



Discrete Input and Output Modules

(Catalog Numbers 1746-IA4, -IA8, -IA16, -IB8, -IB16, -IB32, -IC16, -IG16, -IH16, -IM4, -IM8, -IM16, -IN16, -ITB16, -ITV16, -IV8, -IV16, -IV32, -OA8, -OA16, -OAP12, -OB8, -OBP8, -OB16, -OB16E, -OBP16, -OB32, -OG16, -OV8, -OV16, -OVP16, -OV32, -OW4, -OW8, -OW16, -OX8, -IO4, -IO8, -IO12)

Product Data



Our wide variety of input, output, and combination modules makes the SLC 500™ family the smart choice for all of your small PLC applications. I/O modules are available in a wide variety of densities including 4-, 8-, 16-, and 32-point and can interface to AC, DC, and TTL voltage levels. Output modules are available with solid state AC, solid state DC, and relay contact type outputs. For added flexibility, combination modules are also available in 2-input/2-output, 4-input/4-output, and 6-input/6-output versions.

Designed and tested for industrial applications, our modules are of the highest quality. The modules feature input filtering, optical isolation, and built-in surge protection to enhance the reliability of operation in noisy industrial environments.

Class I, Division 2 certified by UL and CSA. CE compliant. All modules are UL 508 listed and CSA 22.2 142 approved and meet Class I, Division 2 hazardous location requirements of both Underwriter’s Laboratory and the Canadian Standards Association (except for those noted in the module summary on page 2). For use within the European Union or EEA regions, most modules have been tested to meet Council Directive 89/336 Electromagnetic Compatibility (exceptions are listed on page 2).

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Discrete I/O Module Summary

ID Code	Voltage Category	Cat. No.	Input/Output	I/O Points	Module Description	Page
AC Modules						
100	100/120V ac	1746-IA4	Input	4	120V ac Input Module	16
300	100/120V ac	1746-IA8	Input	8	120V ac Input Module	16
500	100/120V ac	1746-IA16	Input	16	120V ac Input Module	16
101	200/240V ac	1746-IM4	Input	4	240V ac Input Module	16
301	200/240V ac	1746-IM8	Input	8	240V ac Input Module	16
501	200/240V ac	1746-IM16	Input	16	240V ac Input Module	16
2703	100/120V ac	1746-OA8	Output	8	120/240V ac Output Module	18
2903	100/120V ac	1746-OA16	Output	16	120/240V ac Output Module	18
2803	120/240V ac	1746-OAP12 ^①	Output	12	High Current 120/240V ac Output Module	18
DC Modules						
306	24V dc	1746-IB8	Input	8	Current Sinking DC Input Module	20
506	24V dc	1746-IB16	Input	16	Current Sinking DC Input Module	20
706	24V dc	1746-IB32 ^①	Input	32	Current Sinking DC Input Module	20
519	24V dc	1746-ITB16	Input	16	Fast Response DC Sinking Input Module	20
509	48V dc	1746-IC16	Input	16	Current Sinking DC Input Module	20
507	125V dc	1746-IH16	Input	16	Current Sinking DC Input Module	20
320	24V dc	1746-IV8	Input	8	Current Sourcing DC Input Module	24
520	24V dc	1746-IV16	Input	16	Current Sourcing DC Input Module	24
720	24V dc	1746-IV32 ^①	Input	32	Current Sourcing DC Input Module	24
518	24V dc	1746-ITV16	Input	16	Fast Response DC Sourcing Input Module	24
515	5V dc/TTL	1746-IG16 ^②	Input	16	Current Sourcing TTL Input Module	28
2713	24V dc	1746-OB8	Output	8	Current Sourcing DC Output Module	29
2913	24V dc	1746-OB16	Output	16	Current Sourcing DC Output Module	29
2920	24V dc	1746-OB16E ^{①③}	Output	16	Current Sourcing DC Output Module	29
3113	24V dc	1746-OB32 ^①	Output	32	Current Sourcing DC Output Module	29
2721	24V dc	1746-OBP8 ^③	Output	8	High Current Sourcing DC Output Module	32
2921	24V dc	1746-OBP16 ^①	Output	16	High Current Sourcing DC Output Module	32
2714	24V dc	1746-OV8	Output	8	Current Sinking DC Output Module	34
2914	24V dc	1746-OV16	Output	16	Current Sinking DC Output Module	34
3114	24V dc	1746-OV32 ^①	Output	32	Current Sinking DC Output Module	34
2922	24V dc	1746-OVP16 ^①	Output	16	High Current Sinking DC Output Module	37
2915	5V dc/TTL	1746-OG16 ^②	Output	16	Current Sinking TTL Output Module	38

ID Code	Voltage Category	Cat. No.	Input/Output	I/O Points	Module Description	Page
AC/DC Modules						
510	24V ac/dc	1746-IN16	Input	16	24V ac/dc Input Module	39
2500	AC/DC Relay	1746-OW4 ^①	Output	4	Relay (Hard Contact) Output Module	40
2700	AC/DC Relay	1746-OW8 ^①	Output	8	Relay (Hard Contact) Output Module	40
2900	AC/DC Relay	1746-OW16 ^①	Output	16	Relay (Hard Contact) Output Module	40
2701	AC/DC Relay	1746-OX8 ^①	Output	8	Isolated Relay Output Module	40
800	Inputs – 120V ac Outputs – AC/DC Relay	1746-IO4 ^①	Input/Output	2 Inputs 2 Outputs	Combination Input/Output Module	42
1100	Inputs – 120V ac Outputs – AC/DC Relay	1746-IO8 ^①	Input/Output	4 Inputs 4 Outputs	Combination Input/Output Module	42
1500	Inputs – 120V ac Outputs – AC/DC Relay	1746-IO12 ^①	Input/Output	6 Inputs 6 Outputs	Combination Input/Output Module	42

① Certified for Class I, Division 2 hazardous location by CSA only.

② Not CE marked.

③ These modules carry the C-UL mark and are certified by UL per CSA requirements.

Spectrum Controls, Inc. Modules

These modules are sold and supported by Spectrum Controls Inc., Bellevue, Washington. For additional information, contact Spectrum at (206) 746-9481.

ID Code	Voltage Category	Cat. No.	Input/Output	I/O Points	Module Description
AC Modules					
2705	120/240V ac	1746sc-OAP8I	Output	8	Isolated ac Output Module
DC Modules					
324	24V dc	1746sc-IB8I	Input	8	Isolated DC Input Module
324	48V dc	1746sc-IC8I	Input	8	48V Isolated DC Input Module
AC/DC Modules					
303	120V ac/dc	1746sc-IA8I	Input	8	Isolated ac/dc Input Module
304	220V ac/dc	1746sc-IM8I	Input	8	Isolated ac/dc Input Module

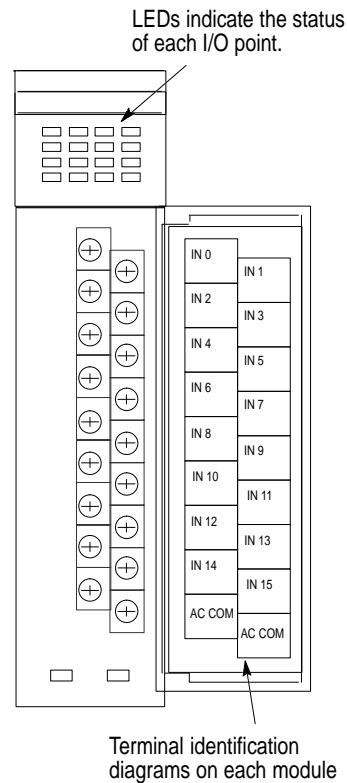
Features and Benefits

Select I/O modules to exactly match your application. Combination modules allow you to have inputs and outputs in a single slot for efficient use of your chassis space.

Expand the I/O capacity of your fixed controller system. Two discrete I/O modules can be added to the fixed controller's 2-slot expansion chassis increasing the flexibility of the system.

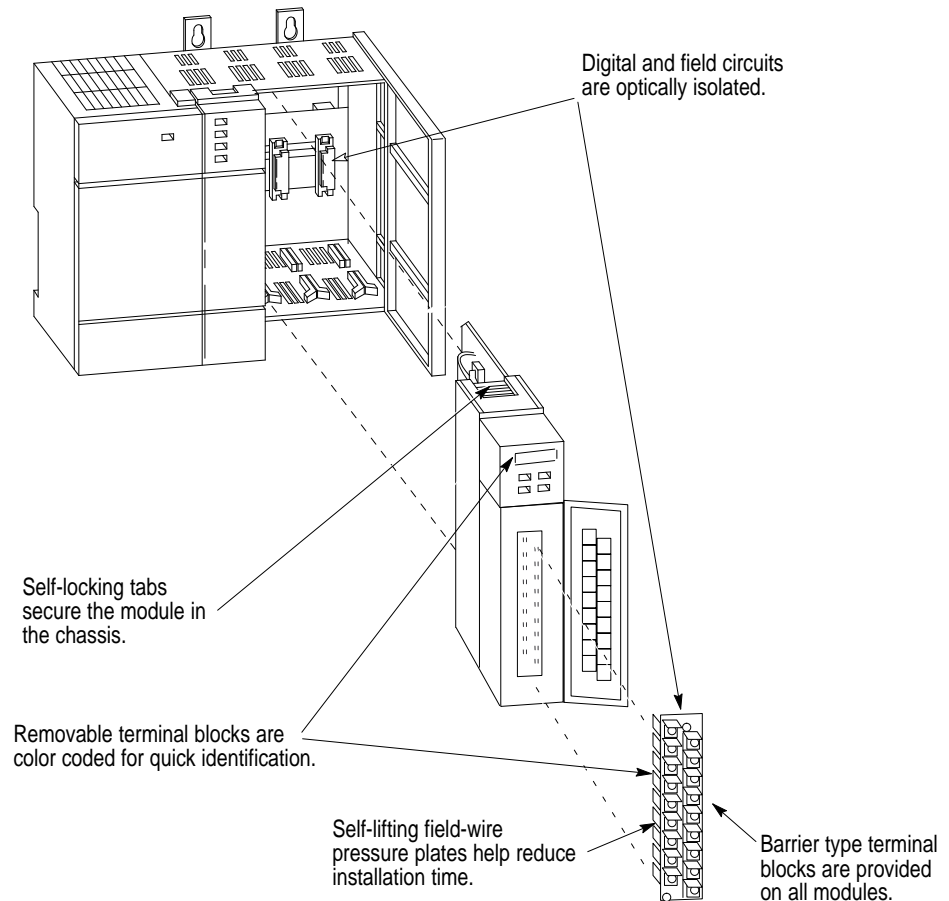
All relay contacts are Silver Cadmium with Gold overlay. Gold plating resists oxidation and tarnishing resulting from non-use. Silver Cadmium acts as an excellent conductor.

High-density 32-Point DC I/O and fast response DC inputs are available. These modules allow you to apply the SLC 500 processors in a broader spectrum of control applications.



LEDs indicate the status of each I/O point. Assisting you in troubleshooting, LEDs illuminate when the proper signal is received at an input terminal, or when the processor applies power to an output terminal.

Terminal identification diagrams on each module. Terminal identification diagrams are located on each module making terminal identification easier.



Digital and field circuits are optically isolated. All modules feature isolation between digital and field circuits, resulting in increased noise immunity and limited damage to your system due to an electrical malfunction of the field wiring.

Self-lifting field-wire pressure plates cut installation time. Wiring terminals have self-lifting pressure plates to secure two #14 AWG field wires.

Removable terminal blocks help ease the wiring task. Removable terminal blocks allow you to replace the module without rewiring it (not available on all modules).

Removable terminal blocks are color coded for quick identification. A matching color band is also provided on the front of the module to assist in matching the terminal block to the module.

Barrier-type terminal blocks provided on all modules. Each terminal block features a barrier on three sides of each terminal to help prevent accidental shorting of field wiring.

Self-locking tabs secure the module in the chassis. No tools are necessary to install or remove a module from the chassis. To install a module, you slide it into the chassis until it latches in place.

I/O Module Operation

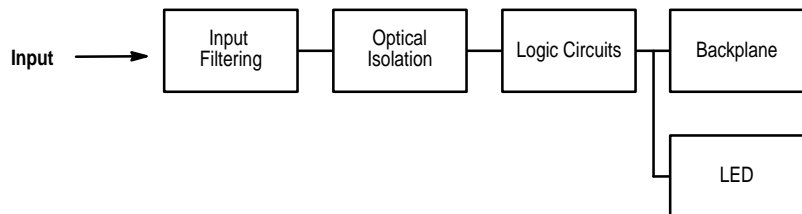
Power Supply Requirements

Discrete modules receive power through the 1746 I/O chassis backplane from the associated chassis power supply. Refer to the individual module specifications for the current required from the power supply (in mA) to operate the module. You should total the current requirements for all the modules in the chassis to avoid overloading the power supply or the I/O chassis backplane.

Input Modules

An input module responds to an input signal in the following manner:

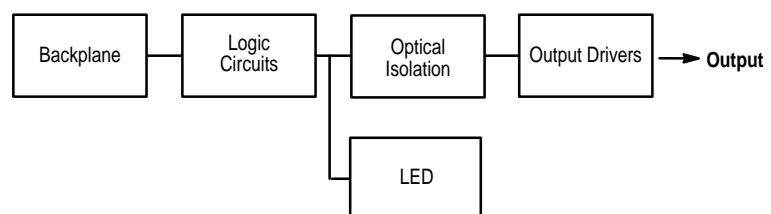
1. Input filtering limits the effect of voltage transients caused by contact bounce and/or electrical noise. If not filtered, voltage transients could produce false data. All input modules use input filtering.
2. Optical isolation shields backplane circuits and module logic circuits from possible damage due to electrical transients.
3. Logic circuits process the signal.
4. An input LED turns on or off indicating the status of the corresponding input device.



Output Modules

An output module controls the output signal in the following manner:

1. Logic circuits determine the output status.
2. An output LED indicates the status of the output signal.
3. Optical isolation separates module logic and backplane circuits from the field signal.
4. The output driver turns the corresponding output on or off.



Surge Suppression

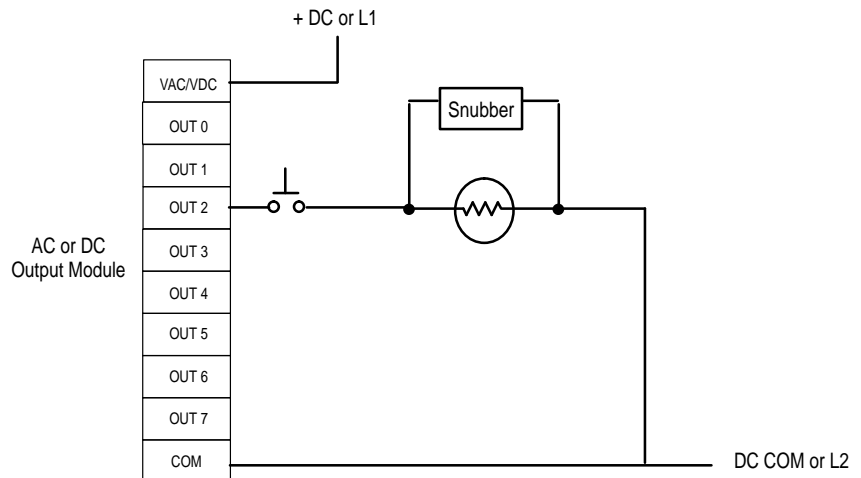
Most output modules have built-in surge suppression to reduce the effects of high-voltage transients. However, we recommend that you use an additional suppression device if an output module is being used to control an inductive device such as:

- relays
- motor starters
- solenoids
- motors

Additional suppression is especially important if your inductive device is in series with or parallel to a hard contact such as:

- pushbuttons
- selector switches

By adding a suppression device directly across the coil of an inductive device, you will reduce the effects of voltage transients caused by interrupting the current to that inductive device and prolong the life of the switch contacts. The diagram below shows an output module with a suppression device.



Recommended surge suppressors are provided in the specifications tables.

Important: Adding a suppression device across your load will defeat the fast turn-off feature of the 1746-OB16E Series B and later, -OBP8 Series B and later, -OBP16, and -OVP16 DC output modules. Refer to pages 29, 32, and 37 for more information about suppression when using the 1746-OB16E, -OBP8, -OBP16, and -OVP16, respectively.

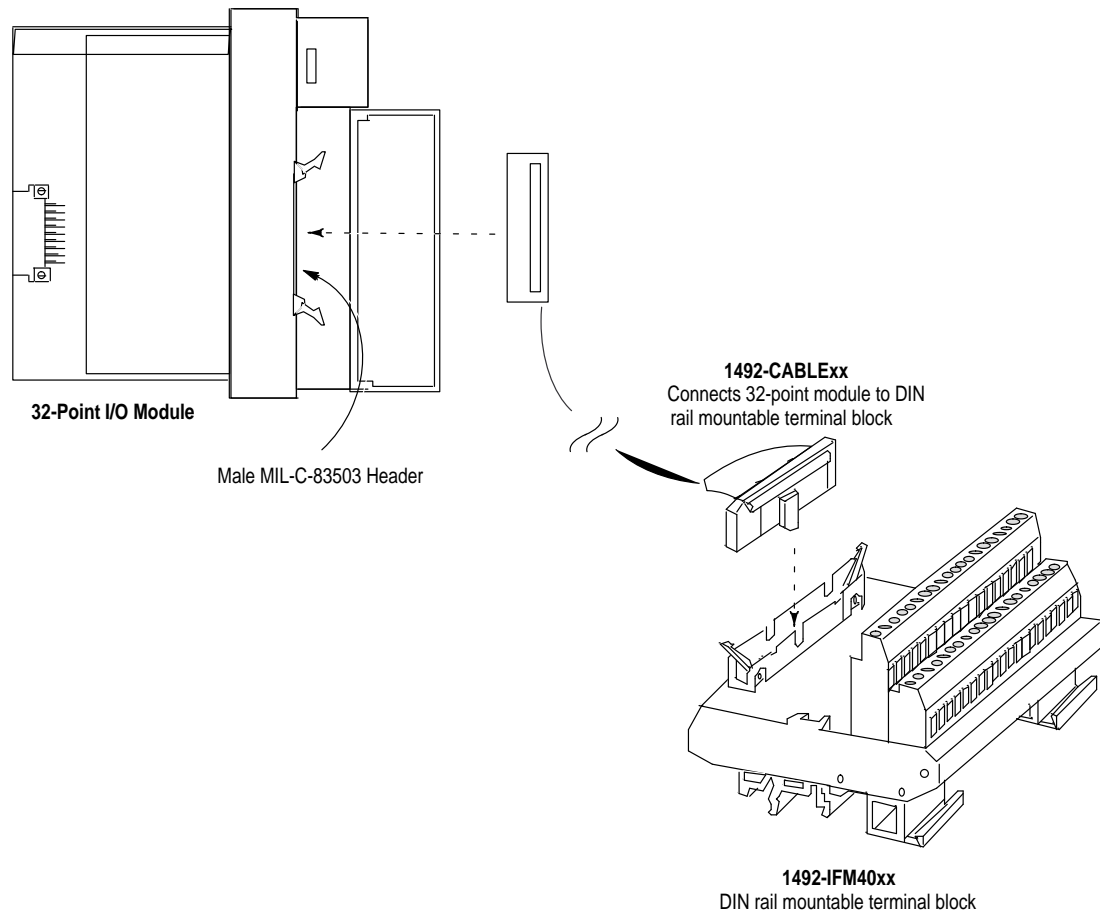
Enhanced Discrete I/O Modules

32-Point Modules (1746-IB32, -IV32, -OB32, -OV32)

The 32-point I/O modules allow you to reduce panel space requirements by wiring 32 DC input or 32 DC output devices to a module residing in one slot. These modules can be used with both modular chassis systems or fixed controllers.

The 32-point modules come equipped with a 40-pin male connector on the front instead of screw terminals. This connector is designed to accept your cable fitted with the 1746-N3 mating connector. One 1746-N3 connector and 45 crimp-type contacts are packaged with each module. The other end of the cable can be wired to a user-supplied terminal block.

As an alternative, 1492 prewired cables, purchased separately, can be used to connect the 32-point modules to 1492 interface modules. For more information, refer to the *Accessories* section on page 47.



Fast Response Input Modules (1746-ITB16, -ITV16)

The fast response DC input modules provide 16 input points and are designed for high-speed applications requiring fast response to input signals from DC sensing devices. When used with an SLC 5/03™ or higher processor and the Discrete Input Interrupt (DII) instruction (100 µsec polling), pulses can be read up to a frequency of 1K Hz. (It is 2K Hz if the input signals are from a gray code encoder.) Recommended wiring to an Allen-Bradley 845D Absolute Gray Code Encoder is provided on page 27.

Both sinking and sourcing versions of the fast response input module are available.

High-Current Solid-State Output Modules (1746-OBP8, -OAP12, -OBP16, -OVP16)

High-current solid-state output modules expand application coverage for the SLC 500 by providing the following enhanced functionality:

- increased current rating
- fuse protection and diagnostics
- high-speed switching
- excellent reliability

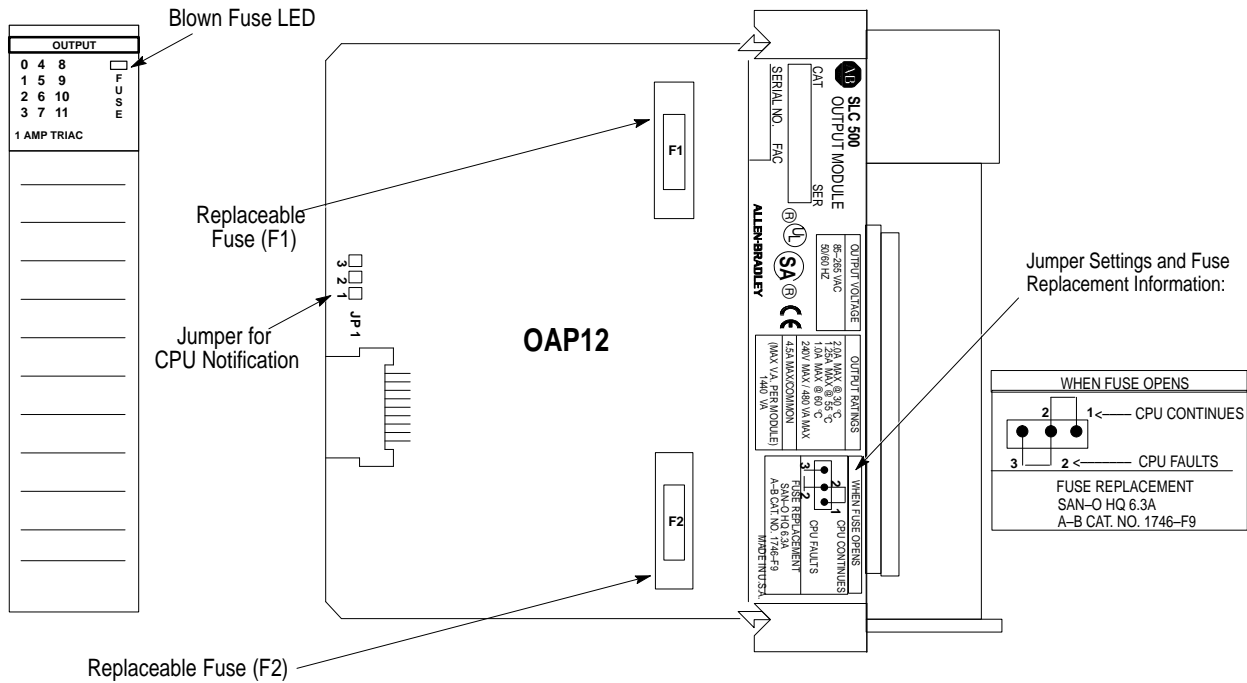
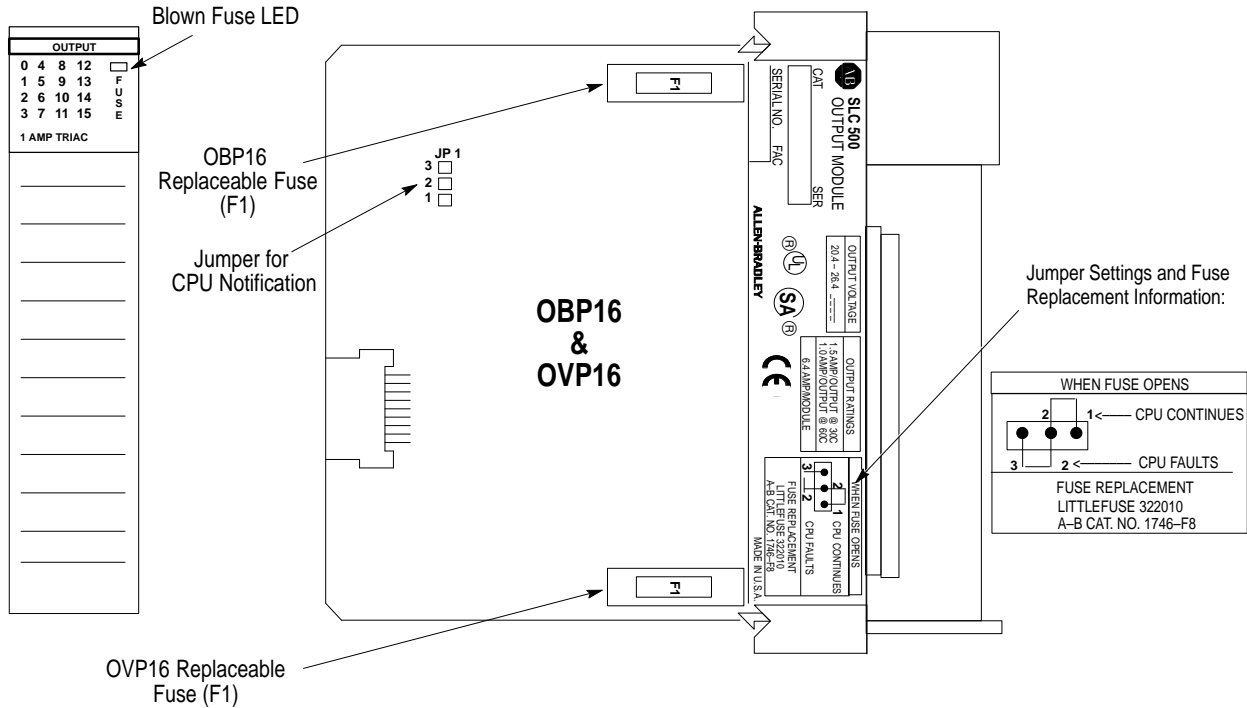
The high current solid state output modules expand application coverage in automotive, packaging, and material handling applications by allowing the SLC 500 processor to directly control solenoids, contactors, motors, and motor starter loads (up to size 5) with continuous current requirements of up to 1A at 60°C (1746-OAP12, -OBP16, -OVP16) and 2.0A at 60°C (1746-OBP8).

1746-OAP12, -OBP16, and -OVP16 modules also provide fuse protection and blown fuse diagnostics for increased up-time. The ac output module includes two replaceable fuses (one per common), which protect the module in the event of short circuits.

1746-OBP16 and -OVP16 output modules include a replaceable fuse on the common providing short circuit protection for wiring (16 AWG or larger) to external loads. A jumper can be set on these modules to provide CPU notification and system shutdown if the module fuse blows. The modules also include a blown fuse LED to assist I/O troubleshooting.

Inductive load turn-off time for 1746-OBP8 (Series B and later), -OBP16 and -OVP16 DC output modules is reduced by 70% over standard 1746 DC output modules allowing fast application cycle times.

Innovative heat sink design for the OAP12 allows heat to be dissipated through the chassis frame metal providing cool operation and excellent reliability.



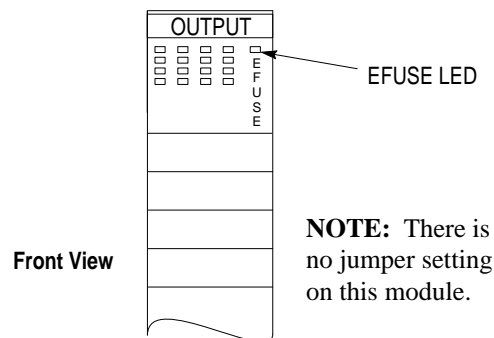
Electronically Protected Output Module (1746-OB16E)

The 1746-OB16E is designed to electronically protect the module from a short circuit or overload condition. The protection is based on a thermal cut-out principle. In the event of a short circuit or overload on an output channel, that channel limits the current within milliseconds after its thermal cut-out temperature has been reached. All other channels continue to operate as directed by the processor.

The 1746-OB16E lowers maintenance costs by eliminating the need to replace damaged modules and blown fuses. After the short circuit or overload condition is corrected, restore power and the module automatically resets and resumes control of the output channel.

The 1746-OB16E provides a broad voltage range of 10 to 30V dc and a current rating of 1A at 30°C and 0.5A at 60°C making it the perfect solution for controlling 12V dc and 24V dc solenoid and lamp loads. The module is also equipped with an LED indicator that illuminates when the short circuit or overload condition occurs to expedite the troubleshooting process.

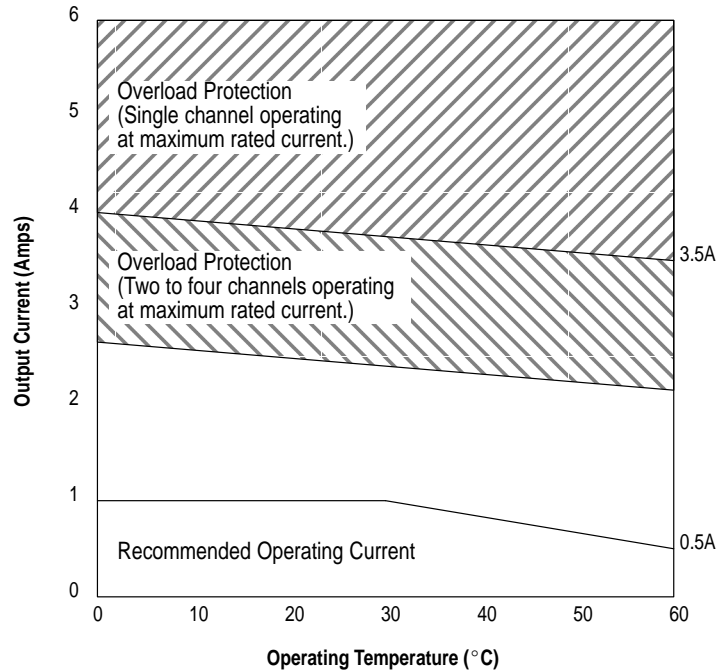
Inductive load turn-off time for 1746-OB16E (Series B and later), output module is reduced by 70% over standard 1746 DC output modules allowing fast application cycle times.



Important: The module does not provide protection against reverse polarity wiring or wiring to AC power sources. Electronic protection is not intended to replace fuses, circuit breakers, or other code-required wiring protection devices.

1746-OB16E Overload Protection

The chart below describes overload protection for the 1746-OB16E. The electronic protection is based on a thermal cut-out temperature, which is reached more quickly (at lower overload current) when two to four adjacent channels are operating. The adjacent channel groupings are 0–3, 4–7, 8–11, and 12–15.



Important: The 1746-OB16E performs auto-reset under overload conditions. The output channel limits current once its thermal cut-out temperature is reached.

Once the overload condition occurs, the channel turns off and begins to cool. If the overload condition has not been corrected, and the channel is turned back on, it will continue to drive the load for several seconds until the cut-out temperature is reached again.

1746-OB16E Short Circuit Protection

The table below describes short circuit protection characteristics for the 1746-OB16E.

External Power Supply Rating	Module turns on with existing short circuit condition		Module is on, then short circuit condition occurs	
	Turn Off Time (msec) ^①	Peak Current (A)	Turn Off Time (msec) ^①	Peak Current (A)
30 volts, 10A	1.4	18	1.3	60
10 volts, 10A	5.9	16	1.4	16

^① This determination was made at 10°C. Turn off times are estimated to be 10 to 20 percent faster at 60°C.

Terms and Symbols Used in the Specification Tables and Wiring Diagrams

Terms

Backplane Current Draw — the amount of current the module requires from the backplane. The sum of the backplane current draw for all modules in a chassis is used to select the appropriate chassis power supply.

Continuous Current Per Module — the maximum current for each module. The sum of the output current for each point should not exceed this value.

Continuous Current Per Point — the maximum current each output is designed to continuously supply to a load.

Inrush Current — the temporary surge current drawn when an input is initially energized.

Minimum Load Current — the lowest amount of current the output is designed to operate at. Operating at or below this value is not recommended.

Nominal Input Current — the current drawn at nominal input voltage.

Off-State Current — for input circuits, the maximum amount of leakage current allowed from an input device that will keep the SLC™ input circuits in their off-state.

Off-State Leakage — for output circuits, the maximum amount of current present at the output terminal when the output circuit is in its off-state.

Off-State Voltage (max) — the maximum input voltage level detected as an off condition by the input module.

On-State Voltage Drop — the voltage developed across the output driver circuit during the on state at maximum load current.

Operating Voltage — for inputs, the voltage range needed for the input to be in the on-state. For outputs, the allowable range of user-supplied voltage.

Points per Common — the number of input or output points connected to a single return (common) or supply (vcc).

Signal Delay — for inputs, the response time required to transmit the circuit status from the field logic to the digital logic. For outputs, the time required to transmit the circuit status from digital logic to the output driver.


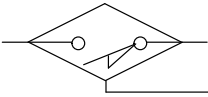

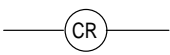
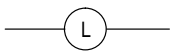
Sinking/Sourcing — describes a current signal flow relationship between field input and output devices in a control system and their power supply. Sourcing I/O modules supply (or source) current to sinking field devices. Sinking I/O modules receive (or sink) current from sourcing field devices.

Surge Current — the temporarily large current drawn by an inductive output device when it is initially energized.

Surge Current Per Point — the maximum amplitude and duration (pulse) of current an output can provide to an inductive output device.

Voltage Category — the nominal voltage used to describe the module.

I/O Wiring Symbols

Symbol	Device Name
	2-wire Input Device
	3-wire Input Device
	Solenoid Output
	Contact Relay Output
	TTL Logic Output

Related Publications: Detailed wiring diagrams for 1746 input modules and Allen-Bradley Series 9000 Photoelectric Sensors are provided in Publication 42GR-7.4.

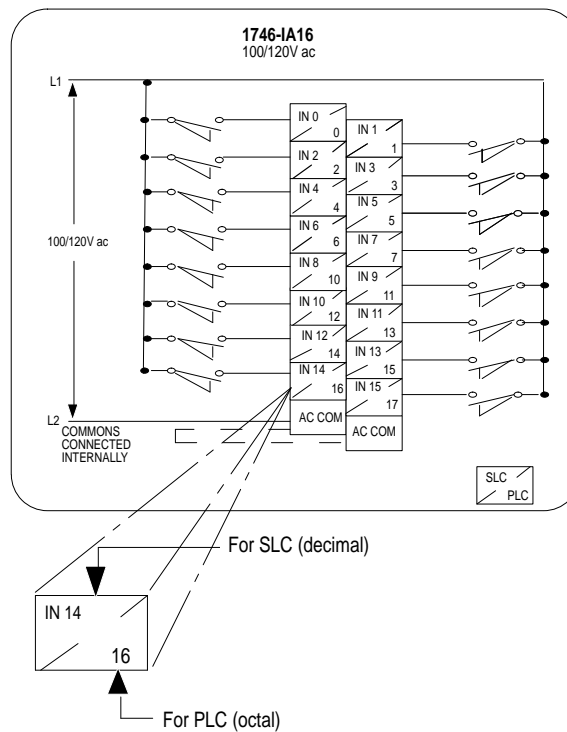
Important: The wiring diagrams in this document are examples only. It is not necessary to connect an I/O device to every terminal on an I/O module's terminal block.

Wiring Diagrams

The 16-point I/O module wiring diagrams include both decimal and octal numbers for I/O addressing and wire identification. (See figure below.) The decimal numbers in the upper left portion of each box are used to wire your 16-point I/O module to an SLC system. The octal numbers in the lower right portion of the box are used for a PLCR system. (As shipped from the factory, the I/O module has a decimal address label on the inside of its door.) An octal label kit is included with your 16-point I/O modules or you can order a separate octal conversion kit to allow you to convert your module to the octal system.

Important: PLC systems use the octal labels. (See figure below.)

Directions on how to install the labels are included in publication number 1746-5.3, Discrete I/O Modules Installation Instructions. These instructions are provided in a kit that is shipped with each discrete I/O module.



Specifications, Wiring, and Circuit Diagrams

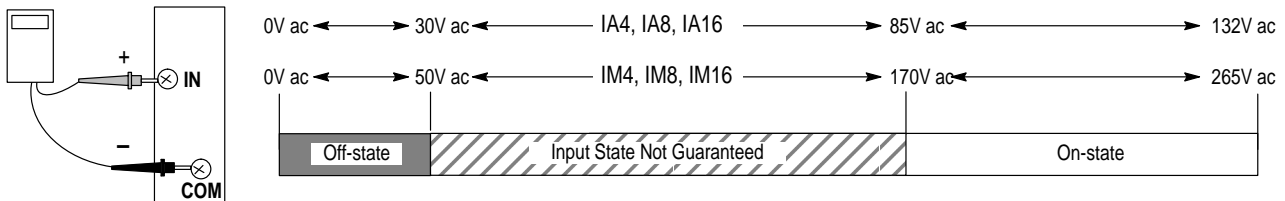
AC Input Modules (1746-IA4, -IA8, -IA16, -IM4, -IM8, -IM16)

Specification	Catalog Number						
	1746-IA4	1746-IA8	1746-IA16 (RTB)	1746-IM4	1746-IM8	1746-IM16 (RTB)	
Voltage Category	100/120V ac			200/240V ac			
Operating Voltage	85 to 132V ac at 47 to 63 Hz			170 to 265V ac at 47 to 63 Hz			
Number of Inputs	4	8	16	4	8	16	
Points per Common	4	8	16	4	8	16	
Backplane Current Draw	5V	0.035A	0.050A	0.085A	0.035A	0.050A	0.085A
	24V	0.0A	0.0A	0.0A	0.0A	0.0A	0.0A
Signal Delay (max.)	on = 35 ms off = 45 ms			on = 35 ms off = 45 ms			
Off-State Voltage (max.)	30V ac			50V ac			
Off-State Current (max.)	2 mA			2 mA			
Nominal Input Current	12 mA at 120V ac			12 mA at 240V ac			
Inrush Current ^① (max.)	0.8A			1.6A			
Inrush Current Time Duration ^① (max.)	500 μsec			500 μsec			

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 will be affected.

RTB = Removable Terminal Block.

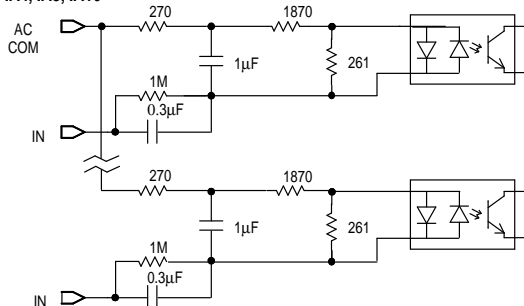
On/Off-State Voltage Range



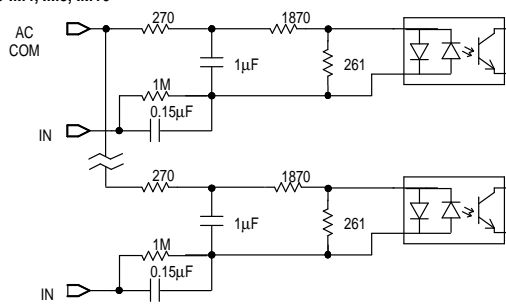
(Measure voltage from common terminal to input terminal.)

Circuit Diagrams

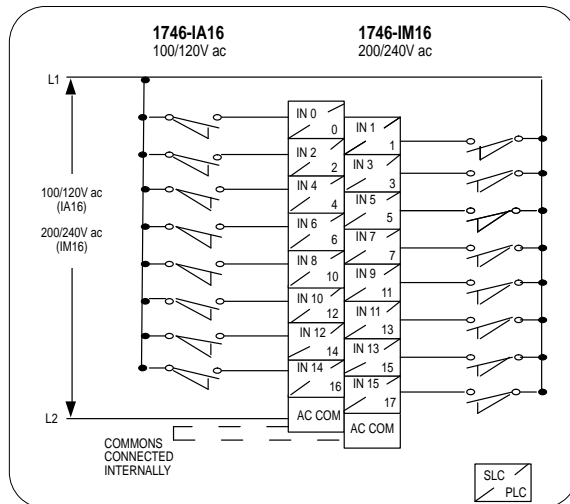
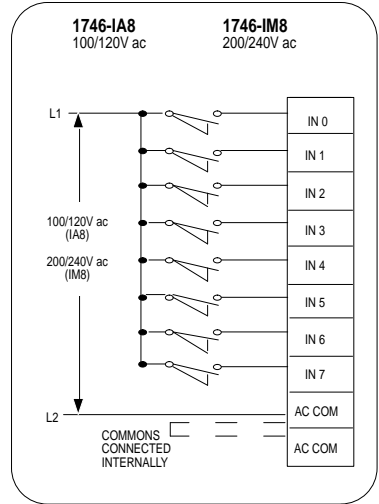
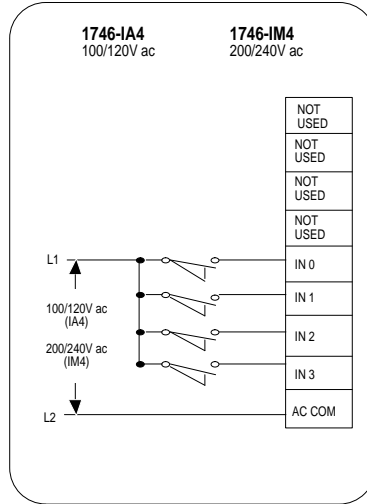
1746-IA4, IA8, IA16



1746-IM4, IM8, IM16



Wiring Diagrams



AC Output Modules (1746-OA8, -OA16, -OAP12)

Specification	Catalog Number		
	1746-OA8 ^①	1746-OA16 ^① (RTB)	1746-OAP12 ^{①②} (RTB)
Voltage Category	120/240V ac		
Operating Voltage	85 to 265V ac at 47 to 63 Hz		
Number of Outputs	8	16	12
Points per Common	4	8	6
Backplane Current Draw	5V	0.185A	0.370A
	24V	0.0A	0.0A
Signal Delay (max.)(Resistive Load)	on = 1 ms off = 11 ms		
Off-State Leakage ^③ (max.)	2 mA		
Load Current (min.)	10 mA		
Continuous Current (max.)	Per Point ^④	1.0A at 30°C 0.50A at 60°C	0.50A at 30°C 0.25A at 60°C
	Per Module	8.0A at 30°C 4.0A at 60°C	8.0A at 30°C 4.0A at 60°C
On-State Voltage Drop (max.)	1.50V at 1A	1.50V at 0.50A	1.2V at 2.0A
Surge Current per Point ^⑤ (max.)	10.0A for 25 ms	10.0A for 25 ms	per point – 17.0A for 25 ms per common – 35.0A for 10 ms

① Triac outputs turn on at any point in the ac line cycle and turn off at ac line zero cross.

② A fused common and blown fuse LED are provided on this module. (Fuses are designed to protect the module.) For replacement fuse, use catalog number 1746-F9 or SAN-O HQ 6.3A.

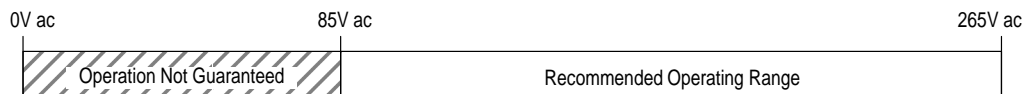
③ To limit the effects of leakage current through triac outputs, a loading resistor can be connected in parallel with your load. For typical 120V ac applications, use a 15k ohm, 2W resistor. For typical 240V ac applications, use a 15k ohm, 5W resistor.

④ Recommended surge suppression for triac outputs when switching 120V ac inductive loads is Harris MOV part number V220MA2A. See page 7 for more information on surge suppression.

⑤ Repeatability is once every 1 second at 30°C. Repeatability is once every 2 seconds at 60°C.

RTB = Removable Terminal Block.

Operating Voltage Range

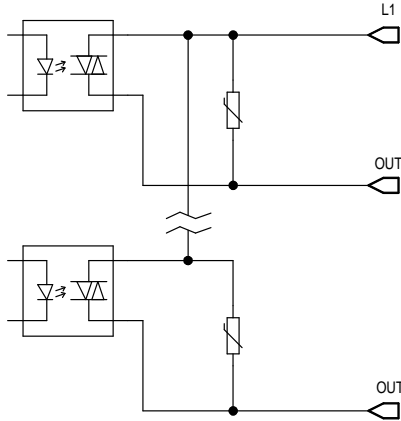


(Voltage is applied between L1 and L2.)

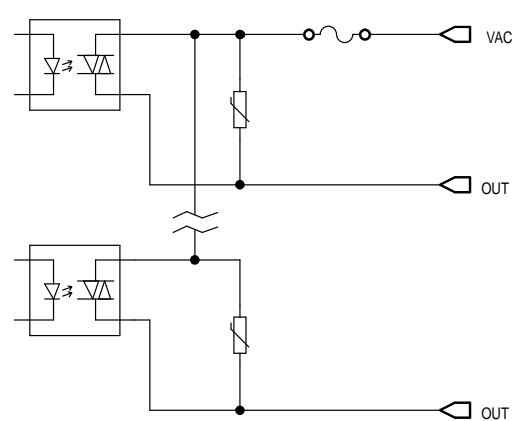
Important: If you measure the voltage at an output terminal that is not connected to a load or is connected to a high-impedance load, you may measure as much as 100V ac even though the output is off.

Circuit Diagrams

1746-OA8, -OA16



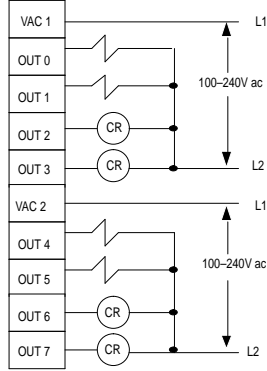
1746-OAP12



Wiring Diagrams

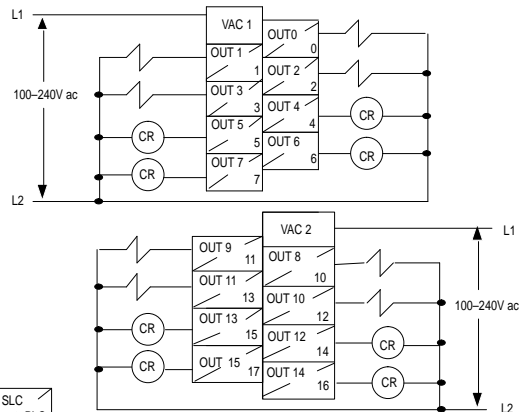
1746-OA8

100-240V ac TRIAC OUTPUT



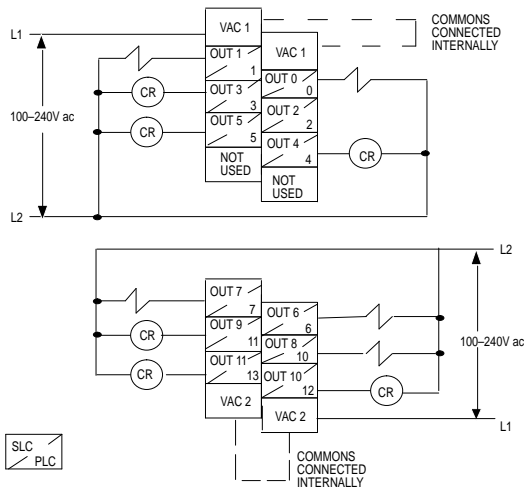
1746-OA16

100-240V ac TRIAC OUTPUT



1746-OAP12

100-240V ac HIGH CURRENT TRIAC OUTPUT



Sinking DC Input Modules (1746-IB8, -IB16, -ITB16, -IB32)

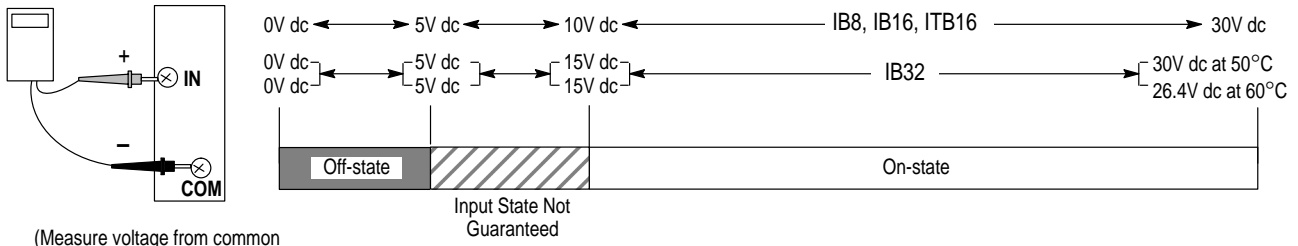
Specification	Catalog Number			
	1746-IB8	1746-IB16 (RTB)	1746-ITB16 (RTB) (Fast Response)	1746-IB32 ^①
Voltage Category	24V dc sink			
Operating Voltage	10 to 30V dc sink			15 to 30V dc at 50°C sink 15 to 26.4V dc at 60°C sink
Number of Inputs	8	16	16	32
Points per Common	8	16	16	8
Backplane Current Draw	5V	0.050A	0.085A	0.085A
	24V	0.0A	0.0A	0.0A
Signal Delay (max.)	on = 8 ms off = 8 ms	on = 8 ms off = 8 ms	on = 0.3 ms ^② off = 0.5 ms	on = 3 ms off = 3 ms
Off-State Voltage (max.)	5V dc	5V dc	5V dc	5V dc
Off-State Current (max.)	1 mA	1 mA	1.5 mA	1.6 mA
Nominal Input Current	8 mA at 24V dc			

① The 32-point input modules are fused to protect external wiring, one fuse per common. These fuses are non-replaceable and are rated at 2.5A.

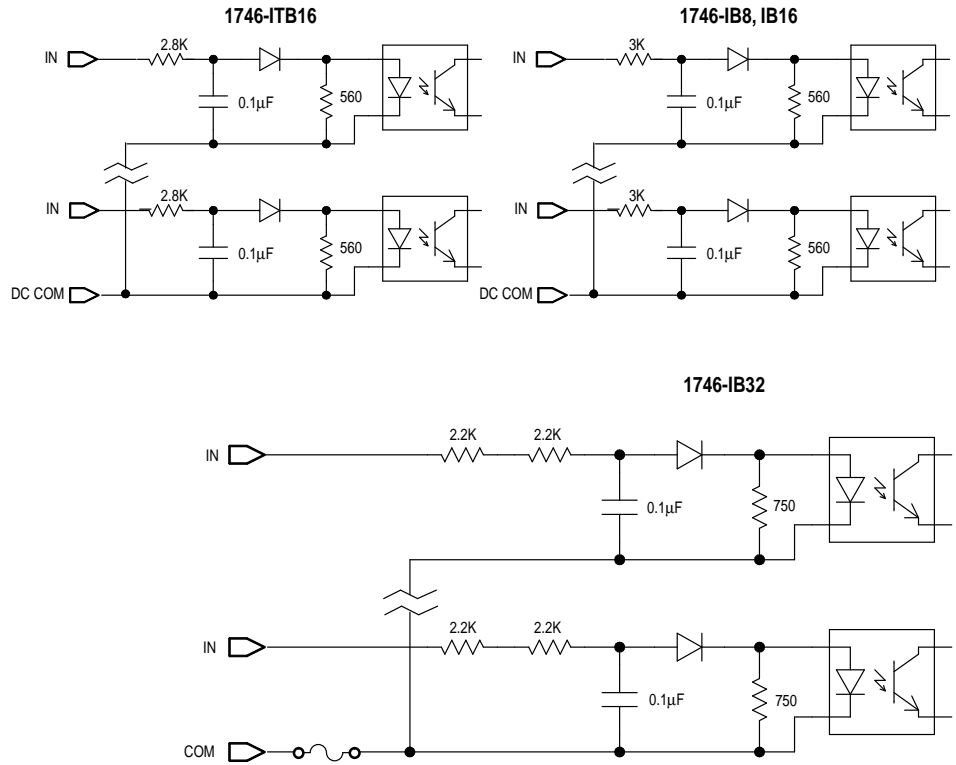
② Typical signal delay for these modules: on=0.10 ms, off=0.25 ms at 24V dc.

RTB = Removable Terminal Block.

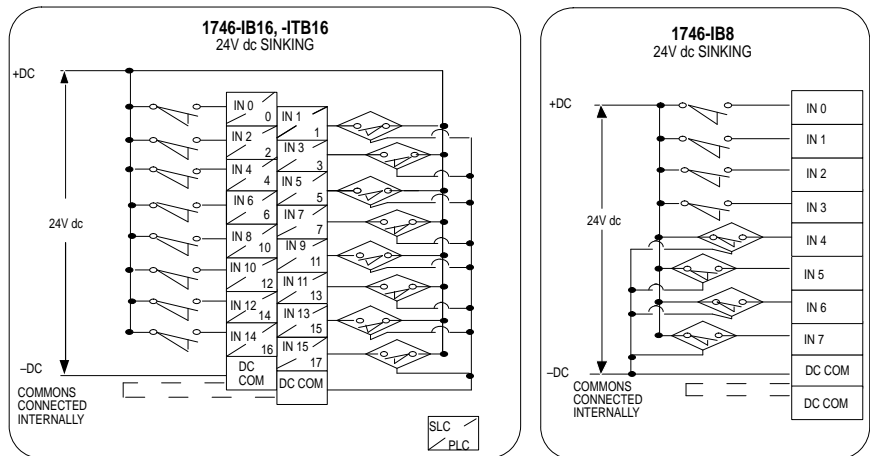
On/Off-State Voltage Range

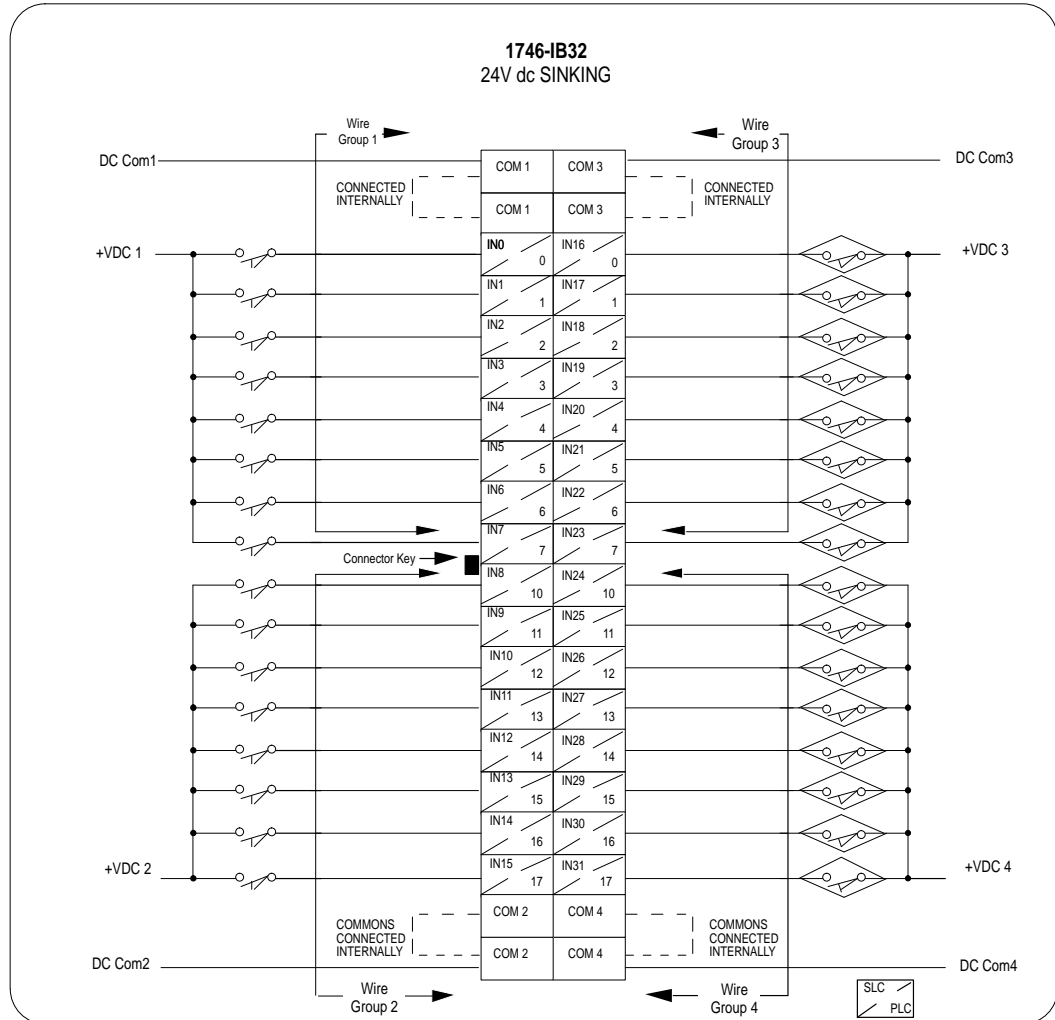


Circuit Diagrams



Wiring Diagrams





Important: Each group has a separate DC common (COM). Common terminals for each wiring group are isolated from one another. You must use the common terminal associated with the respective wiring group.

The 1746 32-point modules include a keyed 40-pin female connector and crimp-type pins for connection to I/O wiring. In addition, 1492 prewired cables and interface modules can be used for connecting external I/O. (See pages 8 and 47.)

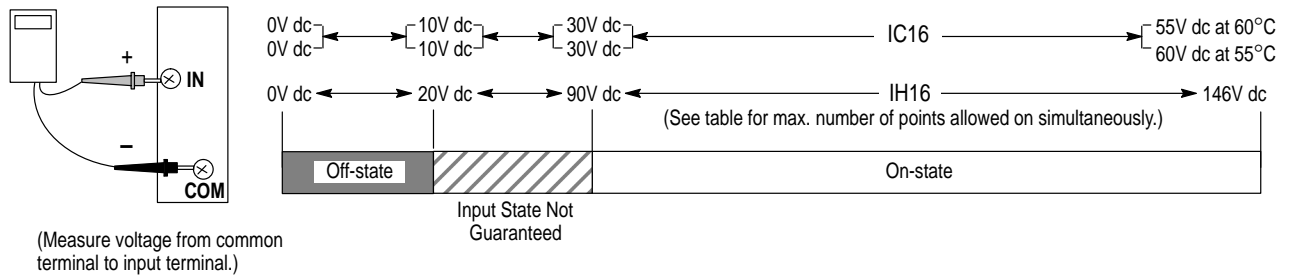
Sinking DC Input Modules (1746-IC16, -IH16)

Specification	Catalog Number	
	1746-IC16 (RTB)	1746-IH16 ^① (RTB)
Voltage Category	48V dc sink	125V dc sink
Operating Voltage	30 to 60V dc at 55°C sink 30 to 55V dc at 60°C sink	90 to 146V dc sink Max. Points on Simultaneously: 16 @ 146V dc and 30°C 12 @ 146V dc and 50°C 14 @ 132V dc and 55°C 16 @ 125V dc and 60°C
Number of Inputs	16	16
Points per Common	16	16
Backplane Current Draw	5V	0.085A
	24V	0.0A
Signal Delay (max.)	on = 4 ms / off = 4 ms	on = 9 ms / off = 9 ms
Off-State Voltage (max.)	10V dc	20V dc
Off-State Current (max.)	1.5 mA	0.8 mA
Nominal Input Current	4.1 mA at 48V dc	2.15 mA at 125V dc / 2.25 mA at 132V dc

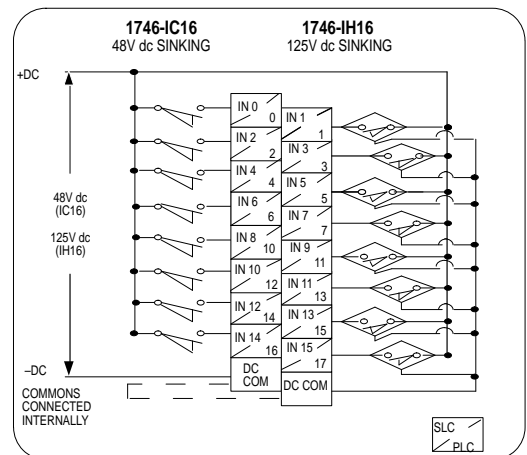
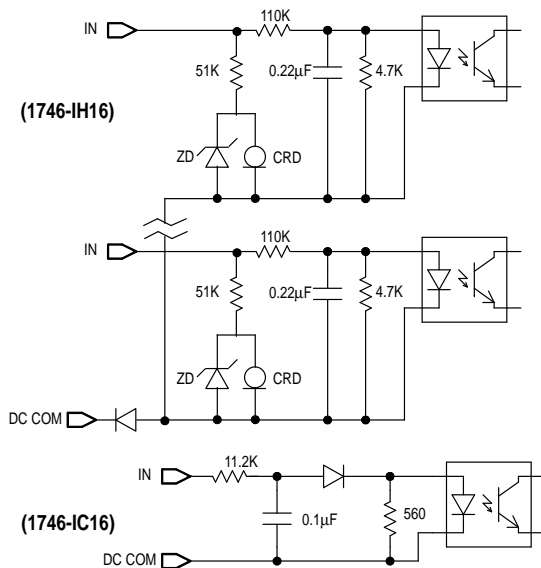
① If the input module is connected in parallel with an inductive load, use surge suppression across the load to protect the input module from damage caused by reverse voltage.

RTB = Removable Terminal Block

On/Off-State Voltage Range



Circuit and Wiring Diagrams



Sourcing DC Input Modules (1746-IV8, -IV16, -ITV16, -IV32)

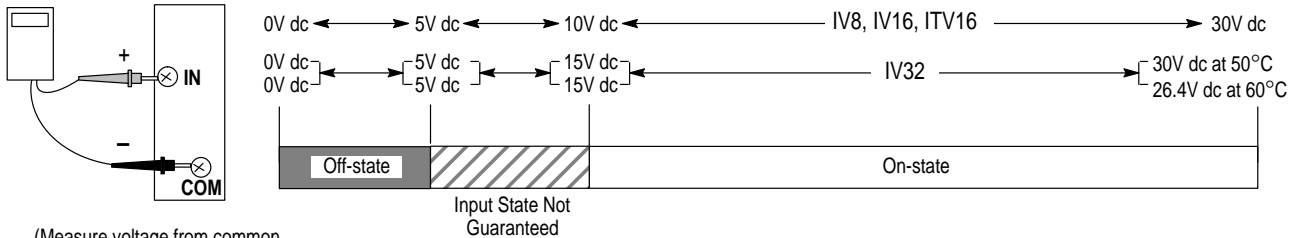
Specification	Catalog Number			
	1746-IV8	1746-IV16 (RTB)	1746-ITV16 (Fast Response) (RTB)	1746-IV32 ^①
Voltage Category	24V dc source			
Operating Voltage	10 to 30V dc source			15 to 30V dc at 50°C source 15 to 26.4V dc at 60°C source
Number of Inputs	8	16	16	32
Points per Common	8	16	16	8
Backplane Current Draw	5V	0.050A	0.085A	0.085A
	24V	0.0A	0.0A	0.0A
Signal Delay (max.)	on = 8 ms / off = 8 ms		on = 0.3 ms / off = 0.5 ms ^②	on = 3 ms / off = 3 ms
Off-State Voltage (max.)	5.0V dc	5.0V dc	5.0V dc	5.0V dc
Off-State Current (max.)	1 mA	1 mA	1.5 mA	1.6 mA
Nominal Input Current	8 mA at 24V dc			

① The 32-point input modules are fused to protect external wiring, one fuse per common. These fuses are non-replaceable and are rated at 2.5A.

② Typical signal delay for these modules: on=0.100 ms, off=0.25 ms for 24V dc.

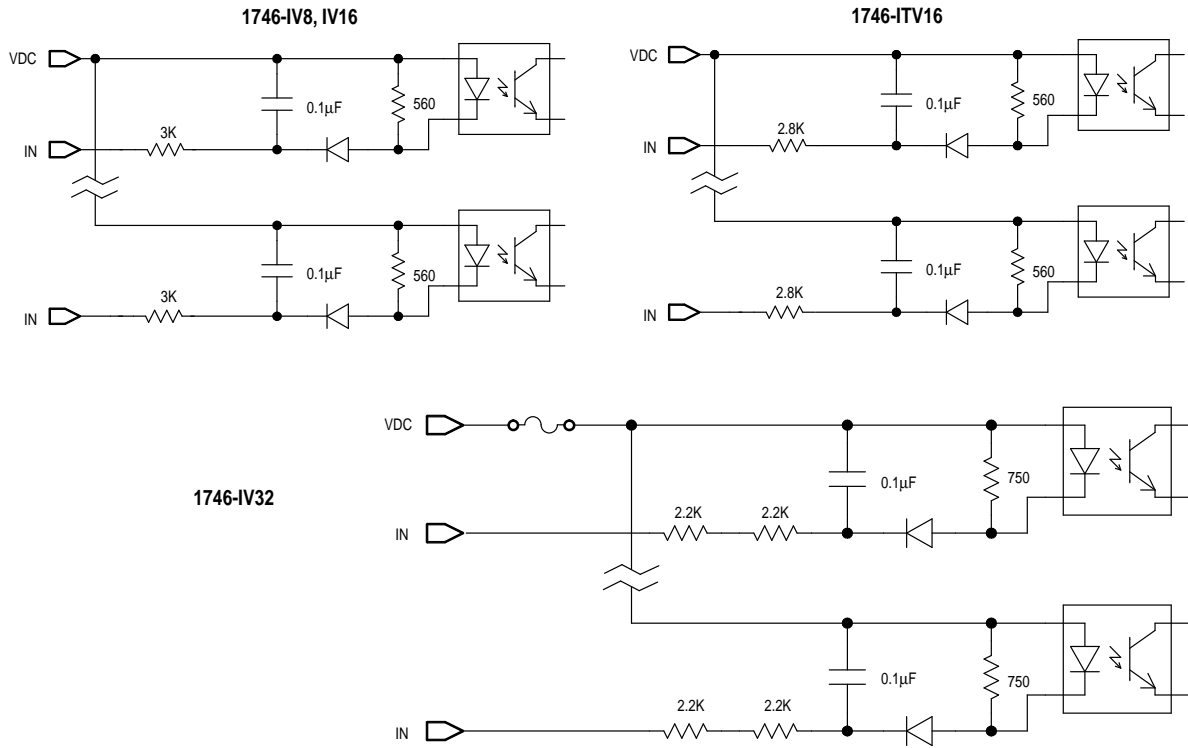
RTB = Removable Terminal Block.

On/Off-State Voltage Range

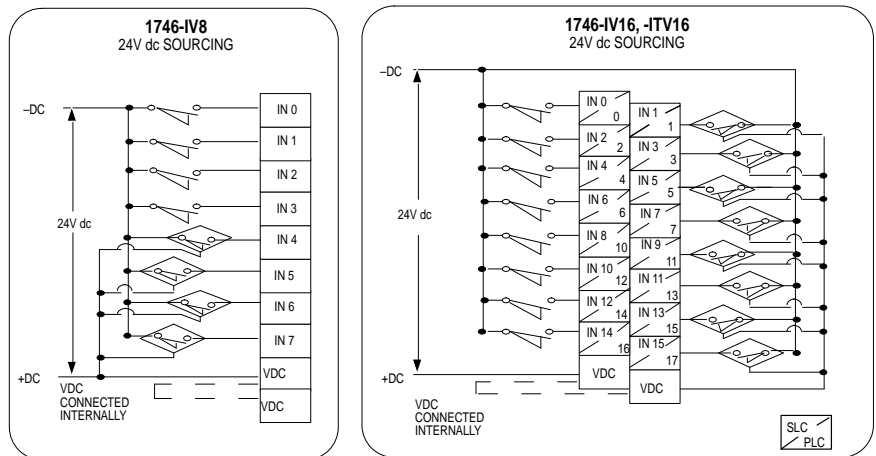


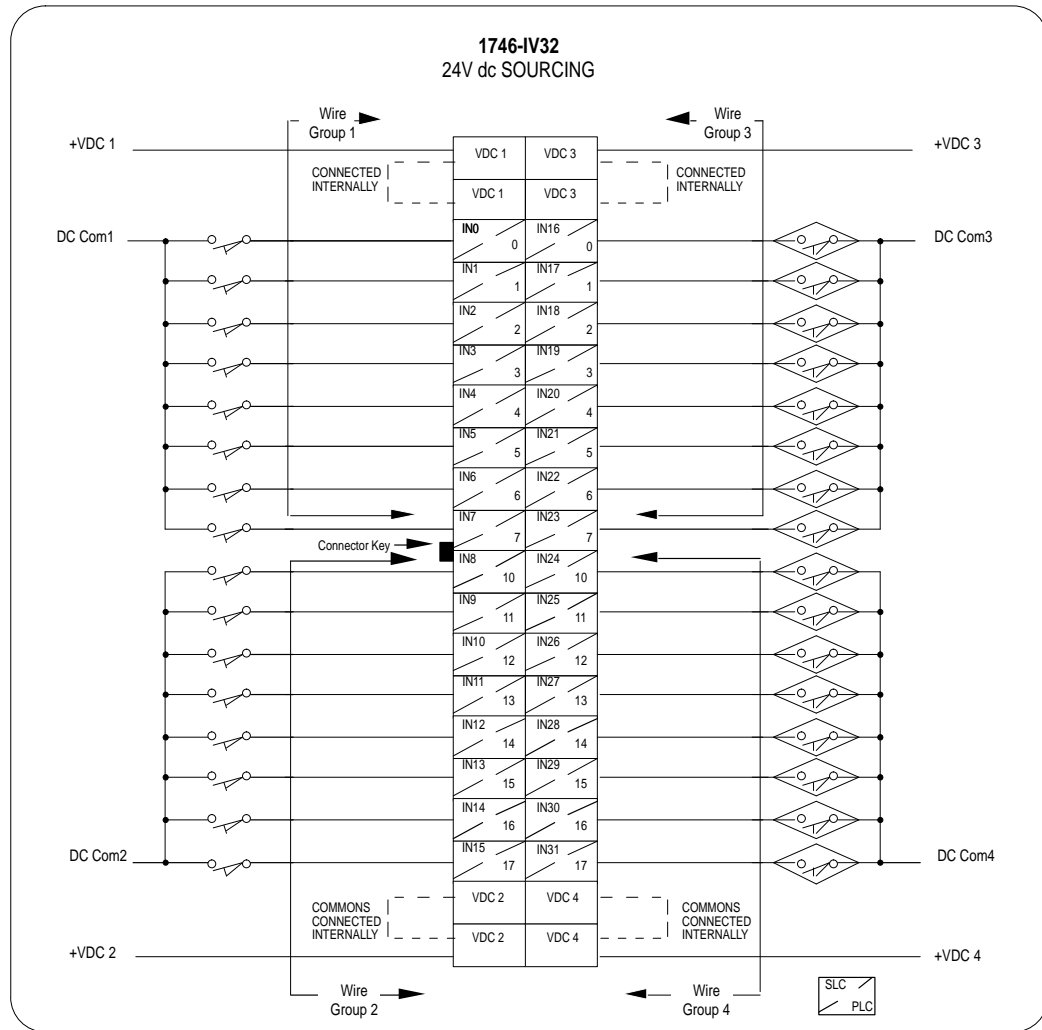
(Measure voltage from common terminal to input terminal.)

Circuit Diagrams



Wiring Diagrams

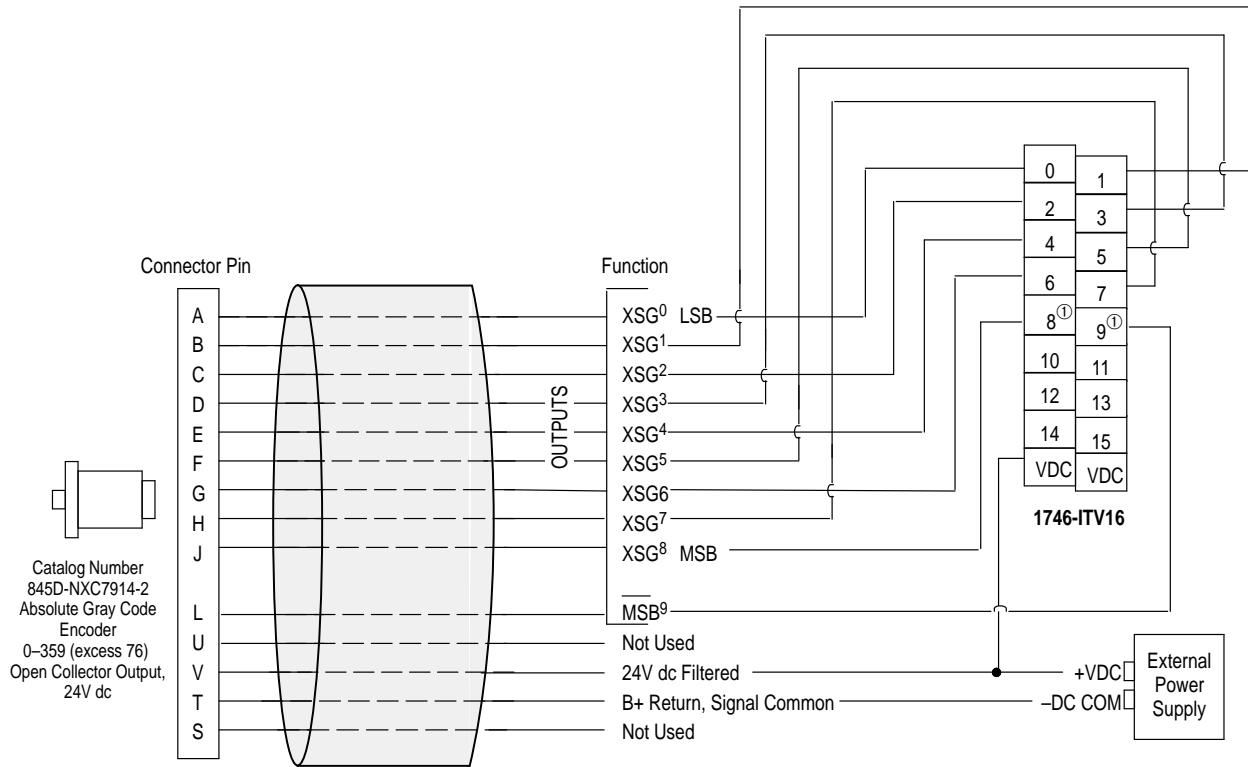




Important: Each group has a separate VDC and DC Common (COM). VDC terminals for each wiring group are isolated from one another. You must use the VDC terminal associated with the respective wiring group.

The 1746 32-point modules include a keyed 40-pin female connector and crimp-type pins for connection to I/O wiring. In addition, 1492 prewired cables and interface modules can be used for connecting external I/O. (See pages 8 and 47.)

845D Absolute Gray Code Encoder to 1746-ITV16



① Terminals 8 and 9 can be interchanged to select CW vs. CCW direction. Refer to your encoder installation manual for recommended cable type and length.

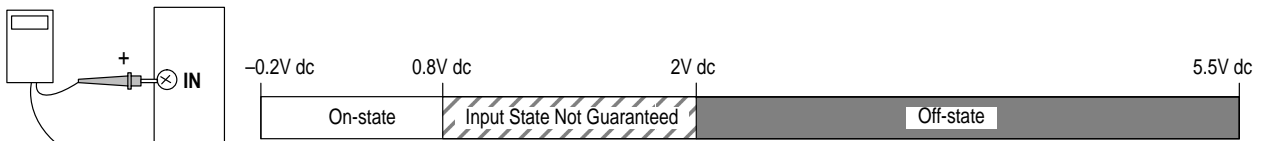
Sourcing TTL Input Module (1746-IG16)

Specification	Catalog Number	
	1746-IG16 (RTB)	
Voltage Category	5V dc TTL source	
Operating Voltage	4.5 to 5.5V dc source 50 mV peak-to-peak ripple max.	
Number of Inputs	16	
Points per Common	16	
Backplane Current Draw	5V	0.140A
	24V	0.0A
Signal Delay (max.)	on = 0.25 ms off = 0.50 ms	
Off-State Voltage (max.)	2.0V dc ^①	
Off-State Current (max.)	4.1 mA	
Nominal Input Current	3.7 mA at 5V dc	

① TTL inputs are inverted (−0.2 to +0.8 = low voltage = True = on). Use a NOT instruction in your program to convert to traditional True = High logic.

RTB = Removable Terminal Block.

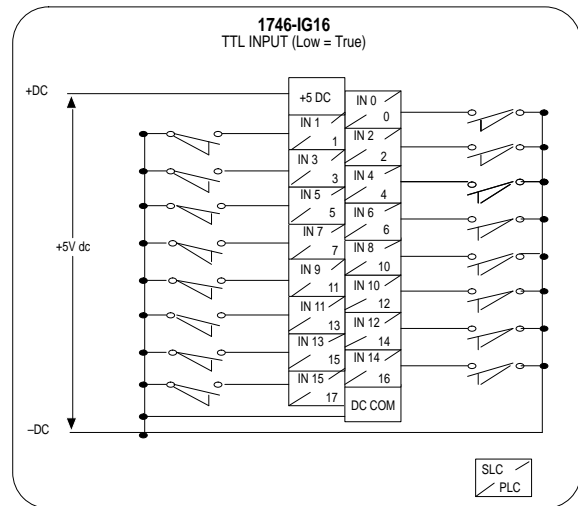
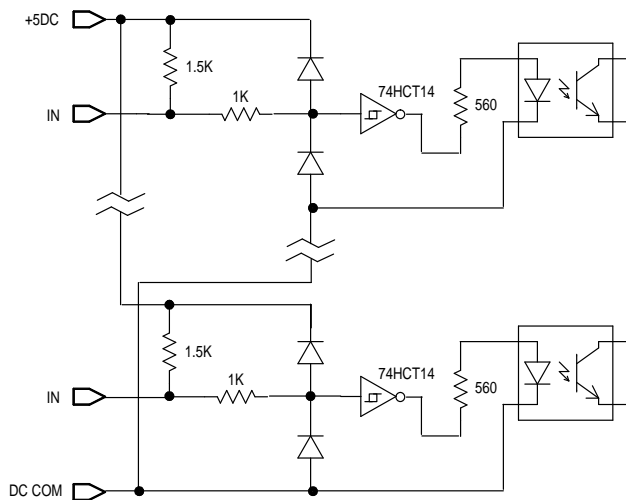
On/Off-State Voltage Range



TTL inputs are inverted (−0.2 to +0.8 = low voltage = True = On).

(Measure voltage from common terminal to input terminal.)

Circuit and Wiring Diagrams



Sourcing DC Output Modules (1746-OB8, -OB16, -OB16E, -OB32)

Specification	Catalog Number			
	1746-OB8	1746-OB16 (RTB)	1746-OB16E ^① (RTB)	1746-OB32 ^②
Voltage Category	24V dc			
Operating Voltage	10 to 50V dc source		10 to 30V dc source	5 to 50V dc source
Number of Outputs	8	16	16	32
Points per Common	8	16	16	16
Backplane Current Draw	5V	0.135A	0.280A	0.135A
	24V	0.0A	0.0A	0.0A
Signal Delay (max.) (Resistive Load)	on = 0.1 ms off = 1 ms	on = 0.1 ms off = 1 ms	on = 1.0 ms off = 1.0 ms	on = 0.1 ms off = 1.0 ms
Off-State Leakage^③ (max.)	1 mA			
Load Current (min.)	1 mA			
Continuous Current (max.)	Per Point^④	1A at 30°C 0.50A at 60°C	0.50A at 30°C 0.25A at 60°C	1.00A at 30°C 0.50A at 60°C
	Per Module	8A at 30°C 4A at 60°C	8A at 30°C 4A at 60°C	8A at 0 to 60°C
On-State Voltage Drop (max.)	1.2V at 1.0A	1.2V at 0.5A	1.0V at 0.5A	1.2V at 0.1A
Surge Current^⑤ (max.)	3A for 10 ms	3A for 10 ms	per point – 2A for 10 ms per module – 32A for 10 ms	1A for 10 ms

① The 1746-OB16E, Series B and later, provides fast turn-off delay for inductive loads. Fast 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 turn-off delay times for 1746-OB8/-OV8 and 1746-OB16E, Series B and later/-OBP8, Series B and later/-OBP16/-OVP16, when switching Bulletin 100-B110 (24W sealed) contactor, are: 1746-OB8/-OV8 off delay = 152 ms; 1746-OB16E, Series B and later/-OBP8, Series B and later/-OBP16/-OVP16 off delay = 47 ms. See page 11 for more information on the 1746-OB16E.

② The 32-point output modules are fused to protect external wiring, one fuse per common. These fuses are non-replaceable and are rated at 2.5A.

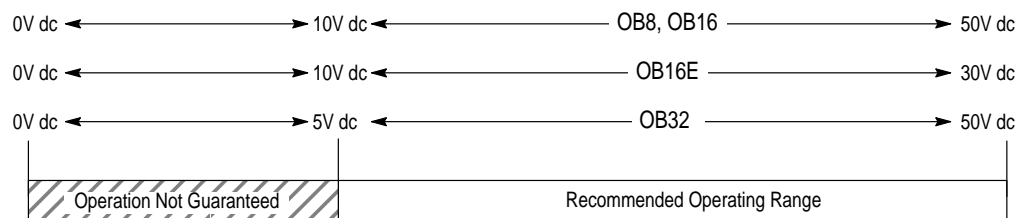
③ To limit the effects of leakage current, a loading resistor can be connected in parallel with your load. For 24V dc operation use a 5.6k ohm, 1/2W resistor.

④ Recommended surge suppression for switching 24V dc inductive loads is a 1N4004 diode that is reverse wired across the load. See page 7 for more information on surge suppression.

⑤ Repeatability is once every 1 second at 30°C. Repeatability is once every 2 seconds at 60°C.

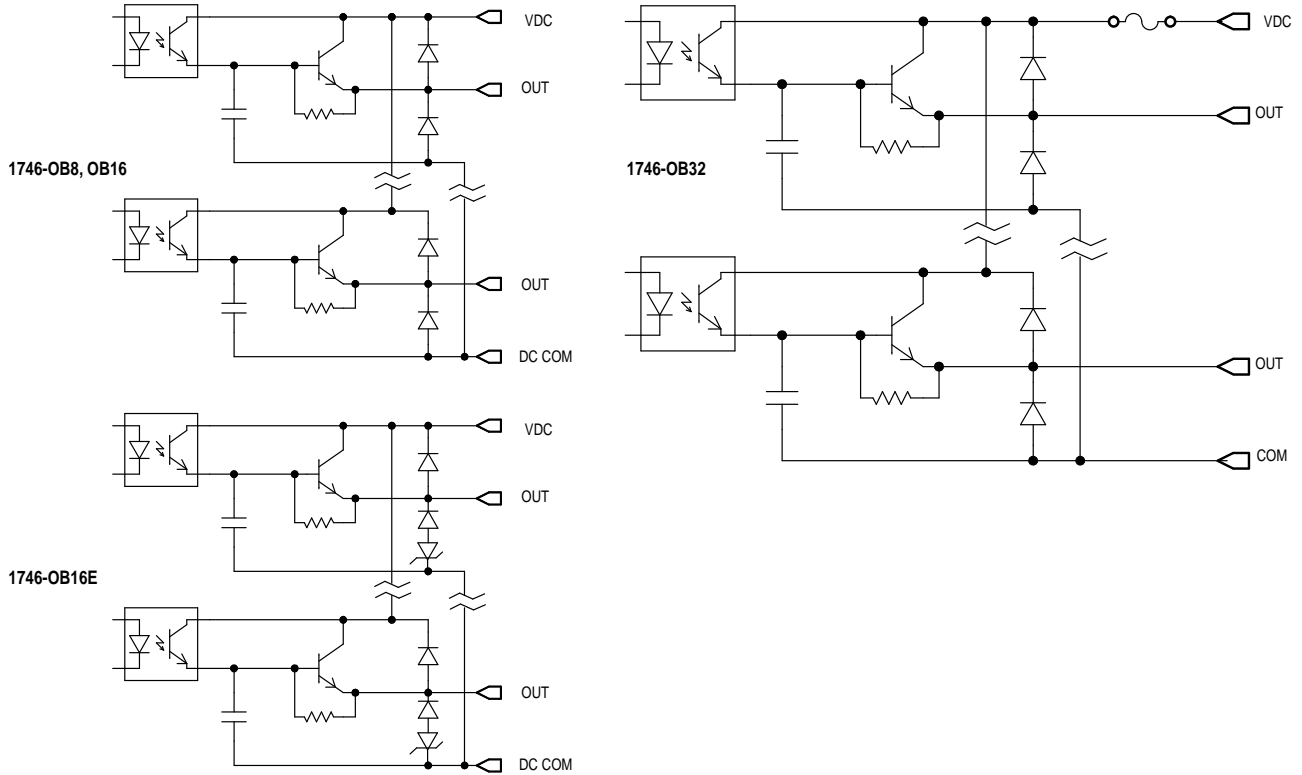
RTB = Removable Terminal Block.

Operating Voltage Range

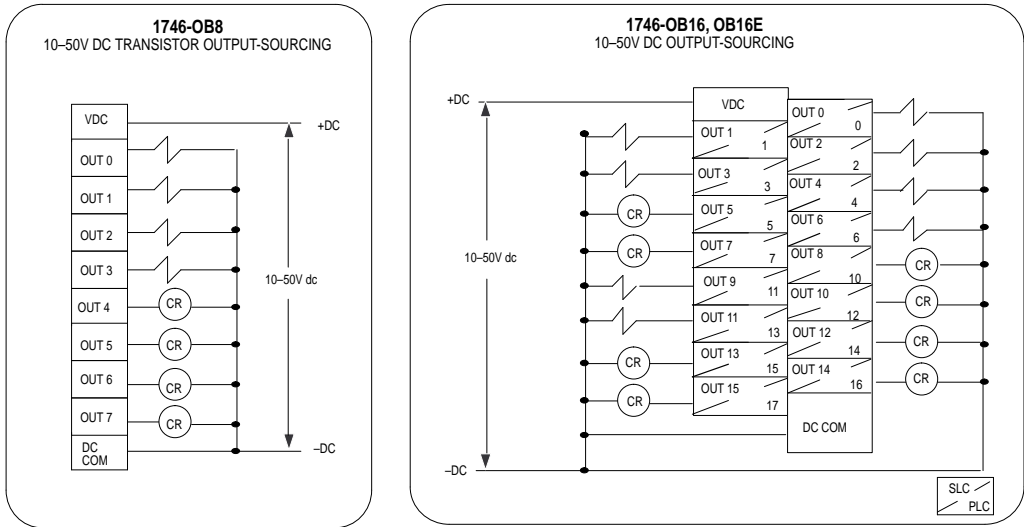


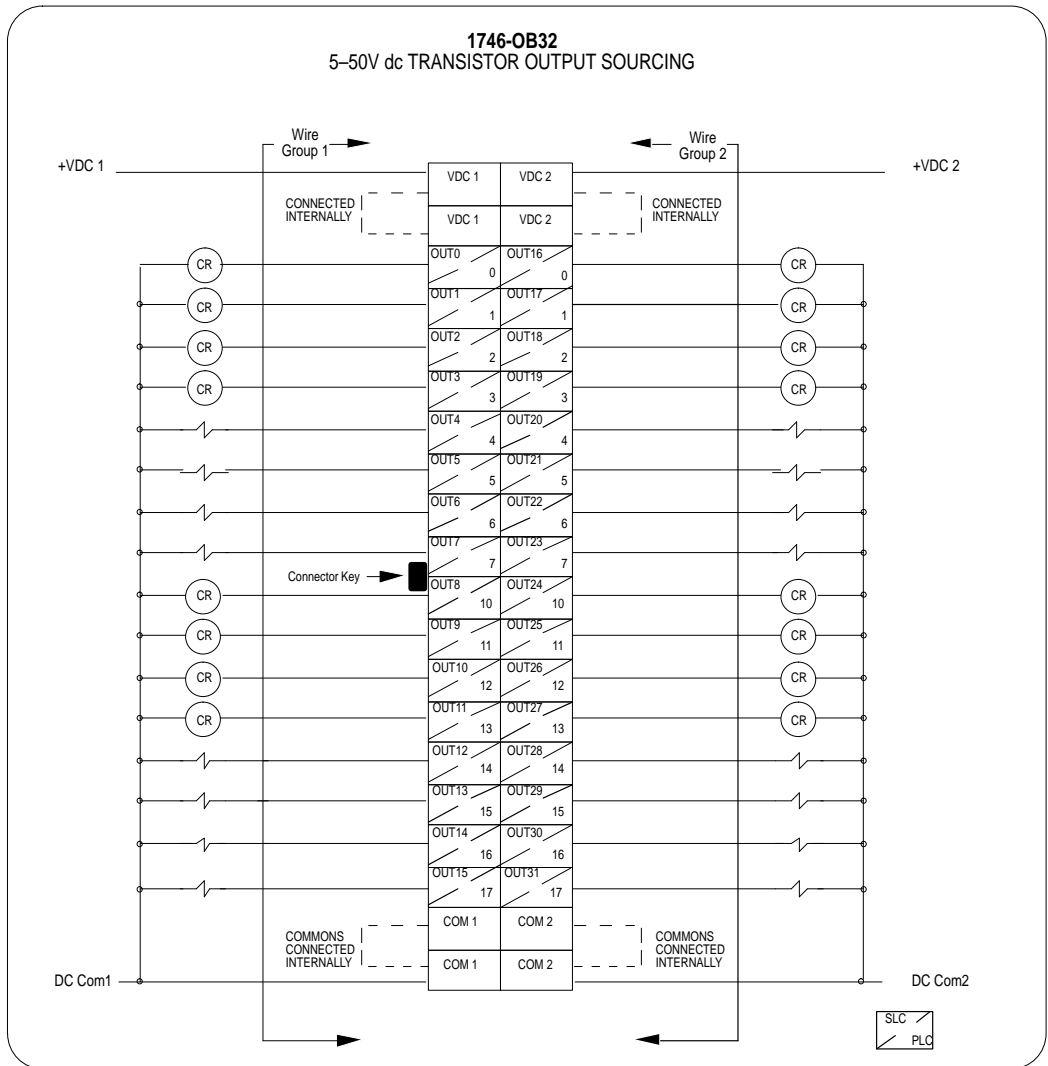
(Voltage is applied between +VDC and DC common.)

Circuit Diagram



Wiring Diagrams





Important: Each group has separate VDC and DC COM connections.

The 1746 32-point modules include a keyed 40-pin female connector and crimp-type pins for connection to I/O wiring. In addition, 1492 prewired cables and interface modules can be used for connecting external I/O. (See pages 8 and 47.)

High Current Sourcing DC Output Modules (1746-OBP8, -OBP16)

Specification	Catalog Number		
	1746-OBP8 (RTB) ^①	1746-OBP16 (RTB) ^{①②}	
Voltage Category	24V dc		
Operating Voltage	20.4 to 26.4V dc source		
Number of Outputs	8	16	
Points per Common	4	16	
Backplane Current Draw	5V	0.135A	0.250A
	24V	0.0A	0.0A
Signal Delay (max.) (Resistive Load)	on = 1.0 ms / off = 2.0 ms	on = 0.1 ms / off = 1 ms	
Off-State Leakage ^③ (max.)	1 mA		
Load Current (min.)	1 mA		
Continuous Current (max.)	Per Point	2.0A at 60°C	1.5A at 30°C 1.0A at 60°C
	Per Module	8.0A at 0° to 60°C	6.4A at 0° to 60°C
On-State Voltage Drop (max.)	1V at 2A		
Surge Current ^④ (max.)	Per Point	4A for 10 ms	4A for 10 ms
	Per Module	32A for 10 ms	32A for 10 ms

① The 1746-OBP8, Series B and later, and 1746-OBP16 provide fast turn-off delay for inductive loads. Fast 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 turn-off delay times for 1746-OB8/-OV8 and 1746-OB16E, Series B and later/-OBP8, Series B and later/-OBP16/-OVP16, when switching Bulletin 100-B110 (24W sealed) contactor, are: 1746-OB8/-OV8 off delay = 152 ms; 1746-OB16E, Series B and later/-OBP8, Series B and later/-OBP16/-OVP16 off delay = 47 ms.

② A fused common and blown fuse LED are provided on this module. For replacement fuse, use catalog number 1746-F8 or Littlefuse 322010. Refer to page 9 for additional information.

③ To limit the effects of leakage current, a loading resistor can be connected in parallel with your load. For 24V dc operation use a 5.6k ohm, 1/2W resistor.

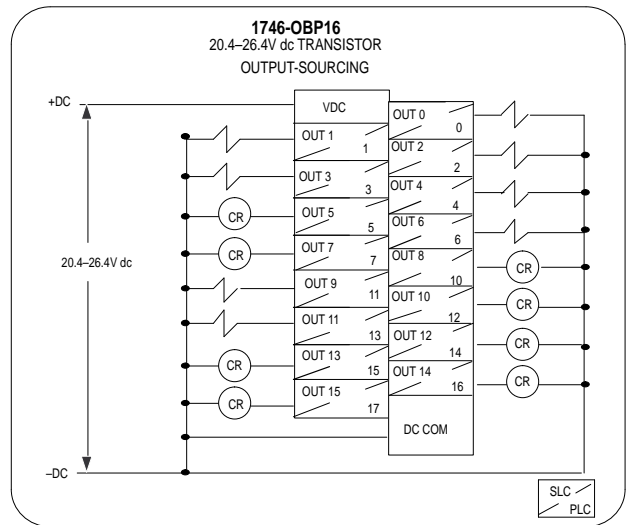
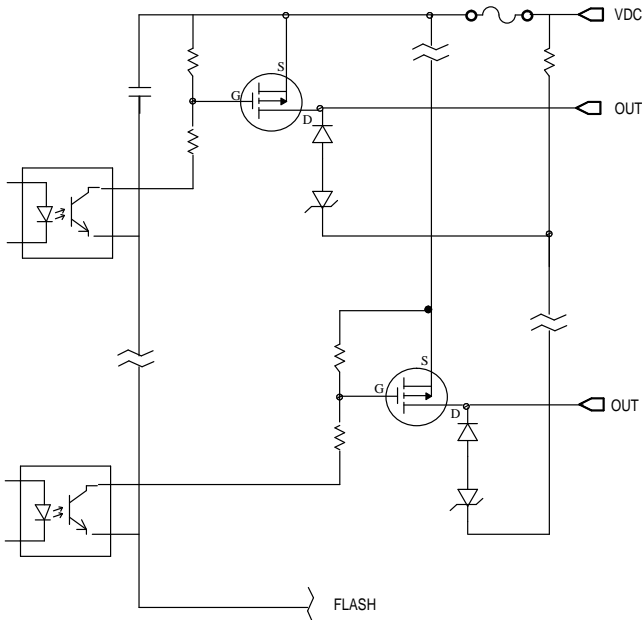
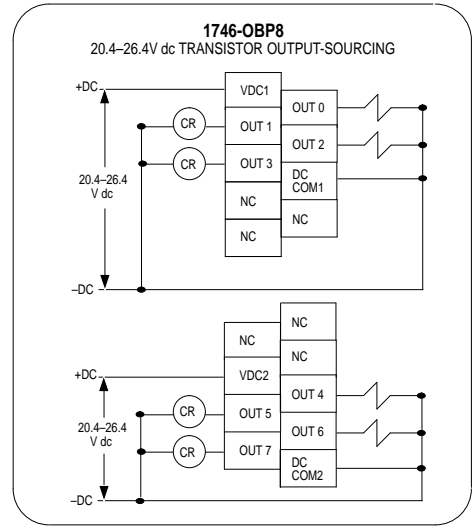
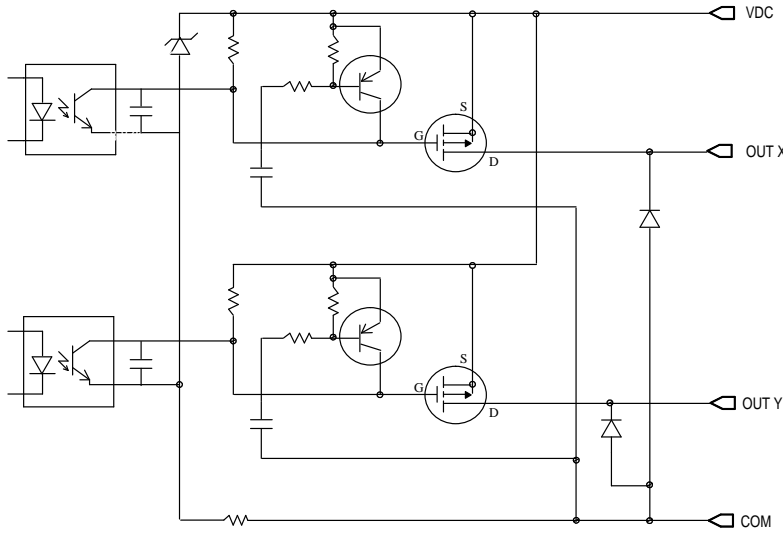
④ Repeatability is once every 1 second at 30 °C. Repeatability is once every 2 seconds at 60°C.

RTB = Removable Terminal Block.

Operating Voltage Range



Circuit and Wiring Diagrams



Sinking DC Output Modules (1746-OV8, -OV16, -OV32)

Specification	Catalog Number			
	1746-OV8	1746-OV16 (RTB)	1746-OV32 ^①	
Voltage Category	24V dc			
Operating Voltage	10 to 50V dc sink		5 to 50V dc sink	
Number of Outputs	8	16	32	
Points per Common	8	16	16	
Backplane Current Draw	5V	0.135A	0.270A	
	24V	0.0A	0.0A	
Signal Delay (max.) (Resistive Load)	on = 0.1 ms / off = 1 ms			
Off-State Leakage ^② (max.)	1 mA			
Load Current (min.)	1 mA			
Continuous Current (max.)	Per Point ^③	1A at 30°C / 0.5A at 60°C	0.5A at 30°C / 0.25A at 60°C	0.1A at 60°C
	Per Module	8A at 30°C / 4A at 60°C	8A at 30°C / 4A at 60°C	3.2A at 60°C
On-State Voltage Drop (max.)	1.2V at 1A	1.2V at 0.5A	1.2V at 0.1A	
Surge Current Per Point ^④ (max.)	3A for 10 ms	3A for 10 ms	1A for 10 ms	

① The 32-point output modules are fused to protect external wiring, one fuse per common. These fuses are non-replaceable and are rated at 2.5A.

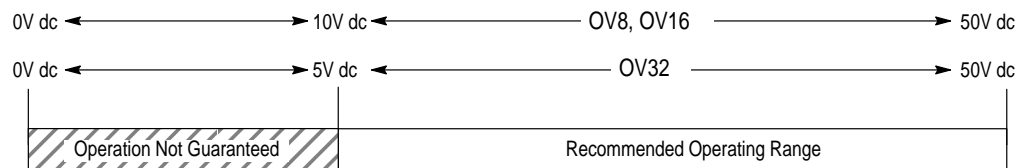
② To limit the effects of leakage current, a loading resistor can be connected in parallel with your load. For 24V dc operation use a 5.6k ohm, 1/2W resistor.

③ Recommended surge suppression for switching 24V dc inductive loads is a 1N4004 diode that is reverse wired across the load. See page 7 for more information on surge suppression.

④ Repeatability is once every 1 second at 30°C. Repeatability is once every 2 seconds at 60 °C.

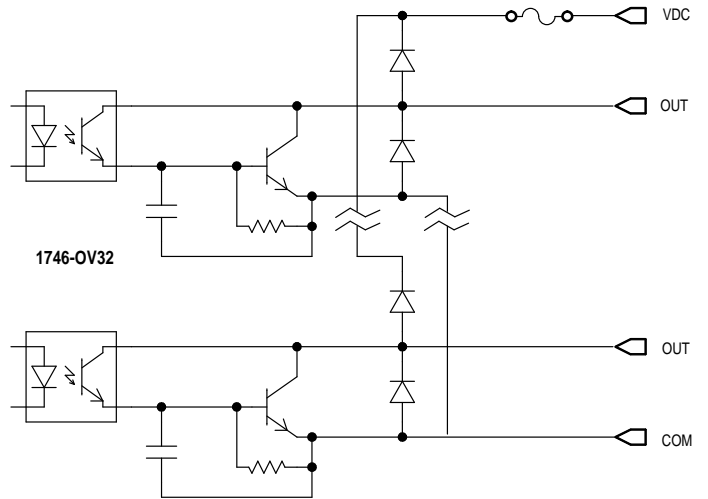
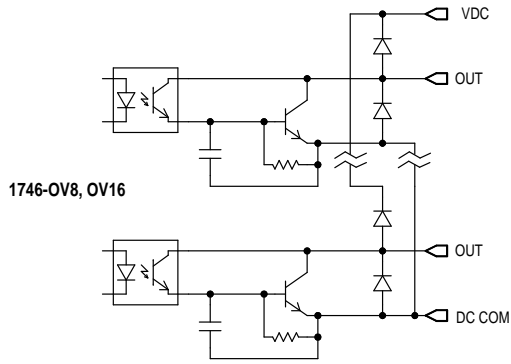
RTB = Removable Terminal Block.

Operating Voltage Range

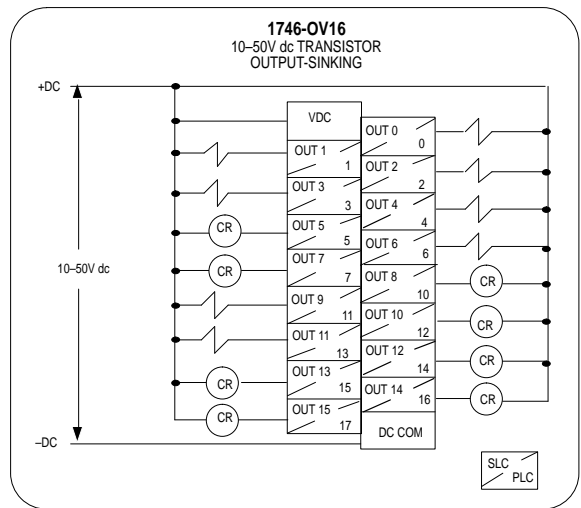
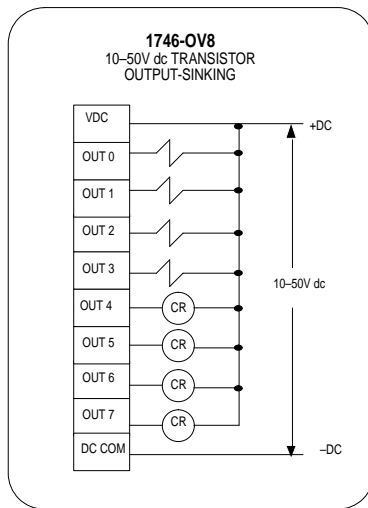


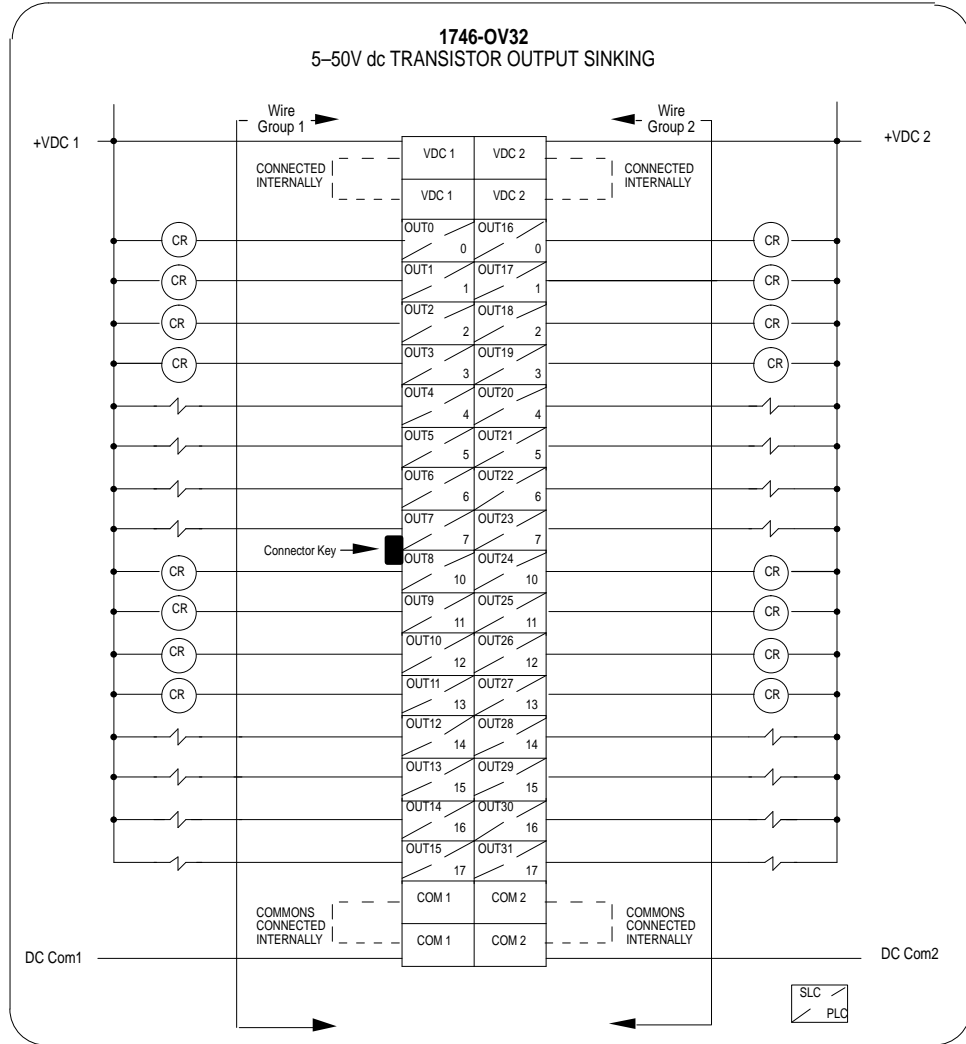
(Voltage is applied between +VDC and DC common.)

Circuit Diagrams



Wiring Diagrams





Important: Each group has separate VDC and DC COM connections.

The 1746 32-point modules include a keyed 40-pin female connector and crimp-type pins for connection to I/O wiring. In addition, 1492 prewired cables and interface modules can be used for connecting external I/O. (See pages 8 and 47.)

High Current Sinking DC Output Module (1746-OVP16)

Specification	Catalog Number	
	1746-OVP16 ^{①②} (RTB)	
Voltage Category	24V dc	
Operating Voltage	20.4 to 26.4V dc sink	
Number of Outputs	16	
Points per Common	16	
Backplane Current Draw	5V	0.25A
	24V	0.0A
Signal Delay (max.) (Resistive Load)	on = 0.1 ms / off = 1 ms	
Off-State Leakage ^③ (max.)	1 mA	
Load Current (min.)	1 mA	
Continuous Current (max.)	Per Point	1.5A at 30°C / 1A at 60°C
	Per Module	6.4A at 0°C to 60°C
On-State Voltage Drop (max.)	1V at 1A	
Surge Current ^④ (max.)	Per Point	4A for 10 ms
	Per Module	32A for 10 ms

① A fused common and blown fuse LED are provided on this module.

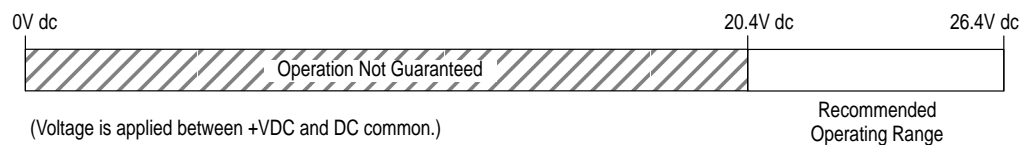
② The 1746-OVP16 provides fast turn-off delay for inductive loads. Fast off delay for inductive loads is accomplished with surge suppressors on this module. A suppressor at the load is not needed unless another contact is connected in series. If this is the case, a 1N4004 diode should be reverse wired across the load. This defeats the fast turn-off feature. Comparative turn-off delay times for 1746-OB8/-OV8 and 1746-OB16E, Series B and later/-OBP8, Series B and later/-OBP16/-OVP16, when switching Bulletin 100-B110 (24W sealed) contactor, are: 1746-OB8/-OV8 off delay = 152 ms; 1746-OB16E, Series B and later/-OBP8, Series B and later/-OBP16/-OVP16 off delay = 47 ms.

③ To limit the effects of leakage current, a loading resistor can be connected in parallel with your load. For 24V dc operation use a 5.6k ohm, 1/2W resistor.

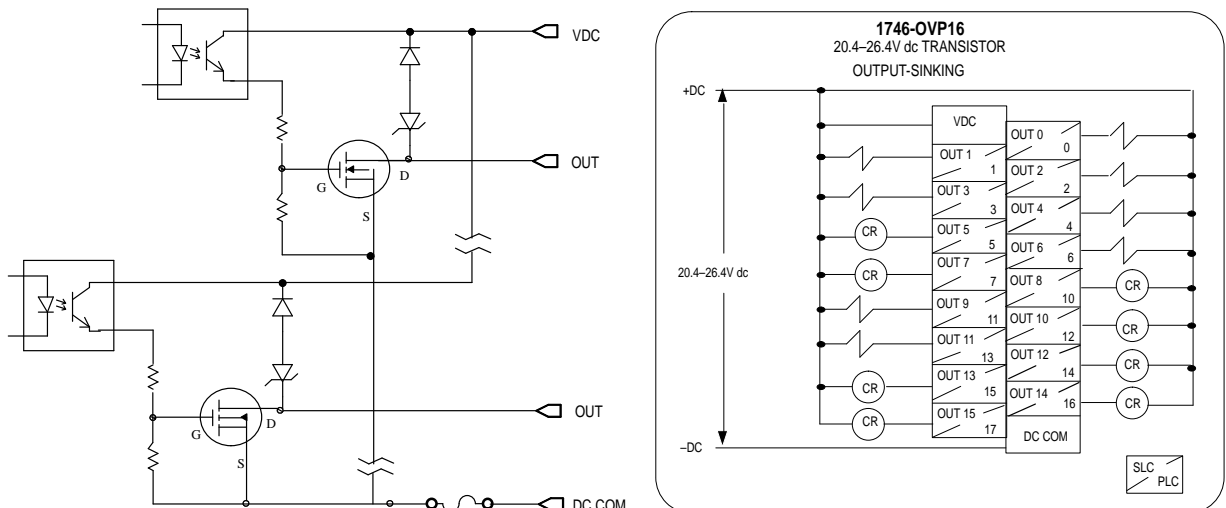
④ Repeatability is once every 1 second at 30°C. Repeatability is once every 2 seconds at 60°C.

RTB = Removable Terminal Block.

Operating Voltage Range



Circuit and Wiring Diagrams



Sinking TTL Output Module (1746-OG16)

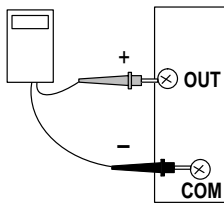
Specification	Catalog Number	
	1746-OG16 (RTB)	
Voltage Category	5V dc TTL ^①	
Operating Voltage Range	4.5 to 5.5V dc 50 mV peak-to-peak ripple maximum 495 mA maximum at 5V dc	
Number of Outputs	16	
Points per Common	16	
Backplane Current Draw	5V	0.180A
	24V	0.0A
Signal Delay (max.) (Resistive Load)	on = 0.25 ms / off = 0.5 ms	
Off-State Leakage (max.)	0.1 mA	
Load Current (min.)	0.15 mA	
Continuous Current (max.)	24 mA	

① TTL outputs are inverted (0–0.4V dc = low voltage = True = On). Use a NOT instruction in your ladder program to convert to traditional True = High logic.

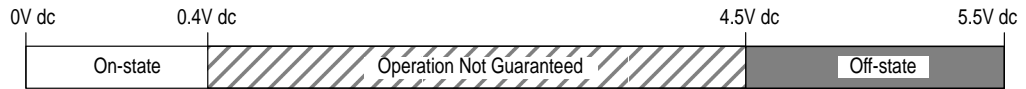
RTB = Removable Terminal Block.

NA = not applicable.

On/Off-State Voltage Range

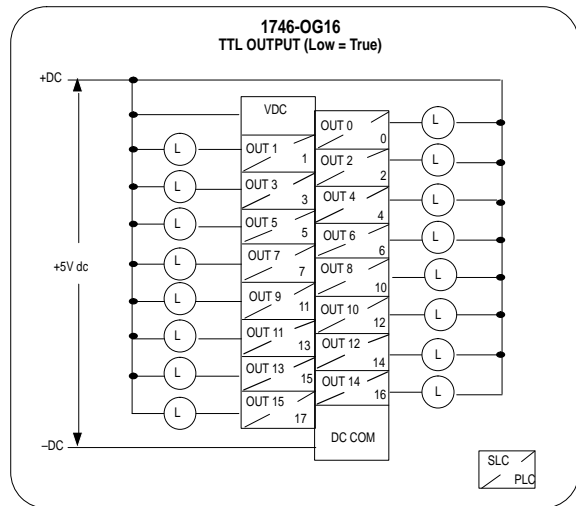
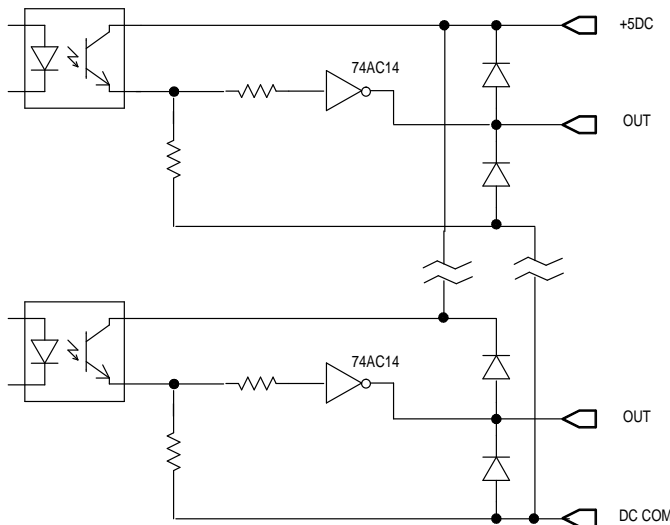


(Measure voltage from common terminal to output terminal.)



TTL inputs are inverted (0–0.4V dc = low voltage = True = On).

Circuit and Wiring Diagrams

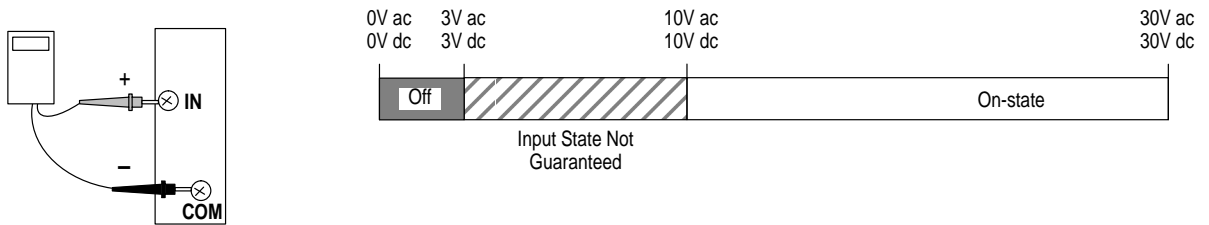


AC/DC Input Module (1746-IN16)

Specification	Catalog Number	
	1746-IN16 (RTB)	
Voltage Category	24V ac/dc	
Operating Voltage	10 to 30V dc sink 10 to 30V ac at 47 to 63 Hz	
Number of Inputs	16	
Points per Common	16	
Backplane Current Draw	5V	0.085A
	24V	0.0A
Signal Delay (max.)	dc – on = 15 ms / off = 15 ms ac – on = 25 ms / off = 25 ms	
Off-State Voltage (max.)	3V dc 3V ac	
Off-State Current (max.)	1 mA dc 1 mA ac	
Nominal Input Current	8 mA at 24V dc 8 mA at 24V ac	
Inrush Current (max.)	0.02A (ac only)	

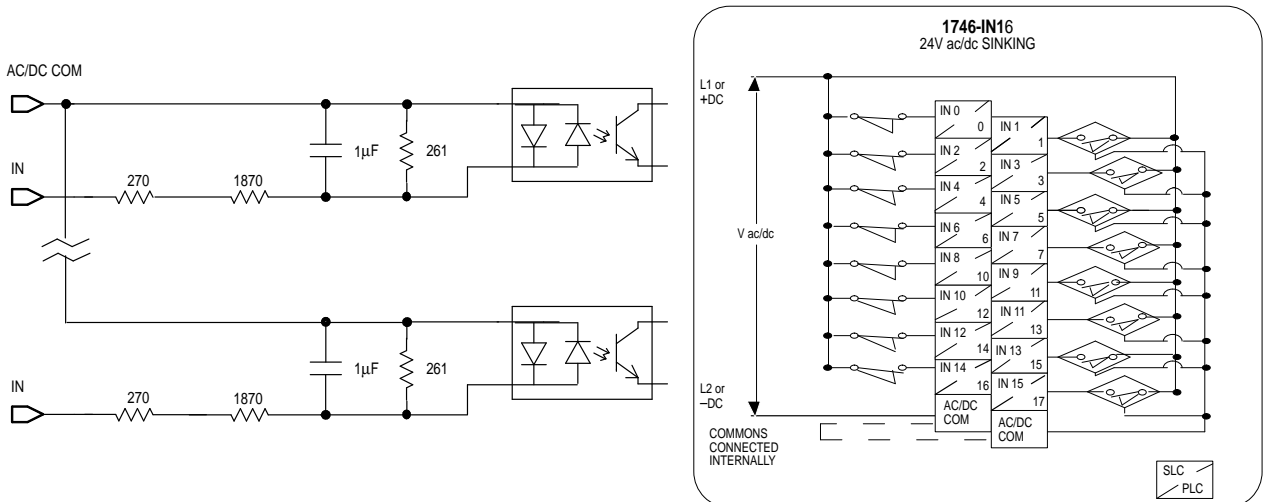
RTB = Removable Terminal Block.

On/Off-State Voltage Range



(Measure voltage from common terminal to input terminal.)

Circuit and Wiring Diagrams



AC/DC Relay Output Modules (1746-OW4, -OW8, -OW16, -OX8)

Specification	Catalog Number			
	1746-OW4	1746-OW8	1746-OW16 (RTB)	1746-OX8 (RTB)
Voltage Category	ac/dc Relay			
Operating Voltage	5 to 265V ac at 47 to 63 Hz / 5 to 125V dc			
Number of Outputs	4	8	16	8
Points per Common	4	4	8	Individually Isolated
Backplane Current Draw	5V	0.045A	0.085A	0.170A
	24V	0.045A	0.090A	0.180A
Signal Delay (max.) (Resistive Load)	on = 10 ms / off = 10 ms			
Off-State Leakage (max.)	0 mA			
Load Current (min.)	10 mA at 5V dc			
Continuous Current per Point ^① (max.)	Refer to the <i>Relay Contact Ratings</i> tables shown below.			
Continuous Current per Module (max.)	8.0A ac	16.0A ac	16.0A ac	②
Current per Common (max.)	8.0A	8.0A	8.0A	

Relay Contact Ratings for 1746-OW4, OW8, and OW16

Maximum Volts		Amperes ^①		Amperes Continuous ^②	Volt-Amperes	
		Make	Break		Make	Break
ac	240V ac	7.5A	0.75A	2.5A	1800 VA	180 VA
	120V ac	15A	1.5A			
dc	125V dc	0.22A ^③		1.0A	28 VA	
	24V dc	1.2A ^③		2.0A		

Relay Contact Ratings for 1746-OX8

Maximum Volts		Amperes ^①		Amperes Continuous ^②	Volt-Amperes	
		Make	Break		Make	Break
ac	240V ac	15A	1.5A	5.0A	3600 VA	360 VA
	120V ac	30A	3.0A			
dc	125V dc	0.22A ^③		1.0A	28 VA	
	24V dc	1.2A ^③		2.0A		

① Connecting surge suppressors across your external load will extend the life of SLC 500 relay contacts. For recommended surge suppressors when switching ac inductive loads, consult the SLC 500 Modular Hardware Style Installation and Operation User Manual (Publication 1747-6.2) or the SLC 500 Fixed Hardware Style Installation and Operation User Manual (Publication 1747-6.21). Recommended surge suppression for switching 24V dc inductive loads is a 1N4004 diode reverse wired across the load.

② The continuous current per module must be limited so the module power does not exceed 1440 VA.

③ 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 = 0.58A. For dc voltage applications less than 14V, the make/break ratings for relay contacts cannot exceed 2A.

RTB = Removable Terminal Block.

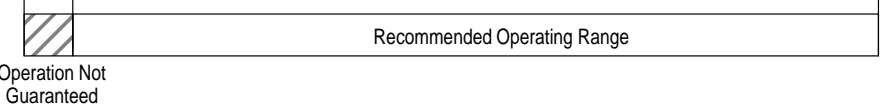
Operating Voltage Range

(For ac operation: voltage is applied between L1 and L2.)

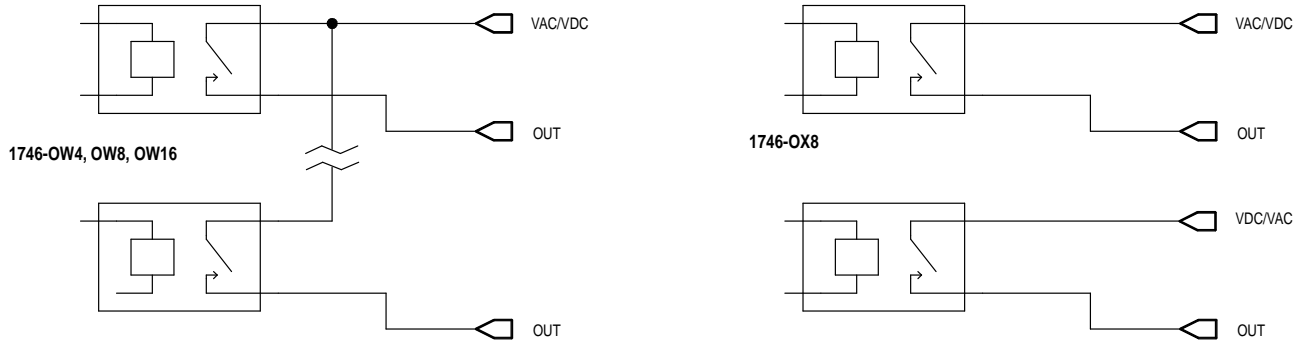
0 V 5V ac
0 V 5V dc

265V ac
125V dc

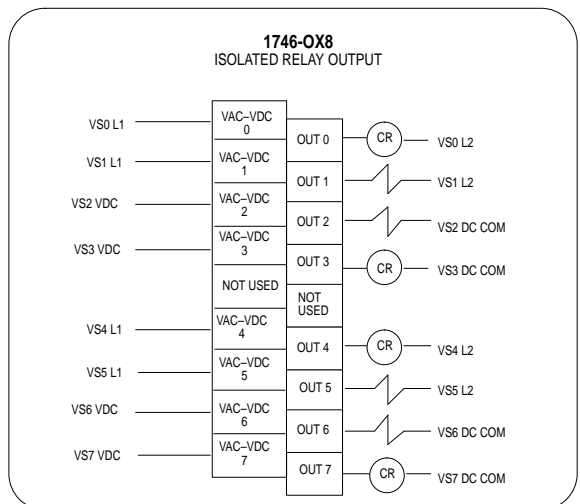
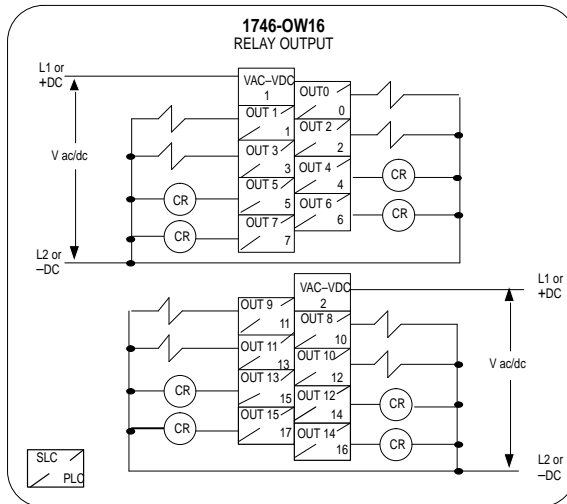
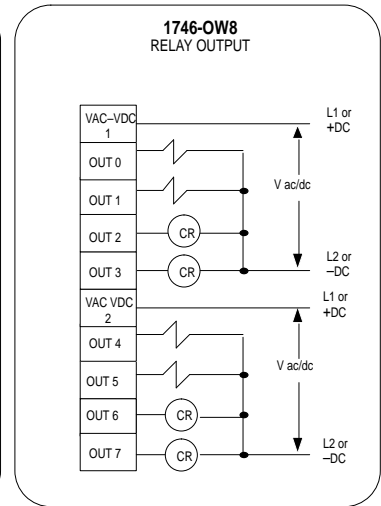
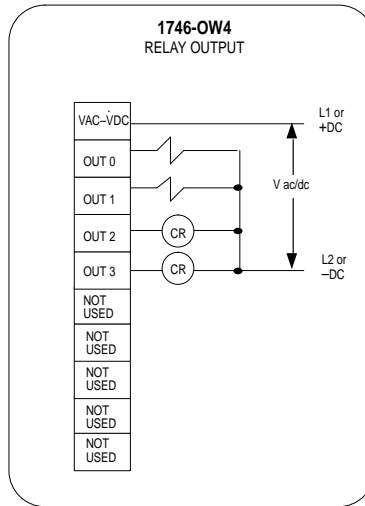
(For dc operation: voltage applied is between +VDC and DC common.)



Circuit Diagram



Wiring Diagrams

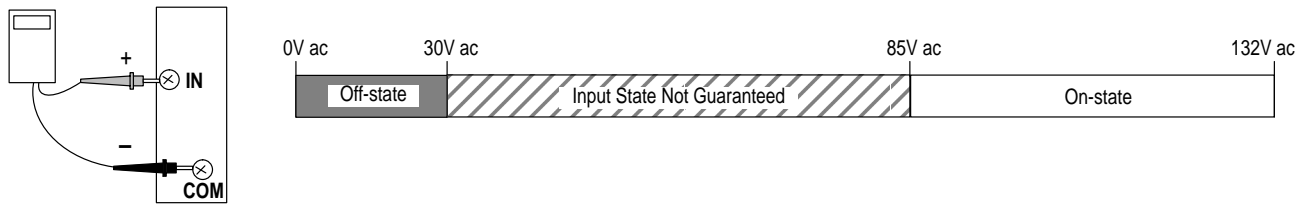


Combination Modules (1746-IO4, -IO8, -IO12)

Specification	Catalog Number		
	1746-IO4	1746-IO8	1746-IO12 (RTB)
Voltage Category	inputs – 120V ac outputs – ac/dc Relay		
Operating Voltage	inputs – 85 to 132V ac at 47 to 63 Hz outputs – 5 to 265V ac at 47 to 63 Hz / 5 to 125V dc		
Points per Common	2	4	6
Points per Module	2 inputs / 2 outputs	4 inputs / 4 outputs	6 inputs / 6 outputs
Backplane Current Draw	5V	0.030A	0.060A
	24V	0.025A	0.045A
Continuous Current per Module	4.0A	8.0A	8.0A
Specification Reference	input same as 1746-IA4 output same as 1746-OW4	input same as 1746-IA4 output same as 1746-OW4	input same as 1746-IA16 output same as 1746-OW16

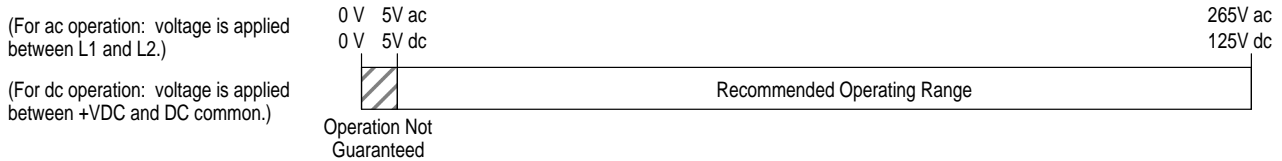
RTB = Removable Terminal Block

On/Off-State Voltage Range (AC Inputs)

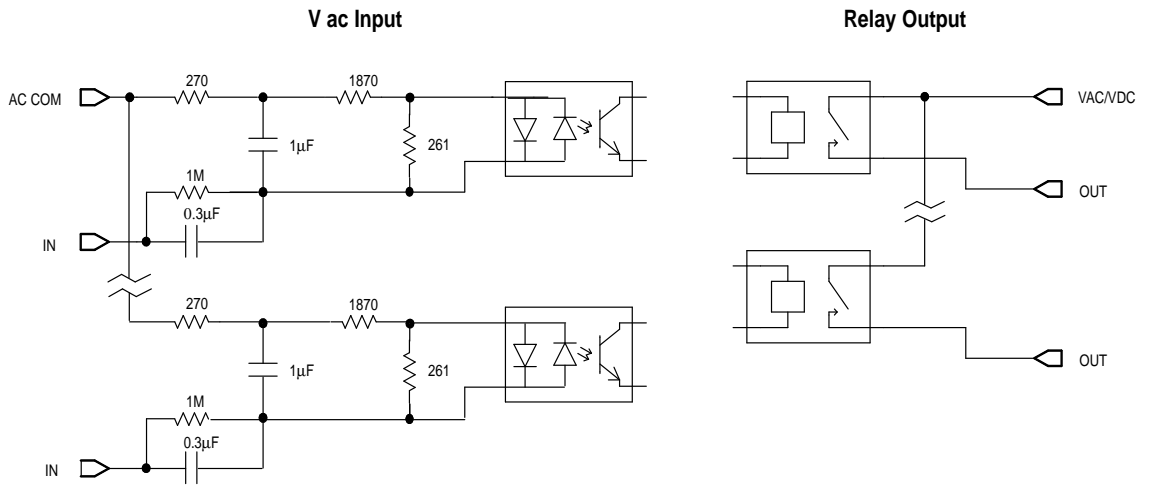


(Measure voltage from common terminal to input terminal.)

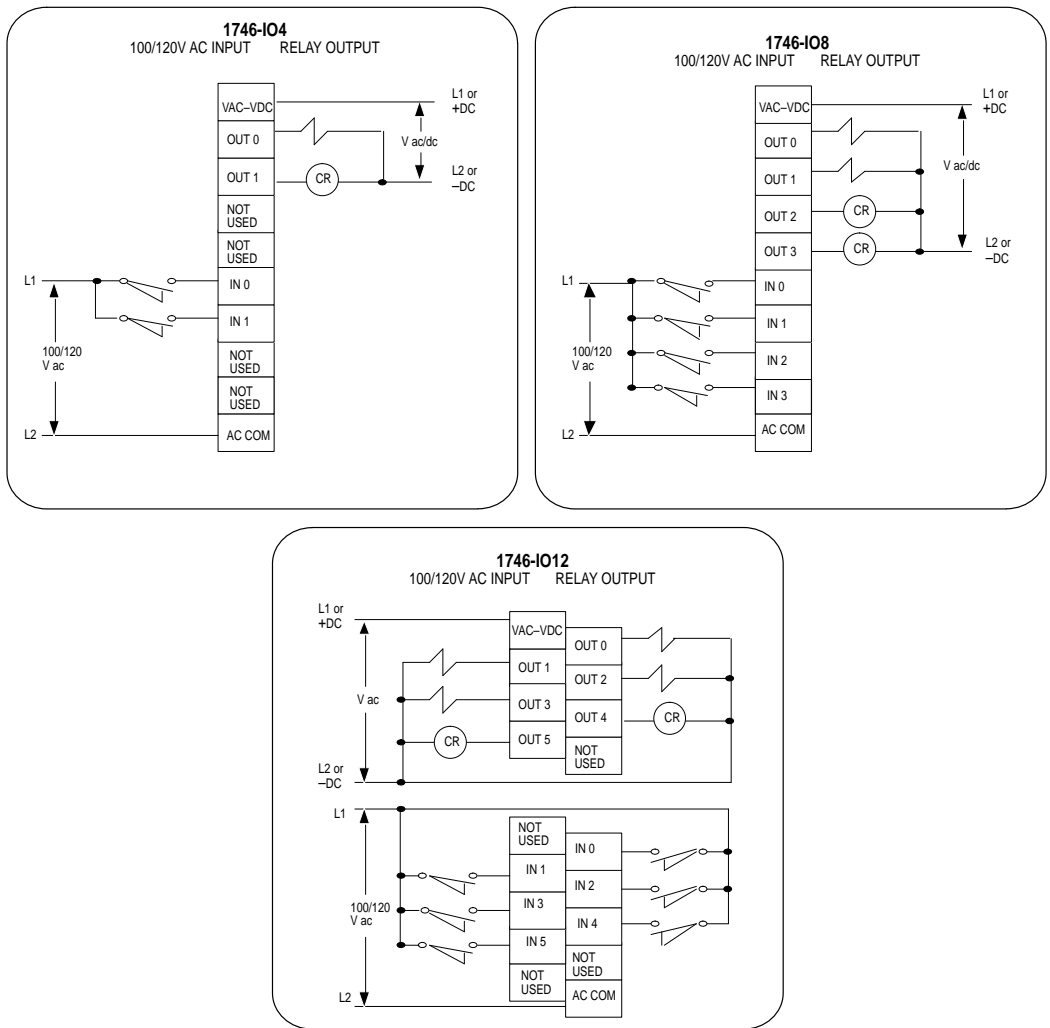
Operating Voltage Range (AC/DC Relay Outputs)



Circuit Diagram



Wiring Diagrams



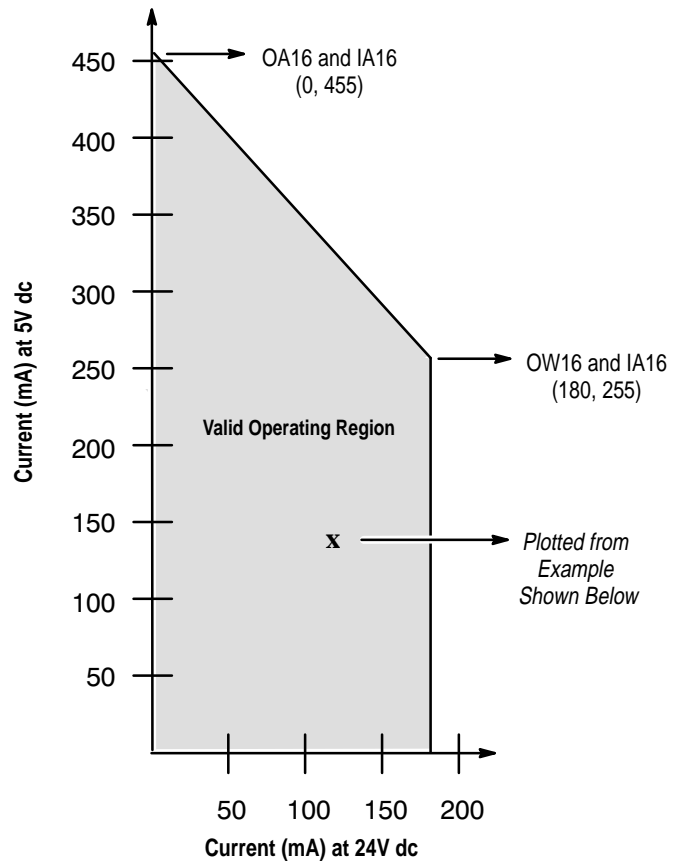
Fixed I/O Chassis Module Compatibility

The following chart depicts the range of current combinations supported by the fixed I/O expansion chassis. To use it, you must first determine the backplane current draw and operating voltage for both of the modules you plan to use in the chassis. You can get these specifications from the Power Supply Loading table on page 45.

Next, plot each of the currents on the chart below. If the point of intersection falls within the operating region, your combination is valid. If not, your combination cannot be used in a 2-slot, fixed I/O chassis.

Example: Plot IN16 and NIO4V
 IN16 = 0.085A at 5V dc and 0A at 24V dc.
 NIO4V = 0.055A at 5V dc and 0.115A at 24V dc

1. Add current draws of both modules at 5V dc to get 0.14A (140 mA).
2. Plot this point on the chart above (140 mA at 5V dc).
3. Add current draws of both modules at 24V dc to get 0.115A (115 mA).
4. Plot current draw at 24V dc (115mA at 24V dc).
5. Note the point of intersection on the chart above (marked x). This combination falls within the valid operating region for your fixed I/O chassis.



Important: The NO4I and NO4V analog output modules may require an external power supply. Refer to your analog user's manual.

Important: There are certain conditions that affect the compatibility characteristics of the BASIC module (BAS) and the DH-485/RS-232C module (KE).

When you use the BAS module or the KE module to supply power to a 1747-AIC Link Coupler, the Link Coupler draws its power through the module. The higher current drawn by the AIC at 24V dc is calculated and recorded in the tables for the modules identified as BASn (BAS networked) or KEn (KE networked). Make sure to refer to these modules if your application uses the BAS or KE module in this way.

Power Supply Loading

Hardware Component	Catalog Numbers	Maximum Current at 5V (Amps)	Maximum Current at 24V (Amps)	Hardware Component	Catalog Numbers	Maximum Current at 5V (Amps)	Maximum Current at 24V (Amps)	
Discrete Input Modules	1746-IA4	0.035	0	Discrete Output Modules	1746-OA8	0.185	0	
	1746-IA8	0.050	0		1746-OA16	0.370	0	
	1746sc-IA8I ^①	0.110	0		1746sc-OAP8I ^①	0.170	0	
	1746-IA16	0.085	0		1746-OAP12	0.370	0	
	1746-IB8	0.050	0		1746-OB8	0.135	0	
	1746sc-IB8I ^①	0.110	0		1746-OB16	0.280	0	
	1746-IB16	0.085	0		1746-OB16E	0.135	0	
	1746-IB32	0.106	0		1746-OB32	0.452	0	
	1746sc-IC8I ^①	0.110	0		1746-OBP8	0.135	0	
	1746-IC16	0.085	0		1746-OBP16	0.250	0	
	1746-IG16	0.140	0		1746-OG16	0.180	0	
	1746-IH16	0.085	0		1746-OV8	0.135	0	
	1746-IM4	0.035	0		1746-OV16	0.270	0	
	1746-IM8	0.050	0		1746-OV32	0.452	0	
	1746sc-IM8I ^①	0.110	0		1746-OVP16	0.250	0	
	1746-IM16	0.085	0		1746-OW4	0.045	0.045	
	1746-IN16	0.085	0		1746-OW8	0.085	0.090	
	1746-ITB16	0.085	0		1746-OW16	0.170	0.180	
	1746-ITV16	0.085	0		1746-OX8	0.085	0.090	
	1746-IV8	0.050	0		Discrete Input & Output Modules	1746-IO4	0.030	0.025
	1746-IV16	0.085	0			1746-IO8	0.060	0.045
	1746-IV32	0.106	0			1746-IO12	0.090	0.070

^① Sold and supported by Spectrum Controls, Inc., Bellevue, WA. For additional information contact Spectrum at (206)746-9481.

Discrete I/O Power Dissipation

The table below lists the power dissipation for the discrete I/O modules operating at nominal voltage. The following terms are used in the Power Dissipation table:

Watts per Point	Minimum Watts	Total Watts
The heat dissipation that can occur in each field wiring point when energized at nominal voltage.	The amount of heat dissipation that can occur when there is no field power present.	The watts per point plus the minimum watts (with all points energized).

For examples on calculating system heat dissipation, refer to the SLC 500 Modular Hardware Style Installation and Operation User Manual (Publication 1747-6.2) or the SLC 500 Fixed Hardware Style Installation and Operation User Manual (Publication 1747-6.21).

Power Dissipation

Catalog Numbers	Watts per Point	Minimum Watts	Total Watts	Catalog Numbers	Watts per Point	Minimum Watts	Total Watts
1746-IA4	0.27	0.175	1.30	1746-OA8	1.000	0.925	9.00
1746-IA8	0.27	0.250	2.40	1746-OA16	0.462	1.850	9.30
1746sc-IA8I ^①	0.43	0.550	4.00	1746sc-OAP8I ^①	1.125	0.850	9.85
1746-IA16	0.27	0.425	4.80	1746-OAP12	1.000	1.850	10.85
1746-IB8	0.20	0.250	1.90	1746-OB8	0.775	0.675	6.90
1746sc-IB8I ^①	0.31	0.550	3.00	1746-OB16	0.338	1.40	7.60
1746-IB16	0.20	0.425	3.60	1746-OB16E	0.150	0.675	3.07
1746-IB32	0.20	0.530	6.90	1746-OB32	0.078	2.26	4.80
1746sc-IC8I ^①	0.49	0.550	4.50	1746-OBP8	0.300	0.675	3.08
1746-IC16	0.22	0.425	3.95	1746-OBP16	0.310	1.250	6.26
1746-IG16	0.02	0.700	1.00	1746-OG16	0.033	0.900	1.50
1746-IH16	0.32	0.217	5.17	1746-OV8	0.775	0.675	6.90
1746-IM4	0.35	0.175	1.60	1746-OV16	0.388	1.400	7.60
1746-IM8	0.35	0.250	3.10	1746-OV32	0.078	2.26	4.80
1746sc-IM8I ^①	0.76	0.550	6.60	1746-OVP16	0.310	1.250	6.26
1746-IM16	0.35	0.425	6.00	1746-OW4	0.133	1.310	1.90
1746-IN16	0.35	0.425	6.00	1746-OW8	0.138	2.590	3.70
1746-ITB16	0.20	0.425	3.60	1746-OW16	0.033	5.170	5.70
1746-ITV16	0.20	0.425	3.60	1746-OX8	0.825	2.590	8.60
1746-IV8	0.20	0.250	1.90	1746-IO4	0.27 per input point 0.133 per output point	0.75	1.60
1746-IV16	0.20	0.425	3.60	1746-IO8	0.27 per input point 0.133 per output point	1.38	3.00
1746-IV32	0.20	0.530	6.90	1746-IO12	0.27 per input point 0.133 per output point	2.13	4.60

^① Sold and supported by Spectrum Controls, Inc., Bellevue, WA. For additional information, contact Spectrum at (206) 746-9481.

Environmental Specifications

Operating Temperature	0°C to 60°C (32°F to 140°F) ^①
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Operating Humidity	5% to 95% (non-condensing)
Noise Immunity	NEMA standard ICS 2-230
Vibration (Operating)	Displacement 0.015 inch peak at 5-57 Hz. Acceleration 2.5Gs at 57-2000 Hz
Shock (Operating)	30Gs (all modules except relay contact). 10Gs (relay contact modules, 1746-OW, -OX, I/O Combo).
Isolation ^②	1500 Volts
Certification ^{③④}	UL listed. CSA or C-UL approved as indicated by product markings. CE compliant for all applicable directives when product or packaging is marked.
Hazardous Environment Class ^④	Class I, Division 2, Groups A, B, C, D Hazardous Environment

^① Exceptions are indicated with certain modules.

^② Electro-optical isolation between I/O terminals and control logic

^③ Some modules are not CE marked. See page 2.

^④ All modules meet Class I, Division 2 requirements for hazardous location. Some modules are rated Class I, Division 2 by CSA only. See page 2.

Accessories

The following accessories are available for use with discrete I/O modules:

Catalog Number	Item	Description
1746-N2	Modular chassis slot filler	Helps prevent debris from entering the SLC enclosure that can cause shorts or improper operation.
1492-IFMxx	Feed-through interface modules	Connects electronic wiring (discrete I/O modules, particularly 16- and 32-point) to electric wiring (factory devices). Available with either 20 or 40 terminals.
1492-CABLExx	Cables: - 1 m. (3.3 ft.) - 2.5 m. (8.2 ft.) - 5 m. (16.4 ft.)	Connects directly to the 1492-IFMxx interface module and is available with a removable terminal block or a ready-to-wire free end.
1746-N3	Connector kit	This kit allows you to create your own cable (3.2 meters max.) if the Catalog Number 1746-C15 cable is not long enough. It contains one female connector and 45 crimp contacts. Note: 32-point modules are shipped with one connector kit.

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