PROTECTION & RELIABILITY
OPTIMIZATION INSTRUMENTS
A CTC COMPANY

PRODUCT MANUAL

SC200 Series

Signal Conditioner

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SECTION 1: OVERVIEW

Introduction

This document contains information on the operation, installation and maintenance of the SC200 Series Signal Conditioner. The Signal Conditioner is a device that converts a sensor input into a 4-20mA, 0-5V DC, or a 0-10V DC output and provides a buffered dynamic output of the vibration waveform. The Signal Conditioner can take an input from an Accelerometer, Velocity Transducer or AC signal from Proximity Probe Driver. As an added feature, sensor power can be turned off, to accept inputs from a sensor that is already powered. The Signal Conditioner can be set to output the 4-20mA signal (and an additional analog voltage output) in proportion to Acceleration, Velocity or Displacement regardless of the type of input transducer.

Description

The Signal Conditioner is a DIN rail mountable component used in continuous machinery monitoring applications. It provides signal conditioning, signal conversion and re-transmission. The Signal Conditioners are traditionally mounted inside a sealed enclosure. All settings are configured using simple DIP switches internal to the Signal Conditioner's case.

Ordering Information

The SC200 Series Signal Conditioner has a wide variety of different configurations for the many different applications it can be used for. Below is the standard selection guide to use to determine the correct configuration.

Ordering Information*

Example Part Number: *SC203-100A-002IR-010-01K-05* *(standard ISO configuration, power on)*

SC20 – [ ] – [ ][ ][ ] [ ] [ ] – [ ][ ][ ] – [ ][ ][ ] – [ ][ ] [ ]

Configuration	Input Source	Full Scale Range Value	Full Scale Units		High Pass Filter	Low Pass Filter	Voltage Output	Power Supplies
3 = ISO (Standard) (see example above) **7** = Factory configured per part number *All SC200 series systems are user configurable after initial set up.	**100A** = 100 mV/g Accelerometer **050A** = 50 mV/g Accelerometer **010A** = 10 mV/g Accelerometer **500A** = 500 mV/g Accelerometer **100V** = 100 mV/IPS Velocity Sensor **500V** = 500 mV/IPS Velocity Sensor **200D** = 200 mV/mil Displacement Probe	**0X5** = 0 - 0.5 **001** = 0 - 1 **002** = 0 - 2 **005** = 0 - 5 **010** = 0 - 10 **020** = 0 - 20 **050** = 0 - 50 **100** = 0 - 100 **200** = 0 - 200	**I** = IPS **M** = mm/s **G** = g's **D** = mils	**P** = Peak **R** = RMS **T** = Peak - Peak	**002** = 2 Hz **005** = 5 Hz **010** = 10 Hz **020** = 20 Hz **050** = 50 Hz **100** = 100 Hz **200** = 200 Hz **500** = 500 Hz **01K** = 1000 Hz	**050** = 50 Hz **070** = 70 Hz **100** = 100 Hz **200** = 200 Hz **500** = 500 Hz **01K** = 1000 Hz **02K** = 2000 Hz **05K** = 5000 Hz **10K**= 10000 Hz **15K** = 15000 Hz **20K** = 20000 Hz	**05** = 0-5 V **10** = 0-10 V (in addition to standard 4-20 mA)	**N** = No (not powered) **Note:** If left blank, the unit provides power to sensor.

Example Part Numbers: *SC207-100A-010MR-005-050-10* *(power on)*
SC207-100A-010MR-005-050-10-N *(power off)*

*** Not All Configuration Options Are Compatible. Please Consult the Factory for options, or Our Part Configurator at www.ctoonline.com**

Figure 1. SC200 Series Selection Guide

Specifications

Environmental

- Operating Temperature Range: **-40°F(-40°C)** to **158°F(70°C)**
- Humidity Range: 0-95% Relative, Non-Condensing

Electrical

- 4-20 mA Output Signals for Vibration and Temperature (0-1.2V Input)
- Selectable 0-5 or 0-10 VDC Output Signal for Vibration
- 24 VDC, 4 mA DC Sensor Excitation (IEPE)
- LED Indicators for Power, Disconnected Sensor and DIP Switch Setting Errors
- Selectable input switches for RMS 0 – Pk, Pk – Pk
- Input selectable between Acceleration, Velocity, or Displacement
- 2 Hz and 20 kHz Analog Filters
- +3dB on Filter Range
- 8 High Pass Digital Filters ranging from 5 Hz to 1000 Hz
- 10 Low Pass Digital Filters ranging from 50 Hz to 15 kHz
- Outputs scalable for Metric and English
- Output selectable between Acceleration, Velocity, or Displacement
- Full Scale Range Limits:
    - IPS…..0.5 – 50
    - Mm/s..10 – 200
    - G's…..0.5 – 100
    - Mils….0.5 – 200

Physical

- 35 mm DIN Rail Mountable
- Removable individually keyed terminal blocks facilitate easier wiring & proper terminal block placement into corresponding signal conditioner slots

- Overall Dimensions:

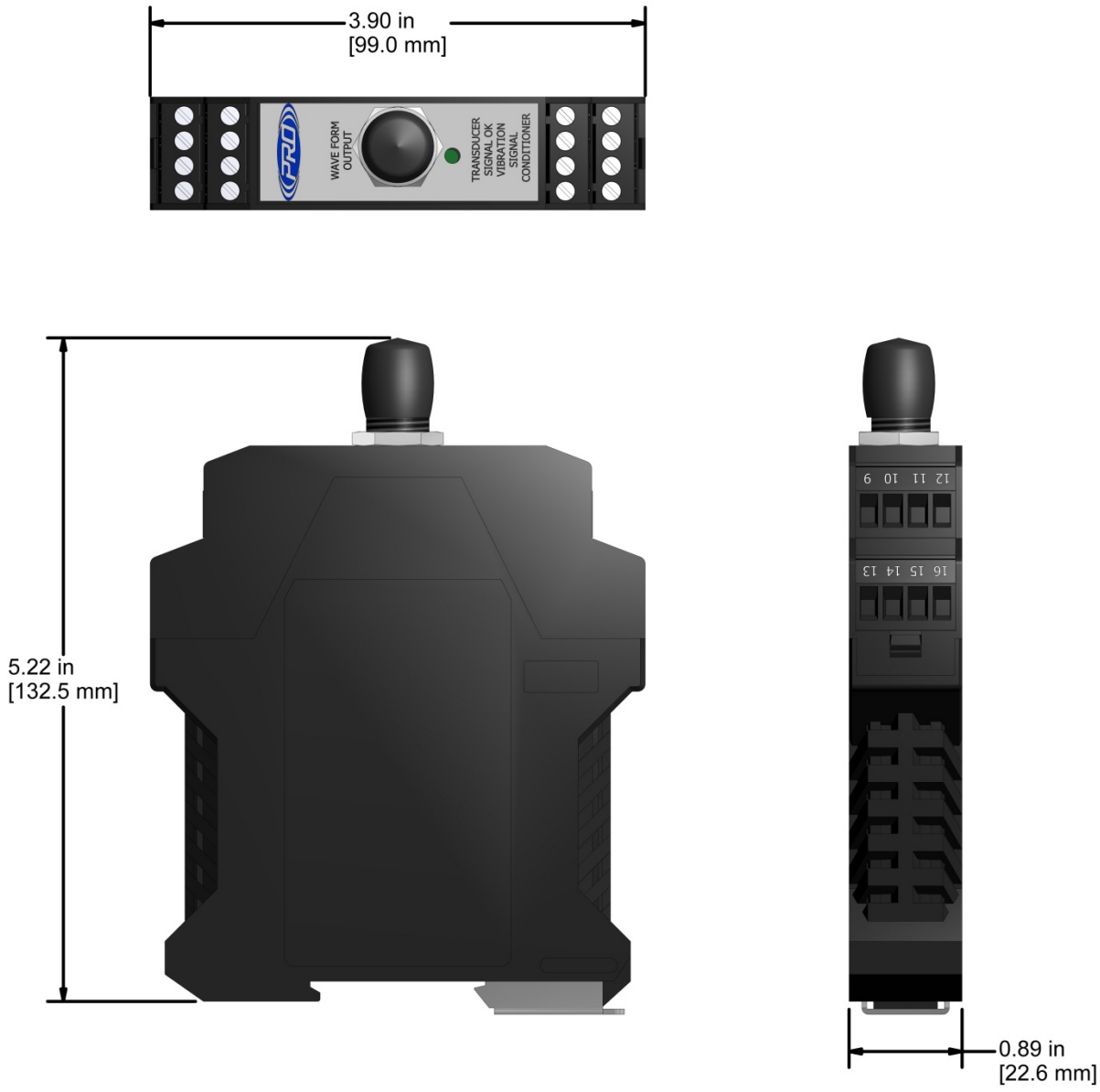

Figure 2. SC200 Series Overall Dimensions

SECTION 2: INSTALLATION

Mounting Instructions

Mounting

The Signal Conditioner is designed to be mounted on 35 mm DIN rail. The mounting clip is spring loaded to facilitate simple permanent locating. To remove the Signal Conditioner, it is recommended that a small flat-head screw-driver be used as a lever on the spring loaded mount clip. With the clip disengaged, simply slide the Signal Conditioner off of the mounting rail.

Figure 3. DIN Rail Release

To make removal easier the terminal blocks can be removed with a small flat head screw driver without the need to disconnect wiring. The terminal blocks are keyed individually to avoid terminal block miss placement.

Figure 4. Terminal Block Removal

Signal Conditioner Configuration and DIP Switch Settings

The transmitter is configured using 24 internal DIP switches. To open the Signal Conditioner case, depress the tabs holding the housing to the top cover and gently slide the circuit board out of the housing. The circuit board can be removed with the plugs and wiring still attached. **Note: CTC does not advise in removing the housing while the unit is powered.**

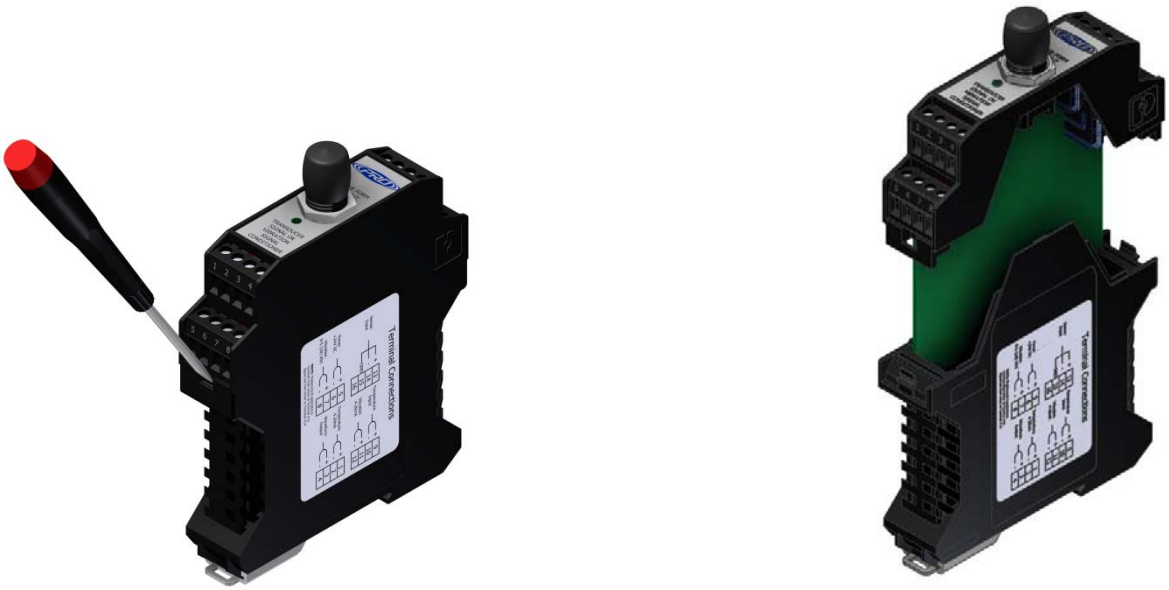

Figure 5. Opening of Housing

There are 3 sets of DIP switches, each labeled 1-8. SW 1 contains switches numbered 1 – 8 in Table 1. SW 2 contains the switches 1-8 from Table 1. SW 3 contains the switches numbered 1-8 in Table 1. (See figure 5)

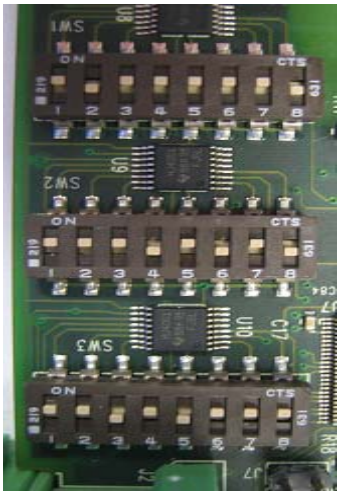

Figure 6. Close up of Dip Switch Settings

To configure the transmitter, use Table 1 and set the appropriate combination of DIP Switches.

Example Configuration 1: (SC207-100A-002-IR-005-500-05)

- 100 mV/g Acceleration Input
- Output Level Based on RMS Level of Input Signal
- Velocity Output with Full Scale of 2 IPS @ RMS
- 0 to 5 VDC Analog Output
- Filter Bandwidth from 5 to 500 Hz
- Power on (supplied)

	1	2	3	4	5	6	7	8
SW 1 →	ON	OFF	ON	ON	ON	ON	ON	ON
SW 2 →	OFF	ON	ON	OFF	ON	ON	OFF	ON
SW 3 →	ON	ON	ON	ON	OFF	ON	ON	ON

Example Configuration 2: (SC207-100V-005-GP-050-200-10-N)

- 100 mV/IPS Acceleration Input
- Output Level Based on 0-Pk Level of Input Signal
- Acceleration Output with Full Scale of 5 G's
- 0 to 10 VDC Analog Output
- Filter Bandwidth from 50 to 200 Hz
- Power off (not supplied)

	1	2	3	4	5	6	7	8
SW 1 →	OFF	ON	OFF	ON	OFF	ON	ON	OFF
SW 2 →	OFF	ON	ON	ON	ON	OFF	ON	ON
SW 3 →	OFF	ON	OFF	OFF	ON	ON	OFF	ON

Figure 7. Examples of Dip Switch Configurations

The dip switch settings are read only once, during start up. Therefore, any changes in the DIP switches settings will have no effect on system operation until the signal conditioner is disconnected from power, then powered on.

Note: CTC does not advise in adjusting any dip switches while the unit is powered.

The Signal Conditioner's electronics are limited to 10V swings and like all electronic devices, it is subject to noise. Therefore, any setting which would require more that 10V or less than several mV cannot be used. Contact an Applications Engineer for further information regarding troubleshooting the transmitter's settings. **Note: The 15kHz LOW PASS FILTER can ONLY be used with a 1000 Hz HIGH PASS FILTER.**
Note: For Displacement Input, low pass filter limit is 2000 Hz

SC Inputs			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
			SW 1								SW 2								SW 3							
**			1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
Category	Section	Values																								
Transducer Input	Acceleration	10	ON	ON	ON	ON																				
		50	OFF	ON	ON	ON																				
		100	ON	OFF	ON	ON																				
		500	OFF	OFF	ON	ON																				
	Velocity	10	ON	ON	OFF	ON																				
		100	OFF	ON	OFF	ON																				
		500	ON	OFF	OFF	ON																				
	Displacement	200	OFF	OFF	OFF	ON																				
Output	RMS						ON	ON																		
	0-Pk						OFF	ON																		
	Pk-Pk						OFF	OFF																		
	English								ON																	
	Metric								OFF																	
Full Scale		0.5								ON	ON	ON	ON													
		1								OFF	ON	ON	ON													
		2								ON	OFF	ON	ON													
		5								OFF	OFF	ON	ON													
		10								ON	ON	OFF	ON													
		20								OFF	ON	OFF	ON													
		50								ON	OFF	OFF	ON													
		100								OFF	OFF	OFF	ON													
		200								ON	ON	ON	OFF													
Output	Acceleration													ON	ON											
	Velocity													OFF	ON											
	Displacement													ON	OFF											
Voltage	0 - 5															ON										
	0 - 10															OFF										
Filters	High Pass Freq.	2															ON	ON	ON	ON						
		5															OFF	ON	ON	ON						
		10															ON	OFF	ON	ON						
		20															OFF	OFF	ON	ON						
		50															ON	ON	OFF	ON						
		100															OFF	ON	OFF	ON						
		200															ON	OFF	OFF	ON						
		500															OFF	OFF	OFF	ON						
		1000															ON	ON	ON	OFF						
	Low Pass Freq.	50																			ON	ON	ON	ON		
		70																			OFF	ON	ON	ON		
		100																			ON	OFF	ON	ON		
		200																			OFF	OFF	ON	ON		
		500																			ON	ON	OFF	ON		
		1000																			OFF	ON	OFF	ON		
		2000																			ON	OFF	OFF	ON		
		5000																			OFF	OFF	OFF	ON		
		10000																			ON	ON	ON	OFF		
		15000																			OFF	ON	ON	OFF		
		20000																			ON	OFF	ON	OFF		
POWER		ON																							ON	
		OFF																							OFF	

Table 1. Dip Switch Configuration Settings

Electrical Connections

1. Connect the +20 to 32V DC Power Lead to the Terminal marked 5 and the negative or common to the terminal marked 6.

2. Wire the sensor leads to 13 (+), 14 (-), and 15 (Shield) as shown in Figure 1.
    - If using a TA series sensor, the Negative sensor input terminal 14 does not need to be jumpered to terminal 10.
    - If using displacement probe assembly, wire Common to 13 and Out to 14.

Note: To avoid any damage of the SC200 unit, the power supply option (if any) of the monitoring device must be turned OFF before connecting to any output terminals of the signal conditioner.

3. Connect output device to terminals 11 and 12 for the 4-20mA signal proportional to the vibration level.

4. Connect output device to terminals 1 and 2 to obtain the 4-20 mA signal representative of temperature level.

5. Connect output device to terminals 7 and 8 to obtain the 0 to 5 or 0 to 10VDC signal representative of vibration level.

6. The Dynamic Signal output can be obtained from the BNC Connector at the top of the Signal Conditioner or/and from terminals 3 and 4. See Figure 2.

Note: Enclosures containing SC200 Series Signal Conditioners should be protected from electrostatic discharge voltage. Voltage powering enclosures containing SC200 series signal conditioners should not exceed 285 volts.

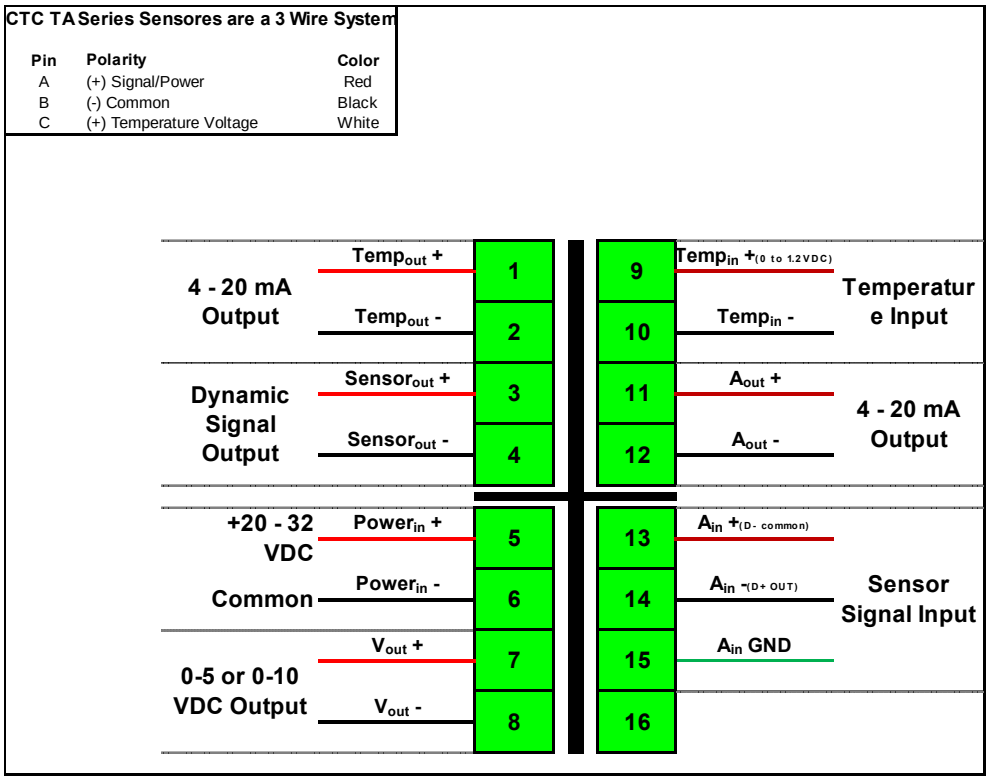

Figure 8. Signal Conditioner Electrical Wiring Diagram

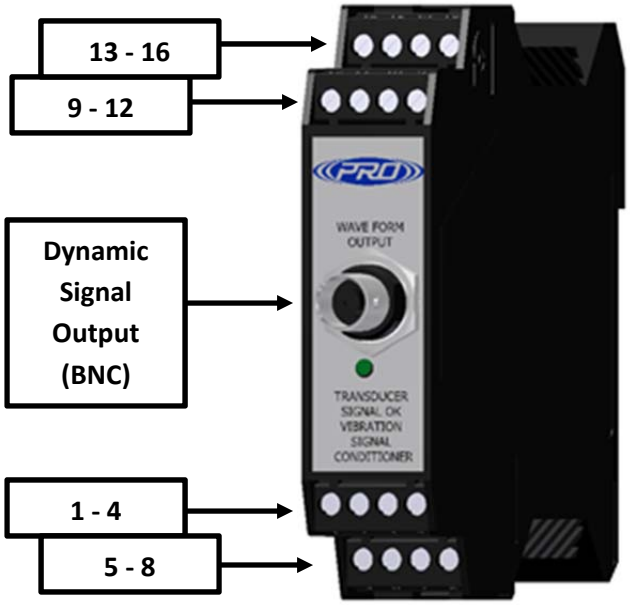

Figure 9. Conditioner Front Panel Dynamic Signal Output

SECTION 3: OPERATION

Once all wires are connected, apply power to begin operating the Signal Conditioner. Make sure the status light is indicating normal mode (Constant ON).

Calibration

The Signal Conditioner is calibrated internally during power up. The digital calibration eliminates the need for any adjustments to the Analog Output.

Indicators

The LED on the front of the Signal Conditioner will indicate the status of the Signal Conditioner. A constant bright LED indicates normal operating condition, and a Flashing LED indicates an error has occurred.

STATE 1 – "Normal" Mode Operation

- LED is a "Solid" ON (———)

STATE 2 – Error Detected

- LED is flashing ON and OFF in 0.5 second Intervals. (— — — —)
- Errors can be due to
  - Input Sensor bias voltage < 5 V. Sensor is considered shorted.
  - Input Sensor bias voltage > 15 V. Sensor is considered unconnected/missing.
  - Invalid configuration of switch settings.

Portable Data Collector Interfacing

In order to collect waveform data from the BNC jack on the Signal Conditioner using a portable data collector that supplies constant current power, **the data collector must be set so that power to the sensor is turned off**. Failure to do so may result in a damaged or non-functional transmitter.

Figure 10. Portable Data Collector Interface

SECTION 4: TROUBLESHOOTING

Common Problems

Problem Description	Recommended Actions
4 - 20 mA or 0 - 5,10V Output is non-functional.	Check status LED; ensure Signal Conditioner is in Normal mode. Check DIP switch settings for validity and make sure sensor is properly wired. Refer to wiring diagram in Figure 3. Check for power to sensor.
No waveform data from BNC jack.	Check status LED; ensure Signal Conditioner is in Normal mode. Check DIP switch settings for validity and make sure sensor is properly wired. Refer to wiring diagram in Figure 3.
4 - 20mA or 0 - 5,10V output is lower than expected.	Check filter settings. Make sure low pass and high pass filters have been set to a range capable of capturing the expected frequencies. Check and make sure you're on the proper scaling settings. (Pk-Pk, RMS, …)

Table 2. Common Troubleshooting

Note: For specific problem resolution, please call an Applications Engineer at 1-800-999-5290.

SECTION 5: MAINTENANCE

General

There are no customer replaceable parts. The device has been designed to self-calibrate and monitor its own operational status. It should provide trouble free continuous service under normal operating conditions.

Warranty

If any PRO product should ever fail, we will repair or replace it at no charge as long as the product was not subject to misuse, natural disasters, improper installation or modification which caused the defect.