This product is obsolete.

OPTO 22

DATA SHEET

Form 1000-230112

BRAINS
SNAP
ANALOG AND DIGITAL

Part Number	Description
B3000-HA	32-channel ARCNET analog and digital brain

Description

***** This product is Obsolete and no longer available. *****

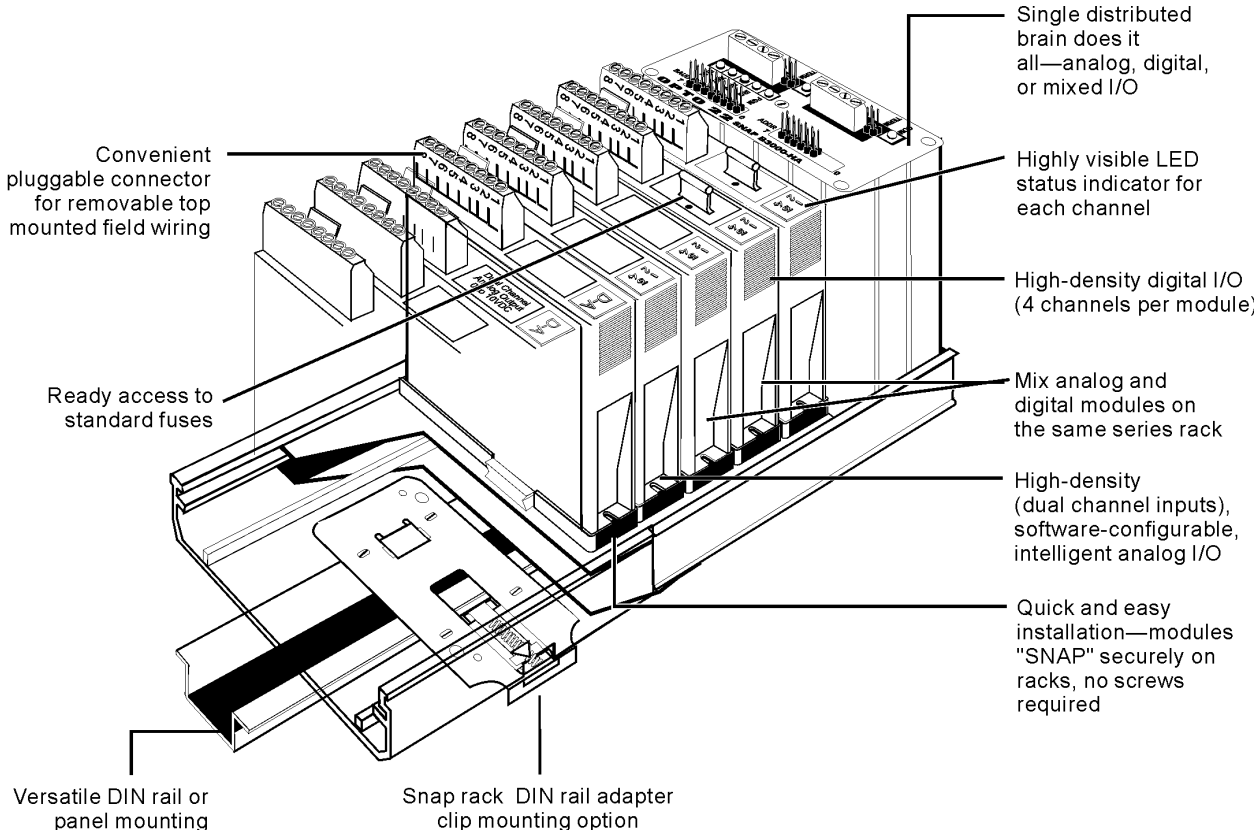
The B3000-HA is one of Opto 22's high-performance SNAP brains that remotely control a mix of both analog and digital I/O modules using Opto 22's SNAP B-series I/O mounting racks. The B3000-HA can be used with either an Opto 22 controller or a host computer. On-board intelligence offers many distributed control functions.

The B3000-HA brain communicates via dual, twisted-pair ARCNET ports. Communicating at 2.5 megabits per second, either port can be used to communicate to a host controller or PC, or both ports can be used for redundant communication. Dual-port ARCNET cards are available for the PC and for the M4 family of controllers from Opto 22.

Using the Mistic protocol, advanced I/O processing—including PID calculations (100-millisecond update), pulse-width duration measurements (100-microsecond resolution), and high-speed counting (20,000 Hz)—can all be done simultaneously on separate channels of the same I/O mounting rack.

Using the Mistic protocol and an Opto 22 controller, SNAP I/O customers can take advantage of FactoryFloor, Opto 22's suite of Microsoft® Windows® 32-bit software. OptoControl, the programming cornerstone of FactoryFloor, uses the distributed control capability of the B3000-HA brain and takes advantage of the graphical Windows 95 or Windows NT® interface to make it easy to configure, design, and troubleshoot your control system.

For applications not using FactoryFloor, Opto 22's OptoDriver Toolkit—Mistic I/O and Optomux—can be used for direct communications from a host PC to the SNAP-B3000. The toolkit includes 32-bit Windows drivers, 16-bit Windows drivers, and Opto 22's Classic DOS drivers. The kit also provides the files, documentation, and examples needed to write Microsoft Windows and DOS software applications. Programmers can access the Opto 22 I/O hardware using high-level languages such as Microsoft Visual C++® or Microsoft Visual Basic®.



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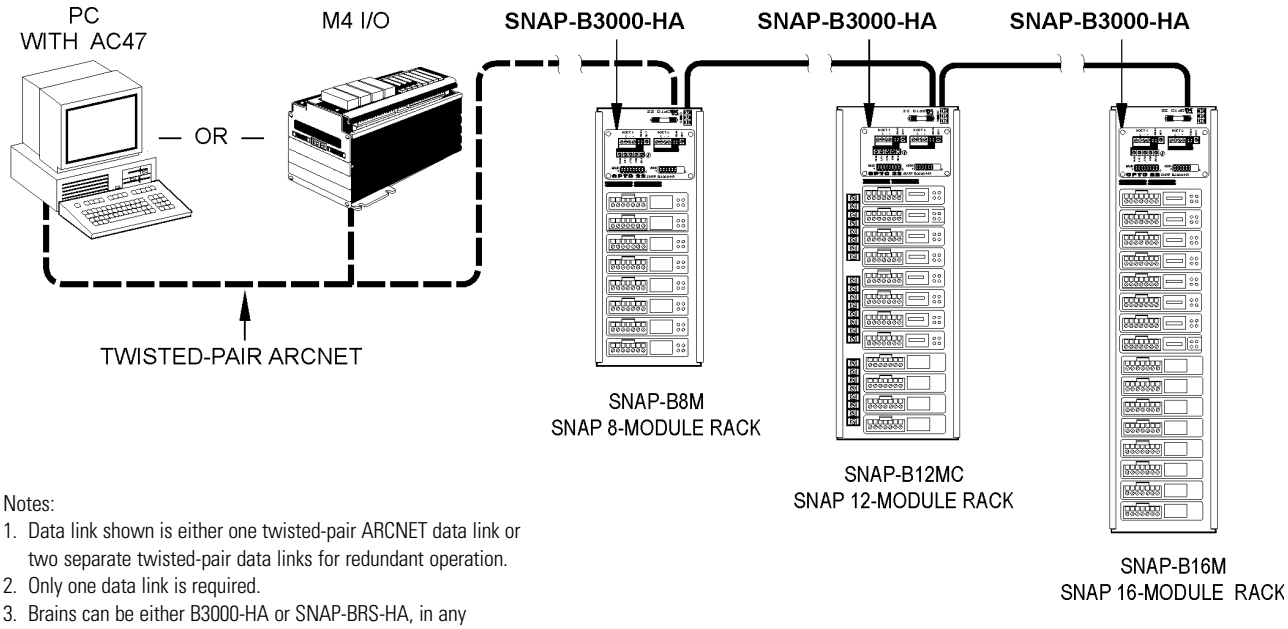
Description (continued)

B3000-HA System Architecture



Notes:
1. Data link shown is either one twisted-pair ARCNET data link or two separate twisted-pair data links for redundant operation.
2. Only one data link is required.
3. Brains can be either B3000-HA or SNAP-BRS-HA, in any combination.
4. B3000-HA does not support interrupts, IRQs.

B3000-HA Functions

Digital Functions

Input Latching
Pulse Duration Measurement (0.1 msec resolution)
Counting (32-bit at 20kHz)
On/Off Time Totalization
Output Pulse Generation (0.1 msec resolution)
Time-Proportional Output (1 msec resolution)
On/Off Status
Time Delays

Analog Functions

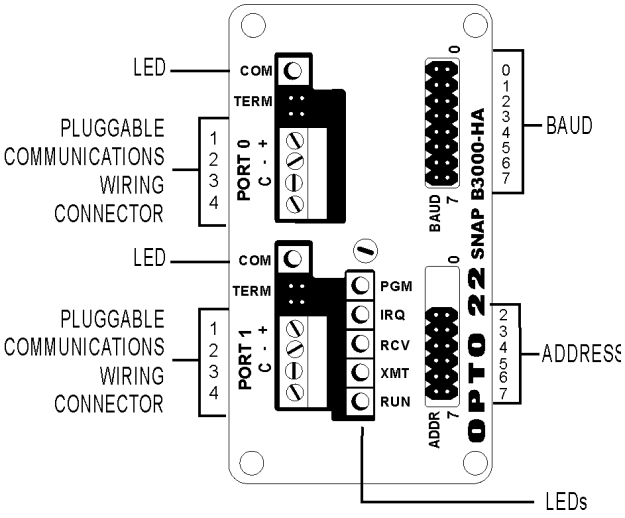
PID Loop Control
High/Low Limit Monitoring
Thermocouple Linearization
Digital Filtering
Ramping/Waveform Generation
Programmable Offset and Gain
Engineering Unit Scaling
Square Root Extraction

Specifications [OBSOLETE]

Power Requirements	5.0 VDC ± 0.1 VDC at 1.0A max.
Operating Temperature	0° to 70° C, 5–95% humidity, non-condensing
CPU	16-bit Intel 80C196 I/O processor
Communications Interface	Node 0 and Node 1; twisted-pair ARCNET at 2.5 megabits per second. Either port can be used, or both ports can be used for redundant processor-to-I/O communication.
Data Rates	2.5 megabits per second; baud jumpers, although present, have no effect.
Range (Multidrop Mode):	Up to 1,000 feet with up to 17 nodes. Repeaters and conversion from Coax cable are commercially available.
Counter/Frequency Measurement	Maximum Rate: 20 kHz Minimum Pulse Width: 10 µsec
Output Pulse	Maximum Rate: 500 Hz Minimum Pulse Width: 1 msec
PID Update Rate	100 msec (for 1 to 8 PID loops)
LED Indicators	RUN (Power On), XMT (Activity), PGM (Program), and COM ports
Options: Jumper Selectable	Address, Node 0 Termination, Node 1 Termination
Cable	CAT-3 or CAT-5 UTP

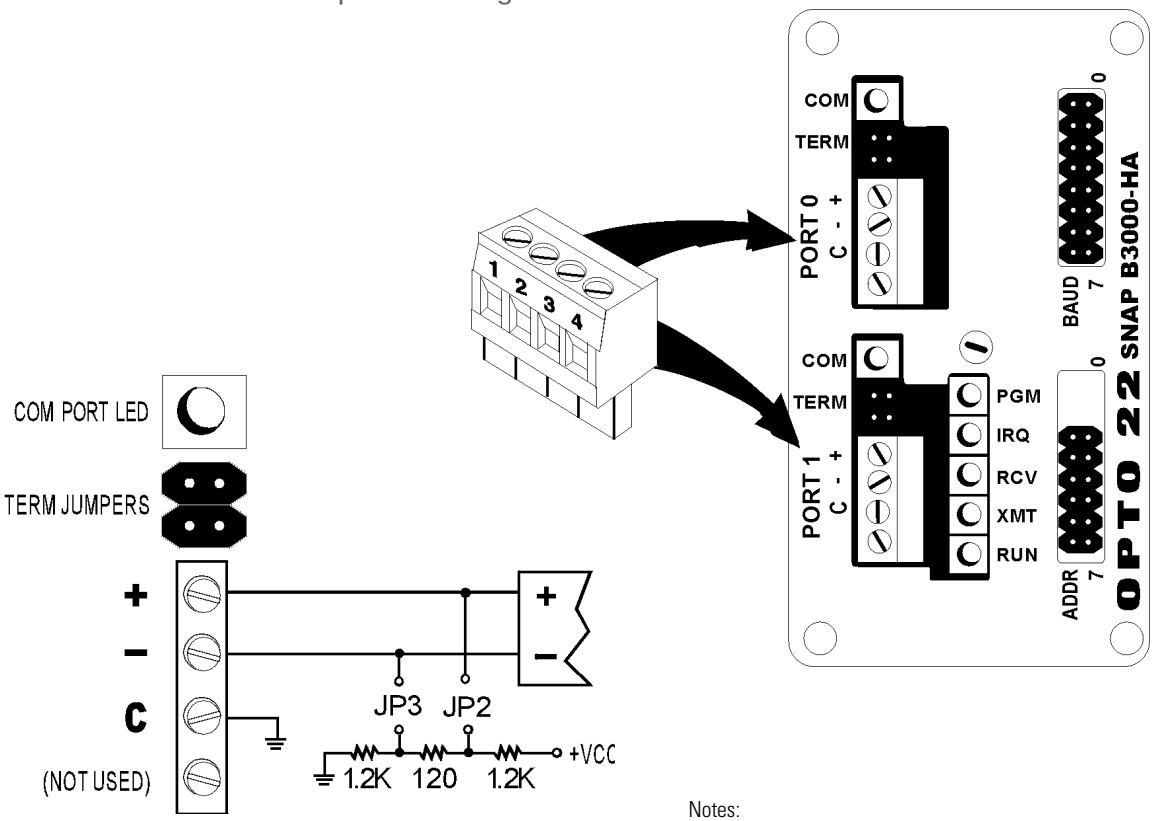
Connectors And Jumpers

Top View: B3000-HA SNAP Brain



Specifications (continued) **[OBSOLETE]**

Communication Jumpers/Wiring



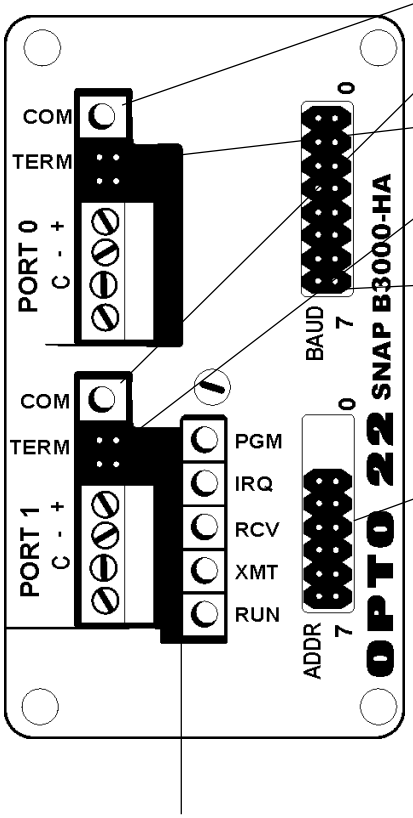
Notes:

1. CAT-3 or CAT-5 UTP cable must be used.
2. The unused pairs (wires) of the cable should be grounded at one end only.
3. When connecting devices on an ARCNET network, be sure to connect the positive terminal of one device to the positive terminal of the next device, and the negative terminal of one device to the negative terminal of the next device.
4. Node termination jumpers are provided to terminate the ARCNET transmission line if this brain is at the end of the data link. Install both node jumpers if this brain is at the end of the link. Do not install any jumpers if this brain is located in the middle of the communication link.
5. The two "nodes" are not two separate addresses, but the same address. The second node is for redundant communications only.

Specifications (continued) [OBSOLETE]

Baud/Address Jumpers and LED Descriptions

B3000-HA SNAP Brain



COM LEDs
When configured for redundant communication, only one port is active at a time. Only the active port will have the com LED lit.

NODE Termination Jumpers
If the B3000-HA is at the physical end of the ARCNET communication link, install both NODE jumpers for that node. Do not install NODE jumpers if the brain is not at the end of the link.

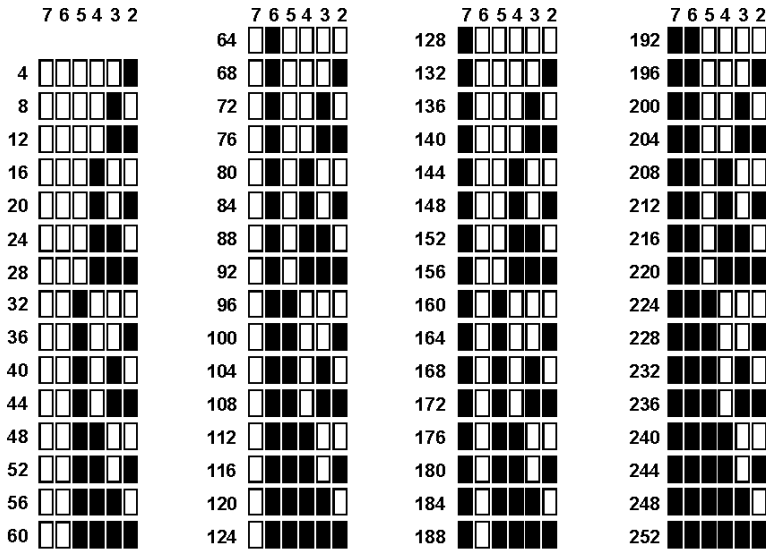
BAUD Jumpers
Although BAUD jumpers are present on the B3000-HA, they have no effect on the operation of the brain. All ARCNET communication is at 2.5 megabits per second.

Address/Node ID Jumpers
Address jumpers 0 and 1 are not used on the B3000-HA SNAP brain. If they are present, they have no function. All B3000-HA addresses begin at 4 or at an even multiple of 4. Address 0 is not valid. The ARCNET Node ID will be the same for both ports. It will match the address of the brain.

LED Descriptions

LED	Description
PGM	LED is on during Flash memory upgrade. Normally LED is off.
IRQ	Not supported.
RCV	Not supported.
XMT	Indicates activity on the communication line.
RUN	Processor has power (at least 4.75 VDC).

Address Jumpers

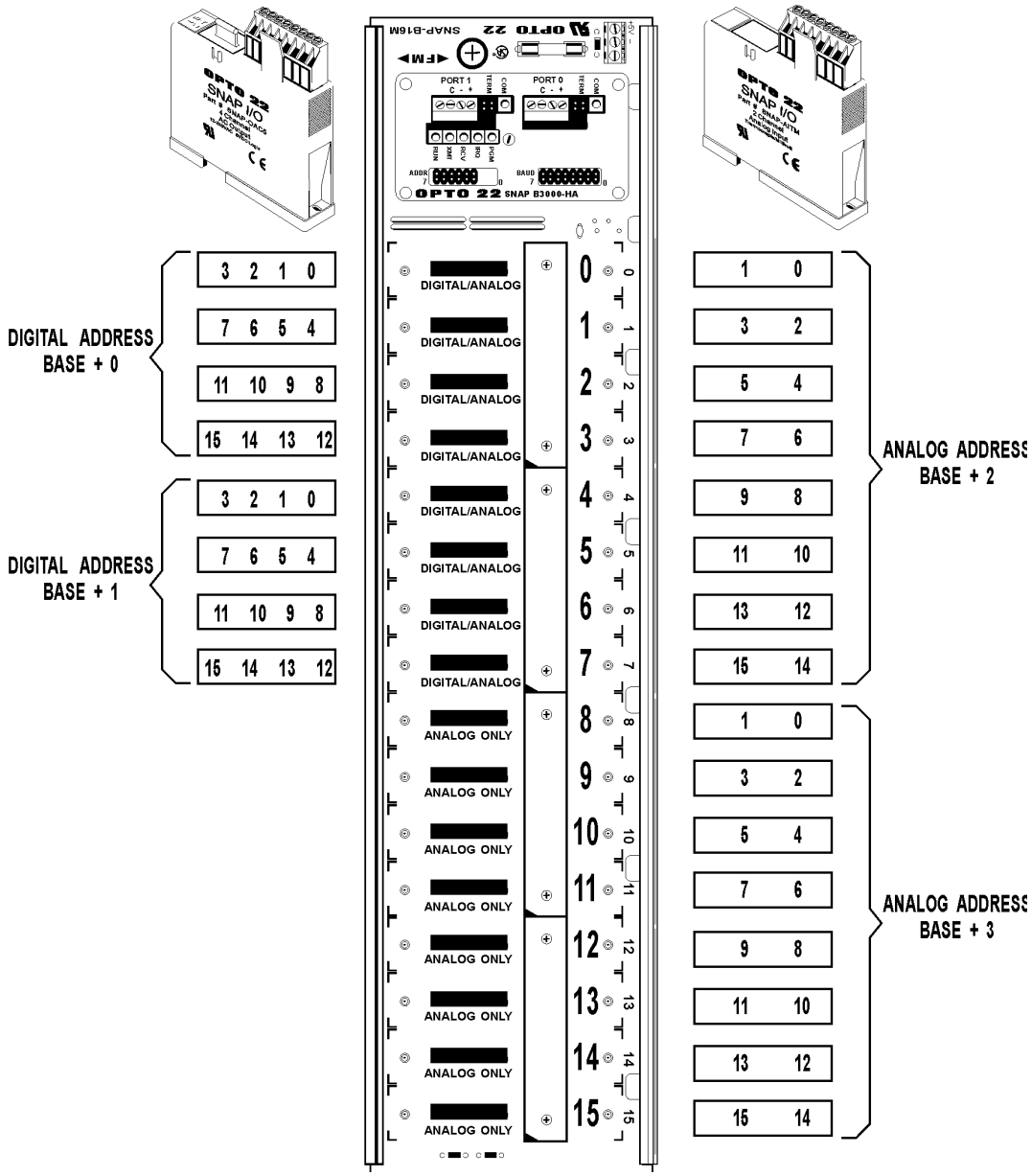


■ = JUMPER INSTALLED □ = NO JUMPER

B3000-HA 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 anlog inputs and outputs in many of the same module positions, you can choose where to install modules and how to use the points.

The following page explains addressing for the digital and analog modules.



B3000-HA I/O Mapping (Continued)

The B3000-HA SNAP brain is connected to a SNAP B-Series I/O rack, which can hold either 8, 12, or 16 SNAP modules. Digital modules (either input or output) contain four channels of I/O. Analog input modules contain two channels, and analog output modules contain either one or two channels. Both analog and digital modules can be on the same rack.

As shown in the diagram on the previous page, a B3000-HA is capable of addressing a maximum of 32 channels of digital I/O and 32 channels of analog I/O. However, the I/O mounting racks will not accommodate 32 channels of both digital and analog.

The actual number of channels available depends on the combination of modules chosen. For example, the SNAP-B16M rack can mount 16 modules. Up to eight of these modules can be digital, providing 32 channels of digital I/O. The remaining eight module positions can be analog, providing up to 16 channels of analog I/O. However, if all 16 modules are analog, up to 32 channels of analog I/O are available.

I/O on the B3000-HA brain is divided into four addresses of I/O (two digital I/O and two analog I/O). The digital addresses are base+0 and base+1. The analog addresses are base+2 and base+3. Therefore, if a SNAP brain is configured at address 12, the digital addresses would be 12 and 13 and the analog addresses would be 14 and 15.

First Four Module Positions (0–3):

Each position can hold either a digital or an analog module. They can be all analog, all digital, or any mix of both. These four positions constitute the 16 digital channels of digital address base+0, or the first eight analog channels of analog address base+2.

Second Four Module Positions (4–7):

Each position can hold either a digital or an analog module. They can be all analog, all digital, or any mix of both. These four positions constitute the 16 digital channels of digital address base+1, or the second eight analog channels of analog address base+2.

Third Four Module Positions (8–11):

These positions can hold analog modules only. These four positions constitute the first eight analog channels of analog address base+3.

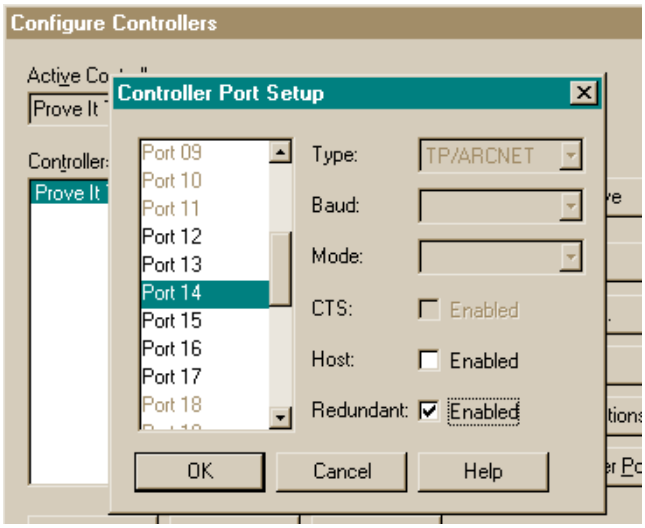
Fourth Four Module Positions (12–15):

These positions can hold analog modules only. These four positions constitute the second eight analog channels of analog address base+3.

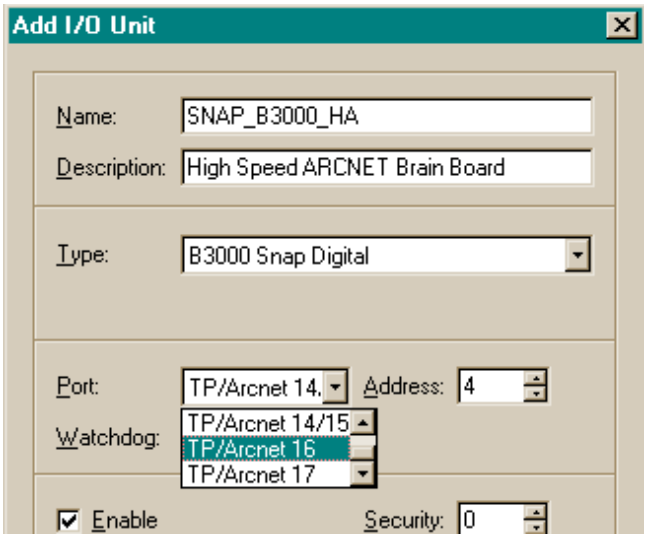
OptoControl Port Configuration

Several I/O port designations in OptoControl support twisted-pair ARCNET on PCs and M4 controllers. Ports 12 through 17 are configured as ARCNET ports and can be used as individual ports or in pairs for redundant communication. For redundant communication, the pair must begin on an even boundary (12, 14, or 16).

In the Configure Controllers dialog box, click the Set Up Controller Ports button. Choose the port number. For redundant communication, check the Redundant box to configure a pair of ports beginning with an even address, 12, 14, or 16.



If the Redundant box is checked as shown above, the two ports are grouped together in the Add I/O Unit or Edit I/O Unit dialog box. The following figure shows the Add I/O Unit dialog box with ports 14 and 15 grouped as a redundant pair:



OptoControl I/O Configuration

As the diagram on page 6 shows, positions 0 through 7 on the SNAP rack can contain either digital or analog modules.

If you configure a digital module in position 0 at the address base+0, you cannot configure an analog module in position 0 on analog address base+2. In OptoControl, the Configure I/O Points dialog box will show that those channels are used by a SNAP digital module.

Digital

When configuring the unit, select B3000 SNAP Digital as the Type in the Add I/O Unit dialog box. The digital addresses are base+0 and base+1. If the SNAP brain is configured at address 12 (base), the digital addresses would be 12 and 13. Two separate digital brains must be configured; one at address 12 and the other at address 13.

When any digital I/O point is configured on a SNAP brain, OptoControl automatically creates and configures the other three points in the module. For example, if a digital SNAP point is added at channel 5, then identical points are created at channels 4, 6, and 7. Names are automatically created for these new points based on the name entered for the original point.

You can change the name, description, features, default, and watchdog for each point independently. Note that if the module type of one digital point is changed, then the module type for the other three points in that module is automatically changed to match.

Analog

When configuring the unit, select B3000 SNAP Analog as the Type in the Add I/O Unit dialog box. The analog addresses are base+2 and base+3. If the SNAP brain is configured at address 12 (base), the analog addresses would be 14 and 15. Two separate addresses must be configured.

Inputs—When an input is configured, OptoControl automatically creates and configures the other input point on that module. You can change the name, description, default, and watchdog fields for the other point. You cannot change the module type and scaling.

Outputs—When an output is configured, OptoControl automatically creates and configures the other output channel on that module. Most SNAP analog output modules have two channels. On single-output modules, only the even-numbered channel is usable (0, 2, 4, and so on). The odd-numbered channel is not valid.

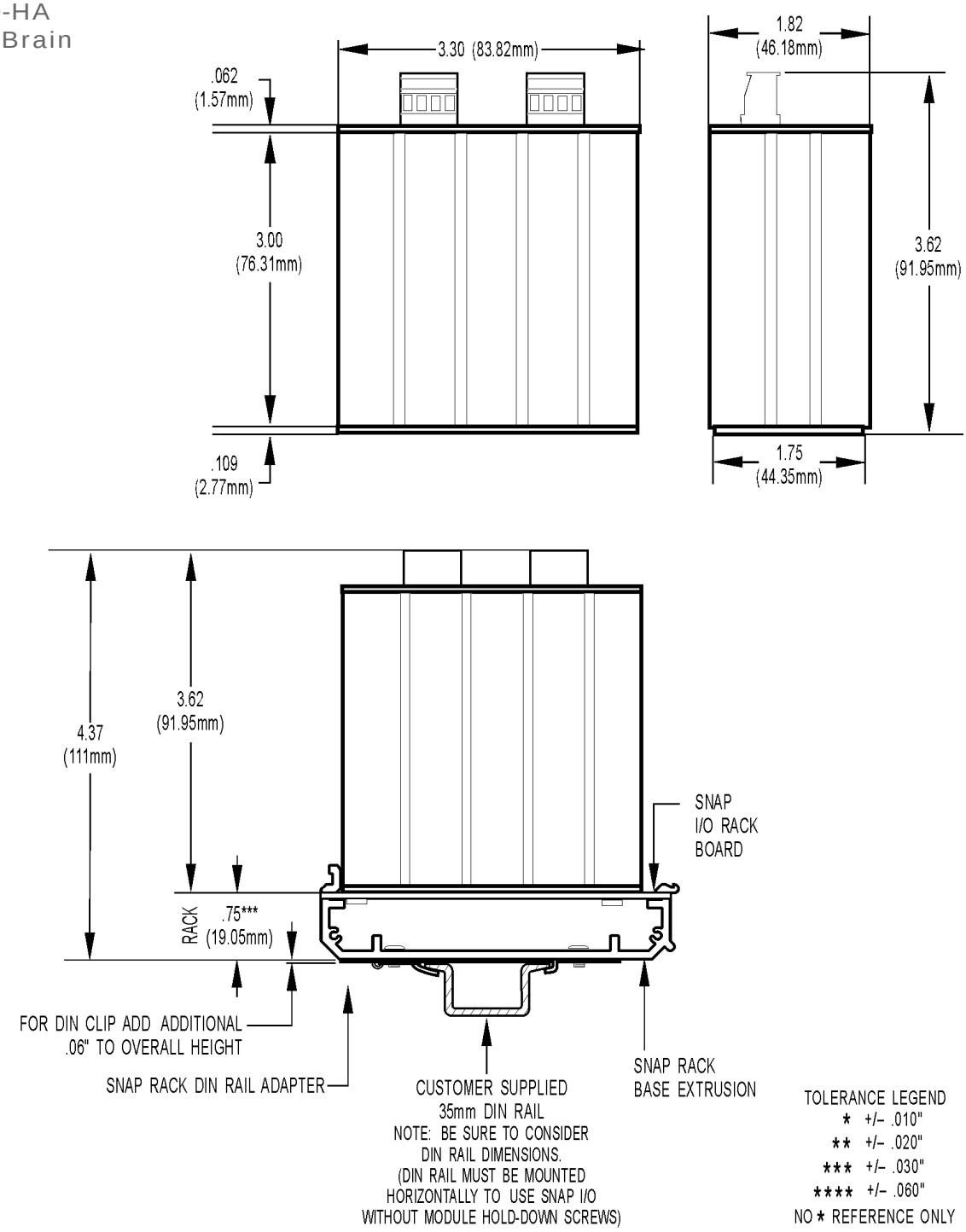
Other Notes

Event/reactions and PID loops can only operate on points in the same address group. They behave just like standard I/O in this sense, and cannot cross address boundaries. For example, a PID loop cannot use an input on Address Base+2 to control an output on Base+3, because Base+3 is, logically, a different brain.

Up to 127 event/reactions can be configured per SNAP address.

Dimensions

B3000-HA
SNAP Brain



Assembly

Brain

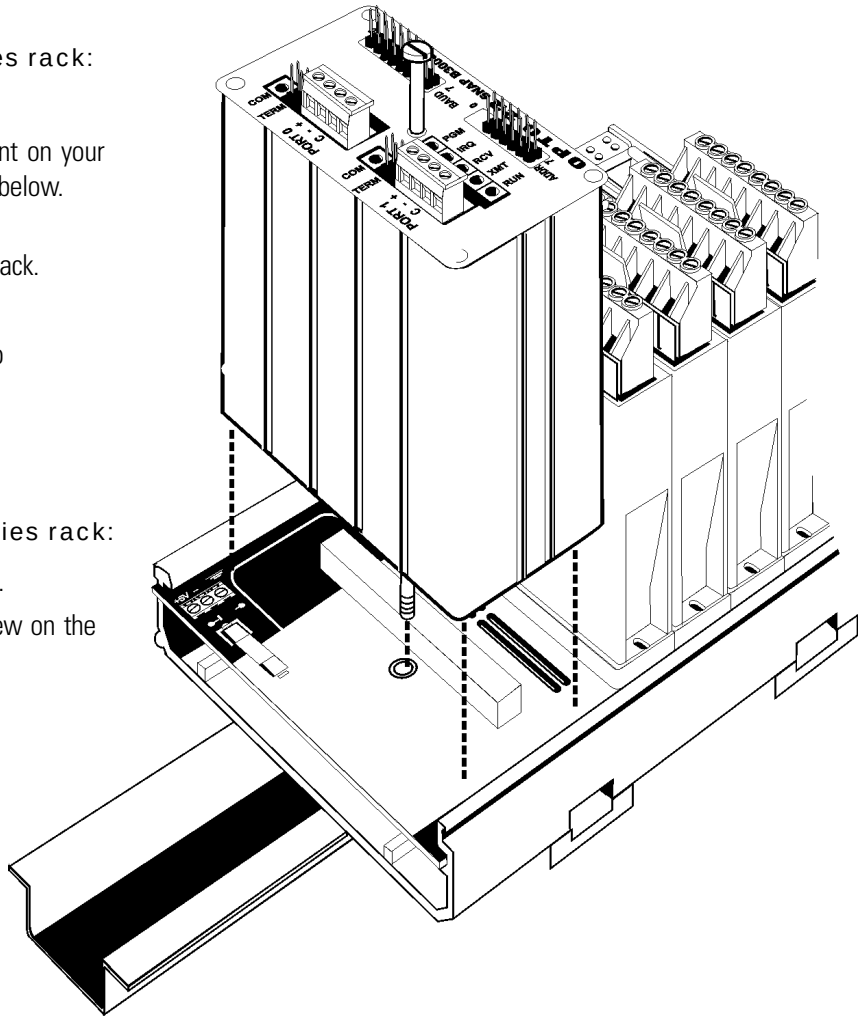
To install the brain onto a B-Series rack:

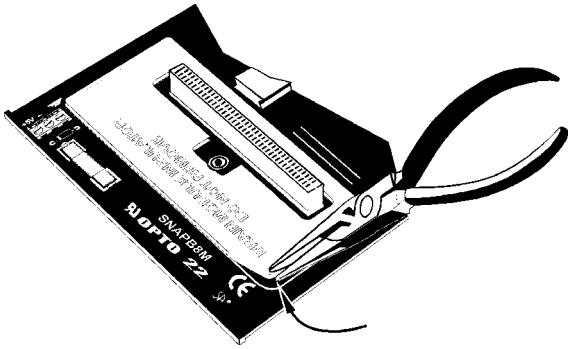
1. Turn off power to the rack assembly.
2. If a plastic brain insulator is present on your mounting rack, remove it as shown below.
3. Align the brain connector with the mating connector on the mounting rack.
4. Seat the brain onto the connector.
5. Use the integral hold-down screw to secure the brain in position.

   DO NOT OVERTIGHTEN!

To remove the brain from a B-Series rack:

1. Turn off power to the rack assembly.
2. Loosen the integral hold-down screw on the brain.
3. Pull up on the brain.





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groov RIO edge I/O offers a single, compact, PoE-powered industrial package with web-based configuration and IIoT software built in, support for multiple OT and IT protocols, and security features like a device firewall, data encryption, and user account control.

Standing alone, *groov* RIO connects to sensors, equipment, and legacy systems, collecting and securely publishing data from field to cloud. Choose a universal I/O model with thousands of possible field I/O configurations, with or without Ignition from Inductive Automation®, or a RIO EMU energy monitoring unit that reports 64 energy data values from 3-phase loads up to 600 VAC, Delta or Wye.

You can also use *groov* RIO with a Modbus/TCP master or as remote I/O for a *groov* EPIC system.

groov EPIC® System

Opto 22's *groov* Edge Programmable Industrial Controller (EPIC) system gives you industrially hardened control with a flexible Linux®-based processor with gateway functions, guaranteed-for-life I/O, and software for your automation and IIoT applications.

groov EPIC Processor

The heart of the system is the *groov* EPIC processor. It handles a wide range of digital, analog, and serial functions for data collection, remote monitoring, process control, and discrete and hybrid manufacturing.

In addition, the EPIC provides secure data communications among physical assets, control systems, software applications, and online services, both on premises and in the cloud. No industrial PC needed.

Configuring and troubleshooting I/O and networking is easier with the EPIC's integrated high-resolution color touchscreen. Authorized users can manage the system locally on the touchscreen, on a monitor connected via the HDMI or USB ports, or on a PC or mobile device with a web browser.

groov EPIC I/O

groov I/O connects locally to sensors and equipment. Modules have a spring-clamp terminal strip, integrated wireway, swing-away cover, and LEDs indicating module health and discrete channel status. *groov* I/O is hot swappable, UL Hazardous Locations approved, and ATEX compliant.

groov EPIC Software

The *groov* EPIC processor comes ready to run the software you need:

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- Efficient MQTT data communications with string or Sparkplug data formats
- Multiple OPC UA server options
- HMI: *groov* View to build your own HMI viewable on touchscreen, PCs, and mobile devices; PAC Display for a Windows HMI; Node-RED dashboard UI
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From solid state relays, to world-famous G4 and SNAP I/O, to SNAP PAC controllers, older Opto 22 products are still supported and working hard at thousands of installations worldwide. You can count on us for the reliability and service you expect, now and in the future.

QUALITY

Founded in 1974, 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 test each product twice before it leaves our factory rather than testing a sample of each batch, we can afford to guarantee most solid-state relays and optically isolated I/O modules for life.

FREE PRODUCT SUPPORT

Opto 22's California-based Product Support Group offers free technical support for Opto 22 products from engineers with decades of training and experience. Support is available in English and Spanish by phone or email, Monday–Friday, 7 a.m. to 5 p.m. PST.

Support is always available on our website, including free online training at OptoU, how-to videos, user's guides, the Opto 22 KnowledgeBase, and OptoForums.

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