

# SKF Enlight Collect IMx-1 System

Automated machine monitoring for reliable rotation

 **ИНДУСТРИАЛ  
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# The SKF Enlight Collect IMx-1 System

## An SKF Enlight Collect IMx-1 System consists of:

- Battery powered wireless sensors (SKF Enlight Collect IMx-1)
- A line powered communication and network manager gateway (SKF Enlight Collect Gateway)
- Host software for data trending visualization and analysis (SKF @ptitude Observer version 12.1 or later)
- A mobile phone app for sensor and gateway commissioning (SKF Enlight Collect Manager)

The sensor is a data-collector and radio combined into one compact battery-operated device. It measures and processes vibration and temperature for detection of common issues with rotating equipment including:

- Unbalance
- Misalignment
- Looseness
- Electrically induced vibration
- Early stage damage to bearings and gears

The sensor communicates its information over a low energy mesh network – designed to route data around the wireless obstacles presented by typical industrial environments – back to a host gateway. This, in turn connects to the plant’s network, or to the internet for connection to monitoring services hosted by SKF.

The system enables machinery health data to be collected automatically and turned into actionable machine maintenance information, enabling valuable predictive maintenance staff to be freed from the task of routine data collection and to concentrate on higher value tasks.

### Features

- Overall level and dynamic vibration data
- Broadband acceleration and velocity measurements
- SKF Acceleration Enveloping for early detection of defects in bearings and gears, and other impact type phenomena

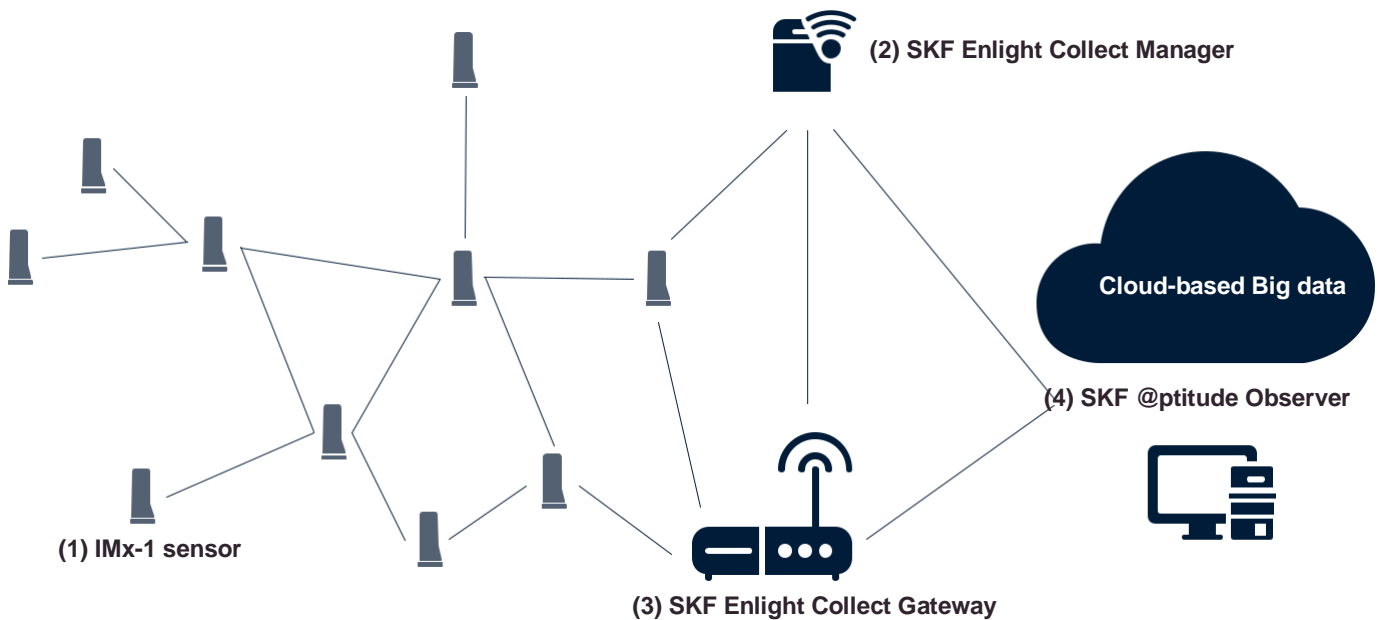


- Temperature measurement
- Configurable data acquisition and processing
- Periodic measurements
- Mesh network communication
- 4-year typical sensor battery lifetime (configuration dependent)
- Rugged, compact design
- Gateway is powered from an industrial, wide range, 24 V DC or PoE
- Interfaces to wireless sensors (such as IMx-1), SKF App and software

### Benefits

- Replacement of manual machinery health data collection and/or widening monitoring coverage
- Increase of the periodic monitoring coverage from months and weeks to days and hours
- Makes automated data collection easier and more affordable
- Data from machines in inaccessible locations or measurement points behind guarding
- Quick and scalable deployment
- Allows reduction of unplanned downtime by identifying and resolving problems before they result in costly machine failure





### An Enlight Collect IMx-1 system consists of four elements:

**(1) IMx-1 sensor** – are small enough to be placed at key measurement locations on a machine – usually the bearing housings. The wireless sensors are fixed using the proven mounting methods employed by standard wired industrial accelerometers. The device is battery powered and, in order to conserve energy, spends much of its time asleep – but with one ear open for network commands. Every few hours (configurable) the gateway asks it to wake up and measure the asset's vibration and temperature. Overall measurements are checked by severity algorithms and – if there is a cause for concern – dynamic data is captured for assessment by more complex computing. However, most of the time all is well, so only overall level data is reported and the sensor returns to its sleep mode. Periodically –

typically on a weekly basis – waveform data is transmitted to build up the long-term historical trend key to predictive maintenance, previously collected manually every month. In this way, an economic balance between automated complex data collection and sensor battery life can be made.

**(2) A Commissioning App** – on a mobile phone is used to set up the Gateway and the IMx-1 sensor during installation. At first use, the sensor is awoken with a simple NFC tap and its embedded factory information is linked via Bluetooth® to the App. The user then matches the sensor to its data-point location in the Host Software. Thereafter, control of the sensor passes to the mesh network and the data-collection parameters are downloaded.

**(3) A Gateway** – this does not just provide a link to the outside world for each sensor. The gateway also manages the mesh network, optimizes the wireless communication paths for the physical environment and requests data collection from all its 'children'. Data and information can then be communicated to the outside world using a wired Ethernet interface or wirelessly by Wi-Fi.

**(4) Host software from SKF** manages all the machine health data, and localized computing results, in order to conclude and communicate actionable maintenance information. How it achieves this can range from a manual evaluation in an on-premises software instance, to automated machine learning operating in a cloud hosted environment.

# SKF Enlight Collect IMx-1 – Specifications

## Measurements

Acceleration	10 Hz to 10 kHz, overall true pk-pk and dynamic, up to 50 g
Velocity	10–1 000 Hz, overall RMS and dynamic, up to 100 mm/s
SKF Acceleration Enveloping	Bands ENV 2 <sup>1)</sup> and ENV 3, overall true pk-pk and dynamic
Temperature measurement	–40 to +85 °C (sensor operating range)

## Data Acquisition and Edge Computing

Selectable maximum frequency <sup>1)</sup>	Options for 50 to 10 000 Hz
Selectable samples/FFT line resolution <sup>1)</sup>	1 024 to 16 384 samples / 400 to 6 400 lines
Alarms	Configurable Alert & Danger alarm setpoints
Typical configuration	Overall level values collected and uploaded every 8 hours 2048–point TWF collected and uploaded every week More frequent data if in alarm

## Mesh Network Wireless Communication

Certifications	2.4 GHz ISM band low energy mesh radio network Europe: RED 2014/53/EU Americas: FCC/CFR 47 part 15, IC <sup>2)</sup> Brazil: Anatel <sup>2)</sup>
Inter-node maximum range	10 m to 20 m typical, depending on plant topology

## Configuration Wireless Communication

App – sensor interface	NFC (Near Field Communication) and Bluetooth
Modes	Bluetooth, Mesh and Flight modes
Mode switch	By Bluetooth/NFC from app or timeout
Handset requirements	Android 7 or later, NFC and Bluetooth 4.2 capability required

## Physical

Mounting	For dimensions, see drawing on page 6
Weight	1/4–28 UNF female, recommended torque 2.9 Nm
Housing material	142 g
Sensor base	Potted thermoplastic
Flammability	304L or 303 stainless steel
	UL 94 V–0

## Environmental

IP rating	IP69K
Mechanical impact rating	According to IEC 60068-2-31, free fall procedure 1
Operating temperature range	–40 to +85 °C
Storage temperature range	Recommended maximum temperature: 30 °C
Humidity	Suitable for installation in high humidity areas
Hazardous area rating	Safe area use only (ATEX/IECEx Zone 1 <sup>2)</sup> pending)

## Power Source

Typical lifetime <sup>1)</sup>	Non-replaceable lithium battery
Factors adversely affecting battery life	4 to 8 years <sup>1)</sup> (configuration dependent) Temperature: extended exposure to 70 to 85 °C range Data collection: higher resolutions, more frequent uploads Wireless environment: longer transmission times

Wireless environment and battery life are linked: having more data to upload affects mesh performance and physical obstacles to the wireless network can increase transmission times and create heavily loaded nodes. Sensors used as (measurement only) leaf nodes have a longer expected lifetime than mesh nodes (measurements/mesh).

## Other

Self-diagnostics  
OTA (Over The Air) Firmware updates

# SKF Enlight Collect Gateway – Specifications

## Inputs

Via Wireless Mesh Network  
Vibration/temperature sensor IMx-1, maximum 50 per gateway  
Future: Wireless speed/phase reference sensor  
Wired  
TTL speed/phase<sup>1)</sup> and support for external antenna<sup>1)</sup>

## Mesh Network Wireless Communication

### Certifications

2.4 GHz ISM band low energy mesh radio network  
AES (128-bit) encryption  
Europe: RED 2014/53/EU  
Americas: FCC/CFR 47 part 15, IC  
Brazil: Anatel<sup>2)</sup>

### Sensor to gateway (direct) maximum range

10 m to 30 m typical, depending on plant topology

## Configuration Wireless

**Communication** App – gateway  
interface Gateway identification  
Handset requirements

Bluetooth 4.2  
By QR code or Bluetooth from app/mobile device  
Android 7 or later, NFC and Bluetooth 4.2 capability required

## Host Network Communication

Wired Ethernet (default interface)

Wired or wireless Ethernet, or mobile data<sup>1)</sup>  
10/100/1000 Mbps auto negotiation, auto MDI-X  
Future: Second Ethernet interface, Modbus TCP/IP and OPC UA  
802.11 a/b/g/n/ac, 2.4 and 5 GHz, WPA2-Personal and WPA2-Enterprise LTE/UMTS<sup>1)</sup>

Wi-Fi

Mobile network<sup>1)</sup>

## Physical

Dimensions

220 x 220 x 50.5 mm, excluding mounting plate

Mounting

4-point mounting, see drawing on page 7

Weight

1200 g

Housing material

ASA+PC-FR (Flame Retardant)  
Acrylonitrile Styrene Acrylate + Polycarbonate

Flammability

UL 94 V-0

## User multi-pole connectors

4 for: power, Ethernet and future: wired inputs and second  
Ethernet SIM card holder

## LEDs

Two LEDs, Power and Status

## Environmental

IP rating

IP65

Operating temperature range

-20 to +60 °C

Storage temperature range

-40 to +85 °C

Humidity

Maximum 95% (relative) non-condensing

Altitude

Maximum 5 000 m

Hazardous area rating

Safe area use only (ATEX/IECEX Zone 2<sup>2)</sup> pending)

## Power Source

Industrial range 24 V DC

Industrial range 24 V DC or Power over Ethernet (PoE)

Power over Ethernet

V DC input: 24 V DC (9-36 V DC); 7.5 W

PoE input: 48 V DC (44-57 V DC); 7.5 W

## Other

Self-diagnostics

Yes

Status and event reporting to the software RTC (Real Time Clock)

Yes

OTA Firmware updates – gateway

Yes

OTA Firmware updates – sensors

Yes, all sensors associated with the gateway

<sup>1)</sup> Stated feature and/or level of specification is planned to be available in the near future. Version 1.1 release of the product has the following features/level of specifications:

### SKF Enlight Collect IMx-1:

SKF Acceleration Enveloping: ENV3

Selectable maximum frequency: Not selectable, fixed at 10 kHz for acceleration, 1 kHz for velocity and ENV3

Selectable samples/FFT line resolution: Selectable, up to 4 096 samples/1 600 lines

Typical lifetime: 4 years (configuration dependent)

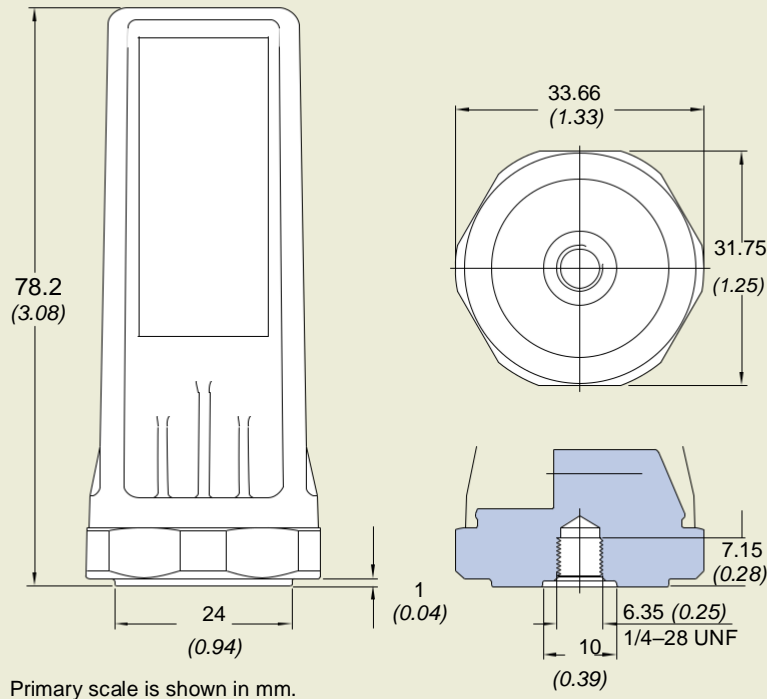
### SKF Enlight Collect Gateway

Support for TTL speed/phase, and external antenna input, not yet activated.

Mobile Host not yet activated

<sup>2)</sup> Certification/qualification pending.

# SKF Enlight Collect IMx-1 – Sensor and mounting dimensions



## Ordering information

Part Number	Description
CMWA 6100	SKF Enlight Collect IMx-1
CMWA 6600	SKF Enlight Collect Gateway, supplied with power supply cable (1.5 m) and Ethernet cable (1 m), each with mating M12 connector.

## Mounting accessories for SKF Enlight Collect IMx-1 sensors

CMAC 230-05	Acc, stud, mtg, 1/4-28/1/4-28, 5 PK
CMAC 231-05	Acc, stud, mtg, 1/4-28/M8, 5 PK
CMSS 910F	Acc, snsrs, cementing stud, 1/4-28, Female
CMSS 910M	Acc, snsrs, cementing stud, 1/4-28, Male

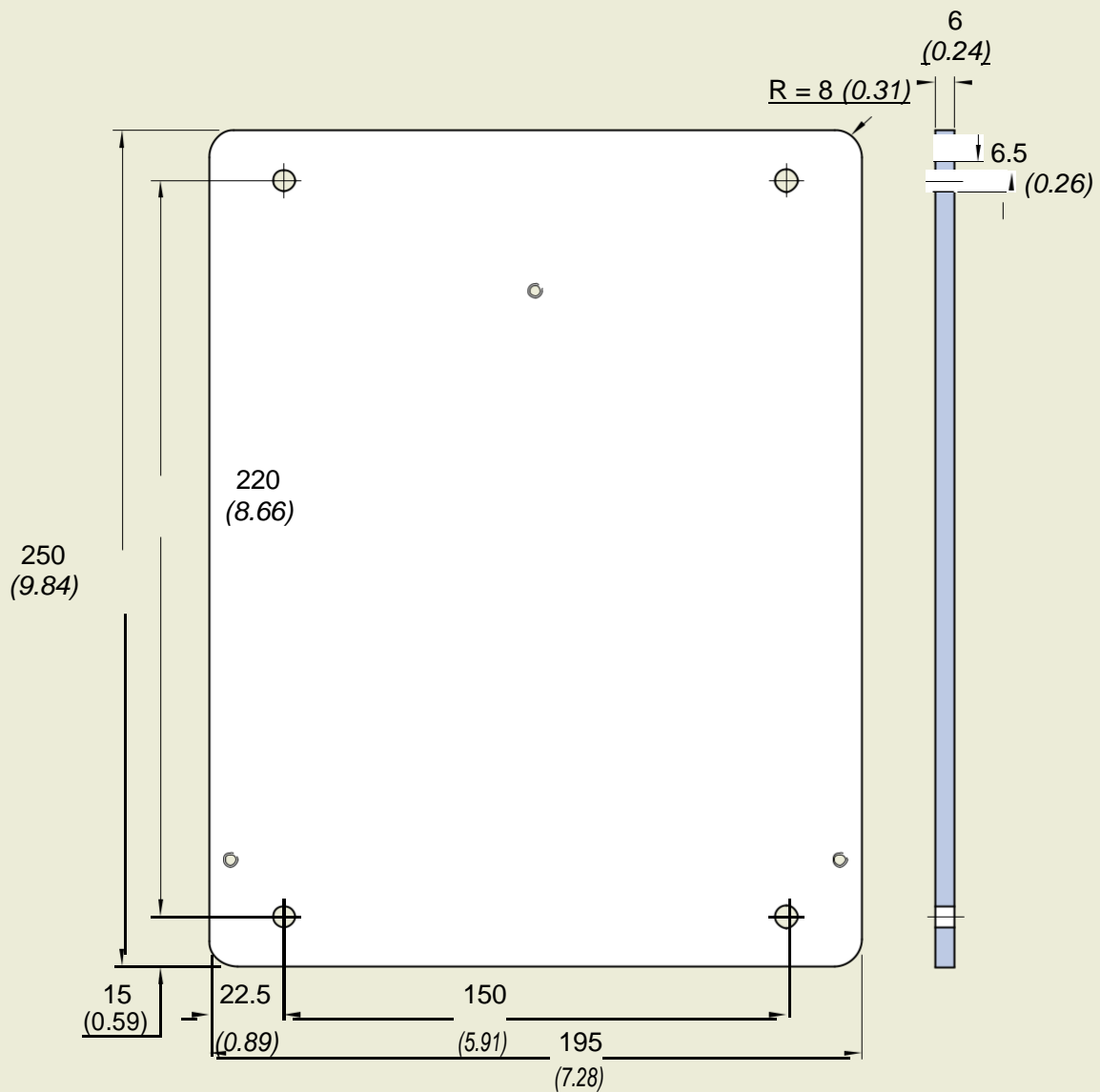
## Accessories for SKF Enlight Collect Gateway

CMAC 6600-NETCBL-1M	Ethernet cable (1 m)
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The SKF Enlight Collect Manager app for Android devices is available from the Google Play store. This app provides features to commission and manage the SKF Enlight Collect IMx-1 system.

# SKF Enlight Collect Gateway – Mounting dimensions

The SKF Enlight Collect Gateway, excluding mounting plate, has overall dimensions of 220 mm high, 220 mm wide and 50.5 mm deep. It is supplied fitted to the mounting plate shown below. This mounting plate has overall dimensions of 195 mm wide, 250 mm high and is 6 mm thick. It provides for a 4-point mounting and has four 6.5 mm clearance for M6, holes on a 150 mm by 220 mm pitch.



Primary scale is shown in mm.



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**PUB SR/P2 18647 EN** · March 2020