SLC 500 System Overview

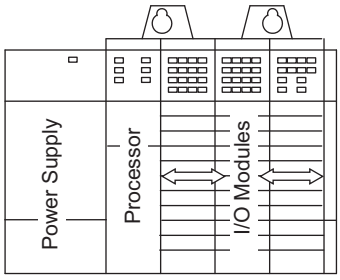
The Allen-Bradley SLC 500 is a small chassis-based family of programmable controllers, discrete, analog, and specialty I/O, and peripheral devices. The SLC 500 family delivers power and flexibility with a wide range of communication configurations, features, and memory options. The RSLogix 500 ladder logic programming package provides flexible editors, point-and-click I/O configuration, and a powerful database editor, as well as diagnostic and troubleshooting tools to help you save project development time and maximize productivity.

Typical Systems

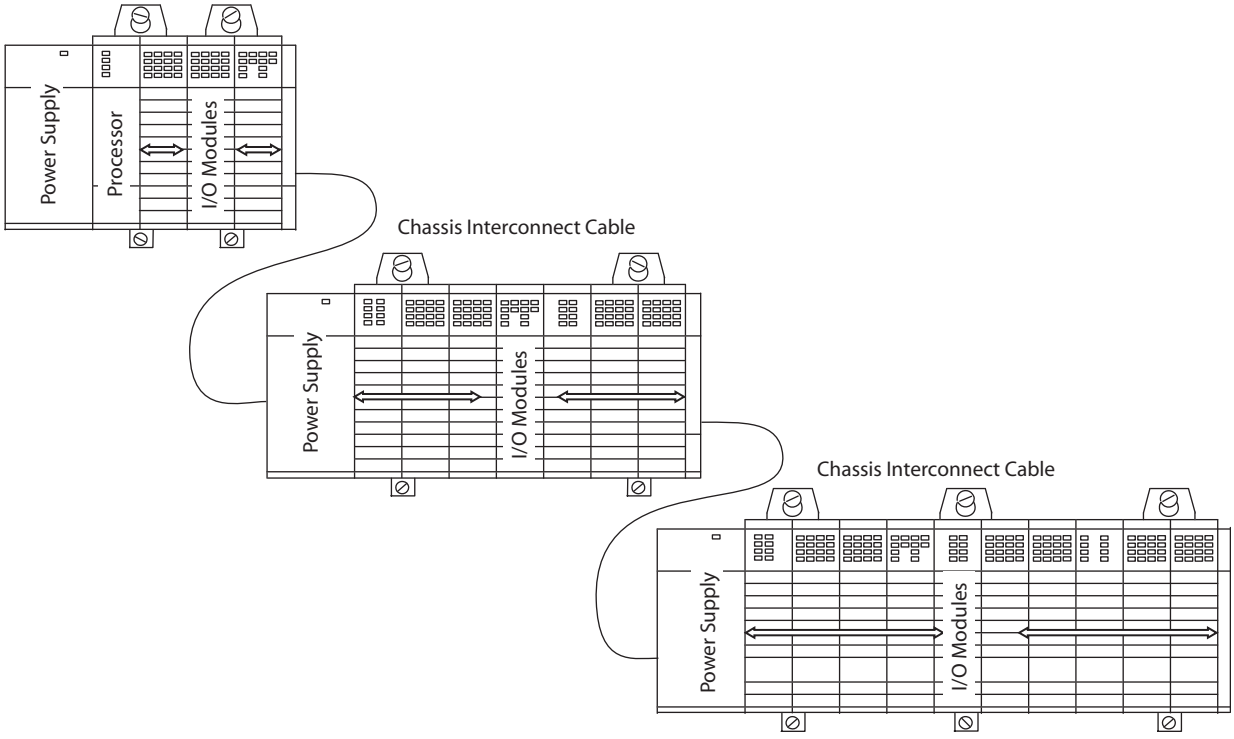
With up to 64 K of configurable data/program memory available and over 60 types of I/O modules, as well as a choice of networking options, the SLC system provides a powerful solution for stand-alone or distributed industrial control.

Local Systems

At minimum, a modular hardware SLC 500 control system consists of a processor module and I/O modules in a single 1746 chassis with a power supply.



You can configure a system with one, two, or three local chassis, for a maximum total of 30 local I/O or communication modules. You connect multiple local chassis together with chassis interconnect cables to extend the backplane signal lines from one chassis to another.



Distributed Systems

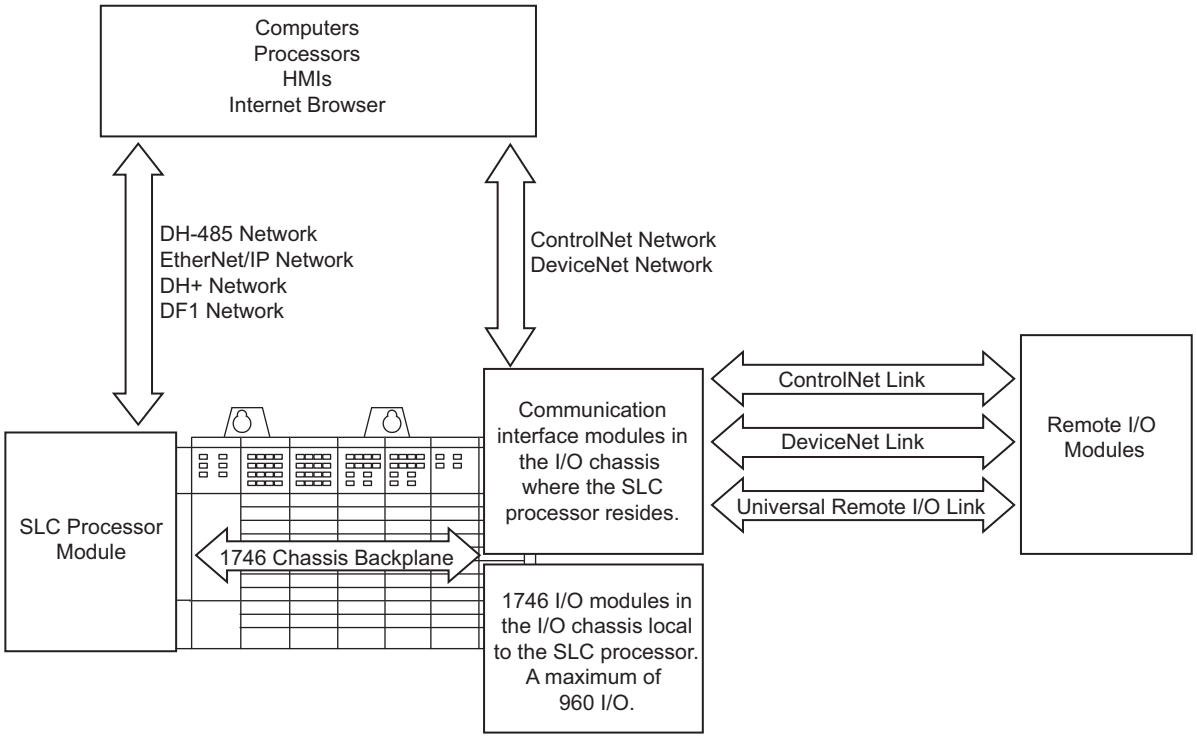
More complex systems can use:

- distributed I/O.

- multiple controllers joined across networks.
- I/O in multiple platforms that are distributed in many locations and connected over multiple I/O links.

Choose the processor module with the on-board communication ports you need. You optionally add modules to provide additional communication ports for the processor. For I/O in locations remote from the processor, you can choose between a ControlNet, DeviceNet, or Univeral I/O link. A communication interface module is required in both the local and remote chassis.

Depending upon the communication ports available on your particular SLC control system, you can select operator interfaces that are compatible.



Laying Out the System

Lay out the system by determining the amount of I/O necessary, the network configurations, and the placement of components in each location. Decide at this time whether each chassis will have its own controller or a networked solution.

SLC 500 processors are available with a large range of memory sizes (1 K...64 K) and can control up to 4096 input and 4096 output signals. All modular processors except the SLC 5/01 processor are capable of controlling remotely located I/O. By adding an I/O scanner module, you can use these processors to control/monitor these remotely located I/O across ControlNet, DeviceNet, and Universal Remote I/O links.

SLC 500 processors are single-slot modules that you place into the left-most slot of a 1746 I/O chassis. For I/O in a location remote from the processor, the I/O adapter is a single-slot module that you place in the left-most slot of the I/O chassis. SLC 500 modular systems provide separate power supplies which must be mounted directly on the left end of the 1746 I/O chassis.

The 1746 I/O chassis are designed for back-panel mounting and available in sizes of 4, 7, 10, or 13 module slots. The 1746 I/O modules are available in densities up to a maximum of 32 channels per module.

Communications

Evaluate what communications need to occur. Knowing your communications requirements will help you determine which processor and which communications devices your application might require.

An SLC processor communicates across the 1746 backplane to 1746 I/O modules in the same chassis in which the processor resides. Various models of SLC processors have various on-board ports for communication with other processors or computers. Also, separate modules are available to provide additional communication ports for communication with other processors, computers, and remotely located I/O.

Each processor has one or two built-in ports for either EtherNet/IP, DH+, DH-485, or RS-232 (DF1, ASCII, or DH-485 protocol) communication.

In addition to the on-board ports available with SLC processors, you have the option of providing another communication port for an SLC processor by adding a communication module.

Adapter modules for 1746 I/O are available for ControlNet and Universal Remote I/O links. An I/O adapter module in a chassis with I/O modules interfaces the I/O modules with the I/O link for communication with a scanner port for a processor at another location.

SLC 500 Common Specifications

The following specifications apply to all SLC 500 modular components unless noted.

Environmental Specifications

Attribute	Value
Temperature, operating	IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): 0…60 °C (32…140 °F)
Temperature, nonoperating	IEC 60068-2-1 (Test Ab, Unpackaged Nonoperating Cold), IEC 60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock): -40…85 °C (-40…185 °F)
Relative humidity	IEC 60068-2-30 (Test Db, Unpackaged Damp Heat): 5…95% without condensation

Environmental Specifications

Attribute	Value
Vibration, operating	IEC 60068-2-6 (Test Fc, Operating): 1 g @ 5…2000 Hz
Vibration, nonoperating	2.5 g @ 5…2000 Hz
Shock, operating	30 g (3 pulses, 11 ms) – for all modules except relay contact 10 g (3 pulses, 11 ms) – for relay contact modules 1746-OWx and 1746-IOx combo
Shock, nonoperating	50 g, 3 pulses, 11 ms
Free fall (drop test)	Portable, 2.268 kg (5 lb) or less @ 0.762 m (30 in.), six drops Portable, 2.268 kg (5 lb) or less @ 0.1016 m (4 in.), three flat drops
Isolation voltage	Isolation between communication circuits: 500V DC Isolation between backplane and I/O: 1500V AC

Certifications

Certifications when product is marked(1)	Value
UL	UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations. See UL File E10314.
c-UL	UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, certified for Canada. See UL File E10314.
CE	European Union 2004/108/EC EMC Directive, compliant with: EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions EN 61131-2; Programmable Controllers (Clause 8, Zone A & B) European Union 2006/95/EC LVD, compliant with: EN 61131-2; Programmable Controllers (Clause 11)
C-Tick	Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions
KC	Korean Registration of Broadcasting and Communications Equipment, compliant with: Article 58-2 of Radio Waves Act, Clause 3

(1) See the Product Certification link at http://www.rockwellautomation.com/products/certification/ for Declarations of Conformity, Certificates, and other certification details.

SLC 500 System Checklist

Use the following Checklist as a guide to completing your own system specification.

✓	Step	See
	1 Select I/O Modules • consider using an interface module or pre-wired 1492 cables • use a spreadsheet to record your selections	page 9
	2 Select Communication Modules/Devices • determine your network communication requirements and select the necessary communication modules/devices • include appropriate communication cables • record your module/device selections on the system spreadsheet	page 51
	3 Select an SLC 500 Processor • choose a processor based on memory, I/O, performance, programming requirements, and communication options	page 69
	4 Select an SLC 500 Chassis • determine the number of chassis and any interconnect cables required based on the physical configuration of your system	page 75
	5 Select an SLC 500 Power Supply • use the power supply loading worksheet to ensure sufficient power for your system • consider future system expansion when selecting a power supply	page 79
	6 Select Programming Software • select the appropriate package of RSLogix 500 Programming Software for your application	page 91

Step 2 – Select:

- *networks*
- *communication modules*
- *appropriate communication cables*

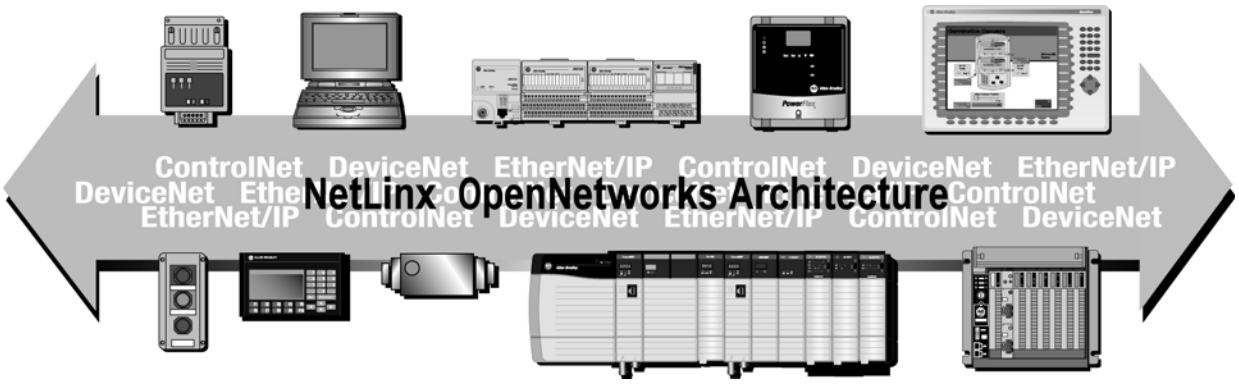
Select Network Communications

Rockwell Automation offers many control and communications media products to help you integrate plant operations. The SLC 500 family features communications modules and devices which provide support for different networks, including EtherNet/IP, ControlNet, DeviceNet, DH+, DH-485, Universal Remote I/O and serial networks.

NetLinx Open Network Architecture

NetLinx Open Network Architecture is the Rockwell Automation strategy of using open networking technology for seamless, top-floor to shop-floor integration. The NetLinxbased networks – DeviceNet, ControlNet, and EtherNet/IP – all use the Common Industrial Protocol (CIP), so they 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 a few devices on one network to multiple devices on multiple networks including access to the Internet – helping you to improve flexibility, reduce installation costs, and increase productivity.

- The EtherNet/IP network is an open industrial-networking standard that supports implicit and explicit messaging and uses commercial, off-the-shelf Ethernet equipment and physical media.
- The ControlNet network 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.
- The DeviceNet network offers low-cost, high-speed access to plant-floor data from a broad range of plant-floor devices and a significant reduction in wiring.



Selecting a Network

You can configure your system for information exchange between a range of devices and computing platforms, and operation systems. Use the table below to help you select a network.

Network Selection Criteria

If your application requires	Choose this network	Select this communication / device
• High-speed data transfer between information systems and/or a large quantity of controllers • Internet/Intranet connection • Program maintenance	EtherNet/IP	• SLC 5/05 Processor, or • 1761-NET-ENI EtherNet Interface • 1761-NET-ENIW Web-Enabled EtherNet Interface
• High-speed transfer of time-critical data between controllers and I/O devices • Deterministic and repeatable data delivery • Program maintenance • Media redundancy or intrinsic safety options	ControlNet	• 1747-KFC15 ControlNet Messaging Module • 1747-SCNR ControlNet Scanner Module • 1747-ACN15 and -ACNR15 ControlNet Adapter Modules
• Connections of low-level devices directly to plant floor controllers, without the need to interface through I/O devices • More diagnostics for improved data collection and fault detection • Less wiring and reduced startup time than traditional, hard-wired systems	DeviceNet	• 1747-SDN DeviceNet Scanner Module • 1761-NET-DNI DeviceNet Interface Module
• Plant-wide and cell-level data sharing with program maintenance	Data Highway Plus (DH+)	• SLC 5/04 Processor
	DH-485	• 1747-KE DH-485/RS-232C Interface • SLC 5/01, 5/02 or 5/03 Processor with a 1747-AIC Isolated Link Coupler • SLC 5/01, 5/02 or 5/03 Processor with a 1761-NET-AIC Advanced Interface Converter • 1747-UIC USB to DH-485 Interface Converter
• Connections between controllers and I/O adapters • Distributed controllers so that each has its own I/O communications with a supervisory controller	Universal Remote I/O	• 1747-SN Remote I/O Scanner • 1747-BSN Backup Remote I/O Scanner • 1747-ASB Remote I/O Adapter • 1747-DCM Direct Communication Module
• Modems • Messages that send and receive ASCII characters to/from devices such as ASCII terminals, bar code readers, message displays, weight scales, or printers	Serial	• SLC 5/03 Processor • SLC 5/04 Processor • SLC 5/05 Processor • SLC 5/01, 5/02, or 5/03 Processor with a 1747-KE DH-485/RS-232C Interface

Ethernet Network

The TCP/IP Ethernet network is a local-area network designed for the high-speed exchange of information between computers and related devices. With its high bandwidth (10 Mbps to 100 Mbps), an Ethernet network allows many computers, controllers, and other devices to communicate over vast distances. An Ethernet network

EtherNet Device Specifications

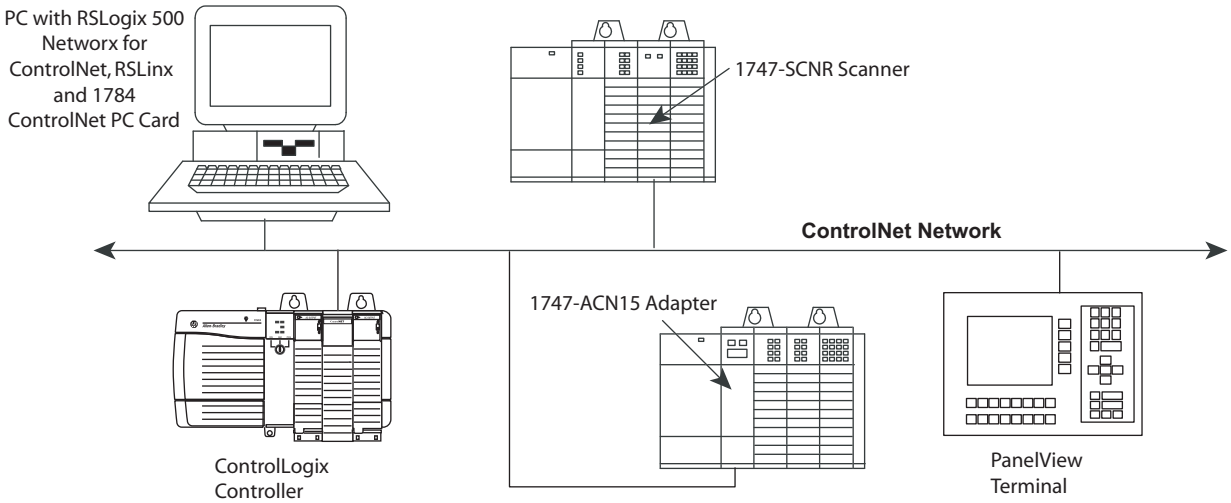
	1761-NET-ENI	1761-NET-ENIW
Description	Ethernet Interface (ENI)	Web-Enabled Ethernet Interface (ENIW)
24V DC current draw	100 mA	
Power supply DC voltage range(1)	20.4…26.4V DC	
Isolation voltage	Tested @ 710V DC for 60 s	
Inrush current, max	200 mA @ 24V	
Communication rate	10/100 Mbps(2)	
Ethernet interface	10/100Base-T(2)	

(1) When the device is connected to a MicroLogix controller, power is provided by the MicroLogix controller's communication port.

(2) Series C devices.

ControlNet Network

The ControlNet network is an open, high-speed, deterministic network used for transmitting time-critical information. It provides real-time control and messaging services for peer-to-peer communication. As a high-speed link between controllers and I/O devices, a ControlNet network combines the capabilities of existing Universal Remote I/O and DH+ networks. You can connect a variety of devices to a ControlNet network, including personal computers, controllers, operator interface devices, drives, I/O modules. A ControlNet network combines the functionality of an I/O network and a peer-to-peer messaging network. This open network provides the performance required for critical control data, such as I/O updates and controller-tocontroller interlocking. ControlNet networks also support the transfer of non-critical data, such as program uploads, downloads, and messaging.



ControlNet network connectivity for SLC 500 is provided by the following:

- 1747-KFC15 ControlNet Messaging Module
- 1747-SCNR ControlNet Scanner
- 1747-ACN15 and 1747-ACNR15 ControlNet Adapters

ControlNet Messaging Module

The 1747-KFC15 module provides the capability for an SLC 5/03, 5/04, and 5/05 processor to send or receive unscheduled ControlNet messages. With unscheduled messaging, the SLC controller program can send peer-to-peer messages or be accessed and edited over the ControlNet network using RSLogix 500 software. The 1747-KFC15 consumes 0.640 A @ 5V DC.

The ControlNet Messaging Module features:

- 4-digit, 7-segment display for node address and module status.
- RS-232 KFC to SLC cable (included).
- media redundancy via dual BNC connectors.
- power from the SLC chassis backplane.
- ability to upgrade firmware via ControlFlash.

ControlNet Scanner Module

The 1747-SCNR module provides scheduled ControlNet network connections for SLC 5/02, 5/03, 5/04, and 5/05 processors. With scheduled messaging, the SLC processor can control I/O events in real time on the ControlNet network. The 1747-SCNR module can communicate with the 1771-PLC5C, 1756-Lx controllers, and with another 1747-SCNR module via scheduled messages on the ControlNet network. The 1747-SCNR module consumes 0.900 A @ 5V DC.

The ControlNet Scanner Module features:

- media redundancy via dual BNC connectors.
- ability to upgrade firmware via ControlFlash.

The 1747-SCNR module can control 1788-CN2DN and 1788-CN2FF linking devices as well as a variety of I/O platforms. The table below indicates with a "✓" which I/O platforms the 1747-SCNR module can control.

ControlNet Scanner I/O Control Capabilities

I/O Platform	Discrete	Analog
1746	✓	✓
1756		
1771	✓	✓

ControlNet Scanner I/O Control Capabilities

I/O Platform	Discrete	Analog
1793	✓	✓
1794	✓	✓
1797	✓	✓

ControlNet Adapter Modules

The 1747-ACN15 and -ACNR15 modules enable up to three 1746 chassis of I/O modules to produce/consume scheduled I/O on the ControlNet network. Both modules are compatible with all 1746 discrete, analog, and specialty I/O, except those requiring G-file configuration, such as the 1747-SN and 1747-BSN modules. The 1747-ACN15 and ACNR15 modules consume 0.9A at 5V dc.

The ControlNet Adapter Modules feature:

- optional media redundancy via dual BNC connectors (1747-ACNR15).
- individual connection to single modules or chassis connections to groups of discrete modules.
- ability to upgrade firmware via ControlFlash.

The table below indicates with a "✓" which ControlNet controllers can communicate to the 1747-ACN via scheduled messaging.

ControlNet Adapter Communication Capabilities

Scheduled Messaging	1747-SCNR	1771-PLC5C	1756-Lx via 1756-CNB	1784-KTCS
1747-ACN(R)15 Discrete I/O	✓	✓		✓
1747-ACN(R)15 Analog I/O	✓	✓		

DeviceNet Network

The DeviceNet network is an open, low-level communication link that provides connections between simple industrial devices like sensors and actuators to high-level devices like controllers. Based on standard Controller Area Network (CAN) technology, this open network offers inter-operability between like devices from multiple vendors. A DeviceNet network reduces installation costs, startup/commissioning time, and system or machine downtime.

The DeviceNet network provides:

- inter-operability – simple devices from multiple vendors that meet DeviceNet standards are interchangeable.
- Common network - an open network provides common end-user solutions and reduces the need to support a wide variety of device networks.
- Lower maintenance costs – replace devices without disrupting other devices.

Specialty Modules

Catalog Number	Backplane Current (mA) @ 5V	Backplane Current (mA) @ 24V	Watts per point	Thermal dissipation, min.	Thermal dissipation, max.
1746-BAS-T	150 mA	40 mA(1)	N/A	3.75 W	3.80 W
1746-BLM	110 mA	85 mA	N/A	5.00 W	5.00 W
1746-BTM	110 mA	85 mA	N/A	2.59 W	2.59 W
1746-HSCE	320 mA	0 mA	N/A	1.60 W	1.60 W
1746-HSCE2	250 mA	0 mA	N/A	1.25 W	1.25 W
1746-HSRV	300 mA	0 mA	N/A	1.50 W	1.50 W
1746-HSTP1	200 mA	90 mA	N/A	1.50 W	1.50 W
1746-INT4	110 mA	85 mA	N/A	1.26 W	1.26 W
1746-NR4	50 mA	50 mA	N/A	1.50 W	1.50 W
1746-NR8	100 mA	55 mA	N/A	1.82 W	1.82 W
1746-NT4	60 mA	40 mA	N/A	0.80 W	0.80 W
1746-NT8	120 mA	70 mA	N/A	2.28 W	2.28 W
1746-QS	1000 mA	200 mA	N/A	9.80 W	9.80 W
1746-QV	250 mA	0 mA	N/A	1.075 W	1.075 W

(1) When using the 1747-BAS or 1747-KE modules to supply power to an AIC, add 0.085 A (the current loading for the AIC) to the 1747-BAS or 1747-KE module's power supply loading value at 24V DC.

Communication Modules

Catalog Number	Backplane Current (mA) @ 5V	Backplane Current (mA) @ 24V	Watts per point	Thermal dissipation, min.	Thermal dissipation, max.
1747-ACN15	900 mA	0 mA	N/A	4.50 W	4.50 W
1747-ACNR15	900 mA	0 mA	N/A	4.50 W	4.50 W
1747-ASB	375 mA	0 mA	N/A	1.875 W	1.875 W
1747-BSN	800 mA	0 mA	N/A	4.00 W	4.00 W
1747-DCM	360 mA	0 mA	N/A	1.80 W	1.80 W
1747-KE	150 mA	40 mA(1)	N/A	3.75 W	3.80 W
1747-KFC15	640 mA	0 mA	N/A	3.20 W	3.20 W
1747-SCNR	900 mA	0 mA	N/A	4.50 W	4.50 W
1747-SDN	500 mA	-- mA	N/A	2.50 W	2.50 W
1747-SN	600 mA	0 mA	N/A	4.50 W	4.50 W

(1) When using the 1747-BAS or 1747-KE modules to supply power to an AIC, add 0.085 A (the current loading for the AIC) to the 1747-BAS or 1747-KE module's power supply loading value @ 24V DC.