Schaeffler OPTIME

What is OPTIME and how does it work?
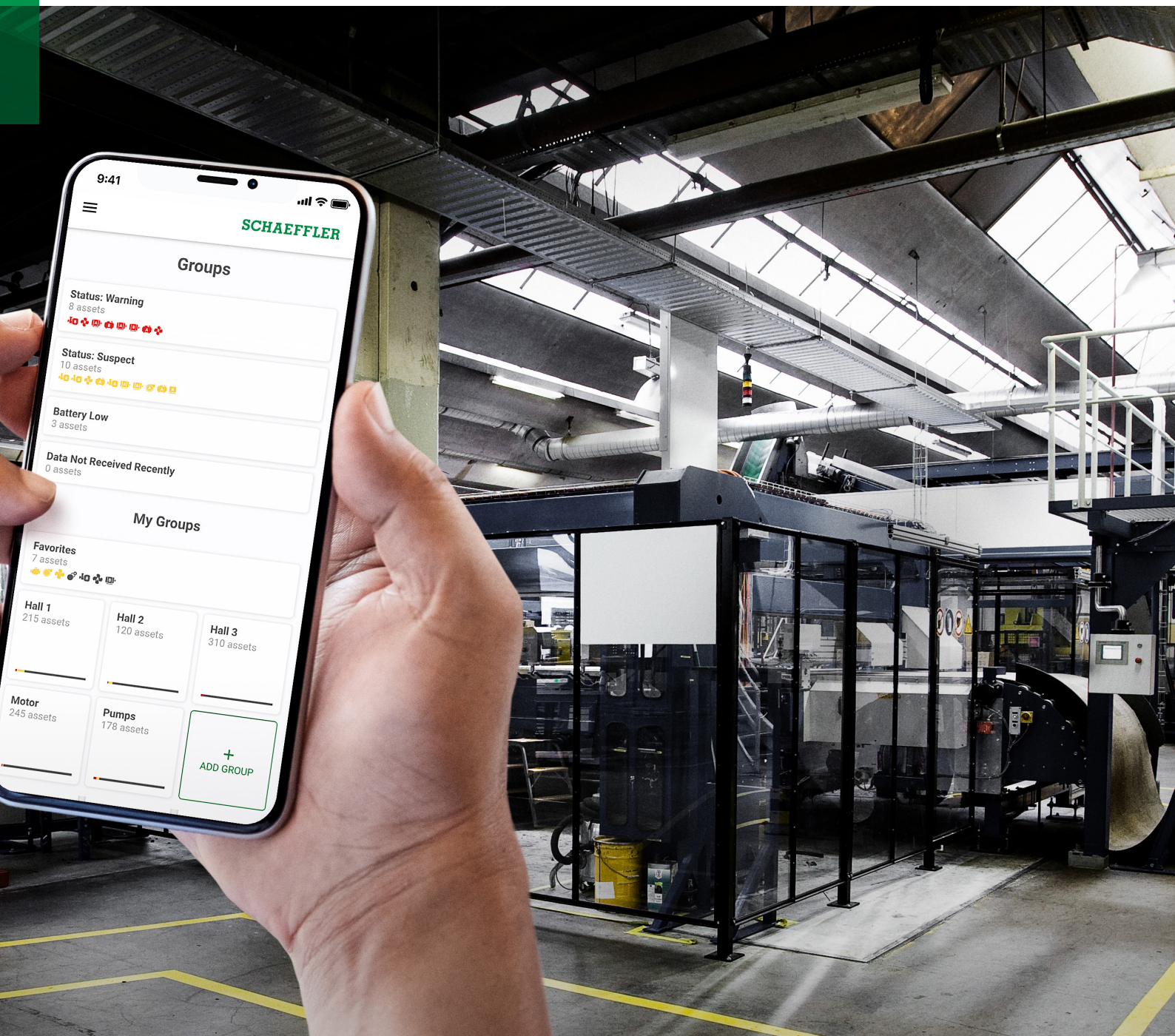
Table of contents
Condition Monitoring Solution

Schaeffler OPTIME

Seamless Monitoring at lowest Cost

What is Schaeffler OPTIME?

Schaeffler OPTIME is an easily scalable Condition Monitoring solution, developed for various purposes in industry, recommended for a range of rotating machines with a speed of 120 rpm*-5000 rpm.

During the development of the system, special attention was paid to the very simple commissioning, problem-free expansion and versatile use of the solution. The effort for the user was kept as low as possible for each individual process step.
These features make Schaeffler OPTIME particularly suitable for condition-based-monitoring of a large number of machines.
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Benefits of Schaeffler OPTIME

- Cost-efficient monitoring.
- Monitoring hundreds of rotating machines for just a few cents per day – up to 50 percent cheaper than manual monitoring with handheld measurement devices.
- Quick to install.
- Installing the sensors and setting up the app takes just a few minutes – no previous knowledge is necessary.
- Use expert knowledge.
- Digital Service provides professional diagnoses based on expert algorithms and machine learning, available 24/7 via app – so you always make the right decision.
- For beginners and advanced users.
- Easy handling, offers decisive information and extensive extensions suitable for different users and needs.

* application-specific

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Solution Components

1. Sensors
The battery-operated sensors can be mounted quickly and easily on the machines and record vibration and temperature data of the monitored unit. The wireless mesh network enables automatic data exchange between all connected units.

2. Gateway
The gateway receives the data sent by the sensors and transmits it to the cloud.

3. Digital Service
In the cloud, continuous, automatic analyses are carried out and early warnings are sent out in case of beginning and imminent failures.
The results are based on algorithms derived from Schaeffler rolling bearing knowledge and condition monitoring expertise as well as machine learning.

All results are available in an easy-to-use smartphone app and a web-based dash-board. The functions are tailored to the needs of the users and their individual work processes.
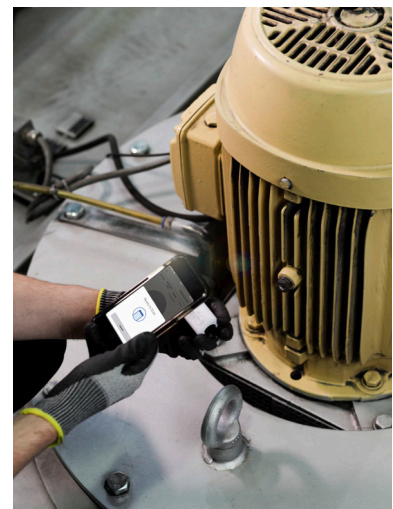
Activate and integrate the sensor using the Schaeffler OPTIME App.

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Digital Service

OPTIME Digital Service is a cloud-based solution and can be used via mobile App and web applications for desktop browsers, e.g. in control rooms or at the workplace.

OPTIME Digital Service, made available to the customer after subscription to the service and purchase of the OPTIME Solution hardware components, by creating a dedicated customer area within the Schaeffler Cloud. The OPTIME installation is managed via the mobile application or the OPTIME Dashboard. The digital service consists of mandatory and optional service components.

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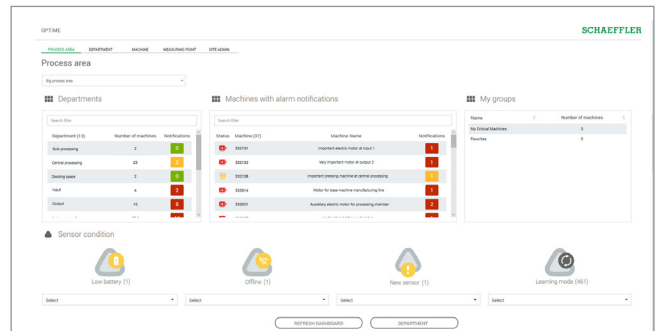
Dashboard

Obligatory service components

Digital Service Tenant with monthly fee
The Digital Service Tenant consists of:
- Provision and access to your own customer area in the Schaeffler Cloud
- User access and management
- Commissioning and activation of sensors and gateways via the mobile App
- Hardware allocation, including the creation of plants and machines, and corresponding groups
- Access to mobile and web applications for desktop browsers

Digital Service Analytics with monthly fee
- Vibration-based automated condition assessment of monitored machines, using algorithm-based automated diagnostics
- Display of alarms and failure causes
- Fees are only charged for active sensors. A sensor is active as soon as the Schaeffler Cloud receives measurement data from the sensor.
- Gateway SIM data costs are included in the monthly fee.

Optional service components

Digital Service REST API usage, with monthly fee, consisting of:
- Access to REST API to retrieve data from the Schaeffler cloud into the customer system

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Mobile Application

The OPTIME app can be downloaded from the Apple App Store and Google Play. The app shows the real machine status according to criticality, thus allowing optimal planning of maintenance activities. You can organize your machine park individually and easily with the help of the group-, machine- and sensor management.
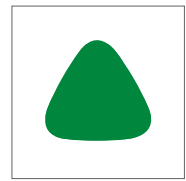

OPTIME App

Group management

Alarm-based groups are preset in the group management initial screen:

- Alarm status
  - *Severe: Machine show advanced damage. These machines should be inspected and repaired if necessary.*
  - *Warning: Inspect machine and schedule repair work for the next regular maintenance interval.*
  - *Suspect: Observe; no immediate reaction required.*
- Battery status: Sensors with low battery.
- Reception status: Sensors which are offline and have not transmitted any data in the last 24 hours.
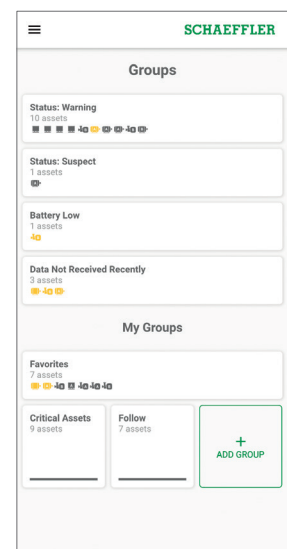
Group management

My groups

Below the alarm-based groups are the user-defined groups that can be created individually.

Examples

- Local conditions (location, buildings)
- Structures relevant to production (segments, product lines, production units)
- Machine types (motors, fans, pumps)

# Schaeffler OPTIME
Mobile Application

Group views

Within a group all assigned machines can be found. There is the list view and the tile view.

List view
The color-coded alarm status of the machine, the status diagram with alarm level and possible open alarm notifications are displayed.
Tile view
In addition to the list view, an extended overview of alarm notifications and the status of the machine's sensors are displayed.
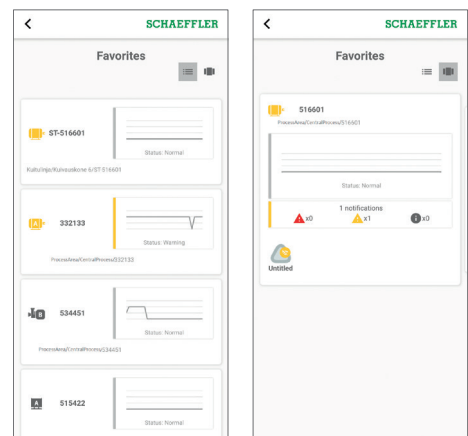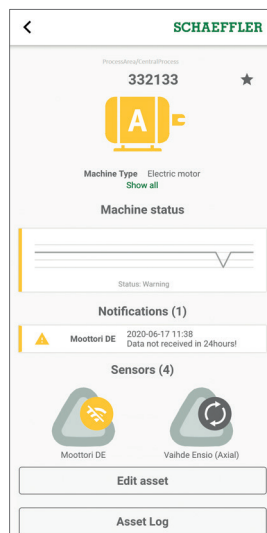

List view

Tile view

Machine management

If you select a machine within the group, you can access the machine management. The machine management shows a machine and related information such as the status, active alarm notifications and the sensors connected to the machine.
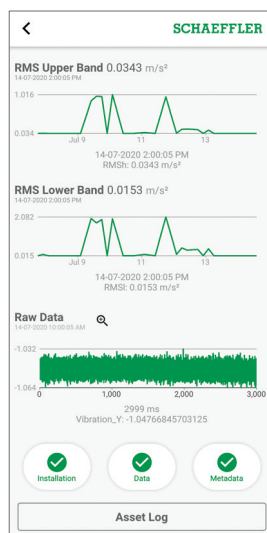

Machine management

Functions
- Tracking the machine status
- Acknowledge alarm notifications
- Edit machines
- Edit and view machine log
- Navigation to the subordinate sensors
- Add a new sensor

Sensor management

The selection of a sensor leads to the sensor management. The sensor management shows active alarm notifications, KPIs and raw data related to the sensor.
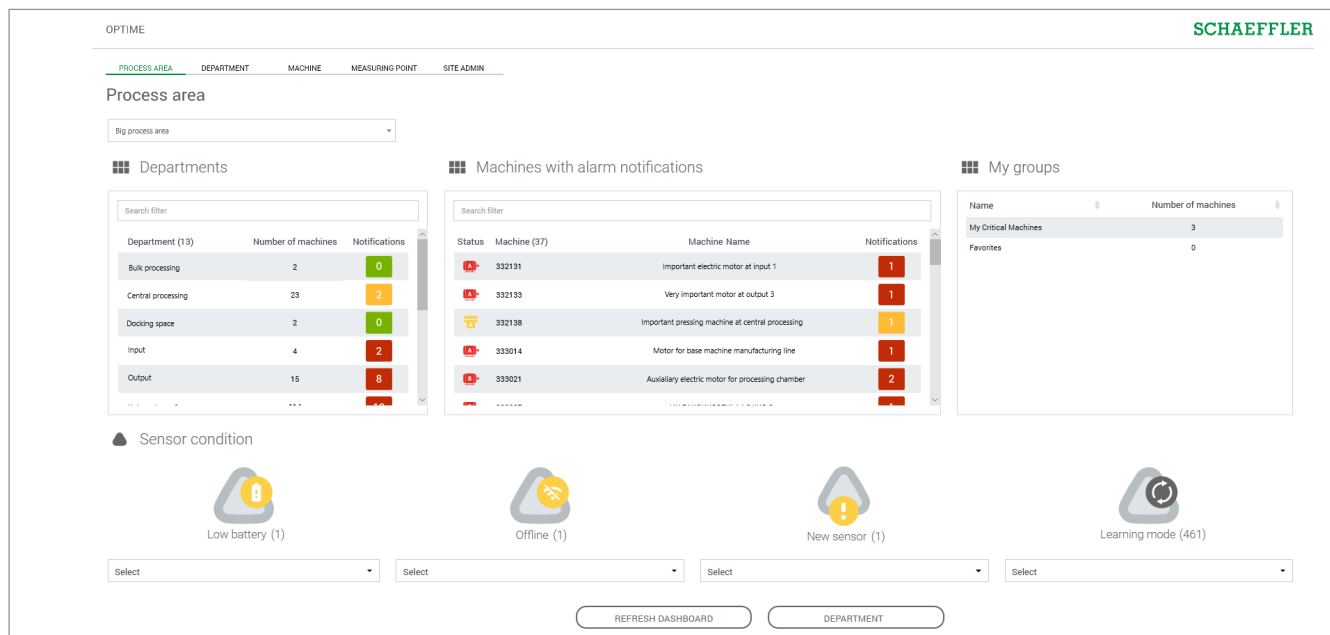

Sensor management

Functions
- Acknowledge alarm notifications
- View KPIs
- View raw data
- Edit sensor
- Request new KPIs and raw data
- Edit machine log

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Web-based Dashboard

The OPTIME dashboard is the central user interface for use in control rooms where KPIs and alarm notifications for plant condition monitoring can be controlled.

Functions

- Track machine status
- Active monitoring of machines and their KPIs
- Display of alarm notifications based on learned KPI limits as an indication of possible machine defects
- Confirmation of alarm notifications
- Display and generation of log entries for machines
- Display of KPI data and raw sensor data

Functions exclusively for administrators

- User administration
  - *Add, edit and delete users and profiles*
  - *Send notifications to users*
- Management of the installations
  - *Add, move and delete gateways and sensors*

Browser
- Google Chrome
- Microsoft Edge
- Mozilla Firefox
- Safari
- Microsoft Internet Explorer

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Applications

The OPTIME system is suitable for machines that are operated continuously or partially continuously. Furthermore, the machine should normally run in a stable operating condition (speed and power) for a period of about one hour. With OPTIME-AW3 sensors machine speeds from 120 rpm* to 3000 rpm, with OPTIME-AW5 sensors up to 5000 rpm are recommended. When selecting the suitable combination of machine and sensor, some factors must be considered, see table.

Typical combinations of machines and sensors

Application	Characteristic	Sensor	Number	Mounting location
Electric motor	‹ 0,5 m	OPTIME 3	1	• Bearing position on the drive side of the motor • Central on the engine • In the middle at the foot of the motor
Electric motor	› 0,5 m	OPTIME 3	2	• Drive side and non-drive side of the motor • Foot from drive side and non-drive side of the motor
Fan	overhang	OPTIME 3	1	• Plummer block housing
Fan	between the bearing	OPTIME 3	2	• Plummer block housing
Fan	directly coupled	OPTIME 3	1	• Drive side of the motor
Compressor	–	OPTIME 5	2	• Bearing location
Pillow block	–	OPTIME 3	1	• Bearing location
Pump	–	OPTIME 5	2	• Bearing location
Gear motor	‹ 0,5 m	OPTIME 5	1	• Bearing location
Gear motor	› 0,5 m	OPTIME 3	1	• Motor
Gear motor	› 0,5 m	OPTIME 5	1	• Gearbox
Extruder	–	OPTIME 3	2	• Bearing location
Calander	–	OPTIME 3	2	• Bearing location
Belt drive	–	OPTIME 3	2	• Bearing location
Saw	–	OPTIME 5	1	• Bearing position of the saw blade
Shaft	–	OPTIME 3	1	• Bearing housing
Gearbox	–	OPTIME 5	2	• Input and output

* application-specific

Schaeffler OPTIME
Product Specification

| OPTIME sensors	OPTIME-3	OPTIME-5
Vibration bandwidth	10 Hz − 3 kHz	10 Hz − 5 kHz
Amplitude range	±2/±4/±8/±16 g	±2/±4/±8/±16 g
Temperature trend measurement	−40°C to +85°C	−40°C to +85°C
Calculated KPIs	RMS_{Low}, $Kurtosis_{Low}$, $ISO_{VELOCITY}$, RMS_{High}, $Kurtosis_{High}$, DeMod, Temperature	RMS_{Low}, $Kurtosis_{Low}$, $ISO_{VELOCITY}$, RMS_{High}, $Kurtosis_{High}$, DeMod, Temperature
Measurement cycle	KPIs: every 4 h Time waveform: every 24 h	KPIs: every 4 h Time waveform: every 24 h
Typical target applications	Motors, generators, fans, pillow block bearings, up to 3.000 rpm	Pumps, geared motors and small gearboxes, compressors, HVACs etc., up to 5.000 rpm
Sensor commissioning	NFC (Near Field Communication)	NFC (Near Field Communication)
Communication	Wirepas Mesh (2.4GHz ISM Band)	Wirepas Mesh (2.4GHz ISM Band)
Sensor transmission range (line of sight)	up to 100 m	up to 100 m
Power supply	Non-replaceable Li-SOCl$_2$ battery	Non-replaceable Li-SOCl$_2$ battery
Typical battery life	up to 5 years (depending on configuration)	up to 5 years (depending on configuration)
Operating temperature range	-40° to +85°C	-40° to +85°C
Recommended storage temperature (for optimum battery life)	0° to 30°C	0° to 30°C
Ingress protection	IP 69K	IP 69K
Materials	Mounting base: steel AISI 316, housing: thermoplastics	Mounting base: steel AISI 316, housing: thermoplastics
Mounting	Single Bolt Mounting (M6) (Adapters available)	Single Bolt Mounting (M6) (Adapters available)
Dimensions	Please see drawings	
Certifications	Europe: CE (Radio Equipment Directive 2014/53/EU) for further countries please see manual)	
Hazardous Area Classification	Zone 1 (in planning)	Zone 1 (in planning)

OPTIME Gateway

Sensor communication	Wirepas Mesh (2.4GHz ISM Band)
Communication to Schaeffler IoT Hub	2G, LTE CAT M1 (default) Wi-Fi 2.4GHz, Ethernet RJ45
SIM card format	Micro-SIM (3FF)
Ingress Protection	IP 66/67
Temperature range	-20°C to 50°C (operation), -40°C to 85°C (storage)
Power supply	Voltage Range 85-264VAC, 47-440Hz, Power Consumption 30VA max.
Dimensions	Please see drawings
Certifications	Europe: CE (Radio Equipment Directive 2014/53/EU), for further countries please see manual

Schaeffler OPTIME

Product Specification
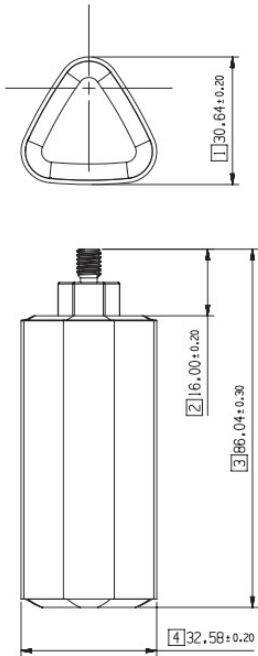
Dimensions of OPTIME Sensor

Installing OPTIME
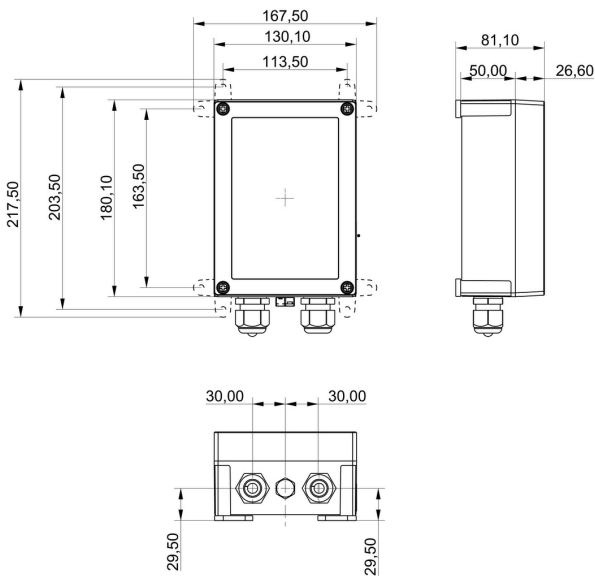
Dimensions OPTIME Gateway

OPTIME in action