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 outptus	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 oututs, a loading resistor can be connected in parallel with your load. For 120V AC operation, use a 15 kΩ, 2 W resistor. For 240V AC operation, use a 15 kΩ, 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-UM011 for more information on surge suppression.

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

(6) Surge current = 35 A per common for 10 ms.

Relay Output Modules

Specifications	1746-OW4	1746-OW8[2]	1746-OW16[2]	1746-OX8[2]
Number of outputs	4	8	16	8
Points per common	4	4	8	Inidvidually isolated
Voltage category	AC/DC Relay			
Operating voltage range	5…125V DC 5…265V AC			
Backplane current (mA) @ 5V	45 mA	85 mA	170 mA	85 mA
Backplane current (mA) @ 24V	45 mA	90 mA	180 mA	90 mA
Load current, min	10 mA @ 5V DC			
Leakage current, off-state output, max	0 mA	0 mA	0 mA	0 mA
Signal on delay, max (resistive load)	10 ms	10 ms	10 ms	10 ms
Signal off delay, max (resistive load)	10 ms	10 ms	10 ms	10 ms
Continuous current per point[1]	See relay contact ratings			
Continuous current per module	8.0 A AC 8.0 A/Common	16.0 A AC 8.0 A/Common		[3]

(1) 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-UM011](#) for more information on surge suppression.

(2) Certified for Class 1 Div 2 Hazardous Locations by CSA.

(3) Limit continuous current per module so that module power does not exceed 1440 VA.

Relay Contact Ratings

Catalog Number	Maximum Volts		Amperes[1]		Amperes[3] Continuous	Volt-Amperes	
			Make	Break		Make	Break
1746-OW4 1746-OW8 1746-OW16	AC	240V AC	7.5 A	0.75 A	2.5 A	1800 VA	180 VA
		120V AC	15 A	1.5 A			
	DC	125V DC	0.22 A[2]		1.0 A	28 VA	
		24V DC	1.2 A[2]		2.0 A		
1746-OX8	AC	240V AC	15 A	1.5 A	5.0 A	3600 VA	360 VA
		120V AC	30 A	3.0 A			
	DC	125V DC	0.22 A[2]		1.0 A	28 VA	
		24V DC	1.2 A[2]		2.0 A		

(1) Connecting surge suppressors across your external load extends the life of SLC 500 relay contacts. For recommended surge suppression when switching ac inductive loads, consult the SLC 500 Modular Hardware Style User Manual, publication 1746-UM011. Recommended surge suppression for switching 24V dc inductive loads is 1N4004 diode reverse wired across the load.

(2) For dc voltage applications, the make/break ampere rating for relay contacts can be determined by dividing the 28 VA by the applied dc voltage. For example, 28 VA/48V DC= 0.58 A for DC voltage applications less than 14V, the make/break ratings for relay contacts cannot exceed 2 A.

(3) The continuous current per module must be limited so the module power does not exceed 1440 VA.

Combination I/O Modules

Specifications	1746-IO4	1746-IO8	1746-IO12	1746-IO12DC
Number of inputs	2	4	6	6
Number of outputs	2	4	6	6
Points per common	2	4	6	6
Voltage category	120V AC (inputs) 100/120V AC (relay contact outputs)			10…30V DC (inputs) 5…265V AC @ 47…63 Hz / 5…125V DC (outputs)
Operating voltage range	85…132V AC @ 47…63 Hz (inputs) 5…265V AC @ 47…63 Hz / 5…125V DC (outputs)			10…30V DC (inputs) 5…265V AC @ 47…63 Hz / 5…125V DC (outputs)
Backplane current (mA) @ 5V	30 mA	60 mA	90 mA	80 mA
Backplane current (mA) @ 24V	25 mA	45 mA	70 mA	60 mA
Continuous current per point	See Relay Contact Ratings for 1746-OW4 on page 16		See Relay Contact Ratings for 1746-OW16 on page 16	
Continuous current per module	4 A	8 A	8 A	8 A

1746-SIM Input Simulator

The 1746-SIM Input Simulator is designed for use on 16-channel 24V DC sinking and sourcing modules with removable terminal blocks, including 1746-IB16, 1746-ITB16, 1746-IV16, 1746-ITV16, and 1746-IN16 modules. The input simulator provides 16 switches for simulating inputs to the SLC 500.

1746 Analog I/O Modules

Analog I/O modules feature user-selectable voltage or current inputs, backplane isolation, removable terminal blocks, and diagnostic feedback.

The 1746-NI4, 1746-NIO4I, and 1746-NIO4V input channels are filtered to reject high frequency noise and provide 14- to 16-bit (range-dependent) resolution.

All 4-channel analog output modules provide 14-bit resolution and a 2.5 ms conversion rate.

The 1746-FIO4I and 1746-FIO4V modules have less input filtering and can sense more rapidly changing inputs. However, their input resolution is only 12-bit. Because the input filter on the 1746-FIO4I or 1746-FIO4V module may pass more electrical noise, you should thoroughly ground and shield the input transducer, its power supply, and cables.

The 1746-NI8 module provides high accuracy and fast analog signal conversion. The 1746-NI8, 1746-NI16I and 1746-NI16V modules are high density analog input modules that are software configurable.

The 1746-NO8I (current output) and 1746-NO8V (voltage output) modules are high density, analog output modules that provide 8 individually configurable output channels with 16-bit resolution.

Analog I/O Module Overview

Catalog Number	Description	Voltage Category	For specifications, see
1746-NI4	High Resolution (4) Analog Input Module	-20…+20 mA (or) -10…+10V DC	page 19: General Input Specifications page 19: Current Loop Input Specifications page 20: Voltage Input Specifications
1746-NI8	High Resolution (8) Analog Input Module	-20…+20 mA (or) -10…+10V DC	page 22: General input specifications page 22: Input step response page 23: Current loop input specifications page 23: Voltage input specifications
1746-NI16I[1]	High Resolution (16) Analog Input Module	-20…+20 mA	page 25: General input specifications page 26: Module update times
1746-NI16V[1]	High Resolution (16) Analog Input Module	-10…+10V DC	
1746-NIO4I	High Resolution (2) Analog Input, (2) Analog Current Output Module	-20…+20 mA (or) -10…+10V DC (inputs) 0…20 mA (outputs)	page 19: General Input Specifications page 19: Current Loop Input Specifications page 20: Voltage Output Specifications
1746-NIO4V	High Resolution (2) Analog Input, (2) Analog Voltage Output Module	20…+20 mA (or) -10…+10V DC (inputs) -10…+10V DC (outputs)	
1746-FIO4I	(2) Fast Analog Input, (2) Analog Current Output Module	0…20 mA (or) 0…10V DC (inputs) 0…20 mA (outputs)	page 19: General Input Specifications page 19: Current Loop Input Specifications page 20: Voltage Input Specifications
1746-FIO4V	(2) Fast Analog Input, (2) Analog Voltage Output Module	0…20 mA	page 20: Output specifications
1746-NIO4I	(4) Analog Current Output Module	-10…+10V DC	page 20: Output specifications
1746-NIO4V	(4) Analog Voltage Output Module	0…20 mA	page 20: Output specifications
1746-NO8I	(8) Analog Current Output Module	-10…+10V DC	page 24: Output specifications
1746-NO8V	(8) Analog Voltage Output Module	-10…+10V DC	page 24: Output specifications

(1) Single-ended connections only.

4-Channel Analog I/O Modules

General Input Specifications for 4-Channel Modules

Specification	1746-NI4	1746-NIO4I	1746-NIO4V	1746-FIO4I	1746-FIO4V
Backplane current (mA) @ 5V	25 mA	55 mA	55 mA	55 mA	55 mA
Backplane current (mA) @ 24V	85 mA	145 mA	115 mA	150 mA	120 mA
Number of inputs	4	2	2	2	2
Backplane isolation	500V AC and 710V DC withstand for 1 minute				
Step response	60 ms			100 µs	

General Input Specifications for 4-Channel Modules

Specification	1746-NI4	1746-NIO4I	1746-NIO4V	1746-FIO4I	1746-FIO4V
Conversion method	sigma-delta modulation			successive approximation	
Converter resolution	16 bit			12 bit	
Conversion time	N/A			7.5 µs every 512 µs (nominal)	
Module throughput delay	512 µs (nominal)			1.10 ms (maximum)[1] 512 µs (typical)	

(1) Worst-case throughput occurs when the module just misses an event.

Current Loop Input Specifications for 4-Channel Modules

Specification	1746-NI4	1746-NIO4I	1746-NIO4V	1746-FIO4I	1746-FIO4V
Full scale	20 mA	20 mA	20 mA	20 mA	20 mA
Input range	±20 mA (nominal) ±30 mA (maximum)			0…20 mA (nominal) for 0…30 mA (maximum)	
Current input coding	±16,384 for ±20mA			0…2047 counts for 0…20 mA	
Absolute maximum input voltage	±7.5V DC or 7.5V AC RMS				
Input Impedance	250 Ω (nominal)			250 Ω (nominal)	
Resolution	1.22070 µA per LSB			9.7656 µA per bit	
Overall accuracy @ 25 °C (77 °F)	±0.365% of full scale			±0.510% of full scale	
Overall accuracy, 0…60 °C (32…140 °F)	±0.642% of full scale (maximum)			±0.850% of full scale	
Overall accuracy drift	+79 ppm/°C of full scale			+98 ppm/°C of full scale (maximum)	
Gain error @ 25 °C (77 °F)	+0.323% (maximum)			+0.400% (maximum)	
Gain error, 0…60 °C (32…140 °F)	+0.556% (maximum)			+0.707% of full scale	
Gain error drift	±67 ppm/°C			±89 ppm/°C (maximum)	

Voltage Input Specifications for 4-Channel Modules

Specification	1746-NI4	1746-NIO4I	1746-NIO4V	1746-FIO4I	1746-FIO4V
Full Scale	10V DC	10V DC	10V DC	10V DC	10V DC
Input Range	±10V DC -1 LSB			0…10V DC -1 LSB	
Input Impedance	1 MΩ				
Overvoltage Protection (IN+ to -IN)	220V DC or AC RMS continuously			220V dc or ac RMS continuously	
Resolution	305.176 µV per LSB			2.4414 mV per LSB (nominal)	
Voltage input coding	-32,768…+32,767 for +10V DC			0…4095 counts for 0…10V DC	
Overall accuracy @ 25 °C (77 °F)	±0.284% of full scale			±0.440% of full scale	
Overall Accuracy, 0…60 °C (32…140 °F)	±0.504% of full scale			±0.750% of full scale	

Relay Master and Expander 40-Terminal XIMs

Description	Catalog Number	I/O Module Catalog Number 1746-				
		IB32	**IV32**	**OB32**	**OB32E**	**OV32**
Relay Master						
40-pin master with eight (8) 24V DC relays	1492-XIM4024-8R	–	–	H	H	–
40-pin master with sixteen (16) 24V DC relays	1492-XIM4024-16R	–	–	H	H	–
40-pin master with sixteen (16) 24V DC relays with fusing	1492-XIM4024-16RF	–	–	H	H	–
Relay Expander						
Expander with eight (8) 24V DC relays	1492-XIM24-8R	–	–	(1)	(1)	–
Expander with eight (8) 120V AC relays	1492-XIM120-8R	–	–	–	–	–
Expander with sixteen (16) 24V DC relays with fusing	1492-XIM24-16RF	–	–	(2)	(2)	–
Fusible Expander						
8-channel expander with 24V DC blown fuse indicators	1492-XIMF-F24-2	–	–	(1)	(1)	–
8-channel expander with 120V AC blown fuse indicators	1492-XIMF-F120-2	–	–	–	–	–
Feed-through Expander						
Expander with eight (8) feed-through channels 132V AC/DC max	1492-XIMF-2	–	–	(1)	(1)	–

(1)   Two or three expanders can be connected to a master to provide a total of 32 outputs. An extender cable is included with each expander to connect it to the master.

(2)   Can have one expandable module per master.

Pre-Wired Cables for 1746 Digital I/O Modules

These pre-wired cables have a pre-wired removable terminal block (RTB) on one end to connect to the front of a Bulletin 1746 digital I/O module and a connector on the other end to plug into a 20- or 40-terminal IFM/XIM. You must first select the IFM/XIM from one of the preceding selection tables.

Cable Catalog Number	Standard Cable Lengths	Build to Order Available	Number of Conductors	Mating I/O Module Catalog Number
1492-CABLE[1]A	0.5, 1.0, 2.5, 5.0 m	Yes	20	1746-IA16, -IM16
1492-CABLE[1]B	0.5, 1.0, 2.5, 5.0 m	Yes	20	1746-IB16, -IH16, -IN16, -ITB16, -ITV16
1492-CABLE[1]C	0.5, 1.0, 2.5, 5.0 m	Yes	20	1746-OA16
1492-CABLE[1]CR	0.5, 1.0, 2.5, 5.0 m	Yes	20	1746-OA16
1492-CABLE[1]D	0.5, 1.0, 2.5, 5.0 m	Yes	20	1746-OW16, -OX8
1492-CABLE[1]E	0.5, 1.0, 2.5, 5.0 m	Yes	20	1746-IG16, -OB16, -OB16E, -OBP16, -OG16, -OV16, -OVP16

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