

SKF Machine Condition Advisor

CMAS 100-SL

Machine monitoring, made simple



SKF Machine Condition Advisor simultaneously measures vibration signals and temperature to indicate machine health or bearing damage.

Introduction

Now both novice users and experts can easily, quickly and accurately check the condition of rotating equipment throughout your facility. Equipping your maintenance and operations personnel with this rugged, ergonomic and easy-to-use instrument can provide early warning of potential machine problems before a costly failure occurs.

Multiple measurements with a single device

The SKF Machine Condition Advisor provides an overall "Velocity" vibration reading that measures vibration signals from the machine and automatically compares them to pre-programmed International Organization for Standardization (ISO) guidelines. An "Alert" or "Danger" alarm displays when measurements exceed those guidelines. Simultaneously an "Enveloped Acceleration" measurement is taken and compared to established bearing vibration guidelines to verify conformity or indicate potential bearing damage.

The SKF Machine Condition Advisor also measures temperature using an infrared sensor to indicate uncharacteristic heat.

Features

- Quick and easy to set up and use, measurements are shown on a bright display viewable in low light to direct sunlight. Free on-line training is also available at SKF @ptitude Exchange.
- Lightweight, compact and ergonomically designed, the SKF Machine Condition Advisor fits neatly at the belt line, in a pocket or a tool kit. Exceptionally durable, the unit is rated IP 54 for use in adverse industrial environments.
- Alert and Danger prompts provide increased diagnostic confidence.
- Measuring Velocity, Enveloped Acceleration and temperature simultaneously saves time.
- Efficient, economical and environmentally friendly, the rechargeable SKF Machine Condition Advisor operates 10 hours on a single charge.
- Flexible enough to work with standard 100 mV/g ICP accelerometers, an optional external sensor can be used for hard-to-reach locations.
- Features English, French, German, Portuguese, Spanish and Swedish for user convenience.



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Accuracy, flexibility and confidence

When performing measurements, the Machine Condition Advisor's acceleration sensor input signal is processed to produce two different measurements for each POINT on the machinery – overall velocity and enveloped acceleration. At the same time, the SKF Machine Condition Advisor's non-contact infrared sensor measures the surface temperature of the measurement location and simultaneously displays all three measurement values.

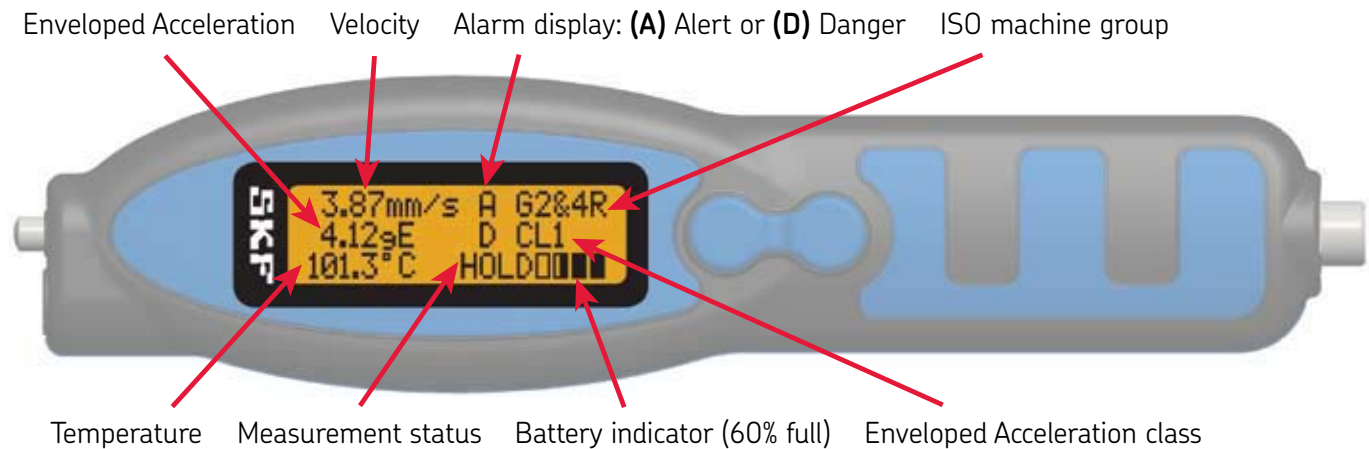
Depending on the SKF Machine Condition Advisor's System setting, the front-panel LCD simultaneously displays:

- Units in Metric or English
- Velocity in mm/s RMS or IPS derived Peak
- Temperature in Celsius or Fahrenheit
- Acceleration enveloping readings in gE

Quick and easy – first time and every time

1. Press "Select" or "Browse" button to turn the SKF Machine Condition Advisor "On"
2. Press the sensor tip against the point to be measured
3. When the readings stabilize, press the "Select" button to hold the reading
4. Read and record the measurement values

LCD display in measurement mode



Specifications

- **Vibration pickup:**
 - *Internal:* Integrated piezoelectric acceleration
 - *External:* Accepts ICP™ type 100 mV/g accelerometer
- **Temperature sensor:** Internal IR temperature sensor
- **Measurements:**
 - *Velocity:*
 - Range: 0.7–65 mm/s (RMS), 0.04–3.60 in/s (equivalent Peak), meets ISO 10816
 - Frequency: 10–1 000 Hz, meets ISO 2954
 - *Enveloped acceleration:*
 - Range: 0.2–50.0 gE
 - Frequency: Band 3 (500–10 000 Hz)
 - *Temperature:*
 - Range: –20 to +200 °C (–4 to +392 °F)
 - IR temperature accuracy: ±2 °C (±3.6 °F)
 - Distance: Short range, maximum 10 cm (4 in) from target
- **Operating temperature range:**
 - *In use:* –10 to +60 °C (+14 to +140 °F)
 - *While charging:* 0 to +40 °C (+32 to +113 °F)
- **Storage temperature:**
 - *Less than one month:* –20 to +45 °C (–4 to +104 °F)
 - *More than one month but less than six months:* –20 to +35 °C (–4 to +95 °F)
- **Humidity:** 95 % relative humidity, non-condensing
- **Enclosure:** IP 54
- **Approvals:** CE
- **Drop test:** 2 m (6.6 ft)
- **Weight:** 125 g (4.4 oz)
- **Dimensions:**
 - *Length:* 200 mm (7.90 in)
 - *Width:* 47 mm (1.85 in)
 - *Height:* 25.4 mm (1.00 in)
- **Battery capacity:** 550 mA hours
- **Battery life:** 10 hours before charging again (≈1,000 measurements)
 - *With external sensor:* Up to 30 % less battery life
- **Supported external sensor:** Any standard accelerometer with 100 mV/g sensitivity that needs ICP (Integrated circuit-piezoelectric)
- **External sensor power:** 24 V DC at 3.5 mA
- **Charger specifications:**
 - Universal AC/DC wall plug-in
 - *Input:* 90–264 VAC, 47–60 Hz
 - *Output:* 5 V DC regulated
 - 3 to 4 hours for a full charge

Understanding and using guidelines for vibration

The SKF Machine Condition Advisor provides a means to evaluate machine health based on ISO 10816-3 and to evaluate the bearings according to general guidelines developed from a statistical analysis of existing databases.

How to choose the correct “Alarm Velocity Group” for your machinery

The Alarm Velocity Group (**G2&4** or **G1&3**) determines the instrument’s “overall vibration” alarm limits. Therefore, select the Group that best describes the general size, type, and speed of the machinery being measured. Note that these machine group classifications are set forth in ISO 10816-3, which rates overall velocity vibration levels for standardized machinery classifications.

Groups 2&4 (default)

ISO Group 2 and 4 classifications define the following type of machinery:

- Medium-sized machines and electrical machines with a shaft height between 160 and 315 mm.
- These machines are normally equipped with rolling element bearings, but may use sleeve bearings, and operate at speeds above 600 RPM.
- These machines include pumps with multi-vane impellers and integrated drivers.

Groups 1&3

ISO Group 1 and 3 classifications define the following type of machinery:

- Large machinery and electrical machines with a shaft height greater than 315 mm.
- These machines are generally equipped with sleeve bearings, but may use rolling element bearings.
- These machines include pumps with multi-vane impellers and integrated drivers.

Rigid or Flexible foundation?

An additional setting allows the specification (when defining the overall alarm levels) of measurements taken

from machinery with **Rigid** (default) or **Flexible** foundations.

Options are:

G2&4R (default)

Alert: 2.8 mm/s (0.16 ips)
Danger: 4.5 mm/s (0.25 ips)

G2&4F

Alert: 4.5 mm/s (0.25 ips)
Danger: 7.1 mm/s (0.39 ips)

G1&3R

Alert: 4.5 mm/s (0.25 ips)
Danger: 7.1 mm/s (0.39 ips)

G1&3F

Alert: 7.1 mm/s (0.39 ips)
Danger: 11.0 mm/s (0.61 ips)

How to choose the correct “Enveloped Acceleration Classification” for your machinery

The Enveloped Acceleration Classification (**CL1**, **CL2**, or **CL3**) you specify determines the instrument’s “bearing vibration” alarm levels. Therefore, the Enveloped Acceleration Class that best describes the general size and speed of the bearings being measured should be selected.

Options are:

CL1

Bearings with a bearing bore diameter between 200 and 500 mm and a shaft speed below 500 RPM.

Alert: 1 gE
Danger: 2 gE

CL2 (default)

Bearings with a bearing bore diameter between 200 and 300 mm and a shaft speed between 500 and 1 800 RPM.

Alert: 2 gE
Danger: 4 gE

CL3

Bearings with a bearing bore diameter between 20 and 150 mm and a shaft speed from 1 800 to 3 600 RPM.

Alert: 4 gE
Danger: 10 gE

Expanding your capabilities with SKF Machine Condition Advisor compatible accessories

External sensor kit Model CMAC 105

The Extension sensor kit CMAC 105 contains an accelerometer with integral cable and everything needed to take measurements from hard-to-reach places.



Accelerometer

- 100 mV/g sensitivity
- Small size case, 0.5" x 1.05"
- Small footprint, 0.5"
- 0.32 Hz to 10 kHz frequency range (± 3 dB)
- Waterproof

Integral cable (1.5 meters)

- Connector to SKF Machine Condition Advisor CMAS 100-SL

Magnet, Model CMAC 106

- 10 lbs pull-strength, 0.75" diameter

Each accelerometer is fully enclosed in a potted and waterproof stainless steel case.

Specifications (Accelerometer)

Dynamic performance

- **Sensitivity (± 10 %):** 10.2 mV/(m/s²) (100 mV/g)
- **Measurement range:** ± 490 m/s² (± 50 g)
- **Frequency range (± 3 dB):** 0.32–10 kHz
- **Mounted resonant frequency:** 22 kHz
- **Amplitude linearity:** ± 1 %
- **Transverse sensitivity:** 7 %

Electrical

- **Settling time:** ≤ 2 sec
- **Excitation voltage:** 18–30 VDC
- **Excitation constant current:** 2–20 mA
- **Output impedance:** < 150 Ω
- **Output bias voltage:** 8–12 VDC
- **Electrical case isolation:** $> 10^8$ Ω
- **Electrical protection:** RFI/ESD
- **Integral cable:** 22 AWG, +105 °C (22 AWG, +221 °F)

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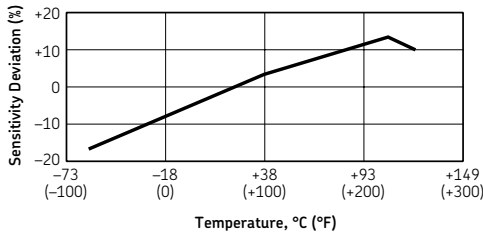
Expanding your capabilities with SKF Machine Condition Advisor compatible accessories *(continued)*

Specifications *(continued)*

Environmental

- **Shock limit:** 49 km/s² pk (5 000 g pk)
- **Temperature range:** -54 to +85 °C (-65 to +185 °F)

Typical sensitivity deviation vs. temperature



Spectral Noise

- **10 Hz:** 78.5 (mm/s²)/√Hz (8 µg/√Hz)
- **100 Hz:** 49.1 (mm/s²)/√Hz (5 µg/√Hz)
- **1 kHz:** 39.2 (mm/s²)/√Hz (4 µg/√Hz)

Mechanical

- **Size:** 12.70 × 26.67 mm (0.50 × 1.05")
- **Weight (including 1.5 meter cable):** 70.7 g (2.5 oz)
- **Mounting thread:** 1/4-28 UNF-2B
- **Mounting torque:** 2.7 to 6.8 N-m (2 to 5 ft-lb)
- **Sensing element:** Ceramic/shear
- **Case material:** Stainless steel
- **Sealing:** Potted
- **Wrench flats:** 7/16"

Connection cable (1.5 meters) Model CMAC 107

Optional Connection cable for standard ICP accelerometers with 100 mV/g, mil-spec connector.



For additional information on SKF Reliability Systems products, contact:

SKF Reliability Systems

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Publication **CM2387 EN** (December 2008) • PDF ONLY

Ordering information

CMAS 100-SL SKF Machine Condition Advisor includes:

- Belt holster [CMAC 102]
- Charger, international DC power supply [CMAC 8002]
- Charger adapter, cable [CMAC 101]
- User manual, English hard copy [32131800-EN]
- CD containing:
 - User manual available in PDF files in English, French, German, Portuguese, Spanish, and Swedish
 - Link to training on @ptitude Exchange
 - Machine Condition Advisor trend worksheet (Excel .xls file)
 - SKF Reliability Systems Condition Monitoring Essentials catalog available in PDF file in English [CM2355]
- CD, Integrating Condition Monitoring Products and Asset Management Services, product catalog [CM5057]

Accessories

- **Extension kit [CMAC 105]**, 100 mV/g accelerometer with 1.5 m integral cable and magnet
- **Connection cable [CMAC 107]**, 1.5 m with M8 socket type connector for standard ICP 100 mV/g accelerometer (ICP: integrated circuit piezoelectric)

Replacement

- **Charger adapter [CMAC 101]**, cable 4 inches, connector to 5.5 mm power
- **Charger [CMAC 8002]**, international DC power supply, +5 V, 1 600 mA, 90–264 VAC, 47–63 Hz
- **Magnet [CMAC 106]**, magnet base, 0,75" diameter, 10 lbs pull-strength
- **Belt holster [CMAC 102]**

Kits that include the SKF Machine Condition Advisor, CMAS 100-SL will be available soon.

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