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GENERATION 4 DIGITAL I/O FAMILY DATA BOOK

Form 727-170118—January 2017

OPTO 22

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G4 Digital I/O Family Data Book
Form 727-170118—January 2017

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1. Welcome to the G4 Digital I/O Family Data Book

Introduction

Generation 4 digital I/O, introduced by Opto 22 in 1989, provides increased density over older modules, while maintaining single-channel flexibility. LEDs and fuses are generally on the modules rather than the rack to make them visible and easy to service. The G4 digital I/O family includes a wide variety of modules, mounting racks, and accessories to meet the needs of your system.

What's In This Book

The *G4 Digital I/O Family Data Book* pulls together information on all Generation 4 digital I/O family products. This same information can also be found in individual product data sheets; it is brought together here for your convenience.

This book covers the following:

Chapter 2. Generation 4 Digital I/O Mounting Racks—Choose your mounting rack from the table on page 4, then see detailed drawings and specifications on the following pages.

Chapter 3. Generation 4 Racks with Integral Digital I/O—Detailed drawings and specifications for a special group of rack products with I/O circuitry permanently integrated.

Chapter 4. Generation 4 Digital I/O Modules—See the table on page 35 for an overview of all G4 modules. Detailed drawings and specifications follow.

Chapter 5. Generation 4 Digital I/O Accessories—Details on G4 accessories, including cables and connectors, fuses, and a jumper strap.

Appendix A. Designing Custom I/O Mounting Racks—Includes helpful information for customers who are designing their own mounting systems for Generation 4 digital I/O modules.

Appendix B. Wiring Diagrams—Examples for mapping field wiring to mounting racks for each type of module that can be plugged into the rack.

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For Help

See *Guide to Troubleshooting Legacy Opto 22 Products* (form 1104) for help in solving problems you may encounter.

If you have additional questions about using your Generation 4 Digital I/O products, please contact Opto 22 Product Support.

Phone:	800-TEK-OPTO (800-835-6786 toll-free in the U.S. and Canada) 951-695-3080 Monday through Friday, 7 a.m. to 5 p.m. Pacific Time	*NOTE: Email messages and phone calls to Opto 22 Product Support are grouped together and answered in the order received.*
Fax:	951-695-3017	
Email:	support@opto22.com	
Opto 22 website:	www.opto22.com	

When calling for technical support, be prepared to provide a complete description of your hardware and operating system to the Product Support engineer. This information should include:

- accessories installed
- type of power supply
- types of I/O modules and racks used
- third-party devices installed
- how the system is wired

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2. Generation 4 Digital I/O Mounting Racks

Overview of Mounting Racks

This chapter includes information on mounting racks used with G4 digital I/O modules. For integral racks, which have permanent I/O circuitry built into the rack, see page 29.

Features

The following features apply to all mounting racks in this chapter:

- Minimum mounting space required
- Spare module fuse included
- UL recognized, CSA certified, and CE compliant
- Uses a single 5, 15, or 24 VDC power supply for control power
- You can insert and remove modules easily and quickly without disturbing field wiring.
- Modules are securely attached with a threaded captive hold-down screw.
- Operating temperature: 0° to 70° C
- Humidity: 95% relative humidity, non-condensing

Notes on I/O Module Use

G4 I/O modules are available with logic voltages of 5 VDC, 15 VDC, or 24 VDC. Your choice of modules, however, usually depends on the equipment you use to control the rack. For example:

- Racks with an Opto 22 brain board or a Raspberry Pi can use only 5 VDC logic I/O modules.
- Racks with an Opto 22 PC adapter card (PCI-AC5, PCIe-AC5, or G4AC5) can use only 5 VDC logic I/O modules.

All modules on a rack must use the same logic voltage, except:

- On a G4PB4R rack, you can mix modules with different logic voltages.
- On a G4PB16I rack, dry contact outputs and all input modules must have the same logic voltage, but output modules other than dry contact outputs can have mixed logic voltages.

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Choose Your Rack

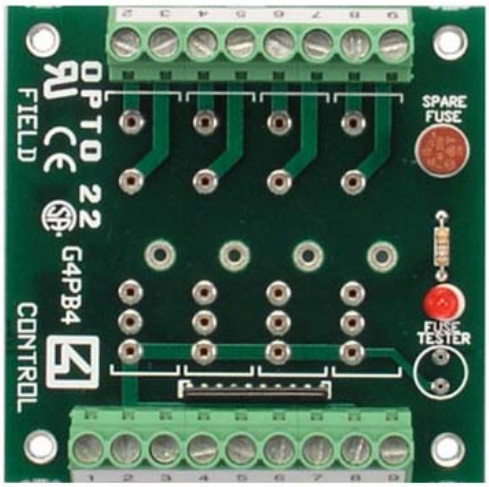
Choose a rack from the following table, and then see the referenced page in this chapter for detailed drawings and specifications, plus links to the product on our website.

Model	Channels	Input Modules	Output Modules	AC	DC	Built-in Fuse Tester	Field Connector	Control Connector	Special Features	See
G4PB4	4	●	●	●	●	●	screw-type barrier strip	screw-type barrier strip	Good for compact locations where only a few I/O points are needed.	page 5
G4PB4R	4		●	●	●		screw-type barrier strip	screw-type barrier strip	Channel-to-channel isolation between all field and control circuits. Outputs can be wired for either positive-true logic or standard negative-true logic. Cannot use dry contact output modules.	page 6
G4PB8	8	●	●	●	●	●	screw-type barrier strip	50-pin header connector	Compatible with a PC adapter card (PCI-AC5, PCIe-AC5, or G4AC5)	page 8
G4PB8H	8	●	●	●	●	●	screw-type barrier strip	50-pin header connector	For use with Optomux B1 or E1, Pamux B5, and mistic B100 brain boards. Also compatible with Raspberry Pi®. Works with Opto 22 PBSA/B/C power supply. Power indicator light.	page 9
G4PB16	16	●	●	●	●	●	screw-type barrier strip	50-pin header connector	Compatible with a PC adapter card (PCI-AC5, PCIe-AC5, or G4AC5)	page 11
G4PB16H	16	●	●	●	●	●	screw-type barrier strip	50-pin header connector	For use with Optomux B1, E1, Pamux B5, and mistic B100 brain boards. Also compatible with Raspberry Pi. Works with Opto 22 PBSA/B/C power supply. Power indicator light.	page 13
G4PB16HC	16	●	●	●	●	●	screw-type barrier strip	50-pin header connector	Extra row of terminals for field power connections. For use with Optomux B1 or E1, Pamux B5, and Mistic B100 brain boards. Works with Opto 22 PBSA/B/C power supply. Power indicator light.	page 15
G4PB16I	16	●	●	●	●		screw-type barrier strip	screw-type barrier strip	Channel-to-channel isolation between all field and control circuits. Outputs (except dry contact output modules) can be wired for either positive-true logic or standard negative-true logic. Inputs and dry contact output modules can only be wired for negative-true logic.	page 17
G4PB16T	16	●	●	●	●	●	screw-type barrier strip	screw-type barrier strip	--	page 20
G4PB24	24	●	●	●	●	●	screw-type barrier strip	50-pin header connector	Compatible with a PC adapter card (PCI-AC5, PCIe-AC5, or G4AC5)	page 21
G4PB32DEC	32	●	●	●	●	●	screw-type barrier strip	50-pin header connector	Interfaces to a DEC computer DRV-11J parallel card.	page 24
G4PB32H	32	●	●	●	●	●	screw-type barrier strip	Boxed header connector	For use with Pamux B4 brain board or OptoMMP G4EB2 brain.	page 26

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G4PB4 Mounting Rack

Description



The G4PB4 I/O mounting rack compactly accommodates up to four G4 digital I/O modules in applications where only a few I/O points are needed.

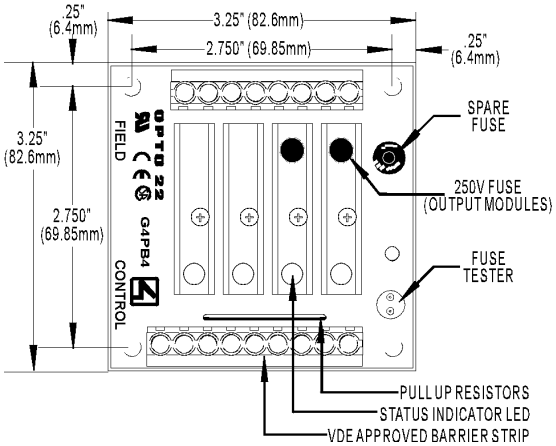
Barrier strips with screw terminals provide the field, control, and mounting rack power connections.

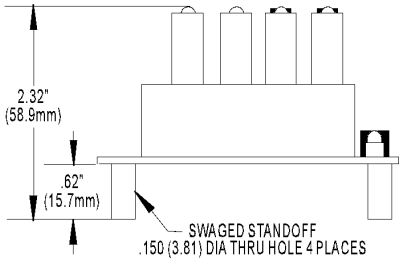
This rack supports negative-true logic only (zero voltage = ON, and Vcc = OFF).

Specifications

Operating temperature	0 °C to 70 °C
Interface connector (field and control)	Screw-type barrier strip accommodates up to 10 AWG wire

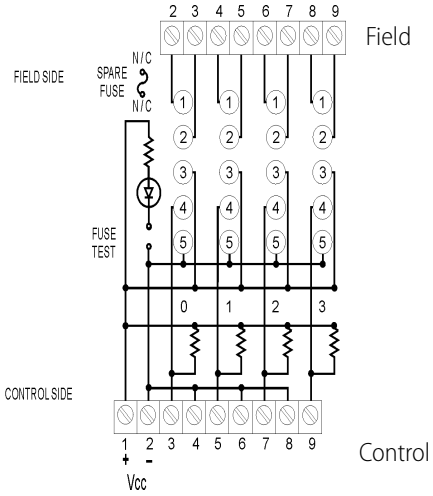
Dimensions





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Connections



Notes:

1. Even pins on control side are connected by etch to common.
2. +VCC and return are connected to control terminals 1 and 2.

G4PB4R Mounting Rack

Description

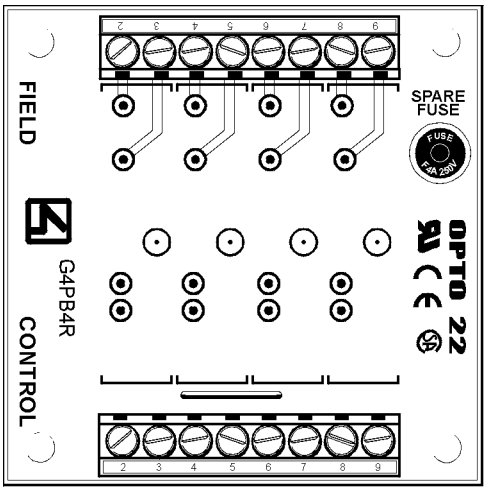
The G4PB4R output mounting rack compactly accommodates up to four G4 output modules and features channel-to-channel isolation between all field and control circuits.

This rack supports negative-true or positive-true logic on a point-by-point basis. Each point can handle control signals differently.

I/O modules on this rack can have varied logic voltage. You can mix 5 VDC, 15 VDC, and 24 VDC logic modules on the rack.

This rack cannot use dry contact output modules.

Barrier strips with screw terminals provide the field, control, and mounting rack power connections.

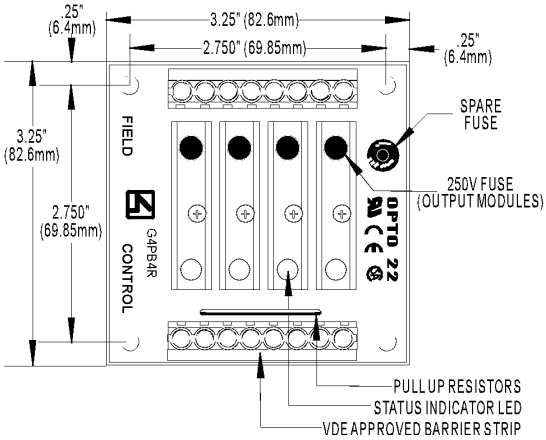


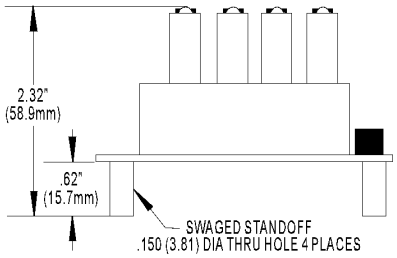
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Specifications

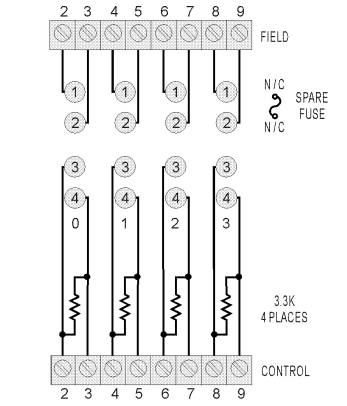
Operating temperature	0 ° to 70 °C
Interface connector (field and control)	Screw-type barrier strip accommodates up to 10 AWG wire
I/O module limitations	Canot use dry contact output modules

Dimensions





Connections

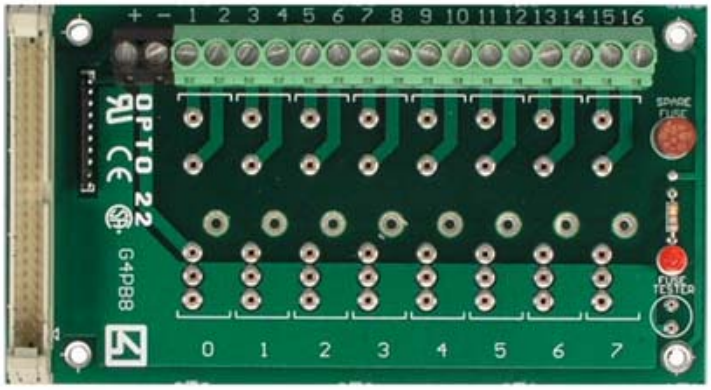


NOTE: G4ODC5R, G4ODC5R5, G4OAC5AMA, G4OAC5MA, G4ODC5MA WILL NOT PLUG INTO THIS RACK.

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G4PB8 Mounting Rack

Description



The G4PB8 I/O mounting rack accommodates up to eight G4 I/O modules.

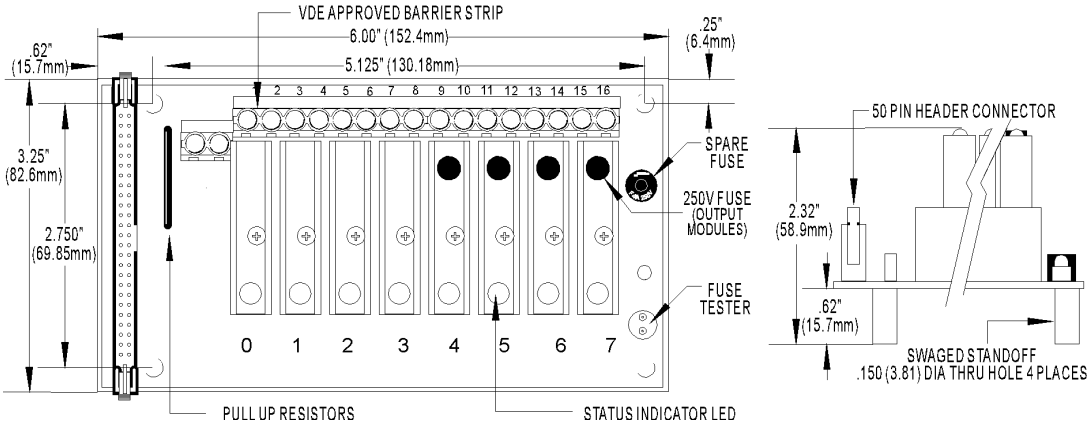
This rack supports negative-true logic only (zero voltage = ON, and Vcc = OFF).

Barrier strips with screw terminals provide the field and mounting rack power connections. A header connector accepts a standard 50-pin cable for the logic connections (typically from a PC adapter card like the PCI-AC5).

Specifications

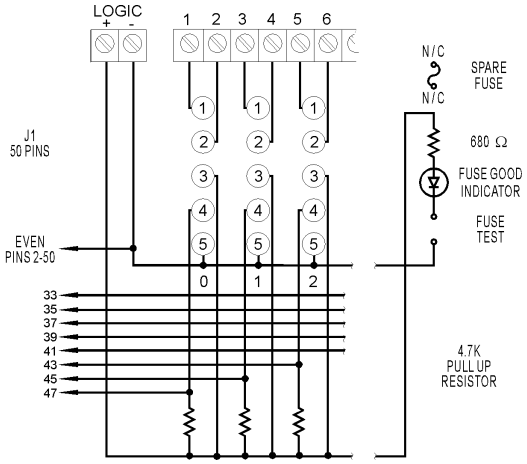
Operating temperature	0 ° to 70 °C
Interface connectors Field: Control:	 Screw-type barrier strip accommodates up to 10 AWG wire 50-pin header connector

Dimensions



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Connections—G4PB8



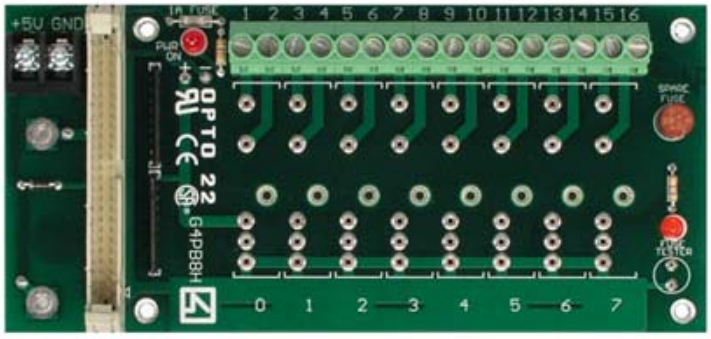
Notes:

1. Even pins on control connector are connected by etch to common.
2. +VCC and return connected to terminals marked LOGIC + and -.
3. At each module position on the field terminal strip, the lower number is always connected to pin 1 of the I/O module.

Module Position	Control (Header Connector)	Field (Terminal Strip)
0	47	1 and 2
1	45	3 and 4
2	43	5 and 6
3	41	7 and 8
4	39	9 and 10
5	37	11 and 12
6	35	13 and 14
7	33	15 and 16

G4PB8H Mounting Rack

Description



The G4PB8H I/O mounting rack accommodates up to eight G4 I/O modules. A header connector accepts a standard 50-pin connector, suited for an Optomux® B1 or E1, Pamux® B5, or B100 brain board. This rack is also compatible with the Digital I/O Carrier Board for Raspberry Pi (part number OPTO-P1-40P).

This rack requires 5 VDC logic I/O modules.

This rack supports negative-true logic only (zero voltage = ON, and Vcc = OFF).

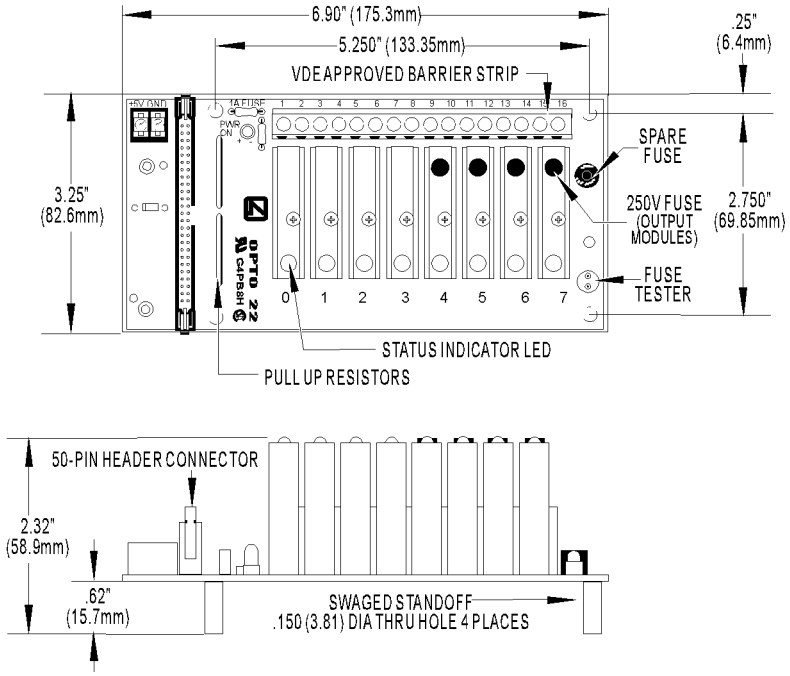
Barrier strips with screw terminals provide the field connections. A two-position screw terminal for 5 VDC connects to a power supply. The logic supply is fused with a 1A fuse.

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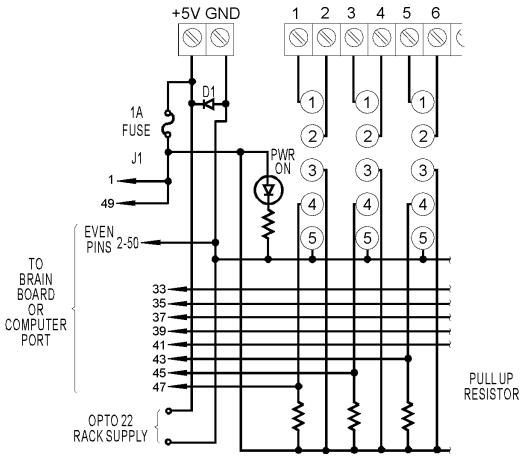
Specifications

Operating temperature	0 ° to 70 °C
Interface connectors Field: Control: Power:	 Screw-type barrier strip accommodates up to 10 AWG wire 50-pin header connector Two-position screw terminal for 5 VDC power supply
I/O module limitations	Supports 5 VDC I/O modules only

Dimensions—G4PB8H



Connections—G4PB8H



Notes:

1. Even pins on control connector are connected by etch to common.
2. +VCC and return connected to terminals marked +5V and GND.
3. At each module position on the field terminal strip, the lower number is always connected to pin 1 of the I/O module.
4. Use only 5 VDC logic modules when using the mounting rack with a brain board.

Module Position	Control (Header Connector)	Field (Terminal Strip)
0	47	1 and 2
1	45	3 and 4
2	43	5 and 6
3	41	7 and 8
4	39	9 and 10
5	37	11 and 12
6	35	13 and 14
7	33	15 and 16

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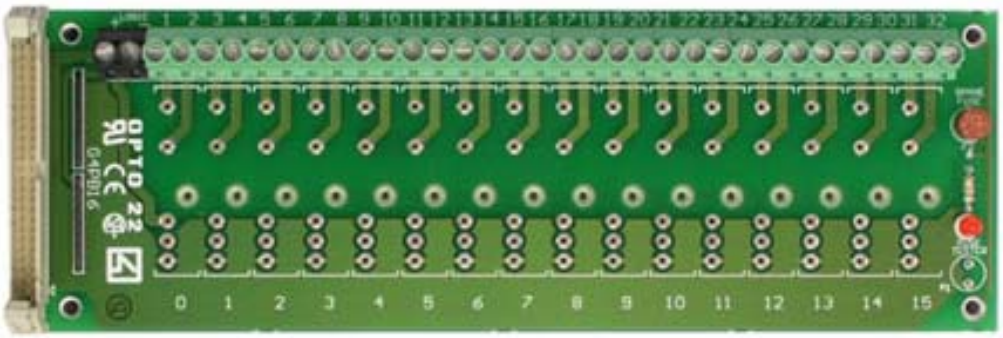
G4PB16 Mounting Rack

Description

The G4PB16 I/O mounting rack accommodates up to 16 G4 I/O modules.

This rack supports negative-true logic only (zero voltage = ON, and Vcc = OFF).

Barrier strips with screw terminals provide the field and mounting rack power connections. A header connector accepts a standard 50-pin cable for the logic connections (typically from a PC adapter card like the PCI-AC5).



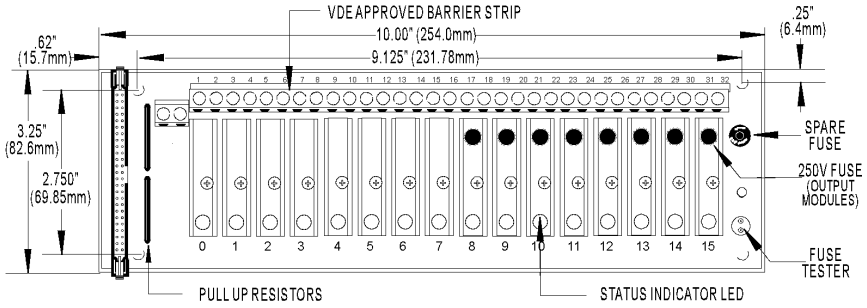
Specifications

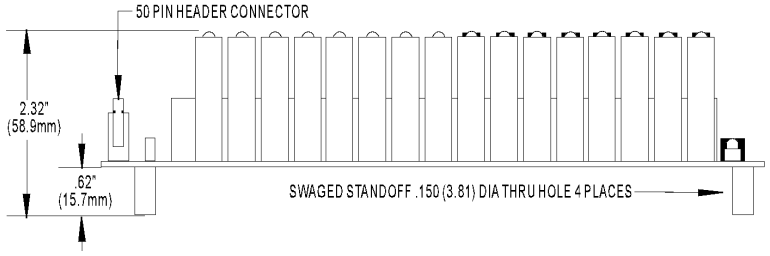
Operating temperature	0 ° to 70 °C
Interface connectors Field: Control:	 Screw-type barrier strip accommodates up to 10 AWG wire 50-pin header connector

See the following page for dimensions and connection information.

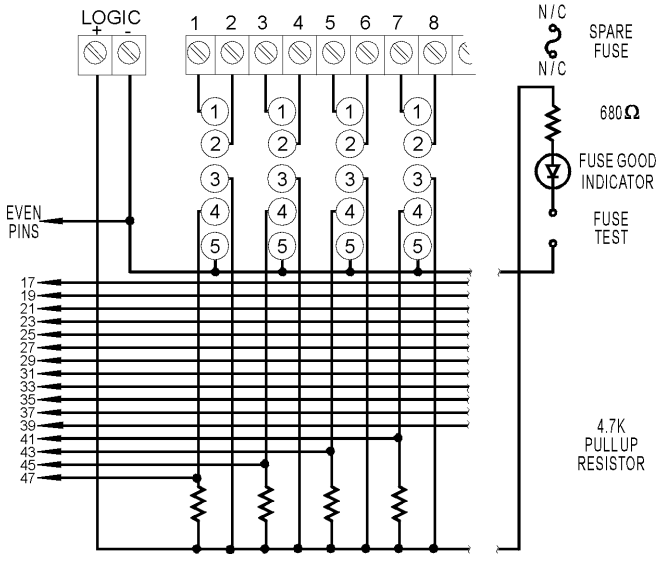
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Dimensions—G4PB16





Connections—G4PB16



Notes:

1. Even pins on control connector are connected by etch to common.
2. +VCC and return connected to terminals marked LOGIC + and -.
3. At each module position on the field terminal strip, the lower number is always connected to pin 1 of the I/O module.

Module Position	Control (Header Connector)	Field (Terminal Strip)
0	47	1 and 2
1	45	3 and 4
2	43	5 and 6
3	41	7 and 8
4	39	9 and 10
5	37	11 and 12
6	35	13 and 14
7	33	15 and 16
8	31	17 and 18
9	29	19 and 20
10	27	21 and 22
11	25	23 and 24
12	23	25 and 26
13	21	27 and 28
14	19	29 and 30
15	17	31 and 32

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G4PB16H Mounting Rack

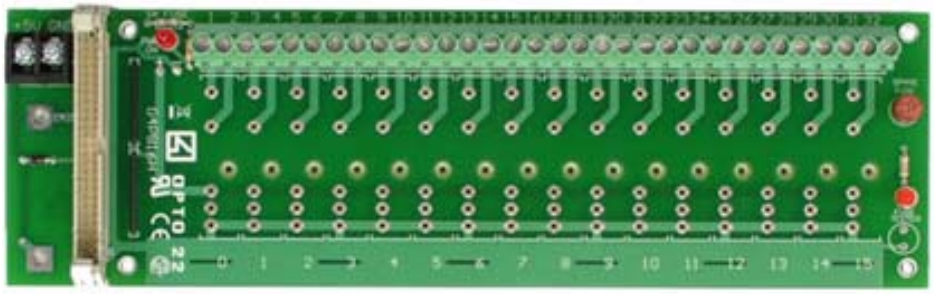
Description

The G4PB16H I/O mounting rack accommodates up to 16 G4 I/O modules. A header connector accepts a standard 50-pin cable for logic connections, suited for an Optomux® B1 or E1, Pamux® B5, or B100 brain board. This rack is also compatible with the Digital I/O Carrier Board for Raspberry Pi (part number OPTO-P1-40P).

This rack requires 5 VDC logic I/O modules.

This rack supports negative-true logic only (zero voltage = ON, and Vcc = OFF).

Barrier strips with screw terminals provide the field connections. A two-position screw terminal for 5 VDC connects to a power supply. The logic supply is fused with a 1A fuse.



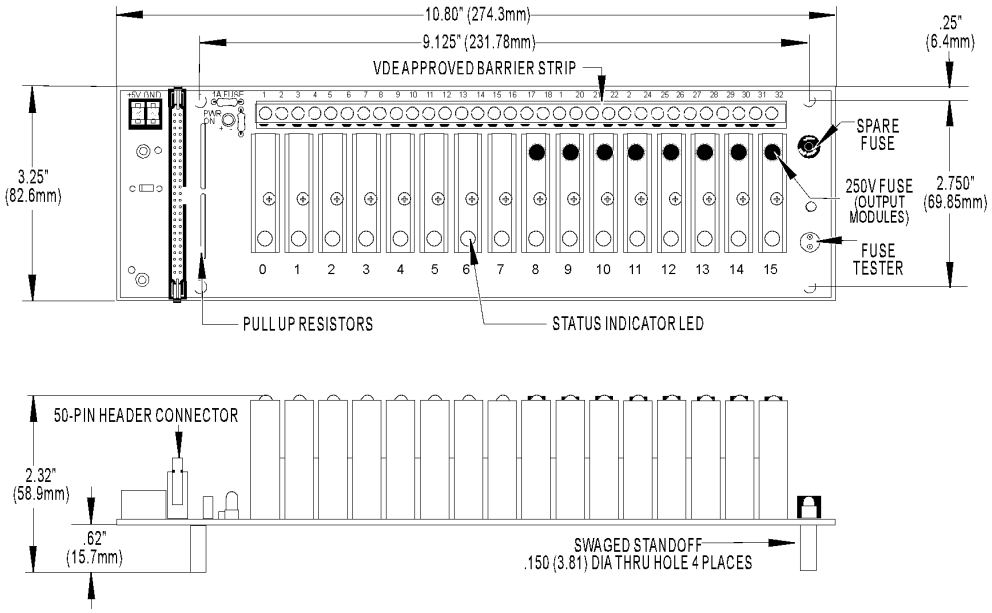
Specifications

Operating temperature	0 ° to 70 °C
Interface connectors Field: Control: Power:	 Screw-type barrier strip accommodates up to 10 AWG wire 50-pin header connector Two-position screw terminal for 5 VDC power supply
I/O module limitations	Supports 5 VDC I/O modules only

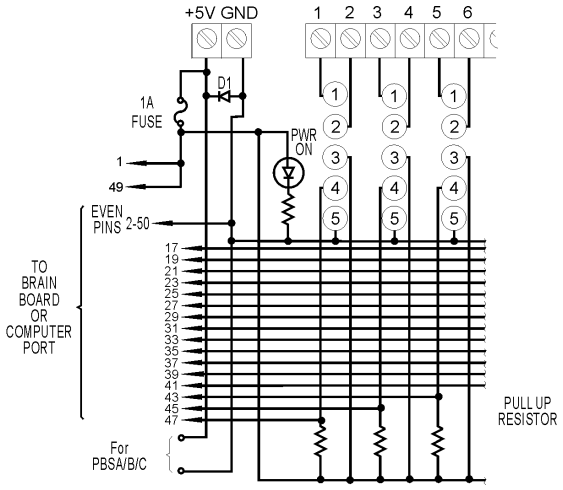
See the following page for dimensions and connection information.

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Dimensions—G4PB16H



Connections—G4PB16H



Notes:

1. Even pins on control connector are connected by etch to common.
2. +VCC and return connected to terminals marked +5V and GND.
3. At each module position on the field terminal strip, the lower number is always connected to pin 1 of the I/O module.
4. Use only 5 VDC logic modules when using the mounting rack with a brain board.

Module Position	Control (Header Connector)	Field (Terminal Strip)
0	47	1 and 2
1	45	3 and 4
2	43	5 and 6
3	41	7 and 8
4	39	9 and 10
5	37	11 and 12
6	35	13 and 14
7	33	15 and 16
8	31	17 and 18
9	29	19 and 20
10	27	21 and 22
11	25	23 and 24
12	23	25 and 26
13	21	27 and 28
14	19	29 and 30
15	17	31 and 32

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G4PB16HC Mounting Rack

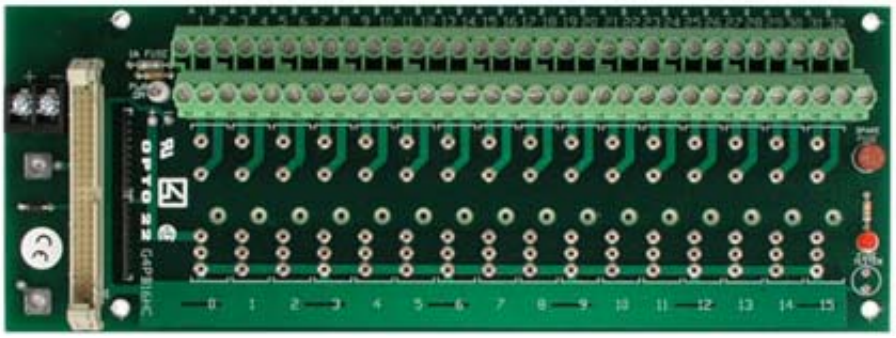
Description

The G4PB16HC I/O mounting rack accommodates up to 16 G4 I/O modules and features an extra row of terminals for field power connections. A header connector accepts a standard 50-pin cable for logic connections, suited for the Optomux® B1 or E1, Pamux® B5, or B100 brain board.

This rack requires 5 VDC logic I/O modules.

This rack supports negative-true logic only (zero voltage = ON, and Vcc = OFF).

Barrier strips with screw terminals provide the field connections. A two-position screw terminal for 5 VDC connects to a power supply. The logic supply is fused with a1A fuse.



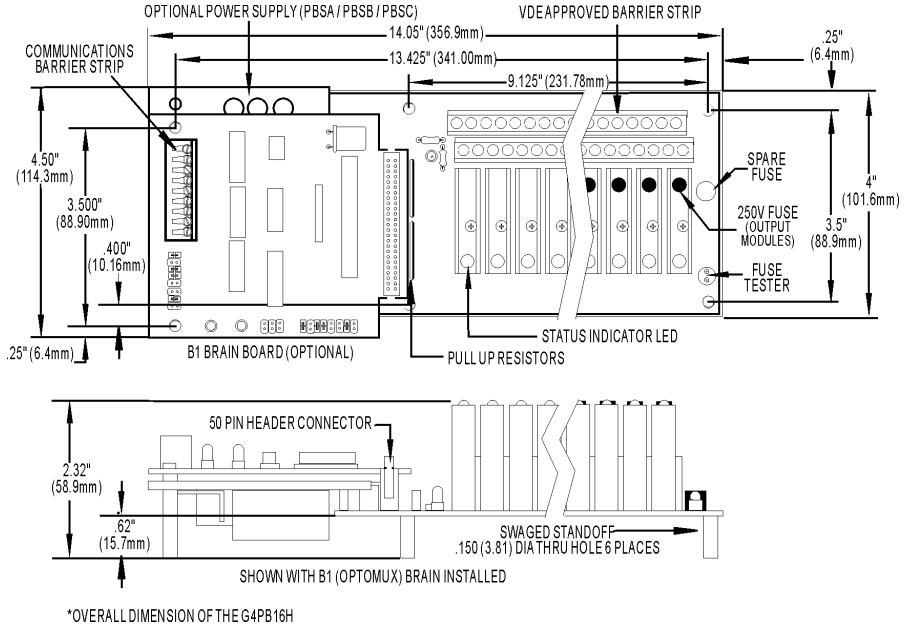
Specifications

Operating temperature	0 ° to 70 °C
Interface connectors Field: Control: Power:	 Screw-type barrier strip accommodates up to 10 AWG wire 50-pin header connector Two-position screw terminal for 5 VDC power supply
I/O module limitations	Supports 5 VDC I/O modules only

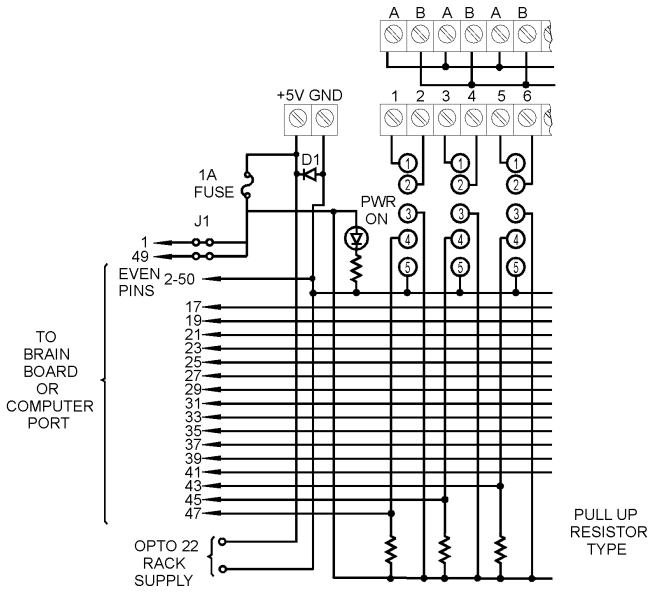
See the following page for dimensions and connection information.

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Dimensions—G4PB16HC



Connections—G4PB16HC



Module Position	Control (Header Connector)	Field (Terminal Strip)
0	47	1 and 2
1	45	3 and 4
2	43	5 and 6
3	41	7 and 8
4	39	9 and 10
5	37	11 and 12
6	35	13 and 14
7	33	15 and 16
8	31	17 and 18
9	29	19 and 20
10	27	21 and 22
11	25	23 and 24
12	23	25 and 26
13	21	27 and 28
14	19	29 and 30
15	17	31 and 32

Notes:

1. Even pins on control connector are connected by etch to common.
2. +VCC and return connected to terminals marked +5V and GND.
3. At each module position on the field terminal strip, the lower number is always connected to pin 1 of the I/O module.
4. Use only 5 VDC logic modules when using the mounting rack with a brain board.

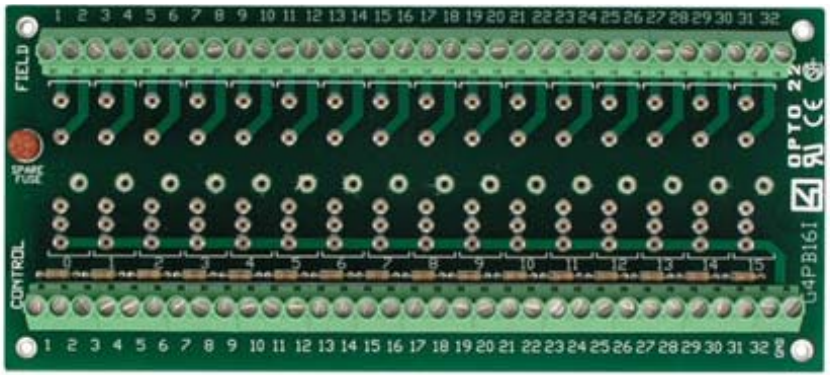
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G4PB16I Mounting Rack

Description

The G4PB16I I/O mounting rack accommodates up to 16 G4 I/O modules and features channel-to-channel isolation between all field and control circuits. Output modules (except dry contact output modules) may have their control side wired for either positive-true or standard negative-true control signals. Input modules and dry contact output modules operate only with negative true logic.

Barrier strips with screw terminals provide the field, control, and mounting rack power connections.



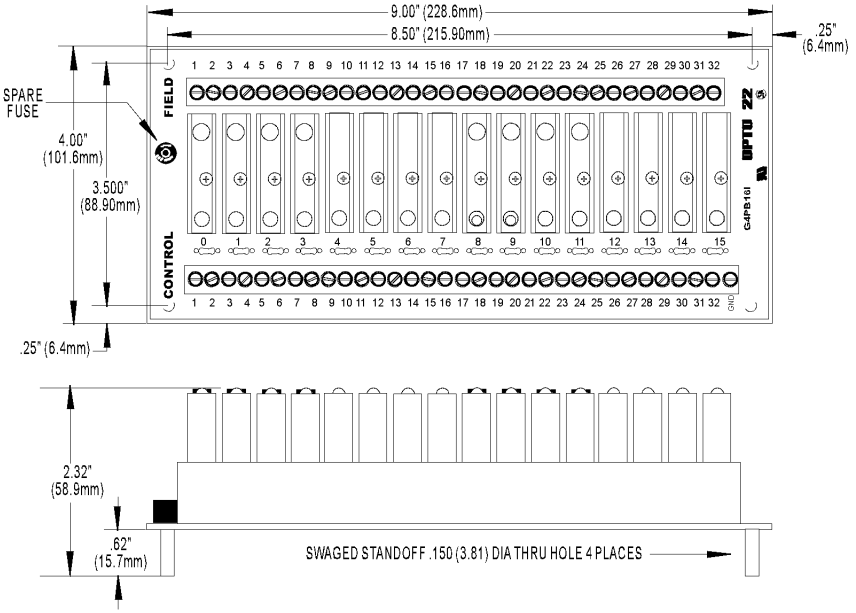
Specifications

Operating temperature	0 °C to 70 °C
Interface connector (field and control)	Screw-type barrier strip accommodates up to 10 AWG wire

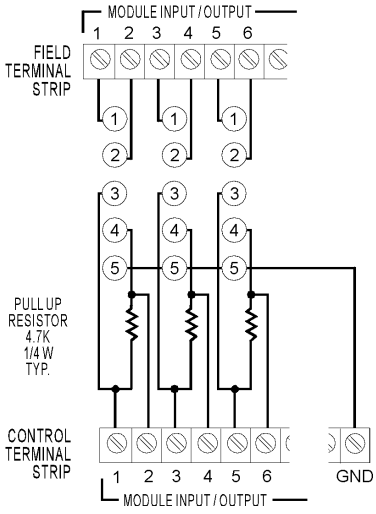
See the following page for dimensions and connection information.

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Dimensions—G4PB16I



Connections—G4PB16I



See application examples on the following page.

Notes:

1. At each module position on the field terminal strip, the lower number is always connected to pin 1 of the module.
2. Input modules and dry contact output modules (G4ODC5R and G4ODC5R5) require the power supply's ground to be connected to the control side's GND terminal. These modules also require that odd-numbered connections on the control side be connected to +VCC.
3. Input modules use even-numbered control terminals and can only be wired for negative-true logic.
4. To wire output modules for standard negative-true logic, connect the odd-numbered control terminals to VCC and use the even-numbered terminals for control.
5. To wire output modules for positive-true logic, connect the even-numbered control terminals to logic ground and use the odd-numbered terminals for control.

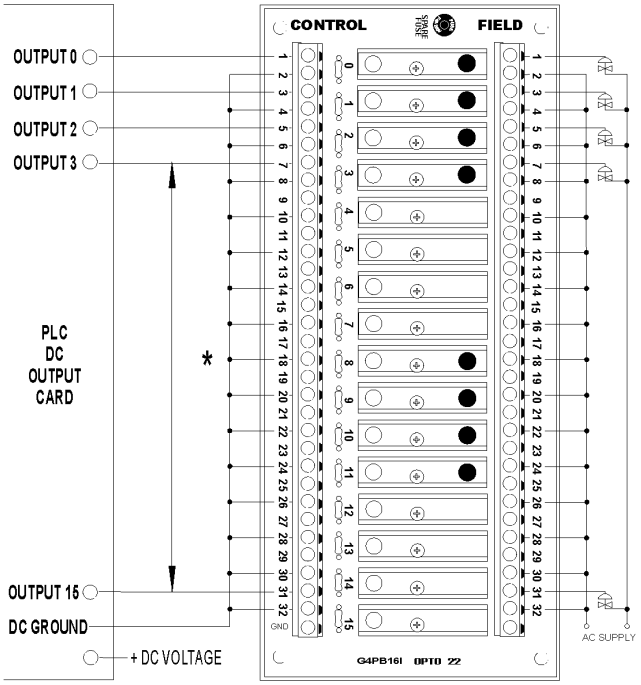
Module Position	Control Terminals	Field Terminals
0	1 and 2	1 and 2
1	3 and 4	3 and 4
2	5 and 6	5 and 6
3	7 and 8	7 and 8
4	9 and 10	9 and 10
5	11 and 12	11 and 12
6	13 and 14	13 and 14
7	15 and 16	15 and 16
8	17 and 18	17 and 18
9	19 and 20	19 and 20
10	21 and 22	21 and 22
11	23 and 24	23 and 24
12	25 and 26	25 and 26
13	27 and 28	27 and 28
14	29 and 30	29 and 30
15	31 and 32	31 and 32

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Application Examples—G4PB16I

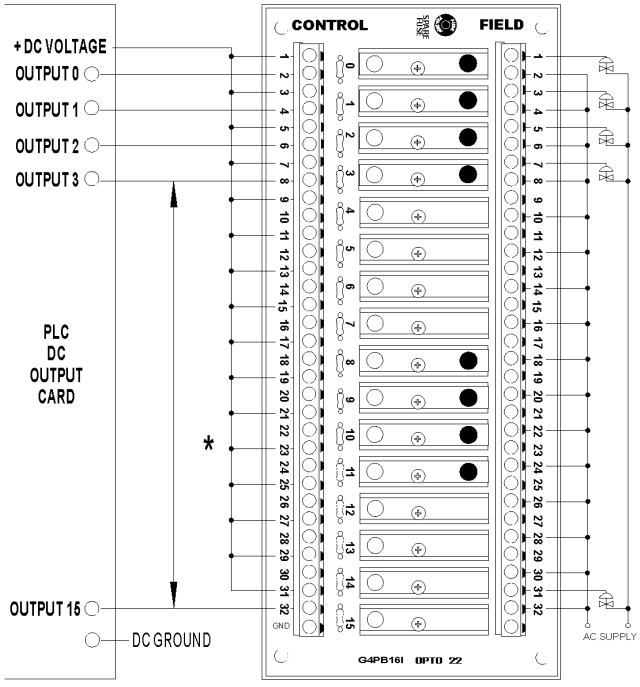
For wiring G4 digital output modules (except dry contact modules):

Positive-True Logic Connection to PLC



* This wiring can be done using a G4STRAP.

Negative-True Logic Connection to PLC



* This wiring can be done using a G4STRAP.

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G4PB16T Mounting Rack

Description



The G4PB16T I/O mounting rack accommodates up to 16 G4 I/O modules.

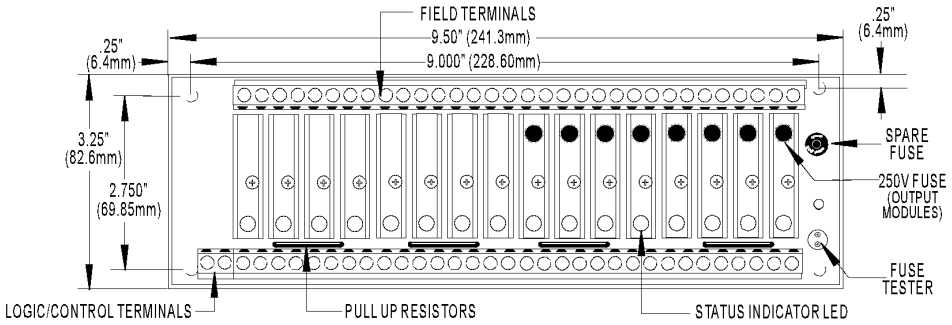
This rack supports negative-true logic only (zero voltage = ON, and Vcc = OFF).

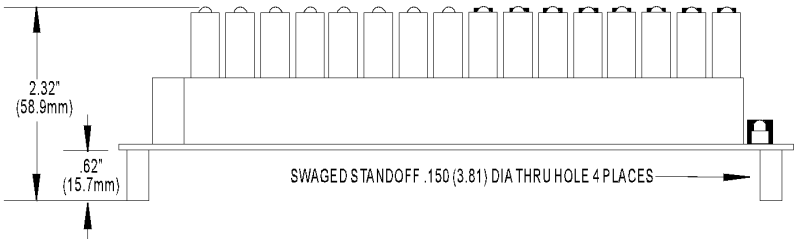
Barrier strips with screw terminals provide the field, logic, and mounting rack power connections.

Specifications

Operating temperature	0 ° to 70 °C
Interface connector (field and control)	Screw-type barrier strip accommodates up to 10 AWG wire

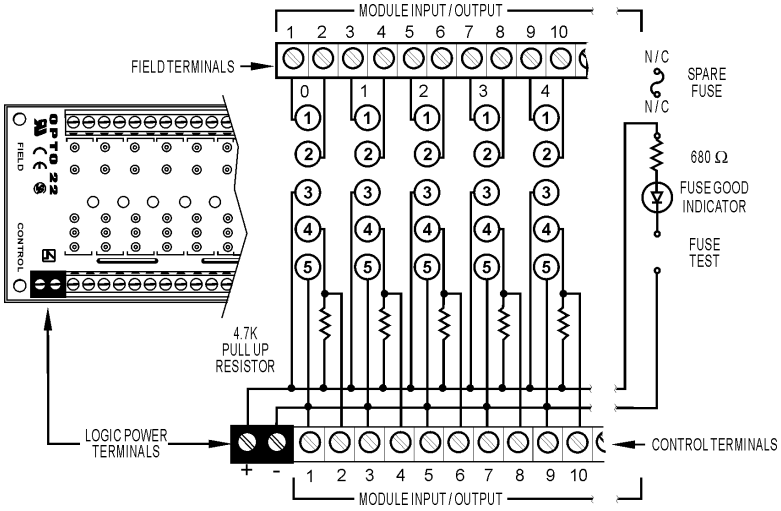
Dimensions





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Connections—G4PB16T



Module Position	Control (Header Connector)	Field (Terminal Strip)
0	47	1 and 2
1	45	3 and 4
2	43	5 and 6
3	41	7 and 8
4	39	9 and 10
5	37	11 and 12
6	35	13 and 14
7	33	15 and 16
8	31	17 and 18
9	29	19 and 20
10	27	21 and 22
11	25	23 and 24
12	23	25 and 26
13	21	27 and 28
14	19	29 and 30
15	17	31 and 32

Notes:

1. +VCC and return are connected to control terminals marked + and -.
2. All odd-numbered terminals on the control terminal strip are connected by etch to the VCC return terminal marked -.
3. At each module position on the field terminal strip, the lower number is always connected to pin 1 of the I/O module.

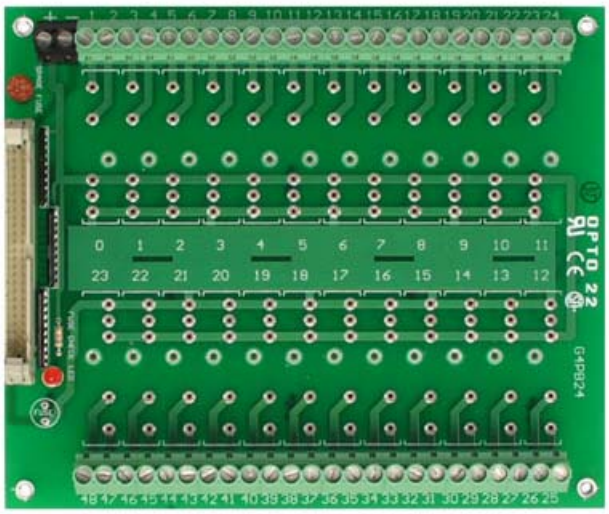
G4PB24 Mounting Rack

Description

The G4PB24 I/O mounting rack accommodates up to 24 G4 I/O modules.

This rack supports negative-true logic only (zero voltage = ON, and Vcc = OFF).

Barrier strips with screw terminals provide the field and mounting rack power connections. A header connector accepts a standard 50-pin cable for the logic connections (typically from a PC adapter card like the PCI-AC5).

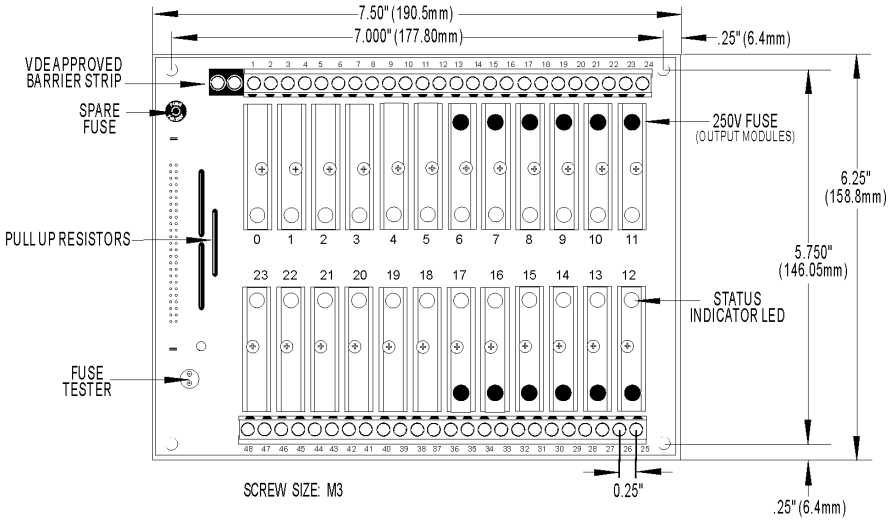


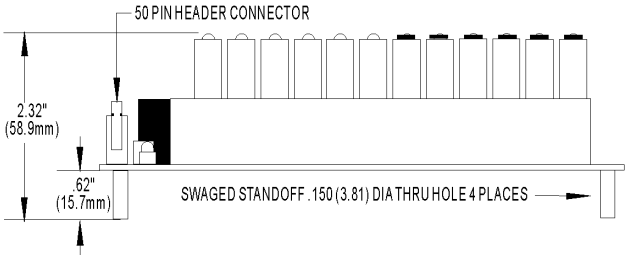
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Specifications

Operating temperature	0 ° to 70 °C
Interface connectors Field: Control:	 Screw-type barrier strip accepts up to 10 AWG wire 50-pin header connector

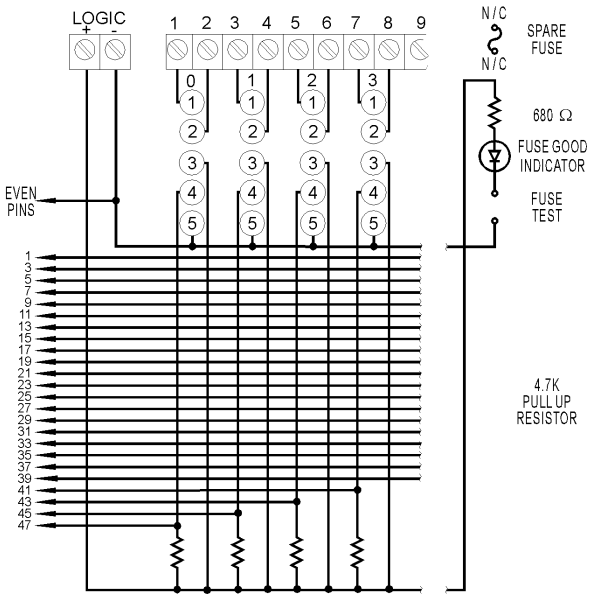
Dimensions





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Connections—G4PB24



Notes:

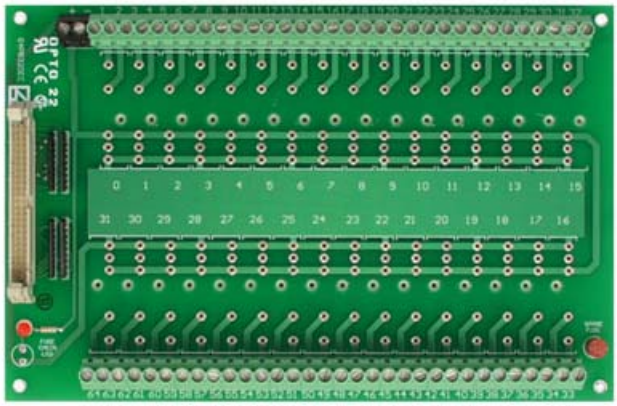
1. Even pins on control connector are connected by etch to common.
2. +VCC and return connected to terminals marked LOGIC + and -.
3. At each module position on the field terminal strip, the lower number is always connected to pin 1 of the I/O module.

Module Position	Control (Header Connector)	Field (Terminal Strip)
0	47	1 and 2
1	45	3 and 4
2	43	5 and 6
3	41	7 and 8
4	39	9 and 10
5	37	11 and 12
6	35	13 and 14
7	33	15 and 16
8	31	17 and 18
9	29	19 and 20
10	27	21 and 22
11	25	23 and 24
12	23	25 and 26
13	21	27 and 28
14	19	29 and 30
15	17	31 and 32
16	15	33 and 34
17	13	35 and 36
18	11	37 and 38
19	9	39 and 40
20	7	41 and 42
21	5	43 and 44
22	3	45 and 46
23	1	47 and 48

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G4PB32DEC Mounting Rack

Description



The G4PB32DEC I/O mounting rack accommodates up to 32 G4 digital I/O modules and is used to interface to a DEC computer DRV-11J parallel card.

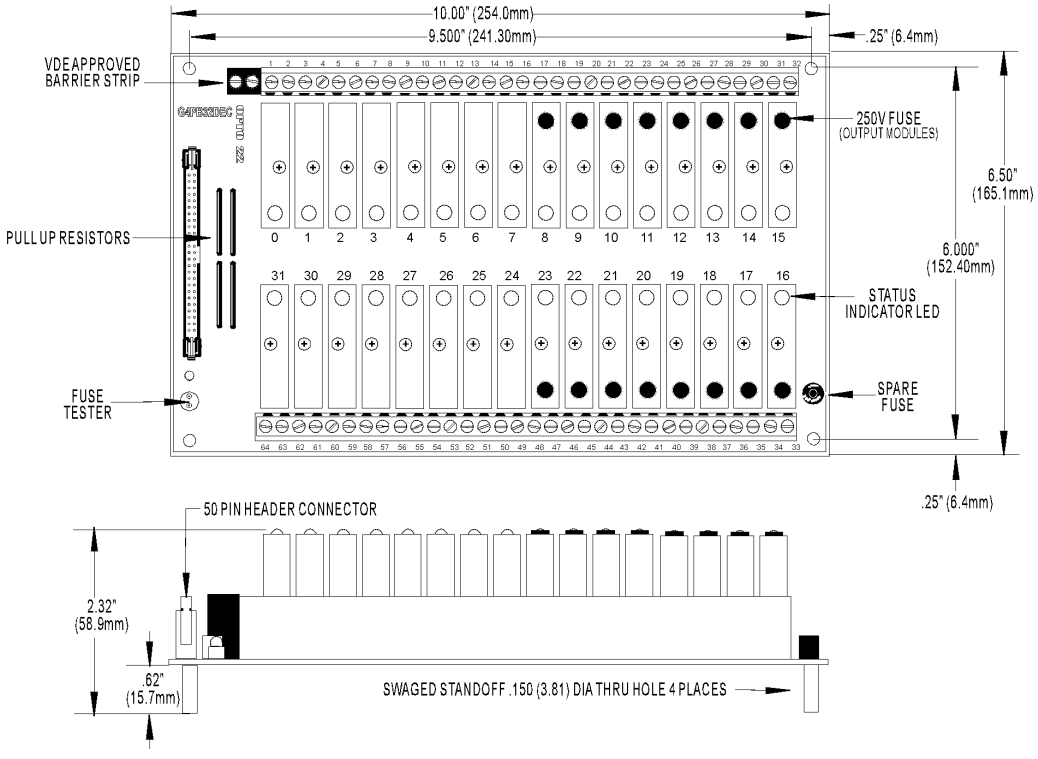
This rack supports negative-true logic only (zero voltage = ON; Vcc = OFF).

A header connector on the rack is used for logic connections with a standard 50-conductor, flat ribbon cable. Barrier strips with screw terminals provide the field and mounting rack power connections.

Specifications

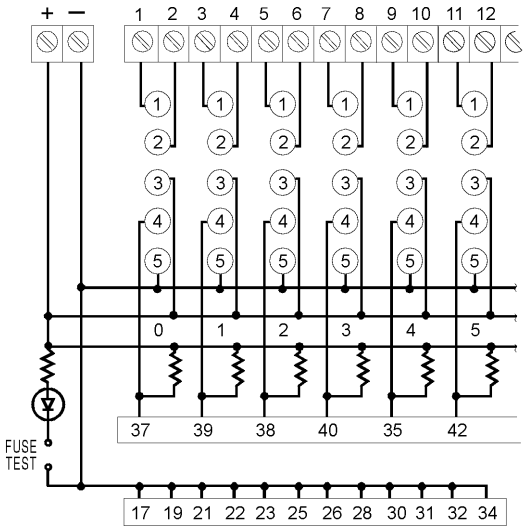
Operating temperature	0 ° to 70 °C
Interface connectors Field: Control: Power:	 Screw-type barrier strip accommodates up to 10 AWG wire 50-pin header connector Two-position screw terminal for a VCC power supply

Dimensions



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Connections—G4PB32DEC



Notes:

1. Pins 17, 19, 21, 22, 23, 25, 26, 28, 30, 31, 32, and 34 on the control connector are etch-connected to the - terminal.
2. +VCC and the return are connected to terminals marked + and -.
3. At each module position on the field terminal strip, the lower number is always connected to pin 1 of the I/O module.
4. The +VCC connection requires +5 VDC.

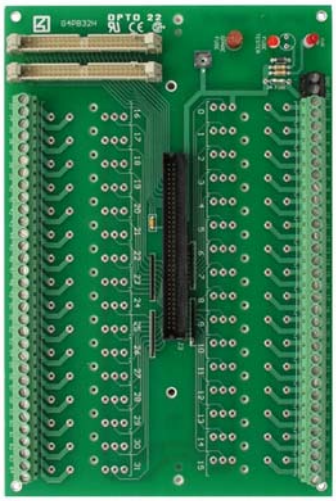
Module Position	Control (Header Connector)	Field (Terminal Strip)
0	37	1 and 2
1	39	3 and 4
2	38	5 and 6
3	40	7 and 8
4	35	9 and 10
5	42	11 and 12
6	36	13 and 14
7	41	15 and 16
8	47	17 and 18
9	50	19 and 20
10	44	21 and 22
11	48	23 and 24
12	49	25 and 26
13	43	27 and 28
14	46	29 and 30
15	45	31 and 32

Module Position	Control (Header Connector)	Field (Terminal Strip)
16	14	33 and 34
17	12	35 and 36
18	13	37 and 38
19	11	39 and 40
20	16	41 and 42
21	9	43 and 44
22	15	45 and 46
23	10	47 and 48
24	4	49 and 50
25	1	51 and 52
26	7	53 and 54
27	3	55 and 56
28	2	57 and 58
29	8	59 and 60
30	5	61 and 62
31	6	63 and 64

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G4PB32H Mounting Rack

Description



The G4PB32H I/O mounting rack accommodates up to 32 G4 I/O modules.

This I/O rack has a header connector and is designed to be used with one of the following brain boards:

- G4EB2—Connects to an Ethernet network and uses the OptoMMP protocol.
- B4—Connects to a serial network and uses the Pamux protocol.

This rack requires 5 VDC logic I/O modules.

This rack supports negative-true logic only (zero voltage = ON, and Vcc = OFF).

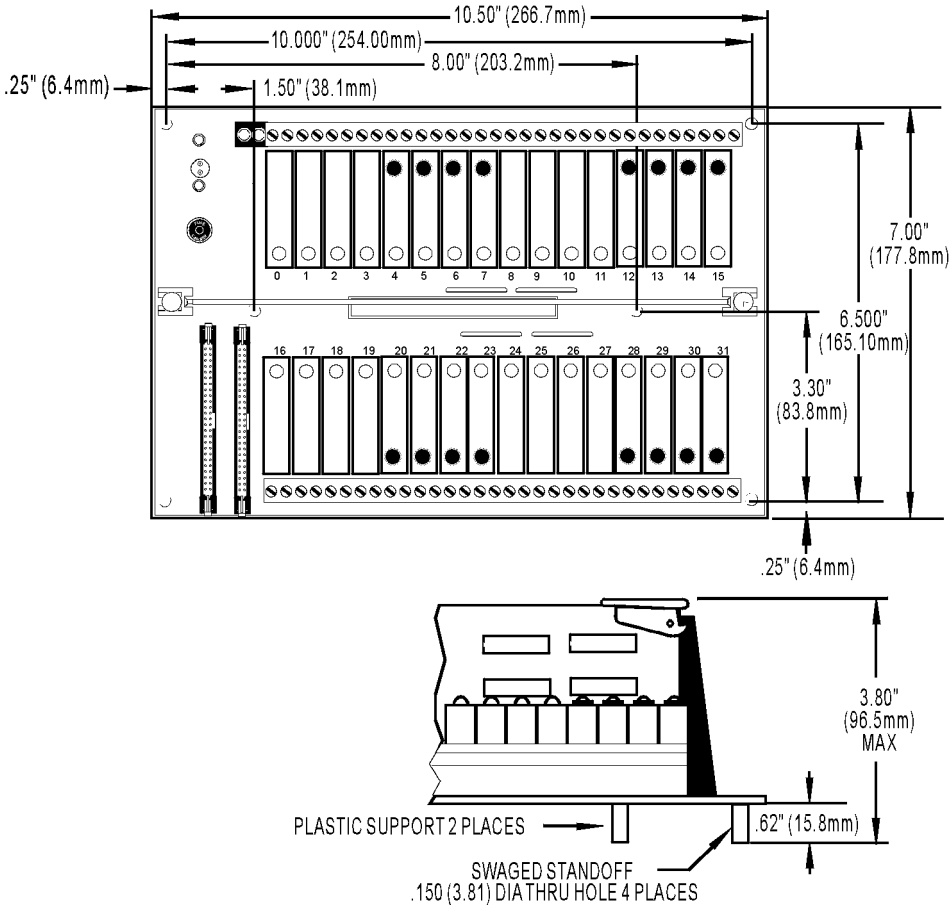
Barrier strips with screw terminals provide the field connections. A two-position screw terminal for 5 VDC connects to a power supply.

Specifications

Operating Temperature Humidity	0 to 70 °C 95% humidity, non-condensing
Interface Connectors: Field Control Power	 Screw-type terminal strip accommodates up to 10 AWG wire Boxed header accepts a B4 or G4EB2 brain Two-position screw terminal for 5 VDC accommodates up to 10 AWG wire
I/O module limitations	Supports 5 VDC I/O modules only
Communications	Two 50-pin header connectors for a PAMUX bus (Ethernet connections, if used, are made through the G4EB2 brain.)

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Dimensions



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3. Generation 4 Racks with Integral Digital I/O

Overview of Racks with Integral I/O

This chapter includes information on racks that have permanent I/O circuitry built in. For mounting racks that are used with separate I/O modules, see page 3.

Features

The following features apply to all racks with integral I/O:

- Minimum mounting space required
- UL recognized, CSA certified, and CE compliant
- Uses a single 5 VDC power supply for control power
- Screw-type barrier strip for field connections; 50-pin header connector for control connections
- Operating temperature: -30° to 70° C. Humidity: 95%, non-condensing
- Can be modified for use with PC adapter cards like the PCI-AC5.

Choose Your Rack

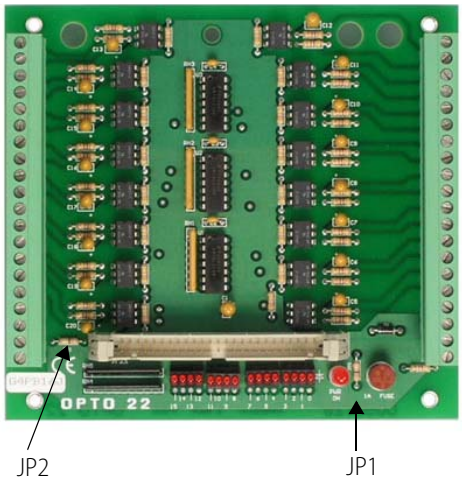
Choose a rack from the following table, then see the referenced page for detailed drawings and specifications.

Model	Number of Channels	Input Modules	Output Modules	AC	DC	Built-in Fuse Tester	Special Features	See
G4PB16J	16	●			●	n/a	Optically isolated 4–16 VDC input channels built in. Use with Optomux B1 and E1, Pamux B5, and mistic B100 brain boards. LED indicator for each channel. Logic supply is fused.	page 30
G4PB16K	16	●			●	n/a	Optically isolated 16–28 VDC input channels built in. Use with Optomux B1 and E1, Pamux B5, and mistic B100 brain boards. LED indicator and fuse for each channel. Logic supply is fused.	page 30
G4PB16L	16		●		●	●	Optically isolated 5–60 VDC output channels built in. Use with Optomux B1 and E1, Pamux B5, and mistic B100 brain boards. LED indicators for each channel. Logic supply is fused.	page 32

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G4PB16J and K Racks with Integral Inputs

Description



The G4PB16J and G4PB16K DC input racks provide 16 channels of optically-isolated inputs for sensing on/off DC voltage levels by a B1, E1, B5, or B100 brain board, or a computer with an Opto 22 PCI-AC5, PCIe-AC5, or G4AC5 adapter card.

The compact size and design of these racks yield a substantial space and cost savings over other 16-channel I/O boards.

All input channels are identical on each board and are ideal for applications that need to monitor several 4–16 VDC signals (model G4PB16J) or 16–28 VDC signals (model G4PB16K). On-board LED indicators display each channel's on/off status.

Typical applications for the integrated DC input racks include sensing the presence or absence of voltage from sources such as BCD devices, TTL level devices, thumbwheel switches, and barcode readers.

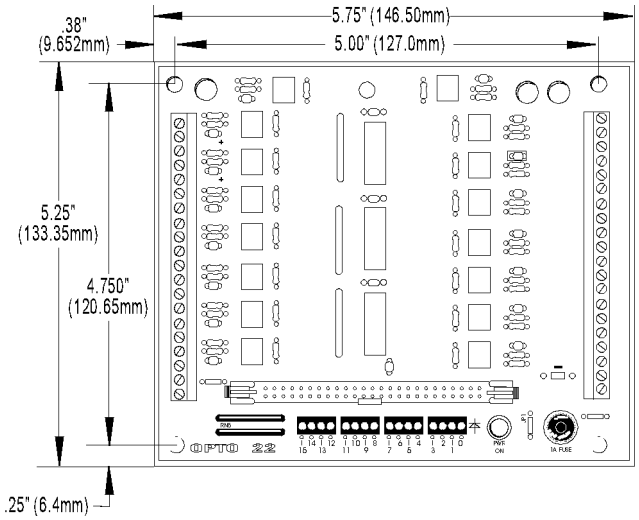
Control connections are easily made to a 50-pin header connector. Barrier strips with screw terminals provide the field and rack power connections. The logic supply is fused with a 1A fuse. These racks can be used with Opto 22 PC adapter cards like the PCI-AC5 if jumpers 1 and 2 are removed. (See the Adapter Cards Data Sheet for more information.)

Specifications

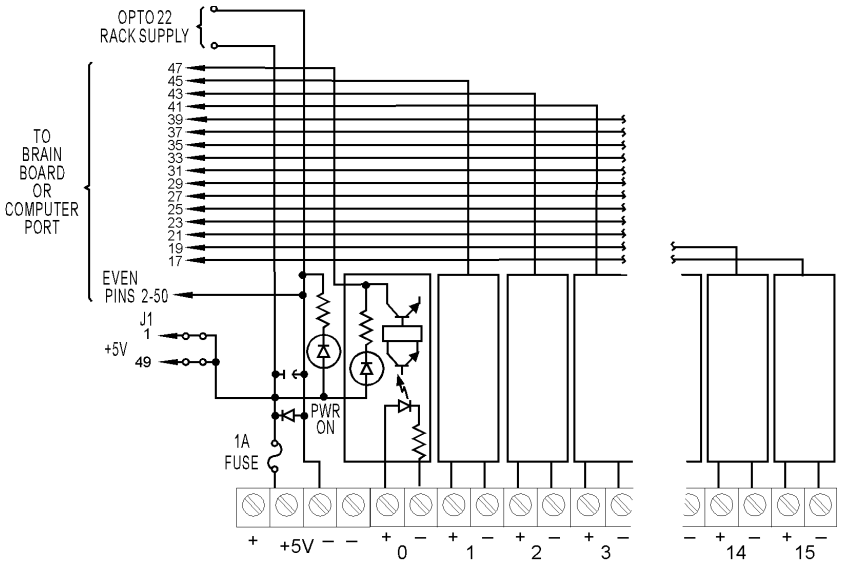
	Units	G4PB16J	G4PB16K
Input line voltage	VDC	4–16	16–28
Input current: @ Minimum voltage range @ Maximum voltage range	 mA @ VDC mA @ VDC	 3.3, 4 16, 16	 3.4, 16 6.3, 28
Isolation: Input-to-output (transient) Channel-to-channel	 volts Continuous volts	 4,000 300	 4,000 300
Input-to-output capacitance	pF/channel	8	8
Turn-on time	ms	2.5	3
Turn-off time	ms	3.5	4.5
Logic supply voltage	VDC	4.5–6	4.5–6
Logic supply current	mA @ VDC	190, 5	190, 5
Temperature: Operating Storage	 °C °C	 -30 to +70 -30 to +85	 -30 to +70 -30 to +85

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Dimensions–G4PB16J and K



Connections–G4PB16J and K



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G4PB16L Rack with Integral Outputs

Description



The G4PB16L DC output rack provides 16 channels of optically-isolated outputs for controlling or switching small DC loads by a B1, E1, B5, or B100 brain board, or a computer with an Opto 22 PCI-AC5, PCIe-AC5, or G4AC5 adapter card.

This rack's compact size and design yields a substantial space and cost savings over other 16-channel I/O boards.

All channels are identical on each board and output 5-60 VDC. They are ideal for applications that need to control or switch several similar small DC loads. On-board LED indicators display each channel's on/off status.

Typical applications for the integrated DC output rack include controlling or switching low-power DC relays, low-power DC solenoids, and DC lamps and indicators.

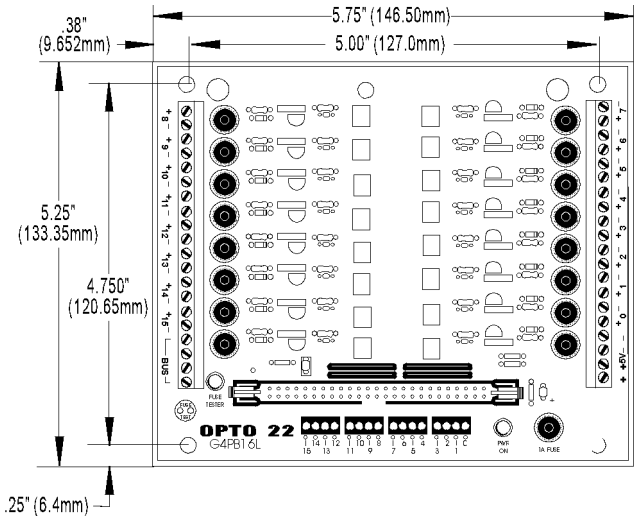
Control connections are easily made to a 50-pin header connector. Barrier strips with screw terminals provide the field and rack power connections. The logic supply and all output channels are individually fused with a 1A fuse. These racks can be used with Opto 22 PC adapter cards like the PCI-AC5 if jumpers 1 and 2 are removed. (See the Adapter Cards Data Sheet for more information.)

Specifications

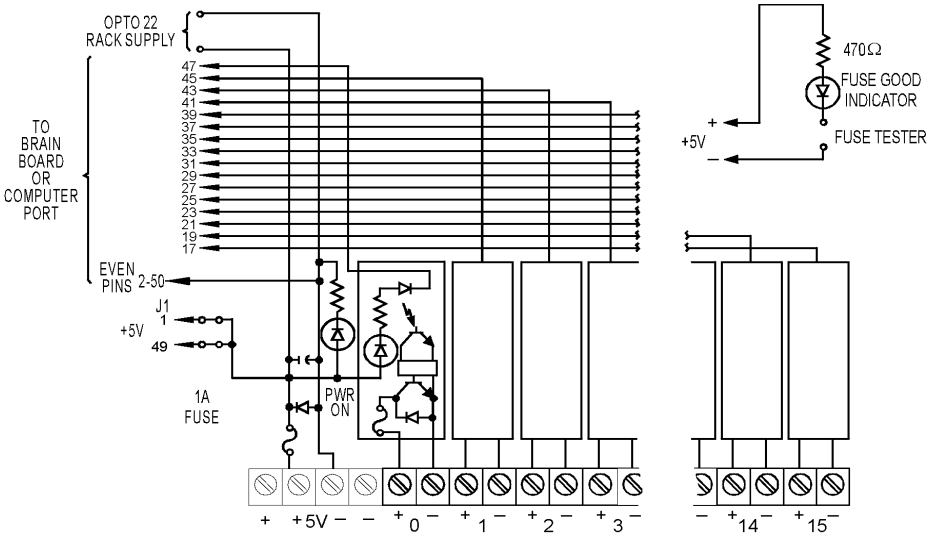
Output voltage range	5–60 VDC
Current rating: @ 45 °C @ 70 °C	 0.5 A 0.2 A
Isolation: Input-to-output (transient) Channel-to-channel	 4,000 volts 300 volts
Off-state leakage at maximum voltage	1 mA
One-second surge	1.3 A
Turn-on time	100 µsec
Turn-off time	100 µsec
Output voltage drop maximum peak	1.6 VDC
Nominal logic voltage	5 VDC
Logic voltage range	4.5–6 VDC
Logic input current at nominal logic voltage	190 mA
Temperature: Operating Storage	 -30 ° to +70 °C -30 ° to +85 °C

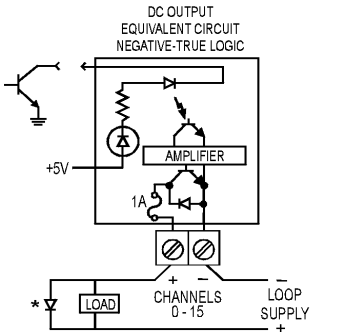
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Dimensions



Connections–G4PB16L





*Note: Commutation diode must be used on inductive loads.
Typically, use diode 1N4005

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4. Generation 4 Digital I/O Modules

Overview of All Modules

Features

The following features apply to all modules:

- Small footprint design, reducing mounting space by approximately 50 percent
- UL recognized, CSA certified, and CE compliant
- Passed NEMA Showering Arc Test (ICS 2-230)
- Meet IEEE Surge Withstand Specification (IEEE-472)
- Operating temperature: - 30° to 70° C.

Choose Your Module

Choose a module from the following table, then see the referenced page for details.

Model	Input	Output	AC	DC	Logic Voltage	Field Voltage	Use for Testing	Use with Raspberry Pi	Special Features	See
G4IDC5	●		●[1]	●	5 VDC	10–32 VDC 12–32 VAC		●		page 37
G4IDC5B	●			●	5 VDC	4–16 VDC			Higher speed	page 37
G4IDC5D	●			●	5 VDC	2.5–28 VDC		●	High speed	page 37
G4IDC5G	●		●[1]	●	5 VDC	35–60 VDC/AC		●		page 37
G4IDC5K	●			●	5 VDC	2.5–16 VDC			Highest speed	page 37
G4IDC5MA	●		●[1]	●	5 VDC	10–32 VDC 12–32 VAC	●	●	Diagnostic switch	page 37
G4IDC15	●		●[1]	●	15 VDC	10–32 VDC 12–32 VAC				page 37

[1] These DC input modules work with either DC or AC voltages.

[2] These AC input modules work with either AC or DC voltages.

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Model	Input	Output	AC	DC	Logic Voltage	Field Voltage	Use for Testing	Use with Raspberry Pi	Special Features	See
G4IDC24	●		●[1]	●	24 VDC	10–32 VDC 12–32 VAC				page 37
G4IAC5	●		●	●[2]	5 VDC	90–140 VAC/DC		●		page 40
G4IAC5A	●		●	●[2]	5 VDC	180–280 VAC/DC		●		page 40
G4IAC5L	●		●	●	5 VDC	90–140 VAC/DC		●	Low input resistance	page 40
G4IAC5MA	●		●	●[2]	5 VDC	90–140 VAC/DC	●	●	Diagnostic switch	page 40
G4IAC15	●		●	●[2]	15 VDC	90–140 VAC/DC				page 40
G4IAC15A	●		●	●[2]	15 VDC	180–280 VAC/DC				page 40
G4IAC24	●		●	●[2]	24 VDC	90–140 VAC/DC				page 40
G4IAC24A	●		●	●[2]	24 VDC	180–280 VAC/DC				page 40
G4SWIN	●		●	●	NA	NA	●	●	Simulates input	page 43
G4ODC5		●		●	5 VDC	5–60 VDC		●		page 44
G4ODC5A		●		●	5 VDC	5–200 VDC		●		page 44
G4ODC5MA		●		●	5 VDC	5–60 VDC		●	Diagnostic switch	page 44
G4ODC15		●		●	15 VDC	5–60 VDC				page 44
G4ODC24		●		●	24 VDC	5–60 VDC				page 44
G4ODC24A		●		●	24 VDC	5–200 VDC				page 44
G4OAC5		●	●		5 VDC	120 VAC		●		page 46
G4OAC5A		●	●		5 VDC	120/240 VAC		●		page 46
G4OAC5A5		●	●		5 VDC	120/240 VAC		●	Normally closed	page 46
G4OAC5MA		●	●		5 VDC	120 VAC	●	●	Diagnostic switch	page 46
G4OAC5AMA		●	●		5 VDC	120/240 VAC	●	●	Diagnostic switch	page 46
G4OAC15		●	●		15 VDC	120 VAC				page 46
G4OAC15A		●	●		15 VDC	120/240 VAC				page 46
G4OAC24		●	●		24 VDC	120 VAC				page 46
G4OAC24A		●	●		24 VDC	120/240 VAC				page 46
G4ODC5R		●	●	●	5 VDC	NA			Dry contact module (reed relay)	page 49
G4ODC5R5		●	●	●	5 VDC	NA			Dry contact module (reed relay)	page 49
G4SWOUT		●	●	●	NA	NA	●	●	Simulates output	page 52

[1] These DC input modules work with either DC or AC voltages.

[2] These AC input modules work with either AC or DC voltages.

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Digital DC Input Modules



Description

Opto 22's G4 DC input modules are used to detect on/off DC voltage levels. Each module provides up to 4,000 V of optical isolation between field inputs and the logic output of the circuit.

All DC input modules except the G4IDC5K and the G4IDC5D are designed with filtering on the input and a hysteresis amplifier, providing high noise rejection and transient-free, "clean" switching. The G4IDC5K is a fast-switching module used to detect signals produced by photoelectric switches and TTL devices. The low-cost G4IDC5D is used for data acquisition. The G4IDC5MA is a special module featuring a manual-on/manual-off/automatic switch, ideal for diagnostic testing of control applications.

Typical applications for DC input modules include sensing the presence or absence of voltage with devices such as proximity switches, limit switches, selector switches, push buttons, photoelectric switches, and TTL-compatible devices. All modules include a built-in LED status indicator.

Specifications—DC Input Modules

	Units	G4IDC5*	G4IDC5B	G4IDC5D*	G4IDC5G*
Input voltage range	VDC VAC	10–32 12–32	4–16 4–16	2.5–28 —	35–60 35–60
Key feature		—	Higher speed	High speed	—
Input current at maximum line	mA	25	45	30	6
Isolation, input-to-output (transient): 1 ms 1 minute	 V V	 4000 1500	 4000 1500	 4000 1500	 4000 1500
Turn-on time	ms	5	0.05	1	10
Turn-off time	ms	5	0.1	1.5	10
Input allowed for off-state	mA, V	1, 3	0.7, 1	0.2, 1	0.7, 7
Nominal output supply voltage	VDC	5	5	5	5
Output supply voltage range	VDC	4.5–6	4.5–6	4.5–6	4.5–6
Output supply current at nominal logic voltage	mA	12	12	12	12
Input resistance (R1 in schematic)	ohms	1.5 K	300	900	10 K
Control resistance (Rc in schematic)	ohms	220	220	470	220
Output voltage drop	V @ 50 mA	0.4	0.4	0.4	0.4
Output current (sinking)	mA	50	50	50	50
Output leakage with no input	microamps @ 30 VDC	100	100	10	100
Transistor	V breakdown	30	30	30	30

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	Units	G4IDC5*	G4IDC5B	G4IDC5D*	G4IDC5G*
Temperature: Operating Storage	 °C °C	 –30 to +70 –30 to +85	 –30 to +70 –30 to +85	 –30 to +70 –30 to +85	 –30 to +70 –30 to +85

* Compatible with Raspberry Pi

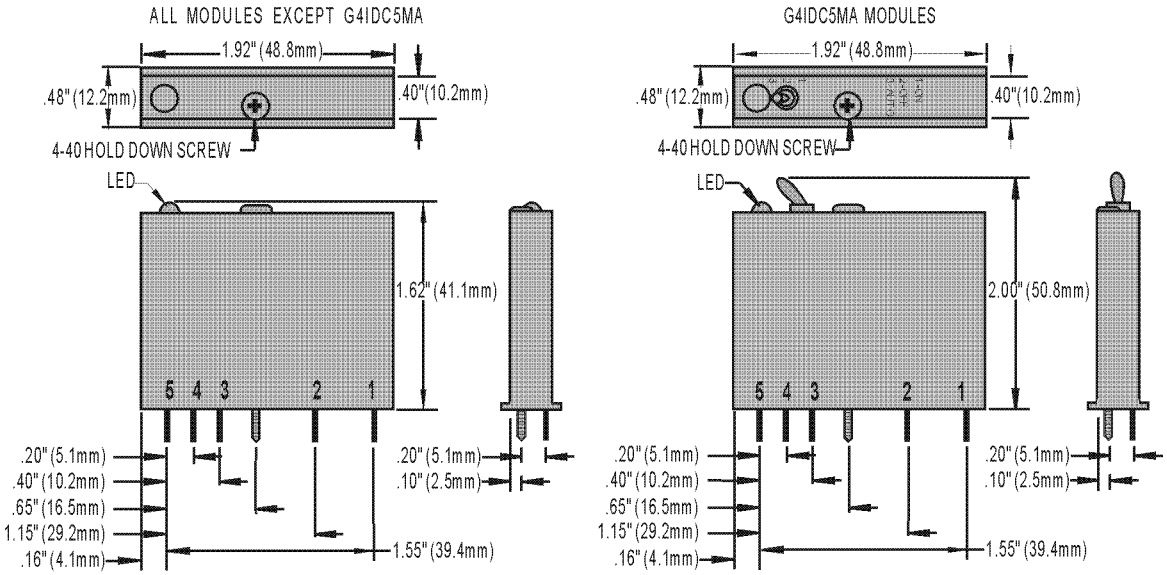
Specifications—DC Input Modules (continued)

	Units	G4IDC5K	G4IDC5MA*	G4IDC15**	G4IDC24**
Input voltage range	VDC VAC	2.5–16 —	10–32 12–32	10–32 12–32	10–32 12–32
Key feature		Highest speed	Diagnostic switch	—	—
Input current at maximum line	mA	30	25	25	25
Isolation, input-to-output (transient): 1 ms 1 minute	 V V	 4000 1500	 4000 1500	 4000 1500	 4000 1500
Turn-on time	ms	0.025***	5	5	5
Turn-off time	ms	0.025***	5	5	5
Input allowed for off-state	mA, V	0.2, 1	1, 3	1, 3	1,3
Nominal output supply voltage	VDC	5	5	15	24
Output supply voltage range	VDC	4.5–6	4.5–6	12–18	20–30
Output supply current at nominal logic voltage	mA	12	12	15	18
Input resistance (R1 in schematic)	ohms	500	1.5 K	1.5 K	1.5 K
Control resistance (Rc in schematic)	ohms	220	220	1 K	2.2 K
Output voltage drop	V @ 50 mA	0.4	0.4	0.4	0.4
Output current (sinking)	mA	50	50	50	50
Output leakage with no input	microamps @ 30 VDC	100	100	100	100
Transistor	V breakdown	30	30	30	30
Temperature: Operating Storage	 °C °C	 –30 to +70 –30 to +85	 –30 to +70 –30 to +85	 –30 to +70 –30 to +85	 –30 to +70 –30 to +85

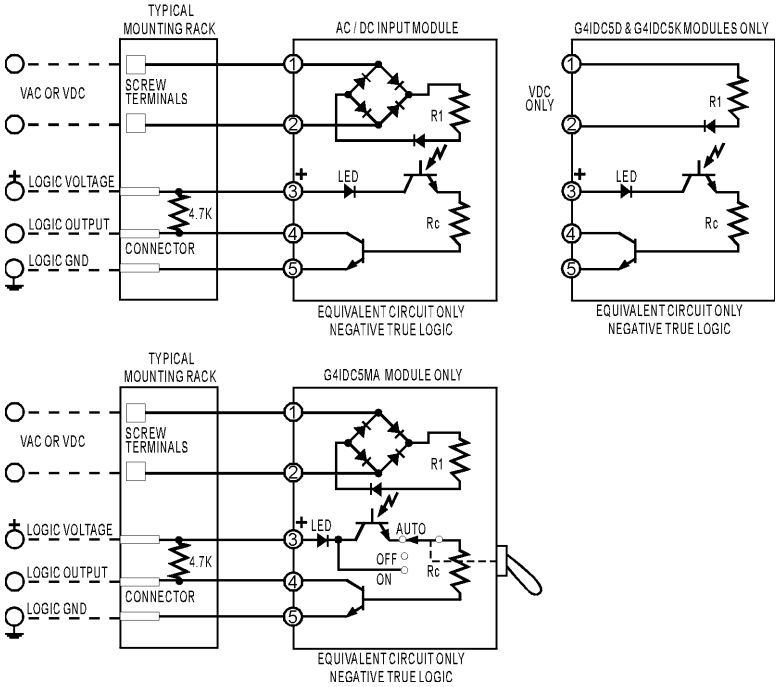
* Compatible with Raspberry Pi
** Not for use with Opto 22 brains
*** At 5Vp-p square wave input, 50% duty cycle

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Dimensions—DC Input Modules



Schematics—DC Input Modules



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Digital AC Input Modules



Description

Opto 22's G4 AC input modules are used to detect on/off AC voltage levels. Each module provides up to 4,000 volts of optical isolation between field inputs and the logic output of the circuit.

All AC input modules are designed with filtering on the input and a hysteresis amplifier, providing high noise rejection and transient-free "clean" switching. The G4IAC5MA is a special module featuring a manual-on/manual-off/automatic switch, ideal for diagnostic testing of control applications.

Typical applications for AC input modules include sensing the presence or absence of voltage with devices such as proximity switches, limit switches, float switches, selector switches, push buttons, toggle switches, and thermostats. All modules include a built-in LED status indicator.

Specifications—AC Input Modules

	Units	G4IAC5*	G4IAC5L*	G4IAC5A*	G4IAC5MA*
Input voltage range	VAC or VDC	90–140	90–140	180–280	90–140
Key feature	--	--	Low R in	--	Diagnostic switch
Input current at maximum line	mA	5	11	5	5
Isolation, input-to-output (transient): 1 ms 1 minute	 V V	 4000 1500	 4000 1500	 4000 1500	 4000 1500
Turn-on time	ms	20	20	20	20
Turn-off time	ms	20	20	20	20
Input allowed for off-state	mA, V	1.4, 40	3, 45	0.7, 45	1.4, 40
Nominal output voltage supply	VDC	5	5	5	5
Output supply voltage range	VDC	4.5–6	4.5–6	4.5–6	4.5–6
Output supply current at nominal logic voltage	mA	12	12	12	12
Input resistance (R1 in schematic)	ohms	28 K	14 K	70K	28 K
Control resistance (R_c in schematic)	ohms	220	220	220	220
Output voltage drop	V @ 50 mA	0.4	0.4	0.4	0.4
Output current (sinking)	mA	50	50	50	50
Output leakage with no input	microamps @ 30 VDC	100	100	100	100
Transistor	V breakdown	30	30	30	30
Temperature Operating: Storage:	 °C °C	 -30 to +70 -30 to +85	 -30 to +70 -30 to +85	 -30 to +70 -30 to +85	 -30 to +70 -30 to +85

* Compatible with Raspberry Pi

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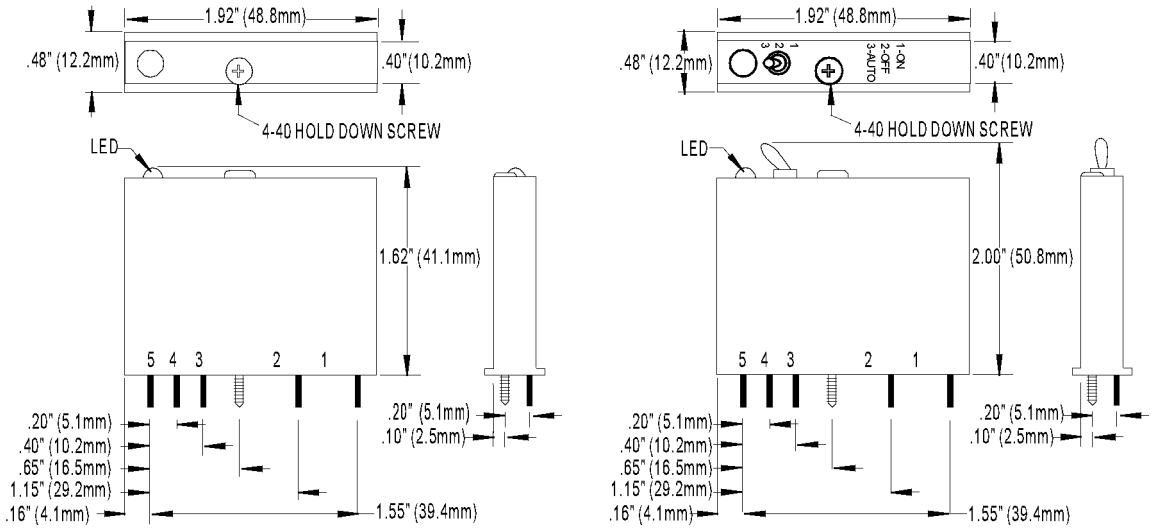
Specifications—AC Input Modules (continued)

	Units	G4IAC15*	G4IAC15A*	G4IAC24*	G4IAC24A*
Input voltage range	VAC or VDC	90–140	180–280	90–140	180–280
Key feature	--	--	--	--	--
Input current at maximum line	mA	5	5	5	5
Isolation, input-to-output (transient): 1 ms 1 minute	 V V	 4000 1500	 4000 1500	 4000 1500	 4000 1500
Turn-on time	ms	20	20	20	20
Turn-off time	ms	20	20	20	20
Input allowed for off-state	mA, V	1.4, 40	0.7, 45	1.4, 40	0.7, 45
Nominal output supply voltage	VDC	15	15	24	24
Output supply voltage range	VDC	12–18	12–18	20–30	20–30
Output supply current at nominal logic voltage	mA	15	15	15	15
Input resistance (R1 in schematic)	ohms	28 K	70 K	28 K	70 K
Control resistance (Rc in schematic)	ohms	1 K	1 K	2.2 K	2.2 K
Output voltage drop	V @ 50 mA	0.4	0.4	0.4	0.4
Output current (sinking)	mA	50	50	50	50
Peak repetitive voltage	VAC	500	500	500	500
Output leakage with no input	microamps @ 30 VDC	100	100	100	100
Transistor	V breakdown	30	30	30	30
Temperature Operating: Storage:	 °C °C	 -30 to +70 -30 to +85	 -30 to +70 -30 to +85	 -30 to +70 -30 to +85	 -30 to +70 -30 to +85

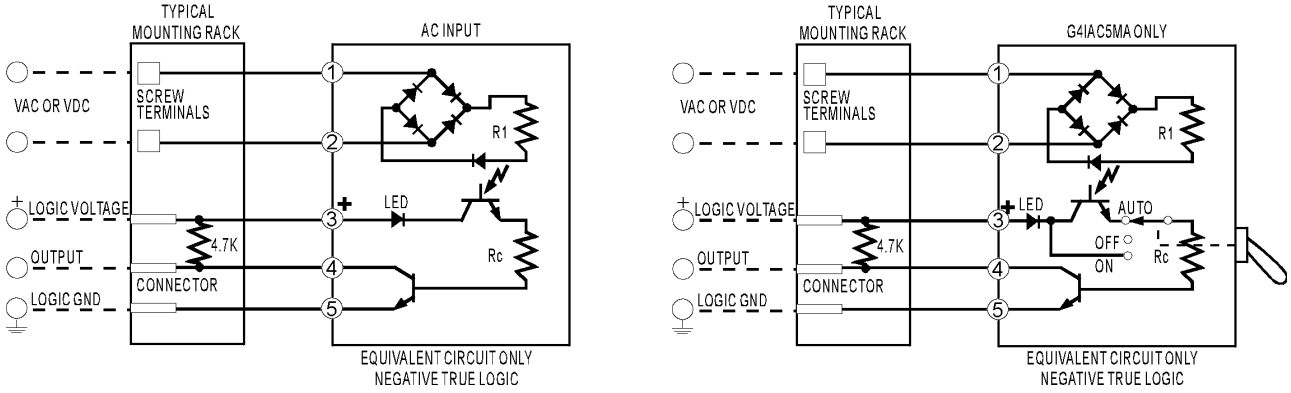
* Not for use with Opto 22 brains.

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Dimensions—AC Input Modules



Schematics—AC Input Modules



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Digital Input Test Module



Description

Opto 22's G4SWIN input test module is used to simulate an input on an I/O mounting rack. Each module contains a toggle switch that closes a contact on the logic side. An internal resistor limits the current through the switch and provides a load similar to that of an actual input module. An internal debounce circuit allows rapid switch closures without false counts.

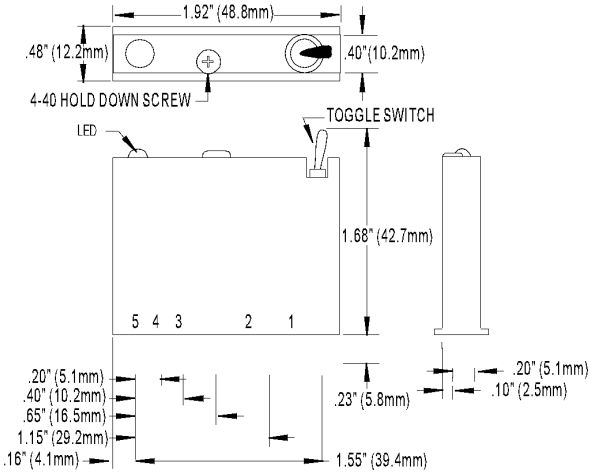
The G4SWIN module works with logic voltages of 5, 15, and 24 volts. Internally, there is no connection to the field inputs. A built-in LED indicates the simulated on/off status.

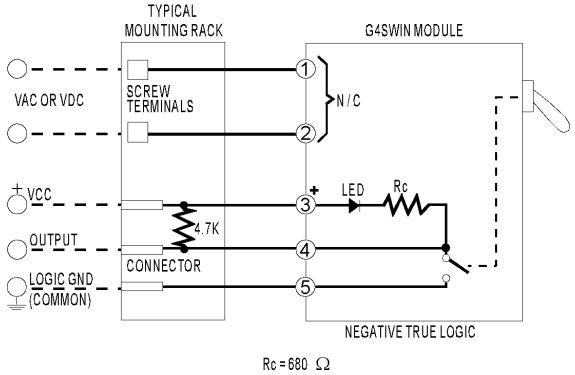
This module is ideal for simulating discrete external events when testing application software.

Specifications—Digital Input Test Module

Isolation, input-to-output (transient): 1 ms 1 minute	 4000 volts 1500 volts
Temperature: Operating Storage	 -30 to +70 °C -30 to +85 °C

Dimensions and Schematics—Digital Input Test Module





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Digital DC Output Modules



Description

Opto 22's G4 DC output modules are used to control or switch DC loads. Each module provides up to 4,000 volts of optical isolation between field devices and control logic.

The G4ODC5MA is a special module featuring a manual-on/manual-off/automatic switch, ideal for diagnostic testing of control applications.

Typical applications for DC output modules include switching loads such as DC relays, solenoids, motor starters, lamps, and indicators. All modules include a built-in LED status indicator.

Specifications—DC Output Modules

	Units	G4ODC5* G4ODC5FM**	G4ODC5A* G4ODC5AFM**	G4ODC5MA*	G4ODC15***	G4ODC24***	G4ODC24A***
Maximum line voltage	VDC	60	200	60	60	60	200
Output voltage range	VDC	5–60	5–200	5–60	5–60	5–60	5–200
Key feature	—	—	—	Diagnostic switch	—	—	—
Current rating: At 45 °C ambient At 70 °C ambient	 A A	 3 2	 1 0.55	 3 2	 3 2	 3 2	 1 0.55
Isolation input-to-output (transient): 1 ms 1 minute	volts	 4000 1500	 4000 1500	 4000 1500	 4000 1500	 4000 1500	 4000 1500
Off-state leakage at maximum voltage	mA	1	1	1	1	1	1
Control resistance (R_c in schematic)	W	220	220	220	1 K	2.2 K	2.2 K
One-second surge	A	5	5	5	5	5	5
Turn-on time	micro-seconds	100	100	100	100	100	100
Turn-off time	micro-seconds	750	750	750	750	750	750
Output voltage drop maximum peak	V	1.6	1.6	1.6	1.6	1.6	1.6
Nominal logic voltage	VDC	5	5	5	15	24	24
Logic voltage range	VDC	4–8	4–8	4–8	10.5–16	19.5–32	19.5–32
Logic pickup voltage	VDC	4	4	4	10.5	19.5	19.5

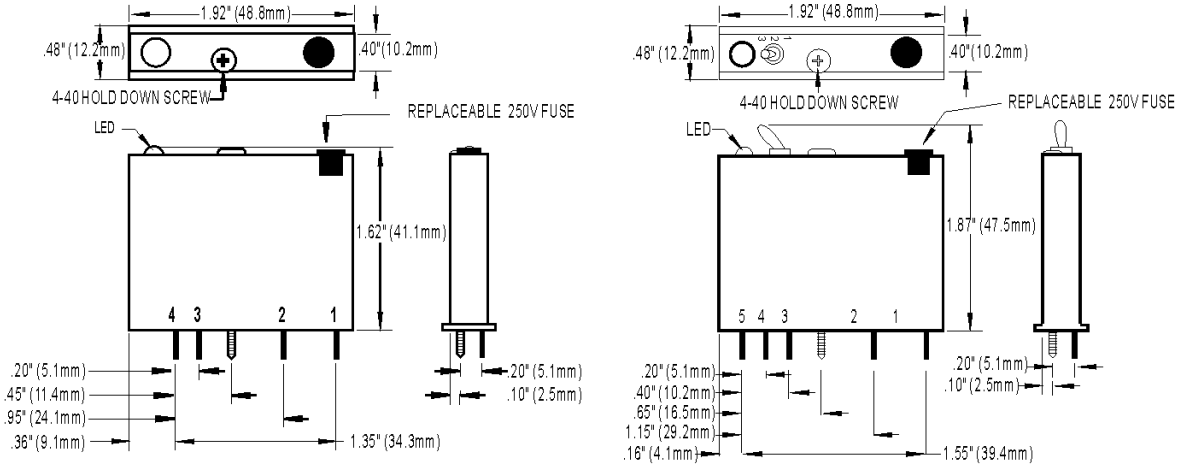
* Compatible with Raspberry Pi
** Part numbers ending in FM are Factory Mutual approved
*** Not for use with Opto 22 brains

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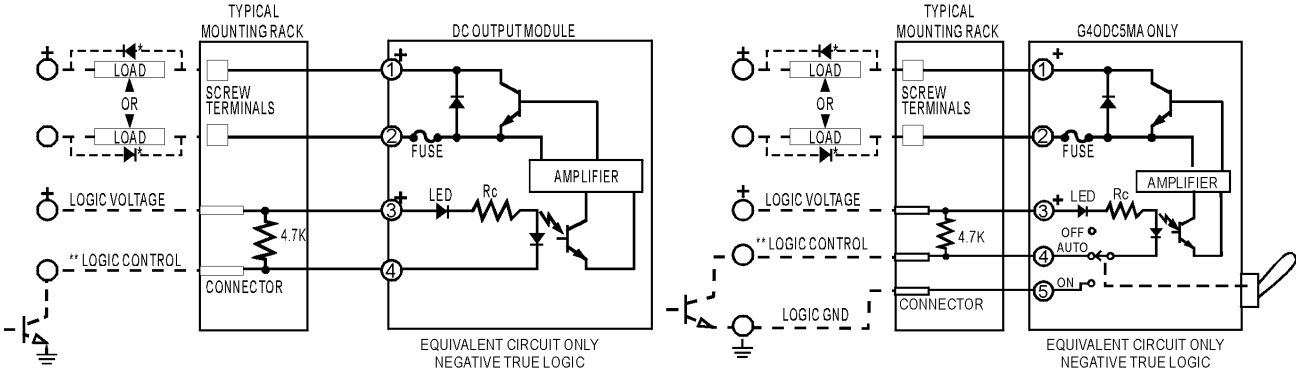
	Units	G4ODC5* G4ODC5FM**	G4ODC5A* G4ODC5AFM**	G4ODC5MA*	G4ODC15***	G4ODC24***	G4ODC24A***
Logic dropout voltage	VDC	1	1	1	1	1	1
Logic input current at nominal logic voltage	mA	12	12	12	15	18	18
Temperature: Operating Storage	 °C °C	 -30 to +70 -30 to +85	 -30 to +70 -30 to +85	 -30 to +70 -30 to +85	 -30 to +70 -30 to +85	 -30 to +70 -30 to +85	 -3- to +70 -30 to +85

* Compatible with Raspberry Pi
** Part numbers ending in FM are Factory Mutual approved
*** Not for use with Opto 22 brains

Dimensions—DC Output Modules



Schematics—DC Output Modules



* Commutation diode must be used on inductive loads. Typically, use diode IN4005.
** Control line is compatible with totem pole or tri-state output device.

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Digital AC Output Modules



Description

Opto 22's G4 AC output modules are used to control or switch AC loads. Each module provides up to 4,000 volts of optical isolation between field outputs and the control side of the circuit, and each features zero voltage turn-on and zero current turn-off. All AC output modules are equivalent to single-pole, single-throw, normally open contacts (Form A, SPST-NO) except the G4OAC5A5, which is equivalent to a single-pole, single-throw, normally closed contact (Form B, SPST-NC).

The G4OAC5MA and the G4OAC5AMA are special modules featuring a manual-on/manual-off/automatic switch, ideal for diagnostic testing of control applications.

Typical applications for AC output modules include switching loads such as AC relays, solenoids, motor starters, heaters, lamps, and indicators. All digital AC output modules include a built-in LED status indicator.

Specifications—AC Output Modules

	Units	G4OAC5* G4OAC5FM**	G4OAC5A* G4OAC5AFM**	G4OAC5A5* G4OAC5A5FM**	G4OAC5MA*	G4OAC5AMA*
Nominal line voltage	VAC	120	120/240	120/240	120	120/240
Output voltage range	VAC	12–140	24–280	24–280	12–140	24–280
Key feature	—	—	—	Normally closed	Diagnostic switch	Diagnostic switch
Current rating: At 45 °C ambient At 70 °C ambient	 A A	 3 2	 3 2	 3 2	 3 2	 3 2
UL Motor Load Rating	A	1.5	1.5	1.5	1.5	1.5
Isolation input-to-output (transient): 1 ms 1 minute	volts	 4000 1500	 4000 1500	 4000 1500	 4000 1500	 4000 1500
Off-state leakage at nominal voltage (60 Hz)	mA_{RMS}	5	1.25/2.5	1.25/2.5	5	1.25/2.5

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	Units	G4OAC5* G4OAC5FM**	G4OAC5A* G4OAC5AFM**	G4OAC5A5* G4OAC5A5FM**	G4OAC5MA*	G4OAC5AMA*
Nominal logic voltage	VDC	5	5	5	5	5
Logic voltage range	VDC	4–8	4–8	4–8	4–8	4–8
Logic pickup voltage	VDC	4	4	4	4	4
Logic dropout voltage	VDC	1	1	1	1	1
Logic input current at nominal logic voltage	mA	12	12	12	12	12
Control resistance (Rc in schematic)	ohms	220	220	220	220	220
One-cycle surge	A peak	80	80	80	80	80
Turn-on time @ 60 Hz	milliseconds	≤8.3***	≤8.3***	≤8.3***	≤8.3***	≤8.3***
Turn-off time @ 60 Hz	milliseconds	≤8.3****	≤8.3****	≤8.3****	≤8.3****	≤8.3****
Peak repetitive voltage	VAC	500	500	500	500	500
Minimum load current	mA	20	20	20	20	20
Output voltage drop maximum peak	V	1.6	1.6	1.6	1.6	1.6
Operating frequency	Hz	25–65	25–65	25–65	25–65	25–65
dV/dT-off-state	V/micro-seconds	200	200	200	200	200
dV/dT-commutating	--	snubbed for 0.5 power factor load	snubbed for 0.5 power factor load	snubbed for 0.5 power factor load	snubbed for 0.5 power factor load	snubbed for 0.5 power factor load
Temperature Operating: Storage:	 °C °C	 -30 to +70 -30 to +85	 -30 to +70 -30 to +85	 -30 to +70 -30 to +85	 -30 to +70 -30 to +85	 -30 to +70 -30 to +85

* Compatible with Raspberry Pi
** Part numbers ending in FM are Factory Mutual approved.
*** One-half cycle maximum. Module turns on at the zero volt crossing of the AC sine wave.
**** One-half cycle maximum. Module turns off at the zero current crossing of the AC sine wave.

Specifications—AC Output Modules (continued)

	Units	G4OAC15***	G4OAC15A***	G4OAC24***	G4OAC24A***
Nominal line voltage	VAC	120	120/240	120	120/240
Output voltage range	VAC	12–140	24–280	12–140	24–280
Key feature	—	—	—	—	—
Current rating: At 45 °C ambient At 70 °C ambient	 A A	 3 2	 3 2	 3 2	 3 2
UL Motor Load Rating	A	1.5	1.5	1.5	1.5
Isolation input-to-output (transient): 1 ms 1 minute	volts	 4000 1500	 4000 1500	 4000 1500	 4000 1500

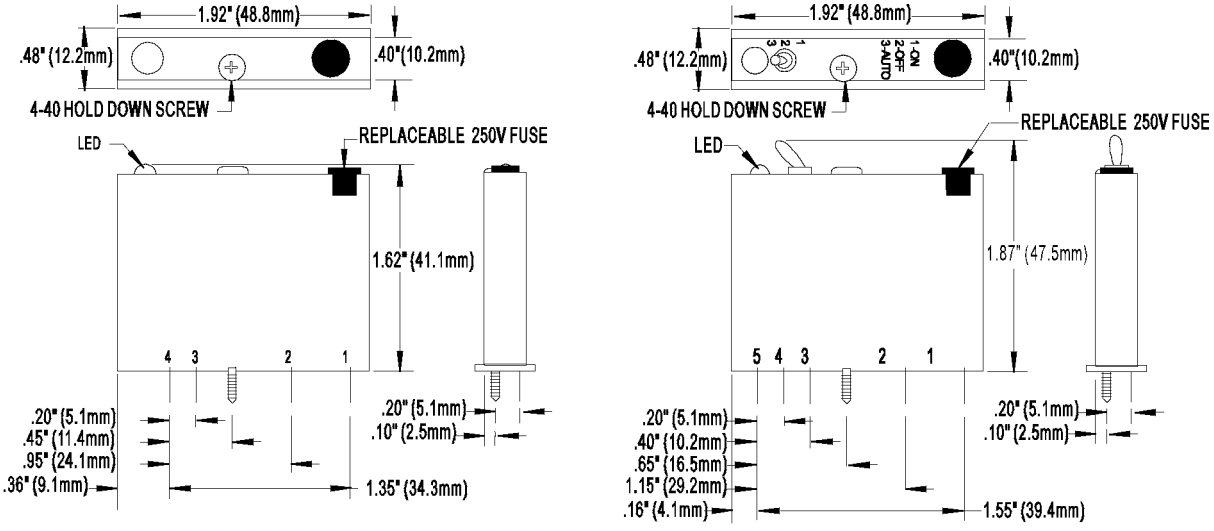
* One-half cycle maximum. Module turns on at the zero volt crossing of the AC sine wave.
** One-half cycle maximum. Module turns off at the zero current crossing of the AC sine wave.
*** Not for use with Opto 22 brains.

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	Units	G4OAC15***	G4OAC15A***	G4OAC24***	G4OAC24A***
Off-state leakage at nominal voltage (60 Hz)	mA_{RMS}	5	1.25/2.5	5	1.25/2.5
Logic voltage range	VDC	10.5–16	10.5–16	19.5–32	19.5–32
Logic pickup voltage	VDC	10.5	10.5	19.5	19.5
Logic dropout voltage	VDC	1	1	1	1
Logic input current at nominal logic voltage	mA	15	15	18	18
Control resistance (Rc in schematic)	ohms	1 K	1 K	2.2 K	2.2 K
One-cycle surge	A peak	80	80	80	80
Turn-on time @ 60 Hz	micro-seconds	≤8.3*	≤8.3*	≤8.3*	≤8.3*
Turn-off time @ 60 Hz	micro-seconds	≤8.3**	≤8.3**	≤8.3**	≤8.3**
Peak repetitive voltage	VAC	500	500	500	500
Minimum load current	mA	20	20	20	20
Output voltage drop maximum peak	V	1.6	1.6	1.6	1.6
Operating frequency	Hz	25–65	25–65	25–65	25–65
dV/dT-off-state	V/micro-second	200	200	200	200
dV/dT-commutating	--	snubbed for 0.5 power factor load	snubbed for 0.5 power factor load	snubbed for 0.5 power factor load	snubbed for 0.5 power factor load
Temperature Operating: Storage:	 °C °C	 -30 to +70 -30 to +85	 -30 to +70 -30 to +85	 -30 to +70 -30 to +85	 -30 to +70 -30 to +85

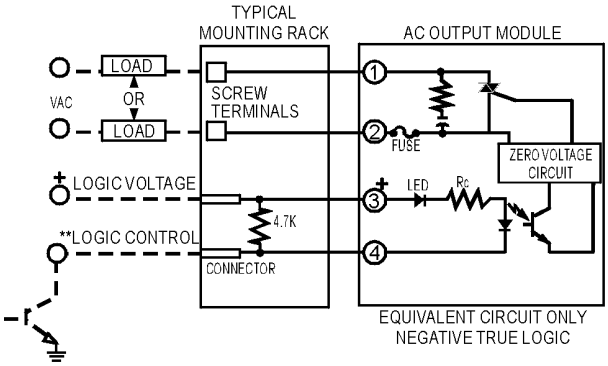
* One-half cycle maximum. Module turns on at the zero volt crossing of the AC sine wave.
** One-half cycle maximum. Module turns off at the zero current crossing of the AC sine wave.
*** Not for use with Opto 22 brains.

Dimensions—AC Output Modules

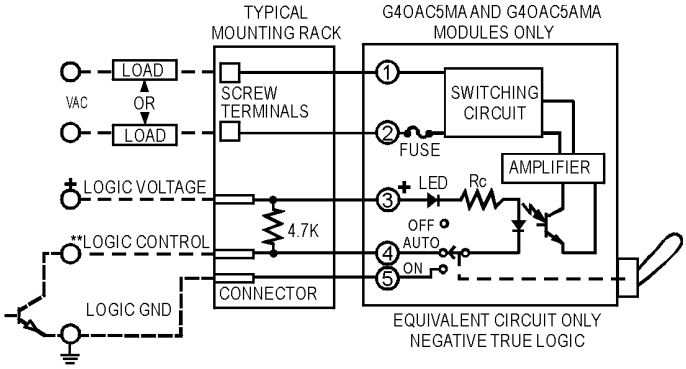


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Schematics—AC Output Modules



**Control line is compatible with totem pole or tri-state output device.



** Control line is compatible with totem pole or tri-state output device.

Dry Contact Output Modules



Description

Opto 22's G4 family of modules includes two dry-contact, low contact-resistance DC output modules: the G4ODC5R and the G4ODC5R5.

The G4ODC5R is a single-pole, single-throw, normally *open* mechanical relay (Form A, SPST-NO). The G4ODC5R5 is a single-pole, single-throw, normally *closed* mechanical relay (Form B, SPST-NC).

Typical applications for these dry-contact modules include analog signal and communication line multiplexing.

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Specifications—Dry Contact Output Modules

	Units	G4ODC5R G4ODC5RFM*	G4ODC5R5 G4ODC5R5FM*
Contact form		Form A SPST mechanical relay	Form B SPST mechanical relay
Normal position		Open	Closed
Contact rating	VA	10	10
Maximum switching voltage (see Note)	VDC	100	100
	VAC	130	130
Maximum switching current	A	0.5 (see Note)	0.5 (see Note)
Contact resistance	Milliohms	200	200
Turn-on time	microseconds	500	500
Turn-off time	microseconds	500	500
Contact bounce	microseconds	250	250
Mechanical life	cycles	5 million	5 million
Logic voltage range	VDC	4.8–6	4.8–6
Logic OFF voltage range	VDC	0.0–0.8	0.0–0.8
Logic ON voltage range	VDC	3.8–6	3.8–6
Indeterminate range	VDC	0.8–3.8	0.8–3.8
Logic input current at nominal logic voltage	milliamps	14	14
Isolation voltage (transient) input-to-output	VDC	1,500	1,500
Ambient temperature: Operating Storage	 °C °C	 0 to 70 -60 to +105	 0 to 70 -60 to +105

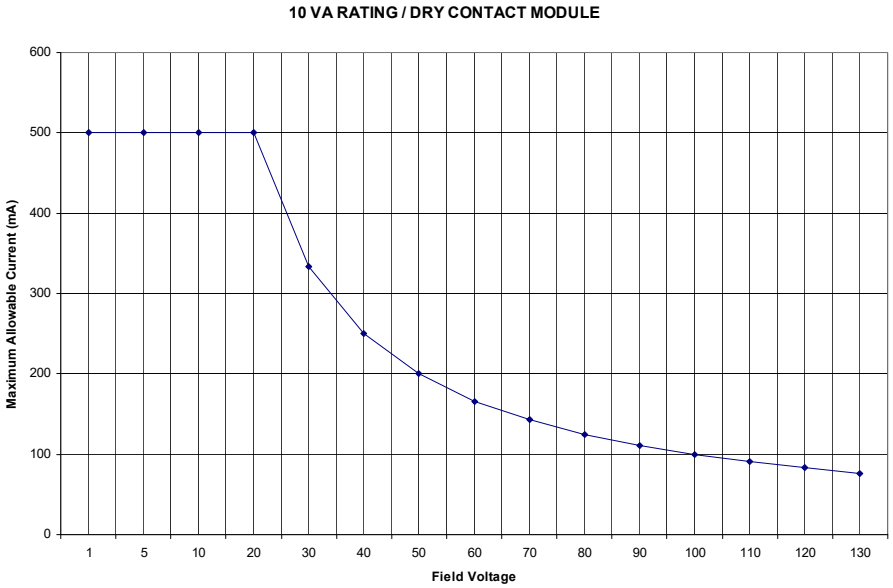
*Part numbers ending in FM are Factory Mutual approved.

NOTE: The application of the dry contact module must not exceed 10 VA under steady-state or momentary in-rush conditions.
For voltages at or below 20 volts, the current limit is 0.5 amps. For voltages above 20 volts, the maximum allowable current is determined by the following equation:
Maximum Current = 10 VA / Voltage

See next page for additional information.

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Specifications—Dry Contact Output Modules (continued)



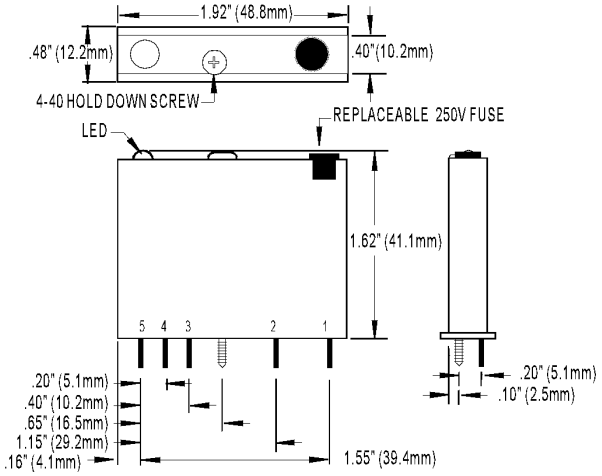
Current Limit at Key Voltages:

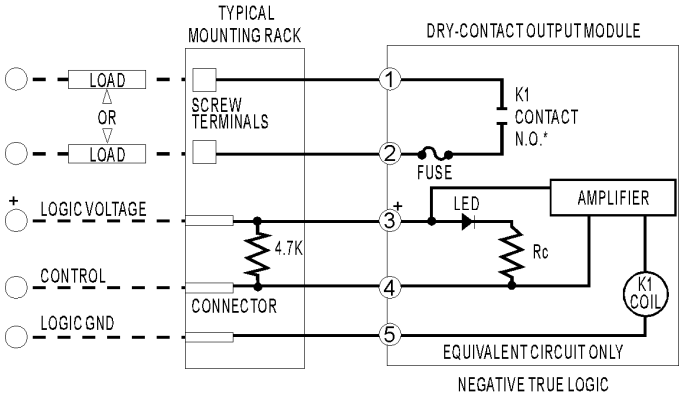
V	mA
5	500
12	500
24	416
100[1]	100
120	83
130[2]	76

[1] Maximum DC voltage is 100 VDC.

[2] Maximum AC voltage is 130 VAC.

Dimensions and Schematics—Dry Contact Output Modules





Note: Also compatible with Totem Pole or Tri-State Output.
Will not plug into G4PB4R mounting rack.

* Normally open for G4ODC5R, normally closed for G4ODC5R5.

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Digital Output Test Module



Description

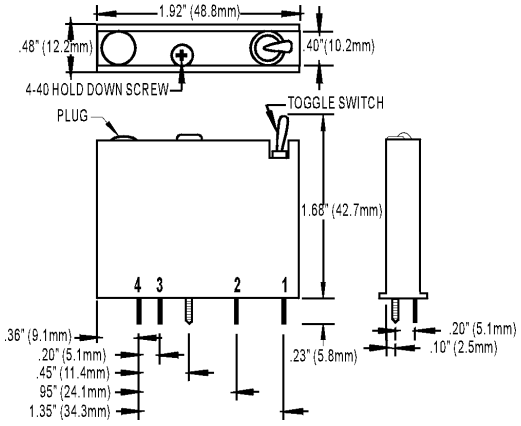
Opto 22's G4SWOUT output test module is used to simulate a G4 output on an I/O mounting rack. Each module contains a manual toggle switch on the field side. The switch closes a contact that shorts the field terminals to turn on a field output. Internally, there is no connection to the logic side of the module.

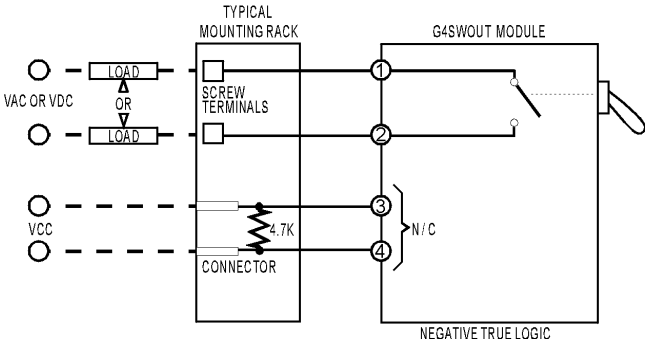
The G4SWOUT module is ideal for testing field wiring and devices by simulating an output from the computer. The switch handles 3 amps at 250 VAC/VDC.

Specifications—Output Test Module

Output voltage range	250 VAC/VDC
Isolation, input-to-output (transient)	4000 volts
Temperature: Operating Storage	 -30 to +70 °C -30 to +85 °C

Dimensions and Schematics—Output Test Module





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5. Generation 4 Digital I/O Accessories

Overview of Accessories

Accessories for Generation 4 I/O include the following:

- Cables and connectors—see below.
- Fuses—see page 54.
- Jumper strap—see page 55.

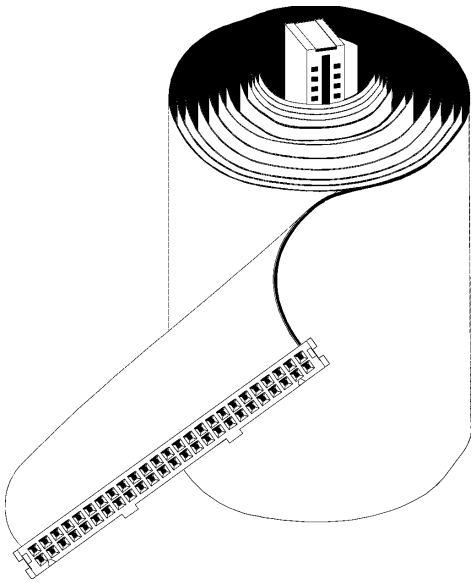
Cables and Connectors

Description

Opto 22 supplies several standard cables to interface with host controllers. There are three series of cables, each available in standard lengths. All three cable types use 50-conductor ribbon cable.

Each series of cables is designated according to the type of connector on each end.

- The HH series has a header connector on both ends.
- The CA series has an edge connector on both ends.
- The OD series has a header connector on one end and a card edge connector on the other.



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Specifications

Length (feet)	Series Part Numbers		
	HH (Header to header)	CA (Card edge to card edge)	OD (Header to card edge)
1.5	HH1.5	--	--
2	--	CA2	OD2
4	HH4	CA4	OD4
6	HH6	CA6	OD6
8	HH8	CA8	OD8
10	HH10	CA10	OD10

Building Your Own Cables

If the standard cables do not meet your requirements, the following list of manufacturers can help you choose connectors and cable. Contact the manufacturer's distributor for more information.

50-Conductor Cables:

3M	P/N 3365/50
ALPHA	P/N 3580/50 or 3583/50

Header Connectors:

Circuit Assemblies, Inc.	P/N CA50IDS2-C-SPT

Edge Connectors:

3M	P/N 3415-0001
Panduit	P/N 055-050-455

Connectors with Strain Reliefs:

Use only Panduit Corporation parts	P/N 050A050-455

Fuses

G4 output module fuse—A 4-amp fuse is mounted on the top of most modules. Each mounting rack ships with one spare module fuse. Additional fuses can be ordered from Opto 22 or directly from Wickmann.



Description	Part Number
4 amp fuses for G4 output modules (10 pack) (Not used for G4SWOUT modules)	FUSEG4B
1 amp fuses for G4 reed relay output modules or for G4PB16L output channels (10 pack)	FUSE01G4B

G4 fuses for racks, brains, and other products—See the Fuses Data Sheet (form 0489) to determine the fuse needed for your rack, brain, or other part.

Mounting racks used with Raspberry Pi—The G4PB8H and G4PB16H mounting racks come equipped with a 1A fuse, which is sufficient for the Raspberry Pi, rack, and I/O modules. However, if you're using USB-powered peripherals (especially USB-WiFi dongles, displays, and hard drives), the 1 A fuse is not sufficient. If you are using USB peripherals, replace the 1 A fuse in the rack with a 5 A

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fuse (part number FUSE05B). For your convenience, a compatible 5 A fuse is shipped with the OPTO-P1-40P Carrier Board.

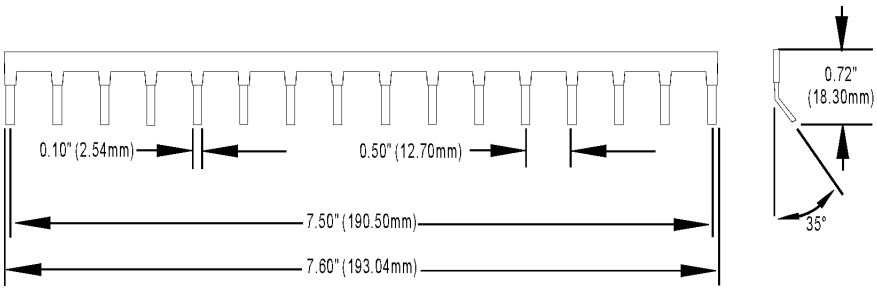
Jumper Strap

Description

Jumper straps are used to simplify wiring in applications that require a common connection between each I/O module position. The G4STRAP can be used on all G4 digital I/O mounting racks. (It does not work with the G4PB16J, G4PB16K, or G4PB16L racks with integral I/O, however.) The jumper strap has an insulated coating and can be cut to size.



Dimensions



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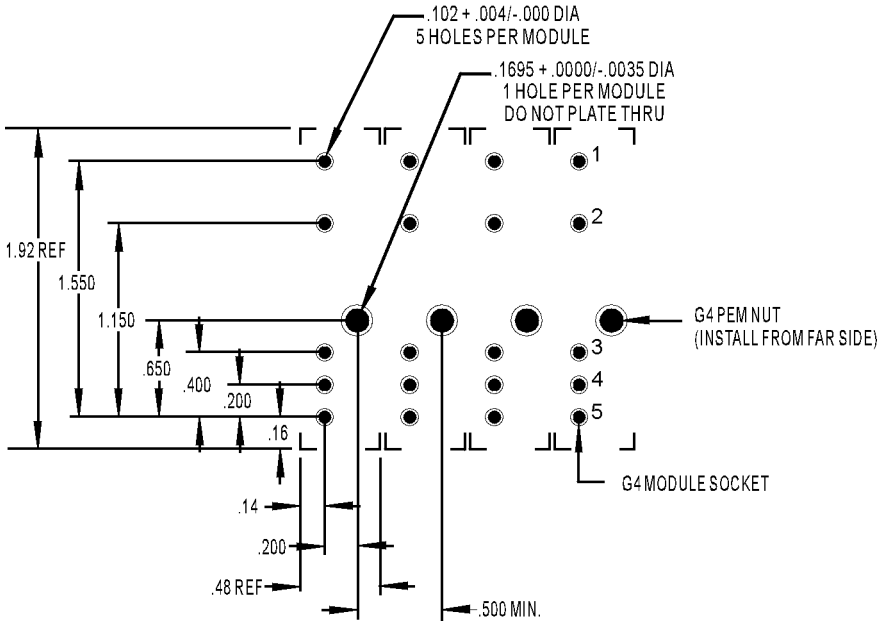
A. Designing Custom I/O Mounting Racks

Introduction

Customers designing their own mounting systems for Generation 4 digital I/O modules may find the following information helpful. Circuit board layout information and a circuit board parts list are provided to help you get started.

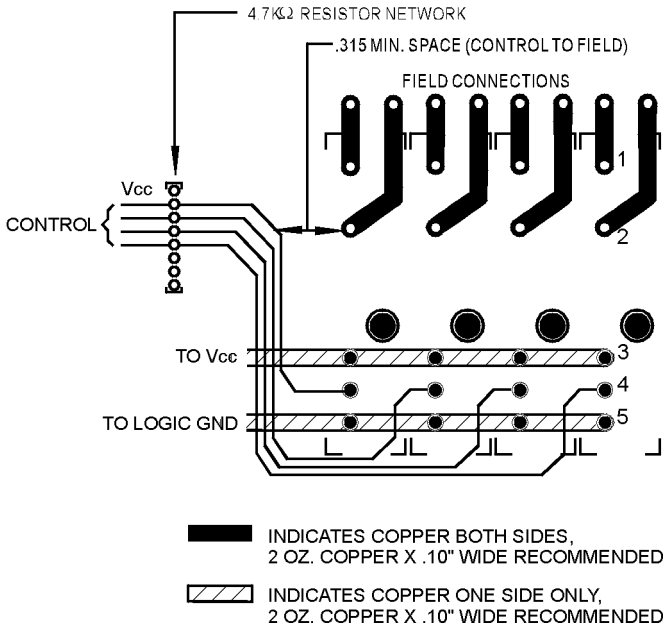
Refer to individual module information in Chapter 4. Generation 4 Digital I/O Modules for additional specifications.

Dimensions



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Printed Circuit Patterns



Parts List

Item	Notes	Manufacturer's Part Number	Opto 22 Part Number
G4 module sockets	Five required for each module position	Elpakco, Inc. P/N 4315-TG	G4-MOD-SOCKETS (Qty. 100)
G4 fuse sockets	Two required for each spare fuse[1]	Elpakco, Inc. P/N A2122	G4 FUSE SOCKETS (Qty. 100)
G4 pem nuts	One required for each module position	PEM Fastening Systems KF2-440ET	G4-PEM-NUTS (Qty. 100)
G4 barrier strip	24-position strip[2]	Phoenix Contact MKDS5/X[3]-6.35	(see note 4)

[1] Hole size is 0.052 + 0.003/-0.001 diameter on 0.200 centers.

[2] Hole size is 0.052 + 0.003/-0.001 diameter on 0.500 centers.

[3] X in the part number is the number of positions in the barrier strip.

[4] See Phoenix Contact (information below)

Elpakco, Inc.
www.elpakco.com
2 Carl Thompson Rd.
Westford, MA 01886

(978) 392-0400
(978) 392-6814 (fax)

PEM Fastening Systems
www.pemnet.com
5190 Old Easton Rd.
Danboro, PA 18916

(215) 766-8853
(215) 766-3633 (fax)

Phoenix Contact
www.phoenixcontact.com
P.O. Box 4100
Harrisburg, PA 17111-0100

(717) 944-1300
(717) 944-1625 (fax)

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B. Wiring Diagrams

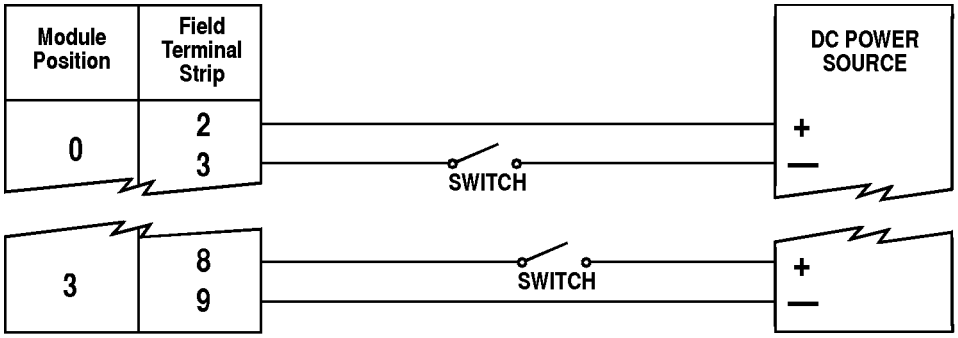
Input Modules Using DC Field Voltages

Use the diagrams on this page for the following modules:

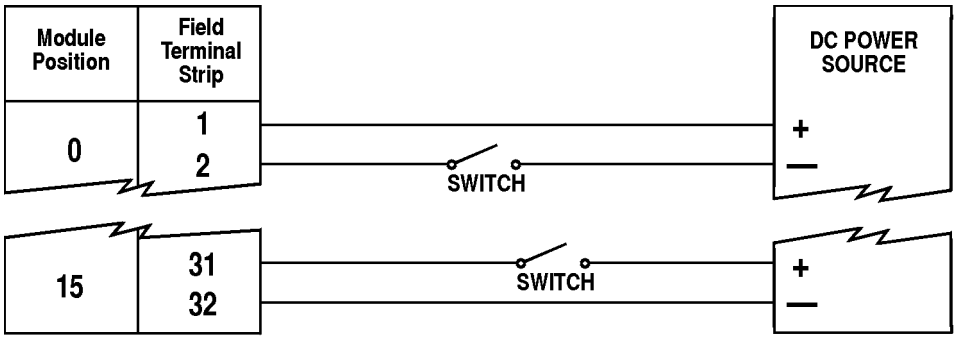
G4IDC5	G4IDC5G	G4IAC5
G4IDC5B	G4IDC5K	G4IAC5A
G4IDC5D	G4IDC5MA	G4IC5MA

NOTE: The AC input modules listed at left will work with either AC or DC field voltages. If you are using them with AC voltages, see page 60. If you are using them with DC field voltages, follow the diagrams on this page.

On 4-Position Mounting Racks (G4PB4 and G4PB4R).



On All Other Mounting Racks .



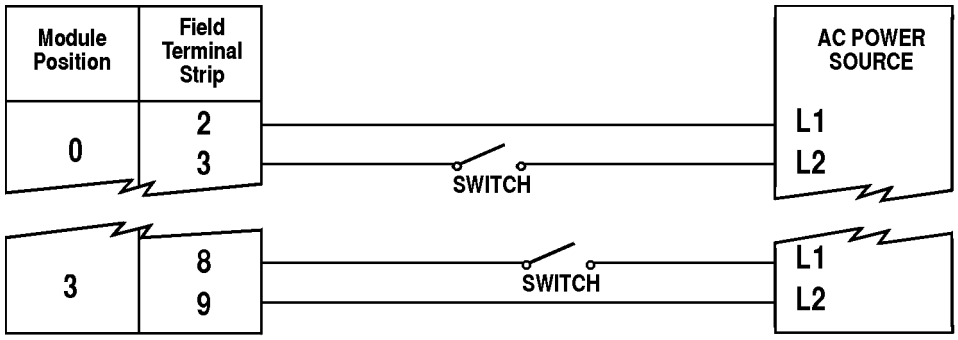
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Input Modules Using AC Field Voltages

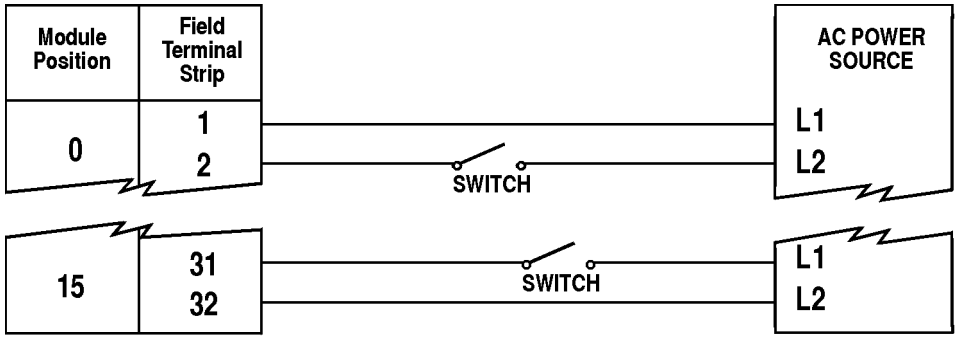
Use the diagrams on this page for the following modules:

G4IAC5	G4IDC5	*NOTE: The DC input modules listed at left will work with either DC or AC field voltages. If you are using them with DC voltages, see page 59. If you are using them with AC field voltages, follow the diagrams on this page.*
G4IAC5A	G4IDC5G	
G4IAC5MA	G4ID5MA	

On 4-Position Mounting Racks (G4PB4 and G4PB4R).



On All Other Mounting Racks.



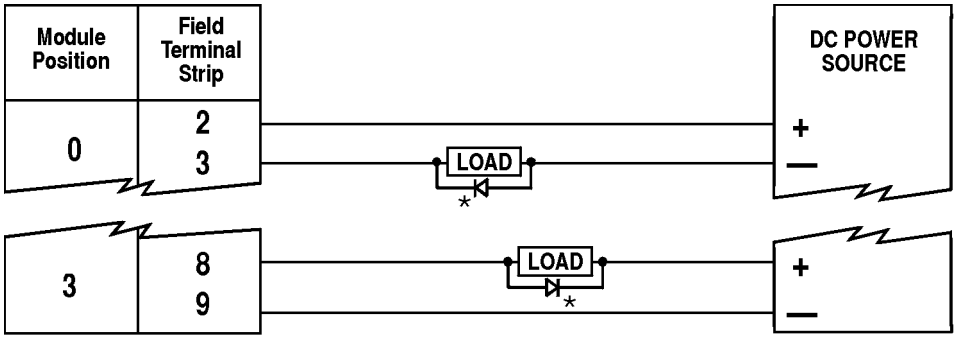
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Output Modules Using DC Field Voltages

Use the diagrams on this page for the following modules:

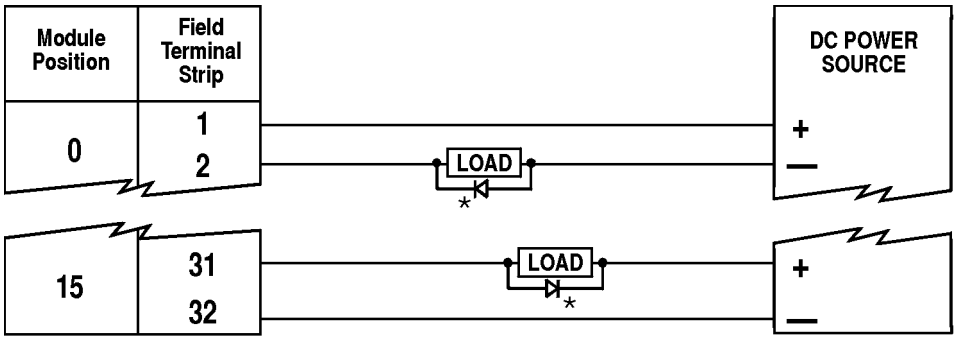
G4ODC5
G4ODC5A
G4ODC5MA

On 4-Position Mounting Racks (G4PB4 and G4PB4R).



*Note: Commutation diode must be used on inductive loads. Typically, use diode 1N4005

On All Other Mounting Racks .



*Note: Commutation diode must be used on inductive loads. Typically, use diode 1N4005

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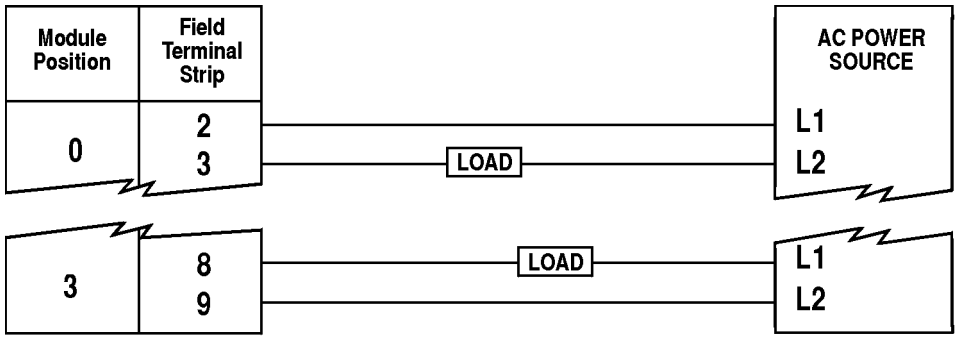
Output Modules Using AC Field Voltages

Use the diagrams on this page for the following modules:

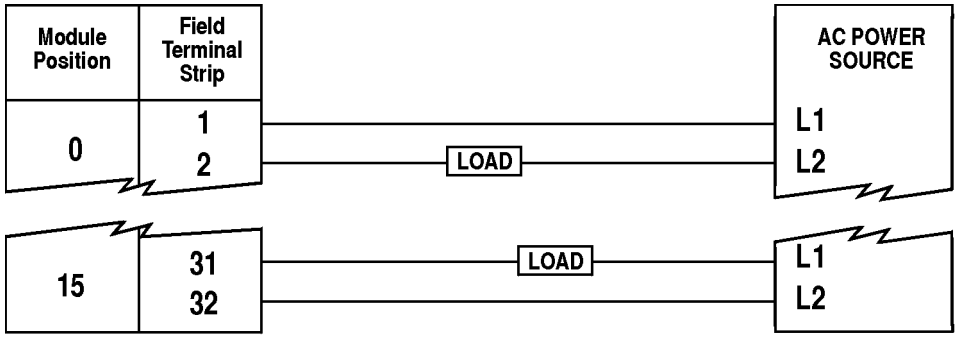
G4OAC5
G4OAC5A
G4OAC5A5
G4OAC5MA
G4OAC5AMA

NOTE: The load can go on either terminal because AC modules are non-polar.

On 4-Position Mounting Racks (G4PB4 and G4PB4R).



On All Other Mounting Racks .



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