High Temperature Accelerometers for Turbine Monitoring

Innovations in high temperature accelerometer technology allow for vibration measurement in extreme heat environments up to +1200 °F (+649 °C). Charge amplifiers allow for use with standard data acquisition equipment.

### General Application Areas
- Gas Turbine Monitoring
- Combustion Instability Measurement
- Diesel & Gas Engine Monitoring
- Natural Gas Variations
- Wind Turbine Vibration Monitoring

### Measurement Types Supported
- High-Intensity Acoustics and Noise
- Dynamic Pressure Fluctuations, Turbulence and Pulsations
- High Temperature Pressure & Vibration
- Reciprocating Machinery Protection
- Predictive Maintenance

### High Temperature Accelerometers for Turbine Monitoring

#### Model 600A03
- +500 °F (+260 °C) Accelerometer Kit
  - Kit includes sensor, integral cable, & charge amplifier
  - Sensitivity: 100 mV/g
  - Measurement Range: ±50 g pk
  - Frequency Range: 10 kHz

#### Model EX615A42
- +500 °F (+260 °C) Charge Accelerometer
  - Sensitivity: 100 mV/g
  - Measurement Range: ±200 g pk
  - Frequency Range: 5 kHz
  - Electrical Connector: Integral Hardline Cable

#### Model EX619A11
- +900 °F (+482 °C) Charge Accelerometer
  - Sensitivity: 50 pC/g
  - Measurement Range: ±500 g pk
  - Frequency Range: 3 kHz
  - Electrical Connector: Integral Hardline Cable

#### Model EX611A00
- +1200 °F (+649 °C) Charge Accelerometer
  - Sensitivity: 10 pC/g
  - Measurement Range: ±200 g pk
  - Frequency Range: 2.8 kHz
  - UHT-12™ element

#### Model 357A9X and 357E9X
- +1200 °F (+649 °C) Charge Accelerometer
  - Sensitivity: 2.3 pC/g (357E92/93), 3.3 pC/g (357A94/95), 5 pC/g (357E90/91)
  - Measurement Range: ±1000 g pk
  - Frequency Range: 3 kHz (357A9X), 2.5 kHz (357E9X)
  - UHT-12™ element

### Pressure Sensors and Accelerometers for Precision Measurement Requirements

Throughout its 40-year history, PCB Piezotronics has been involved with the design and manufacture of sensors and associated signal conditioning instrumentation to address the demanding requirements of the power generation, reciprocating equipment, oil & gas, and petrochemical industries. Whether involved with design evaluations, field testing, compressors, diesel engines, critical component or process monitoring, we can help with off-the-shelf or custom designed equipment to meet your specific needs.

Solid supplier relationships are crucial to the success of any test or monitoring program. With an extensive design engineering team, an experienced staff of field application engineers, full in-house manufacturing capabilities, and 24-hour customer service support, PCBs has what it takes to tackle even the most unique sensor requirements. Manufacturing operations are certified to ISO 9001:2000, AS9100:2004 and calibration procedures accredited by A2LA to ISO 17025. Products are manufactured to meet the specific power generation and petrochemical design requirements, including hazardous area approvals in accordance with ATEX and CSA.

This brochure is intended as an overview to the extensive capabilities available from PCB in the field of power generation and reciprocating machinery monitoring. Additional information is available at www.imi-sensors.com. As with all PCB instrumentation, this equipment is complemented with toll-free applications assistance, a worldwide sales and distribution network, and is backed by a no-risk policy, which guarantees Total Customer Satisfaction or your money refunded.
In response to market and regulatory requirements, modern power turbine manufacturers have achieved remarkable decreases in emissions. In particular, NOx emissions have been dramatically reduced through new “lean burn” or “dry low NOx” designs. As is typically the case, these advances have come at a price. The low fuel-to-air ratios of these combustors can result in coupled acoustic and heat release pressure oscillations. Even though the magnitude of these oscillations may be low, even small fluctuations (less than 1 psi) can cause high-cycle fatigue in metal parts downstream of the combustors.

Piezoelectric pressure sensors are best suited for detecting and measuring dynamic pressure phenomena in the presence of high static pressures. Turbine applications are often at 300 psi (2068 kPa) static, with dynamic pressures up to +/- 5 psi (34 kPa); a perfect fit for PCB® sensors.

**Series 102**

- +275 °F (+135 °C) Remote Sensor
  - Sensitivities: 10 to 100 mV/psi
  - Dynamic Measurement Range: 50 to 5000 psi
  - 3/8-24 UNF fitting

**Model EX171M01**

- +500 °F (+260 °C) Close Coupled Sensor
  - Sensitivities: Up to 1100 pC/psi
  - Dynamic Measurement Range: 10 to 600 psi
  - Case isolated 2-pin MIL connector

**Series 176M**

- +986 °F (+530 °C) On-Turbine Instability Sensor (OTIS)
  - Sensitivity: 17 pC/psi
  - Dynamic Measurement Range: 20 to 400 psi
  - Case isolated, integral hardline cable

**Series 176A02**

- +1200 °F (+649 °C) On-Turbine Instability Sensor (OTIS)
  - Sensitivity: 6 pC/psi
  - Dynamic Measurement Range: 725 psi
  - Case isolated, integral hardline cable

**Electronics**

**Model 422M182**

- Sensitivity: 4 mV/pC
- Voltage Output: ±5 V pk
- Temperature Range (Operating): -60 to +185 °F

**Model EX682A40**

- Sensitivity: 10 mV/pC
- Voltage Output: ±2.5 V pk
- Temperature Range (Operating): -40 to +176 °F

**Model 421A3X**

- Configurable sensitivity
- Voltage Output: ±5 V pk
- Temperature Range (Operating): -22 °F to +185 °F

**Vibration Monitoring on Reciprocating Equipment**

**Model 649A01**

Reciprocating Machinery Protector

- Detects faults and mechanical looseness in reciprocating machinery
- Improves existing impact monitoring technology
- Provides continuous trending, with alarm and alert levels for early warning
- Field programmable set points & alarm levels optimize performance
- Hermetically sealed, loop-powered design
- Approved for use in hazardous areas
Sensors for Power Generation & Reciprocating Equipment Monitoring
Natural Gas Supply & Petrochemical Industry, Hazardous Area Approved Sensors

Sensors that offer hazardous area approvals are widely used on gas and oil well heads, supply lines, natural gas power engines, multi-stage gas compressors, and other machinery operating in hazardous environments. Piezoelectric pressure sensors offer the capability to detect and monitor dynamic pressure spikes, pulsations, and surges in gaseous or liquid media. Engine pressure sensors offer walk-around or permanent monitoring capability, allowing engine balancing and emissions control. Vibration monitoring has proven effective for determining machinery health, planning maintenance intervals, reducing downtime, and avoiding catastrophic loss.

On The Compressor:

**Series 1503**
- Monolithic Design
- 1 Piece Thread/Port/Diaphragm
- 17-4 Stainless Steel or Inconel
- Output: 4-20 mA
- Ranges from 300 to 10,000 psi
- Withstands H₂S and Sour Gas Environments
- 1/2" NPT Fitting

**Model 603C01**
- Sensitivity: 100 mV/g
- Measurement Range: ±50 g pk
- Frequency Range: 0.5 to 10000 Hz
- Electrical Connector: 2-Pin MIL-E-5015

**Series 607A**
- Sensitivity: 100 mV/g
- Measurement Range: ±50 g pk
- Low profile compact design, hermetically sealed
- Patented Swiveler® mounting for easy installation
- Integral rugged industrial armored cabling

**Model EX641B71**
- Output: 4-20 mA
- Measurement Range: 0.0 to 1 in/sec rms
- Frequency Range: 10 to 1000 Hz

**Model EX607A11 Swiveler®**
- Sensitivity: 100 mV/g
- Measurement Range: ±50 g pk
- Frequency Range: 0.5 to 10000 Hz
- Electrical Connector: Molded integral cable

**Model 121A4X**
- Sensitivities: 10 to 100 mV/psi
- Dynamic Measurement Range: 50 to 5000 psi
- ±250 °F
- 316 stainless steel diaphragm
- Case isolated
- 1/4" NPT process fitting
- Robust 2-pin MIL connector

On The Well Head and Supply Lines:

**Series 607A**
- Sensitivity: 100 mV/g
- Measurement Range: ±50 g pk
- Low profile compact design, hermetically sealed
- Patented Swiveler® mounting for easy installation
- Integral rugged industrial armored cabling

**Model EX641B71**
- Output: 4-20 mA
- Measurement Range: 0.0 to 1 in/sec rms
- Frequency Range: 10 to 1000 Hz

**Model EX607A11 Swiveler®**
- Sensitivity: 100 mV/g
- Measurement Range: ±50 g pk
- Frequency Range: 0.5 to 10000 Hz
- Electrical Connector: Molded integral cable

**Model 121A4X**
- Sensitivities: 10 to 100 mV/psi
- Dynamic Measurement Range: 50 to 5000 psi
- ±250 °F
- 316 stainless steel diaphragm
- Case isolated
- 1/4" NPT process fitting
- Robust 2-pin MIL connector

Accelerometers for Wind Turbine Monitoring

Monitoring vibration levels on wind turbines can help diagnose potential problems at an early stage and help prolong the life of the system. Accelerometers are mounted in various locations within the turbine including the main bearing, the gearbox, and the generator. They can also be used for monitoring the motor in the yaw assembly.

**Model 603C01**
- Sensitivity: 100 mV/g
- Measurement Range: ±50 g pk
- Frequency Range: 0.5 to 10000 Hz
- Electrical Connector: 2-Pin MIL-E-5015

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