

SNAP High-Density Digital I/O Modules

Features

- 16 or 32 digital input points or output points in one compact SNAP module
- Up to 16 high-density digital modules on a SNAP rack, making up to 512 digital points available on one rack
- Convenient pluggable wiring harness, breakout racks, and header cables (available separately)
- Rugged packaging
- Operating temperature: 0 to 70 °C

Description

SNAP high-density digital (HDD) modules from Opto 22 provide 16 or 32 digital input or output points in one compact SNAP module. All HDD modules work with the SNAP PAC System, which consists of SNAP PAC controllers and brains, SNAP PAC racks, SNAP I/O modules, and PAC Project software.

SNAP high-density digital modules are ideal for OEMs and for anyone who has high point-count applications. The high-density point configuration reduces per-point costs of digital I/O systems by providing up to eight times as many I/O points in the same space.

The following high-density digital modules are available:

- The **SNAP-IDC-32** digital input module, with 32 input points, can be used to sense on/off status for 10–32 VDC inputs from sources such as proximity switches, limit switches, push buttons, and pilot switches.
- The **SNAP-IDC-16** digital input module offers 16 points with channel-to-channel isolation. It can sense on/off status for 10–32 VDC/VAC loads.
- **SNAP-IAC-16** and **SNAP-IAC-A-16** digital input modules each have 16 points with channel-to-channel isolation. These modules sense on/off status for 90–140 VAC (SNAP-IAC-16) or 180–280 VAC (SNAP-IAC-A-16).
- **SNAP-ODC-32-SRC** and **SNAP-ODC-32-SNK** digital output modules have 32 points and can switch on and off 5–60 VDC loads, either sourcing or sinking.

All HDD input modules feature automatic counting and latching. The DC models are ideal for detecting low-voltage auxiliary contacts.



SNAP-IDC-32 high-density digital input module

Part Numbers

Part	Description
SNAP-IDC-32	SNAP 32-point digital input module, 10–32 VDC
SNAP-IDC-16	SNAP isolated 16-point digital input module, 10–32 VDC/VAC
SNAP-IAC-16	SNAP isolated 16-point digital input module, 90–140 VAC/VDC
SNAP-IAC-A-16	SNAP isolated 16-point digital input module, 180–280 VAC/VDC
SNAP-ODC-32-SRC	SNAP 32-point digital output module, 5–60 VDC load sourcing
SNAP-ODC-32-SNK	SNAP 32-point digital output module, 5–60 VDC load sinking
SNAP-HD-ACF6	6 ft. (1.8 m) wiring harness assembly for SNAP 16-point digital modules
SNAP-HD-CBF6	6 ft. (1.8 m) wiring harness for SNAP 32-point digital modules
SNAP-HD-BF6	6 ft. (1.8 m) header cable for SNAP 32-point digital modules and breakout racks
SNAP-IDC-HDB	Fused breakout rack for SNAP 32-point digital input modules
SNAP-ODC-HDB	Fused breakout rack for SNAP 32-point output modules
SNAP-HD-G4F6	6 ft. (1.8 m) header cable for SNAP 32-point digital modules and G4PB16 mounting racks
OPTOTERMINAL-G20	Terminal with operator controls for use with SNAP high-density digital modules

SNAP High-Density Digital I/O Modules

Mounting Racks

SNAP high-density digital modules are designed to work with SNAP PAC mounting racks. Up to 16 modules can be mounted on a rack, making up to 512 digital points available. In addition, HDD modules can be mixed with 4-channel SNAP digital, analog, and serial modules on the same rack.

Wiring Aids: Flying Leads, Wiring Harnesses and Header Cables

Due to space constraints, instead of using the usual removable terminator connectors, high-density digital modules use other wiring devices.

The 16-point input modules use the **SNAP-HD-ACF6** wiring harness assembly (available separately) to connect to field devices. The assembly includes two 8-point connectors that plug securely into the top of the module and provide flying leads to field devices.

All 32-point modules use the **SNAP-HD-CBF6** wiring harness (available separately). This wiring harness connects to the top of the module and provides flying leads to field devices.

For convenient wiring with built-in fusing, 32-point digital modules can also connect to compact **SNAP-IDC-HDB** or **SNAP-ODC-HDB** breakout racks using the **SNAP-HD-BF6** header cable.

Breakout Racks

SNAP breakout racks for high-density digital modules provide LED indicators and easily accessible fused connectors for input or output points. The **SNAP-IDC-HDB** rack is used with 32-point digital input modules, and the **SNAP-ODC-HDB** rack is for 32-point digital output modules. The compact racks have labeled connectors, fusing, and indicators to simplify connecting field devices to these HDD modules. Each breakout rack connects to a 32-point input or output module with the **SNAP-HD-BF6** header cable.



SNAP-IDC-HDB breakout rack

G4 Digital I/O Connectivity

SNAP high-density digital modules can connect to G4PB16 mounting racks using the **SNAP-HD-G4F6** header cable to

integrate older G4 digital I/O systems with modern PAC Project software and SNAP Ethernet-based controllers. This connection also makes available the G4 I/O's 3-amp switching and sensing capability, which provides twelve times the 0.25 amp capability of the high-density digital modules themselves.

SNAP Product Compatibility

SNAP HDD modules are compatible with the SNAP PAC System and can be used on SNAP PAC mounting racks with SNAP PAC R-series controllers and SNAP PAC EB brains. Any other digital, analog, serial, and special-purpose SNAP I/O modules can be placed on the same rack with HDD modules for the mix of signals required at any location.

NOTE: For information on using HDD modules in older systems, see form #1688, the *SNAP PAC System Migration Technical Note*.

Programming

Opto 22 PAC Control software version 8.0 or greater is required if you are using SNAP high-density digital modules with a SNAP PAC controller. SNAP HDD modules can also be accessed by a custom software application built with the OptoMMP Communication Toolkit or by communication with a Modbus/TCP system.

See Opto 22 form 1547, the *SNAP High-Density Digital Modules User's Guide*, for detailed information on using these modules in PAC Control strategy. The OptoMMP Communication Toolkit is documented in Opto 22 form 1465, the *OptoMMP Protocol Guide*. For Modbus/TCP systems, see form 1678, the *Modbus/TCP Protocol Guide*.

OptoTerminal-G20

SNAP high-density digital modules have a diagnostic port for commissioning and troubleshooting using the optional **OptoTerminal-G20** operator interface terminal. The

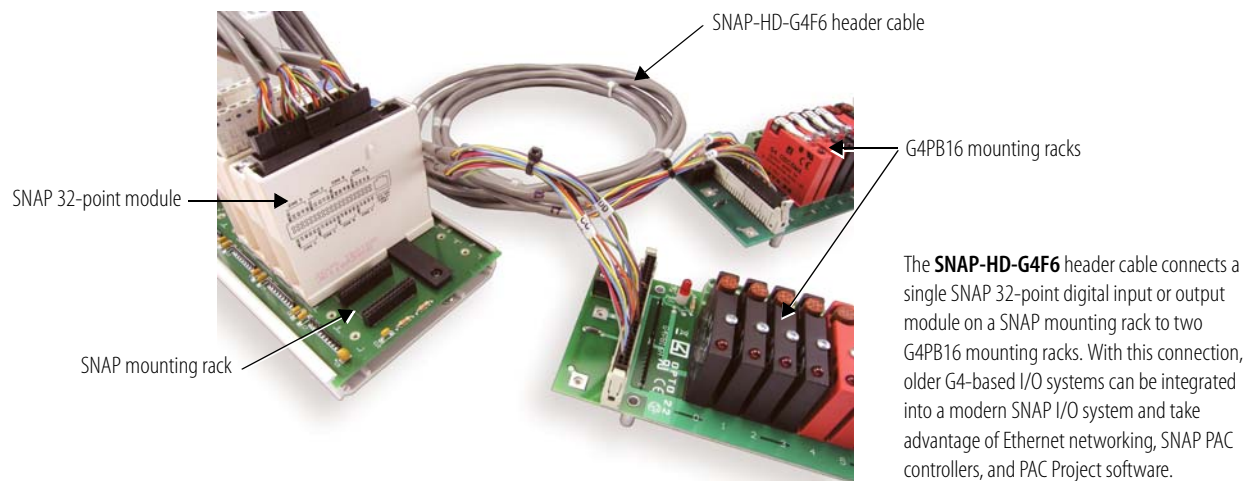
OptoTerminal-G20 displays the status of a high-density digital module's points on a two-line LCD display and can also be used to turn output points on and off. See Opto 22 form 1547, the *SNAP High-Density Digital Modules User's Guide*, for more information.



OptoTerminal-G20

SNAP High-Density Digital I/O Modules

Connecting to G4 Digital I/O



SNAP high-density digital I/O modules can connect to G4PB16 mounting racks using the **SNAP-HD-G4F6** header cable. This cable allows older G4 digital I/O systems to take advantage of modern Opto 22 products like SNAP PAC controllers, SNAP PAC brains, and PAC Project software. The header cable connects two G4PB16, G4PB16H, or G4PB16HC mounting racks to one high-density digital input or output module.

Comparing SNAP Digital Modules

IMPORTANT: SNAP high-density digital modules differ from each other and from 4-channel SNAP digital modules in several critical areas, including electrical capabilities and I/O performance.

You must consider these differences when deciding which SNAP digital module to use for an application. For example, while a SNAP-IDC-32 digital input module provides 32 I/O points on one module, it does not provide the channel-to-channel isolation of a SNAP-IDC-16 with 16 channels or a SNAP-IDC5 with 4. See the table [“Comparing SNAP High-Density and 4-Channel Digital Modules” on page 4](#) for a comparison of capabilities.

Counting

Digital counting is an important area in which HDD input modules differ from 4-channel SNAP digital input modules. Opto 22 has traditionally provided counting capability for any digital input point when used with a brain that supports high-speed digital features. This counting happens in the brain, not in the module.

SNAP high-density digital modules introduce a different kind of counting, where the counting occurs on the module itself. While the module uses a 16-bit counter (counting only to 65,535), the I/O processor used with the module accumulates counts to 32 bits by

periodically getting and clearing the module’s counts, and adding each new count to what it already has for that point. However, this is not high-speed counting because it is done on the module, and both the HDD module’s speed and communication speed between the brain and the module are limited. Note that counting speed on HDD modules is not deterministic and will vary.

However, this slower counting rate works well for many applications that involve counting at slower speeds—for example, rotating shafts, flow meters with pulsed outputs, and electrical meters tuned to slower speeds.

An advantage for high-density digital input modules is that they provide counting capability for SNAP-PAC-R2 on-the-rack controllers and SNAP-PAC-EB2 brains. These processors do not offer counting when used with 4-channel SNAP digital modules, but can provide counting when used with HDD input modules.

SNAP High-Density Digital I/O Modules

Comparing SNAP High-Density and 4-Channel Digital Modules

Item	SNAP High-Density Digital Modules	4-Channel SNAP Digital Modules
Number of points on module	16 or 32, depending on module	4
Isolation and fusing	16-point input modules: Each point is optically isolated from other points on the module. 32-point input and output modules: The module is divided into four groups of eight points. Groups are isolated from each other, but points within a group are not isolated from each other. Groups must be externally fused.	Input modules: Each point is optically isolated from other points on the module. Most output modules: Points are not isolated from each other. Points share a common fuse. See the <i>SNAP Digital Output Modules Data Sheet</i> (form #1144) for isolated modules.
Status LEDs	None; use the handheld OptoTerminal-G20 for module diagnostics and commissioning, or for 32-point modules, connect to an optional breakout rack.	One for each point, located on top of module.
Polling time from I/O processor to module ¹	2–30 ms typical ²	0.5–2 ms typical ²
Module turn-on/off time ¹	16-point input modules: 15–20 ms 32-point input modules: 6 ms Output modules: 100 microseconds	Varies by module. Examples: • SNAP-IDC5-FAST: 25 microseconds • SNAP-IDC5: 5 ms turn-on, 15 ms turn-off
Latching	Yes	Yes
Counting on digital input modules	Counting occurs on the module. ³ Counting is available with any compatible I/O processor (including SNAP-PAC-R2 and SNAP-PAC-EB2). Counting speeds: On 32-point modules, 0–50 Hz @ 50% duty cycle On 16-point modules, 0–25 Hz @ 50% duty cycle	High-speed counting occurs on the I/O processor (brain or on-the-rack controller) and can be configured for any point. (High-speed counting is available on SNAP-PAC-R1 and SNAP-PAC-EB1 processors.) Counting speed varies based on the processor and the speed of the module. Example: SNAP-PAC-EB1 brain with SNAP-IDC5-FAST: up to 20 KHz

¹ Actual turn-on and turn-off times equal the polling time plus the module time.

² Polling time varies based on the SNAP I/O processor (brain or on-the-rack controller), processor configuration, and Ethernet host communication activity.

³ The high-density digital module uses a 16-bit counter, but the processor used with the module accumulates counts to 32 bits by periodically getting and clearing the module's counts and adding to current values. Update time varies based on number of modules and Ethernet communication demands.

SNAP High-Density Digital I/O Modules

Specifications

SNAP High-Density Digital Input Modules

	SNAP-IDC-32	SNAP-IDC-16	SNAP-IAC-16	SNAP-IAC-A-16
Input Range	10–32 VDC	10–32 VDC/VAC	90–140 VAC/VDC	180–280 VAC/VDC
Input Resistance	20 K ohms	44 K ohms	300 K ohms	940 K ohms
Logic Voltage and Current	5 VDC ± 0.1 @ 150 mA	5 VDC ± 0.1 @ 150 mA	5 VDC ± 0.1 @ 150 mA	5 VDC ± 0.1 @ 150 mA
Input Arrangement	32 input channels; 4 groups of 8 inputs each (Points in each group share a common negative connection.)	16 isolated input channels	16 isolated input channels	16 isolated input channels
Channel-to-Channel Isolation	No channel-to-channel isolation; 100 V group-to-group isolation	250 V working, 1500 V transient	250 V working, 1500 V transient	250 V working, 1500 V transient
Maximum Number of HDD Modules on One Mounting Rack	16	16	16	16
Indicators	None; use optional OptoTerminal-G20 diagnostic display or break-out rack.	None; use optional OptoTerminal-G20 diagnostic display.	None; use optional OptoTerminal-G20 diagnostic display.	None; use optional OptoTerminal-G20 diagnostic display.
ON Voltage	10 VDC @ 0.5 mA	10 VDC @ 0.230 mA	90 VDC @ 0.3 mA	180 VDC @ 0.191 mA
OFF Voltage	3 VDC @ 0.1 mA	3 VDC @ 0.05 mA	40 VDC @ 0.135 mA	40 VDC @ 0.043 mA
Polling time from I/O processor to module ¹	2–30 ms typical ²	2–30 ms typical ²	2–30 ms typical ²	2–30 ms typical ²
Input Turn-On/Off Time	6 ms	15 ms turn-on time 20 ms turn-off time	15 ms turn-on time 20 ms turn-off time	15 ms turn-on time 20 ms turn-off time
Counting Frequency (DC input)	0–50 Hz @ 50% duty cycle	0–25 Hz @ 50% duty cycle	0–25 Hz @ 50% duty cycle	0–25 Hz @ 50% duty cycle

¹ Affects turn-on and turn-off determination

² Time varies based on the SNAP PAC I/O processor (brain or on-the-rack controller), processor configuration, and Ethernet host communication activity.

SNAP High-Density Digital I/O Modules

Specifications (continued)

SNAP High-Density Digital Output Modules

	SNAP-ODC-32-SRC	SNAP-ODC-32-SNK
Line Voltage	4–24 VDC	4–24 VDC
Logic Voltage and Current	5 VDC \pm 0.1 @ 150 mA	5 VDC \pm 0.1 @ 150 mA
Output Arrangement	32 output channels; 4 groups of 8 outputs each. Points in each group share a common positive connection.	32 output channels; 4 groups of 8 outputs each. Points in each group share a common negative connection.
Maximum Number of HDD Modules on One Mounting Rack	16	16
Indicators	None; use optional OptoTerminal-G20 diagnostic display or breakout rack.	None; use optional OptoTerminal-G20 diagnostic display or breakout rack.
Polling time from I/O processor to module ¹	2–30 ms typical ²	2–30 ms typical ²
Output Turn-On/Off Time	100 microseconds	100 microseconds
Maximum Load per Point	0.25 A	0.25 A
Forward Drop	0.15 VDC @ 0.25 A	0.15 VDC @ 0.25 A
Maximum Off State Voltage	60 VDC	60 VDC
Reverse Voltage	0.6 VDC	0.6 VDC
Surge (1 sec.)	1 A	1 A

¹ Affects turn-on and turn-off determination

² Time varies based on the SNAP PAC I/O processor (brain or on-the-rack controller), processor configuration, and Ethernet host communication activity.

SNAP High-Density Digital I/O Modules

Specifications (continued)

SNAP-IDC-HDB and SNAP-ODC-HDB Breakout Racks

SNAP-IDC-HDB Breakout Rack for High-Density Digital Input Module	
Used with	SNAP-IDC-32
Connectors	40-pin header connects to SNAP-IDC-32 module using SNAP-HD-BF6 header cable. 32 signal input connectors; each signal connector has a corresponding common connector. For each zone of 8 signal inputs, 1 connection for either module common or field common.
Indicators	1 LED for each signal input (32 signal LEDs total) 1 power status LED for each zone of 8 signal inputs (4 power LEDs total)
Fusing	1 A fuses; 2 fuses for each zone of 8 signal inputs (8 fuses total) Replace with Pudenz 1 A automobile mini-fuse or equivalent.
Jumpers	For each zone of 8 signal inputs, 1 jumper controls whether module common or field common is used.
SNAP-ODC-HDB Breakout Rack for High-Density Digital Output Modules	
Used with	SNAP-ODC-32-SRC SNAP-ODC-32-SNK
Connectors	40-pin header; connects to SNAP-ODC-32-SRC or SNAP-ODC-32-SNK module using SNAP-HD-BF6 header cable. 32 signal output connectors; each signal connector has a corresponding common connector. For each zone of 8 signal outputs, 1 connection for either module common or field common.
Indicators	1 LED for each signal output (32 signal LEDs total) 1 power status LED for each zone of 8 signal outputs (4 power LEDs total)
Fusing	1 A fuses; 1 fuse for each signal output (32 signal fuses total) Replace with Pudenz 1 A automobile mini-fuse or equivalent.
Jumpers	For each zone of 8 signal inputs, 1 jumper controls whether module common or field common is used.

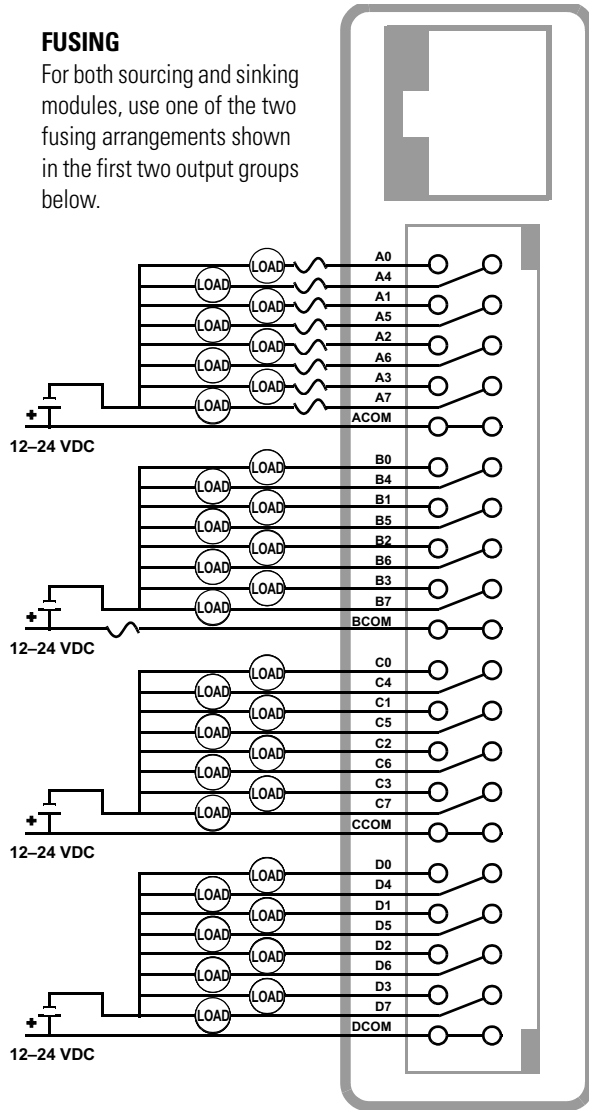
SNAP High-Density Digital I/O Modules

Pinouts and Wiring

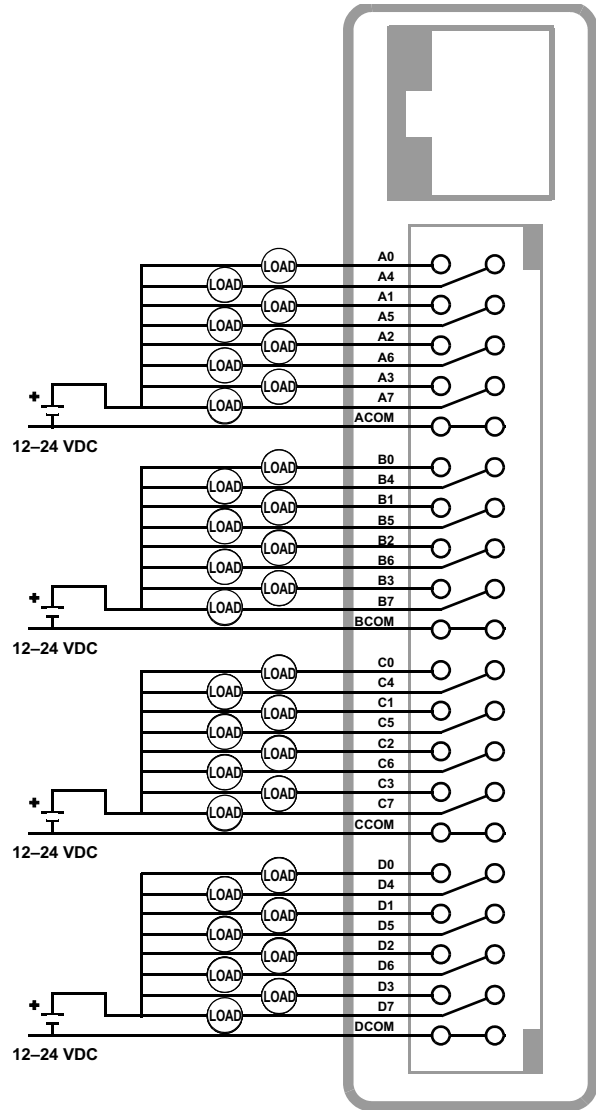
SNAP-IDC-ODC-32-SRC and SNAP-ODC-32-SNK

FUSING

For both sourcing and sinking modules, use one of the two fusing arrangements shown in the first two output groups below.



SNAP-ODC-32-SRC
Load Sourcing Module
(Top view of module)



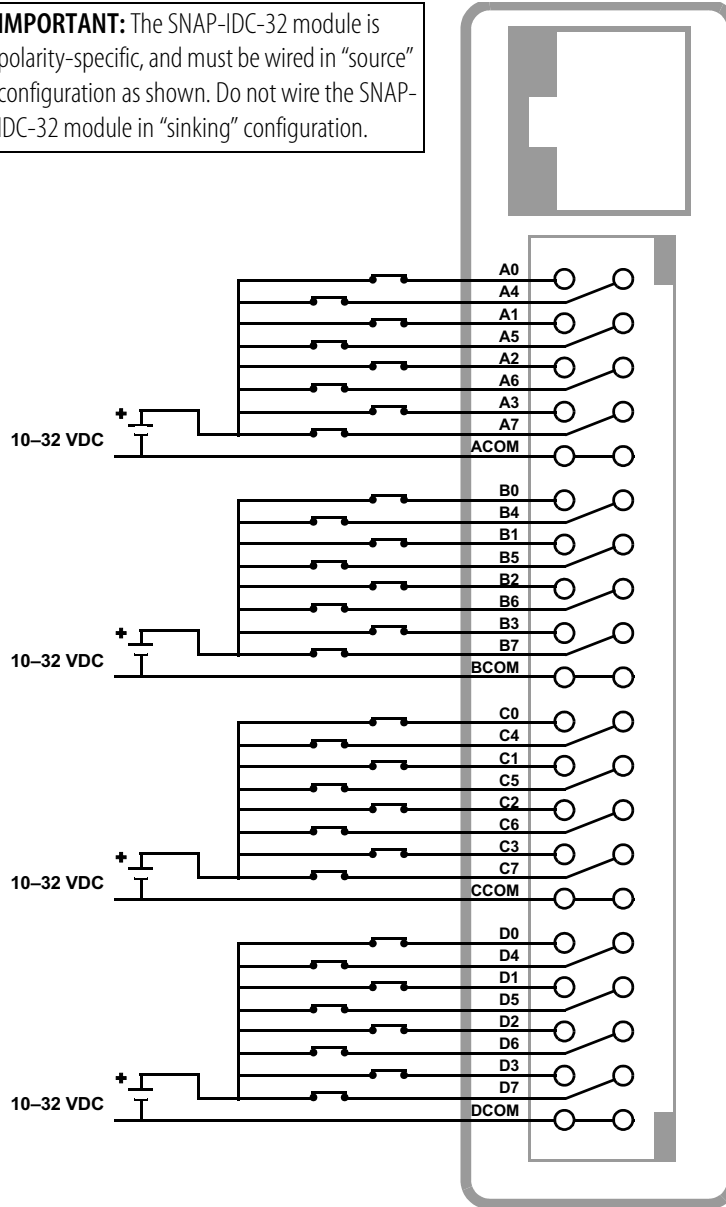
SNAP-ODC-32-SNK
Load Sinking Module
(Top view of module)

SNAP High-Density Digital I/O Modules

Pinouts and Wiring (continued)

SNAP-IDC-32

IMPORTANT: The SNAP-IDC-32 module is polarity-specific, and must be wired in "source" configuration as shown. Do not wire the SNAP-IDC-32 module in "sinking" configuration.

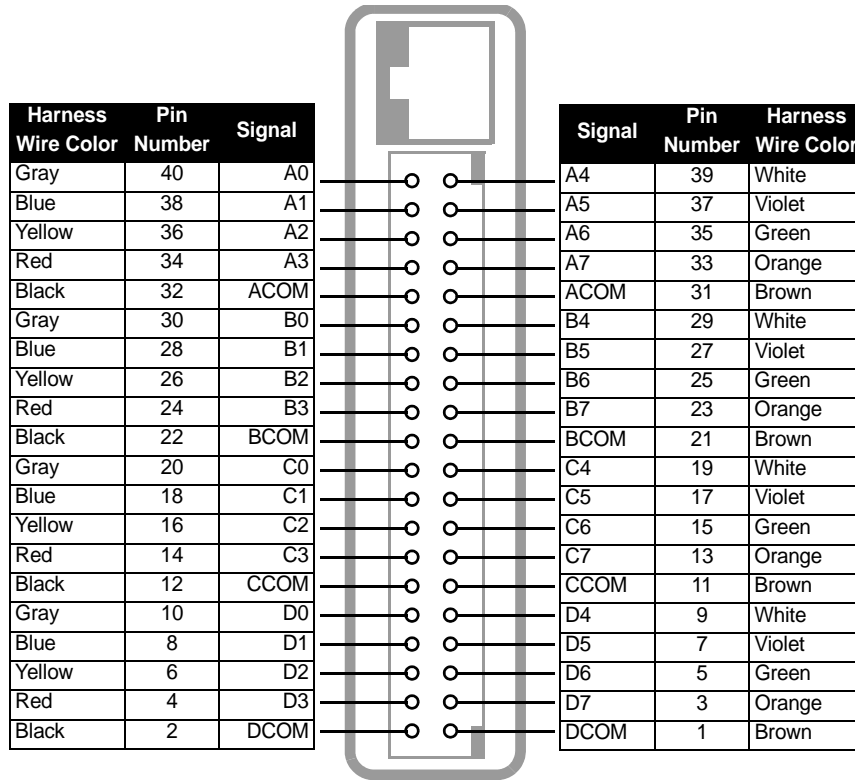


SNAP-IDC-32 32-Channel Digital Input Module (Top view)

SNAP High-Density Digital I/O Modules

Pinouts and Wiring (continued)

Connector Wiring—SNAP 32-Point Digital Modules

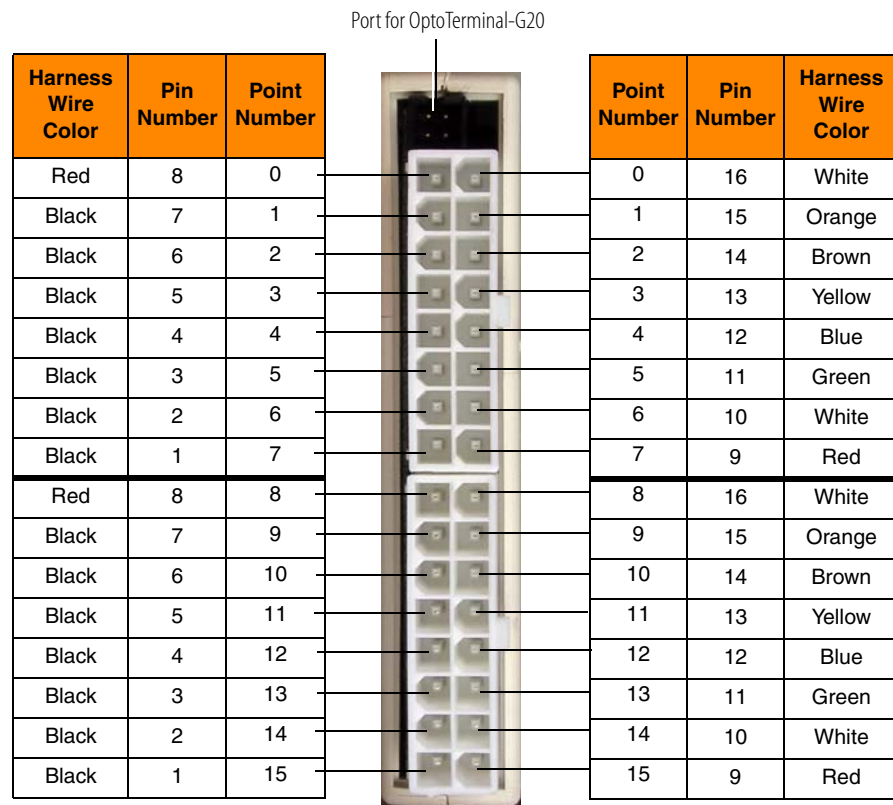


Connector wiring for SNAP-ODC-32-SNK, SNAP-ODC-32-SRC, and SNAP-IDC-32 high-density digital modules (top view of module)

SNAP High-Density Digital I/O Modules

Pinouts and Wiring (continued)

Connector Wiring—SNAP 16-Point Digital Modules



Connector wiring for SNAP-IDC-16, SNAP-IAC-16, and SNAP-IAC-A-16 high-density digital modules (top view of module)

NOTE: The small four-pin connector on the top of a 16-point module connects to the optional OptoTerminal-G20 using a special adapter cable. Contact Opto 22 Product Support for information.

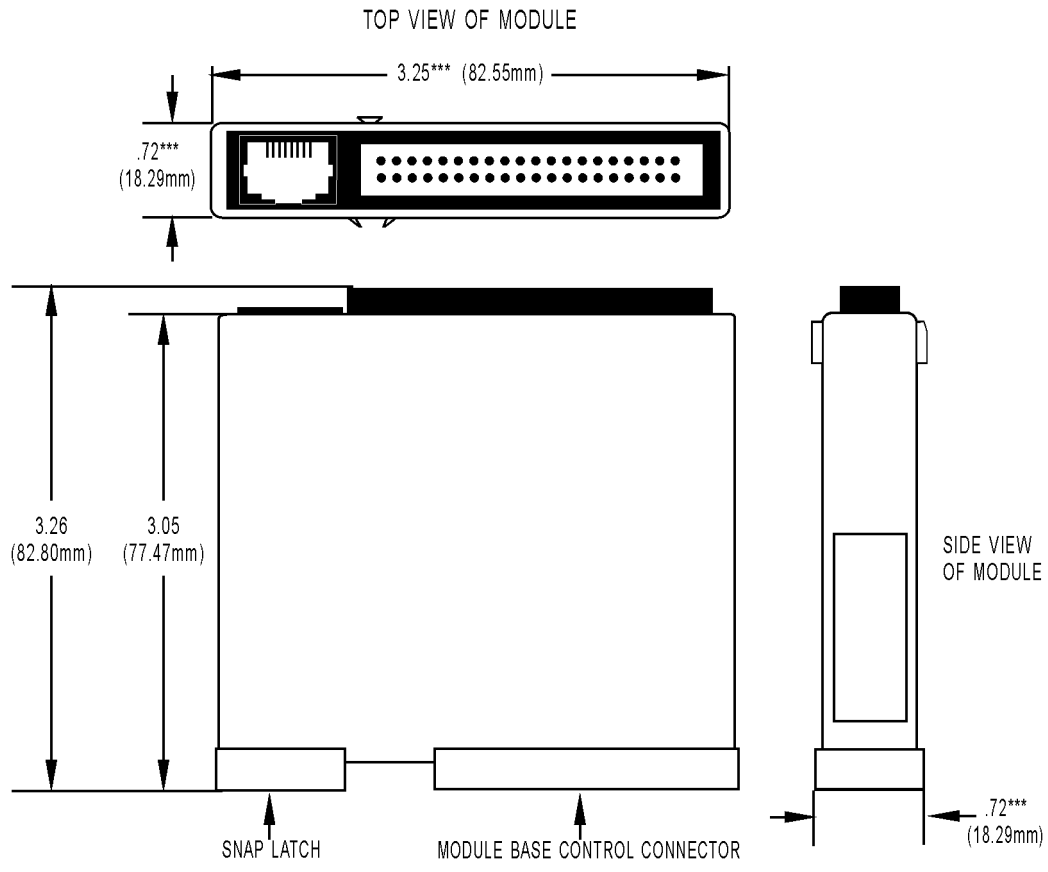
Breakout Rack Wiring and Jumpers

See Opto 22 form 1547, the *SNAP High-Density Digital Module User's Guide*, for SNAP-IDC-HDB and SNAP-ODC-HDB breakout rack wiring and jumper settings.

SNAP High-Density Digital I/O Modules

Dimensional Drawings

SNAP 32-Point Digital Modules

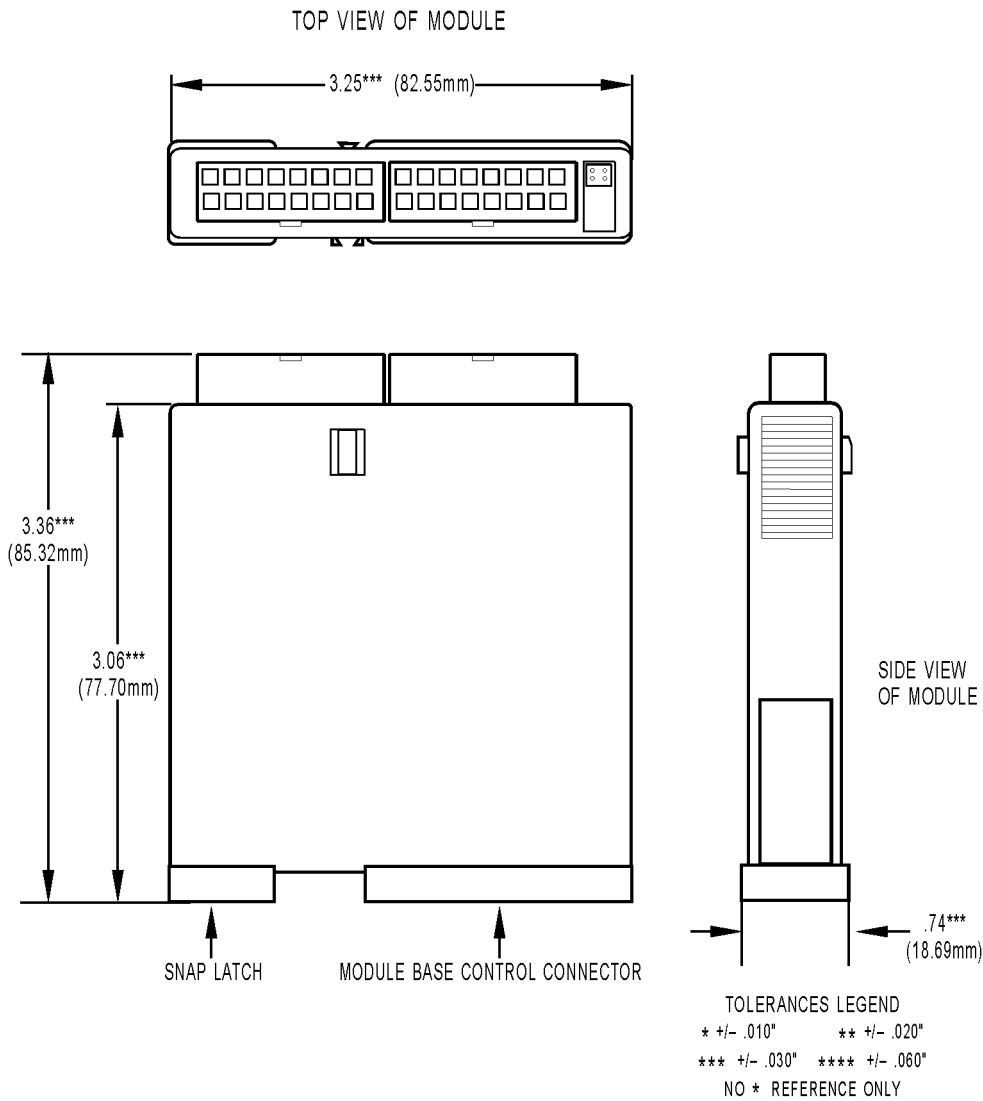


TOLERANCES LEGEND
 * +/- .010" ** +/- .020"
 *** +/- .030" **** +/- .060"
 NO * REFERENCE ONLY

SNAP High-Density Digital I/O Modules

Dimensional Drawings (continued)

SNAP 16-Point Digital Modules

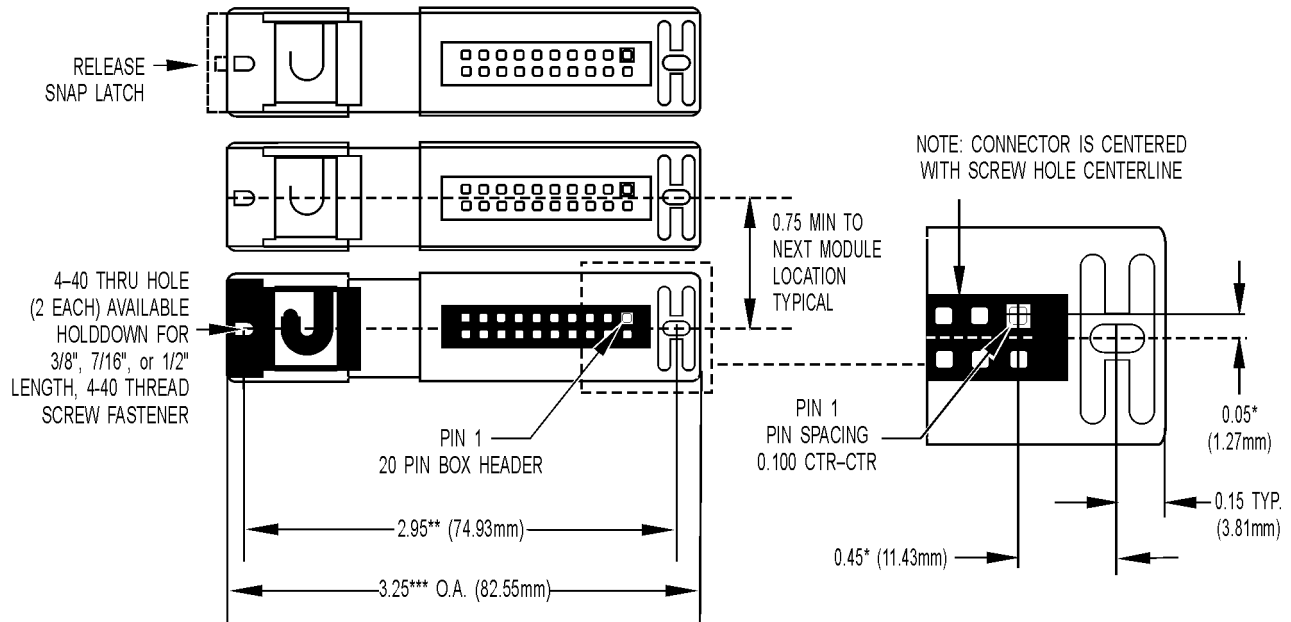


SNAP High-Density Digital I/O Modules

Dimensional Drawings (continued)

SNAP High-Density Digital Modules

BOTTOM VIEW OF MODULE



TOLERANCES

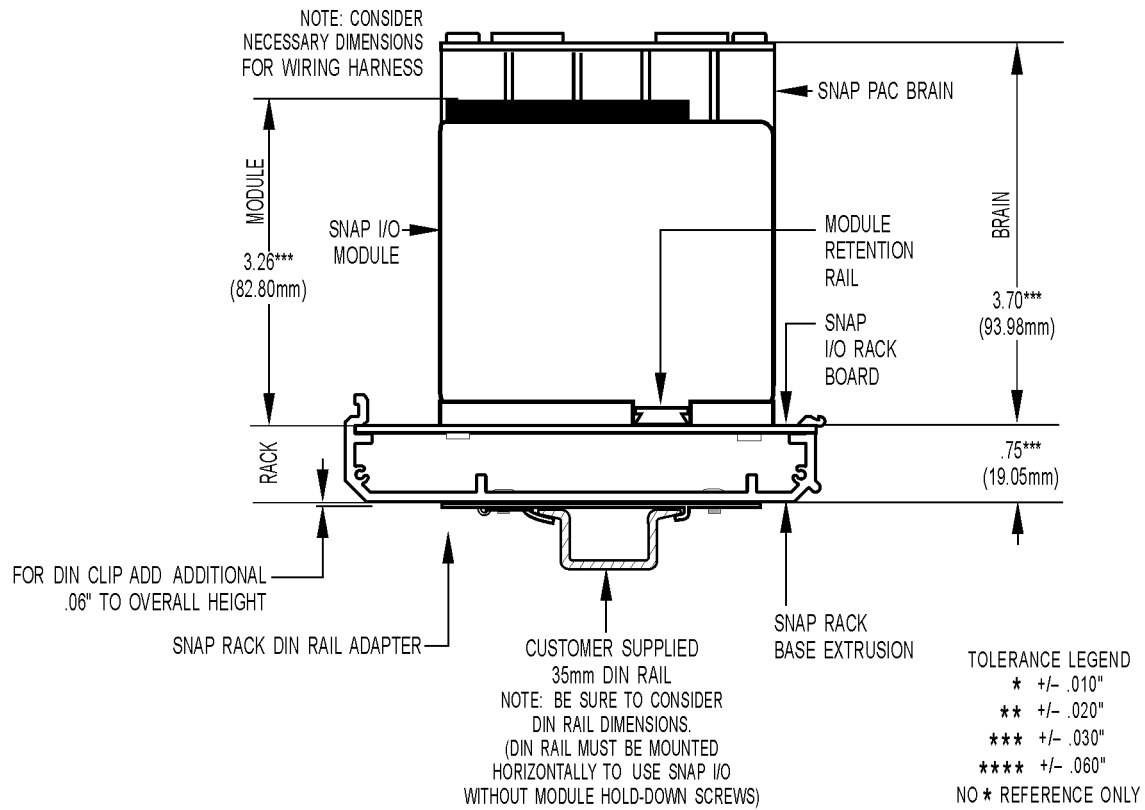
- * +/- 0.010"
- ** +/- 0.020"
- *** +/- 0.030"
- NO * REFERENCE ONLY

IMPORTANT: The mounting rack connector has 24 pins; the module connector has 20 pins. The extra pins on the mounting rack connector prevent misalignment of the module during installation.

SNAP High-Density Digital I/O Modules

Dimensional Drawings (continued)

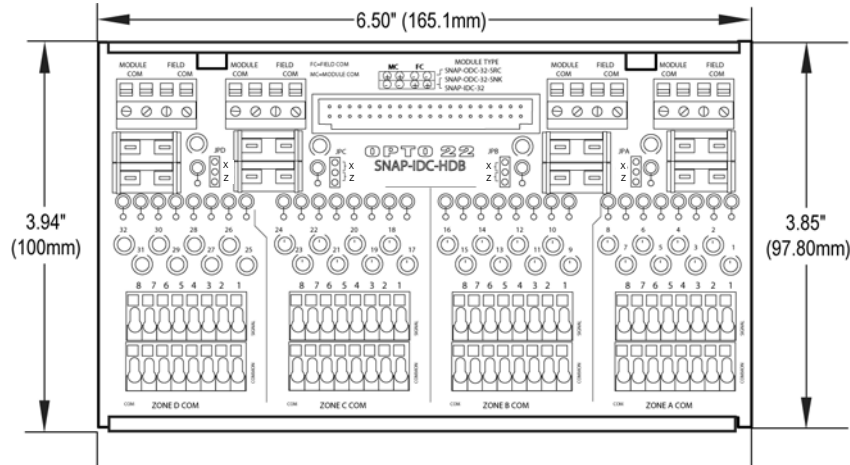
SNAP High-Density Digital Modules



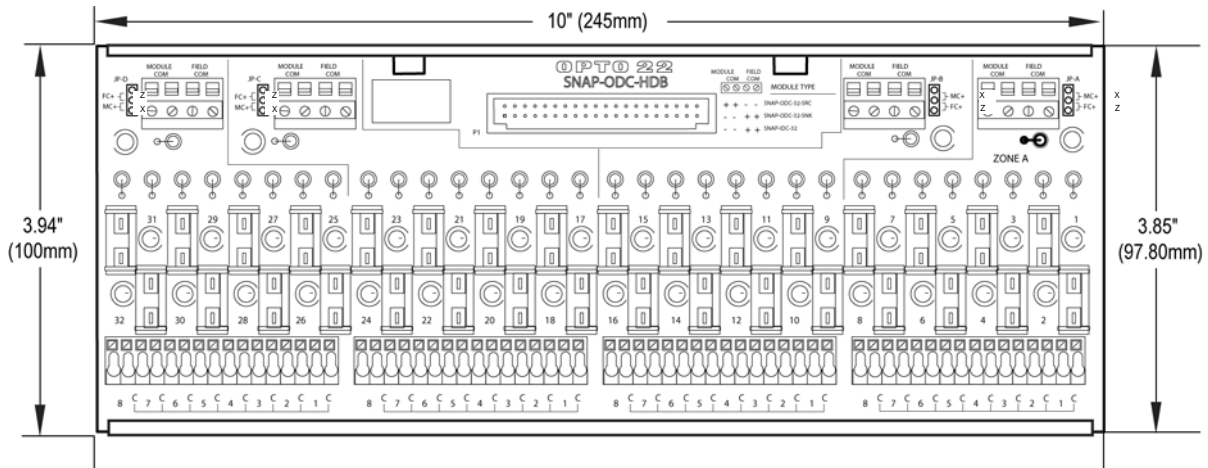
SNAP High-Density Digital I/O Modules

Dimensional Drawings (continued)

Breakout Racks for 32-Channel Digital Modules



SNAP-IDC-HDB breakout rack



SNAP-ODC-HDB breakout rack