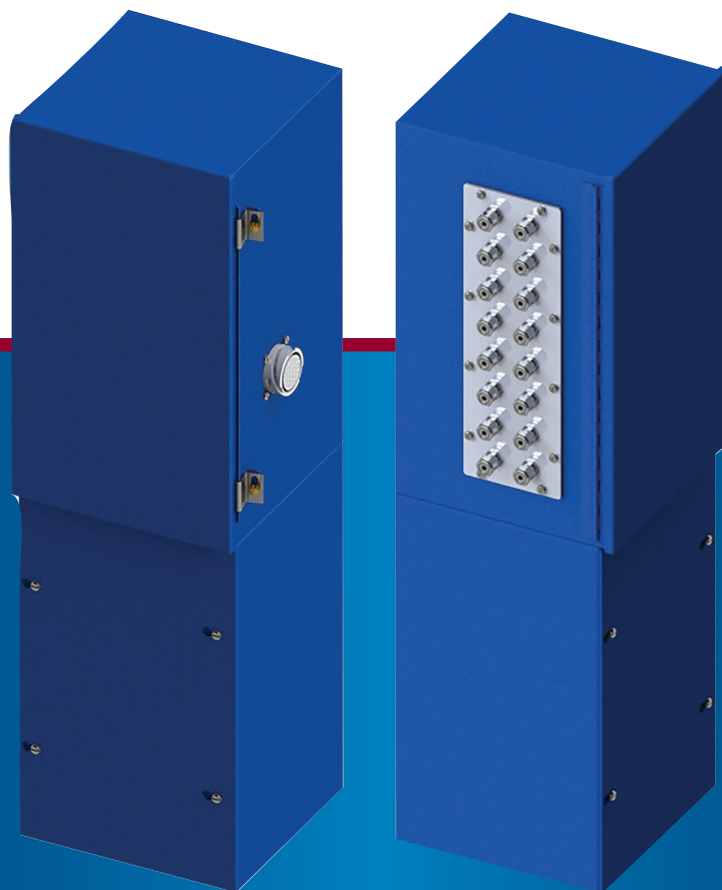


Installation/Operation Manual

USM GEN2 Universal Sensor Module

Form USM GEN2 IOM 3/17

altronic
HOERBIGER Engine Solutions



1.0 DESCRIPTION

- 1.1 The USM GEN2 reduces on-skid conduit and tubing runs by bringing the process information into centralized modules. End-users can route one flexible main harness from each module to the control panel. These main harnesses provide a simple way to integrate engine and compressor process data with a DE-3000 annunciator.
- 1.2 The USM GEN2 board contains the following:
 - 1 magnetic pickup input
 - 8 selectable discrete inputs or outputs
 - 12 temperature inputs
 - 12 analog inputs
- 1.3 A 37-pin **interface harness** is used to make the final wiring terminations in the control panel.
- 1.4 A 37-pin **main harness** is used to connect each USM GEN2 module to the control panel.
- 1.5 For proper operation, these instructions must be adhered to strictly.

2.0 OPERATION

- 2.1 LEDs
The USM GEN2 module is equipped with the following status indicating LEDs.
 - 2.1.1 Five power status indicating LEDs
 - Source Power (24V) – indicates the 24V power supply feeding the board is present.
 - Board Supply (5V) – indicates the 5V board supply is present.
 - Board Supply (24V) – indicates the fused 24V board supply is present.
 - Field Supply (24V) – indicates the fused 24V field supply is present.
 - Field Supply (5V) – indicates the fused 5V field supply is present.
 - 2.1.2 VR/MPU Input – LED will blink at slower speeds, then be on solid at higher speeds.
 - 2.1.3 Discrete Input 1-8 – LED “ON” input faulted
 - 2.1.4 Discrete Output 1-8 – LED “ON” output active
- 2.2 Fuses
 - 2.2.1 Board Supply (24V) – protected with a 5 amp fuse
 - 2.2.2 Field Supply (24V) – protected with a 2 amp fuse
 - 2.2.3 Field Supply (5V) – protected with a 2 amp fuse
- 2.3 Interface Harnesses
A typical application uses two USM Gen2 modules, one to monitor engine points and the other to monitor compressor points. Interface harnesses can be ordered in two varieties to eliminate duplicate wire numbers in the control panel.
 - (Engine)Harness P/N 662022-1 wires are numbered 1001–1037
 - (Compressor)Harness P/N 662022-2 wires are numbered 2001–2037

WARNING: Deviation from these instructions may lead to improper operation of the monitored machine which could cause personal injury to operators or other nearby personnel.

NOTE: The USM Gen2 module contains one spare 5 amp fuse and one spare 2 amp fuse.

NOTE: Retrofit applications will require a 1-7/8" Greenlee punch or a hole saw to cut a 1-7/8" diameter hole into the panel to install the interface harness connector (see Figure 3).

- 2.4 DE-3000 Temperature Channel Configuration Changes
A USM GEN2 module converts thermocouple and/or RTD output signals into a 0-5V analog signal. A DE-3000 requires the following hardware and software changes for all temperature channels.
- 2.4.1 Hardware Change
Any DE-3000 channel receiving a USM GEN2 thermocouple or RTD input must have its slider switches set as analog input channel configurations (see Figure 4).
- 2.4.2 Software Change
Any DE-3000 channel receiving a USM GEN2 thermocouple or RTD input must be configured via the DE-3000 terminal program, with the settings listed in Tables 1 and 2 (see Figure 7).

Table 1

Type K Thermocouple			
Fahrenheit Scale		Celsius Scale	
Channel Type	AI 0-5V./TC	Channel Type	AI 0-5V./TC
Sensor Selection	Other	Sensor Selection	Other
Min	-104	Min	-76
Max	1755	Max	957
Units	F	Units	C

Table 2

RTD			
Fahrenheit Scale		Celsius Scale	
Channel Type	AI 0-5V./TC	Channel Type	AI 0-5V./TC
Sensor Selection	Other	Sensor Selection	Other
Min	-233	Min	-147
Max	1321	Max	716
Units	F	Units	C

3.0 HAZARDOUS AREA OPERATION

- 3.1 The USM GEN2 is CSA-certified for CLASS I, DIVISION 2, GROUPS C & D. The power connections to the Universal Sensor Module must be in accordance with the National Electrical Code in the US, and the Canadian Electrical Code in Canada. In addition, the following requirements must be met:
 - 3.1.1 Wiring to, or from this device which enters or leaves the system enclosure, must utilize wiring methods suitable for CLASS I, DIVISION 2 Hazardous Locations, as appropriate for the installation.
 - 3.1.2 Run sensor and end device wires leaving the panel in a separate conduit from all other wiring and keep them separate throughout the installation.
 - 3.1.3 Power, input, and output wiring must have a grade of insulation capable of withstanding an AC voltage of 500 volts RMS.
 - 3.1.4 In general, run wires in separate conduits and junction boxes from ignition, fuel valve, and other high voltage wiring.
 - 3.1.5 Power from Class 2 power supply.

4.0 WIRING (SEE WIRING DIAGRAMS)

4.1 GENERAL

Take care not to damage the insulation, and take precautions against damage from vibration, abrasion, or liquids in conduits. Never run low voltage power, sensors, or communications wires in the same conduit as the ignition wiring or other high energy wiring such as AC line power. Keep wires at least 12 inches from all high voltage wiring.

4.2 POWER

The power requirement is 24Vdc, 3 amp max. The USM GEN2 Module must be powered from a class 2 power supply. It is recommended that the current from the power supply to the module be limited through a properly sized surge-tolerant fuse or electronic breaker.

USM GEN2 Module 24Vdc Source Power Connections

The corresponding wire numbers of the interface harness are listed in Tables 3 and 4. These wires terminate to the 24Vdc source power supply terminal strip and the ground terminal strip located in the control panel.

Table 3

HARNESS P/N	WIRE #	I/O
662002-1	1002	24Vdc Supply
662002-1	1003	Supply Common

Table 4

HARNESS P/N	WIRE #	I/O
662002-2	2002	24Vdc Supply
662002-2	2003	Supply Common

4.3 MAGNETIC PICKUP INPUT – USM GEN2 Module Wiring

Terminate the two wires from the magnetic pickup to the USM GEN2 Module VR/MPU INPUT terminals (NOT polarity sensitive, see Figure 8).

DE-3000 Annunciator Wiring

The corresponding wire numbers of the interface harness are listed in Table 5. Wire 1036 terminates to the PU IN terminal located on the annunciator power supply module, P/N 691122-1. Wire 1037 terminates to the input power ground terminal on the annunciator power supply module, P/N 691122-1 (see Figure 8).

Table 5

HARNESS P/N	WIRE #	I/O
662002-1	1036	Magnetic Pickup
662002-1	1037	Magnetic Pickup Common

4.4 DISCRETE CHANNELS

Each discrete channel can be set as either an input or output.

4.4.1 Discrete Input – USM GEN2 Module Wiring

Assure that the slide switch is set to the “IN” position for channel “X” being used (see Figure 5). Field devices can be used in either a normally-open or a normally-closed configuration.

- Normally-Closed Configuration – remove the jumper wire connecting terminals “IN” and “+5V” of discrete input channel “X” being used. Terminate one side of the switch contact to the “IN” terminal. Terminate the other side of the switch contact to the “+5V” terminal (see Figure 6).

CAUTION: DO NOT CONNECT THE MINUS TERMINAL DIRECTLY TO AN IGNITION SYSTEM COMMON COIL GROUND ON THE ENGINE.

NOTE: In a normally-open configuration there will be 2 wires terminated to the “IN” terminal of discrete input channel “X”; one end of the jumper wire and the wire from the normally-open switch contact (see Figure 6).

- Normally-Open Configuration – assure that the jumper wire connecting terminals “IN” and “+5V” of discrete input channel “X” being used, is installed. Terminate one side of the normally-open switch contact to the “IN” terminal of the discrete input channel “X”. Terminate the other side of the switch contact to ground (see Figure 6).

DE-3000 Annunciator Wiring

The corresponding wire numbers of the interface harness are listed in Tables 6 and 7. These wires terminate to the + terminals of the user-defined channels of the DE-3000 Terminal Module, P/N 691171-1 or 691171-2, along with a jumper connecting the + terminal to the – terminal of channel “X” being used (see Figure 9).

4.4.2 Discrete Output (Sinking) – USM GEN 2 Module Wiring

Assure the slide switch is set to the “OUT” position for channel “X” being used (see Figure 5). Terminate one side of the coil to the “SINK” terminal. Terminate the other side of the coil to its externally-supplied source voltage (see Figure 10).

DE-3000 Annunciator Wiring

The corresponding wire numbers of the interface harness are listed in Tables 6 and 7. These wires terminate to the user-defined digital output of the DE-3000 Terminal Module, P/N 691171-1 or 691171-2 (see Figure 9).

4.4.3 Discrete Output(Sourcing) – USM GEN2 Module Wiring

Assure the slide switch is set to the “out” position for channel “X” being used (see Figure 5). Terminate one side of the coil to the “SOURCE” terminal. Terminate the other side of the coil to the “GND” terminal (see Figure 10).

DE-3000 Annunciator Wiring

The corresponding wire numbers of the interface harness are listed in Tables 6 and 7. These wires terminate to the user-defined channels of the DE-3000 Terminal Module, P/N 691171-1 or 691171-2 (see Figure 9).

WARNING: Do not disconnect equipment in Div. 2 environment unless power is switched off or the area is known to be non-hazardous.

Table 6

HARNESS P/N	WIRE #	I/O
662002-1	1028	Discrete Input 1
662002-1	1029	Discrete Input 2
662002-1	1030	Discrete Input 3
662002-1	1031	Discrete Input 4
662002-1	1032	Discrete Input 5
662002-1	1033	Discrete Input 6
662002-1	1034	Discrete Input 7
662002-1	1035	Discrete Input 8

Table 7

HARNESS P/N	WIRE #	I/O
662002-2	2028	Discrete Input 1
662002-2	2029	Discrete Input 2
662002-2	2030	Discrete Input 3
662002-2	2031	Discrete Input 4
662002-2	2032	Discrete Input 5
662002-2	2033	Discrete Input 6
662002-2	2034	Discrete Input 7
662002-2	2035	Discrete Input 8

NOTE: 3-wire RTDs are preferred.

4.5 TEMPERATURE INPUTS

The USM GEN2 Module accepts type K thermocouple inputs, or 100Ω platinum RTDs (2/3-wire). 3-wire RTDs are preferred.

NOTE: A USM GEN2 Module converts thermocouple and RTD output signals into a 0-5V analog output signal. A DE-3000 requires the following hardware and software changes for all temperature input channels.

- Hardware Change – any DE-3000 channel receiving a USM GEN2 thermocouple or RTD input must have its slider switches set as an analog input channel configurations (see Figure 4).
- Software Change – any DE-3000 channel receiving a USM GEN2 thermocouple or RTD input must be configured via the DE-3000 terminal program with the settings listed in Tables 1 and 2 (see Figure 7).

4.5.1 Type K Thermocouple – USM GEN2 Module Wiring

Terminate the yellow wire to the “+(YEL)” terminal and the red wire to the “-(RED)” terminal (see Figure 11).

DE-3000 Annunciator Wiring

The corresponding wire numbers of the interface harness are listed in Table 8 and 9. These wires will terminate to the user-defined channels of the DE-3000 Terminal Module P/N 691171-1 or 691171-2 (see Figure 4). The slider switches for this input channel will need to be set as an analog configuration (see Figure 4).

4.5.2 RTD (100Ω platinum)

USM GEN2 Module Wiring (2-wire RTD)

Remove the jumper wire connecting terminals “WHITE” and “RED” of temperature input channel “X” being used. Terminate the white wire to the “WHITE” terminal and the red wire to either “RED” terminal (see Figure 11).

USM GEN2 Module Wiring (3-wire RTD)

Remove the jumper wire connecting terminals “WHITE” and “RED” of temperature input channel “X” being used. Terminate the white wire to the “WHITE” terminal and one red wire to each “RED” terminal (see Figure 11).

DE-3000 Annunciator Wiring

The corresponding wire numbers of the interface harness are listed in Table 8 and 9. These wires terminate to the user-defined channels of the DE-3000 Terminal Module P/N 691171-1 or 691171-2. The slider switches for this input channel must be set as analog configurations (see Figure 4).

Table 8

HARNESS P/N	WIRE #	I/O
662002-1	1016	Temperature Input 1
662002-1	1017	Temperature Input 2
662002-1	1018	Temperature Input 3
662002-1	1019	Temperature Input 4
662002-1	1020	Temperature Input 5
662002-1	1021	Temperature Input 6
662002-1	1022	Temperature Input 7
662002-1	1023	Temperature Input 8
662002-1	1024	Temperature Input 9
662002-1	1025	Temperature Input 10
662002-1	1026	Temperature Input 11
662002-1	1027	Temperature Input 12

Table 9

HARNESS P/N	WIRE #	I/O
662002-2	2016	Temperature Input 1
662002-2	2017	Temperature Input 2
662002-2	2018	Temperature Input 3
662002-2	2019	Temperature Input 4
662002-2	2020	Temperature Input 5
662002-2	2021	Temperature Input 6
662002-2	2022	Temperature Input 7
662002-2	2023	Temperature Input 8
662002-2	2024	Temperature Input 9
662002-2	2025	Temperature Input 10
662002-2	2026	Temperature Input 11
662002-2	2027	Temperature Input 12

4.6 ANALOG INPUTS

USM GEN2 Module Wiring

The 12 analog inputs are simply pass-through terminal points (i.e., the analog input terminals are NOT connected to any active components internally). Each analog channel is equipped with a 5 and 24 volt fused supply for powering an analog device (e.g., transducer).

Terminate the power wire to the “+5V” or “+24V” terminal determined by the required input voltage of the analog field device being used. Terminate the ground wire to the “GND” terminal. Terminate the signal wire to the “SIGNAL” terminal (see Figure 12).

DE-3000 Annunciator Wiring

The corresponding wire numbers of the interface harness are listed in Table 10 and 11. These wires will terminate to the user-defined channels of the DE-3000 Terminal Module P/N 691171-1 or 691171-2 (see Figure 4).

Table 10

HARNESS P/N	WIRE #	I/O
662002-1	1004	Analog Input 1
662002-1	1005	Analog Input 2
662002-1	1006	Analog Input 3
662002-1	1007	Analog Input 4
662002-1	1008	Analog Input 5
662002-1	1009	Analog Input 6
662002-1	1010	Analog Input 7
662002-1	1011	Analog Input 8
662002-1	1012	Analog Input 9
662002-1	1013	Analog Input 10
662002-1	1014	Analog Input 11
662002-1	1015	Analog Input 12

NOTE: Analog commons and supply commons should be bonded together and have the same potential to ground as the engine frame.

Table 11

HARNESS P/N	WIRE #	I/O
662002-2	2004	Analog Input 1
662002-2	2005	Analog Input 2
662002-2	2006	Analog Input 3
662002-2	2007	Analog Input 4
662002-2	2008	Analog Input 5
662002-2	2009	Analog Input 6
662002-2	2010	Analog Input 7
662002-2	2011	Analog Input 8
662002-2	2012	Analog Input 9
662002-2	2013	Analog Input 10
662002-2	2014	Analog Input 11
662002-2	2015	Analog Input 12

DRAWINGS SECTION:

- Figure 1 USM GEN2 Overview**
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- Figure 3 Interface Harness Connector and Required Panel Hole Dimensions**
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Interface Harness Wire Numbers XX04 – XX15 to DE-3000 Annunciator Wiring Diagram**
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Figure 1 USM GEN2 Overview

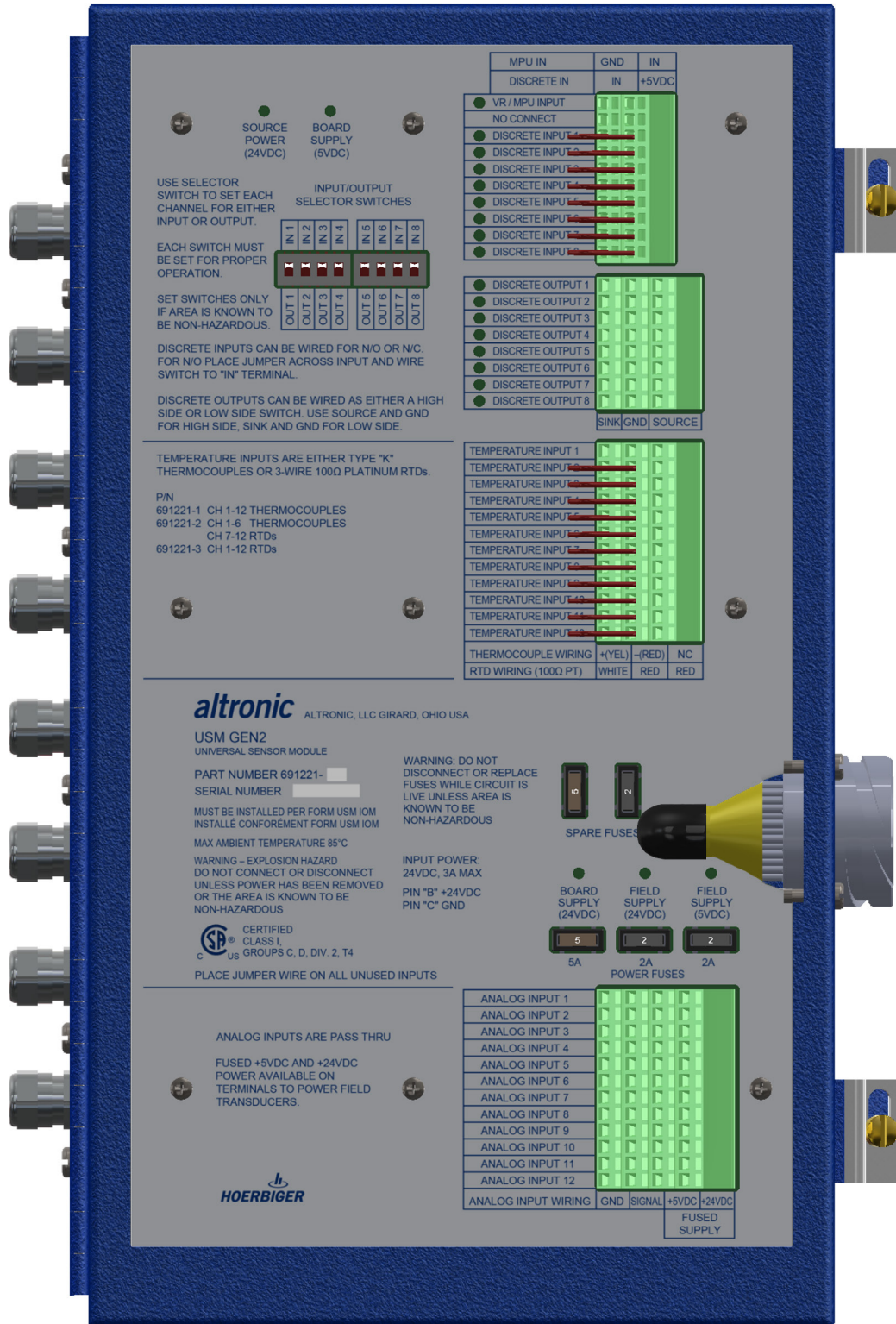
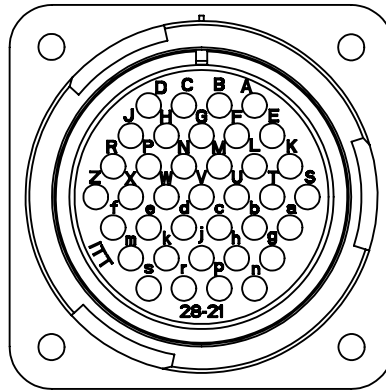


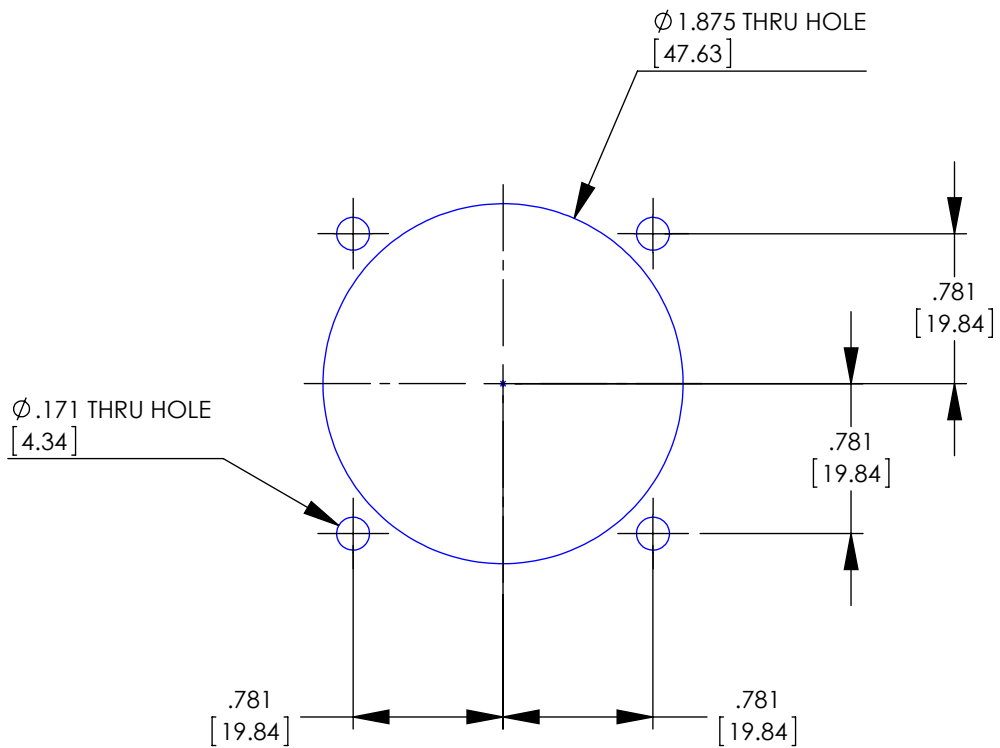
Figure 2 Interface Harness Wiring Number Chart

USM Module I/O	Engine Harness P/N 662 002-1	Compressor Harness P/N 662 002-2	Connector Pin
Analog Common	1001	2001	A
24V Supply	1002	2002	B
Supply Common	1003	2003	C
Analog Input 1	1004	2004	D
Analog Input 2	1005	2005	E
Analog Input 3	1006	2006	F
Analog Input 4	1007	2007	G
Analog Input 5	1008	2008	H
Analog Input 6	1009	2009	J
Analog Input 7	1010	2010	K
Analog Input 8	1011	2011	L
Analog Input 9	1012	2012	M
Analog Input 10	1013	2013	N
Analog Input 11	1014	2014	P
Analog Input 12	1015	2015	R
Temperature 1	1016	2016	S
Temperature 2	1017	2017	T
Temperature 3	1018	2018	U
Temperature 4	1019	2019	V
Temperature 5	1020	2020	W
Temperature 6	1021	2021	X
Temperature 7	1022	2022	Z
Temperature 8	1023	2023	a
Temperature 9	1024	2024	b
Temperature 10	1025	2025	c
Temperature 11	1026	2026	d
Temperature 12	1027	2027	e
Discrete 1	1028	2028	f
Discrete 2	1029	2029	g
Discrete 3	1030	2030	h
Discrete 4	1031	2031	j
Discrete 5	1032	2032	k
Discrete 6	1033	2033	m
Discrete 7	1034	2034	n
Discrete 8	1035	2035	p
Magnetic Pickup	1036	2036	r
Magnetic Pickup Common	1037	2037	s

Figure 3 Interface Harness Connector and Required Panel Hole Dimensions

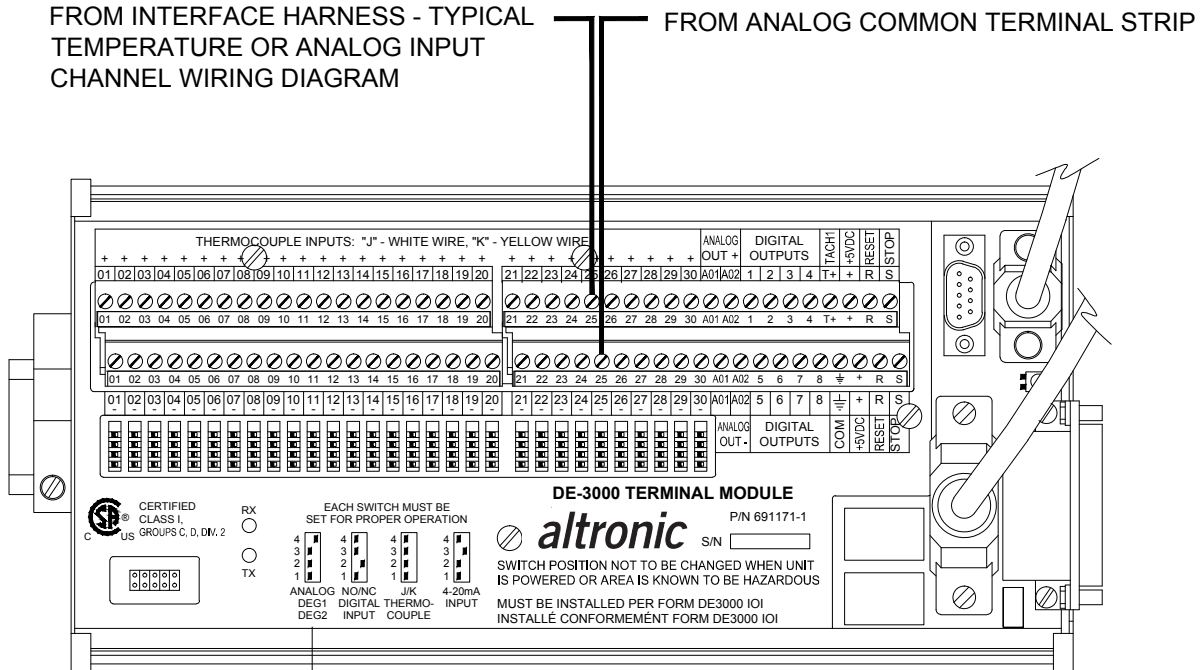


Reference: 662002-1 & 662002-2 Interface Harnesses Connector



Reference: Required Retrofit Hole Cutout Dimensions

Figure 4 Temperature Inputs Interface Harness Wire Numbers XX16 – XX27 & Analog Inputs Interface Harness Wire Numbers XX04 – XX15 to DE-3000 Annunciator Wiring Diagram



NOTE: SET SWITCHES TO "ANALOG INPUT" FOR ANALOG, THERMOCOUPLE AND RTD INPUTS.

INPUTS	INTERFACE HARNESS WIRE NUMBERS
TEMPERATURE	xx16 - xx27
ANALOG	xx04 - xx15

Figure 5 Discrete Inputs/Output Selector Switch Settings

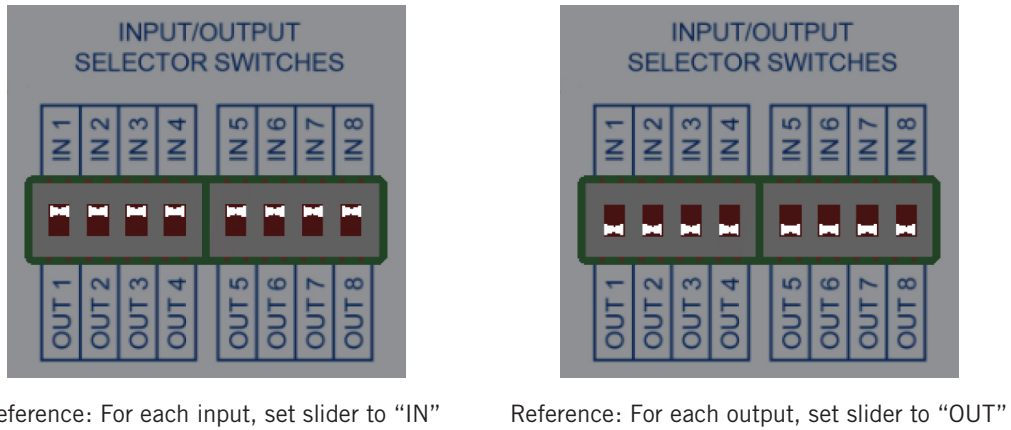


Figure 6 Normally-Open & Normally-Closed Discrete Inputs Wiring Diagram

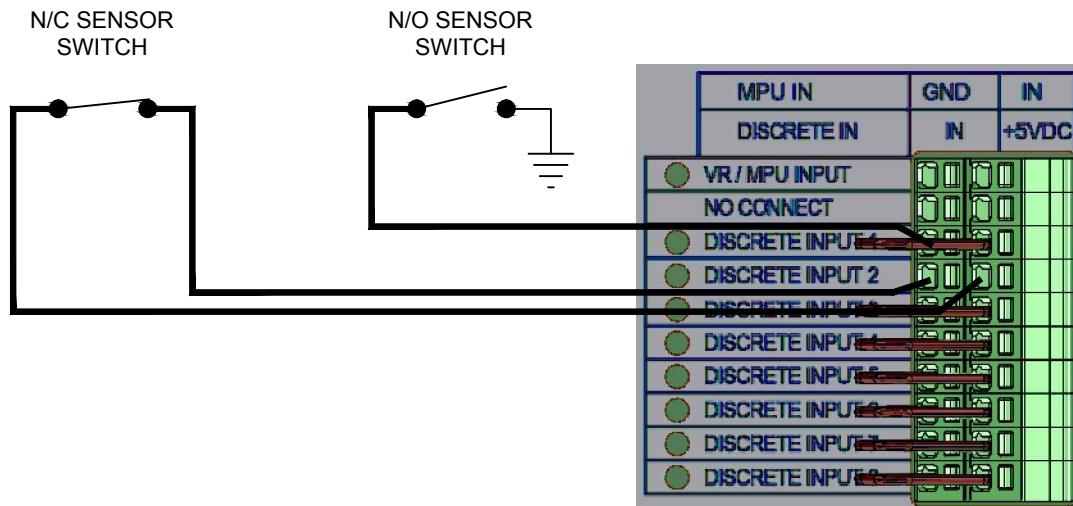
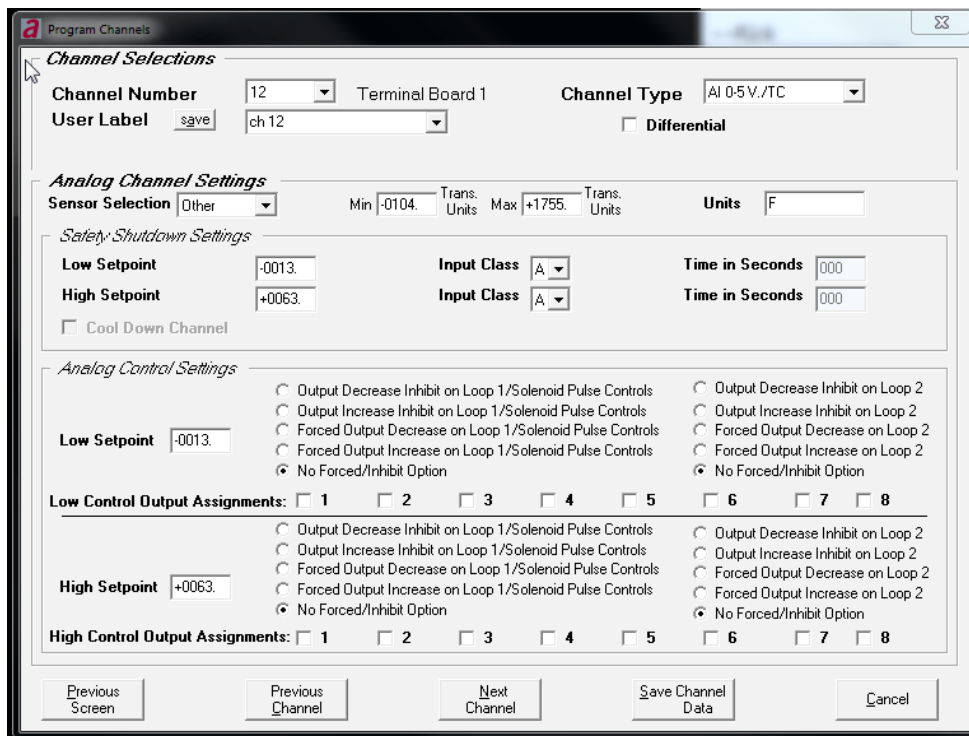


Figure 7 Software Configuration for Thermocouple or RTD Channels



Example: Type K Thermocouple Channel (Fahrenheit Scale)

Note: Any DE-3000 Channel receiving a USM GEN2 thermocouple or RTD input must be configured via the DE-3000 terminal program using the settings listed in Tables 1 and 2:

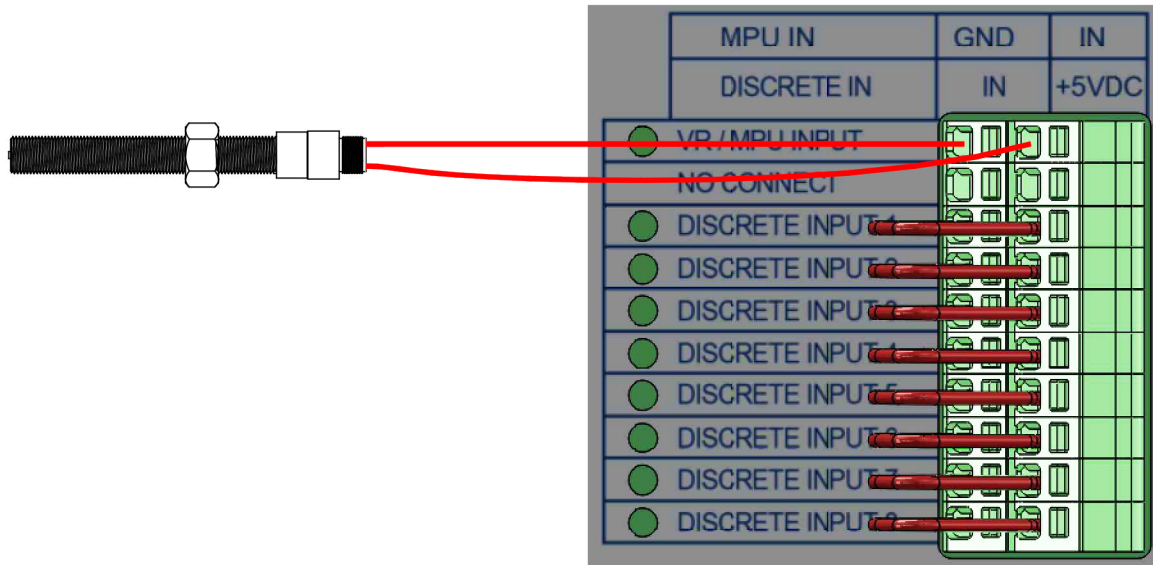
Table 1

Type K Thermocouple			
Fahrenheit Scale		Celsius Scale	
Channel Type	AI 0-5V./TC	Channel Type	AI 0-5V./TC
Sensor Selection	Other	Sensor Selection	Other
Min	-104	Min	-76
Max	1755	Max	957
Units	F	Units	C

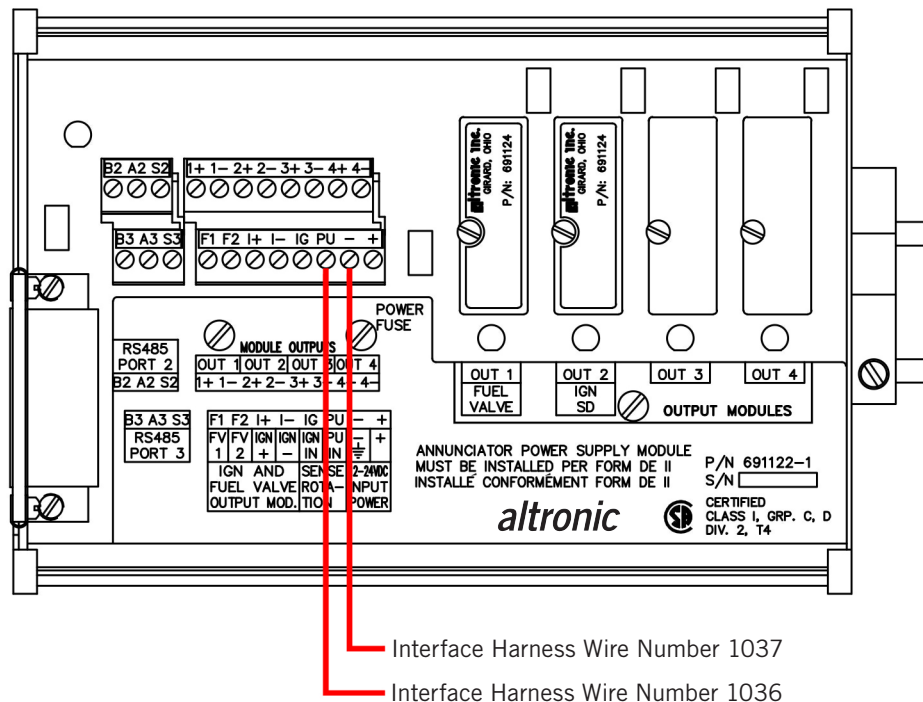
Table 2

RTD			
Fahrenheit Scale		Celsius Scale	
Channel Type	AI 0-5V./TC	Channel Type	AI 0-5V./TC
Sensor Selection	Other	Sensor Selection	Other
Min	-233	Min	-147
Max	1321	Max	716
Units	F	Units	C

Figure 8 Wiring Diagram Magnetic Pickup

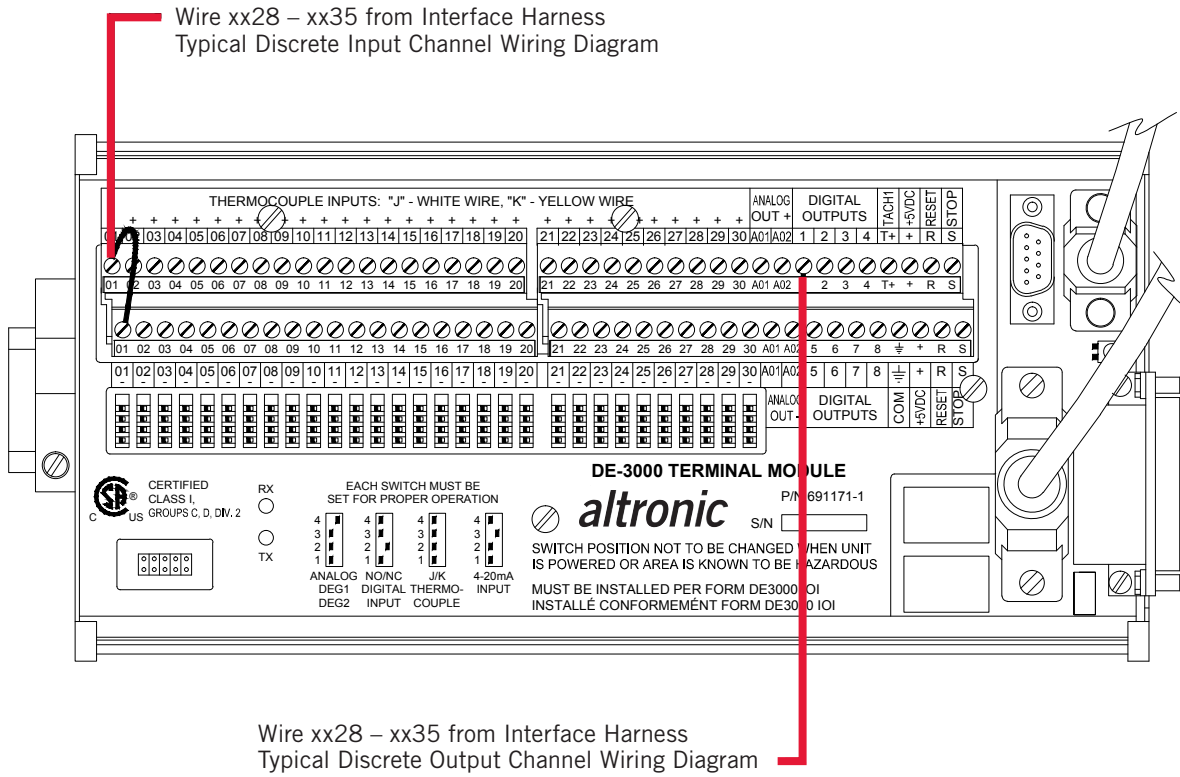


Reference: Magnetic Pickup to USM Wiring Diagram



Reference: Interface Harness to DE-3000 Annunciator Terminal Board Wiring Diagram

Figure 9 Discrete Inputs/Outputs Wiring



INPUTS	INTERFACE HARNESS WIRE NUMBERS
DISCRETE INPUTS / OUTPUTS	xx28 - xx35

Figure 10 Sinking & Sourcing Discrete Output Wiring Diagram

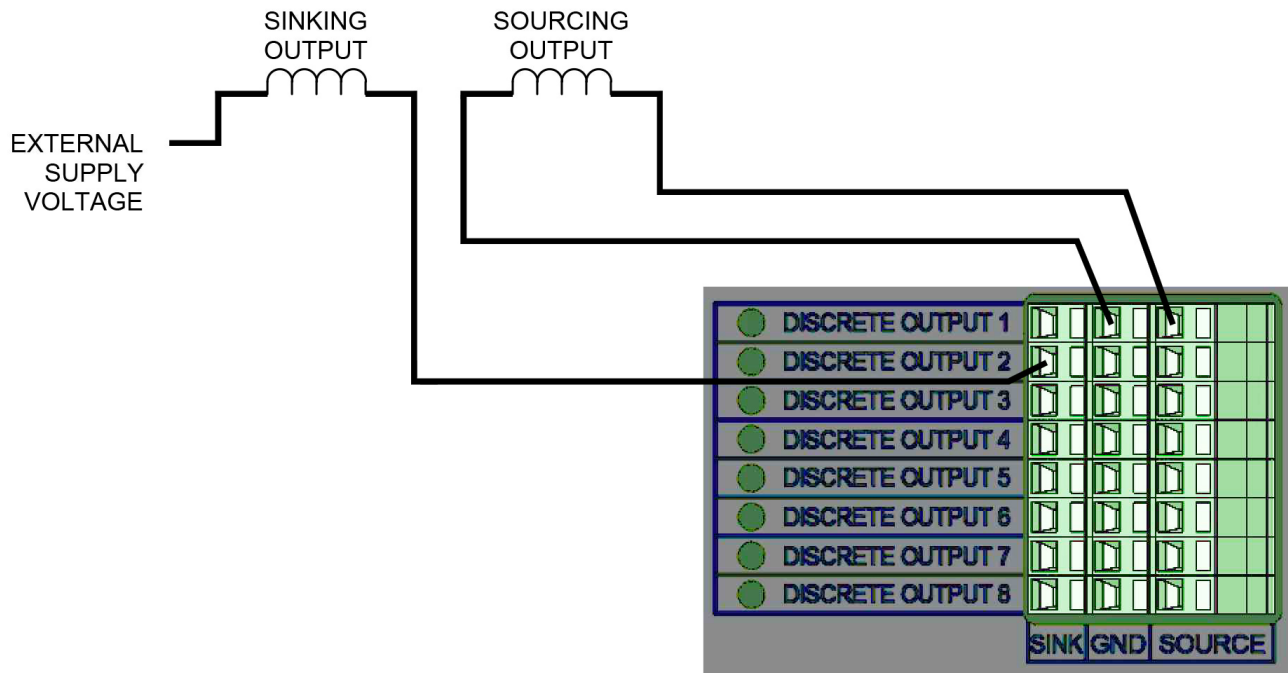


Figure 11 Type K Thermocouple & 2/3 Wire RTD Inputs Wiring Diagram

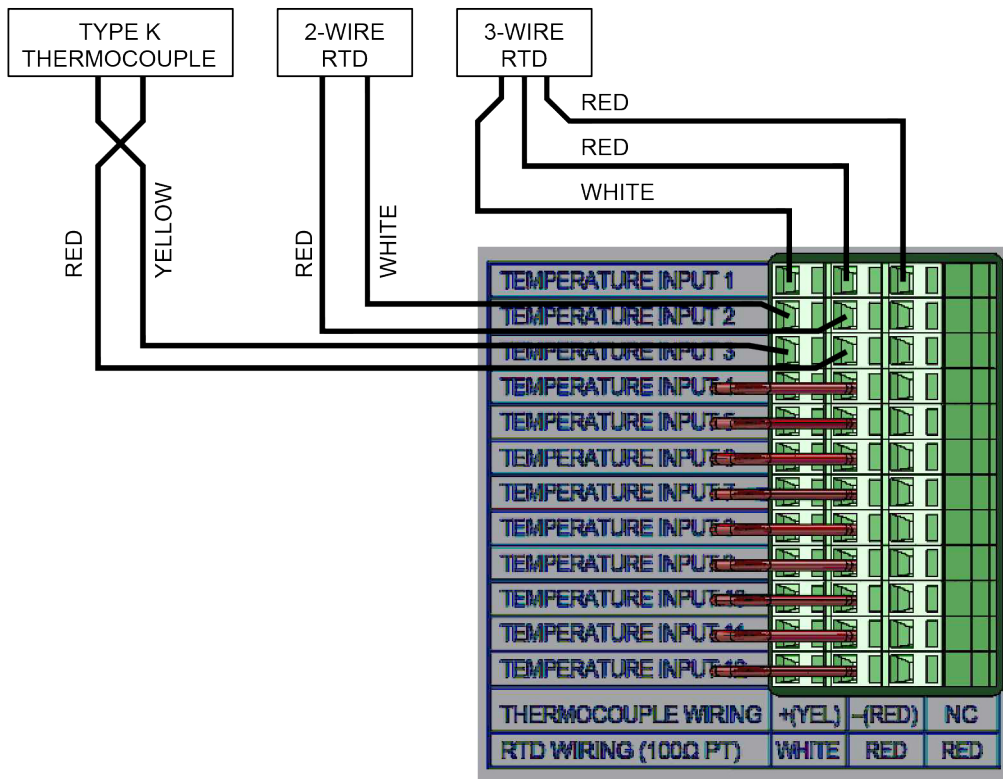


Figure 12 Analog Inputs USM Wiring Diagram

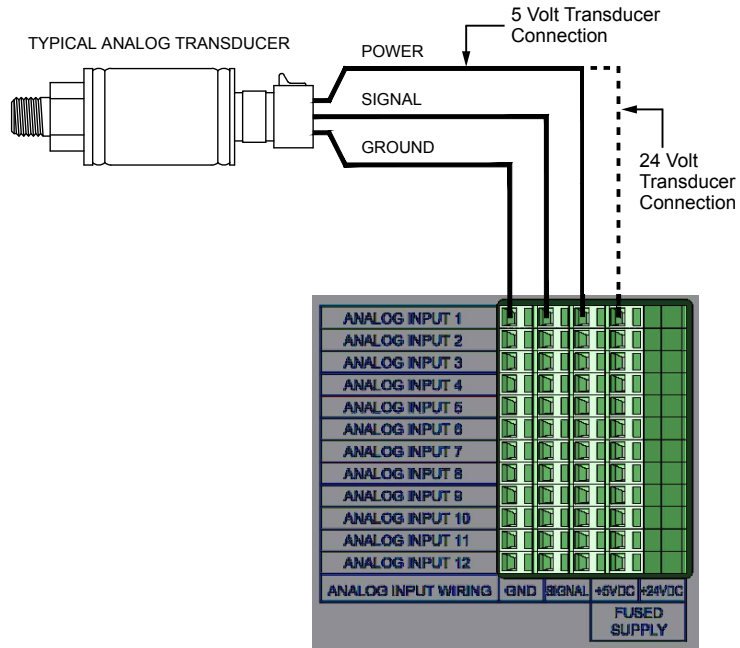


Figure 13 Dimensions, USM Enclosure

