



SLC 500 Digital I/O Modules

Input Catalog Numbers 1746-IA4, 1746-IA8, 1746-IA16, 1746-IB8, 1746-IB16, 1746-IC16, 1746-IG16, 1746-IH16, 1746-IM4, 1746-IM8, 1746-IM16, 1746-IN16, 1746-ITB16, 1746-ITV16, 1746-IV8, 1746-IV16

Output Catalog Numbers 1746-OA8, 1746-OA16, 1746-OAP12, 1746-OB8, 1746-OB6EI, 1746-OB16, 1746-OB16E, 1746-OBP8, 1746-OBP16, 1746-OG16, 1746-OV8, 1746-OV16, 1746-OVP16, 1746-OW4, 1746-OW8, 1746-OW16, 1746-OX8

Combination Input/Output Catalog Numbers 1746-IO4, 1746-IO8, 1746-IO12, 1746-IO12DC

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Important User Information

Solid-state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (Publication [SGI-1.1](#) available from your local Rockwell Automation sales office or online at <http://www.rockwellautomation.com/literature/>) describes some important differences between solid-state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid-state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

	WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
	ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard and recognize the consequences.
	SHOCK HAZARD: Labels may be on or inside the equipment (for example, drive or motor) to alert people that dangerous voltage may be present.
	BURN HAZARD: Labels may be on or inside the equipment (for example, drive or motor) to alert people that surfaces may reach dangerous temperatures.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Overview

In addition to providing the module's electrical specifications, this document tells you how to:

- install the module into a chassis.
- wire the module's terminal block.
- install the Octal Filter Label.

North American Hazardous Location Approval

The following modules are North American Hazardous Location approved: 1746-IA4, 1746-IA8, 1746-IA16, 1746-IB8, 1746-IB16, 1746-IC16, 1746-IG16, 1746-IH16, 1746-IM4, 1746-IM8, 1746-IM16, 1746-IN16, 1746-ITB16, 1746-ITV16, 1746-IV8, 1746-IV16, 1746-OA8, 1746-OA16, 1746-OAP12, 1746-OB8, 1746-OB6EI, 1746-OB16, 1746-OB16E, 1746-OBP8, 1746-OBP16, 1746-OG16, 1746-OV8, 1746-OV16, 1746-OVP16, 1746-OW4, 1746-OW8, 1746-OW16, 1746-OX8, 1746-IO4, 1746-IO8, 1746-IO12, 1746-IO12DC.

The following information applies when operating this equipment in hazardous locations:		Informations sur l'utilisation de cet équipement en environnements dangereux:	
Products marked "CL I, DIV 2, GP A, B, C, D" are suitable for use in Class I Division 2 Groups A, B, C, D, Hazardous Locations and nonhazardous locations only. Each product is supplied with markings on the rating nameplate indicating the hazardous location temperature code. When combining products within a system, the most adverse temperature code (lowest "T" number) may be used to help determine the overall temperature code of the system. Combinations of equipment in your system are subject to investigation by the local Authority Having Jurisdiction at the time of installation.		Les produits marqués "CL I, DIV 2, GP A, B, C, D" ne conviennent qu'à une utilisation en environnements de Classe I Division 2 Groupes A, B, C, D dangereux et non dangereux. Chaque produit est livré avec des marquages sur sa plaque d'identification qui indiquent le code de température pour les environnements dangereux. Lorsque plusieurs produits sont combinés dans un système, le code de température le plus défavorable (code de température le plus faible) peut être utilisé pour déterminer le code de température global du système. Les combinaisons d'équipements dans le système sont sujettes à inspection par les autorités locales qualifiées au moment de l'installation.	
	EXPLOSION HAZARD - Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous. - Do not disconnect connections to this equipment unless power has been removed or the area is known to be nonhazardous. Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product. - Substitution of any component may impair suitability for Class I, Division 2. - If this product contains batteries, they must only be changed in an area known to be nonhazardous.		RISQUE D'EXPLOSION - Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher l'équipement. - Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher les connecteurs. Fixer tous les connecteurs externes reliés à cet équipement à l'aide de vis, loquets coulissants, connecteurs filetés ou autres moyens fournis avec ce produit. - La substitution de tout composant peut rendre cet équipement inadapté à une utilisation en environnement de Classe I, Division 2. - S'assurer que l'environnement est classé non dangereux avant de changer les piles.

Environment and Enclosure



ATTENTION: This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC 60664-1), at altitudes up to 2000 m (6562 ft) without derating.

This equipment is not intended for use in residential environments and may not provide adequate protection to radio communication services in such environments.

This equipment is supplied as open-type equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The enclosure must have suitable flame-retardant properties to prevent or minimize the spread of flame, complying with a flame spread rating of 5VA or be approved for the application if nonmetallic. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings that are required to comply with certain product safety certifications.

In addition to this publication, see the following:

- Industrial Automation Wiring and Grounding Guidelines, publication [1770-4.1](#), for additional installation requirements.
- NEMA Standard 250 and IEC 60529, as applicable, for explanations of the degrees of protection provided by enclosures.

Prevent Electrostatic Discharge



ATTENTION: This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
 - Wear an approved grounding wriststrap.
 - Do not touch connectors or pins on component boards.
 - Do not touch circuit components inside the equipment.
 - Use a static-safe workstation, if available.
 - Store the equipment in appropriate static-safe packaging when not in use.
-

Install and Remove the Module



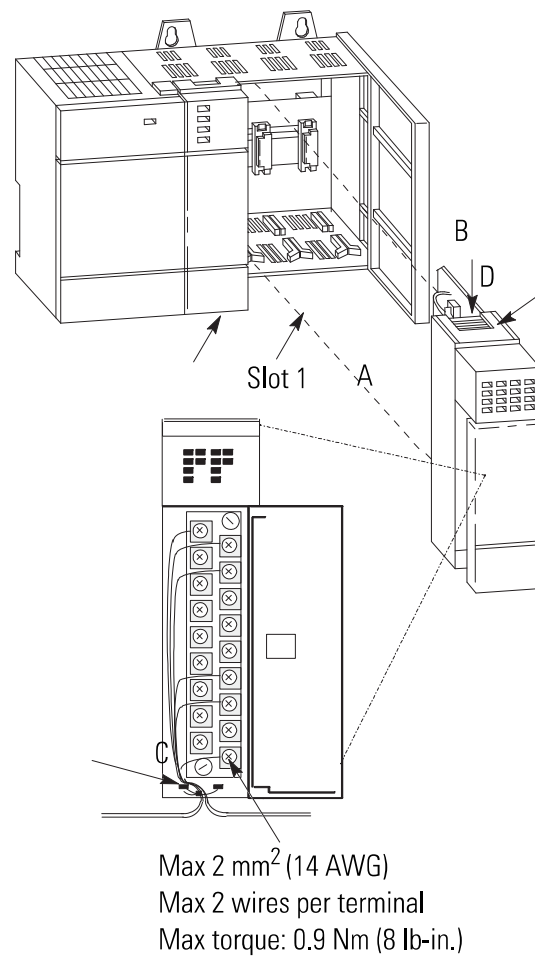
ATTENTION: Never install, remove, or wire modules with power applied to chassis.

IMPORTANT The first slot of the chassis is reserved for the processor or the 1747-ASB module.

Follow these steps to install the module:

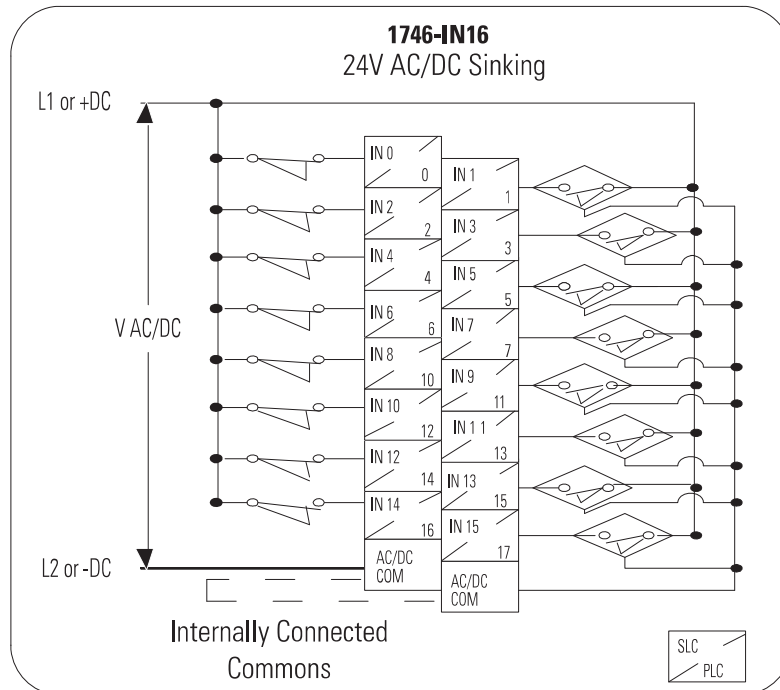
1. Disconnect power.
2. Align the circuit board of module with the chassis card guide. (A)
3. Slide the module into the chassis until the bottom tabs lock into place. (B)
4. Route the wires down and away from the module, securing them with the wire tie. (C)
5. Cover all unused slots with Card Slot Filler, catalog number 1746-N2, to keep the chassis free from debris.
6. To remove the module, press and hold the module release located on each self-locking tab, and slide the module out of the chassis slot. (D)

Module Installation

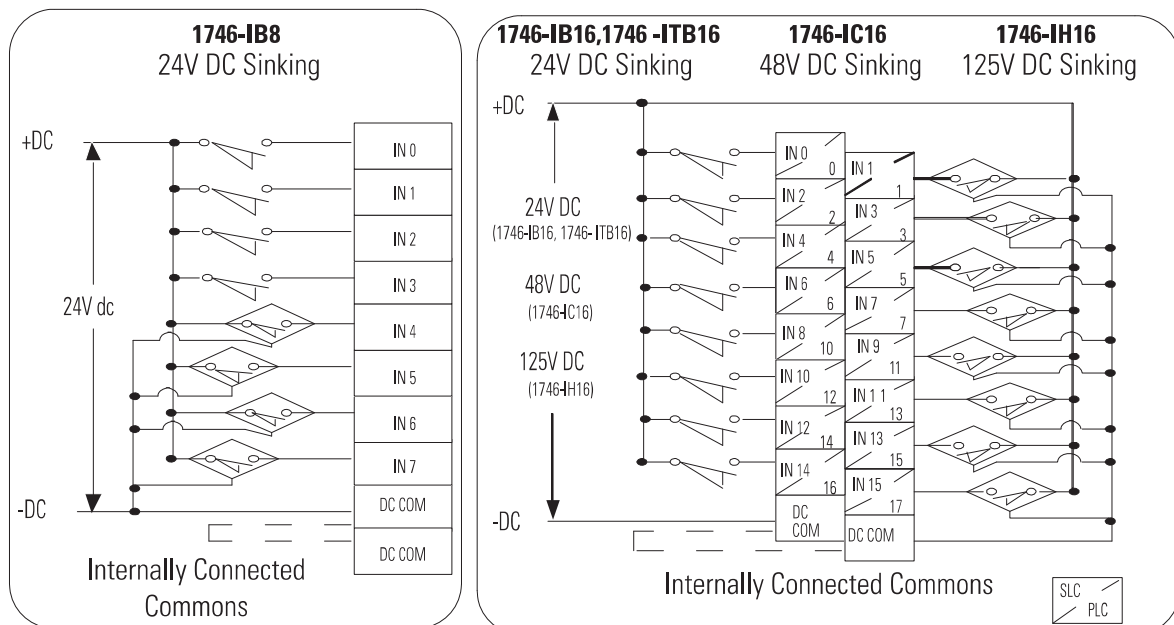


DC Input Modules Wiring Diagrams

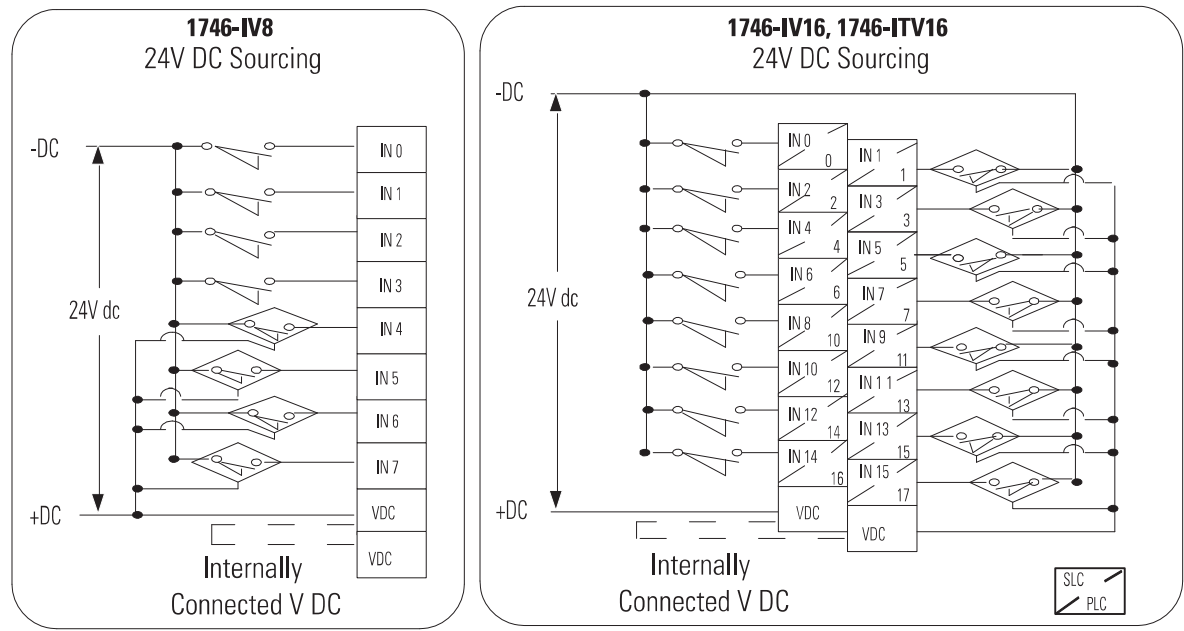
1746-IN16



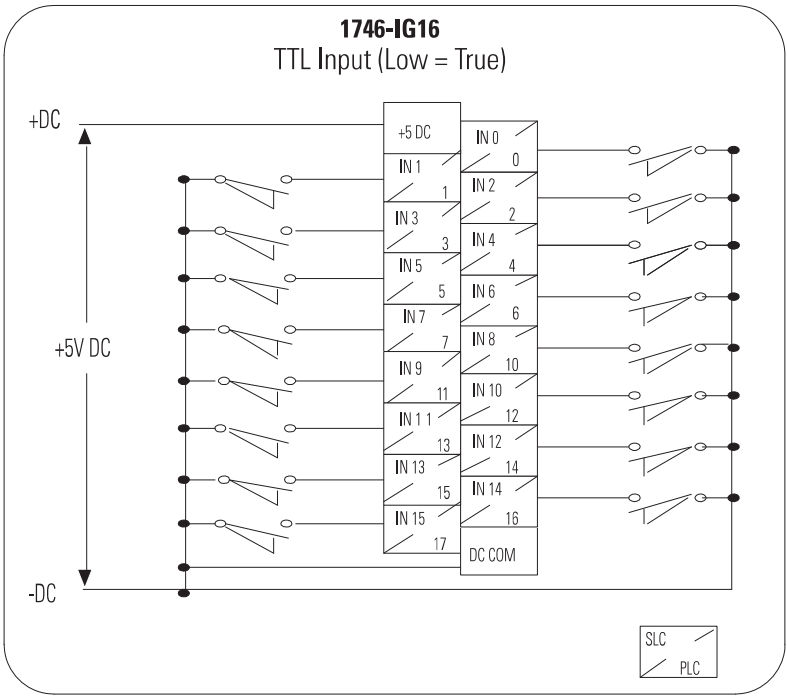
1746-IB8, 1746-IB16, 1746-ITB16, 1746-IC16, 1746-IH16



1746-IV8, 1746-IV16, 1746-ITV16

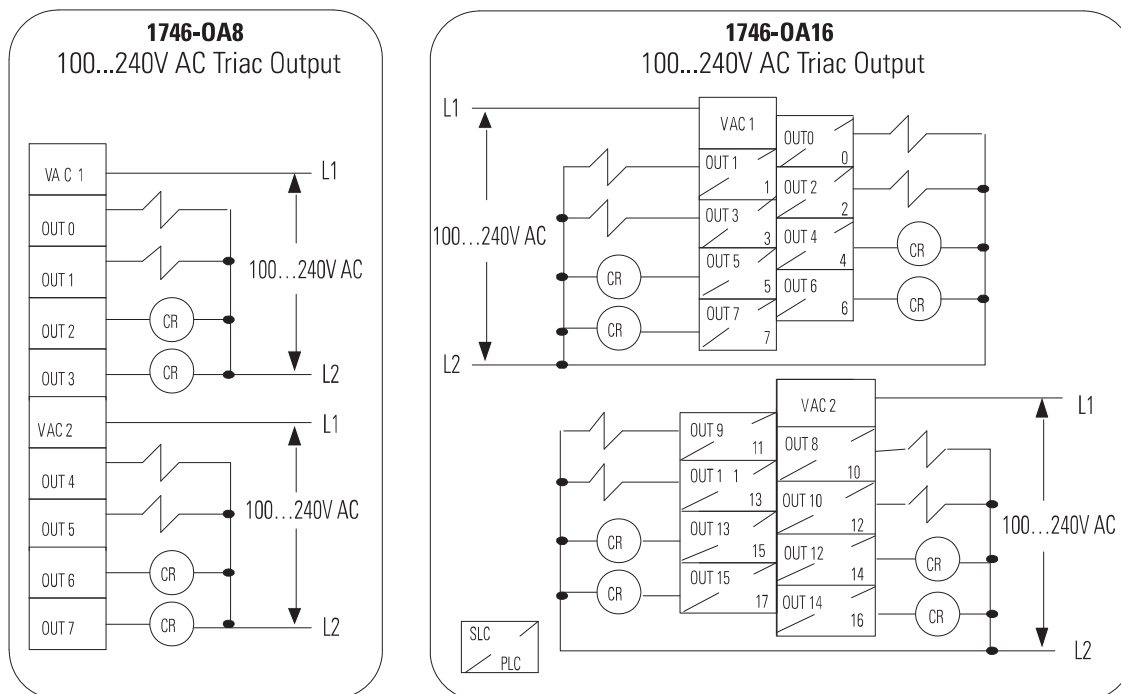


1746-IG16

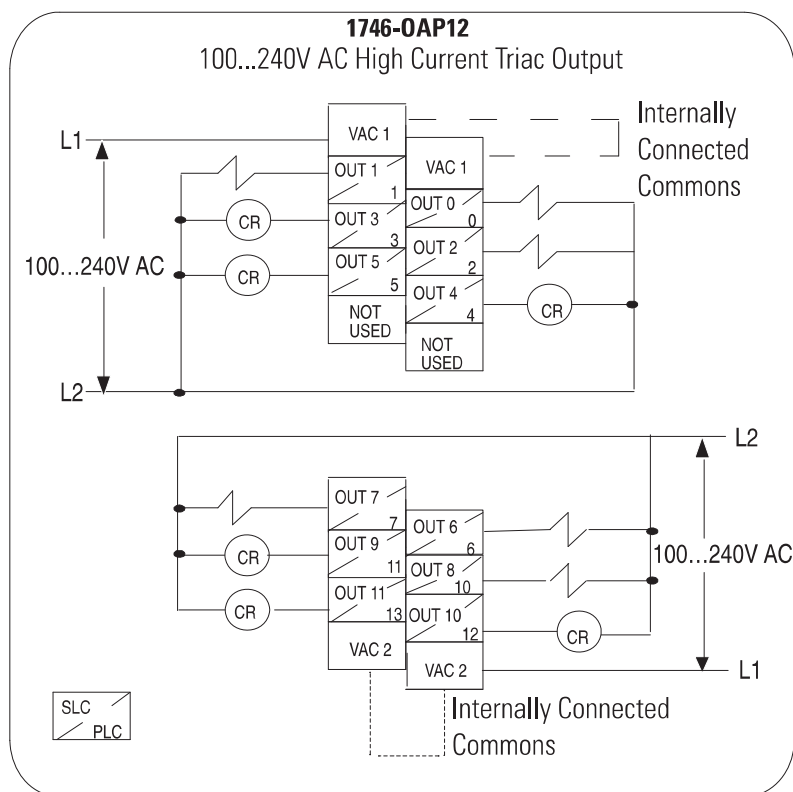


AC Output Modules Wiring Diagrams

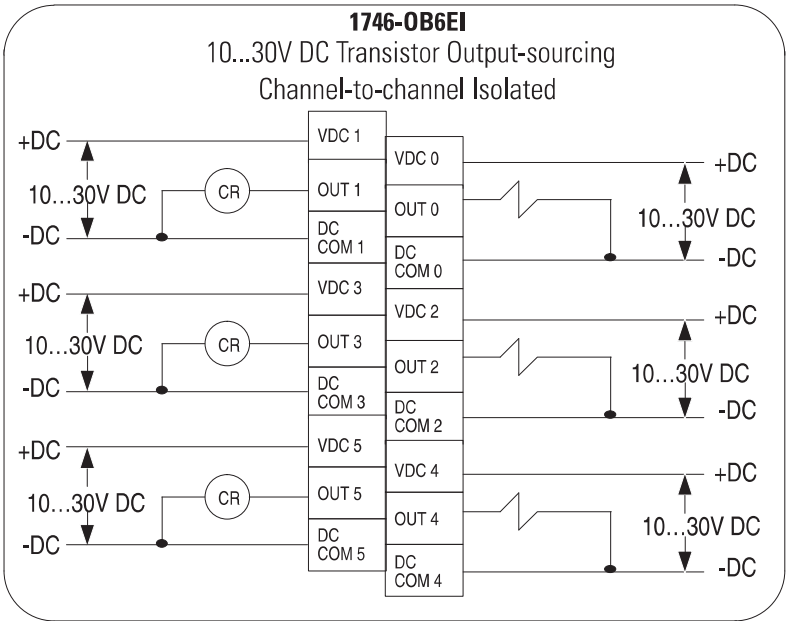
1746-OA8, 1746-OA16

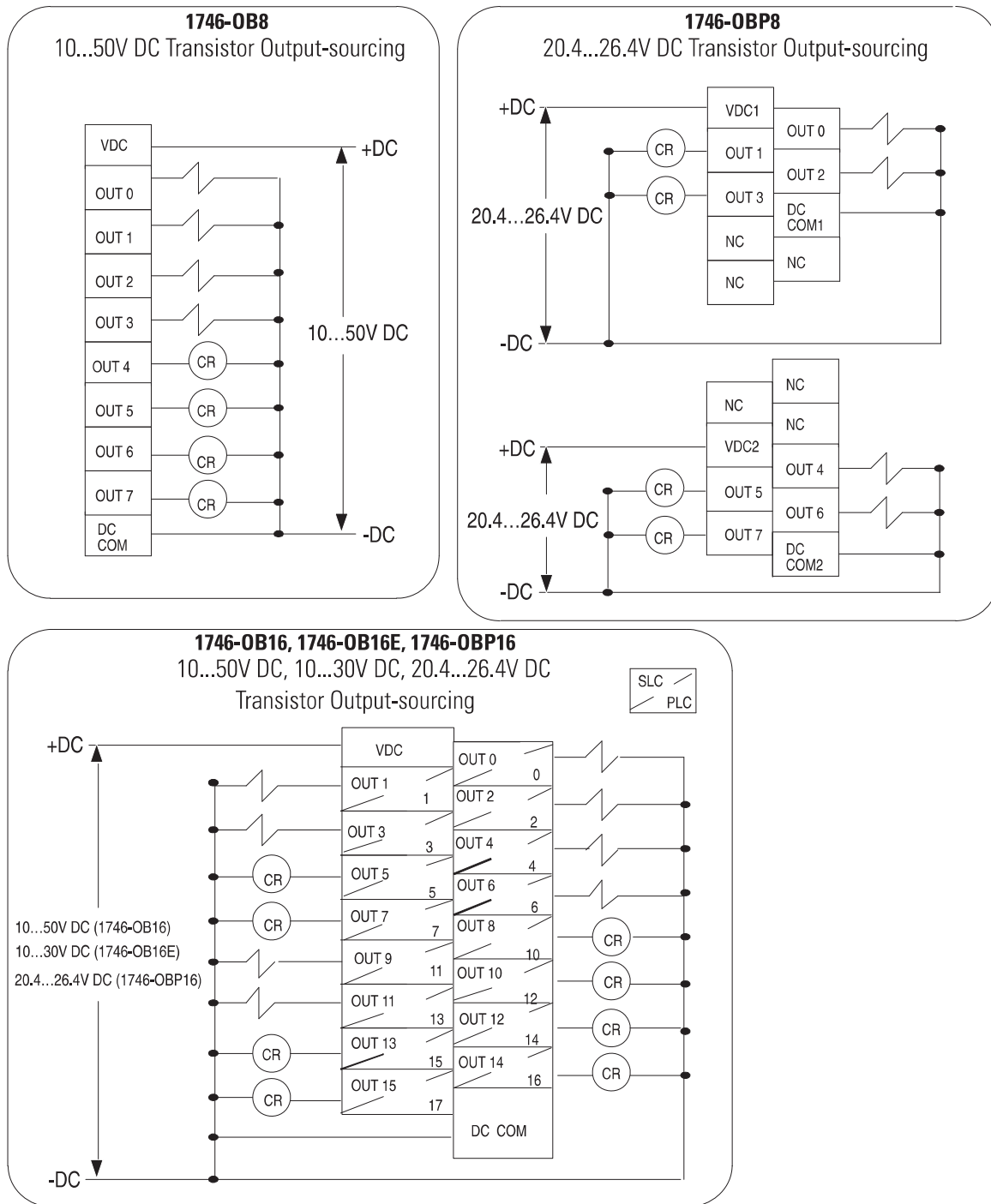


1746-OAP12

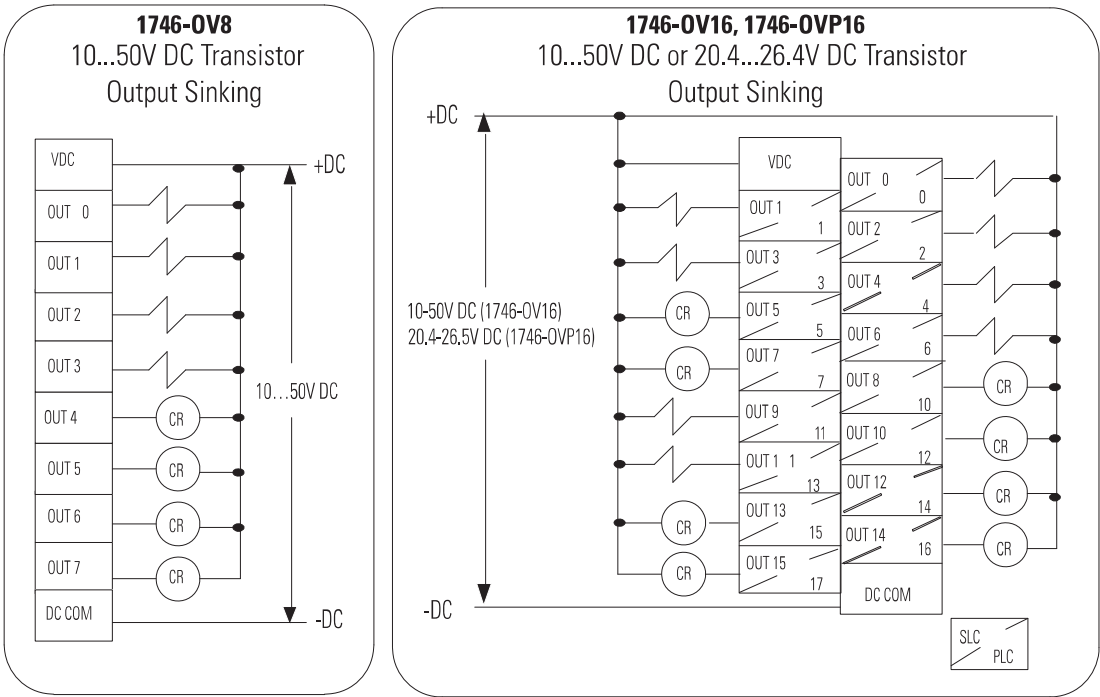


1746-OB6EI

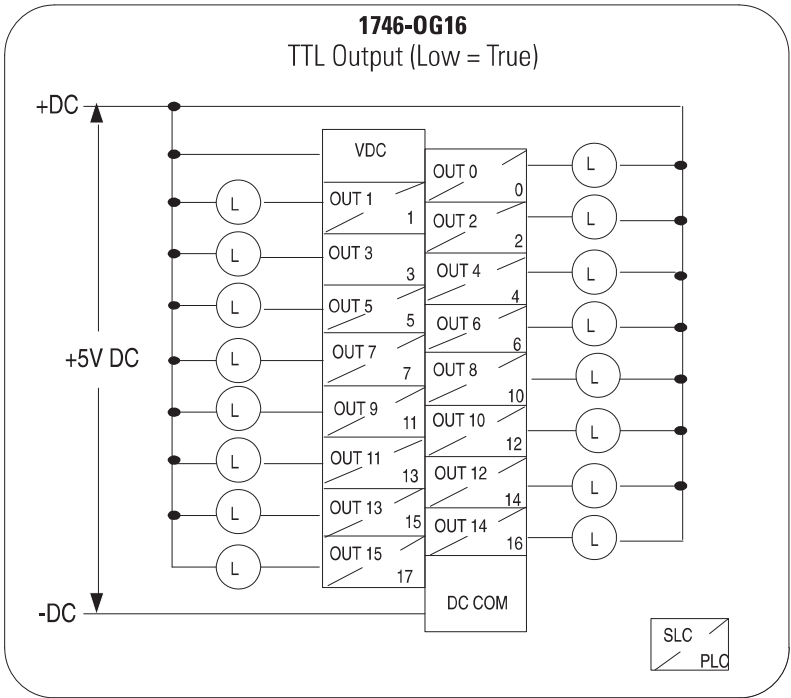


1746-OB8, 1746-OBP8, 1746-OB16, 1746-OB16E, 1746-OBP16

1746-OV8, 1746-OV16, 1746-OVP16

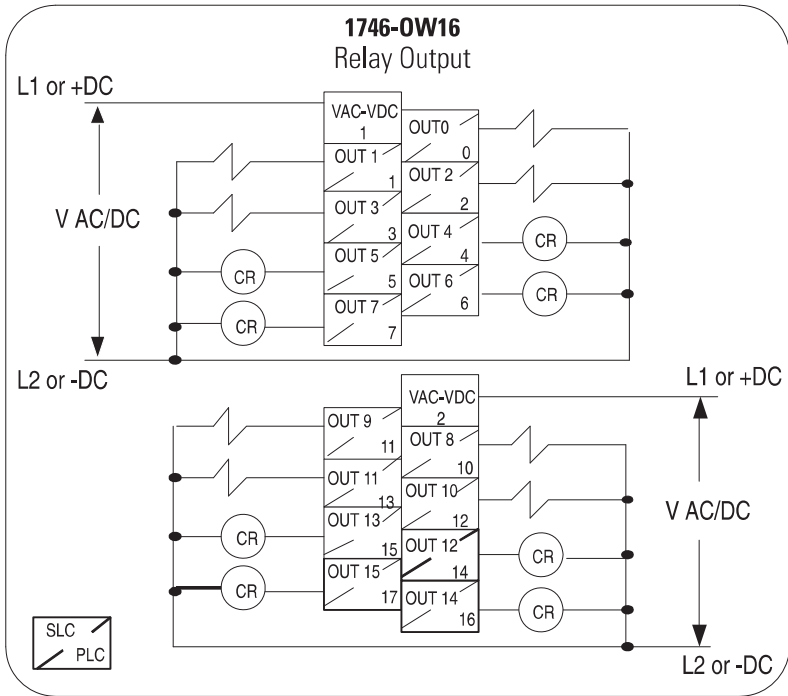
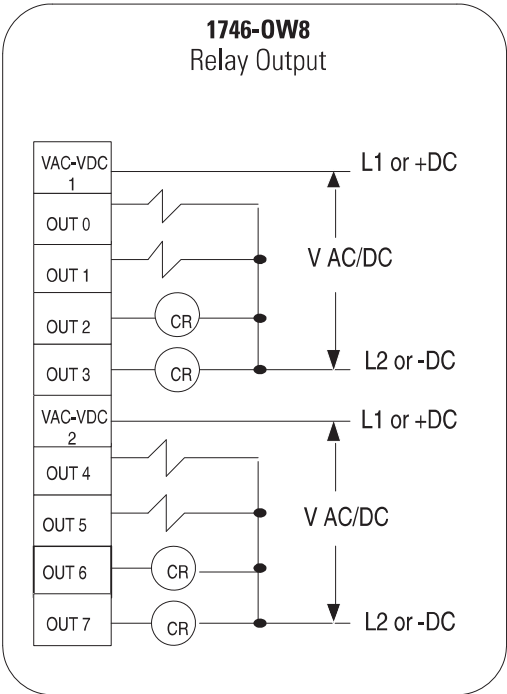
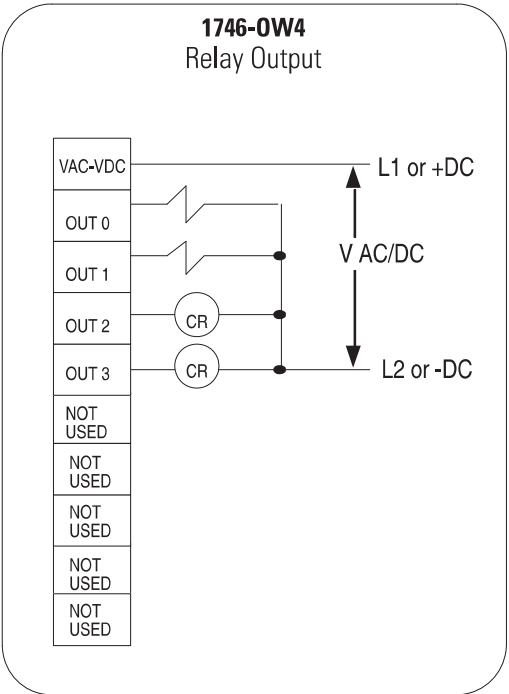


1746-OG16

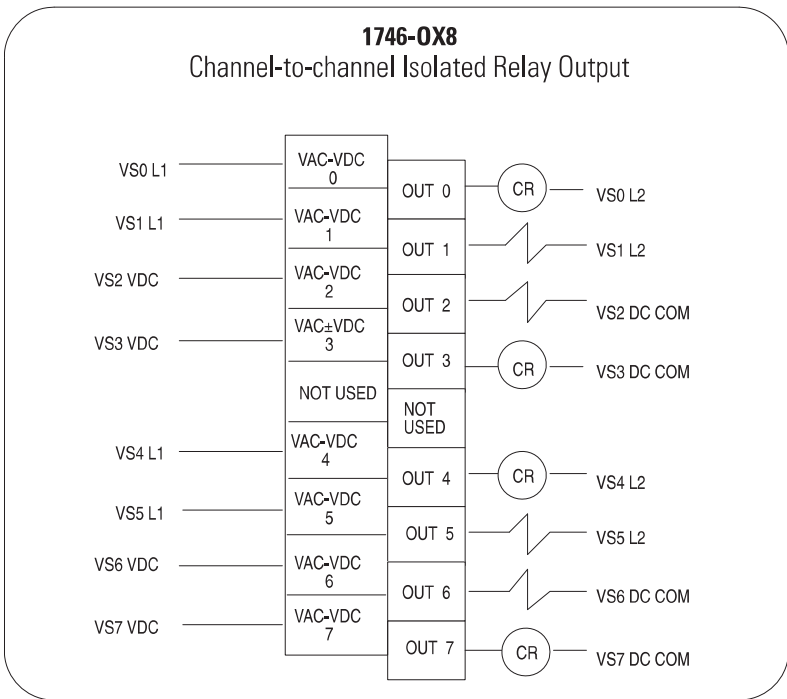


Relay Contact Output Modules Wiring Diagrams

1746-OW4, 1746-OW8, 1746-OW16

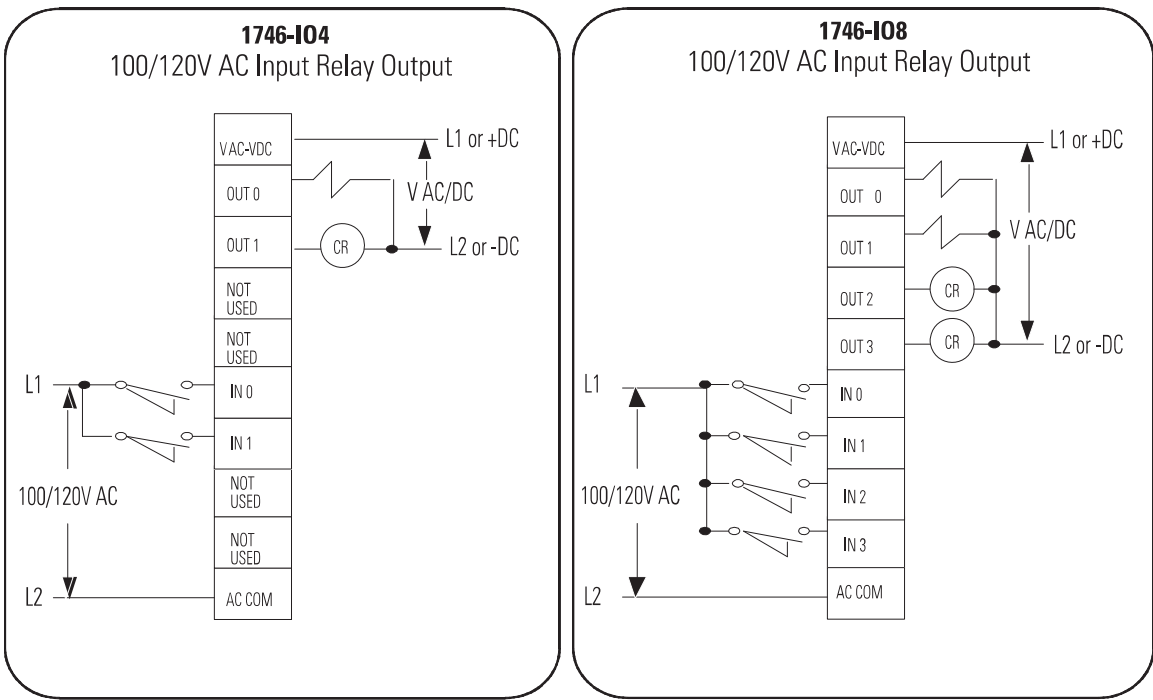


1746-OX8

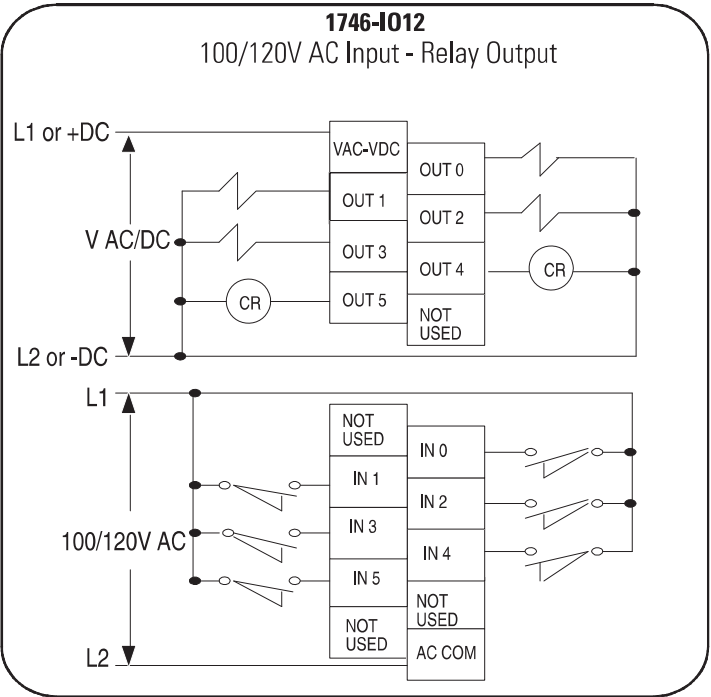


Combination Input/Output Modules Wiring Diagrams

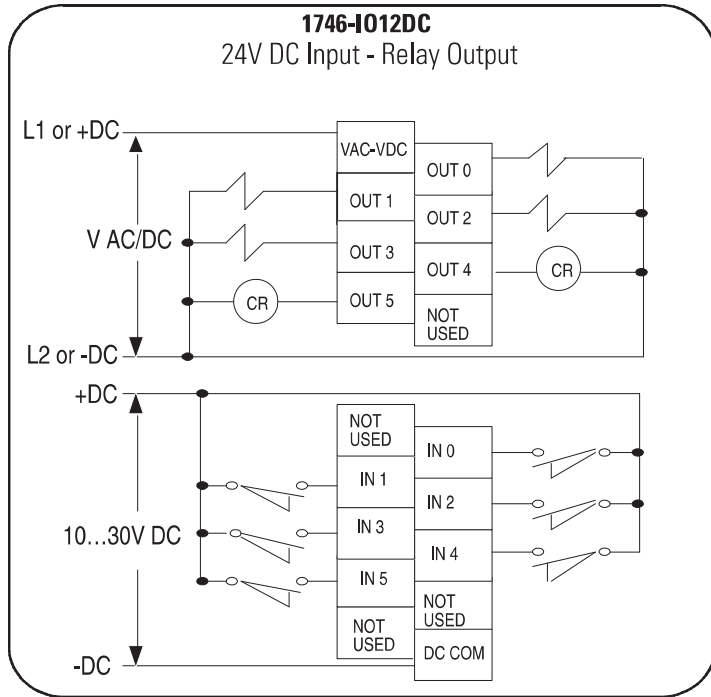
1746-I04, 1746-I08



1746-IO12



1746-IO12DC



Specifications

General Specifications

Attribute	Value
Temperature, operating	0...60 °C (32...140 °F) ⁽³⁾
Temperature, nonoperating	-40...85 °C (-40...185 °F)
Operating humidity	5...95% (noncondensing)
Noise immunity	NEMA standard ICS 2-230
Vibration, operating	Displacement 0.015 in. peak @ 5...57 Hz Acceleration 2.5 g @ 57...2000 Hz
Shock, operating	30 g (all modules except relay contact) 10 g (relay contact modules: 1746-OWx, 1746-0X8, and combination I/O modules)
Isolation ⁽¹⁾	1500V
Agency certification	UL listed CSA certified or C-UL approved as indicated by product marking CE compliant for all applicable directives when product or packaging is marked C-Tick marked for all applicable acts
Hazardous environment class ⁽²⁾	Class I, Division 2 Hazardous Environment UL-A196, CSA, C-UL

⁽¹⁾ Electro-optical isolation between I/O terminals and control logic.

⁽²⁾ Some modules are classified Class 1, Division 2 by CSA only or C-UL only as shown in the specification table for the respective module.

⁽³⁾ Temperature is for air surrounding the SLC 500 system. Temperature range exceptions are indicated with certain modules.

Heat Dissipation

The following tables contain values for the heat dissipated by each I/O module. Use them to calculate the total amount of heat dissipated by your SLC 500 control system. For details on how to calculate total heat dissipation, refer to the SLC 500 Modular Hardware Style User Manual, publication [1747-UM011](#). Please note the following definitions:

- 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 multiplied by the number of points, plus the minimum Watts (with all points energized).

Input Modules Heat Dissipation

Catalog Numbers	Watts per Point	Minimum Watts	Total Watts
1747-IA4	0.27	0.175	1.30
1746-IA8	0.27	0.250	2.40
1746-IA16	0.27	0.425	4.80
1746-IB8	0.20	0.250	1.90
1746-IB16	0.20	0.425	3.60
1746-IC16	0.22	0.425	3.95
1746-IG16	0.02	0.700	1.00
1746-IH16	0.32	0.217	5.17
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-IN16	0.35	0.425	6.00
1746-ITB16	0.20	0.425	3.60
1746-ITV16	0.20	0.425	3.60
1746-IV8	0.20	0.250	1.90
1746-IV16	0.20	0.425	3.60

Output Modules Heat Dissipation

Catalog Numbers	Watts per Point	Minimum Watts	Total Watts
1746-OA8	1.000	0.925	9.00
1746-OA16	0.462	1.850	9.30
1746-OAP12	1.000	1.850	10.85
1746-OB6EI	0.440	0.230	2.90
1746-OB8	0.775	0.675	6.90
1746-OB16	0.388	1.400	7.60
1746-OB16E	0.150	0.675	3.07
1746-OBP8	0.300	0.675	3.08
1746-OBP16	0.310	1.250	6.26
1746-OG16	0.033	0.900	1.50

Output Modules Heat Dissipation

Catalog Numbers	Watts per Point	Minimum Watts	Total Watts
1746-OV8	0.775	0.675	6.90
1746-OV16	0.388	1.400	7.60
1746-OVP16	0.310	1.250	6.26
1746-OW4	0.133	1.310	1.90
1746-OW8	0.138	2.590	3.70
1746-OW16	0.033	5.170	5.70
1746-OX8	0.825	2.590	8.60

Combination Input/Output Modules Heat Dissipation

Catalog Numbers	Watts per Point	Minimum Watts	Total Watts
1746-IO4	0.27 per input point 0.133 per output point	0.75	1.60
1746-IO8	0.27 per input point 0.133 per output point	1.38	3.00
1746-IO12	0.27 per input point 0.133 per output point	2.13	4.60
1746-IO12DC	0.20 per input point 0.133 per output point	1.84	3.90

AC Input Modules

Specifications – 1746-IA4, 1746-IA8, and 1746-IA16

Attribute		Value		
		1746-IA4	1746-IA8	1746-IA16 ⁽²⁾
Voltage category		100/120V AC signal input		
Number of inputs		4	8	16
Points per common		4	8	16
Voltage, operating		85...132V AC @ 47...63 Hz		
Backplane current consumption	5V DC	0.035 A	0.050 A	0.085 A
	24V DC	0.0 A		
Signal delay, max		On = 35 ms Off = 45 ms		
Off-state voltage, max		30V AC		
Off-state current, max		2 mA		
Input current		12 mA @ 120V AC, nom		
Inrush current, max ⁽¹⁾		0.8 A		
Inrush current time duration, max		0.5 ms		

⁽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.

⁽²⁾ Removable terminal block.

Specifications – 1746-IM4, 1746-IM8, and 1746-IM16

Attribute		Value		
		1746-IM4	1746-IM8	1746-IM16 ⁽²⁾
Voltage category		200/240V AC signal input		
Number of inputs		4	8	16
Points per common		4	8	16
Voltage, operating		170...265V AC @ 47...63 Hz		
Backplane current consumption	5V DC	0.035 A	0.050 A	0.085 A
	24V DC	0.0 A		
Signal delay, max		On = 35 ms Off = 45 ms		
Off-state voltage, max		50V AC		
Off-state current, max		2 mA		

Specifications – 1746-IM4, 1746-IM8, and 1746-IM16

Attribute	Value		
	1746-IM4	1746-IM8	1746-IM16 ⁽²⁾
Input current	12 mA @ 240V AC, nom		
Inrush current, max ⁽¹⁾	1.6 A		
Inrush current time duration, max	0.5 ms		

⁽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.

⁽²⁾ Removable terminal block.

DC Input Modules**Specifications – 1746-IB8, 1746-IB16, 1746-ITB16, and 1746-IC16**

Attribute		Value			
		1746-IB8	1746-IB16 ⁽¹⁾	1746-ITB16 ⁽¹⁾	1746-IC16 ^{(1) (3)}
Voltage category		24V DC signal input (sinking)			48V DC signal input (sinking)
Number of inputs		8	16	16	16
Points per common		8	16	16	16
Voltage, operating		10...30V DC (sinking)			30...60V DC @ 55 °C (131 °F) sinking 30...55V DC @ 60 °C (140 °F) sinking
Backplane current consumption	5V DC	0.050 A			
	24V DC	0.0 A			
Signal delay, max		On = 8 ms Off = 8 ms	On = 8 ms Off = 8 ms	On = 0.3 ms Off = 0.5 ms ⁽²⁾	On = 4 ms Off = 4 ms
Off-state voltage, max		5.0V DC			10.0V DC
Off-state current, max		1 mA	1 mA	1.5 mA	1.5 mA
Input current, nom		8 mA @ 24V DC			4.1 mA @ 48V DC

⁽¹⁾ Removable terminal block.

⁽²⁾ Use ID Code 0509 when configuring your system with programming software or the HHT.

⁽³⁾ Typical signal delay for these modules: ON = 0.1 ms, OFF = 0.25 ms @ 24V DC.

Specifications – 1746-IV8, 1746-IV16, and 1746-ITV16

Attribute		Value		
		1746-IV8	1746-IV16 ⁽¹⁾	1746-ITV16 ⁽¹⁾
Voltage category		24V DC signal input (sourcing)		
Number of inputs		8	16	16
Points per common		8	16	16
Voltage, operating		10...30V DC (sourcing)		
Backplane current consumption	5V DC	0.050 A	0.085 A	0.085 A
	24V DC	0.0 A		
Signal delay, max		On = 8 ms Off = 8 ms	On = 8 ms Off = 8 ms	On = 0.3 ms Off = 0.5 ms ⁽²⁾
Off-state voltage, max		5.0V DC		
Off-state current, max		1 mA	1 mA	1.5 mA
Input current		8 mA @ 24V DC, nom		

⁽¹⁾ Removable terminal block.

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

Specifications – 1746-IG16

Attribute		Value ⁽¹⁾
Voltage category		5V DC TTL signal input (sourcing)
Number of inputs		16
Points per common		16
Voltage, operating +5V to DC COM		4.5...5.5V DC (sourcing) 50 mV peak to peak ripple (max)
Backplane current consumption	5V DC	0.140 A
	24V DC	0.0 A
Signal delay, max		On = 0.25 ms Off = 0.50 ms
Off-state voltage		2...5.5 V DC ⁽²⁾
Off-state current, max		4.1 mA
Input current		3.7 mA @ 5V DC, nom

⁽¹⁾ Removable terminal block.

⁽²⁾ TTL inputs are inverted (-0.2...0.8V DC = low voltage = True = ON). Use a NOT instruction in your ladder program to convert to traditional True = High logic.



ATTENTION: To avoid potential damage to TTL modules, handle them by the ends of the module, not metallic surfaces. Electrostatic discharges can damage the module. take care to prevent exposure of terminals or components to electrostatic charges.

Careful wire routing within the enclosure helps cut down electrical noise between I/O lines. Refer to the SLC 500 Modular Hardware Style User Manual, publication [1747-UM011](#), for recommended wiring procedures for TTL modules.

Limit cable length to 15 m (50 ft) per point for inputs in standard environments.

Refer to Allen-Bradley Programmable Controller Wiring and Grounding Guidelines, publication [1770-IN041](#), for complete information.

Specifications – 1746-IN16

Attribute		Value ⁽¹⁾
Voltage category		24V AC/DC Signal Input
Number of inputs		16
Points per common		16
Voltage, operating	DC	10...30V DC (sinking)
	AC	10...30V AC
Backplane current consumption	5V DC	0.085 A
	24V DC	0.0 A
Signal delay, max	DC	On = 15 ms Off = 15 ms
	AC	On = 25 ms Off = 25 ms
Off-state voltage, max	DC	3.0V DC
	AC	3.0V AC
Off-state current, max	DC	1 mA
	AC	1 mA
Input current, nom	DC	8 mA @ 24V DC
	AC	8 mA @ 24V AC
Input current		0.02 A (AC only)

⁽¹⁾ Removable terminal block.