

SKF Machine Condition Indicator

CMSS 200

Reliability meets affordability

The SKF Machine Condition Indicator is an economical vibration sensor and indicator for monitoring of non-critical machines. It is ideal for machinery with constant operating conditions not previously monitored in plants. The device can be compared to the “check engine” light in a car.

Features

- Autonomous operation
- Velocity measurements for general machine health
- Enveloped acceleration measurements for early detection of bearing failure
- Temperature measurements to indicate uncharacteristic heat
- Two modes of operation to address many different machine types
- Transient protection and retry algorithm to avoid false alarming

The SKF Machine Condition Indicator is slightly larger than a standard industrial accelerometer. It is 68,3 mm (2.688 in.) in length and has a stainless steel base diameter of 33,7 mm (1.325 in.).

The enclosure is made of durable polymer. The interior is entirely sealed to environmentally protect the electronics and to achieve the highest ingress protection rating (IP 69K).

The top of the unit features three LEDs to indicate the machine and bearing condition. In addition, it features a barcode with serial number for machine identification purposes and easy incorporation into an Operator



Driven Reliability (ODR) program, maintenance routes or scheduled check-ups.

The stainless steel base on the bottom of the unit has 1/4-28 tapped threads for stud mounting.

What the “check engine” light does for the car, the SKF Machine Condition Indicator does for industrial machinery. Once the SKF Machine Condition Indicator is illuminated, it alerts the predictive maintenance technician to do a root cause analysis on the machine.

Internal sensors measure velocity, enveloped acceleration (bearing or gear impulsive vibration) and machine surface temperature.

A magnetic read-key is included to program the SKF Machine Condition Indicator. It is used to activate the SKF Machine Condition Indicator, change operating modes, set vibration baselines, acknowledge alarms, and reset the SKF Machine Condition Indicator.

The SKF Machine Condition Indicator features three LEDs that rotate and blink green, amber or red at various intervals and durations to indicate the current mode or alarm status.





Top of SKF Machine Condition Indicator barcoded with serial number.



Bottom of SKF Machine Condition Indicator with 1/4-28 tapped threads.

Threshold mode (default mode)

In threshold mode, velocity and enveloping measurement results are compared to the following default alarm threshold levels, which are applicable to most “standard” machinery running at constant speeds from 900 to 3 600 r/min:

- Velocity: 9,0 mm/s rms (0.35 in./s rms; 0.5 in./s equivalent peak)
- Enveloped acceleration: 4 gE
- Temperature: 105 °C (220 °F)

Percentage mode

In percentage mode, the SKF Machine Condition Indicator establishes a baseline value (norm) for the machine’s velocity and enveloped acceleration vibration levels. These machine measurement results are compared to a multiple of the established baseline value:

- Velocity: 2 × baseline value (200%)
- Enveloped acceleration: 2 × baseline value (200%)
- Temperature: Baseline value plus 50 °C (90 °F)

The SKF Machine Condition Indicator sleeps most of the time. When it is asleep, it conserves battery power. It wakes up at a preset interval to take measurements eight times per day. Once activated, the SKF Machine Condition Indicator immediately starts taking measurements and evaluates the current vibration level of the machine. If the level does not meet minimum alarm threshold levels, the SKF Machine Condition Indicator goes back to sleep to eliminate taking data when the machine is off.

Verification

If the SKF Machine Condition Indicator detects an alarm condition, it automatically verifies the alarm condition by retrying its measurements. This helps rule out transient conditions and false alarms.

Adaptive alarming

If the alarm level is exceeded, the SKF Machine Condition Indicator verifies the alarm condition within 2 to 12 hours. If the signal goes above the level by only a small amount, the SKF Machine Condition Indicator will verify the condition for a maximum of 12 hours before it displays the red alarm LEDs.

If the alarm level is exceeded by a large amount, the SKF Machine Condition Indicator recognizes this and performs fewer verifications of the alarm condition before alarming. Stronger alarms display the red alarm LEDs sooner than weaker alarms, and all alarms are verified. Once the SKF Machine Condition Indicator has verified the alarm, red LEDs blink in a specific blink pattern according to the measurement type in alarm for a duration of one week.



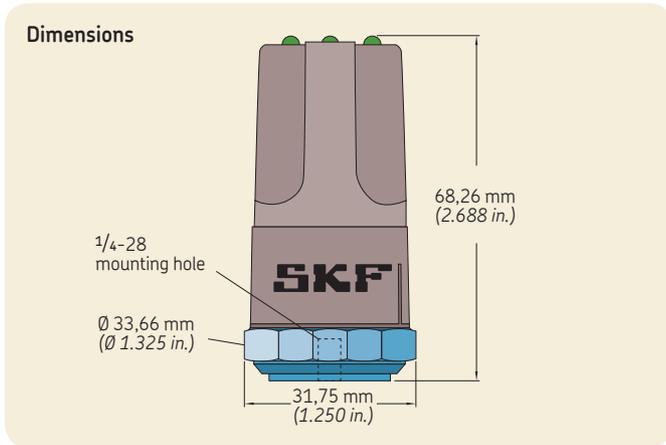
Benefits

- Provides a simple, low cost solution to determine the basic machine health on assets not necessarily being monitored
- Frees up time to concentrate on root cause analysis or maintenance instead of problem detection
- Non-critical machine routes could be more widely spaced, e.g., every other month instead of monthly, with the SKF Machine Condition Indicator installed and replaced by a simple, quick check of the LEDs

Specifications

- Dimensions:
 - Diameter: 33,66 mm (1.325 in.)
 - Height: 68,26 mm (2.688 in.)
- Form: Cone; sensor-like
- Weight: 120 g (4.2 oz.)
- Rating: IP 69K, for use in adverse industrial environments
- Enclosure: White durable polymer cap PC/PET Blend, Bayer Makroblend UT 1018-1000 and a stainless steel base
- Mounting: Stud mounted or epoxy mount
- Velocity measurement: 10 Hz to 1 kHz minimum rotational speed 900 r/min
- Bearing measurement: Enveloped acceleration with sufficient resolution for an early Stage 3 bearing defect, speeds between 900 and 3 600 r/min
- Machine surface temperature measurement range: –20 to +105 °C (–5 to +220 °F)
- Alarm system: Three LEDs (multiple color)
- Power source: Lithium battery 3,6 V, single use, non-replaceable
- Wake up schedule: Eight times per day
- Battery life: Minimum of three years (with one unacknowledged alarm)
- Internal operating temperature range: –20 to +85 °C (–5 to +185 °F)

Table 1



Optional accessories for stud mounting

Model number	Description
CMAC 9600-01	Toolkit for spot face, 1/4-28 mounting
CMAC 9600-02	Toolkit for spot face, M8 x 1,25 mounting
CMAC 9600-10	Toolkit for spot face, M6 x 1 mounting

Toolkit contents:

- 1 Spot face pilot
- 2 Drill bit
- 3 Spot face mill (counter bore)
- 4 Tap for threading
- 5 Allen wrench



Mounting considerations

The SKF Machine Condition Indicator unit can either be stud mounted on the measurement location or epoxy mounted. The measurement location should be on a clean, flat surface, preferably spot faced. If the measurement location is higher than the observer's line of sight of the LEDs, you should consider a horizontal mount.

Stud mount

One of the following mounting or adapter studs is **necessary**:

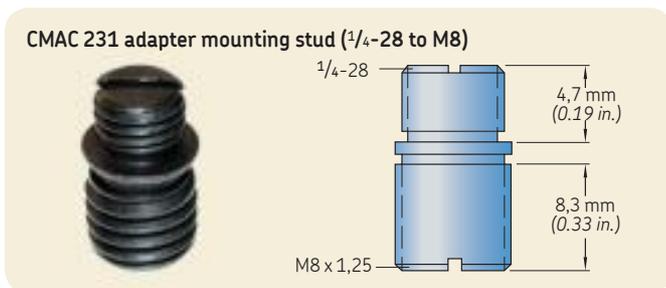
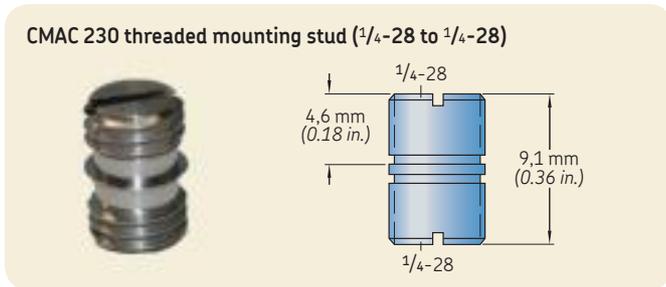
- CMAC 230: Threaded mounting stud (1/4-28 to 1/4-28)
- CMAC 231: Adapter mounting stud (1/4-28 to M8)

Epoxy mount

The SKF Machine Condition Indicator unit can be directly mounted onto the measurement location with epoxy on a clean, flat surface. We recommend locally procuring Loctite 454 adhesive gel. As an alternative, the CMCP 210 acrylic adhesive bypacs are available via ground shipment or with an added hazardous material cost.

Optional accessories for epoxy mounting

Instead of epoxy mounting the SKF Machine Condition Indicator directly onto the machine, you can use mounting pads. The mounting pads are epoxy mounted and the SKF Machine Condition Indicator is threaded with the mounting stud (CMAC 230) onto the mounting pad for easy replacement.



CMAC 240 and CMAC 241 mounting pads

The CMAC 240 and CMAC 241 mounting pads are used to epoxy mount the unit to a prepared surface without drilling into machinery. The pads provide easier installation, removal and replacement of sensors in low to moderate clearance areas. The mounting pads are 303 stainless steel with a passivate finish and are available in two different thicknesses. The minimal 6,4 mm (1/4 in.) and 9,5 mm (3/8 in.) thick pads are threaded (1/4-28 hole) for mounting.



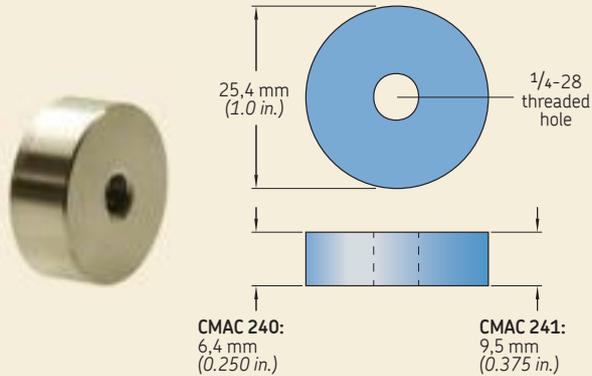
The CMAC 240 and CMAC 241 are recommended when using the combination epoxy and stud mounting method. The low profile CMAC 240 is recommended for installations with low clearance. Use of the sensor mounting pad is recommended if repeated removal of the sensor is required.

The mounting pads have exceptional adherence capability and simplify sensor installation, removal and replacement. The corrosion resistant stainless steel make the mounting pads long lasting and durable. They provide consistent measurement locations designed for repeatable data collection and protect machinery from drilling damage.

Optional accessories for stud mounting

Toolkits for spot facing, drilling and tapping are available for different configurations (→ table 1).

CMAC 240 / CMAC 241 mounting pad



Ordering information

- **CMSS 200-02-SL** SKF Machine Condition Indicator includes:
 - Two battery operated units
 - Two CMAC 225 read-keys (magnets)
 - Two CMAC 230 threaded mounting studs (1/4-28 to 1/4-28)
 - Two CMAC 231 adapter mounting studs (1/4-28 to M8)
 - Two CMAC 200-REF reference cards
 - One Installation Instruction card
 - One product reference CD
- **CMSS 200-10-SL** SKF Machine Condition Indicator includes:
 - 10 battery operated units
 - Four CMAC 225 read-keys (magnets)
 - Four CMAC 200-REF reference cards
 - Two Installation Instruction cards
 - One product reference CD
- **CMSS 200-50-SL** SKF Machine Condition Indicator includes:
 - 50 battery operated units
 - 10 CMAC 225 read-keys (magnets)
 - 10 CMAC 200-REF reference cards
 - Five Installation Instruction cards
 - One product reference CD

Note: The mounting studs are not included in the 10-pack CMSS 200-10-SL or 50-pack CMSS 200-50-SL and must be ordered separately.

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SKF Patents include: US #D663332.

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Accessories

- **CMAC 225-10** Magnetic read-keys, 10-pack

Mounting accessories

Mounting studs

- **CMAC 230-10** Threaded mounting studs (1/4-28 to 1/4-28), stainless steel, 10-pack
- **CMAC 230-50** Threaded mounting studs (1/4-28 to 1/4-28), stainless steel, 50-pack
- **CMAC 231-10** Adapter mounting studs (1/4-28 to M8), stainless steel, 10-pack
- **CMAC 231-50** Adapter mounting studs (1/4-28 to M8), stainless steel, 50-pack

Toolkits

- **CMAC 9600-01** Toolkit for spot face, 1/4-28 mounting
- **CMAC 9600-02** Toolkit for spot face, M8 x 1,25 mounting

Adhesives

- **CMCP 210** Acrylic adhesive bypacs

Note: Shipping restrictions apply.

Mounting pads

- **CMAC 240-10** Mounting pad, 10-pack, stainless steel, 25,4 mm (1 in.) diameter x 6,4 mm (0.250 in.) thick
- **CMAC 240-50** Mounting pad, 50-pack, stainless steel, 25,4 mm (1 in.) diameter x 6,4 mm (0.250 in.) thick
- **CMAC 241-10** Mounting pad, 10-pack, stainless steel, 25,4 mm (1 in.) diameter x 9,5 mm (0.375 in.) thick
- **CMAC 241-50** Mounting pad, 50-pack, stainless steel, 25,4 mm (1 in.) diameter x 9,5 mm (0.375 in.) thick

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