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SLC 500 SYSTEMS

SELECTION GUIDE





BULLETIN 1746 AND 1747

ALLEN-BRADLEY • ROCKWELL SOFTWARE

Rockwell Automation

1746-OB16E, 1746-OB6EI, and 1746-OB32E modules provide electronic protection from short circuit and overload conditions.

Wiring of 16 and 32-channel modules can also be accomplished with a bulletin 1492 interface module and pre-wired cable. All 16-channel I/O modules and catalog numbers 1746-OX8, 1746-OBP8, 1746-OAP12, 1746-IO12 are equipped with color-coded removable terminal blocks.

Digital I/O Module Overview

Catalog Number	Voltage Category	I/O Points	Description	For Detailed Specifications, See
DC Modules				
1746-IB8	24V DC	8	Current Sinking DC Input Module	Sinking DC Input Modules page 11
1746-IB16	24V DC	16	Current Sinking DC Input Module	
1746-IB32	24V DC	32	Current Sinking DC Input Module	
1746-ITB16	24V DC	16	Fast Response DC Sinking Input Module	
1746-IC16	48V DC	16	Current Sinking DC Input Module	
1746-IH16	125V DC	16	Current Sinking DC Input Module	
1746-IV8	24V DC	8	Current Sourcing DC Input Module	Sourcing DC Input Modules page 12
1746-IV16	24V DC	16	Current Sourcing DC Input Module	
1746-IV32	24V DC	32	Current Sourcing DC Input Module	
1746-ITV16	24V DC	16	Fast Response DC Sourcing Input Module	
1746-IG16[1]	5V DC	16	Current Sourcing TTL Input Module	
1746-OB6EI	24V DC	6	Electronically Protected Isolated Sourcing DC Output Module	Sourcing DC Output Modules page 13
1746-OB8	24V DC	8	Current Sourcing DC Output Module	
1746-OB16	24V DC	16	Current Sourcing DC Output Module	
1746-OB16E	24V DC	16	Electronically Protected Current Sourcing DC Output Module	
1746-OB32	24V DC	32	Current Sourcing DC Output Module	
1746-OB32E	24V DC	32	Electronically Protected Current Sourcing DC Output Module	
1746-OBP8	24V DC	8	High Current Sourcing DC Output Module	
1746-OBP16[2]	24V DC	16	High Current Sourcing DC Output Module	
1746-OV8	24V DC	8	Current Sinking DC Output Module	Sinking DC Output Modules page 12
1746-OV16	24V DC	16	Current Sinking DC Output Module	
1746-OV32	24V DC	32	Current Sinking DC Output Module	
1746-OVP16[2]	24V DC	16	High Current Sinking DC Output Module	
1746-OG16[1]	5V DC	16	Current Sinking TTL Output Module	
AC Modules				

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

Sinking DC Input Modules

Specifications	1746-IB8	1746-IB16	1746-IB32	1746-IC16	1746-IH16(1)	1746-ITB16
Voltage, Off-State Input, max.	5.0V DC			10V DC	20V DC	5V DC
Nominal Input Current	8 mA @ 24V DC		5.1 mA @ 24V DC	4.1 mA @ 48V DC	2.15 mA @ 125V DC 2.25 mA @ 132V DC	8 mA @ 24V DC
Current, Off-State Input, Max.	1 mA		1.5 mA		0.8 mA	1.5 mA
Signal On Delay, Max	8 ms max		3 ms max	4 ms max	9 ms max	0.30 ms max
Signal Off Delay, Max	8 ms max		3 ms max	4 ms max	9 ms max	0.50 ms max

(1) If the input module is connected in parallel with an inductive load, use surge suppression across the load to protect the input module from damage caused by reverse voltage. Refer to the SLC 500 Modular Hardware Style User Manual, publication 1747-UM011, for more information on surge suppression.

(2) Maixumum Points ON Simultaneously: 16 @ 146V DC and 30 °C (86 °F); 12 @ 146V DC and 50 °C (122 °F); 14 @ 132V DC and 55 °C (131 °F); 16 @ 125V DC and 60 °C (140 °F).

Sourcing DC Input Modules

Specifications	1746-IG16	1746-IV8	1746-IV16	1746-IV32	1746-ITV16
Number of inputs	16	8	16	32	16
Points per common	16	8	16	8	16
Voltage category	5V DC	24V DC	24V DC	24V DC	24V DC
Operating voltage range	4.5…5.5V DC(1)	10…30V DC		15…30V DC@ 50 °C (122 °F) 15…26.4V DC@ 60 °C (140 °F)	10…30V DC
Backplane current (mA) @ 5V	140 mA	50 mA	85 mA	50 mA	85 mA
Backplane current (mA) @ 24V	0 mA	0 mA	0 mA	0 mA	0 mA
Voltage, off-state input, max.	2…5.5V DC	5.0V DC	5.0V DC	5.0V DC	5.0V DC
Nominal input current	3.7 mA @ 5V DC	8 mA @ 24V DC		5.1 mA @ 24V DC	8 mA @ 24V DC
Current, off-state input, max.	4.1 mA	1 mA		1.5 mA	1.5 mA
Signal on delay, max	0.25 ms max	8 ms max		3 ms max	0.30 ms max
Signal off delay, max	0.50 ms max	8 ms max		3 ms max	0.50 ms max(2)

(1) 50 mV peak-to-peak ripple (max.)

(2) Typical signal delay for this module: ON = 0.1 ms, OFF = 0.25 ms @ 24V DC.

Sinking DC Output Modules

Specifications	1746-OG16	1746-OV8	1746-OV16	1746-OV32	1746-OVP16(5)
Number of outputs	16	8	16	32	16
Points per common	16	8	16	16	16
Voltage category	5V DC	24V DC			
Operating voltage range	4.5…5.5V DC(2)	10…50V DC		5…50V DC	20.4…26.4V DC
Backplane current (mA) @ 5V	180 mA	135 mA	270 mA	190 mA	250 mA
Backplane current (mA) @ 24V	0 mA	0mA	0 mA	0 mA	0 mA

Sinking DC Output Modules

Specifications	1746-OG16	1746-OV8	1746-OV16	1746-OV32	1746-OVP16[5]
Voltage drop, on-state output, max.	—	1.2V @ 1.0 A	1.2V @ 0.5 A	1.2V @ 0.5 A	1.0 V @ 1.0 A
Load current, min.	0.15 mA	1 mA	1 mA	1 mA	1 mA
Leakage current, off-state output,max	0.1 mA	1 mA[3]	1 mA[3]	1 mA[3]	1 mA[3]
Signal On Delay, max (resistive load)	0.25 ms	0.1 ms	0.1 ms	0.1 ms	0.1 ms[6]
Signal Off Delay, max (resistive load)	0.50 ms	1.0 ms	1.0 ms	1.0 ms	1.0 ms
Continuous current per module	N/A	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	24 mA	1.0 A @ 30 °C (86 °F) 0.5 A @ 60 °C (140 °F)	0.50 A @30 °C (86 °F) 0.25 A @60 °C (140 °F)[4]	0.50 A @ 30 °C 0.25 A @ 60 °C	1.5 A @ 30 °C (86 °F) 1.0 A @ 60 °C (140 °F)[7]
Surge current per point for 10 ms[1]	N/A	3.0 A		1.0 A @ 30 °C (86 °F) 1.0 A @ 60 °C (140 °F)	4.0 A[8]

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

(2) 50 mV peak to peak ripple, max.

(3) To limit the effects of leakage current through solid-state outputs, a loading resistor can be connected in parallel with your load. For transistor outputs, 24V DC operation, use a 5.6 K Ω, 1/2 W resistor.

(4) Recommended surge suppression: For transistor outputs, when switching 24V DC inductive loads, use a 1N4004 diode reverse-wired across the load. Refer to the SLC 500 Modular Hardware Style User Manual, publication 1747-UM011, for more information on surge suppression.

(5) The 1746-OVP16 module features a fused common and blown fuse LED indicator.

(6) Fast turn-off modules provide fast OFF delay for inductive loads. Fast turn-off delay for inductive loads is accomplished with surge suppressors on this module. 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. Comparative OFF delay times for 1746-OB8, 1746-OV8 and fast turn-off modules, when switching Bulletin 100-B110 (24 W sealed) contactor, are: 1746-OB8 and 1746-OV8 modules OFF delay = 152 ms; fast turnoff modules OFF delay = 47 ms.

(7) Fast off-delay for inductive loads is accomplished with surge suppressors on the 1746-IB6EI and 1746-OBP8 series B and later, 1746-OB16E series B and later, 1746-OBP16 and 1746-OVP16 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.

(8) Surge current = 32 A per module for 10 ms.

Sourcing DC Output Modules

Specifications	1746-OB6EI	1746-OB8	1746-OB16	1746-OB16E	1746-OB32	1746-OB32E	1746-OBP8[4]	1746-OBP16
Number of outputs	6 Electronically Protected	8	16	16 Electronically Protected	32	32 Electronically Protected	8	16[5]
Points per common	Individually isolated	8	16	16	16	16	4	16
Voltage category	24V DC							
Operating voltage range	10 …30V DC	10…50V DC		10…30V DC	5…50V DC	10…30V DC	20.4…26.4V DC	
Backplane current (mA) @ 5V	46 mA	135 mA	280 mA	135 mA	190 mA		135 mA	250 mA
Backplane current (mA) @ 24V	0 mA	0 mA	0 mA	0 mA	0 mA	0 mA	0 mA	0 mA

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	

Digital Input Modules

Catalog Number	Backplane Current (mA) @ 5V	Backplane Current (mA) @ 24V	Watts per point	Thermal dissipation, min.	Thermal dissipation, max.
1746-ITV16	85 mA	0 mA	0.200 W	0.425 W	3.625 W
1746-IV8	50 mA	0 mA	0.200 W	0.250 W	1.90 W
1746-IV16	85 mA	0 mA	0.200 W	0.425 W	3.60 W
1746-IV32	106 mA	0 mA	0.200 W	0.530 W	6.90 W

(1) Power supply loading for series D and later modules.

Digital Output Modules

Catalog Number	Backplane Current (mA) @ 5V	Backplane Current (mA) @ 24V	Watts per point	Thermal dissipation, min.	Thermal dissipation, max.
1746-OA8	185 mA	0 mA	1.00 W	0.925 W	9.00 W
1746-OA16	370 mA	0 mA	0.462 W	1.85 W	9.30 W
1746-OAP12	370 mA	0 mA	1.00 W	1.85 W	10.85 W
1746-OB8	135 mA	0 mA	0.775 W	0.675 W	6.90 W
1746-OB16	280 mA	0 mA	0.338 W	1.40 W	7.60 W
1746-OB32[1]	190 mA	0 mA	0.078 W	2.26 W	4.80 W
1746-OBP8	135 mA	0 mA	0.300 W	0.675 W	3.08 W
1746-OBP16	250 mA	0 mA	0.310 W	1.25 W	6.21 W
1746-OB16E	135 mA	0 mA	0.338 W	1.40 W	7.60 W
1746-OB32E	190 mA	0 mA	0.078 W	2.26 W	4.80 W
1746-OG16	180 mA	0 mA	0.033 W	0.90 W	1.50 W
1746-OV8	135 mA	0 mA	0.775 W	0.675 W	6.90 W
1746-OV16	270 mA	0 mA	0.338 W	1.40 W	7.60 W
1746-OV32[1]	190 mA	0 mA	0.078 W	2.26 W	4.80 W
1746-OVP16	250 mA	0 mA	0.310 W	1.25 W	6.21 W
1746-OW4	45 mA	45 mA	0.133 W	1.31 W	1.90 W
1746-OW8	85 mA	90 mA	0.138 W	2.59 W	3.70 W
1746-OW16	170 mA	180 mA	0.033 W	5.17 W	5.70 W
1746-OX8	85 mA	90 mA	0.825 W	2.59 W	8.60 W

(1) Power supply loading for series D and later modules.

Digital Combination Modules

Catalog Number	Backplane Current (mA) @ 5V	Backplane Current (mA) @ 24V	Watts per point	Thermal dissipation, min.	Thermal dissipation, max.
1746-IO4	30 mA	25 mA	0.270 W per input point 0.133 W per output point	0.75 W	1.60 W
1746-IO8	60 mA	45 mA	0.270 W per input point 0.133 W per output point	1.38 W	3.00 W
1746-IO12	90 mA	70 mA	0.270 W per input point 0.133 W per output point	2.13 W	4.60 W
1746-IO12DC	80 mA	60 mA	0.200 W per input point 0.133 W per output point	1.84 W	3.90 W

Analog Input Modules

Catalog Number	Backplane Current (mA) @ 5V	Backplane Current (mA) @ 24V	Watts per point	Thermal dissipation, min.	Thermal dissipation, max.
1746-NI4	25 mA	85 mA	N/A	2.17 W	2.20 W
1746-NI8	200 mA	100 mA	N/A	3.4 W	3.4 W
1746-NI16I	125 mA	75 mA	N/A	2.43 W	2.43 W
1746-NI16V	125 mA	75 mA	N/A	3.76 W	3.8 W

Analog Output Modules

Catalog Number	Backplane Current (mA) @ 5V	Backplane Current (mA) @ 24V	Watts per point	Thermal dissipation, min.	Thermal dissipation, max.
1746-NO4I	55 mA	195 mA	N/A	4.96 W	5.00 W
1746-NO4V	55 mA	145 mA	N/A	3.04 W	3.80 W
1746-NO8I	120 mA	250 mA(1)	N/A	3.76 W	6.6 W
1746-NO8V	120 mA	160 mA(1)	N/A	3.04 W	4.44 W

(1) With jumper set to RACK, otherwise 0.000.

Analog Combination Modules

Catalog Number	Backplane Current (mA) @ 5V	Backplane Current (mA) @ 24V	Watts per point	Thermal dissipation, min.	Thermal dissipation, max.
1746-FIO4I	55 mA	150 mA	N/A	3.76 W	3.80 W
1746-FIO4V	55 mA	120 mA	N/A	3.04 W	3.10 W
1746-NIO4I	55 mA	145 mA	N/A	3.76 W	3.80 W
1746-NIO4V	55 mA	115 mA	N/A	3.04 W	3.10 W