

# Vibration Transmitters

- 4-20 mA sensors for permanent installation that interface directly to a PLC, DCS and SCADA systems
- Provides continuous, 24/7 monitoring of critical machinery
- Cost-effective monitoring solution



## 4-20 mA Output Transmitter Model 640B01

- Measurement range: 0 to 1 in/sec pk (0 to 25.4 mm/s pk)
- Frequency range: ( $\pm 10\%$ ) 180 to 60,000 cpm (3 Hz to 1 kHz)
- Raw vibration or temperature output signal options, intrinsically safe options available

Product shown at actual size

## 4-20 mA Output Transmitter Model 640B02

- Measurement range: 0 to 2 in/sec pk (0 to 50.8 mm/s pk)
- Frequency range: ( $\pm 10\%$ ) 180 to 60,000 cpm (3 Hz to 1 kHz)
- Raw vibration or temperature output signal options, intrinsically safe options available

Product shown at actual size



## 4-20 mA Output Transmitter Model 641B01

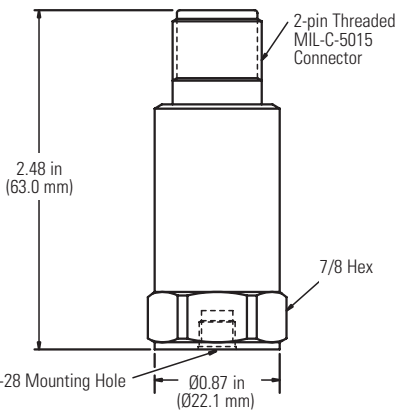
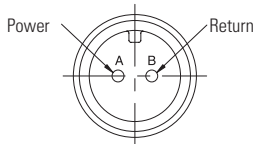
- Measurement range: 0 to 1 in/sec rms (0 to 25.4 mm/s rms)
- Frequency range: ( $\pm 10\%$ ) 600 to 60,000 cpm (10 Hz to 1 kHz)
- Raw vibration or temperature output signal options, intrinsically safe options available

Product shown at actual size

## 4-20 mA Output Transmitter Model 641B02

- Measurement range: 0 to 2 in/sec rms (0 to 25.4 mm/s rms)
- Frequency range: ( $\pm 10\%$ ) 600 to 60,000 cpm (10 Hz to 1 kHz)
- Raw vibration or temperature output signal options, intrinsically safe options available

Product shown at actual size



## 4-20 mA Output Transmitter Model 645B00

- Measurement range: 0 to 5 g rms (0 to 49 m/s<sup>2</sup> rms)
- Frequency range: ( $\pm 10\%$ ) 180 to 60,000 cpm (3 Hz to 1 kHz)
- Raw vibration or temperature output signal options, intrinsically safe options available

Product shown at actual size

## 4-20 mA Output Transmitter Model 646B02

- Measurement range: 0 to 10 g rms (0 to 98.1 m/s<sup>2</sup> rms)
- Frequency range: ( $\pm 10\%$ ) 180 to 600,000 cpm (3 Hz to 10 kHz)
- Raw vibration or temperature output signal options, intrinsically safe options available

Product shown at actual size

## Tips From Techs

### Getting Started with Loop Powered Vibration Sensors

Starting a vibration monitoring program is not always easy. It requires investing human resources for training and capital dollars to obtain data acquisition equipment. But most plants already have PLC, DCS or SCADA systems in place monitoring pressure, flow and temperature. IMI's loop-powered 4-20 mA vibration transmitters are "plug and play" with today's plant control systems. Thus 4-20 mA vibration transmitters are an excellent way to monitor vibration and protect critical equipment without the expense of additional costly data acquisition systems. While 4-20 mA sensors cannot perform diagnostic tasks they provide early warnings that help maintenance technicians avoid catastrophic failure.



Technical Specifications						
Model Number	640B01	640B02	641B01	641B02	645B00	646B02
<b>Performance</b>						
Measurement Range	0.0 to 1 in/sec pk 0.0 to 25.4 mm/s pk [2]	0.0 to 2 in/sec pk 0.0 to 50.8 mm/s pk [2]	0.0 to 1 in/sec rms 0.0 to 25.4 mm/s rms [2]	0.0 to 2 in/sec rms 0.0 to 50.8 mm/s rms [2]	0.0 to 5 g rms 0.0 to 49 m/s <sup>2</sup> rms [2]	0.0 to 10 g rms 0.0 to 98.1 m/s <sup>2</sup> rms [2]
Output	4-20 mA					
Frequency Range (±10 %)	180 to 60,000 cpm 3 Hz to 1 kHz [1][3]		600 to 60,000 cpm 10 Hz to 1 kHz [1][3]		180 to 60,000 cpm 3 Hz to 1 kHz [1][3]	180 to 600,000 cpm 3 Hz to 10 kHz [1][3]
Broadband Resolution	0.005 in/sec pk 0.13 mm/s pk [5]	0.01 in/sec pk 0.26 mm/s pk [5]	0.005 in/sec rms 0.13 mm/s rms [5]	0.01 in/sec rms 0.26 mm/s rms [5]	0.025 g rms 0.24 m/s <sup>2</sup> rms [5]	0.05 g rms 0.49 m/s <sup>2</sup> rms
Non-linearity	±1 %					
<b>Environmental</b>						
Temperature Range	-40 to 185 °F -40 to 85 °C					
<b>Electrical</b>						
Excitation Voltage	12 to 30 VDC					
Load Resistance	50 (Vs-12) ohms					
Settling Time (within 2% of value)	<15 sec					
Electrical Isolation (Case)	>10 <sup>6</sup> ohm					
<b>Physical</b>						
Size - Hex	1.0 in 25.4 mm					
Size - Height	2.6 in 66 mm					
Weight	4.7 oz 131 gm					
Mounting Thread	1/4-28 UNF					
Mounting Torque	3 to 5 ft-lb 4 to 7 N-m					
Sensing Element	Ceramic Shear					
Housing Material	Stainless Steel					
Sealing	Welded Hermetic					
Electrical Connector	2-pin MIL-C-5015 (Top)					
Electrical Connections (Pin A)	4-20 mA Pos (+)					
Electrical Connections (Pin B)	4-20 mA Neg (-)					
<b>Supplied Accessories</b>						
Model 081A40 Mounting Stud (1) Model ICS-4 NIST-traceable single-axis amplitude response calibration from 0 cpm (0 Hz) to upper 10% frequency for 4 - 20 mA output vibration sensor (1)						
<b>Notes</b>						
<b>All specifications are at room temperature unless otherwise specified</b>						
[1] 1Hz = 60 cpm (cycles per minute). [2] Conversion Factor 1 in/sec = 0.0254 m/sec. [3] Current will fluctuate at frequencies below 5 Hz. [4] For CE reference PCB® Declaration of Conformance PS039 or PS053 for details. [5] Typical.						
<b>Optional Versions</b>						
<b>EX - Hazardous Area Approval</b> For Models: 640B01, 640B02, 641B01, 641B02 <b>M - Metric Mount</b> For Models: 640B01, 640B02, 641B01, 641B02 <b>RV - Buffered Analog Signal Output 100 mV/g (±20%)</b> For Models: 640B01, 640B02, 641B01, 641B02 <b>RVVO - Buffered Analog Signal Output 100 mV/in/sec (±20%)</b> For Models: 640B01						
<b>Accessories &amp; Cables: Pages 146 - 159</b>						

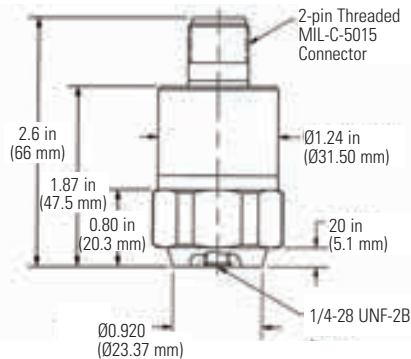
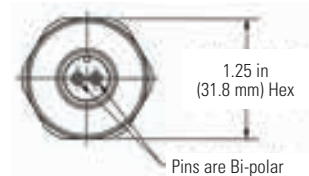
# Displacement Vibration Transmitters

- Industry leading low frequency response
- Interface directly to PLC, DCS and SCADA systems
- Superior signal resolution on slow speed machinery



## 4-20 mA Output Transmitter Model 653A01

- Effective on slow speed machinery
- Measures absolute p-p displacement
- 



## Product Spotlight

### 4-20 mA Indicator / Alarm Model 683A

The model 683A panel meter can be used with either ICP® sensors or 4-20 mA vibration transmitters depending on the options selected. Each display also features two programmable relays with time delays and optional 4-20 mA re-transmit.

- Provides 24 VDC excitation for loop powered 4-20 mA sensors, or ICP® power
- Up to four programmable set-point relays
- Highly visible, fully scalable LED display and user friendly, menu-driven setup



### 4-20 mA Alarm Enclosure Series 684A

- Houses 1 to 8 panel meters
- Fiberglass NEMA 4X enclosure
- BNC's for walk up analysis when ICP® option is selected



Technical Specifications	
<b>Model Number</b>	<b>653A01</b>
<b>Performance</b>	
Measurement Range	2 to 40 mil pk - pk 0.05 to 1.02 mm pk - pk [2]
Output	4-20 mA
Frequency Range (±3 dB)	90 to 18,000 cpm 1.5 Hz to 300 Hz [1]
Non-linearity	±2%
<b>Environmental</b>	
Temperature Range	-60 to 250 °F -54 to 121 °C
Overload Limit	2,500 g pk
<b>Electrical</b>	
Excitation Voltage	12 to 30 VDC
Load Resistance	50 (Vs-12) ohms
Settling Time	60 sec [3]
Electrical Isolation (Case)	>10 <sup>8</sup> ohm
<b>Physical</b>	
Size - Hex	1.25 in 31.75 mm
Size - Height	2.6 in 66 mm
Weight	5.36 oz 152 gm
Mounting Thread	1/4-28 UNF
Mounting Torque	3 to 5 ft-lb 4 to 7 N-m
Sensing Element	Ceramic
Sensing Geometry	Flexural
Housing Material	Stainless Steel
Sealing	Welded Hermetic
Electrical Connector	2-pin MIL-C-5015 (Top)
Electrical Connections (Pin A)	4-20 mA Pos (+)
Electrical Connections (Pin B)	4-20 mA Neg (-)
<b>Supplied Accessories</b>	
	Model 081A41 Mounting stud 1/4-28 socket head set screw brass tip stainless steel 5/8" long (1)
<b>Notes</b>	
<b>All specifications are at room temperature unless otherwise specified</b>	
[1] 1Hz = 60 cpm (cycles per minute). [2] Conversion Factor 1 in/sec = 0.0254 m/sec. [3] Typical	
<b>Optional Versions</b>	
	<b>M - Metric Mount</b> For Model 653A01
<b>Accessories &amp; Cables: Pages 146 - 159</b>	

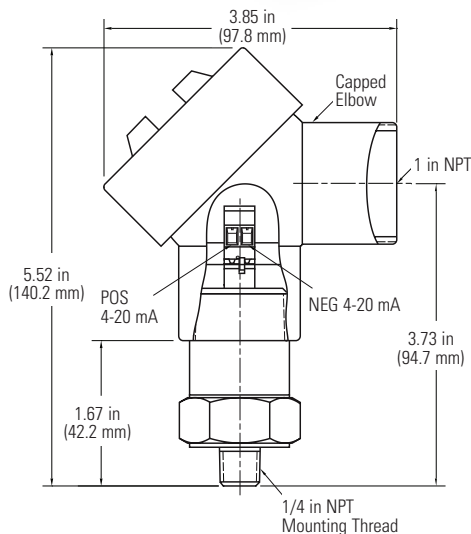
## Ultra Low Frequency Displacement Sensor

Until now users that wanted to monitor equipment turning at speeds below 180 cpm (3 Hz) with one simple sensor were limited in the frequency bands and scale which they could measure. IMI's 4-20 mA displacement sensor changes the game, allowing user's to trend vibration in displacement at speeds as low as 90 CPM (1.5 Hz). Displacement, as opposed to the traditionally offered velocity and acceleration scales, offers the best signal resolution at speeds below 600 CPM (10 Hz) and is ideal for detecting an unbalance condition in slow speed equipment such as fans.

The model 653A01 has a vibration range of 40 mils peak to peak. Its frequency span is 90 CPM to 18,000 CPM (1.5 Hz to 300 Hz), giving it the best low frequency response of any 4-20 mA sensor on the market today. The Ultra Low Frequency Displacement Sensor is available with industry standard 2-pin MIL connector or is fully submersible when ordered with integral cable.

# Hazardous Area Approved Vibration Transmitters

- CSA / ATEX D approved
- Supplied with explosion proof conduit elbow
- Electrical connector: terminal block






**Loop Powered 4-20 mA  
Vibration Transmitter  
Model EX640B71**

- Measurement Range: 0 to 1 in/sec pk (0 to 25.4 mm/s pk)
- Frequency Range: ( $\pm 10\%$ ) 180 to 60,000 cpm (3 Hz to 1 kHz)
- Raw vibration or temperature output signal options

Product shown at actual size




**Loop Powered 4-20 mA  
Vibration Transmitter  
Model EX640B72**

- Measurement Range: 0 to 2 in/sec pk (0 to 50.8 mm/s pk)
- Frequency Range: ( $\pm 10\%$ ) 180 to 60,000 cpm (3 Hz to 1 kHz)
- Raw vibration and temperature output signal options

Product shown at actual size




**Loop Powered 4-20 mA  
Vibration Transmitter  
Model EX641B71**

- Measurement Range: 0 to 1 in/sec rms (0 to 25.4 mm/s rms)
- Frequency Range ( $\pm 10\%$ ) 600 to 600,000 cpm (10 Hz to 1 kHz)
- Raw vibration and temperature output options available

Product shown at actual size




**Loop Powered 4-20 mA  
Vibration Transmitter  
Model EX641B72**

- Measurement Range: 0 to 2 in/sec rms (0 to 50.8 mm/s rms)
- Frequency Range ( $\pm 10\%$ ) 600 to 600,000 cpm (10 Hz to 1 kHz)
- Raw vibration and temperature output options available

Product shown at actual size



Technical Specifications				
Model Number	EX640B71	EX640B72	EX641B71	EX641B72
<b>Performance</b>				
Measurement Range	0.0 to 1 in/sec pk 0.0 to 25.4 mm/s pk [1]	0.0 to 2.0 in/sec pk 0.0 to 50.8 mm/s pk [1]	0.0 to 1 in/sec rms 0.0 to 25.4 mm/s rms [1]	0.0 to 2.0 in/sec rms 0.0 to 50.8 mm/s rms [1]
Output	4-20 mA	4-20 mA	4-20 mA	4-20 mA
Frequency Range(± 3 dB)	180 to 60,000 cpm 3 Hz to 1 kHz [2][3]		600 to 60,000 cpm 10 Hz to 1 kHz [2][3]	
	Broadband Resolution	0.005 in/sec pk 0.13 mm/s pk [4]	0.01 in/sec pk 0.26 mm/s pk [4]	0.005 in/sec rms 0.13 mm/s rms [4]
Non-linearity	± 1 %			
<b>Environmental</b>				
Temperature Range	-40 to 176 °F -40 to 80 °C			
<b>Electrical</b>				
Excitation Voltage	12 to 30 VDC			
Settling Time (within 2% of value)	<15 sec			
Electrical Isolation(Case)	>10 <sup>8</sup> ohm			
<b>Physical</b>				
Size (Hex x Height)	3.85 in x 5.52 in 98 mm x 140 mm			
	Weight	1.2 lb 544 gm		
Mounting Thread		1/4 NPT		
Sensing Element	Ceramic Shear			
Housing Material	Stainless Steel			
Electrical Connector	Removable Screw Terminals			
Electrical Connection Position	Top			
Electrical Connections(Tab 1)	4-20 mA Pos (+)			
Electrical Connections(Tab 2)	4-20 mA Neg (-)			
Screw Terminal Wire Size	12-24 AWG 3.0 - .2mm <sup>2</sup>			
<b>Supplied Accessories</b>				
Model ICS-4 NIST-traceable single-axis amplitude response calibration from 0 cpm (0 Hz) to upper 10% frequency for 4-20 mA output vibration sensor (1)				
<b>Notes</b>				
<b>All specifications are at room temperature unless otherwise specified</b>				
[1] Conversion Factor 1 in/sec = 0.0254 m/sec. [2] Current will fluctuate at frequencies below 5 Hz. [3] 1Hz = 60 cpm (cycles per minute). [4] Typical. [5] For CE reference PCB® Declaration of Conformance PS039 or PS053 for details				
<b>Optional Versions</b>				
Optional versions have identical specifications and accessories as listed for the standard model except where noted below. More than one option may be used.				
<b>EX - Hazardous Area Approval</b> For Models: EX640B71, EX640B72, EX641B71, EX641B72				
<b>RV - Buffered Analog Signal Output 100 mV/g (±20%)</b> For Models: EX640B71, EX640B72, EX641B71, EX641B72				
<b>Accessories &amp; Cables: Pages 146 - 159</b>				

## Easy Implementation

IMI® 4-20mA Vibration Transmitters are particularly well suited for 24/7 vibration monitoring of critical rotating equipment. Simply install the transmitter on the bearing housing and run a cable to the nearest PLC, DCS, SCADA, or any plant information system. That is all it takes to begin continuous vibration monitoring and avoid costly unexpected down time. Using the reliable 4-20mA trending signal enables the user to schedule diagnostic testing based on real data rather than using time scheduled route based testing. This practice saves time and reduces overall costs of predictive maintenance.

These transmitters employ field proven solid state piezoelectric sensing technologies and are available in many measurement ranges of acceleration, velocity or displacement. Optional hazardous area approved models also available.

# Vibration Transmitters

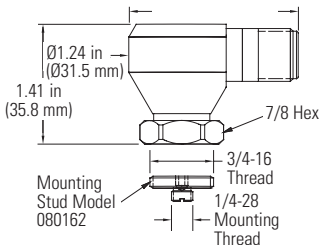
- 4-20 mA sensors for permanent mount installation that interface directly to a PLC, DCS, SCADA, or any PI systems
- Side exit versions allows for simple mounting in tight spaces
- Swivel mounting mechanism eliminates spinning sensors during installation



## Loop Powered 4-20 mA Vibration Transmitter Model 642A01

- Low profile, side exit
- Measurement range 0-25.4 mm/sec peak
- 2-pin MIL-C-5015 connector

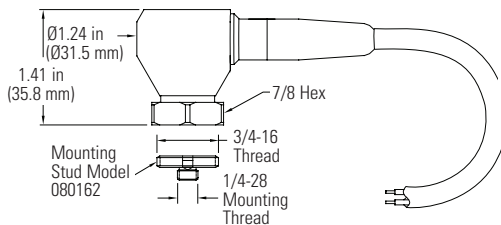
Product shown at actual size



## Loop Powered 4-20 mA Vibration Transmitter Model 642A11

- Measurement range 0-25.4 mm/sec peak
- 3 m of Integral Cable
- Submersible

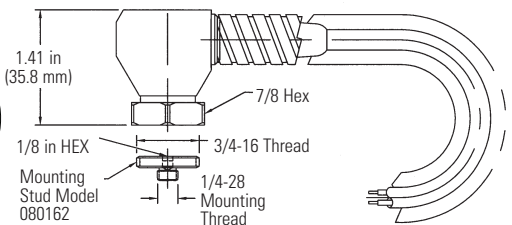
Product shown at actual size



## Loop Powered 4-20 mA Vibration Transmitter Model 642A61

- Measurement range 0-25.4 mm/sec peak
- 3 m of Integral Armored Cable
- Useful in exceedingly rough environments

Product shown at actual size





Technical Specifications			
Model Number	642A01	642A11	642A61
<b>Performance</b>			
Measurement Range	0.0 to 1 in/sec pk		
Output	0.0 to 25.4 mm/s pk [1] 4-20 mA		
Frequency Range (± 3 dB)	180 to 60,000 cpm 3 Hz to 1 kHz [1][3]		
Broadband Resolution	0.005 in/sec pk 0.13 mm/s pk [4]		
Non-linearity	± 1 %		
<b>Environmental</b>			
Temperature Range	-40 to 185 °F -40 to 85 °C		
<b>Electrical</b>			
Excitation Voltage	12 to 30 VDC		
Settling Time (within 2% of value)	<15 sec		
Load Resistance	50 (Vs-12) ohms		
Electrical Isolation (Case)	>10 <sup>9</sup> ohm		
<b>Physical</b>			
Size (Hex x Height)	0.875 in x 1.41 in 22.2 mm x 35.8 mm		
Weight	3.8 oz (without cable) 108 gm (without cable)		
Mounting Thread	1/4-28 UNF		
Mounting Torque	3 to 5 ft-lb 4 to 7 N-m		
Sensing Element	Ceramic Shear		
Housing Material	Stainless Steel		
Electrical Connector	2-pin MIL-C-5015		Integral Cable
Electrical Connection Position	Side		Side
Cable Termination	N/A		Pigtail Ends
Cable Length	N/A		10 ft 3.0 m
Cable Type	N/A		Polyurethane
Electrical Connections	Pin A - 4-20 mA Pos (+) Pin B - 4-20 mA Neg (-)		Red - 4-20 mA Pos (+) Blue - 4-20 mA Neg (-)
<b>Supplied Accessories</b>			
	Model 080A162 Mounting Stud (1)		
	Model ICS-4 NIST-traceable single-axis amplitude response calibration from 0 cpm (0 Hz) to upper 10% frequency for 4-20 mA output vibration sensor (1)		
<b>Notes</b>			
<b>All specifications are at room temperature unless otherwise specified</b>			
[1] 1Hz = 60 cpm (cycles per minute). [2] Conversion Factor 1 in/sec = 0.0254 m/sec. [3] Current will fluctuate at frequencies below 5 Hz. [4] For CE reference PCB® Declaration of Conformance PS039 or PS053 for details. [5] Typical			
<b>Optional Versions</b>			
	<b>EX - Hazardous Area Approval</b> For Models: 642A01, 642A11, 642A61 <b>M - Metric Mount</b> For Models: 642A01, 642A11, 642A61 <b>RV - Buffered Analog Signal Output</b> For Models: 642A01, 642A11, 642A61		
<b>Accessories &amp; Cables: Pages 146 - 159</b>			



# Vibration Transmitters

- ICP® in-line transmitter
- Converts ICP® sensors to loop powered transmitters
- Compact size fits easily in cable trays

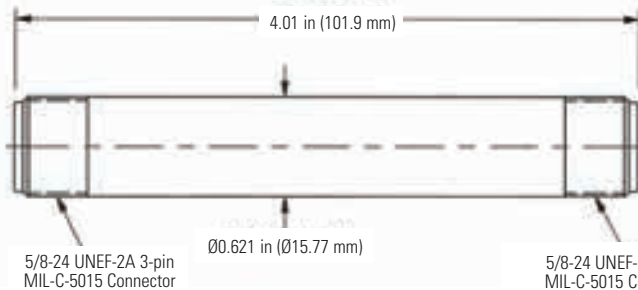
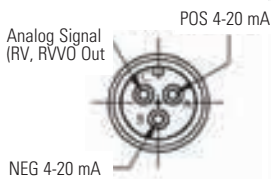
Another IMI Sensors industry first, Model 682A09 installs in-line with any industrial accelerometer and converts the vibration signal to a 4-20 mA velocity output that can be trended with today's PLC, DCS and SCADA systems. Its sleek design installs right into the cable run, no DIN rails, cabinets or special power required. With a 3-pin output connector you can still gather dynamic vibration signals with a vibration analyzer while the PLC monitors overall trends. Now you can take your existing accelerometers and turn them into 24/7 vibration monitoring devices for your most critical machinery.



## ICP® In-Line Vibration Transmitter Model 682A09

- Outputs 4-20 mA proportional to velocity plus analog raw vibration output
- Measurement Range: 0.0 to 25.4 mm/s pk
- Interfaces directly with plant control systems

Product shown at actual size



5/8-24 UNEF-2A 3-pin MIL-C-5015 Connector

5/8-24 UNEF-2A 2-pin MIL-C-5015 Connector

Technical Specifications		Technical Specifications	
Model Number	682A09	Model Number	682A09
<b>Performance</b>		<b>Physical</b>	
Input Signal (ICP® Accelerometer)	100 mV/g 10.2 mV/(m/s <sup>2</sup> )	Size - Height	4.0 in 101.6 mm
Frequency Response (-3dB ±2dB)	600 to 60,000 cpm 10 Hz to 1 kHz	Size - Diameter	0.621 in 15.8 mm
Measurement Range	0.0 to 1.0 in/sec pk 0.0 to 25.4 mm/s pk	Weight	2.5 oz 71 gm
Output Range	4 to 20 mA	Housing Material	Stainless Steel
Broadband Resolution	0.01 in/sec pk 0.26 mm/s pk	Electrical Connector (#1)	2-pin MIL-C-5015
<b>Environmental</b>		Electrical Connection Position (#1)	Sensor End
Temperature Range	-40 to 185 °F	Electrical Connections (#1) (Pin A)	AC IN Pos
Temperature Response (Sensitivity Deviation)	≤ 15 %	Electrical Connections (#1) (Pin B)	AC IN Neg
<b>Electrical</b>		Electrical Connector (#2)	3-pin MIL-C-5015
Excitation Voltage	20 to 30 VDC	Electrical Connection Position (#2)	Output End
Electrical Isolation (Case)	>108 ohm	Electrical Connections (#2) (Pin A)	4-20 mA Pos (+)
Settling Time (within 2% of value)	<60 sec	Electrical Connections (#2) (Pin B)	4-20 mA Neg & AC OUT Neg
Load Resistance	50 (Vs-20) ohm	Electrical Connections (#2) (Pin C)	AC OUT Pos
		Sealing	Welded Hermetic

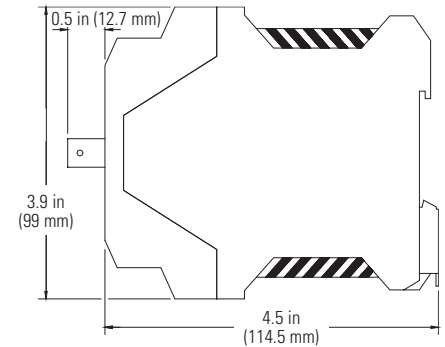
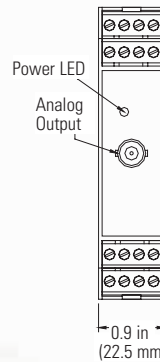
Accessories & Cables: Pages 146 - 159



### ICP® Sensor to 4-20 mA Transmitter Model 682B03

- Provides constant current ICP® sensor excitation
- 24 VDC powered, DIN rail mount
- Analog vibration output for fault diagnostics (through BNC or terminals)
- Adjustable low pass and high pass filtering, selectable acceleration, velocity, or displacement output signal

Product shown at actual size



### Technical Specifications

Model Number	682B03	Model Number	682B03
<b>Performance</b>		<b>Electrical</b>	
Channels	1	Power Required	DC power
Input Signal (Vibration)	±100 mV/g [10]	DC Power	23 to 25 VDC
Input Signal (Temperature)	±10.2 mV/(m/s <sup>2</sup> )	DC Power (maximum)	100 mA
Output Signal (DC Vibration)	0 to 1.2 VDC [11]	Settling Time	<2 min
Output Signal (DC Vibration)	4 to 20 mA [9]	Excitation Voltage (delivered to sensor)	17 to 19 VDC
Output Signal (DC Vibration)	0 to 5 VDC [4][6]	Constant Current Excitation (delivered to sensor)	3 to 5 mA [1][7]
Output Signal (DC Vibration)	0 to 10 VDC [4][6]	Output Span (±5.0 %) (DC Vibration Current Output)	16 mA
Output Signal (Temperature)	4 to 20 mA [11]	Output Span (±5.0 %) (Temperature Output)	16 mA
Output Signal (±0.01 %)	100 mV/g [2]	Output Span (±5.0 %) (DC Vibration Voltage Output)	5 or 10 VDC [6]
(AC Vibration)	10.2 mV/(m/s <sup>2</sup> )	<b>Physical</b>	
Frequency Range (-3 dB) (Acceleration)	180 to 600,000 cpm [3][13][14] 3 Hz to 10 kHz	Electrical Connector (input/output)	Removable Screw Terminals
Frequency Range (-3 dB) (Velocity)	210 to 600,000 cpm [3][13][14] 3.5 Hz to 10 kHz	Electrical Connector (raw vibration output)	BNC Jack
Frequency Range (-3 dB) (Displacement)	210 to 60,000 cpm [3][8][14] 3.5 Hz to 1 kHz	Housing Material	Polyamide
Output Range (DC Acceleration)	0 to 5.00 g pk or rms [5][6][10] 0 to 49.03 m/s <sup>2</sup> pk or rms	Size - Height	99 mm
Output Range (DC Acceleration)	0 to 10.00 g pk or rms [5][6][10] 0 to 98.06 m/s <sup>2</sup> pk or rms	Size - Width	0.9 in
Output Range (DC Acceleration)	0 to 20.00 g pk or rms [5][6][10] 0 to 196.12 m/s <sup>2</sup> pk or rms	Size - Depth	22.5 mm
Output Range (DC Velocity)	0 to 0.5 in/sec pk or rms [5][6][10] 0 to 12.7 mm/s pk or rms	Size - Depth	4.5 in
Output Range (DC Velocity)	0 to 1.00 in/sec pk or rms [5][6][10] 0 to 25.4 mm/s pk or rms	Weight (Maximum)	114.5 mm
Output Range (DC Velocity)	0 to 2.00 in/sec pk or rms [5][6][10] 0 to 50.8 mm/s pk or rms	Screw Terminal Wire Size	6.4 oz
Output Range (DC Displacement)	0 to 10.0 mil pk - pk [5][6][10] 0 to 0.254 mm pk - pk	Din Rail Mount	127
Output Range (DC Displacement)	0 to 20.0 mil pk - pk [5][6][10] 0 to 0.508 mm pk - pk	Status Indicator (Power „on“)	24-14 AWG
Output Range (DC Displacement)	0 to 40.0 mil pk - pk [5][6][10] 0 to 1.02 mm pk - pk	Status Indicator (Input Fault)	1.38 in
<b>Environmental</b>		Status Indicator (Measurement Mode - Acceleration)	35 mm
Temperature Range (Operating)	32 to 158 °F 0 to 70 °C	Status Indicator (Measurement Mode - Velocity)	Green LED
Temperature Range (Storage)	-40 to 257 °F -40 to 125 °C	Status Indicator (Measurement Mode - Displacement)	Green LED
Humidity Range (Non-Condensing)	0 to 95 %	<b>Notes</b>	
		[1] 4 mA constant current diode is internal to 9330VT	[10] Output measurement range is based upon input from 100 mV/g ICP® accelerometer and will be scaled inversely proportional to any percentage deviation of this input.
		[2] Achieved with 100 mV/g ICP® accelerometer input.	[11] Requires use of accelerometer with „TO“ temperature output option.
		[3] Attenuation is -40 dB/decade.	[12] For CE reference PCB® Declaration of Conformance PS051 for details.
		[4] Factory set, 0-5 VDC.	[13] The high frequency tolerance is accurate within ±0.5 kHz of the specified frequency.
		[5] Factory set, 1 in/sec peak	[14] The low frequency tolerance is accurate within ±0.5 Hz of the specified frequency.
		[6] Internal Dip switch selectable	
		[7] Jumper selectable for 18 VDC regulated, 24 VDC power supply voltage or ICP® sensor excitation disabled	
		[8] Maximum 1 kHz for displacement.	
		[9] Output current voltage will fluctuate at frequencies below 5 Hz.	

Accessories & Cables: Pages 146 - 159

# Programmable Vibration Transmitters

- Cost-effective 4-20 mA Loop Powered Transmitters
- Provide Continuous protection
- Work with PLCs, DCS and SCADA Plant information Systems

IMI Sensors advances the industry exclusive USB Programmable Vibration Sensors with 2 additional products. The 649A03 4-20 mA output Bearing Condition Monitor offers a high level of bearing fault monitoring in the small package of a typical sensor housing. Five selectable measurement methods and selectable sensing range increase reliability and accuracy in every application. The 649A04 4-20 mA output sensor brings USB programmability to IMI's tried and true current output vibration sensor line. Selectable displacement, velocity, or acceleration measurement coupled with selectable range scaling brings flexibility and "in field" programming.

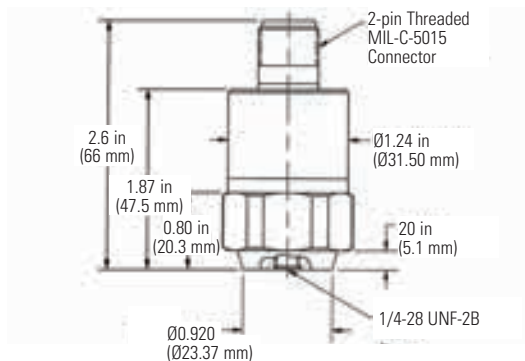
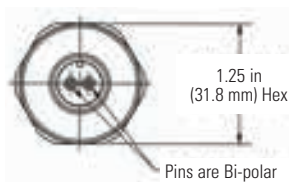


**USB**  
PROGRAMMABLE

## Programmable 4-20 mA Bearing Condition Transmitter Model 649A03

- Offers proven 4-20 mA bearing fault vibration technologies in a standard sensor housing package
- Industry exclusive USB programming technology
- Effective monitoring of constant speed and variable speed systems

Product shown at actual size



### Technical Specifications

Model Number	649A03
<b>Performance</b>	
Output (Loop Power)	4-20 mA
Sampling Time	1 sec
Measurement Range (with HPF 250 Hz)	0-2 to 0-50 g pk [1][2]
(with HPF 2,500 Hz)	0-2 to 0-50 RMS [1][2]
(Compensation pk)	1 to 16 [1]
Crest Factor (with HPF 250 Hz)	1 to 16 [1]
Crest Factor Plus	1 to 16 [1]
Bearing Diameter	1.57 to 39.37 in 40 to 1,000 mm
Bearing Rotation Speed	600 to 3,600 RPM 10 to 60 Hz
Linearity	10%
<b>Environmental</b>	
Temperature Range	-40 to +212 °F -40 to +100 °C
Storage Temperature Range	-40 to 257 °F -40 to 125 °C
<b>Electrical</b>	
Excitation Voltage	15 to 30 VDC
Load Resistance	50 (Vs-15) ohm
Electrical Isolation (Case)	>10 <sup>8</sup> ohm
<b>Physical</b>	
Size (Height x Hex)	2.60 in x 1.25 in 66 mm x 32 mm
Weight	6 oz 170 gm
Mounting Thread	1/4-28 UNF
Mounting Torque	3 to 5 ft-lb 4 to 7 N-m
Sensing Element	Piezoelectric Accelerometer
Housing Material	Stainless Steel
Sealing	Welded Hermetic
Electrical Connector	2-pin MIL-C-5015
Electrical Connection Position	Top
Electrical Connections (Pin A)	4-20 mA Pos (+)
Electrical Connections (Pin B)	4-20 mA Neg (-)
Overload Limit (Shock)	5,000 g pk 49,050 m/s <sup>2</sup> pk
<b>Supplied Accessories</b>	
Model 081A41 Mounting stud 1/4-28 socket head set screw brass tip stainless steel 5/8" long (1)	
<b>Notes</b>	
<b>All specifications are at room temperature unless otherwise specified</b>	
[1] Customer programmable parameters	of
[2] With 0.1g step	Conformance PS039 or PS053 for details
[3] For CE reference PCB® Declaration	
<b>Optional Versions</b>	
Optional versions have identical specifications and accessories as listed for the standard model except where noted below. More than one option may be used.	
<b>M - Metric Mount</b> For Model 649A03	
<b>Accessories &amp; Cables: Pages 146 - 159</b>	



**Technical Specifications**

<b>Model Number</b>	<b>649A04</b>
---------------------	---------------

Performance	
Measurement Range (Velocity)	0.5 to 3 in/sec pk [1][2][3][4] 12.7 to 76.2 mm/s pk [1][2][3][4]
Measurement Range (Acceleration)	1 to 10 g pk 0.0 to 98.1 m/s <sup>2</sup>
Measurement Range (Displacement)	4 to 20 mil pk - pk [6][2][4] 0.1 to 0.5 mm pk - pk [6][2][4]
Output (± 5 %)	4-20 mA
Frequency Range (-6 dB)	180 to 60,000 cpm 3 Hz to 1 kHz [7][8][4][9]
USB Programmable Options for Frequency Range	180 to 300,000 cpm
	3 Hz to 5 kHz [7][8][4]
	180 to 600,000 cpm
	3 Hz to 10 kHz [7][8][4]
	600 to 60,000 cpm
	10 Hz to 1 kHz [7][8][4]
	600 to 300,000 cpm
	10 Hz to 5 kHz [7][8][4]
	600 to 600,000 cpm
	10 Hz to 10 kHz [7][8][4]

Environmental	
Temperature Range	-40 to +185 °F -40 to +85 °C

Electrical	
Excitation Voltage	12 to 30 VDC
Settling Time(within 2% of value)	<30 sec
Electrical Isolation (Case)	>10 <sup>9</sup> ohm

Physical	
Size (Height x Length x Width)	1.0 in x 2.6 in 25.4 mm x 66 mm
Weight	3.7 oz 3.7 oz [10]
Mounting Thread	1/4-28 UNF N/A
Mounting Torque	3 to 5 ft-lb 4 to 7 N-m
Sensing Element	Ceramic
Sensing Geometry	Shear
Housing Material	Stainless Steel
Sealing	Welded Hermetic
Electrical Connector	2-pin MIL-C-5015
Electrical Connection Position	Top
Electrical Connections (Pin A)	4-20 mA Pos (+)
Electrical Connections (Pin B)	4-20 mA Neg (-)

Supplied Accessories	
	Model 081A40 Mounting Stud (1)

**Notes**  
All specifications are at room temperature unless otherwise specified

- |  |   |
|--|---|
| [1] Conversion Factor 1 in/sec = 25.4 mm/sec.      | [7] Current will fluctuate at frequencies below 5 Hz. |
| [2] FS - Full Scale.                               | [8] 1Hz = 60 cpm (cycles per minute).                 |
| [3] Factory set, 1 in/sec peak.                    | [9] Factory Set                                       |
| [4] USB Programmable with 600A21 kit.              | [10] Typical.   |
| [5] Conversion Factor 1g = 9.81 m/s <sup>2</sup> . |   |
| [6] Conversion Factor 1 mil = 0.0254 mm            |   |

**Optional Versions**

Optional versions have identical specifications and accessories as listed for the standard model except where noted below. More than one option may be used.

- M - Metric Mount**  
For Model 649A04
- RV - Buffered Analog Signal Output**  
For Model 649A04

**Accessories & Cables: Pages 146 - 159**

# Programmable 4-20 mA Vibration Transmitters



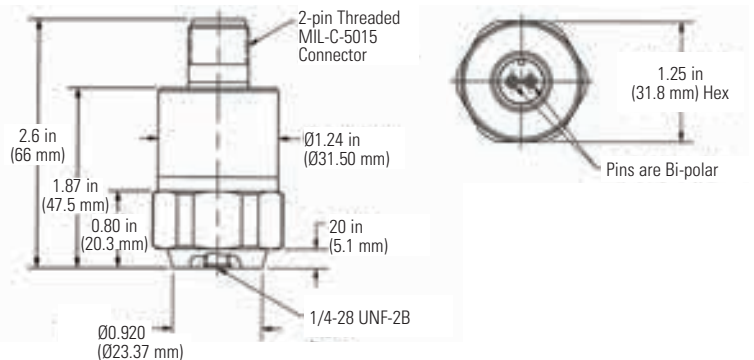
**Programmable 4-20 mA Vibration Transmitter Model 649A04**

- Output signal proportional to displacement, velocity or acceleration
- Selectable high pass and low pass filters, selectable full scale range
- Compatible with plant information systems

Product shown at actual size



CE



# Bearing Fault Detector

- Bearing condition transmitter
- Provides early warning of bearing and gear faults
- Detects impacting associated with spalling cracking and lubrication problems

Model 682B05 Bearing Fault Detector (BFD) is an advanced vibration signal conditioner designed to provide the earliest warning of imminent machinery failure. The unit works with a 100 mV/g ICP® accelerometer and serves to deliver two, 4-20 mA output signals that are proportional to the measured vibration levels of operating rotating machinery. In order to enable detection of a wide variety of machinery faults, the 4-20 mA signals are conditioned to characterize two unique vibration measurements; one containing high frequency peak data and the other containing low frequency rms data. These 4-20 mA signals may be monitored, alongside other plant process variables, using familiar PLC, DCS, SCADA, alarm and control systems. An additional analog voltage output signal is provided for spectral analysis of the monitored vibration for fault diagnostic purposes.

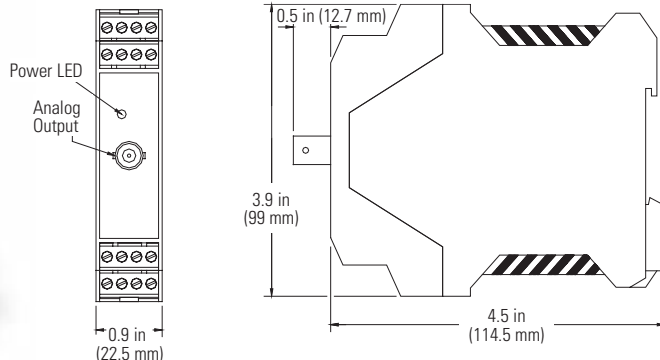
The unit employs a patented signal conditioning technique (US Patent #6,889,553) that provides the unique ability to detect bearing and gear problems at their earliest stages, thus permitting ample maintenance planning to avert a catastrophic failure. The simplified 4-20 mA signal monitoring approach represents a cost-effective alternative to complex vibration monitoring instrumentation and associated training.



## Bearing Fault Detector Model 682B05

- Provides early warning of bearing and gear faults
- Operates with PLC, DCS, SCADA, alarm, and control systems
- Outputs 2 discreet 4-20 mA signals; one proportional to peak acceleration, the other proportional to overall vibration

Product shown at actual size





Technical Specifications	
<b>Model Number</b>	<b>682B05</b>
<b>Performance</b>	
Input Signal	100 mV/g 10.2 mV/(m/s <sup>2</sup> )
Frequency Response (±3 dB) (Overall Vibration)	10 Hz to 1k Hz
Frequency Response (±3 dB) (Fault)	1 or 5 Hz to 100 kHz [1]
Measurement Range (Fault Detector)	50 g
Output Range (Linear Scale)	4 to 20 mA [1][2]
Output Range (Linear Scale)	4 to 20 mA
Sampling Time	7 sec
Span (±5 %)	16 mA
<b>Control Interface</b>	
Power LED	Green
<b>Environmental</b>	
Warm Up	<2 minutes
Temperature Range (Operating)	32 to 158 °F 0 to 70 °C
Temperature Range (Storage)	-40 to 257 °F -40 to 125 °C
Humidity Range (Non-Condensing)	<95 %
<b>Electrical</b>	
Supply Voltage	24 VDC
Current Consumption	≤ 150 mA
Excitation Voltage (±1 V)	24 VDC
Constant Current Excitation (±1 mA)	4 mA
Raw Vibration Output	+/- 0.01% of Input Vibration
Load Resistance	500 ohm
<b>Physical</b>	
Load Resistance	500 ohm 22.5 mm
Size - Height	3.9 in 99 mm
Size - Depth	4.5 in 114.5 mm
Weight	5.2 oz 145.2 gm
Housing Material	Polyamide
Screw Terminal Wire Size	24-14 AWG 0.2 - 2.5 mm <sup>2</sup>
Electrical Connector (input/output)	Removable Screw Terminals
Electrical Connector (Output, Vibration)	BNC Jack
Din Rail Mount	1.38 in 35 mm
<b>Notes</b>	
<b>All specifications are at room temperature unless otherwise specified</b>	
[1] Internal dip switch selectable	
[2] Output current voltage will fluctuate at frequencies below 5 Hz.	
[3] For CE reference PCB® Declaration of Conformance PS051 for details	
<b>Accessories &amp; Cables: Pages 146 - 159</b>	

## Early Impact Detection

IMI Sensors Model 682B05 Bearing Fault Detector (US Patent 6,889,553) senses impacts within rolling element bearings caused by bearing faults. Typical bearing faults, such as cracked races, spalling, brinelling, fatigue failure, looseness and loss of lubrication result in impacts and high frequency vibrations inside the bearing. The impacts are represented as high amplitude, narrow peaks on the acceleration time waveform and add very little energy to the overall vibration level. As a result, they are often missed in normal trending analysis. The Bearing Fault Detector accurately measures these impacts and other high frequency vibrations, providing early warning of potential problems. This unit is also effective for monitoring other problems that produce similar impacts and vibrations data, such as a chipped tooth on a gear.

The Bearing Fault Detector is a DIN rail mount vibration transmitter that works in conjunction with a typical ICP® accelerometer. It supplies the constant current power required by the accelerometer, processes data and has the following three outputs: 4-20 mA proportional to peak amplitude, 4-20 mA proportional to overall vibration level and raw vibration signal via BNC connector for diagnostic analysis. To obtain peak amplitude (measured in a 7 second window) the signal is passed through a high pass filter, rectified and run through a high speed peak detection circuit. To obtain overall vibration level, the signal is passed through a low pass filter, integrated when velocity is required, processed through a true rms circuit and scaled, depending on the desired output type (rms or calculated peak). Bearing Fault Detector output is compatible with any vibration monitoring device or plant equipment that accepts a 4-20 mA signal. It can provide 24/7 protection when used with a PLC, DCS, or SCADA system. It can also be used with numerous off-the-shelf meters, alarms and recorders.

# Reciprocating Machinery Protector

- Loop Powered 4-20 mA output reciprocating machinery protector (RMP)
- Outperforms impact transmitters
- Provides early warning of faults and mechanical looseness



**USB**   
PROGRAMMABLE

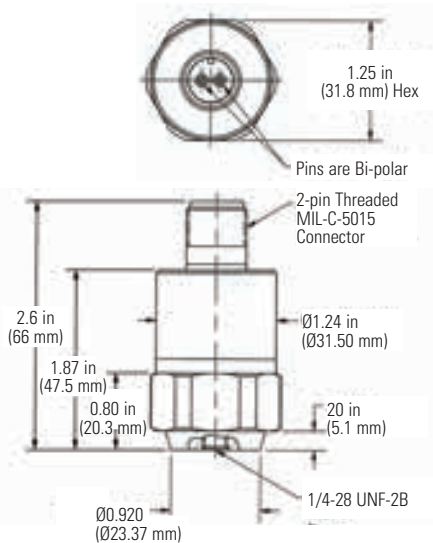
## Reciprocating Machinery Protector Model 649A01

- Output Range: 4-20 mA
- Machinery RPM Range: 150 to 4,800 cpm (2.5 to 80 Hz)
- Sampling Time: 0.2 to 6.4 sec

Product shown at actual size



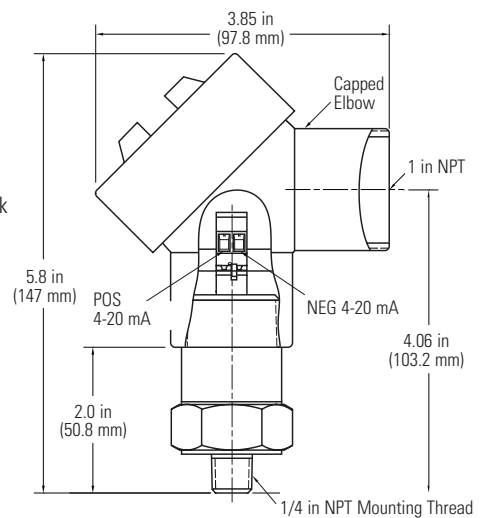
*Industry Exclusive!*



## Reciprocating Machinery Protector Model EX649A71

- CSA/ATEX Approved
- Supplied with explosion proof conduit elbow
- Electrical Connector: Terminal block

Product shown at actual size



# Reciprocating Machinery Protector



Photo Courtesy of Lone Star Compressor

Technical Specifications		
Model Number	649A01	EX649A71
<b>Performance</b>		
Output	4-20 mA	
Machinery RPM Range	150 to 4,800 cpm	
	2.5 to 80 Hz	2.5 to 80 Hz [10]
Sampling Time	0.2 to 6.4 sec	
Weighting Factor	0.1 to 20 mA	
Peak Coupling Current Range	4 to 20 mA	
Shock Threshold Limit	2 to 50 g	
<b>Environmental</b>		
Temperature Range	-40 to 212 °F	
	-40 to 100 °C	
Storage Temperature Range	-40 to 257 °F	
	-40 to 125 °C	
<b>Electrical</b>		
Excitation Voltage	15 to 30 VDC	
Load Resistance	50(Vs-15) ohm	
Electrical Isolation	>10 <sup>8</sup> ohm	
<b>Physical</b>		
Size - Hex	1.25 in	1.375 in
	32 mm	35 mm
Size - Height	2.60 in	5.8 in
	66 mm	147 mm
Size - Width	N/A	3.85 in
		98 mm
Weight	7 oz	1.1 lb
	198 gm	500 gm
Mounting Thread	1/4-28 UNF	1/4 NPT
Mounting Torque	3 to 5 ft-lb	N/A
	4 to 7 N-m	
Sensing Element	Piezoelectric Accelerometer	
Housing Material	Stainless Steel	
Sealing	Welded Hermetic	N/A
Electrical Connector	MIL-C-5015 (Top)	
Electrical Connections (Pin A)	4-20 mA Pos (+)	
Electrical Connections (Pin B)	4-20 mA Neg (-)	
Overload Limit (Shock)	5,000 g pk	
	49,050 m/s <sup>2</sup> pk	
Screw Terminal Wire Size	N/A	12-24 AWG
		3.0 - .2mm <sup>2</sup>
Conduit Housing Thread	N/A	1" NPT Female
<b>Supplied Accessories</b>		
	Model 081A41 Mounting stud 1/4-28 socket head set screw brass tip stainless steel 5/8" long (1)	
<b>Notes</b>		
<b>All specifications are at room temperature unless otherwise specified</b>		
[1] For CE reference PCB® Declaration of Conformance PS039 or PS053 for details. [2] AEx ia IIC T4 [3] AEx nA IIC T4 [4] Class I, Div. 1, Groups A, B, C and D; Class II, Div. 1, Groups E, F and G; Class III, Div. 1 [5] Class I, Div. 2, Groups A, B, C, D [6] Ex ia IIC T4, II IG [7] Ex ia IIC T4 [8] Ex nL IIC T4, II 3 G [9] Ex nL IIC T4 [10] 1Hz = 60 cpm (cycles per minute)		
<b>Optional Versions</b>		
	<b>EX - Hazardous Area Approval</b> Contact factory for specific approvals For Models: 649A01, EX649A71 <b>M - Metric Mount</b> For Models: 649A01, EX649A71	
<b>Accessories &amp; Cables: Pages 146 - 159</b>		

## Impact Detection: Preventing Failure

Although overall vibration trending is an excellent tool for monitoring the health of rotating machinery, it is not generally effective for monitoring reciprocating machinery. Since impacts generally have little effect on overall vibration level, common faults are not detected at an early stage. As a result, abnormalities are not diagnosed until damage has occurred and it is too late to take simple corrective measures. There are several reciprocating machinery faults which do not significantly increase a machine's overall vibration level until damage has reached a severe level, including: loose or broken bolts, excessive clearance in connecting pins, loose or cracked rod nuts, liquid or debris in the cylinder, cracked connecting or piston rod, scoring in the cylinder, excessive crosshead/slipper clearance and other broken parts.

The patented IMI Sensors Reciprocating Machinery Protector (RMP) Model 649A01 (US Patent #7,171,313) is very sensitive to these faults in their early stages of development. For this reason, the RMP is particularly effective in monitoring reciprocating compressors. Model 649A01 is a loop powered device which detects mechanical shock events occurring in or near the machine's cylinder assembly. The Reciprocating Machinery Protector continuously outputs the peak acceleration value, as long as there is no fault condition detected. When a threshold is exceeded, the RMP recognizes a potential fault condition and accurately outputs a computed Reciprocating Fault Index (RFI) proportional to the severity of the fault. With configurable speed parameters, adjustable sampling time and ability to customize alarm levels, the RMP is a powerful tool for reciprocating machinery protection.

Hochwertige Messtechnik und Beratung aus einer Hand

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