Select 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:

Network Comparison by Application Requirement

Application Requirements	Network[1]	Communication Adapter
• 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 • Built-in switch, or high availability requirement (2-port AENTR)	EtherNet/IP	1794-AENT 1794-AENTR 1794-AENTRXT
• High-speed transfer of time-critical data between controllers and I/O devices • Deterministic and repeatable data delivery • Media redundancy	ControlNet	1794-ACN15 1794-ACN15K[2] 1794-ACNR15[3] 1794-ACNR15XT[4]
• 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 1794-ADNK
• Connections to Remote I/O networks	Remote I/O	1794-ASB 1794-ASB2
• Connection to PROFIBUS DP and DPV1 networks	PROFIBUS DP PROFIBUS DPV1	1794-APB 1794-APBDPV1

(1) 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 FLEX I/O platform.

(2) Modules that have the letter K in the last position of the catalog number, before the series designation, refer to conformal coated versions of the standard modules. These modules meet the following certifications: ANSI / ISA-S71.04-1985, Class G1, G2, and G3 environments; CEI IEC 6065A-4 Class 1 and 2 environments; UL 746E

(3) Modules that have the letter R in the catalog number, before the series designation, refer to redundancy versions of the standard modules and are meant for redundancy networks.

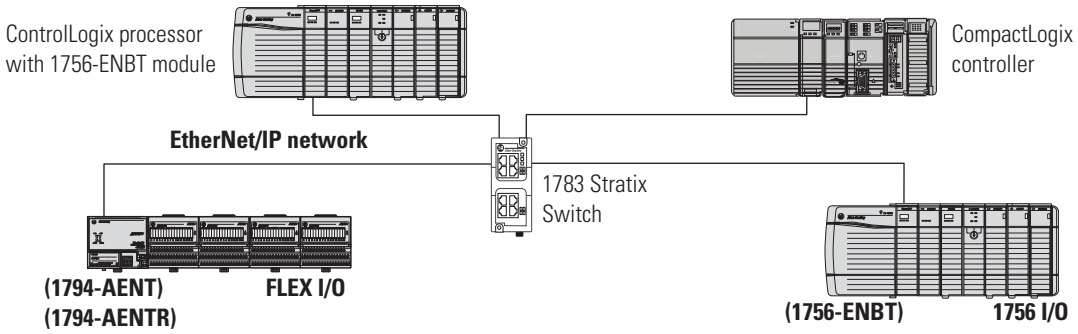
(4) Modules that have the letters XT in the catalog number, before the series designation, refer to extended temperatures version of the standard modules.

EtherNet/IP Network

EtherNet/IP is a network suitable for use in industrial environment and time-critical applications. EtherNet/IP uses standard Ethernet and TCP/IP technologies and an open application layer protocol called the Control and Information Protocol (CIP). CIP is also the application layer used in DeviceNet and ControlNet networks. The open Application Layer protocol makes interoperability and interchangeability of industrial automation and control devices on EtherNet/IP a reality for automation and control applications.

The 1794-AENT and 1794-AENTR connect FLEX I/O to Ethernet/IP enabled controllers such as ControlLogix or CompactLogix.

Figure 1 - EtherNet/IP Communication



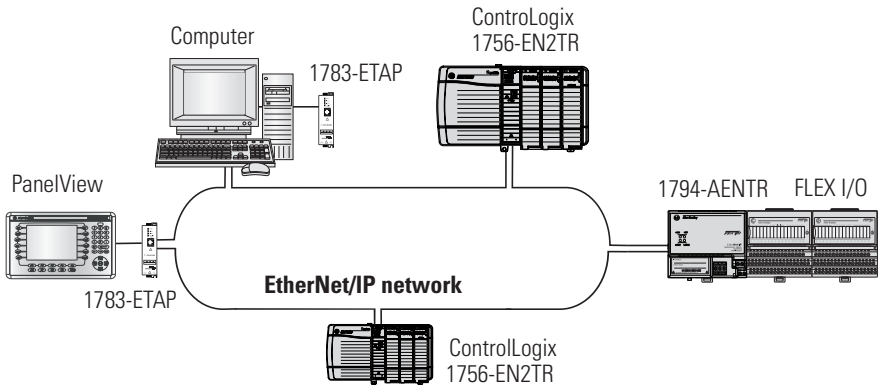
FLEX I/O EtherNet/IP Adapter Specifications

Attribute	1794-AENT	1794-AENTR	1794-AENTRXT
I/O module capacity	8		
Communication rate	10/100 Mbps		
Power consumption at 24V DC	9.6 W	9.3 W	
Power dissipation, max	7.3 W @ 19.2V DC	7.1 W @ 19.2V DC	6.1 W @ 19.2V DC
Thermal dissipation	24.9 BTU/hr @ 24V DC	24.2 BTU/hr @ 24V DC	20.8 BTU/hr @ 24V DC
Power supply 24V current load	450 mA	400 mA @ 24V DC 500 mA max	
Power supply input voltage, nom	24V DC		
Operating voltage range	19.2…31.2V DC (includes 5% AC ripple)		
Ethernet interface	1 – RJ-45 category 5	2 – RJ-45 category 5	
Dimensions (HxWxD), approx	87 x 94 x 69 mm 3.4 x 3.7 x 2.7 in.	87 x 94 x 92 mm 3.44 x 3.7 x 3.6 in.	

Device-Level Ring Topology

A DLR network is a single-fault tolerant ring network intended for the interconnection of automation devices. FLEX I/O modules can connect to a

DLR network using EtherNet/IP taps. The following is an illustration of how FLEX I/O systems can be integrated into a DLR topology.



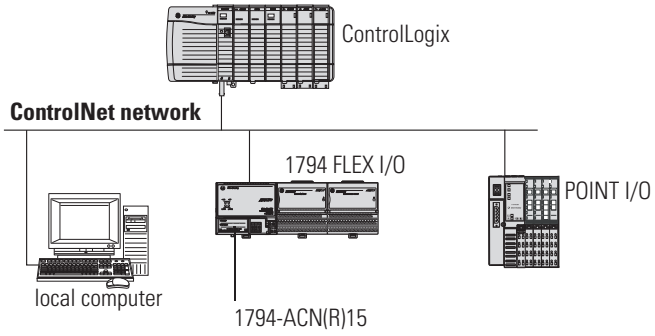
ControlNet Network

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 diagram shows the FLEX I/O platform on a ControlNet network.

Figure 2 - ControlNet Communication



FLEX I/O Counter Modules

In order to decide which FLEX I/O counter module would best suit your application needs, you should identify the following:

- What type of application the module will be used for
- What field devices, signal levels, and signal type are being connected to the counter module

Counter Module Comparison

Catalog Number	Application	Network Capability	Number of Inputs/ Outputs	External DC Supply Current, Nom	Power Dissipation, Max	Thermal Dissipation, Max
1794-IJ2 1794-IJ2XT	Rational control, including: • turbine generators • motors • drives • gears • shaft	All networks supported by FLEX I/O	2 Input 2 Output	220 mA @ 19.2V DC 180 mA @ 24V DC 140 mA @ 31.2V DC	4.5 W @ 31.2V DC	15.3 BTU/hr @ 31.2V DC
1794-VHSC	Applications including: • packaging • material handling • flow monitoring • cut-to-length • motor speed control • monitoring	ControlNet: • 1794-ACN15 • 1794-ACNR15 EtherNet/IP: • 1794-AENT • 1794-AENTR	2 Input 2 Output	100 mA @ 24V DC(1)	5W @ 31.2V DC	17.1 BTU/hr @ 31.2V DC
1794-ID2	Applications including: • quality counting • positioning • speed calculations	All networks supported by FLEX I/O	2 Input	150 mA @ 12V DC 75 mA @ 24V DC	5.0 W @ 26.4V DC	17.1 BTU/hr @ 26.4V DC
1794-IP4	Applications including: • counting pulse from flow meters • counting pulse from density meters • quality counting • speed calculations		4 Input			

(1) Does not represent power required to supply the inputs or outputs

Select a FLEX I/O Power Supply

Step 4 – Select:

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

FLEX I/O modules are interfaced to the I/O link through a FLEX I/O adapter module with a built-in 24V DC input power supply. The FLEX I/O modules receive power from the adapter/power supply through the backplane. The 120V AC to 24V DC power supply (1794-PS13 or 1794-PS3) is also available for powering the adapter/power supply.

General Specification Comparison

Catalog	Power Supply Input Voltage, nom	Power Supply Input Power	Apparent Input Power, max	Transformer Load, max	Output Current, max	Output Voltage, nom	Dimensions (HxWxD), approx
1794-PS3	120V/220V AC	86 W	205 VA	250 VA	3.0 A	24V DC	87 x 94 x 69 mm (3.4 x 3.7 x 2.7 in.)
1794-PS13		36 W	53 VA	90 VA	1.3 A		87 x 69 x 69 mm (3.4 x 2.7 x 2.7 in.)

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 unit.

All Flex I/O adapters provide internal power to the maximum possible number of 8 Flex I/O modules. Power supply modules are required to provide 24V to the adapters.

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(1) 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.

(1) This refers to horizontal mounting: 2.8 A maximum for all other mountings. Refer to the derating curve in the installation instructions for that module.

The 1606 switched mode power supplies are capable of supplying a maximum of up to 40 A at 24V DC and can be used as an alternative when more power is needed.

Digital Input Modules require supplied 24V DC (19.2...31.2V DC) and consume the currents listed in the module specifications.

Digital Output Modules require supplied 24V DC (19.2...31.2V 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...31.2V DC) and consume the currents listed in the module specifications. In addition, adequate power must be supplied to the 1794-IE8 and 1794-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 calculated.

Analog Output Modules require supplied 24V DC (19.2...31.2V 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 modules 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 1794-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.

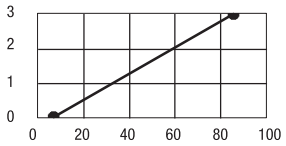
Counter Modules require module power, transmitter input power, and in some cases output load power. If output load power is required, use a separate power supply for output load power for noise immunity.

Power Requirements and Transformer Sizing

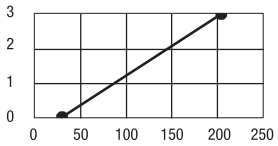
- Use the real power value in watts for determining the amount of heat dissipation you will have inside the enclosure.
- Use the apparent power value in VA for estimated power distribution sizing.
- Use the transformer load value in VA of each power supply plus all other loads on a transformer to determine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

1794-PS3 AC/DC

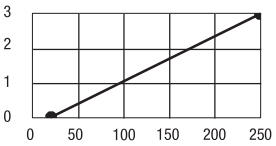
output current load



real power (Watts



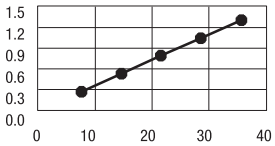
apparent power (Watts)



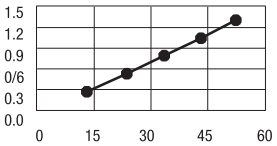
transformer load (VS)

1794-PS13 AC/DC

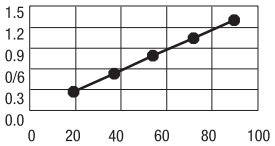
output current load (Amps)



real power (Watts



apparent power (Watts)



transformer load (VS)
= real power (Watts) X 25

Mount the FLEX System

Step 6 – Select:

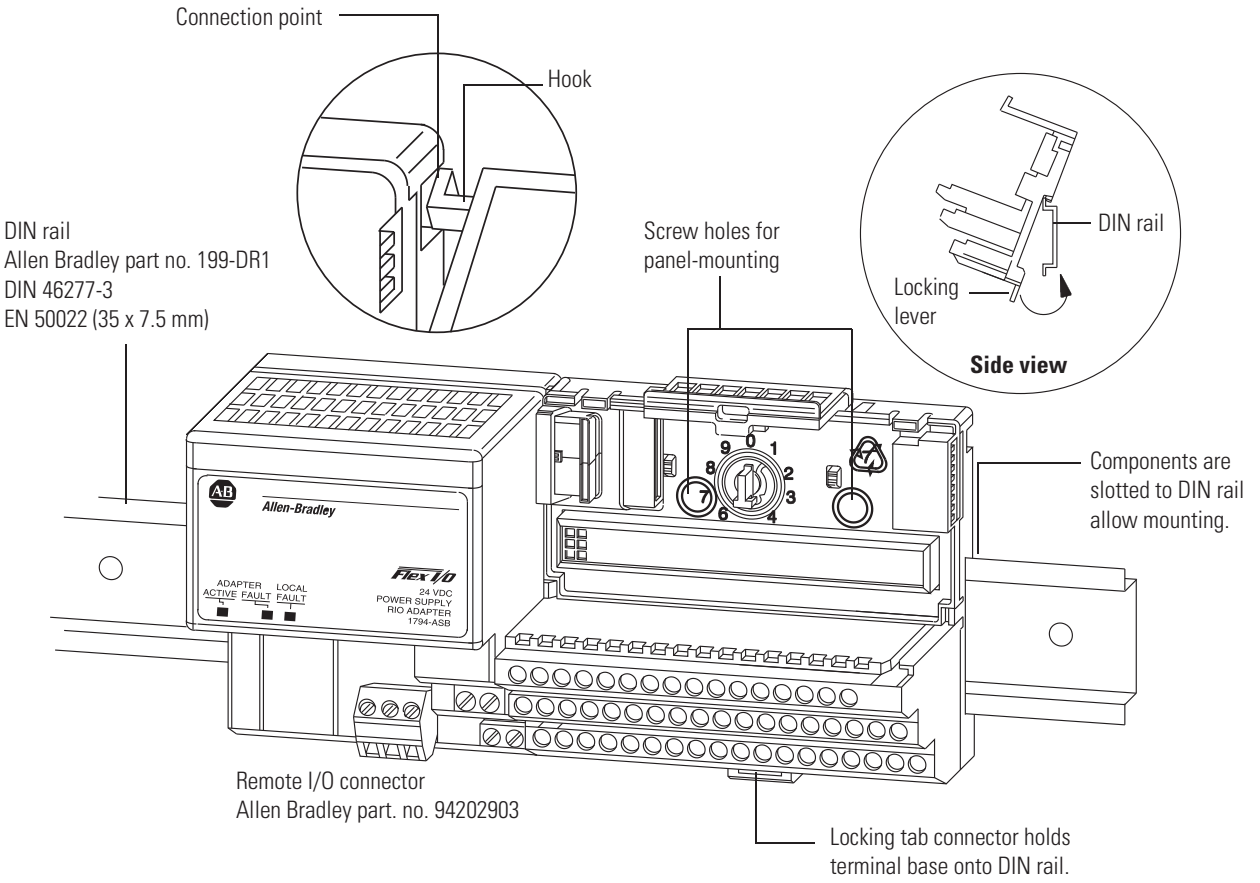
•panel mount or DIN rail mount

•appropriate number of panels or DIN rails based on the number of modules and the physical requirements

•one end cap per controller system

You can horizontally or vertically mount the FLEX I/O or FLEX Ex I/O system on a standard 35 mm DIN rail. The adapter and terminal base unit 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 25 mm (1 in.) of air space around your FLEX system.



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

If installing FLEX on non-recommended DIN rail materials, use the mounting holes provided with each terminal base, or use a 1794-NM1 mounting kit with an approved mounting bracket. Use mounting screws with star washers to provide the FLEX 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 unit) and adjacent connection point (on the communication adapter) keep the terminal base units tight together. These components are capable of maintaining a reliable connection in case of shock and/or vibration. Refer to the environmental specifications section for each module.

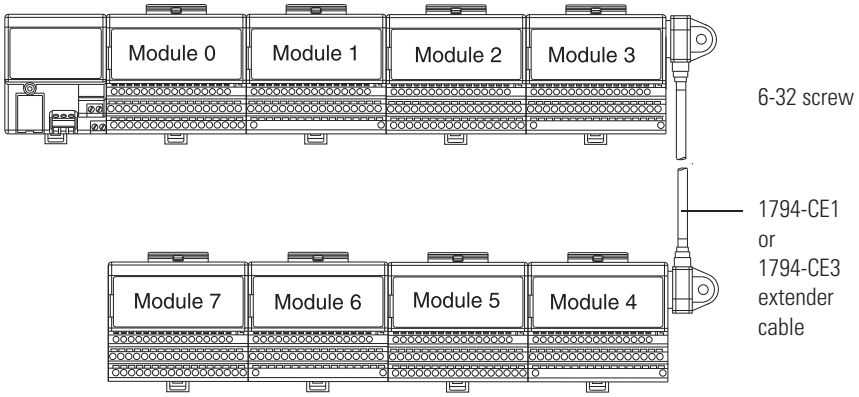
Select Optional Accessories

Step 5 – Select:

optional accessories for FLEX I/O and FLEX I/O XT modules

1794-CE1 and 1794-CE3 Extender Cables

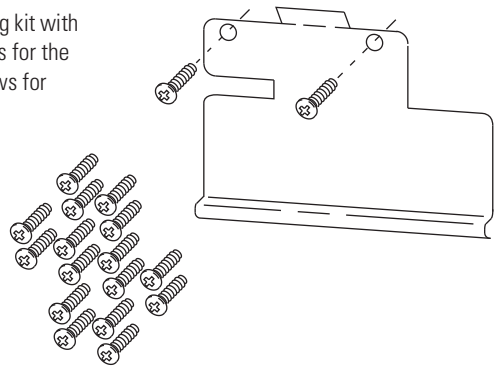
Use one optional 1794-CE1 – 0.3 m (1 ft) or 1794-CE3 – 0.9 m (3 ft) extender cable, per system, to arrange your system in two rows or split your system into horizontal and vertical orientation. The cable can be used between any module or between adapters and modules.



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 (Allen-Bradley part number 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: a terminal base with no I/O module. It contains no electronics.

1794-CJC2

This Cold Junction Compensation kit contains two replacements for the CJCs supplied with 1794-IT8 and 1794-IRT8 modules.