Sensors for Power Generation & Reciprocating Equipment Monitoring

1967 - 2007
40
YEARS OF TOTAL CUSTOMER SATISFACTION
PCB PIEZOTRONICS

Pressure Sensors & Accelerometers for Precision Measurement Requirements.

PCB PIEZOTRONICS INC.

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Sensors for Power Generation and Reciprocating Equipment Monitoring

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, and oil, gas and petrochemical industries. Whether involved with design evaluations, field testing, compressors and diesel engines, critical component or process monitoring, we can help, with off-the-shelf or custom designed equipment to meet your specific needs.

Faithful supplier relationships are crucial to the success of any test or monitoring program. With an extensive design engineering team, experienced staff of field application engineers, full in-house manufacturing capabilities, and 24-hour customer service support, PCB® has what it takes to tackle even the most exotic 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 intrinsic safety certification 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.pcb.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 Satisfactionor your money refunded.

Total Customer Satisfaction Guaranteed ©PCB PIEZOTRONICS

General Application Areas

- Turbine Engine Monitoring
- Engine Combustion Measurement
- Diesel & Gas Engine Monitoring
- Natural Gas Variations
- Wind Turbine Vibration Monitoring

Measurement Types Supported

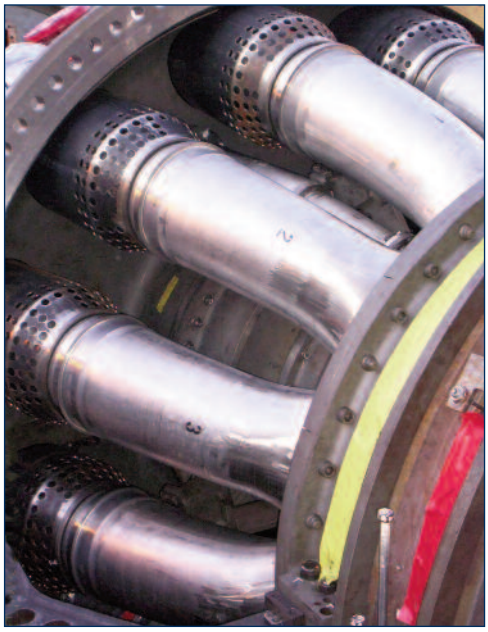
- High-intensity Acoustics and Noise
- Dynamic Pressure Fluctuations, Turbulence, Pulsations High Temperature Pressure & Vibration
- Vibration Monitoring
- Predictive Maintenance

Note: Products as show are not to scale. For actual product dimensions and specifications, please visit *www.pcb.com*

High Temperature Pressure Sensors for Turbine Engine Monitoring

In response to market and regulatory pressures, modern power turbine manufacturers have achieved unprecedented 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.



High temperature sensors allow monitoring closer to the source of combustion instability or vibration.

Series 171

- Sensitivities to 1200 pC/psi (174 pC/kPa)
- Ranges from 10 to 600 psi (70 to 4140 kPa)
- High temperatures to +500 °F (+260 °C)
- Case isolated, rugged, 2-pin MIL connector

Series 176

- Sensitivities to 17 pC/psi (2.5 pC/kPa)
- Ranges from 20 to 400 psi (140 to 2760 kPa)
- High temperatures to +1,000 °F (+535 °C)
- Low-noise, in-line differential charge amplifier
- Case isolated

CE cULus ATEX

Sensors for Power Generation and Reciprocating Equipment Monitoring

High Temperature Accelerometers for Turbine Engine Monitoring

Innovations in high temperature accelerometer technology allow for vibration measurement in extreme heat environments up to +900°F (+482°C). Integral charge amplifiers allow for use with standard data acquisition equipment.

Model 600A03

(+500 °F/ +260°C) Accelerometer Kit

- Kit includes sensor, integral cable, & charge converter
- 100 mV/g (10.2 mV/(m/s²)) sensitivity
- 10 & 1000 mV/g options available (1.02/102 mV/(m/s²))
- 1 to 10 kHz frequency range

Model 600A13

(+900 °F/ +482°C) Accelerometer Kit

- Kit includes sensor, integral cable, & charge converter
- One piece construction with hermetically sealed integral hardline cable
- 100 mV/g (10.2 mV/(m/s²)) sensitivity
- Option available for 10 m/V/g sensitivity (Model 600A14)

Natural Gas Supply & Petro-Chemical Industry Intrinsically Safe Pressure Sensors

Sensors that offer intrinsically safe certifications 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 Engine:

Series 175

- Ranges to 4000 psi (275 bar)
- High temperatures to +600 °F (+315°C)
- M14 thread
- Integral charge amplifier at end of cable

On The Compressor:

Series 1503

- Monolithic Design
  - 1 Piece Thread/Port/Diaphragm
  - 17-4 Stainless Steel or Inconel
- Outputs 2 mV/V or 4-20 mA
- Ranges from 500 to 10,000 psi
- Withstands H_2S and Sour Gas Environments
- 1/2" NPT

On The Well Head and Supply Lines:

Series 121

- Sensitivities from 10 to 100 mV/psi (1.45 to 14.5 mV/kPa)
- Ranges from 50 to 5000 psi (345 to 345 MPa)
- +250 °F (+121 °C)
- 316 stainless steel diaphragm
- Case isolated
- 1/4" NPT process fitting
- Robust 2-pin MIL connector
- Determine flow and contaminate content

CE CSA US
Ex ATEX

Vibration Monitoring on Reciprocating Equipment

Model 649A01

Reciprocating Machinery Protector

(patent pending)

- Detects faults and mechanical looseness in reciprocating compressors
- Improves on 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
- Intrinsic safe version available

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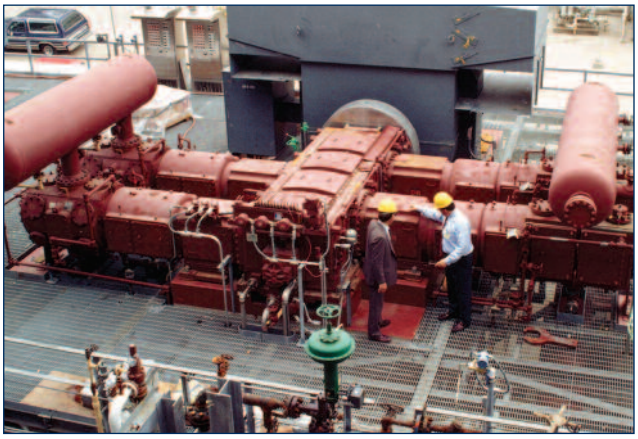

Sensors for Power Generation and Reciprocating Equipment Monitoring

Pressure Sensors for Diesel Engine Monitoring of Locomotive, Marine, and Back-up Generators

Proper monitoring of dynamic combustion pressure in diesel engines allows for extended maintenance intervals, improved fuel efficiency, and lower NOx emissions. Piezoelectric pressure sensors feature sensing elements with very fast response times, and are best suited for continuous monitoring or periodic walk-around cylinder balancing.

Series 105

- Small and robust enough to fit inside engine
- Ranges to 3600 psi (250 bar)
- High temperatures to +570 °F (+300 °C)
- M5 floating nut with 4.2mm front seal

Series 175

- Ranges to 4000 psi (275 bar)
- High temperatures to +600 °F (+315 °C)
- M14 thread
- Integral charge amplifier at end of cable

Accelerometers for Diesel Engine Monitoring

Industrial, case isolated accelerometers are ideal for use with route-based data collectors or may be used for continuous machinery monitoring of critical reciprocating equipment. They allow diesel engine bearings to be monitored for wear, overall engine knock detection and gas leakage around valves or seals.

Model HT622A01

(+325 °F/ +163°C) ICP® Accelerometer

- ICP® output-no charge converter required
- 100 mV/g (10.2 mV/(m/s²)) sensitivity
- 0.2 to 8000 Hz frequency range
- Industry standard 2-pin MIL-C-5015 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.

Series 607A ICP® Swiveler® Accelerometers

- Low profile compact design, hermetically sealed
- Patented Swiveler® mounting for easy installation
- 100 mV/g sensitivity (10.2 mV/(m/s²))
- Optional 10, 50, & 350 mV/g sensitivities (1.02, 5.1, & 35.7 mV/(m/s²))
- Integral rugged industrial armored cabling

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Visit www.pcb.com to locate your nearest sales office

ISO 9001:2000 Certified **AS9100:2004 Certified** **A2LA Accredited to ISO 17025**

PCB Piezotronics, Inc. manufactures accelerometers, force sensors, load cells, microphones, pressure transducers and transmitters, strain sensors, torque sensors, signal conditioners, cables, and accessories. This instrumentation is used for test, measurement, monitoring, and feedback control requirements in automotive, aerospace, industrial, R&D, military, educational, commercial, and OEM applications. PCB Piezotronics offers exceptional customer service, 24-hour technical assistance, and a **Total Customer Satisfaction** guarantee.

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