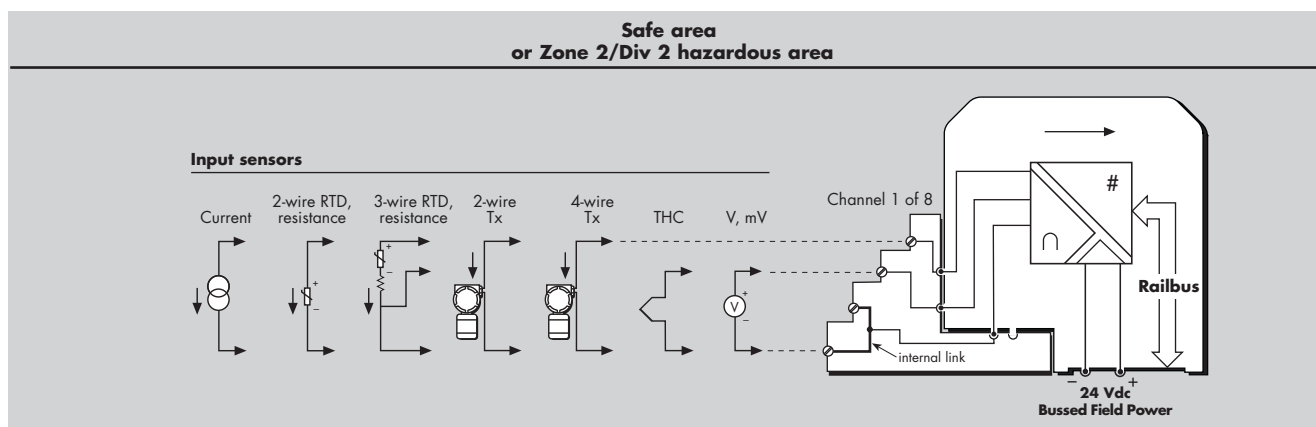


8-channel Isolated Universal Analog Input

4-20mA, Thermocouple, RTD and Voltage

8132-AI-UN



- ◆ 8 isolated, universal, input channels
- ◆ configurable on a channel by channel basis: 4-20mA, THC, RTD, resistance & voltage
- ◆ 250V ac rms channel to channel isolation
- ◆ thermocouple types B, E, J, K, N, R, S, T, W3, W5, Russian K, Russian L
- ◆ RTD Types Pt100, iPt100, Pt200, Pt500, Ni120, Cu10
- ◆ volt input types $\pm 120\text{mV}$, 0-1V, 0-5V, 1-5V, 0-10V, $\pm 10\text{V}$
- ◆ 2 or 3-wire RTDs
- ◆ 2 or 4-wire transmitters
- ◆ non-incendive field circuits
- ◆ 24 V dc bussed field power required

MODULE SPECIFICATION

See also System Specification

INPUTS

Number of configurable channels 8 isolated

4-20mA INPUTS

Nominal signal range 4 to 20mA

Span 0 to 25mA

Output voltage (@ 20mA) 13.5 V (min.)

Output current (linear operation) 25 mA (max.)

Output short circuit current (max.) 75 mA for 100ms
(Output turns off after ~100ms at more than 25mA)

Input current (max.) 30mA (continuous)

Calibration accuracy

10°C to 40°C $\pm 0.1\%$ of span

-40°C to 70°C $\pm 0.3\%$ of span

Resolution 15 bits (typ.)

Repeatability 0.05% of span

THERMOCOUPLE INPUTS

THC Types ... B, E, J, K, N, R, S, T, W3, W5, Russian K, Russian L

(See table for temperature ranges)

Calibration accuracy (see table for ranges & error)

10°C to 40°C $\pm 0.1\%$ of span (typ.)

-40°C to 70°C $\pm 0.2\%$ of span (typ.)

Cold junction compensation error† $< \pm 1^\circ\text{C}$ (-40°C to +70°C)

Resolution 14 bits (typ.)

Optional open circuit bleed current $\pm 0.9\mu\text{A}$ (nom.)

Open circuit detection time 1 sec

(with $< 0.5\mu\text{F}$ cable capacitance)

RTD INPUT (2 OR 3 WIRE)

RTD types Pt100, Pt200, Pt500, Cu10, Ni120; iPt100

Maximum wire resistance 40 ohms

Calibration accuracy 3-wire (see table for ranges & error)

10°C to 40°C $\pm 0.1\%$ of span (typ.)

-40°C to 70°C $\pm 0.2\%$ of span (typ.)

RTD excitation current selected for ~0.2 mW at 0°C

Resolution 14 bits (typ.)

Open circuit detection time 1 sec

(with $< 0.5\mu\text{F}$ cable capacitance)

RESISTANCE INPUT (2 OR 3 WIRE)

Input resistance range (span) 0 to 110, 280,

470 and 1000 ohms

Calibration accuracy 3-wire

10°C to 40°C $\pm 0.2\%$ of span

-40°C to 70°C $\pm 0.4\%$ of span

Calibration accuracy 2-wire

10°C to 40°C (except 110 Ohm scale) $\pm 0.2\%$ of span

10°C to 40°C (110 Ohm scale) $\pm 0.3\%$ of span

70°C to -40°C (except 110 Ohm scale) $\pm 0.4\%$ of span

70°C to -40°C (110 Ohm scale) $\pm 0.5\%$ of span

Maximum wire resistance 40 ohms

Resistance excitation current ..selected for ~1.0 mW at max R

Resolution 14 bits (typ.)

† C J compensation located in recommended field terminal

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VOLTAGE INPUT

Nominal signal range 1 (span) ± 120 mV, 0-1 V,
 0-5V, 1-5V, 0-10V, ± 10 V
 (see table for calibration accuracy over temperature)
Resolution 14 bits (typ.)

CONFIGURABLE PARAMETERS

Sensor type user selectable
Alarms high-high, high, low and low-low
Alarm deadband (hysteresis) user defined value
Input dead zone user defined value
Channel status active/inactive
Filter/sample rates user selectable

GENERAL SPECIFICATIONS

Common mode rejection (using 50/60Hz filter)
 > 120 dB @ 50/60 Hz
Series mode rejection (using 50/60Hz filter)
 > 65 dB @ 50/60 Hz
Maximum input voltage (except current I/P) ± 25 V
Common mode voltage between channels 250 V ac rms
Isolation
 (channel to channel) 250 V ac rms
 (any channel to Railbus) 250 V ac rms
 (any channel to Bussed Field Power) 250 V ac rms
 (Railbus to Bussed Field Power) 150 V ac rms
Input filter response time constant 4 ms
Input impedance > 1 M ohm
Data Format 0 to 65535 corresponds to selected span

RESPONSE TIME

Signal change on any channel to availability on Railbus
 dependent on user-selectable filter/sample rates

Sample Rates Response Time

Fast (10ms) 1366Hz 11 ms
 Medium (20ms) 683Hz 21 ms

Filter

60Hz reject 18 ms
 50Hz reject 21 ms
 50 ms 55 ms
 100 ms 105 ms
 300 ms (50/60 Hz Noise Rejection) 305 ms
 500 ms 505 ms

Note: For those inputs requiring multiple measurements, i.e. resistance and RTD, the minimum response time is 55 ms. See also on this page **Tradeoff of Resolution for module throughput**.

Open circuit detection < 1 sec
 (with < 0.5 μ F cable capacitance)

SAFETY

FM non-incendive field wiring parameters (each channel)
 Voc=20 V; Isc = 75mA; Ca= 0.61 μ F; La= 11.3mH

POWER SUPPLIES

Railbus (12V) current 60 mA (typ.)
 100 mA (max.)

Bussed Field Power @ 24 V dc $\pm 10\%$

All configurations - except 4/20mA with excitation.. 125 mA (max.)
 4/20mA with excitation 300 mA (max.)

MECHANICAL

Module Key Code A1*
Module width 42mm
Weight 230g

* **WARNING** If this module is being used in an application that requires 250V ac rms channel-to-channel isolation, it must be replaced *only* with an A1 key code module that has equivalent, or better, channel-to-channel isolation rating.

Tradeoff of Resolution for Module Throughput

The module offers ~15 bit effective resolution on all channels. The module also offers several analog-to-digital conversion options that allow higher speed signals to be selectively read more quickly on a channel-by-channel basis.

Note however, that at the highest speeds, uncertainty in value of the lower bits will increase, resulting in reduced resolution. The following table indicates the approximate effect on resolution of higher speeds.

Channel response time	Digital Filter	Approximate Resolution
11 ms	none	8 bits (0.4%)
25 ms	none	9 bits (0.2%)
55 ms	50 ms	14 bits (0.006%)
105 ms	100 ms	15 bits
305 ms	300 ms	15 bits
505 ms	500 ms	15 bits

FIELD TERMINAL (See Note below)

Field wiring	Recommended Field Terminal	Alternative Field Terminal
All purpose	8608-FT-NI (no internal CJ)	8607-FT-TC (See Note) (internal CJ)
THC	8607-FT-TC (internal CJ)	8608-FT-NI (See Note) (no internal CJ)

Note

For further advice on field terminals for this module and for operation with more than one type of sensor, see MTL Technical Support Note: **TSN113 - Getting the most from 8607 and 8608 field terminals**.

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Current Input Ranges

Current	Full Scale
0 to 25 mA	0 to 25 mA

Table of RTD types with calibration error in +/- °C

Type	Range	± °C error for T _{amb} = 10°C to 40°C				± °C error for T _{amb} = -40°C to 70°C			
		Bottom of range	0°C	Middle of range	Top of range	Bottom of range	0°C	Middle of range	Top of range
Pt100	-200°C to +850°C	0.5	0.9	1.2	2.1	0.6	1.4	2.2	4.3
iPt100	-200°C to +650°C	0.5	0.9	1.2	1.7	0.6	1.4	2.2	3.5
Pt200	-200°C to +850°C	0.5	0.8	1.2	2.0	0.6	1.2	2.2	4.2
Pt500	-200°C to +850°C	0.5	0.8	1.4	2.4	0.6	1.3	2.5	4.8
Ni120	-60°C to +250°C	0.8	0.6	0.6	0.6	1.1	0.8	1.0	1.0
Cu10	-30°C to +220°C	3.7	3.9	3.9	4.1	3.8	4.6	4.3	4.5

Ohms Ranges

Resistance	Full Scale
Ohms 110	0 to 110 ohms
Ohms 280	0 to 280 ohms
Ohms 470	0 to 470 ohms
Ohms 1000	0 to 1000 ohms

Table of Thermocouple types with calibration error in +/- °C

Type	Normal operating range	±°C error for T _{amb} = 10°C to 40°C			±°C error for T _{amb} = -40°C to 70°C			(for reference) Full scale range
		Bottom of range	Middle of range	Top of range	Bottom of range	Middle of range	Top of range	
B	500 to 1810	6.1	2.9	2.8	10.2	5.0	5.0	0 to +1820
E	-200 to 1000	1.3	0.5	0.6	2.3	0.9	1.4	-270 to 1000
J	-190 to +1200	1.1	0.6	0.8	2.1	1.2	1.8	-210 to +1200
K	-200 to +1372	2.0	0.8	1.3	3.4	1.5	2.6	-270 to +1372
N	-190 to +1300	2.7	0.9	1.2	4.4	1.7	2.3	-270 to +1300
R	0 to +1768	6.1	2.5	3.0	10.1	4.4	5.5	-50 to +1768
S	0 to +1768	6.1	2.9	3.2	10.1	5.1	5.8	-50 to +1768
T	-200 to +400	2.0	0.7	0.6	3.4	1.2	1.1	-270 to +400
W3	0 to +2000	3.1	1.8	2.7	5.1	3.3	5.3	0 to +2315
W5	0 to +2000	2.2	2.0	4.2	3.7	3.7	6.0	0 to +2315
Russian K	-200 to +1300	2.0	0.8	1.3	3.4	1.2	2.6	-200 to +1300
Russian L	-200 to +800	1.0	0.5	1.0	2.1	0.8	2.1	-200 to +800

Voltage Ranges showing calibration accuracy

Voltage	Full Scale	Calibration accuracy as % of span	
		10°C to 40°C	-40°C to 70°C
-120 to 120mV	-120 to 120mV	0.1%	0.15%
0 to +1V	0 to +1V	0.1%	0.15%
0 to +5V	0 to +5V	0.15%	0.4%
1 to +5V	1 to +5V	0.15%	0.5%
0 to +10V	0 to +10V	0.15%	0.4%
-10 to +10V	-10 to +10V	0.1%	0.2%