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# Smart Vibration Sensors

Programmable sensors utilizing microprocessor technology and application specific algorithms

## Highlights

- Fully USB programmable
- Selectable measurement parameters
- Polarity independent
- Hazardous area approvals
- Hermetically sealed
- Increases monitoring reliability

## Applications

- Motors, pumps and compressors
- Reciprocating machinery
- Cooling towers, fans and gearboxes
- Mixers
- Fin fans
- Wind turbines



Typical USB Programmer Kit

Most industrial machinery exhibit a measurable warning sign that a fault, such as a worn bearing, cracked gear, loss of lubrication, or an unbalance condition is developing. Continuous vibration monitoring of critical machinery is widely regarded as an effective means of detecting such faults before a failure occurs. *IMI Smart Vibration Sensors combine traditional vibration sensors, specialized circuitry, advanced microprocessor technology, and targeted algorithms to provide useful, accurate, and timely information regarding a machine's health.*

IMI Smart Vibration Sensors are USB programmable (using an optional USB Programmer) and have 2-pin polarity independent connections. The transmitters are 2-wire, loop-powered and are completely compatible with most existing plant monitoring systems such as PLC, DCS, or other Plant Information systems that accept a 4-20 mA input. Explosion proof, CSA, and ATEX approvals for use in hazardous areas are available for some models.



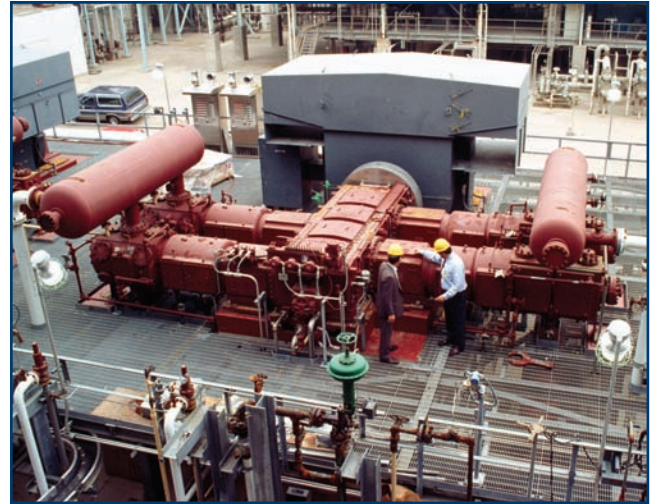
## Reciprocating Machinery Protector (US Patent Number 7,171,313)

- Outperforms impact transmitters
- Provides early warning of faults
- Detects any mechanical looseness
- Outputs *Exclusive* Reciprocating Fault Index (RFI)
- Provides continuous true peak acceleration trending
- Intrinsically Safe, Explosion Proof, and HT models available

Reciprocating compressors can develop devastating faults in a short period of time. Mechanical looseness caused by a cracked rod nut, loose bolt, or excessive clearance can deteriorate quickly resulting in catastrophic failure of the compressor. In extreme cases, this can happen in a matter of minutes.

The patented Reciprocating Machinery Protector (RMP) detects true peak acceleration, counts impacts above specific thresholds, and processes the data based on compressor speed to quantify the machine's health in terms of an *Exclusive* Reciprocating Fault Index (RFI). It outputs a 4-20 mA signal that is proportional to the RFI. Using an optional Model 070A89 USB Programmer and free software, analysis parameters can be changed to optimize the results. This data can be logged and trended to provide historical information. One RMP is recommended per cylinder and should be mounted perpendicular to the motion of the piston on the crosshead or distance piece.

The *New* Model 649A62 high-temperature (HT) RMP operates up to 500 °F (260 °C). Intrinsically safe versions (ATEX and CSA) for use in hazardous areas are available on some models.



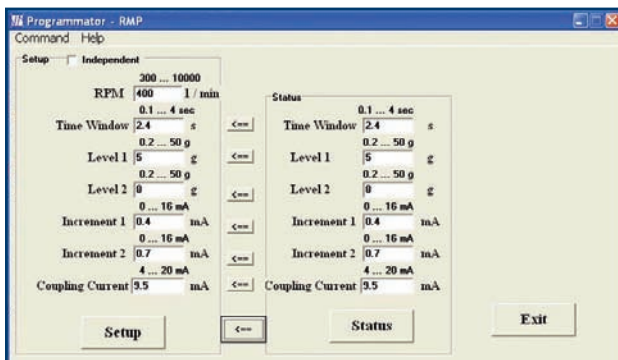
**NEW**

**Model 649A62  
High-Temperature RMP**

Series 649A Specifications	
Output	4-20 mA
Sampling Time (Programmable)	0.2 to 6.6 sec
Range (Programmable)	2 to 50 g (8 to 200 g for 649A62)
Supply Voltage (Vs @ load)	15 to 30 VDC @ 50 (Vs-15) Ohms
Operating Temperature	-40 to +212 °F (-40 to +100 °C)
Model 649A62	-40 to +500 °F (-40 to +260 °C)
Machinery Speed	150 to 4800 RPM

### Models Available

- 649A01 2-pin MIL Connector
- 649A11 Integral Cable
- 649A61 Integral Armor Cable
- 649A62 High Temperature
- 649A71 2-pin Terminal Connector
- EP649A71 Explosion Proof with Condulet Elbow
- EX649A71 Intrinsically Safe with Condulet Elbow



**RMP Programmer Screen**



## Bearing Condition Transmitter

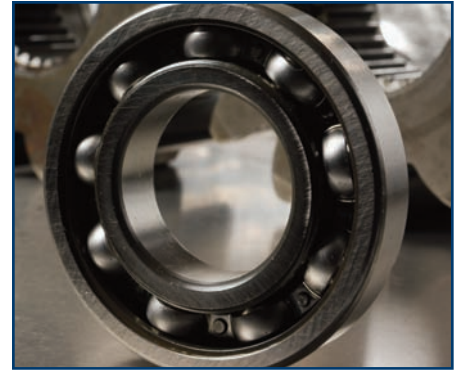
**NEW**

- Provides early warning of REB bearing faults
- Has five modes of operation
- Works on constant and variable speed machines
- Normalizes output using compensated peak
- Effective on large, slow speed roll bearings

The Bearing Condition Transmitter is a smart, microprocessor-based sensor that is specifically designed to provide early warning of typical rolling element bearing (REB) faults such as: cracked races, spalling, brinelling, looseness, and even loss of lubrication. It has five modes of detection that are user selectable for optimum performance: rms acceleration, true peak acceleration, compensated peak (using bearing diameter and speed to normalize output), crest factor, and an *Exclusive* crest factor + for improved detection on variable speed machinery.

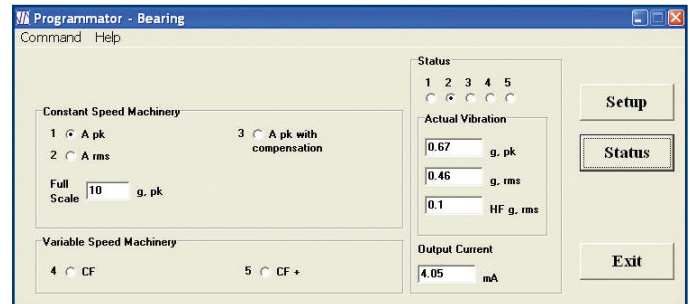


**Model 649A03**  
Bearing Condition Transmitter



### Models Available

- Model 649A03 2-pin MIL Connector
- Model 649A13 Integral Cable



**Bearing Condition Transmitter Programmer Screen**

## Programmable 4-20 mA Output Sensor

**NEW**

- Outputs acceleration, velocity, or displacement
- Selectable low and high pass filters
- Selectable full scale range
- English or metric units

The Model 649A04 is a fully USB programmable, integrated vibration sensor and transmitter. It is housed in a hermetically sealed industrial sensor housing and mounts with a standard 1/4-28 stud. It can be programmed to output a 4-20 mA signal proportional to peak acceleration, peak or rms velocity, or peak-peak displacement in either English or SI units. The sensor also has three selectable low pass filters and two high pass filters.

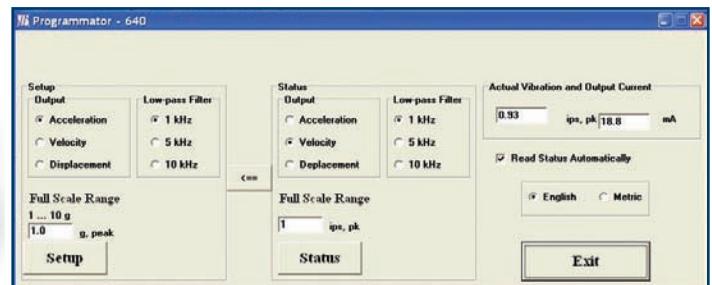


**Sensor with Integral**  
Armor Cable



### Models Available

- Model 649A04 2-pin MIL Connector
- Model 649A14 Integral Cable
- Model 649A64 Integral Armor Cable
- Model 649A74 2-pin Terminal Connector



**Programmable 4-20 mA Output Sensor Programmer Screen**



# Series 686B Smart Vibration Switch

## Smart Vibration Switch (Patent Pending)

- Solid-state relay for reliable operation
- Monitors velocity for consistent results
- 2-wire, universal power operation
- Works well in cooling tower environment
- Remote Reset Anywhere™ for safety and convenience
- Direct replacement for mechanical switches

The *Electronic* Smart Vibration Switch from IMI Sensors is a versatile, low cost, drop-in replacement for most popular mechanical vibration switches. It includes an embedded piezoelectric accelerometer for accurate measurement, monitors vibration velocity for more consistent results, and provides reliability not found in mechanical switches. It also is a significantly lower cost alternative for many electronic vibration switch applications. This 2-wire switch runs off universal AC or DC power, has a solid-state relay, and programmable time delays. It is made of stainless steel, is hermetically sealed, and survives harsh environments, making it an excellent choice for protecting cooling towers.

CSA Certified for Hazardous Areas with Condulet Elbow



### Models Available

- Model 686B01 2-pin MIL Connector
- Model 686B11 Integral Cable
- Model 686B61 Integral Armor Cable
- Model 686B71 2-pin Terminal Connector
- Model EX686B71 CSA Approved with Condulet Elbow

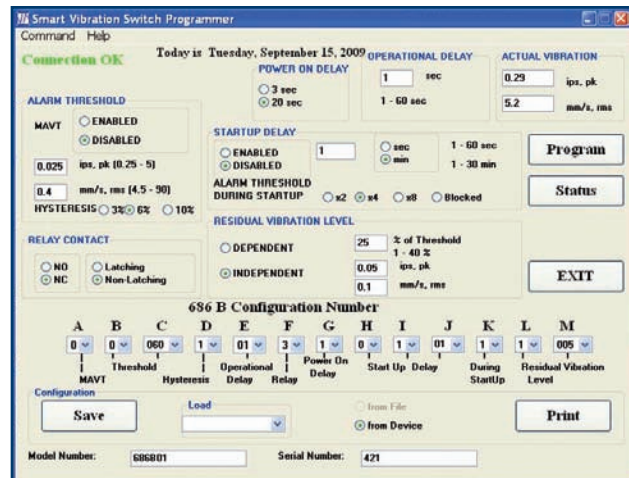


Photo Courtesy of Midwest Towers, Inc.

### Series 686B Smart Vibration Switch Specifications

Relay (Programmable)	NO, NC, Latching, Non-Latching
Power	24 to 240 V DC/AC 50-60 Hz
Alarm Threshold Level (Programmable)	0.25 to 5.0 in/sec pk or 4.5 to 90.0 mm/sec rms
Operational Delay (Programmable)	1 to 60 sec
Operating Temperature	-40 to +185 °F (-40 to +85 °C)

**Order Online @**  
**www.imi-sensors.com**



Smart Vibration Switch Programmer Screen



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IMI-Smart-Vib-Switch-0615

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IMI Sensors designs and manufactures a full line of accelerometers, sensors, vibration switches, vibration transmitters, cables and accessories for predictive maintenance, continuous vibration monitoring, and machinery equipment protection. Products include rugged, industrial ICP® accelerometers, 4-20 mA industrial vibration sensors and transmitters for 24/7 monitoring, electronic and mechanical vibration switches, the patented Bearing Fault Detector, high-temperature accelerometers to +900 °F (+482 °C), 2-wire Smart Vibration Switch, and the patented Reciprocating Machinery Protector. CE approved and intrinsically safe versions are available for most products.

Visit [www.imi-sensors.com](http://www.imi-sensors.com) to locate your nearest sales office