

# SKF Vibration Sensors Catalog

Vibration sensors, sensor selection, installation and mounting, cables and connectors, mounting accessories



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# Introduction

The measurement of vibration is the most common method of assessing the mechanical status of machinery for condition monitoring purposes.

Although advances have been made in the field of vibration monitoring and analysis equipment, the selection of sensors and the way they are installed on a machine remain critical factors in determining the success of any condition monitoring program. Investments made for installing superior sensors are a prudent investment since the information provided about the machine of interest is accurate and reliable. Poor quality sensors and inadequate installation can easily give misleading data or, in some cases, cause a critical machine condition to be completely overlooked.

SKF has developed a range of industrial vibration sensors that incorporates over three decades of practical experience from providing transducers such as eddy current probe displacement sensors, accelerometers and velocity sensors, to machinery monitoring of all classes in multiple industries.

## The measurements of vibration

The three parameters representing motion detected by vibration monitors are:

- Displacement
- Velocity
- Acceleration

These parameters can be measured by a variety of motion sensors and are mathematically related:

- Velocity is the first time derivative of displacement
- Acceleration is the first time derivative of velocity

Selection of a sensor proportional to displacement, velocity or acceleration depends upon the type and design of the equipment that is to be monitored, the frequencies of interest and the signal levels involved.

## Displacement sensors

Eddy current probes are non-contact sensors primarily used to measure displacement that reflects shaft radial vibration, shaft/rotor position and clearance and rotational speed. Also referred to as “proximity probes” or “displacement probes”, eddy current probes are typically applied on machines utilizing sleeve/journal bearings. They have excellent frequency response with no lower frequency limit and can also be used to provide a trigger input for phase-related measurements. Eddy current probe systems are the best solution for shaft position measurements in sleeve bearing equipment. The selection and specifications of SKF’s range of eddy current probes is detailed in a separate catalog.

## Velocity sensors

Velocity sensors are used for low to medium frequency measurements. They are useful for vibration monitoring and balancing operations on rotating machinery. As compared to accelerometers, velocity sensors have lower sensitivity to high frequency vibrations. There are two types:

- Traditional, “self-generating” velocity sensors or “velocity pickups”. These are of a mechanical design that use an electromagnetic (coil and magnet) system to generate the velocity signal. Their advantage is a direct measurement of velocity. Their disadvantages are that they wear out over time, owing to the moving parts, and are sensitive to mounting orientation.
- Piezoelectric velocity sensors (internally integrated accelerometers). These are more common today, as they have improved capabilities over self-generating types and are a more rugged and smaller size design.

## Accelerometers

The acceleration sensor is versatile, reliable and the most popular vibration sensor for machinery monitoring. For a given mechanical acceleration level, piezoelectric accelerometers have a constant signal over a wide frequency range, typically up to 20 kHz, and are very useful for all types of vibration measurements. Acceleration integrated to velocity can be used for low frequency measurements. Acceleration signals in the high frequency range added with various signal processing techniques like Acceleration Enveloping (gE) are very useful for bearing and gear measurements.

The basic acceleration sensor has a good signal to noise ratio over a wide dynamic range. They are useful for measuring low to very high frequencies and are available in a wide variety of general purpose and application specific designs.

When combined with vibration monitors capable of integrating from acceleration to velocity, accelerometers can be useful components in a multi-parameter monitoring program.

## Sensor wiring, mounting hardware and accessories

In addition to sensor selection, sensor mounting and wiring are important aspects of vibration sensor installation. As with sensors and monitoring equipment, using superior installation components is a good investment. Time and effort to troubleshoot problems related to poor cabling and inferior mounting can easily exceed the original cost of an inferior installation.

SKF offers a comprehensive product line of sensor wiring, mounting hardware and accessories. These are the same components that SKF uses in its own bearing manufacturing plants and for customer systems that are installed and maintained under SKF service contracts.

# Vibration sensor selection

The range of vibration sensors offered is wide, as a vibration sensor has many different characteristics that may vary, including measurement related factors such as frequency response, sensitivity and accuracy. Physical characteristics such as temperature rating, size and connector orientation are also considerations.

The following is a guide to SKF's experience in sensor use in the most common industrial sectors in which vibration monitoring is employed.

For each industry, the top four features required of a quality vibration sensor are stated and explained. Industrial sensor choices are graded:

- “Good” – A general purpose choice that has adequate measurement and physical characteristics for condition monitoring programs, where data is trended for change and absolute precision is not so important.
- “Better” – A general purpose choice that has adequate measurement and physical characteristics for condition monitoring programs, but adds a specific feature such as an extended temperature range or mounting orientation better suited to the application.
- “Best” – A premium choice that has optimum measurement and physical characteristics, but also offers the longest history as evidence of reliability. These are particularly suited to critical machinery applications where the sensor may be used in safety-related functions such as machinery protection.



# Pulp and paper

Following are the top features required of a quality vibration sensor in the pulp and paper industry, along with the reasons why:

- Low frequency response  $\leq 1,0$  Hz
  - For low rotational speed of rolls
- Elevated temperature 120 to 150 °C (250 to 300 °F)
  - For dryer section heat and humidity
- IP 68 cable/connector assembly
  - For wet environment and frequent roll changes
- Good signal to noise ratio
  - For bearing defect detection



**Good**  
General purpose monitoring



CMSS 2100



CMSS 2100T

**Better**  
Installation robustness



CMSS 2200



CMSS 2200T

**Best**  
Elevated temperatures



CMSS 2106



CMSS 2207

# General purpose, food and beverage

Following are the top features required of a quality vibration sensor in the food and beverage industry, along with the reasons why:

- Low frequency response  $\leq 1,0$  Hz
  - For low rotational speed of machines
- Small physical size
  - Small bearing and access restrictions
- Corrosion precautions
  - Cleaning fluid and chemical attack
- Integral cable or IP 68 connector/cable
  - Frequent hose-down environment



**Good**  
General purpose monitoring



CMSS  
780C

**Better**  
Installation robustness



CMSS  
2100F

**Best**  
Frequency and precision



CMSS  
2100



CMSS  
2200

# Oil and gas, refining, petrochemicals

Following are the top features required of a quality vibration sensor in the oil and gas, refining and petrochemical industries:

- ATEX/NEC certification
  - Hazardous area
- Minimum 10 Hz to 10 kHz frequency response
  - For turbines, blades and gears
- ±5% sensitivity precision
  - May be used for API 670 machine trip
- High EMI/RFI shielding
  - May be used for API 670 machine trip



## Good

Monitoring in Class I, Division 2 areas



CMSS  
786A-D2



CMSS  
787A-D2

## Better

Monitoring in Intrinsically Safe areas



CMSS  
786A-IS



CMSS  
787A-IS

## Best

High precision and long experience



CMSS  
793-EE  
(-FM, -CA)



CMSS  
797-EE  
(-FM, -CA)



CMSS  
793V-EE  
(-FM, -CA)

# Power generation (fossil fuel, nuclear, hydro)

Following are the top features required of a quality vibration sensor in the power generation (fossil fuel, nuclear and hydro) industry:

- Velocity and/or acceleration
  - For absolute shaft vibration
- High temperature,  $\geq 120\text{ }^{\circ}\text{C}$  ( $\geq 250\text{ }^{\circ}\text{F}$ )
  - For steam leaks
- $\pm 5\%$  sensitivity precision
  - May be used for API 670 machine trip
- High EMI/RFI shielding
  - High voltage environment



**Good**  
General purpose monitoring



CMSS 2100



CMSS 2200



CMSS 2100T



CMSS 2200T

**Better**  
Elevated temperatures



CMSS 2106



CMSS 2207

**Best**  
High precision velocity sensor



CMSS 793V

# Power generation (wind turbines)

Following are the top features required of a quality vibration sensor in the power generation (wind turbines) industry, along with the reasons why:

- Very low frequency response (-6 dB at 1,0 Hz)
  - Germanischer Lloyd requirement
- Small and compact physical size
  - Restricted space locations
- Packaged components
  - Simplicity for wind turbine OEM's
- DNV GL certification for SKF on-line IMx systems



## Good

Integral cable, general purpose monitoring



CMSS  
WIND-100-10

## Better

Cable with connector / easier in case of sensor exchange need



CMSS  
2200

# Metals

Following are the top features required of a quality vibration sensor in the metalworking industry, along with the reasons why:

- Low frequency response  $\leq 1,0$  Hz
  - For low rotational speed of machines
- Physically robust
  - Misuse, abuse and flying debris
- Corrosion precautions
  - Hot, dusty and corrosive environment
- Good signal-to-noise ratio
  - For bearing defect detection



**Good**  
General purpose monitoring



**Better**  
Installation robustness



**Best**  
Elevated temperature



# Mining, mineral processing and cement

Following are the top features required of a quality vibration sensor in the mining, mineral processing and cement industry:

- Physically robust
  - Flying debris and high vibration
- Corrosion precautions
  - Dusty and corrosive environment
- Good signal-to-noise ratio
  - For bearing defect detection
- Low frequency response 0,2 Hz
  - For very low rotational speed



**Good**  
General purpose monitoring



CMPT  
2310

**Better**  
Higher sensitivity for low amplitudes



CMPT  
2323

**Best**  
Approved for Mining



CMPT  
2310A



CMPT  
2310AC

# Industrial accelerometers for widespread applications

- CMSS 2100 Industrial accelerometer, straight exit
- CMSS 2100F Accelerometer with integral cable, straight exit
- CMSS 2200 / CMSS 2200-M8 Industrial accelerometer, side exit
- CMSS 780C / CMSS 780C-M8 Economical accelerometer, straight exit
- CMSS 793 Superior accelerometer, straight exit
- CMSS 797 Superior accelerometer, side exit



CMSS 2100



CMSS 2200 / CMSS  
2200-M8



CMSS 2100F



CMSS 797



CMSS 793



CMSS 780C / CMSS  
780C-M8

# CMSS 2100

## Industrial accelerometer, straight exit

The CMSS 2100 accelerometer is a good multi-purpose sensor. The sensor is commonly deployed in the following industries:

- Power Generation (Fossil, Nuclear, Hydro)
- Pulp and Paper
- Food and Beverage
- Automation
- Metals
- Water & Waste Water

## Features

- For use with all SKF on-line systems, protection systems and the portable data collection instruments
- Rugged, economical and all around general purpose sensor
- 100 mV/g sensitivity to optimize use in multiple applications
- Exceptional bias voltage (BV) stability at elevated temperatures
- Designed for exceptional low noise level over a wide temperature range
- Meets CE, EMC requirements
- Two mounting studs (1/4-28 and M8 x 1,25) provided
- Corrosion resistant and hermetically sealed for installation in high humidity areas
- Reverse polarity wiring protection

## Recommended connector/cable assembly

- CMSS 932 series

## Specifications

Specifications conform to ISA-RP-37.2 (1-64) and are typical values referenced at 24 °C (75 °F), 24 V DC supply, 4 mA constant current and 100 Hz.

## Dynamic

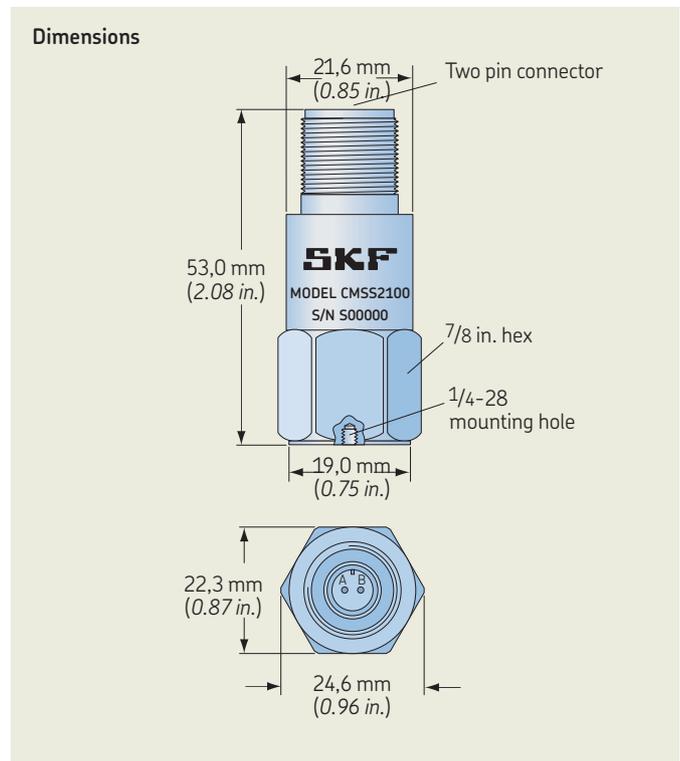
- Sensitivity: 100 mV/g
- Sensitivity precision:  $\pm 5\%$  at 24 °C (75 °F)
- Acceleration range: 80 g peak
- Amplitude linearity:  $\leq 1\%$ , up to full scale
- Frequency range:
  - $\pm 5\%$ : 3,0 to 5 000 Hz
  - $\pm 10\%$ : 1,0 to 9 000 Hz
  - $\pm 3$  dB: 0,5 to 14 000 Hz
- Resonance frequency, mounted, nominal: 30 kHz



- Transverse sensitivity:  $\leq 5\%$  of axial
- Temperature response: See graph

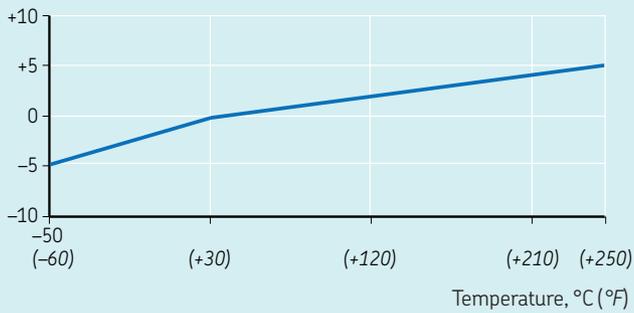
## Electrical

- Power requirements:
  - Voltage source: 24 V DC nominal, 18 to 30 V DC
  - Constant current diode: 2 to 10 mA, recommended 4 mA
- Electrical noise:
  - 2,0 Hz: 20  $\mu\text{g}/\sqrt{\text{Hz}}$
- Output impedance:  $< 100 \Omega$
- Bias output voltage: 12 V DC
- Grounding: Case isolated, internally shielded



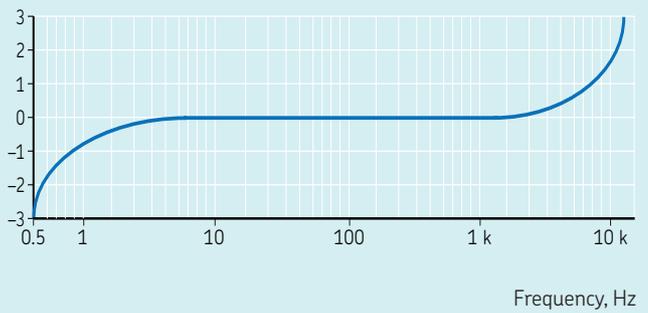
### Typical temperature response

Deviation, % sensitivity



### Typical frequency response

Deviation, dB



### Environmental

- Temperature range:  $-50$  to  $+120$  °C ( $-60$  to  $+250$  °F) operating temperature
- Vibration limit: 500 g peak
- Shock limit: 5 000 g peak
- Electromagnetic sensitivity, equivalent g, maximum: 70  $\mu$ g/gauss
- Sealing: Hermetic
- Base strain sensitivity: 0,0002 g/ $\mu$ strain
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak

### Physical

- Dimensions: See drawing
- Weight: 90 g (3.2 oz.)
- Case material: 316L stainless steel
- Mounting:
  - Internal 1/4-28 thread
  - M8  $\times$  1,25 and 1/4-28 to 1/4-28 mounting studs provided
- Mounting torque: 2,9 Nm (24 in. lbs.)
- Connections:
  - Pin A: Signal/Power
  - Pin B: Common
- Mating connector: CMSS 932-68LC or CMSS 932-68TL, two pin, IP 68, locking collar or twist lock
- Recommended cable: CMSS 932-SY-XXM and CMSS 932-DY-XXM, two conductor, twisted pair, single or double shielded, yellow

### Ordering information

**CMSS 2100** Industrial accelerometer, straight exit with MIL-C-5015 two pin connector.

- 1/4-28 and M8 mounting studs provided. Calibration sensitivity and nominal sensitivity is provided for each accelerometer package.
- For corresponding cables, refer to the section Vibration sensor cables and accessories.

# CMSS 2100F

## Accelerometer with integral cable, straight exit

The CMSS 2100F accelerometer is a good multi-purpose sensor with integral cable for light to medium-duty applications in the following industries:

- Automation
- Food and Beverage
- Pulp and Paper
- Water and Waste Water

Common applications include general purpose machines such as pumps, motors and fans.

## Features

- For use with all SKF on-line surveillance systems
- Economical, top exit design
- Rugged, corrosion resistant and hermetically sealed
- Case isolation
- Meets CE, EMC requirements
- Two mounting studs ( $1/4$ -28 and M8  $\times$  1,25) provided
- ESD protection
- Reverse wiring protection

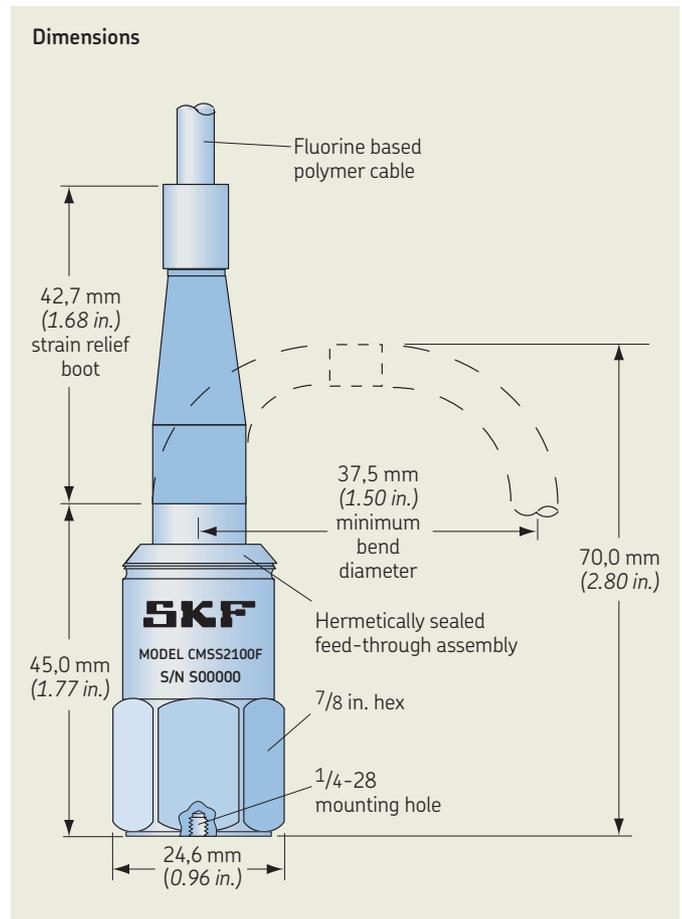
## Specifications

### Dynamic

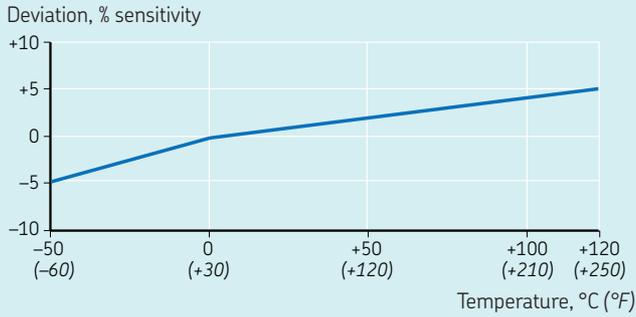
- Sensitivity: 100 mV/g
- Sensitivity precision:  $\pm 5\%$  at 24 °C (75 °F)
- Acceleration range: 80 g peak
- Amplitude linearity: 1%
- Frequency range:
  - $\pm 5\%$ : 3,0 to 5 000 Hz
  - $\pm 10\%$ : 1,0 to 9 000 Hz
  - $\pm 3$  dB: 0,5 to 14 000 Hz
- Resonance frequency, mounted, nominal: 30 kHz
- Transverse sensitivity:  $\leq 5\%$  of axial
- Temperature response: See graph

### Electrical

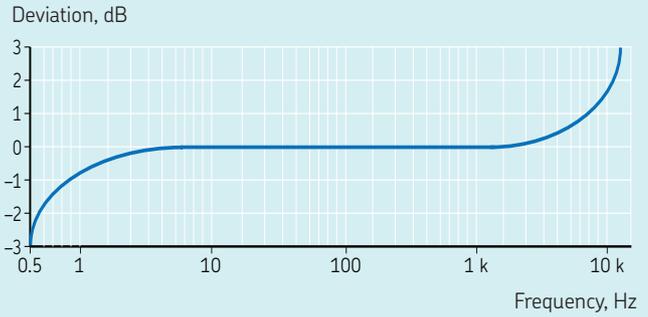
- Power requirements:
  - Voltage source<sup>1)</sup>: 18 to 30 V DC
  - Constant current diode<sup>1), 2)</sup>: 2 to 10 mA
- Electrical noise:
  - Broadband:
    - 2,5 Hz to 25 kHz: 700  $\mu$ g
  - Spectral:
    - 10 Hz: 10  $\mu$ g/ $\sqrt$ Hz
    - 100 Hz: 5  $\mu$ g/ $\sqrt$ Hz
    - 1 000 Hz: 5  $\mu$ g/ $\sqrt$ Hz
- Output impedance: < 100  $\Omega$
- Bias output voltage: 12 V DC
- Grounding: Case isolated, internally shielded



### Typical temperature response



### Typical frequency response



### Environmental

- Temperature range:  $-50$  to  $+120$  °C ( $-60$  to  $+250$  °F) operating temperature
- Vibration limit: 500 g peak
- Shock limit: 5 000 g peak
- Electromagnetic sensitivity, equivalent g maximum: 70  $\mu$ g/gauss
- Sealing: Hermetic
- Base strain sensitivity: 0,0002 g/ $\mu$ strain
- Hydrostatic pressure: 100 psi
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak

### Physical

- Dimensions: See drawing
- Weight: 90 g (3.2 oz.)
- Case material: 316L stainless steel
- Mounting: Internal  $1/4$ -28 thread
- Mounting torque: 2,9 Nm (24 in. lbs.)
- Connections:
  - Power/Signal: White
  - Common: Black
  - Case: Shield
- Integral cable: Fluorine based polymer, 5 m (16.4 ft.) blunt cut

- <sup>1</sup>To minimize the possibility of signal distortion when driving long cables with high vibration signals, 24 to 30 V DC powering is recommended. The higher level constant current source should be used when driving long cables (please consult SKF).
- <sup>2</sup>A maximum current of 6 mA is recommended for operating temperatures in excess of 100 °C (210 °F).

### Ordering information

<b>CMSS 2100F</b>	Accelerometer with 5 meter (16,4 ft) integral cable, straight exit.
<b>CMSS 2100F-33</b>	Accelerometer with 10 meter (33 ft) integral cable, straight exit.
<b>CMSS 2100F-66</b>	Accelerometer with 20 meter (66 ft) integral cable, straight exit.

- $1/4$ -28 and M8 mounting studs provided. Calibration sensitivity is provided for each accelerometer package with nominal sensitivity etched on each unit.

# CMSS 2200 / CMSS 2200-M8

## Industrial accelerometer, side exit

The CMSS 2200 accelerometer is a good multi-purpose sensor. The sensor is commonly deployed in the following industries:

- Power Generation (Fossil, Nuclear, Hydro, Wind)
- Pulp and Paper
- Mineral Processing
- Food and Beverage
- Automation
- Metals
- Water & Waste Water

## Features

- For use with all SKF on-line systems, protection systems and the portable data collection instruments
- Rugged, economical and all around general purpose sensor
- 100 mV/g sensitivity to optimize use in multiple applications
- Exceptional bias voltage (BV) stability at elevated temperatures
- Designed for exceptional low noise level over a wide temperature range
- Meets CE, EMC requirements
- Captive mounting bolts (1/4-28 and M6 x 1,00) provided
- Corrosion resistant and hermetically sealed for installation in high humidity areas
- Reverse polarity wiring protection

## Recommended connector/cable assembly

- CMSS 932 series

## Specifications

Specifications conform to ISA-RP-37.2 (1-64) and are typical values referenced at 24 °C (75 °F), 24 V DC supply, 4 mA constant current and 100 Hz.

## Dynamic

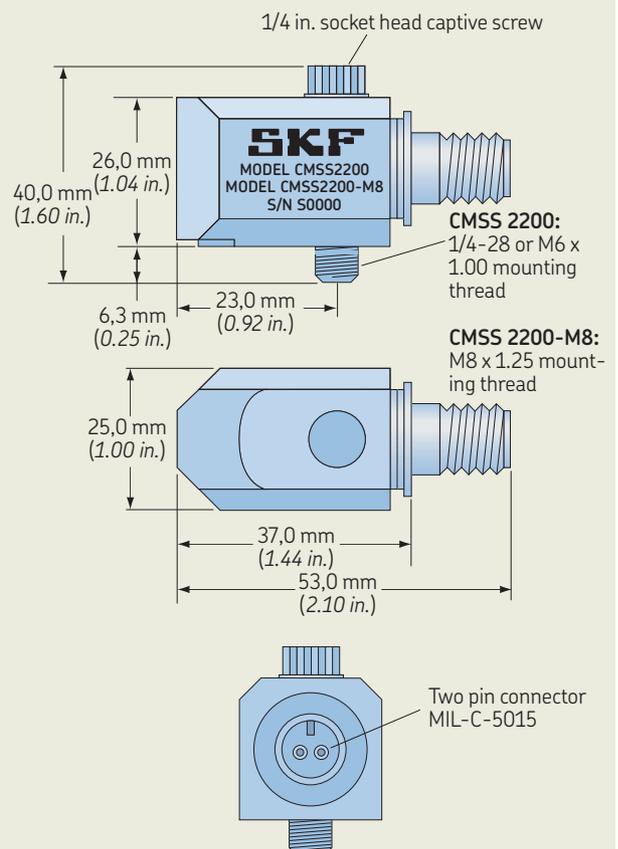
- Sensitivity: 100 mV/g
- Sensitivity precision:  $\pm 5\%$  at 24 °C (75 °F)
- Acceleration range: 80 g peak
- Amplitude linearity: 1%
- Frequency range:
  - $\pm 10\%$ : 1,0 to 5 000 Hz
  - $\pm 3$  dB: 0,7 to 10 000 Hz
- Resonance frequency, mounted, nominal: 22 kHz
- Transverse sensitivity:  $\leq 5\%$  of axial
- Temperature response: See graph



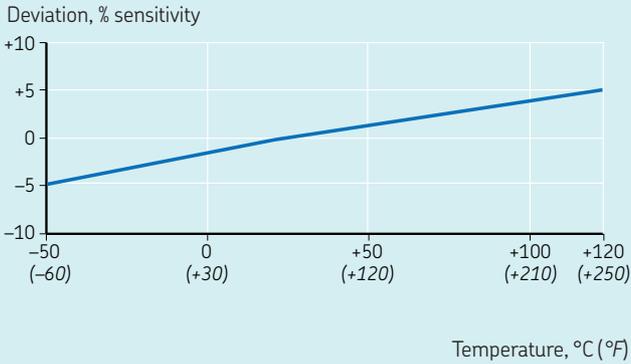
## Electrical

- Power requirements:
  - Voltage source: 18 to 30 V DC
  - Constant current diode: 2 to 10 mA, recommended 4 mA
- Electrical noise:
  - 2,0 Hz: 20  $\mu\text{g}/\sqrt{\text{Hz}}$
- Output impedance:  $< 100 \Omega$
- Bias output voltage: 12 V DC
- Grounding: Case isolated, internally shielded

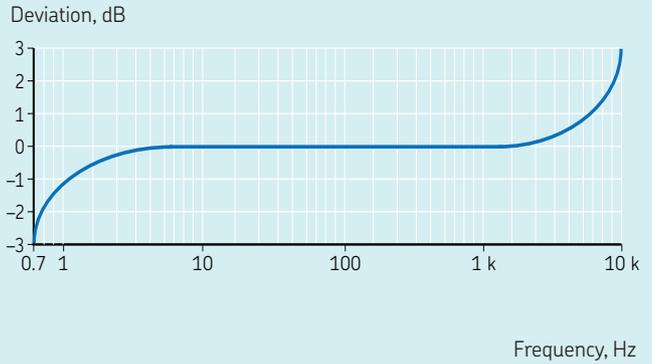
## Dimensions



### Typical temperature response



### Typical frequency response



### Environmental

- Temperature range:  $-50$  to  $+120$  °C ( $-60$  to  $+250$  °F) operating temperature
- Vibration limit: 500 g peak
- Shock limit: 5 000 g
- Electromagnetic sensitivity, equivalent g, maximum: 30  $\mu$ g/gauss
- Sealing: Hermetic
- Base strain sensitivity: 0,002 g/ $\mu$ strain
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak

### Physical

- Dimensions: See drawing
- Weight: 135 g (4.8 oz.)
- Case material: 316L stainless steel
- Mounting:  $\frac{1}{4}$ -28 and M6 x 1 captive socket head screw
- Mounting torque: 2,9 Nm (24 in. lbs.)
- Connections:
  - Shell: Ground
  - Pin A: Power/Signal
  - Pin B: Common
- Mating connector: CMSS 932-68LC or CMSS 932-68TL, two pin, IP 68, locking collar or twist lock
- Recommended cable: CMSS 932-SY-XXM and CMSS 932-DY-XXM, two conductor, twisted pair, single shielded, yellow

### Ordering information

- |                     |   |
|---------------------|---|
| <b>CMSS 2200</b>    | CMSS 2200 Industrial accelerometer with side exit MIL-C-5015 two pin connector <ul style="list-style-type: none"><li>• <math>\frac{1}{4}</math>-28 and M6 captive socket head screws provided. Calibration sensitivity and nominal sensitivity is provided for each accelerometer package</li></ul> |
| <b>CMSS 2200-M8</b> | CMSS 2200-M8 Industrial accelerometer with side exit MIL-C-5015 two pin connector <ul style="list-style-type: none"><li>• M8 x 1,25 captive socket head screw provided. Calibration sensitivity and nominal sensitivity is provided for each accelerometer package</li></ul>                        |

# CMSS 793

## Superior accelerometer, straight exit

The CMSS 793 sensor is a higher precision accelerometer mainly for use in the following industries:

- Oil and Gas
- Refining
- Petrochemicals
- Power Generation

This series of sensor is one of the most long-standing models from SKF, with over 25 years of installed experience, together with a long track record of proven reliability. It is recommended for use when the vibration signal is to be used for machinery protection applications, where a higher precision may be required.

Common applications include API 670 standard monitoring of gearboxes, pumps and compressors.

## Features

- Optimal for use with SKF on-line surveillance systems and protection systems when used with the appropriate safety barriers, accessories and/or methods as required by the particular hazardous area classification
- Rugged, corrosion resistant and hermetically sealed
- Case isolated
- Meets CE, EMC requirements
- ESD protection
- Reverse polarity wiring protection

## Recommended connector/cable assembly

- CMSS 932 series

## Specifications

Intrinsically safe certification. Installation must be in accordance with the appropriate Intrinsic Safety installation drawing.

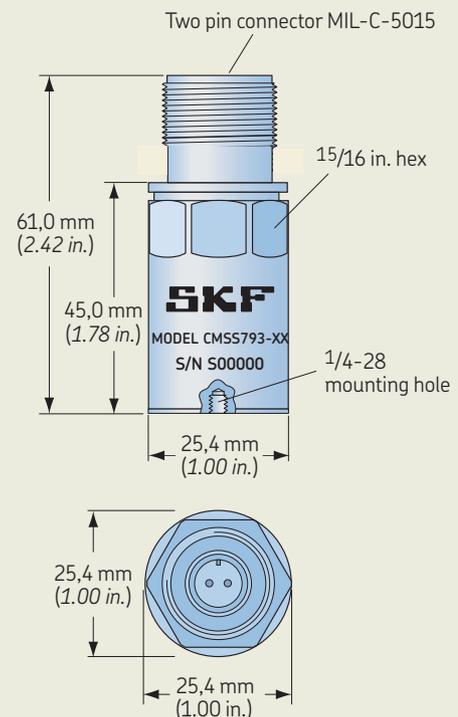
## Dynamic

- Sensitivity: 100 mV/g
- Sensitivity precision:  $\pm 5\%$  at 24 °C (75 °F)
- Acceleration range: 80 g peak
- Amplitude linearity: 1%
- Frequency range:
  - $\pm 5\%$ : 1,5 to 5 000 Hz
  - $\pm 10\%$ : 1,0 to 7 000 Hz
  - $\pm 3$  dB: 0,5 to 15 000 Hz
- Resonance frequency, mounted, nominal: 25 kHz
- Transverse sensitivity:  $\leq 5\%$  of axial
- Temperature response: See graph



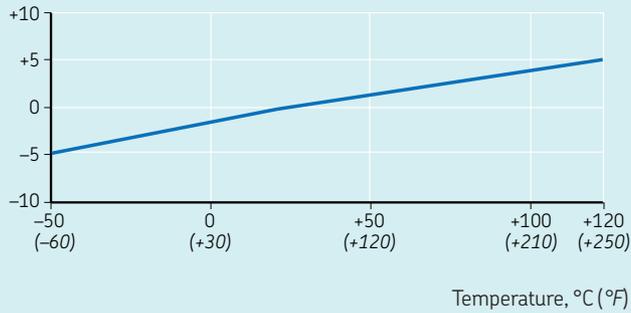
A

## Dimensions



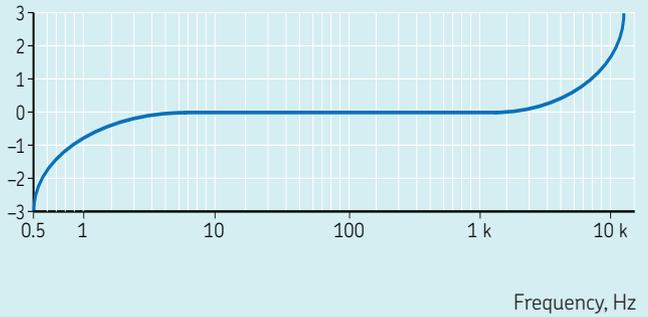
### Typical temperature response

Deviation, % sensitivity



### Typical frequency response

Deviation, dB



### Electrical

- Power requirements:
  - Voltage source<sup>1)</sup>: 18 to 30 V DC
  - Constant current diode<sup>1)</sup>, <sup>2)</sup>: 2 to 10 mA
- Electrical noise:
  - Broadband:
    - 2,5 Hz to 25 kHz: 600 µg
  - Spectral:
    - 10 Hz: 8 µg/√Hz
    - 100 Hz: 5 µg/√Hz
    - 1 000 Hz: 5 µg/√Hz
- Output impedance: < 100 Ω
- Bias output voltage: 12 V DC
- Grounding: Case isolated, internally shielded

### Environmental

- Temperature range: –50 to +120 °C (–60 to +250 °F)
- Vibration limit: 500 g peak
- Shock limit: 5 000 g (CMSS 793-EE: 2 800 g peak, Group IIC; 4 900 g peak, Group IIB, IIA)
- Electromagnetic sensitivity, equivalent g, maximum: 10 µg/gauss
- Sealing: Hermetic
- Base strain sensitivity: 0,0005 g/µstrain
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak

### Ordering information

**CMSS 793** Superior accelerometer, straight exit.

- All models with MIL-C-5015 style two pin connector. 1/4-28 mounting studs provided. A calibration certificate with the actual sensitivity of the accelerometer is included in each package. The nominal sensitivity is etched on each unit.
- CMSS 793-CA, CMSS 793-EE or CMSS 793-FM agency approved, intrinsically safe (IS), superior accelerometers with straight exit are available; please see the *Hazardous Area Approved Sensor* section.

### Physical

- Dimensions: See drawing
- Weight: 112 g (3.9 oz.)
- Case material: 316L stainless steel
- Mounting: 1/4-28 tapped hole
- Mounting torque: 2,9 Nm (24 in. lbs.)
- Connections:
  - Shell: Ground
  - Pin A: Power/Signal
  - Pin B: Common
- Mating connector: CMSS 932-68LC or CMSS 932-68TL, two pin, IP 68, locking collar or twist lock
- Recommended cable: CMSS 932-SY-XXM and CMSS 932-SB-XXM, two conductor, twisted pair, shielded, yellow or blue

<sup>1)</sup> To minimize the possibility of signal distortion when driving long cables with high vibration signals, 24 to 30 V DC powering is recommended. The higher level constant current source should be used when driving long cables (please consult SKF).

<sup>2)</sup> A maximum current of 6 mA is recommended for operating temperatures in excess of 100 °C (210 °F).

### Agency approvals for hazardous area

#### CMSS 793-CA



CSA

Class I, Division 1, Groups A, B, C, D

Must be installed per drawing 31256700.

#### CMSS 793-EE



SIRA

ATEX Zone 0

II 1 G

Ex ia IIC T4 Ga (Ta = –50 to +120 °C (–5 to +250 °F))

Must be installed per drawing 11537.

#### CMSS 793-FM



APPROVED  
FM

Intrinsically Safe

Class I, II, III, Division 1, Groups A, B, C, D, E, F, G  
NI

Class I, II, III, Division 2, Groups A, B, C, D, F, G

Must be installed per document drawing set 31475400.

# CMSS 797

## Superior accelerometer, side exit

The CMSS 797 sensor is a higher precision accelerometer mainly for use in the following industries:

- Oil and Gas
- Refining
- Petrochemicals
- Power Generation

This series of sensor is one of the most long-standing models from SKF, with over 25 years of installed experience, together with a long track record of proven reliability. It is recommended for use when the vibration signal is to be used for machinery protection applications, where a higher precision may be required.

Common applications include API 670 standard monitoring of gearboxes, pumps and compressors.

## Features

- Optimal for use with SKF on-line system surveillance systems and protection systems when used with the appropriate safety barriers, accessories and/or methods as required by the particular hazardous area classification
- Rugged, corrosion resistant and hermetically sealed
- Case isolated
- Meets CE, EMC requirements
- ESD protection
- Reverse polarity wiring protection

## Recommended connector/cable assembly

- CMSS 932 series

## Specifications

Intrinsically safe certification. Installation must be in accordance with the appropriate Intrinsic Safety installation drawing.

### Dynamic

- Sensitivity: 100 mV/g
- Sensitivity precision:  $\pm 5\%$  at 24 °C (75 °F)
- Acceleration range: 50 g peak
- Amplitude linearity: 1%
- Frequency range:
  - $\pm 5\%$ : 3,0 to 5 000 Hz
  - $\pm 10\%$ : 2,0 to 7 000 Hz
  - $\pm 3$  dB: 1,0 to 12 000 Hz
- Resonance frequency, mounted, nominal: 26 kHz
- Transverse sensitivity:  $\leq 5\%$  of axial
- Temperature response: See graph

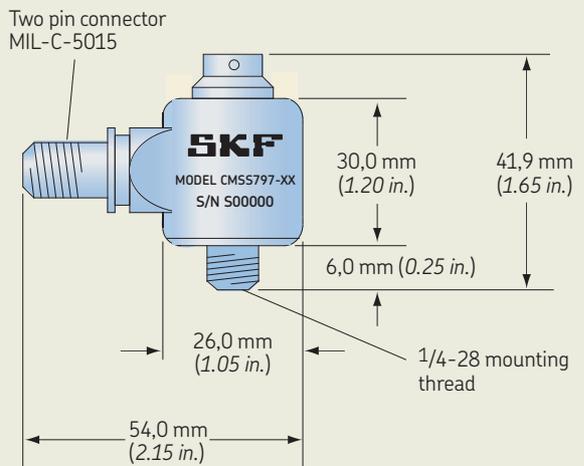


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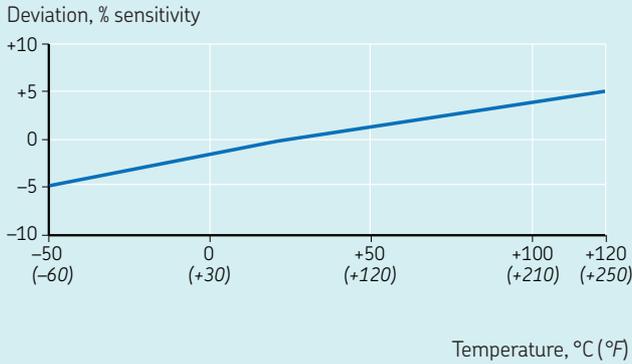
## Electrical

- Power requirements:
  - Voltage source(1): 18 to 30 V DC
  - Constant current diode(1), 2): 2 to 10 mA
- Electrical noise:
  - Broadband:
    - 2,5 Hz to 25 kHz: 600  $\mu\text{g}$
  - Spectral:
    - 10 Hz: 8  $\mu\text{g}/\sqrt{\text{Hz}}$
    - 100 Hz: 5  $\mu\text{g}/\sqrt{\text{Hz}}$
    - 1 000 Hz: 5  $\mu\text{g}/\sqrt{\text{Hz}}$
- Output impedance:  $< 100 \Omega$
- Bias output voltage: 12V DC
- Grounding: Case isolated, internally shielded

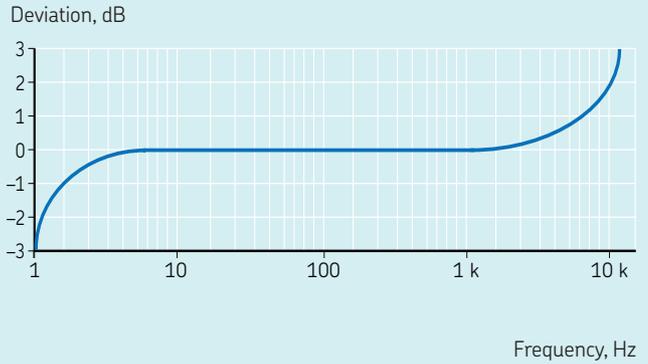
## Dimensions



### Typical temperature response



### Typical frequency response



### Environmental

- Temperature range: -50 to +120 °C (-60 to +250 °F)
- Vibration limit: 500 g peak
- Shock limit: 5 000 g
- Electromagnetic sensitivity, equivalent g, maximum: 30 µg/gauss
- Sealing: Hermetic
- Base strain sensitivity: 0,002 g/µstrain
- Radiation exposure limit (CMSS 797R): 1 × 10<sup>7</sup> RADs
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated "false equivalent g level" under the above test conditions should be less than 2 mg measured peak to peak

### Physical

- Dimensions: See drawing
  - Weight: 135 g (4.8 oz.)
  - Case material: 316L stainless steel
  - Mounting: 1/4-28 captive socket head screw
  - Mounting torque: 2,9 Nm (24 in. lbs.)
  - Connections:
    - Shell: Ground
    - Pin A: Power/Signal
    - Pin B: Common
  - Mating connector: CMSS 932-68LC or CMSS 932-68TL, two pin, IP 68, locking collar or twist lock
  - Recommended cable: CMSS 932-SY-XXM and CMSS 932-DY-XXM, two conductor, twisted pair, single shielded, yellow or blue
- 1) To minimize the possibility of signal distortion when driving long cables with high vibration signals, 24 to 30 V DC powering is recommended. The higher level constant current source should be used when driving long cables (please consult SKF).
- 2) A maximum current of 6 mA is recommended for operating temperatures in excess of 100 °C (210 °F).

### Agency approvals for hazardous area

#### CMSS 797-CA



CSA

Class I, Division 1, Groups A, B, C, D

Must be installed per drawing 31256700.

#### CMSS 797-EE



SIRA

ATEX Zone 0  
II 1 G

Ex ia IIC T4 Ga (Ta = -50 to +120 °C (-5 to +250 °F))

Must be installed per drawing 11537.

#### CMSS 797-FM



APPROVED  
FM

Intrinsically Safe

Class I, II, III, Division 1, Groups A, B, C, D, E, F, G  
NI

Class I, II, III, Division 2, Groups A, B, C, D, F, G

Must be installed per document drawing set 31475400.

### Ordering information

#### CMSS 797

Superior accelerometer, side exit.

- All models with MIL-C-5015 style two pin connector. 1/4-28 captive hex head screw. A calibration certificate with the actual sensitivity of the accelerometer is included in each package. The nominal sensitivity is etched on each unit.
- CMSS 797-CA, CMSS 797-EE or CMSS 797-FM agency approved, intrinsically safe (IS), superior accelerometers with side exit are available; please see the *Hazardous Area Approved Sensor* section.

# CMSS 780C / CMSS 780C-M8

## Small economical accelerometer, straight exit

The CMSS 780C is a cost-effective, small sensor for use with portable data collector routes found in the following industries:

- General Industry
- Food and Beverage

Common applications include general purpose machines such as pumps, motors, fans and gearboxes, where a trend of normal condition is the main measurement objective, rather than absolute sensitivity precision.

## Features

- For use with all SKF on-line surveillance systems and portable data collection instruments
- Economical top-exit design
- Small physical size
- Rugged corrosion resistant and hermetically sealed
- Case isolated
- Meets CE, EMC requirements
- ESD protection
- Reverse polarity wiring protection

### Recommended connector/cable assembly

- CMSS 932 series

## Specifications

### Dynamic

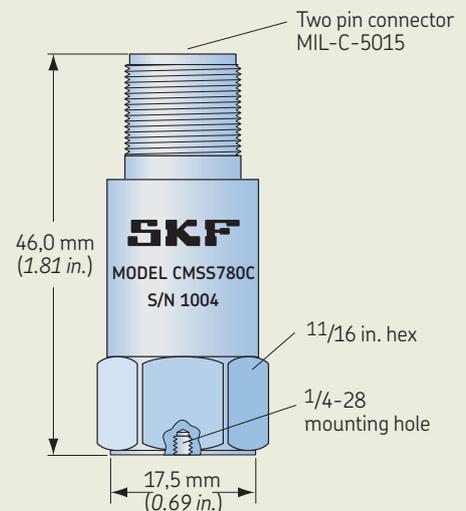
- Sensitivity: 100 mV/g
- Sensitivity precision:  $\pm 15\%$  at 24 °C (75 °F)
- Acceleration range: 80 g peak
- Amplitude linearity: 1%
- Frequency range:
  - $\pm 5\%$ : 1,0 to 7 000 Hz
  - $\pm 10\%$ : 0,7 to 9 000 Hz
  - $\pm 3$  dB: 0,4 to 14 000 Hz
- Resonance frequency, mounted, nominal: 30 kHz
- Transverse sensitivity:  $\leq 5\%$  of axial
- Temperature sensitivity:
  - -50 °C (-60 °F): -5%
  - +120 °C (+250 °F): +5%



### Electrical

- Power requirements:
  - Voltage source: 18 to 30V DC
  - Constant current diode: 2 to 10 mA
- Electrical noise:
  - Broadband:
    - 2,5 Hz to 25 kHz: 500  $\mu$ g
  - Spectral:
    - 10 Hz: 7  $\mu$ g/ $\sqrt$ Hz
    - 100 Hz: 4  $\mu$ g/ $\sqrt$ Hz
    - 1 000 Hz: 2  $\mu$ g/ $\sqrt$ Hz
- Output impedance: < 100  $\Omega$
- Bias output voltage: 12V DC
- Grounding: Case isolated, internally shielded

### Dimensions



## Environmental

- Temperature range: -50 to +120 °C (-60 to +250 °F) operating temperature
- Vibration limit: 500 g peak
- Shock limit: 5 000 g peak
- Electromagnetic sensitivity, equivalent g, maximum: 70 µg/gauss
- Sealing: Hermetic
- Base strain sensitivity: 0,0002 g/µstrain
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak

## Physical

- Dimensions: See drawing
- Weight: 62 g (2.2 oz.)
- Case material: 316L stainless steel
- Sensing element design: PZT ceramic/shear
- Mounting:
  - CMSS 780C: 1/4-28 stud
  - CMSS 780C-M8: 1/4-28 to M8 stud
- Connections:
  - Sensor casing to ground
  - Pin A: Power/Signal
  - Pin B: Common
- Output connector: Two pin, MIL-C-5015 style
- Mating connector/cable: CMSS 932 series
- Recommended cable: CMSS 932-SY-XXM and CMSS 932-DY-XXM, two conductor, twisted pair, single or double shielded, yellow

### Ordering information

- |                     |   |
|---------------------|---|
| <b>CMSS 780C</b>    | Small economical accelerometer, straight exit with 1/4-28 stud.       |
| <b>CMSS 780C-M8</b> | Small economical accelerometer, straight exit with 1/4-28 to M8 stud. |
- A calibration certificate with the actual sensitivity of the accelerometer is included in each package. The nominal sensitivity is etched on each unit.

# CMSS 2110

## Accelerometer with integral, braided cable, straight exit

The CMSS 2110 is a rugged accelerometer designed for installation where cable protection is paramount without the luxury of cable trays or protective conduit. The CMSS 2110 is typically used in the following industries:

- Food and Beverage
- Metals
- Pulp and Paper

Common applications include motors and bearings on conveyor systems.

### Features

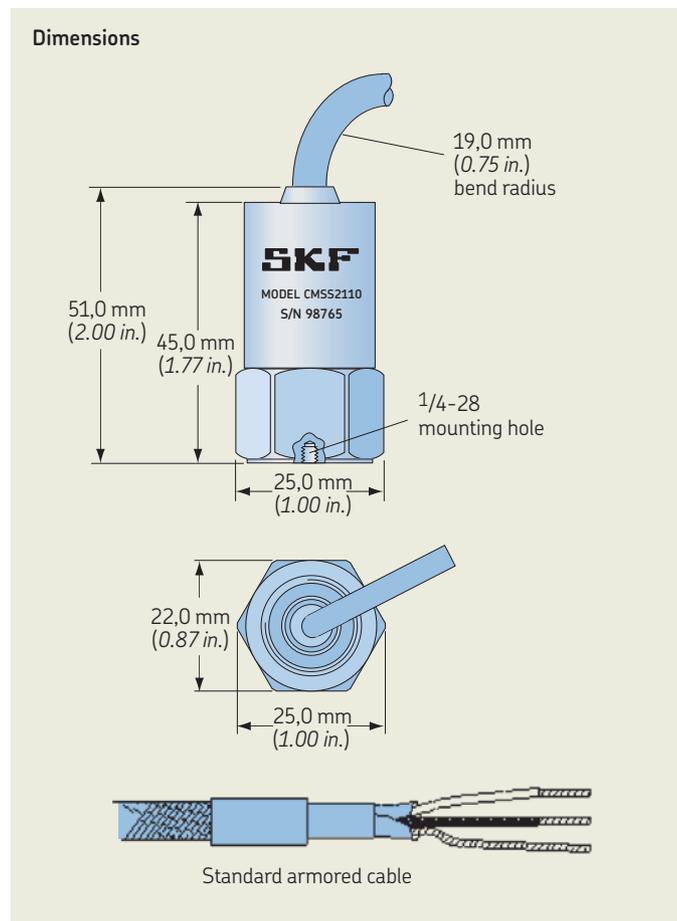
- For use with all SKF on-line surveillance systems
- Economical, top exit design
- Rugged, corrosion resistant and hermetically sealed
- Case isolated
- Meets CE, EMC requirements
- ESD protection
- Cable shield and braid connected to sensor housing
- Reverse wiring protection

### Specifications

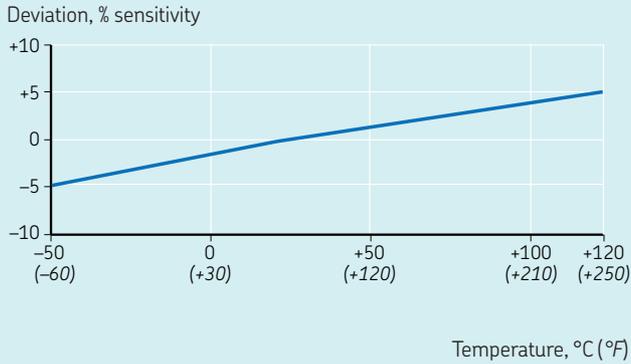
Specifications conform to ISA-RP-37.2 (1-64) and are typical values referenced at 24 °C (75 °F), 24 V DC supply, 4 mA constant current and 100 Hz.

#### Dynamic

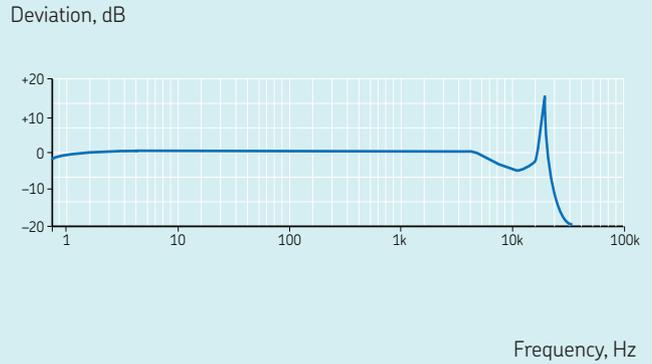
- Sensitivity: 100 mV/g
- Sensitivity precision:  $\pm 10\%$  at 24 °C (75 °F)
- Sensitivity deviation over full temperature range:  $\leq \pm 10\%$
- Acceleration range: Minimum  $\pm 8$  V equivalent to 80 g peak; turn-on time to within 10% of final bias is  $\leq 1,0$  s
- Amplitude linearity:  $\leq 1\%$ , up to full scale
- Frequency range:
  - $\pm 3$  dB: 0,8 Hz to 10,0 kHz
- Resonance frequency, mounted:
  - Nominal 25 kHz or higher
  - Controlled resonance amplitude
  - +15 dB maximum at resonance
- Transverse sensitivity:  $\leq 5\%$  of axial
- Temperature response: See graph



### Typical temperature response



### Typical frequency response



### Electrical

- Power requirements:
  - Voltage source: 24 V DC nominal,  $\pm 20\%$
  - Constant current diode: 2 to 10 mA, recommend 4 mA
- Electrical noise:
  - Broadband (2,5 Hz to 25,0 kHz): < 0,6 mg RMS
- Output impedance: < 50  $\Omega$
- Bias output voltage:
  - 12,5 to 13,5 V DC for 24 V DC supply over temperature range  $-50$  to  $+100$  °C ( $-60$  to  $+210$  °F)
  - 11,0 to 14,0 V DC for 24 V DC supply over temperature range 100 to 120 °C ( $210$  to  $250$  °F)
- Grounding:
  - Case isolated, internally shielded (Faraday cage)
  - The internal Faraday cage is connected to the signal return of the shielded twisted pair
  - The internal shield, as well as the stainless steel braid, is connected to the sensor housing
- Isolation to sensor housing: > 10 M $\Omega$  over full temperature range
- Over-voltage protection
- Reverse polarity (wiring) protection

### Environmental

- Temperature range:  $-50$  to  $+120$  °C ( $-60$  to  $+250$  °F) operating temperature
- Vibration limit: 500 g peak
- Shock limit: 1 000 g peak
- Electromagnetic sensitivity, equivalent g, maximum: < 100  $\mu\text{g}$ /gauss at 50 to 60 Hz
- Base strain sensitivity: 200  $\mu\text{g}/\mu\text{strain}$
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak

### Physical

- Dimensions: See drawing
- Cable length: 5 m (16.4 ft.)
- Weight: 350 g (12.4 oz.), including cable
- Case material: 316L stainless steel
- Mounting:
  - Internal 1/4-28 thread
  - M8  $\times$  1,25 and 1/4-28 to 1/4-28 mounting studs provided
- Mounting torque: 2,9 Nm (24 in. lbs.)
- Connections:
  - Power signal: White
  - Common: Black
  - Shielding: Drain
- Cable:
  - Integral cable, 5 m (16.4 ft.) long
  - Shielded twisted pair; two times AWG 20
  - Shield grounded to sensor housing
  - Cable armored with 304 stainless steel braid
  - Braid also connected to sensor housing
  - High temperature cable
  - Cable diameter less than 5 mm (0.19 in.)
- Cable specifications: 2/C 20 AWG FEP/A/M/FEP 10-1254; recommend two wire, twisted, shielded

### Ordering information

**CMSS 2110** Accelerometer with 5 meter (16,4 ft) overbraided integral cable, straight exit.

**CMSS 2110-33** Accelerometer with 10 meter (33 ft) integral braided cable, straight exit.

- 1/4-28 and M8 mounting studs provided. Calibration sensitivity is provided for each accelerometer package with nominal sensitivity etched on each unit.

# CMSS 2110-3

## Accelerometer with integral, braided cable, straight exit

The CMSS 2110-3 is a rugged accelerometer designed for installation where cable protection is paramount without the luxury of cable trays or protective conduit. The CMSS 2110-3 is typically used in the following industries:

- Metals
- Food and Beverage
- Pulp and Paper

Common applications include motors and bearings on conveyor systems.



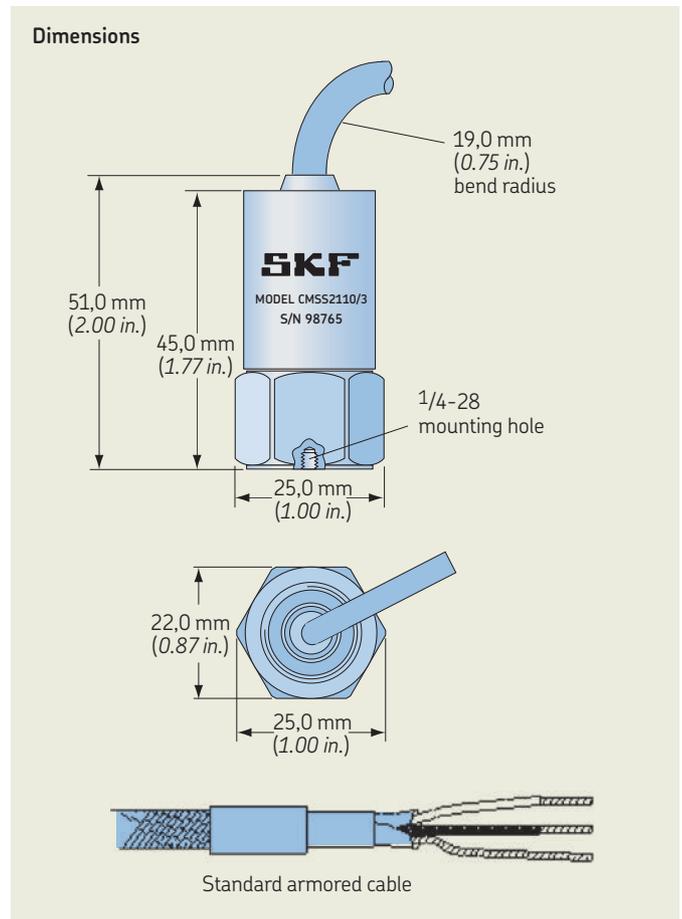
### Features

- For use with all SKF on-line surveillance systems
- Economical, top exit design
- 30 mV/g sensitivity to optimize use in most applications
- Rugged, corrosion resistant and hermetically sealed
- Case isolated
- Meets CE, EMC requirements
- ESD protection
- Cable shield and braid connected to sensor housing
- Reverse wiring protection

### Specifications

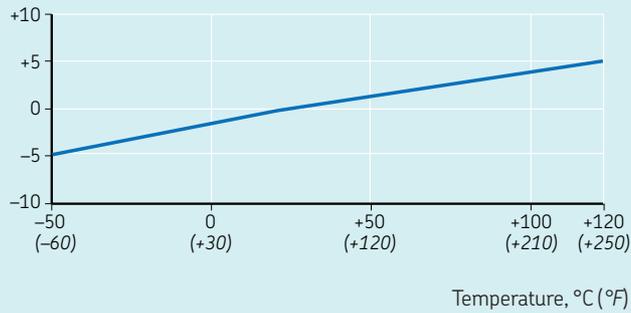
#### Dynamic

- Sensitivity: 30 mV/g
- Sensitivity precision:  $\pm 10\%$  at 20 °C (70 °F)
- Sensitivity deviation over full temperature range:  $\leq \pm 10\%$
- Acceleration range: Minimum  $\pm 6$  V equivalent to 200 g peak; turn-on time for one time constant is 0,5 s
- Amplitude linearity:  $\leq 1\%$ , up to full scale
- Frequency range:
  - $\pm 10\%$ : 3,0 to 8,0 kHz
  - $\pm 3$  dB: 0,8 to 10,0 kHz
- Resonance frequency, mounted:
  - Nominal 20 kHz or higher
  - Controlled resonance amplitude
  - Second order Q limiting filter
- Transverse sensitivity:  $\leq 5\%$  of axial
- Temperature response: See graph



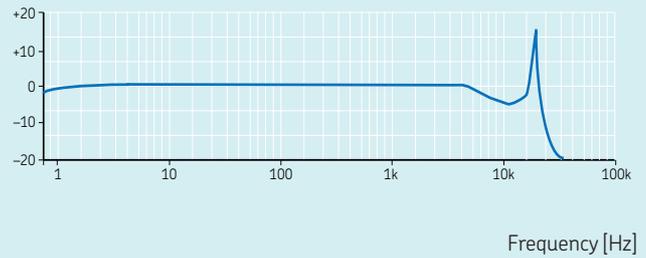
### Typical temperature response

Deviation, % sensitivity



### Typical frequency response

Deviation [dB]



### Electrical

- Power requirements:
  - Voltage source: 24 V DC,  $\pm 20\%$
  - Constant current diode: 2 to 6 mA
- Electrical noise:
  - Broadband (2,0 to 20,0 kHz): < 0,7 mg RMS
- Output impedance: < 50  $\Omega$
- Bias output voltage: 11,5 V DC ( $\pm 10\%$ ) for 24 V DC supply voltage over the temperature range from  $-50$  to  $+100$  °C ( $-60$  to  $+210$  °F)
- Grounding:
  - Case isolated, internally shielded (Faraday cage)
  - The internal Faraday cage is connected to the signal return of the shielded twisted pair
  - The internal shield, as well as the stainless steel braid, is connected to the sensor housing
- Isolation to sensor housing: > 10 M $\Omega$  over full temperature range
- Over-voltage protection
- Reverse polarity (wiring) protection

### Environmental

- Temperature range:  $-50$  to  $+120$  °C ( $-60$  to  $+250$  °F) operating temperature
- Vibration limit: 500 g peak
- Shock limit: 1 000 g peak
- Electromagnetic sensitivity, equivalent g, maximum:
  - < 100  $\mu\text{g/gauss}$  at 50 to 60 Hz
- Base strain sensitivity: 200  $\mu\text{g}/\mu\text{strain}$
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak

### Physical

- Dimensions: See drawing
- Cable length: 5 m (16.4 ft.)
- Weight: 350 g (12.3 oz.), including cable
- Case material: 316L stainless steel
- Mounting: 1/4-28 to M8 and 1/4-28 to 1/4-28 mounting studs provided
- Mounting torque: 2,9 Nm (24 in- lbs.)
- Connections:
  - Integral cable
  - Power/Signal: White
  - Common: Black
  - Shielding: Drain
- Cable:
  - Integral cable, 5 m (16.4 ft.) long
  - Shielded twisted pair; two times AWG 20
  - Shield grounded to sensor housing
  - Cable armored with 304 stainless steel braid
  - Braid also connected to sensor housing
  - High temperature cable
  - Cable diameter less than 5 mm (0.19 in.)
- Cable specifications: 2/C 20 AWG FEP/A/M/FEP 10-1254
- Cable capacitance: 25 pF/m (80 pF/ft.)

### Ordering information

- CMSS 2110-3** Accelerometer, 30mV/g, with 5 meter (16.4 ft) integral braided cable, straight exit.
- 1/4-28 and M8 mounting studs provide Calibration sensitivity is provided for each accelerometer package with nominal sensitivity etched on each unit.

# CMPT 2310

## Accelerometer for heavy-duty environments, integral, braided cable, side exit

The CMPT 2310 is a physically rugged accelerometer optimized for use in heavy-duty environments such as the following industries:

- Mining
- Mineral Processing
- Cement

In these industries, dust, mud and flying debris are commonplace, together with low rotational speeds. When used on shakers and screens, the accelerometer must also withstand high levels of continuous and random vibration. The sensor uses an integral cable with stainless over-braid for protection in heavy-duty environments.

### Features

- For use with all SKF on-line surveillance systems
- 100 mV/g sensitivity
- Physically rugged
- Meets CE, EMC requirements
- Low profile, side exit industrial accelerometer with M6 × 1 and 1/4-28 UNF socket head cap screws provided
- 5 m (16.4 ft.) integral cable with stainless steel over-braid
- Corrosion resistant and encapsulation sealed
- The internal sensor capsule is isolated from the machine ground
- Low noise, highly shock resistant
- Overload protected electronics
- Reverse wiring protection

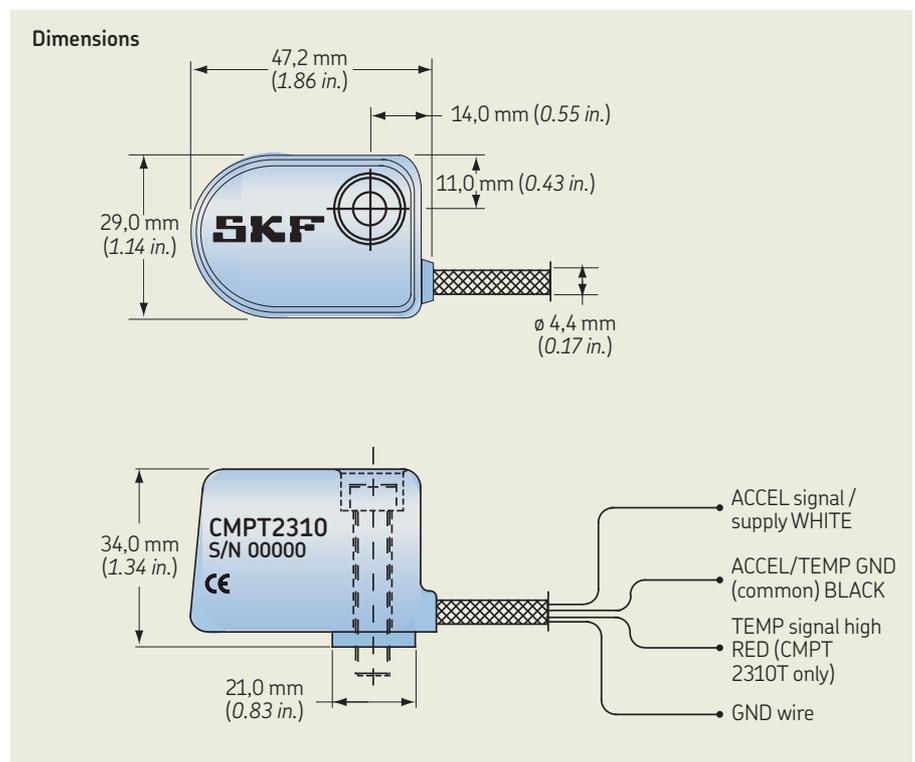


### Specifications

Specifications conform to ISA-RP-37.2 (1-95) and are typical values referenced at 24 °C (75 °F), 24 V DC supply, 4 mA constant current and 80 Hz.

#### Dynamic

- Sensitivity: 100 mV/g
- Sensitivity precision: ±10% at 24 °C (75 °F)
- Sensitivity deviation over full temperature range: 10%, approximately -5% at -50 °C (-60 °F) and +5% at +120 °C (+250 °F)
- Acceleration range: 70 g peak
- Amplitude linearity: < 1%, up to full scale
- Frequency range:
  - +/- 3dB%: 1.0 Hz to 10.0 kHz
- Transverse sensitivity: ≤ 5% of axial
- Resonance frequency, mounted, nominal: 18 kHz



## Electrical

- Power requirements:
  - Voltage source: 24 V DC nominal, 18 to 30 V DC
  - Constant current diode: 4 mA at 24 V, 2 to 10 mA is permissible
- Electrical noise: < 1 mg RMS broadband 2,5 Hz to 25,0 kHz
- Bias output voltage: 11,5 V DC,  $\pm 10\%$  for 24 V DC supply at 25 °C (77°F)
- Grounding: Case isolated, internally shielded (Faraday cage)
  - Faraday cage connected to power supply return
- Over-voltage protection: Approximately 18 V DC
- Reverse polarity (wiring) protection

## Environmental

- Temperature range:
  - Accelerometer measurement temperature range: –50 to +120 °C (–60 to +250 °F)
  - Maximum operating temperature: 120 °C (250 °F)
  - Storage temperature: –50 to +150 °C (–60 to +300 °F)
- Vibration limit: 70 g peak
- Shock limit: 5 000 g peak
- Electromagnetic sensitivity, equivalent g, maximum: < 100  $\mu\text{g}$ /gauss at 50 to 60 Hz
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak
- IEC: 529, IP 67 (For climatic conditions, recommend to use conduit/hose over braided cable.)

## Physical

- Dimensions: See drawing
- Weight:
  - Sensor without cable: 210 g (7.4 oz.)
  - Sensor with cable: 410 g (14.5 oz.)
- Case material: 304 stainless steel
- Mounting: M6  $\times$  1 and 1/4-28 UNF socket head cap screws provided
- Mounting torque: 6 Nm (50 in. lbs.)
- Cable: Integral cable, 5 m (16.4 ft.) length
- Wire specification: 0,32 mm<sup>2</sup> (AWG 22) stranded tin copper (seven strands at 0,05 mm<sup>2</sup> each)
- Connections:
  - White: ACCEL signal/power (connected to constant current source)
  - Black: ACCEL signal ground (GND)
  - Blank twisted wire: Screen connected to internal shield

### Ordering information

<b>CMPT 2310</b>	Accelerometer with 5 meter (16,4 ft) integral braided cable, side exit.
<b>CMPT 2310X10</b>	Accelerometer with 10 meter (33 ft) integral braided cable, side exit.
<b>CMPT 2310X15</b>	Accelerometer with 15 meter (50 ft) integral braided cable, side exit. <ul style="list-style-type: none"><li>• 1/4-28 and M6 <math>\times</math> 1 socket head cap screws provided. Calibration certificate with the actual sensitivity is provided for each accelerometer package.</li></ul>

# CMPT 2323

## Accelerometer for heavy-duty environments, integral, braided cable, side exit

The CMPT 2323 is a physically rugged accelerometer optimized for use in heavy-duty environments such as the following industries:

- Mining
- Mineral Processing
- Cement

In these industries, dust, mud and flying debris are commonplace, together with low rotational speeds. When used on shakers and screens, the accelerometer must also withstand high levels of continuous and random vibration. The sensor uses an integral cable with stainless over-braid for protection in heavy-duty environments. A higher sensitivity is used for detection of low amplitude signals in slow moving equipment.

### Features

- For use with all SKF on-line surveillance systems
- 230 mV/g sensitivity
- Physically rugged
- Meets CE, EMC requirements
- Low profile, side exit industrial accelerometer with M6 x 1 and 1/4-28 UNF socket head cap screws provided
- 5 m (16.4 ft.) integral cable with stainless steel over-braid
- Corrosion resistant and encapsulation sealed
- The internal sensor capsule is isolated from the machine ground
- Low noise, highly shock resistant
- Overload protected electronics
- Reverse wiring protection

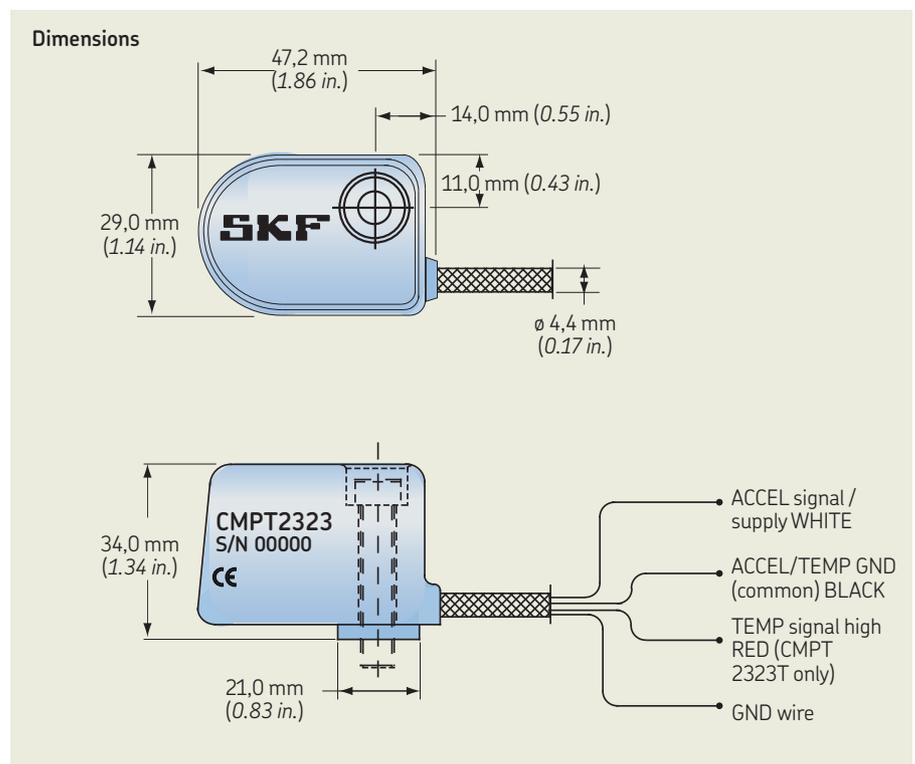


### Specifications

Specifications conform to ISA-RP-37.2 (1-95) and are typical values referenced at 24 °C (75 °F), 24 V DC supply, 4 mA constant current and 80 Hz.

#### Dynamic

- Sensitivity: 230 mV/g
- Sensitivity precision:  $\pm 10\%$  at 24 °C (75 °F)
- Sensitivity deviation over full temperature range: 10%, approximately  $-5\%$  at  $-50\text{ °C}$  ( $-60\text{ °F}$ ) and  $+5\%$  at  $+120\text{ °C}$  ( $+250\text{ °F}$ )
- Acceleration range: 70 g peak
- Amplitude linearity:  $< 1\%$ , up to full scale
- Frequency range:
  - $\pm 3\text{ dB}$ : 0.2 Hz to 10.0kHz
- Transverse sensitivity:  $\leq 5\%$  of axial
- Resonance frequency, mounted, nominal: 18 kHz



## Electrical

- Power requirements:
  - Voltage source: 24 V DC nominal, 18 to 30 V DC
  - Constant current diode: 4 mA at 24 V, 2 to 10 mA is permissible
- Electrical noise: < 1 mg RMS broadband 2,5 Hz to 25,0 kHz
- Bias output voltage: 11,5 V DC, ±10% for 24 V DC supply at 25 °C (77 °F)
- Grounding: Case isolated, internally shielded (Faraday cage)
  - Faraday cage connected to power supply return
- Over-voltage protection: Approximately 18 V DC
- Reverse polarity (wiring) protection

## Environmental

- Temperature range:
  - Accelerometer measurement temperature range: –50 to +120 °C (–60 to +250 °F)
  - Maximum operating temperature: 120 °C (250 °F)
  - Storage temperature: –50 to +150 °C (–60 to +300 °F)
- Vibration limit: 70 g peak
- Shock limit: 5 000 g peak
- Electromagnetic sensitivity, equivalent g, maximum: < 100 µg/gauss at 50 to 60 Hz
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak
- IEC: 529, IP 67 (For climatic conditions, recommend to use conduit/hose over braided cable.)

## Physical

- Dimensions: See drawing
- Weight:
  - Sensor without cable: 210 g (7.4 oz.)
  - Sensor with cable: 410 g (14.5 oz.)
- Case material: 304 stainless steel
- Mounting: M6 × 1 and 1/4-28 UNF socket head cap screws provided
- Mounting torque: 6 Nm (50 in. lbs.)
- Cable: Integral cable, 5 m (16.4 ft.) length
- Wire specification: 0,32 mm<sup>2</sup> (AWG 22) stranded tin copper (seven strands at 0,05 mm<sup>2</sup> each)
- Connections:
  - White: ACCEL signal/power (connected to constant current source)
  - Black: ACCEL signal ground (GND)
  - Blank twisted wire: Screen connected to internal shield

### Ordering information

<b>CMPT 2323</b>	Accelerometer, 230 mV/g, with 5 meter (16,4 ft) integral braided cable, side exit.
<b>CMPT 2323X10</b>	Accelerometer, 230 mV/g, with 10 meter (33 ft) integral braided cable, side exit.
<b>CMPT 2323X15</b>	Accelerometer, 230 mV/g, with 15 meter (50 ft) integral braided cable, side exit. <ul style="list-style-type: none"><li>• 1/4-28 and M6 × 1 socket head cap screws provided. Calibration certificate with the actual sensitivity is provided for each accelerometer package.</li></ul>

# CMSS WIND-100-10

## Small accelerometer, with integral cable, side exit

The CMSS WIND-100-10 is an compact accelerometer commonly used in the following applications:

- Wind turbine gearboxes
- Wind turbine generators

The small-size accelerometer is specially configured for unobtrusive mounting on wind turbine drive components, within the relatively protected environment of the turbine's nacelle. An integral cable is used to eliminate any cause to travel to a remote site to fix a loose connector.

## Features

- For use with all SKF on-line surveillance systems
- 100 mV/g sensitivity
- Meets CE, EMC requirements
- High resistance to electrical noise
- Low profile integral cable accelerometer
- Compact design ideal for mounting with limited space
- Corrosion resistant

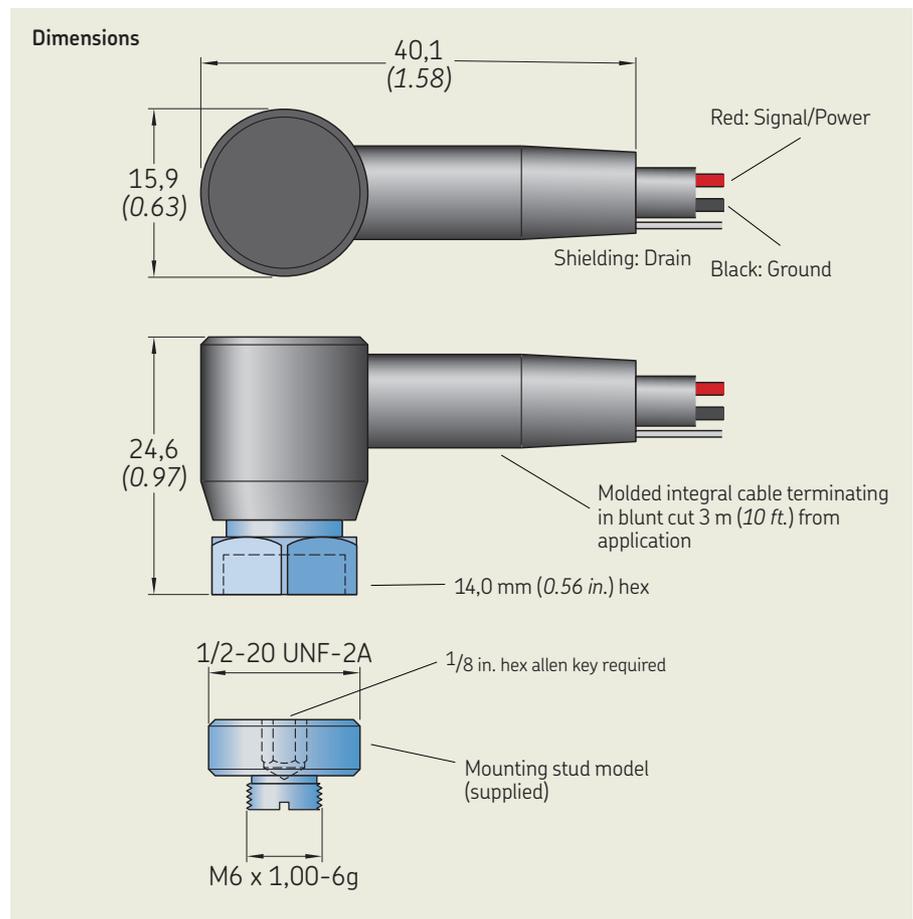


## Specifications

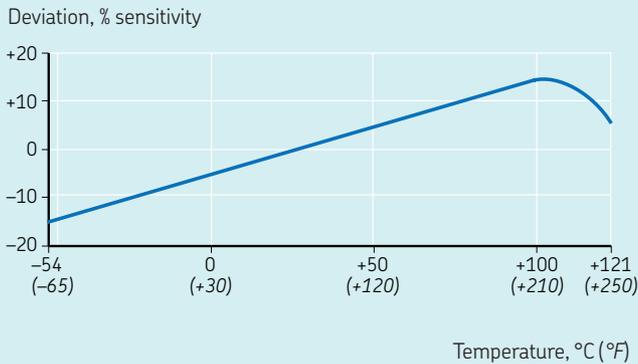
Specifications based on low profile industrial constant current accelerometer, 100 mV/g, 0,5 to 10 000 Hz, side exit, 3 m (10 ft.) integral cable and swiveled base.

### Dynamic

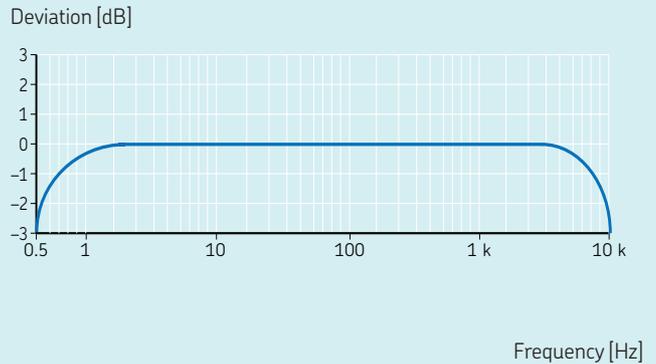
- Sensitivity: 100 mV/g
- Sensitivity precision:  $\pm 15\%$  at 24 °C (75 °F)
- Acceleration range: 50 g peak
- Amplitude linearity:  $\pm 1\%$
- Frequency range:  $\pm 3\text{dB}$ : 0,5 Hz to 10 kHz (30 to 600 000 cpm)
- Resonance frequency, mounted, nominal: 25 kHz (1 500 kcpm)
- Transverse sensitivity:  $\leq 7\%$
- Temperature response: See graph



### Typical temperature response



### Typical frequency response



### Electrical

- Power requirements:
  - Voltage source: 18 to 28 V DC
  - Constant current diode: 2 to 20 mA
- Electrical noise:
  - Spectral:
    - Output impedance: < 150  $\Omega$
- Bias output voltage: 8 to 12 V DC
- Electrical isolation (case): > 108  $\Omega$

### Environmental

- Temperature range: -55 to +120 °C (-65 to +250 °F)
- Shock limit: 5 000 g peak
- Sealing: Welded hermetic
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak

### Physical

- Dimensions: See drawing
- Weight: 31 g (1.1 oz.)
- Case material: 316L Stainless steel, with molded integral cable
- Enclosure rating: IP 68
- Sensing element: Ceramic, shear
- Mounting: Threaded stud 1/4-28 male
- Mounting torque:
  - Stud: 9,5 to 10,8 Nm (7 to 8 ft. lbs.)
  - Hex nut: 2,7 to 6,8 Nm (2 to 5 ft. lbs.)
- Connection: Molded integral cable, side
- Cable type: Integral FEP cable, stainless steel overbraid

### Ordering information

<b>CMSS WIND-100-10</b>	Small accelerometer with integral cable, side exit, 10 m (32.8 ft.).
<b>CMSS WIND-100-15</b>	Small accelerometer with integral cable, side exit, 15 m (49.2 ft.).
<b>CMSS WIND-100-20</b>	Small accelerometer with integral cable, side exit, 20 m (65.6 ft.).

### Optional accessories

<b>CMSS-WIND-201</b>	Mounting pad, size 20mm AF dia, 10mm height, M6 thread, stainless steel
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# Accelerometers with extended temperature range

- CMSS 2106 Extended temperature range accelerometer, straight exit
- CMSS 2207 Extended temperature range accelerometer, side exit



CMSS 2106



CMSS 2207

# CMSS 2106

## Extended temperature range accelerometer, straight exit

The CMSS 2106 accelerometer is a multi-purpose sensor with an elevated temperature resistance to extend life and performance in applications that are known to provide a challenging hot environment. The sensor is most commonly deployed in the following industries:

- Pulp and Paper – dryer sections
- Mineral Processing – ovens and kilns
- Metalworking – hot rolling mills

### Features

- Optimal for use with SKF on-line system IMx and all portable data collection instruments
- Rugged, economical and all around high temperature, general purpose sensor for up to 150 °C (300 °F) operating temperature
- 100 mV/g sensitivity to optimize use in multiple applications
- Exceptional bias voltage (BV) stability at elevated temperatures
- Designed for exceptional low noise level over a wide temperature range
- Meets CE, EMC requirements
- Two mounting studs 1/4-28 and M8 x 1,25) provided
- Corrosion resistant and hermetically sealed for installation in high humidity areas
- Reverse polarity wiring protection

### Recommended connector/cable assembly

- CMSS 932 series

### Specifications

Specifications conform to ISA-RP-37.2 (1-64) and are typical values referenced at 24 °C (75 °F), 24 V DC supply, 4 mA constant current and 100 Hz.

#### Dynamic

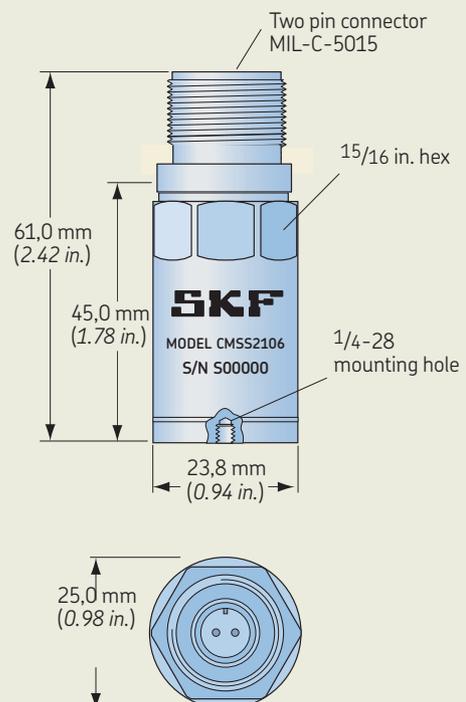
- Sensitivity: 100 mV/g
- Sensitivity precision: ±10% at -50 to +150 °C (-60 to +300 °F)
- Acceleration range: 50 g peak
- Amplitude linearity: 1%
- Frequency range:
  - ±5%: 4,0 to 4 000 Hz
  - ±10%: 3,0 to 6 000 Hz
  - ±3 dB: 1,0 to 10 000 Hz
- Resonance frequency, mounted, nominal: 20 kHz
- Transverse sensitivity: ≤ 5% of axial
- Temperature response: See graph

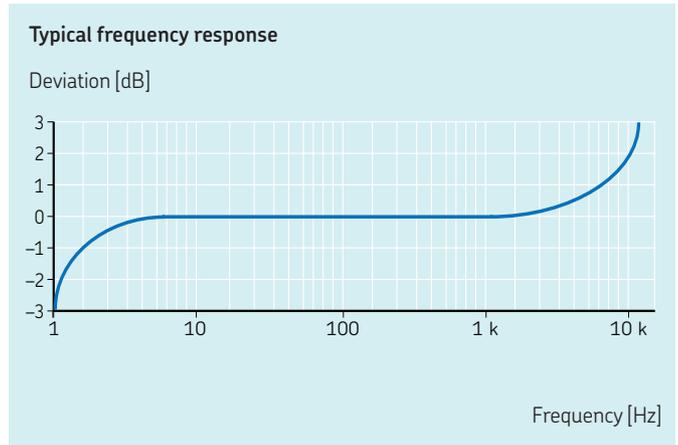
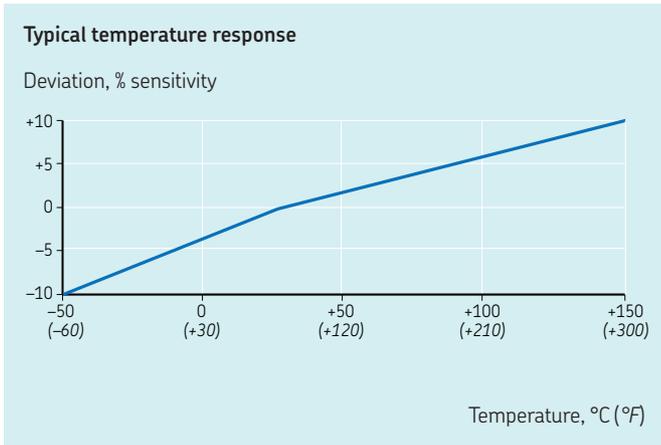


### Electrical

- Power requirements:
  - Voltage source: 24 V DC nominal, 18 to 30 V DC
  - Constant current diode: 2 to 4 mA, recommended 4 mA
- Electrical noise:
  - 2,0 Hz: 30 µg/√Hz
- Output impedance: < 100 Ω
- Bias output voltage:
  - 12 V DC at 25 °C (77 °F)
  - 11 V DC at 150 °C (300 °F)
- Grounding: Case isolated, internally shielded

### Dimensions





#### Environmental

- Temperature range:  $-50$  to  $+150$  °C ( $-60$  to  $+300$  °F) operating temperature
- Vibration limit: 500 g peak
- Shock limit: 2 500 g peak
- Electromagnetic sensitivity, equivalent g, maximum: 15  $\mu$ g/gauss
- Sealing: Hermetic
- Base strain sensitivity: 500  $\mu$ g/ $\mu$ strain
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak

#### Physical

- Dimensions: See drawing
- Weight: 135 g (4.8 oz.)
- Case material: 316L stainless steel
- Mounting:
  - Internal 1/4-28 thread
  - M8  $\times$  1,25 and 1/4-28 to 1/4-28 mounting studs provided
- Mounting torque: 2,9 Nm (24 in. lbs.)
- Connections:
  - Pin A: Signal/Power
  - Pin B: Common
- Mating connector: CMSS 932-68LC or CMSS 932-68TL, two pin, IP 68, locking collar or twist lock
- Recommended cable: CMSS 932-SY-XXM and CMSS 932-DY-XXM, two conductor, twisted pair, single or double shielded, yellow

#### Ordering information

**CMSS 2106** Superior accelerometer, straight exit with MIL-C-5015 two pin connector.

- 1/4-28 and M8 mounting studs provided. Calibration certificate with the actual sensitivity is provided for each accelerometer package. The normal sensitivity is etch on each unit.

# CMSS 2207

## Extended temperature range accelerometer, side exit

The CMSS 2207 accelerometer is a multi-purpose sensor with an elevated temperature resistance to extend life and performance in applications that are known to provide a challenging hot environment. The sensor is most commonly deployed in the following industries:

- Pulp and Paper – dryer sections
- Mineral Processing – ovens and kilns
- Metalworking – hot rolling mills

## Features

- Optimal for use with SKF on-line system IMx and all portable data collection instruments
- Rugged, economical and all around high temperature, general purpose sensor for up to 150 °C (300 °F) operating temperature
- 100 mV/g sensitivity to optimize use in multiple applications
- Exceptional bias voltage (BV) stability at elevated temperatures
- Designed for exceptional low noise level over a wide temperature range
- Meets CE, EMC requirements
- Captive mounting bolts (1/4-28 or M6 × 1,0) provided
- Corrosion resistant and hermetically sealed for installation in high humidity areas
- Reverse polarity wiring protection

## Recommended connector/cable assembly

- CMSS 932 series

## Specifications

Specifications conform to ISA-RP-37.2 (1-64) and are typical values referenced at 24 °C (75 °F), 24 V DC supply, 4 mA constant current and 100 Hz.

## Dynamic

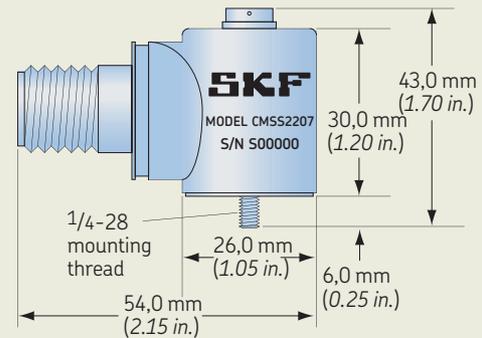
- Sensitivity: 100 mV/g
- Sensitivity precision: ±10% at 24 °C (75 °F)
- Acceleration range: 50 g peak
- Amplitude linearity: ≤ 1%, up to full scale
- Frequency range:
  - ±5%: 4,0 to 5 000 Hz
  - ±10%: 3,0 to 7 000 Hz
  - ±3 dB: 1,0 to 11 000 Hz
- Resonance frequency, mounted, nominal: 18.5 kHz
- Transverse sensitivity, maximum: ≤ 5% of axial
- Temperature response: See graph



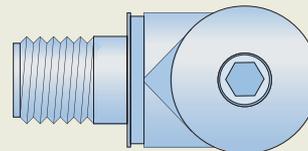
## Electrical

- Power requirements:
  - Voltage source: 24 V DC nominal, 18 to 30 V DC
  - Constant current diode: 2 to 4 mA, recommended 4 mA
- Electrical noise:
- 2,0 Hz: 30 µg/√Hz
- Output impedance: < 100 Ω
- Bias output voltage:
  - 12 V DC at 25 °C (77 °F)
  - 11 V DC at 150 °C (300 °F)
- Grounding: Case isolated, internally shielded

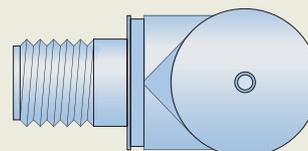
## Dimensions



Side view

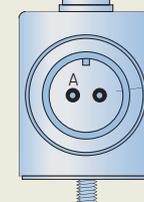


Top View



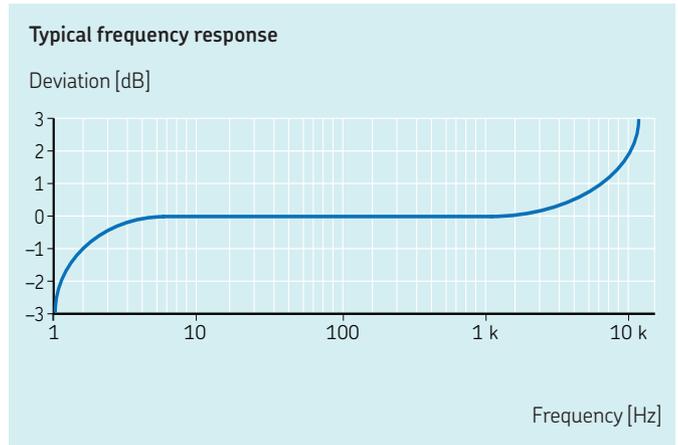
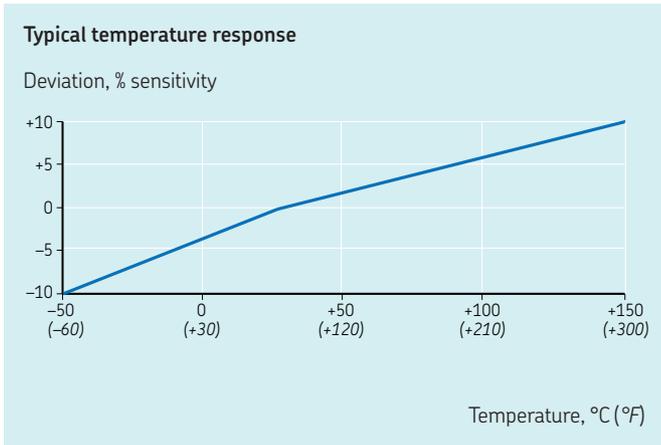
Bottom View

Safety wire hole  
1,5 mm (0.06 in.)  
diameter



End View

Two pin  
connector  
MIL-C-5015



### Environmental

- Temperature range:  $-50$  to  $+150$  °C ( $-60$  to  $+300$  °F) operating temperature
- Vibration limit: 500 g peak
- Shock limit: 2 500 g peak
- Electromagnetic sensitivity, equivalent g, maximum:  $< 5$   $\mu\text{g/gauss}$
- Base strain sensitivity: 100  $\mu\text{g}/\mu\text{strain}$
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak

### Physical

- Dimensions: See drawing
- Weight: 145 g (5.1 oz.)
- Case material: 316L stainless steel
- Mounting: M6  $\times$  1,0 and 1/4-28 captive socket head screws provided
- Mounting torque: 3,4 Nm (30 in. lbs.)
- Connections:
  - Pin A: Signal/Power
  - Pin B: Common
- Mating connector: CMSS 932-68LC or CMSS 932-68TL, two pin, IP 68, locking collar or twist lock
- Recommended cable: CMSS 932-SY-XXM and CMSS 932-DY-XXM, two conductor, twisted pair, single or double shielded, yellow

### Ordering information

**CMSS 2207** Superior accelerometer, side exit with MIL-C-5015 two pin connector.

- 1/4-28 and M6 Captive socket head screws provided. Calibration certificate with the actual sensitivity is provided for each accelerometer package. The normal sensitivity is etch on each unit.

# Combination vibration and temperature sensors

- CMSS 2100T Industrial sensor, straight exit, acceleration and temperature
- CMSS 2200T Industrial sensor, side exit, acceleration and temperature
- CMSS 793T-3 Superior sensor, straight exit, acceleration and temperature
- CMSS 797T-1 Superior sensor, ring mode, side exit, acceleration and temperature
- CMPT 2310T Sensor for heavy-duty environments, side exit, acceleration and temperature
- CMPT 2323T Sensor for heavy-duty environments, side exit, acceleration and temperature



CMSS 2100T



CMSS 2200T



CMSS 793T-3



CMSS 797T-1



CMPT 2310T



CMPT 2323T

# CMSS 2100T

## Industrial sensor, straight exit, acceleration and temperature

The CMSS 2100T is a cost-effective, dual output sensor ideal for light to medium-duty applications, where both vibration and surface temperature measurements are required. The CMSS 2100T is typically used in the following industries:

- Pulp and Paper
- Food and Beverage
- Automation
- Metals
- Water & Waste Water

Common applications include general purpose machines such as pumps, motors and fans.

## Features

- For use with all SKF on-line surveillance systems
- Rugged, corrosion resistant and hermetically sealed
- Case isolation
- Meets CE, EMC requirements
- ESD protection
- Miswiring protection

## Recommended connector/cable assembly

- CMSS 933 series

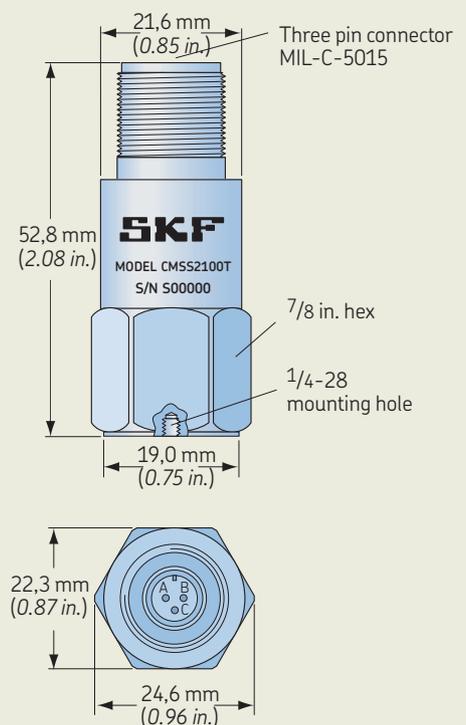
## Specifications

### Dynamic

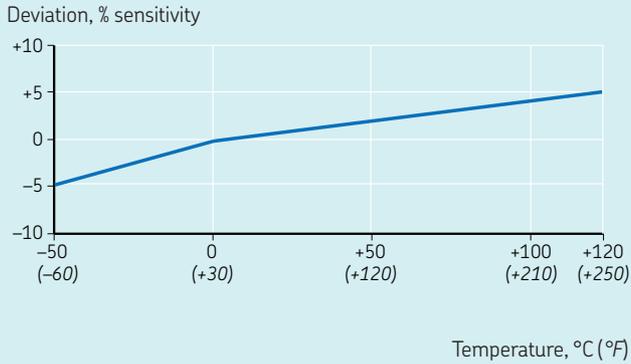
- Sensitivity: 100 mV/g
- Sensitivity precision:  $\pm 5\%$  at 24 °C (75 °F)
- Acceleration range: 60 g peak
- Amplitude linearity: 1%
- Frequency range:
  - $\pm 5\%$ : 3,0 to 5 000 Hz
  - $\pm 10\%$ : 1,0 to 7 000 Hz
  - $\pm 3$  dB: 0,5 to 12 000 Hz
- Resonance frequency, mounted, nominal: 30 kHz
- Transverse sensitivity:  $\leq 5\%$  of axial
- Temperature response: See graph
- Temperature output sensitivity:
  - $\pm 1,5$  °C ( $\pm 2,7$  °F): 10 mV/°C (18 mV/°F)
- Temperature measurement range: 2 to 120 °C (36 to 250 °F)



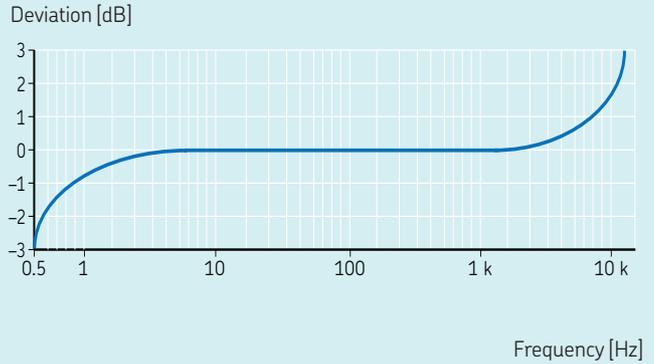
### Dimensions



### Typical temperature response



### Typical frequency response



### Electrical

- Power requirements:
  - Voltage source: 18 to 30 V DC
  - Constant current diode: 2 to 10 mA
- Electrical noise:
  - Broadband:
    - 2,5 Hz to 25 kHz: 700  $\mu$ g
  - Spectral:
    - 10 Hz: 10  $\mu$ g/ $\sqrt$ Hz
    - 100 Hz: 5  $\mu$ g/ $\sqrt$ Hz
    - 1 000 Hz: 5  $\mu$ g/ $\sqrt$ Hz
- Output impedance: < 100  $\Omega$
- Bias output voltage: 10 V DC
- Grounding: Case isolated, internally shielded

### Environmental

- Temperature range: -50 to +120 °C (-60 to +250 °F) operating temperature
- Vibration limit: 500 g peak
- Shock limit: 5 000 g peak
- Electromagnetic sensitivity, equivalent g, maximum: 70  $\mu$ g/gauss
- Sealing: Hermetic
- Base strain sensitivity: 0,0002 g/ $\mu$ strain
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak

### Physical

- Dimensions: See drawing
- Weight: 90 g (3.2 oz.)
- Case material: 316L stainless steel
- Mounting:
  - Internal 1/4-28 thread
  - M8  $\times$  1,25 and 1/4-28 to 1/4-28 mounting studs provided
- Mounting torque: 2,9 Nm (24 in. lbs.)
- Connections:
  - Pin A: Accelerometer signal/power
  - Pin B: Accelerometer common
  - Pin C: Temperature sensor signal
- Mating connector: CMSS 933-68LC or CMSS 933-68TL, three pin, IP 68, locking collar or twist lock or three pin MIL-C-5015 style
- Recommended cable: CMSS 933-SY-XXM, three conductor, triad cable, single shielded, yellow

### Ordering information

**CMSS 2100T** Industrial sensor, straight exit, acceleration and temperature, with MIL-C-5015 three pin connector.

- 1/4-28 and M8 mounting studs provided. Calibration certificate with the actual sensitivity is provided for each accelerometer package. The normal sensitivity is etch on each unit.

# CMSS 2200T

## Industrial sensor, side exit, acceleration and temperature

The CMSS 2200T is a cost-effective, dual output sensor ideal for light to medium-duty applications, where both vibration and temperature measurements are required. The CMSS 2200T is typically used in the following industries:

- Pulp and Paper
- Food and Beverage
- Automation
- Metals
- Water & Waste Water

Common applications include general purpose machines such as pumps, motors and fans.

## Features

- For use with all SKF on-line surveillance systems
- Measures both acceleration and temperature
- Low profile
- Rugged, corrosion resistant and hermetically sealed for installation in high humidity areas
- 100 mV/g sensitivity to optimize use in multiple applications
- 10 mV/°C temperature output sensitivity
- Meets CE, EMC requirements
- ESD protection
- M6 and 1/4-28 captive mounting bolts provided
- Miswiring protection

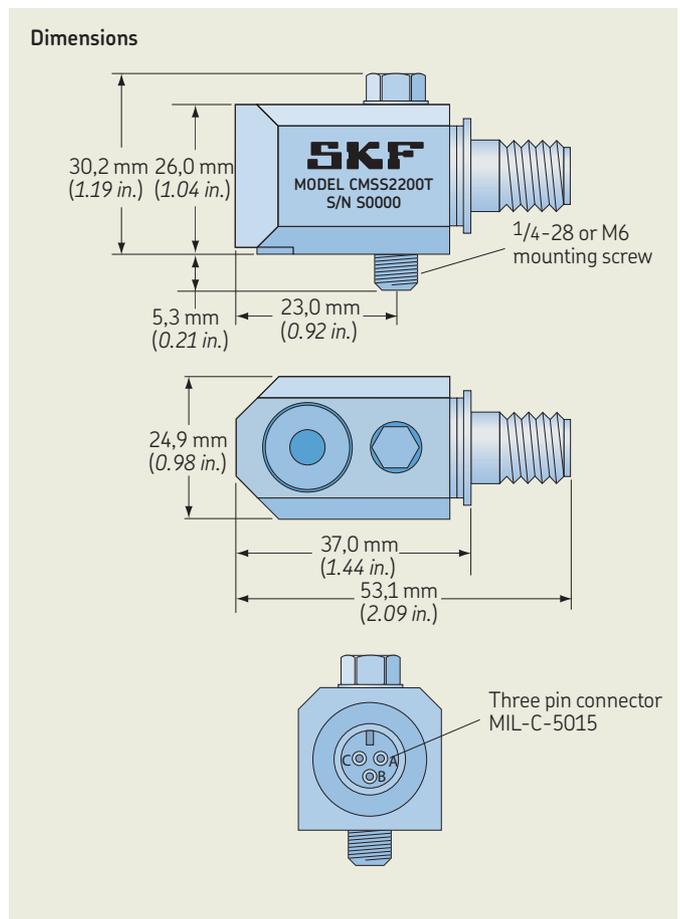
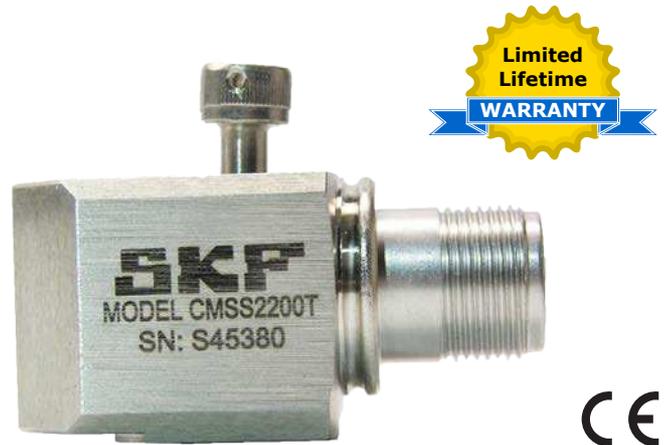
## Recommended connector/cable assembly

- CMSS 933 series

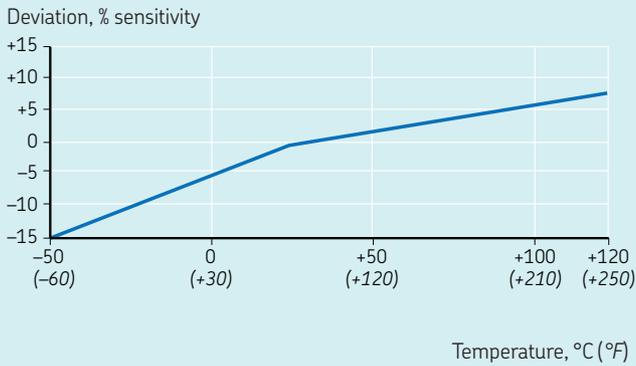
## Specifications

### Dynamic

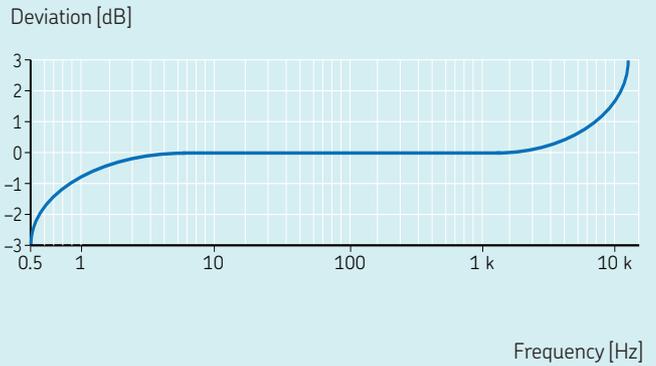
- Sensitivity: 100 mV/g
- Sensitivity precision:  $\pm 5\%$  at 24 °C (75 °F)
- Acceleration range: 60 g peak
- Amplitude linearity: 1%
- Frequency range:
  - $\pm 5\%$ : 1,0 to 5 000 Hz
  - $\pm 10\%$ : 0,7 to 10 000 Hz
  - $\pm 3$  dB: 0,5 to 12 000 Hz
- Resonance frequency, mounted, minimum: 22 kHz
- Transverse sensitivity:  $\leq 5\%$  of axial
- Temperature response: See graph
- Temperature output sensitivity:
  - $\pm 1,5$  °C ( $\pm 2,7$  °F): 10 mV/°C (18 mV/°F)
- Temperature measurement range: 2 to 120 °C (36 to 250 °F)



### Typical temperature response



### Typical frequency response



### Electrical

- Power requirements:
  - Voltage source: 20 to 30 V DC
  - Constant current diode: 2 to 10 mA
- Electrical noise, equivalent g:
  - Broadband:
    - 2,5 Hz to 25 kHz: 700  $\mu\text{g}$
  - Spectral:
    - 10 Hz: 10  $\mu\text{g}/\sqrt{\text{Hz}}$
    - 100 Hz: 5  $\mu\text{g}/\sqrt{\text{Hz}}$
    - 1 000 Hz: 5  $\mu\text{g}/\sqrt{\text{Hz}}$
- Output impedance:  $\leq 100 \Omega$
- Bias output voltage, nominal: 12 V DC
- Grounding: Case isolated, internally shielded

### Environmental

- Temperature range:  $-50$  to  $+120$  °C ( $-60$  to  $+250$  °F) operating temperature
- Vibration limit: 500 g peak
- Shock limit: 5 000 g peak
- Electromagnetic sensitivity, equivalent g, maximum: 70  $\mu\text{g}/\text{gauss}$
- Sealing: Hermetic
- Base strain sensitivity: 2 mg/ $\mu\text{strain}$

### Physical

- Dimensions: See drawing
- Weight: 145 g (5.1 oz.)
- Case material: 316L stainless steel
- Mounting: 1/4-28 and M6 x 1 captive hex head screw provided
  - Black screw = M6
  - Silver screw = 1/4-28
- Mounting torque: 3,4 Nm (30 in. lbs.)
- Connections:
  - Pin A: Accelerometer power/signal
  - Pin B: Accelerometer common
  - Pin C: Temperature sensor signal
- Mating connector: CMSS 933-68LC or CMSS 933-68TL, three pin, IP 68, locking collar or twist lock
- Recommended cable: CMSS 933-SY-XXM, three conductors, twisted pair, single shielded, yellow

### Ordering information

**CMSS 2200T** Industrial sensor, side exit, acceleration and temperature, with MIL-C-5015 three pin connector.

- 1/4-28 and M6 captive hex head screw provided. Calibration certificate with the actual sensitivity is provided for each accelerometer package. The normal sensitivity is etch on each unit.

# CMSS 793T-3

## Superior sensor, straight exit, acceleration and temperature

The CMSS 793T-3 is a higher precision accelerometer that also offers an in-built measurement of the temperature of the mounting point surface. The sensor is most applicable in the following industries:

- Power Generation (Fossil, Nuclear, Hydro) – pumps and fans, where regulatory expectations may require a higher vibration precision

The surface temperature measurement is good for rolling element (anti-friction) bearing housings and small journal bearing housings. Temperature measurements in large journal bearings should use established measurement locations.

### Features

- Optimal for use with SKF on-line surveillance systems, protection systems and all portable data collection instruments
- Measures both temperature and acceleration
- Rugged construction
- Hermetically sealed
- Case isolated
- Meets CE, EMC requirements
- ESD protection
- Miswiring protection

### Recommended connector/cable assembly

- CMSS 933 series

### Specifications

#### Dynamic

- Sensitivity: 100 mV/g
- Sensitivity precision:  $\pm 5\%$  at 24 °C (75 °F)
- Acceleration range: 80 g peak
- Amplitude linearity: 1%
- Frequency range:
  - $\pm 5\%$ : 1,5 to 5 000 Hz
  - $\pm 10\%$ : 1,0 to 7 000 Hz
  - $\pm 3$  dB: 0,5 to 15 000 Hz
- Resonance frequency, mounted, nominal: 24 kHz
- Transverse sensitivity:  $\leq 5\%$  of axial
- Temperature response: See graph
- Temperature output sensitivity:  $\pm 5\%$  of 10 mV/°K
- Temperature measurement range:  $-50$  to  $+120$  °C ( $-60$  to  $+250$  °F)

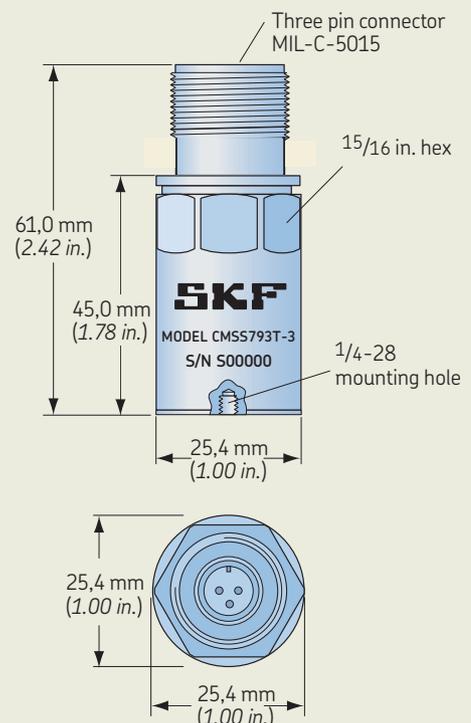


### Electrical

#### Temperature sensor

- Power requirements:
  - Voltage source: 18 to 30 V DC
  - Constant current diode: 2 to 4 mA
- Grounding: Case isolated, internally shielded

#### Dimensions





# CMSS 797T-1

## Superior sensor, ring mode, side exit, acceleration and temperature

The CMSS 797T-1 is a higher precision accelerometer that also offers an in-built measurement of the temperature of the mounting point surface. The sensor is most applicable in the following industries:

- Power Generation (Fossil, Nuclear, Hydro) – pumps and fans, where regulatory expectations may require a higher vibration precision

The surface temperature measurement is good for rolling element (anti-friction) bearing housings and small journal bearing housings. Temperature measurements in large journal bearings should use established measurement locations.

### Features

- Optimal for use with SKF on-line surveillance systems, protection systems and all portable data collection instruments
- Measures both temperature and acceleration
- Rugged construction
- Hermetically sealed
- Case isolated
- Meets CE, EMC requirements
- ESD protection
- Reverse wiring protection

### Recommended connector/cable assembly

- CMSS 933 series

### Specifications

#### Dynamic

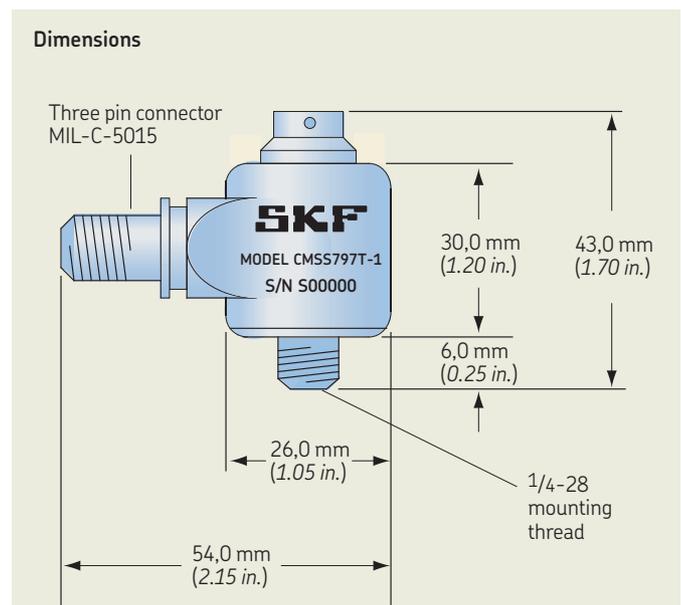
- Sensitivity: 100 mV/g
- Sensitivity precision:  $\pm 5\%$  at 24 °C (75 °F)
- Acceleration range: 80 g peak
- Amplitude linearity: 1%
- Frequency range:
  - $\pm 5\%$ : 3,0 to 5 000 Hz
  - $\pm 10\%$ : 2,0 to 7 000 Hz
  - $\pm 3$  dB: 1,0 to 12 000 Hz
- Resonance frequency, mounted, nominal: 26 kHz
- Transverse sensitivity:  $\leq 5\%$  of axial
- Temperature response: See graph
- Temperature output sensitivity:  $\pm 5\%$  of 10 mV/°K
- Temperature measurement range:  $-50$  to  $+120$  °C ( $-60$  to  $+250$  °F)



### Electrical

#### Accelerometer

- Power requirements:
  - Voltage source: 18 to 30V DC
  - Constant current diode: 2 to 10 mA
- Electrical noise:
  - Broadband:
    - 2,5 Hz to 25 kHz: 600  $\mu$ g
  - Spectral:
    - 10 Hz: 8  $\mu$ g/ $\sqrt$ Hz
    - 100 Hz: 5  $\mu$ g/ $\sqrt$ Hz
    - 1 000 Hz: 5  $\mu$ g/ $\sqrt$ Hz
- Output impedance:  $< 100 \Omega$
- Bias output voltage: 12V DC
- Grounding: Case isolated, internally shielded





# CMPT 2310T

## Sensor for heavy-duty environments, side exit, acceleration and temperature

The CMPT 2310T is a physically rugged accelerometer that also provides a surface temperature measurement. The sensor is optimized for use in heavy-duty environments such as the following industries:

- Mining
- Mineral Processing
- Cement

In these industries, dust, mud and flying debris are commonplace, together with low rotational speeds. When used on shakers and screens, the accelerometer must also withstand high levels of continuous and random vibration. The sensor uses an integral cable with stainless over-braid for mounting where protective conduit is not available.

### Features

- For use with all SKF on-line surveillance systems
- 100 mV/g sensitivity
- Acceleration (mV/g) and temperature (mV/°C)
- Physically rugged
- Meets CE, EMC requirements
- Low profile, side exit industrial accelerometer with M6 × 1 and 1/4-28 UNF socket head cap screws provided
- 5 m (16.4 ft.) integral cable with stainless steel over-braid
- Corrosion resistant and encapsulation sealed
- The internal sensor capsule is isolated from the machine ground
- Low noise, highly shock resistant
- Overload protected electronics

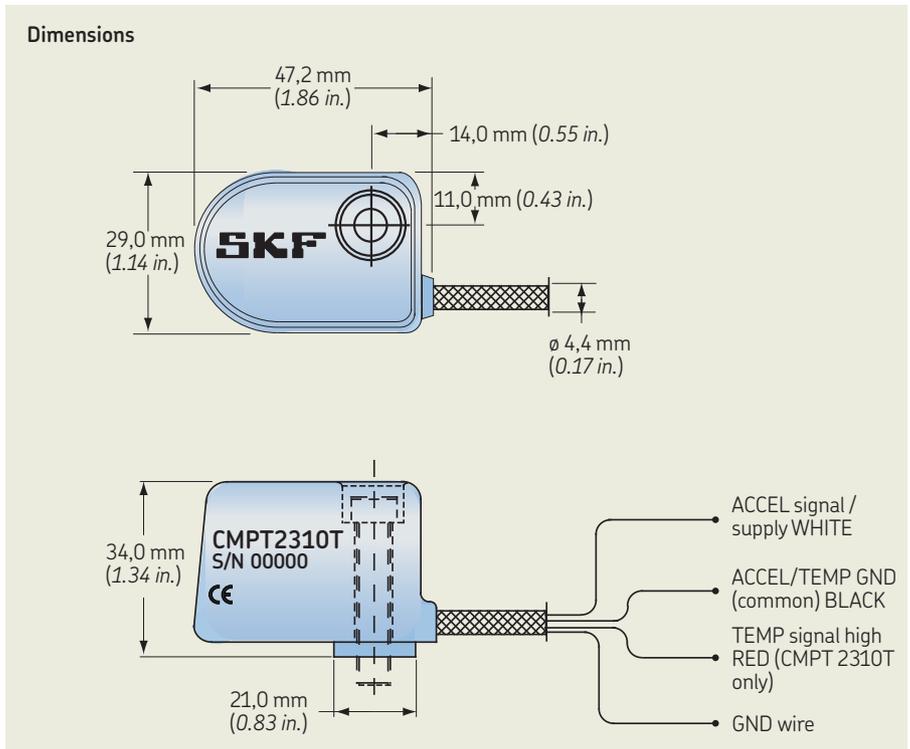


### Specifications

Specifications conform to ISA-RP-37.2 (1-95) and are typical values referenced at 24 °C (75 °F), 24 V DC supply, 4 mA constant current and 80 Hz.

#### Dynamic

- Sensitivity: 100 mV/g
- Sensitivity precision: ±10% at 24 °C (75 °F)
- Sensitivity deviation over full temperature range: 10%, approximately -5% at -50 °C (-60 °F) and +5% at +120 °C (+250 °F)
- Acceleration range: 70 g peak
- Amplitude linearity: < 1%, up to full scale
- Frequency range:
  - +/- 3dB: 1.0 Hz to 10.0kHz
- Transverse sensitivity: ≤ 5% of axial
- Temperature sensitivity: 10 mV/°C
- Temperature sensor measurement range: 0 to 120 °C (30 to 250 °F)
- Temperature precision: ±1,5 °C (±2.7 °F)
- Resonance frequency, mounted, nominal: 18 kHz



## Electrical

- Power requirements:
  - Voltage source: 24 V DC nominal, 18 to 30 V DC
  - Constant current diode: 4 mA at 24 V, 2 to 10 mA is permissible
- Electrical noise: < 1 mg RMS broadband 2,5 Hz to 25,0 kHz
- Bias output voltage: 11,5 V DC,  $\pm 10\%$  for 24 V DC supply at 25 °C (77 °F)
- Grounding: Case isolated, internally shielded (Faraday cage)
  - Faraday cage connected to power supply return
- Over-voltage protection: Approximately 18 V DC
- Reverse polarity (wiring) protection

## Environmental

- Temperature range:
  - Accelerometer measurement temperature range: –50 to +120 °C (–60 to +250 °F)
  - Maximum operating temperature: 120 °C (250 °F)
  - Storage temperature: –50 to +150 °C (–60 to +300 °F)
- Vibration limit: 70 g peak
- Shock limit: 5 000 g peak
- Electromagnetic sensitivity, equivalent g, maximum: < 100  $\mu\text{g}$ /gauss at 50 to 60 Hz
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak
- IEC: 529, IP 67 (For climatic conditions, recommend to use conduit/hose over braided cable.)

## Physical

- Dimensions: See drawing
- Weight:
  - Sensor without cable: 210 g (7.4 oz.)
  - Sensor with cable: 410 g (14.5 oz.)
- Case material: 304 stainless steel
- Mounting: M6  $\times$  1 and 1/4-28 UNF socket head cap screws provided
- Mounting torque: 6 Nm (50 in. lbs.)
- Cable: Integral cable, 5 m (16.4 ft.) length
- Wire specification: 0,32 mm<sup>2</sup> (AWG 22) stranded tin copper (seven strands at 0,05 mm<sup>2</sup> each)
- Connections:
  - White: ACCEL signal/power
  - Black: ACCEL/TEMP signal ground (GND)
  - Red: TEMP signal high
  - Blank twisted wire: Screen connected to internal shield

### Ordering information

- |  |   |
|--|---|
| <b>CMPT 2310T</b>                      | Acceleration and temperature sensor with 5 meter (16,4 ft) integral braided cable, side exit. |
| <b>CMPT 2310T<math>\times</math>10</b> | Acceleration and temperature sensor with 10 meter (33 ft) integral braided cable, side exit.  |
| <b>CMPT 2310T<math>\times</math>15</b> | Acceleration and temperature sensor with 15 meter (50 ft) integral braided cable, side exit.  |
- 1/4-28 and M6  $\times$  1 socket head cap screws provided. Calibration sensitivity is provided for each accelerometer package.

# CMPT 2323T

## Sensor for heavy-duty environments, side exit, acceleration and temperature

The CMPT 2323T is a physically rugged accelerometer optimized for use in heavy-duty environments such as the following industries:

- Mining
- Mineral Processing
- Cement

In these industries, dust, mud and flying debris are commonplace, together with low rotational speeds. When used on shakers and screens, the accelerometer must also withstand high levels of continuous and random vibration. The sensor uses an integral cable with stainless over-braid for protection in heavy-duty environments.

A higher sensitivity is used for detection of low amplitude signals in slow moving equipment.

### Features

- For use with all SKF on-line surveillance systems
- 230 mV/g sensitivity
- Acceleration (mV/g) and temperature (mV/°C)
- Physically rugged
- Meets CE, EMC requirements
- Low profile, side exit industrial accelerometer with M6 × 1 and 1/4-28 UNF socket head cap screws provided
- 5 m (16.4 ft.) integral cable with stainless steel over-braid
- Corrosion resistant and encapsulation sealed
- The internal sensor capsule is isolated from the machine ground
- Low noise, highly shock resistant
- Overload protected electronics

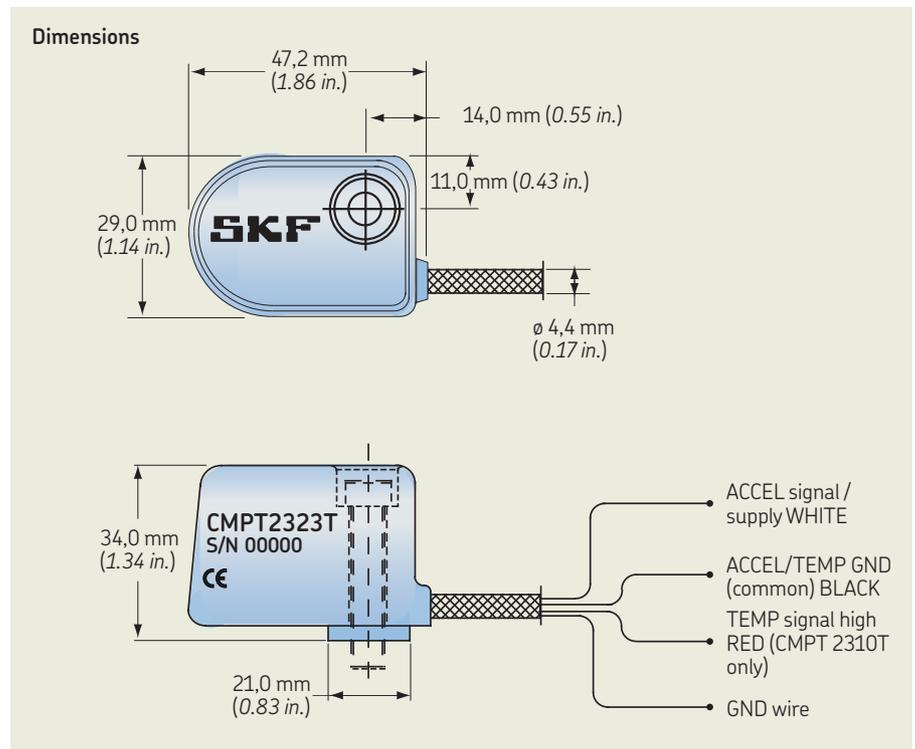


### Specifications

Specifications conform to ISA-RP-37.2 (1-95) and are typical values referenced at 24 °C (75 °F), 24 V DC supply, 4 mA constant current and 80 Hz.

#### Dynamic

- Sensitivity: 230 mV/g
- Sensitivity precision: ±10% at 24 °C (75 °F)
- Sensitivity deviation over full temperature range: 10%, approximately -5% at -50 °C (-60 °F) and +5% at +120 °C (+250 °F)
- Acceleration range: 70 g peak
- Amplitude linearity: < 1%, up to full scale
- Frequency range:
  - +/- 3dB: 0.2 Hz to 10.0kHz
- Transverse sensitivity: ≤ 5% of axial
- Temperature sensitivity: 10 mV/°C
- Temperature sensor measurement range: 0 to 120 °C (30 to 250 °F)
- Temperature precision: ±1,5 °C (±2.7 °F)
- Resonance frequency, mounted, nominal: 18 kHz



## Electrical

- Power requirements:
  - Voltage source: 24 V DC nominal, 18 to 30 V DC
  - Constant current diode: 4 mA at 24 V, 2 to 10 mA is permissible.
- Electrical noise: < 1 mg RMS broadband 2,5 Hz to 25,0 kHz
- Bias output voltage: 11,5 V DC,  $\pm 10\%$  for 24 V DC supply at 25 °C (77 °F)
- Grounding: Case isolated, internally shielded (Faraday cage)
  - Faraday cage connected to power supply return
- Over-voltage protection: Approximately 18 V DC
- Reverse polarity (wiring) protection

## Environmental

- Temperature range:
  - Accelerometer measurement temperature range:  $-50$  to  $+120$  °C ( $-60$  to  $+250$  °F)
  - Maximum operating temperature:  $120$  °C ( $250$  °F)
  - Storage temperature:  $-50$  to  $+150$  °C ( $-60$  to  $+300$  °F)
- Vibration limit: 70 g peak
- Shock limit: 5 000 g peak
- Electromagnetic sensitivity, equivalent g, maximum: < 100  $\mu$ g/gauss at 50 to 60 Hz
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak
- IEC: 529, IP 67 (For climatic conditions, recommend to use conduit/hose over braided cable.)

## Physical

- Dimensions: See drawing
- Weight:
  - Sensor without cable: 210 g (7.4 oz.)
  - Sensor with cable: 410 g (14.5 oz.)
- Case material: 304 stainless steel
- Mounting: M6  $\times$  1 and 1/4-28 UNF socket head cap screws provided
- Mounting torque: 6 Nm (50 in. lbs.)
- Cable: Integral cable, 5 m (16.4 ft.) length
- Wire specification: 0,32 mm<sup>2</sup> (AWG 22) stranded tin copper (seven strands at 0,05 mm<sup>2</sup> each)
- Connections:
  - White: ACCEL signal/power
  - Black: ACCEL/TEMP signal ground (GND)
  - Red: TEMP signal high
  - Blank twisted wire: Screen connected to internal shield

### Ordering information

<b>CMPT 2323T</b>	Acceleration and temperature sensor, 230 mV/g, with 5 m (16,4 ft) integral braided cable, side exit.
<b>CMPT 2323Tx10</b>	Acceleration and temperature sensor, 230 mV/g, with 10 m (33 ft) integral braided cable, side exit.
<b>CMPT 2323Tx15</b>	Acceleration and temperature sensor, 230 mV/g, with 15 m (50 ft) integral braided cable, side exit.

- 1/4-28 and M6  $\times$  1 socket head cap screws provided. Calibration sensitivity is provided for each accelerometer package.

# Hazardous area approved sensors

- CMSS 786A-IS / CMSS 786A-D2 Agency approved accelerometer, straight exit
- CMSS 787A-IS / CMSS 787A-M8-IS / CMSS 787A-D2 / CMSS 787A-M8-D2 Agency approved accelerometer, side exit
- CMSS 786T-IS / CMSS 786T-D2 Agency approved sensor, acceleration and temperature, straight exit
- CMSS 793-CA / CMSS 793-EE / CMSS 793-FM Superior, agency approved accelerometer, straight exit
- CMSS 797-CA / CMSS 797-EE / CMSS 797-FM Superior, agency approved accelerometer, ring mode, side exit
- CMPT 2310A / CMPT 2310TA Mining Group 1 Intrinsically Safe accelerometer (IECEX / ATEX certified)
- CMPT 2310AC / CMPT 2310ACT Mining Group 1 Intrinsically Safe accelerometer (IECEX ITA Australia certified)
- CMSS 793V / CMSS 793V-CA / CMSS 793V-EE / CMSS 793V-FM Industrial velocity sensor, straight exit



CMSS 786A-IS /  
CMSS 786A-D2



CMSS 787A-IS /  
CMSS 787A-M8-IS /  
CMSS 787A-D2 /  
CMSS 787A-M8-D2



CMSS 786T-IS /  
CMSS 786T-D2



CMSS 793V /  
CMSS 793V-CA /  
CMSS 793V-EE /  
CMSS 793V-FM



CMSS 793-CA /  
CMSS 793-EE /  
CMSS 793-FM



CMSS 797-CA /  
CMSS 797-EE /  
CMSS 797-FM



CMPT 2310A /  
CMPT 2310TA



CMPT 2310AC /  
CMPT 2310ACT

# CMSS 786A-IS / CMSS 786A-D2

## Agency approved accelerometer, straight exit

The CMSS 786A-IS / CMSS 786A-D2 is a cost-effective sensor for use in hazardous areas typically found in the following industries:

- Oil and Gas
- Refining
- Petrochemicals

Common applications include general purpose machines such as pumps, motors, fans and gearboxes. The CMSS 786A-IS is particularly suitable for the SKF on-line surveillance and protection systems since, in this case, no additional barriers are required for use in hazardous areas.

## Features

- Optimal for use with SKF on-line surveillance systems and protection systems when used with the appropriate safety barriers, accessories and/or methods as required by the particular hazardous area classification
- Economical, top exit design
- Rugged, corrosion resistant and hermetically sealed
- Case isolated
- Meets CE, EMC requirements
- ESD protection
- Reverse wiring protection

## Recommended connector/cable assembly

- CMSS 932 series

## Specifications

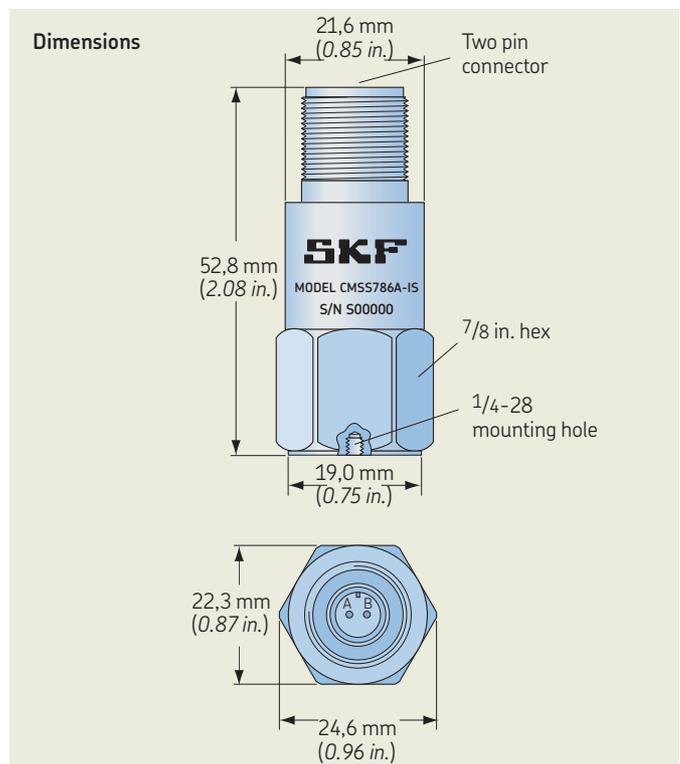
### Dynamic

- Sensitivity: 100 mV/g
- Sensitivity precision:  $\pm 5\%$  at 24 °C (75 °F)
- Acceleration range: 80 g peak
- Amplitude linearity: 1%
- Frequency range:
  - $\pm 5\%$ : 3,0 to 5 000 Hz
  - $\pm 10\%$ : 1,0 to 9 000 Hz
  - $\pm 3$  dB: 0,5 to 14 000 Hz
- Resonance frequency, mounted, nominal: 30 kHz
- Transverse sensitivity:  $\leq 5\%$  of axial
- Temperature response: See graph

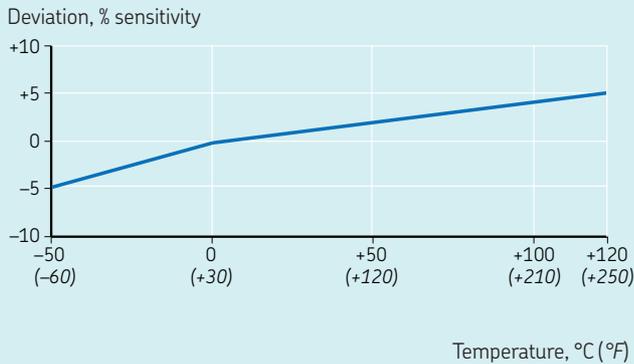


## Electrical

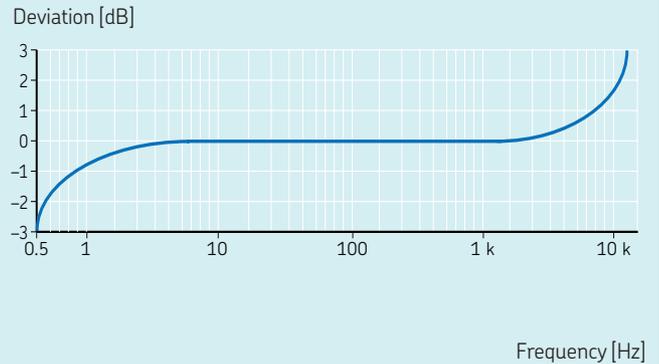
- Power requirements:
  - Voltage source<sup>1)</sup>: 18 to 30 V DC
  - Constant current diode<sup>1)</sup>, <sup>2)</sup>: 2 to 10 mA
- Electrical noise:
  - Broadband:
    - 2,5 Hz to 25 kHz: 700  $\mu\text{g}$
  - Spectral:
    - 10 Hz: 10  $\mu\text{g}/\sqrt{\text{Hz}}$
    - 100 Hz: 5  $\mu\text{g}/\sqrt{\text{Hz}}$
    - 1 000 Hz: 5  $\mu\text{g}/\sqrt{\text{Hz}}$
- Output impedance:  $< 100 \Omega$
- Bias output voltage: 12 V DC
- Grounding: Case isolated ( $> 108 \Omega$  at 100 V), internally shielded



### Typical temperature response



### Typical frequency response



### Environmental

- Temperature range:  $-50$  to  $+120$  °C ( $-60$  to  $+250$  °F)
- Vibration limit: 500 g peak
- Shock limit: 5 000 g peak
- Electromagnetic sensitivity, equivalent g, maximum: 30  $\mu$ g/gauss
- Sealing: Hermetic
- Base strain sensitivity: 0,002 g/ $\mu$ strain
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak

### Physical

- Dimensions: See drawing
- Weight: 90 g (3.2 oz.)
- Case material: 316L stainless steel
- Mounting: 1/4-28 tapped hole
- Mounting torque: 2,9 Nm (24 in. lbs.)
- Connections:
  - Shell: Ground
  - Pin A: Power/Signal
  - Pin B: Common
- Mating connector: CMSS 932-68LC or CMSS 932-68TL, two pin, IP 68, locking collar or twist lock
- Recommended cable: CMSS 932-SY-XXM and CMSS 932-DY-XXM, two conductor, twisted pair, single or double shielded, yellow or blue

- 1) To minimize the possibility of signal distortion when driving long cables with high vibration signals, 24 to 30 V DC powering is recommended. The higher level constant current source should be used when driving long cables (please consult SKF).
- 2) A maximum current of 6 mA is recommended for operating temperatures in excess of 100 °C (210 °F).

### Agency approvals for hazardous area

#### CMSS 786A-IS



Intrinsically Safe  
Class I, Zone 0, AEx / Ex ia IIC; T4

CSA



Class I, Division 1, Groups A, B, C, D  
Class II, Division 1, Groups E, F, G  
Class III, Division 1

CSA



ATEX Zone 0  
II 1 G Ex ia IIC; T4

KEMA

Must be installed per drawing 12881.

#### CMSS 786A-D2



Non-incendive  
Class I, Division 2, Groups A, B, C, D  
Class I, Zone 2, Ex nA II; T4

CSA



ATEX Zone 2  
II 3 G Ex nA II; T4

KEMA

Must be installed per drawing 13031

### Ordering information

**CMSS 786A-IS** Agency approved accelerometer, straight exit (intrinsically safe (IS) rated).

**CMSS 786A-D2** Agency approved accelerometer, straight exit (non-incendive rated).

- Both models with MIL-C-5015 style two pin connector. 1/4-28 and M8 mounting studs provided. A calibration certificate with the actual sensitivity of the accelerometer is included in each package. The nominal sensitivity is etched on each unit.

# CMSS 787A-IS / CMSS 787A-M8-IS / CMSS 787A-D2 / CMSS 787A-M8-D2



## Agency approved accelerometer with side exit

The CMSS 787A-IS / CMSS 787A-D2 is a cost-effective sensor for use in hazardous areas typically found in the following industries:

- Oil and Gas
- Refining
- Petrochemicals

Common applications include general purpose machines such as pumps, motors, fans and gearboxes. The CMSS 787A-IS is particularly suitable for the SKF on-line surveillance and protection systems since, in this case, no additional barriers are required for use in hazardous areas.

## Features

- Optimal for use with SKF on-line surveillance systems and protection systems when used with the appropriate safety barriers, accessories and/or methods as required by the particular hazardous area classification
- Low profile, side exit design
- Rugged, corrosion resistant and hermetically sealed
- Case isolated
- Meets CE, EMC requirements
- ESD protection
- Reverse wiring protection

## Recommended connector/cable assembly

- CMSS 932 series

## Specifications

### Dynamic

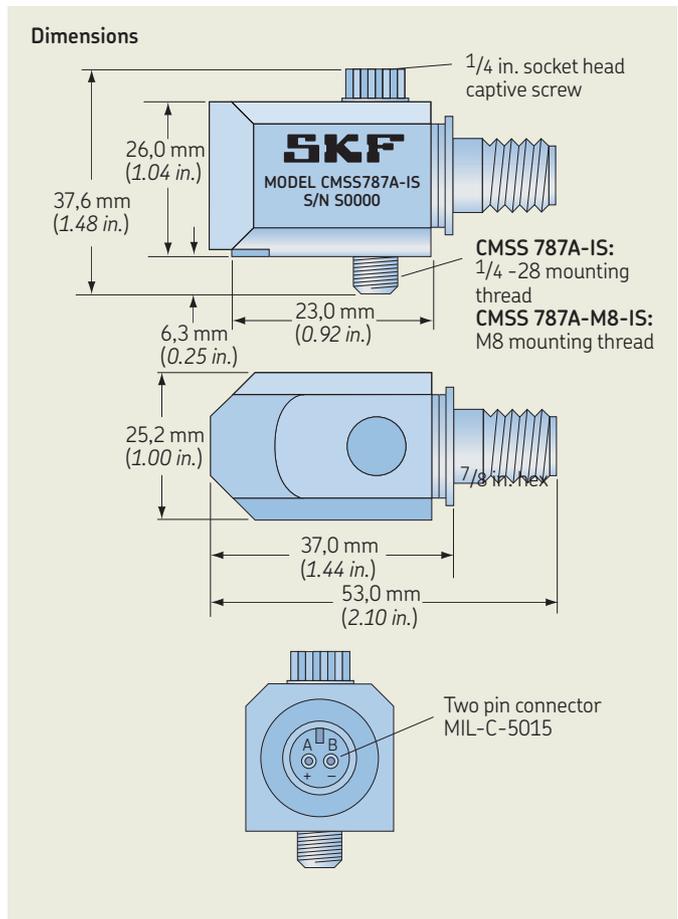
- Sensitivity: 100 mV/g
- Sensitivity precision:  $\pm 5\%$  at 24 °C (75 °F)
- Acceleration range: 80 g peak
- Amplitude linearity: 1%
- Frequency range:
  - $\pm 10\%$ : 1,0 to 5 000 Hz
  - $\pm 3$  dB: 0,7 to 10 000 Hz
- Resonance frequency, mounted, nominal: 22 kHz
- Transverse sensitivity:  $\leq 5\%$  of axial
- Temperature response: See graph

### Electrical

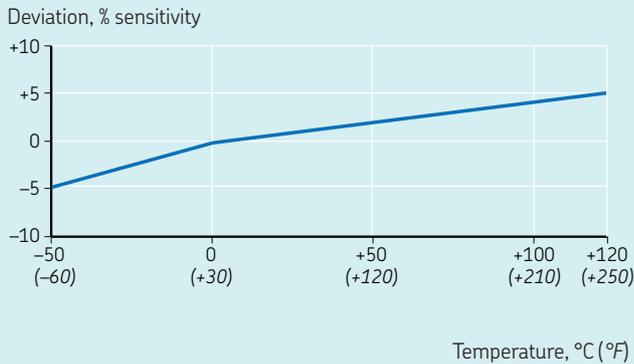
- Power requirements:
  - Voltage source<sup>1)</sup>: 18 to 30 V DC
  - Constant current diode<sup>1)</sup>, <sup>2)</sup>: 2 to 10 mA
- Electrical noise:
  - Broadband:



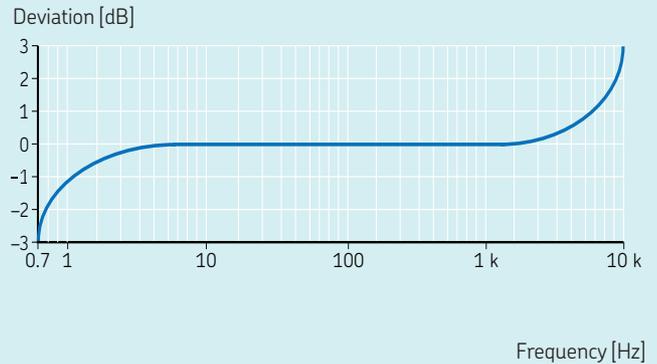
- 2,5 Hz to 25 kHz: 700  $\mu\text{g}$
- Spectral:
  - 10 Hz: 10  $\mu\text{g}/\sqrt{\text{Hz}}$
  - 100 Hz: 5  $\mu\text{g}/\sqrt{\text{Hz}}$
  - 1 000 Hz: 5  $\mu\text{g}/\sqrt{\text{Hz}}$
- Output impedance:  $< 100 \Omega$
- Bias output voltage: 12 V DC
- Grounding: Case isolated, internally shielded



### Typical temperature response



### Typical frequency response



### Environmental

- Temperature range:  $-50$  to  $+120$  °C ( $-60$  to  $+250$  °F) operating temperature
- Vibration limit: 500 g peak
- Shock limit: 5 000 g peak
- Electromagnetic sensitivity, equivalent g, maximum: 70  $\mu$ g/gauss
- Sealing: Hermetic
- Base strain sensitivity: 0,0002 g/ $\mu$ strain
- Certifications: CE, CSA and ATEX (see table)
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak

### Physical

- Dimensions: See drawing
- Weight: 90 g (3.2 oz.)
- Case material: 316L stainless steel
- Mounting: With 1,5 mm (0.06 in.) diameter safety wire hole
  - CMSS 787A-IS: 1/4-28 captive hex head screw provided
  - CMSS 787A-M8-IS: M8 captive hex head screw provided
- Mounting torque: 2,9 Nm (24 in. lbs.)
- Connections:
  - Shell: Ground
  - Pin A: Power/Signal
  - Pin B: Common
- Mating connector: CMSS 932-68LC or CMSS 932-68TL, two pin, IP 68, locking collar or twist lock
- Recommended cable: CMSS 932-SY-XXM and CMSS 932-DY-XXM, two conductor, twisted pair, single or double shielded, yellow or blue

### Agency approvals for hazardous area

#### CMSS 787A-IS



CSA

Intrinsically Safe  
Class I, Zone 0, AEx / Ex ia IIC; T4



CSA

Class I, Division 1, Groups A, B, C, D  
Class II, Division 1, Groups E, F, G  
Class III, Division 1



KEMA

ATEX Zone 0  
II 1 G Ex ia IIC; T4

Must be installed per drawing 12881.

#### CMSS 787A-D2



CSA

Non-incendive  
Class I, Division 2, Groups A, B, C, D  
Class I, Zone 2, Ex nA II; T4



KEMA

ATEX Zone 2  
II 3 G Ex nA II; T4

Must be installed per drawing 13031

- 1) To minimize the possibility of signal distortion when driving long cables with high vibration signals, 24 to 30 V DC powering is recommended. The higher level constant current source should be used when driving long cables (please consult SKF).
- 2) A maximum current of 6 mA is recommended for operating temperatures in excess of 100 °C (210 °F).

### Ordering information

**CMSS 787A-IS** Agency approved accelerometer with side exit, intrinsically safe (IS) rated.

**CMSS 787A-D2** Agency approved accelerometer with side exit, non-incendive rated.

- Both models with MIL-C-5015 style two pin connector. 1/4-28 captive hex head screw. Calibration sensitivity is provided for each accelerometer package with nominal sensitivity etched on each unit.

**CMSS 787A-M8-IS** Agency approved accelerometer with side exit, intrinsically safe (IS) rated.

**CMSS 787A-M8-D2** Agency approved accelerometer with side exit, non-incendive rated.

- Both models with MIL-C-5015 style two pin connector. M8 captive hex head screw. A calibration certificate with the actual sensitivity of the accelerometer is included in each package. The nominal sensitivity is etched on each unit.

# CMSS 786T-IS / CMSS 786T-D2

## Agency approved sensor, acceleration and temperature, straight exit

The CMSS 786T-IS / CMSS 786T-D2 is a cost-effective, dual output sensor ideal for applications where both vibration and surface temperature measurements are required. The sensor is suitable for use in hazardous areas typically found in the following industries:

- Oil and Gas
- Refining
- Petrochemicals

Common applications include general purpose machines such as pumps, motors, fans and gearboxes. The CMSS 786T-IS is particularly suitable for the SKF on-line surveillance and protection systems, and the CMSS 786T-D2 is suitable for the Machine Condition Transmitters (MCT), as in both cases no additional barriers are required for use in hazardous areas.

## Features

- Optimal for use with SKF on-line surveillance systems and protection systems when used with the appropriate safety barriers, accessories and/or methods as required by the particular hazardous area classification
- Economical, top exit design
- Rugged, corrosion resistant and hermetically sealed
- Case isolated
- Meets CE, EMC requirements
- ESD protection
- Reverse wiring protection

## Recommended connector/cable assembly

- CMSS 933 series

## Specifications

### Dynamic

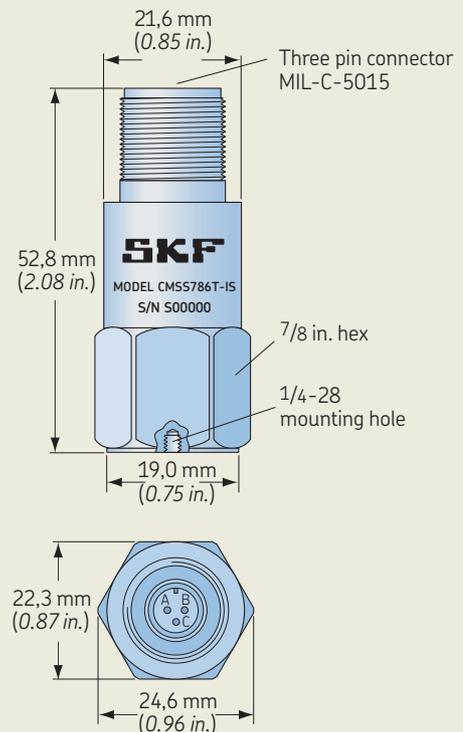
- Sensitivity: 100 mV/g
- Sensitivity precision:  $\pm 5\%$  at 24 °C (75 °F)
- Acceleration range: 60 g peak
- Amplitude linearity: 1%
- Frequency range:
  - $\pm 5\%$ : 3,0 to 5 000 Hz
  - $\pm 10\%$ : 1,0 to 7 000 Hz
  - $\pm 3$  dB: 0,5 to 12 000 Hz
- Resonance frequency, mounted, nominal: 30 kHz
- Transverse sensitivity:  $\leq 5\%$  of axial
- Temperature response: See graph
- Temperature output sensitivity:
  - $\pm 1,5$  °C ( $\pm 2,7$  °F): 10 mV/°C (18 mV/°F)
- Temperature measurement range: 2 to 120 °C (36 to 250 °F)



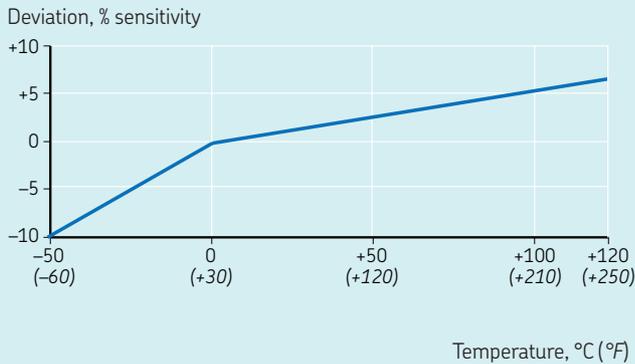
## Electrical

- Power requirements:
  - Voltage source: 18 to 30 V DC
  - Constant current diode: 2 to 10 mA
- Electrical noise:
  - Broadband:
    - 2,5 Hz to 25 kHz: 700  $\mu$ g
  - Spectral:
    - 10 Hz: 10  $\mu$ g/ $\sqrt$ Hz
    - 100 Hz: 5  $\mu$ g/ $\sqrt$ Hz
    - 1 000 Hz: 5  $\mu$ g/ $\sqrt$ Hz
- Output impedance:  $< 100 \Omega$
- Bias output voltage: 12 V DC
- Grounding: Case isolated, internally shielded

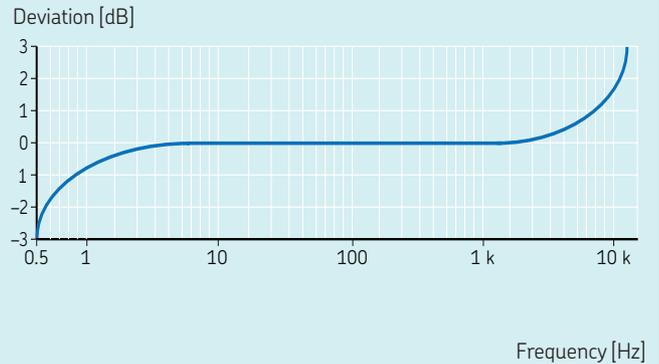
## Dimensions



### Typical temperature response



### Typical frequency response



### Environmental

- Temperature range:  $-50$  to  $+120$  °C ( $-60$  to  $+250$  °F) operating temperature
- Vibration limit: 500 g peak
- Shock limit: 5 000 g peak
- Electromagnetic sensitivity, equivalent g, maximum: 70  $\mu$ g/gauss
- Sealing: Hermetic
- Base strain sensitivity: 0,0002 g/ $\mu$ strain
- Certifications: CE, CSA and ATEX (see table)
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak

### Physical

- Dimensions: See drawing
- Weight: 90 g (3.2 oz.)
- Case material: 316L stainless steel
- Mounting:
  - Internal  $\frac{1}{4}$ -28 thread
  - M8  $\times$  1,25 and  $\frac{1}{4}$ -28 to  $\frac{1}{4}$ -28 mounting studs provided
- Mounting torque: 2,9 Nm (24 in. lbs.)
- Connections:
  - Pin A: Accelerometer signal/power
  - Pin B: Accelerometer and temperature signal common
  - Pin C: Temperature sensor signal
- Mating connector: CMSS 933-68LC or CMSS 933-68TL, three pin, IP 68 locking collar or twist lock or three pin MIL-C-5015 style
- Recommended cable: CMSS 933-SY-XXM, three conductor, triad cable, single shielded, yellow

### Agency approvals for hazardous area

#### CMSS 786T-IS



CSA

Intrinsically Safe  
Class I, Zone 0, AEx / Ex ia IIC; T4



CSA

Class I, Division 1, Groups A, B, C, D  
Class II, Division 1, Groups E, F, G  
Class III, Division 1



KEMA

ATEX Zone 0  
II 1 G Ex ia IIC; T4  
Must be installed per drawing 12882.

#### CMSS 786T-D2



CSA

Non-incendive  
Class I, Division 2, Groups A, B, C, D  
Class I, Zone 2, Ex nA II; T4



KEMA

ATEX Zone 2  
II 3 G Ex nA II; T4  
Must be installed per drawing 13032

### Ordering information

**CMSS 786T-IS** Agency approved sensor, acceleration and temperature, straight exit, intrinsically safe (IS) rated.

**CMSS 786T-D2** Agency approved sensor, acceleration and temperature, straight exit, non-incendive rated.

- Both models with MIL-C-5015 style three pin connector.  $\frac{1}{4}$ -28 and M8 mounting studs provided. A calibration certificate with the actual sensitivity of the accelerometer is included in each package. The nominal sensitivity is etched on each unit.

# CMSS 793-CA / CMSS 793-EE / CMSS 793-FM

## Superior, agency approved accelerometer, straight exit

The CMSS 793-CA, CMSS 793-EE and CMSS 793-FM are superior acceleration sensors with a top exit, two pin connector and agency approvals. They are based on the CMSS 793 sensor specifications.

### Features

- Agency approval
  - CMSS 793-CA: Canadian Standards Association (CSA) Class I, II, III, Division 1 certification
  - CMSS 793-EE: ATEX Zone 0 intrinsically safe (IS) certification
  - CMSS 793-FM: Factory Mutual (FM) intrinsically safe (IS) certification
- Ground isolated
- Rugged construction
- Corrosion resistant and hermetically sealed for installation in high humidity areas
- Meets CE, EMC requirements
- ESD protection
- Reverse wiring protection

For more information about this hazardous area approved sensor, refer to the section Industrial accelerometers for widespread applications (→ **page 18**).



#### Agency approvals for hazardous area

##### CMSS 793-CA



CSA

Class I, Division 1, Groups A, B, C, D  
Must be installed per drawing 31256700

##### CMSS 793-EE



SIRA

ATEX Zone 0  
II 1 G  
Ex ia IIC T4 Ga (Ta = -50 to +120 °C (-60 to +250 °F))  
Must be installed per drawing 11535.

##### CMSS 793-FM



FM

Intrinsically Safe  
Class I, II, III, Division 1, Groups A, B, C, D, E, F, G  
NI  
Class I, II, III, Division 2, Groups A, B, C, D, F, G  
Must be installed per document drawing set 31533600

#### Ordering information

- |                    |   |
|--------------------|---|
| <b>CMSS 793-CA</b> | Superior, CSA approved accelerometer, straight exit.  |
| <b>CMSS 793-EE</b> | Superior, ATEX approved accelerometer, straight exit. |
| <b>CMSS 793-FM</b> | Superior, FM approved accelerometer, straight exit.   |

- 1/4-28 mounting studs are provided for all models. A calibration certificate with the actual sensitivity of the accelerometer is included in each package. The nominal sensitivity is etched on each unit.

#### Optional accessories

- |                    |                           |
|--------------------|---------------------------|
| <b>CMSS 908-MD</b> | Medium duty magnetic base |
|--------------------|---------------------------|

# CMSS 797-CA / CMSS 797-EE / CMSS 797-FM

## Superior, agency approved accelerometer, ring mode, side exit

The CMSS 797-CA, CMSS 797-EE and CMSS 797-FM are superior acceleration sensors with a side exit, two pin connector and agency approvals. They are based on the CMSS 797 sensor specification.

### Features

- Agency approval
  - CMSS 797-CA: Canadian Standards Association (CSA) Class I, II, III, Division 1 certification
  - CMSS 797-EE: ATEX Zone 0 intrinsically safe (IS) certification
  - CMSS 797-FM: Factory Mutual (FM) intrinsically safe (IS) certification
- Rugged construction
- Corrosion resistant and hermetically sealed for installation in high humidity areas
- Case isolated
- Meets CE, EMC requirements
- ESD protection
- Reverse wiring protection

For more information about this hazardous area approved sensor, refer to the section Industrial accelerometers for widespread applications (→ page 20).



#### Agency approvals for hazardous area

##### CMSS 797-CA



Class I, Division 1, Groups A, B, C, D

Must be installed per drawing 31256700.

CSA

##### CMSS 797-EE



ATEX Zone 0

II 1 G

Ex ia IIC T4 Ga (Ta = -50 to +120 °C (-60 to +250 °F))

SIRA

Must be installed per drawing 11537.

##### CMSS 797-FM



Intrinsically Safe

Class I, II, III, Division 1, Groups A, B, C, D, E, F, G

NI

Class I, II, III, Division 2, Groups A, B, C, D, F, G

FM

Must be installed per document drawing set 31533600.

#### Ordering information

<b>CMSS 797-CA</b>	Superior, CSA approved accelerometer, ring mode, side exit.
<b>CMSS 797-EE</b>	Superior, ATEX approved accelerometer, ring mode, side exit.
<b>CMSS 797-FM</b>	Superior, FM approved accelerometer, ring mode, side exit.

- 1/4-28 captive hex head screws are provided for all models. A calibration certificate with the actual sensitivity of the accelerometer is included in each package. The nominal sensitivity is etched on each unit.

# CMPT 2310A / CMPT 2310TA

## Mining Group 1 Intrinsically Safe accelerometer (IECEX / ATEX certified)

The CMPT 2310A / CMPT 2310TA models are piezoelectric accelerometer sensors especially made for the monitoring of machinery operating in hazardous mining environments. They are highly reliable with their high shock limit, excellent thermal stability and minimum mass loading effects.

The CMPT 2310TA model sensors includes a precision integrated circuit temperature sensor. The CMPT 2310TA temperature output voltage is linearly proportional to the temperature (°C) and does not require external calibration or trimming to provide high accuracy over the full 0 to +110 °C temperature range.

The CMPT 2310A / CMPT 2310TA sensors are encapsulation sealed in a stainless steel body and have an integral stainless steel wire over-braided cable. The sensors have low profile housing and a side exit integral cable for use in a wide range of industrial applications where harsh operating conditions and limited mounting space prevail. The stainless steel and encapsulated construction makes them suitable in corrosive and wet environments. The sensor cable is double insulated and highly resistant to abrasion and wear. It has excellent signal transmission characteristics, low capacitance, redundant shielding and high mechanical durability. The transducer and internal cable shield/ground are isolated from the sensor housing to prevent ground loops.

The Intrinsic Safe CMPT 2310A / CMPT 2310TA sensors can be used with any Intrinsic Safe portable vibration data collector having the allowable terminal and isolation parameters, as defined in the features section.

## Features

- ATEX certification:
- I M1 Ex ia I Ma ( $-50\text{ °C} \leq T_a \leq +110\text{ °C}$ )
- IECEX certification: Ex ia I Ma ( $-50\text{ °C} \leq T_a \leq +110\text{ °C}$ )
- IP 67
- 100 mV/g sensitivity
- CMPT 2310TA includes an integral temperature sensor (10 mV/°C)
- Rugged design, stainless steel encapsulation sealed sensor housing
- Integral 5 m (16.4 feet) stainless steel wire over-braided shielded cable
- Straightforward sensor interface with color-coded cabling
- Standard mounting techniques, utilizing a low profile side exit cable with recessed mounting screws
- The internal sensor capsule is isolated from the machine ground
- Low noise, highly shock resistant, and overload protected electronics

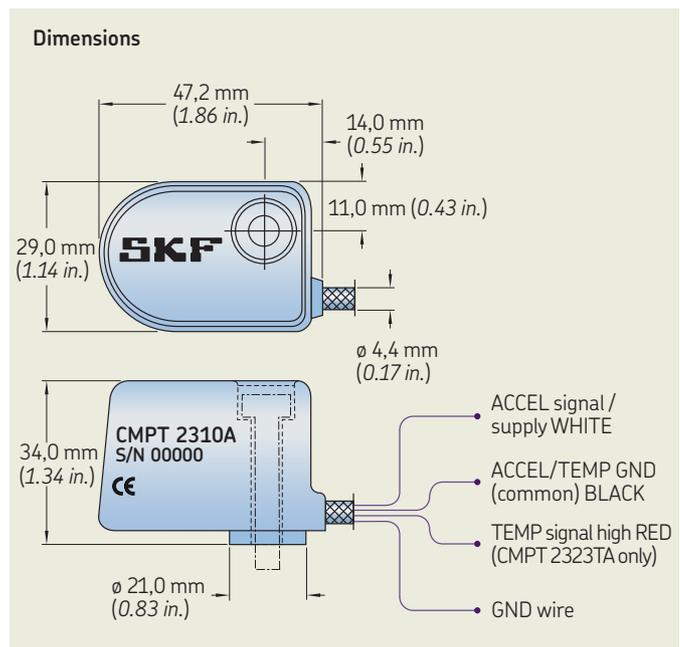


## Certified to the following standards

- IEC Standards for IECEX
  - IEC 60079-0:2011
  - IEC 60079-11:2011
- Essential Health and Safety Requirements for ATEX
  - EN 60079-0:2012
  - EN 60079-11:2012
  - EN 50303:2000

## Specifications

Specifications conform to ISA-RP-37.2 (1-95) and are typical values referenced at 24 °C (75 °F), 24 V DC supply, 4 mA constant current and 80 Hz.



## Sensor Accelerometer (CMPT 2310A / CMPT 2310TA)

- Mounted base resonance: 22 kHz (nominal)
- Sensitivity: 100 mV/g,  $\pm 10\%$ , nominal 80 Hz at 22 °C (72 °F)
- Frequency response: 2 Hz to 10 kHz,  $\pm 5\%$ , 0,8 Hz to 15 kHz
- Isolation: Base isolated
- Acceleration output range: 70 g
- Transverse sensitivity: <5% of axial
- Accelerometer measurement temperature range: -50 to +110 °C (-58 to +230 °F)

## Sensor – Temperature (CMPT 2310TA)

- Sensitivity: 10 mV/°C
- Temperature sensor measurement range: 0 to +110 °C (32 to +230 °F)

## Electrical

- Power requirements:
  - Voltage source: +24 V DC nominal, +18 to +30 V DC
  - Constant current diode: 4 mA DC at +24 V DC, 2 to 10 mA is permissible
- Acceleration sensor electrical noise: <1 mg RMS broadband 2,5 Hz to 25,0 kHz
- Acceleration sensor bias output voltage: 11,5 V DC,  $\pm 10\%$  for +24 V DC supply at 25 °C (77 °F)
- Over-voltage protection: Approximately 18 V DC
- Reverse polarity (wiring) Protection
- Settling time: 2 seconds
- Output impedance: 200 Ohms maximum
- Case isolation: >108 Ohms at 500 V

## Wire connections (CMPT 2310A)

- White: ACCEL signal/power (connected to constant current source)
- Black: ACCEL signal ground (GND)
- Drain wire: Screen connected to internal shield (isolated from case)

## Wire connections (CMPT 2310TA)

- Wire connections (CMPT 2310TA)
- White: ACCEL signal/power (connected to constant current source)
- Black: ACCEL signal ground (GND)
- Red: Temperature signal high
- Drain wire: Screen connected to internal shield (isolated from case)

## Environmental

- Storage temperature range: -50 to +110 °C (-58 to +230 °F)
- Vibration limit: 70 g peak
- Shock limit: 5 000 g
- Electromagnetic sensitivity, equivalent g, maximum: <100  $\mu\text{g}$ /gauss at 50 to 60 Hz
- Emissions: EN 61000-6-4:2001
- Immunity: EN 61000-6-2:1999
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak
- IEC: 529, IP 67 (For climatic conditions, recommend to use conduit/hose over braided cable.)

## Physical

- Dimensions: See drawing
- Weight: Sensor with cable 410 g (14.5 oz.)
- Case material: 304 stainless steel
- Sensing element/construction: PZT/Compression
- Mounting: M6 x 1 (30 mm long) and 1/4–28 UNF (1.25 in. long) socket head cap screws provided
- Mounting torque: 6 Nm (50 in. lbs.)
- Cable: Integral cable, 5 m (16.4 ft.)
- Wire specification: 0,32 mm<sup>2</sup> (AWG 22) stranded tin copper (seven strands at 0,02 mm<sup>2</sup> each)

## Intrinsically Safe Requirements

- Cable: Integral cable, 5 m (16.4 ft.)
- Certificate details: Group I
  - IECEx BAS 08.0087, Ex ia I Ma (-50 °C  $\leq$  Ta  $\leq$  +110 °C)
  - Baseefa08ATEX0268, I M 1 Ex ia I Ma (-50 °C  $\leq$  Ta  $\leq$  +110 °C)
- Terminal parameters: Ui = 28 V, li = 93 mA, Pi = 0.65 W
- 500 V isolation: Units will pass a 500 V Isolation Test
- Equipment: The equipment must be returned to the manufacturer for maintenance or replacement
  - Address:  
SKF Condition Monitoring Centre (Livingston) Ltd  
2 Michaelson Square, Kirkton Campus,  
Livingston, United Kingdom EH54 7DP

## Ordering information

### Standard sensor, 5 m (16.4 ft.) configuration\*

Sensor with 5 m (16.4 ft.) integral cable, 1/4-28 and M6 x 1 socket head cap screws provided.

**CMPT 2310A** Sensor for mining industry, side exit and acceleration.

**CMPT 2310TA** Sensor for mining industry, side exit, acceleration and temperature.

### 10 m (32.8 ft.) configuration\*

Sensor with 10 m (32.8 ft.) integral cable, 1/4-28 and M6 x 1 socket head cap screws provided.

**CMPT 2310A-10** Sensor for mining industry, side exit and acceleration.

**CMPT 2310TA-10** Sensor for mining industry, side exit, acceleration and temperature.

### 15 m (49.2 ft.) configuration\*

Sensor with 15 m (49.2 ft.) integral cable, 1/4-28 and M6 x 1 socket head cap screws provided.

**CMPT 2310A-15** Sensor for mining industry, side exit and acceleration.

**CMPT 2310TA-15** Sensor for mining industry, side exit, acceleration and temperature.

\* Calibration sensitivity is provided for each accelerometer package with nominal sensitivity etched on each unit.

# CMPT 2310AC / CMPT 2310ACT

## Mining Group 1 Intrinsically Safe accelerometer (IECEx ITA Australia certified)

The CMPT 2310AC / CMPT 2310ACT models are piezoelectric accelerometer sensors especially made for the monitoring of machinery operating in hazardous mining environments. They are highly reliable with their high shock limit, excellent thermal stability and minimum mass loading effects.

The CMPT 2310ACT model sensors includes a precision integrated circuit temperature sensor. The CMPT 2310ACT temperature output voltage is linearly proportional to the temperature (°C) and does not require external calibration or trimming to provide high accuracy over the full 0 to +110 °C temperature range.

The CMPT 2310AC / CMPT 2310ACT sensors are encapsulation sealed in a stainless steel body and have an integral stainless steel wire over-braided cable. The sensors have low profile housing and a side exit integral cable for use in a wide range of industrial applications where harsh operating conditions and limited mounting space prevail. The stainless steel and encapsulated construction makes them suitable in corrosive and wet environments. The sensor cable is double insulated and highly resistant to abrasion and wear. It has excellent signal transmission characteristics, low capacitance, redundant shielding and high mechanical durability. The transducer and internal cable shield/ground are isolated from the sensor housing to prevent ground loops.

The Intrinsic Safe CMPT 2310AC / CMPT 2310ACT sensors can be used with any Intrinsic Safe portable vibration data collector having the allowable terminal and isolation parameters, as defined in the features section.

## Features

- IECEx certification: Ex ia I Ma (-50 °C ≤ Ta ≤ +110 °C)
- IP 67
- 100 mV/g sensitivity
- CMPT 2310ACT includes an integral temperature sensor (10 mV/°C)
- Rugged design, stainless steel encapsulation sealed sensor housing
- Integral 5 m (16.4 feet) stainless steel wire over-braided shielded cable
- Straightforward sensor interface with color-coded cabling
- Standard mounting techniques, utilizing a low profile side exit cable with recessed mounting screws
- The internal sensor capsule is isolated from the machine ground
- Low noise, highly shock resistant, and overload protected electronics



## Certified to the following standards

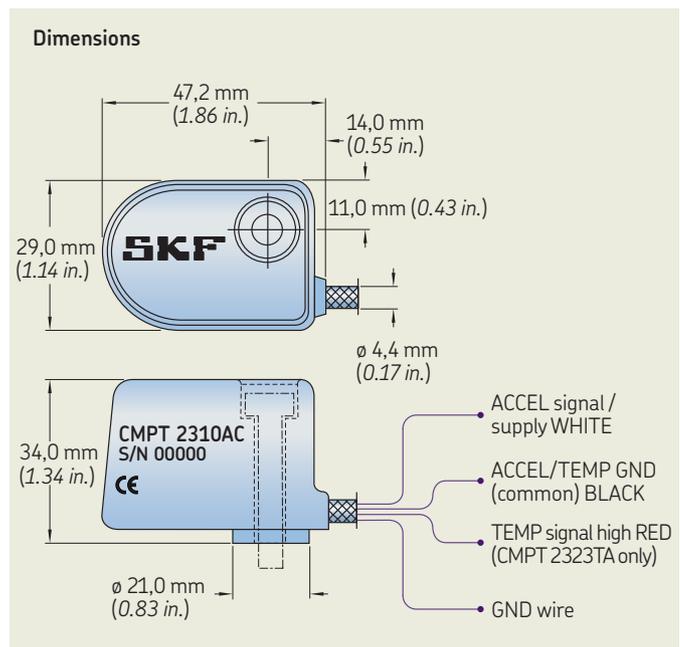
- IEC Standards for IECEx
  - IEC 60079-0:2011
  - IEC 60079-11:2011

## Specifications

Specifications conform to ISA-RP-37.2 (1-95) and are typical values referenced at 24 °C (75 °F), 24 V DC supply, 4 mA constant current and 80 Hz.

### Sensor Accelerometer (CMPT 2310AC / CMPT 2310ACT)

- Mounted base resonance: 22 kHz (nominal)
- Sensitivity: 100 mV/g, ±10%, nominal 80 Hz at 22 °C (72 °F)
- Frequency response: 2 Hz to 10 kHz, ±5%, 0,8 Hz to 15 kHz
- Isolation: Base isolated
- Acceleration output range: 70 g
- Transverse sensitivity: <5% of axial
- Accelerometer measurement temperature range: -50 to +110 °C (-58 to +230 °F)



## Sensor – Temperature (CMPT 2310ACT)

- Sensitivity: 10 mV/°C
- Temperature sensor measurement range: 0 to +110 °C (32 to +230 °F)

### Electrical

- Power requirements:
  - Voltage source: +24 V DC nominal, +18 to +30 V DC
  - Constant current diode: 4 mA DC at +24 V DC, 2 to 10 mA is permissible
- Acceleration sensor electrical noise: <1 mg RMS broadband 2,5 Hz to 25,0 kHz
- Acceleration sensor bias output voltage: 11,5 V DC, ±10% for +24 V DC supply at 25 °C (77 °F)
- Over-voltage protection: Approximately 18 V DC
- Reverse polarity (wiring) Protection
- Settling time: 2 seconds
- Output impedance: 200 Ohms maximum
- Case isolation: >108 Ohms at 500 V

### Wire connections (CMPT 2310AC)

- White: ACCEL signal/power (connected to constant current source)
- Black: ACCEL signal ground (GND)
- Drain wire: Screen connected to internal shield (isolated from case)

### Wire connections (CMPT 2310ACT)

- White: ACCEL signal/power (connected to constant current source)
- Black: ACCEL signal ground (GND)
- Red: Temperature signal high
- Drain wire: Screen connected to internal shield (isolated from case)

### Environmental

- Storage temperature range: –50 to +110 °C (–58 to +230 °F)
- Vibration limit: 70 g peak
- Shock limit: 5 000 g
- Electromagnetic sensitivity, equivalent g, maximum: <100 µg/gauss at 50 to 60 Hz
- Emissions: EN 61000-6-4:2001
- Immunity: EN 61000-6-2:1999
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak
- IEC: 529, IP 67 (For climatic conditions, recommend to use conduit/hose over braided cable.)

### Physical

- Dimensions: See drawing
- Weight: Sensor with cable 410 g (14.5 oz.)
- Case material: 304 stainless steel
- Sensing element/construction: PZT/Compression
- Mounting: M6 x 1 (30 mm long) and 1/4–28 UNF (1.25 in. long) socket head cap screws provided
- Mounting torque: 6 Nm (50 in. lbs.)
- Cable: Integral cable, 5 m (16.4 ft.)
- Wire specification: 0,32 mm<sup>2</sup> (AWG 22) stranded tin copper (seven strands at 0,02 mm<sup>2</sup> each)

## Intrinsically Safe Requirements

- Cable: Integral cable, 5 m (16.4 ft.)
- Certificate details: Group I
  - IECEx ITA 13.0008X, Ex ia I Ma (–50 °C to +110 °C)
- Terminal parameters: U<sub>i</sub> = 28 V, I<sub>i</sub> = 93 mA, P<sub>i</sub> = 0,65 W
- 500 V isolation: Units will pass a 500 V Isolation Test
- Equipment: The equipment must be returned to the manufacturer for maintenance or replacement
  - Address:  
SKF Condition Monitoring Centre (Livingston) Ltd  
2 Michaelson Square, Kirkton Campus,  
Livingston, United Kingdom EH54 7DP

### Ordering information

#### Standard sensor, 5 m (16.4 ft.) configuration\*

Sensor with 5 m (16.4 ft.) integral cable, 1/4–28 and M6 x 1 socket head cap screws provided.

**CMPT 2310AC** Sensor for mining industry, side exit and acceleration.

**CMPT 2310ACT** Sensor for mining industry, side exit, acceleration and temperature.

#### 10 m (32.8 ft.) configuration\*

Sensor with 10 m (32.8 ft.) integral cable, 1/4–28 and M6 x 1 socket head cap screws provided.

**CMPT 2310AC-10** Sensor for mining industry, side exit and acceleration.

**CMPT 2310ACT-10** Sensor for mining industry, side exit, acceleration and temperature.

#### 15 m (49.2 ft.) configuration\*

Sensor with 15 m (49.2 ft.) integral cable, 1/4–28 and M6 x 1 socket head cap screws provided.

**CMPT 2310AC-15** Sensor for mining industry, side exit and acceleration.

**CMPT 2310ACT-15** Sensor for mining industry, side exit, acceleration and temperature.

\* Calibration sensitivity is provided for each accelerometer package with nominal sensitivity etched on each unit.

# CMSS 793V / CMSS 793V-CA / CMSS 793V-EE / CMSS 793V-FM

## Piezoelectric industrial velocity sensor, straight exit

The CMSS 793V is a precision velocity sensor mainly for use in the following industries:

- Oil and Gas
- Refining
- Petrochemicals
- Power Generation

Corporate standards and practices in these industries often require the use of velocity transducers, and piezoelectric devices such as the CMSS 793V eliminate the moving parts associated with self-generating velocity sensors (which will lead to degradation over time). The CMSS 793V is an accelerometer with internal integration electronics in order to provide velocity as an output.

This series of sensor is one of the most long-standing models from SKF, with over 25 years of installed experience, together with a long track record of proven reliability. It is recommended for use when the vibration signal is to be used for machinery protection applications, where a higher precision may be required.

Common applications would include API 670 standard monitoring of pumps, fans and compressors.

## Features

- Optimal for use with SKF on-line surveillance systems and protection systems when used with the appropriate safety barriers, accessories and/or methods as required by the particular hazardous area classification
- Rugged, corrosion resistant and hermetically sealed
- Case isolated
- Meets stringent CE, EMC requirements
- ESD protection
- Reverse wiring protection

### Recommended connector/cable assembly

- CMSS 932 series

## Specifications

### Dynamic

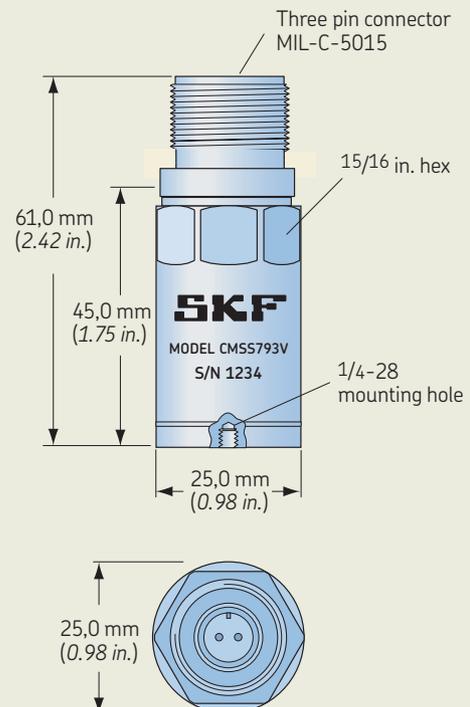
- Sensitivity: 100 mV/in./s
- Sensitivity precision:  $\pm 10\%$  at 24 °C (75 °F)
- Velocity range: 50 in./s peak
- Amplitude linearity: 1%
- Frequency range:
  - 10%: 3,0 to 3 500 Hz
  - $\pm 3$  dB: 2,5 to 7 000 Hz
- Resonance frequency, mounted, nominal: 15 kHz
- Transverse sensitivity:  $\leq 5\%$  of axial
- Temperature response: See graph



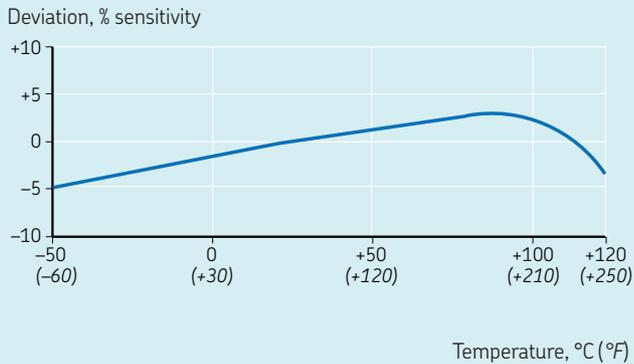
## Electrical

- Power requirements:
  - Voltage source(1): 18 to 30 V DC
  - Constant current diode(1), 2): 2 to 10 mA
- Electrical noise:
  - Broadband:
    - 2,5 Hz to 25 kHz: 100  $\mu$ in./s
  - Spectral:
    - 10 Hz: 10,0  $\mu$ in./s/ $\sqrt{\text{Hz}}$
    - 100 Hz: 1,0  $\mu$ in./s/ $\sqrt{\text{Hz}}$
    - 1 000 Hz: 0,2  $\mu$ in./s/ $\sqrt{\text{Hz}}$
- Output impedance:  $< 200 \Omega$
- Bias output voltage: 10 V DC
- Grounding: Case isolated, internally shielded

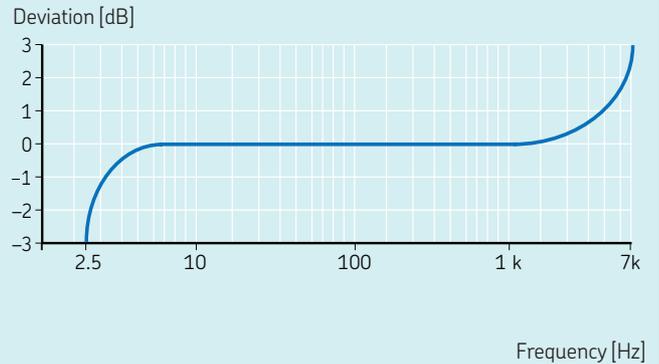
## Dimensions



### Typical temperature response



### Typical frequency response



- Absolute phase shift, nominal: > 2°
- Bias output voltage: 12 V DC
- Grounding: Case isolated, internally shielded

### Environmental

- Temperature range: -50 to +120 °C (-60 to +250 °F) operating temperature
- Vibration limit: 250 g peak
- Shock limit: 2 500 g peak
- Electromagnetic sensitivity, equivalent g, maximum: 25  $\mu\text{in./s/}$  gauss
- Sealing: Hermetic
- Base strain sensitivity: 0,0005  $\mu\text{in./s/}\mu\text{strain}$
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak

### Physical

- Dimensions: See drawing
  - Weight: 145 g (5.1 oz.)
  - Case material: 316L stainless steel
  - Mounting: 1/4-28 tapped hole
  - Mounting torque: 2,9 Nm (24 in. lbs.)
  - Connections:
    - Pin A: Power/Signal
    - Pin B: Common
  - Mating connector: CMSS 932-68LC or CMSS 932-68TL, two pin, IP 68 locking collar or twist lock
  - Recommended cable: CMSS 932-SY-XXM and CMSS 932-SB-XXM, two conductor, twisted pair, single shielded, yellow or blue
- 1) To minimize the possibility of signal distortion when driving long cables with high vibration signals, 24 to 30 V DC powering is recommended. The higher level constant current source should be used when driving long cables (please consult SKF).
  - 2) A maximum current of 6 mA is recommended for operating temperatures in excess of 100 °C (210 °F).

### Agency approvals for hazardous area

#### CMSS 793V-CA



Class I, Division 1, Groups A, B, C, D  
Must be installed per drawing 31256700.

#### CMSS 793V-EE



ATEX Zone 0  
II 1 G  
Ex ia IIC T4 Ga (Ta = -50 to +120 °C (-60 to +250 °F))  
Must be installed per drawing 11535.

#### CMSS 793V-FM



Intrinsically Safe  
Class I, II, III, Division 1, Groups A, B, C, D, E, F, G  
NI  
Class I, II, III, Division 2, Groups A, B, C, D, F, G  
Must be installed per document drawing set 31533600.

### Ordering information

**CMSS 793V** Piezoelectric industrial velocity sensor, straight exit.

- CMSS 793V-CA, CMSS 793V-EE or CMSS 793V-FM agency approved intrinsically safe (IS) version.
- All models with MIL-C-5015 style two pin connector. 1/4-28 mounting studs provided. A calibration certificate with the actual sensitivity of the accelerometer is included in each package. The nominal sensitivity is etched on each unit.

# Portable analysis accelerometers

- CMSS 2200 / CMSS 2200-M8 Industrial accelerometer, side exit
- CMSS 2111 Small footprint accelerometer with integral cable
- CMSS 2114-K High frequency accelerometer kit
- CMSS 4370-K Triax accelerometer kit



CMSS 2200 / CMSS  
2200-M8



CMSS 2111



CMSS 2114-K



CMSS 4370-K

## Data capture from a range of sources

SKF Microlog analyzers automatically collect both dynamic (vibration) and static (process) measurements from almost any source, including handheld and magnetically mounted accelerometers, permanently mounted vibration sensors or on-line monitoring systems. Temperature measurements can be collected with a non-contact infrared sensor or with a contact probe.



## CMSS 2200 / CMSS 2200-M8

### Industrial accelerometer, side exit

The CMSS 2200 and CMSS 2200-M8 industrial accelerometers, with their side exit and two pin connector, offer a low profile for machinery with limited clearance. The sensor mounts in any orientation.

Please refer to the Industrial accelerometers for widespread applications section earlier in this catalog for more information about this portable sensor.



#### Ordering information

- |                     |  |
|---------------------|--|
| <b>CMSS 2200</b>    | Industrial accelerometer with side exit MIL-C-5015 two pin connector.  |
|                     | <ul style="list-style-type: none"><li>• 1/4-28 and M6 mounting studs provided. Calibration sensitivity and nominal sensitivity is provided for each accelerometer package.</li></ul> |
| <b>CMSS 2200-M8</b> | Industrial accelerometer with side exit MIL-C-5015 two pin connector.  |
|                     | <ul style="list-style-type: none"><li>• M8 mounting stud provided. Calibration sensitivity and nominal sensitivity is provided for each accelerometer package.</li></ul>             |

# CMSS 2111

## Small footprint accelerometer with integral cable

The CMSS 2111 is a small footprint accelerometer that includes an integrated 2 m (6.56 ft.) cable along with a magnetic mount.

## Specifications

### Dynamic

- Sensitivity: 100 mVg
- Sensitivity precision:  $\pm 10\%$
- Measurement range:  $\pm 50$  g
- Frequency range ( $\pm 3$  dB): 0,5 to 10 000 Hz
- Resonance frequency, mounted, nominal: 22 kHz
- Broadband resolution (1 to 10 000 Hz): 350  $\mu$ g
- Amplitude non-linearity:  $\pm 1\%$
- Transverse sensitivity:  $\leq 7\%$

### Electrical

- Electrical noise:
  - Spectral:
    - 10 Hz: 8  $\mu$ g/ $\sqrt{\text{Hz}}$
    - 100 Hz: 5  $\mu$ g/ $\sqrt{\text{Hz}}$
    - 1 kHz: 4  $\mu$ g/ $\sqrt{\text{Hz}}$
- Output impedance:  $< 150 \Omega$
- Bias output voltage: 8 to 12 V DC
- Settling time (within 1% of bias):  $\leq 2,0$  s
- Discharge time constant:  $\leq 0,3$  s
- Excitation voltage: 18 to 28 V DC
- Constant current diode: 2 to 20 mA
- Electrical connector: Molded integral cable
- Electrical connection position: Top

### Environmental

- Temperature range (operating):  $-55$  to  $+120$  °C ( $-65$  to  $+250$  °F)
- Shock limit: 5 000 g peak
- Enclosure rating: IP 68
- Sealing: Molded

### Physical

- Dimensions:
  - Accelerometer (hex  $\times$  height): 14  $\times$  64 mm (0.55  $\times$  2.52 in.)
  - Magnetic mount: 25,4  $\times$  25,9 mm (1.00  $\times$  1.02 in.)
- Weight (with cable): 99,3 g (3.5 oz.)
- Case material: Stainless steel
- Sensing element: Ceramic
- Sensing geometry: Shear
- Mounting: Magnet
- Mounting thread (accelerometer and magnetic base): 1/4–28 tapped hole
- Magnetic mount pull strength: 156 N (35 lb.)
- Cable length: 2 m (6.56 ft.)
- Cable type: Polyurethane
- Connection: Fischer type 103 six pin

**NOTE:** Compatible with SKF Microlog models CMXA 70, CMXA 75, CMXA 80 and CMXA 50.



### Ordering information

#### CMSS 2111

Small footprint accelerometer with an integrated cable and a magnetic mount; includes 1/4–28 stud and 1/4–28 to M6 adapter stud to connect the magnetic base to the accelerometer.

# CMSS 2114-K

## High frequency accelerometer kit

The CMSS 2114-K is a high frequency accelerometer kit that includes a high frequency cable with an adhesive mounting base.

## Specifications

### Dynamic

- Sensitivity: 10 mVg
- Sensitivity precision:  $\pm 15\%$
- Measurement range:  $\pm 500$  g peak
- Amplitude non-linearity:  $\leq 1\%$
- Frequency range ( $\pm 3$  dB): 5 to 60 000 Hz
- Resonance frequency, mounted, nominal:  $\geq 95$  kHz
- Broadband resolution (1 to 10 000 Hz): 0,002 g RMS
- Transverse sensitivity:  $\leq 5\%$

### Electrical

- Electrical noise:
  - Spectral:
    - 10 Hz: 160  $\mu\text{g}/\sqrt{\text{Hz}}$
    - 100 Hz: 40  $\mu\text{g}/\sqrt{\text{Hz}}$
    - 1 kHz: 15  $\mu\text{g}/\sqrt{\text{Hz}}$
    - 10 kHz: 10  $\mu\text{g}/\sqrt{\text{Hz}}$
- Output impedance:  $\leq 100 \Omega$
- Bias output voltage: 8 to 12 V DC
- Excitation voltage: 18 to 30 V DC
- Constant current diode: 2 to 20 mA
- Discharge time constant: 0,02 to 0,06 s
- Electrical connector: 5-44 Coaxial
- Electrical connection position: Top

### Environmental

- Temperature range:  $-55$  to  $+120$  °C ( $-65$  to  $+250$  °F)
- Shock limit: 5 000 g peak
- Base strain sensitivity:  $\leq 0,05$  g  $\mu$
- Sealing: Welded hermetic
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak

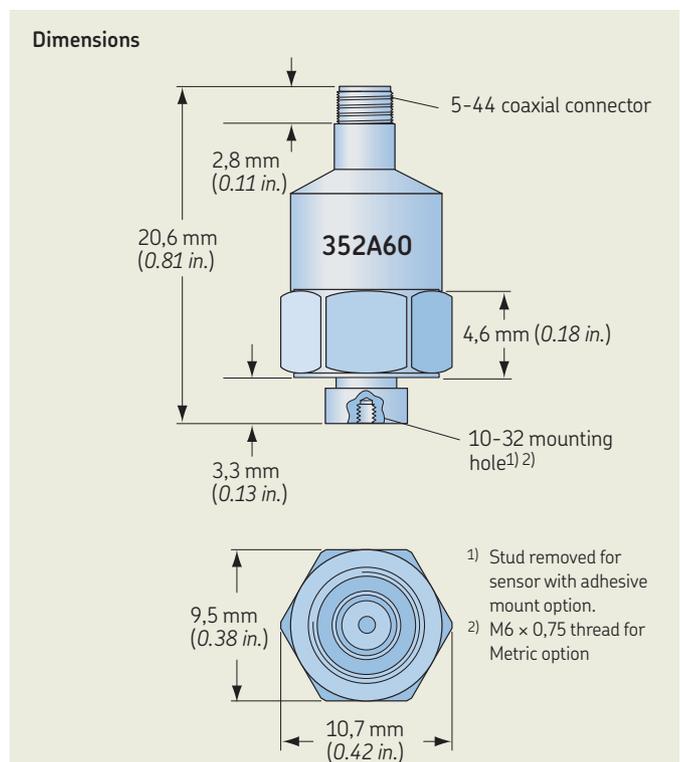
### Physical

- Dimensions: See drawing
- Weight: 6,0 g (0.21 oz.)
- Case material: Stainless steel
- Sensing element: Ceramic
- Sensing geometry: Shear
- Mounting thread: 10-32, male
- Mounting torque: 1,13 to 2,25 Nm (10 to 20 in. lbs.)

**Note:** All specifications are at room temperature unless otherwise specified. Compatible with SKF Microlog models CMXA 70, CMXA 75, CMXA 80 and CMXA 50. Loctite 454 insensitive adhesive gel is the recommended adhesive. This item is not included in the kit



E



## Kit contents

- 352A60: High frequency constant current accelerometer
- CMAC 5062: High frequency accelerometer cable, Fischer six pin to Microdot connector (5-44 coaxial connector)
- Adhesive mounting base



*CMAC 5062 high frequency  
accelerometer cable*



*Adhesive mounting  
base*

### Ordering information

**CMSS 2114-K** High frequency accelerometer kit, including a high frequency accelerometer, cable and adhesive mounting base.

# CMAC 4370-K

## Triax accelerometer kit

SKF's triax accelerometer quickly and automatically measures horizontal, vertical and axial (triaxial) data with the press of a button. Triaxial measurements offer the user additional information on the condition of machinery, enabling a more complete diagnostic analysis. For example, measuring in a vertical direction often provides insight into how the shaft is restrained when considering bearing looseness. A horizontal orientation is preferred for bearing fault diagnosis and an axial measurement can provide clues as to the severity of shaft misalignment.

The SKF Microlog can acquire data simultaneously from all three axes. The triax accelerometer also enables measurement in any of the three axes where, in specialized cases, a single point accelerometer would be unable to measure data due to physical mounting restrictions or a difficult to access mounting surface.

For those who typically collect triaxial data, the sensor dramatically reduces data collection time. For users who up until now have collected only one data point per sensor location, triax offers the advantage of additional information for improved diagnostics. The triax accelerometer facilitates the efficient collection of accurate and repeatable machine data for enhanced decision making.

## Specifications for triax accelerometer

### Dynamic

- Sensitivity: 100 mVg
- Sensitivity precision:  $\pm 5\%$
- Range full scale: 50 g, RMS
- Resolution (electrical noise): 0,0005 g, RMS
- Amplitude non-linearity:  $\pm 1\%$ , full scale maximum
- Frequency range:
  - $\pm 5\%$ : 0,5 to 3 000 Hz
  - $\pm 10\%$ : 0,3 to 5 000 Hz
  - $\pm 3$  dB: 0,2 to 10 000 Hz
- Discharge time constant: 0,6 s
- Resonance frequency, mounted, nominal: 25 kHz
- Transverse sensitivity:  $\leq 5\%$
- Strain sensitivity: 0,001 g per  $\mu$ strain at 250/ $\mu$   $\Omega$

### Electrical

- Output impedance:  $< 100 \Omega$
- Bias output voltage: 12 to 13 V DC
- Supply voltage range\*: 18 to 30 V DC
- Supply current range: 2 to 20 mA
- Case ground isolation, signal/power ground pin to case: 10 M $\Omega$

\* Do not apply power to this instrument without current limiting in the range of 20 mA maximum. To do so will immediately destroy the integral amplifier. It is suggested that only SKF approved power units be utilized for powering this instrument.

### Environmental

- Temperature range:  $-55$  to  $+120$  °C ( $-65$  to  $+250$  °F)
- Maximum vibration: 1 000 g, RMS
- Shock limit: 2 000 g peak



- Environmental seal: Welded / glass to metal seal / O-rings, hermetic
- Thermal coefficient of sensitivity: 0,03%/°F

### Physical

- Dimensions (not including connector): 41 × 41 × 24 mm (1.625 × 1.625 × 0.950 in.)
- Weight: 115 g (4 oz.)
- Mounting provision: Captive 1/4–28 mounting screw
- Connection, coaxial, radially mounted: Four pin MIL-C-26482, 8-4P
- Case material: Aluminum alloy
- Recommended magnetic base: CMSS 908-MD

**Note:** Compatible with SKF Microlog models CMXA 70, CMXA 75, CMXA 80 and CMXA 50.

## Kit contents

- Triax accelerometer
- Anti-rotation pin mounted on the bottom surface of the sensor (the anti-rotation pin can be carefully unthreaded from the sensor so that it can be permanently mounted)
- CMAC 5009: Triaxial accelerometer cable
- CMAC 4300: Stud adapter
- CMSS 2620-3: Studs (three)
- Calibration certificate traceable to NIST

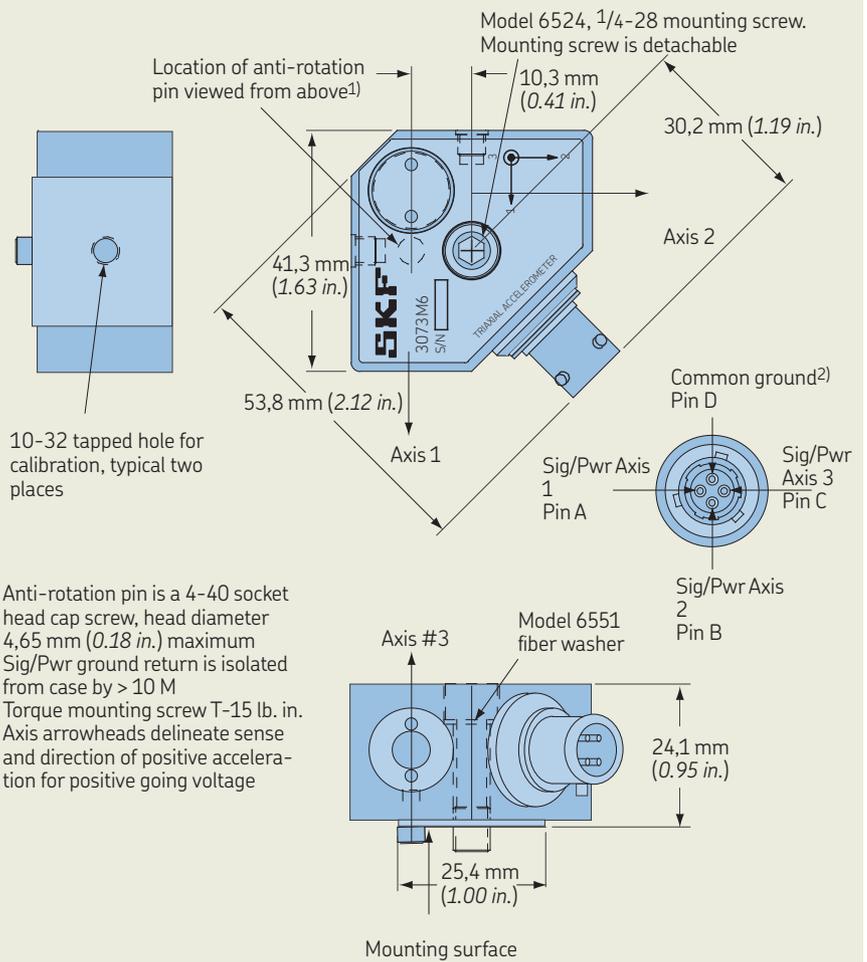


CMAC 5009 triaxial accelerometer cable



CMSS 2620-3 stud

### Dimensions



- <sup>1)</sup> Anti-rotation pin is a 4-40 socket head cap screw, head diameter 4,65 mm (0.18 in.) maximum
- <sup>2)</sup> Sig/Pwr ground return is isolated from case by > 10 M
- <sup>3)</sup> Torque mounting screw T-15 lb. in.
- <sup>4)</sup> Axis arrowheads delineate sense and direction of positive acceleration for positive going voltage

### Ordering information

**CMAC 4370-K** Triax accelerometer kit. Each kit includes a triax accelerometer, triax accelerometer cable, stud adapter and three studs. A calibration certificate traceable to NIST is also supplied with each instrument.

### Optional Accessories

**CMSS 908-MD** Medium duty magnetic base

# Special purpose sensors

## Low frequency accelerometers

- CMSS 793L Low frequency accelerometer, straight exit
- CMSS 797L Low frequency industrial accelerometer, ring mode, side exit



CMSS 793L



CMSS 797L

# Low-frequency accelerometers

## CMSS 793L

### Low-frequency accelerometer, straight exit

The CMSS 793L is an industrial accelerometer for higher precision measurements at rotational frequencies as low as 12 r/min. These speeds are most commonly found in the following industries:

- Power Generation (Wind Turbines)
- Pulp and Paper
- Petrochemicals

Applications include rotors, rolls and extruders. The CMSS 793L combines high sensitivity (to reveal low amplitude signals) with a narrow band of frequency response. The value of the high-pass filtering within the sensor makes it ideal for use in specialized, low speed analysis tasks using portable instruments or at specific measurement points on on-line systems. However, the low-pass filtering makes the CMSS 793L unsuitable as a general purpose accelerometer for rolling element bearing defect detection at more normal rotational speeds.

### Features

- Optimal for use with SKF on-line surveillance and protection systems and all portable data collection instruments
- 500 mV/g high sensitivity
- Ultra low-noise electronics for clear signals at very low vibration levels
- Low-pass filtered to attenuate high frequencies
- Hermetically sealed
- ESD protection
- Reverse wiring protection

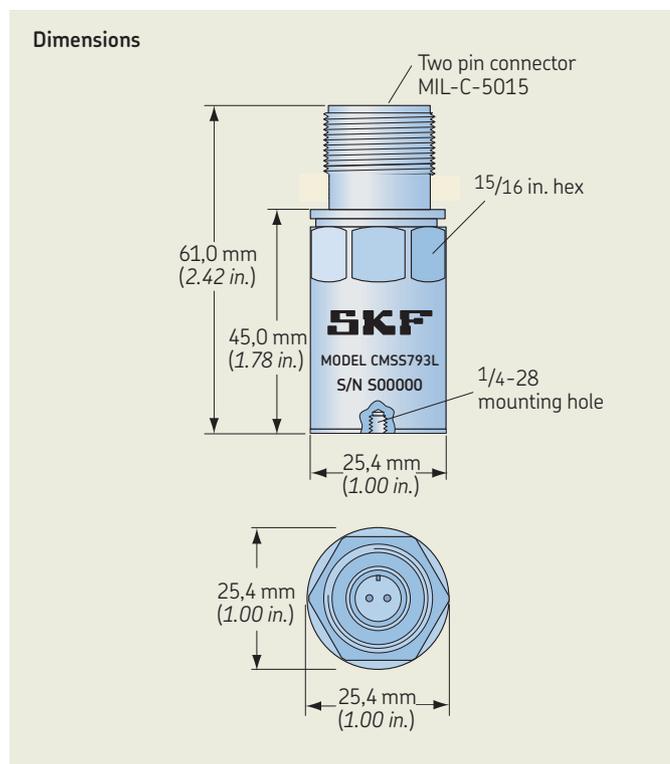
### Recommended connector/cable assembly

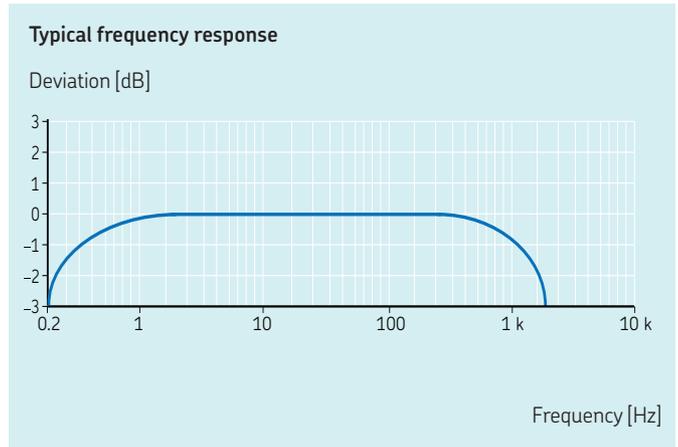
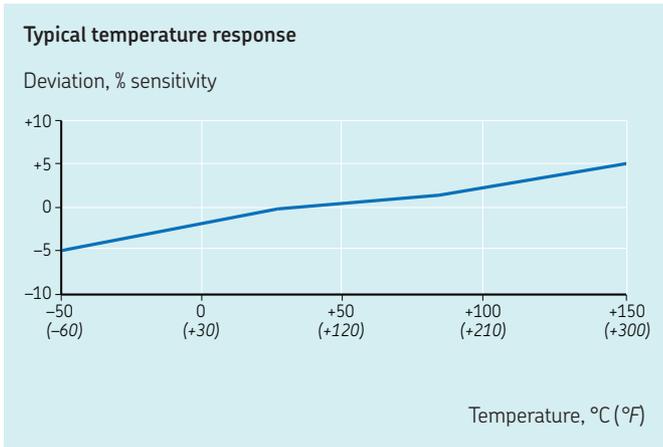
- CMSS 932 series

### Specifications

#### Dynamic

- Sensitivity: 500 mV/g
- Sensitivity precision:  $\pm 5\%$  at 24 °C (75 °F)
- Acceleration range: 10 g peak
- Amplitude non-linearity: 1%
- Frequency range:
  - $\pm 5\%$ : 0,6 to 700 Hz
  - $\pm 10\%$ : 0,4 to 1 000 Hz
  - $\pm 3$  dB: 0,2 to 2 300 Hz
- Resonance frequency, mounted, nominal: 15 kHz
- Transverse sensitivity:  $\leq 5\%$  of axial
- Temperature response: See graph





## Electrical

- Power requirements:
  - Voltage source<sup>1)</sup>: 18 to 30 V DC
  - Constant current diode<sup>1), 2)</sup>: 2 to 10 mA
- Electrical noise:
  - Broadband:
    - 2,5 Hz to 25 kHz: 8,0 µg
  - Spectral:
    - 2 Hz: 2,0 µg/√Hz
    - 10 Hz: 0,4 µg/√Hz
    - 100 Hz: 0,2 µg/√Hz
- Output impedance: < 100 Ω
- Bias output voltage: 10 V DC
- Grounding: Case isolated, internally shielded

## Environmental

- Temperature range: -50 to +120 °C (-60 to +250 °F) operating temperature
- Vibration limit: 250 g peak
- Shock limit: 5 000 g peak
- Electromagnetic sensitivity, equivalent g, maximum: 20 µg/gauss
- Sealing: hermetic
- Base strain sensitivity: 0,0001 g/µstrain
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak

## Physical

- Dimensions: See drawing
- Weight: 142 g (5 oz.)
- Case material: 316L stainless steel
- Mounting: 1/4-28 tapped hole
- Mounting torque: 2,9 Nm (24 in. lbs.)
- Connections:
  - Shell: Ground
  - Pin A: Power/Signal
  - Pin B: Common
- Mating connector: CMSS 932-68LC or CMSS 932-68TL, two pin, IP 68, locking collar or twist lock
- Recommended cable: CMSS 932-SY-XXM and CMSS 932-DY-XXM, two conductor, twisted pair, single or double shielded, yellow

<sup>1)</sup> To minimize the possibility of signal distortion when driving long cables with high vibration signals, 24 to 30 V DC powering is recommended. The higher level constant current source should be used when driving long cables (please consult SKF).

<sup>2)</sup> A maximum current of 6 mA is recommended for operating temperatures in excess of 100 °C (210 °F).

## Ordering information

**CMSS 793L** Low frequency accelerometer, straight exit.

- 1/4 -28 mounting stud provided. A calibration data certificate with the actual sensitivity of the accelerometer is included in each package. The nominal sensitivity is etched on each unit.

# CMSS 797L

## Low frequency industrial accelerometer, ring mode, side exit

The CMSS 797L is an industrial accelerometer for higher precision measurements at rotational frequencies as low as 12 r/min. These speeds are most commonly found in the following industries:

- Power Generation (Wind Turbines)
- Pulp and Paper
- Petrochemicals

Applications include rotors, rolls and extruders. The CMSS 797L combines a high sensitivity (to reveal low amplitude signals) with a narrow band of frequency response. The value of the high-pass filtering within the sensor makes it ideal for use in specialized, low speed analysis tasks using portable instruments or at specific measurement points on on-line systems. However, the low-pass filtering makes the CMSS 797L unsuitable as a general purpose accelerometer for rolling element bearing defect detection at more normal rotational speeds.

### Features

- Optimal for use with SKF on-line surveillance and protection systems and all portable data collection instruments
- 500 mV/g high sensitivity
- Ultra low-noise electronics for clear signals at very low vibration levels
- Low-pass filtered to attenuate high frequencies
- Hermetically sealed
- ESD protection
- Reverse wiring protection

### Recommended connector/cable assembly

- CMSS 932 series

### Specifications

#### Dynamic

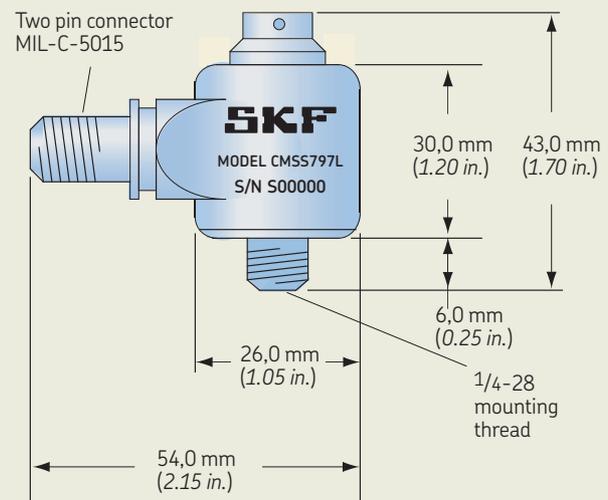
- Sensitivity: 500 mV/g
- Sensitivity precision:  $\pm 5\%$  at 24 °C (75 °F)
- Acceleration range: 10 g peak
- Amplitude non-linearity: 1%
- Frequency range:
  - $\pm 5\%$ : 0,6 to 850 Hz
  - $\pm 10\%$ : 0,4 to 1 500 Hz
  - $\pm 3$  dB: 0,2 to 3 700 Hz
- Resonance frequency, mounted, nominal: 18 kHz
- Transverse sensitivity:  $\leq 7\%$  of axial
- Temperature response: See graph

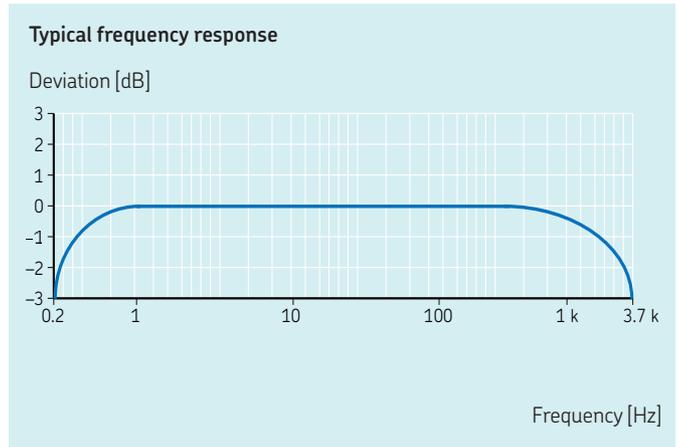
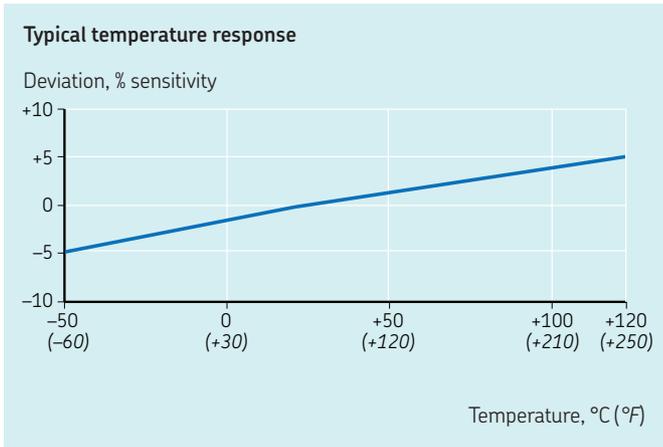


### Electrical

- Power requirements:
  - Voltage source<sup>1)</sup>: 18 to 30 V DC
  - Constant current diode<sup>1)</sup>, <sup>2)</sup>: 2 to 10 mA
- Electrical noise:
  - Broadband:
    - 2,5 Hz to 25 kHz: 12,0  $\mu$ g
  - Spectral:
    - 2 Hz: 2,0  $\mu$ g/ $\sqrt$ Hz
    - 10 Hz: 0,6  $\mu$ g/ $\sqrt$ Hz
    - 100 Hz: 0,2  $\mu$ g/ $\sqrt$ Hz
- Output impedance:  $< 100 \Omega$
- Bias output voltage: 10 V DC
- Grounding: Case isolated, internally shielded

### Dimensions





#### Environmental

- Temperature range:  $-50$  to  $+120$  °C ( $-60$  to  $+250$  °F) operating temperature
- Vibration limit: 250 g peak
- Shock limit: 2 500 g peak
- Electromagnetic sensitivity, equivalent g, maximum: 5  $\mu$ g/gauss
- Sealing: Hermetic
- Base strain sensitivity: 0,0001 g/ $\mu$ strain
- CE: According to the generic immunity standard for Industrial Environment EN 50082-2
  - Acceptance criteria: The generated “false equivalent g level” under the above test conditions should be less than 2 mg measured peak to peak

#### Physical

- Dimensions: See drawing
  - Weight: 148 g (5.2 oz.)
  - Case material: 316L stainless steel
  - Mounting:  $\frac{1}{4}$ -28 captive socket head screw
  - Mounting torque: 2,9 Nm (24 in. lbs.)
  - Connections:
    - Shell: Ground
    - Pin A: Power/Signal
    - Pin B: Common
  - Mating connector: CMSS 932-68LC or CMSS 932-68TL, two pin, IP 68, locking collar or twist lock
  - Recommended cable: CMSS 932-SY-XXM and CMSS 932-DY-XXM, two conductor, twisted pair, single or double shielded, yellow
- 1) To minimize the possibility of signal distortion when driving long cables with high vibration signals, 24 to 30 V DC powering is recommended. The higher level constant current source should be used when driving long cables (please consult SKF).
  - 2) A maximum current of 6 mA is recommended for operating temperatures in excess of 100 °C (210 °F).

#### Ordering information

**CMSS 797L** Low frequency, industrial accelerometer, ring mode, side exit.

- $\frac{1}{4}$ -28 captive socket head screw provided. A calibration data certificate with the actual sensitivity of the accelerometer is included in each package. The nominal sensitivity is etched on each unit.

# Vibration sensor installation and mounting requirements

## Cabling requirements

Cabling is one of the most important aspects of vibration sensor installation. As with sensors and monitoring equipment, money saved by purchasing inferior components is usually a poor investment. Time and effort to troubleshoot problems related to poor cabling can easily cost several times the cost of the original cable. Furthermore, measurement results can be unreliable and inaccurate, thereby defeating the purpose of the condition monitoring program in the first place. Careful attention must be given to six major cable considerations:

- Type
- Length
- Routing
- Grounding
- Anchoring
- Environment

## Cable type

Vibration signals are dynamic, usually voltage-modulated and of low amplitude (millivolts per engineering unit), thus the type of cable used is an important factor in determining the quality of the signals that reach the vibration monitoring device. This is true for both hand-held and permanently mounted sensors, but typically the consideration is more important for permanently installed sensors, since the length of the cable is usually longer and, therefore, exposed to more possible sources of noise.

High quality cable is recommended. In the context of vibration, “high quality” can be defined as twisted pair, shielded cable. The sensor power and signal are carried on individual wires and the cable’s shield(s) is grounded at either the sensor or the vibration monitor (see the section on Cable Grounding).

In general, coaxial cables are not recommended for use with vibration monitors in an industrial environment. They are not rugged enough and are susceptible to noise intrusion, since any type of noise will be picked up on the coaxial cable’s shield and amplified along with the signal.



## Integral cables

Some vibration sensor models have a cable permanently fixed (or “integral”) to the sensor body.

As there is no connector, this has the advantage of reducing cost and eliminating any doubt about connectors working loose over time and introducing noise. This feature is suited to environments where the cable may be exposed to high ambient vibration, such as on a vibrating screen, or the sensor is on a moving body, such as a press.

However, the integral cable brings with it significant maintenance disadvantages. Should either the sensor or cable be damaged, the entire sensor and cable must be replaced. In applications where the sensor may need to be removed relatively frequently, such as with paper machine roll changes, then an integral cable complicates the procedure, particularly if a simple stud-mount has been used. In this case, the cable will “coil up” and eventually break after repeated changes (see the section on Mounting Requirements). Cable runs greater than 5 to 10 m (16 to 33 ft.) should also be avoided – it introduces costly installation rework in the event of a sensor change.



### Connector and cable assemblies

The most common and practical approach is to use a connector and cable assembly with a vibration sensor.

This approach has the advantage of easy and quick sensor replacement or first installation without the need to disturb installed field cabling. The sensor can be stud-mounted without any cable “coil up”, and cable runs up to 20 m (t) remain practical. Most SKf sensors utilize a sturdy “MIL-style” connector – when correctly installed, these connectors do not work loose over time.

SKf offers a range of connector/cable assemblies designed to withstand most industrial environments, from a simple fan to the hot and wet environment of a paper machine dryer section.

### Cable impedance

For monitoring vibration at higher frequencies or for applications requiring a cable to carry a signal over a long distance with minimum loss and distortion, the characteristic impedance is possibly the most important cable parameter.

The characteristic impedance ( $Z_0$ ) is the combined resistive and reactive components of the cable’s resistance to the flow of electrons. Its value depends on the type of conductors, their size, spacing, whether (and how tightly) they are twisted together and the type and amount of insulating material used.

If there is a substantial mismatch between the characteristic impedance of the transducer and the cable, or the cable and the monitoring system, an electrical reflection will occur at the point of the impedance mismatch. This electrical reflection will distort both signal strength and quality. Additionally, if there is a lack of control in the manufacture of the cable, then  $Z_0$  can vary over the length of the cable, causing electrical reflections, distortion and reduction in signal integrity within the cable itself.

For these reasons, it is important to use high quality cable that is matched to both the transducer and the monitoring system. With SKf sensors and monitoring equipment, best results will be obtained with signal cable having a characteristic impedance of 120  $\Omega$ .

### Cable capacitance

All cables have capacitance across their leads; therefore, the capacitance load on the output of the sensor increases with cable length.

## Cable length

### Length versus cable capacitance

All cables have a capacitance across their leads related to length. Depending on the cable construction, this capacitance is generally 100 to 200 pF/m (30 to 60 pF/ft.).

After the cable length has been determined, its effect on the sensor installation should first be evaluated. This is particularly important in intrinsically safe applications, where a maximum permissible cable capacitance is required by the certifications of the hazardous area rated sensors and vibration monitoring device.

Length/Capacitance also has an effect on performance. Capacitive loading attenuates the high frequency output of accelerometers. For example, for a 160 pF/m multi-pair cable with 35  $\Omega$ /km resistance, the effect of cable length on maximum frequency attenuation is shown below.

#### Effect of cable length on maximum frequency attenuation

Distance: sensor to online device	Maximum frequency attenuation (kHz) in acceleration
100 m (330 ft.)	18,0
300 m (984 ft.)	6,0
500 m (1 640 ft.)	3,5
700 m (2 296 ft.)	2,5
1 000 m (3 281 ft.)	1,8

**NOTE:** Cable lengths for velocity transducers are less important since they are employed at low frequencies and contain filtering of acceleration components.

The use of high quality, twisted pair(s), shielded cable can greatly improve the quality and reliability of vibration measurements, together with permitting the use of longer cable runs in the installation.

## Amplitude range versus cable capacitance

When the amplifier in the monitor drives a long cable, its performance is limited by the current available from the Constant Current Diode (CCD) to charge the cable capacitance at high frequencies. This limits the amount of voltage swing from the amplifier and may reduce the high frequency amplitude range. The reduction of the amplitude range increases the sensor's susceptibility to high frequency amplifier overload. This will cause signal distortion and produce erroneous signals at low frequencies. Sources of high frequency overload could be gear impacts or the broadband hiss of a steam release valve. SKF sensors are protected from distortion caused by moderate overloads.

### SKF recommendations for cables

Cable characteristic	SKF recommendation
Type	Twisted pair(s) or triads, shielded
Capacitance across leads	< 60 pF/m (20 pF/ft.)
Impedance	120 Ω for signal cable
Size (gauge)	20 to 24 AWG (American Wire Gauge)
Shield	Braided or foil, single or double shield
Insulation	As required by operating environment. A fluorine based polymer is standard. A fluoropolymer is recommended where fire retardation or some radiation resistance is needed.

## Powering versus cable length

Proper powering will reduce signal distortion in long cable applications. It is recommended that for cable lengths over 30 m (100 ft.), the constant current source should be 6 to 10 mA. In addition, the voltage source should be no less than 24 V for maximum amplitude range. Even when using very short cables, the current source should be increased if amplifier overload signals are present or suspected.

## Cable routing

### Cable routing and electromagnetic interference

Walkie-talkies, power lines or even electrical sparks may cause signal interference. The following guidelines will eliminate many measurement errors due to electromagnetic interference (EMI) and electrostatic discharge (ESD):

- Assure that high quality, well shielded cables are used; in such environments, 100% shield coverage is necessary
- If cable splices are made, shielding continuity must be maintained
- Never run sensor cable alongside AC power lines
- Cables must cross AC power lines at right angles 1 m (3 ft.) away from the power line
- Where possible, provide a separate grounded conduit to enclose the sensor cable
- Where possible, route the cable away from radio transmission equipment, motors/generators, transformers and other high current charging conductors
- Finally, avoid routing the cable through areas prone to ESD, except in applications where it is unavoidable; for example, in the area around a paper machine, ESD cannot be escaped

Even though SKF sensors are protected against ESD failure, temporary signal distortion may appear at the monitor. Such signals usually appear as an overload or a "ski-slope" shaped FFT (Fast Fourier Transform).

### Cable routing and junction boxes

The practicalities of cabling result in the following typical arrangement:

- Sensor and connector/cable assembly, typically 5 m (16.4 ft.) length
- Junction box, mounted on or near the machine skid
- Multi-pair cabling to monitor, up to 500 m (1 640 ft.) in length, with or without intermediate marshalling junction boxes

The short connector/cable assembly is to facilitate sensor maintenance without disturbance to field cabling. When designing, attempt to minimize the number of physical connections per "wire loop" between sensor and monitor – it reduces the number of potential failure points, sources of interference and is less to check when commissioning or troubleshooting.

## Cable grounding

The purpose of having one or more shields around a pair of signal lines is to reduce the coupling between the shielded signal line and other signal lines and to reduce the intrusion of external noise. Doing so protects the strength and fidelity of the signal of interest. Grounding of shields, and the way in which they are grounded, has a remarkable effect on their effectiveness. An improperly grounded shield may actually be worse than no shield at all. In order to provide proper shielding and prevent ground loops, cable grounding should be carefully considered.

### Ground loops

Ground loops are developed when a common line is grounded at two points of differing electrical potential; for example, a single shield is connected to ground on the sensor and on the instrument side. Inadequate grounding results from not connecting the shield to any side. As a first step to avoid ground loops, the signal, return and internal shielding of all SKF sensors are isolated from the sensor casing (housing).

### Cable and shield

The cable shield serves to protect the signal from ESD and EMI. As a second step to avoid ground loops, the shield should be grounded at only one point, normally either to the instrument or to the sensor casing. All SKF instruments are designed to accommodate grounding of the sensor cable shield at the instrument (→ **fig. 2**).

Alternatively, it is possible to ground at the sensor side. Most of SKF's sensors are designed to allow for such a grounding scheme. Assuming the sensor is stud-mounted to the machine and the machine is properly grounded, the shield is thus grounded to the machine through the sensor, and the drain wire should not be connected to ground at the instrument end (→ **fig. 3**).

### Non-isolated cable/connector assemblies

Within a single-shielded cable/connector assembly, "non-isolated" means the drain wire (and hence the shield) is connected to the sensor casing (→ **fig. 3**).

Within a single-shielded cable/connector assembly, "isolated" means the drain wire (and hence the shield) are not connected to the sensor casing, and the drain wire must be connected to ground at the instrument end (→ **fig. 2**).

### Double-shielded cable

When double-shielded cable is selected, then the outer shield is non-isolated through the connector (to be grounded at the sensor end only) and the inner shield is isolated (to be connected to ground at the instrument end only) (→ **fig. 4**). Hence, double-shielded cable cannot be selected in conjunction with isolated cable connector assemblies.

**NOTE:** Sensors mounted in hazardous areas should be installed and grounded according to the installation drawings associated with their certification.

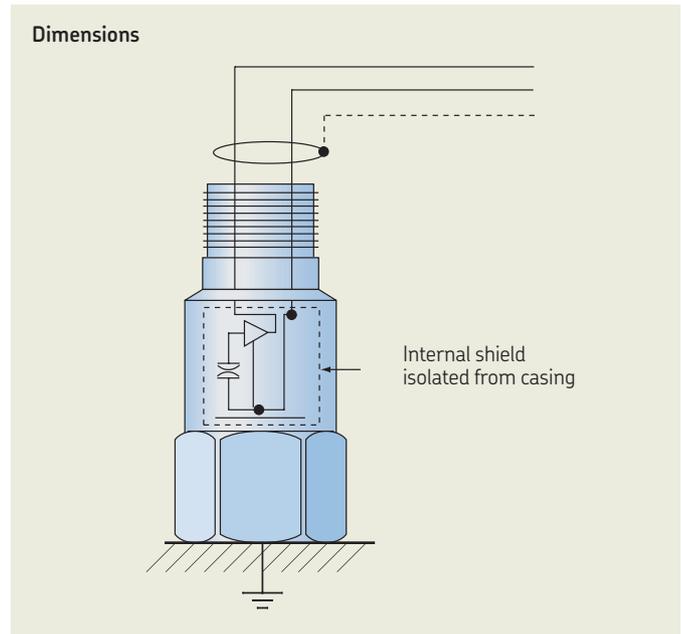


Fig. 1. Electronic circuit isolated from sensor casing.

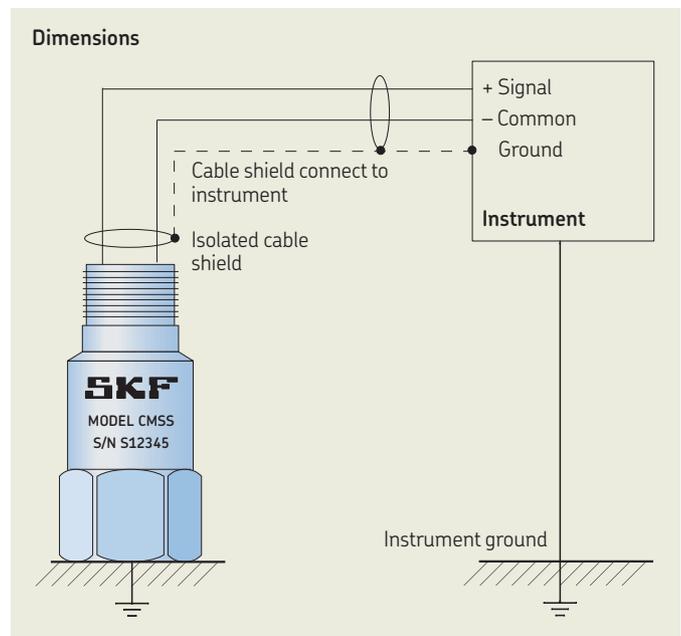


Fig. 2. Grounding at instrument side.

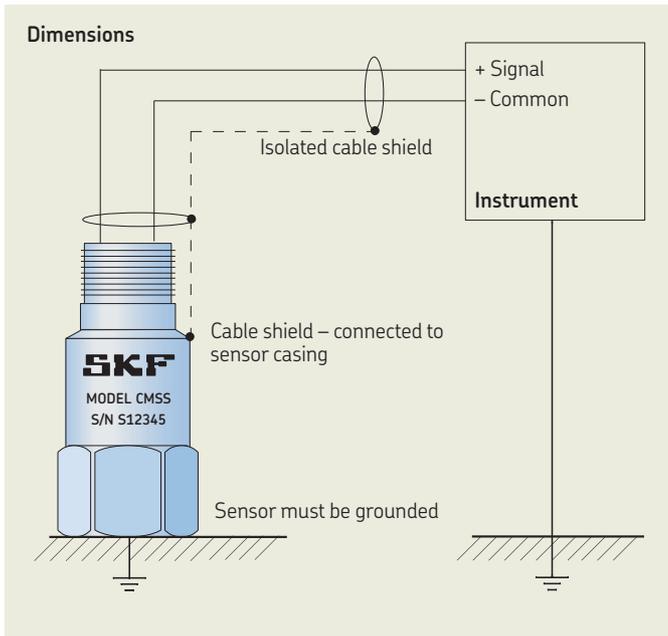


Fig. 3. Grounding at sensor side.

### Grounding at the machine

If the machine being monitored is well grounded and the transducer has a case terminal, the shield can be connected there. If the machine is not well grounded, or if there is no terminal available on the transducer, the shield should be connected to a good electrical ground point at the machine.

However, if a junction box is used at the machine being monitored, it is acceptable practice to leave the shields open at the transducers and electrically connect all of the shields together in the junction box. A ground wire should then be run from the “daisy chained” shields to a good electrical ground at the machine being monitored.

Some cables contain more than one individually shielded signal pair with the entire cable enclosed by an overall shield. In this case, the recommended practice is to ground the individual shields at the transducer and leave them open at the instrument. The overall shield should then be grounded at the instrument and left open at the transducers.

If a junction box is used, the overall shield must be electrically continuous through the junction box and not connected to the other shields.

If, when grounding at the sensor, EMI signals are found to affect the vibration signal, a filtering capacitor (0,01  $\mu\text{F}$ , 200 V low loss) should be placed between the shield and the grounded monitor. This capacitor prevents the passage of low frequency ground currents, yet diverts high frequency EMI signals to ground.

Sources producing high levels of electromagnetic noise (such as radio transmitters, static discharge and motor bush arcing) may require a cable with dual isolated shields. In this configuration, the outer shield is grounded to the sensor housing. The inner shield, which is electrically isolated from the outer, is grounded to the transmitter.

The double shielding allows electrical charges impressed on the cable to be attenuated twice to minimize influence on the vibration signal. Similar to the previous configuration, it is recommended that a capacitor (0,01  $\mu\text{F}$ , 200 V low loss) be placed in the terminal box between the inner and outer shields to maximize this protection.

**NOTE:** In all cases, it is very important that the cable shield be properly grounded. Failure to do so in high EMI/ESD environments can result in damage to the sensor electronics.

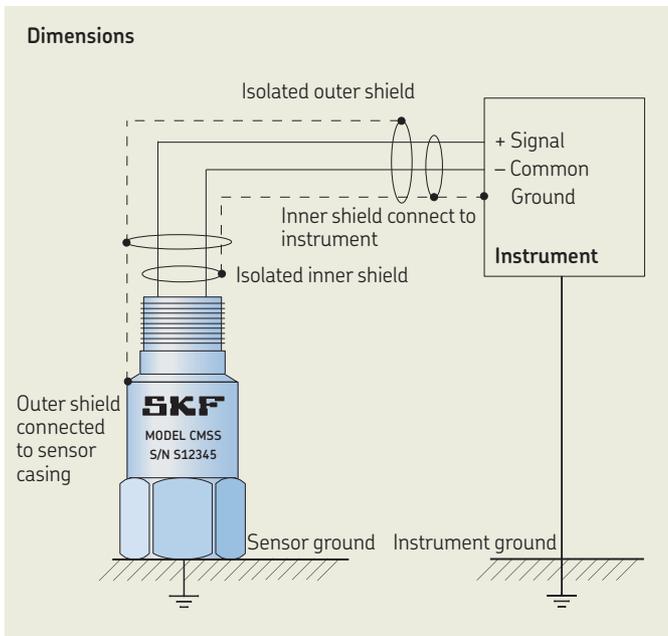


Fig. 4. Grounding with double-shielded cable.

## Cable anchoring

The cable should not be bent into a radius less than approximately 50 mm (2.0 in.) and should be anchored to reduce stress at the cable terminations. When securing the cable, leave just enough slack to allow free movement of the accelerometer. Failure to leave enough slack will cause undue stress on the cable and dramatically influence the sensor's output (→ fig. 5).

### Silicone grease

When assembling any cable/connector to the vibration sensor, application of a small amount of silicone grease to the pin contacts is recommended to ensure reliable operation over a long period.

### Top exit or side exit

The cable anchoring shown in fig. 5 also illustrates the different orientations of accelerometer – a “top exit” or “side exit” sensor.

Top exit accelerometers have the connector axis in line with the measurement and mounting axis, and are used most commonly on small to medium bearing housings. Their main advantages are that they can be fitted in narrow access locations. Their disadvantages are that they provide ideal hand- and foot-holds, the small studs mounting them to the machine cannot take high bending loads and the cable loops can also be entangled with other objects passing by during maintenance.

Side exit accelerometers have the connector axis perpendicular to the measurement and mounting axis and are used most commonly on medium to large bearing housings. They have a cylindrical design with a central mounting hole through which a sturdy hexagon type screw (for example socket head, captive mounting bolts) can be used to mount the sensor to the machine. Their main advantages are that they can be mounted flush to the surface, allowing the cable to be tied down, and they present a smaller foot- hold target. In addition, side-exit sensors can be detached from the machine without breaking the seal of the sensor cable connector assembly connection. Their only disadvantage is a higher cost compared to top exit.

## Cable environment

In addition to the EMI/ESD environment discussed above, the heat, humidity and general nature of the cable's environment needs to be considered.

On some machines, the location of the bearing may be at a temperature well suited to the sensor, but the path of the cable back to the local junction box may well pass hot surfaces that exceed the rating of the cable.

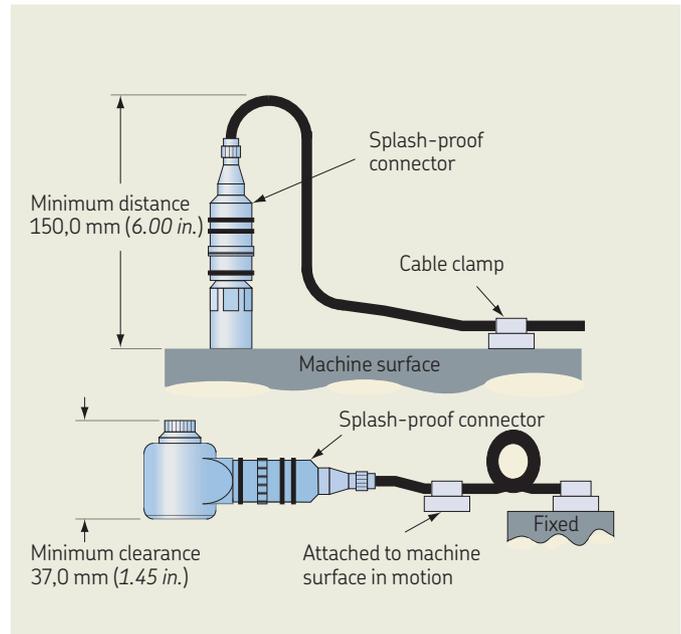


Fig. 5. Cable anchoring.

It is recommended that the cable be enclosed in appropriate steel or non-metallic protective conduit. In some applications, such as those found in the mineral processing industry, there may be a high chance of physical contact with flying process debris. In these instances, when protective conduit is not possible, then metal-braided (or “armored”) cable would be suitable.

Other times, the need can arise to disconnect the cable connector assembly from the sensor (for example for felt changes).

When Cable connector assemblies are disconnected from the sensors, the connectors should not be left unprotected to the harsh environment. Corrosion and dirt will enter the connection, -even when silicone grease is used. Best practices are to use the blue cap that comes with the sensor to protect the sensor's connector and to tie a small plastic bag, secured with a rubber band around the cable connector when the connection is open.

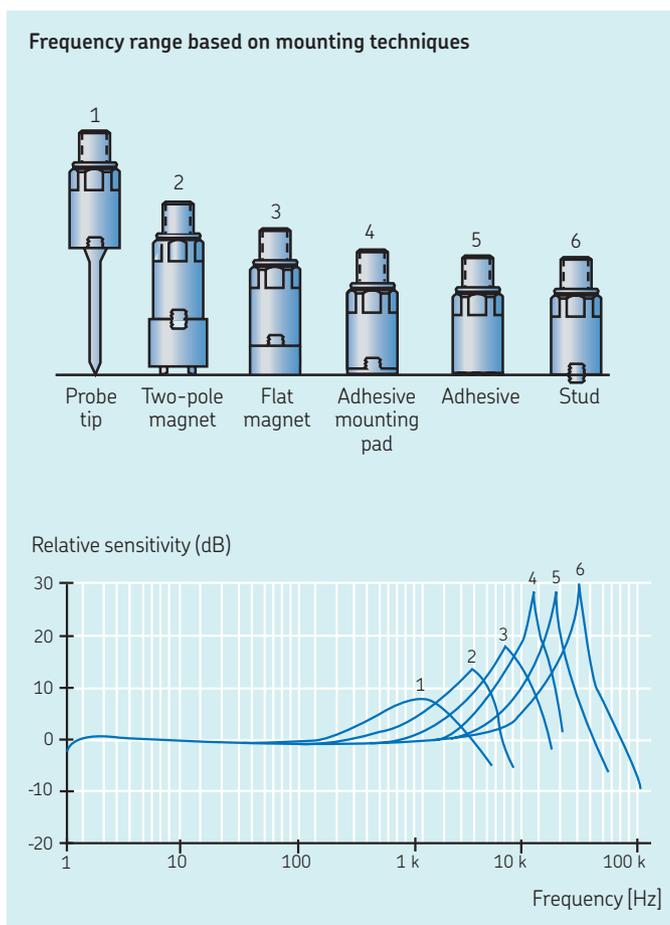
Most of today's on-line systems can trend the bias voltage of the sensors, it should remain stable and unchanging. Shifting biases are linked to poor or contaminated connections, as do low frequency bias and contact noises. Look for corroded, dirty or loose connections. Repair or replace the connection as necessary. Non-conducting silicone grease should always be applied to connectors to reduce contamination.

## Mounting requirements

The mounting configuration depends upon the dynamic measurement requirements, such as frequency and amplitude range. Other factors to be considered are mounting location, prohibitions, accessibility and temperature. In general, there are four mounting configurations:

- Handheld probe tips
- Magnets
- Adhesives
- Threaded studs

The following table illustrates each method. A clear observation is how the mounting method affects the frequency range that can be measured; the less rigid the method, the lower the maximum frequency.



## Handheld probe tip

Handheld “stingers” are commonly used in walk-around monitoring programs. The main task of any such program is basic screening and seeking changes in trends, rather than absolute measurements. Hence, the handheld method offers a fast and convenient way of locating the sensor. The frequency attenuation experienced with the method is still insufficient to affect the rotational vibration components of most machines. However, good operator training and diligence is required to ensure that measurements taken are reasonably repeatable, and consideration must be given to any higher frequency measurements.

Because probe tips may have structural resonances in the frequency range of interest, they should be made of steel and should not exceed 150 mm (6 in.) in length.

## Magnetic mounting

Magnetic mounts are also popular in walk-around monitoring programs. The method removes the variations associated with handheld probes being applied by different users, and the frequency response is better, although still dramatically reduced when compared to stud or adhesive mounts.

Magnetic mounts are available with flat surfaces for flat locations or two pole configurations for curved surfaces. Ensuring the magnet is firmly attached is vital for good measurements.

## Adhesive mounting

If a hole cannot be tapped properly into the machine, an adhesive mount is recommended. The rigidity of an adhesive mount is very dependent on the suitability of the adhesive used for the environment and whether it has been applied in accordance to the manufacturer’s instructions. An acrylic adhesive is the recommended adhesive type.

## Mounting pads

When using an adhesive, the sensor may be directly attached to the machine or onto an adhesive mounting pad. The adhesive mounting pad is flat on one side with a threaded stud on the other.

After the pad is adhered to the machine, the sensor is torqued onto the stud. A coupling fluid should be applied to the stud face that mates with the sensor. Use of an adhesive mounting pad is recommended if repeated removal of the sensor is required.



**NOTE:** If the circuit grounding scheme requires the sensor case to be grounded to the machine, then the installer must ensure that the adhesive mounting pad is electrically grounded to the machine. If grounding at the adhesive mounting pad is not practical, a suitable option is to place a junction box between the sensor and the monitor. The sensor shields can then be jumpered together and a common ground established at the machine.

## Motor fin mounts

Motor fin mounts provide a mounting location for either magnetically mounted or permanently mounted accelerometers on motors. They are adhesive mounted between the cooling fins of the motor.



## Pipe thread adapters

Pipe thread mounting adapters provide a mounting location for either magnetically mounted or permanently mounted accelerometers, but avoid the need to drill a hole in the machine and spot-face. They can make use of existing plugged holes on the machine.

## Quick connects

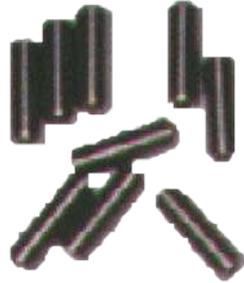
A “quick connect” assembly allows the advantages of stud mounting to be combined with repeated fitting and removal of the accelerometer, which is most typically required in a walk-around monitoring program.



## Threaded studs

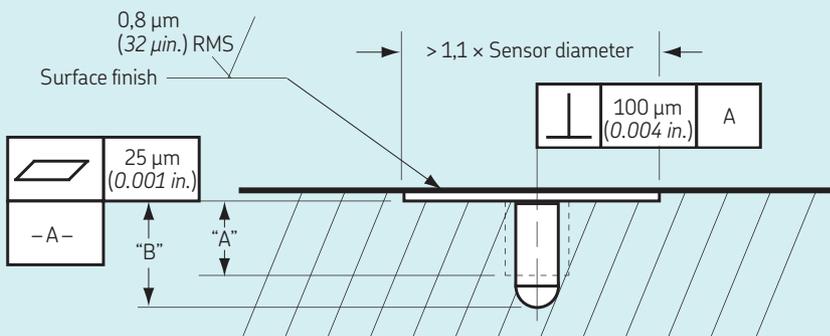
The use of stud mounting results in the widest frequency measurement range. It is recommended for permanent monitoring systems, high frequency testing and harsh environments.

The mounting point on the structure should be spot-faced 1,1 times greater than the diameter of the mounting surface of the sensor. For measurements involving frequencies above 1 kHz, the surface should be flat within 25 µm (0.001 in.) and have surface texture no greater than 0,8 µm (32 µin.). The tapped hole must be perpendicular to the mounting surface and at least two threads deeper than the stud. This will prevent a gap between the sensor and the mounting surface, producing optimum frequency response.



Proper screw torque on the mounting stud is also required. Under-torque of the sensor reduces the stiffness of the coupling. Over-torque can cause permanent thread damage to the sensor. The following table shows recommended nominal mounting torques.

### Stud mounting surface preparation



Stud	Stud size	“A” Dimension	“B” Dimension	Torque
CMSS 30205300	10-32	4,78 mm (0.19 in.)	6,35 mm (0.25 in.)	20 Nm (2.3 lbf. in.)
CMAC 230	1/4-28	6,35 mm (0.25 in.)	8,90 mm (0.35 in.)	24 Nm (2.7 lbf. in.)
1/4-28 captive screw		6,35 mm (0.25 in.)	8,90 mm (0.35 in.)	30 Nm (3.4 lbf. in.)

## Maintenance considerations

In general, piezoelectric accelerometers are almost maintenance-free, with only a small number of factors that need to be remembered, as follows.

### Sensitivity validation

Regular sensitivity validation (or “calibration”) is not usually a requirement. For example, the procedure is unnecessary in condition monitoring applications where changes in gross vibrations are being measured and extreme accuracy is not a concern.

If high accuracy amplitude measurements are required, sensor calibration should be verified once a year and can normally be done on-site by a qualified technician with a vibration generator/shaker device. A piezoelectric accelerometer cannot be adjusted, so any variation measured must be accommodated by adjusting the sensitivity used by the monitor system.

### Bias output voltage monitoring

A good indicator of accelerometer health can be found in its “bias output voltage”. The bias output voltage is the base DC voltage upon which the AC vibration signal is carried and is typically around 12 V DC.

A regular check of the bias output voltage, or a continuous trend in an on-line system, can reveal deterioration in the electronics within the sensor, which may be caused by the environment (such as temperature). It can also flag damage to cabling. Complete absence of the bias output voltage will indicate a break in the cable or circuit.

## Self generating velocity sensors

These sensors wear out over time, as they contain moving parts. An annual sensitivity check is recommended.

## Summary

Vibration sensors are the initial source of machinery information upon which productivity, product quality and personnel safety decisions are based.

It is crucial that sensors be properly selected and installed to ensure reliable signal information. Procedures should be implemented to monitor the performance of all measurement channels to further ensure the integrity of the vibration information base. Following this process will increase the effectiveness of your vibration monitoring program and improve productivity of plant personnel and equipment.

# CMSS 932-SY / CMSS 932-DY / CMSS 932-SB / CMSS 933-SY

Bulk cable: single or double shielded, yellow or blue jacket, twisted pair or triads cables

*SKF's CMSS 93X-XX cables are premium sensor cables providing superior performance in demanding environments.*

## Description

CMSS 932 is a single or double shielded, twisted pair cable with the conductors individually insulated with a fluorine based polymer, a braided shield with drain wire and an outer insulated jacket also made of a fluorine based polymer. Two insulated conductors are cabled together with one un-insulated drain wire and two glass cord fillers. The double shielded option adds an inner shield of aluminum polyester foil with drain wire.

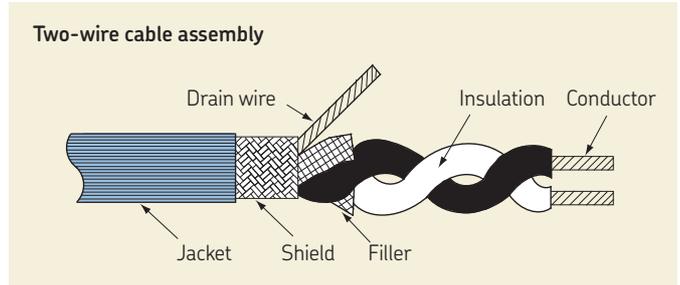
The CMSS 933 cable has the same characteristics as the CMSS 932 cable, except it is a three-wire version for use with dual temperature and vibration sensors. This cable does not have a double shielded option. There are two wire colors (jacket) available:

- Yellow: For high visibility in the often dusty and debris laden industrial environment
- Blue: For use in intrinsically safe circuits in the Oil/Gas and Hydrocarbon Processing industries

## Recommended uses

The single shield cable is recommended for use with sensors in normal industrial applications where these cable types have been historically used and installed.

The double shield cable is highly recommended for use with sensors in industrial installations where there is a high noise field, such as machine tools and power generating facilities.



## Specifications (all models)

### Electrical

- Capacitance: Approximately 89 pF/m (27 pF/ft.)
- Voltage rating: 600 V RMS maximum continuous use

### Environmental

- Minimum bend radius: 48 mm (1.9 in.)
- Working temperature range: -80 to +200 °C (-110 to +390 °F)
- Heat and flame resistance: Non-flame propagating
- Plenum rated
- Meets ROHS requirements

### Physical

- Materials:
  - Conductor: Tin plated copper, 19 × 32 strands, size 20 AWG (American Wire Gauge)
  - Insulation: Extruded FEP
  - Drain wire: Tin plated copper, 7 × 32 strands, size 24 AWG
  - Shield: 36 AWG tin plated copper braid
  - Jacket: Extruded FEP

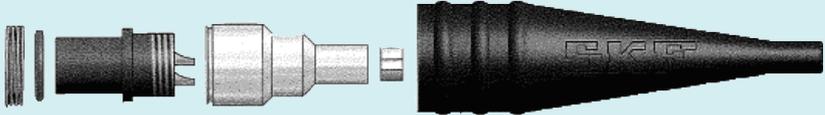
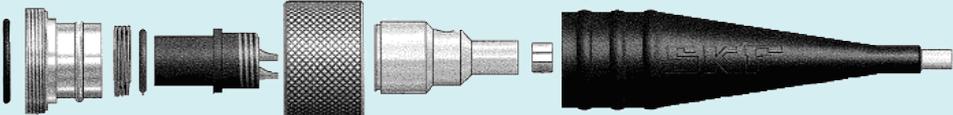
- Color code:
  - Conductor: Black and white pair
  - Jacket: Yellow (Y) or blue (B)
- Color code for CMSS 932:
  - A = White = Acceleration signal/power
  - B = Black = Common
- Color code for CMSS 933:
  - A = Red = Acceleration signal/power
  - B = Black = Acceleration and temperature common
  - C = White = Temperature signal
- Dimensions:
  - Conductor: 0,96 mm (0.038 in.) nominal
  - Insulation: 1,40 mm (0.058 in.) nominal
  - Drain wire: 0,61 mm (0.024 in.) nominal
  - Shield: 3,50 mm (0.138 in.) nominal
  - Jacket: 4,80 mm, ±0,1 mm (0.190 in., ±0.005 in.)

### Ordering information

**CMSS 932-SY-150M** Two-conductor, twisted pair, single shield, yellow cable with continuous cable length, 150 m (500 ft.) spool.  
**CMSS 932-SY-300M** Two-conductor, twisted pair, single shield, yellow cable with continuous cable length, 300 m (1 000 ft.) spool.  
**CMSS 932-DY-150M** Two-conductor, twisted pair, double shield, yellow cable with continuous cable length, 150 m (500 ft.) spool.  
**CMSS 932-SB-150M** Two-conductor, twisted pair, single shield, blue cable with continuous cable length, 150 m (500 ft.) spool.  
**CMSS 933-SY-150M** Three-conductor, triad, single shield, yellow cable with continuous cable length, 150 m (500 ft.) spool.

# Connectors and toolkits

## For on-site cable fabrication

Model number	Description
<b>Connector packs for cables with a twist lock connector</b>	
	
<b>For CMSS 932 series</b>	
CMSS 932-68TL-1	Connector pack for CMSS 932 series cable, two pin, IP 68, twist lock, isolated and non-isolated, single and double shield, quantity one
CMSS 932-68TL-10	Connector pack for CMSS 932 series cable, two pin, IP 68, twist lock, isolated and non-isolated, single and double shield, quantity 10
CMSS 932-68TL-50	Connector pack for CMSS 932 series cable, two pin, IP 68, twist lock, isolated and non-isolated, single and double shield, quantity 50
<b>For CMSS 933 series</b>	
CMSS 933-68TL-1	Connector pack for CMSS 933 series cable, three pin, IP 68, twist lock, isolated and non-isolated, single shield, quantity one
CMSS 933-68TL-10	Connector pack for CMSS 933 series cable, three pin, IP 68, twist lock, isolated and non-isolated, single shield, quantity 10
CMSS 933-68TL-50	Connector pack for CMSS 933 series cable, three pin, IP 68, twist lock, isolated and non-isolated, single shield, quantity 50
<b>Connector packs for cables with a locking collar connector</b>	
	
<b>For CMSS 932 series</b>	
CMSS 932-68LC-1	Connector pack for CMSS 932 series cable, two pin, IP 68, locking collar, isolated and non-isolated, single and double shield, quantity one
CMSS 932-68LC-10	Connector pack for CMSS 932 series cable, two pin, IP 68, locking collar, isolated and non-isolated, single and double shield, quantity 10
CMSS 932-68LC-50	Connector pack for CMSS 932 series cable, two pin, IP 68, locking collar, isolated and non-isolated, single and double shield, quantity 50
<b>For CMSS 933 series</b>	
CMSS 933-68LC-1	Connector pack for CMSS 933 series cable, three pin, IP 68, locking collar, isolated and non-isolated, single shield, quantity one
CMSS 933-68LC-10	Connector pack for CMSS 933 series cable, three pin, IP 68, locking collar, isolated and non-isolated, single shield, quantity 10
CMSS 933-68LC-50	Connector pack for CMSS 933 series cable, three pin, IP 68, locking collar, isolated and non-isolated, single shield, quantity 50

# Connectors and toolkits

## For on-site cable fabrication (continued)

Model number	Description
CMSS 930-68-K	<p><b>Toolkit for field installation</b>            Toolkit for field installation for CMSS 93x series cable, IP 68 connectors, single and double shield (excludes connectors), for 25 to 50 connectors</p> <p>Each toolkit contains:</p> <ul style="list-style-type: none"> <li>• Crimp tool</li> <li>• Crimp tool positioner</li> <li>• Crimp tool frame</li> <li>• Exacto knife</li> <li>• Exacto knife blades (15)</li> <li>• Scissors</li> <li>• Wire stripper</li> <li>• High temperature epoxy (3 pack) (must use within two months)</li> <li>• Epoxy mix applicator gun</li> <li>• Metal socket insertion tool</li> <li>• Plastic socket insertion tool (2)</li> <li>• Epoxy mixing plunger</li> <li>• Epoxy nozzle (static mixing tubes) (10)</li> </ul>

CMSS 930-68-K Toolkit for field installation



# CMSS 932 / CMSS 933

## Connector and cable assemblies for vibration sensors

Using detailed knowledge acquired from many years of supplying high quality sensors to a broad spectrum of industry users, SKF offers rugged cable and connector assemblies for use with vibration transducers employed in the Pulp and Paper, Petrochemical, Steel, Mining and Construction, Metal Working and Machine Tool industries.

The weakest part of any vibration monitoring system is the sensor and field cabling. Selection of a quality sensor is the first important step towards the integrity of a system, but equally important is the choice of mating connector and cable.

### Features

- For use with the SKF range of vibration sensors
- Rugged, economical
- Shielding for low-voltage dynamic vibration signals
- Proven, advanced styles of connectors
- Two levels of dust and water ingress protection

### Description

#### CMSS 932-68

The CMSS 932-68 is a cable connector assembly designed for use with piezoelectric vibration sensors that require high specification shielded cable to maximize the quality of the signal transmitted to the monitoring system.

The CMSS 932-68 is a two wire assembly, using a single or double shield, twisted pair cable with the conductors individually insulated with a fluorine based polymer, a braided shield with drain wire and an outer insulated jacket also made of a fluorine based polymer.

The double shielded option adds an inner shield of aluminum polyester foil with drain wire. There are two wire colors (jacket) available:

- Yellow: For high visibility in the often dusty and debris laden industrial environment
- Blue: For use in intrinsically safe circuits in the Oil/Gas and Hydrocarbon Processing industries

#### CMSS 933-68

The CMSS 933-68 has the same characteristics as the CMSS 932-68, except it is a three wire version for use with dual temperature and vibration sensors.

All IP 68 connectors are heavy duty MIL-style, with sealing against dust and water ingress. The stainless steel connectors are also physically protected by a fluoroelastomer "rubber boot" with SKF molded logo for easy vendor identification.

At the other end, the cables are blunt cut, ready for installation in field termination boxes.



CMSS 932 / CMSS 933 IP 68 cable connector assemblies with locking collar (top) and with twist lock (bottom).

### Recommended uses

The single shield cable is recommended for use with sensors in normal industrial applications where these cable types have been previously used and installed.

The double shield cable is highly recommended for use with sensors in industrial installations where there is a high noise field, such as machine tools and power generating facilities.

For double shielded versions, the inner shield is isolated and the outer shield is non-isolated.

### Specifications

#### Cables

- Two insulated conductors are cabled together with one uninsulated drain wire and two glass cord fillers

#### Materials

- Conductor: Tin plated copper, 19 × 32 strands, size 20 AWG (American Wire Gauge)
- Insulation: Extruded FEP
- Drain wire: Tin plated copper, 7 × 32 strands, size 24 AWG
- Shield: 36 AWG tin plated copper braid
- Jacket: Extruded FEP
- Molded boot: Black fluoroelastomer, offering better chemical resistance
- Adaptor / Locking rings: Stainless steel

## Color code

- Conductor: Black and white pair
- Jacket: Yellow or blue
- Color code for CMSS 932:
  - A = White = Acceleration signal/power
  - B = Black = Common
- Color code for CMSS 933:
  - A = Red = Acceleration signal/power
  - B = Black = Acceleration and temperature common
  - C = White = Temperature signal

## Dimensions

- Conductor: 0,96 mm (0.038 in.) nominal
- Insulation: 1,40 mm (0.058 in.) nominal
- Drain wire: 0,61 mm (0.024 in.) nominal
- Shield: 3,50 mm (0.138 in.) nominal
- Jacket: 4,80 mm, ±0,1 mm (0.190 in., ±0.005 in.)

## Electrical

- Capacitance: Approximately 89 pF/m (27 pF/ft.)
- Voltage rating: 600 V RMS maximum continuous use

## Environmental

- Minimum bend radius: 48 mm (1.9 in.)
- Working temperature range: -80 to +200 °C (-110 to +390 °F)
- Heat and flame resistance: Non-flame propagating
- Plenum rated
- Meets ROHS requirements



*IP 68 sensor/connector/cable assembly with twist lock (CMSS 932-68TLX-XX-XXX).*



*IP 68 sensor/connector/cable assembly with locking collar (CMSS 932-68LCX-XX-XXX).*

## Connectors

MIL-style stainless steel connectors are designed for use with SKF sensors. There are two different styles of IP 68 connectors: twist lock and locking collar.

With the twist lock connector, a quarter twist of the fluoroelastomer boot locks the assembly into a tight fit.

The locking collar is a threaded connector that threads onto an accompanying sensor adapter. It is recommended to secure the sensor adapter to the accelerometer connector using thread lock (Loctite).

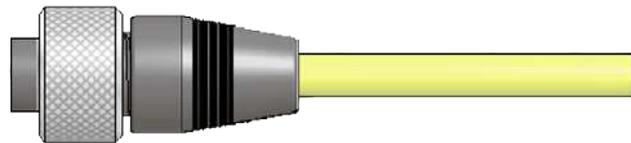
Both provide excellent protection against dust and water, and achieved an ingress protection rating of IP 68. However, the connector/cable assembly with locking collar features an O-ring and metal locking ring and is therefore more suitable for applications under water.

## Definition of IP 68 (Immersion)

- No ingress of dust; complete protection against contact
- Suitable for continuous immersion in water depth greater than 1 m (3.3 ft.) when the connector and mating connector on the sensor is assembled with silicone grease

## CMSS 932-64 / CMSS 933-64

The MIL-style IP 64 rated connectors is an economical choice and suits application in lighter industrial environments.



*IP 64 connector/cable assembly with standard build (CMSS 932-64SBI-XX-XXX).*

Due to its size, the standard build does not feature an SKF logo and has limited options. The IP 64 connector/cable assembly is only available isolated, the shield is not connected to the sensor body.

## Definition of IP 64 (splash-proof)

- Complete protection against contact; protection from infiltration of dust and protection from splashed water (splash-proof)

# Cable assemblies

## Industrial two pin accelerometer assemblies for SKF on-line systems

MIL-style stainless steel connectors are designed for use with SKF sensors. There are two different styles of IP 68 connectors: an assembly with a twist lock and an assembly with a locking collar.

The locking collar is a threaded connector that threads onto an accompanying sensor adapter. It is recommended to secure the sensor adapter to the accelerometer connector using thread lock (Loctite).

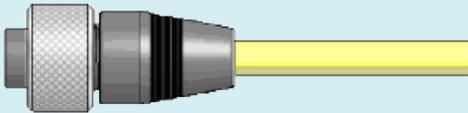
Both provide excellent protection against dust and water, and both achieved an ingress protection rating of IP 68. However, the connector/cable assembly with locking collar features an O-ring and metal locking ring and is therefore more suitable for applications under water.

Model number	Description	Compatible accelerometers
<b>Twist lock cables</b>		
		
	<b>Twist lock, non-isolated</b>	
CMSS 932-68TLN-SY-5M	Two wire, IP 68 connector, twist lock, non-isolated, single shield, yellow cable, 5 m (16.4 ft.) length	CMSS 780C CMSS 780C-M8 CMSS 786A-IS CMSS 787A-IS
CMSS 932-68TLN-SY-10M	Two wire, IP 68 connector, twist lock, non-isolated, single shield, yellow cable, 10 m (32.8 ft.) length	CMSS 787A-M8-IS CMSS 793-CA CMSS 793-EE
CMSS 932-68TLN-SY-20M	Two wire, IP 68 connector, twist lock, non-isolated, single shield, yellow cable, 20 m (65.6 ft.) length	CMSS 793 CMSS 793-FM CMSS 793L CMSS 793V CMSS 793V-CA CMSS 793V-EE CMSS 793V-FM CMSS 797 CMSS 797-FM CMSS 797-CA CMSS 797-EE
	<b>Twist lock, isolated</b>	
CMSS 932-68TLI-SY-5M	Two wire, IP 68 connector, twist lock, isolated, single shield, yellow cable, 5 m (16.4 ft.) length	CMSS 797L CMSS 2100 CMSS 2106 CMSS 2200 CMSS 2200-M8 CMSS 2207
CMSS 932-68TLI-SY-10M	Two wire, IP 68 connector, twist lock, isolated, single shield, yellow cable, 10 m (32.8 ft.) length	
CMSS 932-68TLI-SY-20M	Two wire, IP 68 connector, twist lock, isolated, single shield, yellow cable, 20 m (65.6 ft.) length	
<b>Locking collar cables</b>		
		
	<b>Locking collar, non-isolated</b>	
CMSS 932-68LCN-SY-5M	Two wire, IP 68 connector, locking collar, non-isolated, single shield, yellow cable, 5 m (16.4 ft.) length	
CMSS 932-68LCN-SY-10M	Two wire, IP 68 connector, locking collar, non-isolated, single shield, yellow cable, 10 m (32.8 ft.) length	
CMSS 932-68LCN-SY-20M	Two wire, IP 68 connector, locking collar, non-isolated, single shield, yellow cable, 20 m (65.6 ft.) length	
	<b>Locking collar, isolated</b>	
CMSS 932-68LCI-SY-5M	Two wire, IP 68 connector, locking collar, isolated, single shield, yellow cable, 5 m (16.4 ft.) length	
CMSS 932-68LCI-SY-10M	Two wire, IP 68 connector, locking collar, isolated, single shield, yellow cable, 10 m (32.8 ft.) length	
CMSS 932-68LCI-SY-20M	Two wire, IP 68 connector, locking collar, isolated, single shield, yellow cable, 20 m (65.6 ft.) length	

# Cable assemblies

## Economical two-pin accelerometer assemblies

The MIL-style IP 64 rated connector is an economical choice and suits applications in lighter industrial environments. Due to its size, the standard build does not feature an SKF logo and has limited options. The IP 64 connector/cable assembly is only available isolated; the shield is not connected to the sensor body.

Model number	Description	Compatible accelerometers
	<p><b>Standard build cables</b></p> 	CMSS 780C CMSS 780C-M8 CMSS 786A-IS CMSS 787A-IS CMSS 787A-M8-IS CMSS 793 CMSS 793-FM CMSS 793-CA CMSS 793-EE CMSS 793L CMSS 793V CMSS 793V-CA CMSS 793V-EE CMSS 793V-FM CMSS 797 CMSS 797-FM CMSS 797-CA CMSS 797-EE CMSS 797L CMSS 2100 CMSS 2106 CMSS 2200 CMSS 2200-M8 CMSS 2207
CMSS 932-64SBI-SY-5M	<p><b>Standard build, isolated</b>            Two wire, IP 64 connector, standard build, isolated, single shield, yellow cable, 5 m (16.4 ft.) length</p>	
CMSS 932-64SBI-SY-10M	<p>Two wire, IP 64 connector, standard build, isolated, single shield, yellow cable, 10 m (32.8 ft.) length</p>	
CMSS 932 -64SBI-SY-20M	<p>Two wire, IP 64 connector, standard build, isolated, single shield, yellow cable, 20 m (65.6 ft.) length</p>	
CMSS 932-64SBI-SY-30M	<p>Two wire, IP 64 connector, standard build, isolated, single shield, yellow cable, 30 m (98.4 ft.) length</p>	
CMSS 932-64SBI-SY-50M	<p>Two wire, IP 64 connector, standard build, isolated, single shield, yellow cable, 50 m (164 ft.) length</p>	

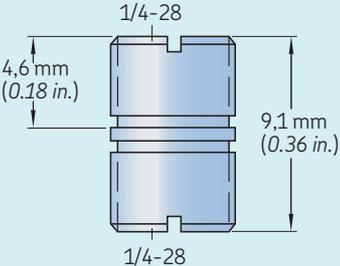
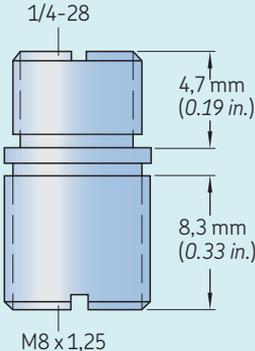
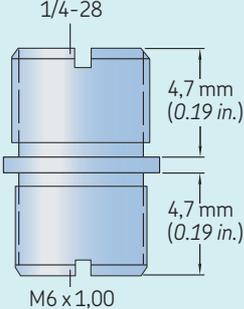
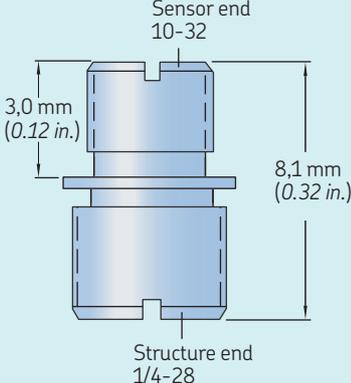
# Cable assemblies

## Industrial three pin cable assemblies

Model number	Description	Compatible accelerometers
<b>Twist lock cables</b>		
		
CMSS 933-68TLN-SY-10M	<b>Twist lock, non-isolated</b> Three wire, IP 68 connector, twist lock, non-isolated, single shield, yellow cable, 10 m (32.8 ft.) length	CMSS 786T-IS CMSS 793T-3 CMSS 797T-1 CMSS 2100T CMSS 2200T CMSS 2350T-D2
CMSS 933-68TLN-SY-20M	Three wire, IP 68 connector, twist lock, non-isolated, single shield, yellow cable, 20 m (65.6 ft.) length	
CMSS 933-68TLI-SY-10M	<b>Twist lock, isolated</b> Three wire, IP 68 connector, twist lock, isolated, single shield, yellow cable, 10 m (32.8 ft.) length	
CMSS 933-68TLI-SY-20M	Three wire, IP 68 connector, twist lock, isolated, single shield, yellow cable, 20 m (65.6 ft.) length	
<b>Locking collar cables</b>		
		
CMSS 933-68LCN-SY-5M	<b>Locking collar, non-isolated</b> Three wire, IP 68 connector, locking collar, non-isolated, single shield, yellow cable, 5 m (16.4 ft.) length	
CMSS 933-68LCN-SY-10M	Three wire, IP 68 connector, locking collar, non-isolated, single shield, yellow cable, 10 m (32.8 ft.) length	
CMSS 933-68LCN-SY-20M	Three wire, IP 68 connector, locking collar, non-isolated, single shield, yellow cable, 20 m (65.6 ft.) length	
CMSS 933-68LCI-SY-5M	<b>Locking collar, isolated</b> Three wire, IP 68 connector, locking collar, isolated, single shield, yellow cable, 5 m (16.4 ft.) length	
CMSS 933-68LCI-SY-10M	Three wire, IP 68 connector, locking collar, isolated, single shield, yellow cable, 10 m (32.8 ft.) length	
CMSS 933-68LCI-SY-20M	Three wire, IP 68 connector, locking collar, isolated, single shield, yellow cable, 20 m (65.6 ft.) length	

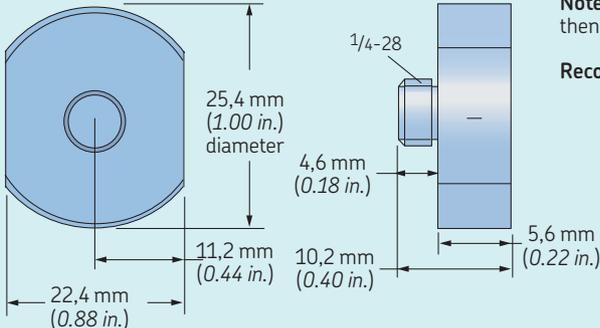
# Mounting hardware

## Accelerometer / Velocity sensor mounting hardware

Model number	Description
<p>CMAC 230</p>  	<p>Threaded mounting stud (1/4-28 to 1/4-28)</p> <p>Flanged sensor mounting stud, 1/4-28 thread on both sides            Material: Stainless steel            Recommended mounting torque: 2,9 Nm (24 in. lbs.)            Frequency response: Proper mounting on clean flat surface can achieve the specified frequency response of sensor</p> <p>Ordering information:            CMAC 230-10 Threaded mounting studs (1/4-28 to 1/4-28), stainless steel, 10-pack</p>
<p>CMAC 231</p>  	<p>Adapter mounting stud (1/4-28 to M8)</p> <p>Flanged sensor mounting stud, adapts 1/4-28 threads to M8 thread            Material: Stainless steel            Recommended mounting torque: 2,9 Nm (24 in. lbs.)            Frequency response: Proper mounting on clean flat surface can achieve the specified frequency response of sensor</p> <p>Ordering information:            CMAC 231-10 Adapter mounting studs (1/4-28 to M8), stainless steel, 10-pack</p>
<p>CMSS 30168703</p>  	<p>Adapter mounting stud (1/4-28 to M6)</p> <p>Flanged sensor mounting stud, adapts 1/4-28 tapped threads to M6 thread            Material: Stainless steel            Recommended mounting torque: 2,9 Nm (24 in. lbs.)            Frequency response: Proper mounting on clean flat surface can achieve the specified frequency response of sensor</p>
<p>CMSS 30205300</p>  	<p>Mounting stud (1/4-28 to 10-32)</p> <p>Flanged sensor mounting stud, adapts 1/4-28 tapped threads to 10-32 thread            Material: Stainless steel            Recommended mounting torque: 2,3 Nm (20 in. lbs.)            Frequency response: Proper mounting on clean flat surface can achieve the specified frequency response of sensor</p>

# Mounting hardware

## Accelerometer / Velocity sensor mounting hardware (continued)

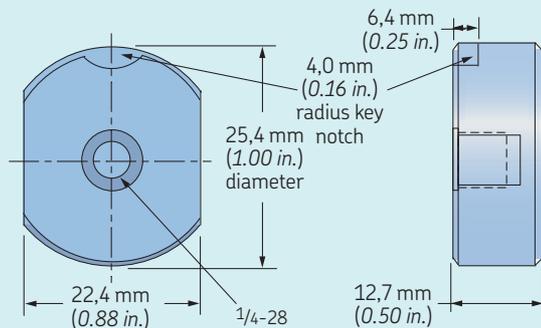
Model number	Description
CMSS 910M	Cementing stud with 1/4-28 male
	<ul style="list-style-type: none"><li>• Cementing studs for sensors with 1/4-28 tapped threads</li><li>• Material: Stainless steel</li><li>• Recommended mounting torque: 2,9 Nm (24 in. lbs.)</li><li>• Frequency response: Flat up to about 80% of the specified response value using epoxy or similar cement; flat up to about 30% of the specified response value using double-sided tape</li></ul>
	<p><b>Note:</b> To avoid sensor damage, always remove the sensor from the cementing stud first, then remove the stud from the surface by means of a wrench using the flats provided.</p> <p><b>Recommended with Loctite 454 adhesive gel (not included).</b></p>

# Mounting hardware

## Accelerometer / Velocity sensor mounting hardware (continued)

### Model number

CMSS 910F



### Description

Cementing stud with 1/4-28 female

- Cementing studs for sensors requiring 1/4-28 tapped mounting threads (see **page 97** for adapters to M6, M8 and 10-32 thread accelerometers); includes key notch for consistent triaxial axis orientation
- Material: Stainless steel
- Recommended mounting torque: 2,9 Nm (24 in. lbs.)
- Frequency response: Flat up to about 80% of the specified response value using epoxy or similar cement; flat up to about 30% of the specified response value using double-sided tape

**Note:** To avoid sensor damage, always remove the sensor from the cementing stud first, then remove the stud from the surface by means of a wrench using the flats provided.

**Recommended with Loctite 454 adhesive gel (not included).**

CMSS 910QDB1  
CMSS 910QDP1  
CMSS 910QDP2

Quick connect/disconnect sensor mounting pads

Mounting pads allow vibration technicians using such instruments as the SKF Microlog on walkaround routes to quickly mount vibration sensors in less than one turn. This quick mount design results in a decrease in mounting time as compared to the older style threaded stud mounting pads.

#### Key benefits:

- Decreased sensor mounting time by 90%
- Eliminates wrist fatigue from repetitive twisting
- Combines ease and speed of a magnet mount with the accuracy and repeatability of a permanent mount
- Ensures the repeatable, reliable vibration data of a permanently mounted sensor
- Prevents cable twisting
- Upgrades existing installations

#### Features:

- Constructed of corrosion resistant 316 stainless steel
- Convenient cement mounting capability
- Accepts all 1/4-28 compatible vibration sensors, including SKF's low profile models
- Compatible with existing 1/4-28 stud mount installations
- Easily removed to upgrade to permanent mount allowing the sensor to be directly attached to the same measuring point

CMSS 910QDB1

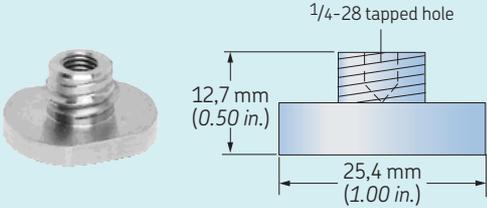
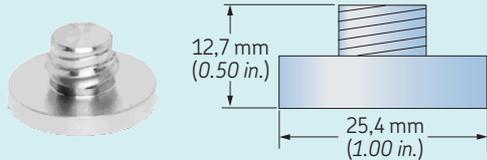
Quick connect adapter sensor base



- The CMSS 910QDB1 attaches easily to 1/4-28 compatible sensors
- In walkaround data collection, the sensor can be attached in less than one turn to any of the quick connect/disconnect mounting pads
- The CMSS 910QDB1 can remain on the sensor or be removed and reattached to other SKF vibration sensors

# Mounting hardware

## Accelerometer / Velocity sensor mounting hardware (continued)

Model number	Description
<p><b>CMSS 910QDP1</b></p> 	<p>Quick connect, threaded stud mounting pad</p> <ul style="list-style-type: none"> <li>• The CMSS 910QDP1 is stud mounted to the measuring point or attached to an existing 1/4-28 stud</li> <li>• Easy conversion to permanently mounted sensors</li> <li>• Once the CMSS 910QDP1 is mounted, conversion to permanently mounted sensors is quick and easy</li> <li>• By simply removing the pad and attaching an SKF vibration sensor to the existing 1/4-28 stud, sensor location and vibration data history remains reliable</li> </ul>
<p><b>CMSS 910QDP2</b></p> 	<p>Quick connect, cement mounting pad</p> <ul style="list-style-type: none"> <li>• The CMSS 910QDP2 is epoxied to the measuring point</li> <li>• Removable for upgrading to permanently mounted sensors</li> <li>• When upgrading to permanently mounted sensors, the cement pad can easily be removed to allow a stud mounted sensor to be installed in the location</li> </ul> <p><b>Recommended with Loctite 454 adhesive gel (not included).</b></p>

# Mounting hardware

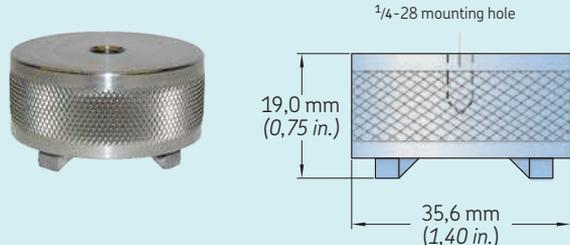
## Magnetic bases

G

### Magnetic bases for curved surfaces (CMSS 908-MD)

CMSS 908-MD is designed in a two-pole configuration for industrial vibration monitoring applications where flat surfaces are rarely found. Each magnet is supplied with a 1/4-28 mounting stud to allow compatibility with most SKF transducers.

**Note:** Two-pole magnet bases are not recommended for high-frequency measurements. To be used where other mounting methods are not practical.

Model number	Description
<p><b>CMSS 908-MD</b></p> 	<p>Medium-duty magnetic base for use in moderate conditions</p> <ul style="list-style-type: none"> <li>• <b>Material:</b> Stainless steel</li> <li>• <b>Pull strength:</b> 23 kg (50 lbs.)</li> <li>• <b>Mounting hole:</b> 1/4-28</li> <li>• <b>Dimensions:</b> 19,0 mm (0.75 in.) height × 35,6 mm (1.40 in.) diameter</li> <li>• 1/4-28 mounting stud provided</li> </ul>

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