

Part Number	Description
SNAP-B6	High Speed Analog/Digital Pamux Brain

Description

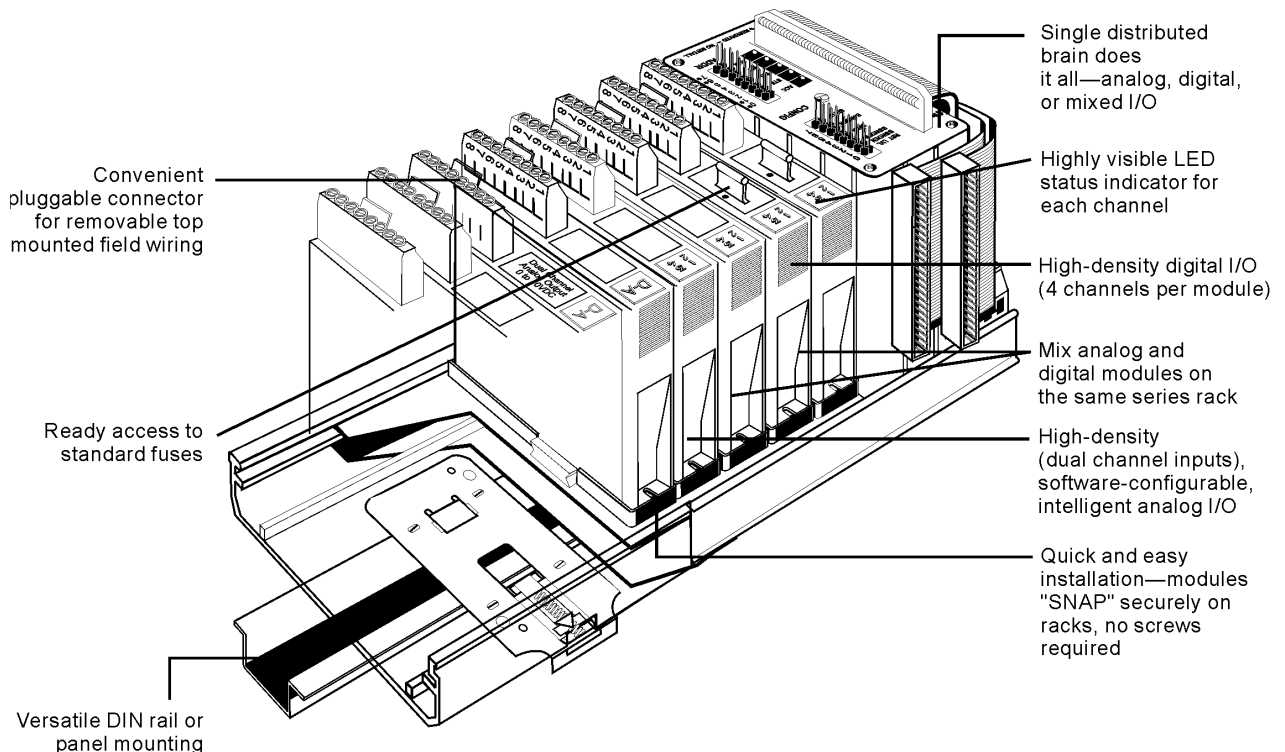
The SNAP-B6 is a high-speed, addressable brain that can remotely control a mix of both analog and digital I/O modules, using the Pamux® protocol. Since the SNAP-B6 is designed for use with Opto 22's SNAP "B series" mounting racks, capable of handling eight, 12, or 16 I/O modules, it has a maximum capacity of 32 analog channels, or 16 analog and 32 digital channels.

The equivalent of two regular B6 analog brains and one regular B4 digital brain, the SNAP-B6 provides power and flexibility in a compact package. The SNAP-B6 includes an on-board microprocessor that continually scans all I/O points on the mounting rack, performs necessary conversions, and

then updates a dual-port RAM. The host computer transfers data along the Pamux bus by reading from or writing to the dual-port RAM.

The SNAP-B6 includes an adapter cable with two 50-pin connectors to attach to the Pamux bus or a terminator board. Up to 16 SNAP-B6 brains can be linked on a single Pamux bus to control up to 512 points of analog or digital I/O. Each SNAP-B6 requires 5 VDC ± 0.1 V @ 1.0 A (plus an additional 0.5 A if a terminator board is installed).

For complete information on the Pamux system, see form #726, the *Pamux Manual*, available on our website, www.opto22.com. The easiest way to find it is to search on the form number, 726.



Specifications

Power Requirements	5.0 VDC \pm 0.1 VDC @ 1.0A max (plus additional 0.5A if terminated)
Operating Temperature	0° C to 70° C, 95% humidity, non-condensing
Communications Interface	50-pin Pamux bus
Analog Read/Write Access Time	70 μ sec per channel, 1.12 msec per 16 channels (channels accessed individually)
Digital Read/Write Access Time	2 μ sec per channel, 2 μ sec per 8 channels (channels accessed in banks of 8)
Update Time	With digital functionality enabled: Analog channels updated every 20 msec Digital channels updated every 1.25 msec Without digital functionality: Analog channels updated every 2 msec
Range: Multidrop	Up to 500 feet
LED Indicators	ACC (Access), STS (Status), SEL (Address selected), WD (Watchdog), and RUN (Power On)
Options: Jumper Selectable	Address Watchdog Reset Enable digital (B4) Analog configuration mode

Software Included

The SNAP-B6 includes the following software:

PamScan utility (DOS and Windows 32-bit versions), used for troubleshooting and for configuring analog modules. Online help in PamScan tells how to use the utility.

Pamux drivers, used to allow PamScan and third-party software to talk to the AC28 adapter card.

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Specifications

Address Jumpers and LED Descriptions

Table 1: Configuration Jumpers 0-7

See the next page for specific jumper settings.

Jumper(s)	Description
0	Sets the reset line polarity
1 and 2	Set the analog watchdog
3	Not used
4	Enables digital functionality
5 and 6	Set the digital watchdog
7	Used for analog setup in a special boot mode

Top View: SNAP-B6

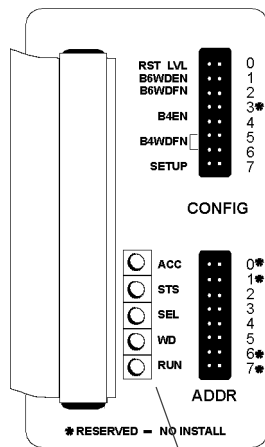


Table 2: Address Jumpers

These jumpers configure the base address of the SNAP-B6. Each Pamux station on a bus must have a unique address. The SNAP-B6 emulates two analog brains and, optionally, one digital brain. Each analog brain occupies two addresses, one for the data register and one for the control register. (For more information, see the *Pamux User's Guide*.) The digital brain occupies four addresses, one for every 8-bits (or bank) of I/O. If configuration jumper 4 is installed to enable digital function, address jumper 2 must not be installed.

Jumpers				With digital enabled			Without digital enabled	
J5	J4	J3	J2	An#1	An#2	Dig	An#1	An#2
Out	Out	Out	Out	00	02	04-07	00	02
Out	Out	Out	In				04	06
Out	Out	In	Out	08	10	12-15	08	10
Out	Out	In	In				12	14
Out	In	Out	Out	16	18	20-23	16	18
Out	In	Out	In				20	22
Out	In	In	Out	24	26	28-31	24	26
Out	In	In	In				28	30
In	Out	Out	Out	32	34	36-39	32	34
In	Out	Out	In				36	38
In	Out	In	Out	40	42	44-47	40	42
In	Out	In	In				44	46
In	In	Out	Out	48	50	52-55	48	50
In	In	Out	In				52	54
In	In	In	Out	56	58	60-63	56	58
In	In	In	In				60	62

Table 3: LED Descriptions

LED	Description
ACC (Access)	LED is on whenever access has been granted to the dual-port RAM. It remains on until access is released (For more information on access, see chapter 4 of the <i>Pamux User's Guide</i> .)
STS (Status)	LED is on while booting (approximately two seconds) or while in reset. It flashes rapidly in configuration mode and blinks slowly to indicate an error condition such as an improperly configured module. LED is off for normal operation.
SEL (Selected)	LED flashes when analog or digital address is selected by the host computer.
WD (Watchdog)	LED is on if watchdog timer is tripped. LED is off for normal operation. Disabling the analog or digital watchdog does <i>not</i> disable the watchdog LED.
RUN	LED is on whenever power is connected to the board.

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Configuration jumpers

Default settings are shown in **boldface**.

Table 4: Reset Jumper

Reset Level	Jumper 0
Active High	In
Active Low	Out

Table 5: Analog Watchdog Jumper

Watchdog	Jumper 1	Jumper 2
Disabled	In	--
Enabled	Out	--

Table 6: Digital Functionality Jumper

Digital Functionality	Jumper 4
Enable digital	In
Disable digital	Out

Table 7: Digital Watchdog Jumper

Watchdog	Jumper 5	Jumper 6
No action	In	In
Activate channel 0	Out	In
Deactivate all channels	In	Out
Activate channel 0 and deactivate channels 1–31	Out	Out

Table 8: Setup Jumper

Analog Setup	Jumper 7
Configuration mode	In
Normal operation	Out

Jumper 0 (Reset)

One of the control lines on the Pamux bus is the reset line. This line is used to clear all analog outputs on a SNAP-B6 station to zero scale and turn off all digital outputs, and then to set the configuration of the SNAP-B6 to input on all positions. Note that the reset is not intended to be used to shut off outputs upon a system communication error.

Jumper 0 determines the polarity of the reset line, either active high or active low, as shown in Table 4 at left. The default is active low. In general, it does not matter which polarity you select as long as you are consistent throughout your Pamux system.

Jumpers 1 and 2 (Analog Watchdog)

A watchdog timer shuts down a process when the host computer goes offline. If the host computer does not access the SNAP-B6 analog or digital addresses for 1.6 seconds, the watchdog function is activated. As shown in Table 5, jumper 1, if installed, disables the watchdog for both analog addresses. The default is disabled. Jumper 2 is reserved for future use and has no effect.

Since the SNAP-B6 watchdog function is also under software control, the watchdog register must be written to **and** the jumper must be removed for the watchdog to be enabled. For information on software configuration of the watchdog, see Chapter 3 of the *Pamux User's Guide*.

Note: Disabling the analog watchdog does **not** disable the watchdog LED.

Jumper 3 (Not Used)

Jumper 4 (Digital Functionality)

To enable digital functionality, install jumper 4. See Table 6. The default is enabled.

Jumpers 5 and 6 (Digital Watchdog)

A watchdog timer shuts down a process when the host computer goes offline. If the host computer does not access the SNAP-B6 analog or digital addresses for 1.6 seconds, the watchdog function is activated.

Jumpers 5 and 6 configure the digital address to take one of four actions when the watchdog is activated. The four actions are shown in Table 7. The default is all channels deactivated.

Note: Disabling the digital watchdog does **not** disable the watchdog LED.

Jumper 7 (Setup)

Because SNAP analog modules are multi-purpose, the SNAP-B6 must be set up using a special configuration mode in order to scale module readings properly. Use jumper 7, shown in Table 8, to set up this special mode before you turn the board on for the first time. (See next page for instructions.)

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SNAP-B6 I/O Configuration
Setting Up Analog Modules

The disk that comes with the SNAP-B6 includes a utility called PamScan, a diagnostic tool for reading and writing to analog and digital I/O. PamScan can also be used to configure analog channel types. It reads channel types and lets you change types easily. For information on using PamScan, see its online help.

Follow these steps to set up analog modules:

1. Install configuration jumper 7 on the SNAP-B6 brain. The STS and RUN LEDs should be lit. (Ignore other LEDs.)
2. Watch for the STS LED to start flashing rapidly, indicating that the brain is in configuration mode.
3. Using the PamScan utility, choose the I/O Address/Bank that corresponds to the address jumpers on the SNAP-B6. Make sure the type of I/O is analog.
4. Scan the brain and read current channel types using the tables on this page. Values are decimal if you are using the DOS version of PamScan. If you are using the Win 32 version, you can choose whether to show decimal or hexadecimal values.
5. To change a channel type, write the appropriate value from the table on this page out to the channel. Channel types cannot be larger than 1 byte (values 0–255). You can configure the channels for both analog addresses in any order.
6. To put the SNAP-B6 into the 16-bit mode for analog reads, write a 10 hex to the status register at 76 hex.
7. When you have finished, remove configuration jumper 7. The configuration is automatically saved, the STS LED stops flashing, and the SNAP-B6 goes through a normal power-up sequence.

Note: The flash memory on the SNAP-B6 has a programming life of approximately 100,000 write/erase cycles.

*For information on how temperature is reported, see page 7.

Outputs (Bit 7 = 1 if Output)

Dec	Hex	Channel Type
128	80	Generic Output Module
129	81	Reserved
131	82	4–20 mA
132	83	0–5 VDC
133	84	0–10 VDC
134	85	-5–+5 VDC
135	86	-10–+10 VDC
136	88	0–20 mA
137–255	89–FF	Reserved Output Types

Inputs

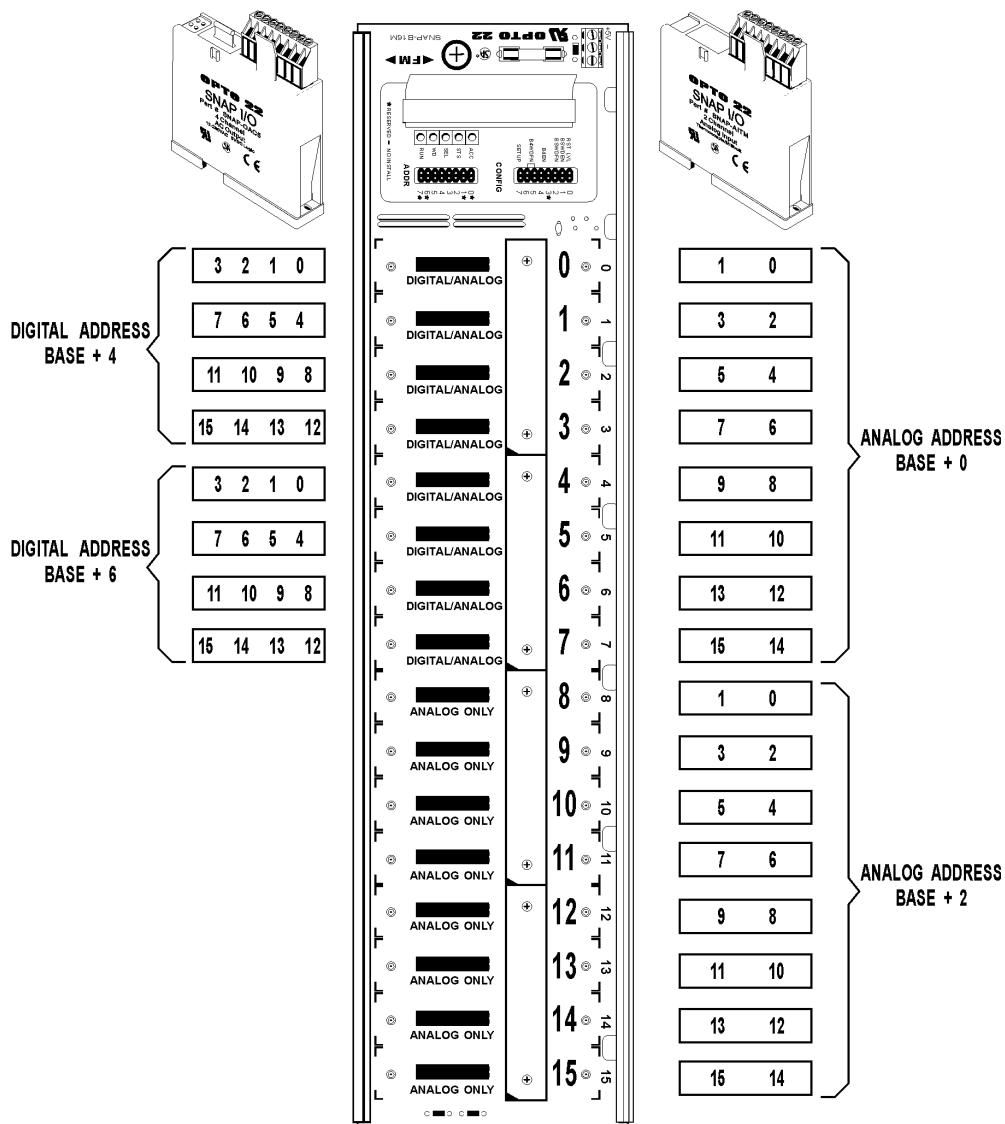
Dec	Hex	Channel Type
0	0	Generic Input Module (Bipolar)
1	1	Generic Input Module (Unipolar)
2	2	0–20 mA
3	3	4–20 mA
4	4	ICTD
5	5	Type J Thermocouple*
6	6	0-5 VDC
7	7	0-10 VDC
8	8	Type K Thermocouple*
9	9	-50-+50 mV
10	A	3-wire, 100 Ohm PT RTD
11	B	-5-+ VDC
12	C	-10-+10 VDC
13	D	0-100 mV (±160 mA)
14-16	E-10	Unused
17	11	Type R Thermocouple*
18	12	Type T Thermocouple*
19	13	Type E Thermocouple*
20	14	Unused
21	15	Unused
22	16	0-1 VDC
23	17	Type S Thermocouple*
24	18	Type B Thermocouple*
25-29	19-1D	Unused
30	1E	Type N Thermocouple*
31	1F	Type G Thermocouple*
32	20	Type C Thermocouple*
33	21	Type D Thermocouple*
34-63	22-3F	Unused
64	40	-20-+20 mA
65	41	Unused
66	42	-150-+150 mV
67	43	-25-+25 mV
68	44	-75-+75 mV
69	45	AIRATE, 0-25,000 kHz
70-127	46-7F	Unused

SNAP-B6 I/O Mapping

The largest SNAP B Series I/O rack can contain a maximum of 16 modules. As shown below, the first eight modules can be either digital or analog. The last eight modules can be analog only. Because of the rack's flexibility in handling both digital and analog inputs and outputs in many of the same module positions, you can choose where to install modules and how to use the points.

Since each digital module contains four points, up to 32 digital I/O points can be installed in the first eight module positions.

Analog input modules contain two points, but analog output modules can have either one or two points, depending on the module. Using all module positions, up to 32 analog I/O points can be installed in the rack.



Terminating a SNAP-B6 Station

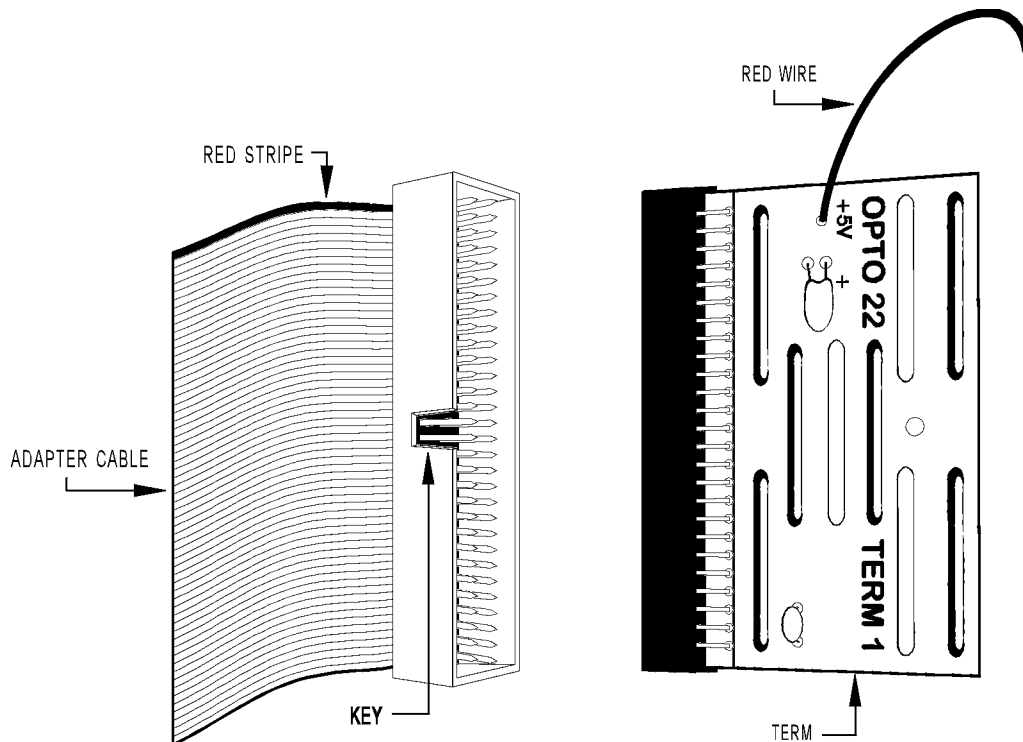
For stations on a Pamux bus to operate correctly, both ends of the bus must be terminated. The host computer and the last Pamux station on the bus are the only devices that should be terminated. Note that if you are using an Opto 22 Pamux adapter card, the host computer is automatically terminated, since termination resistors are built into the card.

To terminate a SNAP-B6 station, plug a Pamux bus terminator board (TERM1 or TERM2) into either connector on the brain. When the terminator board is installed correctly, its red wire connects to the +5V terminal on the rack as shown below.

Temperature Reporting on the SNAP-B6

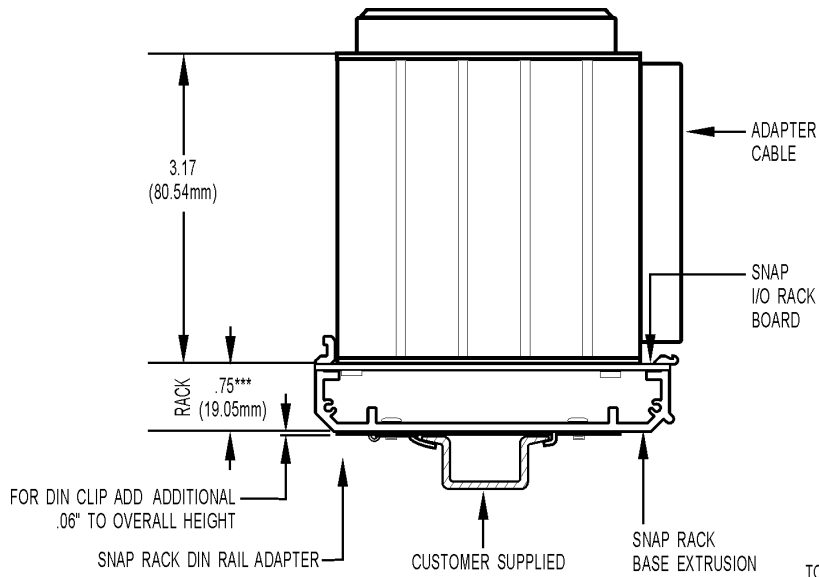
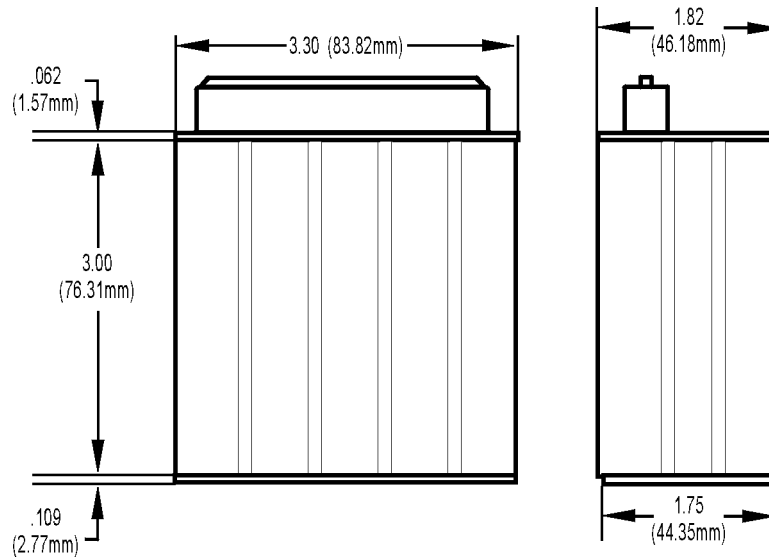
Customers who have used Classic B6 brains will notice a difference in the new SNAP-B6: how the brain reports temperature values. Classic B6 brains return a non-linear raw count between 0 and 4095, which you must linearize to derive temperature.

The SNAP-B6, however, does the linearization on the brain and returns a temperature value in degrees C multiplied by 10. For example, room temperature would be returned as 250 (25° C x 10).



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Dimensions



NOTE: BE SURE TO CONSIDER DIN RAIL DIMENSIONS. (DIN RAIL MUST BE MOUNTED HORIZONTALLY TO USE SNAP I/O WITHOUT MODULE HOLD-DOWN SCREWS)

TOLERANCE LEGEND
 * +/- .010"
 ** +/- .020"
 *** +/- .030"
 **** +/- .060"
 NO * REFERENCE ONLY

Assembly

Brain

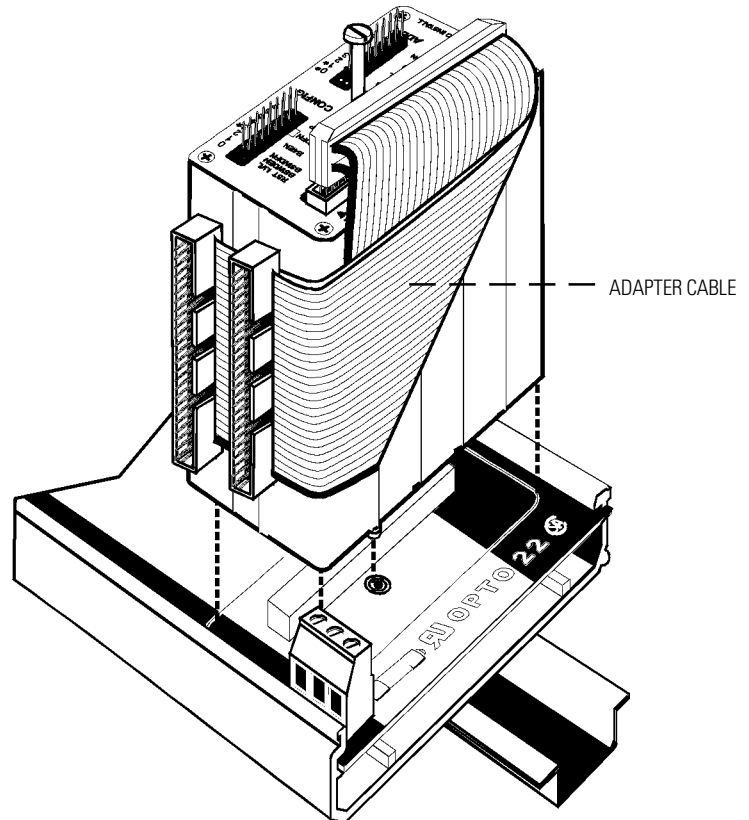
To install the SNAP-B6 brain on a B Series rack:

1. Remove power from rack assembly.
2. Align the brain connector with the mating connector on mounting rack.
3. Seat brain onto connector.
4. Use integral hold-down screw to secure in position.

DO NOT OVERTIGHTEN!

To remove the brain from a B Series rack:

1. Remove power from rack assembly.
2. Loosen integral hold-down screw on brain.
3. Pull up on brain.



More About Opto 22

Products

Opto 22 develops and manufactures reliable, flexible, easy-to-use hardware and software products for industrial automation, remote monitoring, and data acquisition applications.

SNAP PAC System

Designed to simplify the typically complex process of understanding, selecting, buying, and applying an automation system, the SNAP PAC System consists of four integrated components:

- SNAP PAC controllers
- PAC Project™ Software Suite
- SNAP PAC brains
- SNAP I/O™

SNAP PAC Controllers

Programmable automation controllers (PACs) are multifunctional, multidomain, modular controllers based on open standards and providing an integrated development environment.

Opto 22 has been manufacturing PACs for many years. The latest models include the standalone SNAP PAC S-series and the rack-mounted SNAP PAC R-series. Both handle a wide range of digital, analog, and serial functions and are equally suited to data collection, remote monitoring, process control, and discrete and hybrid manufacturing.

SNAP PACs are based on open Ethernet and Internet Protocol (IP) standards, so you can build or extend a system without the expense and limitations of proprietary networks and protocols.

PAC Project Software Suite

Opto 22's PAC Project Software Suite provides full-featured and cost-effective control programming, HMI (human machine interface) development and runtime, OPC server, and database connectivity software to power your SNAP PAC System.

These fully integrated software applications share a single tagname database, so the data points you configure in PAC Control™ are immediately available for use in PAC Display™, OptoOPCServer™, and OptoDataLink™. Commands are in plain English; variables and I/O point names are fully descriptive.

PAC Project Basic offers control and HMI tools and is free for download on our website, www.opto22.com. PAC Project Professional, available for separate purchase, adds OptoOPCServer, OptoDataLink, options for Ethernet link redundancy or segmented networking, and support for legacy Opto 22 serial *mistic*™ I/O units.

SNAP PAC Brains

While SNAP PAC controllers provide central control and data distribution, SNAP PAC brains provide distributed intelligence for I/O processing and communications. Brains offer analog, digital, and serial functions, including thermocouple linearization; PID loop control; and optional high-speed digital counting (up to 20 kHz), quadrature counting, TPO, and pulse generation and measurement.

SNAP I/O

I/O provides the local connection to sensors and equipment. Opto 22 SNAP I/O offers 1 to 32 points of reliable I/O per module, depending on the type of module and your needs. Analog, digital, serial, and special-purpose modules are all mixed on the same mounting rack and controlled by the same processor (SNAP PAC brain or rack-mounted controller).

Quality

Founded in 1974 and with over 85 million devices sold, Opto 22 has established a worldwide reputation for high-quality products. All are made in the U.S.A. at our manufacturing facility in Temecula, California. Because we do no statistical testing and each part is tested twice before leaving our factory, we can guarantee most solid-state relays and optically isolated I/O modules for life.

Free Product Support

Opto 22's Product Support Group offers free, comprehensive technical support for Opto 22 products. Our staff of support engineers represents decades of training and experience. Product support is available in English and Spanish, by phone or email, Monday through Friday, 7 a.m. to 5 p.m. PST.

Free Customer Training

Hands-on training classes for the SNAP PAC System are offered at our headquarters in Temecula, California. Each student has his or her own learning station; classes are limited to nine students. Registration for the free training class is on a first-come, first-served basis. See our website, www.opto22.com, for more information or email training@opto22.com.

Purchasing Opto 22 Products

Opto 22 products are sold directly and through a worldwide network of distributors, partners, and system integrators. For more information, contact Opto 22 headquarters at 800-321-6786 or 951-695-3000, or visit our website at www.opto22.com.

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