

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.



Topic	Page
Select SLC 500 I/O Modules	2
Select Network Communications	2
Select an SLC 500 Processor	69
Select an SLC 500 Chassis	75
Select SLC 500 Power Supplies	79
Select Programming Software	91
Summary	101

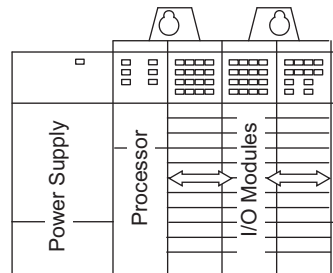
Typical Systems

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.

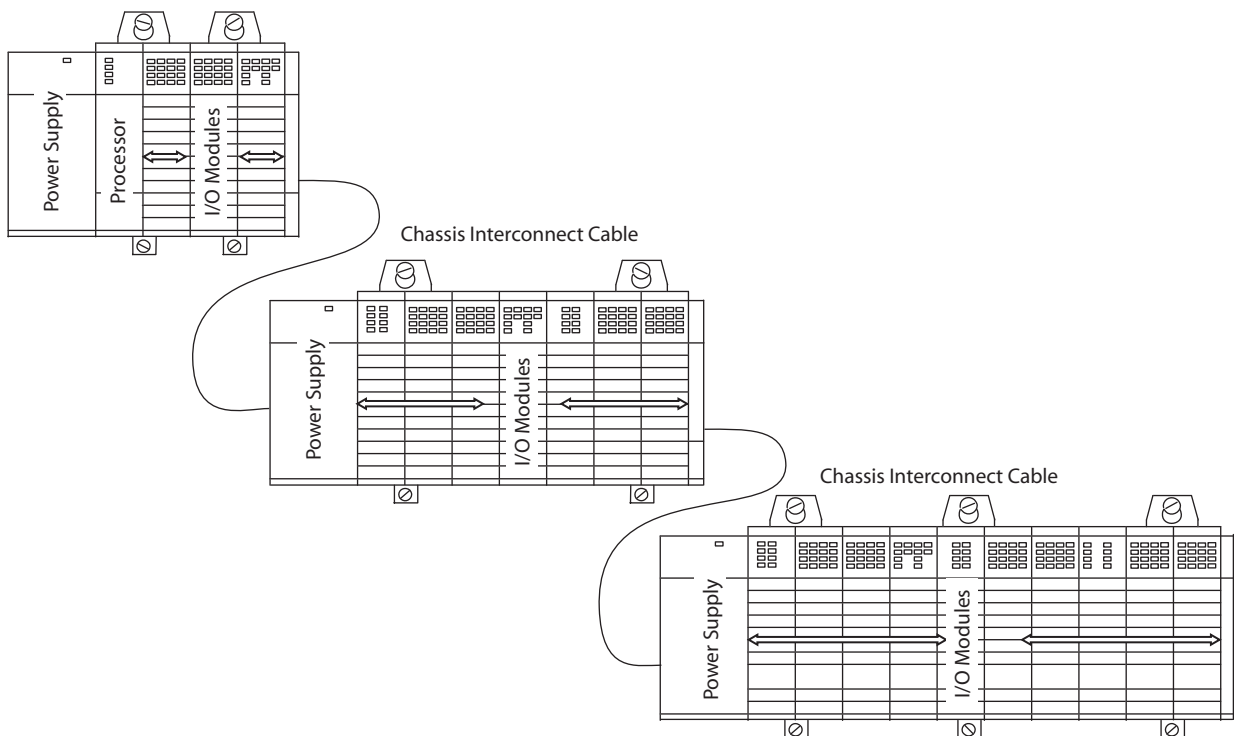
Allen-Bradley 1746-IA8

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

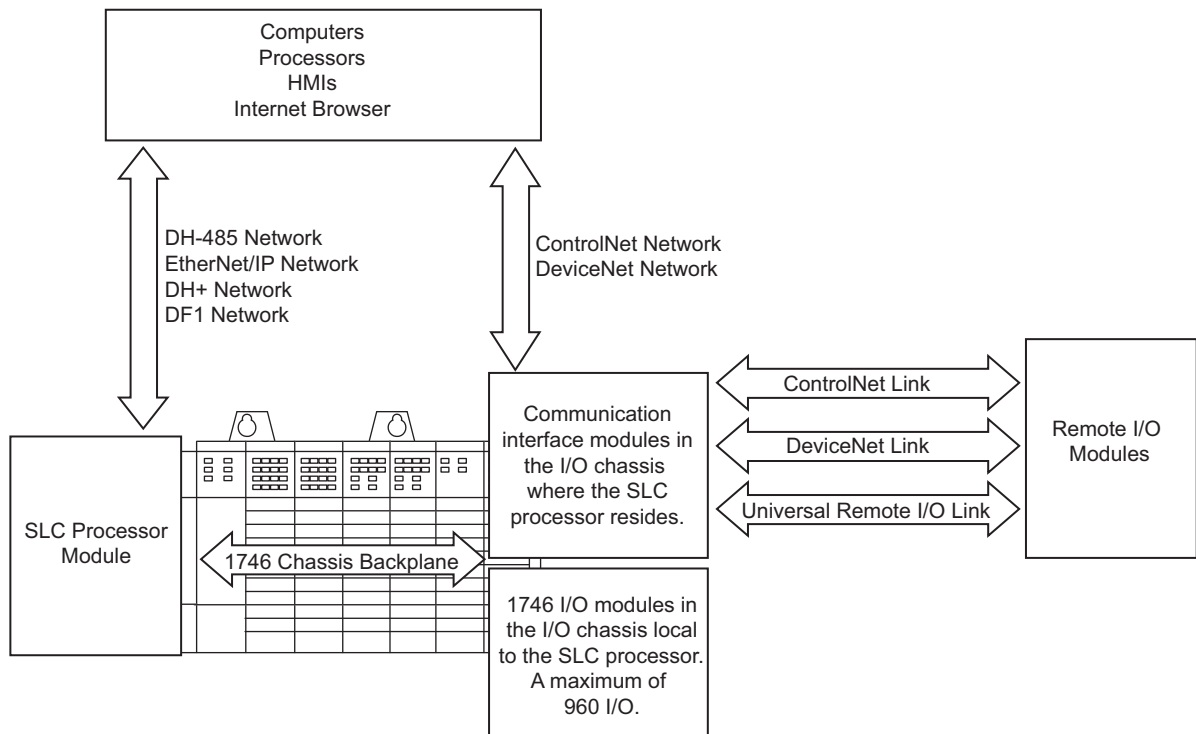
More complex systems can use:

- 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 Universal 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.

Allen-Bradley 1746-IA8

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.

Allen-Bradley 1746-IA8

SLC 500 System Checklist

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

✓	Step	See
	1 Select I/O Modules <ul style="list-style-type: none"> consider using an interface module or pre-wired 1492 cables use a spreadsheet to record your selections 	page 9
	2 Select Communication Modules/Devices <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> choose a processor based on memory, I/O, performance, programming requirements, and communication options 	page 69
	4 Select an SLC 500 Chassis <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> select the appropriate package of RSLogix 500 Programming Software for your application 	page 91

Digital I/O Module Overview

Catalog Number	Voltage Category	I/O Points	Description	For Detailed Specifications, See
1746-IA4	100/120V AC	4	120V AC Input Module	AC Input Modules page 14
1746-IA8	100/120V AC	8	120V AC Input Module	
1746-IA16	100/120V AC	16	120V AC Input Module	
1746-IM4	200/240V AC	4	240V AC Input Module	
1746-IM8	200/240V AC	8	240V AC Input Module	
1746-IM16	200/240V AC	16	240V AC Input Module	
1746-OA8	120/240V AC	8	120/240V AC Output Module	AC Output Modules page 15
1746-OA16	120/240V AC	16	120/240V AC Output Module	
1746-OAP12 ⁽²⁾	120/240V AC	12	High Current 120/240V AC Output Module	

AC/DC Modules

1746-IN16	24V AC/DC	16	24V AC/DC Input Module	AC Input Modules page 14
1746-OW4 ⁽²⁾	AC/DC Relay	4	Relay (Hard Contact) Output Module	Relay Output Modules page 16
1746-OW8 ⁽²⁾	AC/DC Relay	8	Relay (Hard Contact) Output Module	
1746-OW16 ⁽²⁾	AC/DC Relay		Relay (Hard Contact) Output Module	
1746-OX8 ⁽²⁾	AC/DC Relay	8	Relay (Hard Contact) Output Module	
1746-IO4 ⁽²⁾	120V ac (Inputs) 100/120V AC (Relay Contact Outputs)	2 In 2 Out	Combination Input/Output Module	Combination I/O Modules page 17
1746-IO8 ⁽²⁾	120V AC (Inputs) 100/120V AC (Relay Contact Outputs)		Combination Input/Output Module	
1746-IO12 ⁽²⁾	120V AC (Inputs) 100/120V AC (Relay Contact Outputs)	4 In 4 Out	Combination Input/Output Module	
1746-IO12DC	24V DC (Inputs) 100/120V AC (Relay Contact Outputs)	6 In 6 Out	Combination Input/Output Module	

(1) Not CE marked.

(2) Certified for Class 1, Division 2 hazardous location by C-UL only.

Sinking DC Input Modules

Specifications	1746-IB8	1746-IB16	1746-IB32	1746-IC16	1746-IH16 ⁽¹⁾	1746-ITB16
Number of Inputs	8	16	32	32	16	16
Points Per Common	8	16	8	8	16	16
Voltage Category	24V DC			48V DC	125V DC	24V DC
Operating Voltage Range	10...30V DC		15...30V DC @ 50 °C (122 °F) 15...26.4V DC @ 60 °C (140 °F)	30...60V DC @ 55 °C (131 °F) 30...55V DC @ 60 °C (140 °F)	90...146V DC ⁽²⁾	10...30V DC
Backplane Current (mA) @ 5V	50 mA	50 mA	50 mA	50 mA		
Backplane Current (mA) @ 24V	0 mA	0 mA	0 mA	0 mA	0 mA	0mA

Sourcing DC Output Modules

Specifications	1746-OB6EI	1746-OB8	1746-OB16	1746-OB16E	1746-OB32	1746-OB32E	1746-OBP8 ⁽⁴⁾	1746-OBP16
Voltage drop, on-state output, max.	1.0V @ 2.0 A	1.2V @ 1.0 A	1.2V @ 0.5 A	1.0V @ 0.5 A	1.2V @ 0.5 A		1.0V @ 2.0 A	1.0V @ 1.0 A
Load current, min.	1 mA	1 mA	1 mA	1 mA	1 mA	1 mA	1 mA	1 mA
Leakage current, off-state output, max	1 mA	1 mA	1 mA	1 mA	1 mA	1 mA	1 mA	1 mA
Signal on delay, max (resistive load)	1.0 ms ⁽²⁾	0.1 ms	0.1 ms	1.0 ms ⁽³⁾	0.1 ms	1.0 ms	1.0 ms ⁽³⁾	0.1 ms ⁽³⁾
Signal off delay, max (resistive load)	2.0 ms	1.0 ms	1.0 ms	1.0 ms	1.0 ms	2.0 ms	2.0 ms	1.0 ms
Continuous current per module	12.0 A @ 0...60 °C (32 °...140 °F)	8.0 A @ 30 °C (86 °F) 4.0 A @ 60 °C (140 °F)		8.0 A @ 0...60 °C (32...140 °F)				6.4 A @ 0...60 °C (32...140 °F)
Continuous current per point	2.0 A @ 0...60 °C (32 °...140 °F) ⁽³⁾	1.0 A @ 30 °C (86 °F) 0.50 A @ 60 °C (140 °F)	0.50 A @ 30 °C (86 °F) 0.25 A @ 60 °C (140 °F)	1.0 A @ 30 °C (86 °F) 0.50 A @ 60 °C (140 °F) ⁽⁴⁾	0.50 A @ 30 °C (86 °F) 0.25 A @ 60 °C (140 °F)		2.0 A @ 0...60 °C (32...140 °F) ⁽⁴⁾	1.5 A @ 30 °C (86 °F) 1.0 A @ 60 °C (140 °F) ⁽⁴⁾
Surge current per point for 10 ms ⁽¹⁾	4.0 A	3.0 A		2.0 A	1.0 A @ 30 °C (86 °F) 1.0 A @ 60 °C (140 °F)		4.0 A	

(1) Repeatability is once every 1 s @ 30 °C (86 °F). Repeatability is once every 2 s @ 60 °C (140 °F).

(2) Fast turn-off modules provide fast OFF delay for inductive loads. Comparative OFF delay times for 1746-OB8, 1746-OB16 and fast turn-off modules, when switching Bulletin 100-B110 (24 W sealed) contractor, are: 1746-OB8 and 1746-OB16 modules OFF delay = 152 ms; fast turn-off modules OFF delay = 47 ms.

(3) Fast off-delay for inductive loads is accomplished with surge suppressors on the 1746-OB6EI, 1746-OBP8 series B and later, 1746-OB16E series B and later, 1746-OBP16, and 1746-OBP16 modules. A suppressor at the load is not needed unless another contact is connected in series. If this is the case, a 1N4004 diode should be reverse-wired across the load. This defeats the fast turn-off feature.

(4) An external fuse can be used to protect this module from short circuits. Recommended fuse is SANO MQ 4-3.15 A, 5 x 20 mm.

(5) The 1746-OBP16 module features a fused common and blown fuse LED indicator.

AC Input Modules

Specifications	1746-IA4	1746-IA8	1746-IA16	1746-IM4	1746-IM8	1746-IM16	1746-IN16
Number of inputs	4	8	16	4	8	16	16
Points per common	5	8	16	4	8	16	16
Voltage category	100/120V AC			200/240V AC			24V AC/DC
Operating voltage range	85...132V AC @ 47...63 Hz			170...265V AC @ 47...63 Hz			10...30V AC 10...30V DC
Backplane current (mA) @ 5V	35 mA	50 mA	85 mA	35 mA	50 mA	85 mA	85 mA
Backplane current (mA) @ 24V	0 mA	0 mA	0 mA	0 mA	0 mA	0 mA	0 mA
Voltage, off-state input, max	30V AC			50V AC			3.0V DC 3.0V AC

AC Input Modules

Specifications	1746-IA4	1746-IA8	1746-IA16	1746-IM4	1746-IM8	1746-IM16	1746-IN16
Nominal input current	12 mA @ 120V AC			12 mA @ 240V AC			8 mA @ 24V DC 8 mA @ 24V AC
Current, off-state input, max.	2 mA	2 mA	2 mA	2 mA	2 mA	2 mA	1 mA (DC) 1 mA (AC)
Inrush current, max. ⁽¹⁾	0.8 A			1.6 A			0.02 A (AC only)
Inrush current time duration, max.	0.5 ms	0.5 ms	0.5 ms	0.5 ms	0.5 ms	0.5 ms	—
Signal on delay, max.	35 ms max	35 ms max	35 ms max	35 ms max	35 ms max	35 ms max	15 ms max (DC) 25 ms (AC)
Signal off delay, max	45 ms max	45 ms max	45 ms max	45 ms max	45 ms max	45 ms max	15 ms max (DC) 25 ms (AC)

(1) An AC input device must be compatible with SLC 500 input circuit inrush current. A current limiting resistor can be used to limit inrush current. However, the operating characteristics of the AC input circuit are affected.

AC Output Modules

Specifications	1746-OA8	1746-OA16	1746-OAP12
Number of outputs	8	16	12
Points per common	4	8	6 ⁽⁵⁾
Voltage category	120/240V AC		
Operating voltage range	85...265V AC @ 47...63 Hz		
Backplane current (mA) @ 5V	185 mA	370 mA	
Backplane current (mA) @ 24V	0 mA	0 mA	0 mA
Voltage drop, on-state output, max	1.50V @ 1.0 A	1.50V @ 0.50 A	1.2V @ 2.0 A
Load current, min	10 mA	10 mA	10 mA
Leakage current, off-state output, max ⁽¹⁾	2 mA	2 mA	2 mA
Surge current per point, max ⁽²⁾	10 A for 25 ms		17.0 A for 25 ms ⁽⁶⁾
Signal on delay, max (resistive load) ⁽³⁾	1 ms	1 ms	1 ms
Signal off delay, max (resistive load) ⁽⁵⁾	11 ms	11 ms	11 ms
Continuous current per point ⁽⁴⁾	1.0 A @ 30 °C (86 °F) 0.50 A @ 60 °C (140 °F)	0.50 A @ 30 °C (86 °F) 0.25 A @ 60 °C (140 °F)	2.0 A @ 30 °C (86 °F) 1.25 A @ 55 °C (131 °F) 1.0 A @ 60 °C (140 °F)
Continuous current per module	8.0 A @ 30 °C (86 °F) 4.0 A @ 60 °C (140 °F)		9.0 A @ 30 °C (86 °F) 6.0 A @ 60 °C (140 °F)

(1) To limit the effects of leakage current through solid-state outputs, a loading resistor can be connected in parallel with your load. For 120V AC operation, use a 15 k Ω , 2 W resistor. For 240V AC operation, use a 15 k Ω , 5 W resistor.

(2) Repeatability is once every 1 s @ 30 °C (86 °F). Repeatability is once every 2 s @ 60 °C (140 °F).

(3) Triac outputs turn on at any point in the AC line cycle and turn off at AC line zero cross.

(4) Recommended surge suppression: For triac outputs when switching 120V AC inductive loads, use Harris Metal-oxide Varistor, model number V220MA2A. Refer to the SLC 500 Modular Hardware Style User Manual, publication [1747-UJ011](#) for more information on surge suppression.

(5) The 1746-OAP12 module features a fused common and blown fuse LED indicator.

Cable Catalog Number	Standard Cable Lengths	Build to Order Available	Number of Conductors	Mating I/O Module Catalog Number
1492-CABLE ⁽¹⁾ G	0.5, 1.0, 2.5, 5.0 m	Yes	20	1746-OA16
1492-CABLE ⁽¹⁾ H	0.5, 1.0, 2.5, 5.0 m	Yes	20	1746-IB32, -IV32, -OB32, -OB32E, -OV32
1492-CABLE ⁽¹⁾ N	0.5, 1.0, 2.5, 5.0 m	Yes	20	1746-OW16, -OX8
1492-CABLE ⁽¹⁾ S	0.5, 1.0, 2.5, 5.0 m	Yes	20	1746-OX8

(1) Cables are available in standard lengths of 0.5 m, 1.0 m, 2.5 m, and 5.0 m. To order, insert the code for the desired cable length into the cat. no. (005 = 0.5 m, 010 = 1.0 m, 025 = 2.5 m, and 050 = 5.0 m). Example: Cat. No. 1492-CABLE005N is for a 0.5 m cable that could be used to connect a catalog number 1492-IFM20D24N IFM to a Catalog Number 1746-OW16 I/O module. Build-to-order lengths are also available.

I/O Module-Ready Cables for 1746 Digital I/O Modules

The I/O module-ready cables have a pre-wired RTB on one end to plug onto the front of a Bulletin 1746 I/O module and 20 or 40 individually colored #18 AWG conductors on the other end. These cables provide the convenience of pre-wired connections at the I/O module end, while still allowing the flexibility to fieldwire to standard terminal blocks of your choice.

I/O Module-Ready Cables for 1746 Digital I/O Modules

Cable Catalog Number	Standard Cable Lengths	Build to Order Available	Number of Conductors	Mating I/O Module Catalog Number
1492-CABLE ⁽¹⁾ N3	1.0, 2.5, 5.0 m	Yes	40	1746-IB32, -IV32, -OB32, -OV32, -OB32E
1492-CABLE ⁽¹⁾ RTBB	1.0, 2.5, 5.0 m	Yes	20	1746-IB16, -IC16, -IG16, -IH16, -IN16, -ITB16, -ITV16, -IV16, -OB16, -OB16E, -OBP8, -OBP16, -OG16, -OV16, -OVP16
1492-CABLE ⁽¹⁾ RTBO	1.0, 2.5, 5.0 m	Yes	20	1746-OW16, -OX8
1492-CABLE ⁽¹⁾ RTBR	1.0, 2.5, 5.0 m	Yes	20	1746-IA16, -OA16, -OAP12, -IM16

(1) Cables are available in standard lengths of 0.5 m, 1.0 m, 2.5 m, and 5.0 m. To order, insert the code for the desired cable length into the cat. no. (005 = 0.5 m, 010 = 1.0 m, 025 = 2.5 m, and 050 = 5.0 m). Example: Cat. No. 1492-CABLE005N is for a 0.5 m cable that could be used to connect a catalog number 1492-IFM20D24N IFM to a Catalog Number 1746-OW16 I/O module. Build-to-order lengths are also available.

IMPORTANT The following I/O Modules do not have RTBs: 1746-IA4, 1746-IA8, 1746-IB8, 1746-IM4, 1746-IM8, 1746-IV8, 1746-OA8, 1746-OB8.

Power Supply Loading and Heat Dissipation

Use the values in the following tables to calculate the power supply loading for each chassis in your SLC modular application.

Processors

Catalog Number	Backplane Current (mA) @ 5V	Backplane Current (mA) @ 24V	Watts per point	Thermal dissipation, min.	Thermal dissipation, max.
1747-L511	90 mA	0 mA	N/A	1.75 W	1.75 W
1747-L514	90 mA	0 mA	N/A	1.75 W	1.75 W
1747-L524	350 mA	105 mA	N/A	1.75 W	1.75 W
1747-L531	500 mA	175 mA	N/A	1.75 W	1.75 W
1747-L532	500 mA	175 mA	N/A	2.90 W	2.90 W
1747-L533	500 mA	175 mA	N/A	2.90 W	2.90 W
1747-L541	1000 mA	200 mA	N/A	4.00 W	4.00 W
1747-L542	1000 mA	200 mA	N/A	4.00 W	4.00 W
1747-L543	1000 mA	200 mA	N/A	4.00 W	4.00 W
1747-L551	1000 mA	200 mA	N/A	4.00 W	4.00 W
1747-L552	1000 mA	200 mA	N/A	4.00 W	4.00 W
1747-L553	1000 mA	200 mA	N/A	4.00 W	4.00 W

Digital Input Modules

Catalog Number	Backplane Current (mA) @ 5V	Backplane Current (mA) @ 24V	Watts per point	Thermal dissipation, min.	Thermal dissipation, max.
1746-IA4	35 mA	0 mA	0.270 W	0.175 W	1.30 W
1746-IA8	50 mA	0 mA	0.270 W	0.250 W	2.40 W
1746-IA16	85 mA	0 mA	0.270 W	0.425 W	4.80 W
1746-IB8	50 mA	0 mA	0.200 W	0.250 W	1.90 W
1746-IB16	50 mA	0 mA	0.200 W	0.425 W	3.60 W
1746-IB32 ⁽¹⁾	106 mA	0 mA	0.200 W	0.530 W	6.90 W
1746-IC16	50 mA	0 mA	0.220 W	0.425 W	3.95 W
1746-IG16	140 mA	0 mA	0.270 W	0.700 W	1.00 W
1746-IH16	85 mA	0 mA	0.320 W	0.675 W	3.08 W
1746-IM4	35 mA	0 mA	0.350 W	0.175 W	1.60 W
1746-IM8	50 mA	0 mA	0.350 W	0.250 W	3.10 W
1746-IM16	85 mA	0 mA	0.350 W	0.425 W	6.00 W
1746-IN16	85 mA	0 mA	0.350 W	0.425 W	6.00 W
1746-ITB16	50 mA	0 mA	0.200 W	0.425 W	3.625 W