User manual

SKF QuickCollect Sensor CMDT 390



User Manual Part No. 15V-090-00056-100 Revision A

▲ WARNING! Read this manual before using this product. Failure to follow the instructions and safety precautions in this manual can result in serious injury, damage to the product or incorrect readings. Keep this manual in a safe location for future reference.



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Product support – Contact Information

Product Support – To request a <u>Return Authorisation</u>, <u>Product Calibration</u> or <u>Product Support Plan</u>, use the web page links for direct contact and support.

Product Sales – For customer support or information on purchasing condition monitoring products or services, contact your <u>local SKF sales office</u>.

General Product Information

For general product information (i.e. product data sheets, accessories catalogue, etc.), visit the <u>Condition</u> <u>Monitoring Products</u> page at SKF.com and select the appropriate product link.

Technical Support Group

Discuss/review issues of specific interest with maintenance and reliability specialists from around the world at the <u>SKF Knowledge Centre</u>.

For technical support when troubleshooting product installation, troubleshooting product performance, etc., use our <u>technical support</u> web page to contact one of our Technical Support Groups.

201703FP/PW

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A Safety Messages

A WARNING! Your safety is extremely important. Read and follow all warnings in this document before handling and operating the equipment. Failure to observe the safety warnings may result in personal injury and/or damage to the equipment and data.

WARNING! – Warning messages are used to alert you to an operating procedure, practice, condition or statement that must be strictly observed to prevent equipment damage or destruction, or corruption to or loss of data.

IMPORTANT: Important messages mean that there is a risk of product or property damage if the instruction is not heeded.

Personnel Safety

Dress properly. Do not wear loose clothing or jewellery. Keep your hair, clothing and gloves away from moving parts.

Do not overreach. Maintain proper footing and balance at all times to enable better control of the device during unexpected situations.

Use safety equipment. Always wear eye protection. Non-skid safety shoes, hard hat or hearing protection must be used in the appropriate settings.

Do not repair or adjust energised equipment alone, under any circumstances. Someone capable of providing first aid must always be present for your safety.

To work on or near high-voltage equipment, you should be familiar with approved industrial first-aid methods.

Always obtain first aid or medical attention immediately after sustaining an injury. Never neglect an injury, no matter how superficial it seems.

Device Safety

Devices must only be serviced by qualified SKF repair personnel.

Use only accessories recommended or provided by SKF or the manufacturer.

Energised equipment

Never work on energised equipment unless authorised by a responsible authority. Energised electrical equipment is dangerous. Electric shocks from energised equipment can be fatal. If you must perform authorised emergency work on energised equipment, be sure that you comply entirely with approved safety regulations.

No Submersion/Immersion

This equipment is IP67-rated. It is dust-tight and resistant to accidental immersion in liquid up to a depth of 1 m (39.37 in.) for up to 30 minutes. If the instrument is subjected to more extreme conditions, this may result in adverse operation.

Avoiding Damage and Injury

To avoid costly damage to the instrument or injury caused by the instrument falling, place the instrument on a solid stable surface when not in use and do not place any heavy objects on it.

Use a damp, clean cloth for cleaning. Do not use cleaning fluids, abrasives or aerosols. These might cause damage, fire or electrical shock.

Do not open the device cover in a hazardous area or in locations where contact with water or other contaminants may occur.

About This Manual

This manual provides information on the setup and use of the *SKF QuickCollect Sensor* **Bluetooth**® instrument (part no. CMDT 390). In this manual, the sensor instrument is commonly referred to as *the QuickCollect sensor*, or just *the sensor*.

Please refer to the relevant user manual to use the QuickCollect sensor within a DataCollect question:

- For iOS devices, refer to *DataCollect CMDT 3900 iOS User Manual* P/N 15V-090-00053- Chapter Completing Standalone Collections.
- For Android devices, refer to *DataCollect CMDT 3900 Android User Manual* P/N 15V-090-00052-100 Chapter Completing Standalone Collections.

As you use this manual, you will discover certain conventions used:

Bold type is used to indicate text that appears in a menu, window or dialogue box.

Italics are used to emphasise important information.

➤ is used to indicate notes to the reader.

Step-by-step procedures are sequenced using bullet points, •.

Technical Support

If you have questions regarding the installation or operation of your SKF product, please visit the self-help portal before contacting the help desk to see if the answer has already been published:

Technical Support Self-help Portal: www.skf.com/cm/tsg

If further assistance is needed, please submit a support request by clicking on the SUPPORT tab, and one of our support engineers will contact you shortly.

The technical support team can be reached during normal business hours (7 am to 4 pm local time) by phone, e-mail or live chat:

- Customers in Europe, Middle East and Africa: Phone: +46 31 337 6500 E-Mail: <u>TSG-EMEA@skf.com</u> Chat: <u>www.skf.com/cm/tsg</u>
- Customers in all other locations: Phone: 1-858-496-3627 or toll-free (USA) 1-800-523-7514 E-Mail: <u>TSG-Americas@skf.com</u> Chat: <u>www.skf.com/cm/tsg</u>

Note: Standard technical support will be provided at no cost for products or software covered by an SKF Product Support Plan (PSP), wherever applicable. Many SKF Machine Health products include limited technical support for the first 180 days after purchase. Support obtained after 180 days or without PSP coverage will be subject to a per-incident fee. Contact the technical support team for more information.

2 SKF QuickCollect Sensor

SKF QuickCollect Sensor System Overview

The SKF QuickCollect sensor is part of the SKF Enlight Collect system, which also includes the QuickCollect app and the DataCollect app. This system is used by service, reliability, operations or maintenance personnel as part of a walk-around data collection program. With one wireless vibration and temperature sensor that can be connected to tablets, smart phones and smart watches, the user can monitor hundreds of assets per day and thousands of assets per month. The data can be analysed on the spot in real-time or sent to the cloud for analysis.



Figure 2 - 1. On the job with an Enlight QuickCollect system.

In brief, a typical operation would include the following steps:

- Carry the QuickCollect sensor and smart device out to the machine with rotating parts (such as a pump or motor).
- Mount the sensor on the bearing housing using the magnet mount.
- Initiate the sensor measurement wirelessly (using **Bluetooth**[®] Low Energy, or BLE) using either the SKF QuickCollect or DataCollect app running on a smart device.
- After taking the measurement, remove the sensor and proceed to the next machine or measurement location to continue taking measurements.
- When complete, return the sensor to its charging power supply via the cable.



SKF App on Phones and Tablets

Figure 2 – 2. A portable data collection system.

The QuickCollect sensor uses **Bluetooth**® low-energy version 4.2 wireless technology to communicate with off-the-shelf iOS and Android devices using the SKF QuickCollect or DataCollect application for capturing overall machine vibration (velocity and enveloped acceleration), time waveform and temperature data.

The QuickCollect sensor features wireless data transfer, a rugged design and a rechargeable battery. The sensor increases operator safety by eliminating the hazards and inconvenience of cumbersome cables to provide a safe, fast and easy-to-use system for performing front-line machinery condition monitoring. The data collected and transferred to SKF's QuickCollect or DataCollect application is displayed on the screen with easy-to-identify colour-coded bars that indicate alarm status: green for acceptable, yellow for alert and red for danger.



Figure 2 – 3. QuickCollect sensor.

SKF QuickCollect	t		٩
••• LIVE DATA			
VELOCITY			
0.071 mm/s			
0	4	7	9
ACCELERATED ENVELO	PING		
🥑 0.022 gE			j i i i
0 1		2	2
TEMPERATURE			
	14. JA. 14		
0		72 82	98

Figure 2 – 4. QuickCollect application for mobile devices.

Your QuickCollect sensor kit contains the following components:

- 1 QuickCollect sensor (P/N CMDT 390)
- 1 CMAC 8007 power supply with international plugs
- 1 MM-8 magnet

Machine Health Monitoring

Vibration

Most machinery problems cause excessive vibration. Mechanical looseness, imbalance, soft foundation, misalignment, rotor bow, bearing wear, gear defects or lost rotor vanes can all be detected using vibration measurements.

The QuickCollect sensor is capable of performing two vibration measurements and the temperature measurement simultaneously. When performing measurements, the sensor's vibration input signal is processed to produce two very meaningful vibration measurements for each measurement point.

- Velocity Vibration velocity is considered the "general purpose" vibration measurement for detecting machinery problems. This is because most machinery problems generate low to mid-frequency sinusoidal-type vibration signals (problems such as imbalance, misalignment, bent shaft and looseness), and velocity measurements focus on detecting sinusoidal vibration signals occurring in this frequency range. ISO standards provide general guidelines for vibration severity using velocity criteria.
- Enveloped acceleration Rolling element bearing faults cause low-amplitude impulsive-type vibration signals at a regular rate of repetition. When monitored using velocity measurements, these low-energy impulsive signals are typically lost in surrounding machinery vibration noise caused by imbalance, misalignment, looseness, etc. Enveloped acceleration measurements filter out surrounding machine vibration noise and enhance the impulsive nature of repetitive rolling element bearing or gear fault vibration signals, allowing much earlier and accurate bearing fault detection. Not used for overall machine vibration monitoring, enveloped acceleration measurements ensure consistent early detection of bearing and gear-type defects.

Temperature

Temperature measurement is a useful indicator of mechanical condition or the load applied to a specific component. As a bearing or its lubrication fails, friction causes its temperature to rise. Measuring temperature changes within the bearing allows you to recognise problems early and to schedule maintenance before a serious and expensive failure occurs. The sensor's opening for taking temperature measurements is located next to the magnet stud and has a range of 4 cm from the machine. The infra-red (IR) sensor quickly determines the temperature of the equipment being measured.



Figure 2 – 5. IR sensor location.

Controls and Functions



Figure 2 - 6. Sensor controls and LEDs.

1 Power button 2 Battery LED 3 Communication LED 4 All-purpose check LED

Power button – Powers the sensor on and off. When the sensor is off, pressing the power button will immediately turn on the sensor.

When powered on, a 15-minute inactivity timer will start. If no communication is detected between the sensor and QuickCollect or DataCollect within 15 minutes, the sensor will automatically power off.

When powered on, any button press of less than 3 seconds will reset the inactivity timer.

When powered on, a press and hold of greater than 3 seconds will power off the sensor.

Battery LED – (Green, Red)

Green – Indicates battery is fully charged when connected to the power source.

Red, solid – Indicates battery is charging when connected to the power source.

Red, slow blinking – Indicates low battery. Remaining life is about 15% of fully charged level (TBD).

Red, fast blinking – Indicates battery is too low to keep the sensor powered on; the device will power itself off.

Communication LED - (Green, Red)

Off – Indicates the sensor is powered off.

Green, blinking – Indicates the sensor is powered on and not connected to an application.

Green, solid – Indicates the sensor is powered on and connected to an application.

Toggling between green and red – Firmware update in progress.

All-purpose check LED – (Green, Red, Amber)

Red, solid – Indicates an error condition: factory state, no serial number, uncalibrated.

Red, fast blinking – Indicates a critical error.

Environmental and Regulatory Specifications

Temperature range	Non-hazardous areas: -20 to +60°C
	Hazardous areas: -20 to +60°C
	Charging: +0 to 40°C
Humidity	95% non-condensing
IP rating	IP67, Dust and water ingress protection testing standard.
Hazardous approval (North America)	Class 1 Division 1 Group A, B, C, D certification Class 1 Zone 1 (pending)
Hazardous approval (Europe)	ATEX Zone 1 certification (pending) Area = II (non-mining) Category = 2G (Zone 1) Exib IIC T4
Radio approvals	Europe (CE), USA (FCC), Canada (IC)
CE mark	CE-approved

Measurement Range

Overall velocity:	10 Hz to 1 kHz up to 55 mm/s	
Bearing condition:	SKF-patented Enveloped acceleration up to 20 gE	
FFT maximum	Velocity 1 kHz, Enveloped Acceleration 2 kHz	
frequency:		
Lines of resolution:	Velocity 400, Enveloped acceleration 800	
Detection type:	Velocity RMS, Enveloped acceleration True Peak-to-Peak	

Power

Main power	Rechargeable lithium battery, 3.7 V DC. 0.14 A	
Battery lifetime	Eight hours with normal usage	
Mains supply voltage, charger	Varies up to ±10% of the nominal voltage TRANSIENT OVERVOLTAGE CATEGORY II; POLLUTION DEGREE 2	
Charger	Input 5 V DC ± 10%, 1 A	
AC adapter	Input 100 to 240 V DC, 0.4 A, 47 to 63 Hz Output 5 V DC, 1.6 A	

Environmental

Storage temperature	-20 to +45°C (-5 <i>to +115°F</i>) for less than one month -20 to +35°C (-5 <i>to +95°F</i>) for less than six months
Operating temperature, battery	0 to +40°C (3 <i>2 to +105°F</i>) for charging -20 to +60°C (- <i>5 to +140°F</i>) for discharging
Operating temperature, charger	0 to +40°C (32 to +105°F)
Altitude	Up to 2,000 m (6,560 ft.)
Humidity	95% non-condensing

Physical

Case	Water and dust-resistant (IP67)
Drop test with boot	1.8 m (6 ft.) to concrete
Dimensions	45 x 45 x 135 mm (<i>1.8 x 1.8 x 5.3 in</i> .)
	200 g (<i>7 oz.</i>)

Preparing the Sensor for Use

Charging the Battery

The battery charger may only be connected to the equipment in a safe area.

The sensor is equipped with an internal lithium ion battery. Prior to using the sensor for the first time, you must use the power supply provided to fully charge the lithium battery.

The sensor's only external connector is the 6-pin "back" connector. The connector provides charging power. The connector is IP67-rated and the energy available via this connector is limited.



Figure 3 – 1. External sensor connector.

To charge the battery:

- Connect the charger to an AC outlet (if necessary, use regional AC outlet adapters).
- Align, connect and tighten the charger's cable to the sensor's external 6-pin connector.
- The battery LED will display red when the battery is charging. The battery will be fully charged after approximately four hours. The battery LED will display green when the battery is fully charged.

Once the battery is fully charged, the sensor is ready for operation. With normal use, the estimated battery life is eight hours. The battery LED will blink red when the power level is low. If the battery level becomes too low, the sensor will automatically power itself off to prevent battery damage.

Connect the sensor to its power supply/battery charger whenever you do not intend to resume operations in the immediate future.

Measurement Guidelines

Performing Vibration Measurements

Measurements are typically performed with the machine operating under normal conditions. For example, when the machinery has reached its normal operating temperature and is running under its normal rated condition (at rated voltage, flow, pressure and load). For machines with varying speeds or loads, perform measurements at all extreme rating conditions, as well as at selected conditions within these limits.

Place the sensor's magnet on the machine's measurement point. When placing the sensor on the machine, generally avoid greasy, oily or wet surfaces, housing splits, and structural gaps. Select the best measurement point (specifically avoid unloaded bearing zones), and be consistent in terms of sensor position, sensor angle and contact pressure.

If possible, choose a flat surface in the bearing's load zone. Measurements should be taken at the same precise location (moving the probe only a few inches can produce drastically different vibration readings). To ensure measurements are taken in the exact same spot, mark the measurement point with permanent ink.

Proper hand-held sensor technique is vital to the accuracy of measurements. It is critical that you perform consistent readings.

Performing Infrared Temperature Measurements

To perform accurate non-contact infrared temperature measurements, bear in mind infrared sensor cleanliness. The infrared sensor has a small opening. Dirt, grease or oil may enter the opening and cause inaccurate temperature measurements. If necessary, clean the opening using alcohol and cotton buds.

How to Use the Sensor within a DataCollect Question

Please refer to the SKF DataCollect user manual for details.

Downloading, Installing and Launching the QuickCollect App

You can download and install the app via the Google Play Store. After download and installation, the QuickCollect app will be available on your device.

Preparing to Take Measurements

To configure alarm thresholds:

• Navigate to the **Settings** table by tapping the settings icon in the top right of the app's home screen.

SKF QuickCollect	ŝ	SKF QuickCollect	7	Ā	1
		Scan machine QR co	de		
		MACHINE ID			
		SKF-1			
		THRESHOLDS			
		Velocity (mm/s RMS)			
		1 Danger			7.10
		Alert			4.50
		Acceleration Envelope (gE)			
		! Danger			2.07
		Alert			0.69

Figure 4 – 2. Navigating to the Settings table from the home screen.

• Tap the QR icon to scan a machine's QR code in order to automatically collect information and values for thresholds for the machine.

OR

- Tap within the **MACHINE ID** text box to bring up a keyboard, and enter unique identifying information for the machine that your sensor will be measuring.
- Tap the **THRESHOLDS: Velocity** field to navigate to the **Velocity** table.

SKF QuickCollect		Ā	<u>ي</u>
Large machine			0
O Medium-sized machi	ne		0
Rigid			
O Flexible			
Enter machine size and select rig calculate ISO Velocity (mm/s) thi	jid or flex resholds	ible to	
1 Danger			7.10
Alert			4.50

Figure 4 – 3. Velocity table.

• Make selections and/or enter values for **Velocity** measurement thresholds:

Select whether the machine that your sensor will be measuring is a **Large machine** or a **Medium-sized machine** and whether it is **Rigid** or **Flexible**. The app will automatically calculate the ISO velocity thresholds for such a machine.

Tap either information icon to learn what constitutes a Large machine as opposed to a Medium-sized machine.

Alternatively, tap within the **Danger** and/or the **Alert** field to bring up a keyboard and enter a threshold value. You may enter user-defined levels.

• Tap **Return** on your device to set all configurations and return to the **Settings** table.

• Tap the **THRESHOLDS: Acceleration Enveloping** field to navigate to the **Acceleration Enveloping** table.

SKF QuickCollect			÷
BEARING BORE SIZE (MM)			
12			
ROTATIONAL SPEED (rpm)			
1200			
! Danger			2.07
Alert			0.69
Enter bearing bore size and rota calculate Acceleration Envelopir	tional spe ng thresho	ed to olds.	
BEARING DESIGNATION			
Bearing designation (par	t numbe	er)	
This information will be included	l in any er	nail rep	orts.

Figure 4 – 4. Acceleration Enveloping table.

• Make selections and/or enter values for **Acceleration Enveloping** measurement thresholds and other information:

Tap within the **BEARING BORE SIZE** text box to bring up a keyboard, and enter the bore size of the bearing that your sensor will be measuring according to the units currently designated (millimetres or inches, indicated next to field label).

Tap within the **ROTATIONAL SPEED** text box to bring up a keyboard, and enter the bearing rotational speed, in RPM, at which your sensor will be measuring.

The app automatically calculates the acceleration enveloping thresholds for the bearing at the speed indicated.

Tap within the **BEARING DESIGNATION** text box to bring up a keyboard, and enter the bearing's part number for reference purposes.

• Tap **Return** on your device to set all configurations and return to the **Settings** table.

• Tap the **THRESHOLDS: Temperature** field to navigate to the **Temperature** table.



Figure 4 – 5. Temperature table.

• Enter values for **Temperature** measurement thresholds:

Tap within the **Danger** and/or the **Alert** field to bring up a keyboard, and enter a threshold value according to the units currently designated (degrees Celsius or degrees Fahrenheit, indicated above these fields). • Tap **Return** on your device to set all configurations and return to the **Settings** table.

SKF QuickCollect		Ā	3
			4.00
Acceleration Envelope (gE)			
1 Danger			2.07
Alert			0.69
Temperature (°C)			
Danger			82
Alert			72
Metric			~
Imperial			
Reset Settin	ngs		

Figure 4 – 6. Settings table, scrolled to bottom.

- Below the **THRESHOLDS** field, tap to select the units of measurement system that you wish to use for all measurements: **Metric** or **Imperial**.
- Tap **Reset settings** to reset all **Settings** configurations to their defaults.
- Tap **Return** on your device to return to the home screen.

Taking Measurements

To connect to a sensor and obtain measurement data:

IMPORTANT! Your phone's Bluetooth function must be on to communicate with a QuickCollect sensor.

• Navigate to the **Devices** table by tapping the devices icon at the bottom right of the screen.



Figure 4 – 7. Navigating to the Devices table from the home screen.

The names of the available QuickCollect sensors will appear in the **Devices** table with their signal strengths indicated to the right.

- Tap to select the desired sensor.
 - If your device's Bluetooth feature is not on, you will receive a prompt to turn it on. Tap Settings to navigate to your device's Settings for this purpose.

Once you have successfully connected to the sensor, a checkmark and an information icon will display next to that sensor.



If you wish to see details about the sensor, tap on the information icon.

Figure 4 – 8. Devices table with connected sensor.

• To disconnect from the connected sensor, tap **Disconnect sensor** or tap to select a different sensor.

• When you are ready to continue with the selected sensor, tap **Return** on your device. The home screen will then be displayed with Live Data.

SKF QuickCollect	Ā	ŝ
•••	₩ŀ- SPECTRUM	
VELOCITY O.071 mm/s		
0 4	7	9
0.022 gE		
0 1	2	2
TEMPERATURE 24.1 °C		
0	72 82	98

If you wish to change sensor, click the device icon at the top right of the screen to go to the **Devices** table.

Figure 4 – 9. Home screen with live readings.

Each reading displays a current overall measurement, including alarm status, and alert and danger thresholds.

Figure 4 – 10. Live reading detail.

- 1. Reading category
- 2. Alarm status
- 5. Alert threshold 6. Danger threshold
- 3. Overall value
- 4. Minimum
- 7. Maximum 8. Current reading

QuickCollect User Manual

Over-the-Air Firmware Updates (OTA)

- Tap the information icon next to the sensor to see if there are any updates available.
 - Firmware updates (OTA) will be visible only if there is more recent firmware available than what is already installed, and if the battery percentage is over 50%.

SKF QuickCollect		
Sensor serial number	1701038	
Core firmware version	41244	
Bluetooth firmware versi	ion 36210	
Battery (%)	60	
Firmware updates	Updates available	

Figure 4 – 11. Over-the-air firmware updates available.

- When you tap **Firmware updates**, the **Firmware** screen will display current versions of and available updates for the Core and Bluetooth firmware.
- Tap **Update Firmware** to start downloading.
 - If there are updates available for both the Core and the Bluetooth, both will be downloaded.
 - > The time for downloading varies between 2 and 15 minutes.
 - When downloading, the sensor should be left on and not connected to the charger.

SKF QuickCollect		
CORE FIRMWARE		
Current version	41244	
Available version	41244	
BLUETOOTH FIRMWARE		
Current version	36210	
Available version	36210	
This update will take approximately 15 minutes. Please do not turn off QuickCollect during this time.		
UPDATE FIRMWARE		

When downloading, the process status will be displayed as a percentage.

> If an error occurs or if downloading stops, an error message will be displayed.

SKF QuickCollect		
	ILLART.	
CORE FIRM	AWARE	
Current	version	41244
Available	eversion	41244
BLUETOC		
Current		36210
Availab	Uploading file 1/2	
	Do Not Close QuickCollect	36210
This update will take approximately 15 minutes. Please do not turn off QuickCollect during this time.		
UPDATE FIRMWARE		

Figure 4 – 13. Download view.

When the download is complete, the process status will be displayed as "Update Succeeded!" $\ensuremath{\mathsf{Succeeded}}$

Figure 4 – 14. Download view.

Viewing Graphical Measurement Results

To view measurement data plots:

• Tap the spectrum button at the top of the home screen.

QuickCollect collects data and then processes this data to calculate velocity and acceleration envelope. The **Measurement Results** screen will appear with two **View Spectrum** options.

SKF QuickCollect	🖸 🧏 🍪
•••	₩- SPECTRUM
VELOCITY	View Spectrum
0 4	79
ACCELERATED ENVELOPING O.018 gE	View Spectrum
0 1	2 2
TEMPERATURE	
0	72 82 98

Figure 4 – 16. Measurement results screen with view spectrum options.

• Tap the appropriate **View Spectrum** button. A plot screen will appear.

Figure 4 – 17.

Top: velocity spectrum. Bottom: acceleration enveloping spectrum.

• Review the plot data and tap the return button on your device to return to the **Measurement Results** screen.

To go to Live Data mode:

- Tap Live Data at the top of the Measurement Results screen. The home screen will reload in Live Data... mode.
- Repeat all the above steps as necessary to configure, record and report velocity, acceleration enveloping and temperature measurements.

Reporting Measurement Results

To send an email report of the measurement results:

• Tap the email icon at the top right of the **Measurement Results** screen. Then select the e-mail application for which you want QuickCollect to generate an email containing the current measurement's results.

Figure 4 – 18. Measurement results email.

- Tap within the **To:** field to bring up a keyboard and enter recipient email addresses.
- Tap **Send** to send the report and return to the Measurement Results screen.

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