

# A: I/O Specifications

## Introduction

This appendix includes specifications for the following SNAP PAC System I/O modules:

Digital input modules	<a href="#">page 112</a>
Digital output modules	<a href="#">page 117</a>
Analog input modules	<a href="#">page 126</a>
Analog output modules	<a href="#">page 143</a>
Serial modules	<a href="#">page 147</a>
Breakout boards and cables	<a href="#">page 149</a>

## Digital Input Module Specifications

### SNAP-IAC5, SNAP-IAC5A, and SNAP-IAC5MA

	SNAP-IAC5	SNAP-IAC5A	SNAP-IAC5MA
Key Feature	--	--	Diagnostic switches
Field Side Ratings (each channel)			
Nominal Input Voltage	120 VAC/VDC	240 VAC/VDC	120 VAC/VDC
Channel-to-channel isolation	300 VAC (1,500 V transient)	300 VAC (1,500 V transient)	300 VAC (1,500 V transient)
Input Voltage Range	90–140 VAC/VDC	180–280 VAC/VDC	90–140 VAC/VDC
Turn-on Voltage	90 VAC/VDC	180 VAC/VDC	90 VAC/VDC
Turn-off Voltage	35 VAC/VDC	35 VAC/VDC	35 VAC/VDC
Input Resistance	169 K ohms (nominal)	305 K ohms (nominal)	169 K ohms (nominal)
Logic Side Ratings			
Logic Output Voltage	<.5 V max. (on) @ 2 mA sinking 2.7 V min. (off) @ 400 mA sourcing	<.5 V max. (on) @ 2 mA sinking 2.7 V min. (off) @ 400 mA sourcing	<.5 V max. (on) @ 2 mA sinking 2.7 V min. (off) @ 400 mA sourcing
Logic Supply Voltage*	5 VDC ± 0.25 VDC	5 VDC ± 0.25 VDC	5 VDC ± 0.25 VDC
Logic Supply Current	50 mA maximum	50 mA maximum	50 mA maximum
Negative True Logic Output Drive	TTL 74 Series = 1 UL TTL 74LS Series = 5 UL	TTL 74 Series = 1 UL TTL 74LS Series = 5 UL	TTL 74 Series = 1 UL TTL 74LS Series = 5 UL
Module Ratings			
Number of Channels Per Module	4	4	4
Turn-on Time	30 msec	30 msec	30 msec
Turn-off Time	30 msec	30 msec	30 msec
Optical Isolation Field Side to Logic Side)	4,000 volts (transient)	4,000 volts (transient)	4,000 volts (transient)
Temperature	0 °C to 70 °C, operating -30 °C to 85 °C, storage	0 °C to 70 °C, operating -30 °C to 85 °C, storage	0 °C to 70 °C, operating -30 °C to 85 °C, storage

\* When used with an I/O processor (brain or on-the-rack controller), the processor requires 5.0 to 5.2 VDC.

**SNAP-IAC5FM, SNAP-IAC5AFM, SNAP-IDC5FM, and SNAP-IDC5DFM**

	SNAP-IAC5FM	SNAP-IAC5AFM	SNAP-IDC5FM	SNAP-IDC5DFM
Key Feature	Factory Mutual approved	Factory Mutual approved	Factory Mutual approved	Factory Mutual approved
Field Side Ratings (each channel)				
Nominal Input Voltage	120 VAC/VDC	240 VAC/ VDC	24 VAC/VDC	5 VDC
Channel-to-channel isolation	300 VAC (1,500 V transient)	300 VAC (1,500 V transient)	300 VAC (1,500 V transient)	300 VAC (1,500 V transient)
Input Voltage Range	90–140 VAC/VDC	180–280 VAC/VDC	10–32 VAC/VDC	2.5–28 VDC
Turn-on Voltage	90 VAC/VDC	180 VAC/VDC	10 VAC/VDC	2.5 VDC
Turn-off Voltage	35 VAC/VDC	35 VAC/VDC	3 VAC/VDC	1 VDC
Input Resistance	169 K ohms (nominal)	305 K ohms (nominal)	15 K ohms (nominal)	3 K ohms (nominal)
Logic Side Ratings				
Logic Output Voltage	<.5 V max. (on) @ 2 mA sinking 2.7 V min. (off) @ 400 mA sourcing	<.5 V max. (on) @ 2 mA sinking 2.7 V min. (off) @ 400 mA sourcing	<.5 V max. (on) @ 2 mA sinking 2.7 V min. (off) @ 0.4 mA sourcing	<.5 V max. (on) @ 2 mA sinking 2.7 V min. (off) @ 0.4 mA sourcing
Logic Supply Voltage*	5 VDC ± 0.25 VDC	5 VDC ± 0.25 VDC	5 VDC ± 0.25 VDC	5 VDC ± 0.25 VDC
Logic Supply Current	50 mA maximum	50 mA maximum	50 mA maximum	50 mA maximum
Negative True Logic Output Drive	TTL 74 Series=1 UL TTL 74LS Series=5 UL	TTL 74 Series=1 UL TTL 74LS Series=5 UL	TTL 74 Series=1 UL TTL 74LS Series=5 UL	TTL 74 Series=1 UL TTL 74LS Series=5 UL
Module Ratings				
Number of Channels Per Module	4	4	4	4
Turn-on Time	30 msec	30 msec	5 msec	1 msec
Turn-off Time	30 msec	30 msec	15 msec	1 msec
Optical Isolation (Field Side to Logic Side)	4,000 volts (transient)	4,000 volts (transient)	4,000 volts (transient)	4,000 volts (transient)
Temperature	0 °C to 70 °C, operating -30 °C to 85 °C, storage	0 °C to 70 °C, operating -30 °C to 85 °C, storage	0 °C to 70 °C, operating -30 °C to 85 °C, storage	0 °C to 70 °C, operating -30 °C to 85 °C, storage

\*When used with an I/O processor (brain or on-the-rack controller), the processor requires 5.0 to 5.2 VDC.

**SNAP-IDC5, SNAP-IDC5D, SNAP-IDC5G, and SNAP-IDC5HT**

	SNAP-IDC5	SNAP-IDC5D	SNAP-IDC5G	SNAP-IDC5-HT
Key Feature	--	--	--	Leakage-tolerant
Field Side Ratings (each channel)				
Nominal Input Voltage	24 VAC/VDC	5 VDC	48 VAC/VDC	24 VAC/VDC
Channel-to-channel isolation	300 VAC (1,500 V transient)	300 VAC (1,500 V transient)	300 VAC (1,500 V transient)	300 VAC (1,500 V transient)
Input Voltage Range	10–32 VAC/VDC	2.5–28 VDC	35–75 VAC/VDC	15–32 VAC/VDC
Turn-on Voltage	10 VAC/VDC	2.5 VDC	35 VAC/VDC	15 VAC/VDC
Turn-off Voltage	3 VAC/VDC	1 VDC	7 VAC/VDC	8 VAC/VDC
Input Resistance	15 K ohms (nominal)	3 K ohms (nominal)	64 K ohms (nominal)	3 K ohms (nominal)
Logic Side Ratings				
Logic Output Voltage	<.5 V max. (on) @ 2 mA sinking 2.7 V min. (off) @ 0.4 mA sourcing	<.5 V max. (on) @ 2 mA sinking 2.7 V min. (off) @ 0.4 mA sourcing	<.5 V max. (on) @ 2 mA sinking 2.7 V min. (off) @ 0.4 mA sourcing	<.5 V max. (on) @ 2 mA sinking 2.7 V min. (off) @ 0.4 mA sourcing
Logic Supply Voltage***	5 VDC ± 0.25 VDC	5 VDC ± 0.25 VDC	5 VDC ± 0.25 VDC	5 VDC ± 0.25 VDC
Logic Supply Current	50 mA maximum	50 mA maximum	50 mA maximum	50 mA maximum
Negative True Logic Output Drive	TTL 74 Series = 1 UL TTL 74LS Series = 5 UL	TTL 74 Series = 1 UL TTL 74LS Series = 5 UL	TTL 74 Series = 1 UL TTL 74LS Series = 5 UL	TTL 74 Series = 1 UL TTL 74LS Series = 5 UL
Module Ratings				
Number of Channels Per Module	4	4	4	4
Turn-on Time	5 msec	1 msec	5 msec	20 msec
Turn-off Time	15 msec	1 msec	15 msec	25 msec
Optical Isolation (Field Side to Logic Side)	4,000 volts (transient)	4,000 volts (transient)	4,000 volts (transient)	4,000 volts (transient)
Temperature	0 °C to 70 °C, operating -30 °C to 85 °C, storage	0 °C to 70 °C, operating -30 °C to 85 °C, storage	0 °C to 70 °C, operating -30 °C to 85 °C, storage	0 °C to 70 °C, operating -30 °C to 85 °C, storage

\* At 20kHz, 5Vp-p square wave input, 50% duty cycle.

\*\* At 20kHz, 28Vp-p square wave input, 50% duty cycle.

\*\*\* When used with an I/O processor (brain or on-the-rack controller), the processor requires 5.0 to 5.2 VDC.

## SNAP-IDC5FAST, SNAP-IDC5-FAST-A, and SNAP-IDC5MA

	SNAP-IDC5FAST*	SNAP-IDC5-FAST-A**	SNAP-IDC5MA
Key Feature	High-speed	High-speed	Diagnostic switches
Field Side Ratings (each channel)			
Nominal Input Voltage	5 VDC	28 VDC	24 VAC/VDC
Channel-to-channel isolation	300 VAC (1,500 V transient)	300 VAC (1,500 V transient)	300 VAC (1,500 V transient)
Input Voltage Range	2.5–16 VDC	18–32 VDC	10–32 VAC/VDC
Turn-on Voltage	2.5 VDC	18 VDC	10 VAC/VDC
Turn-off Voltage	1 VDC	5 VDC	3 VAC/VDC
Input Resistance	440 ohms (nominal)	8 K ohms (nominal)	15 K ohms (nominal)
Logic Side Ratings			
Logic Output Voltage	<.5 V max. (on) @ 2 mA sinking 2.7 V min. (off) @ 0.4 mA sourcing	<.5 V max. (on) @ 2 mA sinking 2.7 V min. (off) @ 0.4 mA sourcing	<.5 V max. (on) @ 2 mA sinking 2.7 V min. (off) @ 400 mA sourcing
Logic Supply Voltage***	5 VDC ± 0.25 VDC	5 VDC ± 0.25 VDC	5 VDC ± 0.25 VDC
Logic Supply Current	50 mA maximum	50 mA maximum	50 mA maximum
Negative True Logic Output Drive	TTL 74 Series = 1 UL TTL 74LS Series = 5 UL	TTL 74 Series = 1 UL TTL 74LS Series = 5 UL	TTL 74 Series = 1 UL TTL 74LS Series = 5 UL
Module Ratings			
Number of Channels Per Module	4	4	4
Turn-on Time	.025 msec*	.025 msec**	5 msec
Turn-off Time	.025 msec*	.025 msec**	15 msec
Optical Isolation (Field Side to Logic Side)	4,000 volts (transient)	4,000 volts (transient)	4,000 volts (transient)
Temperature	0 °C to 70 °C, operating -30 °C to 85 °C, storage	0 °C to 70 °C, operating -30 °C to 85 °C, storage	0 °C to 70 °C, operating -30 °C to 85 °C, storage

\* At 20kHz, 5Vp-p square wave input, 50% duty cycle.

\*\* At 20kHz, 28Vp-p square wave input, 50% duty cycle.

\*\*\* When used with an I/O processor (brain or on-the-rack controller), the processor requires 5.0 to 5.2 VDC.

### SNAP-IDC5Q

Logic Voltage	5 VDC
Operating Ambient Temperature	0 to 70 °C
Isolation input-to-output	4,000 Vrms
Input Voltage Range	4–24 VDC
Input Resistance	1K ohms @ 4 V 560 ohms @ 24 V
Input Allowed for No Output	1 V
Logic Supply Current @ 5 VDC	120 mA
Maximum Input Frequency, 50% Duty Cycle	25 kHz for SNAP PAC brains and controllers with high-speed digital functions Legacy brains vary*
Maximum Reverse Input Voltage	-21 V

\* The SNAP-IDC5Q supports an encoder input frequency of 25 kHz. However, legacy I/O brains have limited quadrature counting capability. The following limits apply to them:  
 2.5 kHz for SNAP-B3000-ENET brains  
 4 kHz for SNAP-UP1-ADS brains  
 5 kHz for other legacy brains with high-speed counting

### SNAP-IDC5-SW and SNAP-IDC5-SW-NC

Field Side Ratings (each channel)	
Open Circuit Voltage (Switch Open)	15 VDC typical
Short Circuit Current (Switch Closed)	7 milliamps nominal
Minimum Off Resistance	>20 K ohms
Maximum Allowable On Resistance (Wire + Contact Resistance)	500 ohms
Logic Side Ratings	
Logic Output Voltage for SNAP-IDC5-SW (normally open)	<0.5 V max. (switch closed; LED on) @ 2 mA sinking 2.7 V min. (switch open; LED off) @ 0.4 mA sourcing
Logic Output Voltage for SNAP-IDC5-SW-NC (normally closed)	<0.5 V max. (switch open; LED on) @ 2 mA sinking 2.7 V min. (switch closed; LED off) @ 0.4 mA sourcing
Maximum Operating Common Mode Voltage (Field Term to Logic Connector)	250 V
Power Requirements	5 VDC (±0.25) @ 200 mA
Module Ratings	
Number of Channels Per Module	4
Turn-on Time	5 msec
Turn-off Time	25 msec
Channel-to-channel Isolation	None
Input-to-output Isolation	1500 V AC/DC
Temperature	0 °C to 70 °C, operating -30 °C to 85 °C, storage

## SNAP-IDC-32, SNAP-IDC-32-FM, and SNAP-IDC-32N

	SNAP-IDC-32 SNAP-IDC-32-FM	SNAP-IDC-32N
Input Range	10 to 32 VDC	-10 to -32 VDC
Nominal Voltage Range	24 VDC	24 VDC
Input Resistance	20 K ohms	20 K ohms
Logic Voltage and Current	5 VDC $\pm$ 0.1 @ 150 mA	5 VDC $\pm$ 0.1 @ 150 mA
Input Arrangement	32 input channels; 4 groups of 8 inputs each (Points in each group share a common <b>negative</b> connection.)	32 input channels; 4 groups of 8 inputs each (Points in each group share a common <b>positive</b> connection.)
Channel-to-Channel Isolation	No channel-to-channel isolation; 100 V group-to-group isolation	No channel-to-channel isolation; 100 V group-to-group isolation
Maximum Number of HDD Modules on One Mounting Rack	16	16
Indicators	None; use optional OptoTerminal-G20 diagnostic display or breakout rack.	None; use optional OptoTerminal-G20 diagnostic display or breakout rack.
ON Voltage	10 VDC @ 0.5 mA	10 VDC @ 0.5 mA
OFF Voltage	3 VDC @ 0.1 mA	3 VDC @ 0.1 mA
Polling time from I/O processor to module <sup>1</sup>	2–30 ms typical <sup>2</sup>	2–30 ms typical <sup>2</sup>
Input Turn-On/Off Time	6 ms	6 ms
Counting Frequency (DC input)	0–50 Hz @ 50% duty cycle	0–50 Hz @ 50% duty cycle

<sup>1</sup> Affects turn-on and turn-off determination

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

## SNAP-IDC-16, SNAP-IDC-HT-16, SNAP-IAC-16, SNAP-IAC-A-16, and SNAP-IAC-K-16

	SNAP-IDC-16	SNAP-IDC-HT-16	SNAP-IAC-16	SNAP-IAC-A-16	SNAP-IAC-K-16
Input Range	10–32 VDC/VAC	15–28 VDC/VAC	90–140 VAC/VDC	180–280 VAC/VDC	70–130 VAC/VDC
Nominal Voltage Range	24 VDC	24 VDC	120 VAC	240 VAC	100 VAC
Input Resistance	44 K ohms	4 K ohms	300 K ohms	940 K ohms	220 K ohms
Logic Voltage and Current	5 VDC ± 0.1 @ 150 mA	5 VDC ± 0.1 @ 150 mA	5 VDC ± 0.1 @ 150 mA	5 VDC ± 0.1 @ 150 mA	5 VDC ± 0.1 @ 150 mA
Input Arrangement	16 isolated input channels	16 isolated input channels	16 isolated input channels	16 isolated input channels	16 isolated input channels
Channel-to-Channel Isolation	250 V steady-state, 1500 V transient	250 V steady-state, 1500 V transient	250 V steady-state, 1500 V transient	250 V steady-state, 1500 V transient	250 V steady-state, 1500 V transient
Maximum Number of HDD Modules on One Mounting Rack	16	16	16	16	16
Indicators	None; use optional OptoTerminal-G20 diagnostic display.	None; use optional OptoTerminal-G20 diagnostic display.	None; use optional OptoTerminal-G20 diagnostic display.	None; use optional OptoTerminal-G20 diagnostic display.	None; use optional OptoTerminal-G20 diagnostic display.
ON Voltage	10 VDC @ 0.230 mA	15 VDC @ 3.50 mA	90 VAC/VDC @ 0.3 mA	180 VAC/VDC @ 0.191 mA	70 VAC/VDC @ 0.3 mA
OFF Voltage	3 VDC @ 0.05 mA	9 VDC @ 2.0 mA	40 VAC/VDC @ 0.135 mA	40 VAC/VDC @ 0.043 mA	30 VAC/VDC @ 0.135 mA
Polling time from I/O processor to module <sup>1</sup>	2–30 ms typical <sup>2</sup>	2–30 ms typical <sup>2</sup>	2–30 ms typical <sup>2</sup>	2–30 ms typical <sup>2</sup>	2–30 ms typical <sup>2</sup>
Input Turn-On/Off Time	15 ms turn-on time 20 ms turn-off time	20 ms turn-on time 25 ms turn-off time	15 ms turn-on time 20 ms turn-off time	15 ms turn-on time 20 ms turn-off time	15 ms turn-on time 20 ms turn-off time
Counting Frequency (DC input)	0–25 Hz @ 50% duty cycle	0–15 Hz @ 50% duty cycle	0–25 Hz @ 50% duty cycle	0–25 Hz @ 50% duty cycle	0–25 Hz @ 50% duty cycle

<sup>1</sup> Affects turn-on and turn-off determination

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

## Digital Output Module Specifications

### SNAP-OAC5, SNAP-OAC5MA, and SNAP-OAC5-i

	SNAP-OAC5	SNAP-OAC5MA	SNAP-OAC5-i
Key Feature	--	Diagnostic switches Four isolated channels	Four isolated channels
<b>Field Side Ratings (each channel)</b>			



	SNAP-OAC5	SNAP-OAC5MA	SNAP-OAC5-i
Line Voltage - Maximum	250 VAC	250 VAC	250 VAC
Line Voltage - Nominal	120/240 VAC	120/240 VAC	120/240 VAC
Current Rating 0 °C to 70 °C Ambient	3 amps per module	3 amps per module	3 amps per module
One Cycle Surge	80 amps peak (50/60 Hz)	80 amps peak (50/60 Hz)	80 amps peak (50/60 Hz)
Minimum Load Current	20 mA	20 mA	20 mA
Output Voltage Drop	1.6 volts max. @ 0.75 amps	1.6 volts max. @ 0.75 amps	1.6 volts max. @ 0.75 amps
Off-state Leakage at Nominal Voltage - 60 Hz	2.5 mA @ 240 VAC 1.25 mA @ 120 VAC	2.5 mA @ 240 VAC 1.25 mA @ 120 VAC	2.5 mA @ 240 VAC 1.25 mA @ 120 VAC
Peak Blocking Voltage	500 V	500 V	500 V
Operating Frequency	25–65 Hz	25–65 Hz	25–65 Hz
dV/ dt - Off-state	200 volts/msec	200 volts/msec	200 volts/msec
dV/ dt - Commutating	Snubbed for rated 0.5 power factor load	Snubbed for rated 0.5 power factor load	Snubbed for rated 0.5 power factor load
Fuse (Common to all Channels)	250 VAC - 4A 5x20 mm Fast-acting Bell Fuse Part No. BEL 5HF4 Opto 22 Part No. SNAP-4A	Has four isolated channels. User must provide own fus- ing.	Has four isolated channels. User must provide own fus- ing.
Channel-to-channel isola- tion	Not applicable	300 VAC (1500 V transient)	300 VAC (1500 V transient)
<b>Logic Side Ratings</b>			
Pickup Voltage	4 V @ 5.5 mA	4 V @ 5.5 mA	4 V @ 5.5 mA
Dropout Voltage	1 VDC	1 VDC	1 VDC
Control Resistance	220 ohms	220 ohms	220 ohms
Logic Supply Voltage	5 VDC ± 0.25 VDC	5 VDC ± 0.25 VDC	5 VDC ± 0.25 VDC
Logic Supply Current	50 mA maximum	50 mA maximum	50 mA maximum
<b>Module Ratings</b>			
Number of Channels Per Module	4	4	4
Turn-on Time	0.5 cycle maximum (zero volts crossover)	0.5 cycle maximum (zero volts crossover)	0.5 cycle maximum (zero volts crossover)
Turn-off Time	0.5 cycle maximum (zero current crossover)	0.5 cycle maximum (zero current crossover)	0.5 cycle maximum (zero current crossover)
Isolation (Field Side to Logic Side)	4,000 volts (transient)	4,000 volts (transient)	4,000 volts (transient)
Temperature	0 ° to 70 °C, operating -30 ° to 85 °C, storage	0 ° to 70 °C, operating -30 ° to 85 °C, storage	0 ° to 70 °C, operating -30 ° to 85 °C, storage

## SNAP-OAC5FM and SNAP-OAC5-iFM

	SNAP-OAC5-FM	SNAP-OAC5-i-FM
Key Feature	Factory Mutual approved	Four isolated channels Factory Mutual approved
<b>Field Side Ratings (each channel)</b>		
Line Voltage - Maximum	250 VAC	250 VAC
Line Voltage - Nominal	120/240 VAC	120/240 VAC
Current Rating 0 °C to 70 °C Ambient	3 amps per module	3 amps per module
One Cycle Surge	80 amps peak (50/60 Hz)	80 amps peak (50/60 Hz)
Minimum Load Current	20 mA	20 mA
Output Voltage Drop	1.6 volts max. @ 0.75 amps	1.6 volts max. @ 0.75 amps
Off-state Leakage at Nominal Voltage - 60 Hz	2.5 mA @ 240 VAC 1.25 mA @ 120 VAC	2.5 mA @ 240 VAC 1.25 mA @ 120 VAC
Peak Blocking Voltage	500 V	500 V
Operating Frequency	25–65 Hz	25–65 Hz
dV/ dt - Off-state	200 volts/msec	200 volts/msec
dV/ dt - Commutating	Snubbed for rated 0.5 power factor load	Snubbed for rated 0.5 power factor load
Fuse (Common to all Channels)	250 VAC - 4A 5x20 mm Fast-acting Bell Fuse Part No. BEL 5HF4 Opto 22 Part No. SNAP-4A	Has four isolated channels. User must provide own fusing.
Channel-to-channel isolation	Not applicable	300 VAC (1500 V transient)
<b>Logic Side Ratings</b>		
Pickup Voltage	4 V @ 5.5 mA	4 V @ 5.5 mA
Dropout Voltage	1 VDC	1 VDC
Control Resistance	220 ohms	220 ohms
Logic Supply Voltage	5 VDC ± 0.25 VDC	5 VDC ± 0.25 VDC
Logic Supply Current	50 mA maximum	50 mA maximum
<b>Module Ratings</b>		
Channels Per Module	4	4
Turn-on Time	0.5 cycle maximum (zero volts crossover)	0.5 cycle maximum (zero volts crossover)
Turn-off Time	0.5 cycle maximum (zero current crossover)	0.5 cycle maximum (zero current crossover)
Isolation (Field Side to Logic Side)	4,000 volts (transient)	4,000 volts (transient)
Temperature	0 ° to 70 °C, operating -30 ° to 85 °C, storage	0 ° to 70 °C, operating -30 ° to 85 °C, storage

## SNAP-ODC5SNK, SNAP-ODC5SRC, SNAP-ODC5R, and SNAP-ODC5R5

	SNAP-ODC5SRC	SNAP-ODC5SNK	SNAP-ODC5R	SNAP-ODC5R5
Key Feature	Load sourcing	Load sinking	Dry contact Normally open	Dry contact Normally closed
<b>Field Side Ratings (each channel)</b>				
Line Voltage - Range	5–60 VDC	5–60 VDC	0–100 VDC 0–130 VAC*	0–100 VDC 0–130 VAC*
Line Voltage - Nominal	5–48 VDC	5–48 VDC	--	--
Current Rating 0 °C to 70 °C Ambient	3 amps per module	3 amps per module	0.5 amps switching*	0.5 amps switching*
Surge Current	5 amps peak for 1 second	5 amps peak for 1 second	0.5 amps*	0.5 amps*
Minimum Load	20 mA	20 mA	0 mA	0 mA
Output Voltage Drop	1.6 volts max. @ 0.75 amps	1.6 volts max. @ 0.75 amps	0 volts	0 volts
Off-state Leakage	1 mA @ 60 VDC	1 mA @ 60 VDC	0 mA	0 mA
Peak Blocking Voltage	60 VDC	60 VDC	100 VDC / 130 VAC	100 VDC / 130 VAC
Fuse (Common to all Channels)	250 VAC - 4A 5x20 mm Fast-acting Bell Fuse Part No. BEL 5HF4 Opto 22 Part SNAP-4A	250 VAC - 4A 5x20 mm Fast-acting Bell Fuse Part No. BEL 5HF4 Opto 22 Part SNAP-4A	Has four isolated channels. User must provide own fusing.	Has four isolated channels. User must provide own fusing.
Channel-to-channel isolation	Not applicable	Not applicable	300 VAC (1500 V transient)	300 VAC (1500 V transient)
<b>Logic Side Ratings</b>				
Pickup Voltage	4 V @ 5.5 mA	4 V @ 5.5 mA	4 V @ 5.5 mA	4 V @ 5.5 mA
Dropout Voltage	1 VDC	1 VDC	1 VDC	1 VDC
Control Resistance	220 ohms	220 ohms	220 ohms	220 ohms
Logic Supply Voltage	5 VDC ± 0.25 VDC	5 VDC ± 0.25 VDC	5 VDC ± 0.25 VDC	5 VDC ± 0.25 VDC
Logic Supply Current	50 mA maximum	50 mA maximum	50 mA maximum	50 mA maximum
<b>Module Ratings</b>				
Number of Channels Per Module	4	4	4	4
Turn-on Time	100 usec	100 usec	500 usec	500 usec
Turn-off Time	750 usec	750 usec	500 usec	500 usec
Isolation (Field Side to Logic Side)	4,000 volts (transient)	4,000 volts (transient)	1,500 volts (transient)	1,500 volts (transient)
Temperature	0 ° to 70 °C, operating -30 ° to 85 °C, storage	0 ° to 70 °C, operating -30 ° to 85 °C, storage	0 ° to 70 °C, operating -30 ° to 85 °C, storage	0 ° to 70 °C, operating -30 ° to 85 °C, storage

\* The power rating of the dry contact module must not exceed 10 VA under steady state or momentary in-rush conditions. For voltages at or below 20 volts, the current limit is 0.5 amps. For voltages above 20 volts, the maximum allowable current is determined by the following equation:  $10 \text{ VA} / \text{Voltage} = \text{Current maximum}$ . Rating curve is in the data sheet.

## SNAP-ODC5SNKFM, SNAP-ODC5SRCFM, SNAP-ODC5RFM, and SNAP-ODC5R5FM

	SNAP-ODC5SRCFM	SNAP-ODC5SNKFM	SNAP-ODC5RFM	SNAP-ODC5R5FM
Key Feature	Factory Mutual approved	Factory Mutual approved	Factory Mutual approved	Factory Mutual approved
<b>Field Side Ratings (each channel)</b>				
Line Voltage - Range	5–60 VDC	5–60 VDC	0–100 VDC 0–130 VAC*	0–100 VDC 0–130 VAC*
Line Voltage - Nominal	5–48 VDC	5–48 VDC	--	--
Current Rating 0°C to 70°C Ambient	3 amps per module	3 amps per module	0.5 amps switching*	0.5 amps switching*
Surge Current	5 amps peak for 1 second	5 amps peak for 1 second	0.5 amps*	0.5 amps*
Minimum Load	20 mA	20 mA	0 mA	0 mA
Output Voltage Drop	1.6 volts max. @ 0.75 amps	1.6 volts max. @ 0.75 amps	0 volts	0 volts
Off-state Leakage	1 mA @ 60 VDC	1 mA @ 60 VDC	0 mA	0 mA
Peak Blocking Voltage	60 VDC	60 VDC	100 VDC / 130 VAC	100 VDC / 130 VAC
Fuse (Common to all Channels)	250 VAC - 4A 5x20 mm Fast-acting Bell Fuse Part No. BEL 5HF4 Opto 22 Part SNAP-4A	250 VAC - 4A 5x20 mm Fast-acting Bell Fuse Part No. BEL 5HF4 Opto 22 Part SNAP-4A	Has four isolated channels. User must provide own fusing.	Has four isolated channels. User must provide own fusing.
<b>Logic Side Ratings</b>				
Pickup Voltage	4 V @ 5.5 mA	4 V @ 5.5 mA	4 V @ 5.5 mA	4 V @ 5.5 mA
Dropout Voltage	1 VDC	1 VDC	1 VDC	1 VDC
Control Resistance	220 ohms	220 ohms	220 ohms	220 ohms
Logic Supply Voltage	5 VDC ± 0.25 VDC	5 VDC ± 0.25 VDC	5 VDC ± 0.25 VDC	5 VDC ± 0.25 VDC
Logic Supply Current	50 mA maximum	50 mA maximum	50 mA maximum	50 mA maximum
<b>Module Ratings</b>				
Number of Channels Per Module	4	4	4	4
Turn-on Time	100 usec	100 usec	500 usec	500 usec
Turn-off Time	750 usec	750 usec	500 usec	500 usec
Isolation (Field Side to Logic Side)	4,000 volts (transient)	4,000 volts (transient)	1,500 volts (transient)	1,500 volts (transient)
Temperature	0 ° to 70 °C, operating -30 ° to 85 °C, storage	0 ° to 70 °C, operating -30 ° to 85 °C, storage	0 ° to 70 °C, operating -30 ° to 85 °C, storage	0 ° to 70 °C, operating -30 ° to 85 °C, storage

\* The power rating of the dry contact module must not exceed 10 VA under steady state or momentary in-rush conditions. For voltages at or below 20 volts, the current limit is 0.5 amps. For voltages above 20 volts, the maximum allowable current is determined by the following equation: 10 VA / Voltage = Current maximum. Rating curve is in the data sheet.

## SNAP-ODC5-iFM and SNAP-ODC5A-iFM

	SNAP-ODC5-iFM	SNAP-ODC5A-iFM
Key Feature	Four isolated channels Factory Mutual approved	Four isolated channels Factory Mutual approved
<b>Field Side Ratings (each channel)</b>		
Line Voltage - Range	5–60 VDC	5–200 VDC
Line Voltage - Nominal	5–48 VDC	5–200 VDC
Current Rating 0°C to 70°C Ambient	3 amps per module	3 amps per module
Surge Current	5 amps peak for 1 second	5 amps peak for 1 second
Minimum Load	20 mA	20 mA
Output Voltage Drop	1.6 volts max. @ 0.75 amps	1.6 volts max. @ 0.75 amps
Off-state Leakage	1 mA @ 60 VDC	1 mA @ 60 VDC
Peak Blocking Voltage	60 VDC	200 VDC
Fuse (Common to all Channels)	Has four isolated channels. User must provide own fusing.	Has four isolated channels. User must provide own fusing.
<b>Logic Side Ratings</b>		
Pickup Voltage	4 V @ 5.5 mA	4 V @ 5.5 mA
Dropout Voltage	1 VDC	1 VDC
Control Resistance	220 ohms	220 ohms
Logic Supply Voltage	5 VDC ± 0.25 VDC	5 VDC ± 0.25 VDC
Logic Supply Current	50 mA maximum	50 mA maximum
<b>Module Ratings</b>		
Number of Channels Per Module	4	4
Turn-on Time	100 usec	100 usec
Turn-off Time	750 usec	750 usec
Isolation (Field Side to Logic Side)	4,000 volts (transient)	4,000 volts (transient)
Temperature	0 ° to 70 °C, operating -30 ° to 85 °C, storage	0 ° to 70 °C, operating -30 ° to 85 °C, storage

**SNAP-ODC5MA, SNAP-ODC5-i, SNAP-ODC5A-i, and SNAP-ODC5ASNK**

	SNAP-ODC5MA	SNAP-ODC5-i	SNAP-ODC5A-i	SNAP-ODC5ASNK
Key Feature	Diagnostic switches Four isolated channels	Four isolated channels	Four isolated channels	Load sinking
<b>Field Side Ratings (each channel)</b>				
Line Voltage - Range	5–60 VDC	5–60 VDC	5–200 VDC	5–200 VDC
Line Voltage - Nominal	5–48 VDC	5–48 VDC	5–200 VDC	5–200 VDC
Current Rating 0 °C to 70 °C Ambient	2 amps per module 0.5 amps per channel	3 amps per module	3 amps per module	3 amps per module
Surge Current	1.5 amps peak for 1 second	5 amps peak for 1 second	5 amps peak for 1 second	5 amps peak for 1 second
Minimum Load	20 mA	20 mA	20 mA	20 mA
Output Voltage Drop	1.6 volts max. @ 0.75 amps	1.6 volts max. @ 0.75 amps	1.6 volts max. @ 0.75 amps	1.6 volts max. @ 0.75 amps
Off-state Leakage	1 mA @ 60 VDC	1 mA @ 60 VDC	1 mA @ 200 VDC	1 mA @ 200 VDC
Peak Blocking Voltage	60 VDC	60 VDC	200 VDC	200 VDC
Fuse (Common to all Channels)	Has four isolated channels. User must provide own fusing.	Has four isolated channels. User must provide own fusing.	Has four isolated channels. User must provide own fusing.	250 VAC - 4A 5x20 mm Fast-acting Bell Fuse Part No. BEL 5HF4 Opto 22 Part No. SNAP-4A
Channel-to-channel isolation	300 VAC (1500 V transient)	300 VAC (1500 V transient)	300 VAC (1500 V transient)	Not applicable
<b>Logic Side Ratings</b>				
Pickup Voltage	4 V @ 5.5 mA	4 V @ 5.5 mA	4 V @ 5.5 mA	4 V @ 5.5 mA
Dropout Voltage	1 VDC	1 VDC	1 VDC	1 VDC
Control Resistance	220 ohms	220 ohms	220 ohms	220 ohms
Logic Supply Voltage	5 VDC ± 0.25 VDC	5 VDC ± 0.25 VDC	5 VDC ± 0.25 VDC	5 VDC ± 0.25 VDC
Logic Supply Current	50 mA maximum	50 mA maximum	50 mA maximum	50 mA maximum
<b>Module Ratings</b>				
Number of Channels Per Module	4	4	4	4
Turn-on Time	100 usec	100 usec	100 usec	100 usec
Turn-off Time	750 usec	750 usec	750 usec	750 usec
Isolation (Field Side to Logic Side)	4,000 volts (transient)	4,000 volts (transient)	4,000 volts (transient)	4,000 volts (transient)
Temperature	0 ° to 70 °C, operating -30 ° to 85 °C, storage	0 ° to 70 °C, operating -30 ° to 85 °C, storage	0 ° to 70 °C, operating -30 ° to 85 °C, storage	0 ° to 70 °C, operating -30 ° to 85 °C, storage

## SNAP-ODC-32-SRC, SNAP-ODC-32-SRC-FM, SNAP-ODC-32-SNK, and SNAP-ODC-32-SNK-FM

	SNAP-ODC-32-SRC SNAP-ODC-32-SRC-FM	SNAP-ODC-32-SNK SNAP-ODC-32-SNK-FM
Switching Voltage	5–60 VDC	5–60 VDC
Nominal Switching Voltage	12–24 VDC	12–24 VDC
Logic Voltage and Current	5 VDC $\pm$ 0.1 @ 150 mA	5 VDC $\pm$ 0.1 @ 150 mA
Output Arrangement	32 output channels; 4 groups of 8 outputs each. Points in each group share a common positive connection.	32 output channels; 4 groups of 8 outputs each. Points in each group share a common negative connection.
Maximum Number of HDD Modules on One Mounting Rack	16	16
Indicators	None; use optional OptoTerminal-G20 diagnostic display or breakout rack.	None; use optional OptoTerminal-G20 diagnostic display or breakout rack.
Polling time from I/O processor to module <sup>1</sup>	2–30 ms typical <sup>2</sup>	2–30 ms typical <sup>2</sup>
Output Turn-On/Off Time	100 microseconds	100 microseconds
Maximum Load per Point	0.25 A	0.25 A
Voltage Drop	0.15 VDC @ 0.25 A	0.15 VDC @ 0.25 A
Maximum Off State Voltage	60 VDC	60 VDC
Surge (1 sec.)	1 A	1 A

<sup>1</sup> Affects turn-on and turn-off determination

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

## Analog Input Module Specifications

### SNAP-AIARMS

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 microamps
DC Reversal	±16 mA (0.16%)
Input Response Time (Step Change)	5% (12.5 V) in 100 mS 63.2% (158 V) in 200 mS 99% (248 V) in 1200 mS
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB at 60 Hz
Maximum Operating Common Mode Voltage	250 V
Isolation	1500 V
Power Requirements	5 VDC (±0.15 V) at 170 mA
Operating Temperature	0 °C to 70 °C
Storage Temperature	-25 °C to 85 °C

### SNAP-AIARMS-i, SNAP-AIARMS-i-FM

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
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	0 °C to 70 °C -25 °C to 85 °C



## SNAP-AILC and SNAP-AILC-2

Input Range Sensitivity: SNAP-AILC SNAP-AILC-2	2 mV/V or 3 mV/V (Over range $\pm 2.2$ mV or $\pm 3.3$ mV) 3 mV/V or 4 mV/V (Over range $\pm 3.3$ mV or $\pm 4.4$ mV)
Input Resistance	100 Megohms differential
Resolution: Analog Scale Points	>22 bits + sign ( $\pm 6,400,000$ counts = $\pm 100\%$ of scale)
Response Time, Data Freshness	See the following table
DC Reversal (Input)	0.015% ( $\pm 1000$ counts of reading @ 6,400,000 F.S.)
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB @ 60 Hz
Maximum Survivable Input	$\pm 15$ volts across module load cell connector
Maximum Operating Common Mode Voltage	250 V
Accuracy (% Full Scale): Offset Gain	$\pm 0.05\%$ (= 3,200 counts out of 6,400,000, out of box) $\pm 0.05\%$ (= 3,200 counts out of 6,400,000, out of box)
Usable Resolution at Default Configuration (Fast)	38 nV - sign and 19 bits ( $\pm 524,288$ counts @ channel 2) At filter weight 64, settles to 99.9% of final reading in 3.9 s.
DRIFT: Gain Offset	40 PPM / °C 10 PPM / °C
Isolation: Optical	4000 V
Isolation: Transformer	1500 V
Rack Power Requirements	5.00 VDC to 5.20 VDC @ 120 mA
24V Bridge Supply: Input Voltage Input Current Output Fault Current	24 VDC nominal (22 V min. to 30 V max.) 40 mA for one load cell or 115 mA for four load cells 124 mA typical (field fault—shorted bridge)
Ambient Temperature: Operating Storage	0 to 70 °C -25 to 85 °C

### SNAP-AICTD and SNAP-AICTD-4

Input Range with ICTD Probe	-40 °C to +100 °C
Module Input Range Zero Scale Full Scale	-273 °C +150 °C
Resolution	0.017 °C
Accuracy with ICTD Probe	±0.8 °C
Sensitivity	1.0 microamps/ °C
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB @ 60 Hz
Maximum Operating Common Mode Voltage	250 V
Isolation	1500 V
Power Requirements	5 VDC (± .015 ) @ 150 mA
Operating Temperature	0 °C to 70 °C
Storage Temperature	-25 °C to 85 °C

### SNAP-AICTD-8

Input Range with ICTD Probe	-40 °C to +100 °C
Module Input Range Zero Scale Full Scale	-273 °C +150 °C
Data Freshness (Max)	0.28 seconds
Resolution	0.017 °C
Accuracy with ICTD Probe	±0.8 °C
Sensitivity	1.0 mA/ °C
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB @ 60 Hz
Maximum Operating Common Mode Voltage	250 V
Isolation	1500 V
Power Requirements	5 VDC (± .015 ) @ 170 mA
Operating Temperature	0 °C to 70 °C
Storage Temperature	-25 °C to 85 °C

**SNAP-AIMA and SNAP-AIMA-4**

Input Range	-20 mA to +20 mA
Resolution	0.8 microamps
Over-Range Limits	From -22 to +22 mA (+/-20 mA range)
Input Response Time (% of span/ delta I/delta tme)	99.9% / 19.9 mA / 10 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 microamps)
DRIFT: Gain Temperature Coefficient	30 PPM/ °C
DRIFT: Offset Temperature Coefficient	15 PPM/ °C
Power Requirements	5 VDC (±0.15 ) @ 170 mA
Input Resistance - Single Ended	200 ohms (each channel)
Operating Temperature	0 °C to 70 °C
Storage Temperature	-25 °C to 85 °C

**SNAP-AIMA-8**

Input Range	-20 mA to +20 mA
Over-Range Limits	From -22 to +22 mA (+/-20 mA range)
Resolution	0.8 microamps
Data Freshness (Max)	0.28 seconds
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 microamps)
DRIFT: Gain Temperature Coefficient	30 PPM/ °C
DRIFT: Offset Temperature Coefficient	15 PPM/ °C
Isolation	1500 V
Power Requirements	5 VDC (±0.15 ) @ 170 mA
Input Resistance - Single Ended	200 ohms (all channels share the same reference point)
Operating Temperature	0 °C to 70 °C
Storage Temperature	-25 °C to 85 °C

### SNAP-AIMA-32, SNAP-AIMA-32-FM

Input Range	-20 mA to +20 mA
Over-Range Limits	From -22 to +22 mA (+/-20 mA range)
Resolution	0.8 microamps
Input Filtering	-3 dB @ 31 Hz
Data Freshness (Max)	1.15 s
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 microamps)
DRIFT: Gain Temperature Coefficient	30 PPM/ °C
DRIFT: Offset Temperature Coefficient	15 PPM/ °C
Isolation	1500 V
Power Requirements	5 VDC (±0.15 ) @ 150 mA
Input Resistance - Single Ended	200 ohms (each channel)
Operating Temperature	0 °C to 70 °C
Storage Temperature	-25 °C to 85 °C

### SNAP-AIMA2-i

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
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	0 °C to 70 °C -25 °C to 85 °C

**SNAP-AIMA-i**

Input Range	-20 mA to +20 mA
Maximum Over Range	$\pm 10\%$ (= $\pm 27500$ counts)
Resolution	0.8 $\mu$ A
Input Response Time (% of span/delta I/delta time)	99.9 %/19.9 $\mu$ A/10 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 $\mu$ A)
Isolation: Optical	4000 V
Isolation: Transformer	1500 V
Isolation: Channel to Channel	250 V continuous (1500 V transient)
DRIFT: Gain Temperature Coefficient	30 PPM/ $^{\circ}$ C
DRIFT: Offset Temperature Coefficient	15 PPM/ $^{\circ}$ C
Power Requirements	5 VDC ( $\pm 0.15$ ) @ 200 mA
Input Resistance - Single Ended	200 ohms (each channel)
Ambient Temperature: Operating Storage	0 $^{\circ}$ C to 70 $^{\circ}$ C -25 $^{\circ}$ C to 85 $^{\circ}$ C

**SNAP-AIMA-iSRC and  
SNAP-AIMA-iSRC-FM**

Input Range	0 to +20 mA with loop sourcing -20 mA to +20 mA
Maximum Over Range	$\pm 10\%$ (= $\pm 27500$ counts)
Resolution	0.8 $\mu$ A
Input Response Time (% of span/delta I/delta time)	99.9 %/19.9 mA/10 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 $\mu$ A)
DRIFT: Gain Temperature Coefficient	30 PPM/ $^{\circ}$ C
DRIFT: Offset Temperature Coefficient	15 PPM/ $^{\circ}$ C
Isolation: Optical	4000 V
Isolation: Transformer	1500 V
Isolation: Channel to Channel	250 V continuous (1500 V transient)
Power Requirements	5 VDC ( $\pm 0.15$ ) @ 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 ( $\pm 1.5$ V) @ 20 mA Open loop: 30 V maximum Shorted loop: 24 mA nominal
Input Resistance	200 ohms (each channel)
Ambient Temperature: Operating Storage	0 $^{\circ}$ C to 70 $^{\circ}$ C -25 $^{\circ}$ C to 85 $^{\circ}$ C

### SNAP-AIR40K-4

Input Range	0 to 40,000 Ohms 0 to 20,000 Ohms 0 to 10,000 Ohms 0 to 5,000 Ohms
Maximum Over-Range	44 K (40 K Ohms range) 22 K (20 K Ohms range) 11 K (10 K Ohms range) 5.5 K (5 K Ohms range)
Resolution	1.6 Ohm @ 40 K Ohms 0.8 Ohm @ 20 K Ohms 0.4 Ohm @ 10 K Ohms 0.2 Ohm @ 5 K Ohms
Input Filtering	-3 dB @ 3.2 Hz
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB @ 60 Hz
Maximum Operating Common Mode Voltage	250 V
Accuracy	0.1% ± 40 Ohms @ 40 K Ohms 0.1% ± 20 Ohms @ 20 K Ohms 0.1% ± 10 Ohms @ 10 K Ohms 0.1% ± 5 Ohms @ 5 K Ohms
DRIFT: Gain Temperature Coefficient	30 PPM/ °C
DRIFT: Offset Temperature Coefficient	15 PPM/ °C
Isolation	1500 V
Power Requirements	5 VDC (±0.15 ) @ 190 mA
Operating Temperature	0 °C to 70 °C
Storage Temperature	-25 °C to 85 °C

### SNAP-AIMV-4

Input Range	From -150 mV to +150 mV From -75 mV to +75m V
Over-Range Limits	From -165 to +165 mV (+/-150 mV range) From -82.5 to +82.5 mV (+/-75 mV range)
Resolution	6 microvolts (-150 mV to +150 mV) 3 microvolts (-75 mV to +75 mV)
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	3 microvolts / °C
Drift: Offset Temperature Coefficient	2 microvolts / °C
Isolation	1500 V
Power Requirements	5 VDC (±0.15 ) @ 170 mA
Input Resistance - Single Ended	100 Megohms (each channel)
Operating Temperature	0 °C to 70 °C
Storage Temperature	-25 °C to 85 °C

**SNAP-AIMV2-4**

Input Range	From -50 mV to +50 mV From -25 mV to +25m V
Over-Range Limits	From -55 to +55 mV (+/-50 mV range) From -27.5 to +27.5 mV (+/-25 mV range)
Resolution	2 microvolts (-50 mV to +50 mV) 1 microvolt (-25 mV to +25 m V)
Input Filtering	-3 dB @ 2.4Hz
Input Response Time (% of span/delta V/delta time)	63.2%/31.5 mV/66 ms
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB @ 60 Hz
Maximum Survivable Input	±15 volts
Maximum Operating Com- mon Mode Voltage	250 V
Accuracy at Full Scale	0.1% (50 microvolts) @ 50m V 0.2% (50 microvolts) @ 25 mV
Drift: Gain Temperature Coefficient	3 microvolts / °C
Drift: Offset Temperature Coefficient	2 microvolts / °C
Isolation	1500 V
Power Requirements	5 VDC (±0.15 ) @ 170 mA
Input Resistance - Single Ended	100 Megohms (each channel)
Operating Temperature	0 °C to 70 °C
Storage Temperature	-25 °C to 85 °C

**SNAP-AIRATE**

Nominal Input Range	0 to 25,000 Hz
Input Over-Range	To 27,500 Hz
Resolution	1 Hz
Input Response Time(% of span / delta Hz / delta time)	10.0% / 2,500 Hz / 0.1 sec 63.2% / 15.8 K Hz / 0.9 sec 99.0% / 24.75 K Hz / 4.2 sec
DC Common Mode Rejection	> -120 dB
AC Common Mode Rejection	> -120 dB at 60 Hz
Maximum Operating Com- mon Mode Voltage	250 V
Accuracy (% full scale)	±4 Hz or ±0.5% of the input fre- quency (whichever is greater)
Drift: Gain Temperature Coef- ficient	200 ppm / °C
Drift: Offset Temperature Coefficient	50 ppm / °C
Input Coupling	Single-ended AC (capacitor coupled)
Input Amplitude Sine wave Square wave	2.5 V to 24 V p-p 0.5 V to 24 V p-p
Minimum Pulse Width	18 microseconds
Input Impedance (Inputs share the same reference point.) Pull-up Voltage Pull-up Resistor	50 K ohms AC coupled (-input to +input) 6 to 9 V 4.7 K ohms
Isolation	1500 V
Power Requirements	5 VDC (±0.15 V) at 190 mA
Operating Temperature	0 °C to 70 °C
Storage Temperature	-25 °C to 85 °C

### SNAP-AIRTD

3-wire RTD input	100-0hm platinum; $\alpha = 0.00385$
Input Temperature Range	-200 °C to 850 °C (-328° to +1,582° F)
Input Range	0 to 400 ohms
Over-Range Limit	to 400 ohms
Resolution (average)	0.042 °C (0.016 ohms)
Input Filtering	-3 dB @ 0.1 Hz
Input Response Time (% of span/delta temp/delta time)	63.2 %/598 °C/25 ms
Lead Compensation	Automatic when used with SNAP brains
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB at 60 Hz
Excitation (typical)	1.25 mA constant current
Maximum Lead Resistance	>40 ohms single wire (all leads to be equal resistance)
Maximum Fault Voltage at Input (between any 2 field wires)	±15 V
Maximum Operating Common Mode Voltage	250 V
Accuracy From factory After using gain and offset commands	0.8 °C 0.6 °C
Isolation	1500 V
Power Requirements	5 VDC (±0.15) @ 190 mA
Operating Temperature	0 °C to 70 °C
Storage Temperature	-25 °C to 85 °C

### SNAP-AITM

Input Range	From -150 mV to +150 mV From -75 mV to +75 mV
Over-Range Limits	From -165 to +165 mV (+/-150 mV range) From -82.5 to +82.5 mV (+/-75 mV range)
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-AITM-i

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
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	0 °C to 70 °C -25 °C to 85 °C

## SNAP-AITM-2

Input Range	From -50 mV to +50 mVDC From -25 mV to +25 mVDC
Over-range Limits	From -55 to +55 mV (+/-50 mV range) From -27.5 to +27.5 mV (+/-25 mV range)
Resolution	2 microvolts from -50 mV to +50 mV 1 microvolts 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
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	0.1% (50 microvolts) @ 50 mV 0.2% (50 microvolts) @ 25 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	B, R, S    C, D, G    T, N ±5            ±4            ±3 ±3            ±2            ±2
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-AITM2-i

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
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	0 °C to 70 °C -25 °C to 85 °C

### SNAP-AITM-8, SNAP-AITM-8-FM

Input Range	From -75 mV to +75 mV From -50 mV to +50 mV From -25 mV to +25 mV
Over-Range Limits	From -82.5 to +82.5 mV (+/-75 mV range) From -55 to +55 mV (+/-50 mV range) From -27.5 to +27.5 mV (+/-25 mV range)
Resolution	3 microvolts from -75 mV to +75 mV 2 microvolts from -50 mV to +50 mV 1 microvolts from -25 mV to +25 mV
Cold Junction Temperature Compensation	Automatic when used with SNAP I/O processors
Input Filtering	-3 dB @ 5 Hz
Data Freshness (Max)	2.25 s
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB @ 60 Hz
Maximum Survivable Input	±15 volts
Max Operating Common Mode Voltage	250 V
Accuracy at Full Scale	0.1% (75 microvolts) @ 75 mV 0.1% (50 microvolts) @ 50 mV 0.2% (50 microvolts) @ 25 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	E, J, K    B, R, S    C, D, G    T, N ±2.0        ±5        ±4        ±3 ±0.5        ±3        ±2        ±2
Isolation	1500 V
Power Requirements	5 VDC (±0.15) @ 200 mA
Input Resistance	100 Megohms (each channel)
Ambient Temperature: Operatin Storage	0 °C to 70 °C -25 °C to 85 °C

**SNAP-AIV2-i**

Input Range	From -100 volts to +100 volts From -50 volts to +50 volts
Maximum Over Range	$\pm 10\%$ (= $\pm 27500$ 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
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 ( $\pm 0.15$ ) @ 200 mA
Input Resistance	1 megohms (each channel)
Ambient Temperature: Operating Storage	0 °C to 70 °C -25 °C to 85 °C

**SNAP-AIV-i**

Input Range	From -10 volts to +10 volts From -5 volts to +5 volts
Maximum Over Range	$\pm 10\%$ (= $\pm 27500$ 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
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 ( $\pm 0.15$ ) @ 200 mA
Input Resistance	1 megohms (each channel)
Ambient Temperature: Operating Storage	0 °C to 70 °C -25 °C to 85 °C

### SNAP-AIV and SNAP-AIV-4

Input Range	From -10 volts to +10 volts From -5 volts to +5 volts
Over-Range Limits	From -11 to +11 volts (+/-10 V range) From -5.5 to +5.5 volts (+/-5 V range)
Resolution	0.4 mV when configured -10 to +10 volts 0.2 mV when configured -5 to +5 volts
Input Filtering	-3 dB @ 64 Hz
Input Response Time (% of span/ delta V / delta t)	63.2% / 6.7 V / 10 ms
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	1500 V
Power Requirements	5 VDC (±0.15) @ 170 mA
Input Resistance	1 M ohms (each channel; both channels share the same reference point)
Ambient Temperature: Operating Storage	0 °C to 70 °C -25 °C to 85 °C

### SNAP-AIV-32, SNAP-AIV-32-FM

Input Range	From -10 volts to +10 volts From -5 volts to +5 volts
Over-Range Limits	From -11 to +11 volts (+/-10 V range) From -5.5 to +5.5 volts (+/-5 V range)
Resolution	0.4 mV when configured -10 to +10 volts 0.2 mV when configured -5 to +5 volts
Input Filtering	-3 dB @ 31 Hz
Data Freshness (Max)	1.1 s
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	1500 V
Power Requirements	5 VDC (±0.15) @ 150 mA
Input Resistance	1 M ohms (each channel; all channels share the same reference point)
Ambient Temperature: Operating Storage	0 °C to 70 °C -25 °C to 85 °C

**SNAP-AIV-8**

Input Range	From -10 volts to +10 volts From -5 volts to +5 volts
Over-Range Limits	From -11 to +11 volts (+/-10 V range) From -5.5 to +5.5 volts (+/-5 V range)
Resolution	0.4 mV when configured -10 to +10 volts 0.2 mV when configured -5 to +5 volts
Input Filtering	-3 dB @ 64 Hz
Data Freshness (Max)	0.28 seconds
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	1500 V
Power Requirements	5 VDC ( $\pm 0.15$ ) @ 170 mA
Input Resistance	1 M ohms (all channels share the same reference point)
Ambient Temperature: Operating Storage	0 °C to 70 °C -25 °C to 85 °C

### SNAP-AIVRMS

Input Range	0 to 250 V RMS AC/DC
Input Over-Range	To 275 V
Input Resistance	1 M ohms
Accuracy	±0.2 V and ±0.2% reading
Resolution	10 mV
DC Reversal	± 0.4 V (.16%)
Input Response Time (Step Change)	5% (12.5 V) in 100 mS 63.2% (158 V) in 200 mS 99% (248 V) in 1200 mS
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB @ 60 Hz
Maximum Operating Common Mode Voltage	250 V
Isolation	1500 V
Power Requirements	5 VDC (±0.15 V) at 170 mA
Operating Temperature	0 °C to 70 °C
Storage Temperature	-25 °C to 85 °C

### SNAP-AIVRMS-i, SNAP-AIVRMS-i-FM

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
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	0 °C to 70 °C -25 °C to 85 °C

## SNAP-AIPM

	SNAP-AIPM	SNAP-AIPM-3
<b>Voltage Inputs (each voltage channel)</b>		
Recommended Input Range Scaled Input Range	85 to 250 VAC RMS 0 to 250 VAC RMS	85 to 250 VAC RMS 0 to 250 VAC RMS
Input Over Range	To 275 volts	To 275 volts
Resolution	10 mV	10 mV
Accuracy (47 to 63 Hz)	(When used within recommended range) $\pm 0.2$ V and $\pm 0.2\%$ reading (at full scale = $\pm 0.7$ V or 0.28%) ( $-0.2$ dB at 660 Hz; $-3$ dB at 1.89 kHz) nominal	(When used within recommended range) $\pm 0.2$ V and $\pm 0.2\%$ reading (at full scale = $\pm 0.7$ V or 0.28%) ( $-0.2$ dB at 660 Hz; $-3$ dB at 1.89 kHz) nominal
RMS Integration Time/ Data Freshness	1000 ms (synchronous with current measurement)	1000 ms (synchronous with current measurement)
Input Filtering	Time constant = 70 $\mu$ s (analog front end)	Time constant = 70 $\mu$ s (analog front end)
Input Resistance – Single Ended	1 Megohm NOTE: Because both channels share the same reference terminal, <b>polarity must be observed</b> when connecting the current channel.	1 Megohm NOTE: Because both channels share the same reference terminal, <b>polarity must be observed</b> when connecting the current channel.
Maximum Input	300 V non-operating	300 V non-operating
<b>Current Inputs (each current channel)</b>		
Input Range	0 to 10 AC amps RMS	0 to 10 AC amps RMS
Input Over Range	To 11 amps (Reading is not reliable over 11 A.)	To 11 amps (Reading is not reliable over 11 A.)
Input Overload	15 A continuous, non-operating	15 A continuous, non-operating
Resolution	400 $\mu$ A	400 $\mu$ A
Accuracy (47 to 63 Hz)	$\pm 8$ mA and $\pm 0.2\%$ reading (at full scale = $\pm 28$ mA or 0.28%) ( $-0.2$ dB at 660 Hz; $-3$ dB at 1.89 kHz) nominal	$\pm 8$ mA and $\pm 0.2\%$ reading (at full scale = $\pm 28$ mA or 0.28%) ( $-0.2$ dB at 660 Hz; $-3$ dB at 1.89 kHz) nominal
RMS Integration Time/ Data Freshness	1000 ms (synchronous with voltage measurement)	1000 ms (synchronous with voltage measurement)
Input Filtering	Time constant = 105 $\mu$ s (analog front end)	Time constant = 105 $\mu$ s (analog front end)
Input Resistance – Single Ended	0.005 Ohm NOTE: Because both channels share the same reference terminal, <b>polarity must be observed</b> when connecting the voltage channel.	0.005 Ohm NOTE: Because both channels share the same reference terminal, <b>polarity must be observed</b> when connecting the voltage channel.
Maximum Input	15 A continuous, non-operating	15 A continuous, non-operating
<b>All Inputs (each channel)</b>		
True Power and Volt-Amps Range	True power: 2500.0 Watts. Volt-amps: 2500.0 volt-amps (inputs = 250 volts and 10 amps)	True power: 2500.0 Watts. Volt-amps: 2500.0 volt-amps (inputs = 250 volts and 10 amps)
Over Range	2750 Watts true power or 27,500 counts volt-amps	2750 Watts true power or 27,500 counts volt-amps
Accuracy: True Power Volt-Amps	$\pm 0.6\%$ reading (at full scale = $\pm 15$ Watts) $\pm 0.6\%$ reading (at full scale = $\pm 15$ VA)	$\pm 0.6\%$ reading (at full scale = $\pm 15$ Watts) $\pm 0.6\%$ reading (at full scale = $\pm 15$ VA)
Resolution	100 Megohms	100 Megohms
AC Common Mode Rejection	$>-120$ dB at 60 Hz	$>-120$ dB at 60 Hz

	SNAP-AIPM	SNAP-AIPM-3
Maximum Operating Common Mode Voltage	250 VAC	250 VAC
Power Requirements	5.0 VDC $\pm$ 0.15 VDC at 100 mA	5.0 VDC $\pm$ 0.15 VDC at 100 mA
Ambient Temperature: Operating Storage	0 to 70 °C -25 to 85 °C	0 to 70 °C -25 to 85 °C

## SNAP-pH/ORP

Input Range	-1.00 V to +1.00 V for ORP probes -0.50 V to +0.50 V for pH probes
Resolution	40 $\mu$ V when configured -1.00 V to +1.00 V 20 $\mu$ V when configured -0.50 V to +0.50 V
Data Freshness (Maximum)	126 ms (63 ms per channel) when configured -1.00 V to +1.00 V 251 ms (125.5 ms per channel) when configured -0.50 V to +0.50 V
Input Filtering	-3 dB @ 2.4 Hz
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB at 60 Hz
Maximum Survivable Input	$\pm$ 100 VDC or peak AC
Maximum Operating Common Mode Voltage	250 VDC or peak AC
Accuracy (% full scale)	0.05% when configured -1.00 V to +1.00 V 0.05% when configured -0.50 V to +0.50 V
Gain Temperature Coefficient	30 PPM/°C
Offset Temperature Coefficient	15 PPM/°C
Power Requirements	5 VDC ( $\pm$ 0.15) at 170 mA
Input Resistance (Differential)	>10 Tera Ohms (each channel)
Ambient Temperature: Operating Storage	0 to 70 °C -25 to 85 °C



## Analog Output Module Specifications

### SNAP-AOA-3

Input	12-bit serial data
Output	4 to 20 mA (floating)
Span	16 mA
Resolution	3.9 microamps
Response Time (% of span/delta I / delta time)	99.9%/15.98 mA/3 mS
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB @ 60 Hz
Maximum Operating Common Mode Voltage	250 V
Common Mode Resistance	>1000 M W
Accuracy	0.1% of span
Gain Temperature Coefficient	50 PPM/ °C
Offset Temperature Coefficient	20 PPM/ °C
Module Power Requirements	5 Volts DC ( $\pm 0.15$ ) @ 140 mA
Loop Power Requirements	10 Volts DC (min) to 32 Volts DC (max)
Max. Loop Resistance (Ohms) @ Loop Supply	250 350 950 1350 10V 12V 24V 32V
Max. Loop Resistance formula	$\frac{(\text{Loop Voltage} - 5)}{0.02}$
Ambient Temperature: Operating Storage	0 °C to 70 °C -25 °C to 85 °C

### SNAP-AOA-23

Input	12-bit serial data (each channel)
Outputs	4 to 20 mA (each channel)
Span	16 mA
Resolution	3.9 microamps
Response Time (% of span/delta I / delta time)	99.9%/15.98 mA/3 mS
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB @ 60 Hz
Maximum Operating Common Mode Voltage	250 V
Common Mode Resistance	>1000 Megohms
Accuracy	0.1% of Span
Gain Temperature Coefficient	50 PPM/°C
Offset Temperature Coefficient	20 PPM/°C
Module Power Requirements	5 Volts DC ( $\pm 0.15$ ) @ 150 mA
Loop Power Requirements	8 VDC (min) to 32 Volts DC (max)
Max. Loop Resistance (Ohms) @ Loop Supply	250 450 650 105 145 8V 12V 15V 24V 32V
Max. Loop Resistance formula	$\frac{(\text{Loop Voltage} - 3)}{0.02}$
Ambient Temperature: Operating Storage	0 °C to 70 °C -25 °C to 85 °C

### SNAP-AOA-23-iSRC and SNAP-AOA-23-iSRC-FM

Input	12-bit serial data (each channel)
Outputs	4 to 20 mA (each channel)
Span	16 mA
Resolution	3.9 microamps
Response Time (% of span/delta I/ delta time)	99.9%/15.98 mA/3 mS
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB @ 60 Hz
Maximum Operating Common Mode Voltage	250 V
Common Mode Resistance	>1000 Megohms
Accuracy	0.1% of Span
Gain Temperature Coefficient	50 PPM/°C
Offset Temperature Coefficient	20 PPM/°C
Max. Loop Resistance @ Loop Supply	950 Ohms
Ambient Temperature: Operating Storage	0 °C to 70 °C -25 °C to 85 °C
Isolation: Optical	4000 V
Isolation: Transformer	1500 V
Isolation: Channel to Channel	250 V continuous (1500 V transient)
Power Requirements	5 Volts DC (±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

### SNAP-AOA-28

Input	12-bit serial data (each channel)
Outputs	0 to 20 mA (each channel)
Span	20 mA
Resolution	4.9 microamps
Response Time (% of span/delta I/ delta time)	99.9%/15.98 mA/3 mS
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB @ 60 Hz
Maximum Operating Common Mode Voltage	250 V
Common Mode Resistance	>1000 Megohms
Accuracy	0.1% of Span
Gain Temperature Coefficient	50 PPM/°C
Offset Temperature Coefficient	20 PPM/°C
Module Power Requirements	5 Volts DC (±0.15) @ 150 mA
Loop Power Requirements	8 Volts DC (min) to 32 Volts DC (max)
Max. Loop Resistance (Ohms) @ Loop Supply	250 450 650 1050 1450 8V 8V 12V 24V 32V
Max. Loop Resistance formula	$\frac{(\text{Loop Voltage} - 5)}{0.02}$
Ambient Temperature: Operating Storage	0 °C to 70 °C -25 °C to 85 °C

**SNAP-AOD-29**

Input	12-bit serial data (each channel)
Switched Output at 45 °C Ambient at 70 °C Ambient	5 to 60 Volts DC 0.5 A 0.2 A
TPO Resolution	12-bit Each bit = Period/4095 1 millisecond/bit default
Period Range	0.251 sec. to 64.25 sec. (0.251 sec for Ethernet-based I/O units) 0.251 seconds module default
Period Accuracy	± 0.5%
Period Resolution	.251 second
Inhibit Inputs On Off	4.0 Volts DC at 1.0 mA (32 Volts DC max. 1.0 Volt DC)
Maximum Operating Common Mode Voltage	250 V
Common Mode Resistance	>1,000 Megohms
Timebase Temperature Coef- ficient	50 PPM/°C
Power Requirements	5 Volts DC (±0.15) @ 150 mA
Ambient Temperature: Operating Storage	0 °C to 70 °C -25 °C to 85 °C

**SNAP-AOV-5**

Input	12-bit serial data
Output	0 to +10 Volts DC (floating)
Span	10 Volt span
Resolution	2.44 mV
Response Time (% of span/delta V/delta time)	99.9%/19.98 V/3 mS
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB @ 60 Hz
Maximum Operating Common Mode Voltage	250 V
Common Mode Resistance	>1000 Megohms
Load Current	10 mA (floating)
Short Circuit Current Continu- ous	125 mA (typical)
Accuracy	0.1% of span
Gain Temperature Coefficient	50 PPM/°C
Offset Temperature Coefficient	20 PPM/°C
Power Requirements	5 Volts DC @ 150 mA
Ambient Temperature: Operating Storage	0 °C to 70 °C -25 °C to 85 °C

**SNAP-AOV-25**

Input	12-bit serial data (each channel)
Outputs	0 to +10 Volts DC
Span	10 Volts
Resolution	2.44 mV
Response Time (% of span/delta V/delta time)	99.9%/19.98 V/3 mS
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB @ 60 Hz
Maximum Operating Common Mode Voltage	250 V
Common Mode Resistance	>1,000 Megohms
Load Current (nominal)	5 mA (each channel)
Short Circuit Output Current Continuous	40 mA per channel
Accuracy	0.1% of Span
Gain Temperature Coefficient	50 PPM/°C
Offset Temperature Coefficient	20 PPM/°C
Power Requirements	5 Volts DC (±0.15) @ 150 mA
Ambient Temperature: Operating Storage	0 °C to 70 °C -25 °C to 85 °C

**SNAP-AOV-27**

Input	12-bit serial data (each channel)
Outputs	-10 to +10 Volts DC
Span	20 Volts
Resolution	4.88 mV
Response Time (% of span/delta V/delta time)	99.9%/19.98 V/3 mS
DC Common Mode Rejection	>-120 dB
AC Common Mode Rejection	>-120 dB @ 60 Hz
Maximum Operating Common Mode Voltage	250 V
Common Mode Resistance	>1,000 Megohms
Load Current (nominal)	5 mA (each channel)
Short Circuit Output Current Continuous	40 mA per channel
Accuracy	0.1% of Span
Gain Temperature Coefficient	50 PPM/°C
Offset Temperature Coefficient	20 PPM/°C
Power Requirements	5 Volts DC (±0.15) @ 150 mA
Ambient Temperature: Operating Storage	0 °C to 70 °C -25 °C to 85 °C

## Serial Module Specifications

### SNAP-SCM-232 and SNAP-SCM-485-422

Baud rates	300–115,200
Channel-to-channel isolation	750 V <sub>RMS</sub>
Logic supply voltage	5.0 VDC
Logic supply current	250 mA DC
Number of ports per module	2 (1 on SNAP-SCM-485-422 in 4-wire mode)
Max. number of modules per rack	8
Maximum cable length, point-to-point (SNAP-SCM-232)	50 feet
Maximum cable length, multi-drop (SNAP-SCM-485-422)	1,000 feet at 115,200 Kbd
Operating temperature	0 to 70 °C
Storage temperature	-30 to 85 °C

### SNAP-SCM-MCH16

Baud rates	115,200
Parity	Even
Data bits	8 only
Logic supply voltage	5.0 to 5.2 VDC
Logic supply current	250 mA <sup>1</sup> 500 mA <sup>2</sup>
Number of ports per module	1
Maximum number of modules per rack	8 <sup>1</sup>
Maximum cable length, multi-drop	1,000 feet at 115,200 Baud
I/O processor (brain or on-the-rack controller) compatibility	SNAP-PAC-R1, SNAP-PAC-R2, SNAP-PAC-EB1, or SNAP-PAC-EB2
Operating temperature	0 to 70 °C
Storage temperature	-30 to 85 °C
<p>1. Each breakout board is powered by a separate power supply. 2. Breakout board uses power from the module.</p>	

## SNAP-SCM-PROFI

Baud rates	9600 to 1.5 MBaud
Channel-to-channel isolation	750 Vrms
Logic supply voltage	5.0 VDC
Logic supply current	250 mA
Number of ports per module	1
Maximum number of modules per rack	8
Operating temperature Storage temperature	0 to 70 °C -30 to 85 °C

## SNAP-SCM-W2

Channel-to-channel isolation	250 Vrms
Logic supply voltage	5.0 VDC (± 0.15)
Logic supply current	250 mA
Number of ports per module	2
Maximum number of modules per rack	8
Maximum cable length	See table below
Operating Temperature Storage Temperature	0 to 70 °C operating -30 to 85 °C storage

## Breakout Board and Cable Specifications

### SNAP-TEX-32, SNAP-TEX-FB16-H, and SNAP-TEX-FB16-L

Feature	SNAP-TEX-32	SNAP-TEX-FB16-H	SNAP-TEX-FB16-L
Use with I/O modules	2- or 4-channel analog inputs/outputs; 4-channel digital inputs/outputs *	4-channel digital inputs and outputs 16- and 32-ch digital inputs/outputs	4-channel digital inputs and outputs 16- and 32-ch digital inputs/outputs
Use with cables	SNAP-TEX-CBE6 (even pins connected), SNAP-TEX-CBO6 (odd pins connected), or SNAP-TEX-CBS6 (no connections), depending on module.	<b>4-ch modules:</b> SNAP-TEX-CBO6 (odd pins connected)** or SNAP-TEX-CBS6 (straight-through), depending on module. <b>16-ch modules:</b> SNAP-HD-ACF6 <b>32-ch modules:</b> SNAP-HD-CBF6	<b>4-ch modules:</b> SNAP-TEX-CBO6 (odd pins connected)** or SNAP-TEX-CBS6 (straight-through), depending on module. <b>16-ch modules:</b> SNAP-HD-ACF6 <b>32-ch modules:</b> SNAP-HD-CBF6
Connectors	32 spring connectors; accommodates eight 4-channel modules	16 spring connectors; accommodates four 4-channel modules	16 spring connectors; accommodates four 4-channel modules
Fusing	none	1 A, 250 V, fast-acting fuse for each I/O point (16 total). Replace with Opto 22 PN SNAP-FUSE1AC (Wickman PN 19373-1A)	1 A, 250 V, fast-acting fuse for each I/O point (16 total). Replace with Opto 22 PN SNAP-FUSE1AC (Wickman PN 19373-1A)
Indicators	none	1 LED per fuse (16 LEDs total)	1 LED per fuse (16 LEDs total)
Bussed power	none	120–240 V	12–24 V

\* Can also be used with 8-, 16-, or 32-channel digital and analog inputs (not thermocouples).

\*\* **IMPORTANT:** Do NOT USE the FB16 breakout boards with a SNAP-TEX-CBE6 cable. The board has odd pins connected; the cable has even pins connected.

### SNAP-SCM-BB4

Power Requirements	8.0 to 32.0 VDC @ 250mA 5.00 to 5.20 VDC @ 500mA
Operating Temperature	0 to 70 °C
Relative Humidity	95%, non-condensing

## SNAP-IDC-HDB, SNAP-IDC-HDB-FM, SNAP-ODC-HDB, and SNAP-ODC-HDB-FM

SNAP-IDC-HDB and SNAP-IDC-HDB-FM Breakout Racks for High-Density Digital Input Modules	
Used with	SNAP-IDC-32, SNAP-IDC-32-FM, and SNAP-IDC-32N
Connectors	40-pin header connects to SNAP-IDC-32 module using SNAP-HD-BF6 header cable. 32 signal input connectors; each signal connector has a corresponding common connector. For each zone of 8 signal inputs, 1 connection for either module common or field common.
Indicators	1 LED for each signal input (32 signal LEDs total) 1 power status LED for each zone of 8 signal inputs (4 power LEDs total)
Fusing	1 A fuses; 2 fuses for each zone of 8 signal inputs (8 fuses total) Replace with Pudenz 1 A automobile mini-fuse or equivalent.
Jumpers	For each zone of 8 signal inputs, 1 jumper controls whether module common or field common is used.
Voltage	32 VDC maximum, 12-24 VDC nominal
SNAP-ODC-HDB and SNAP-ODC-HDB-FM Breakout Racks for High-Density Digital Output Modules	
Used with	SNAP-ODC-32-SRC, SNAP-ODC-32-SRC-FM, SNAP-ODC-32-SNK, and SNAP-ODC-32-SNK-FM
Connectors	40-pin header; connects to 32-channel sourcing or sinking module using SNAP-HD-BF6 header cable. 32 signal output connectors; each signal connector has a corresponding common connector. For each zone of 8 signal outputs, 1 connection for either module common or field common.
Indicators	1 LED for each signal output (32 signal LEDs total) 1 power status LED for each zone of 8 signal outputs (4 power LEDs total)
Fusing	1 A fuses; 1 fuse for each signal output (32 signal fuses total) Replace with Pudenz 1 A automobile mini-fuse or equivalent.
Jumpers	For each zone of 8 signal inputs, 1 jumper controls whether module common or field common is used.
Voltage	32 VDC maximum, 12-24 VDC nominal



## SNAP-HD-ACF6, SNAP-HD-CBF6, and SNAP-HD-BF6

Feature	SNAP-HD-ACF6	SNAP-HD-CBF6	SNAP-HD-BF6
Cable length	6 feet (1.8 meters)	6 feet (1.8 meters)	6 feet (1.8 meters)
Connectors	Two-connector assembly at module end, each with 16 pins; flying leads at other end	One 40-pin connector at module end; flying leads at other end	One connector at module end; one connector at breakout board end
Wires	Pre-stripped, color-coded, 22-gauge wires	Pre-stripped, color-coded, 24-gauge wires	24 gauge wires
Use with	Modules: SNAP-IAC-16 SNAP-IAC-A-16 SNAP-IAC-K-16 SNAP-IDC-16 SNAP-IDC-HT-16	Modules: SNAP-IDC-32 SNAP-IDC-32-FM SNAP-IDC-32N SNAP-ODC-32-SNK SNAP-ODC-32-SNK-FM SNAP-ODC-32-SRC SNAP-ODC-32-SRC-FM SNAP-AIV-32 SNAP-AIV-32-FM	Modules to breakout boards (regular and -FM versions of all): SNAP-IDC-32 to SNAP-IDC-HDB SNAP-IDC-32N to SNAP-IDC-HDB SNAP-ODC-32-SNK to SNAP-ODC-HDB SNAP-ODC-32-SRC to SNAP-ODC-HDB SNAP-AIV-32 to SNAP-AIV-HDB SNAP-AIMA-32 to SNAP-AIMA-HDB

## SNAP-TEX-MR10-4 and SNAP-TEX-MR10-16

Feature	SNAP-TEX-MR10-4	SNAP-TEX-MR10-16
Use with I/O modules	SNAP-ODC5-i, SNAP-ODC5A-i, SNAP-ODC5SRC, SNAP-ODC-32-SRC	SNAP-ODC5-i, SNAP-ODC5A-i, SNAP-ODC5SRC, SNAP-ODC-32-SRC
Use with cables	SNAP-TEX-CBO6 (odd pins bussed), SNAP-TEX-CBS6 (no bussing), or SNAP-HD-CBF6, depending on module.	SNAP-TEX-CBO6 (odd pins bussed), SNAP-TEX-CBS6 (no bussing), or SNAP-HD-CBF6, depending on module.
Relay contacts	SPDT (1 Form C) Typical life expectancy (Electrical): $1 \times 10^5$	SPDT (1 Form C) Typical life expectancy (Electrical): $1 \times 10^5$
Switching capacity	10 A @ 240 VAC	10 A @ 240 VAC
Switch On time	7 ms nominal	7 ms nominal
Switch Off time	3 ms nominal	3 ms nominal
Fusing	24 V fuse for board	24 V fuse for board
Indicators	4 On/Off status indicators (one for each channel) 1 fuse-blown indicator	16 On/Off status indicators (one for each channel) 1 fuse-blown indicator
Power requirements (all positions On)	24 VDC @ 75 mA	24 VDC @ 300 mA

## SNAP-TEX-CBO6, SNAP-TEX-CBE6, and SNAP-TEX-CBS6

Feature	SNAP-TEX-CBO6	SNAP-TEX-CBE6	SNAP-TEX-CBS6
Cable length	6 feet (1.8 meters)	6 feet (1.8 meters)	6 feet (1.8 meters)
Connector	8 pins, 0.2 in. (5.08 mm) center-to-center	8 pins, 0.2 in. (5.08 mm) center-to-center	8 pins, 0.2 in. (5.08 mm) center-to-center
Wires	8 pre-stripped, color-coded, 18 gauge	8 pre-stripped, color-coded, 18 gauge	8 pre-stripped, color-coded, 18 gauge
Bussing	Odd-numbered pins connected	Even-numbered pins connected*	No connected

\*Do NOT USE the CBE6 with a SNAP-TEX-FB16-H or -L breakout board. The FB16s have odd-numbered pins connected.