71.04-1985	Tested to severity level G3, ISA-S71.04-1985	Tested to severity level G3, ISA-S71.04-1985
FLEX Ex Power Consumption (W) at 24V	7.5	7.1	7.5
Power Dissipation	5.2 W	5.2 W	5.2 W
Thermal Dissipation, Max.	17.75 BTU/hr	17.75 BTU/hr	17.75 BTU/hr
Dimensions (HxWxD), Metric	46 x 94 x 75 mm	46 x 94 x 75 mm	46 x 94 x 75 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.95 in	1.8 x 3.7 x 2.95 in	1.8 x 3.7 x 2.95 in
Weight, Metric	0.2 kg	0.2 kg	0.2 kg
Intrinsically Safe Input Type	Uo ≤ 23.7V Io ≤ 93.5 mA Po ≤ 555 mW EEx ia IIB/IIC (CENELEC) AEx ia IIC (US) Ex ia IIC (Canada) Class I, Zone 0, Groups IIC, IIB, IIA Class I, Division 1, Groups A, B, C, D Class II, Division 1, Groups E, F, G Class III, Division 1	Uo ≤ 24.4V Io ≤ 92.5 mA Po ≤ 565 mW EEx ia IIB/IIC T4	Uo ≤ 23.7V Io ≤ 93.5 mA Po ≤ 555 mW EEx ia IIB/IIC (CENELEC) AEx ia IIC (US) Ex ia IIC (Canada) Class I, Zone 0, Groups IIC, IIB, IIA Class I, Division 1, Groups A, B, C, D Class II, Division 1, Groups E, F, G Class III, Division 11
Intrinsically Safe Input Characteristics	16 pin male and female FlexBus connector: Ui ≤ 5.8V dc Ii ≤ 400 mA Li = Negligible Ci ≤ 1.35 µF	16 pin male and female FlexBus connector: Ui ≤ 5.8V dc Ii ≤ 400 mA Li = Negligible Ci ≤ 1.35 µF	16 pin male and female FlexBus connector: Ui ≤ 5.8V dc Ii ≤ 400 mA Li = Negligible Ci ≤ 1.35 µF

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HART Interface Modules

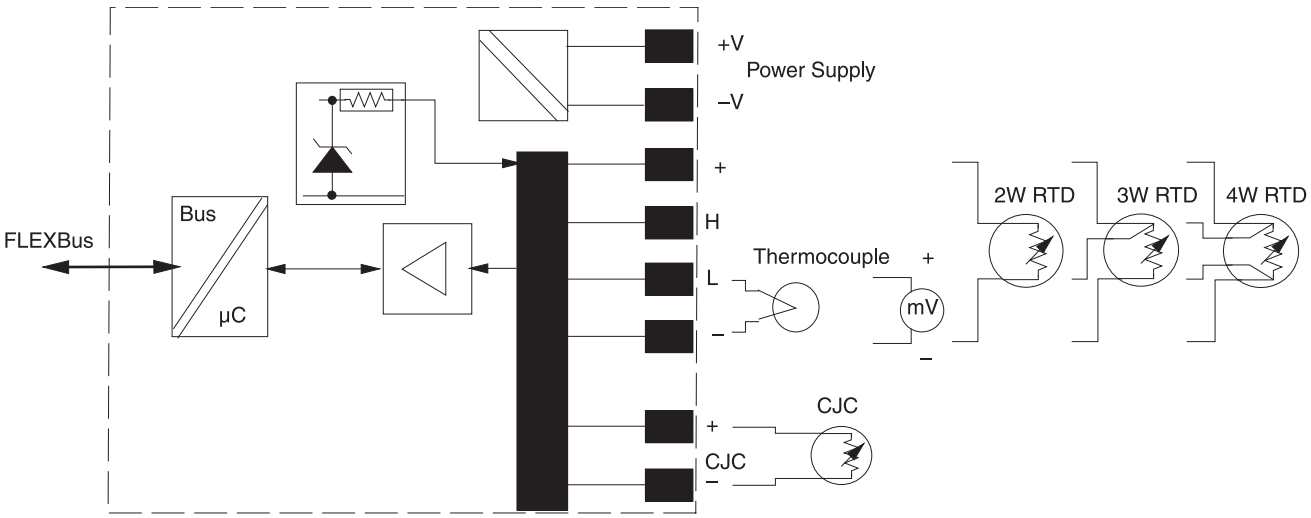
FLEX and FLEX Ex HART analog modules (IE8H and OE8H) are ideal for use in applications that need connection with FDT (Field Device Tool) compatible asset management software, such as Rockwell Software FieldCare HART Communication bundle or Endress + Hauser Fieldcare. For HART Device Type Management (DTM) programs and drivers, go to http://www.ab.com/io, and select Configurations Files, DTM files for HART.

- FLEX HART analog modules can be used on ControlNet or EtherNet/IP. The FLEX Ethernet adapter requires firmware v3.1 or later, which is flash upgradeable, to support these modules.
- Each HART field device is wired to its own input or output channel:
  - 8 single-ended channels
    does not support multi-drop
    2 or 3 wire devices
- For use with FlexLogix, the modules must be used on a distributed rail with a ControlNet adapter and not on a local rail.
- HART commands cand be transmitted by unscheduled message:
  - sample RLL subroutines are available.
    currently limited to one instance of RLL subroutine per module, one channel at a time.

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1797-IRT8 8 pt 16 Bit Non-Isolated RTD Thermocouple/mV Input Module

- input channels referenced to a single common
- RTD mode
  - 2-, 3-, and 4-wire connection
  - sensor lead breakage and short circuit detection all 4 leads
  - measuring resistance 0 to 500Ω
  - accuracy: 0.1% of span at 20°C, filter cutoff < 1 Hz
- mV mode
  - input voltage -40 to 100 mV differential sensing
  - sensor breakage detection
- thermocouple mode
  - types B, E, J, K, TXK/XK (L), N, R, S, T
  - cold junction compensation (CJC)
  - external reference junction (programmable)
  - sensor breakage detection
  - accuracy: 0.1% of span, filter cutoff < 1 Hz
  - accuracy of CJC: ± 1 C/K



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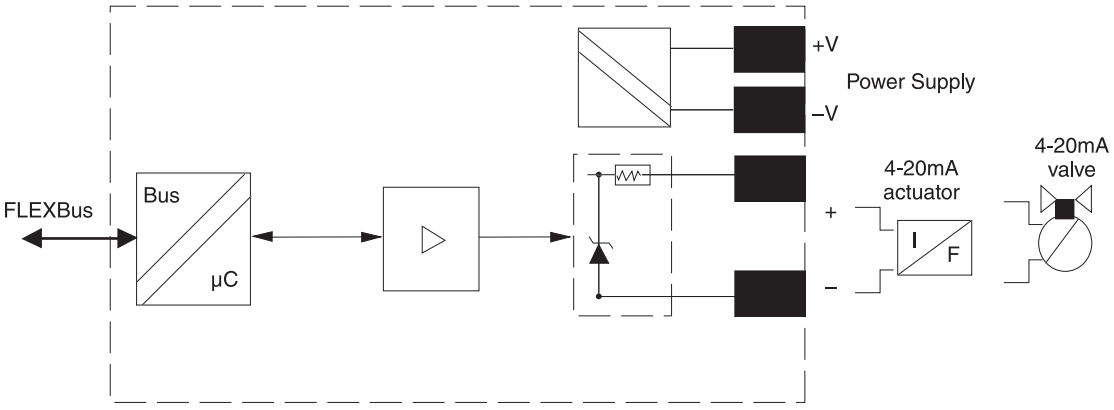
	1797-IRT8
Input Type	Suitable for Pt 100, Pt200, Ni 100, Ni120, Ni200, 10Cu RTD, Thermocouple Type B, E, J, K, N, R, S, T, XK/XK (L) Configuration via internal bus
Input Signal Range	0…500 Ω -40…100 mV TC RTD
Settling Time	8 ms to 99% of final value (mV mode, °F thermocouple)
Open RTD Detection	Out of range upscale reading
Lead Resistance Compensation	<15 Ω total
Transfer Characteristics, Accuracy	RTDs: 0.1% of span @ 20 °C, filter cutoff < 1 Hz Thermocouples: 0.1% of span @ 20 °C, filter cutoff < 1 Hz
Transfer Characteristics, Temperature Drift	Cold junction compensation = +1 °C 150ppm/ °C (primary range)
Data Organization	Overrange Alarm - Individually for each channel Lead Breakage Alarm - Individually for each channel Fault State - Individually for each channel (includes overrange, lead breakage and short circuit) Sensor Mode RTD 2, 3, or 4-wire - Common to groups of 4 channels (ch 0-3, ch 4-7) TC Sensor Type (e.g. TC, Type B, E, J..., RTD or mV) - Common to groups of 4 channels (ch 0-3, ch 4-7) Internal Reference Junction (TC mode) - Common to all channels (0 °C, 20 °C, 25 °C, 30 °C, 40 °C, 50 °C, 60 °C, 70 °C selectable
Noxious Gas Exposure	Tested to severity level G3, ISA-S71.04-1985
FLEX Ex Power Consumption (W) at 24V	1.6
Power Dissipation	1.6 W
Thermal Dissipation, Max.	5.46 BTU/hr
Dimensions (HxWxD), Metric	46 x 94 x 75 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.95 in
Weight, Metric	0.2 kg
Intrinsically Safe Input Characteristics	16 pin male and female FlexBus connector: Ui ≤ 5.8V dc Ii ≤ 400 mA Li = Negligible Ci ≤ 1.35 µF

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FLEX Ex I/O Analog Output Modules

1797-OE8 and -OE8H (HART) 8 pt 13 Bit Single-Ended Non-Isolated Analog 4 Output Module

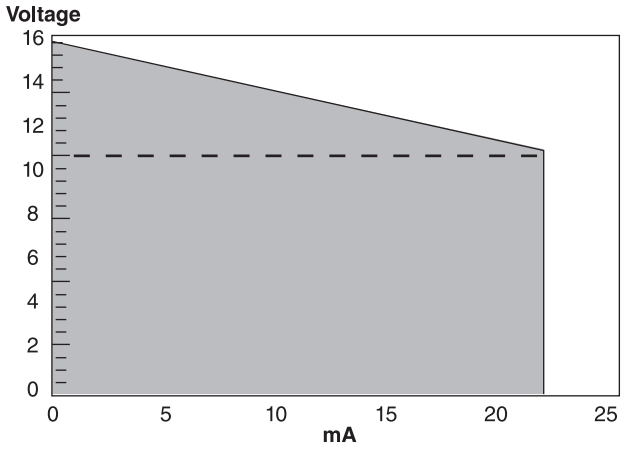
- Eight dual-ended output channels referenced over sense resistors to a single common
- Functional data:
  normal output
  current = 4...20 mA, full current
  range = 0...22 mA to allow for over- and under-range indication
- Output wire-off detection, LED (per channel) blinking red for fault, threshold < 2 mA
- Output wire-off detection on per channel basis via module data bits
- All channels updated to the backplane every ≤ 4 ms
- Resolution: 13 bits
- Accuracy: 0.1%
- One power supply loop for one module
- Output fault state programmable
- The 1797-OE8 can be used in digital mode for low energy digital field devices.
- The 1797-OE8H is similar to the 1797-OE8 with real time data table updates. It also supports pass-through of HART commands as unscheduled ControlNet messages. It is compatible with FDT software packages.



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	1797-OE8	1797-OE8H
Output Resolution	13 bits	13 bits
Transfer Characteristics, Accuracy	0.1% of output signal at 20 °C (68 °F)	0.1% of output signal at 20 °C (68 °F)
Transfer Characteristics, Temperature Drift	0.010%/C of output signal range	0.010%/C of output signal range
Output Load Range	0…500 Ω @ 22 mA >11V @ 22 mA	0…500 Ω @ 22 mA >11V @ 22 mA
Step Response to 99% of Full Scale	4 ms	4 ms
Intrinsically Safe Output Type	EEx ia IIB/IIC T4, (CENELEC) AEx ia IIC T4 (US), Class I, II, III Division 1 Groups A…G T4 (Canada) Class I, Zone 0, Groups IIC, IIB, IIA Class I, Division 1, Groups A, B, C, D Class II, Division 1, Groups E, F, G Class III, Division 1	EEx ia IIB/IIC T4
Intrinsically Safe Output Characteristics	Ch 0…7 Terminals: 0…1; 4…5; 8…9; 12…13; 17…18; 21…22; 25…26; 29…30 Uo ≤ 21V Io ≤ 100 mA Po ≤ 520 mW	Ch 0…7 Terminals: 0…1; 4…5; 8…9; 12…13; 17…18; 21…22; 25…26; 29…30 Uo ≤ 21.6V Io ≤ 92 mA Po ≤ 500 mW
Noxious Gas Exposure	Tested to severity level G3, ISA-S71.04-1985	Tested to severity level G3, ISA-S71.04-1985
FLEX Ex Power Consumption (W) at 24V	6.3	6.1
Power Dissipation	5.4 W	6.1 W
Dimensions (HxWxD), Metric	46 x 94 x 75 mm	46 x 94 x 75 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.95 in	1.8 x 3.7 x 2.95 in
Weight, Metric	0.2 kg	0.2 kg
Thermal Dissipation, Max.	18.4 BTU/hr	20.8 BTU/hr

1797-OE8 and -OE8H Output Voltage/Current Capability



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Counter I/O Module

Ideal for applications requiring rotational control, the FLEX Ex counter is essentially a tachometer with the capability of reporting frequency, acceleration, and direction. Outputs are activated by alarms. Input devices range from magnetic pickup to flowmeters, to incremental encoders to proximity detectors.

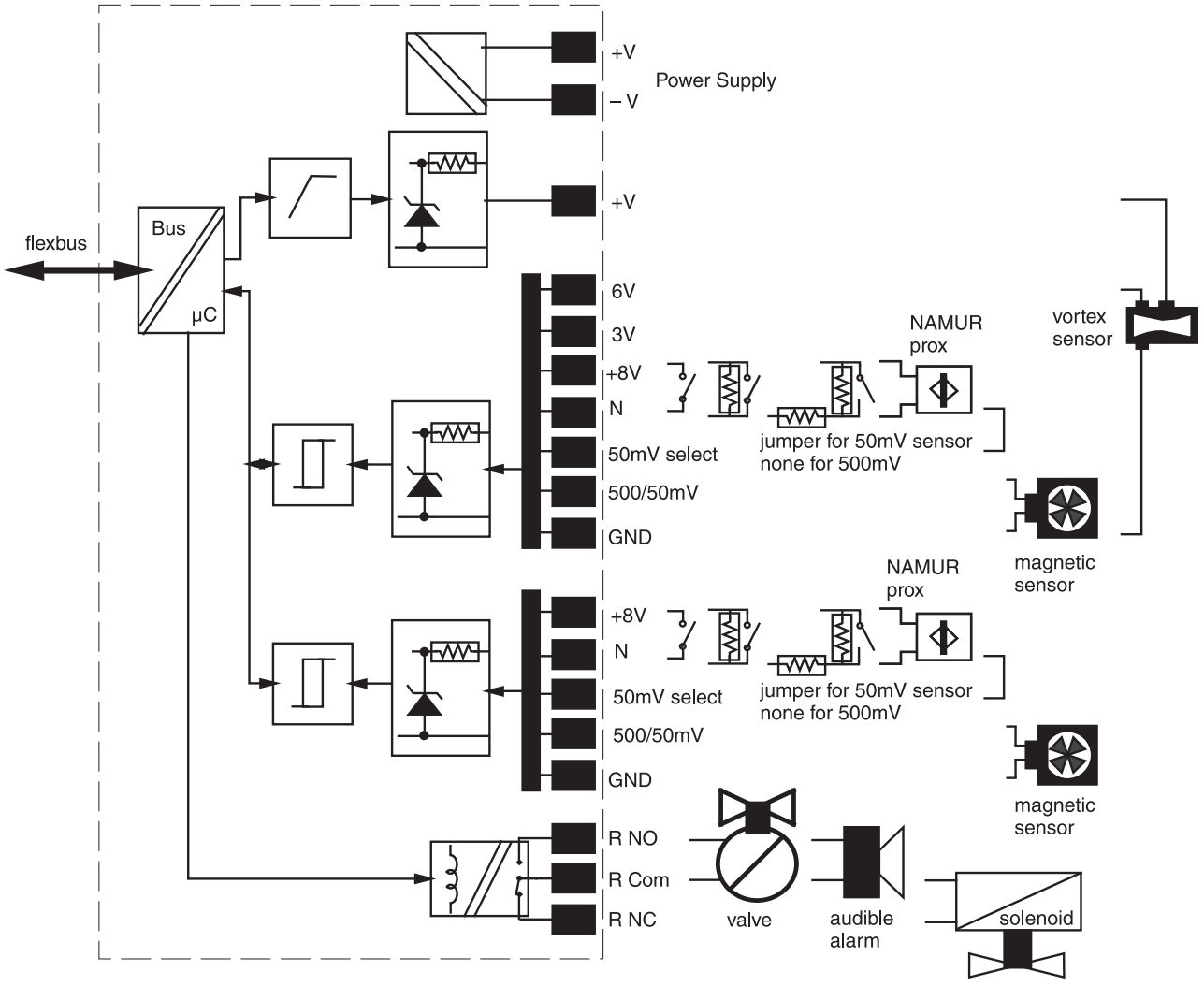
This intelligent I/O module is designed to perform high-speed frequency algorithms. The module provides two frequency inputs, two gate inputs, and two outputs. The frequency inputs are capable of accepting frequencies up to 32 KHz. The module accepts and returns binary data.

The counter measures frequency over a user-specified time interval. A frequency calculation can start **before** the time interval clock is synchronized with the frequency input to count over a user-selected sampling time or a user-defined number of frequency input pulses. All power for input devices (24V dc) is supplied by the module.

1797-IJ2 2 Input Frequency Counter Module

- Software configurable frequency operating mode, with independent selections per frequency input
- Frequency inputs, two gate inputs, and two outputs
- Functional data: four selectable ranges: 50 mV; 500 mV (magnetic pickup); flowmeter; and NAMUR
- Provides IS power to drive up to two NAMUR and two flowmeter frequency inputs and/or contact switches and NAMUR gate inputs
- NAMUR lead breakage indication for any lead, signal to the backplane and LED (per channel) blinking red for fault
- NAMUR lead breakage defeat on per channel basis via module data table (NAMUR inputs only)
- Frequency count range up to 32 kHz
- Calculate frequency on time interval or input count
- Programmable scaling
- Acceleration value calculated
- Maximum frequency or acceleration alarms
- All channels updated to the backplane every ≤4 ms (according to sampling time)

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	1797-IJ2
Number of Inputs	2
Flowmeter Input Signal Threshold	3V or 6V selectable
Flowmeter Input Voltage Available	> 15V @ 20 mA
Magnetic Pickup Input Signal	50 mV or 500 mV, selectable
Processing Time	≤ 4 ms
Input Frequency Range	1.0…32,767 Hz
Frequency Resolution, Min.	Sampling Time - Accuracy 2 ms - 0.043% 4 ms - 0.033% 5 ms - 0.031% 10 ms - 0.027% 20 ms - 0.025% 50 ms - 0.023% 100 ms - 0.023% 200 ms - 0.023% 500 ms - 0.023% 1000 ms - 0.023%
Frequency Input, Characteristics	Magnetic pickup: 50 mV, 500 mV NAMUR: 8V, 8 mA Flowmeter: low ≥ 3V, high ≤ 6V
Impedance, Frequency Input	> 5 kΩ magnetic pickup > 10 kΩ flowmeter
Intrinsically Safe Input Type	EEx ia IIB/IIC T4, AEx ia IIC T4, Class I, II, III Division 1 Groups A…G T4
Intrinsically Safe Input Characteristics	DIN19234 (NAMUR)
Number of Outputs	2
Noxious Gas Exposure	Tested to severity level G3, ISA-S71.04-1985
FLEX Ex Power Consumption (W) at 24V	4.25
Power Dissipation	4.25 W
Dimensions (HxWxD), Metric	46 x 94 x 75 mm
Dimensions (HxWxD), Imperial	1.8 x 3.7 x 2.95 in
Weight, Metric	0.2 kg
Thermal Dissipation, Max.	14.5 BTU/hr

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Step 3 - Select:

- *the appropriate terminal base unit for your module and system*

Selecting a Terminal Base Unit

Each FLEX Ex I/O module requires a FLEX Ex terminal base unit that snaps onto the DIN Rail to the right of the I/O adapter. The terminal bases provide terminal connection points for I/O wiring and plug together to form the backplane. They are available with screw and spring terminations.

Cat. No.	Number of Terminals	Wire Size	Dimensions (HxWxD), Metric	Dimensions (HxWxD), Imperial	Weight, Metric	Terminal Base Screw Torque, Imperial
1797-TB3	1 row of 16 2 rows of 18	22…12 AWG (0.34 mm²…2.5 mm²) stranded copper wire rated at 75 °C or higher 1.2 mm (3/64 in) insulation max.	94 x 94 x 69 mm	3.7 x 3.7 x 2.7 in✶	0.2 kg	7…9 lb•in
1797-TB3S						—

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Step 4 - Select:

- *if power consumption exceeds the maximum for a single power supply, install additional power supplies*

Selecting a Power Supply

The power supply is an essential component in the operation of an intrinsically safe system. It must isolate the unsafe incoming power from the control system and limit the available energy to IS-safe levels.

FLEX Ex power supplies provide power for the FLEX Ex ControlNet network, communication adapter, I/O modules, fiber hub, and IS field devices. No other power sources are needed to operate any components attached to the FLEX Ex system in the hazardous area. Power for valves, actuators, or transmitters come from the FLEX Ex modules.

No other power sources are needed to operate any components attached to the FLEX Ex system in the hazardous area. Power for valves, actuators, and transmitters come from the FLEX Ex modules.

There are two types of enclosures: (N-Type) explosion-proof with 1 in. conduit pipe thread input/output terminations that are certified in North America and (E-Type) flame-proof with increased safety input/output terminations that are certified to European standards. Each type is available in 24V dc or 85...253V ac for supply sources.

Common features include:

- four channels, 8.5W output each channel
- dual power feeds for source input redundancy
- outputs are IS galvanically isolated from the source
- all channels are independently IS limited

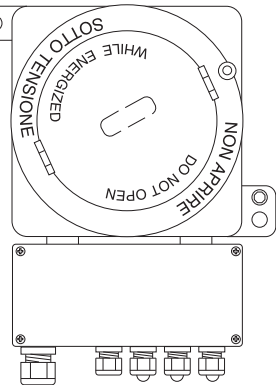
Cat. No.	Description	Input Voltage, Max.	Power Supply Output Power (W)	Dimensions (HxWxD), Metric/Imperial	Weight, Metric/Imperial
1797-PS1N	FLEX Ex 85-250V AC In/Quad-Ex DC Out Power Supply	250V ac	34 W✶	174 x 174 x 128 mm 6.9 x 6.9 x 5.04 in	7.3 kg 16 lb
1797-PS1E	FLEX Ex 85-253V AC In/Quad-Ex DC Out Power Supply	253V ac	34 W✶	174 x 174 x 280 mm 6.9 x 6.9 x 11.0 in	7.7 kg 17 lb
1797-PS2N2	FLEX Ex Power Supply in explosion proof enclosure	40V dc	34 W✶	174 x 174 x 128 mm 6.9 x 6.9 x 5.04 in	7.3 kg 16 lb
1797-PS2E2	FLEX Ex Power Supply in explosion proof enclosure	40V dc	34 W✶	174 x 174 x 280 mm 6.9 x 6.9 x 11.0 in	7.7 kg 17 lb

✶8.5 W at each of 4 outputs.

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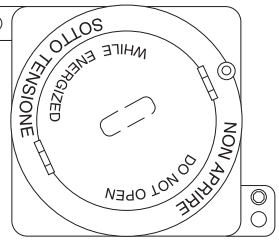
E Type Power Supply

1797-PS1E
or
PS2E



N Type Power Supply

1797-PSIN
or
PS2N2



Understanding System Planning

Part of system planning is determining what modules are needed for the application, how many power supplies are needed, how to best partition the system, and where to locate the system cabinets.

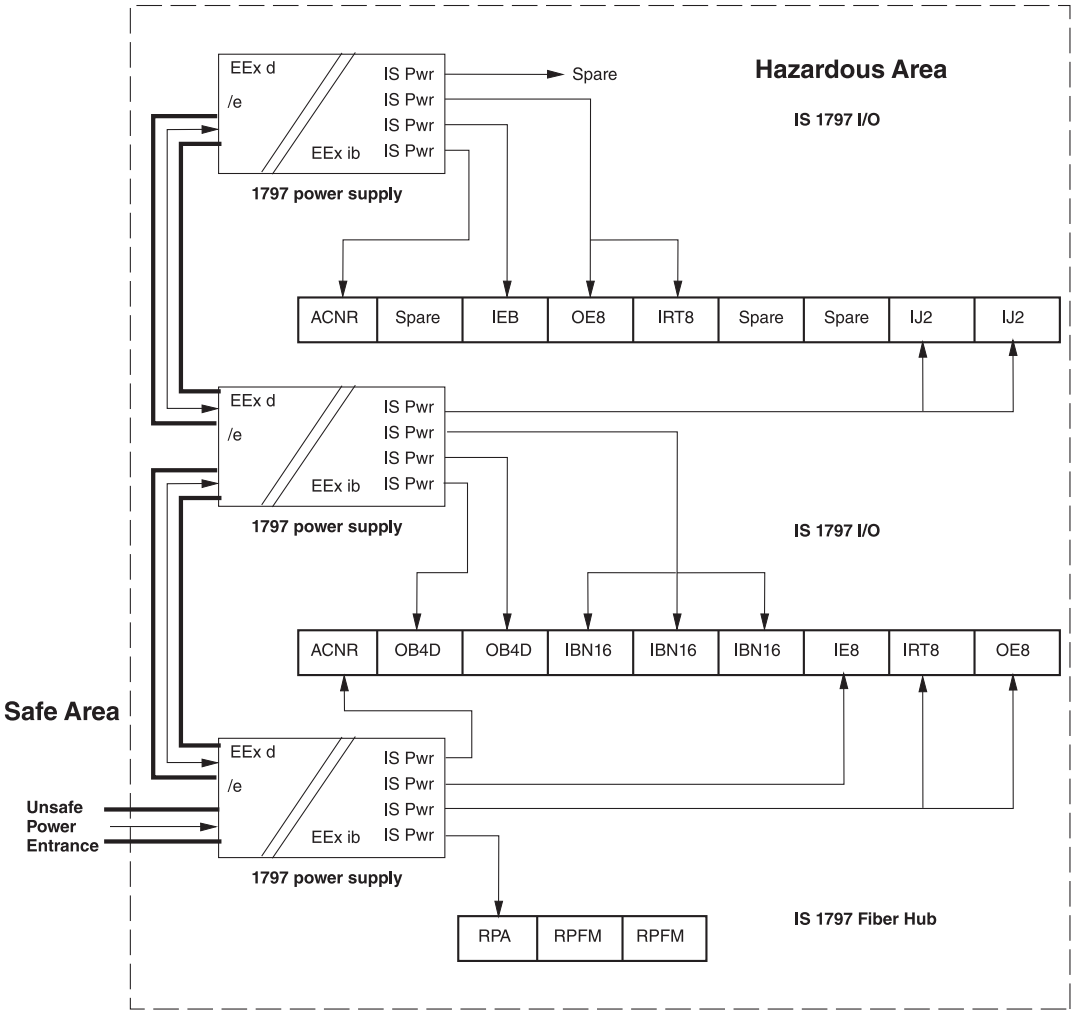
A key task in the development cycle is determining the number of power supply outputs (thus power supplies) you will need.

Each power supply has four independent IS power outputs capable of 8.5W each. In this example, we required eleven IS power outputs so three power supplies were sufficient.

Modules	Requires
Fiber Hub	8.5W
Two ControlNet Adapters	8.5W each
Two Analog Inputs	7.5W each
Two Analog Outputs	6.3W each
Two Thermocouple Inputs	1.6W each
Two Digital Outputs	7.5W each
Three NAMUR Digital Inputs	2.8W each
Two Counter Inputs	4.25W each

The total number of power supplies needed depends on the modules used and the total system configuration. The following illustration shows how this example may be configured.

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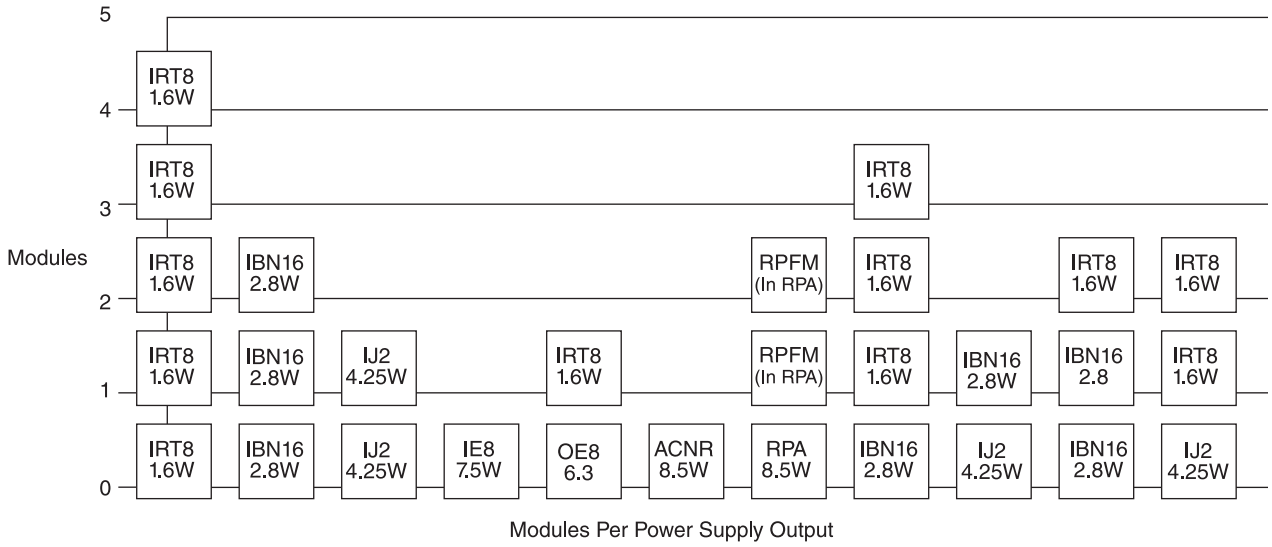


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Assigning Power Supplies

Note the amount of power each module requires and assign it to a power supply output. Continue to assign modules to the power supply output until the supply's output power rating is consumed.

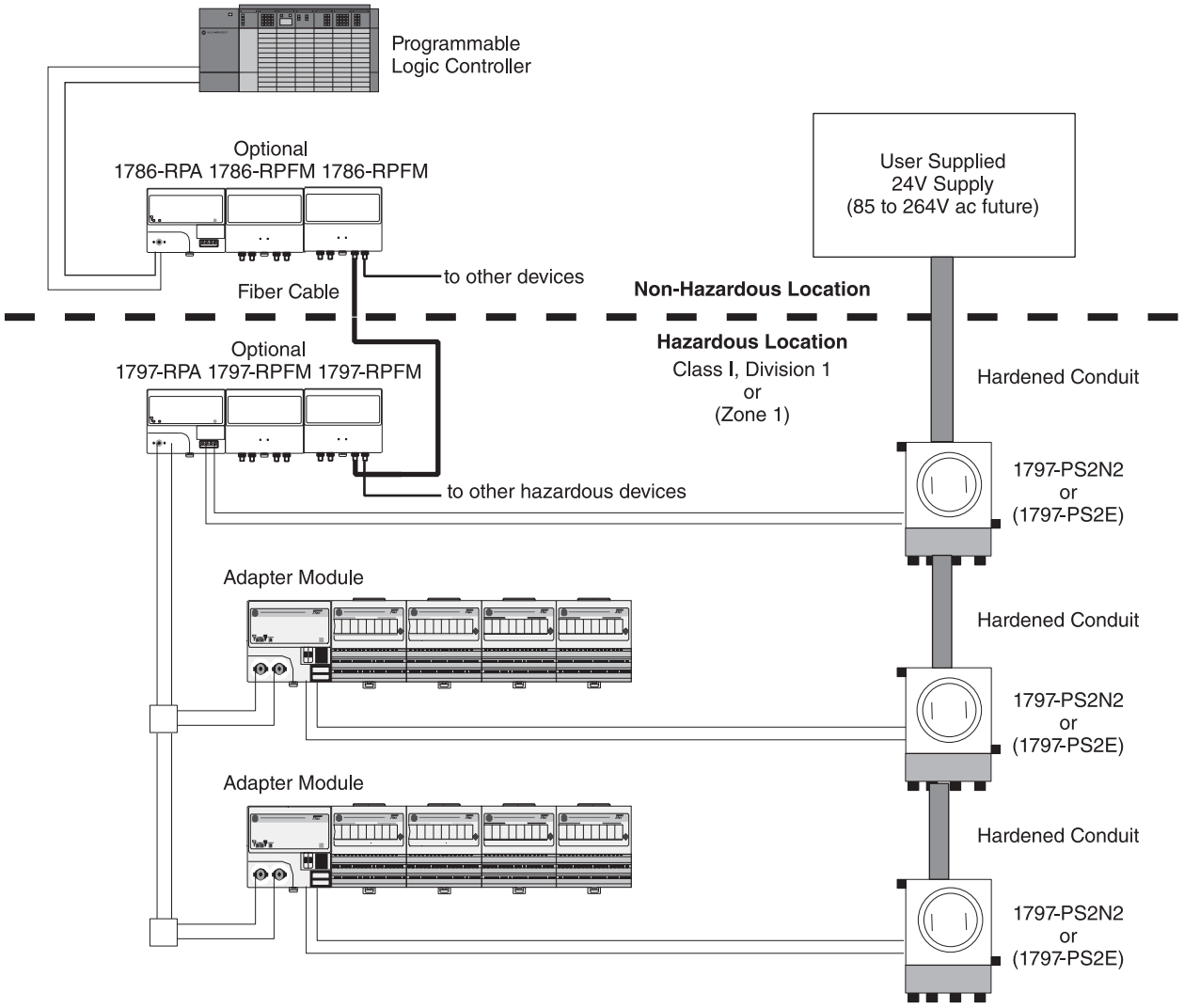
Each power supply output in the FLEX Ex system is rated for 8.5W. Modules can be attached to the output until their combined power equals that number. Do not exceed the power supply maximum of 8.5W.



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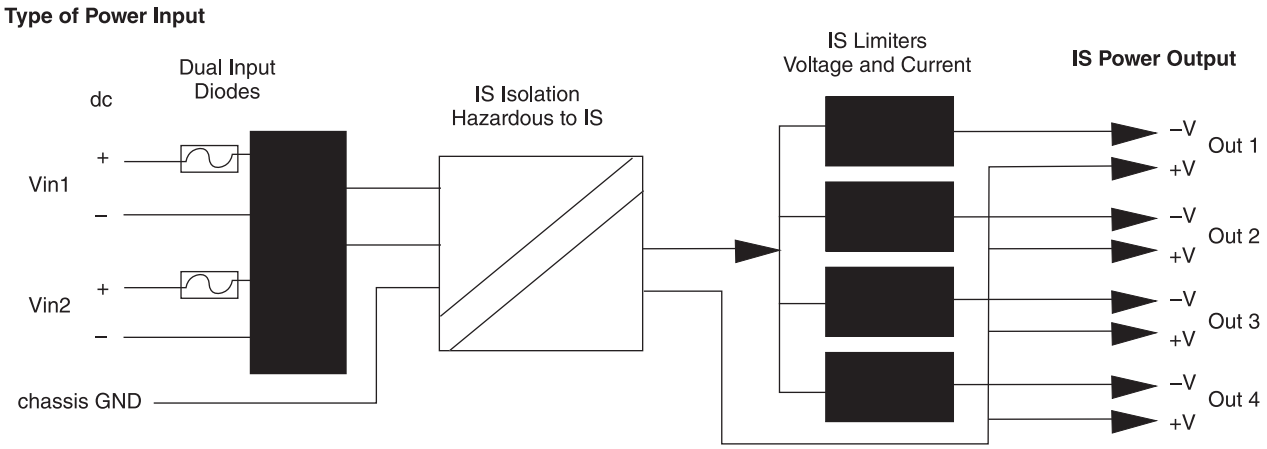
Hazardous Area Installation

The following illustration provides an example of how power supplies are arranged within the FLEX Ex system when using fiber hubs.

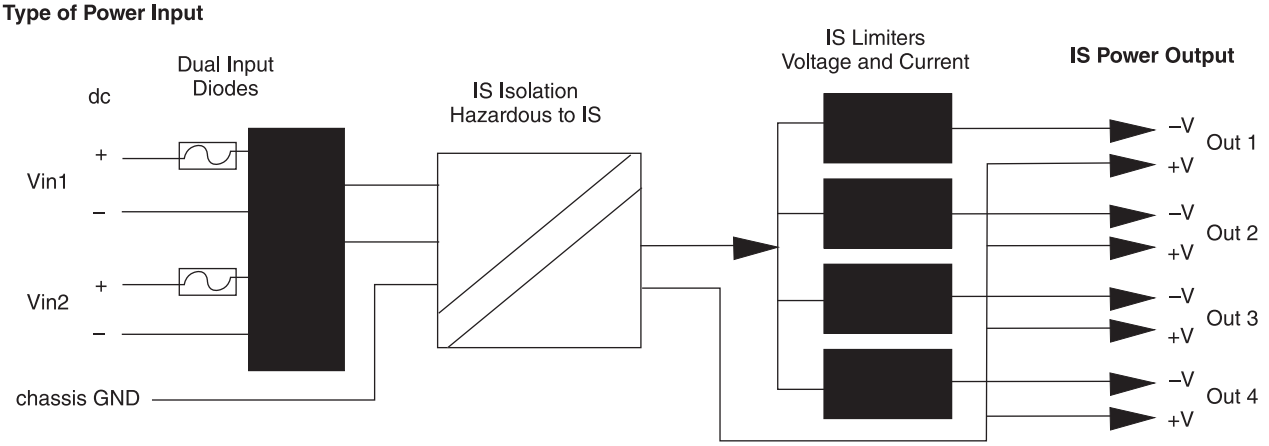


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1797-PS1N and -PS1E 24V DC In/Quad-Ex DC Out Power Supplies



1797-PS2N2 and -PS2E2 24V DC In/Quad-Ex DC Out Power Supplies



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	1797-PS1N	1797-PS1E	1797-PS2N2	1797-PS2E2
Intrinsically Safe Module Type	Class I, Division 1, Groups A…D T4 (UL and C-UL) Class II, Division 1 Groups E…G (UL and C-UL) Class III (UL and C-UL)	EEx de [ib] IIC T4	Class I Division 1 Groups A…D T4 (UL, C-UL and FM) Class II Division 1 Groups E…G (UL, C-UL) Class III	Zone 1: II 2G EEx de [ib] IIC T4 (DMT 02 ATEX E253 X) Zone 22: II 3D IP54 T90C
Intrinsically Safe Output Type	Class I, II, III, Division 1 & 2, Groups A…G (UL and C-UL)	EEx ib IIC	Class I, II, III Division 1 & 2 Groups A…G (UL, C-UL, and FM)	EEx ib IIC
Input Connector Terminals	Terminals 1, 2, 4, 5	Terminals 1, 2, 4, 5 (earth symbol)	Terminals 1, 2, 4, 5	Terminals 1, 2, 4, 5
Operating Voltage Range	85…250V ac 120…250V dc	85…253V ac	19…32V dc	18…32V dc
Current Consumption	0.35…0.9 A	0.9 A	3.1 A	1.3…1.6 A
Ripple	—	—	5% ac	5% ac
Input Power Entry	1 in NPT, ≤ 6 in conduit allowed between power supply and seal (UL and C-UL)	Increased safety	1 in NPT, 6 in conduit allowed between power supply and seal (UL and C-UL) 1 in NPT, 0 in conduit allowed between power supply and seal (FM)	Increased safety
Output Connector Terminals	Terminals 10…17	Terminals 10…17	Terminals 10…17	Terminals 10…17
Power Supply Output Power (W)	34 W✶	34 W✶	34 W✶	34 W✶
Input Voltage, Max.	250V ac	253V ac	40V dc	40V dc
Voltage U_O	≤ 9.5V	≤ 9.5V	≤ 9.5V	≤ 9.5V
Current I_O	≤ 1 A	≤ 1 A	≤ 1 A	≤1 A
C_O (IIC)	≤ 500 nF	≤ 500 nF	≤ 500 nF	≤ 500 nF
L_O (IIC)	≤ 8 µH	≤ 8 µH	≤ 8 µH	≤ 8 µH
Output Cable Resistance, Max.	≤ 0.1 Ω (both directions)	≤ 0.1 Ω (both directions)	≤ 0.1 Ω (both directions)	≤ 0.1 Ω
Power Supply Input Power	55 W	55 W	55 W	55 W
Power Dissipation	21 W	21 W	21 W	21 W
Thermal Dissipation, Max.	71.67 BTU/hr	71.67 BTU/hr	71.67 BTU/hr	71.67 BTU/hr
Dimensions (HxWxD), Metric	174 x 174 x 128 mm	174 x 174 x 280 mm	174 x 174 x 128 mm	174 x 174 x 280 mm
Dimensions (HxWxD), Imperial	6.9 x 6.9 x 5.04 in	6.9 x 6.9 x 11.0 in	6.9 x 6.9 x 5.04 in	6.9 x 6.9 x 11.0 in
Weight, Metric	7.3 kg	7.7 kg	7.3 kg	7.7 kg
Protections Class	IP 66/NEMA 7B	IP 65/NEMA 7B	IP 66/NEMA 7B	IP 65/NEMA 7B

✶8.5 W at each of 4 outputs.

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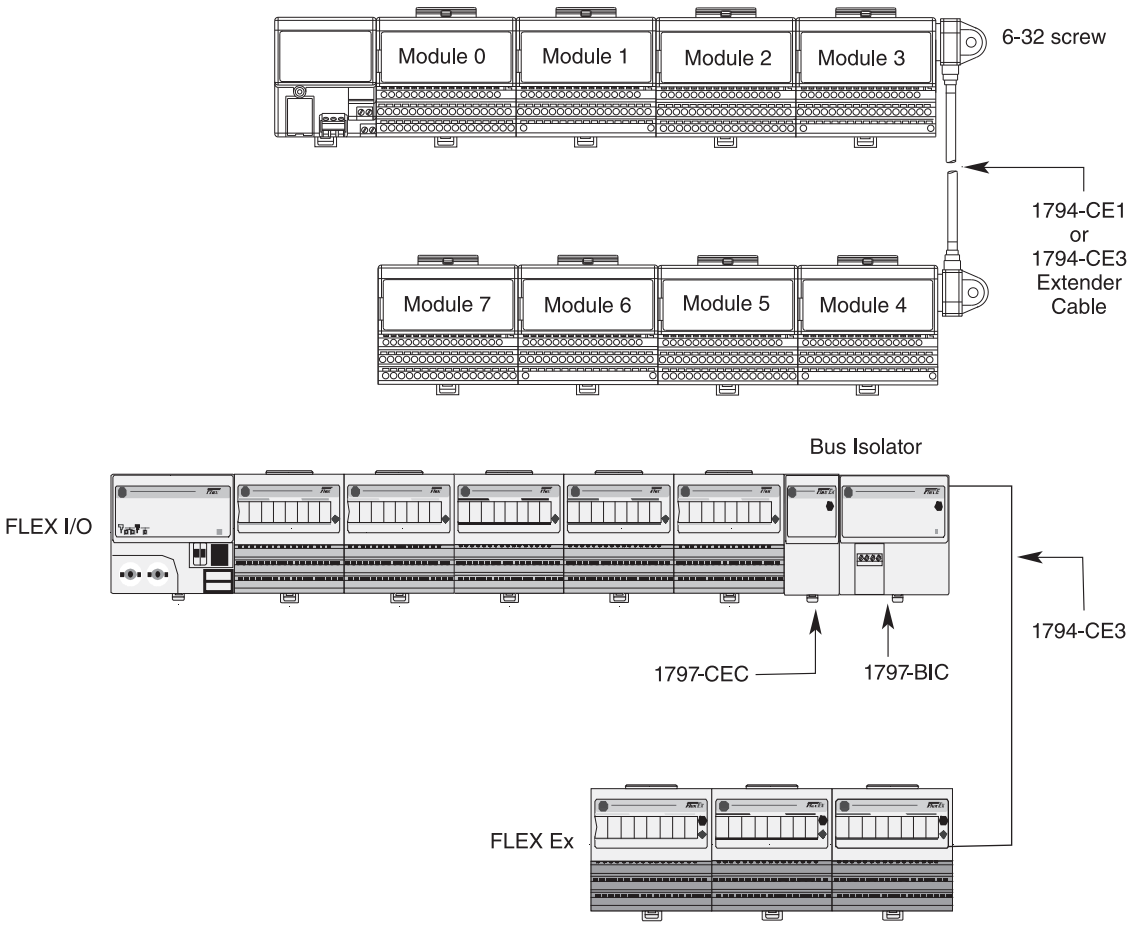
Step 5 - Select:

- *optional FLEX Ex accessories*

Selecting FLEX Ex Accessories

1794-CE1 and -CE3 Extender Cables

Use the optional 1794-CE1 (0.3m, 1ft) or 1794-CE3 (0.9m, 3ft) extender cable (one per system) to arrange your system in two rows or split your system into horizontal and vertical orientation. The cable can be used between any module or adapter.

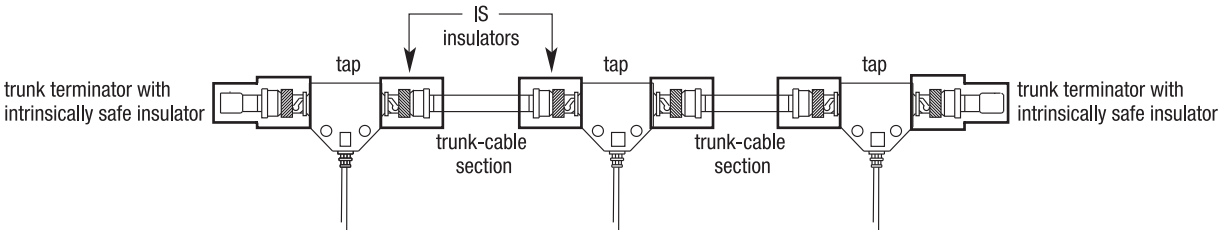


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1797-BOOT ControlNet BNC Boot

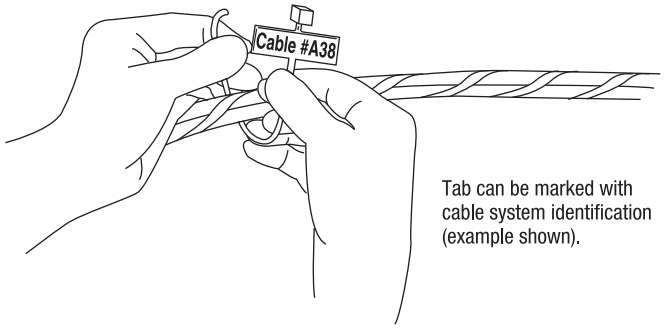
Use the ControlNet BNC boot, trunk isolator, and marking kit in your cable connections.

The 1797-BOOT covers the BNC connector on the ControlNet Ex trunk cable. The kit contains 50 pieces.



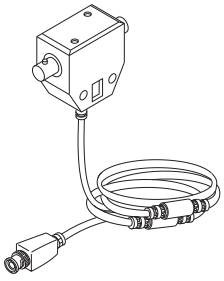
1797-INS Trunk Insulator and 1797-EXMK Marking Kit

The 1797-INS is a bag of 50 assorted insulators that you can use to replace those shipped with the product. The 1797-EXMK is a marking kit for FLEX Ex cable, containing 100 pieces.



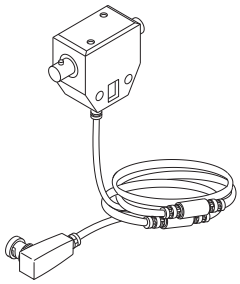
ControlNet Ex Taps

1797-TPS ControlNet Ex Straight T-Tap

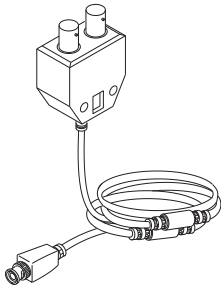


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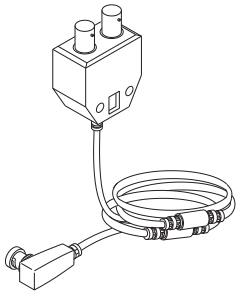
1797-TPR ControlNet Ex Right-Angle T-Tap



1797-TPYS ControlNet Ex Straight Y-Tap

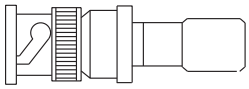


1797-TPYR ControlNet Ex Right-Angle Y-Tap



1797-XT ControlNet Ex 75Ω Terminator

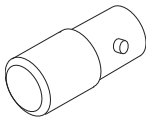
The terminator is sold in lots of 50.



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1797-TCAP ControlNet Tap Terminator

This kit contains five pieces.



1786-RG6 Coax Trunk Cable

The 1786-RG6 Coas Trunk Cable can be used in Flex Ex applications in hazardous areas.

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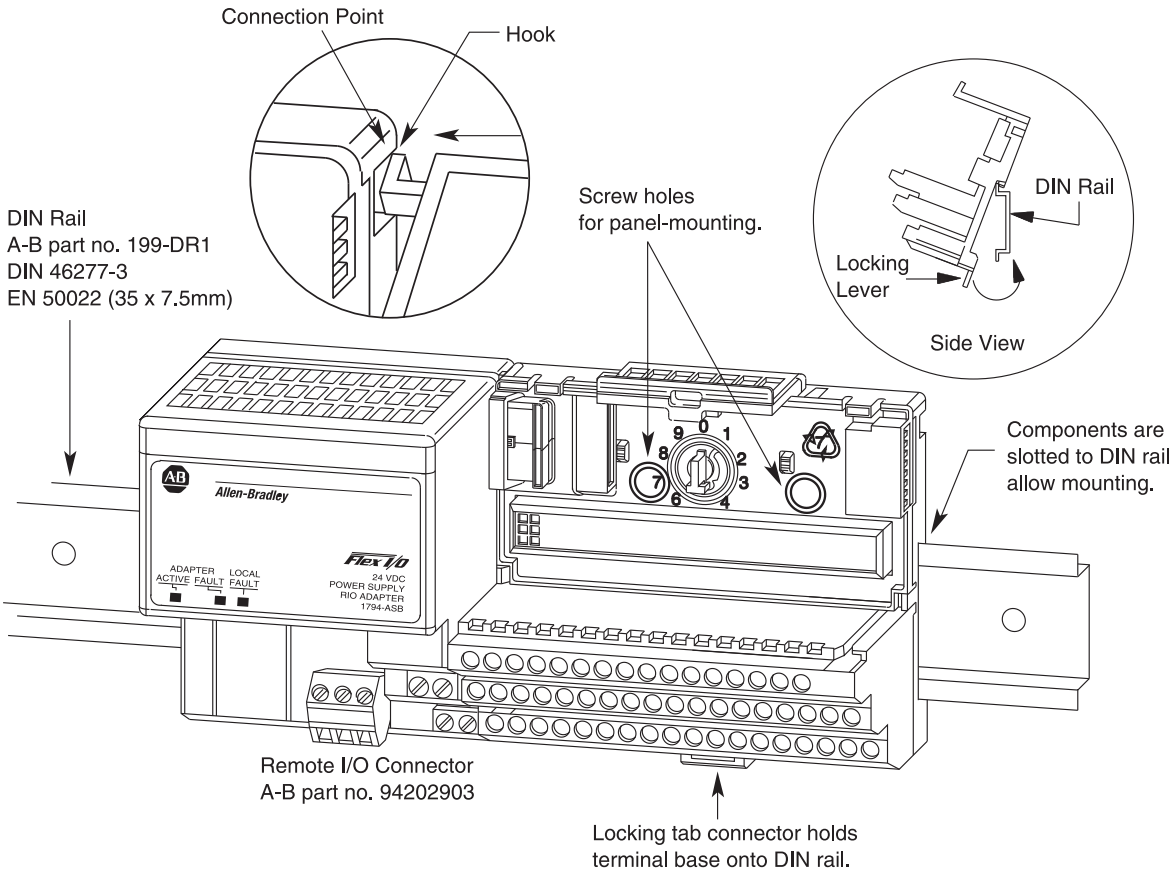
Step 6 - Select:

- *panel mount or DIN Rail mount*
- *appropriate number of panels or DIN Rails based on the number of modules and the physical requirements*
- *one end cap per controller system*

Mounting the FLEX Ex System

You can horizontally or vertically mount the FLEX Ex system on a standard 35 mm DIN Rail. The adapter and terminal base easily snap on the DIN Rail by hand. Use a flat-blade screwdriver to remove components from the DIN Rail.

Screw holes allow you to horizontally or vertically panel-mount your system in an enclosure. An example of a FLEX Ex DIN-Rail mounted system is shown in 30239.



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When properly installed, FLEX Ex is grounded through the DIN Rail to chassis ground. Use zinc-plated, yellow-chromated steel DIN Rail to assure proper grounding. Using other DIN Rail materials (e.g. aluminum, plastic, etc.) which can corrode, oxidize, or are poor conductors can result in improper or intermittent platform grounding.

If installing FLEX Ex on non-recommended DIN Rail materials, use the mounting holes provided in each terminal base or a 1794-NM1 mounting kit with approved mounting bracket. Use mounting screws with star washers to provide the FLEX Ex platform with a chassis ground connection that is not likely to be affected by shock, vibration, or oxidation over time.

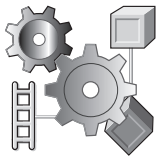
The hook (on the terminal base) and adjacent connection point (on the communication adapter) keep the terminal bases tight together. These components are capable of maintaining a reliable connection in case of shock and/or vibration. Refer to the environmental conditions information in each module's specifications.

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Step 7 - Select:

• *the ControlNet Ex network*



Selecting Software

Your selection of modules and network configuration determines what software packages you need to configure and program your system.

If you have a:	Use this network:	You need:	Order this catalog number:
1797-ACNR15	ControlNet Ex	RSNetWorx for ControlNet RSLinx RSLogix 5000	9357-CNETL3 9355-WAB100ENE 9324-RL5300ENE
1797-BIC and -CEC	EtherNet/IP	RSNetWorx for EtherNet/IP RSLinx RSLogix 5000	9357-ENETL3 individually 9357-ANETL3 combined 9355-WAB100ENE 9324-RLD300ENE✶
	DeviceNet	RSNetWorx for DeviceNet RSLinx RSLogix 5000	9357-DNETL3 9355-WAB100ENE 9324-RLD300ENE✶
	Remote I/O	RSLinx RSLogix 5000	9355-WAB100ENE 9324-RLD300ENE✶

✶Order RSLogix 5000 bundled with RSNetWorx and RSLinx with catalog number 9324-RLD300NXENE.

RSLogix 5000 Programming Software

RSLogix 5000 Enterprise series software is designed to work with Rockwell Automation's Logix platforms and the Logix5000 family of controllers. RSLogix 5000 Enterprise series software is an IEC 61131-3 compliant software package that offers relay ladder, structured text, function block diagram, and sequential function chart editors for you to develop application programs. RSLogix 5000 Enterprise series software also includes axis configuration and programming support for motion control.

RSLogix 5000 Software Requirements

Description	Value
Personal Computer	Pentium II 450 MHz minimum 733 MHz recommended
Software Requirements	Microsoft Windows NT version 4.0 with Service Pack 6A or greater Microsoft Windows 2000 with Service Pack 1 recommended
RAM	128 Mbytes of RAM minimum 256 Mbytes of RAM recommended
Hard Disk Space	100 Mbytes of free hard disk space (or more based on application requirements)
Video Requirements	256-color VGA graphics adapter 800 x 600 minimum resolution (1024 x 768 recommended)

Network Configuration Software

RSNetWorx software for ControlNet (9357-CNETxx) is the configuration tool for your ControlNet Ex networks. RSNetWorx software lets you create a graphical representation of your network configuration and configure the parameters that define your network.

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Each network scanner has its own scan list and memory mapping. This information is stored in the configuration files in the scanner. When changes are made to the scan lists, RSNetWorx software automatically calculates network bandwidth for the entire network, as well as the bandwidth used by each network component.

RSNetWorx Software Requirements

Description	Value
Personal Computer	IBM compatible 120 MHz minimum Pentium recommended
Software Requirements	Microsoft Windows 98 or Windows NT version 6.0 or greater, or Microsoft Windows 2000 with Service Pack 1 or greater
RAM	32 Mbytes of RAM minimum 48 Mbytes of RAM recommended
Hard Disk Space	65 ... 460 Mbytes of free hard disk space (or more based on application requirements)
Video Requirements	16-color VGA graphics adapter 640 x 480 or greater resolution (256-color 800 x 600 minimum for optimal resolution)

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Summary

As you select devices for your FLEX Ex system, keep in mind:

✓	Step	Remember to Select
	1 Select a communication adapter and fiber hub Choose the adapter and optional fiber hub to extend the length of the ControlNet Ex segments.	• the appropriate communication network and related adapter
	2 Select devices for an intermixed system Choose the proper devices to create an intermixed system using the same communication adapter.	• the appropriate devices to create a system with 1794 and 1797 I/O modules
	3 Select I/O devices based on field devices • location of the device • number of points needed • appropriate catalog number • number of points available per module • number of modules	• I/O modules
	4 Select a terminal base Choose an appropriate terminal base for your modules.	• the appropriate terminal base unit(s) for your modules
	5 Select power supplies and ensure sufficient power for the communication adapter and modules If power consumption exceeds the maximum for a single power supply, install additional power supplies.	• additional power supplies as necessary
	6 Select optional accessories Choose appropriate accessories to enhance your system.	• optional accessories as necessary
	7 Determine mounting requirements Determine whether to panel mount or DIN Rail mount the FLEX Ex system.	• panel mount or DIN Rail mount • appropriate number of panels or DIN Rail based on the number of modules and the physical locations of those modules
	8 Select software Based on the system design, determine the software products you need to configure and program your application.	• software necessary to configure and program your I/O modules

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Related Documenation

Additional user documentation presents information according to the tasks you perform and the programming environment you use. Refer to the table below for information on 1794 FLEX I/O publications.

FLEX Ex Related Publications✶

	Cat. No.	Description	Pub.No.
FLEX Ex System	1797 Series	FLEX Ex System Certification Reference Manual	1797-6.5.6
Communication	1797-ACNR15	Dual Media ControlNet Ex 1.5 Adapter	1797-5.14
	1797-RPA	ControlNet Ex Coax Drop Repeater Module	1797-5.15
	1797-RPFM	ControlNet Ex 3 km Fiber Media Port Adapter	
Intermixed	1797-BIC	Bus Isolator Module	1797-5.13
	1797-CEC	Flexbus Connector Module	
	1797-BCNR	Redundant ControlNet Barrier Module	1797-5.35
Bases	1797-TB3	3-Tier Screw Clamp Terminal Base Unit	1797-5.1
	1797-TB3S	3-Tier Spring-Clamp Terminal Base Unit	
Digital	1797-IBN16	16 pt Non-Isolated NAMUR Input Module	1797-5.7
	1797-OB4D	24V dc 4 pt Non-Isolated Source Output Module	1797-5.6
Analog	1797-IE8	8 pt 16 bit Single-Ended Non-Isolated Analog Input Module	1797-5.5 1797-6.5.1
	1797-IE8H	8 pt 16 bit Single-Ended Non-Isolated Analog Input Module with HART capability	
	1797-IE8NF	8 pt 16 bit Single-Ended Non-Isolated Analog Input Module with Noise Filter	
	1797-IRT8	8 pt 16 bit Non-Isolated RTD Thermocouple/mV Input Module	1797-5.4
	1797-OE8	8 pt 13 bit Single-Ended Non-Isolated Analog Output Module	1797-5.3 1797-6.5.1
	1797-OE8H	8 pt 16 bit Single-Ended Non-Isolated Analog Input Module with HART capability	
Counter	1797-IJ2	2 Input Frequency Module	1797-5.9
Power Supplies	1797-PS1N	FLEX Ex 85-250V AC In/Quad-Ex DC Out Power Supply	1797-5.34
	1797-PS1E	FLEX Ex 85-253V AC In/Quad-Ex DC Out Power Supply	1797-5.33
	1797-PS2N2	FLEX Ex Power Supply in explosion proof enclosure	1797-5.12
	1797-PS2E2	FLEX Ex Power Supply in explosion proof enclosure	1797-5.8
Accessories	1797-CE1S	FLEX Ex Bus Isolator Extender Cable, 0.3 m (1 ft)	1797-5.20
	1797-CE3S	FLEX Ex Bus Isolator Extender Cable, 0.9 m (3 ft)	
	1797-EXMK	FLEX Ex Cable Marking Kit	1797-5.23
	1797-TCAP	ControlNet Tap Terminator	1797-5.30

✶Contact your local A-B distributor for information on ordering any of the above publications.
For electronic copies of these publications, go to http://www.ab.com/literature

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