SNAP ISOLATED ANALOG INPUT MODULES

Features

- Channel-to-channel isolation
- Rugged packaging and convenient pluggable wiring. Accepts 22 to 14 AWG wire.
- Factory calibrated; no user adjustment necessary
- Operating temperature -20 °C to 70 °C

SNAP Isolated Analog Input Modules

DESCRIPTION

SNAP I/O isolated analog input modules provide two or more channels isolated from each other, thereby eliminating problems caused by ground loop currents. These isolated analog modules are part of Opto 22's SNAP PAC System and mount on SNAP PAC racks with an I/O processor (brain or on-the-rack controller). SNAP isolated analog input modules are compatible with all SNAP PAC brains and rack-mounted controllers, including Wired+Wireless™.

Since many SNAP analog input modules are software-configurable and handle a wide variety of signal levels, a small number of modules can support a wide range of input requirements. Modules provide high resolution for precise signal levels, and all SNAP analog modules are factory calibrated. Part numbers ending in -FM are Factory Mutual approved. Dimensional drawings start on page 14.

SNAP analog input modules have an on-board microprocessor to provide module-level intelligence, making them an ideal choice for original equipment manufacturers (OEMs). For more information about standalone SNAP analog modules, see the *SNAP I/O Module Integration Guide* (form 876).

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 (recommended torque: 4 inch pounds [0.45 Newton meters]).

Notes for legacy hardware: Most isolated analog input modules can be used with SNAP Simple, SNAP Ethernet, SNAP Ultimate, and SNAP *mistic* brains such as the serial B3000, and with M-series or B-series mounting racks. For exceptions, see individual module descriptions.

Isolation

All SNAP analog input modules are isolated from all other modules and from the I/O processor. In addition, the modules in this data sheet have all channels isolated from each other. Channel-to-channel isolation gives you complete freedom from ground-loop problems even on grounded devices connected to channels on the same module.

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.

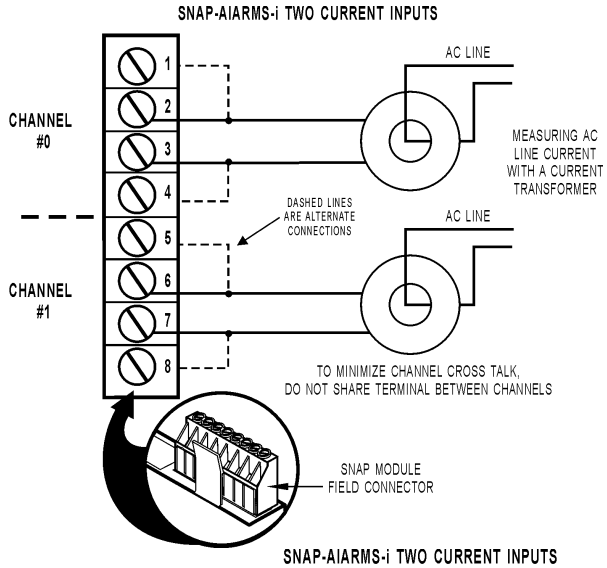
Isolation also provides protection for sensitive control electronics from industrial field signals.

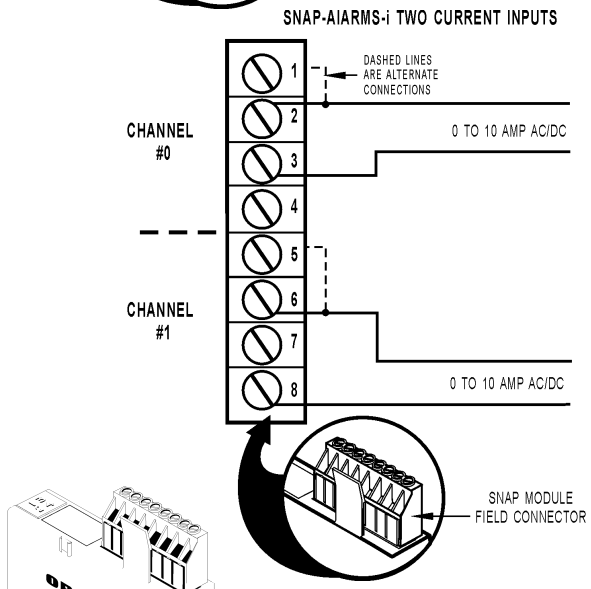
Part Numbers

Part	Description
SNAP-AIARMS-i SNAP-AIARMS-i-FM*	Isolated two-channel 0–0 amp RMS AC/DC input
SNAP-AIVRMS-i SNAP-AIVRMS-i-FM*	Isolated two-channel 0–250 V RMS AC/DC input
SNAP-AIMA-i	Isolated two-channel analog current input -20 mA to +20 mA
SNAP-AIMA-iSRC SNAP-AIMA-iSRC-FM*	Isolated two-channel analog current input -20 mA to +20 mA, with loop sourcing
SNAP-AIMA2-i	Isolated two-channel analog current input -1 mA to +1 mA
SNAP-AIRATE-HFi	Isolated two-channel analog frequency input, 2 Hz to 500 kHz or 20 Hz to 500kHz
SNAP-AITM-i	Isolated two-channel analog type E, J, or K thermocouple or ±150 mV or ±75 mV input
SNAP-AITM2-i	Isolated two-channel analog type B, C, D, G, N, T, R, or S thermocouple or ±50 mV or ±25 mV input
SNAP-AITM-4i	Isolated four-channel analog type B, C, D, E, G, J, K, N, R, S, or T thermocouple or ±150 mV, ±75 mV, ±50 mV, or ±25 mV input
SNAP-AIV-i	Isolated two-channel analog voltage input ±10 VDC or ±5 VDC
SNAP-AIV2-i	Isolated two-channel analog voltage input ±100 VDC or ±50 VDC

* Factory Mutual approved

ISOLATED 0 TO 10 AMP RMS AC/DC INPUT MODULE





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.

Part Number	Description
SNAP-AIARMS-i SNAP-AIARMS-i-FM	Isolated two-channel 0 to 10 amp RMS AC/DC input

Description

The SNAP-AIARMS-i and SNAP-AIARMS-i-FM modules provide an input range of 0 to 10 amps RMS AC/DC. An ideal input is the 5-amp secondary of a standard current transformer used to monitor AC line current. The two channels are isolated from each other; they do not share any field connection. These modules are ideal for differential current measurements. These modules may also be used to monitor AC current to greater than a 100-amp range, using a current transformer of suitable ratio. The SNAP-AIARMS-i-FM module is Factory Mutual approved.

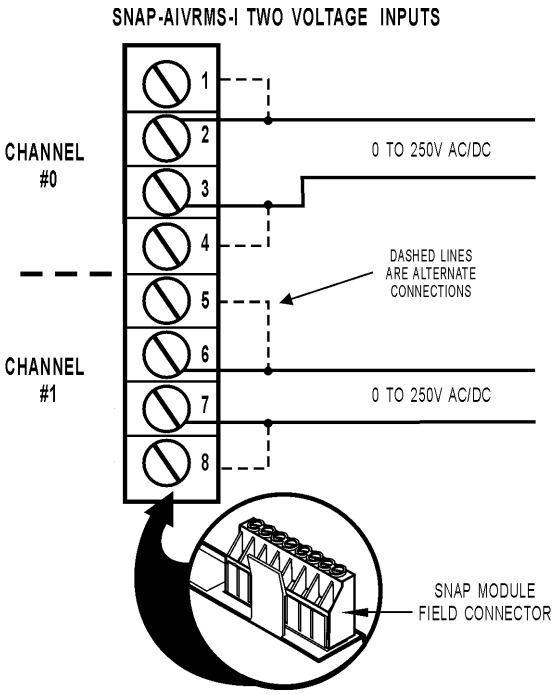
Specifications

Input Range	0 to 10 amp RMS AC/DC
Input Over Range	To 11 amps
Input Resistance	0.005 ohms
Maximum Input	11 amps AC/DC
Accuracy (AC)	±8 mA and ±0.2% reading
Resolution	400 µA
DC Reversal	±16 mA (0.16%)
Input Response Time (Step Change)	63.2% (6.32 A) in 50 ms 99% (9.92 A) in 75 ms
Data Freshness (Max)	0.025 ms
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB at 60 Hz
Maximum Operating Voltage Between Channels Common Mode Voltage	 250 V 250 V
Isolation: Optical	4000 V
Isolation: Transformer	1500 V
Isolation: Channel to Channel	250 V continuous (1500 V transient)
Power Requirements	5 VDC (±0.15 V) at 200 mA
Ambient Temperature: Operating Storage	 -20 °C to 70 °C -40 °C to 85 °C
Humidity	5-95%, non-condensing
Torque, hold-down screws	4 in-lb (0.45 N-m)
Torque, connector screws	5.26 in-lb (0.6 N-m)
Wire size range	22 to 14 AWG
Agency Approvals	CE, RoHS, DFARS; UKCA FM (SNAP-AIARMS-FM only)
Warranty	Lifetime

MADE IN THE USA

ISOLATED 0 TO 250 VOLT RMS AC/DC INPUT MODULE

Part Number	Description
SNAP-AIVRMS-i SNAP-AIVRMS-i-FM	Isolated two-channel 0 to 250 V RMS AC/DC input



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

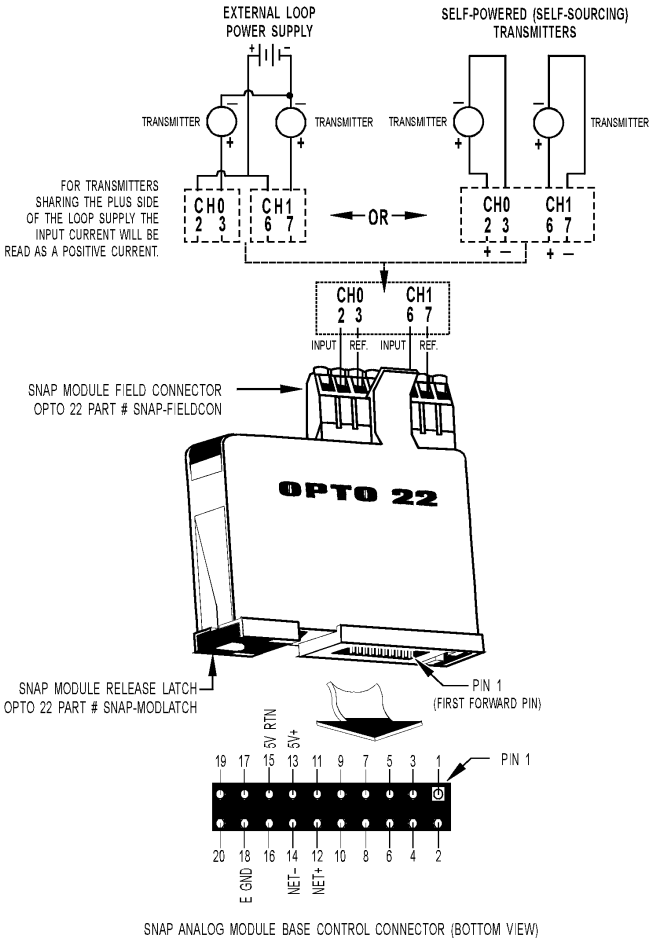
The SNAP-AIVRMS-i and SNAP-AIVRMS-i -FM modules provide an input range of 0 to 250 volts AC or DC. These modules may be used to monitor 120/240-volt AC/DC and 12/24/48-volt AC/DC system voltage. The SNAP-AIVRMS-i-FM module is Factory Mutual approved.

The two channels are isolated from each other; they do not share any field connection. These modules are ideal for differential voltage measurements.

Specifications

Input Range	0 to 250 V RMS AC/DC
Input Over Range	To 275 V
Input Resistance	1 megohms
Accuracy	±0.2 V and ±0.2% reading
Resolution	10 mV
DC Reversal	± 0.2 V (0.08%)
Input Response Time (Step Change)	63.2% (158 V) in 50 ms 99% (248 V) in 75 ms
Data Freshness	25 ms
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB @ 60 Hz
Maximum Operating Voltage Between Channels Common Mode Voltage	 250 V 250 V
Isolation: Optical	4000 V
Isolation: Transformer	1500 V
Isolation: Channel to Channel	250 V continuous (1500 V transient)
Power Requirements	5 VDC (±0.15 V) at 200 mA
Ambient Temperature: Operating Storage	 -20 °C to 70 °C -40 °C to 85 °C
Humidity	5-95%, non-condensing
Torque, hold-down screws	4 in-lb (0.45 N-m)
Torque, connector screws	5.26 in-lb (0.6 N-m)
Wire size range	22 to 14 AWG
Agency Approvals	CE, RoHS, DFARS FM (SNAP-AIVRMS-i-FM only)
Warranty	Lifetime

ISOLATED CURRENT INPUT MODULE -20 MA TO +20 MA



SNAP ANALOG MODULE BASE CONTROL CONNECTOR (BOTTOM VIEW)

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-AIMA-i module provides an input range of -20mA to +20mA. The SNAP-AIMA-i has two channels that are isolated from each other. This module DOES NOT supply loop excitation current. See page 5 for a loop sourcing model.

Part Number	Description
SNAP-AIMA-i	Isolated two-channel analog current input -20 mA to +20 mA

Specifications

Input Range	-20 mA to +20 mA
Maximum Over Range	± 10% (= ± 27500 counts)
Resolution	0.8 µA
Input Response Time (% of span/delta I/delta time)	99.9 %/19.9 µA/10 mS
Data Freshness	11 ms
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB @ 60 Hz
Maximum Survivable Input	36 mA or 9 VDC
Maximum Operating Common Mode Voltage	250 V
Accuracy	0.05% (10 µA)
Isolation: Optical	4000 V
Isolation: Transformer	1500 V
Isolation: Channel to Channel	250 V continuous (1500 V transient)
DRIFT: Gain Temperature Coefficient	30 PPM/ °C
DRIFT: Offset Temperature Coefficient	15 PPM/ °C
Power Requirements	5 VDC (±0.15) @ 200 mA
Input Resistance - Single Ended	200 ohms (each channel)
Ambient Temperature: Operating Storage	 -20 °C to 70 °C -40 °C to 85 °C
Humidity	5-95%, non-condensing
Torque, hold-down screws	4 in-lb (0.45 N-m)
Torque, connector screws	5.26 in-lb (0.6 N-m)
Wire size range	22 to 14 AWG
Agency Approvals	UL, CE, FM, RoHS, DFARS; UKCA
Warranty	Lifetime

ISOLATED CURRENT INPUT MODULE -20MA TO +20MA WITH LOOP SOURCING

Specifications

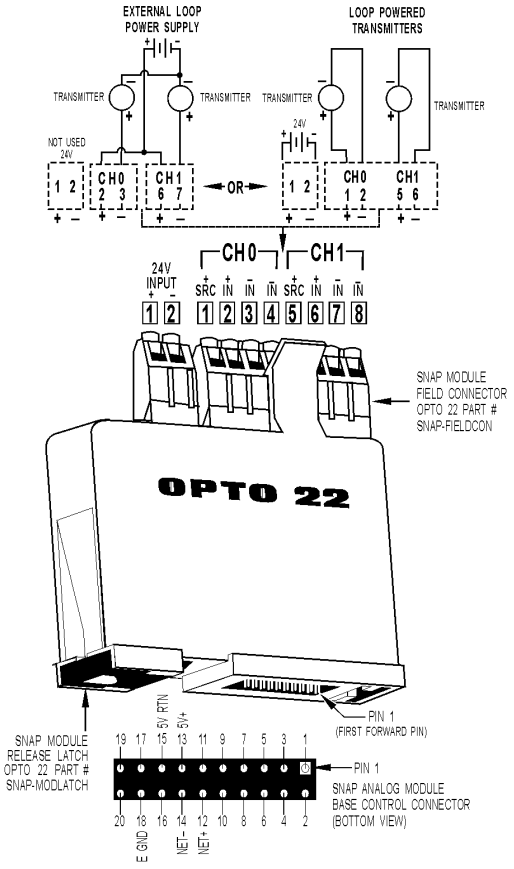
Input Range	0 to +20 mA with loop sourcing -20 mA to +20 mA
Maximum Over Range	± 10% (= ± 27500 counts)
Resolution	0.8 µA
Input Response Time (% of span/delta I/delta time)	99.9 %/19.9 mA/10 ms
Data Freshness	11 ms
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB @ 60 Hz
Maximum Survivable Input	36 mA or 9 VDC
Maximum Operating Common Mode Voltage	250 V
Accuracy	0.05% (10 µA)
DRIFT: Gain Temperature Coefficient	30 PPM/ °C
DRIFT: Offset Temperature Coefficient	15 PPM/ °C
Isolation: Optical	4000 V
Isolation: Transformer	1500 V
Isolation: Channel to Channel	250 V continuous (1500 V transient)
Power Requirements	5 VDC (±0.15) @ 200 mA
Power Requirements - Loop Power (Input)	From separate field connector: 24 VDC nominal (70 mA max @ 24 V input, both loops @ 20 mA), 30 VDC maximum
Loop Power (Output)	24 VDC (± 1.5 V) @ 20 mA Open loop: 30 V maximum Shorted loop: 24 mA nominal
LED on top of module	Indicates that there is power to the 24v source supply 2-pin connector
Input Resistance	200 ohms (each channel)
Ambient Temperature: Operating Storage	 -20 °C to 70 °C -40 °C to 85 °C
Humidity	5-95%, non-condensing
Torque, hold-down screws	4 in-lb (0.45 N-m)
Torque, connector screws	5.26 in-lb (0.6 N-m)
Wire size range	22 to 14 AWG
Agency Approvals	CE, RoHS, DFARS; UKCA FM (SNAP-AIMA-iSRC-FM only)
Warranty	Lifetime

Part Number	Description
SNAP-AIMA-iSRC SNAP-AIMA-iSRC-FM	Isolated two-channel analog current input -20 mA to +20 mA, with loop sourcing

Description

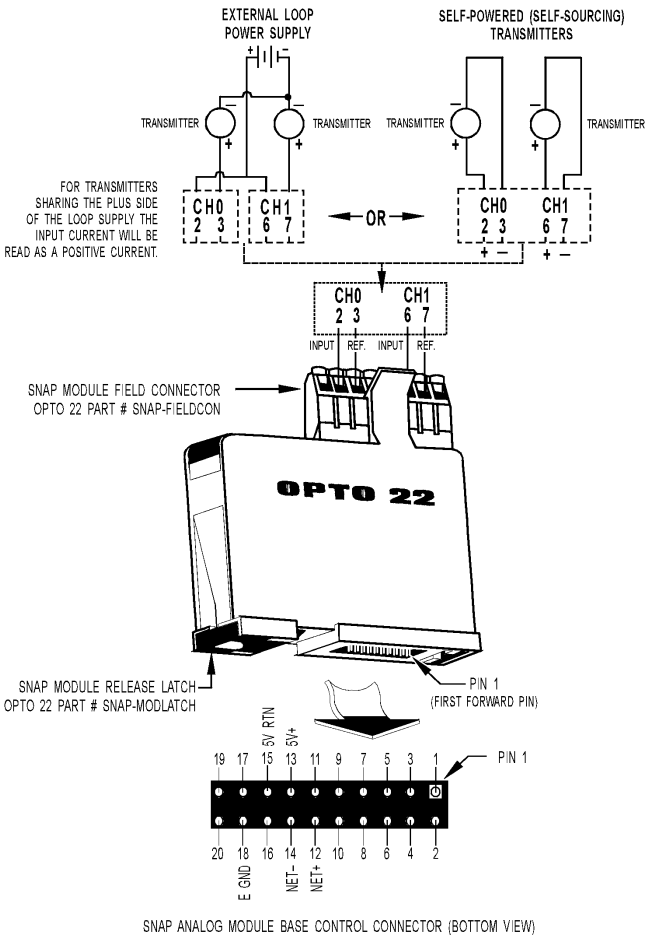
The SNAP-AIMA-iSRC and SNAP-AIMA-iSRC-FM are similar to the SNAP-AIMA-i module but include built-in loop sourcing capability. With the connection of a single 24 V power supply, these modules source 24 V for two 4–20 mA loops. The two channels and their loop sources are isolated from each other; they do not share any field connection. The isolation allows you to independently wire one channel to a loop with an external power supply and the other channel to a loop powered through the module. In addition, each loop sourced through the module is current limited so that an external fault on one loop will not affect the other.

The SNAP-AIMA-iSRC-FM is Factory Mutual approved.



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.

ISOLATED CURRENT INPUT MODULE -1 MA TO +1 MA



SNAP ANALOG MODULE BASE CONTROL CONNECTOR (BOTTOM VIEW)

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.

Part Number	Description
SNAP-AIMA2-i	Isolated two-channel analog current input, -1 to +1 mA

Description

The SNAP-AIMA2-i module provides an input range of -1 mA to +1 mA. The SNAP-AIMA2-i has two channels that are isolated from each other. This module DOES NOT supply loop excitation current.

Specifications

Input Range	-1 mA to +1mA
Maximum Over Range	± 10% (= ± 27500 counts)
Resolution	0.04 µA
Input Response Time (% of span/delta I/delta time)	99.9 %/19.9 µA/10 ms
Data Freshness	11 ms
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB @ 60 Hz
Maximum Survivable Input	11 mA or 28 VDC
Maximum Operating Common Mode Voltage	250 V
Accuracy	0.05% (0.05 µA)
DRIFT: Gain Temperature Coefficient	30 PPM/ °C
DRIFT: Offset Temperature Coefficient	15 PPM/ °C
Isolation: Optical	4000 V
Isolation: Transformer	1500 V
Isolation: Channel to Channel	250 V continuous (1500 V transient)
Power Requirements	5 VDC (±0.15) @ 200 mA
Input Resistance	5 K ohms (each channel)
Ambient Temperature: Operating Storage	 -20 °C to 70 °C -40 °C to 85 °C
Humidity	5-95%, non-condensing
Torque, hold-down screws	4 in-lb (0.45 N-m)
Torque, connector screws	5.26 in-lb (0.6 N-m)
Wire size range	22 to 14 AWG
Agency Approvals	CE, RoHS, DFARS
Warranty	Lifetime

ISOLATED FREQUENCY INPUT MODULE

Part Number	Description
SNAP-AIRATE-HFi	Isolated two-channel analog frequency input, 2 Hz–500 kHz or 20 Hz–500 kHz

Description

The SNAP-AIRATE-HFi module provides frequency to digital conversion. Each channel can be configured for a 0.1-second measurement interval, providing an input range of 20 Hz to 500 kHz, or a 1-second measurement interval, providing an input range of 2 Hz to 500 kHz. Data freshness is dependent upon and directly related to the measurement interval.

Nine volts through a 3.6 kOhm pull-up resistor is provided internally for each channel for use with devices that have open-collector outputs. This feature eliminates the need for you to provide the pull-up voltage supply and associated wiring, barrier strips, and so on. The module works with TTL, CMOS, and open-collector outputs.

The two channels on the module are isolated from each other. Since these channels do not share any common connections, grounded sensors and field devices may be used with them.

This module requires a SNAP PAC controller or brain with SNAP PAC firmware version 9.3e or higher. It cannot be used with legacy controllers or brains.

See wiring diagrams on the following page.

Specifications

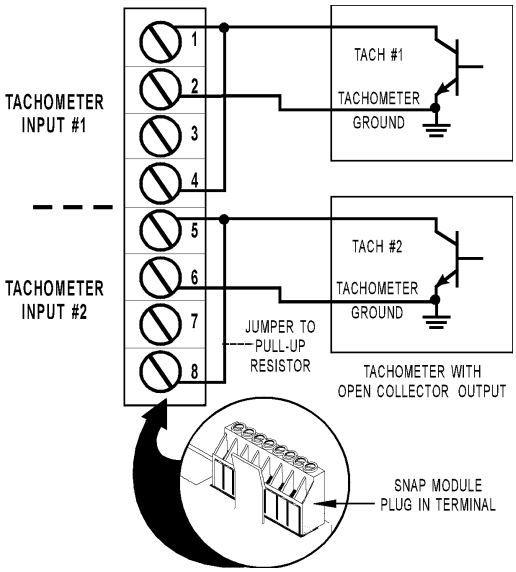
Input Range	2 Hz - 500 kHz at 1.0 s Data Freshness 20 Hz - 500 kHz at 0.1 s Data Freshness
Input Voltage Range Sine wave >= 2000 Hz Sine wave at 200 Hz Sine wave at 20 Hz Sine wave at 2 Hz Square wave Maximum survivable	 3.0 V to 48 V_{p-p} 4.0 V to 48 V_{p-p} 5.0 V to 48 V_{p-p} 17 V to 48 V_{p-p} 3.0 V to 48 V_{p-p} 110 V_{p-p}
Input Impedance	55 kOhms
Input Coupling	Single-ended AC
Pull-up Voltage	6 to 9 VDC
Pull-up Resistor	3.6 kOhm
Minimum Pulse Width	1 microsecond
Data Freshness*	100 ms at 20 Hz - 500 kHz 1.0 s at 2 Hz to 500 kHz
Resolution (Hz)	*f* / (48,000,000 * Data Freshness), where *f* is the current frequency measurement
Accuracy (at 1.0 s Data Freshness)	+- 0.005% of input for input greater than 500 Hz +- 0.005% of input plus an additional +- 0.006 Hz for input less than 500 Hz
Maximum Operating Common Mode Voltage	250 V Continuous 1500 V Transient
DC Common Mode Rejection	> -120 dB
AC Common Mode Rejection	> -120 dB at 60 Hz
Isolation: Channel to Channel	250 V Continuous 1500 V Transient
Power Consumption	1.05 W (210 mA @ 5 V)
Ambient Temperature Operating Storage	 -20 to 70 °C -40 to 85 °C
Humidity	5-95%, non-condensing
Torque, hold-down screws	4 in-lb (0.45 N-m)
Torque, connector screws	5.26 in-lb (0.6 N-m)
Wire size range	22 to 14 AWG
Agency Approvals	CE, RoHS, DFARS; UKCA
Warranty	Lifetime

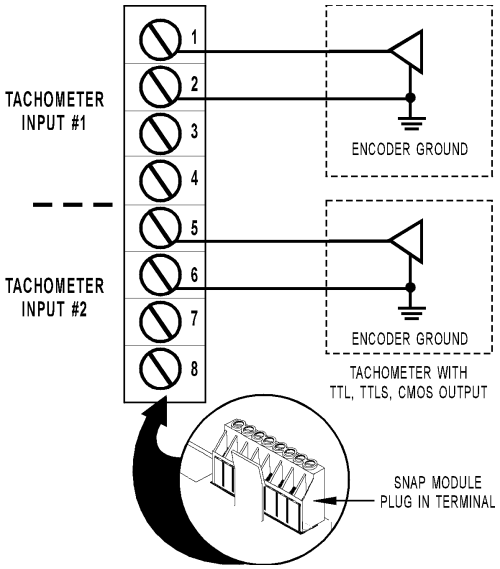
* User selectable. Default is 0.1 seconds.

ISOLATED FREQUENCY INPUT MODULE (CONTINUED)

SNAP-AIRATE-HFi Wiring Diagrams

The two channels on the module are isolated from each other. Because these channels do not share any common connections, grounded sensors and field devices may be used with them.





ISOLATED THERMOCOUPLE/MILLIVOLT INPUT MODULE

Specifications

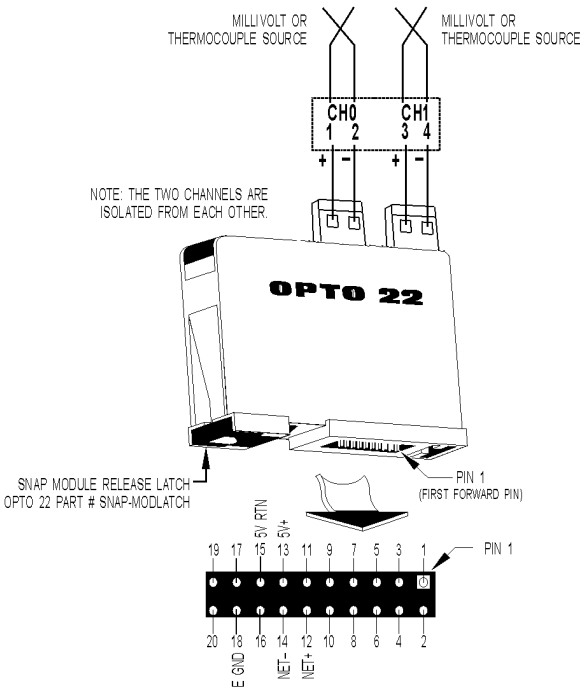
Input Range	From -150 mV to +150 mV From -75 mV to +75 mV
Maximum Over Range	± 10% (= ± 27500 counts)
Resolution	6 µV from -150 mV to +150 mV 3 µV from -75 mV to +75 mV
Cold Junction Temperature Compensation	Automatic when used with SNAP brains
Input Filtering	-3 dB @ 7 Hz
Input Response Time (% of span/delta V/delta time)	63.2%/95 mV/23 mS
Data Freshness	65 ms for +/- 150 mV 130 ms for +/- 75 mV 130 ms for E-, J-, and K-type thermocouples
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	0.06% (90 µV) @ 150 mV (full scale) 0.1% (75 µV) @ 75 mV (full scale)
Drift: Gain Temperature Coefficient	5 µV / °C
Drift: Offset Temperature Coefficient	2 µV / °C
Thermocouple Accuracy [°C] From factory After user gain and offset commands	 ± 2.0 (E, J, and K) ± 0.8
Isolation: Optical	4000 V
Isolation: Transformer	1500 V
Isolation: Channel to Channel	250 V continuous (1500 V transient)
Power Requirements	5 VDC (±0.15) @ 200 mA
Input Resistance	100 megohms (each channel)
Ambient Temperature: Operating Storage	 -20 °C to 70 °C -40 °C to 85 °C
Humidity	5-95%, non-condensing
Torque, hold-down screws	4 in-lb (0.45 N-m)
Torque, connector screws	3 in-lb (0.34 N-m)
Wire size range	22 to 14 AWG
Agency Approvals	CE, FM, RoHS, DFARS; UKCA
Warranty	Lifetime

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

Description

The SNAP-AITM-i 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. The two channels are isolated from each other. Since these channels do not share any common connections, grounded sensors and field devices may be used with them.

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



SNAP ANALOG MODULE BASE CONTROL CONNECTOR (BOTTOM VIEW)

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.

ISOLATED THERMOCOUPLE/MILLIVOLT INPUT MODULE

Specifications

Input Range	From -50 mV to +50 mVDC From -25 mV to +25 mVDC
Maximum Over Range	± 10% (= ± 27500 counts)
Resolution	2 µV from -50 mV to +50 mV 1 µV from -25 mV to +25 mV
Cold Junction Temperature Compensation	Automatic when used with SNAP brains
Input Filtering	-3 dB @ 2.4 Hz
Input Response Time (% of span/delta V/delta time)	63.2%/31.5 mV/66 ms
Data Freshness	65 ms for +/- 50 mV 130 ms for +/- 25 mV 130 ms for B-, R-, S-, and T-type thermocouples 65 ms for C-, D-, G-, and N-type thermocouples
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	0.1% (50 µV) @ 50 mV (full scale) 0.2% (50 µV) @ 25 mV (full scale)
Drift: Gain Temperature Coefficient	5 µV / °C
Drift: Offset Temperature Coefficient	2 µV / °C
Thermocouple Accuracy [°C] From factory After user gain and offset commands	B, R, S C, D, G T, N ±5 ±4 ±3 ±3 ±2 ±2
Isolation: Optical	4000 V
Isolation: Transformer	1500 V
Isolation: Channel to Channel	250 V continuous (1500 V transient)
Power Requirements	5 VDC (±0.15) @ 200 mA
Input Resistance	100 megohms (each channel)
Ambient Temperature: Operating Storage	 -20 °C to 70 °C -40 °C to 85 °C
Humidity	5-95%, non-condensing
Torque, hold-down screws	4 in-lb (0.45 N-m)
Torque, connector screws	3 in-lb (0.34 N-m)
Wire size range	22 to 14 AWG
Agency Approvals	CE, FM, RoHS, DFARS; UKCA
Warranty	Lifetime

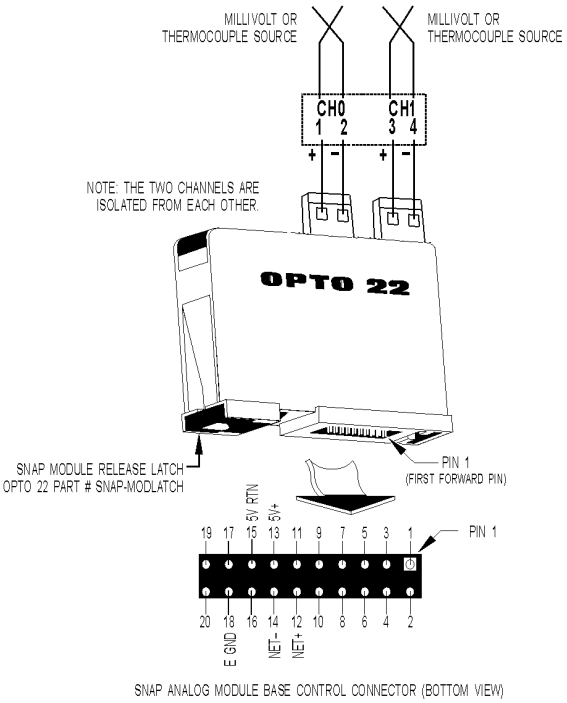
Part Number	Description
SNAP-AITM2-i	Isolated two-channel analog type B, C, D, G, N, T, R, or S thermocouple or -50 mV to +50 mVDC input or -25 mV to +25 mVDC input

Description

The SNAP-AITM2-i module provides an input range of ±50 mV, ±25 mV, or Type B, C, D, G, N, T, R, or S thermocouple.

The two channels on the module are isolated from each other. Since these channels do not share any common connections, grounded sensors and field devices may be used with them.

Type	-	+	Range
B	RED	GRAY	+42 °C to +1,820 °C
C, D, G	RED	WHITE	0 °C to +2,320 °C
N	RED	ORANGE	-270 °C to +1,300 °C
R, S	RED	BLACK	-50 °C to +1,768 °C
T	RED	BLUE	-270 °C to +400 °C



SNAP ANALOG MODULE BASE CONTROL CONNECTOR (BOTTOM VIEW)

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.

MADE IN THE USA

ISOLATED THERMOCOUPLE/MILLIVOLT INPUT MODULE

Specifications

Input Range	From -150 mV to +150 mVDC From -75 mV to +75 mVDC From -50 mV to +50 mVDC From -25 mV to +25 mVDC			
Maximum Over Range	± 10% (= ± 27500 counts)			
Resolution	6 µV from -150 mV to +150 mV 3 µV from -75 mV to +75 mV 2 µV from -50 mV to +50 mV 1 µV from -25 mV to +25 mV			
Cold Junction Temperature Compensation	Automatic when used with SNAP PAC brains			
Input Filtering	-3 dB @ 5 Hz			
Data Freshness	mV input: 75 ms Thermocouple input: 140 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	0.06% (90 µV) @ 150 mV (full scale) 0.1% (75 µV) @ 75 mV (full scale) 0.1% (50 µV) @ 50 mV (full scale) 0.2% (50 µV) @ 25 mV (full scale)			
Drift: Gain Temperature Coefficient	5 µV / °C			
Drift: Offset Temperature Coefficient	2 µV / °C			
Thermocouple Accuracy [°C]	B,R,S	C,D,G	E,J,K	N,T
From factory	±5.0	±4.0	± 2.0	±3.0
After user gain and offset commands	±3.0	±2.0	± 0.8	±2.0
Isolation: Transformer	1500 V			
Isolation: Channel to Channel	250 V continuous (1500 V transient)			
Power Requirements	5 VDC (±0.15) @ 150 mA			
Input Resistance	100 megohms (each channel)			
Ambient Temperature: Operating Storage	 -20 °C to 70 °C -40 °C to 85 °C			
Humidity	5-95%, non-condensing			
Wire size range	22 to 14 AWG			
Agency Approvals	CE, RoHS, DFARS; UKCA			
Warranty	Lifetime			

Part Number	Description
SNAP-AITM-4i	Isolated four-channel analog type B, C, D, E, G, J, K, N, R, S, or T thermocouple or ±150 mV, ±75 mV, ±50 mV, or ±25 mV input

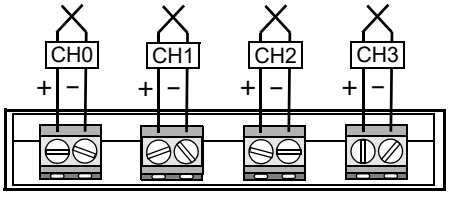
Description

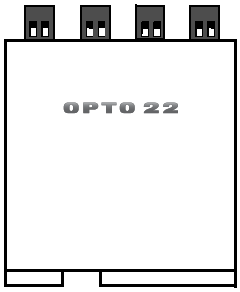
The SNAP-AITM-4i module provides an input range of ±150 mV, ±75 mV, ±50 mV, ±25 mV, or Type B, C, D, E, G, J, K, N, R, S, or T thermocouple.

The four channels on the module are isolated from each other. Since these channels do not share any common connections, grounded sensors and field devices may be used with them.

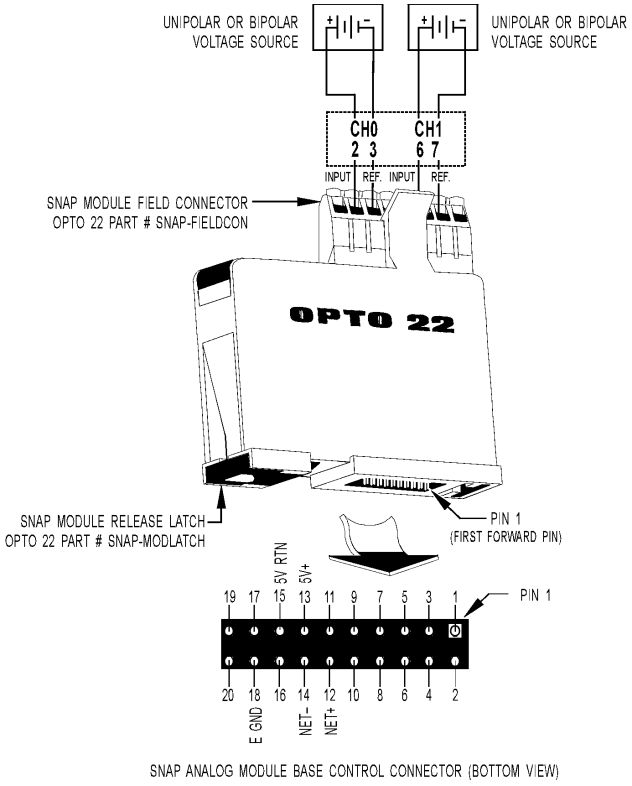
SNAP-AITM-4i requires a SNAP PAC rack, a SNAP PAC brain or R-series controller with firmware 9.1 or newer, and PAC Project 9.1 or newer.

Type	-	+	Range
B	Red	Gray	+42 °C to +1,820 °C
C, D, G	Red	White	0 °C to +2,320 °C
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
N	Red	Orange	-270 °C to +1,300 °C
R, S	Red	Black	-50 °C to +1,768 °C
T	Red	Blue	-270 °C to +400 °C





ISOLATED VOLTAGE INPUT MODULE -10 VDC TO +10 VDC OR -5 VDC TO +5 VDC



SNAP ANALOG MODULE BASE CONTROL CONNECTOR (BOTTOM VIEW)

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

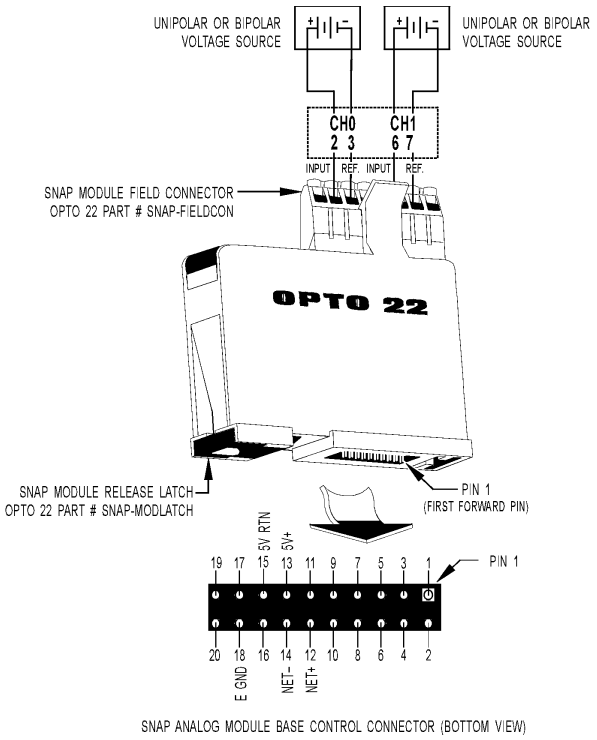
The SNAP-AIV-i module can be configured for either -10 VDC to +10 VDC or -5 VDC to +5 VDC operation on each channel. The SNAP-AIV-i provides two channels that are isolated from each other. Since these channels do not share any common connections, grounded sensors and field devices may be used with them.

Part Number	Description
SNAP-AIV-i	Isolated two-channel analog voltage input -10 VDC to +10 VDC or -5 VDC to +5 VDC

Specifications

Input Range	From -10 volts to +10 volts From -5 volts to +5 volts
Maximum Over Range	± 10% (= ± 27500 counts)
Resolution	0.4 mV when configured -10 volts to +10 volts 0.2 mV when configured -5 volts to +5 volts
Input Filtering	-3 dB @ 64 Hz
Input Response Time (% of span/ DV / Dt)	63.2% / 6.7 V / 10 mS
Data Freshness	11 ms for +/- 10 V 18 ms for +/- 5 V
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB @ 60 Hz
Maximum Survivable Input	220 VAC or 300 VDC
Maximum Operating Common Mode Voltage	250 V
Accuracy	0.05%, 5 mV @ 10 VDC 2.5 mV @ 5 VDC
Gain Temperature Coefficient	30 PPM/ °C
Offset Temperature Coefficient	15 PPM/ °C
Isolation: Optical	4000 V
Isolation: Transformer	1500 V
Isolation: Channel to Channel	250 V continuous (1500 V transient)
Power Requirements	5 VDC (±0.15) @ 200 mA
Input Resistance	1 megohms (each channel)
Ambient Temperature: Operating Storage	 -20 °C to 70 °C -40 °C to 85 °C
Humidity	5-95%, non-condensing
Torque, hold-down screws	4 in-lb (0.45 N-m)
Torque, connector screws	5.26 in-lb (0.6 N-m)
Wire size range	22 to 14 AWG
Agency Approvals	UL, CE, FM, RoHS, DFARS; UKCA
Warranty	Lifetime

ISOLATED VOLTAGE INPUT MODULE -100 VDC TO +100 VDC OR -50 VDC TO +50 VDC



SNAP ANALOG MODULE BASE CONTROL CONNECTOR (BOTTOM VIEW)

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-AIV2-i module can be configured for either -100 VDC to +100 VDC or -50 VDC to +50 VDC operation on each channel. The SNAP-AIV2-i provides two channels that are isolated from each other. Since these channels do not share any common connections, grounded sensors and field devices may be used with them.

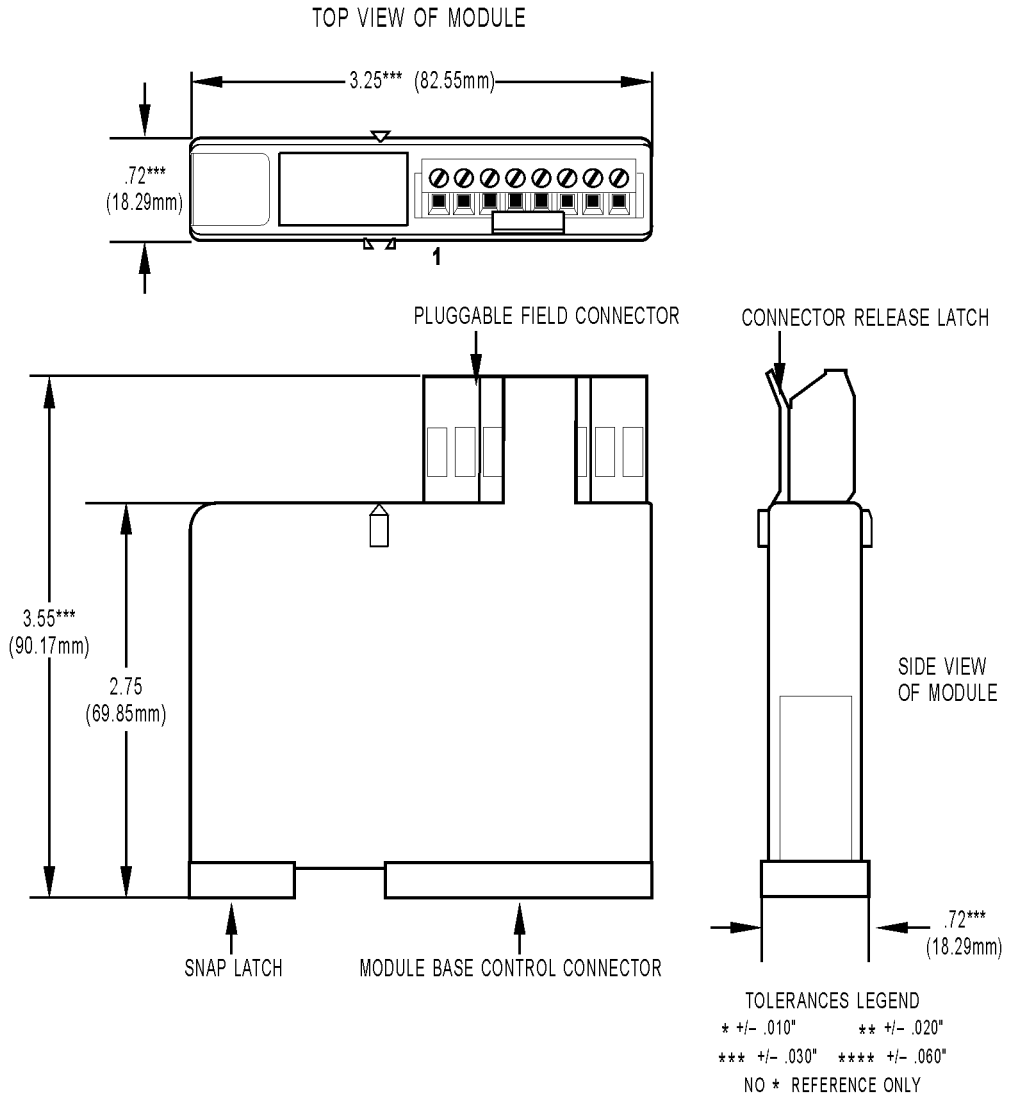
Part Number	Description
SNAP-AIV2-i	Isolated two-channel analog voltage input -100 VDC to +100 VDC or -50 VDC to +50 VDC

Specifications

Input Range	From -100 volts to +100 volts From -50 volts to +50 volts
Maximum Over Range	± 10% (= ± 27500 counts)
Resolution	4.0 mV when configured -100 volts to +100 volts 2.0 mV when configured -50 volts to +50 volts
Input Filtering	-3 dB @ 64 Hz
Input Response Time (% of span/ DV / Dt)	63.2% / 6.7 V / 10 mS
Data Freshness	11 ms for +/- 100 V 18 ms for +/- 50 V
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB @ 60 Hz
Maximum Survivable Input	220 VAC or 300 VDC
Maximum Operating Common Mode Voltage	250 V
Accuracy	0.05%, 50 mV @ 100 VDC 25 mV @ 50 VDC
Gain Temperature Coefficient	30 PPM/ °C
Offset Temperature Coefficient	15 PPM/ °C
Isolation: Optical	4000 V
Isolation: Transformer	1500 V
Isolation: Channel to Channel	250 V continuous (1500 V transient)
Power Requirements	5 VDC (±0.15) @ 200 mA
Input Resistance	1 megohms (each channel)
Ambient Temperature: Operating Storage	 -20 °C to 70 °C -40 °C to 85 °C
Humidity	5-95%, non-condensing
Torque, hold-down screws	4 in-lb (0.45 N-m)
Torque, connector screws	5.26 in-lb (0.6 N-m)
Wire size range	22 to 14 AWG
Agency Approvals	CE, RoHS, DFARS; UKCA

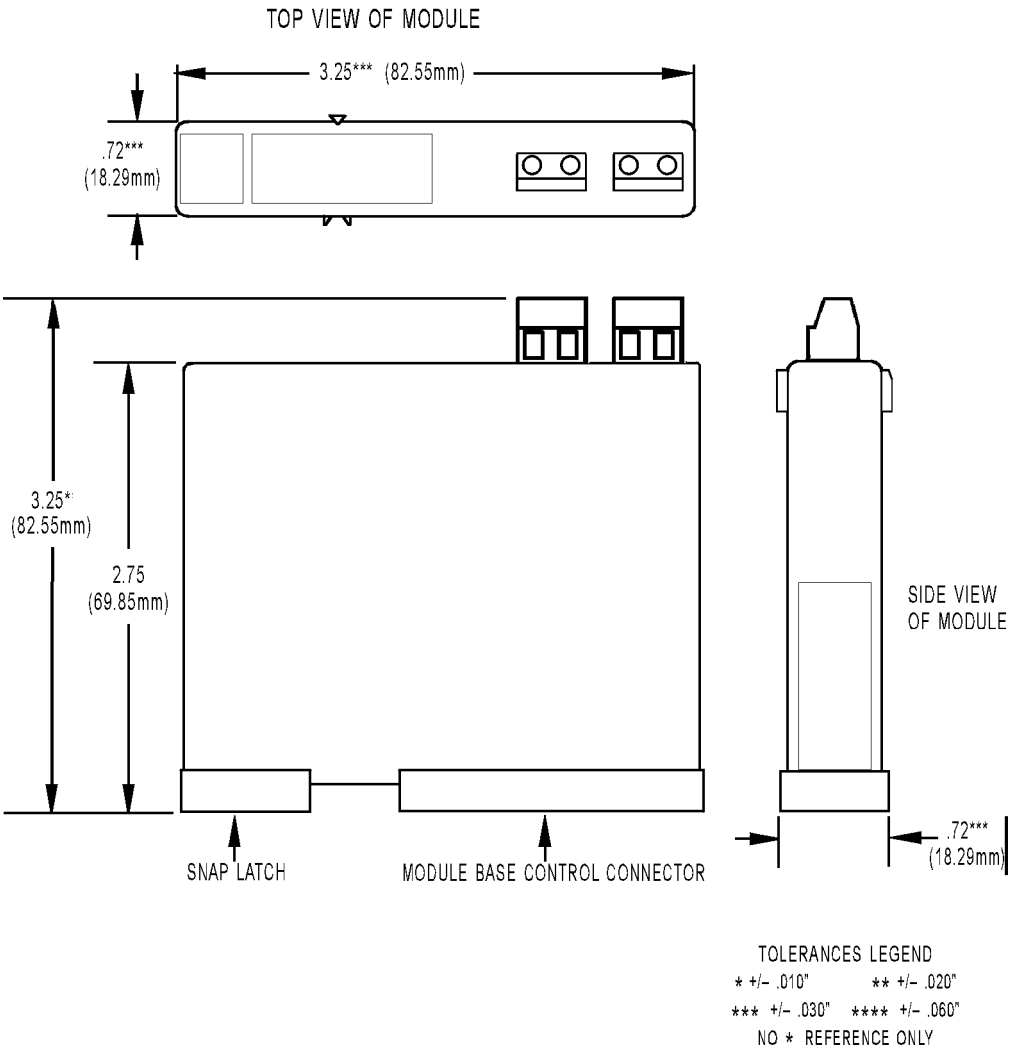
DIMENSIONAL DRAWING

All Modules Except SNAP-AITM-i, SNAP-AITM2-i, SNAP-AITM-4i, SNAP-AIMA-iSRC, and SNAP-AIMA-iSRC-FM



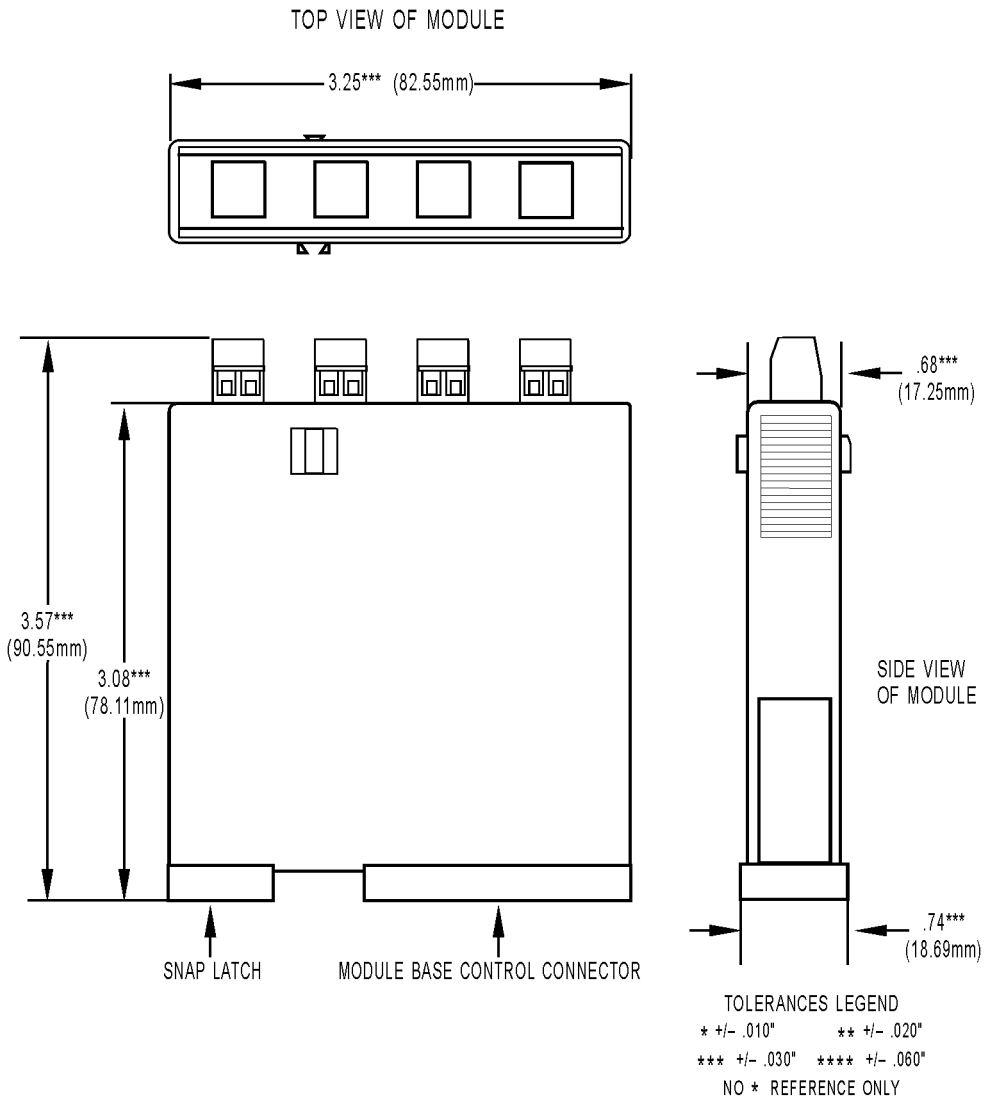
DIMENSIONAL DRAWING

SNAP-AITM-i and SNAP-AITM2-i Modules



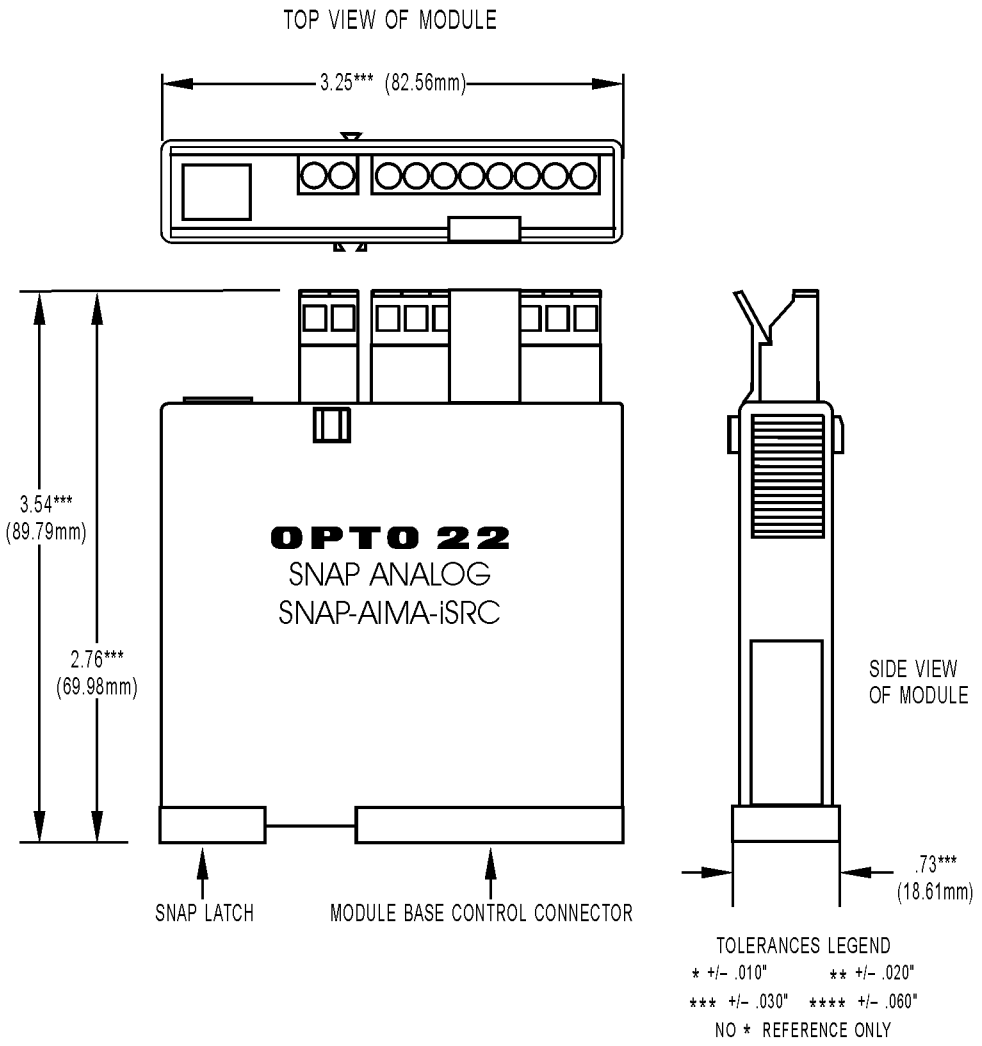
DIMENSIONAL DRAWING

SNAP-AITM-4i Module



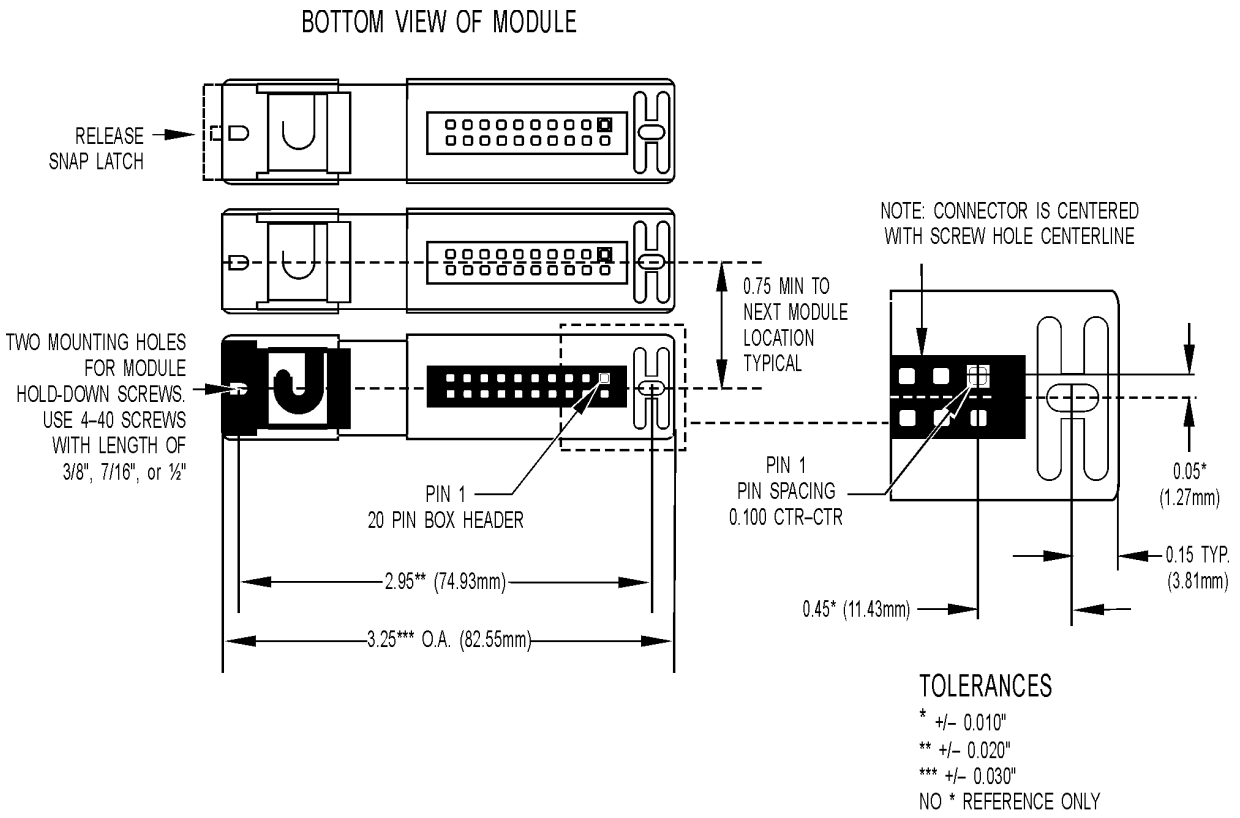
DIMENSIONAL DRAWING

SNAP-AIMA-iSRC and SNAP-AIMA-iSRC-FM Modules



DIMENSIONAL DRAWING

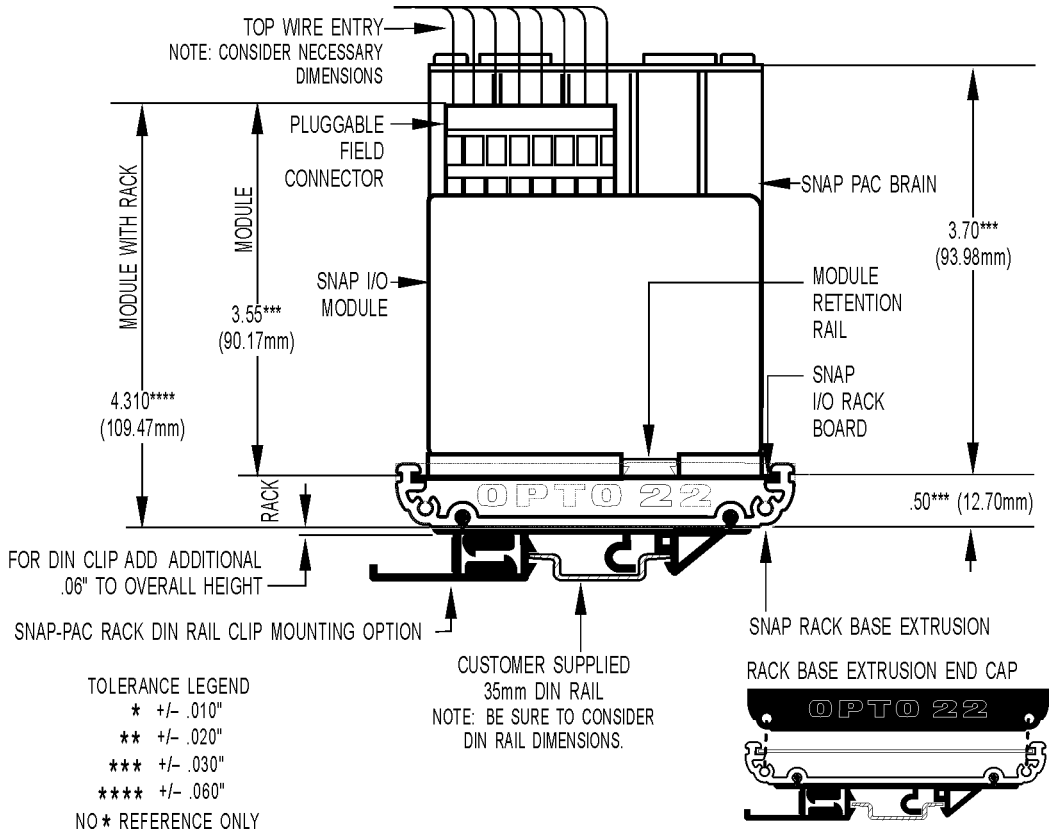
All Modules



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.

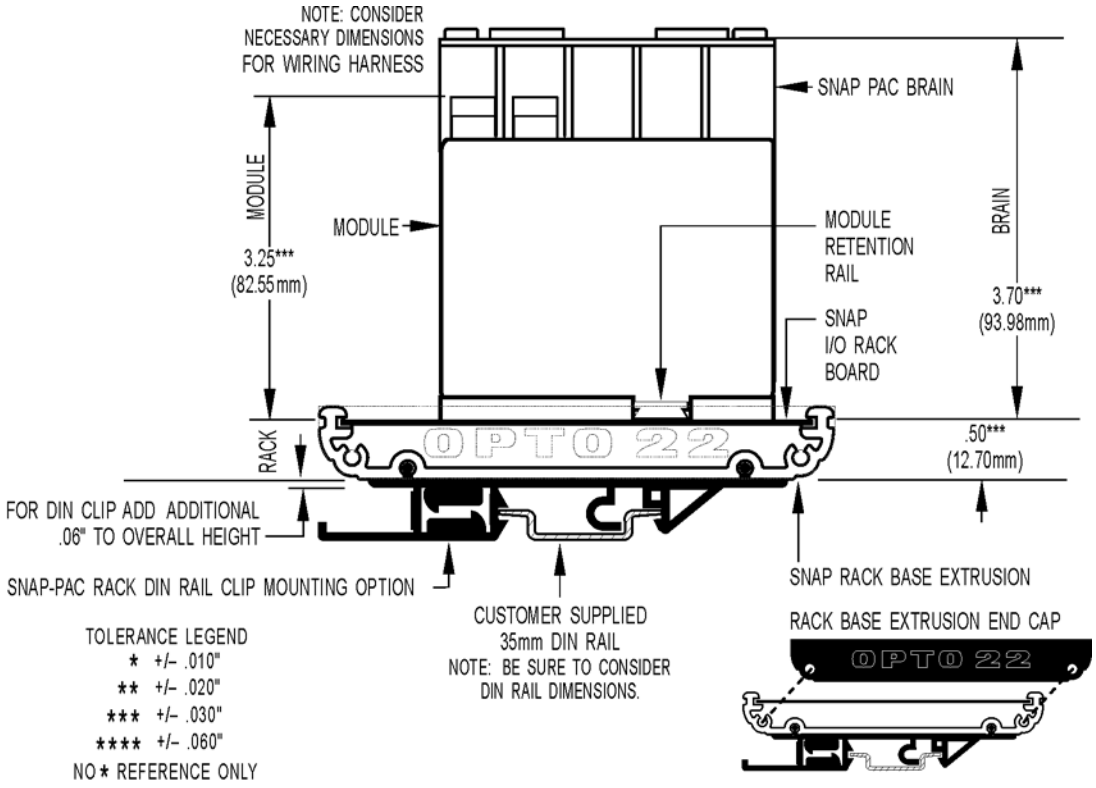
DIMENSIONAL DRAWING

Height on Rack: All Modules Except SNAP-AITMi and SNAP-AITM2-i



DIMENSIONAL DRAWING

Height on Rack: SNAP-AITMi and SNAP-AITM2-i Modules



More about Opto 22

OPTO 22

PRODUCTS

Opto 22 develops and manufactures reliable, easy-to-use, open standards-based hardware and software products. Industrial automation, process control, remote monitoring, data acquisition, and industrial internet of things (IIoT) applications worldwide all rely on Opto 22.

groov RIO®

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:

- Programming: Choose flowchart-based PAC Control, CODESYS Development System for IEC61131-3 compliant programs, or secure shell access (SSH) to the Linux OS for custom applications
- Node-RED for creating simple IIoT logic flows from pre-built nodes
- Efficient MQTT data communications with string or Sparkplug data formats
- 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
- Ignition or Ignition Edge® from Inductive Automation (requires license purchase) with OPC-UA drivers to Allen-Bradley®, Siemens®, and other control systems, and MQTT communications

Older products

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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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** (toll-free in the U.S. and Canada) or **+1-951-695-3000**, or visit our website at www.opto22.com.

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