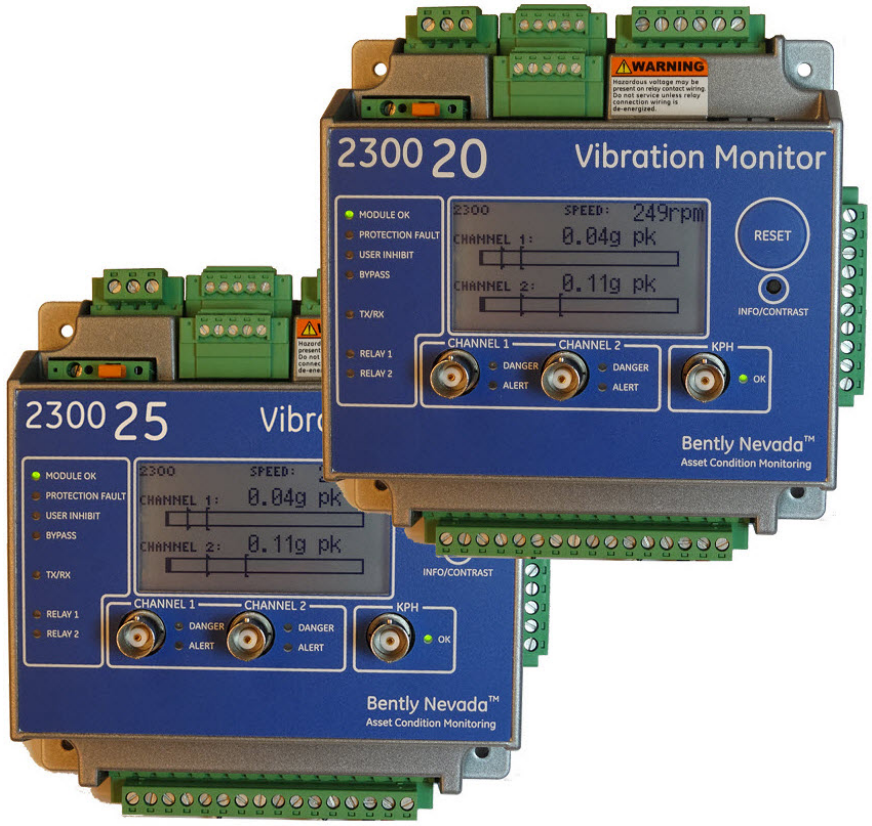
2300 Vibration Monitors Temperature Module Connections

Installation Guide

Bently Nevada Machinery Condition Monitoring

121M3029 Rev. B



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Bently.com

Contents

1. General Safety

1.1 Receiving Inspection

Visually inspect the monitor for obvious shipping damage. If you detect shipping damage, file a claim with the carrier and submit a copy to Bently Nevada. Include all model numbers and serial numbers with the claim.

1.2 Handling and Storing Considerations

To prolong the service life of the system, handle components carefully, use best practices during installation, and practice diligent inspection procedures. Follow prescribed maintenance procedures and dispose of obsolete components in compliance with applicable electronic waste regulations.

Circuit Boards

Circuit boards contain devices that are susceptible to damage when exposed to electrostatic charges. Damage caused by obvious mishandling of the board voids any warranty. To avoid damage, observe the following precautions in the order given.

1. Do not discharge static electricity onto the circuit board. Avoid tools or procedures that would subject the circuit board to static damage. Some possible causes include ungrounded soldering irons, and non-conductive plastics and similar materials.
2. Personnel must be grounded with a suitable grounding strap before handling or maintaining a printed circuit board.
3. Transport and store circuit boards in electrically conductive bags or foil.
4. Use extra caution during dry weather. Relative humidity less than 30% tends to multiply the accumulation of static charges on any surface.

When performed properly, you may install this module into or remove this module from the rack while power is applied to the rack. Refer to the Rack Installation and Maintenance Manual (document 129766) for the proper procedure.

1.3 Personal Safety Warnings

Labels and markings are provided on to guide the system integrator in the processes of choosing appropriate interface equipment, determining safe use conditions, and identifying recommended installation procedures. The format of these markings are governed by the standards that dictate safe use and environmental compliance in a variety of regions and regulated settings.

Potential Electrostatic Charging Hazard

WARNING

ELECTROSTATIC CHARGING HAZARD

RISK OF PERSONAL INJURY OR EQUIPMENT DAMAGE.

Potential for electrostatic charging hazard.

Do not separate when energized.

Remove power before service.

Connect grounding before power.

Installations and maintenance tasks performed in potentially hazardous areas must be performed only after the area has been verified to be free of hazardous materials, atmospheres, and conditions.

- Do not discharge static electricity onto the circuit board. Avoid tools or procedures that would subject the circuit board to static damage. Some possible causes of static damage include ungrounded soldering irons, non-conductive plastics, and similar materials.
- Use a suitable grounding strap before handling or performing maintenance on a printed circuit board.
- Transport and store circuit boards in electrically conductive bags or foil.
- Use extra caution during dry weather. Relative humidity less than 30% tends to multiply the accumulation of static charges on any surface.

The following situations could cause a spark sufficient to cause an explosion:

- Potential of electrostatic discharge on plastic components, or
- Removal or placement of an energized connection.

Hazardous Environment

WARNING

HAZARDOUS ENVIRONMENT

Risk of explosive atmosphere.

De-energize all relays and connections before placement or removal. Take precautionary measures to avoid electrostatic potential, especially on plastic components.

Adapters, isolation valves, or sealing rings that are not compatible with process gasses will corrode and fail. This failure may result in gas leaks, fire, explosion, or projectiles. To prevent corrosion and failure, verify that all components are compatible.

Installations and maintenance tasks performed in potentially hazardous areas must be performed only after the area has been verified to be free of hazardous materials, atmospheres, and conditions.

The following situations could cause a spark enough to ignite an explosion:

- Potential of electrostatic discharge on plastic components, or
- Removal or placement of an energized connection.

1.4 Safe Disposal

Replacing Device and Failure Analysis

To return parts under warranty and request failure analysis, visit **Bently Nevada**.

Hazardous Materials

This device does not use hazardous materials outlined by RoHS or battery directive statutes. These regulations confirm that lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ether, and battery-related materials such as lithium are limited to no more than trace amounts within the system.

Recycling Facilities

Decommissioning of instrumentation should endeavor to minimize the impact of the waste created by disposal of system material. Refer to local or regional waste removal administration to collect information on proper material collection, reuse, and recycling.

Product Disposal Statement

Customers or third parties who are not member states of the European Union and who are in control of the product at the end of its life or at the end of its use, are solely responsible for diligent product disposal at the end of its useful life. No person, firm, corporation, association, or agency shall dispose of the product in a way that is in violation of any applicable international, federal, state, or local regulations. Visit www.weeerohsinfo.com for recycling information.

2. Configuration

2.1 Reference

These instructions cannot claim all details of possible equipment variations, nor in particular can they provide for every possible example of installation, operation, or maintenance. Please review and understand the following additional documentation prior to beginning the installation process:

- Operation and Maintenance Manual (105M0341)

2.2 Description

The 2300 Vibration Monitors can provide the standard interface module inputs, and temperature module connection via isolated RTD input temperature transmitters or isolated thermocouple input temperature transmitters. All the interface modules connection can be applied to the two vibration input channels or the speed input channel.

The sensor is required to be connected to the interface module input, but not connected to 2300 monitor directly.

2.3 Temperature module recommendation

The recommended temperature transmitters are OMEGA DRSL-RTD-ISO, PHOENIX CONTACT MINI MCR-2-RTD-UI, OMEGA DRSL-TC-ISO and PHOENIX CONTACT MINI MCR-2-TC-UI. Please refer to the manufacturer's datasheet for the detailed features about these transmitters.

Those 4 modules above have passed the test with 2300 monitor by Bently Nevada. Please refer to the manufacturer's manual & datasheet for the module interface detailed features.

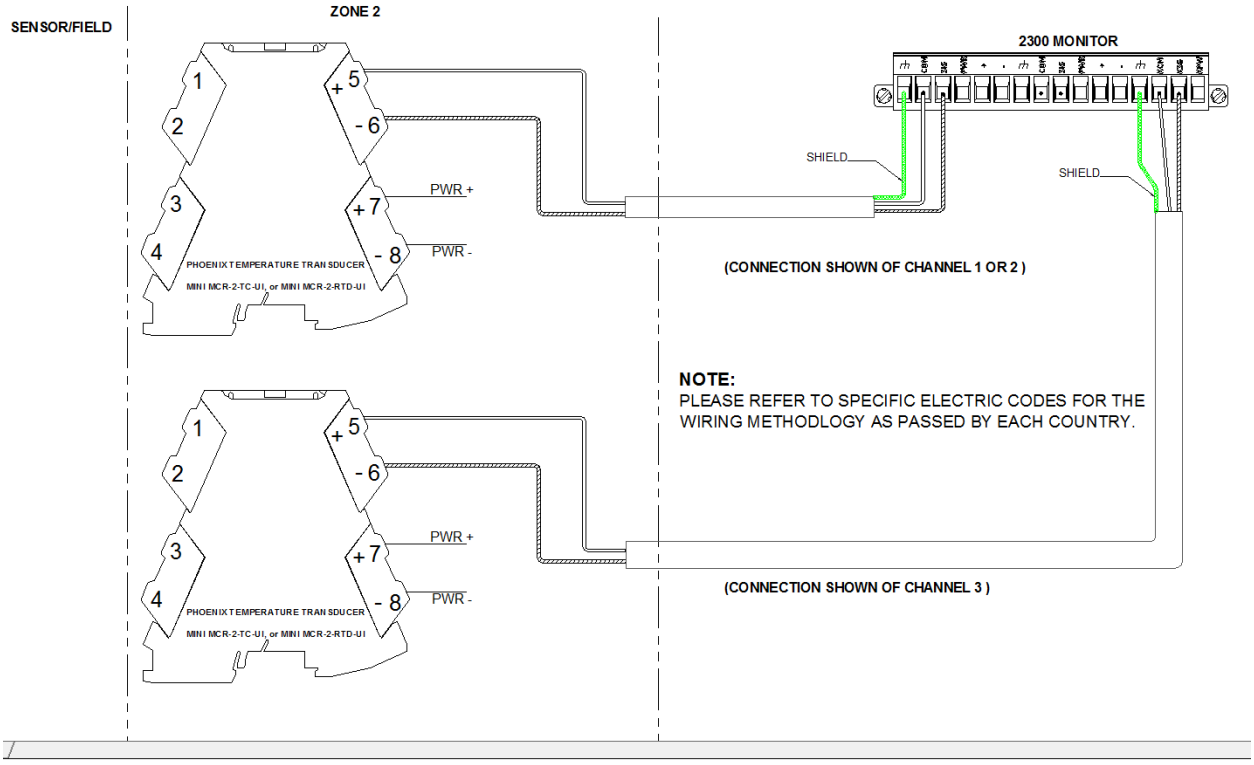
PHOENIX CONTACT MINI MCR-2-TC-UI

OMEGA DRSL-TC

PHOENIX CONTACT MINI MCR-2-RTD-UI

OMEGA DRSL-RTD

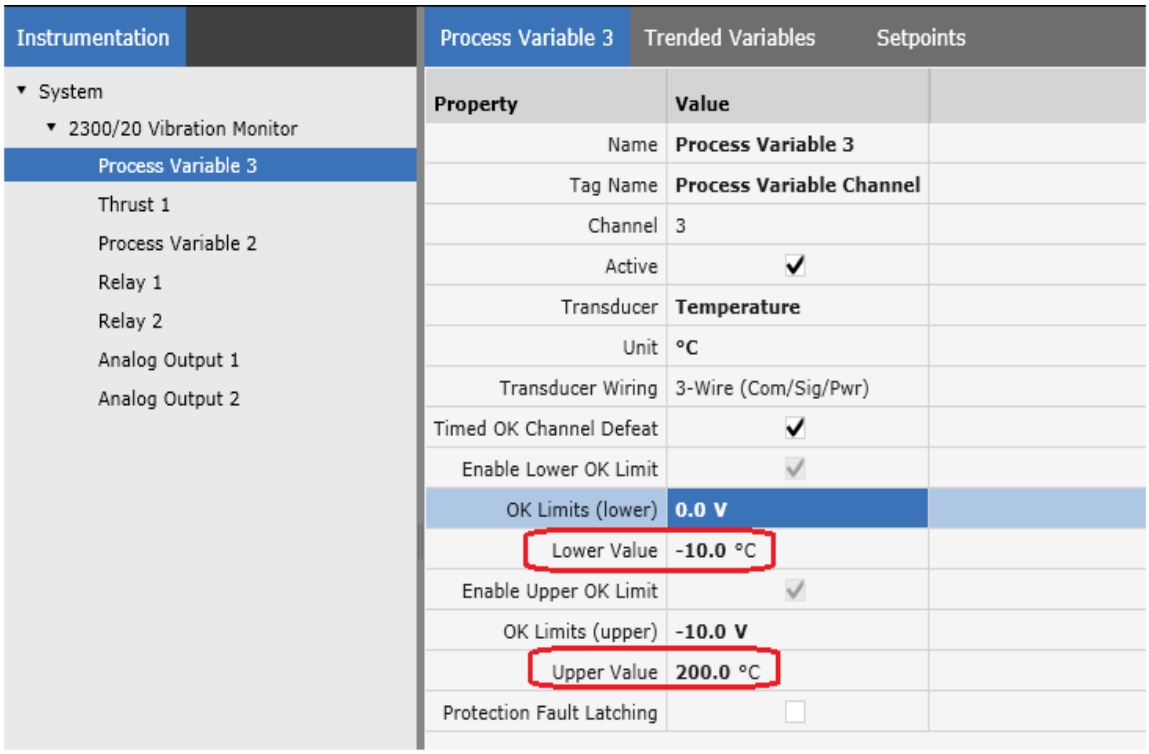
The modules from Phoenix can be installed in Zone 2 hazardous area with the 2300 monitors in North America and Europe as shown below. Install the device in a suitable approved housing with IP54 protection when used in potentially explosive area. Please refer to Phoenix's datasheet for the detailed installation in zone 2 area.



The Omega modules can not be installed in Zone 2 hazardous area.

2.4 Temperature interface module configuration

The transmitter of the temperature interface module is configured to voltage output via DIP switch, and a voltage range such as 0V ~ -10V, shown as below BNMC interface 'OK Limit'. And need to set the "Lower Value" and "Upper Value", such as the temperature -10°C ~ +200°C in BNMC, which matches with the setting of transmitter for the respective voltage value, shown as below.



The green LED of the module is on to shown the temperature module configuration is correct. For the detailed temperature module configuration, please refer to the vendor's datasheet.

Here is an example of the PHOENIX MCR-2-RTD-UI configured via DIP for the application: 2 wire, 0~10V for sensor Pt100, -100°C~+200°C temperature range, error evaluation A selected.

Configure the DIP switches according to the planned application to get the setting as below tables.

DIP S1							
Connection system		**Analog output**			**Start temperature**		
1	2	3	4	5	6	7	8
ON	OFF	OFF	OFF	ON	OFF	ON	ON

DIP S2									
End temperature						**Error Evaluation**			**Sensor type**
1	2	3	4	5	6	7	8	9	0
OFF	OFF	OFF	ON	OFF	ON	OFF	OFF	OFF	OFF

At delivery, all DIP switches are in the "OFF" position. You need to select the below highlighted to get the two DIP switches configuration for above settings.

		ON ≙ •	DIP S1						
			1	2	3	4	5	6	7	8
Connection system	Configuration via software								
	2-wire		•						
	3-wire			•					
	4-wire		•	•					
Analog OUT	0 ... 20 mA								
	20 ... 0 mA				•				
	4 ... 20 mA					•			
	20 ... 4 mA				•	•			
	0 ... 10 V						•		
	10 ... 0 V				•		•		
	0 ... 5 V					•	•		
	1 ... 5 V				•	•	•		
Start temperature	0 °C	≙ 32 °F							
	-10 °C	≙ 14 °F						•		
	-20 °C	≙ -4 °F							•	
	-30 °C	≙ -22 °F						•	•	
	-40 °C	≙ -40 °F								•
	-50 °C	≙ -58 °F						•		•
	-100 °C	≙ -148 °F							•	•
	-150 °C	≙ -238 °F						•	•	•

End temperature	DIP S2 1	2	3	4	5	6	ON ≙ •	DIP S2 1	2	3	4	5	6	7	8	9	0
0 °C ≙ 32 °F							160 °C ≙ 320 °F						•				
5 °C ≙ 41 °F	•						165 °C ≙ 329 °F	•					•				
10 °C ≙ 50 °F		•					170 °C ≙ 338 °F		•				•				
15 °C ≙ 59 °F	•	•					175 °C ≙ 347 °F	•	•				•				
20 °C ≙ 68 °F			•				180 °C ≙ 356 °F			•			•				
25 °C ≙ 77 °F	•		•				185 °C ≙ 365 °F	•		•			•				
30 °C ≙ 86 °F		•	•				190 °C ≙ 374 °F		•	•			•				
35 °C ≙ 95 °F	•	•	•				195 °C ≙ 383 °F	•	•	•			•				
40 °C ≙ 104 °F				•			200 °C ≙ 392 °F				•		•				
45 °C ≙ 113 °F	•			•			210 °C ≙ 410 °F	•			•		•				
50 °C ≙ 122 °F		•		•			220 °C ≙ 428 °F		•		•		•				
55 °C ≙ 131 °F	•	•		•			230 °C ≙ 446 °F	•	•		•		•				
60 °C ≙ 140 °F			•	•			240 °C ≙ 464 °F			•	•		•				
65 °C ≙ 149 °F	•		•	•			250 °C ≙ 482 °F	•		•	•		•				
70 °C ≙ 158 °F		•	•	•			260 °C ≙ 500 °F		•	•	•		•				
75 °C ≙ 167 °F	•	•	•	•			270 °C ≙ 518 °F	•	•	•	•		•				
80 °C ≙ 176 °F					•		280 °C ≙ 536 °F					•	•				
85 °C ≙ 185 °F	•				•		290 °C ≙ 554 °F	•				•	•				
90 °C ≙ 194 °F		•			•		300 °C ≙ 572 °F		•			•	•				
95 °C ≙ 203 °F	•	•			•		325 °C ≙ 617 °F	•	•			•	•				
100 °C ≙ 212 °F			•		•		350 °C ≙ 662 °F			•		•	•				
105 °C ≙ 221 °F	•		•		•		375 °C ≙ 707 °F	•		•		•	•				
110 °C ≙ 230 °F		•	•		•		400 °C ≙ 752 °F		•	•		•	•				
115 °C ≙ 239 °F	•	•	•		•		425 °C ≙ 797 °F	•	•	•		•	•				
120 °C ≙ 248 °F				•	•		450 °C ≙ 842 °F				•	•	•				
125 °C ≙ 257 °F	•			•	•		475 °C ≙ 887 °F	•			•	•	•				
130 °C ≙ 266 °F		•		•	•		500 °C ≙ 932 °F		•		•	•	•				
135 °C ≙ 275 °F	•	•		•	•		550 °C ≙ 1022 °F	•	•		•	•	•				
140 °C ≙ 284 °F			•	•	•		600 °C ≙ 1112 °F			•	•	•	•				
145 °C ≙ 293 °F	•		•	•	•		650 °C ≙ 1202 °F	•		•	•	•	•				
150 °C ≙ 302 °F		•	•	•	•		700 °C ≙ 1292 °F		•	•	•	•	•				
155 °C ≙ 311 °F	•	•	•	•	•		850 °C ≙ 1562 °F	•	•	•	•	•	•				

Error evaluation - Analog OUT		0...20 mA	20...0 mA	4...20 mA	20...4 mA	0...10 V	10...0 V	0...5 V	1...5 V			
A	Line-break	21 mA	21 mA	21 mA	21 mA	10.5 V	10.5 V	5.25 V	5.25 V			
	Overrange	20.5 mA	20.5 mA	20.5 mA	20.5 mA	10.25 V	10.25 V	5.125 V	5.125 V			
	Underrange	0 mA	0 mA	4 mA	4 mA	0 V	0 V	0 V	1 V			
	Short-circuit	0 mA	0 mA	4 mA	4 mA	0 V	0 V	0 V	1 V			
B	Line-break	21 mA	21 mA	21 mA	21 mA	10.5 V	10.5 V	5.25 V	5.25 V			
	Overrange	20.5 mA	20.5 mA	20.5 mA	20.5 mA	10.25 V	10.25 V	5.125 V	5.125 V	•		
	Underrange	0 mA	0 mA	3.5 mA	3.5 mA	0 V	0 V	0 V	0.875 V			
	Short-circuit	0 mA	0 mA	3 mA	3 mA	0 V	0 V	0 V	0.75 V			
C	Line-break	21 mA	21 mA	21 mA	21 mA	10.5 V	10.5 V	5.25 V	5.25 V			
	Overrange	20 mA	20 mA	20 mA	20 mA	10 V	10 V	5 V	5 V		•	
	Underrange	0 mA	0 mA	4 mA	4 mA	0 V	0 V	0 V	1 V			
	Short-circuit	21 mA	21 mA	21 mA	21 mA	10.5 V	10.5 V	5.25 V	5.25 V			
D	Line-break	0 mA	0 mA	4 mA	4 mA	0 V	0 V	0 V	1 V			
	Overrange	20 mA	20 mA	20 mA	20 mA	10 V	10 V	5 V	5 V	•	•	
	Underrange	0 mA	0 mA	4 mA	4 mA	0 V	0 V	0 V	1 V			
	Short-circuit	0 mA	0 mA	4 mA	4 mA	0 V	0 V	0 V	1 V			

NE43	(only OUT = 4...20 mA or 20...4 mA)											
	Upscale	Line-break, overrange, underrange, short-circuit = 21.5 mA										•
	Downscale	Line-break, overrange, underrange, short-circuit = 3.5 mA								•		•
	0 mA	Line-break, overrange, underrange, short-circuit = 0 mA									•	•
	Up-/Downscale	Line-break, short-circuit = 3.5 mA								•	•	•
		Overrange, underrange = 21.5 mA										
Sensor type	Pt 100 (IEC 751)											
	Pt 1000 (IEC 751)											•

2.5 Module powering

The temperature module power supply voltage is 16.8~30 VDC and the maximum power dissipation is about 850mW, for each module. The installer needs to review the power supply requirements in the data sheets of the interface modules.

One option proposed is to power the temperature modules by the 2300 monitor's power supply which the part number (106M7607-01, 110M7102-01 or 106M6694-01) is specified in the document 105M0340. When three temperature modules are powered by one of those power supplies, the maximum 2300 monitor (powered by this power supply) quantity should decrease one, and please refer to the accessories section of the document 105M0340 for the detailed requirement.

2.6 Module wiring

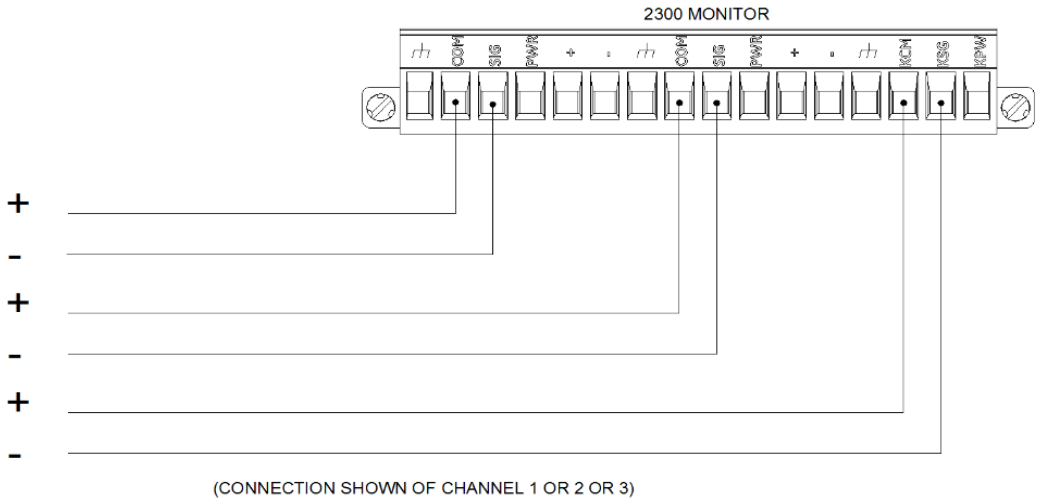
A standard interface module of 2300 channel 1, channel 2, or channel 3 (speed input) provides generic interface module input.

The RTD/TC temperature transmitters module provides an interface to connect RTD/TC signals to 2300 channel 1, channel 2, or channel 3 (speed input). These transmitters all are DIN rail mounting.

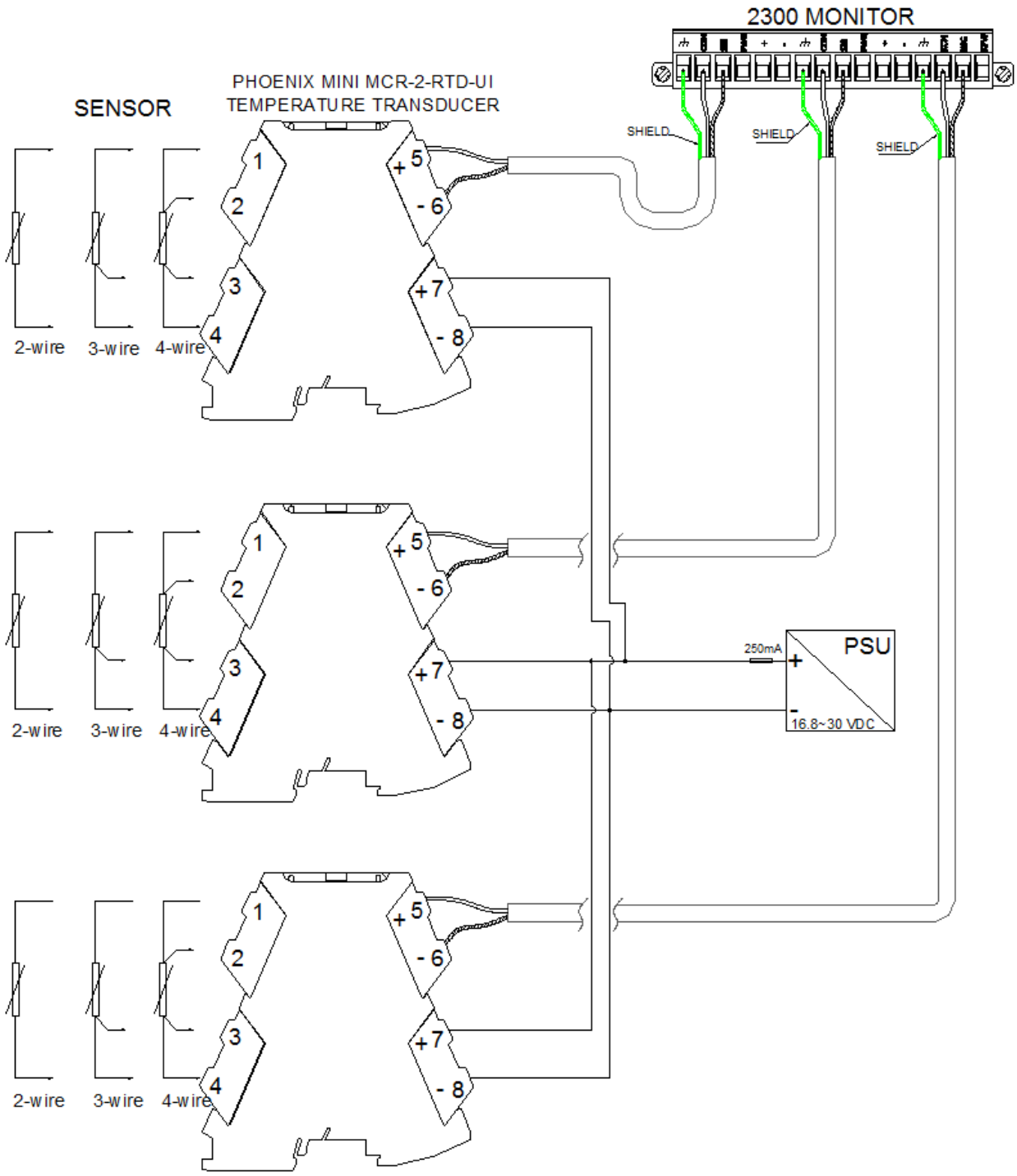
The transmitter offers 3-way isolation between input, output and power supply. The positive output of the transmitter is allowed to be wired to the common of the corresponding channel of 2300 monitor without special setting or wiring. About how to set voltage output, please refer to the vendor's datasheet.

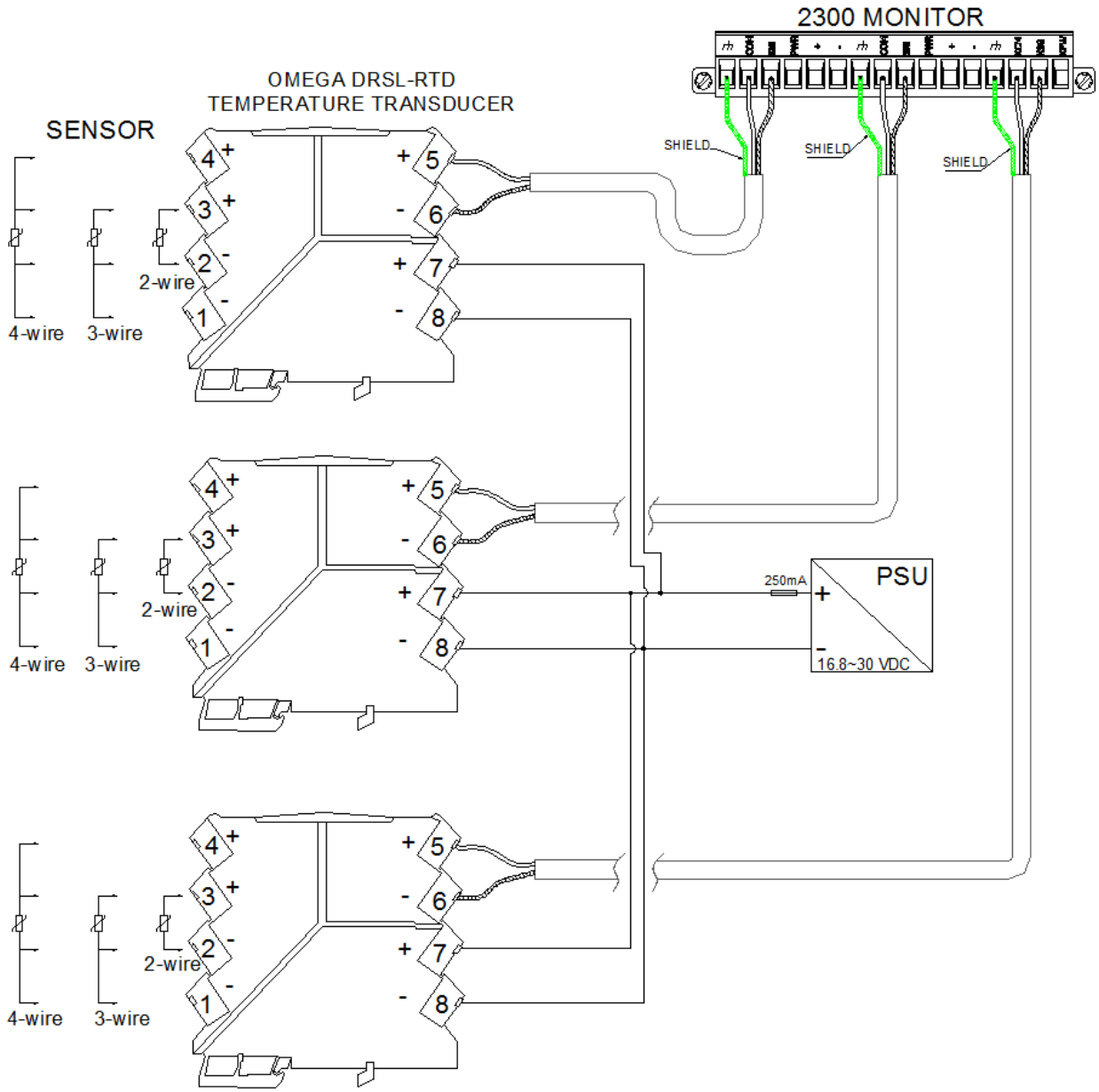
Please refer to the manufacturer's manual for the detailed module interface installation requirements.

1. Standard transducer interface module wiring

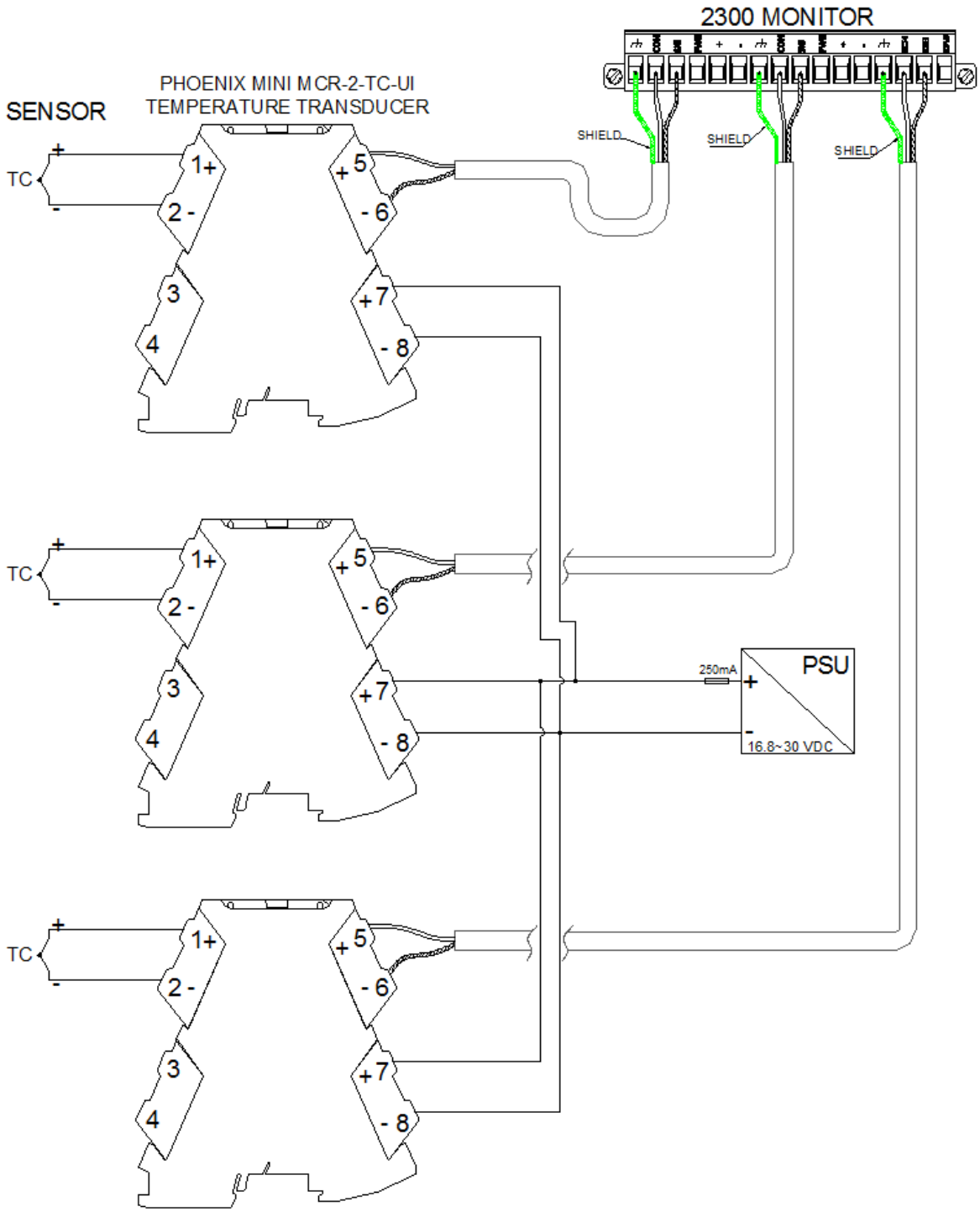


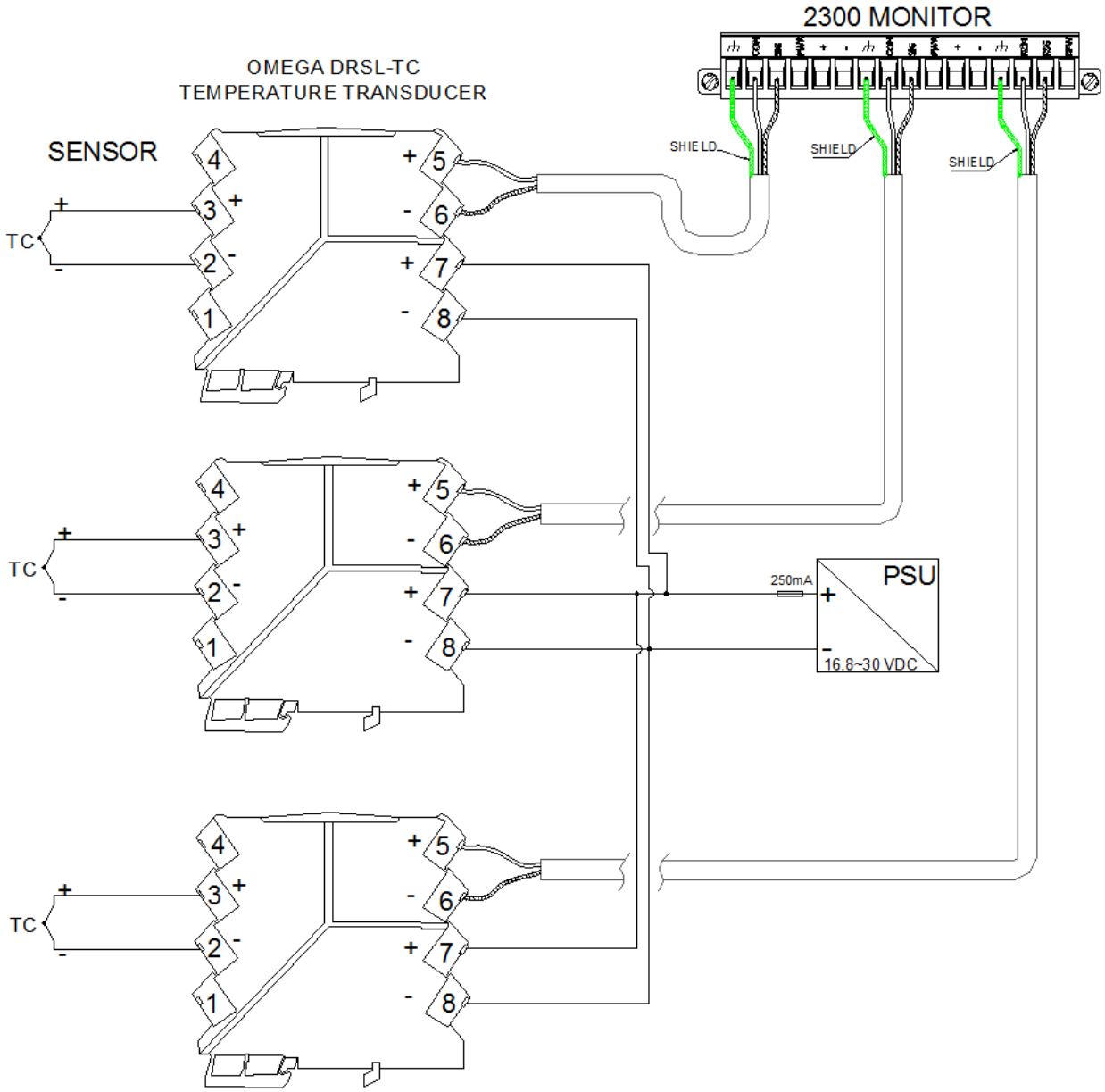
2. RTD temperature trans mitter s wiring




2300 MONITOR
OMEGA DRSL-RTD
TEMPERATURE TRANSDUCER
SENSOR
SHIELD
SHIELD
SHIELD
4-wire
3-wire
2-wire
PSU
250mA
16.8~30 VDC

3. TC temperature transmitters wiring

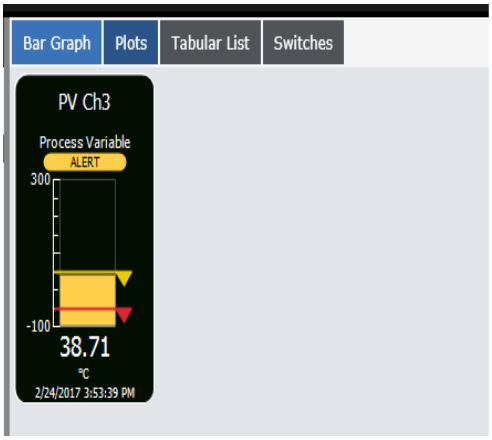



2300 MONITOR
OMEGA DRSL-TC
TEMPERATURE TRANSDUCER
SENSOR
TC
SHIELD
SHIELD
SHIELD
250mA
PSU
16.8~30 VDC

2.7 Verify Temperature Interface Module operation with 2300

After the properly hook up a temperature interface module to a 2300 monitor, the operation is ready to detect the temperature via sensor connected with the temperature interface module. The user may verify the measured temperature by, for example, a side by side comparison with a known temperature measurement.

Bently Nevada utilized an Omega model CL27 as a known thermometer to simulate a series of temperature points, then compare the Channel-3 PV value shows on 2300 monitor's LCD & the BNMC interface reading, thus verified the Omega DRSL-TC-ISO temperature interface module (K type TC sensor connected) to a 2300 monitor working correctly. Such as, one temperature point 40ºC (simulated as the actual measured temperature, in range -100ºC to +300ºC, by a known thermometer) detected, the module was set as 0 to 10V voltage output, then the BNMC interface reading showed 38.71ºC and the 2300 monitor LCD PV value showed 38.71ºC (There is about 3 minutes reading delay of 2300 monitor LCD), shown as below. The tolerance is about 1.5ºC by comparison, it is acceptable.



The user can apply the similar method to verify the operation is accurate. At least two temperature points in the entire supported temperature range, for example the ambient temperature, to be measured by temperature interface module (sensor connected at input) with a 2300 monitor, and measured by a known available thermometer too, then the user may know the operation is right by comparing both values detected for a same temperature point if the deviation is not far.