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OBsolete SNAP HIGH-DENSITY DIGITAL I/O MODULES TECHNICAL NOTE

This technical note contains information you may need about obsolete SNAP High Density Digital I/O modules you're still using. Included are part numbers, descriptions, specifications, wiring diagrams, and dimensional drawings. In most cases, these parts have been removed from data sheets because we no longer sell them.

This document includes information on the following obsolete SNAP high density digital IO modules:

Part	Description
SNAP-IDC-32-FM	SNAP 32-point digital input module, 10–32 VDC
SNAP-ODC-32-SRC-FM	SNAP 32-point digital output module, 5–60 VDC load sourcing
SNAP-ODC-32-SNK-FM	SNAP 32-point digital output module, 5–60 VDC load sinking

Note: Part numbers ending in FM were Factory Mutual approved prior to 2024.

- Specifications begin on [page 6](#)
- Pinouts and Wiring Diagrams begin on [page 8](#).
- Dimensional Drawings begin on [page 11](#).

For Help

As always, if you are using Opto 22 products and cannot find the help you need in this technical note, contact Opto 22 Product Support. Product support is free.

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.

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



SNAP HIGH-DENSITY DIGITAL IO MODULES

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. These modules can also be used in intelligent remote I/O for Allen-Bradley® Logix PLC systems.

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 SNAP-IDC-32-FM 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 (PNP or sourcing type).

The SNAP-ODC-32-SRC-FM and SNAP-ODC-32-SNK-FM 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. DC models are ideal for detecting low-voltage auxiliary contacts.

Mounting Racks

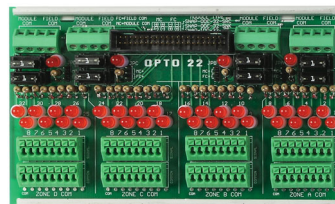
SNAP high-density digital modules are designed to work with SNAP PAC mounting racks. Up to 16 modules can be mounted on a rack, making up to 512 digital points available. In addition, HDD modules can be mixed with 4-channel SNAP digital, analog, and serial modules on the same rack.

SNAP racks have a retention rail locking system. Use two 4-40 by ½-inch standard machine screws to hold each module securely in position on the SNAP rack.

Wiring Aids: Breakout Boards, Wiring Harnesses, and Header Cables

Due to space constraints, instead of using the usual removable terminal connectors, high-density digital modules use other wiring devices. These cables and breakout boards are available separately and are detailed in form 1756, [SNAP TEX Cables and Breakout Boards Data Sheet](#), available on our website.

SNAP breakout boards for high-density digital modules provide LED indicators as well as labeled and easily accessible fused connectors for input or output points, all of which simplify connecting field devices to HDD modules.



SNAP-IDC-HDB breakout board

For a table showing compatible boards, cables, and modules, see form 1756, [SNAP TEX Cables and Breakout Boards Data Sheet](#).

If you are not using breakout boards, you can connect 16-point input modules directly to field devices or terminal strips using the **SNAP-HD-ACF6** wiring harness assembly. The assembly has two 8-point connectors that plug securely into the top of the module and provide flying leads at the field end.

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Similarly, 32-point modules can connect to field devices with the **SNAP-HD-CBF6** wiring harness, which plugs into the top of the module and provides flying leads.

SNAP Product Compatibility

SNAP HDD modules are part of the SNAP PAC System and can be used on SNAP PAC mounting racks with SNAP PAC R-series controllers and SNAP PAC EB and SB brains. These modules can be used with both standard wired Ethernet controllers and brains and with Wired+Wireless™ models.

Other digital, analog, and serial SNAP I/O modules can be placed on the same rack with HDD modules for the mix of signals required at any location.

NOTE: To use HDD modules in older systems, see form 1688, [SNAP PAC System Migration Technical Note](#).

Programming

Opto 22 PAC Control software version 8.0 or newer is required for SNAP high-density digital modules used with a SNAP PAC controller. SNAP HDD modules can also be accessed by an EtherNet/IP or Modbus/TCP system or by custom software built with the OptoMMP Communication Toolkit.

See form 1547, [SNAP High-Density Digital Modules User's Guide](#) for detailed information on using these modules in a PAC Control strategy. The OptoMMP Communication Toolkit is documented in form 1465, [OptoMMP Protocol Guide](#). Communication with A-B PLC systems is covered in form 1770, [EtherNet/IP for SNAP PAC Protocol Guide](#). For Modbus/TCP systems, see form 1678, [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 form 1547, [SNAP High-Density Digital Modules User's Guide](#) for detailed information.

Connecting to G4 Digital I/O

Some 32-channel HDD modules can connect to older G4 and G1 mounting racks, using a special cable, to integrate older G4 digital I/O systems with modern PAC Project software and SNAP Ethernet-based controllers. For outputs, this connection makes available the G4 module's 3-amp switching capability, which provides twelve times the 0.25 amp capability per point of the high-density digital modules themselves.

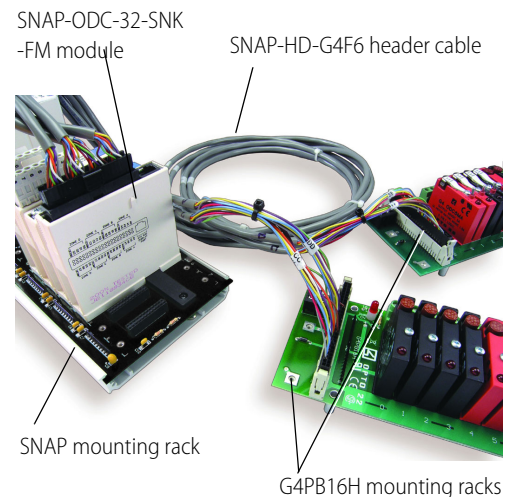
These HDD modules and cables also work with some G1 racks, and the SNAP-HD-G4F6 cable works with some integrated I/O racks.

For more information, see form 1756, [SNAP TEX Cables and Breakout Boards Data Sheet](#).

Outputs

Connect SNAP-ODC-32-SNK-FM digital output modules to G4PB16H and G4PB16HC mounting racks using the **SNAP-HD-G4F6** header cable.

- Do not use SNAP-ODC-32-SRC modules with G4 digital.
- All G4 modules on the G4 mounting rack must be outputs and must be the same logic voltage (5, 15, or 24 VDC)



Inputs

SNAP-IDC-32N and SNAP-IDC-32DN digital input modules can connect to G4PB16H and G4PB16HC mounting racks using the **SNAP-HD-G4F6N** header cable.

- All G4 modules on the G4 mounting rack must be inputs and must be the same logic voltage (5, 15, or 24 VDC).
- For 5 volt G4 modules, use the SNAP-IDC-32DN.
- For 15 or 24 volt G4 modules, use the SNAP-IDC-32N.

NOTE: While not designed for this use, it is possible to connect the SNAP-IDC-32-FM module with G4 15 or 24 V inputs using a SNAP-HD-G4F6 cable. However, the SNAP-IDC-32 uses positive-true logic and therefore returns the inverse of the typical negative-true logic. For example, if the SNAP-IDC-32 is controlled by a PAC Control strategy, an "OFF" state from it actually indicates that the associated G4 module is turned ON.

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 5 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.

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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	<p>16-point input modules: Each point is optically isolated from other points on the module.</p> <p>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.</p>	<p>Input modules: Each point is optically isolated from other points on the module.</p> <p>Most output modules: Points are not isolated from each other. Points share a common fuse. For isolated modules, see form 1144, SNAP Digital Output Modules Data Sheet.</p>
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	<p>16-point input modules: 15–20 ms</p> <p>32-point input modules: 6 ms</p> <p>Output modules: 100 microseconds</p>	<p>Varies by module. Examples:</p> <ul style="list-style-type: none"> • SNAP-IDC5-FAST: 25 microseconds • SNAP-IDC5: 5 ms turn-on, 15 ms turn-off
On/off status	Yes	Yes
Input latching	Yes	Yes
Counting on digital input modules	<p>Counting occurs on the module.³</p> <p>Counting is available with SNAP-PAC-R1⁴, SNAP-PAC-EB1⁵, and SNAP-PAC-SB1 processors.</p> <p>Counting speeds:</p> <p>On 32-point modules, 0–50 Hz @ 50% duty cycle</p> <p>On 16-point modules, 0–25 Hz @ 50% duty cycle (Speed depends on module; see specifications for each part number.)</p>	<p>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-R1⁴, SNAP-PAC-EB1⁵, and SNAP-PAC-SB1 processors.)</p> <p>Counting speed varies based on the processor and the speed of the module.</p>
Watchdog timer	Firmware 8.1 and higher, yes. Firmware 8.0 and lower, no.	Yes
Pulse generation	Yes	Yes
On-pulse, off-pulse, and period measurement	No	Yes
Frequency	No	Yes
Totalizer	No	Yes
Digital events	Firmware 8.1 and higher, yes. Firmware 8.0 and lower, no.	Yes

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.

4 Including the SNAP-PAC-R1-B.

5 OBSOLETE product, please contact Pre-Sales Engineering for more information.



SPECIFICATIONS

	SNAP-IDC-32-FM [OBSOLETE]
Input Range	10 to 32 VDC
Nominal Voltage Range	24 VDC
Input Resistance	20 K ohms
Logic Voltage and Current	5 VDC ± 0.1 @ 150 mA
Maximum Operating Common Mode Voltage	250 V
Isolation: Field to Logic	1500 V
Input Arrangement	32 input channels; 4 groups of 8 inputs each
Common connection	Points in each group share a common negative connection.
Channel-to-Channel Isolation	No channel-to-channel isolation; 100 V group-to-group isolation
Hold-down screws	Torque: Not to exceed 1 in-lb (0.11 N-m)
Connector screws	Torque: 5.22 in-lb (0.59 N-m)
Maximum Number of HDD Modules on One Mounting Rack	16
Indicators	None; use optional OptoTerminal-G20 diagnostic display or breakout rack.
ON Voltage	10 VDC @ 0.5 mA
OFF Voltage	3 VDC @ 0.1 mA
Polling time from I/O processor to module ¹	2–30 ms typical ²
Input Turn-On/Off Time	6 ms
Counting Frequency (DC input)	0–50 Hz @ 50% duty cycle
Operating Temperature	-20 to 70 °C
Storage Temperature	-40 to 85 °C
Agency Approvals	UL, CE, RoHS, DFARS; UKCA
Warranty	Lifetime

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.

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SPECIFICATIONS (CONTINUED)

	SNAP-ODC-32-SRC SNAP-ODC-32-SRC-FM [OBSOLETE]	SNAP-ODC-32-SNK SNAP-ODC-32-SNK-FM [OBSOLETE]
Switching Voltage	5–60 VDC	5–60 VDC
Nominal Switching Voltage	12–24 VDC	12–24 VDC
Logic Voltage and Current	5 VDC ± 0.1 @ 150 mA	5 VDC ± 0.1 @ 150 mA
Maximum Off State Voltage	60 VDC	60 VDC
Output Leakage, Typical	<10 microamps per channel (60 V, 70 °C)	<10 microamps per channel (60 V, 70 °C)
Maximum Load per Point	0.25 A	0.25 A
Voltage Drop	0.15 VDC @ 0.25 A	0.15 VDC @ 0.25 A
Surge (1 sec.)	1 A	1 A
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 Operating Common Mode Voltage	250 V	250 V
Isolation: Field to Logic	1500 V	1500 V
Output Turn-On/Off Time	100 microseconds	100 microseconds
Polling time from I/O processor to module ¹	2–30 ms typical ²	2–30 ms typical ²
Indicators	None; use optional OptoTerminal-G20 diagnostic display or breakout rack.	None; use optional OptoTerminal-G20 diagnostic display or breakout rack.
Maximum Number of HDD Modules on One Mounting Rack	16	16
Torque, hold-down screws	Not to exceed 1 in-lb (0.11 N-m)	Not to exceed 1 in-lb (0.11 N-m)
Torque, connector screws	5.22 in-lb (0.59 N-m)	5.22 in-lb (0.59 N-m)
Operating Temperature	-20 to 70 °C	-20 to 70 °C
Storage Temperature	-40 to 85 °C	-40 to 85 °C
Agency Approvals	SNAP-ODC-32-SRC: UL, CE, RoHS, DFARS, UKCA SNAP-ODC-32-SRC-FM ^a : CE, RoHS, DFARS, UKCA	SNAP-ODC-32-SNK: UL, CE, RoHS, DFARS; UKCA SNAP-ODC-32-SNK-FM ^a : CE, RoHS, DFARS; UKCA
Warranty	Lifetime	Lifetime

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.

^a OBSOLETE product, please contact Pre-Sales Engineering for more information.

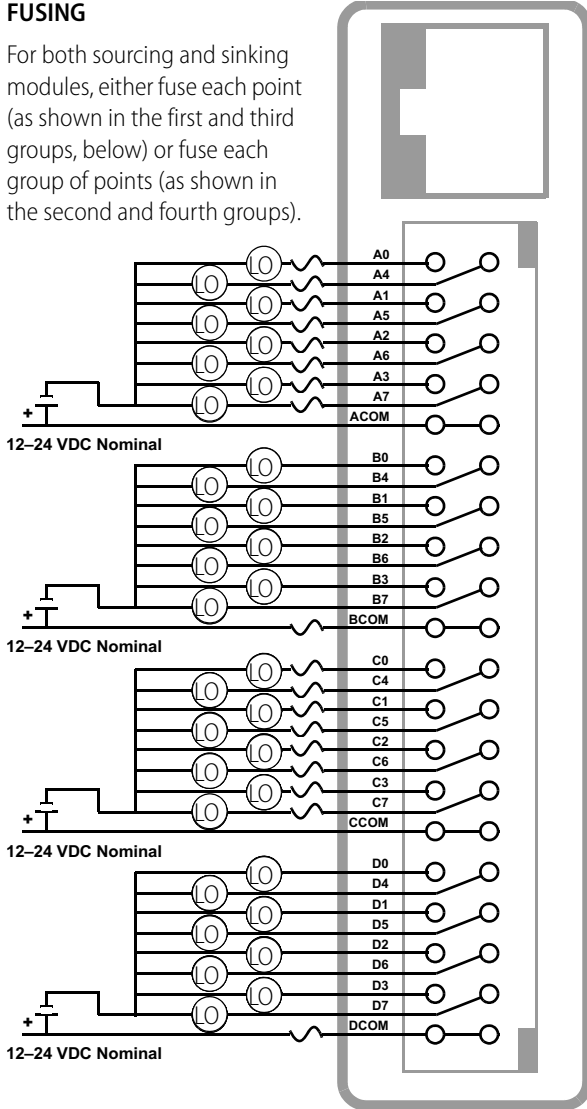


PINOUTS AND WIRING

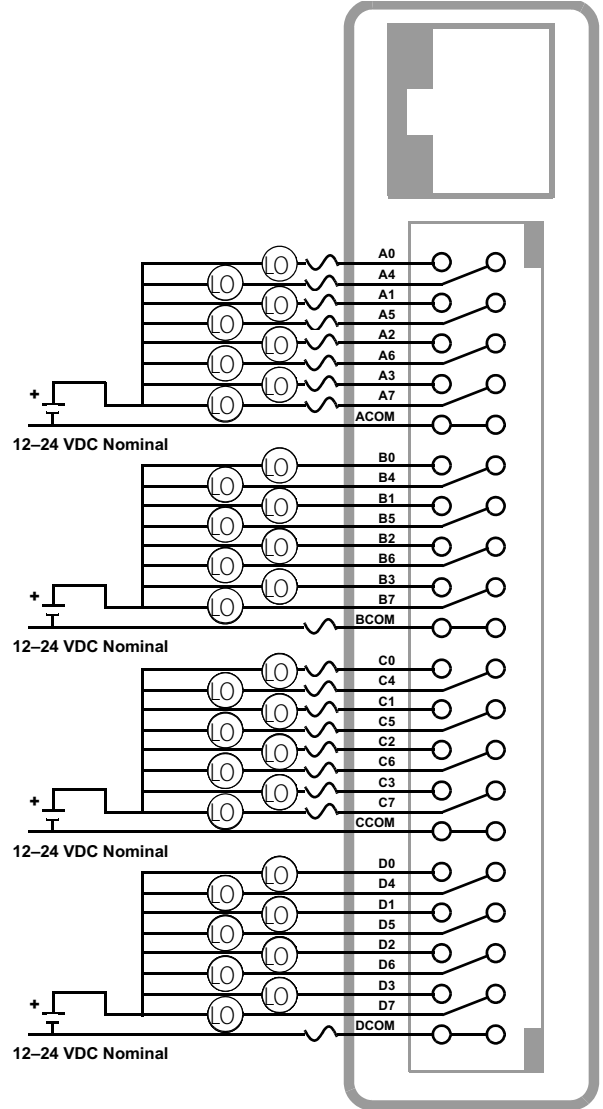
Pinouts—SNAP-ODC-32-SRC-FM and SNAP-ODC-32-SNK-FM Digital Modules

FUSING

For both sourcing and sinking modules, either fuse each point (as shown in the first and third groups, below) or fuse each group of points (as shown in the second and fourth groups).



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



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

NOTE: The SNAP-ODC-32-SRC and SNAP-ODC-32-SNK modules (includes OBSOLETE -FM models) have built-in transient suppression for each channel. Additional commutating diodes are not necessary.

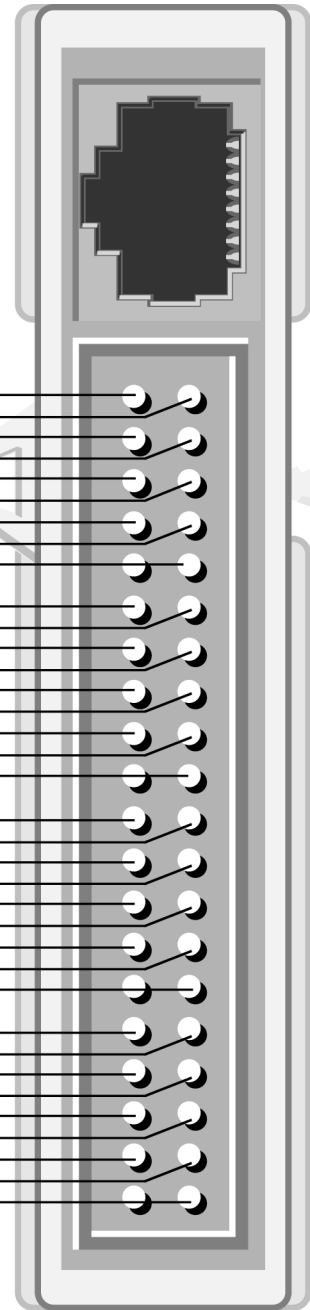
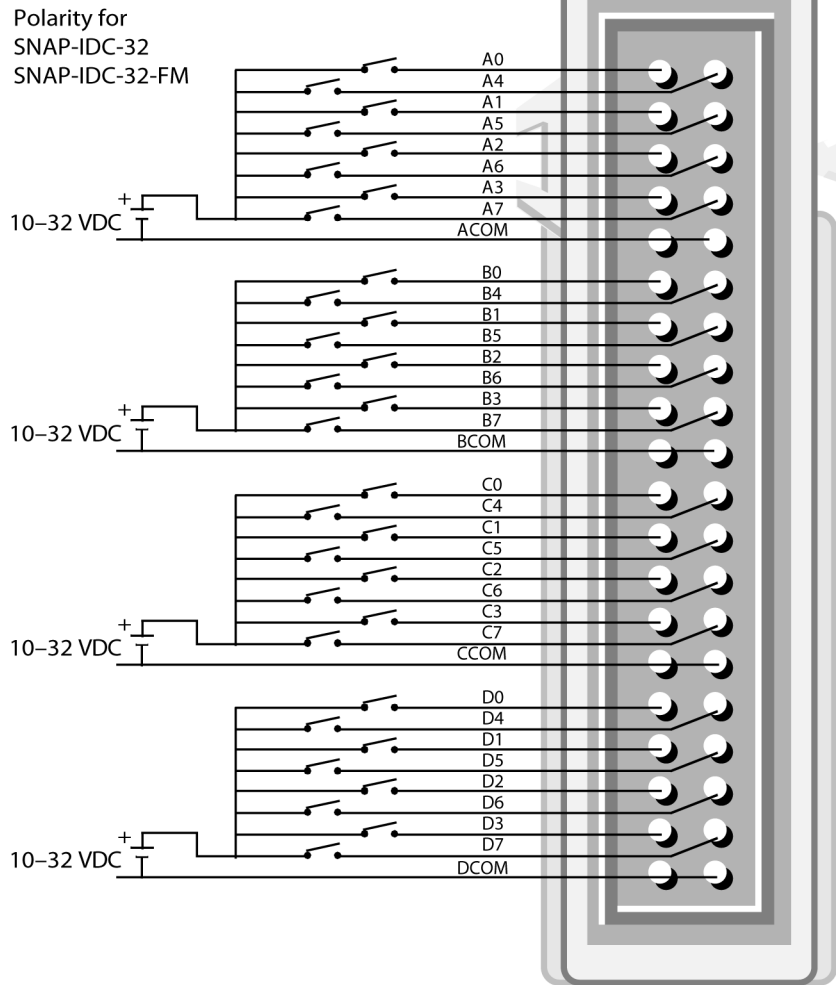
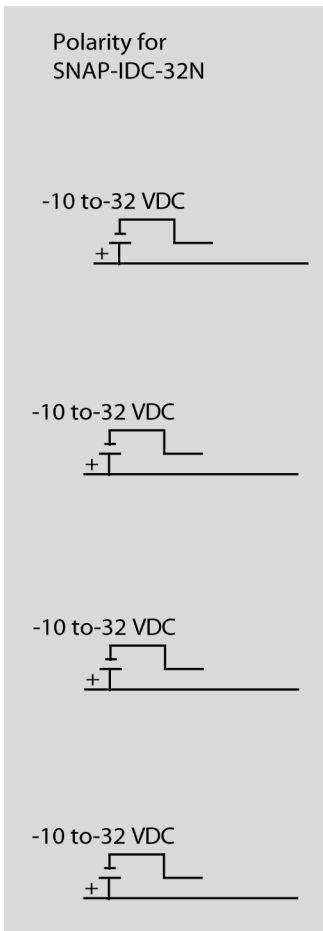
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PINOUTS AND WIRING (CONTINUED)

Pinouts for SNAP-IDC-32-FM Digital Modules

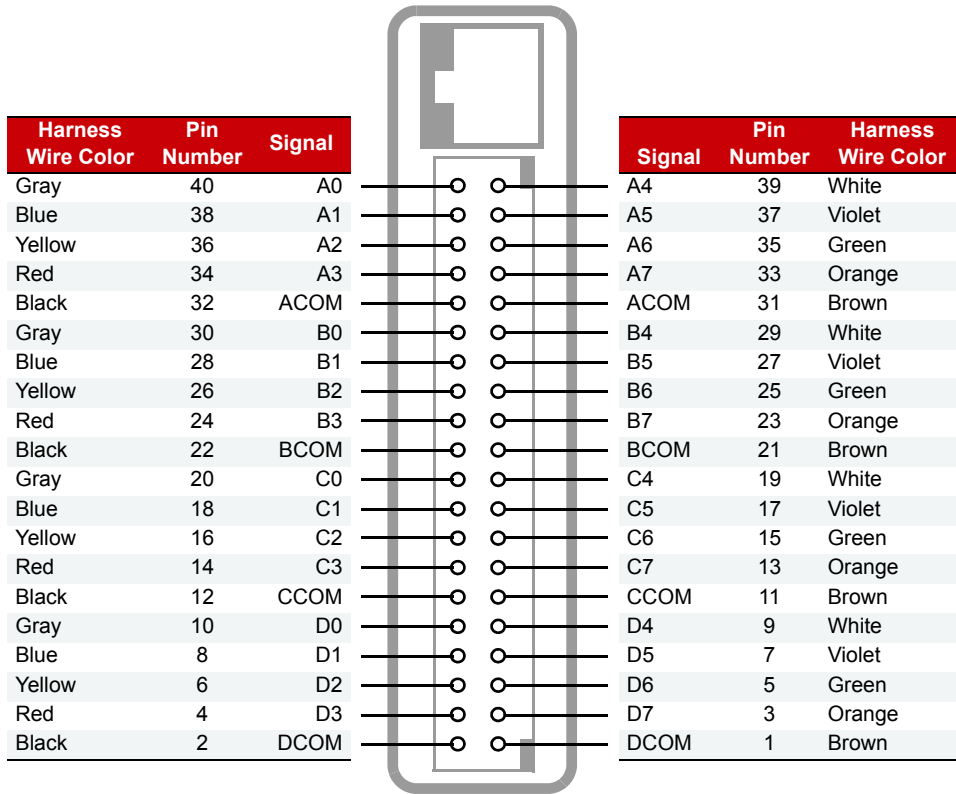
IMPORTANT: All SNAP-IDC-32 modules are polarity specific and must be wired as shown.



PINOUTS AND WIRING (CONTINUED)

Connector Wiring—SNAP 32-Point Digital Modules

The following diagram shows 32-channel module connector wiring for the SNAP-HD-CBF6 wiring harness. Wires from the wiring harness are grouped into four sets. Each set contains color-coded wires.



Connector wiring for SNAP-ODC-32-SNK, SNAP-ODC-32-SRC, SNAP-IDC-32, -FM [OBSOLETE] versions, SNAP-IDC-32N, and SNAP-IDC-32DN (top view of module)

Building Your Own Wiring Harness or Header Cable for a 32-channel module

To build your own wiring harness similar to the SNAP-HD-CBF6, you will need the following parts:

- Connector:** Molex 15-04-5401
- Pin housing:** Molex 50-57-9320
- Pins:** Molex p/n 16-02-0103
- Cable:** Alpha 5020/40c (24 AWG, 40 conductor) or equivalent (UL type CM)

To build your own SNAP-HD-BF6 header cable for use with either breakout rack, you will need the parts listed below. Both ends of the cable use the same connectors.

- Connector:** Molex 15-04-5401
- Pin housing:** Molex 50-57-9320
- Pins:** Molex p/n 16-02-0103
- Cable:** Alpha 5020C or Manhattan M38910 (24 AWG, 10 conductor, 4x length needed) or equivalent (UL type CM)

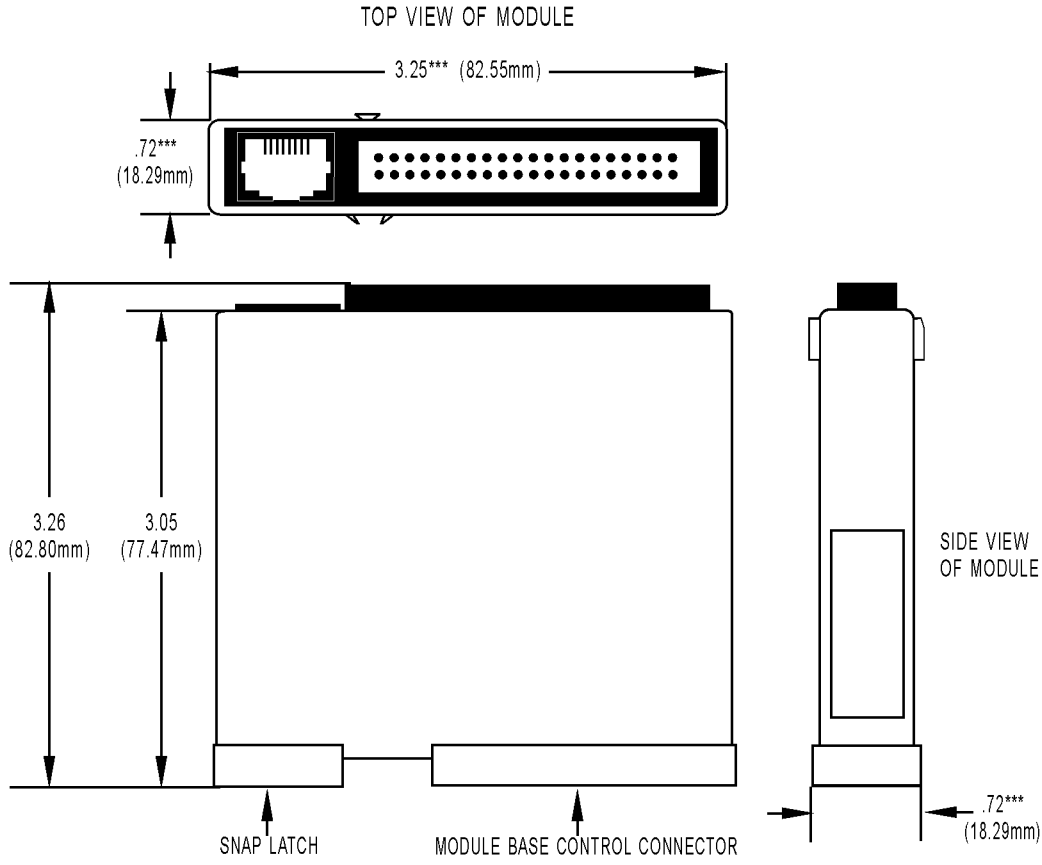
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DIMENSIONAL DRAWINGS

SNAP 32-Point Digital Modules



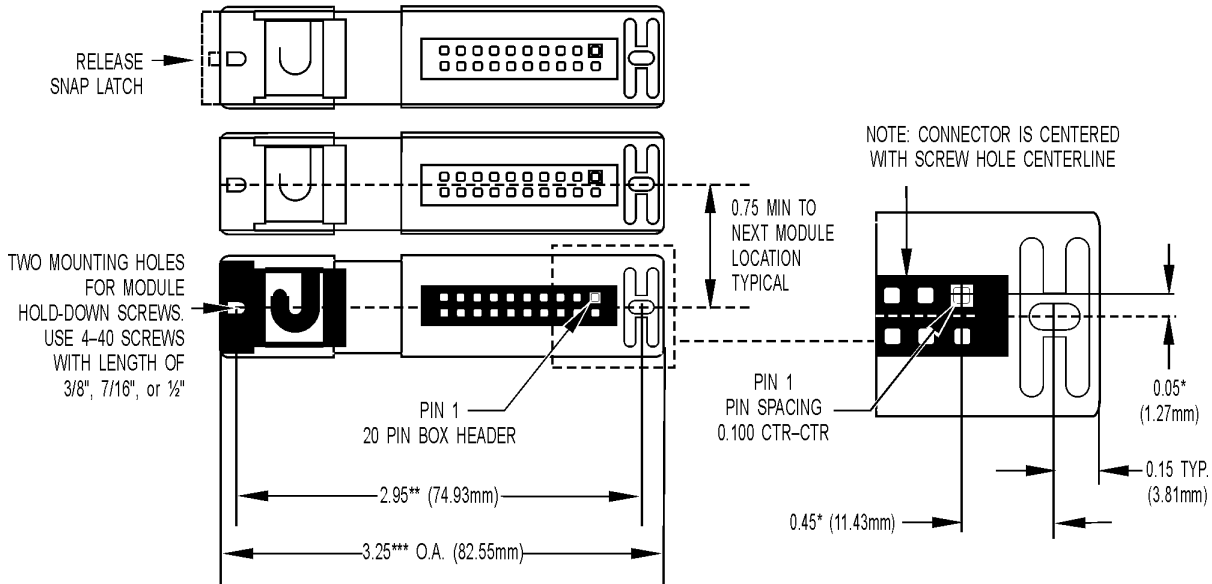
TOLERANCES LEGEND
* +/- .010" ** +/- .020"
*** +/- .030" **** +/- .060"
NO * REFERENCE ONLY



DIMENSIONAL DRAWINGS (CONTINUED)

SNAP High-Density Digital Modules (All)

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.

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DIMENSIONAL DRAWINGS (CONTINUED)

SNAP High-Density Digital Modules (All)

