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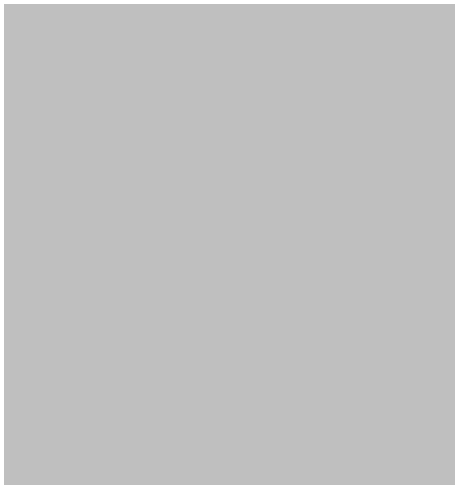
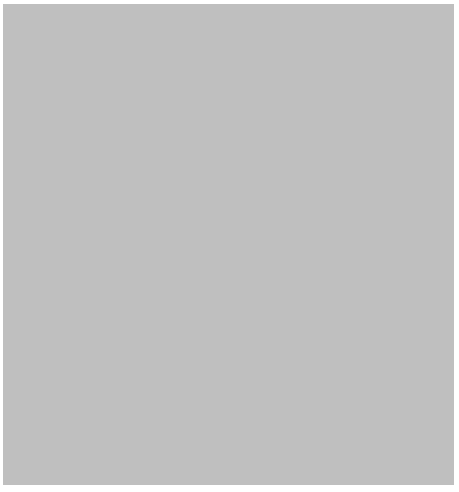
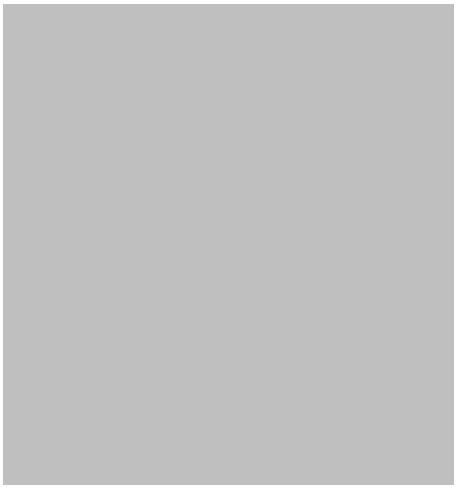
Rockwell Automation
Allen-Bradley

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, -OBP16, -OB32, -OG16, -OV8, -OV16, -OVP16, -OV32, -OW4, -OW8, -OW16, -OX8, -IO4, -IO8, -IO12)

Product Data

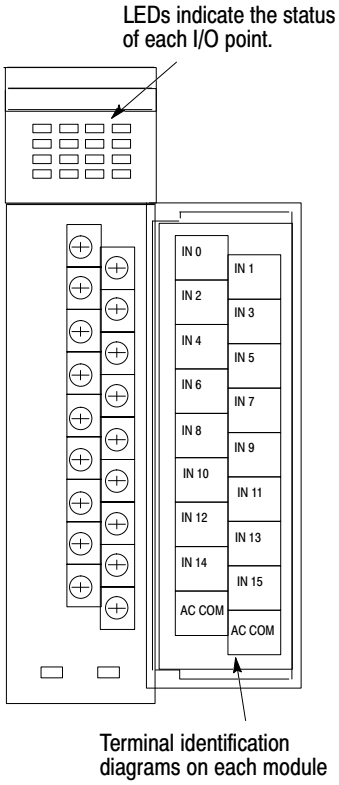




Our wide variety of input, output, and combination modules makes the SLC 500™ family the smart choice for all of your small PLC applications. I/O modules are available in a wide variety of densities including 4-, 8-, 16-, and 32-point and can interface to AC, DC, and TTL voltage levels. Output modules 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 12). 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 12).

Features and Benefits



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

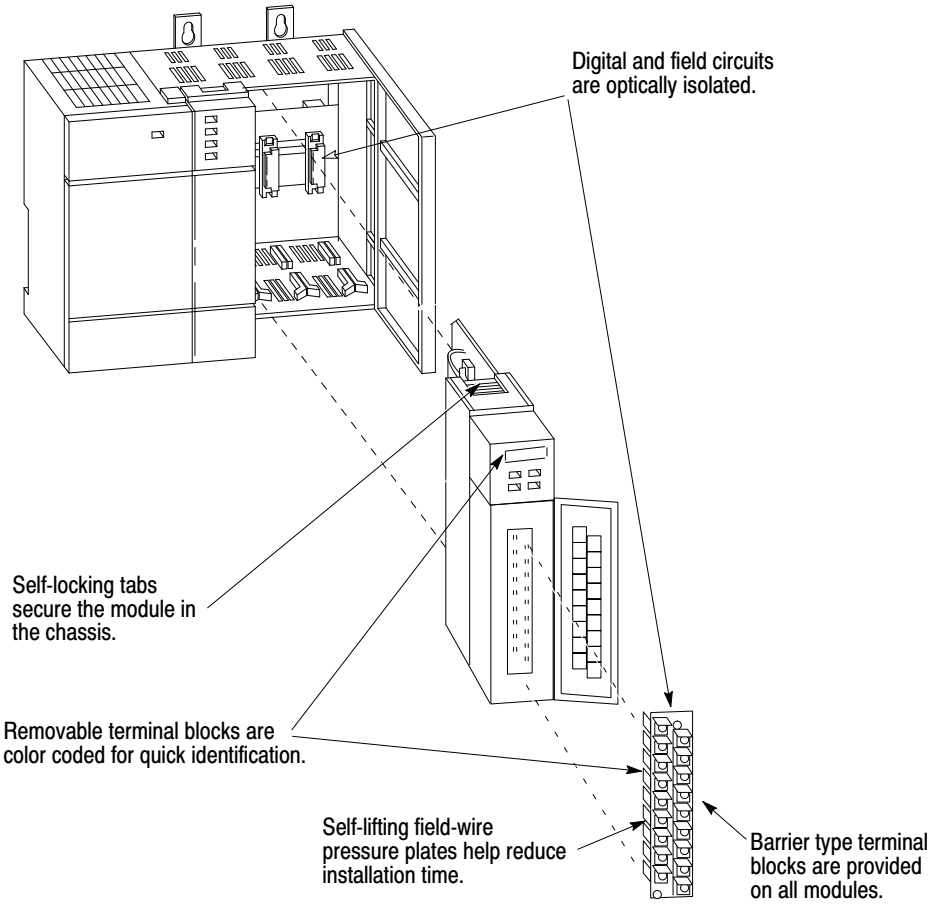
LEDs indicate the status of each I/O point. Assisting you in troubleshooting, LEDs illuminate when the proper signal is received at an input terminal, or when the processor applies power to an output terminal.

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.

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.

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.



Digital and field circuits are 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

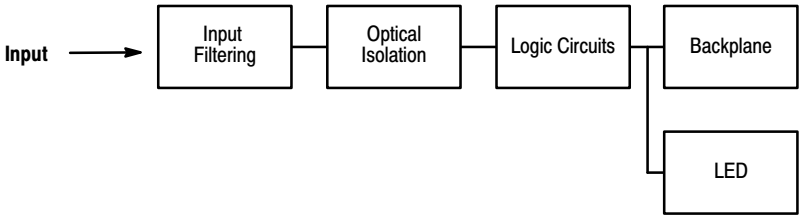
Power Supply Requirements

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:

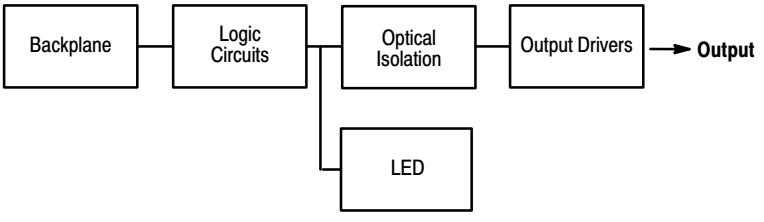
1. Input filtering limits the effect of voltage transients caused by contact bounce and/or electrical noise. If not filtered, voltage transients could produce false data. All input modules use input filtering.
2. Optical isolation shields backplane circuits and module logic circuits from possible damage 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

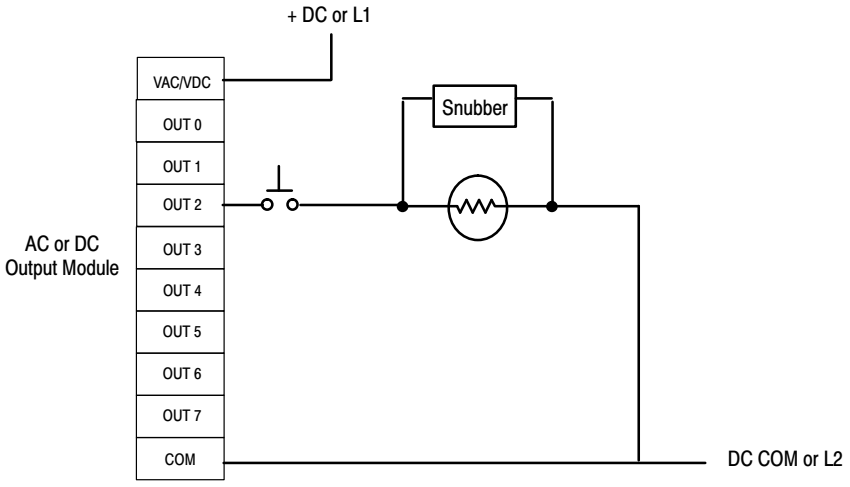
Most output modules have built-in surge suppression to reduce the effects of high voltage transients. However, we recommend that you use an additional suppression device if an output module is being used to control an inductive device such as:

- 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-OBP16 and -OVP16 DC output modules. Refer to pages 28 and 31 for more information about suppression when using the 1746-OBP16 and -OVP16, respectively.

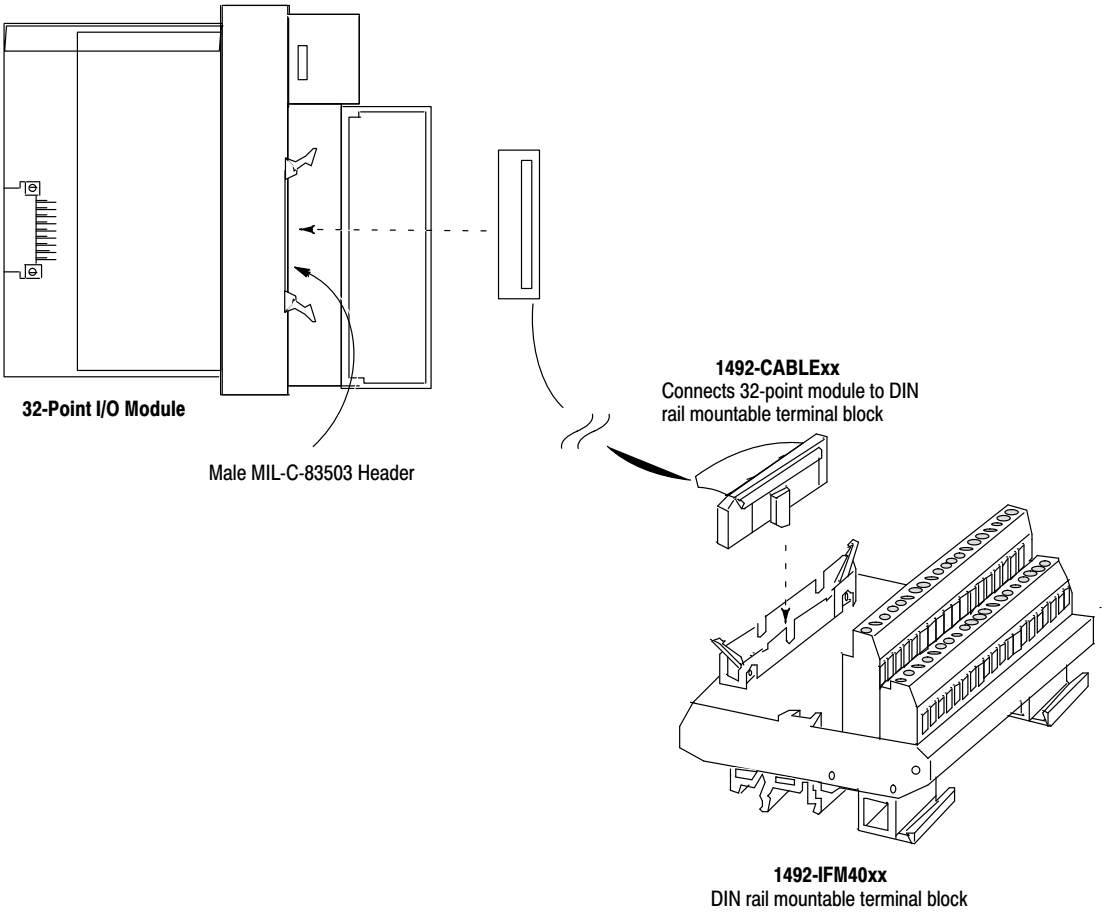
Enhanced Discrete I/O Modules

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 46.



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 SLC 5/04™ 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 21.

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

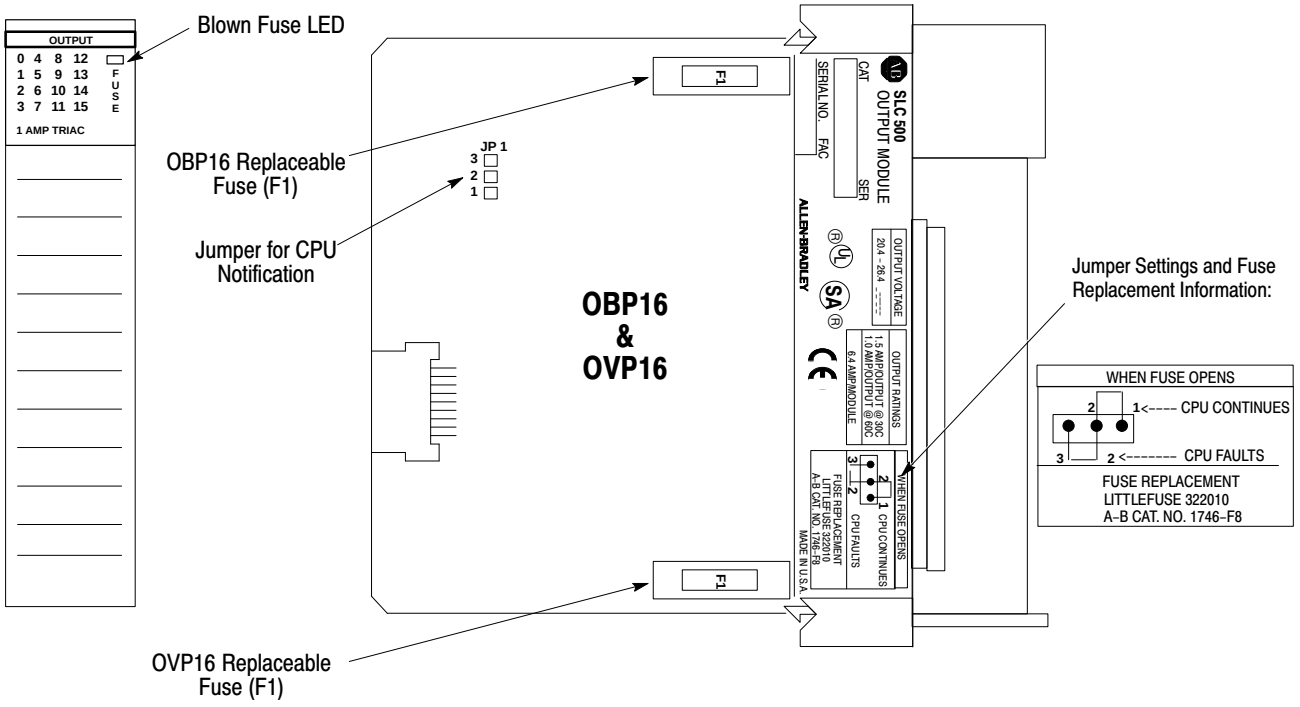
The high current solid state output modules expand application coverage in automotive, packaging, and material handling applications by allowing the SLC 500 processor to directly control solenoids, contactors, motors, and motor starter loads (up to size 5) with continuous current requirements of up to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

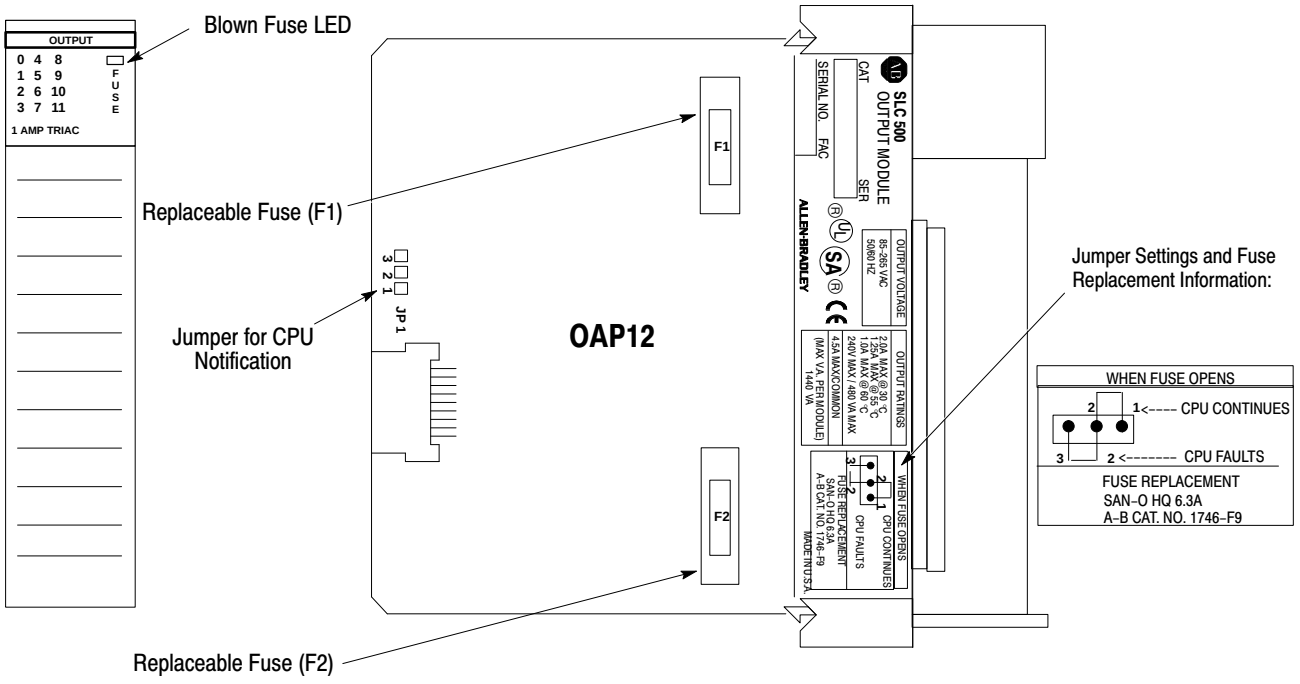
1746-OAP12, -OBP16, and -OVP16 modules also provide fuse protection and blown fuse diagnostics for increased up-time. The ac output module includes two replaceable fuses (one per common), which protect the module in the event of short circuits.

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-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.


Blown Fuse LED
OBP16 Replaceable Fuse (F1)
Jumper for CPU Notification
OVP16 Replaceable Fuse (F1)
OBP16 & OVP16
OUTPUT
1 AMP TRIAC
F1
JP 1
SLC 500 OUTPUT MODULE
ALLEN-BRADLEY
Jumper Settings and Fuse Replacement Information:
WHEN FUSE OPENS
1<---- CPU CONTINUES
2 <-------- CPU FAULTS
FUSE REPLACEMENT
LITTLEFUSE 322010
A-B CAT. NO. 1746-F8


Blown Fuse LED
Replaceable Fuse (F1)
Jumper for CPU Notification
Replaceable Fuse (F2)
OAP12
OUTPUT
1 AMP TRIAC
F1
F2
JP1
SLC 500 OUTPUT MODULE
ALLEN-BRADLEY
Jumper Settings and Fuse Replacement Information:
WHEN FUSE OPENS
1<---- CPU CONTINUES
2 <-------- CPU FAULTS
FUSE REPLACEMENT
SAN-O HQ 6.3A
A-B CAT. NO. 1746-F9

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.

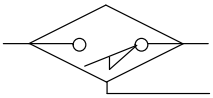
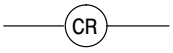
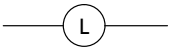
Sinking/Sourcing — describes a current signal flow relationship between field input and output devices in a control system and their power supply. Sourcing I/O modules supply (or source) current to sinking field devices. Sinking I/O modules receive (or sink) current from sourcing field devices.

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.

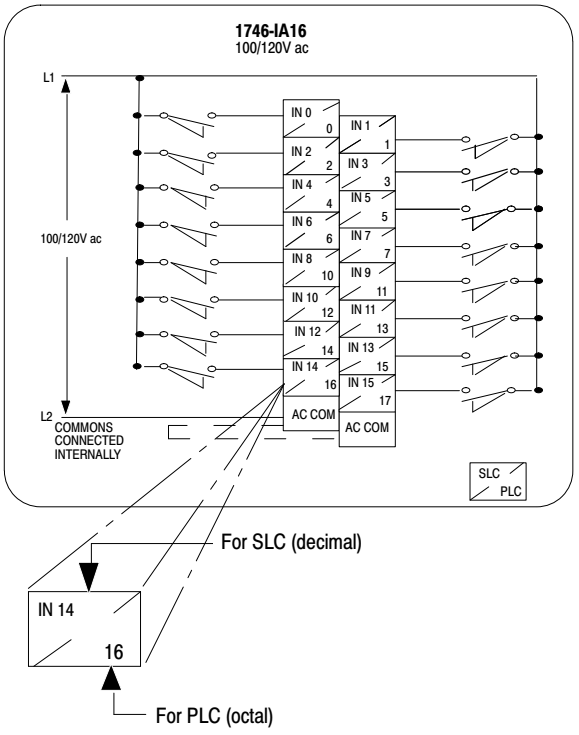
Important: The wiring diagrams in this document are examples only. It is not necessary to connect an I/O device to every terminal on an I/O module's terminal block.

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 PLC® 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 illustration 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's shipped with each discrete I/O module.



Discrete I/O Module Summary

ID Code	Voltage Category	Cat. No.	Input/Output	Number of I/O	Module Description	Page
AC Modules						
100	100/120V ac	**1746-IA4**	Input	4	120V ac Input Card	13
300	100/120V ac	**1746-IA8**	Input	8	120V ac Input Card	13
500	100/120V ac	**1746-IA16**	Input	16	120V ac Input Card	13
101	200/240V ac	**1746-IM4**	Input	4	240V ac Input Card	14
301	200/240V ac	**1746-IM8**	Input	8	240V ac Input Card	14
501	200/240V ac	**1746-IM16**	Input	16	240V ac Input Card	14
2703	100/120V ac	**1746-OA8**	Output	8	120/240V ac Output Card	15
2903	100/120V ac	**1746-OA16**	Output	16	120/240V ac Output Card	15
2705	120/240V ac	**1746sc-OAP8I** ③	Output	8	Isolated ac Output Card	–
2803	120/240V ac	**1746-OAP12** ①	Output	12	High Current 120/240V ac Output Card	16
DC Modules						
306	24V dc	**1746-IB8**	Input	8	Current Sinking DC Input Card	17
506	24V dc	**1746-IB16**	Input	16	Current Sinking DC Input Card	17
706	24V dc	**1746-IB32** ①	Input	32	Current Sinking DC Input Card	18
519	24V dc	**1746-ITB16**	Input	16	Fast Response DC Sinking Input Card	17
509	48V dc	**1746-IC16**	Input	16	Current Sinking DC Input Card	17
507	125V dc	**1746-IH16**	Input	16	Current Sinking DC Input Card	17
320	24V dc	**1746-IV8**	Input	8	Current Sourcing DC Input Card	20
520	24V dc	**1746-IV16**	Input	16	Current Sourcing DC Input Card	20
720	24V dc	**1746-IV32** ①	Input	32	Current Sourcing DC Input Card	22
518	24V dc	**1746-ITV16**	Input	16	Fast Response DC Sourcing Input Card	20
515	5V dc/TTL	**1746-IG16** ②	Input	16	Current Sourcing TTL Input Card	24
2713	24V dc	**1746-OB8**	Output	8	Current Sourcing DC Output Card	25
2913	24V dc	**1746-OB16**	Output	16	Current Sourcing DC Output Card	25
3113	24V dc	**1746-OB32** ①	Output	32	Current Sourcing DC Output Card	26
2721	24V dc	**1746-OBP8**	Output	8	High Current Sourcing DC Output Card	28
2921	24V dc	**1746-OBP16** ①	Output	16	High Current Sourcing DC Output Card	28
2714	24V dc	**1746-OV8**	Output	8	Current Sinking DC Output Card	30
2914	24V dc	**1746-OV16**	Output	16	Current Sinking DC Output Card	30
3114	24V dc	**1746-OV32** ①	Output	32	Current Sinking DC Output Card	32
2922	24V dc	**1746-OVP16** ①	Output	16	High Current Sinking DC Output Card	31
2915	5V dc/TTL	**1746-OG16** ②	Output	16	Current Sinking TTL Output Card	34
AC/DC Modules						
303	120V ac/dc	**1746sc-IA8I** ③	Input	8	Isolated ac/dc Input Card	–
304	220V ac/dc	**1746sc-IM8I** ③	Input	8	Isolated ac/dc Input Card	–
510	24V ac/dc	**1746-IN16**	Input	16	24V ac/dc Input Card	35
2500	AC/DC Relay	**1746-OW4** ①	Output	4	Relay (Hard Contact) Output Card	36
2700	AC/DC Relay	**1746-OW8** ①	Output	8	Relay (Hard Contact) Output Card	36
2900	AC/DC Relay	**1746-OW16** ①	Output	16	Relay (Hard Contact) Output Card	36
2701	AC/DC Relay	**1746-OX8** ①	Output	8	Isolated Relay Output Card	38
800	Inputs – 120V ac, Outputs – AC/DC Relay	**1746-IO4** ①	Input/Output	2 Inputs, 2 Outputs	Combination Input/Output Module	39
1100	Inputs – 120V ac, Outputs – AC/DC Relay	**1746-IO8** ①	Input/Output	4 Inputs, 4 Outputs	Combination Input/Output Module	39
1500	Inputs – 120V ac, Outputs – AC/DC Relay	**1746-IO12** ①	Input/Output	6 Inputs, 6 Outputs	Combination Input/Output Module	39

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

② Not CE marked.

③ Sold and supported by Spectrum Controls, Inc., Bellevue, WA. For additional information contact Spectrum at (206)746-9481.

Specifications, Wiring, and Circuit Diagrams

AC Input Modules (1746-IA4, -IA8, -IA16)

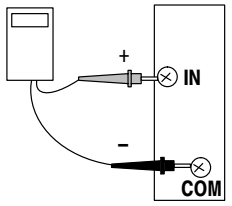
Voltage Category	Operating Voltage ①	Number of Inputs	Points per Common	Catalog Number	Backplane Current Draw 5V	Backplane Current Draw 24V	Signal Delay (max.)	Off-State Current (max.)	Nominal Input Current	Inrush Current ② (max.)	Inrush Current Time Duration ② (max.)
100/120V ac	85 to 132V ac	4	4	**1746-IA4**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

① Frequency = 47 to 63 Hz

② 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.

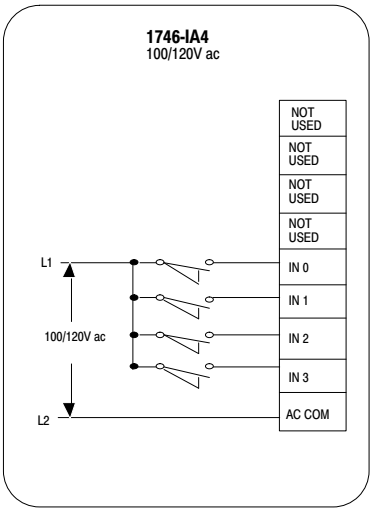
RTB = Removable Terminal Block.

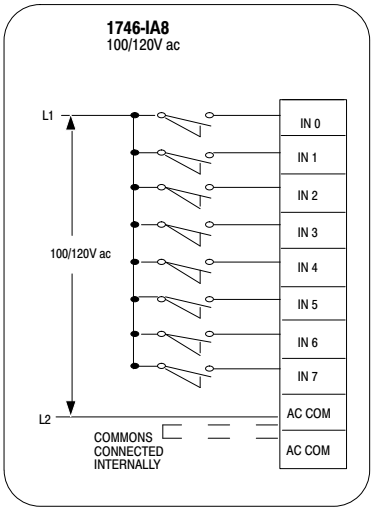
On/Off-State Voltage Range

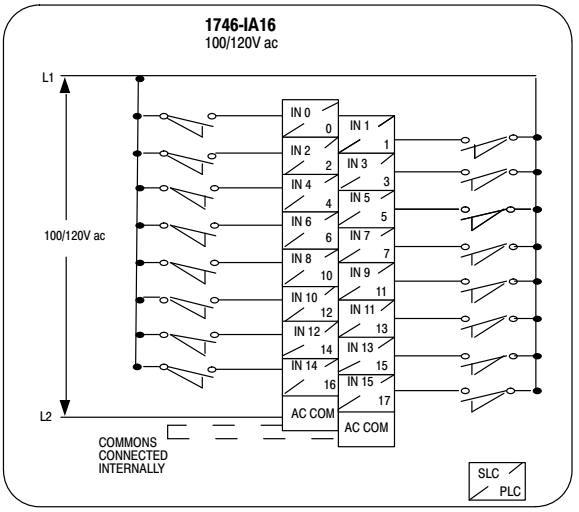


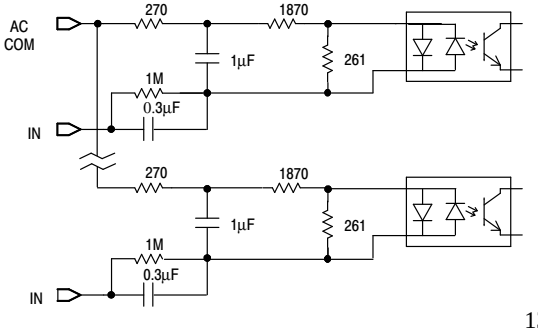
(Measure voltage from common terminal to input terminal.)

Wiring and Circuit Diagrams









AC Input Modules (1746-IM4, -IM8, -IM16)

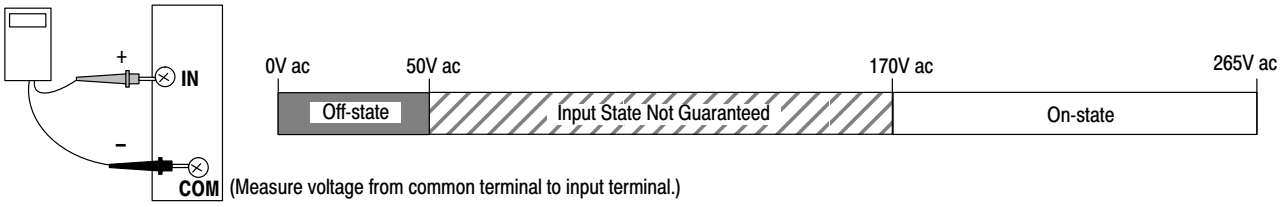
Voltage Category	Operating ① Voltage	Number of Inputs	Points per Common	Catalog Number	Backplane Current Draw 5V	Backplane Current Draw 24V	Signal Delay (max.)	Off-State Current (max.)	Nominal Input Current	Inrush ② Current (max.)	Inrush ② Current Time Duration (max.)
200/240V ac	170 to 265V ac	4	4	**1746-IM4**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

① Frequency = 47 to 63 Hz

② 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.

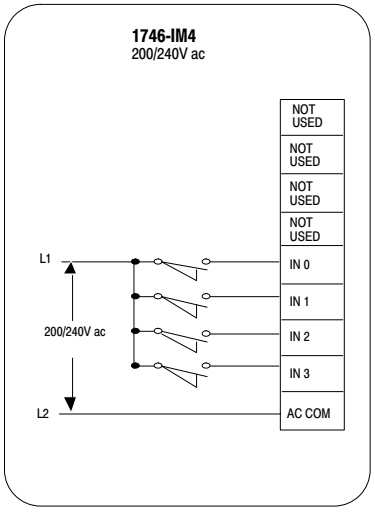
RTB = Removable Terminal Block.

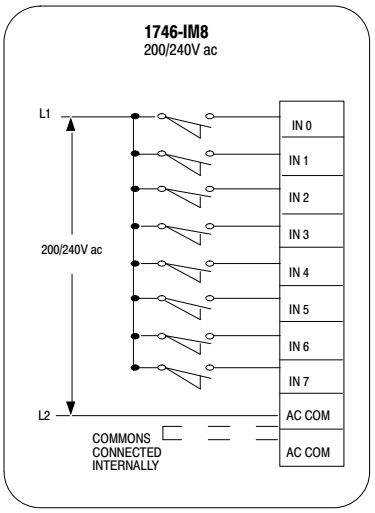
On/Off-State Voltage Range

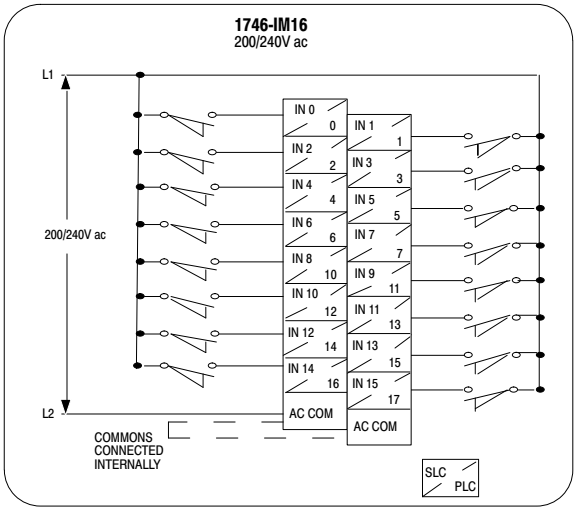


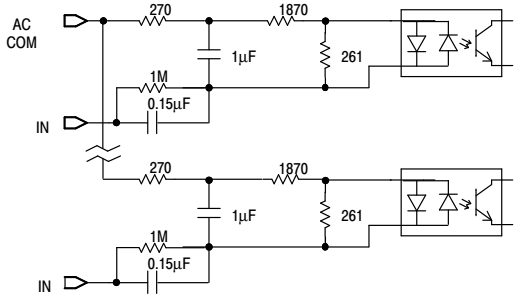
(Measure voltage from common terminal to input terminal.)

Wiring and Circuit Diagrams









AC Output Modules (1746-OA8, -OA16)

Voltage ① Category	Number of Outputs	Points per Common	Catalog ② Number	Backplane Current Draw 5V	Backplane Current Draw 24V	Signal Delay (max.)	Off-State Leakage (max.)	Load Current (min.)	Continuous Current per Point (max.)	Continuous Current per Module (max.)	On-State Voltage Drop (max.)	Surge ④ Current per point (max.)
120-240V ac (Operating Voltage 85-265V ac)	8	4	**1746-OA8**	0.185A	0.0A	on = 1 ms off =11 ms	2 mA ③	10 mA	1A at 30°C 0.50A at 60°C	8A at 30°C 4A at 60°C	1.50V at 1A	10.0A for 25 ms
	16	8	**1746-OA16** (RTB)	0.370A	0.0A	on = 1 ms off = 11 ms	2 mA ③	10 mA	0.50A at 30°C 0.25A at 60°C	8A at 30°C 4A at 60°C	1.50V at 0.50A	10.0A for 25 ms

① Frequency = 47 to 63 Hz

② Triac outputs turn on at any point in the ac line cycle and turn off at ac line zero cross. Recommended surge suppression for triac outputs when switching 120V ac inductive loads is Harris MOV part number V220MA2A.

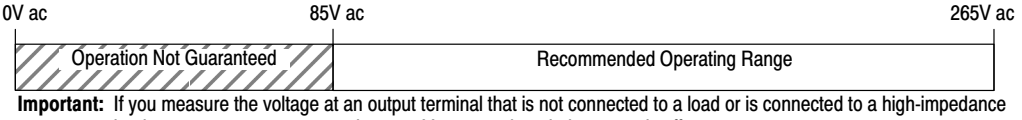
③ To limit the effects of leakage current through solid state outputs, a loading resistor can be connected in parallel with your load. For typical 120V ac applications, use a 15k ohm, 2W resistor. For typical 240V ac applications, use a 15k ohm, 5W resistor.

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

RTB = Removable Terminal Block.

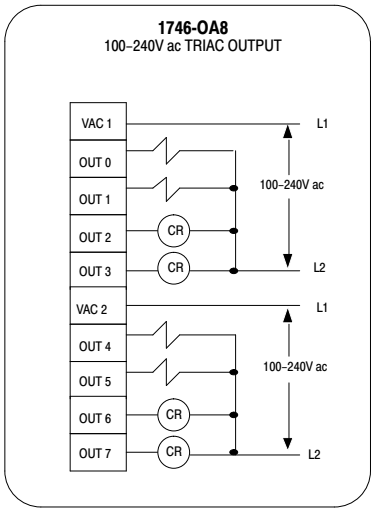
Operating Voltage Range

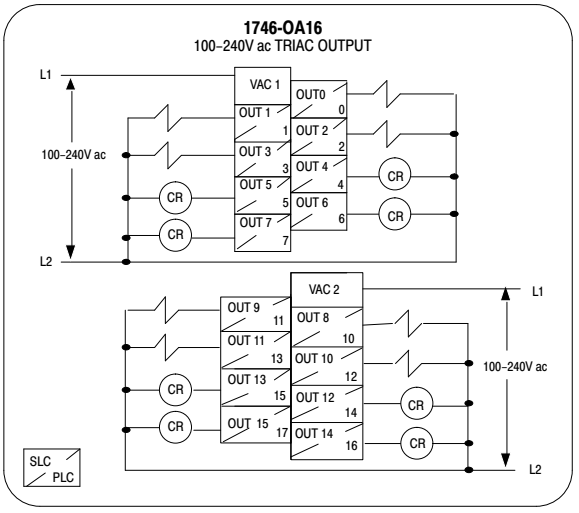
(Voltage is applied between L1 and L2.)

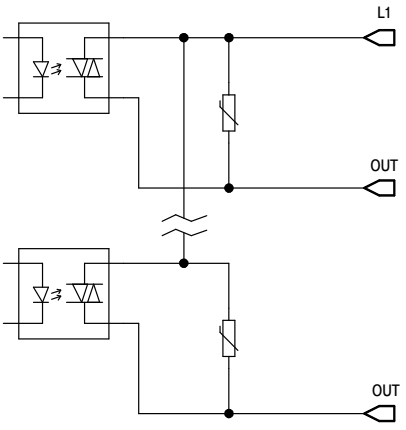


Important: If you measure the voltage at an output terminal that is not connected to a load or is connected to a high-impedance load, you may measure as much as 100V ac even though the output is off.

Wiring and Circuit Diagrams







AC Output Modules (1746-OAP12)

Voltage ① Category	Number of Outputs	Points per Common	Catalog ②⑤ Number	Backplane Current Draw 5V	Backplane Current Draw 24V	Signal Delay (max.)	Off-State Leakage (max.)	Load Current (min.)	Continuous Current per Point (max.)	Continuous Current per Module (max.)	On-State Voltage Drop (max.)	Surge ④ Current per point (max.)
120–240V ac (Operating Voltage 85–265V ac)	12	6	**1746-OAP12** (RTB)	0.370A	0.0A	on = 1 ms off = 11 ms	2 mA ③	10 mA	2.0A at 30°C 1.25A at 55°C 1.0A at 60°C	9.0A at 30°C 6.0A at 60°C	1.2V at 2.0A	17.0A ⑥ for 25 ms

① Frequency = 47 to 63 Hz

② Triac outputs turn on at any point in the ac line cycle and turn off at ac line zero cross. Recommended surge suppression for triac outputs when switching 120V ac inductive loads is Harris MOV part number V220MA2A.

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

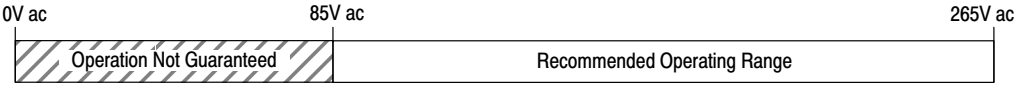
⑤ A fused common and blown fuse LED are provided on this module. (Fuses are designed to protect the module.) For replacement fuse, use catalog number 1746-F9 or SAN-O HQ 6.3A.

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

RTB = Removable Terminal Block.

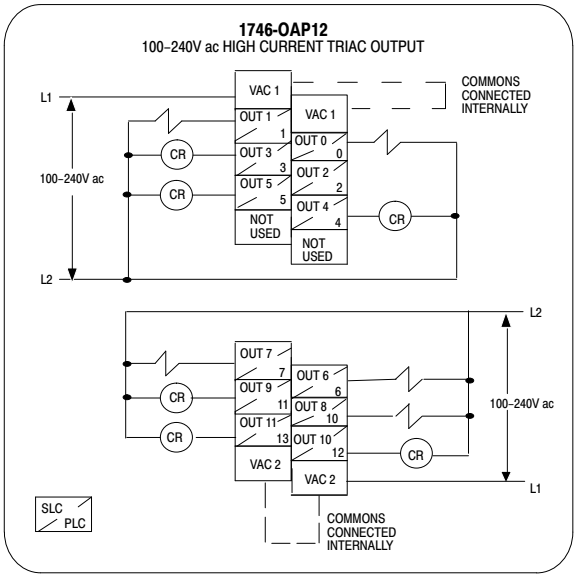
Operating Voltage Range

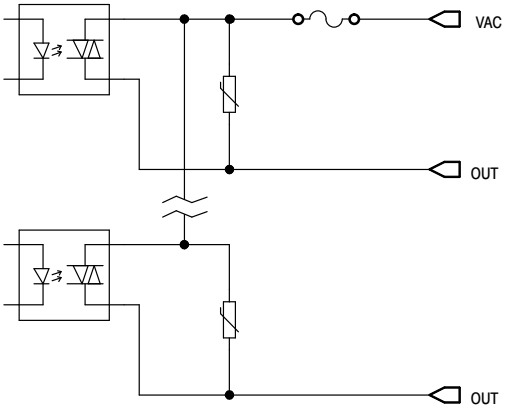
(Voltage is applied between L1 and L2.)



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.

Wiring and Circuit Diagrams





Sinking DC Input Modules (1746-IB8, -IB16, -ITB16, -IC16, -IH16)

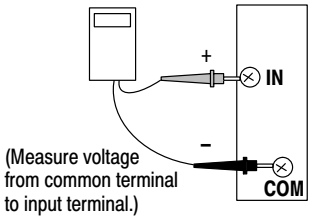
Voltage Category	Operating Voltage	Number of Inputs	Points per Common	Catalog Number	Backplane Current Draw 5V	Backplane Current Draw 24V	Signal Delay (max.)	Off-State Voltage (max.)	Off-State Current (max.)	Nominal Input Current
24V dc	10–30 sink	8	8	**1746-IB8**	0.050A	0.0A	on = 8 ms off = 8 ms	5V dc	1 mA	8 mA at 24V dc
		16	16	**1746-IB16** (RTB)	0.085A	0.0A	on = 8 ms off = 8 ms	5V dc	1 mA	8 mA at 24V dc
		16 (RTB)	16	**1746-ITB16** (Fast Response)	0.085A	0.0A	on = 0.3 ms ① off = 0.5 ms	5V dc	1.5 mA	8 mA at 24V dc
48V dc	30–60 at 55°C 30–55 at 60°C sink	16	16	**1746-IC16** (RTB)	0.085A	0.0A	on = 4 ms off = 4 ms	10V dc	1.5 mA	4.1 mA at 48V dc
125V dc	90–146 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	16	16	**1746-IH16** ② (RTB)	0.085A	0.0A	on = 9 ms off = 9 ms	20V dc	0.8 mA	2.15 mA at 125V dc 2.25 mA at 132V dc

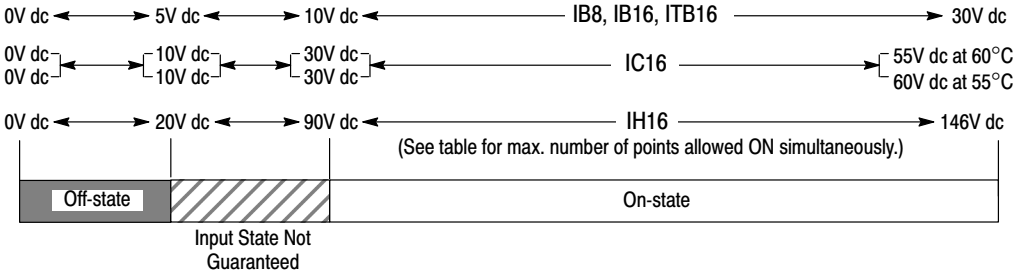
① Typical signal delay for these modules: ON=0.100 ms, OFF=0.25 ms at 24V dc.

② 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.

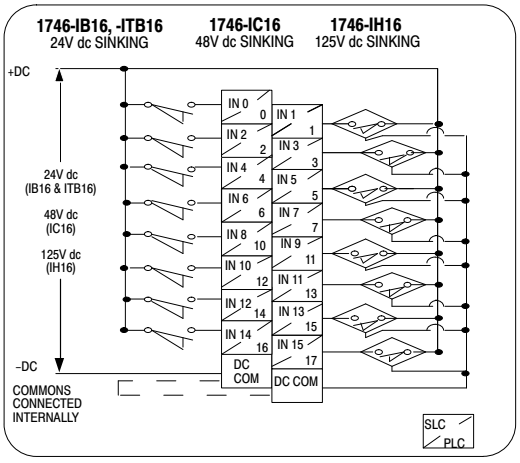
On/Off-State Voltage Range

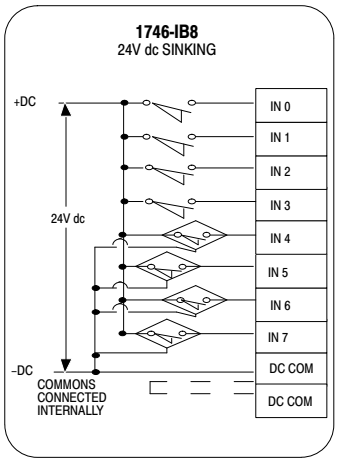


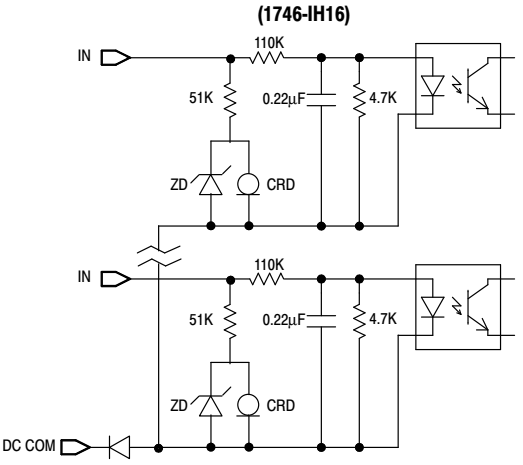


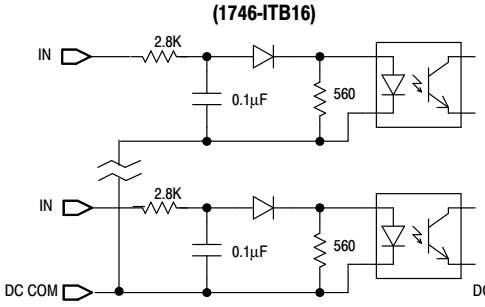
See page18 for Wiring and Circuit Diagrams.

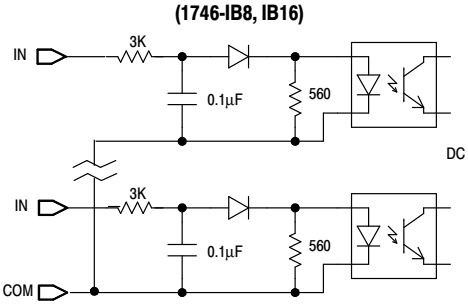
Wiring and Circuit Diagrams

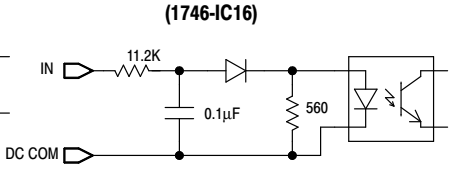












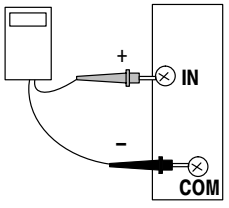
Sinking DC Input Module (1746-IB32)

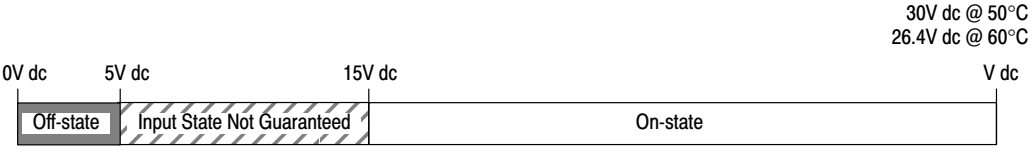
Voltage Category	Operating Voltage	Number of Inputs	Points per Common	Catalog Number	Backplane Current Draw 5V	Backplane Current Draw 24V	Signal Delay (max.)	Off-State Voltage (max.)	Off-State Current (max.)	Nominal Input Current
24V dc	15–30 at 50°C 15–26.4 at 60°C sink	32	8	**1746-IB32** ①	0.106A	0.0A	on = 3 ms off = 3 ms	5.0V dc	1.6 mA	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.

RTB = Removable Terminal Block.

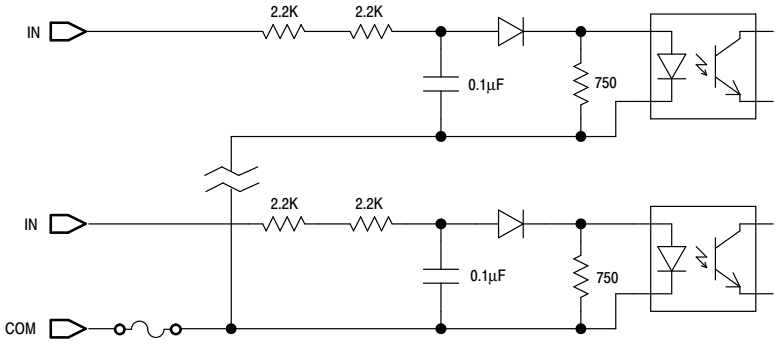
On/Off-State Voltage Range



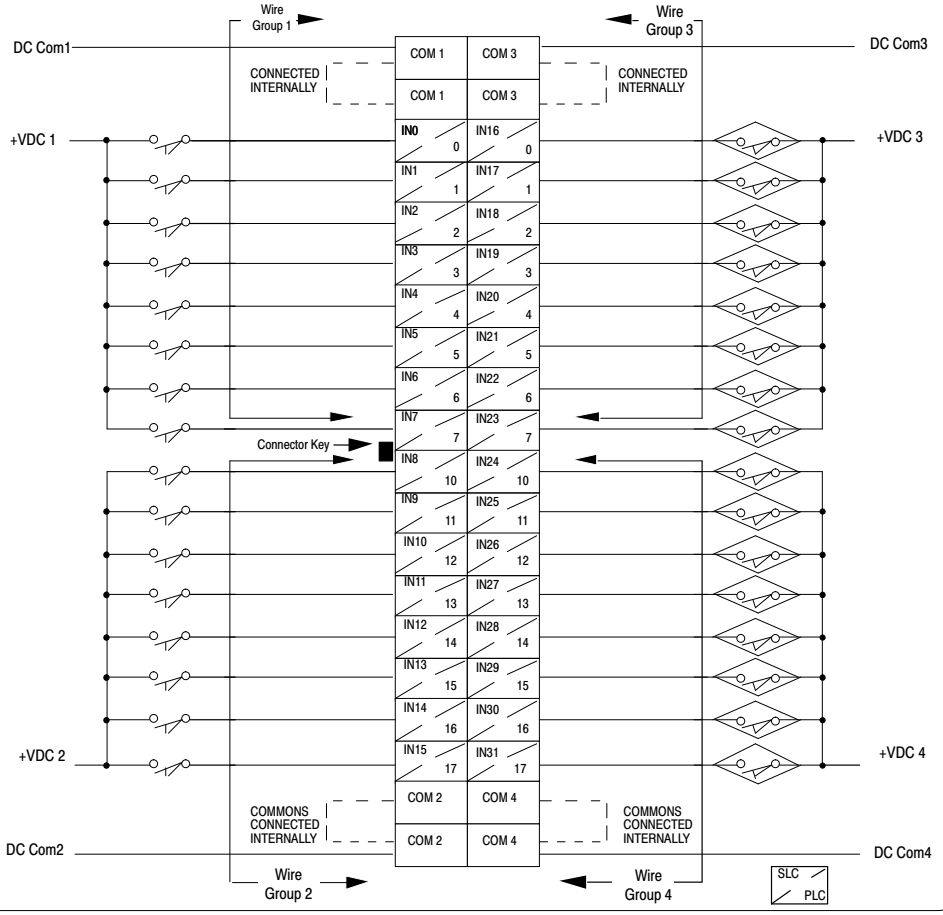


(Measure voltage from common terminal to input terminal.)

Wiring and Circuit Diagrams



1746-IB32
24V dc SINKING



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 6 and 46.)

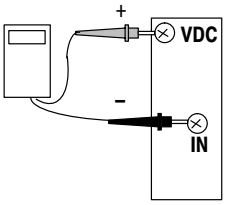
Sourcing DC Input Modules (1746-IV8, -IV16, -ITV16)

Voltage Category	Operating Voltage	Number of Inputs	Points per Common	Catalog Number	Backplane Current Draw 5V	Backplane Current Draw 24V	Signal Delay (max.)	Off-State Voltage (max.)	Off-State Current (max.)	Nominal Input Current
24V dc	10–30 source	8	8	**1746-IV8**	0.050A	0.0A	on = 8 ms off = 8 ms	5.0V dc	1 mA	8 mA at 24V dc
		16	16	**1746-IV16** (RTB)	0.085A	0.0A	on = 8 ms off = 8 ms	5.0V dc	1 mA	8 mA at 24V dc
		16 (Fast Response)	16	**1746-ITV16** (RTB)	0.085A	0.0A	on = 0.3 ms off = 0.5 ms ①	5.0V dc	1.5 mA	8 mA at 24V dc

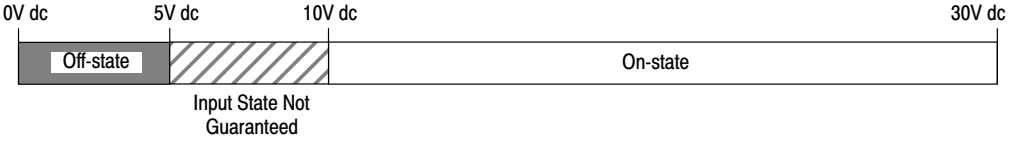
① Typical signal delay for these modules: ON=0.100 ms, OFF=0.25 ms for 24V dc.

RTB = Removable Terminal Block.

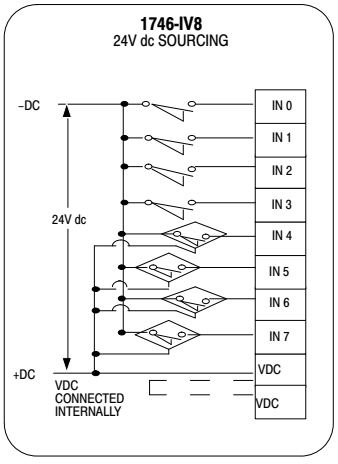
On/Off-State Voltage Range

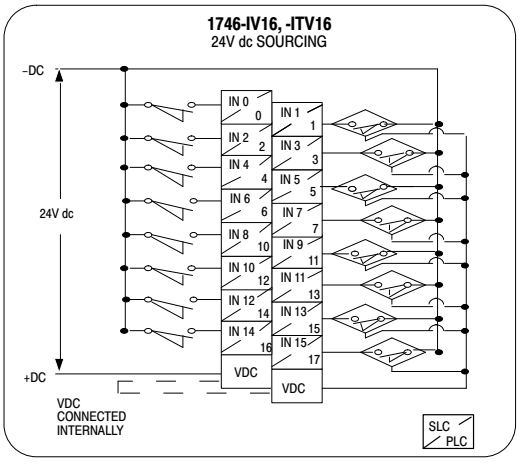


(Measure voltage from input terminal to VDC.)

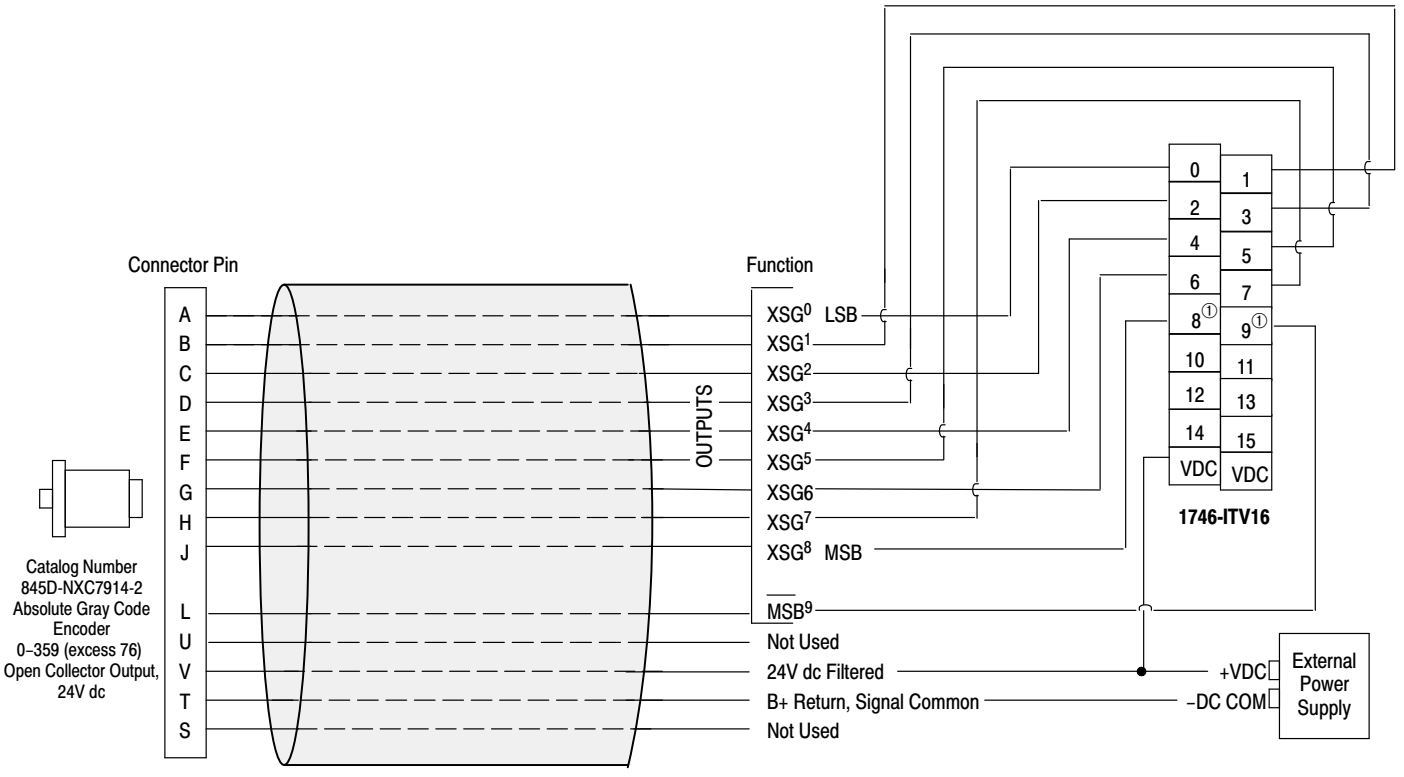


Wiring Diagrams





845D Absolute Gray Code Encoder to 1746-ITV16

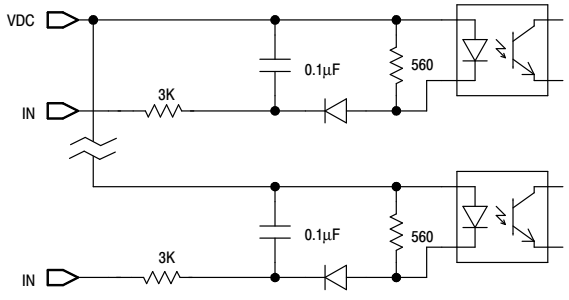


① Terminals 8 and 9 can be interchanged to select CW vs. CCW direction.

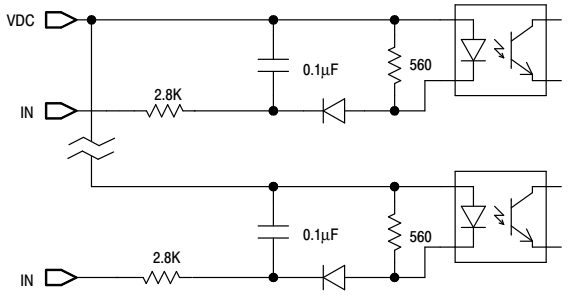
Refer to your encoder installation manual for recommended cable type and length.

Circuit Diagrams

(1746-IV8, IV16)



(1746-ITV16)



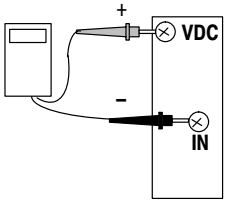
Sourcing DC Input Module (1746-IV32)

Voltage Category	Operating Voltage	Number of Inputs	Points per Common	Catalog Number	Backplane Current Draw 5V	Backplane Current Draw 24V	Signal Delay (max.)	Off-State Voltage (max.)	Off-State Current (max.)	Nominal Input Current
24V dc	15–30 at 50°C 15–26.4 at 60°C source	32	8	**1746-IV32** ①	0.106A	0.0A	on = 3 ms off = 3 ms	5.0V dc	1.6 mA	8 mA at 24V dc

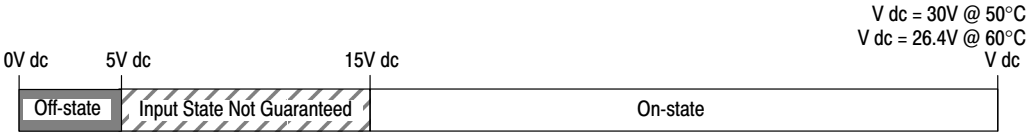
① The 32-point input modules are fused to protect external wiring, one fuse per common. These fuses are non-replaceable and are rated at 2.5A.

RTB = Removable Terminal Block.

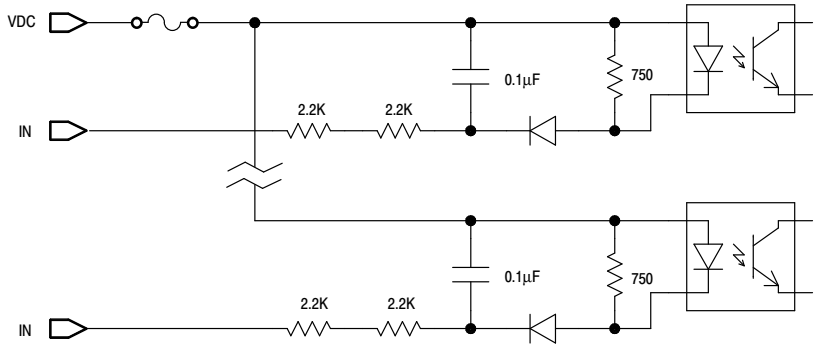
On/Off-State Voltage Range



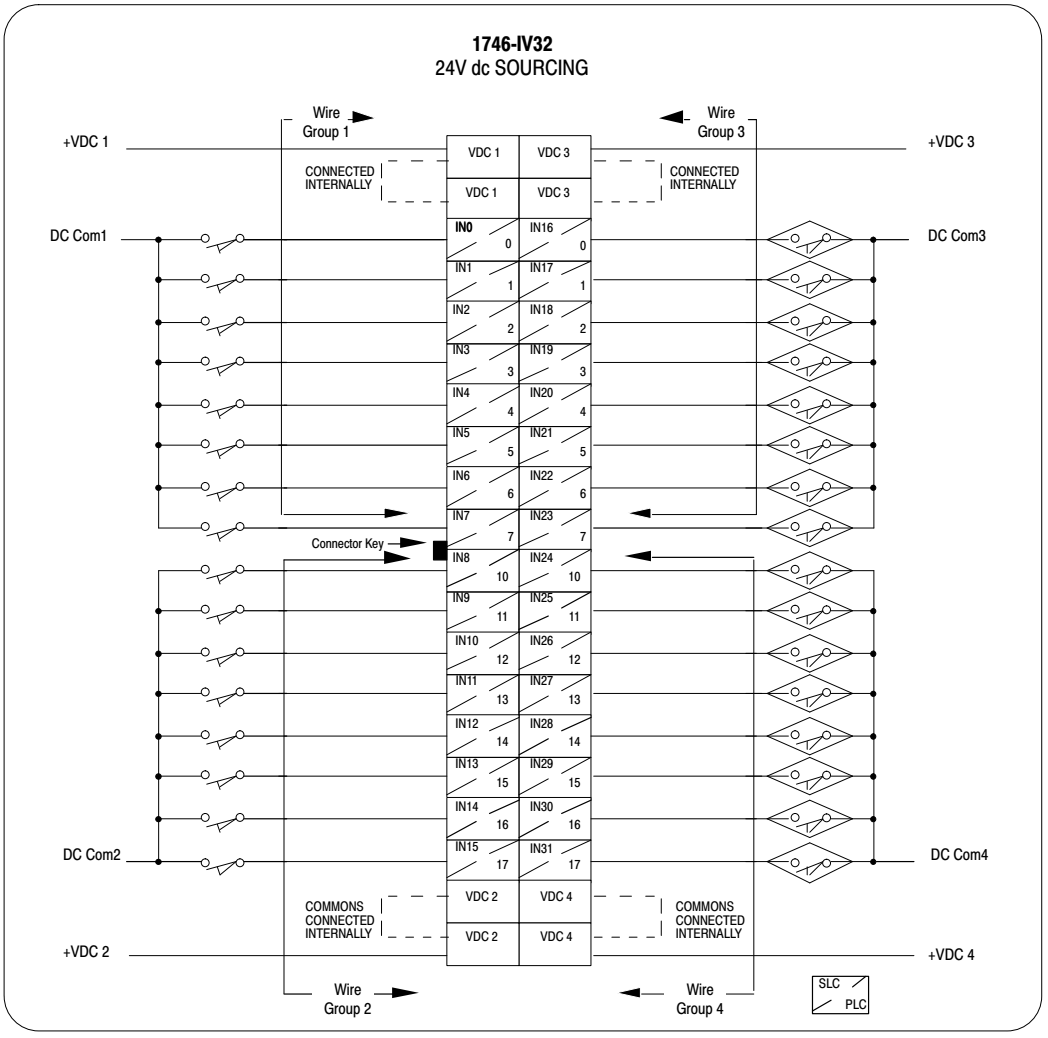
(Measure voltage from input terminal to VDC.)



Circuit Diagram



Wiring Diagram



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 6 and 46.)

Sourcing TTL Input Module (1746-IG16)

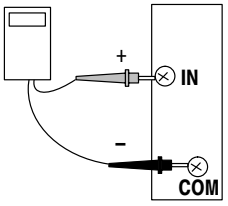
Voltage Category	Operating Voltage	Number of Inputs	Points per Common	Catalog Number	Backplane Current Draw 5V	Backplane Current Draw 24V	Signal Delay (max.)	Off-State Voltage (min.)	Off-State Current (max.)	Nominal Input Current
5V dc TTL	4.5–5.5 source ②	16	16	**1746-IG16** (RTB)	0.140A	0.0A	on = 0.25 ms off = 0.50 ms	2.0V dc ①	4.1 mA	3.7mA at 5V dc

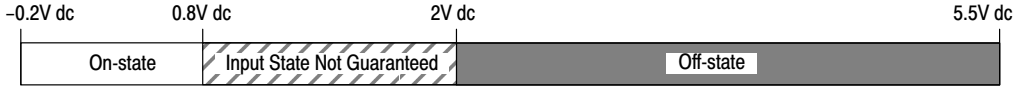
① TTL inputs are inverted (–0.2 to +0.8 = low voltage = True = ON). Use a NOT instruction in your program to convert to traditional True = High logic.

② User supplied voltage: 4.5 to 5.5V dc, 50 mV p-p ripple maximum.

RTB = Removable Terminal Block.

On/Off-State Voltage Range

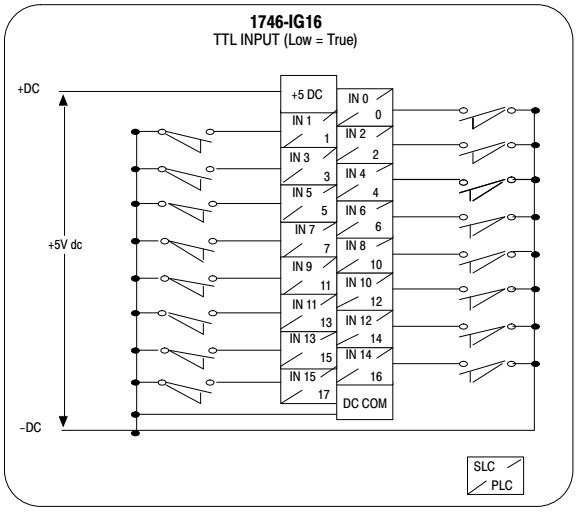


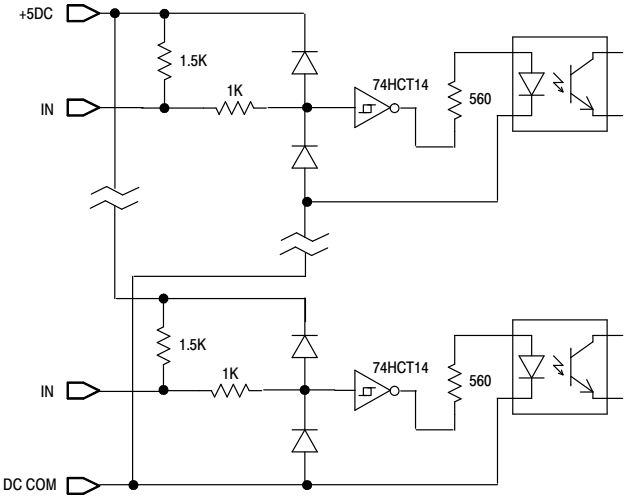


TTL inputs are inverted (– 0.2 to +0.8 = low voltage = True = On).

(Measure voltage from common terminal to input terminal.)

Wiring and Circuit Diagrams





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

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

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

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.

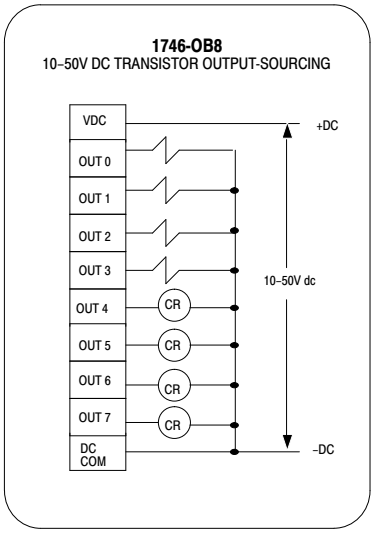
③ Recommended surge suppression for switching 24V dc inductive loads is a 1N4004 diode reverse-wired across the load.

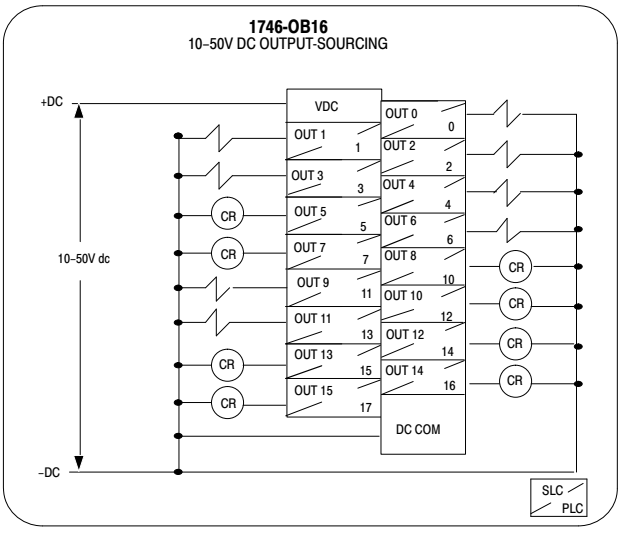
RTB = Removable Terminal Block.

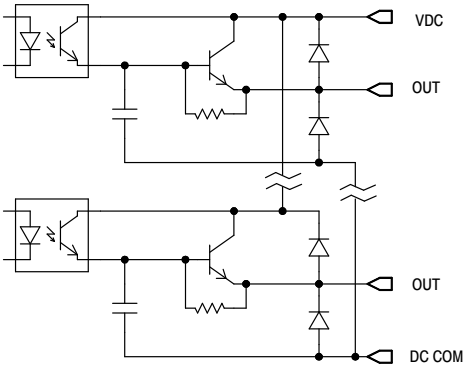
Operating Voltage Range

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

Wiring and Circuit Diagrams







Sourcing DC Output Module (1746-OB32)

Voltage Category	Number of Outputs	Points per Common	Catalog Number	Backplane Current Draw 5V	Backplane Current Draw 24V	Signal Delay (max.)	Off-State ② Leakage (max.)	Load Current (min.)	Continuous ③ Current per Point (max.)	Continuous Current per Module (max.)	On-State Voltage Drop (max.)	Surge ① Current per Point (max.)
24V dc (Operating voltage 5–50V dc)	32	16	**1746-OB32** ④	0.452A	0.0A	on = 0.1 ms off =1 ms	1 mA	1 mA	0.1A at 60°C	3.2A at 60°C	1.2V at 0.1A	1A for 10 ms

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

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.

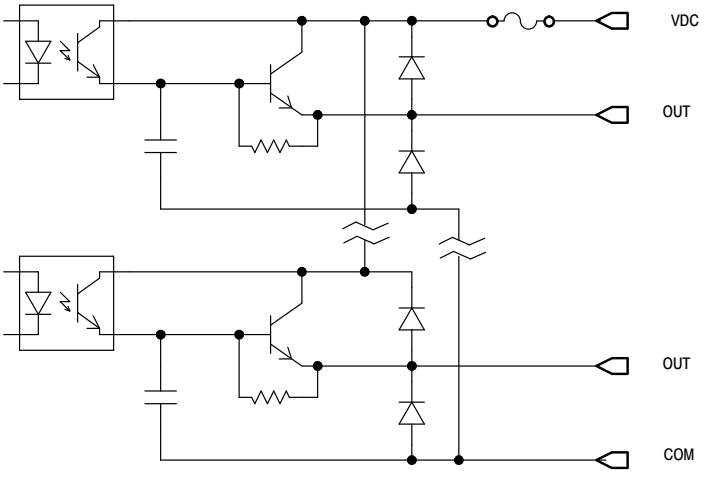
③ Recommended surge suppression for switching 24V dc inductive loads is a 1N4004 diode that is reverse wired across the load.

④ 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.

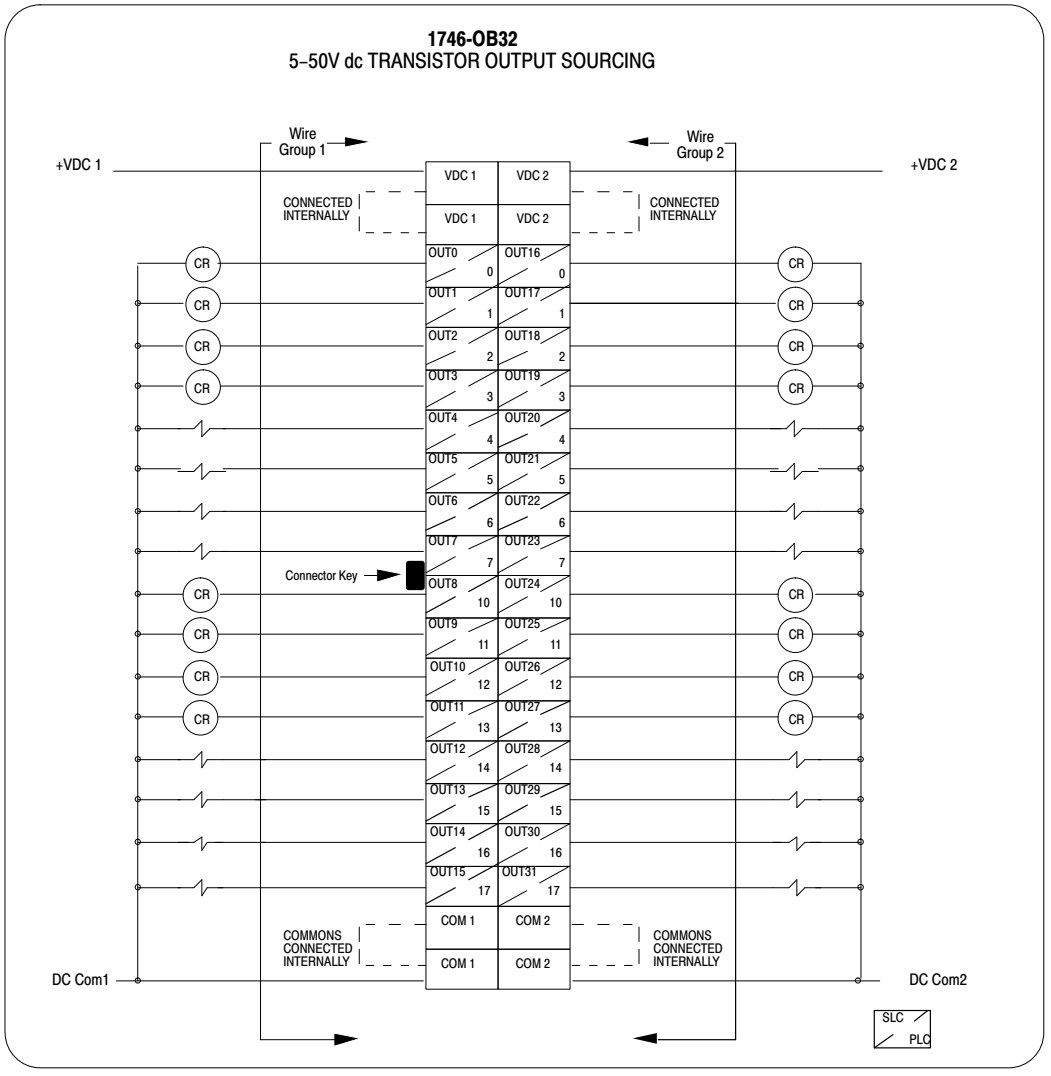
Operating Voltage Range

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

Circuit Diagram



Wiring Diagram



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 6 and 46.)

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

Voltage Category	Number of Outputs	Points per Common	Catalog Number	Backplane Current Draw 5V	Backplane Current Draw 24V	Signal Delay (max.) (Resistive Load)	Off-State ② Leakage (max.)	Load Current (min.)	Continuous Current per Point (max.)	Continuous Current per Module (max.)	On-State Voltage Drop (max.)	Surge ③⑥ Current per Point (max.)
24V dc (Operating voltage 20.4 – 26.4V dc)	8	4	**1746-OBP8** (RTB)	0.135A	0.0A	on = 1.0 ms off = 2.0 ms	1 mA	1 mA	2.0A at 60°C	8.0A at 0° to 60°C	1V at 2A	4A for 10 ms
	16	16	**1746-OBP16** (RTB) ①⑤	0.250A	0.0A	on = 0.1 ms off = 1 ms ④	1 mA	1 mA	1.5A at 30°C 1.0A at 60°C	6.4A at 0° to 60°C	1V at 1A	4A for 10 ms

① 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 7 for additional information.

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

④ This module provides fast OFF delay for inductive loads. Comparative OFF delay times for 1746-OB8/-OV8 and 1746-OBP16/-OVP16, when switching Bulletin 100-B110 (24W sealed) contactor, are: 1746-OB8/-OV8 OFF delay = 152 ms; 1746-OBP16/-OVP16 OFF delay = 47 ms.

⑤ Fast off delay for inductive loads is accomplished with surge suppressors on the OBP16 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. See also footnote 4.

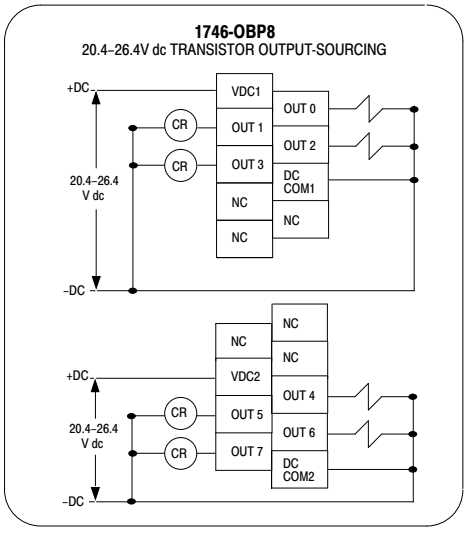
⑥ Surge current = 32A per module for 10 ms.

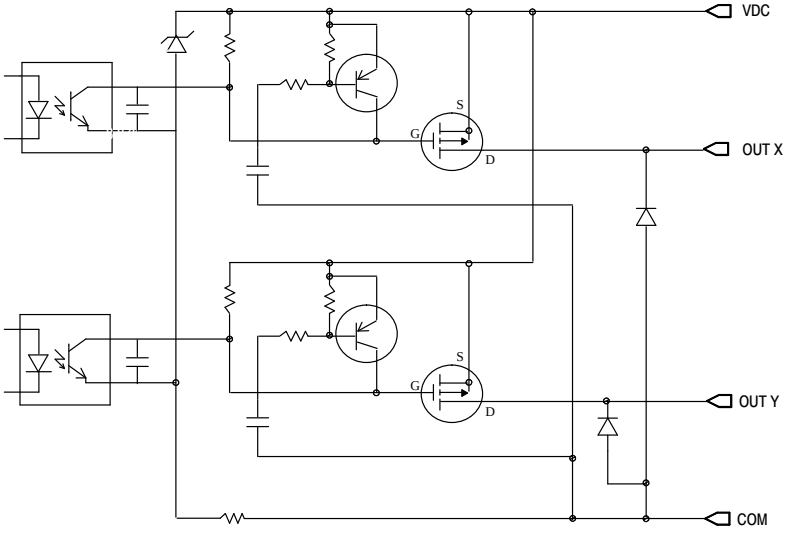
RTB = Removable Terminal Block.

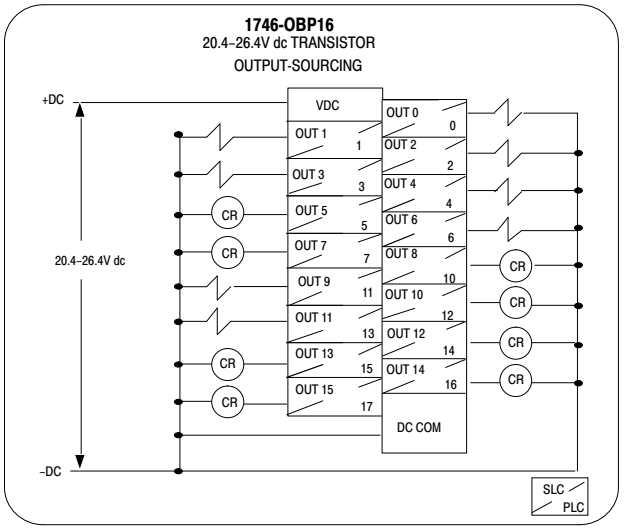
Operating Voltage Range

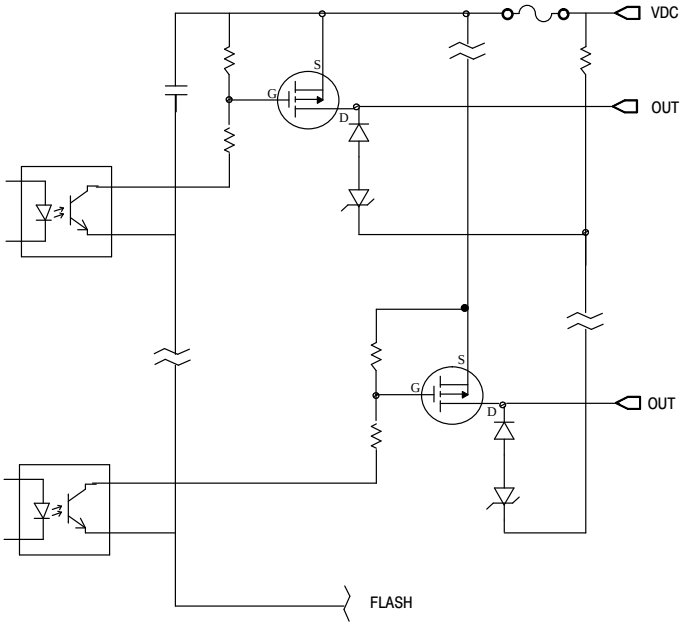
(Voltage is applied between +VDC and DC common.)

Wiring and Circuit Diagrams









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

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

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

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.

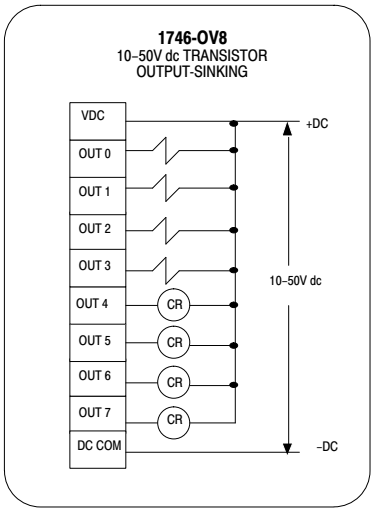
③ Recommended surge suppression for switching 24V dc inductive loads is a 1N4004 diode that is reverse wired across the load.

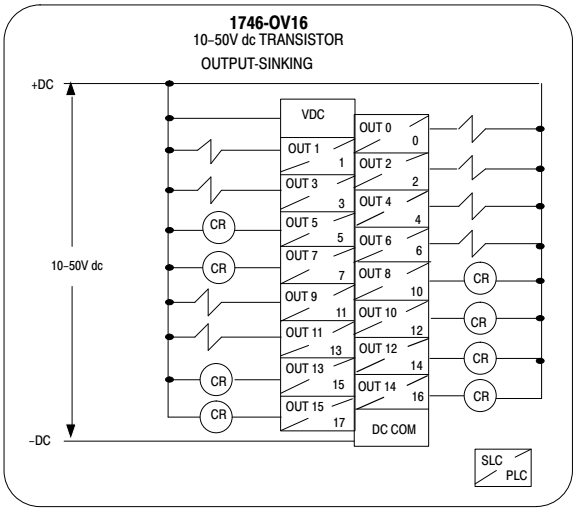
RTB = Removable Terminal Block.

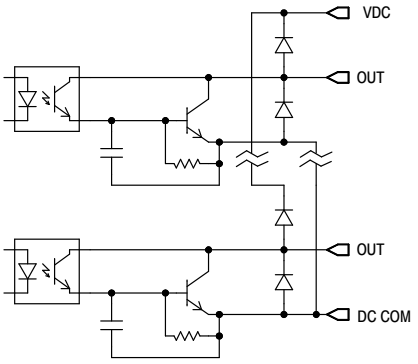
Operating Voltage Range

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

Wiring and Circuit Diagrams







High Current Sinking DC Output Module (1746-OVP16)

Voltage Category	Number of Outputs	Points per Common	Catalog Number	Backplane Current Draw 5V	Backplane Current Draw 24V	Signal Delay (max.) (Resistive Load)	Off-State ② Leakage (max.)	Load Current (min.)	Continuous Current per Point (max.)	Continuous Current per Module (max.)	On-State Voltage Drop (max.)	Surge ③⑥ Current per Point (max.)
24V dc (Operating voltage 20.4–26.4V dc)	16	16	**1746-OVP16** (RTB) ①⑤	0.25A	0.0A	on = 0.1 ms off = 1 ms ④	1 mA	1 mA	1.5A at 30°C 1A at 60°C	6.4A at 0°C to 60°C	1V at 1A	4A for 10 ms

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

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

④ This module provides fast OFF delay for inductive loads. Comparative OFF delay times for 1746-OB8/-OV8 and 1746-OBP16/-OVP16, when switching Bulletin 100-B110 (24W sealed) contactor, are: 1746-OB8/-OV8 OFF delay = 152 ms; 1746-OBP16/-OVP16 OFF delay = 47 ms.

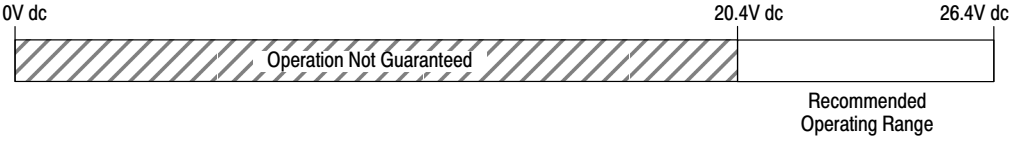
⑤ Fast off delay for inductive loads is accomplished with surge suppressors on 1746-OBP16/-OVP16 modules. A suppressor at the load is not needed unless another contact is connected in series. If this is the case, a 1N4004 diode should be reverse wired across the load. This defeats the fast turn-off feature. See also footnote 4.

⑥ Surge current = 32A per module for 10 ms.

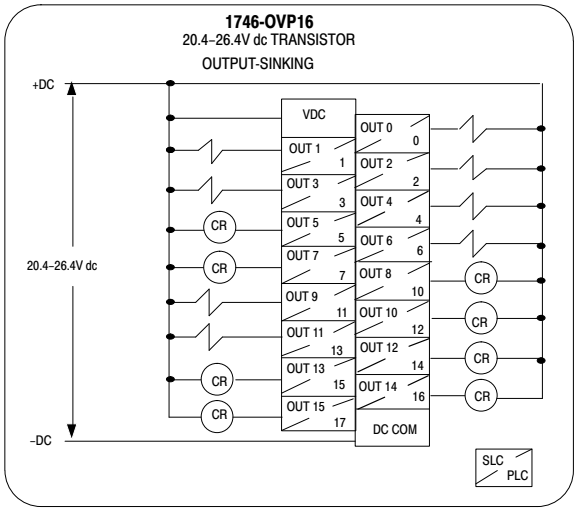
RTB = Removable Terminal Block.

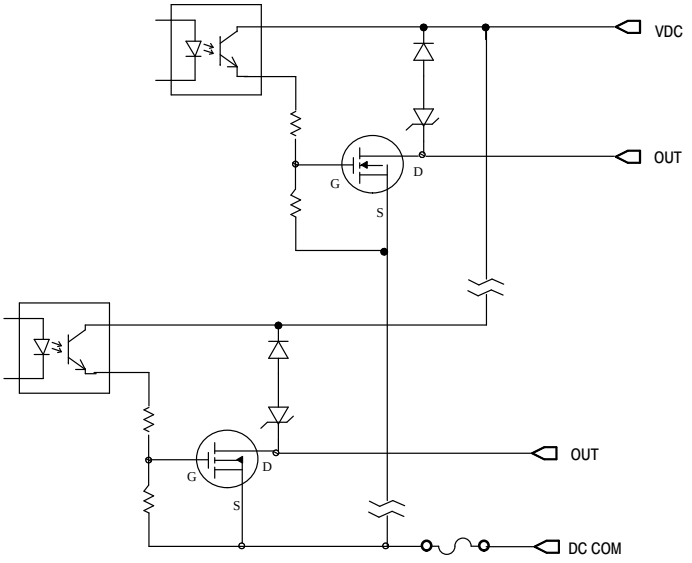
Operating Voltage Range

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



Wiring and Circuit Diagrams





Sinking DC Output Module (1746-OV32)

Voltage Category	Number of Outputs	Points per Common	Catalog Number	Backplane Current Draw 5V	Backplane Current Draw 24V	Signal Delay (max.)	Off-State ② Leakage (max.)	Load Current (min.)	Continuous ③ Current per Point (max.)	Continuous Current per Module (max.)	On-State Voltage Drop (max.)	Surge ① Current per Point (max.)
24V dc (Operating voltage 5–50V dc)	32	16	**1746-OV32** ④	0.452A	0.0A	on = 0.1 ms off = 1 ms	1 mA	1 mA	0.1A at 60°C	3.2A at 60°C	1.2V at 0.1A	1A for 10 ms

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

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.

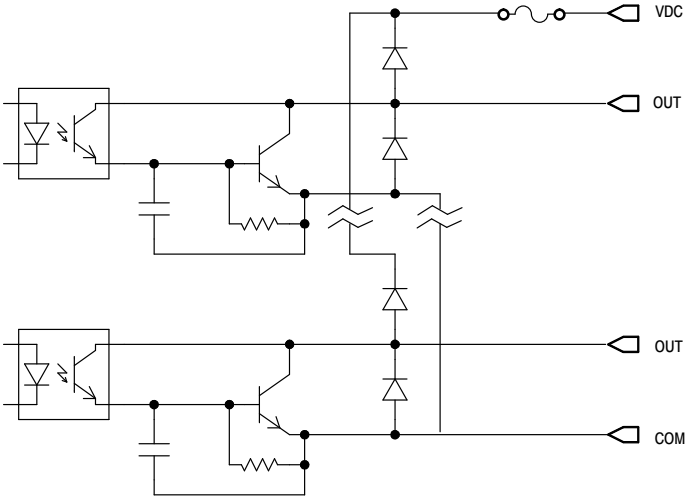
③ Recommended surge suppression for switching 24V dc inductive loads is a 1N4004 diode that is reverse wired across the load.

④ 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.

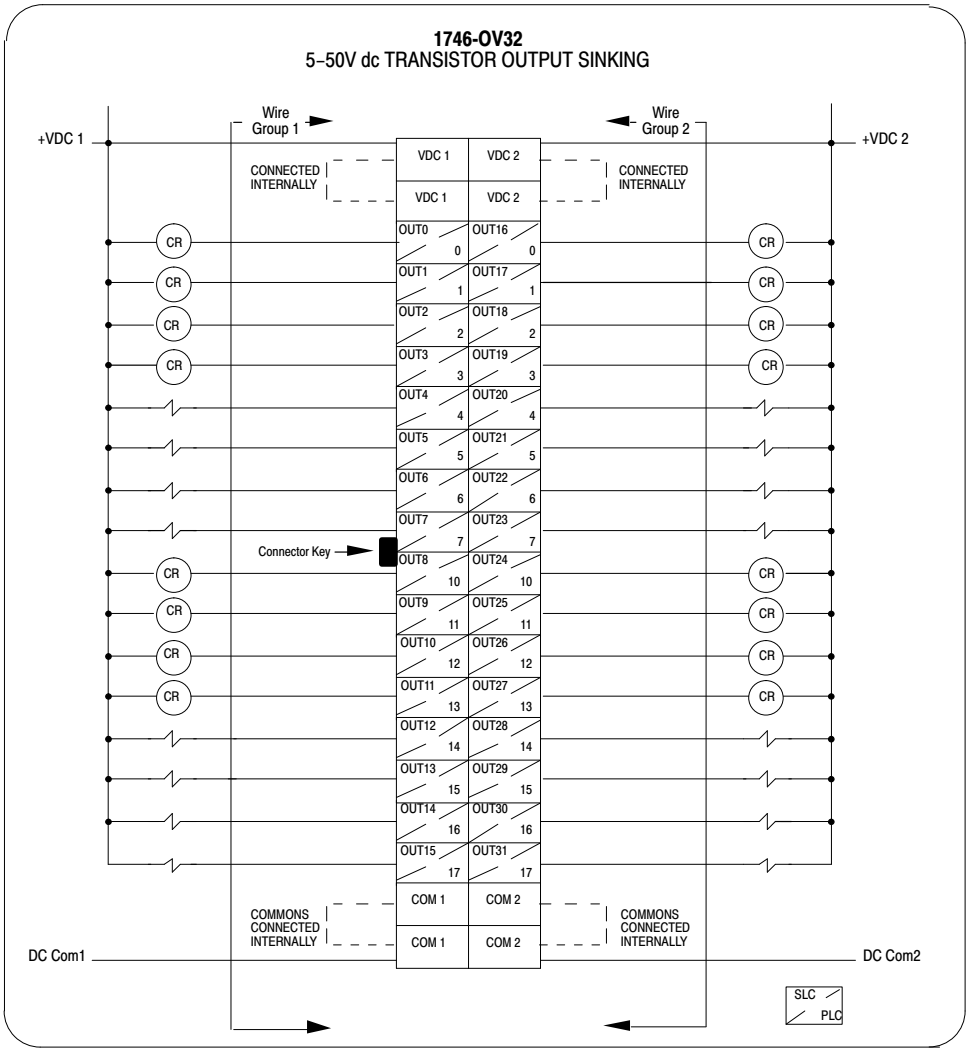
Operating Voltage Range

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

Circuit Diagram



Wiring Diagram



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 6 and 46.)

Sinking TTL Output Module (1746-OG16)

Voltage Category	Number of Outputs	Points per Common	Catalog Number	Backplane Current Draw 5V	Backplane Current Draw 24V	Signal Delay (max.)	Off-State Leakage (max.)	Load Current (min.)	Continuous Current per Point (max.)	Continuous Current per Module (max.)	On-State Voltage Drop (max.)	Surge Current per Point (max.)
①② 5V dc TTL	16	16	**1746-OG16** (RTB)	0.180A	0.0A	on = 0.25 ms off = 0.5 ms	0.1 mA	0.15 mA	24 mA	NA	NA	NA

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.

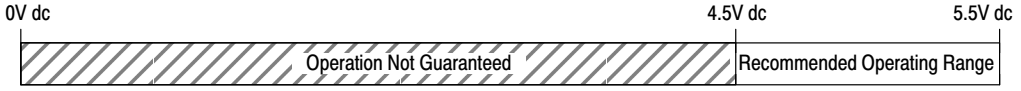
② User supplied voltage: 4.5–5.5V dc, 50 mV p-p ripple (max.).

NA = not applicable.

RTB = Removable Terminal Block.

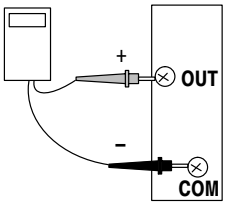
Operating Voltage Range

(Measure voltage from output terminal to common terminal.)

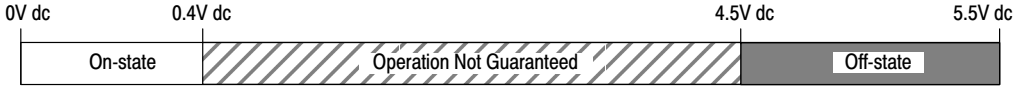


User supplied voltage: 4.5 to 5.5 V dc, 50 mV p-p ripple maximum. User supplied current: 495 mA maximum at 5 V dc.

On/Off-State Voltage Range

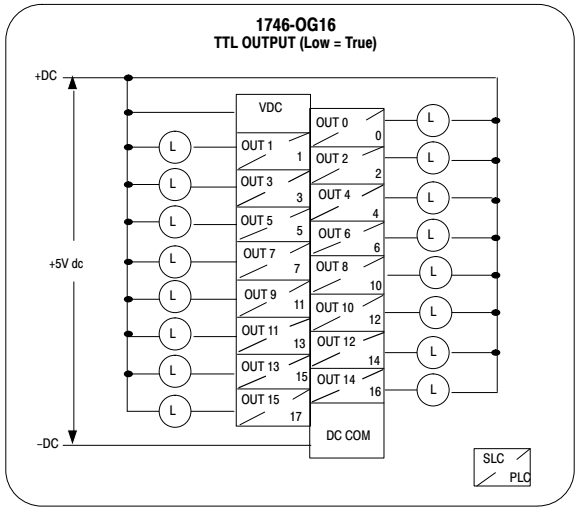


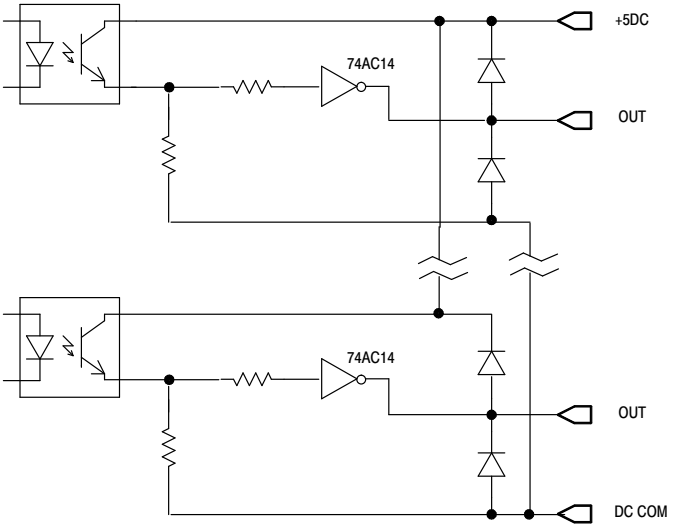
(Measure voltage from common terminal to output terminal.)



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

Wiring and Circuit Diagrams





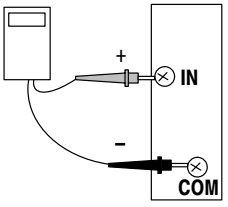
AC/DC Input Module (1746-IN16)

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

① AC frequency = 47 to 63 Hz

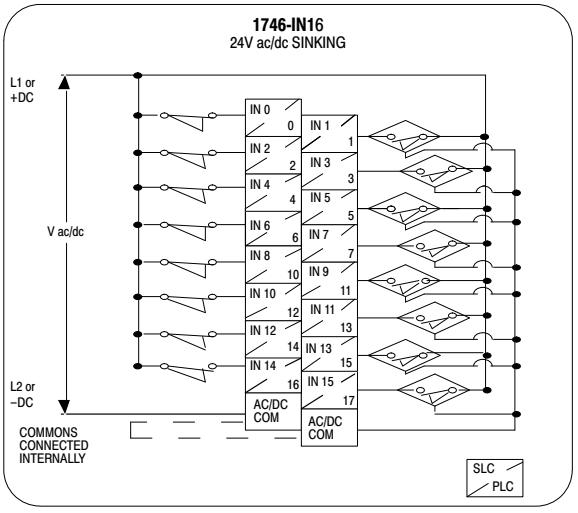
RTB = Removable Terminal Block.

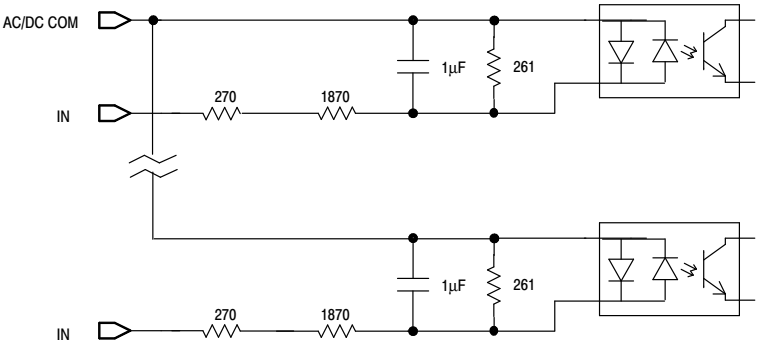
On/Off-State Voltage Range



(Measure voltage from common terminal to input terminal.)

Wiring and Circuit Diagrams





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

Voltage ① Category	Number of Outputs	Points per Common	Catalog Number	Backplane Current Draw 5V	Backplane Current Draw 24V	Signal Delay (max.)	Off-State Leakage (max.)	Minimum Load Current at 5V dc	Continuous Current per Point (max.)	Continuous Current per Module (max.)
ac/dc Relay (Operating voltage: 5–265V ac 5–125V dc)	4	4	**1746-OW4**	0.045A	0.045A	on = 10 ms off = 10 ms	0 mA	10 mA	Refer to the *Relay Contact Ratings* table shown below.	8.0A ac 8.0A/common
	8	4	**1746-OW8**	0.085A	0.090A	on = 10 ms off = 10 ms	0 mA	10 mA		16.0A ac 8.0A/common
	16	8	**1746-OW16** (RTB)	0.170A	0.180A	on = 10 ms off = 10 ms	0 mA	10 mA		16.0A ac 8.0A/common

① AC frequency = 47 to 63 Hz

Relay Contact Ratings for **OW4, OW8,** and **OW16**	Maximum Volts	Amperes ① Make	Amperes ① Break	Amperes ③ Continuous	Voltamperes Make	Voltamperes Break
	240V ac 120V ac	7.5A 15A	0.75A 1.5A	2.5A	1800 VA	180 VA
	125V dc	O.22A ②		1.0A	28 VA	
	24V dc	1.2A ②		2.0A	28 VA	

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 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.

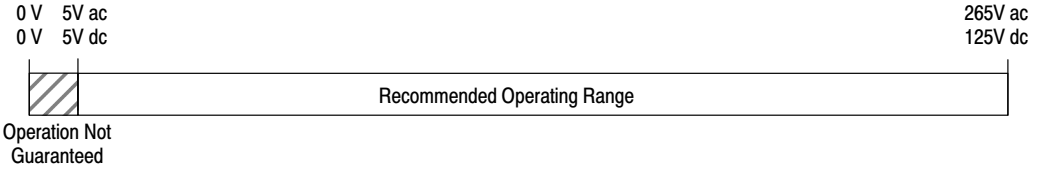
③ The continuous current per module must be limited so the module power does not exceed 1440 VA.

RTB = Removable Terminal Block.

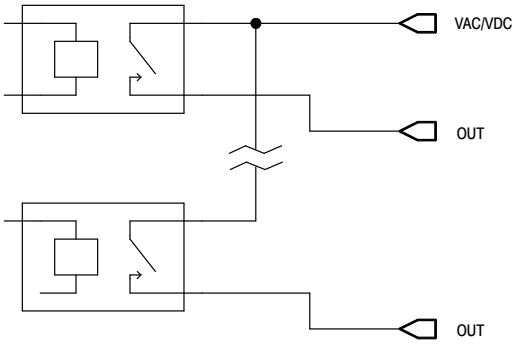
Operating Voltage Range

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

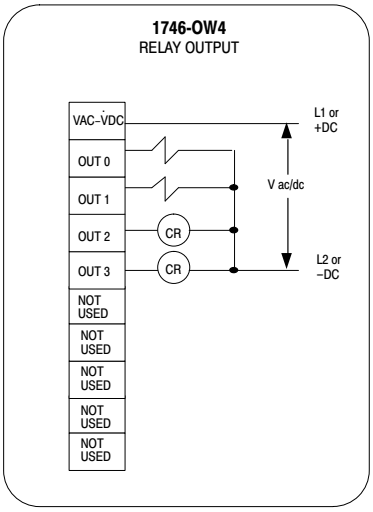
(For dc operation: voltage applied is between +VDC and DC common.)

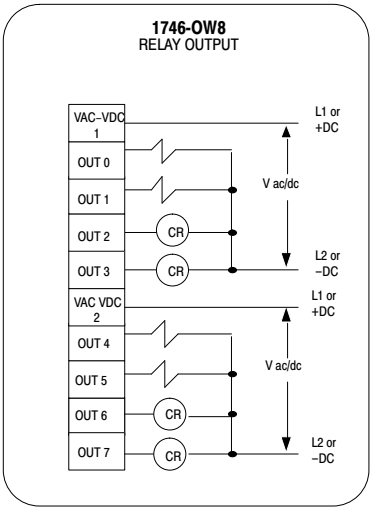


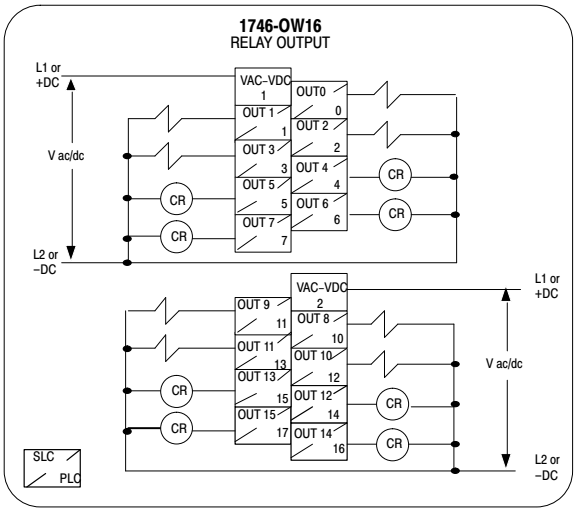
Circuit Diagram



Wiring Diagrams







AC/DC Relay Output Module (1746-OX8)

Voltage ① Category	Number of Outputs	Points per Common	Catalog ② Number	Backplane Current Draw 5V	Backplane Current Draw 24V	Signal Delay (max.)	Off-State Leakage (max.)	Minimum Load Current at 5V dc	Continuous ② Current per Point (max.)	Continuous Current per Module (max.)
ac/dc Relay (Operating Voltage: 5–265V ac 5–125V dc)	8	individually isolated	**1746-OX8** (RTB)	0.085A	0.090A	on = 10 ms off = 10 ms	0 mA	10 mA	Refer to the *Relay Contact Ratings* table shown below.	③

	Maximum Volts	Amperes Make	Amperes Break	Amperes Continuous ③	Voltamperes Make	Voltamperes Break
Relay Contact Ratings for **OX8**	240V ac 120V ac	15A 30A	1.5A 3.0A	5.0A	3600 VA	360 VA
	125V dc	0.22A ④		1.0A	28 VA	
	24V dc	1.2A ④		2.0A	28 VA	

① AC frequency = 47 to 63 Hz

② 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.

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

④ 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.

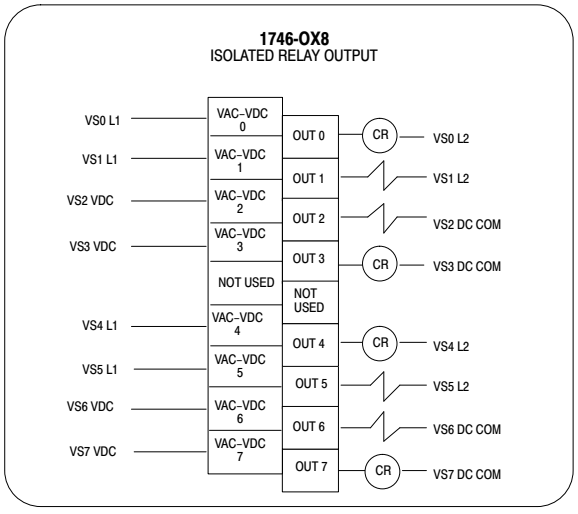
RTB = Removable Terminal Block.

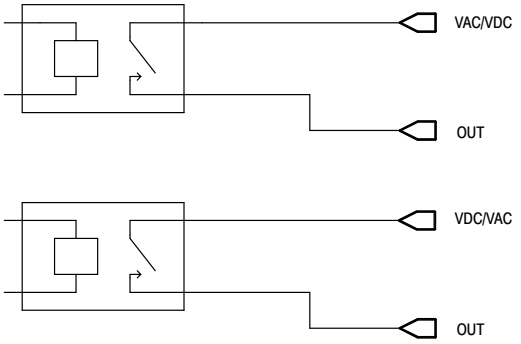
Operating Voltage Range

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

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

Wiring and Circuit Diagrams



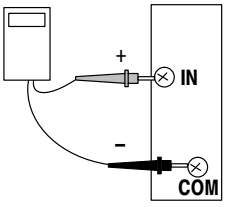


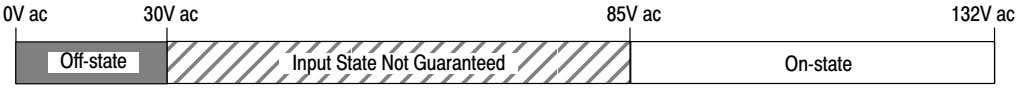
Combination Modules (1746-IO4, -IO8, -IO12)

Voltage Category ①	Points per Common	Points per Module	Catalog Number	Backplane Current Draw 5V	Backplane Current Draw 24V	Specification Reference
Inputs 120V ac Relay Outputs 100/120V ac (Operating Voltage 85–132V ac)	2	2 inputs 2 outputs	**1746-IO4**	0.030A	0.025A	For inputs see specifications for Catalog Number 1746-IA4. For outputs see specifications for Catalog Number 1746-OW4. Continuous Current per Module is 4.0A.
	4	4 inputs 4 outputs	**1746-IO8**	0.060A	0.045A	For inputs see specifications for Catalog Number 1746-IA4. For outputs see specifications for Catalog Number 1746-OW4. Continuous Current per Module is 8.0A.
	6	6 inputs 6 outputs	**1746-IO12** (RTB)	0.090A	0.70A	For inputs see specifications for Catalog Numbers 1746-IA16. For outputs see specifications for Catalog Number 1746-OW16. Continuous Current per Module is 8.0A.

① Frequency = 47 to 63 Hz

On/Off-State Voltage Range (AC Inputs)





(Measure voltage from common terminal to input terminal.)

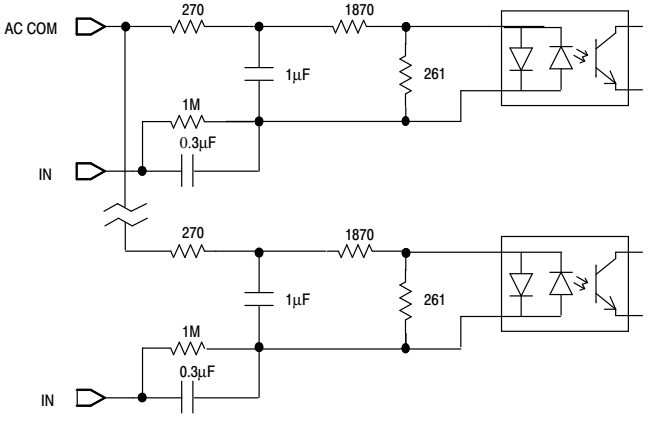
Operating Voltage Range (AC/DC Relay Outputs)

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

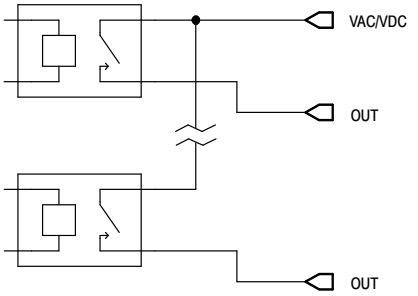
(For dc operation: voltage is applied between +VDC and DC common.)

Circuit Diagram

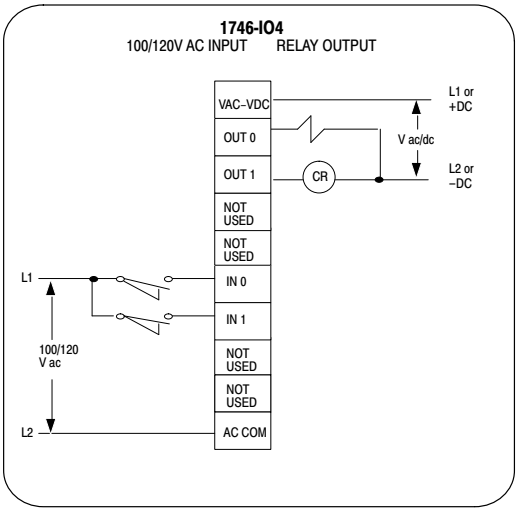
V ac Input

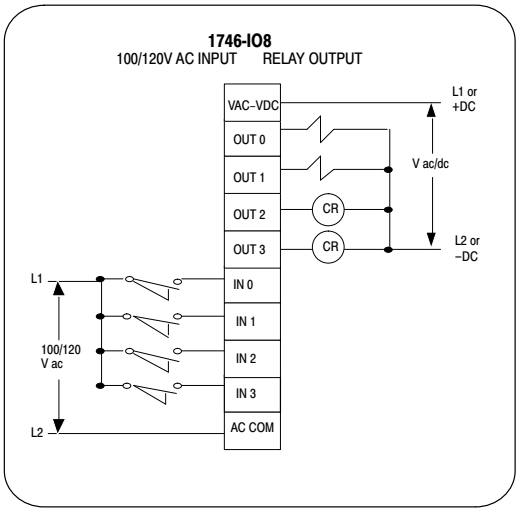


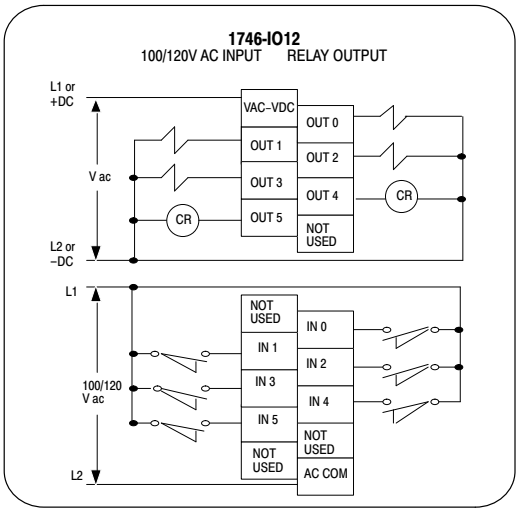
Relay Output



Wiring Diagrams







Fixed I/O Chassis Module Compatibility

You can use either of two methods to determine whether the 2-slot, fixed I/O expansion chassis will support a specific combination of modules.

- tabular method
- charting method

The table on the following page represents combinations of modules and indicates whether or not each combination is valid. The chart on page 43 represents the region of operating current that the fixed I/O expansion chassis supports.

Important: When referencing either method on the following pages, be aware that 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.

Tabular Method

Using the table on the next page, locate both of the modules you plan to use in the fixed I/O expansion chassis. Follow the top row across until you find one of the modules. Then follow the left column down until you find the other module. The symbol shown in the table cell that marks their intersection gives you information you must know before installing the modules.

•	A dot indicates a valid combination.
	No symbol indicates an invalid combination.
▽	A triangle indicates an external 24V dc power supply may be required. (Refer to the Analog I/O Module User Manual, 1746-6.4.)

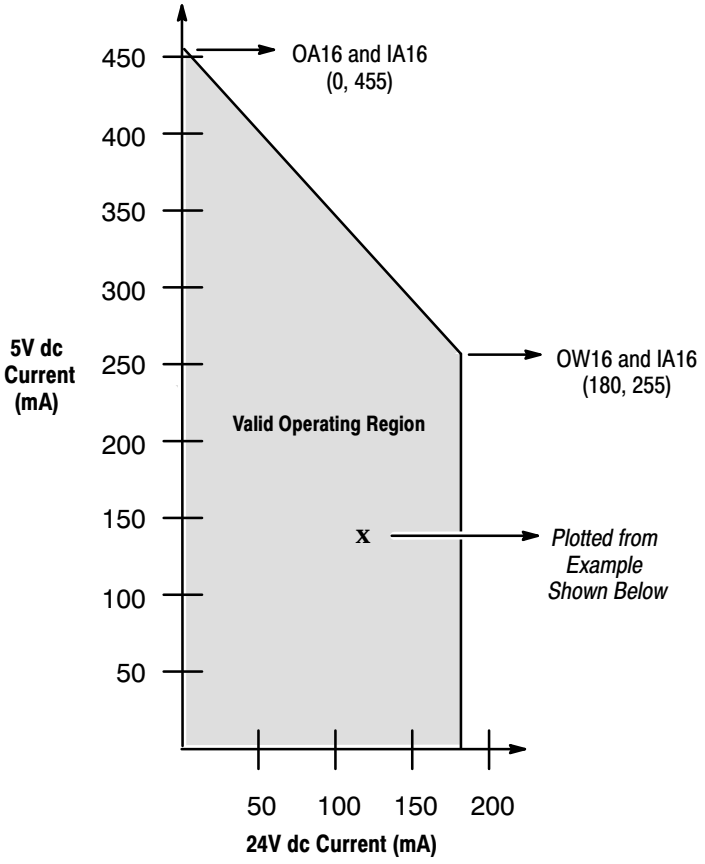
Fixed I/O Chassis – Module Compatibility Table

This page is reserved for compatibility table

	5V dc AMPS	24V dc AMPS
IA4	0.035	–
IA8	0.050	–
IA16	0.085	–
IM4	0.035	–
IM8	0.050	–
IM16	0.085	–
OA8	0.185	–
OA16	0.370	–
OAP12	0.370	–
IB8	0.050	–
IB16	0.085	–
IV8	0.050	–
IV16	0.085	–
IG16	0.140	–
OV8	0.135	–
OV16	0.270	–
OB8	0.135	–
OBP8	0.135	–
OG16	0.180	–
OW4	0.045	0.045
OW8	0.085	0.090
OW16	0.170	0.180
IO4	0.030	0.025
IO8	0.060	0.045
IO12	0.090	0.070
NI4	0.025	0.085
NIO4I	0.055	0.145
NIO4V	0.055	0.115
FIO4I	0.055	0.150
FIO4V	0.055	0.120
DCM	0.360	–
HS	0.300	–
OB16	0.280	–
IN16	0.085	–
BASn	0.150	0.125
BAS	0.150	0.040
OB32	0.452	–
OV32	0.452	–
IV32	0.106	–
IB32	0.106	–
OX8	0.085	0.090
NO4I	0.055	0.195
NO4V	0.055	0.145
ITB16	0.085	–
ITV16	0.085	–
IC16	0.085	–
IH16	0.085	–
KE	0.150	0.040
KEn	0.150	0.125
OBP16	0.250	–
OVP16	0.250	–
NT4	0.060	0.040
NR4	0.050	0.050
HSPT1	0.200	–

Charting Method

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 table alongside the chart. 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
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 (140mA).
2. Plot this point on the chart above (140mA @ 5V dc).
3. Plot current draw at 24V dc (115mA @ 24V dc).
4. 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.

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).
Isolation②	1500 Volts
Certification③④	UL listed. CSA approved. CE compliant for all applicable directives when product or packaging is marked.
Hazardous Environment Class④	Class I Division 2 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 12.

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 12.

Discrete I/O Power Dissipation

The table on the following page lists the power dissipation for all discrete I/O modules operating at nominal voltage. An explanation of the terms used in the table follows:

Watts per point — the heat dissipation that can occur in each field wiring point when energized at nominal voltage.

Minimum watts — the amount of heat dissipation that can occur when there is no field power present.

Total watts — 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 for All Discrete I/O Modules

Hardware Component	Catalog Numbers	Watts per Point	Minimum Watts	Total Watts
Input Modules	1746-IA4	0.27	0.175	1.30
	1746-IA8	0.27	0.250	2.40
	1746-IA16	0.27	0.425	4.80
	1746-IM4	0.35	0.175	1.60
	1746-IM8	0.35	0.250	3.10
	1746-IM16	0.35	0.425	6.00
	1746-IB8	0.20	0.250	1.90
	1746-IB16	0.20	0.425	3.60
	1746-IB32	0.20	0.530	6.90
	1746-IV8	0.20	0.250	1.90
	1746-IV16	0.20	0.425	3.60
	1746-IV32	0.20	0.530	6.90
	1746-IG16	0.02	0.700	1.00
	1746-IN16	0.35	0.425	6.00
	1746-ITV16	0.20	0.425	3.60
	1746-ITB16	0.20	0.425	3.60
	1746-IC16	0.22	0.425	3.95
	1746-IH16	0.32	0.217	5.17
Output Modules	1746-OA8	1.00	0.925	9.00
	1746-OA16	0.462	1.85	9.30
	1746-OAP12	1.00	1.85	10.85
	1746-OB8	0.775	0.675	6.90
	1746-OB16	0.338	1.40	7.60
	1746-OBP8	0.30	0.675	3.08
	1746-OBP16	0.31	1.25	6.26
	1746-OB32	0.078	2.26	4.80
	1746-OV8	0.775	0.675	6.90
	1746-OV16	0.338	1.40	7.60
	1746-OVP16	0.31	1.25	6.26
	1746-OV32	0.078	2.26	4.80
	1746-OW4	0.133	1.31	1.90
	1746-OW8	0.138	2.59	3.70
	1746-OW16	0.033	5.17	5.70
	1746-OX8	0.825	2.59	8.60
	1746-OG16	0.033	0.90	1.50
Combination Input & Output Modules	1746-IO4	0.27 — per input pt. 0.133 — per output pt.	0.75	1.60
	1746-IO8	0.27 — per input pt. 0.133 — per output pt.	1.38	3.00
	1746-IO12	0.27 — per input pt. 0.133 — per output pt.	2.13	4.60

Accessories

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

Catalog Number	Item	Description
1746-N2	Modular card 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.*

Support Services

In today's competitive environment, when you buy any product, you expect that product to meet your needs. You also expect the manufacturer of that product to back it up with the kind of customer service and product support that will prove you made a wise purchase.

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Notes

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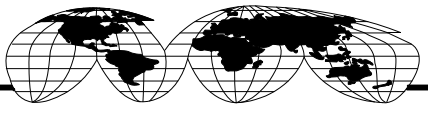

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