

# SNAP Analog Input Modules

## Features

- Resolution = 0.004% of nominal range
- Two, 4, 8, or 32 single-ended inputs per module
- Out-of-range indication
- Operating temperature 0 °C to 70 °C
- Factory calibrated; no user adjustment necessary

## Description

SNAP I/O analog input modules are part of Opto 22's SNAP PAC System. All of these modules mount on a SNAP PAC rack with a SNAP PAC brain or R-series controller.

A minimum number of SNAP module types support a full range of analog input requirements. These software-configurable modules handle a wide variety of signal levels. They provide high resolution (0.004% of nominal range) for precise signal levels, as well as multiple-channel packaging. All SNAP analog modules are factory calibrated and individually tested. Part numbers ending in -FM are Factory Mutual approved.

SNAP analog input modules have an on-board microprocessor to provide module-level intelligence, which makes them an ideal choice for Original Equipment Manufacturers (OEMs). For additional information about the standalone operation of SNAP analog modules, see Opto 22 form #0876, *SNAP I/O Module Integration Guide*.

**Notes for legacy hardware:** Some of these modules also work with older Opto 22 I/O processors (brains or on-the-rack controllers) and M-series or B-series racks. To check processor compatibility, see the table on [page 2](#).

Specifications begin on [page 3](#). For dimensional drawings, see [pages 28–36](#).

**IMPORTANT:** Any system using analog sensors and input modules should be calibrated annually for analog signals. For I/O units on a SNAP PAC System, use the PAC Control™ commands "Calculate and Set Offset" and "Calculate and Set Gain." For other Ethernet-based I/O units, you can also use PAC Manager™ software to calculate and set offset and gain.



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## Part Number

Part	Description	See page
SNAP-AIARMS	2-channel 0 to 10 amp RMS AC/DC input	3
SNAP-AIVRMS	2-channel 0 to 250 V RMS AC/DC input	4
SNAP-AIMA	2-channel analog current input, -20 to +20 mA	8
SNAP-AIMA-4	4-channel analog current input -20 to +20 mA	8
SNAP-AIMA-8	8-channel analog current input -20 to +20 mA	10
SNAP-AIMA-32 SNAP-AIMA-32-FM*	32-channel analog current input -20 to +20 mA	11
SNAP-AIRATE	2-channel 0–25,000 Hz analog rate input	14
SNAP-AIRTD	2-channel 100-ohm platinum RTD input	21
SNAP-AICTD	2-channel analog temperature input, ICTD	5
SNAP-AICTD-4	4-channel analog temperature input, ICTD	5
SNAP-AICTD-8	8-channel analog temperature input, ICTD	7
SNAP-AITM	2-channel analog type E, J, or K thermocouple or -150 to +150 mV input or -75 to +75 mV input	18
SNAP-AITM-2	2-channel analog type B, C, D, G, N, T, R, or S thermocouple or -50 to +50 mV DC or -25 to +25 mV DC input	19
SNAP-AITM-8 SNAP-AITM-8-FM*	8-channel B, C, D, E, G, J, K, N, R, S, or T thermocouple or -75 to +75 mV, -50 to +50 mV, or -25 to +25 mV input	20
SNAP-AIV	2-channel analog voltage input -10 to +10 VDC or -5 to +5 VDC	23
SNAP-AIV-4	4-channel analog voltage input -10 to +10 VDC or -5 to +5 VDC	23
SNAP-AIV-8	8-channel analog voltage input -10 to +10 VDC or -5 to +5 VDC	25
SNAP-AIV-32 SNAP-AIV-32-FM*	32-channel analog voltage input -10 to +10 VDC or -5 to +5 VDC	26
SNAP-AIMV-4	4-channel -150 to +150 mV input or -75 to +75 mV input	16
SNAP-AIMV2-4	4-channel -50 to +50 mV input or -25 to +25 mV input	17
SNAP-AIR40K-4	4-channel analog resistor/thermistor input, 40 K ohms, 20 K ohms, 10 K ohms, or 5 K ohms	13

\* Factory Mutual approved

### Transformer and Optical Isolation

All SNAP analog input modules are transformer isolated and optically isolated from all other modules and from the SNAP I/O processor. The modules in this data sheet do not have channel-to-channel isolation, however. (If you need isolated analog modules, see Opto 22 form #1182.)

**Optical isolation** provides 4,000 volts of transient (4,000 V for 1 ms) protection for sensitive control electronics from industrial field signals.

**Transformer isolation** prevents ground loop currents from flowing between field devices and causing noise that produces erroneous readings. Ground loop currents are caused when two grounded field devices share a connection, and the ground potential at each device is different.

**IMPORTANT:** Since these analog input modules provide multiple single-ended input channels with a common reference, the channels are not isolated from each other. (See Opto 22 form #1182 for isolated modules.)

### Installation

Note module and processor compatibility in the following table:

Modules	Compatible I/O Processors
32-channel inputs 8-channel inputs	SNAP PAC R-series controllers and SNAP PAC brains
4-channel inputs	SNAP PAC R-series controllers and SNAP PAC brains Also the following legacy brains: SNAP Ethernet, SNAP Simple, SNAP Ultimate; SNAP-DNP-ASDS; SNAP OEM
2-channel inputs	SNAP PAC R-series controllers and SNAP PAC brains Also the following legacy brains: SNAP Ethernet, SNAP Simple, SNAP Ultimate; SNAP-DNP-ASDS; SNAP OEM; serial SNAP brains (B3000, Modbus, Profibus); B3000-HA; B6

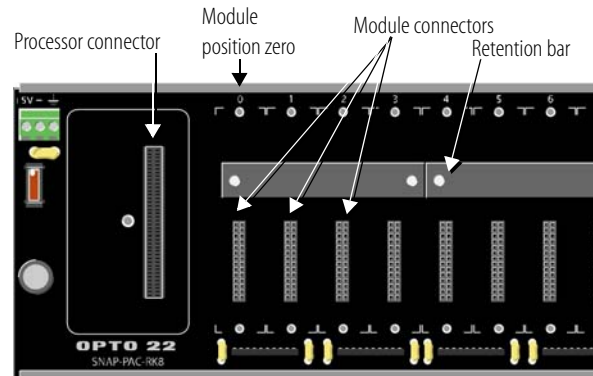
All modules can be used with SNAP PAC racks and can be placed in any position on the rack. Two- and four-channel modules can also be used with legacy SNAP M-series and B-series mounting racks. (For more information on using legacy hardware, see form #1688, the *SNAP PAC System Migration Technical Note*.)

Modules snap securely into place in the row of connectors on the mounting rack. Each module connector has a number. Analog input modules and other types of SNAP I/O modules are mounted on the module connectors starting at module position zero.

Modules require a special tool (provided) for removal.

## SNAP Analog Input Modules

The following diagram shows part of a SNAP PAC mounting rack.



1. Place the rack so that the module connector numbers are right-side up, with zero on the left, as shown in the diagram above. (If your rack has screw connectors, the screw connectors will be at the bottom.)
2. Position the module over the module connector, aligning the small slot at the base of the module with the retention bar on the rack. When positioning modules next to each other, be sure to align the male and female module keys at the tops of the modules before snapping a module into position.
3. With the module correctly aligned, push on the module to snap it into place.
4. (Optional) Use standard 4-40 x 1/4 truss-head Phillips hold-down screws to secure both sides of each module.  
**CAUTION:** Do not over-tighten screws.
5. Follow the wiring diagrams beginning on [page 3](#) to attach modules to the devices they monitor. Most modules accept up to 14 AWG wire; the SNAP-AITM-8 accepts a maximum of two solid 18 AWG wires.

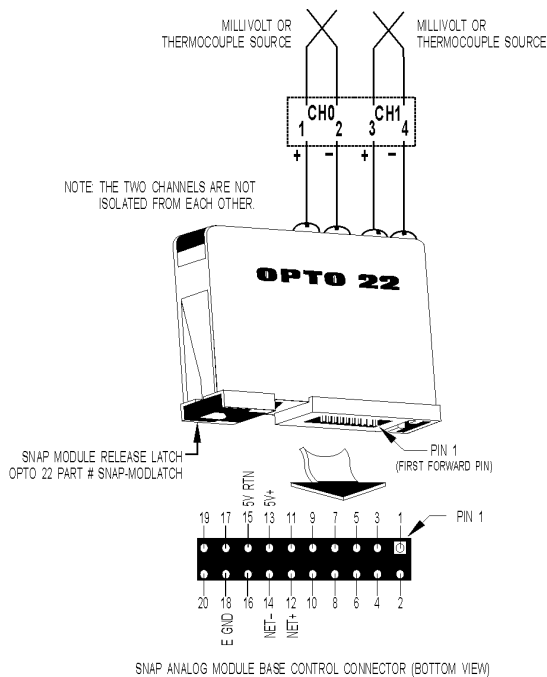
**For faster, easier field wiring** installation and maintenance, use **SNAP TEX** cables and breakout boards. See Opto 22 form #1756, the *SNAP TEX Cables & Breakout Boards Data Sheet*, for compatibility and specifications.

## Thermocouple/Millivolt Input Module

### SNAP-AITM

#### Thermocouple Polarity and Range

Type	-	+	Range
E	Red	Purple	-270°C to +1,000 °C
J	Red	White	-210°C to +1,200 °C
K	Red	Yellow	-270°C to +1,372 °C



**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.

### Description

The SNAP-AITM module provides two channels of analog to digital conversion. Each channel on the module can be configured for -150 mV DC to +150 mV DC or -75 mV DC to +75 mV DC, or for type E, J, or K thermocouple operation.

Since both inputs share the same reference terminal, use isolated probes for thermocouple inputs. If you need isolated channels on the same module, see Opto 22 form #1182.

## SNAP Analog Input Modules

Part Number	Description
SNAP-AITM	Two-channel analog type E, J, or K thermocouple or -150 mV to +150 mV input or -75 mV to +75 mV input

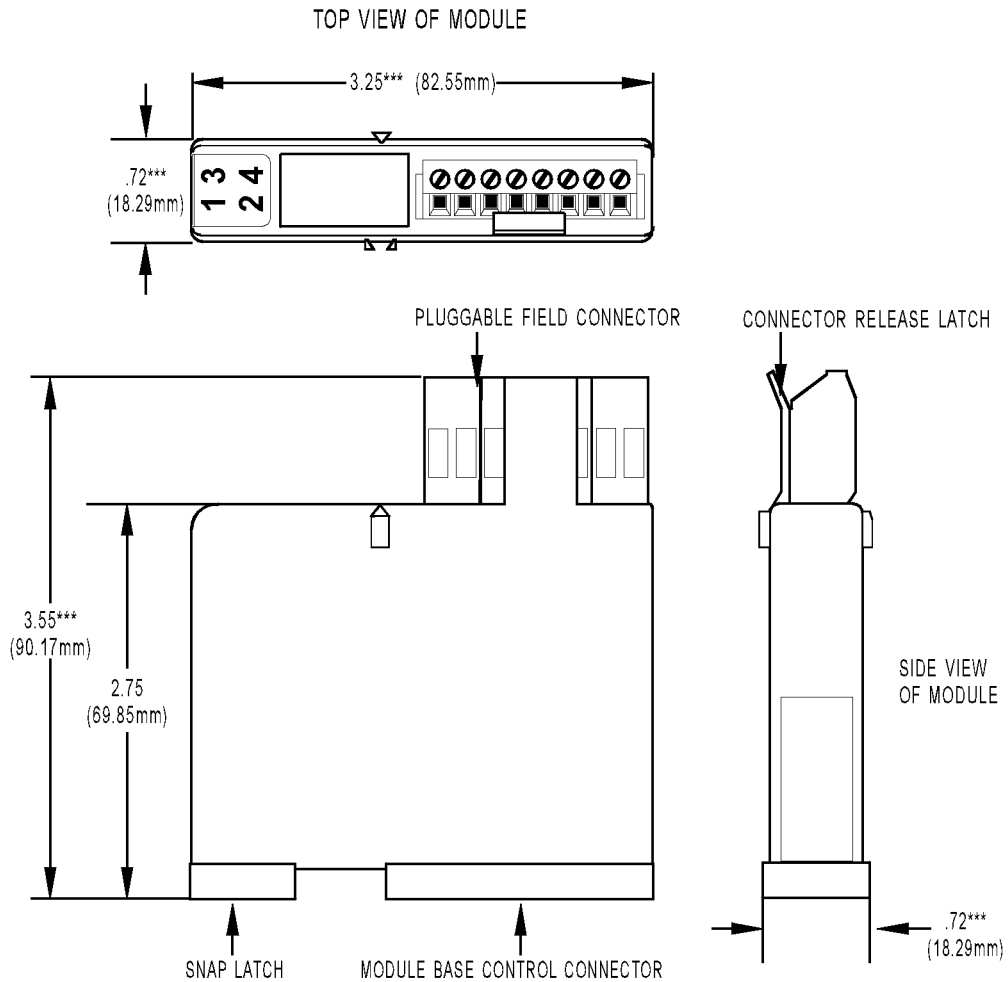
### Specifications

Input Range	From -150 mV to +150 mV From -75 mV to +75 mV
Resolution	6 microvolts from -150 to +150 mV 3 microvolts from -75 to +75 mV
Cold Junction Temperature Compensation	Automatic when used with SNAP I/O processors
Input Filtering	-3 dB @ 7 Hz
Input Response Time (% of span/delta V/delta time)	63.2%/95 mV/23 mS
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB @ 60 Hz
Maximum Survivable Input	±15 volts
Maximum Operating Common Mode Voltage	250 V
Accuracy at Full Scale	0.06% (90 microvolts) @ 150 mV 0.1% (75 microvolts) @ 75 mV
Drift: Gain Temperature Coefficient	5 microvolts / °C
Drift: Offset Temperature Coefficient	2 microvolts / °C
Thermocouple Accuracy [°C] From factory After user gain and offset commands	± 2.0 (E, J, and K) ± 0.8
Isolation	1500 V
Power Requirements	5 VDC (±0.15) @ 170 mA
Input Resistance	100 Megohms (each channel)
Ambient Temperature: Operating Storage	0 °C to 70 °C -25 °C to 85 °C

# SNAP Analog Input Modules

## Dimensional Drawing

All Two- and Four-channel Modules



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

# SNAP Analog Input Modules

## Dimensional Drawing

Height on Rack: All Two- and Four-channel Modules

