A·B
QUALITY

Installation Instructions

SLC 500™ 32-Point I/O Modules
(Catalog Numbers 1746-IB32, -IV32, -OB32, OB32E and -OV32)

Inside ...   **page**

Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Allen-Bradley does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley publication SGI-1.1, *Safety Guidelines for the Application, Installation, and Maintenance of Solid-State Control* (available from your local Allen-Bradley office), describes some important differences between solid-state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

Reproduction of the contents of this publication, in whole or in part, without written permission of the Allen-Bradley Company is prohibited.

Throughout these installation instructions we use notes to make you aware of safety considerations:

ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.

Attention statements help you to:

- identify a hazard
- avoid the hazard
- recognize the consequences

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 the chassis
- install the Octal Filter Label
- wire the module

We assume you have already installed your chassis and power supply. If not, please refer to the installation instructions for these products before preceding.

Installation of Your I/O Module

> ⚠ **ATTENTION:** Never install, remove, or wire modules with power applied to the chassis.

Important: The first slot of the chassis is reserved for the processor or Remote I/O module Catalog Number 1747-ASB for a remote chassis.

1. Disconnect power.

2. Align the circuit board of the
    module with the chassis card
    guide. (A)

3. Slide the module into the chassis
    until the top and bottom tabs lock
    into place. (B)

4. Refer to pages 16 through 19 for
    32-point wiring instructions.

5. Route the wires down and away
    from the module, securing them with
    the wire tie. (C)

6. To keep the chassis free from debris,
    cover all unused slots with
    Card Slot Filler, Catalog Number 1746-N2.

To remove the module, disconnect wiring
or pre-wired connector, press and hold
the module release located on each
self-locking tab (D), and slide the
module out of the chassis slot.

Slot 1
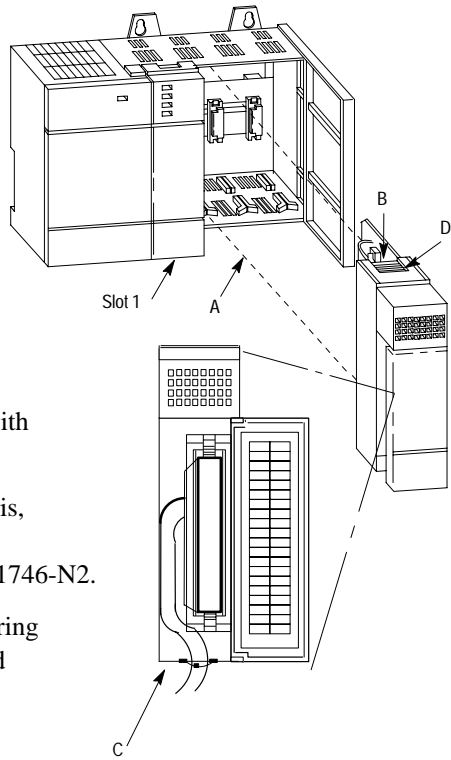
Specifications

Input Module Specifications[1]

Description:		Specification: 1746-	
		IB32	**IV32**
Voltage Category		24	
Number of Inputs		32	
Points per Common		8	
Operating Voltage		15 to 30V dc at 50°C 15 to 26.4V dc at 60°C Sink	15 to 30V dc at 50°C 15 to 26.4V dc at 60°C Source
Backplane Current Consumption	5V	0.050A	
	24V	0A	
Isolation from Backplane		1500V ac for 1 min.	
Signal Delay (max.)		on = 3 ms off = 3 ms	
On State Voltage (min.)		15.0V dc	
Off State Voltage (max.)		5.0V dc	
Off State Current (max.)		1.5 mA	
Nominal Input Current at 24V dc		5.1 mA at 24V dc	
Heat Dissipation Watts per point		0.20	
Heat Dissipation Watts (min.)		0.25	
Heat Dissipation Total Watts		6.65	

[1] Series A, B and C 32-point input modules are fused to protect external wiring, one fuse per common. The fuses are non-replaceable and are rated at 2.5A. Series D 32-point input modules are not fused.

Output Module Specifications[1]

Description:		Specification: 1746-		
		OB32 Series D	OV32 Series D	OB32E[3]
Voltage Category		24		
Number of Outputs		32		
Points per Common		16		
Operating Voltage		5–50V dc Source	5–50V dc Sink	10–30V dc Source
Backplane Current Consumption	5V	0.190A		
	24V	0A		
Isolation from Backplane		1500V ac for 1 min.		
Signal Delay (max.)		on = 0.1 ms off = 1.0 ms		on = 1.0 ms off = 2.0 ms
Off State Leakage (min.)		1 mA		
Load Current (min.)		1 mA		
Continuous Current per Modules (max.)[2]		8.0A at 0°C to 60°C		
Continuous Current per Point (max.)[2]	at 30°C	0.50A		
	at 60°C	0.25A		
Continuous Current per Common (max.)[2]		4.0A at 0°C to 60°C		
Continuous Current per Common Pin (max.)[2]		2.0A at 0°C to 60°C		

[1] Series A, B, and C 1746-OB32 and 1746-OV32 output modules are fused to protect external wiring, one fuse per common. The fuses are non-replaceable and are rated at 2.5A. 1746-OB32, OV32 Series D modules are not fused and have a higher current rating than Series A, B, and C.

[2] To attain the maximum Continuous Current per common rating for an OB32 Series D and OB32E modules, both V dc connections in a wire group must be connected to your DC source. To attain the maximum Continuous Current per common rating for an OV32 Series D module, both dc Com connections in a wire group must be connected to your DC source.

[3] Use the following ID code when configuring the system with programming software or the HHT. 1746-OB32E = 3120

Description:		Specification: 1746-		
		OB32 Series D	OV32 Series D	OB32E [3]
On State Voltage Drop (max.)		1.2V at 0.5A		
Surge Current per Point	at 30°C [4]	1.0A for 10 ms		
	at 60°C [5]	1.0A for 10 ms		
Electronic Protection		No	No	Yes
Heat Dissipation Watts per Point		0.172	0.172	0.250
Heat Dissipation Watts (min.)		0.95	0.95	0.95
Heat Dissipation Total Watts		6.45	6.45	8.95

[3] Use the following ID code when configuring the system with programming software or the HHT. 1746-OB32E = 3120

[4] Repeatability once every second.

[5] Repeatability once every 2 seconds.

ATTENTION: A transient pulse occurs in transistor inputs when the external dc supply voltage is applied to the output common terminals (e.g., via the master control relay). This can occur whether or not the processor is powered. For most applications, the energy of this pulse is not sufficient to energize the load. For more information on transient pulses and guidelines to reduce inadvertent processor operation, refer to the *SLC 500 Modular or Fixed Hardware Style Installation and Operation Manual* (Publication Number 1747-6.2 or 1747-6.21).

Electronically Protected Modules (1746-OB32E)

Electronic Protection

The electronic protection of the 1746-OB32E has been designed to provide protection for the module from short-circuit and overload current conditions. The protection is based on a thermal cut-out principle. In the event of a short circuit or overload current condition on an output channel, that channel will limit current within milliseconds after its thermal cut-out temperature has been reached. All other channels continue to operate as directed by the CPU (processor) module.

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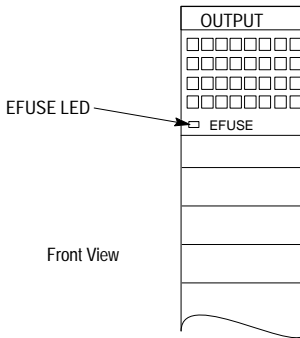
Auto Reset Operation

Important: The 1746-OB32E performs auto-reset under overload conditions. When an output channel overload occurs as described above, that channel limits current within milliseconds after its thermal cut-out temperature has been reached. While in current limit, the output channel can cool below the thermal cut-out temperature, allowing the module to auto-reset and resume control of the output channel as directed by the processor until the thermal cut-out temperature is again reached.

Removing power from an overloaded output channel would also allow the output channel to cool below the thermal cut-out temperature allowing auto-reset to occur when power is restored. The output channel would operate as directed by the processor until the thermal cut-out temperature is again reached.

To avoid auto-reset of an output channel under overload conditions, an external mechanical fuse can be used to open the circuit when overloaded.

Short Circuit/Overload Current DIagnostics

If a short circuit or overload current condition occurs on an output channel:

1. The E-Fuse LED will illuminate provided that power is applied to the module. (power required: 5V dc via backplane and load power via an external supply)

2. All other channels continue to operate as directed by the CPU (processor) module.

Recovery From Channel Shutdown

1. Remove the SLC 500 system power and correct the conditions causing causing the short circuit or overload current condition.

2. Restore the SLC 500 system power. The module automatically resets and resumes control of the output channel and associated load.

## Installation of the Octal Label Kit (for PLC® Processors Only)

The octal label kit consists of an octal filter label and a door label. In a PLC system, use these octal labels to replace the decimal labels that are attached to the I/O modules.   Octal label kits are included with the I/O modules and can also be obtained through your Allen-Bradley distributor.

Applying the Octal Filter Label

1. Remove the octal filter label from its paper carrier.

2. Align the octal filter label numbers horizontally to the module color bar and over the decimal filter numbers, as shown in the illustration on page 10.

3. Apply the octal label to the filter.

4. Press firmly to ensure proper adhesion of the label.

Applying the Octal Door Label

1. Remove the octal door label from its paper carrier.

2. Align the octal label directly over the decimal door label on the inside of the door.

3. Apply the octal label to the door.

4. Press firmly to ensure proper adhesion of the label.
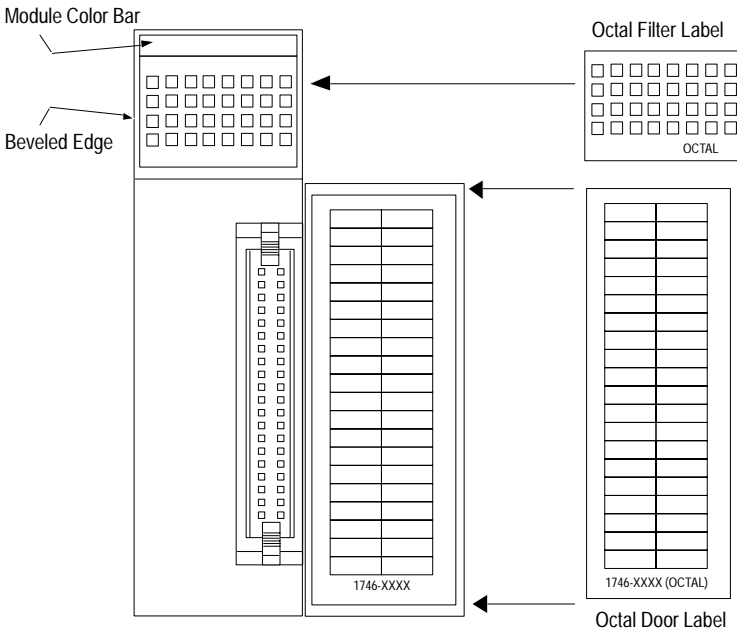
Wiring Options for the I/O Module

Included with your 32-point I/O module is a keyed 40-pin female connector and crimp type pins. These components allow you to wire I/O devices to the module using a 40-conductor cable or individual wires. The wiring diagrams on pages 16 through 19 show the I/O terminations of the connector for your specific module. Refer to page 15 for connector/pin assembly instructions. When assembled, align the female connector over the modules male header using the keying slot as a guide. Firmly lock them together with the upper and lower retaining arms. 1492 pre-wired cables and interface modules can be used for connecting external I/O.

There are two options for wiring the 32-point I/O module.

Option #1
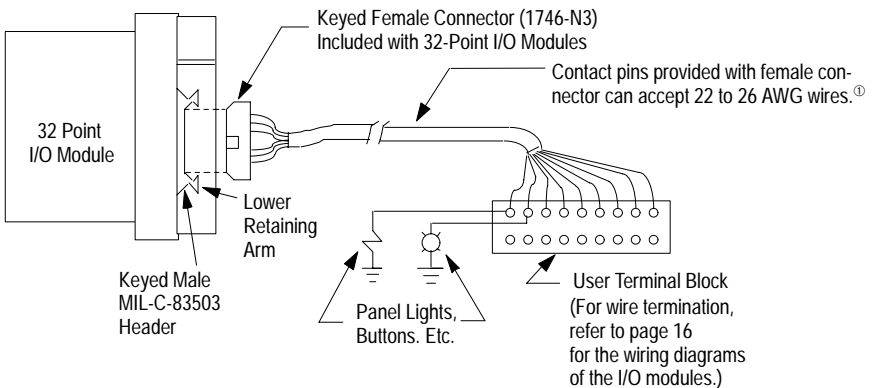
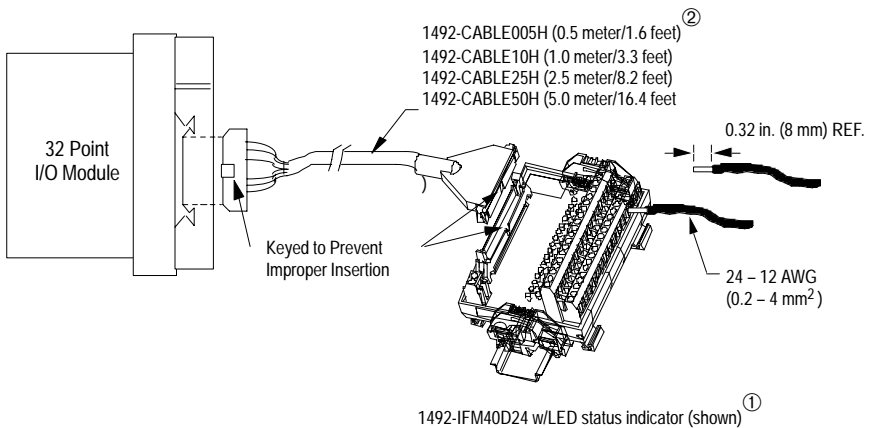[1] Maximum user cable length is dependent on how much voltage drop (current x (ohms/ft) x (feet)) the user's system can tolerate. The user's system should take into account the minimum turn-on voltage required by external loads connected to the 32-point output modules and all of the voltage drops associated with wiring to and from the load, terminal blocks, power sources and the module itself.

Option #2

Allen-Bradley 1492 wiring systems are available for connecting 32-point I/O
modules to external I/O. These wiring systems include a pre-wired cable
available in four lengths: 0.5m (1.6 feet), 1.0m (3.3 feet), 2.5m (8.2 feet), 5.0m
(16.4 feet). An interface module for connecting external devices is also
available. Cables are equipped with keyed connectors at both ends for proper
connections. Interface modules are DIN rail mountable and are available with or
without field-side status indicating LEDs. Stick-on labels are provided with the
interface modules to identify I/O wiring termination points.

1492-CABLE005H (0.5 meter/1.6 feet) ②
1492-CABLE10H (1.0 meter/3.3 feet)
1492-CABLE25H (2.5 meter/8.2 feet)
1492-CABLE50H (5.0 meter/16.4 feet

0.32 in. (8 mm) REF.

32 Point
I/O Module

Keyed to Prevent
Improper Insertion

24 – 12 AWG
$(0.2 – 4 \text{ mm}^2)$

1492-IFM40D24 w/LED status indicator (shown) ①

① To maintain group isolation provided by 32-point I/O modules, use a 1492 terminal block
that provides group isolation. Consult 1492 documentation or your Allen-Bradley Sales
Office for additional information.

② Maximum user cable length is dependent on how much voltage drop
(current x (ohms/ft) x (feet)) the user's system can tolerate. The user's system should take
into account the minimum turn-on voltage required by external loads connected to the
32-point output modules and all of the voltage drops associated with wiring to and from the
load, terminal blocks, power sources and the module itself. See table on page 13 for
voltage drop values for the above 1492 cables.

| Catalog No.	Voltage Drop at 30°C		Voltage Drop at 60°C	
Series C Cables	V dc and dc com Wires[1]	Output Channel Wires[2]	V dc and dc com Wires[1]	Output Channel Wires[2]
1492-CABLE005H	127 mv	34 mv	144 mv	38 mv
1492-CABLE10H	173 mv	45 mv	196 mv	51 mv
1492-CABLE25H	334 mv	83 mv	388 mv	95 mv
1492-CABLE50H	574 mv	147 mv	686 mv	169 mv

[1] Voltage drop at maximum rated current of 2 amps per conductor.

[2] Voltage drop at maximum rated current of 0.5 amps per output channel.

Labeling for the 1492 Interface Module

Several different stick-on label sets are provided on a single card with 1492 interface modules. Each label set is identified with an I/O module catalog number and the words "upper" and "lower" to identify which terminal strip the label should be affixed to.

The table on the following page identifies 32-point labels (SLC = decimal addressing, PLC = octal addressing) and their location on the interface module. Peel off the appropriate label for your 32-point module and apply it to the interface module. The following is an example for the 1746-IV32 module.
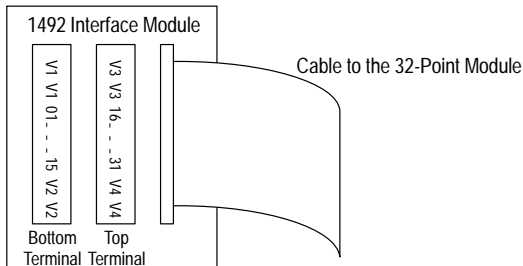
Example for the 1746-IV32 Module

Terminal Block Labels											
Bottom Terminal Block						**Top Terminal Block**					
1746-OB32 1746-OB32E 1746-OV32		1746-IV32		1746-IB32		1746-OB32 1746-OB32E 1746-OV32		1746-IV32		1746-IB32	
SLC	PLC	SLC	PLC	SLC	PLC	SLC	PLC	SLC	PLC	SLC	PLC
+V1	+V1	+V1	+V1	CM1	CM1	+V2	+V2	+V3	+V3	CM3	CM3
+V1	+V1	+V1	+V1	CM1	CM1	+V2	+V2	+V3	+V3	CM3	CM3
0	0	0	0	0	0	16	0	16	0	16	0
1	1	1	1	1	1	17	1	17	1	17	1
2	2	2	2	2	2	18	2	18	2	18	2
3	3	3	3	3	3	19	3	19	3	19	3
4	4	4	4	4	4	20	4	20	4	20	4
5	5	5	5	5	5	21	5	21	5	21	5
6	6	6	6	6	6	22	6	22	6	22	6
7	7	7	7	7	7	23	7	23	7	23	7
8	10	8	10	8	10	24	10	24	10	24	10
9	11	9	11	9	11	25	11	25	11	25	11
10	12	10	12	10	12	26	12	26	12	26	12
11	13	11	13	11	13	27	13	27	13	27	13
12	14	12	14	12	14	28	14	28	14	28	14
13	15	13	15	13	15	29	15	29	15	29	15
14	16	14	16	14	16	30	16	30	16	30	16
15	17	15	17	15	17	31	17	31	17	31	17
CM1	CM1	+V2	+V2	CM2	CM2	CM2	CM2	+V4	+V4	CM4	CM4
CM1	CM1	+V2	+V2	CM2	CM2	CM2	CM2	+V4	+V4	CM4	CM4

The stick-on labels of the 1492 Interface Module are abbreviated as follows: +V1 = V dc 1, +V2 = V dc 2, CM1 = Com 1, etc.

NOTE: If you decide to build your cable using another 1746-N3 to terminate the cable at the 1492 Interface Module end, wire it in the following manner: Pin 1 to Pin 1, Pin 2 to Pin 2, Pin 3 to Pin 3, etc.

Assembly of the Wire Contacts

1. Strip the wire insulation as shown in Figure 1. Crimp pins can accept 22 to 26 AWG wire.

2. Insert the wire up to the wire stop as shown in Figure 2.

3. Crimp with Hirose's HIF3-T2226HC. Equivalent Amp part numbers are: pin – #87666-2, connector – #102387-9, and crimp tool – #90418-1. If a crimp tool is not available, use the following crimping procedure:

   A. Crimp the wire barrel around the wire using small needle nose pliers.

   B. Crimp the insulation barrel around the wire insulation using small needle nose pliers.

   C. Solder wire and wire barrel together using rosin core (60% tin/ 40% lead) solder and soldering pencil.

4. Insert the wire contact into the socket as shown in Figure 3 and 4. Check to make sure that the tang, shown as A in Figure 4, is properly latched by lightly pulling on the wire.
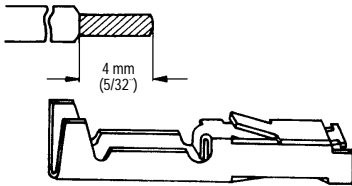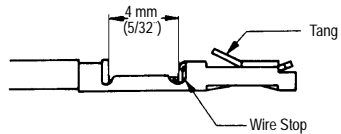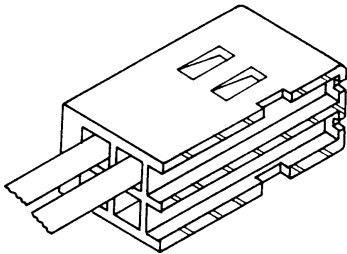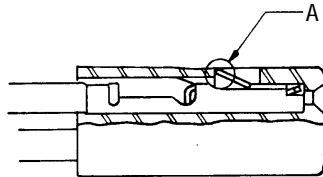

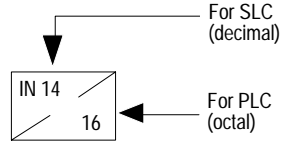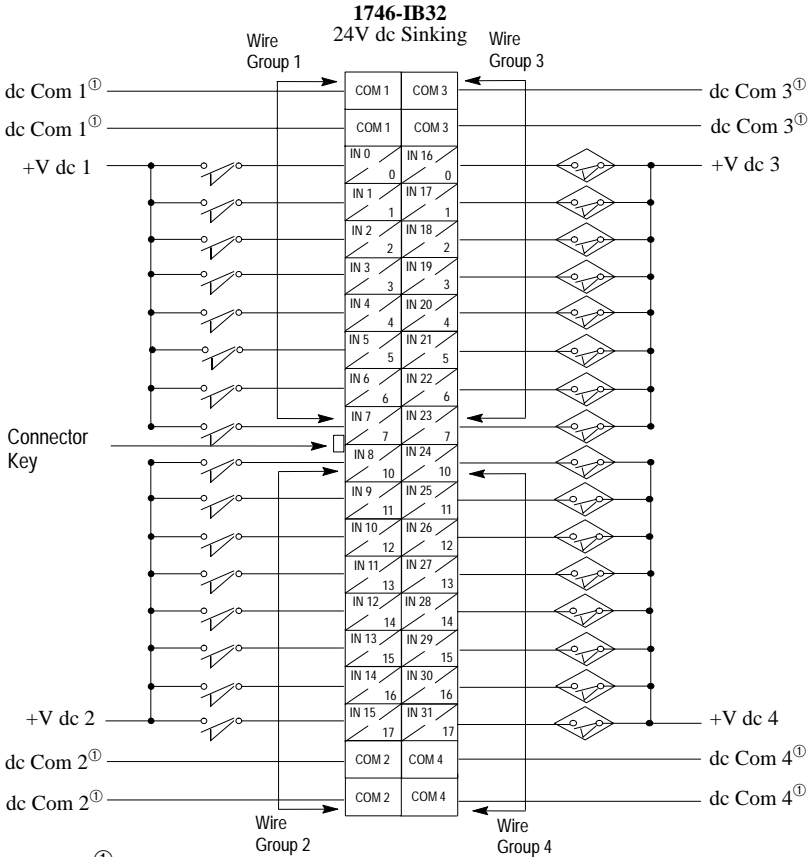Figure 1

Figure 2

Figure 3

Figure 4

Wiring Diagrams

The wiring diagrams include both decimal and octal numbers. To wire your module when used in an SLC system, use the decimal numbers.   To wire your module when used in a PLC system, use the octal numbers.

For SLC (decimal)

IN 14

16

For PLC (octal)

Input Module (1746-IB32)

1746-IB32
24V dc Sinking

Wire Group 1

Wire Group 3

dc Com 1[1]   COM 1   COM 3   dc Com 3[1]
dc Com 1[1]   COM 1   COM 3   dc Com 3[1]

+V dc 1   IN 0   IN 16   +V dc 3
                    0   0
                 IN 1   IN 17
                    1   1
                 IN 2   IN 18
                    2   2
                 IN 3   IN 19
                    3   3
                 IN 4   IN 20
                    4   4
                 IN 5   IN 21
                    5   5
                 IN 6   IN 22
                    6   6
                 IN 7   IN 23
                    7   7
Connector
Key   IN 8   IN 24
                    10   10
                 IN 9   IN 25
                    11   11
                 IN 10   IN 26
                    12   12
                 IN 11   IN 27
                    13   13
                 IN 12   IN 28
                    14   14
                 IN 13   IN 29
                    15   15
                 IN 14   IN 30
                    16   16
+V dc 2   IN 15   IN 31   +V dc 4
                    17   17

dc Com 2[1]   COM 2   COM 4   dc Com 4[1]
dc Com 2[1]   COM 2   COM 4   dc Com 4[1]

Wire Group 2

Wire Group 4

[1] The dc Com pins on the 1746-IB32 input module are isolated between the four groups and the two com pins in each group are connected internally. To maintain group isolation provided by 32-point I/O modules, use a 1492 terminal block that provides group isolation. Consult 1492 documentation or your Allen-Bradley Sales Office for additional information
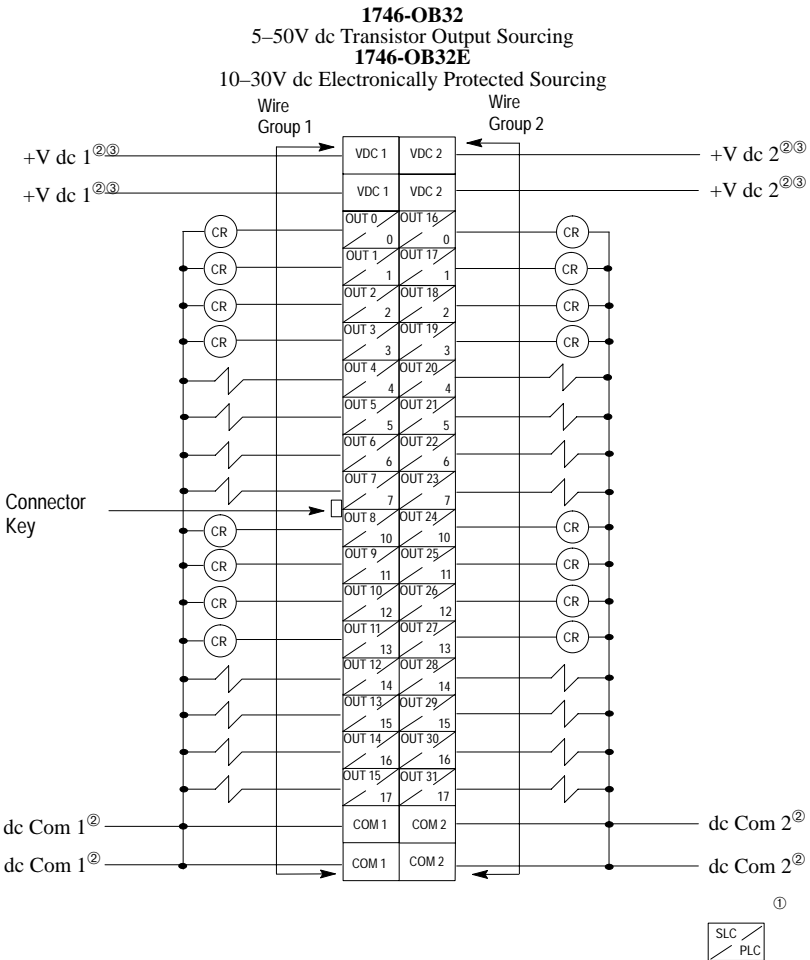
Input Module (1746-IV32)

1746-IV32
24V dc Sourcing
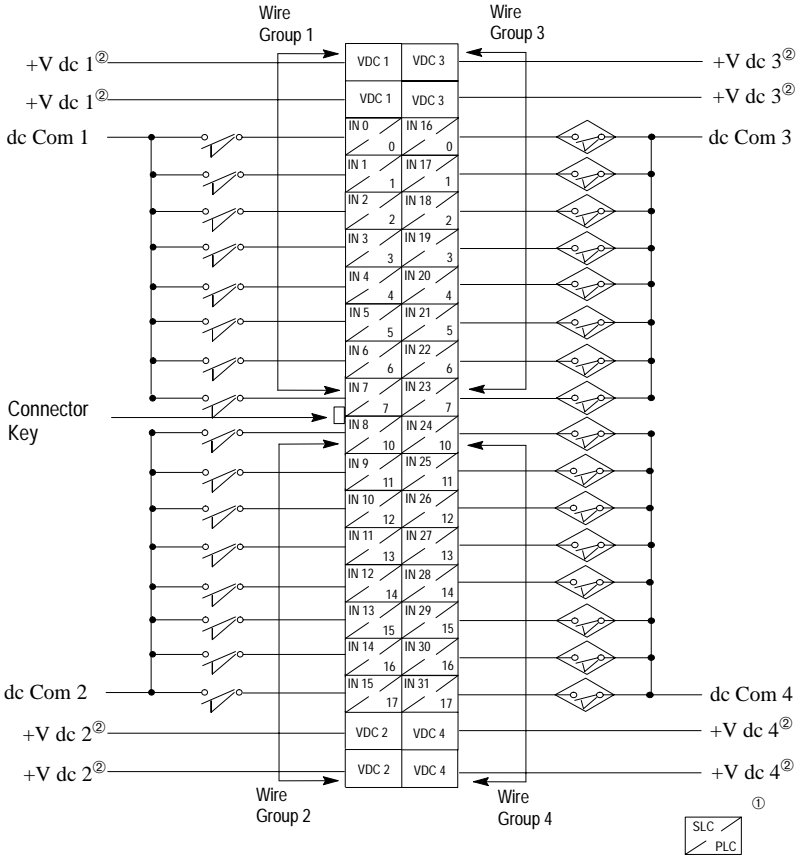
[1] See page 16 for more information about decimal and octal labeling.

[2] The V dc pins on the 1746-IV32 input module are isolated between the four groups and the two V dc pins in each group are connected internally. To maintain group isolation provided by 32-point I/O modules, use a 1492 terminal block that provides group isolation. Consult 1492 documentation or your Allen-Bradley Sales Office for additional information.

Output Module (1746-OB32, -OB32E)

1746-OB32
5–50V dc Transistor Output Sourcing
1746-OB32E
10–30V dc Electronically Protected Sourcing

[1] See page 16 for more information about decimal and octal labeling.

[2] The V dc and dc Com pins on the 1746-OB32 and 1746-OB32E output module are isolated between the two groups and the two V dc and two dc Com pins in each group are connected internally.

[3] Both V dc pins must be connected to the dc power source if current for a common group is expected to exceed 2 amps. To maintain group isolation provided by 32-point I/O modules, use a 1492 terminal block that provides group isolation. Consult 1492 documentation or your Allen-Bradley Sales Office for additional information.

Output Module (1746-OV32)

1746-OV32
5–50V dc Transistor Output Sinking
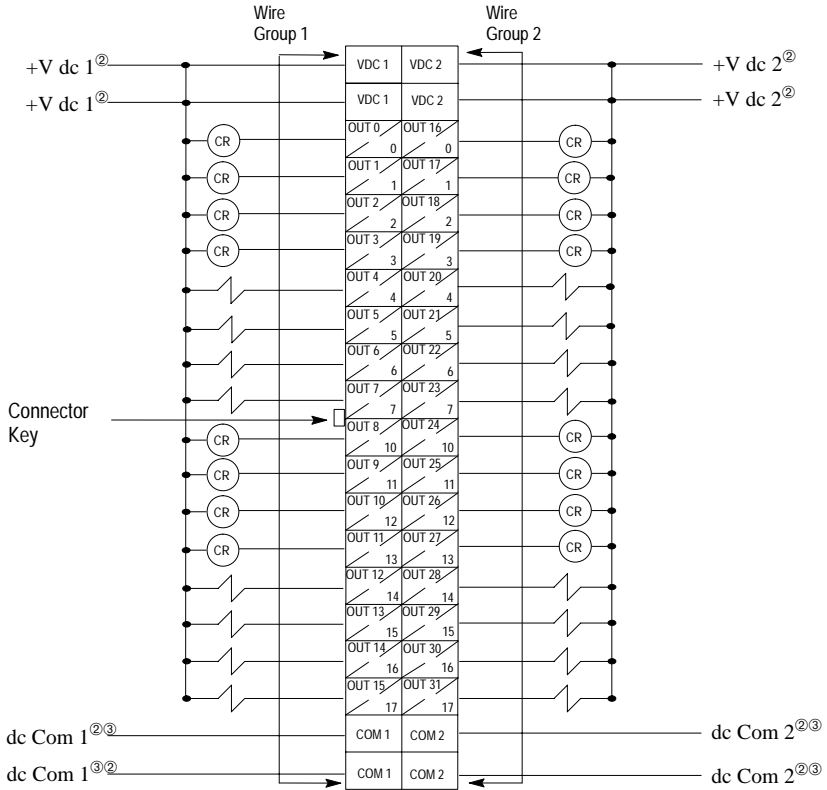
[1] See page 16 for more information about decimal and octal labeling.

[2] The V dc and dc Com pins on the 1746-OV32 output module are isolated between the two groups and the two V dc and two dc Com pins in each group are connected internally.

[3] Both dc Com pins must be connected to the dc power source if current for a common group is expected to exceed 2 amps. To maintain group isolation provided by 32-point I/O modules, use a 1492 terminal block that provides group isolation. Consult 1492 documentation or your Allen-Bradley Sales Office for additional information.

SLC is a trademark of Rockwell Automation

PLC is a registered trademark of Rockwell Automation

Rockwell Automation

Allen-Bradley

Worldwide representation.

Argentina • Australia • Austria • Bahrain • Belgium • Brazil • Bulgaria • Canada • Chile • China, PRC •
Colombia • Costa Rica • Croatia • Cyprus • Czech Republic • Denmark • Ecuador • Egypt • El Salvador •
Finland • France • Germany • Greece • Guatemala • Honduras • Hong Kong • Hungary • Iceland • India
• Indonesia • Ireland • Israel • Italy • Jamaica • Japan • Jordan • Korea • Kuwait • Lebanon • Malaysia •
Mexico • Netherlands • New Zealand • Norway • Pakistan • Peru • Philippines • Poland • Portugal •
Puerto Rico • Qatar • Romania • Russia–CIS • Saudi Arabia • Singapore • Slovakia • Slovenia • South
Africa, Republic • Spain • Sweden • Switzerland • Taiwan • Thailand • Turkey • United Arab Emirates •
United Kingdom • United States • Uruguay • Venezuela • Yugoslavia

Allen-Bradley Headquarters, 1201 South Second Street, Milwaukee, WI 53204 USA
Tel: (1) 414 382-2000 Fax: (1) 414 382-4444