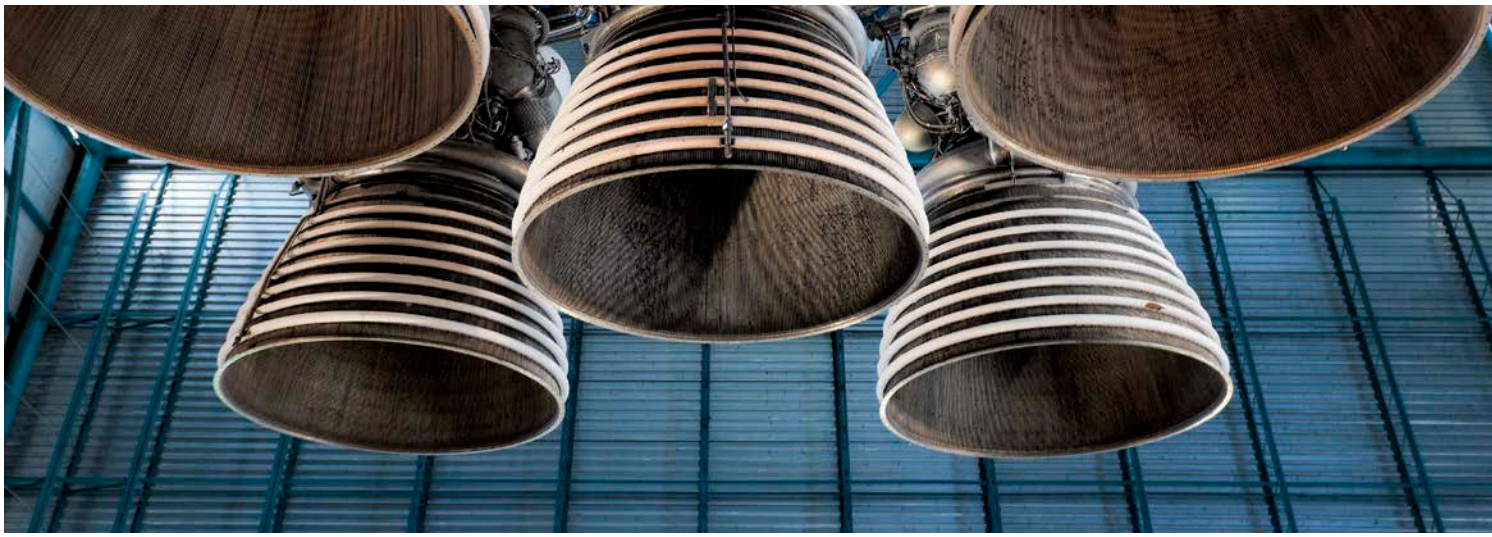


HIGH TEMPERATURE ACCELEROMETERS FOR GAS TURBINES & HELICOPTERS

PCB PIEZOTRONICS
AN AMPHENOL COMPANY

pcb.com/uht12 | 1 800 828 8840



VIBRATION TESTING IN SEVERE THERMAL ENVIRONMENTS

Featuring UHT-12™ Ultra High Temperature Sensing Element

Vibration testing of aircraft gas turbine engines, industrial turbines, rocket propulsion systems, and exhaust systems requires accelerometers that are designed to withstand very high temperature environments. PCB's accelerometers for testing and monitoring of turbomachinery are manufactured from tough low mass materials such as titanium and inconel, and are hermetically sealed.

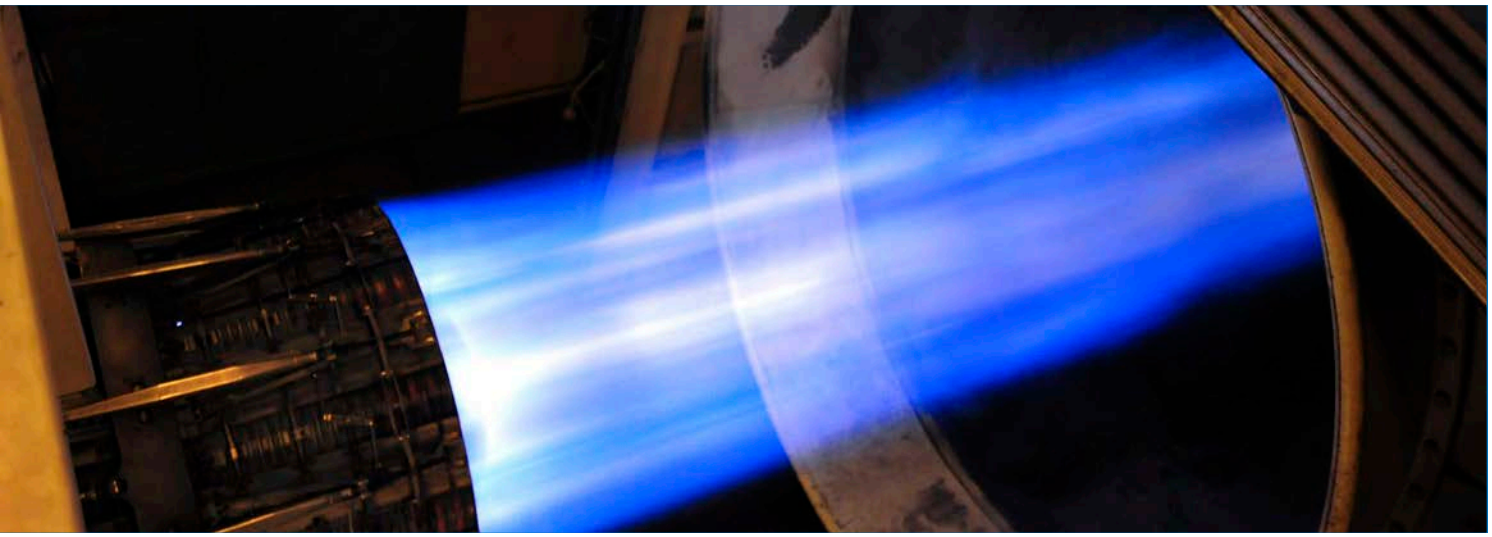
This brochure contains a sample of our stock and standard high temperature instrumentation, featuring the UHT-12™ high temperature crystal for operation to 1200 °F (650 °C). We also offer sensors that are matched precisely to the requirements of engine manufacturers to ensure successful measurement.

VIBRATION TESTING IN SEVERE THERMAL ENVIRONMENTS

- Temperature Range: -100 to +1200 °F (-73 to +650 °C)
- ICP® & Charge Output
- Case and Ground Isolation
- RTCA/DO-160 & MIL STD-810 Qualification Available
- UHT-12™ Crystal

APPLICATIONS

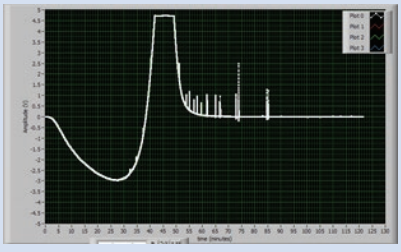
- Test & Monitor Vibration of Gas Turbine Engines
- Turbocharger and Exhaust System Testing
- Engine Balancing



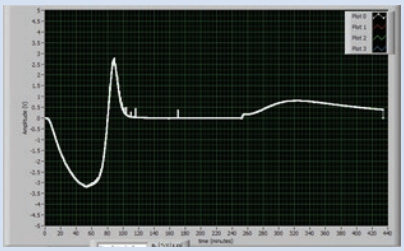
WHAT IS UHT-12™?

The UHT-12™ family of accelerometers include Model 320C52, Model 357A63, Model EX356A73, Series 339, EX357A9X, EX357E9X, and EX611. Other products such as Series 115 and 176 combustion pressure sensors are also available.

UHT-12™ is a proprietary crystal designed for more accurate, lower noise measurements at elevated temperatures. UHT-12™ technology reduces the effects of temperature variation. Pyroelectricity phenomenon may occur during large temperature fluctuations, generating “spikes” and disrupting behavior of the accelerometer and the test results. Accelerometers made with UHT-12™ technology have an improved data quality. See plots below.



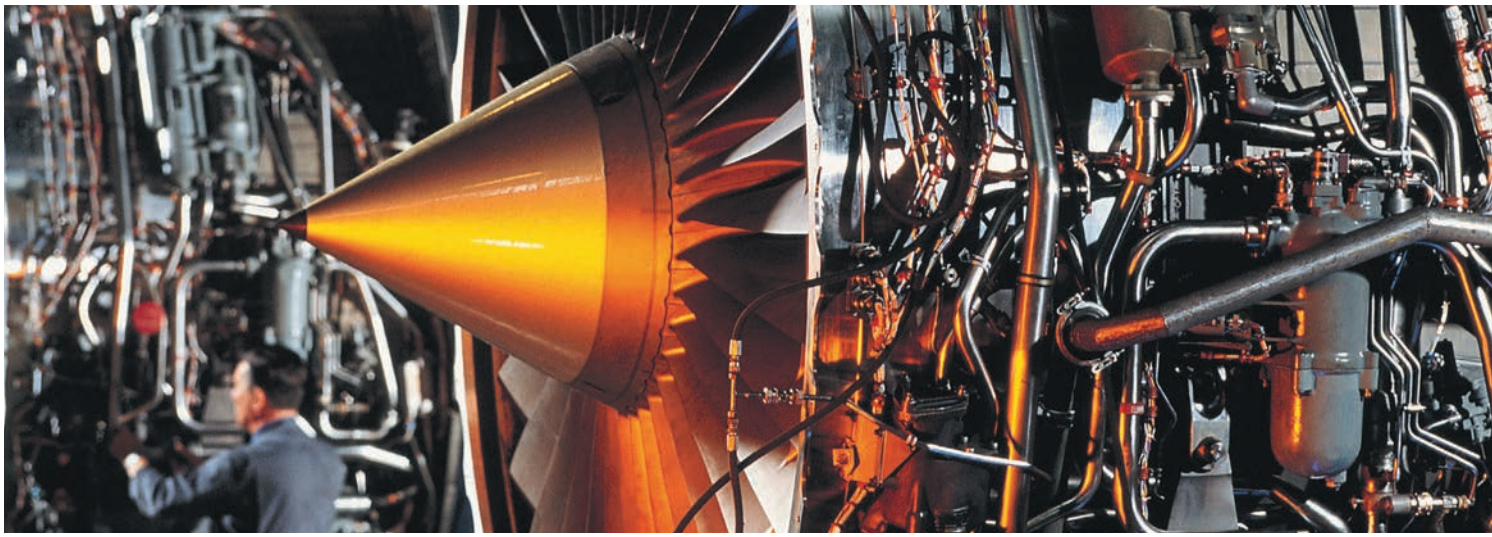
Without UHT-12™



With UHT-12™

HIGHLIGHTS

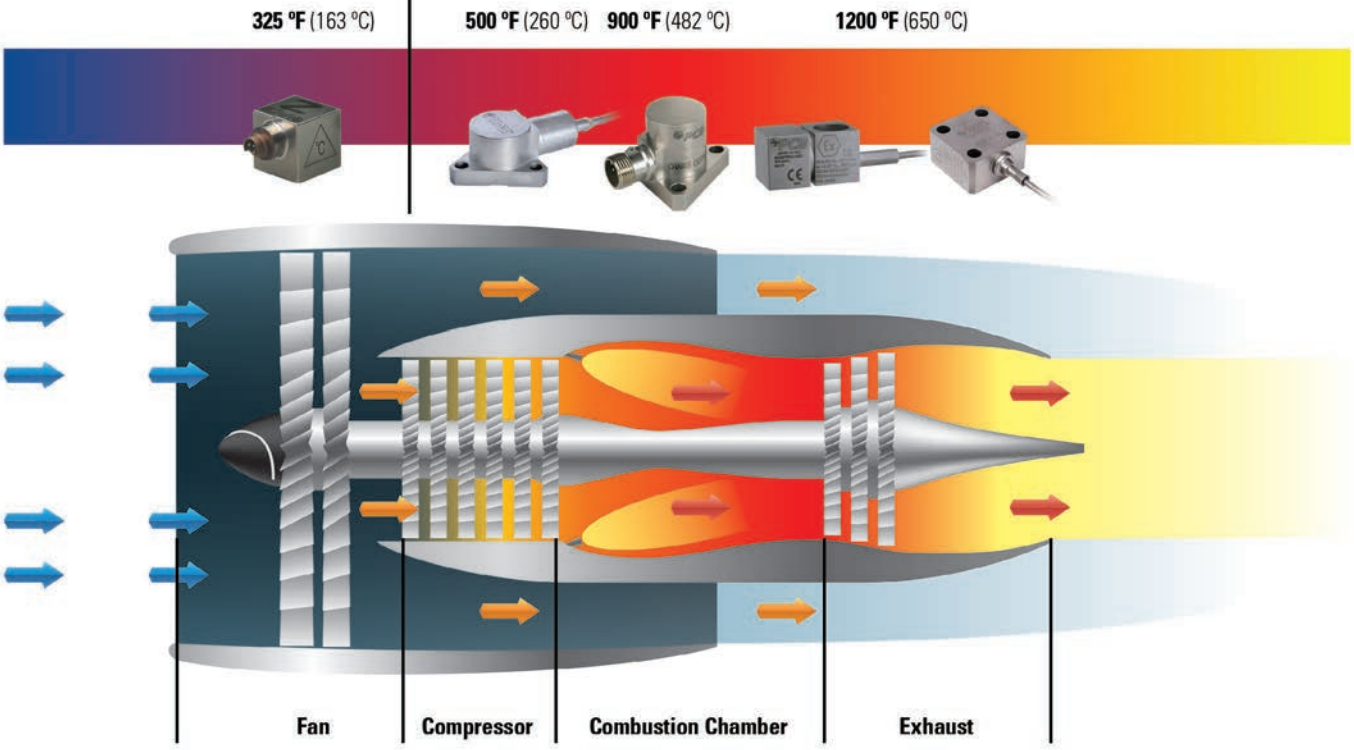
- Proprietary crystal technology sealed in a hermetic package provides long-term reliability.
- No pyroelectric output provides accurate low-frequency measurements.
- Reduced thermal noise spikes eliminate false alarms during monitoring.
- More consistent sensitivity over a wide temperature change provides greater accuracy.
- Shear mode crystals prevent base strain and transverse measurement errors.



PCB® High Temperature Accelerometers are Available to 1200 ºF (650 ºC)

ICP® Accelerometers available in single and triaxial versions to 325 ºF (163 ºC)

Charge output accelerometers for testing or continuous monitoring cover temperature ranges to 1200 ºF (650 ºC)



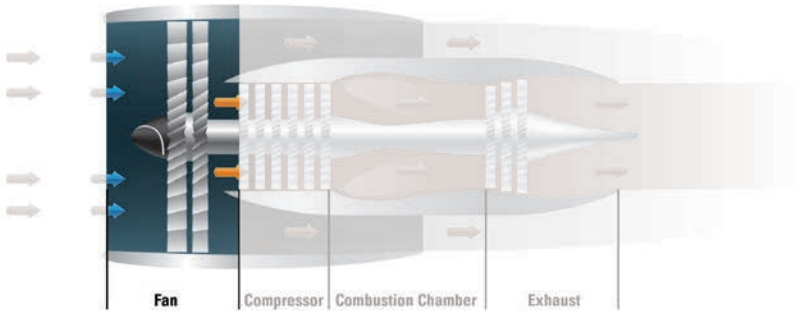
FAN AREA AND COMPONENT TESTING

HIGHLIGHTS

- Robust titanium housings
- Measuring range up to 1000 g
- Frequency from 2 to 10k Hz
- Low weight starting at only 1 gram

ICP®ACCELEROMETERS TO 356 ˚F (180 ˚C)

The fan area of a turbine engine requires test accelerometers capable of withstanding not only high temperatures but also severe vibration. With small size and low mass, ICP® accelerometers below are recommended for ESS and HALT/HASS testing of engine components.





ESS MINI QUARTZ SHEAR ICP® ACCELEROMETER

MODEL 320C15 & 320C18

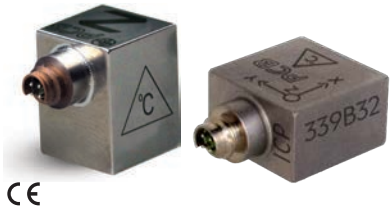
- Temperature: -100 to +325 ºF (-73 to +163 °C)
- Sensitivity: 10 mV/g
- Measuring range: 500 g
- Weight: 1.7 to 2 grams



TRIAXIAL LIGHTWEIGHT MINIATURE ICP® ACCELEROMETER

MODEL HT356B01 & HTJ356B01

- Temperature: -65 to +356 ºF (-54 to +180 °C)
- Sensitivity: 5 mV/g
- Measuring range: 1000 g
- Weight: 1 gram
- HTJ356B01 is ground isolated



UHT-12™ ICP® TRIAXIAL ACCELEROMETER

MODEL 339A31 & 339B32

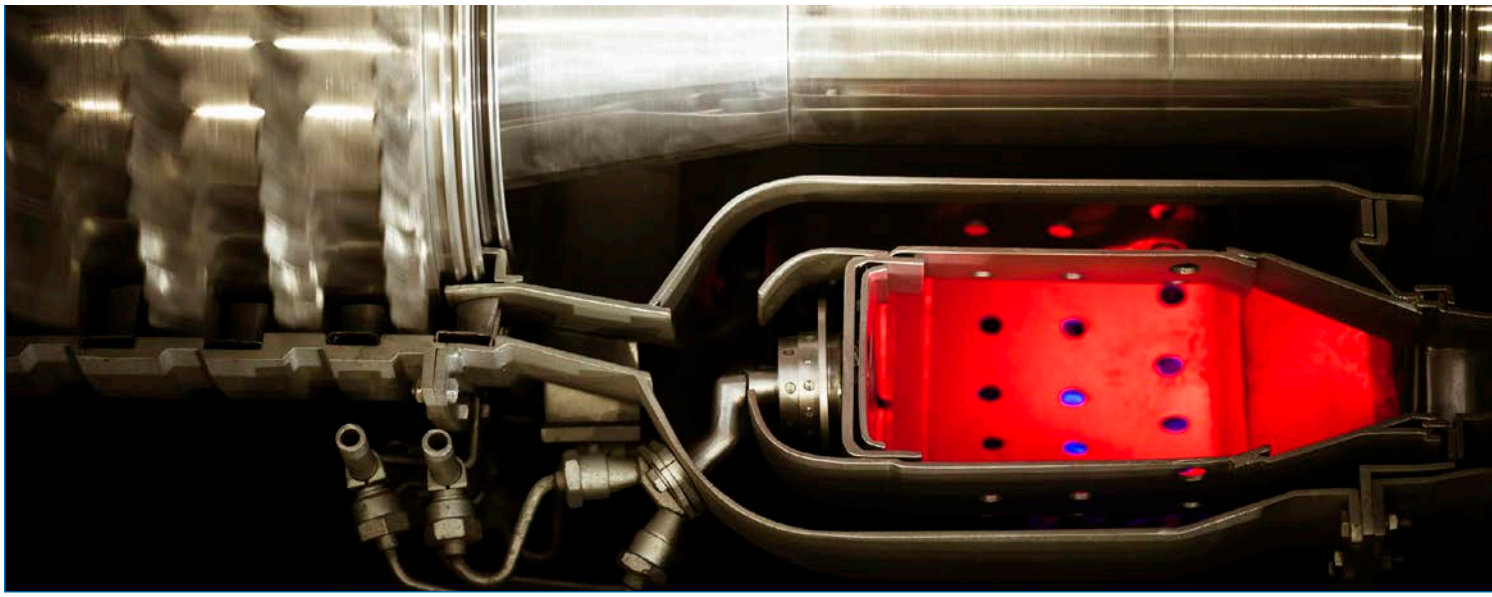
- Temperature: -65 to +325 ºF (-54 to +163 °C)
- Sensitivity: 10 mV/g
- Measuring range: 500 g
- Weight: 3.6 to 5.5 grams
- UHT-12™ sensing technology



UHT-12™ ICP® TRIAXIAL ACCELEROMETER

MODEL 339B31

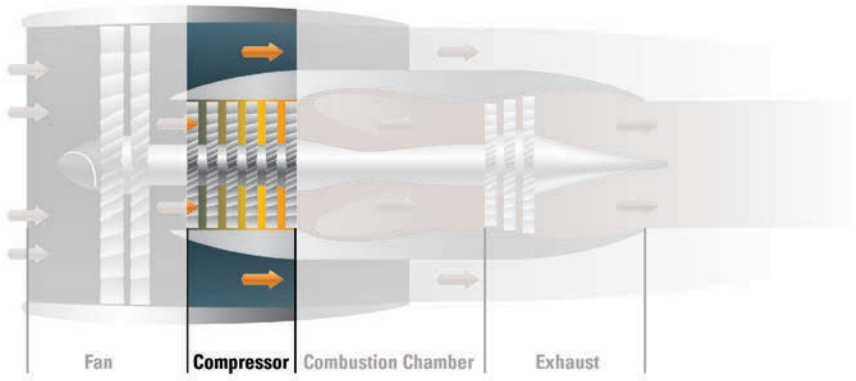
- Sensitivity: (± 10%) 10 mV/g
- Measurement Range: ±500 g pk
- Frequency Range: (±5%) 2 - 8000 Hz
- Temperature Range: (Operating) -65 to +356 °F (-54 to +180 °C)
- Weight: 4.2 grams



COMPRESSOR AREA AND COMPONENT TESTING

CHARGE OUTPUT ACCELEROMETERS TO 900 ˚F (482 ˚C)

The compressor area of a turbine engine requires an accelerometer capable of higher temperatures. The charge accelerometers listed below are ideal for the application and feature hermetically sealed titanium housings, smaller size and high frequency range.



HIGHLIGHTS

- Robust housings, hermetically sealed
- Measuring range to 2300 g
- Frequency to 12k Hz
- Miniature models from 2 grams



MINIATURE TRIAXIAL CHARGE OUTPUT ACCELEROMETER

MODEL 356A70 & 356A71

Temperature: -94 to +490 °F (-70 to +254 °C)

Sensitivity: 2.7 to 10 pC/g

Measuring range: 1500 g

Weight: 8 grams



MINIATURE RING-STYLE CHARGE OUTPUT ACCELEROMETER

MODEL 357B06

Temperature: -65 to +500 °F (-54 to +260 °C)

Sensitivity: 5 pC/g

Measuring range: 500 g

Weight: 2.3 grams



HIGH TEMPERATURE MINIATURE CHARGE OUTPUT ACCELEROMETER

MODEL 357B11

Temperature: -95 to +500 °F (-71 to +260 °C)

Sensitivity: 3 pC/g

Measuring range: 2300 g

Weight: 2 grams



CHARGE OUTPUT TRIAXIAL ACCELEROMETER WITH UHT-12™

MODEL EX356A73

Temperature: -67 to +900 °F (-55 to +482 °C)

Sensitivity: 3.2 pC/g

Measuring range: ±500 g

Weight: 150 grams



UHT-12™ HIGH TEMPERATURE CHARGE OUTPUT ACCELEROMETER

MODEL 357A63

Temperature: -65 to +900 °F (-54 to +482 °C)

Sensitivity: 0.53 pC/g

Measuring range: ±5000 g

Weight: 8.7 grams



HIGH TEMPERATURE CHARGE OUTPUT ACCELEROMETER

MODEL 357B69

Temperature: -65 to +900 °F (-54 to +482 °C)

Sensitivity: 3.5 pC/g

Measuring range: ±500 g

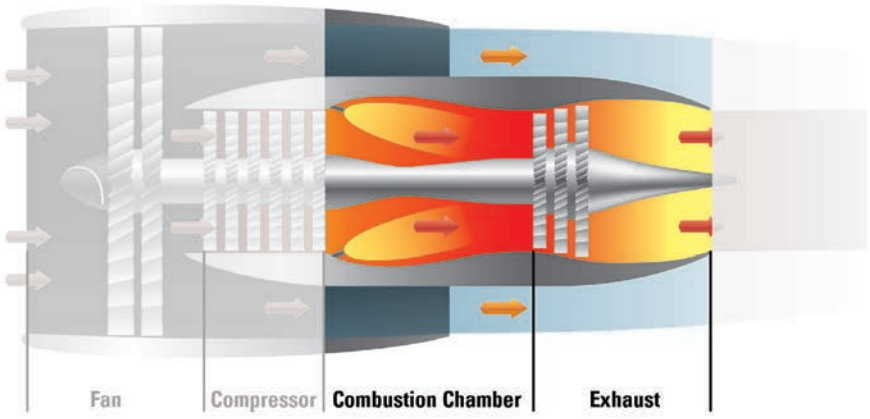
Weight: 16.0 grams



COMBUSTOR AND EXHAUST TESTING

CHARGE OUTPUT ACCELEROMETERS TO 1200 ˚F (650 ˚C)

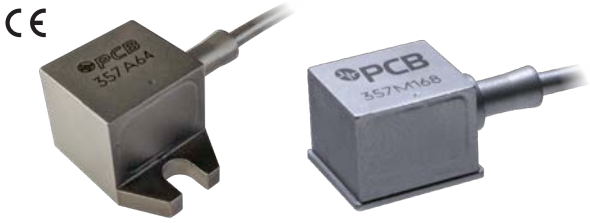
Testing the combustor and exhaust of turbine engines requires an ultra-high temperature sensor. The confined space demands accelerometer compactness. These sensors are designed specifically for the testing and development of turbine combustors and exhaust systems and feature integral hardline cables.



HIGHLIGHTS

- Compact and electrically isolated
- Temperature range to 1200 ºF (650 ºC)
- Insensitive to extreme variations in temperature with UHT-12™ element





CHARGE OUTPUT ACCELEROMETER WITH UHT-12™

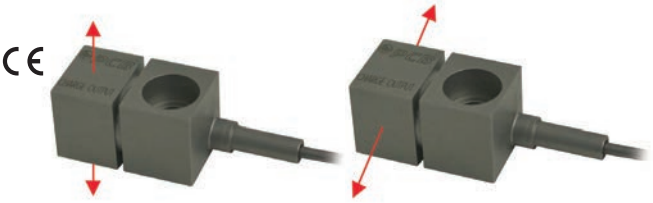
MODEL 357A64 & 357M168

Sensitivity: 1.15 pC/g

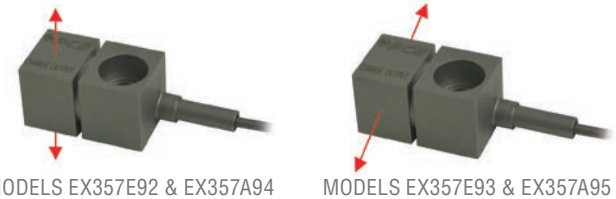
Measurement Range: ±1000 g

Signal Type: Single-ended

Connector: 10-32 jack



MODEL EX357E90 MODEL EX357E91



MODELS EX357E92 & EX357A94 MODELS EX357E93 & EX357A95

Arrows Depict Sensitive Axis

CHARGE OUTPUT ACCELEROMETER WITH UHT-12™

SERIES EX357A9X & EX357E9X

EX357E90/91 Sensitivity: 5.0 pC/g

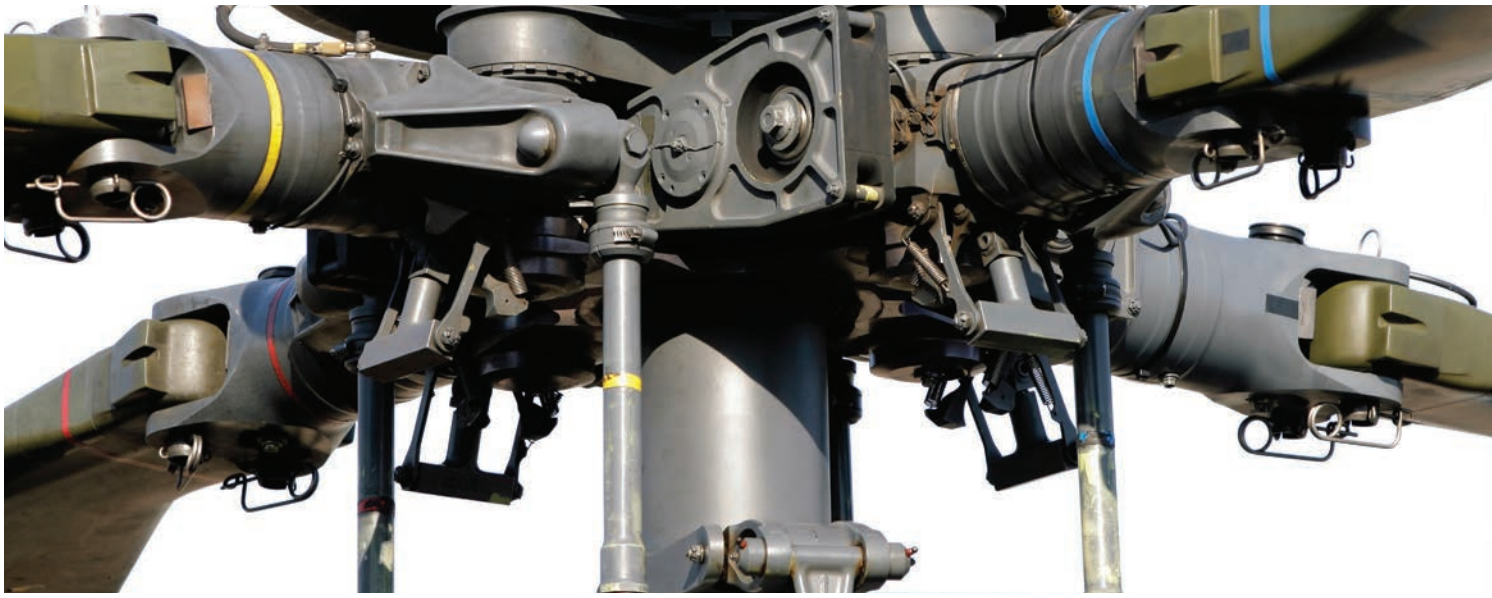
EX357E92/93 Sensitivity: 2.3 pC/g

EX357A94/95 Sensitivity: 3.3 pC/g

Measurement Range: ±1000 g

Signal Type: Single-ended (EX357E9X), differential (EX357A9X)

Connector: 10-32 jack (EX357E9X), 7/16-27 2-pin (EX357A9X)



LONG TERM VIBRATION MONITORING AND HUMS

DIFFERENTIAL ACCELEROMETERS FOR TURBINE ENGINE MONITORING

Charge mode accelerometers with high temperature differential output are ideal for monitoring of turbines and HUMS applications on helicopters.



UHT-12™ HIGH TEMPERATURE ACCELEROMETER

SERIES EX600B1X

- Temperature: -65 to 900 °F (-54 to 482 °C)
- Sensitivity: 10 to 100 mV/g
- Measurement Range: ±50 to 500 g
- Hazardous location approvals
- UHT-12™ sensing technology





HIGH TEMPERATURE CHARGE OUTPUT ACCELEROMETER WITH UHT-12™

MODEL 357A100

Temperature: -65 to 900 °F (-54 to 482 °C)

Sensitivity: 5.0 pC/g

Measuring Range: ±200 g

UHT-12™ sensing technology



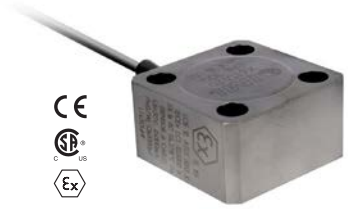
CHARGE OUTPUT ACCELEROMETER

SERIES 357C7X

Temperature: -65 to 900 °F (-54 to 482 °C)

Sensitivity: 10 to 100 pC/g

Measurement Range: 300 to 1000 g



HIGH TEMPERATURE ACCELEROMETER WITH UHT-12™

MODEL EX611A20

Temperature: -165 to 1200 °F (-109 to 650 °C)

Measurement Range: ±200 g

Featuring shear mode sensing element

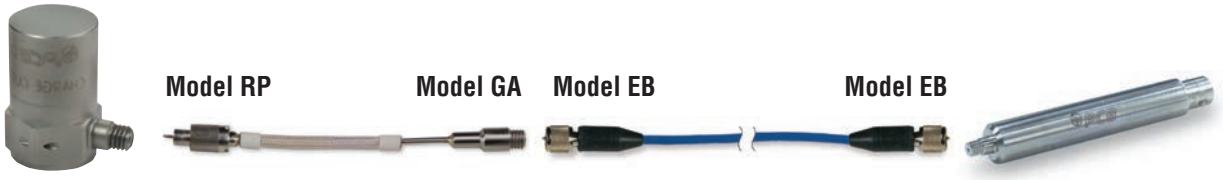
Hazardous location approvals

UHT-12™ sensing technology



ACCESSORIES

HIGH TEMPERATURE, SINGLE-ENDED, CHARGE OUTPUT SYSTEM CONFIGURATION



(xx = Cable length in feet)

Series 023
Hardline Cable

Series 003Axx
Low Noise, Softline Cable

Series 422
In-Line Charge Converter

RECOMMENDED OUTPUT CABLES



Series 003Cxx



Series 003Dxx

(xx = Cable length in feet)



SINGLE-ENDED IN-LINE CHARGE CONVERTERS

Condition signals from charge output piezoelectric sensors

Convert high impedance charge signals into low impedance voltage signals

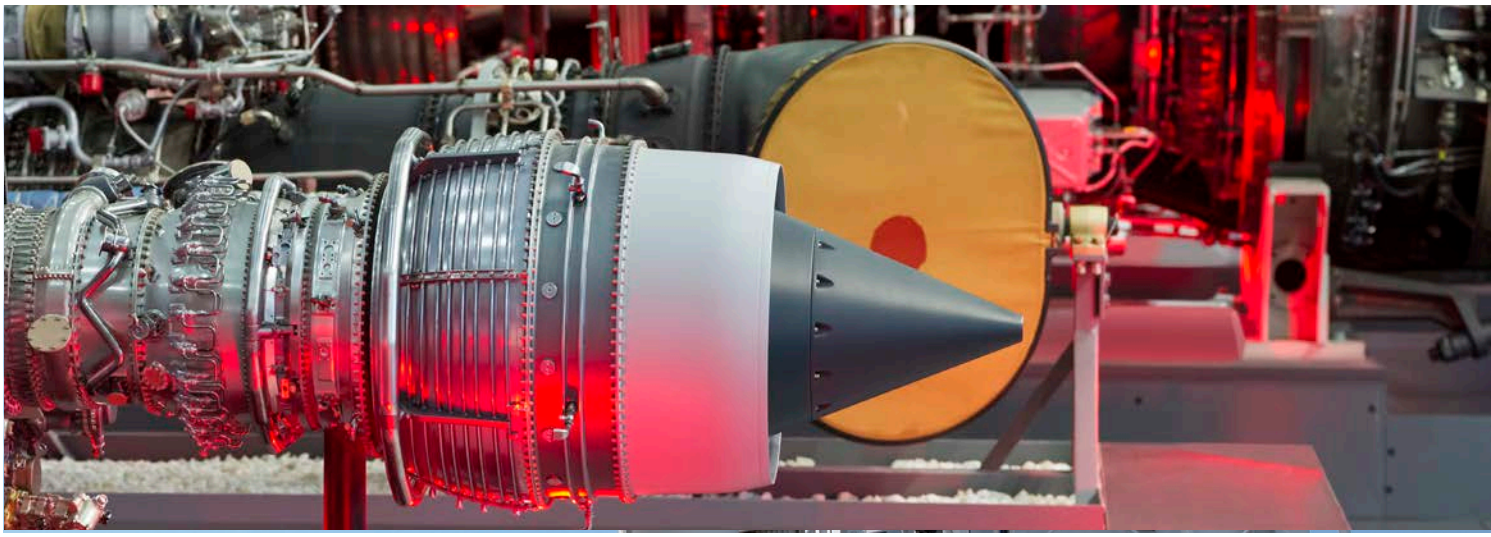
Operate with ICP® sensor signal conditioners or readout devices with an ICP® sensor input

Maintain fixed charge conversion regardless of input capacitance



Series 422Exx

Model	Sensitivity	Input Range	Low Frequency (-5%)
422E38	0.1 mV/pC	25000 pC	5 Hz
422E35	1 mV/pC	2500 pC	5 Hz
422E36	10 mV/pC	250 pC	5 Hz
422E39	1 mV/pC	2500 pC	5 Hz



DIFFERENTIAL CHARGE OUTPUT SYSTEM COMPONENTS



Model GN Hardline Accelerometer Mating Socket Connector 900 °F (482 °C)

Model 013 2-Conductor Hardline Cable 1200 °F (650 °C)

Model GP Hardline 7/16-27 2-pin Connector 900 °F (482 °C)



Model ET Softline Accelerometer Mating Socket Connector 500 °F (260 °C)

Model 045 2-Conductor Softline FEP Cable 500 °F (260 °C)

Model JD 2-pin connector mate to 495B10



Series 495B10 Differential Charge Amplifier

COMPLETE HIGH TEMPERATURE ACCELEROMETER LISTING

Temp	Model	
≥ 325 to < 500 °F (162 °C < 260 °C)	357C10	
	357C10/NC	
	320C15	
	320C18	
	357A09	
	P357A09	
	339A31*	
	339B31*	
	339B32*	
	TLD339A37	
	HT356B01	
	HTJ356B01	
	356A70	
	356A71	
	HT356A43	
	HT356A44	
≥ 500 to < 1200 °F (≥ 260 °C to < 650 °C)	357B03	
	357B06	
	357B21	
	357B04	
	357B11	
	EX356A73*	
	EX600B1X*	
	357A63*	
	357C71	
	357C72	
	357C73	
	357A07/NC	
	357A100*	
	357B69	
	357B69/NC	
	357B53	
	357B61	
	357B61/NC	
≥ 1200 °F (≥ 650 °C)	357A64*	
	357M168*	
	EX357E90*	
	EX357E91*	
	EX357E92*	
	EX357E93*	
	EX357A94*	
	EX357A95*	
	EX611A20*	

*UHT-12™ sensing technology



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