

# 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
- Out-of-range indication
- Operating temperature 0 °C to 70 °C

## 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 use a retention rail locking system that holds modules in place. In addition, Opto 22 recommends using two 4-40 by 1/2-inch standard machine screws to secure each module to the 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.



SNAP Isolated Analog Input Modules

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.

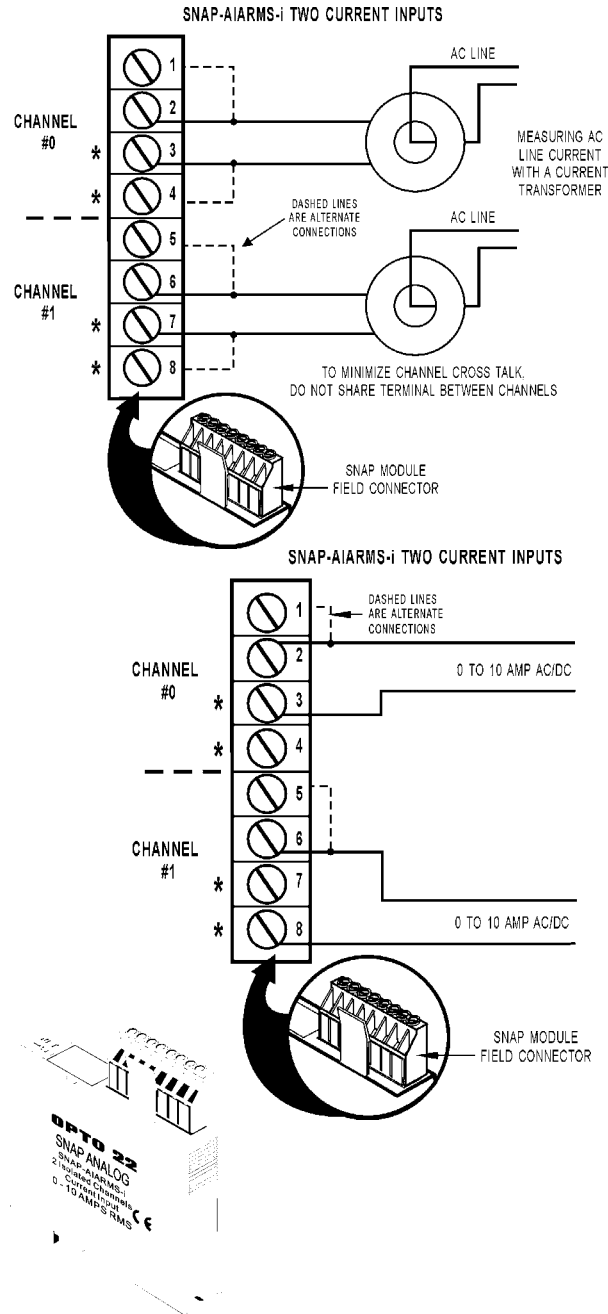
## Part Numbers

| Part                                 | Description   | Pg |
|--------------------------------------|---|----|
| SNAP-AIARMS-i<br>SNAP-AIARMS-i-FM*   | Isolated two-channel 0 to 10 amp RMS AC/DC input  | 2  |
| SNAP-AIVRMS-i<br>SNAP-AIVRMS-i-FM*   | Isolated two-channel 0 to 250 V RMS AC/DC input   | 3  |
| SNAP-AIMA-i                          | Isolated two-channel analog current input -20 mA to +20 mA  | 4  |
| SNAP-AIMA-iSRC<br>SNAP-AIMA-iSRC-FM* | Isolated two-channel analog current input -20 mA to +20 mA, with loop sourcing  | 5  |
| SNAP-AIMA2-i                         | Isolated two-channel analog current input -1 mA to +1 mA  | 6  |
| SNAP-AIRATE-HFi                      | Isolated two-channel analog frequency input, 2 Hz to 500 kHz or 20 Hz to 500 kHz  | 7  |
| SNAP-AITM-i                          | Isolated two-channel analog type E, J, or K thermocouple or ±150 mV or ±75 mV input   | 9  |
| 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                             | 10 |
| 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 | 11 |
| SNAP-AIV-i                           | Isolated two-channel analog voltage input ±10 VDC or ±5 VDC   | 12 |
| SNAP-AIV2-i                          | Isolated two-channel analog voltage input ±100 VDC or ±50 VDC   | 13 |

\* Factory Mutual approved

# SNAP Isolated Analog Input Modules

## 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    | Isolated two-channel 0 to 10 amp RMS AC/DC input |
| 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. 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.

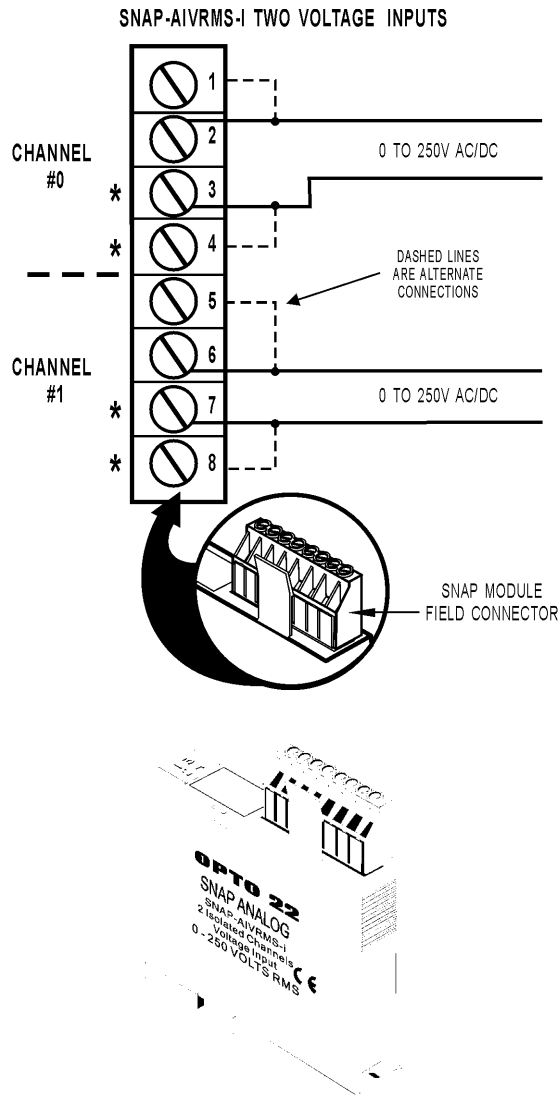
The two channels are isolated from each other; they do not share any field connection. These modules are ideal for differential current measurements.

### 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<br>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 | 250 V  |
| Common Mode Voltage                        | 250 V  |
| Isolation: Optical                         | 4000 V   |
| Isolation: Transformer                     | 1500 V   |
| Isolation: Channel to Channel              | 250 V continuous<br>(1500 V transient)           |
| Power Requirements                         | 5 VDC (±0.15 V) at 200 mA                        |
| Ambient Temperature: Operating             | 0 °C to 70 °C                                    |
| Storage                                    | -40 °C to 85 °C                                  |
| 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<br>FM (SNAP-AIARMS-FM only)      |
| Warranty                                   | Lifetime   |

# SNAP Isolated Analog Input Modules

## Isolated 0 to 250 Volt 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-AIVRMS-i    | Isolated two-channel 0 to 250 V RMS AC/DC input |
| SNAP-AIVRMS-i-FM | Isolated two-channel 0 to 250 V RMS AC/DC input |

### 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.

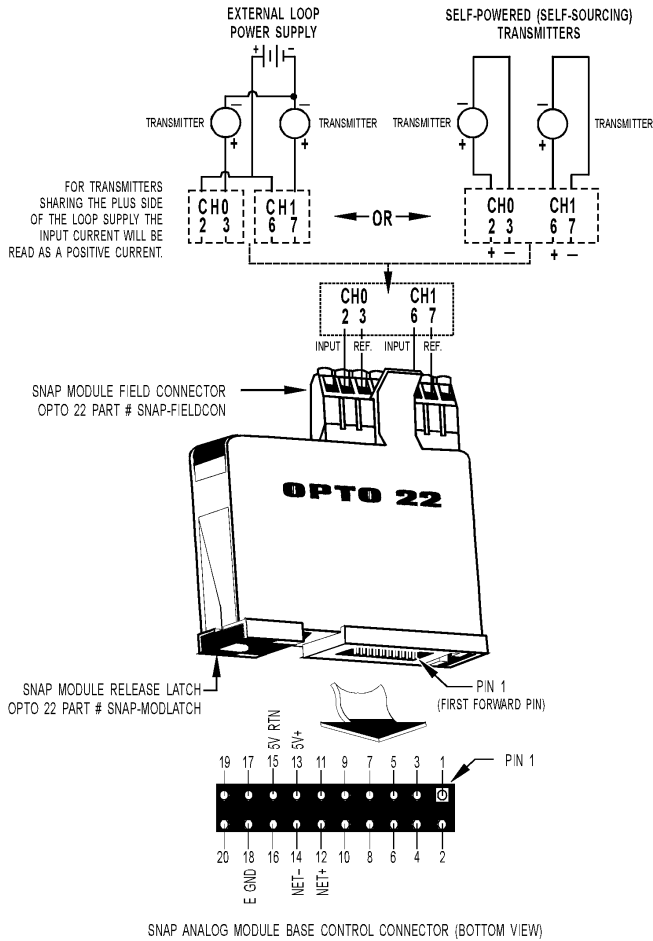
The two channels are isolated from each other; they do not share any field connection. These modules are ideal for differential voltage measurements.

### 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<br>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<br>Common Mode Voltage | 250 V<br>250 V                                 |
| Isolation: Optical  | 4000 V   |
| Isolation: Transformer  | 1500 V   |
| Isolation: Channel to Channel                                     | 250 V continuous<br>(1500 V transient)         |
| Power Requirements  | 5 VDC (±0.15 V) at 200 mA                      |
| Ambient Temperature:<br>Operating<br>Storage                      | 0 °C to 70 °C<br>-40 °C to 85 °C               |
| 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                                       |

# SNAP Isolated Analog Input Modules

## Isolated Current Input Module -20 mA to +20 mA



**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-AIMA-i | Isolated two-channel analog current input<br>-20 mA to +20 mA |

### Specifications

|   |  |
|---|--|
| Input Range   | -20 mA to +20 mA                       |
| Maximum Over Range                                    | ± 10%<br>(= ± 27500 counts)            |
| Resolution  | 0.8 µA                                 |
| Input Response Time<br>(% 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<br>(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:<br>Operating<br>Storage          | 0 °C to 70 °C<br>-40 °C to 85 °C       |
| 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                |
| Warranty  | Lifetime                               |

### 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.

# SNAP Isolated Analog Input Modules

## Isolated Current Input Module -20mA to +20mA with Loop Sourcing

### Specifications

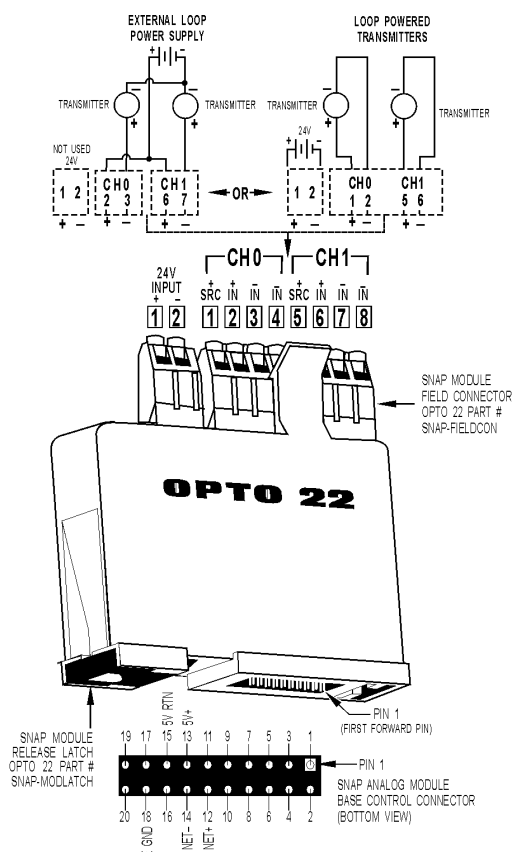
|   |   |
|---|---|
| Input Range   | 0 to +20 mA with loop sourcing<br>-20 mA to +20 mA  |
| Maximum Over Range                                    | ± 10%<br>(= ± 27500 counts)   |
| Resolution  | 0.8 µA  |
| Input Response Time<br>(% of span/delta I/delta time) | 99.9 %/19.9 mA/10 ms  |
| Data Freshness  | 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<br>Common Mode Voltage              | 250 V   |
| Accuracy  | 0.05% (10 µA)   |
| DRIFT: Gain Temperature<br>Coefficient                | 30 PPM/ °C  |
| DRIFT: Offset Temperature<br>Coefficient              | 15 PPM/ °C  |
| Isolation: Optical                                    | 4000 V  |
| Isolation: Transformer                                | 1500 V  |
| Isolation: Channel to Channel                         | 250 V continuous<br>(1500 V transient)  |
| Power Requirements                                    | 5 VDC (±0.15) @ 200 mA  |
| Power Requirements -<br>Loop Power (Input)            | From separate field connector:<br>24 VDC nominal (70 mA max @ 24 V<br>input, both loops @ 20 mA),<br>30 VDC maximum |
| Loop Power (Output)                                   | 24 VDC (± 1.5 V) @ 20 mA<br>Open loop: 30 V maximum<br>Shorted loop: 24 mA nominal                                  |
| LED on top of module                                  | Indicates that there is power to the<br>24v source supply 2-pin connector   |
| Input Resistance                                      | 200 ohms (each channel)   |
| Ambient Temperature:<br>Operating<br>Storage          | 0 °C to 70 °C<br>-40 °C to 85 °C  |
| 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<br>FM (SNAP-AIMA-iSRC-FM only)  |
| Warranty  | Lifetime  |

| Part Number                         | Description  |
|-------------------------------------|--|
| SNAP-AIMA-iSRC<br>SNAP-AIMA-iSRC-FM | Isolated two-channel analog current<br>input -20 mA to +20 mA, with loop<br>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 loops are internally connected to the individual inputs. The two channels and their loop sources are isolated from each other; they do not share any field connection. In addition, each loop source is current limited so that an external fault on one loop will not affect the other.

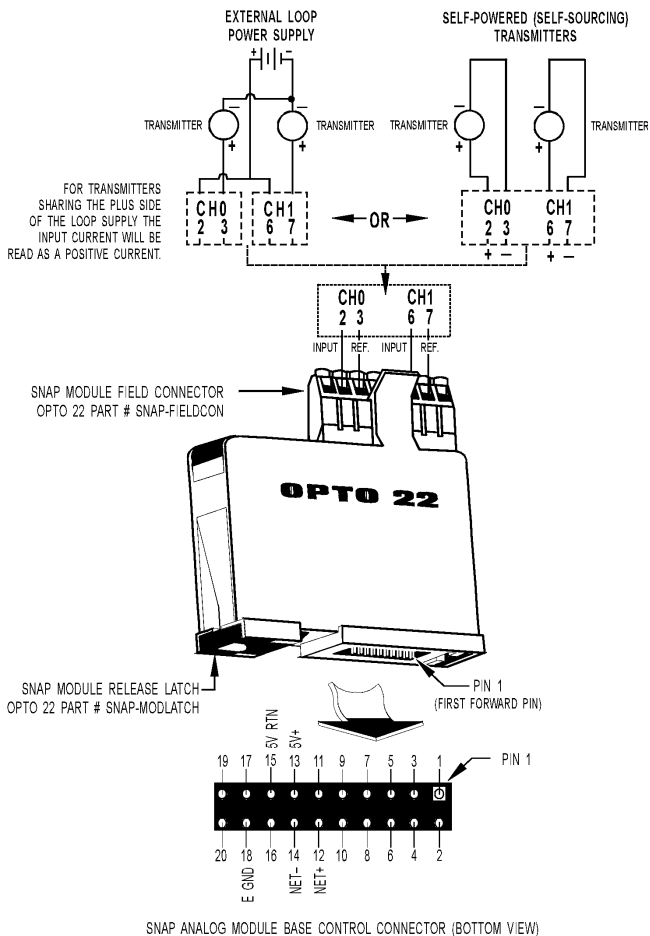
The SNAP-AIMA-iSRC-FM is Factory Mutual approved.



**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.

# SNAP Isolated Analog Input Modules

## Isolated Current Input Module -1 mA to +1 mA



**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<br>-1 mA 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%<br>(= ± 27500 counts)            |
| Resolution  | 0.04 µA                                |
| Input Response Time<br>(% 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<br>Common Mode Voltage              | 250 V                                  |
| Accuracy  | 0.05% (0.05 µA)                        |
| DRIFT: Gain Temperature<br>Coefficient                | 30 PPM/ °C                             |
| DRIFT: Offset Temperature<br>Coefficient              | 15 PPM/ °C                             |
| Isolation: Optical                                    | 4000 V                                 |
| Isolation: Transformer                                | 1500 V                                 |
| Isolation: Channel to Channel                         | 250 V continuous<br>(1500 V transient) |
| Power Requirements                                    | 5 VDC (±0.15 ) @ 200 mA                |
| Input Resistance                                      | 5 K ohms (each channel)                |
| Ambient Temperature:<br>Operating<br>Storage          | 0 °C to 70 °C<br>-40 °C to 85 °C       |
| 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                               |



# SNAP Isolated Analog Input Modules

## Isolated Frequency Input Module

### 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 9.3c or higher. It cannot be used with legacy controllers or brains.

See wiring diagrams on the following page.



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

### Specifications

|                                       |   |
|---------------------------------------|---|
| Input Range                           | 2 Hz - 500 kHz at 1.0 s Data Freshness<br>20 Hz - 500 kHz at 0.1 s Data Freshness   |
| Input Voltage Range                   | 3.0 V to 48 V <sub>p-p</sub><br>4.0 V to 48 V <sub>p-p</sub><br>5.0 V to 48 V <sub>p-p</sub><br>17 V to 48 V <sub>p-p</sub><br>3.0 V to 48 V <sub>p-p</sub><br>110 V <sub>p-p</sub> |
| 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<br>1.0 s at 2 Hz to 500 kHz   |
| Resolution (Hz)                       | $f / (48,000,000 * \text{Data Freshness})$ , where $f$ is the current frequency measurement   |
| Accuracy                              | + 0.005% of input for input greater than 500 Hz.<br>+ 0.005% of input plus an additional +/- 0.1 Hz for input less than 500 Hz.   |
| Maximum Operating Common Mode Voltage | 250 V Continuous<br>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<br>1500 V Transient  |
| Power Consumption                     | 1.05 W (210 mA @ 5 V)   |
| Ambient Temperature Operating Storage | 0 to 70 °C<br>-40 to 85 °C  |
| 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  |

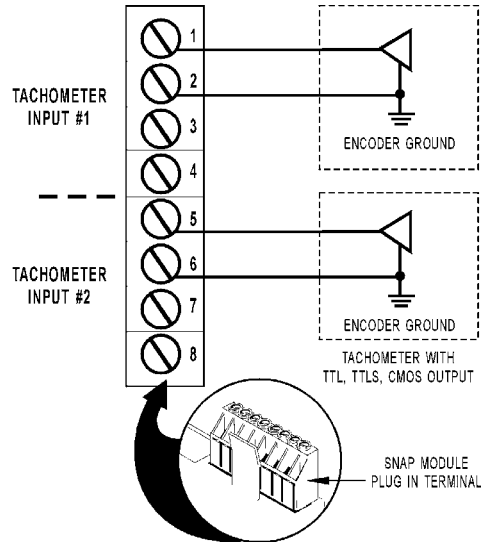
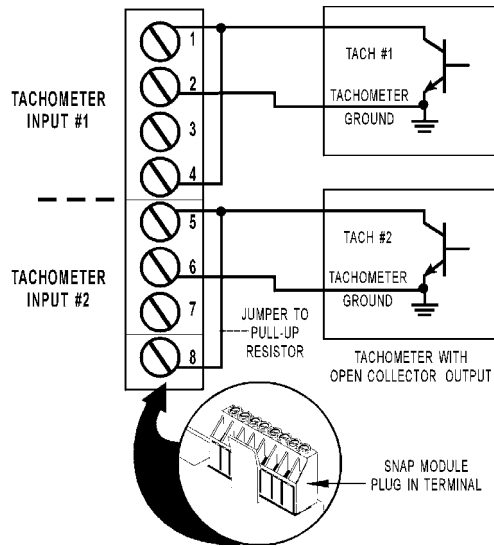
\* User selectable. Default is 0.1 seconds.

# SNAP Isolated Analog Input Modules

## Isolated Frequency Input Module (cont'd)

### SNAP-AIRATE-HFi Wiring Diagrams

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.





# SNAP Isolated Analog Input Modules

## Isolated Thermocouple/ Millivolt Input Module

### Specifications

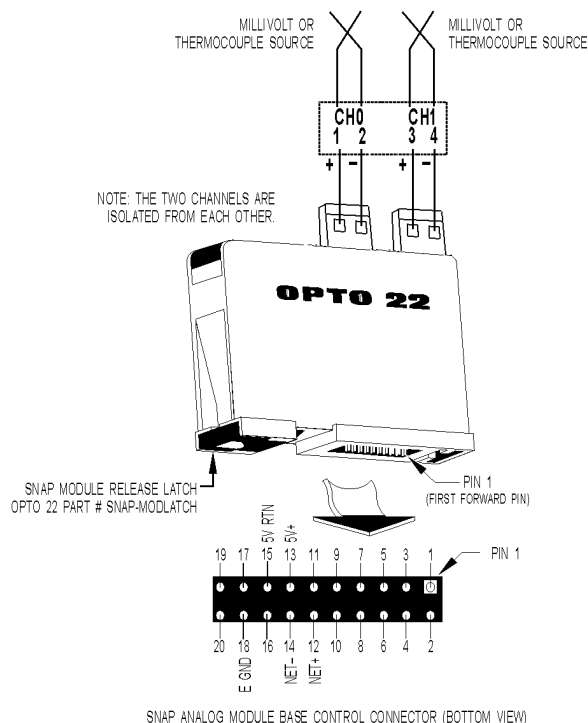
|   |   |
|---|---|
| Input Range   | From -150 mV to +150 mV<br>From -75 mV to +75 mV  |
| Maximum Over Range  | ± 10%<br>(= ± 27500 counts)   |
| Resolution  | 6 µV from -150 mV to +150 mV<br>3 µV from -75 mV to +75 mV                                  |
| Cold Junction Temperature Compensation  | Automatic when used with SNAP brains  |
| Input Filtering   | -3 dB @ 7 Hz  |
| Input Response Time<br>(% of span/delta V/delta time)                             | 63.2%/95 mV/23 mS   |
| Data Freshness  | 65 ms for +/- 150 mV<br>130 ms for +/- 75 mV<br>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)<br>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]<br>From factory<br>After user gain and offset commands | ± 2.0 (E, J, and K)<br>± 0.8  |
| Isolation: Optical  | 4000 V  |
| Isolation: Transformer  | 1500 V  |
| Isolation: Channel to Channel   | 250 V continuous<br>(1500 V transient)  |
| Power Requirements  | 5 VDC (±0.15) @ 200 mA  |
| Input Resistance  | 100 megohms (each channel)  |
| Ambient Temperature:<br>Operating<br>Storage                                      | 0 °C to 70 °C<br>-40 °C to 85 °C  |
| 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   |
| 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 |

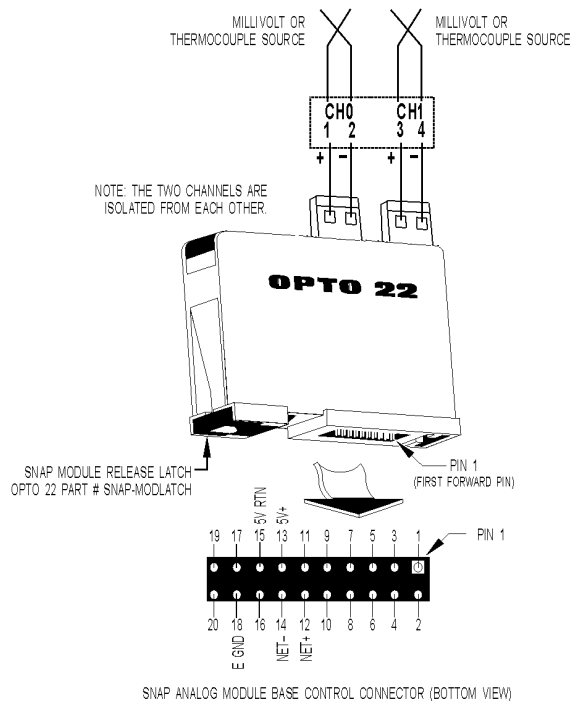


**IMPORTANT:** The mounting rack connector has 24 pins; the module connector has 20 pins. The extra pins on the mounting rack connector prevent misalignment of the module during installation.

# SNAP Isolated Analog Input Modules

## Isolated Thermocouple/ Millivolt Input Module

| 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   |



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-AITM2-i module provides an input range of  $\pm 50$  mV,  $\pm 25$  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.

| 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 |

### Specifications

|  |  |
|--|--|
| Input Range  | From -50 mV to +50 mVDC<br>From -25 mV to +25 mVDC   |
| Maximum Over Range                                 | $\pm 10\%$<br>(= $\pm 27500$ counts)   |
| Resolution   | 2 $\mu$ V from -50 mV to +50 mV<br>1 $\mu$ V 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<br>130 ms for +/- 25 mV<br>130 ms for B-, R-, S-, and T-type thermocouples<br>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                           | $\pm 15$ volts   |
| Maximum Operating Common Mode Voltage              | 250 V  |
| Accuracy   | 0.1% (50 $\mu$ V) @ 50 mV (full scale)<br>0.2% (50 $\mu$ V) @ 25 mV (full scale)   |
| Drift: Gain Temperature Coefficient                | 5 $\mu$ V / °C   |
| Drift: Offset Temperature Coefficient              | 2 $\mu$ V / °C   |
| Thermocouple Accuracy [°C]                         | B, R, S C, D, G T, N<br>From factory $\pm 5$ $\pm 4$ $\pm 3$<br>After user gain and offset commands $\pm 3$ $\pm 2$ $\pm 2$                      |
| Isolation: Optical                                 | 4000 V   |
| Isolation: Transformer                             | 1500 V   |
| Isolation: Channel to Channel                      | 250 V continuous<br>(1500 V transient)   |
| Power Requirements                                 | 5 VDC ( $\pm 0.15$ ) @ 200 mA  |
| Input Resistance                                   | 100 megohms (each channel)   |
| Ambient Temperature: Operating Storage             | 0 °C to 70 °C<br>-40 °C to 85 °C   |
| 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  |
| Warranty   | Lifetime   |

# SNAP Isolated Analog Input Modules

## Isolated Thermocouple/ Millivolt Input Module

### Specifications

|  |  |       |       |      |
|--|--|-------|-------|------|
| Input Range                            | From -150 mV to +150 mVDC<br>From -75 mV to +75 mVDC<br>From -50 mV to +50 mVDC<br>From -25 mV to +25 mVDC   |       |       |      |
| Maximum Over Range                     | ± 10%<br>(= ± 27500 counts)  |       |       |      |
| Resolution                             | 6 µV from -150 mV to +150 mV<br>3 µV from -75 mV to +75 mV<br>2 µV from -50 mV to +50 mV<br>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<br>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)<br>0.1% (75 µV) @ 75 mV (full scale)<br>0.1% (50 µV) @ 50 mV (full scale)<br>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<br>(1500 V transient)   |       |       |      |
| Power Requirements                     | 5 VDC (±0.15 ) @ 150 mA  |       |       |      |
| Input Resistance                       | 100 megohms (each channel)   |       |       |      |
| 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, RoHS, DFARS  |       |       |      |
| 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 |

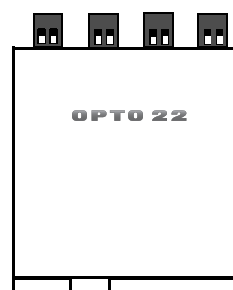
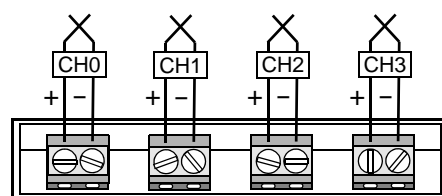
### Description

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.

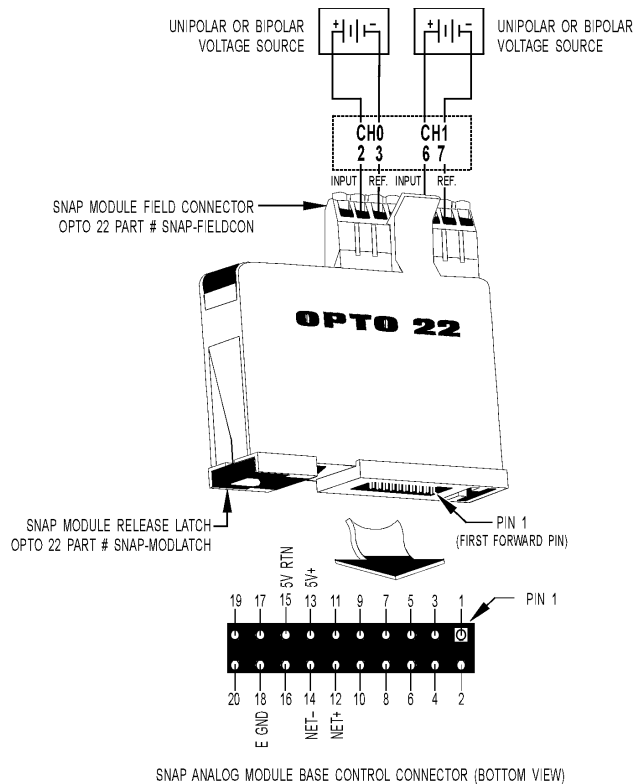
SNAP-AITM-4i requires SNAP PAC racks, a SNAP PAC brain or R-series controller with firmware 9.1 or newer, and PAC Project 9.1 or newer.

| 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   |



# SNAP Isolated Analog Input Modules

## Isolated Voltage Input Module -10 VDC to +10 VDC or -5 VDC to +5 VDC



**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.

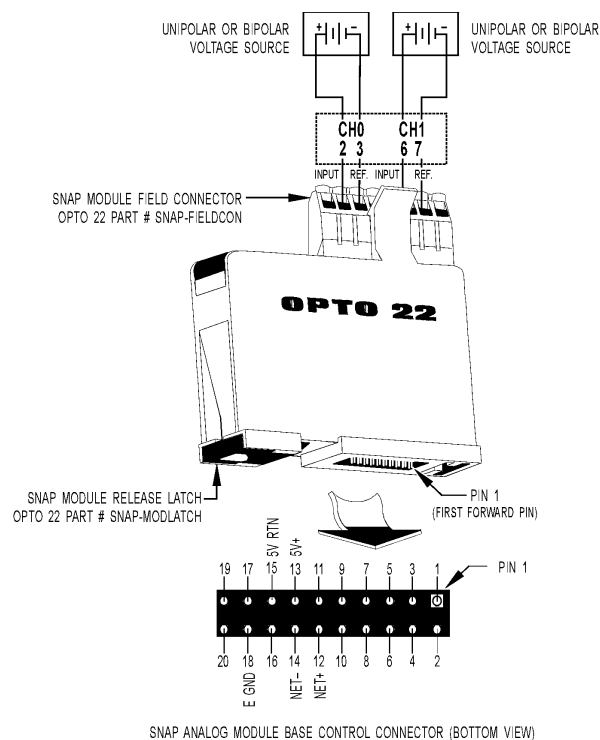
| Part Number | Description   |
|-------------|---|
| SNAP-AIV-i  | Isolated two-channel analog voltage input<br>-10 VDC to +10 VDC or -5 VDC to +5 VDC |

### Specifications

|  |  |
|--|--|
| Input Range                                  | From -10 volts to +10 volts<br>From -5 volts to +5 volts   |
| Maximum Over Range                           | $\pm 10\%$<br>(= $\pm 27500$ counts)   |
| Resolution                                   | 0.4 mV when configured<br>-10 volts to +10 volts<br>0.2 mV when configured<br>-5 volts to +5 volts |
| Input Filtering                              | -3 dB @ 64 Hz  |
| Input Response Time<br>(% of span/ DV / Dt)  | 63.2% / 6.7 V / 10 mS  |
| Data Freshness                               | 11 ms for +/- 10 V<br>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<br>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<br>(1500 V transient)   |
| Power Requirements                           | 5 VDC ( $\pm 0.15$ ) @ 200 mA  |
| Input Resistance                             | 1 megohms (each channel)   |
| Ambient Temperature:<br>Operating<br>Storage | 0 °C to 70 °C<br>-40 °C to 85 °C   |
| 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, FM, RoHS, DFARS  |
| Warranty                                     | Lifetime   |

# SNAP Isolated Analog Input Modules

## Isolated Voltage Input Module -100 VDC to +100 VDC or -50 VDC to +50 VDC



**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<br>-100 VDC to +100 VDC or -50 VDC to +50 VDC |

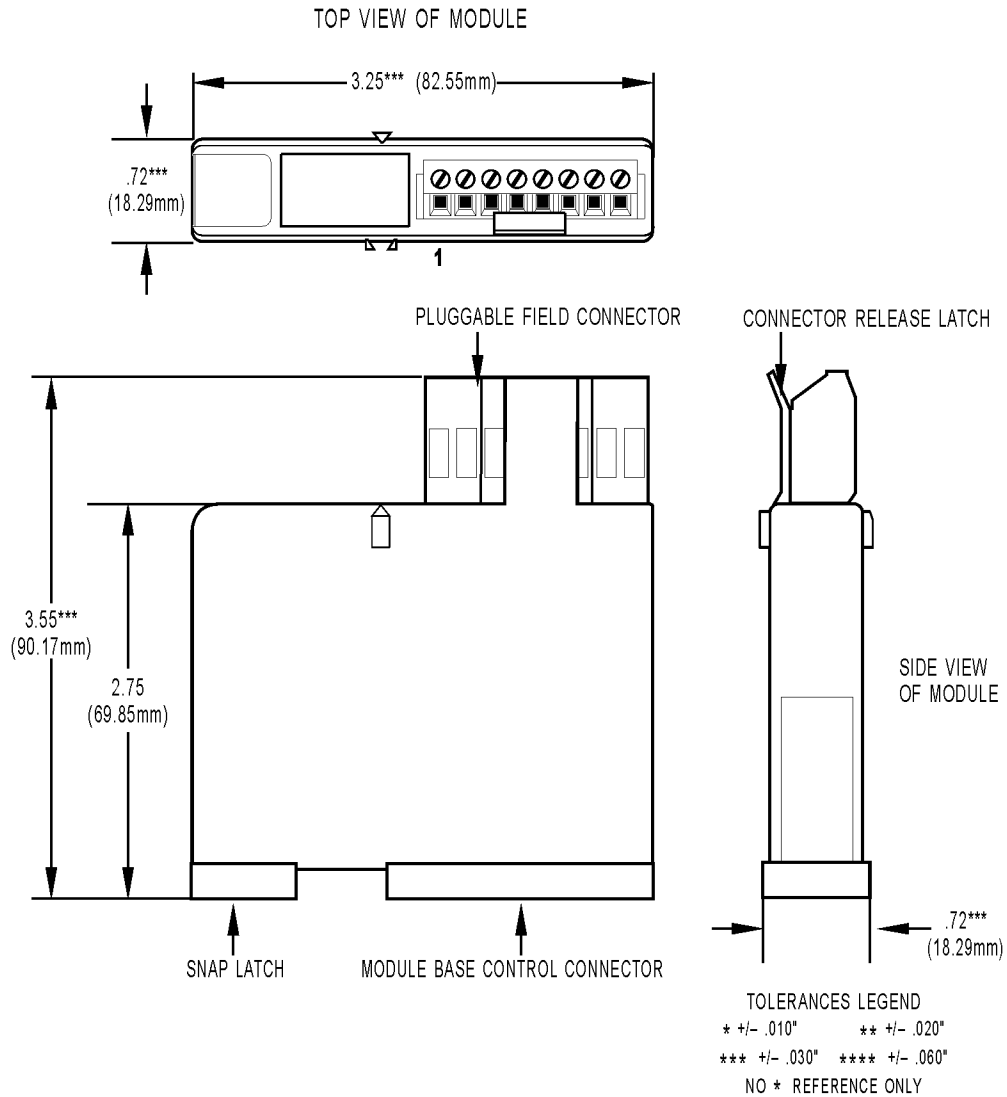
### Specifications

|  |  |
|--|--|
| Input Range                                  | From -100 volts to +100 volts<br>From -50 volts to +50 volts                                     |
| Maximum Over Range                           | ± 10%<br>(= ± 27500 counts)  |
| Resolution                                   | 4.0 mV when configured -100 volts to +100 volts<br>2.0 mV when configured -50 volts to +50 volts |
| Input Filtering                              | -3 dB @ 64 Hz  |
| Input Response Time<br>(% of span/ DV / Dt)  | 63.2% / 6.7 V / 10 mS  |
| Data Freshness                               | 11 ms for +/- 100 V<br>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<br>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<br>(1500 V transient)   |
| Power Requirements                           | 5 VDC (±0.15) @ 200 mA   |
| Input Resistance                             | 1 megohms (each channel)   |
| Ambient Temperature:<br>Operating<br>Storage | 0 °C to 70 °C<br>-40 °C to 85 °C   |
| 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   |

# SNAP Isolated Analog Input Modules

## Dimensional Drawing

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

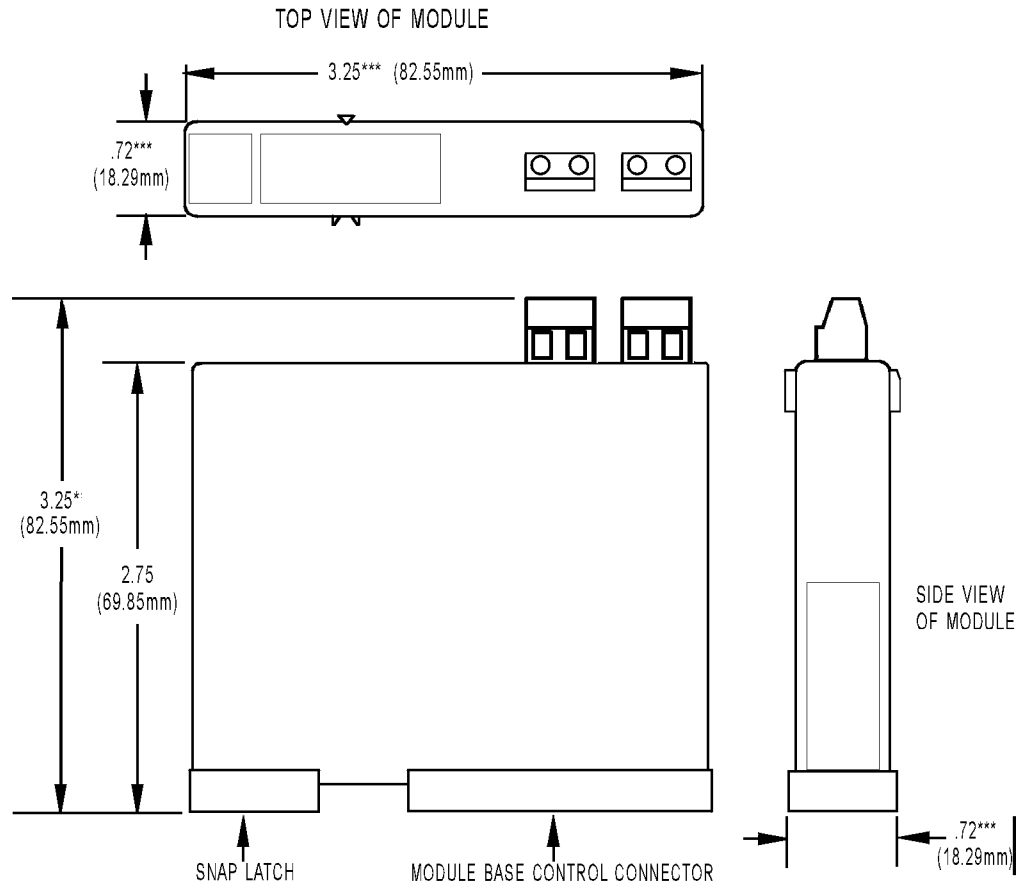




# SNAP Isolated Analog Input Modules

## Dimensional Drawing

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

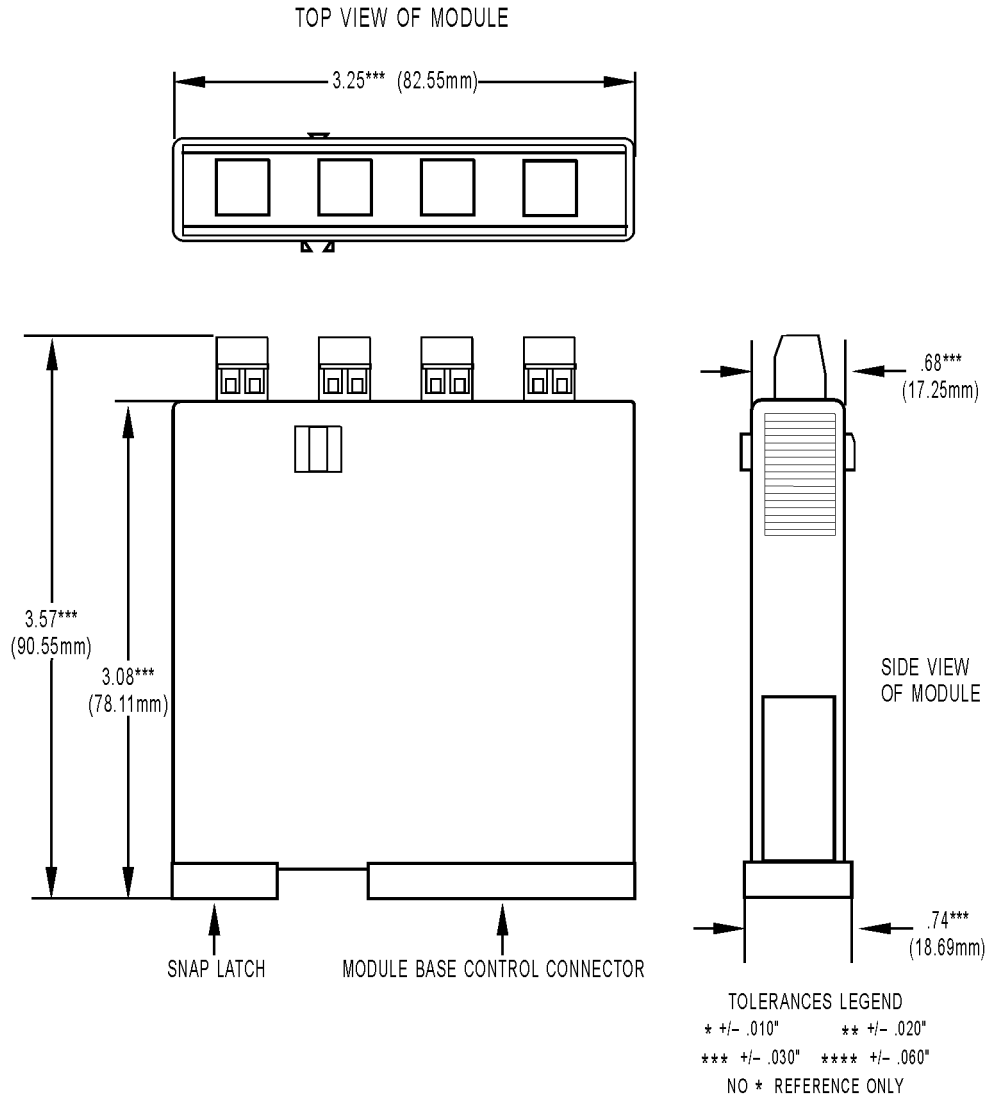


TOLERANCES LEGEND  
 \* +/- .010"      \*\* +/- .020"  
 \*\*\* +/- .030"    \*\*\*\* +/- .060"  
 NO \* REFERENCE ONLY

# SNAP Isolated Analog Input Modules

## Dimensional Drawing

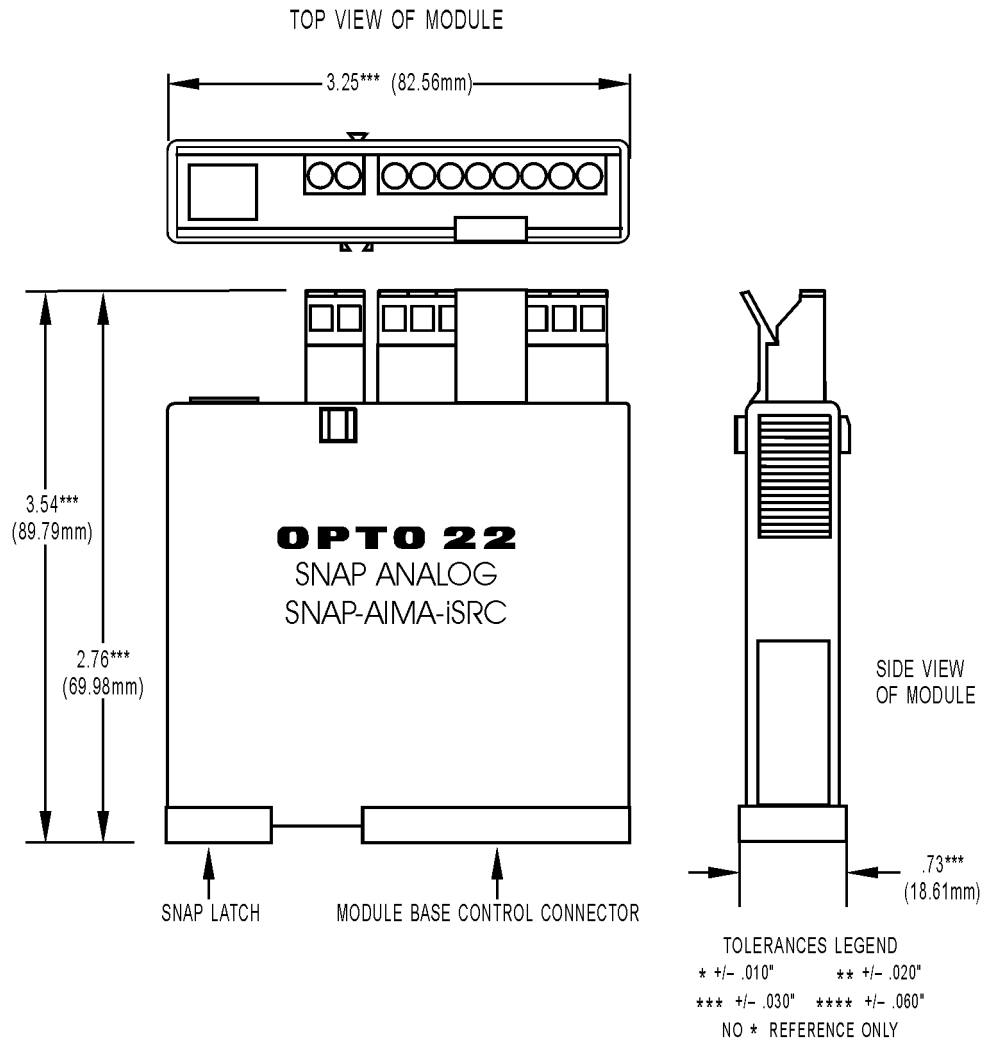
### SNAP-AITM-4i Module



# SNAP Isolated Analog Input Modules

## Dimensional Drawing

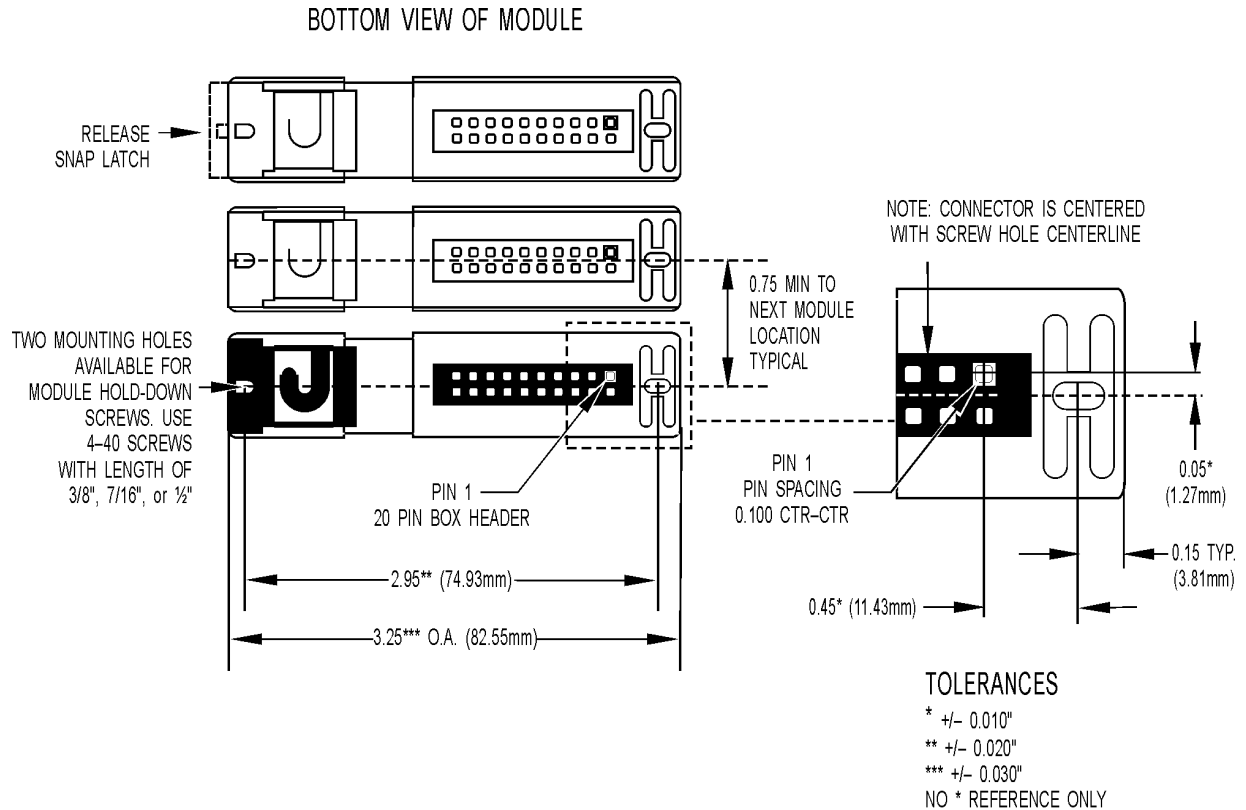
SNAP-AIMA-iSRC and SNAP-AIMA-iSRC-FM Modules



# SNAP Isolated Analog Input Modules

## Dimensional Drawing

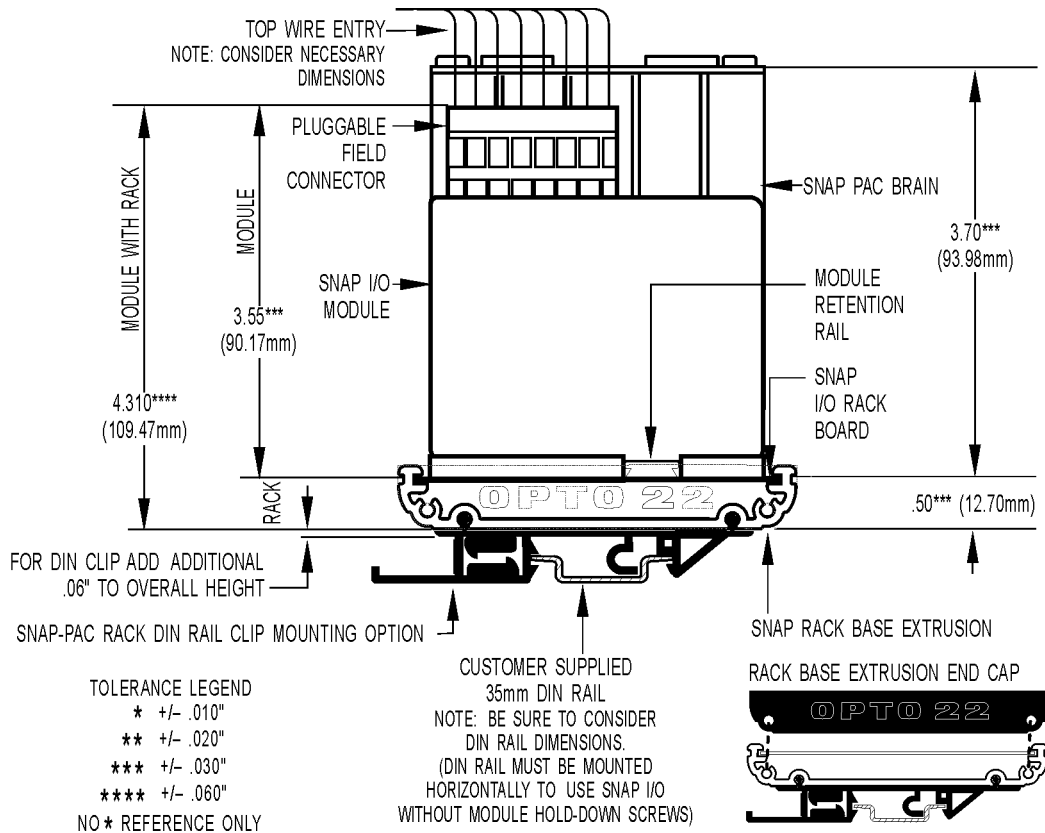
All Modules



**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.**

# SNAP Isolated Analog Input Modules

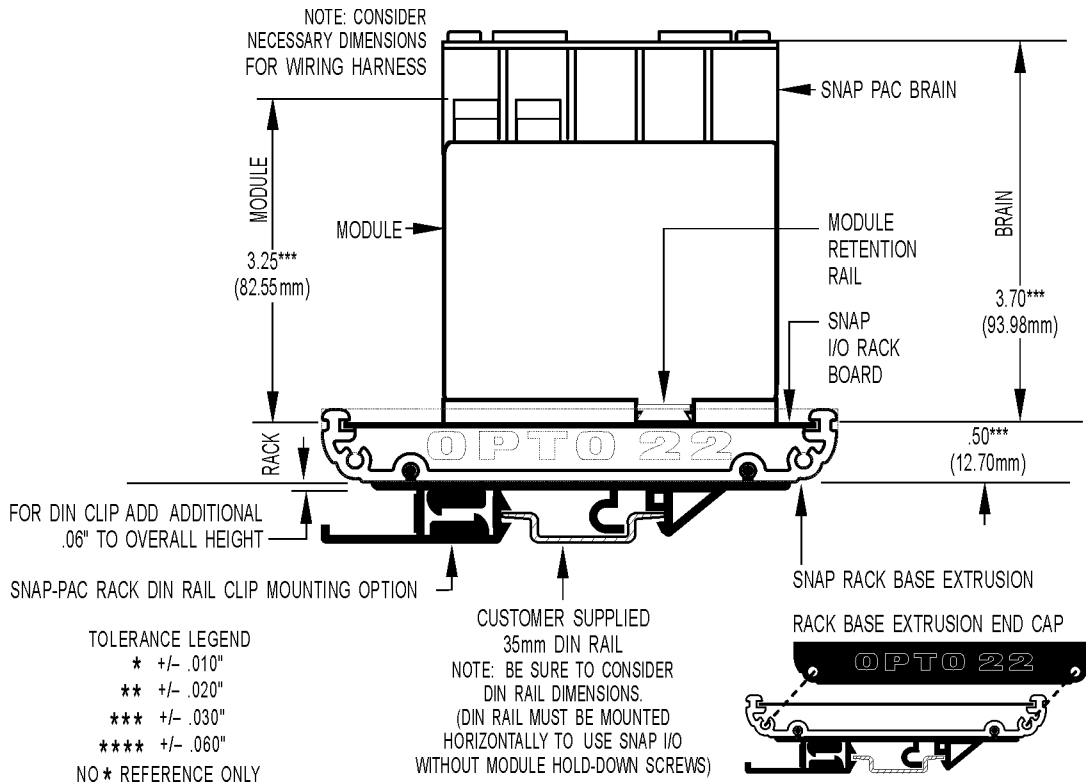
## Dimensional Drawing



# SNAP Isolated Analog Input Modules

## Dimensional Drawing

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





## More About Opto 22

### Products

Opto 22 develops and manufactures reliable, flexible, easy-to-use hardware and software products for industrial automation, energy management, remote monitoring, and data acquisition applications.

#### groov

groov puts your system on your mobile device. With zero programming, you can build mobile operator interfaces to monitor and control systems from Allen-Bradley, Siemens, Schneider Electric, Modicon, and many more. Web-based groov puts mobile-ready gadgets at your fingertips. Tag them from your existing tag database, and they automatically scale for use on any device with a modern web browser. See [groov.com](http://groov.com) for more information and your free trial.

#### SNAP PAC System

Designed to simplify the typically complex process of selecting and applying an automation system, the SNAP PAC System consists of four integrated components:

- SNAP PAC controllers
- PAC Project™ Software Suite
- SNAP PAC brains
- SNAP I/O™

#### SNAP PAC Controllers

Programmable automation controllers (PACs) are multifunctional, modular controllers based on open standards.

Opto 22 has been manufacturing PACs for over two decades. The standalone SNAP PAC S-series, the rack-mounted SNAP PAC R-series, and the software-based SoftPAC™ all handle a wide range of digital, analog, and serial functions for data collection, remote monitoring, process control, and discrete and hybrid manufacturing.

SNAP PACs are based on open Ethernet and Internet Protocol (IP) standards, so you can build or extend a system easily, without the expense and limitations of proprietary networks and protocols. Wired+Wireless™ models are also available.

#### PAC Project Software Suite

Opto 22's PAC Project Software Suite provides full-featured, cost-effective control programming, HMI (human machine interface) development and runtime, OPC server, and database connectivity software for your SNAP PAC System.

Control programming includes both easy-to-learn flowcharts and optional scripting. Commands are in plain English; variables and I/O point names are fully descriptive.

PAC Project Basic offers control and HMI tools and is free for download on our website, [www.opto22.com](http://www.opto22.com). PAC Project

Professional, available for separate purchase, adds one SoftPAC, OptoOPCServer, OptoDataLink, options for controller redundancy or segmented networking, and support for legacy Opto 22 serial *mistic*™ I/O units.

#### SNAP PAC Brains

While SNAP PAC controllers provide central control and data distribution, SNAP PAC brains provide distributed intelligence for I/O processing and communications. Brains offer analog, digital, and serial functions, including thermocouple linearization; PID loop control; and optional high-speed digital counting (up to 20 kHz), quadrature counting, TPO, and pulse generation and measurement.

#### SNAP I/O

I/O provides the local connection to sensors and equipment. Opto 22 SNAP I/O offers 1 to 32 points of reliable I/O per module, depending on the type of module and your needs. Analog, digital, and serial modules are all mixed on the same mounting rack and controlled by the same processor (SNAP PAC brain or rack-mounted controller).

### 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 only testing a sample of each batch, we can guarantee most solid-state relays and optically isolated I/O modules for life.

### Free Product Support

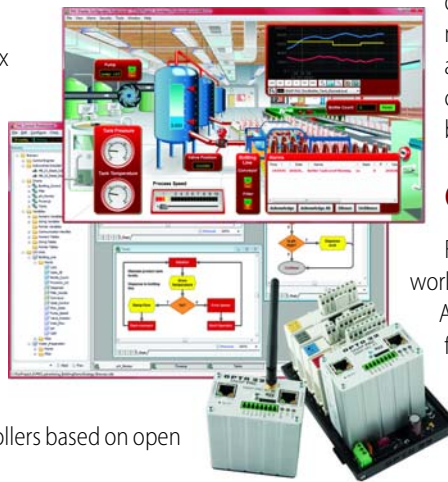
Opto 22's California-based Product Support Group offers free, comprehensive technical support for Opto 22 products. Our staff of support engineers represents decades of training and experience. Support is available in English and Spanish by phone or email, Monday–Friday, 7 a.m. to 5 p.m. PST.

Additional support is always available on our website: how-to videos, OptoKnowledgeBase, self-training guide, troubleshooting and user's guides, and OptoForums.

In addition, hands-on training is available for free at our Temecula, California headquarters, and you can [register online](#).

### Purchasing Opto 22 Products

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 or 951-695-3000, or visit our website at [www.opto22.com](http://www.opto22.com).



[www.opto22.com](http://www.opto22.com)