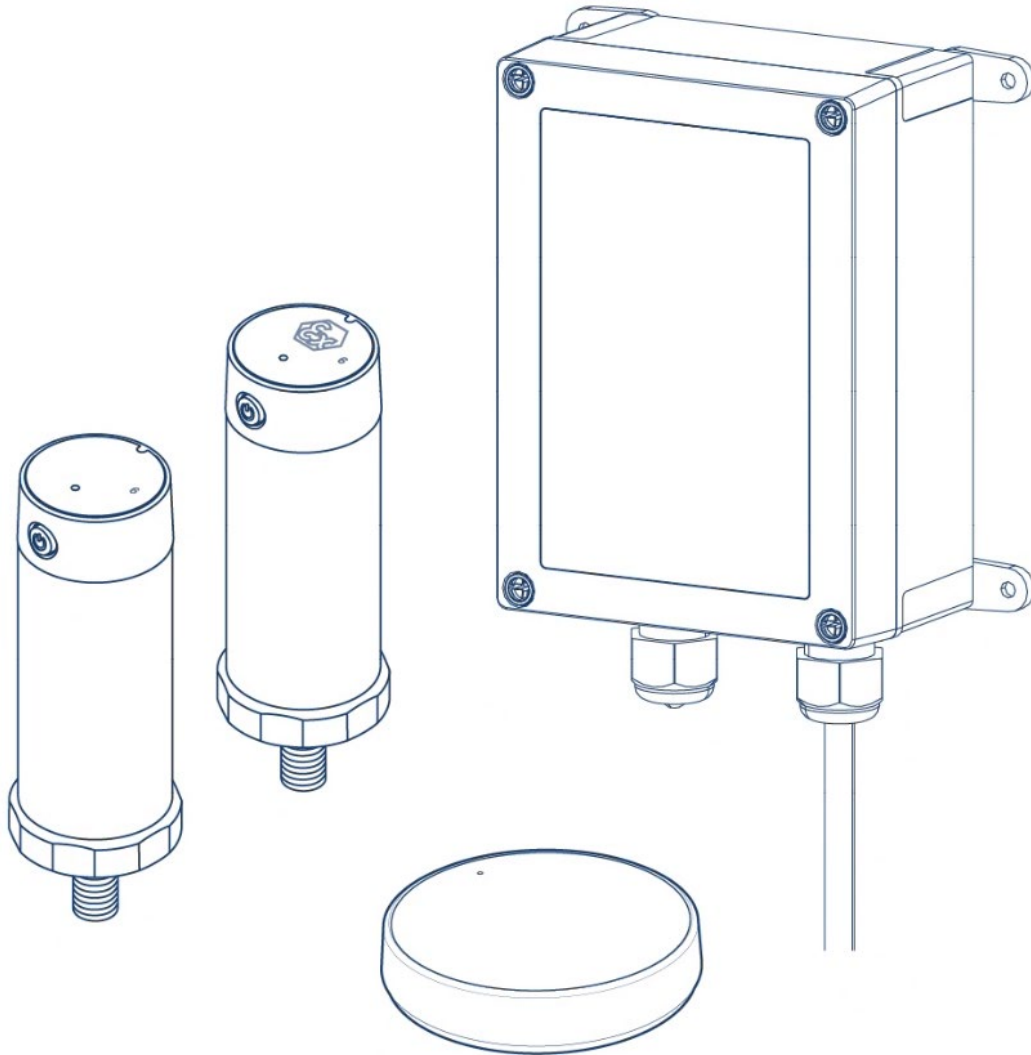**Brüel & Kjær Vibro**

A member of the NSK Group

Instructions

BKV Wireless Sensor Solution

BKV Collect Wireless Sensor / BKV Connect Gateway

CE

Keep it accessible for future reference

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Table of Contents

1   System Overview

1.1   BKV Wireless Sensor Solution

1.1.1   General

The BKV Wireless Sensor Solution offers the following advantages:

- Monitoring the condition (tri-axial vibration, surface temperature data) of machines in large industrial facilities
- Acquiring data with wireless sensors
- Exchanging data by a mesh network with gateways and processing, storing, and sending the data to local or cloud backends
- Wireless bridging of long distances (up to 100 m (328 ft) in a free line of sight)
- Collecting data from hard-to-reach machines
- Providing Ex- certified sensors to be used in potentially explosive atmospheres
- Providing gateways in a protective enclosure to be used in outdoor or industrial environments that require a higher degree of water and dust protection
- Setting up the system with a mobile setup application

As a high density of connected devices is required, a mesh network is the perfect solution for connectivity.
In the mesh network, individual sensors transmit their own measurement data while acting as routing sensors that relay data from other sensors. Routing sensors in a mesh network provide the most efficient communication path from all sensors to the gateway and back.
The mesh network provides the best and most efficient communication path to a gateway.

Also refer to 3.2 General Workflow.
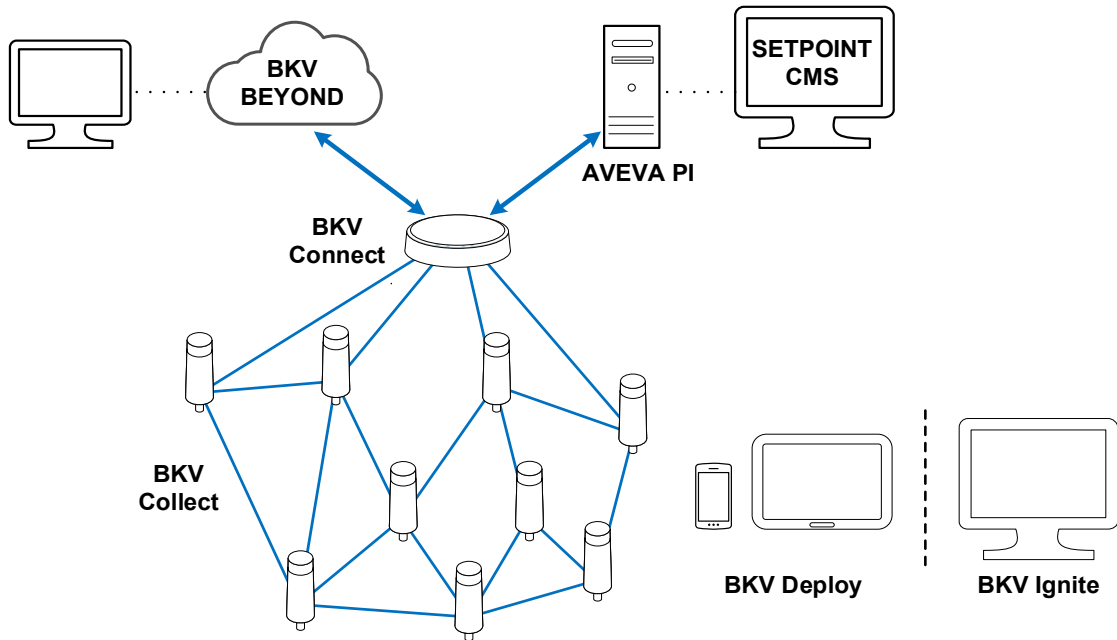
Figure 1-1) System overview

1.1.2 Terms Used in the Instructions

In the instructions, the following terms are used synonymously:

BKV term	Description
BKV Wireless Sensor Solution	Brüel & Kjær Vibro GmbH system with BKV Collect wireless sensors and BKV Connect gateways
BKV Collect 6	Wireless sensor - (Treon Industrial Node 6)
BKV Collect 6 Ex	Wireless sensor for hazardous areas (Ex-certified variant) - (Treon Industrial Node 6 Ex)
BKV Connect 1	Gateway - (Treon Gateway)
BKV Connect 2	Gateway in protective enclosure - (Treon Gateway in Protective Enclosure)
BKV Ignite	Pre-configuration tool
BKV Deploy	Installation and commissioning App for Android and iOS
BKV Beyond	SaaS based predictive maintenance solution empowered by AI
Setpoint CMS	SETPOINT Condition Monitoring Software based on AVEVA PI
AVEVA PI	Database for the OnPremise solution Setpoint CMS

Table 1-1) Terms used in the instructions

1.1.3 Definition of a Site

- A **Site** can consist of several **Areas**.
- Each **Area** can contain multiple **Assets**.
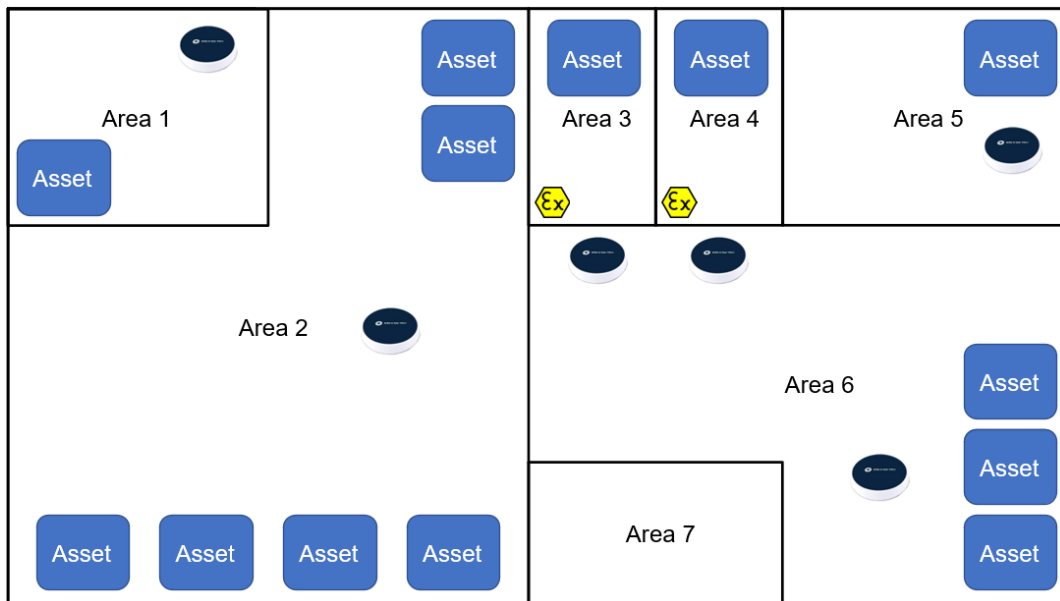
Figure 1-2) Definition of a site

1.1.4 Definition of an Asset

- An **Asset** can consist of several **Components** (for example, **1**, **2**)
- Each **Component** can be equipped with several **Measuring Points** (**MP**).
- Each **Measuring Point** represents a sensor.
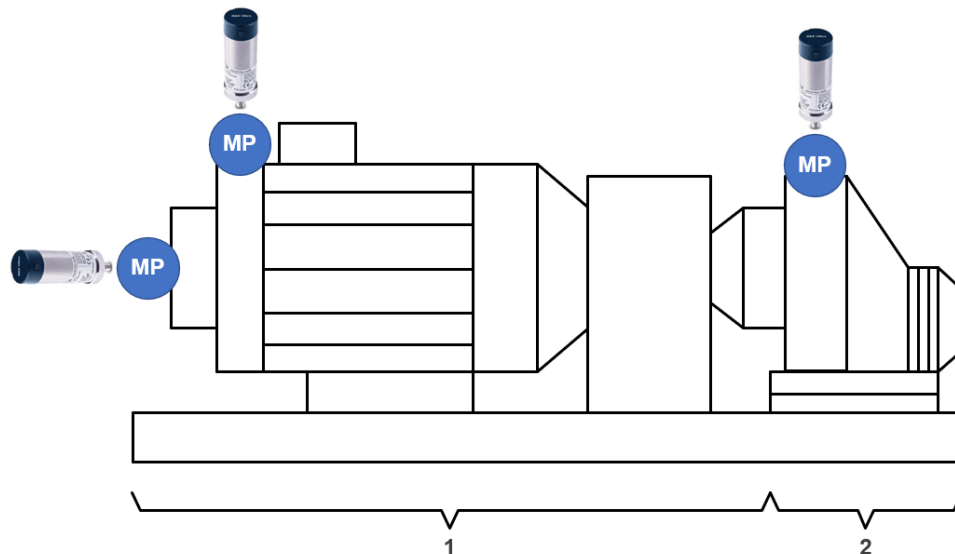
Figure 1-3) Definition of an asset

1.1.5 Gateway

A gateway connects a mesh network of a few to several dozens of wireless devices to a backend. The gateway exchanges data with the mesh network and can process, store, and send data to local or cloud backends.

One gateway can connect up to 14 sensors directly and up to several dozen via a mesh network.

Depending on the data amount transmitted from the sensors to the gateway, it is a good practice to use a second gateway at the latest when more than 20-25 sensors are connected. This ensures that all data flows from the sensors to your backend without interruption.

The gateway can be connected over a wired Ethernet connection or wirelessly over a Wi-Fi or cellular connection (LTE Cat M1 or 2G).

The gateway is also available in a protective enclosure that can be use in outdoor or industrial environments that require a higher degree of water and dust protection.

1.1.6 Wireless Sensors

The sensors are wireless battery-operated sensor devices for condition monitoring and predictive maintenance.
They measure tri-axial vibration and surface temperature of rotating equipment, such as pumps, motors, and compressors. Abnormal machine vibrations or high temperatures can be early signs of failure due component imbalance, misalignment, wear, or improper use of equipment use.

The sensors operate in a mesh network and transmit sensor data directly or via other sensors to a gateway. Typically, the data is sent from the gateway to a backend (BKV Beyond or Setpoint CMS based on AVEVA PI) for storage and further analysis.

As soon as the sensors are switched on, they automatically start measuring and transmitting data at pre-configured intervals. Depending on configuration, the sensors can send raw vibration data and/or pre-calculated values such as RMS velocity, Fast Fourier Transform (FFT), Crest factor and many more via the gateway.

The sensors within the mesh network self-arrange into the best possible data routing configuration based on the signal strength between sensors.

The maximum distance between the gateways and the sensors, as well as between the sensors, can vary from less than 10 m (32.8 ft) to up to more than 50 m (164 ft), depending on the individual operational environment area.

The **Ex-certified** sensors are designed for vibration and temperature monitoring of rotating equipment in potentially explosive atmospheres.

1.1.7 Software

1.1.7.1 Pre-Configuration Tool (BKV Ignite)

Within the BKV Ignite pre-configuration tool (https://ignite.bkvbeyond.com) you will be able to:

- Set up your sites and areas
- Set up your assets and components
- Set up your monitoring devices (gateways, sensors, etc.)
- Configure your monitoring strategy (measurement locations, measurements, etc.)
- Create the installation project (including users) that can be downloaded to the BKV Deploy installation and commissioning app

Refer to 5 Pre-Configuration Tool (BKV Ignite).

1.1.7.2 Installation and Commissioning App (BKV Deploy)

Within the BKV Deploy installation and commissioning app you will be able to get guidance on how to set up, install and commission the sensors, the gateways and the connection to either BKV Beyond or Setpoint CMS based on Aveva Pi.

QR code Google Play Store (Android)	QR code Apple App Store (iOS)

Table 1-2) QR codes (Google Play Store / Apple App Store)

Refer to 6 Installation and Commissioning App (BKV Deploy)

1.1.7.3 SETPOINT Condition Monitoring Software based on AVEVA PI

A comprehensive online condition monitoring software solution for critical and non-critical machinery. It is designed for use in the hydrocarbon processing, petrochemical, power generation and other industries. Setpoint CMS provides powerful visualization tools for analysis and diagnostics of rotating and reciprocating machinery.

Refer to the SETPOINT Condition Monitoring Software, Installation and Operations Manual.

2 Safety

2.1 Disclaimer

Observing these instructions is a basic requirement for the proper and safe operation of the product. We accept no liability for personal injury, damage to property or financial loss caused by failure to observe this technical documentation. In such cases, any liability for material defects is excluded.

i	**NOTE!** These instructions are part of the product. Read the instructions carefully before using the product and keep it accessible for future use.

The latest electronic version (PDF) of these instructions is available from: https://www.bkvibro.com

2.2 Safety Symbols and Signal Words

⚠	**DANGER!** This symbol and signal word warn of hazardous situations, which, if not avoided, **will result** in death or serious injury.

⚠	**WARNING!** This symbol and signal word warn warns of hazardous situations, which, if not avoided, **could result** in death or serious injury.

⚠	**CAUTION!** This symbol and signal word warn of hazardous situations, which, if not avoided, **could result** in minor or moderate injury or damage to product.

⚠	**NOTICE!** This symbol and signal word indicate a situation or practice that requires attention but does not directly result in personal injury if ignored.

i	**NOTE!** This symbol and signal word indicate general and useful information for using the product.

2.3 Intended Use

The BKV Wireless Sensor Solution system is intended solely for measuring tri-axial vibration and surface temperature of rotating equipment, such as pumps, motors, and compressors.

- The gateways and sensors are designed for indoor industrial environment
- The gateway is also available in a protective enclosure that can be used in industrial environments that require a higher degree of water and dust protection. But it is not intended for continuous submersion
- The sensors in Ex-certified variant are certified for use in potentially explosive atmospheres

If gateways, sensors, and cables are used in a way not described in the relevant instructions, function and protection may be impaired and serious personal damage, death or serious, irreversible injuries may result.

- Exclusively use gateways, sensors and cables as specified in the instructions. Any use other than specified is considered inappropriate. Brüel & Kjær Vibro does not assume any liability for damages resulting from inappropriate use. The user is solely responsible
- Mounted gateways and sensors must not be used as steps
- Ensure that system is exposed only to admissible environmental influences specified in the Product Specifications and Ordering Information
- Maintain electrical equipment in regular intervals. Remedy defects, e.g., loose wires, defective connectors, immediately

Transport, storage, installation, assembly, connection, commissioning, maintenance and service must be undertaken exclusively by qualified technicians.
The following must strictly be observed:

- The latest version of the instructions a www.bkvibro.com
- Pictograms on the product
- Any product specific provisions and requirements
- All national and regional regulations for safety and accident prevention must be followed.

2.4 Unintended Use

- The BKV Wireless Sensor Solution system may be used only within the scope defined by the Product Specifications and Ordering Information

> ⚠️ **WARNING!**
> - The BKV Wireless Sensor Solution system does not provide machine protection
> - Do not use the BKV Wireless Sensor Solution system for safety-related functions

- Only the gateway in a protective enclosure can be used in industrial environments that require a higher degree of water and dust protection
- Only the **Ex-certified** sensors are allowed to be used in potentially explosive atmospheres

2.5 Risks and Hazards

⚠️ **WARNING!**

Failure to follow the safety instructions in these instructions could result in death, serious personal injury and/or property damage and may void warranty. Read this guide carefully before installing or using the device. Save the guide for future reference.

2.5.1 Explosion Hazards

2.5.1.1 Gateways and Sensors in Not-Ex-certified Variant

⚠️ **DANGER!**

The gateways and the sensors in **not- Ex-certified** variant are not intended for use in potentially explosive atmospheres. They must not be operated near flammable liquids or gases.

2.5.1.2 Sensors in Ex-certified Variant

The sensors in **Ex-certified v**ariant are certified for use in potentially explosive atmospheres.

However, the following requirements must be met:

⚠️ **DANGER!**

When installed, the sensors must be grounded to the machine.

Refer to 7.2.2.3 Mounting Ex-certified Sensors.

Treon disclaims all responsibility for work done by untrained and unauthorized personnel. All installation work must be performed by trained and authorized personnel.

⚠️ **DANGER!**

The personnel requirements for **Ex-certified** devices in potentially explosive atmospheres are:

- All personnel must be knowledgeable about the risks of electrical current and the chemical and physical properties of gases and/or vapors present in hazardous areas.
- The installation for **Ex-certified** devices must be made in conformity to the international or national standards (IEC/EN 60079-17 and IEC/EN 60079-14).

2.5.2 Electrical Hazards

⚠️ **WARNING!**

Any adjustment, maintenance, and repair of the open product under voltage must be avoided as far as possible and, if unavoidable, must be carried out only by trained service.

> ⚠️ **CAUTION!**
>
> Switch off all power to equipment before connecting or disconnecting their digital interface. Failure to do so could damage the equipment.

2.5.3 Safety Distance (Radio Frequency / Magnetic Fields)

> ⚠️ **WARNING!**
>
> Radio Frequency / Magnetic Fields
>
> - Due to radio frequency exposure limits, the gateway should be installed and operated with a minimum distance of 20 cm (7.87 in) between the device and the user´s body or nearby persons.
> - Due to the high-strength magnets of the sensors, a safety distance of 150 mm (5.9 in) from the surface of the magnetic mount adapter must be maintained.

2.5.4 Interference with Medical Devices

The device may emit radio waves that can interfere with the operation of nearby electronic devices, such as pacemakers, hearing aids, and defibrillators.

> ⚠️ **WARNING!**
>
> Interference with Medical Devices
>
> - If you have a pacemaker or other implanted medical device, do not use the device without first consulting your physician or the manufacturer of your medical device.
> - Keep a safe distance between the device and your medical devices and stop using the device if you experience persistent interference with your medical device.

2.5.5 Danger of Burns Due to Hot Surfaces

> ⚠️ **WARNING!**
>
> Hot Surfaces
> When mounted at external heat sources (e.g., machine parts), gateways, sensors and cables can adopt dangerous temperatures, whereby burning, among other things, can occur in the event of contact.

External heat sources (e.g., machine parts) can adopt dangerous temperatures. Burns can occur in the event of direct contact.

- Switch off the machine before installing the gateways, sensors and cables and wait until the machine has cooled down
- Avoid unprotected contact with hot surfaces

2.6 Limitations

2.6.1 Usage

The gateway in protective enclosure must not be used without the finger guard of the power cable connector. Removing the finger guard may result in electric shock. The protective guard can only be removed by an authorized electrician when gateway's power cable is unplugged from the wall outlet. Do not cover the device, otherwise it will not work properly.

2.6.2 Care and Maintenance

Handle your device with care. The following suggestions will help you keep your device operational.

- Do not open the device other than as described in the instructions
- Unauthorized modifications may damage the device and violate regulations governing radio devices
- Do not drop, knock, or shake the device. Rough handling may damage it
- Use only a soft, clean, and dry cloth to clean the surface of the device. Do not clean the device with solvents, toxic chemicals, or strong detergents, as they may damage your device and void the warranty
- Do not paint the device. Paint can prevent proper operation
- The sensor is dust and splash proof. However, it is not recommended to immerse it in water

2.6.3 Damage

Never put damaged devices into operation. Immediately report any damage.

If the device is damaged, contact Brüel & Kjær Vibro GmbH. Only qualified personnel are allowed to repair the devices.

2.6.4 Small Children

The device is not a toy. It may contain small parts. Keep them out of the reach of small children.

2.6.5 Handling the Lithium Batteries in the Sensors

The sensors are equipped with a 3.6V A lithium thionyl chloride (LI-SOCI2) bobbin cell primary battery. The battery is not replaceable. If the battery is empty, replace the sensor.

> **WARNING!**
> - Do not charge, short circuit, crush, dissemble, heat above 100 °C (212 °F), incinerate or expose the battery contents to water.
> - Hazardous substances in batteries may have detrimental effects on the environment and human health.
> - Dispose of the batteries in a professional way. Do not dispose batteries as unsorted municipal waste.
> - For info on your nearest recycling point, check with your local waste authority.

Also refer to 4.2 Transport and 4.3 Storage.

2.6.6 Warranty

The manufacturer shall assume liability for warranties in regard to operational security, reliability and performance only under the following conditions:

- Installation and commissioning must be carried out only by authorized and skilled personnel
- The system must be used in accordance with the information in the technical data sheets. The limits indicated in the technical data must not be exceeded under any circumstances
- Repair work and related activities on the system may only be carried out by the manufacturer

2.6.7 Warranty and Software License Agreement

By using BKV Connect gateways, you are agreeing to be bound by the terms of BKV Software License Agreement, unless you return the BKV Connect gateways as part of the return policy.

Refer to:

BKV Connect Software License Agreement
Brüel & Kjær Vibro GmbH, May 2023.

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2.7   User Qualification

Personnel must be trained according to IEC 60079-14. In addition, personnel must be aware of the general installation regulations for electrical equipment and the relevant national regulations regarding the construction of explosion-protected facilities. Ensure that all work in conjunction with our systems is performed by skilled, expert, and authorized workers (for ATEX systems according to EN 60079-14).
Installation and commissioning primarily concern work on electrical equipment. These works may be performed exclusively by electricians or workers instructed and supervised by an electrician in accordance with electrotechnical regulations/directives.

Also transport, storage, assembly, maintenance, and service must be undertaken exclusively by qualified technicians.
The following must strictly be observed:
- The latest version of the instructions at www.bkvibro.com
- Pictograms on the product
- Any product specific provisions and requirements
- All national and regional regulations for safety and accident prevention must be followed.

Also refer to 2.5.1.2 Sensors in **Ex-certified** Variant.

3 System Description

3.1 Structure

The system consists of several components:
- BKV Collect (wireless sensors)
- BKV Connect (gateways)
- BKV Deploy (installation and commissioning app)
- BKV Ignite (pre-configuration tool)
- BKV Beyond (SaaS based predictive maintenance solution empowered by AI)
- AVEVA PI (database for the OnPremise solution Setpoint CMS)
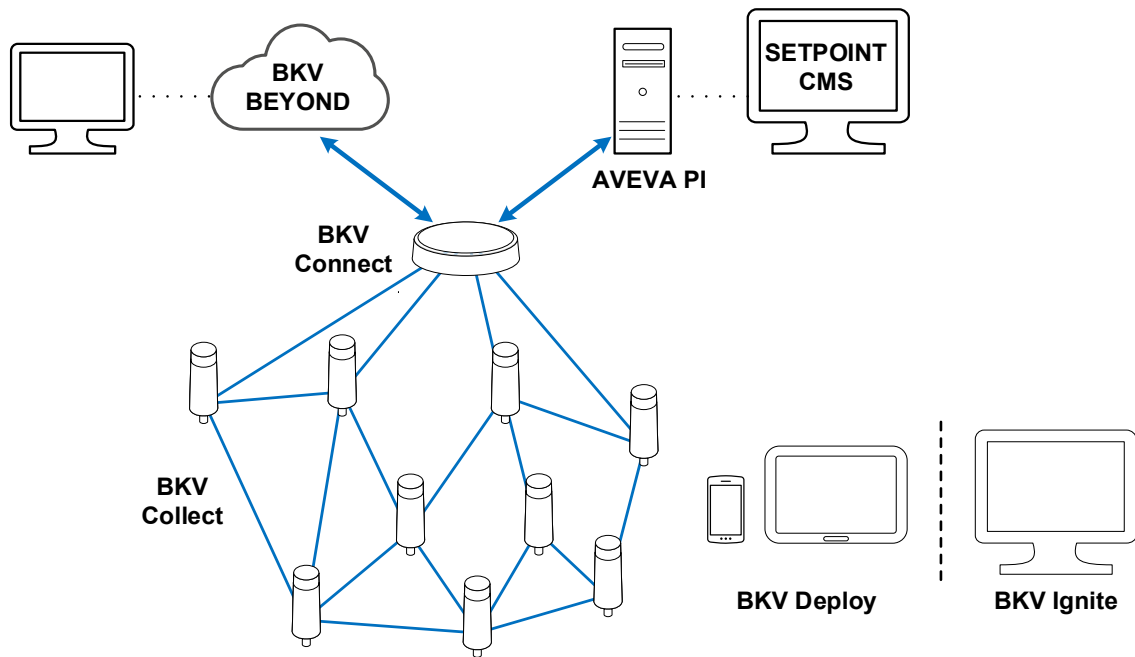- Setpoint CMS (SETPOINT Condition Monitoring Software based on AVEVA PI)

Figure 3-1) Structure

3.2   General Workflow

It is good practice to set up your BKV Wireless Sensor Solution system according to the following main steps:

- Getting an overview of the operational environment area
  - Look at the floor plans and local conditions.

- Specifying the placement of the sensors and the gateways
  Refer to:
  - 3.3 Planning the Mesh Network
  - 3.4 Positioning of the Gateway
  - 3.5 Positioning of the Sensors

- Pre-configuring your system
  Refer to:
  - 5 Pre-Configuration Tool (BKV Ignite)

- Mounting the gateways and sensors and installing and commissioning the gateways and sensors using your mobile device
  Refer to:
  - 6 Installation and Commissioning App (BKV Deploy)
  - 7 Mounting and Installation

- Viewing the data provided by the sensors
  Refer to:
  - 8 SETPOINT Condition Monitoring Software based on AVEVA PI

3.3   Planning the Mesh Network

3.3.1   Overview

It is important to plan the mesh network before the actual on-site installation.
The layout of the operational environment area defines where the individual sensors and gateways need to be placed.
Therefore, it is important to plan the entire mesh network layout before deployment so that all data from the sensors can be transmitted smoothly to the backend.

If you are planning a mesh network, you need at least the following information:

- Layout of the operational environment area
- Intended placement of the sensors and the gateways
- Connection type of the gateways (Ethernet, Wi-Fi, cellular connection) and restrictions of these within the operational environment area
- Type of collected data (scalar, FFT or raw data)

The gateways and sensors work based on a Wirepas mesh network.
This network builds up as soon as the gateways and the sensors are activated and forms the most efficient connection structure.

3.3.2 Basic Principles of a Mesh Network

- The sensors communicate via Wirepas, a low power network mesh technology
- In a mesh network, individual sensors transmit their own measurement data while acting as routing sensors that relay data from other sensors.
  Routing sensors in a mesh provide the most efficient communication path from all sensors to the gateway and back
- The mesh network does not have a fixed configuration. Instead, the way information is routed from the sensors to the gateway and back can change as the mesh network continues to maintain the ideal mesh network layout. If you have more than one gateway in your mesh network, the gateway to which a single sensor transmits data via intermediate sensors may also change
- All devices within the Wirepas network self-arrange into the best possible data routing configuration based on the signal strength between sensors
- If a device is down or communication is blocked for any other reason, the mesh network automatically rearranges itself and uses alternate routes to communicate with the gateway and sensors
- One gateway can connect up to 14 sensors directly and up to several dozen via a mesh network
- All sensors in the mesh network transmit data. Sensor collect data themselves and forward data for other sensors.
  You can also add sensors to your network that only work as routing sensors. They do not collect data and are placed to improve the layout of the mesh network and avoid structural obstacles

3.3.3 Placement of Devices and Optimal Layout

3.3.3.1 Installation Sequence of the Devices

Based on the operational environment area, you can determine the locations of the sensors. They must be installed in the places where they will collect data. From this starting point, you can plan where to place the gateways and sensors that only work as routing sensors.
For best performance, place the gateway so that as many sensors as possible are directly within its operating range. A gateway supports direct connection to up to 14 sensors. This way, the sensors closest to the gateway are not overloaded with routed data, and the network can automatically optimize data routes.

3.3.3.2 Operating Range of the Sensors

The maximum distance between the gateways and the sensors, as well as between the sensors, can vary from less than 10 m (32.8 ft) to up to more than 50 m (164 ft), depending on the individual operational environment area.
A free line of sight between the devices ensures a greater operating range and optimal conditions for data transmission.
Especially in an industrial environment, the conditions for data transmission may not be optimal and the operating range may be limited.
Thick walls and other large or metallic objects between the sensors and the gateways obstruct data transmission and should be avoided if possible.
Sensor to gateway (direct) maximum range depending on plant topology:
- Theoretical: 100 m (328 ft) with low complex data and infrequent data transmission
- Typical: 50-60 m (164-197 ft) with default monitoring settings
- Obstructions: < 10 m (< 32.8 ft) in case of obstructions (concrete walls, metal covers, etc.)

3.3.3.3 Short Routes

The data from each sensor should be able to reach the gateway by the shortest route.
The longer the routing chain, the more data is transferred through sensors closer to the gateway.
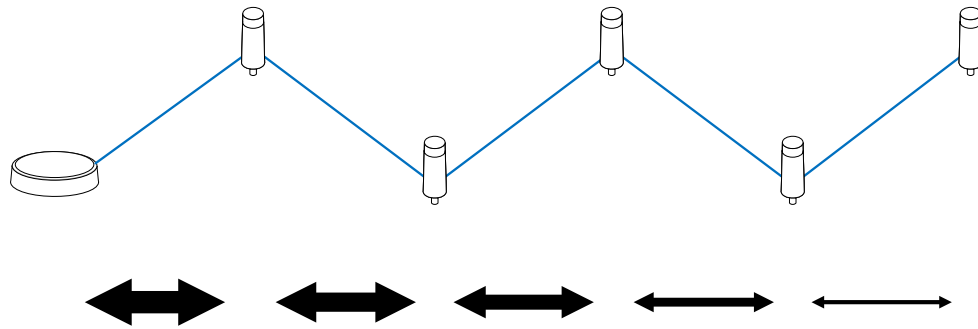This can lead to data congestion and high battery consumption.

Figure 3-2) Short routes

3.3.3.4 Gateway to Sensor Ratio

When designing the mesh layout, it is important to consider the number and the location of gateways in the operational environment area.

One gateway can connect up to 14 sensors directly and up to several dozen via a mesh network.

Depending on the data amount transmitted from the sensors to the gateway, it is a good practice to use a second gateway at the latest when more than 20-25 sensors are connected. This ensures that all data flows from the sensors to your backend without interruption.

> **i** **NOTE!**
>
> Avoiding long routing paths in your layout is an important aspect of mesh network design. Single sensors transmitting data for multiple other sensors can cause problems.

A large amount of data may overload the network, and you may not get all the data from all the sensors in the expected amount of time, or at all. Transmitting data for multiple other sensors also requires more power and results in lower battery life expectancy for the routing sensor.
If the planned layout could create such "super routing sensors" in the mesh network, you should add another gateway instead.

3.3.3.5 Gap Bridging

If the gateway and sensors are too far apart for efficient data transmission, place one or more routing sensors between them to transmit data from one sensor to the other.
Avoid layouts where one sensor routes traffic from multiple other sensors. This can happen if a group of sensors is located too far from the gateway or in a long row.
Optimally, the sensors should be able to send their data to the gateway via multiple routes, that is, each sensor should be within the operating range of several other sensors.

> **i**   **NOTE!**
>
> If you later add more sensors or gateways to your mesh network, the entire mesh network will reorganize itself. This process may take several hours. However, the sensors continue to work during this time.

You can also add sensors to your network that only work as routing sensors. They do not collect data and are placed only to forward data from other sensors.

Bridging gaps with long individual chains of routing sensors, even if only the data from one sensor is transmitted, should be avoided. Setting up an additional gateway near the sensor is an option.

Adding a gateway can help to minimize distances between individual sensors in a mesh network. It can also help to bypass structural issues that prevent sensors from communicating.

Thick walls and other large or metallic objects can obstruct data transmission and can be circumvented by installing an additional routing sensor to connect the sensor behind the obstacle to the mesh network.
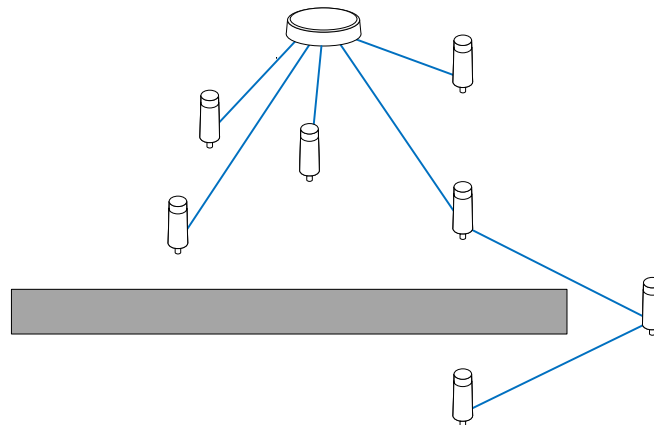
Figure 3-3) Gap bridging

When planning your mesh network, it is not always clear that you need gap bridging sensors. Depending on the individual three-dimensional layout in the operational environment area and depending on the surface and core materials of the structures, a signal may be reflected further than expected or blocked closer to another sensor than expected.
Often only the on-site deployment shows that a sensor cannot connect. Always be prepared to place additional gateways and routing sensors if that happens.

3.3.4   Impact of Routing Large Data on Mesh Network Performance

An important factor when designing the layout for a mesh network is the amount of data that will be transmitted through the mesh network to the gateway.

In general, we distinguish between the following data:

- Scalar data: Few data fragments generate little traffic in the mesh network
- Burst data: FFT and especially raw data generate thousands of data fragments that can potentially cause issues in the mesh network

If you want to route burst data, please consider:

- The more sensor measurements are triggered at the same time, the more data traffic is generated in the mesh network. Triggering measurements and sending raw data at different times can help to solve this
- If data from multiple sensors must pass through a single sensor, it is more likely that a data congestion will occur, and measurement data may be lost. The routes through the mesh network should be short, and sufficient endpoints in the form of gateways are required

3.4   Positioning of the Gateway

Also refer to 3.3 Planning the Mesh Network.

The following guidelines apply to the positioning of the gateways to ensure adequate data transmission:

- Mount and install the gateway in a central position in the area of the installed sensors so that as many sensors as possible are directly within its operating range. If possible, install the gateway above the sensors
- Make sure that there is a free line of sight from the gateway to as many sensors as possible
- Do not install the gateway at the end of a row of several sensors in succession
- Make sure that there are no thick walls and other large or metallic objects between the sensors and the gateways
- Do not install the gateway in a metal control cabinet
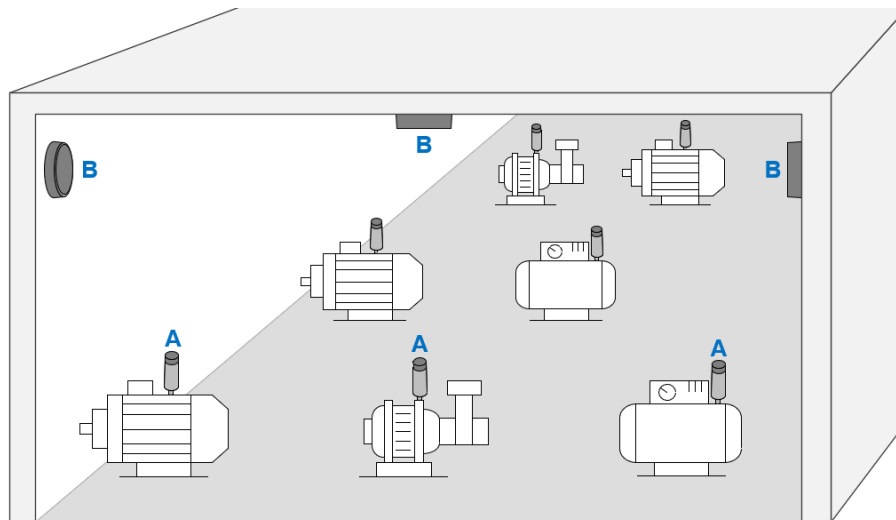
Figure 3-4) Example of installation positions

A. Sensors
B. Gateways

3.5   Positioning of the Sensors

Also refer to 3.3 Planning the Mesh Network and 7.2.2 Mounting the Sensors.

When mounting the sensors to a monitored equipment, it is important to consider the location of the sensor and the contact between the sensor and the machine. The best location to attach the sensor depends on the machine and the monitored vibration source.

For best measurement quality, the contact surface on the machine should be:
- Completely flat (within 0.03 mm (1 mil = 1/1000th inch))
- Smooth (surface texture no greater than Ra 0.8 (32 microinches))
- Larger than the base of the sensor.

The following guidelines apply to the positioning of the sensors to ensure adequate data acquisition:

- Aim to mount the sensor near the bearings of the machine, if possible, in perpendicular position. Alternatively, the sensor can be attached to a suitable flat surface on the motor housing or at the base of the motor
  Machine housing parts, such as cover plates, are not suitable as mounting locations.
- Make sure that the sensor is not shielded laterally by metal parts

4 Delivery, Transport and Storage

4.1 Delivery

Check the packaging for damage upon delivery and make sure that the contents are complete. Report any defects immediately as a complaint.

4.2 Transport

Also refer to 2.6.5 Handling the Lithium Batteries in the Sensors.

The sensors contain lithium thionyl chloride batteries (LI-SOCI2) and are therefore classified as dangerous goods during transport.

	WARNING!
⚠️	• Transport the sensors in accordance with the legal requirements • Do not send defective sensors by air freight • Deactivate the sensors during transport

	NOTICE!
⚠️	Handle the devices with care: • Protect the devices from shocks, dust and dirt during transport • Transport the devices in their original packaging • Transport the devices with covers attached

4.3 Storage

Also refer to 2.6.5 Handling the Lithium Batteries in the Sensors.

	WARNING!
⚠️	Deactivate the sensors during storage.

	NOTICE!
⚠️	Handle the devices with care: • Protect the devices from shocks, dust and dirt during storage • Store the devices in their original packaging • Store the devices with covers attached

The device storage temperature is +0 to +30 °C (+32 to +86 °F).

5 Pre-Configuration Tool (BKV Ignite)

Within the BKV Ignite pre-configuration tool (https://ignite.bkvbeyond.com) you will be able to:

- Set up your sites and areas (refer to 1.1.3 Definition of a Site)
- Set up your assets and components (refer to 1.1.4 Definition of an Asset)
- Set up your monitoring devices (gateways, sensors, etc.)
- Create the installation project (invite **Project Installers**) that can be downloaded to the BKV Deploy installation and commissioning app

5.1 General Steps to Create a Project

To create a project, the following steps must be performed:

- 5.3 Logging in to the Pre-Configuration Tool (BKV Ignite)
  https://ignite.bkvbeyond.com
- 5.4 Create New Site
- 5.5 Create New Monitoring Device (Gateway)
- 5.6 Add New Asset (Machine)
- 5.7 Add Component (of the Machine)
- 5.8 Add Measuring Point
- 5.9 Create Sensor
- 5.10 Create a New Project

5.2   Overview and Detail Pages
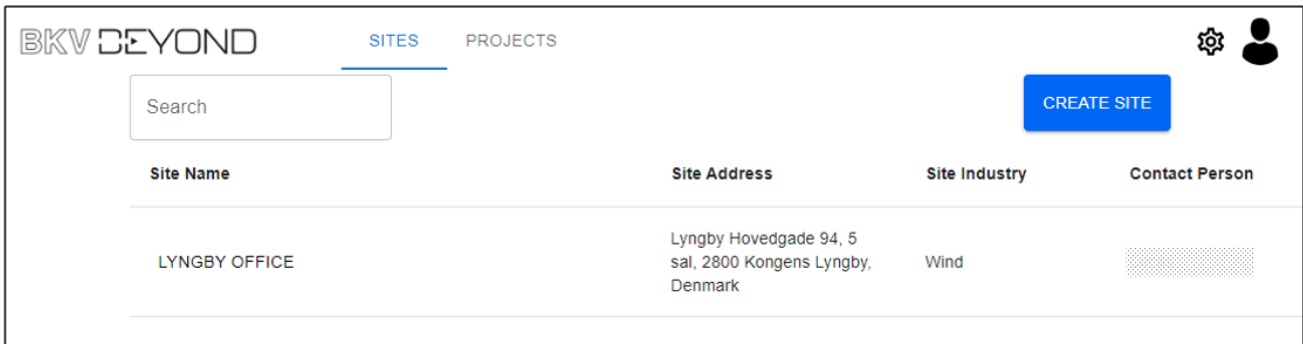
5.2.1   SITES Overview

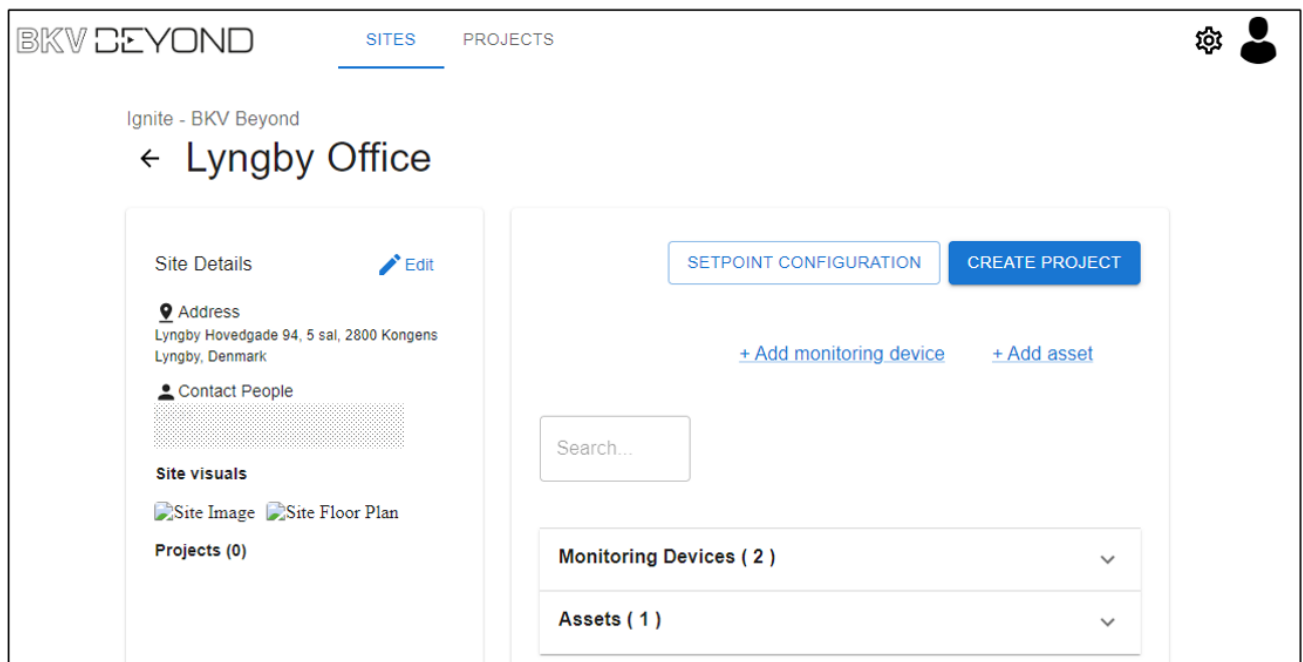**Figure 5-1)** SITES overview

5.2.2   Site Details

Figure 5-2) Site details

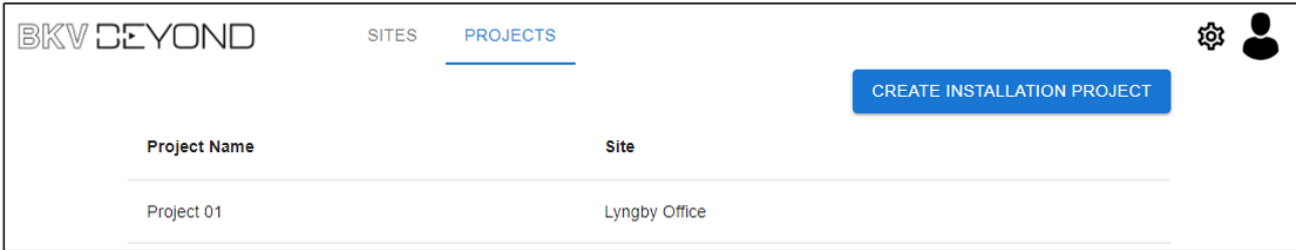### 5.2.3   PROJECTS Overview

Figure 5-3) PROJECTS overview
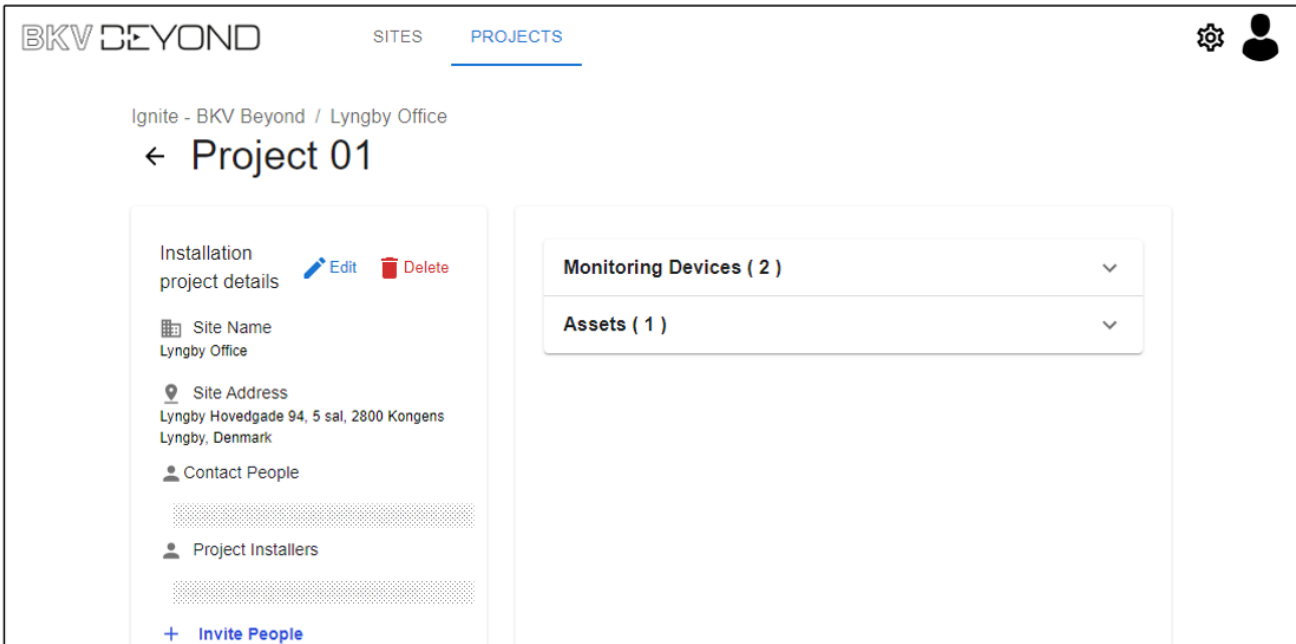
5.2.4   Project Details

Figure 5-4) Project details
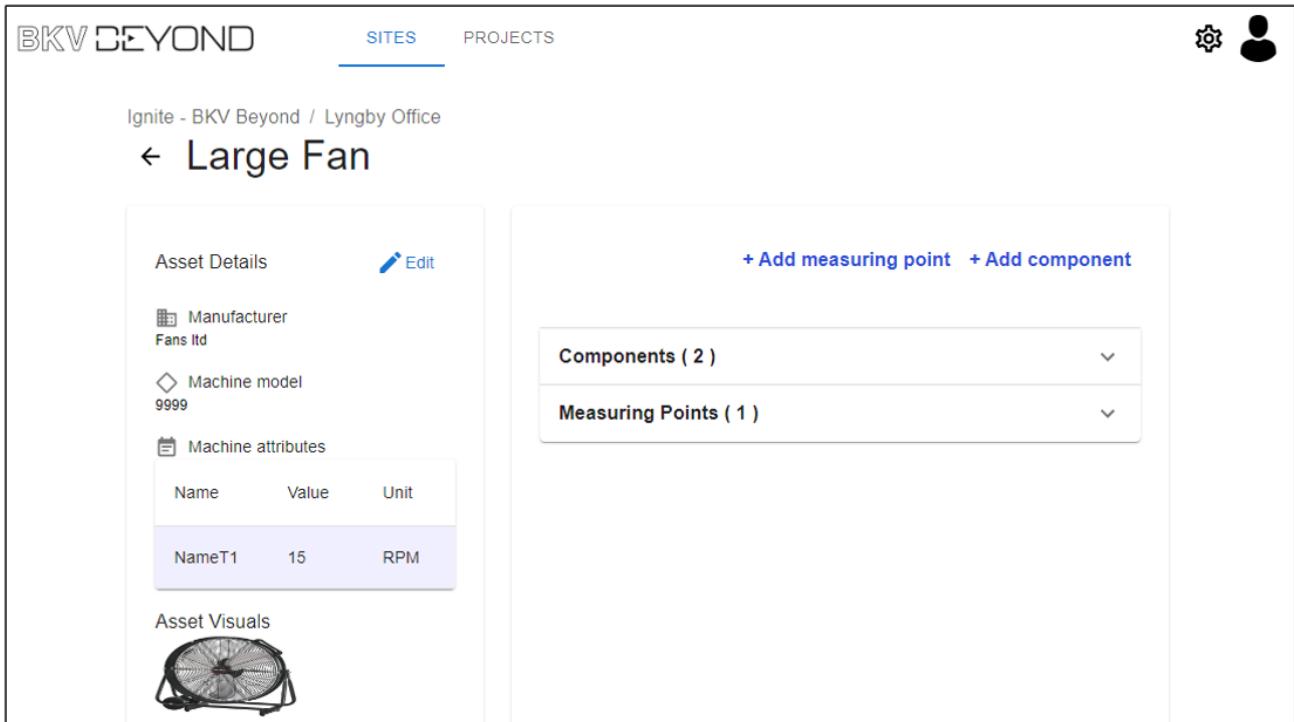
5.2.5   Asset Details

Figure 5-5) Asset details

5.2.6   Measuring Point Details

Figure 5-6) Measuring point details

5.3 Logging in to the Pre-Configuration Tool (BKV Ignite)

Log in to the BKV Ignite pre-configuration tool (https://ignite.bkvbeyond.com).
The login data is provided by the Brüel & Kjær Vibro GmbH.

After logging in, the **SITES** overview (5.2.1 SITES Overview) is displayed, which contains information about the already existing sites.

There you can create a new site (**CREATE SITE**).

5.4 Create New Site

A. **Site name**: Enter the name of your production site.
B. **Address**: Enter the address of your production site.
C. **Industry**: Enter your industrial division.
D. **Contact people**: Enter the name, phone number and email.
   You can also add additional contact persons (**+ Add contact person**).
E. **Site areas**: Create the areas of your production site. You can also add additional site areas (**+ Create area**).
F. **Site visuals**: Add a graphical representation of your production site.

Save your new production site. (**Cancel** will discard your edits).

Figure 5-7) Create new site

---

i	**NOTE!**
	It is mandatory to create at least one area for a new site.

After creating a new site, the **SITES** overview is displayed again. Click on the newly created site to display the **Site details** page (5.2.2 Site Details).

5.5 Create New Monitoring Device (Gateway)

On the **Site details** page (5.2.2 Site Details) click **Add monitoring device**.

A. **Monitoring Device Name**: Enter the name of the monitoring device.
B. **Monitoring Device Type**: Select the monitoring device type.
C. **Area**: Select the area where the monitoring device will be mounted.

Save your monitoring device. (**Cancel** will discard your edits).

Figure 5-8) Add monitoring device

After creating a new monitoring device, the **Site details** page is displayed again.

5.6   Add New Asset (Machine)

On the **Site details** page (5.2.2 Site Details), click **Add asset**.

A. **Machine name**: Enter the name of the machine.
B. **Machine details**: Enter the **Manufacturer**. Select an **Area** and a **Machine type**.
Enter the **Iso classification**, **Machine model** and **Serial number** of the machine.
C. **Machine attributes**: Enter **Name**, **Value** and **Unit** for the machine attributes. You can also add additional attributes (**+ Add new attribute**).
D. **Asset visuals**: Add a graphical representation of your machine.

Save your machine. (**Cancel** will discard your edits).

Figure 5-9) Add new asset (machine)

After adding a new asset, the **Site details** page is displayed again.

Select the newly created asset in the **Assets** list to add components or measuring points.

5.7   Add Component (of the Machine)

On the **Site details** page (5.2.2 Site Details), select the asset from the **Assets** list to which you want to add a component.

The **Asset details** page is displayed (5.2.5 Asset Details).

Click **Add component**.

A. **Component name**: Enter the name of the component (e.g., bearing, gearbox).

B. Enter the **Component manufacturer**. Select a **Component type**. Enter the **Component model** and the **Component serial number**.

C. **Component attributes**: Enter **Name**, **Value** and **Unit** for the component attributes. You can also add additional attributes (**+ Add new attribute**).

D. **Image**: Add a graphical representation of your component.

Save your component. (**Cancel** will discard your edits).

Figure 5-10) Add component

After adding a new component, the **Asset details** page is displayed again.

5.8 Add Measuring Point

On the **Site details** page (5.2.2 Site Details), select the asset from the **Assets** list to which you want to add a measuring point.

The **Asset details** page (5.2.5 Asset Details) is displayed.

Click **Add measuring point**.

A. **Measuring point location**: Enter the location of the measuring point.

B. **Installation warning**: Enter a **Warning message** about what to avoid when installing sensors.

C. Select the **Orientation** and the **Direction** of the measuring point.

D. **Monitored components**: Select the component to be monitored.

 Save your measuring point. (**Cancel** will discard your edits).

Figure 5-11) Add measuring point

---

i	**NOTE!**
	It is mandatory to create at least one sensor for a new measuring point.

After adding a new measuring point, the **Asset details** page is displayed again.

5.9 Create Sensor

On the **Asset details** (5.2.5 Asset Details) page, select the measuring point from the **Measuring points** list to which you want to add a sensor.

The **Measuring point details** page (5.2.6 Measuring Point Details) is displayed.

Click **Add sensor**.

A. **Sensor name**: Enter the name of the sensor.
B. **Sensor details**: Select the **Sensor category**, **Sensor model**, **Sensor type**, and the **Sensor profile**.

   Save your sensor. (**Cancel** will discard your edits).

Figure 5-12) Add sensor

After adding a new sensor, the **Measuring point details** page is displayed again.

5.10   Create a New Project

On the **Site details** page (5.2.2 Site Details), click **CREATE PROJECT**.

A.   **Project name**: Enter the name
of your new project.

B.   **Select customer**: Select a
customer.

C.   **Select site**: Select the
production site to which your
new project belongs.

D.   **Project installers**: Enter the
email addresses of the project
installers separated by a
comma.

Figure 5-13) Create a new project

Click **Proceed** to open the **Updating project** page.

The **Updating project** page lists the monitoring devices and assets in your project.

Select what should be part of your project and confirm with **UPDATE PROJECT**.

After saving your project, a pop-up window informs you about successful creation of the project and
offers to switch to the **Site details** page or to the **Project details** page.

Now all persons added to the **Project installers** (see above) can download the project to the
BKV Deploy installation and commissioning app.

Refer to 6 Installation and Commissioning App (BKV Deploy).

5.11 Export Setpoint Configuration (for Setpoint only)

Export the configuration from BKV Beyond Ignite using the SETPOINT CONFIGURATION button from the Site Details screen (refer to 5.2.2 Site Details).
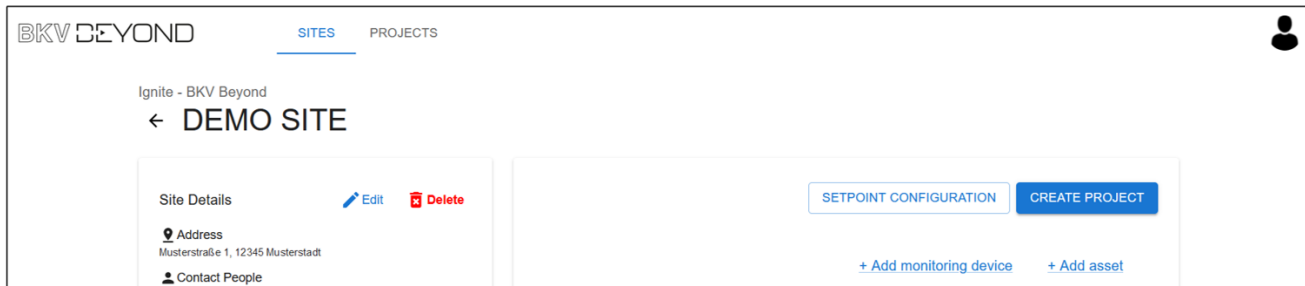
Figure 5-14) SETPOINT CONFIGURATION

This will open a screen where the assets to be included in this exported configuration can be selected.

Figure 5-15) EXPORT CONFIGURATION

Select all assets whose data should be collected using the present installation of SETPOINT ® Connector. In most cases, a single of SETPOINT ® Connector installation, so all assets can be selected.

Complete the export by clicking EXPORT CONFIGURATION.

The generated configuration file (.json) will automatically be downloaded onto your computer. To use the configuration file, refer to CMS_Instruction_S1176125.

6 Installation and Commissioning App (BKV Deploy)

Within the BKV Deploy installation and commissioning app you will be able to get guidance on how to set up, install and commission the sensors, the gateways and the connection to either BKV Beyond or Setpoint CMS based on Aveva Pi.

6.1 Installing the App (BKV Deploy)

First you must install the installation and commissioning app (BKV Deploy) on your mobile device.

The BKV Deploy app can be downloaded from the Google Play Store (Android) or the Apple App Store (iOS).

To do so, scan the corresponding QR code.

QR code Google Play Store (Android)	QR code Apple App Store (iOS)

Table 6-1) QR codes (Google Play Store / Apple App Store)

6.2 Logging in to the App (BKV Deploy)

1. Open the installation and commissioning app.
2. Tap on the **Next** button to navigate through the informative welcome screens.
3. In the login screen, enter your username and password and tap on **Continue**.
4. If prompted, enter a new password, and confirm it.
5. After login, a new screen displays the projects you are invited for (created with the pre-configuration tool BKV Ignite, refer to 5 Pre-Configuration Tool (BKV Ignite)).
6. Select a project and tap on the **Download project** button.
7. After your project is downloaded, you see the home screen of the app.

6.3   Home Screen of the App
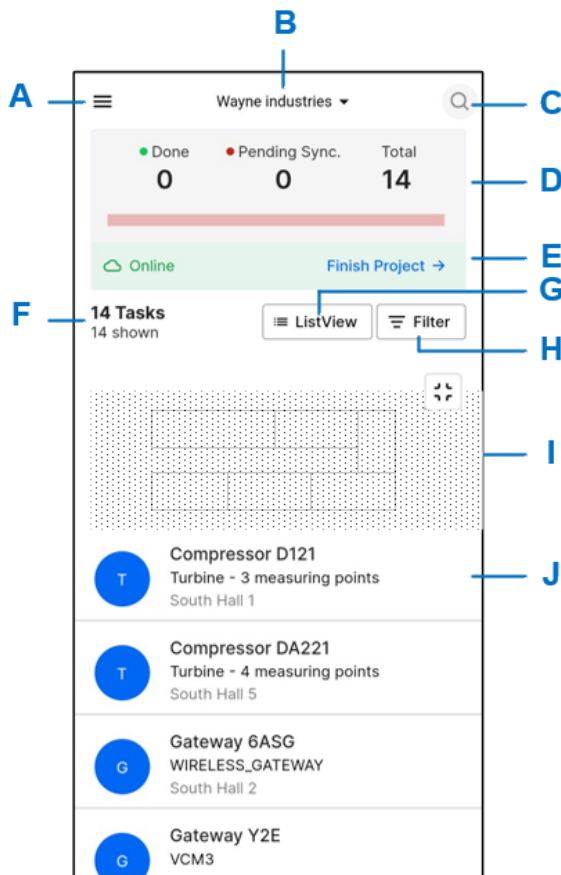
A. Opens the navigation drawer (refer to 6.4 Navigation Drawer).
B. Displays the name of the present project.
    Tab on the **v**-arrow to select another project.
C. Opens a filter screen.
    Enter text to search for a task.
D. Displays information on the done, pending and total amount of tasks.
E. **Sync now** / **Finish Project**
    Before you can finish your project, you need to synchronize it.
F. Displays information on the total amount of the tasks.
G. **List View / Show layout**
    Toggles between list view and layout view of the tasks.
H. **Filter**
    Opens a new screen to filter the tasks by machine type, area, or task status.
I. Graphical representation of the present area
    You can zoom and move the graphical representation.
J. Lists the gateways and machines in the present area
    Tab on a list entry to open a detail screen of a gateway or a machine.

Figure 6-1) Home screen of the app

6.4   Navigation Drawer

To open the navigation drawer, tab on the hamburger icon in the upper left corner of the home screen.
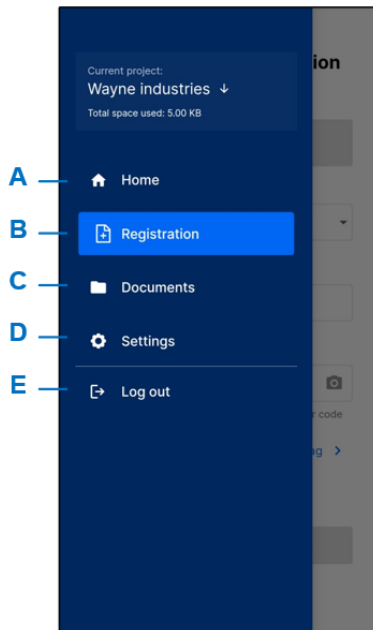
A. **Home**: Opens the home screen.
B. **Registration**
    Opens the general **Registration & Configuration** screen for sensors and gateways.
C. **Documents**
    Lists the documents added to the project for information.
    You can open the documents.
D. **Settings**
    Here you can change your password, activate the dark mode, get information on the total space of the memory.
E. **Log out**
    Here you can log out from your project.

Figure 6-2) Navigation drawer

6.5   Detail Screen of a Gateway
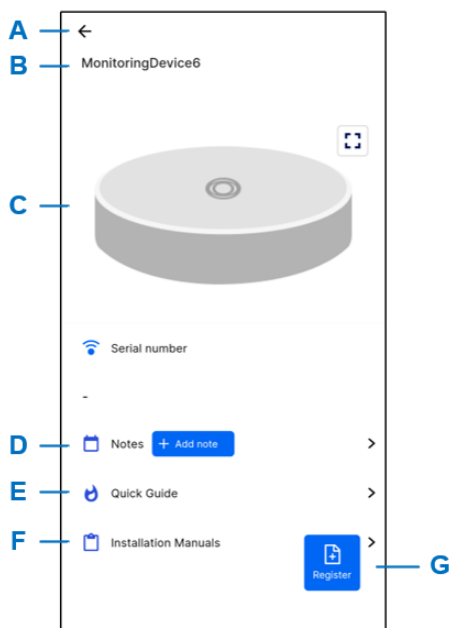
A. Back to the previous screen
B. Detailed information on the gateway
C. Graphical representation of the gateway
D. **Notes** added to the gateway
    Tab on the **>**-arrow to list the already added notes.
E. **Quick Guide**
    Tab on the **>**-arrow to display the quickstart guide.
F. **Installation Manuals**
    Tab on the **>**-arrow to list the related installation manuals.
G. Tab on **Register** to display the **Registration & Configuration** screen.

Figure 6-3) Detail screen of a gateway

6.6 Detail Screen of a Machine
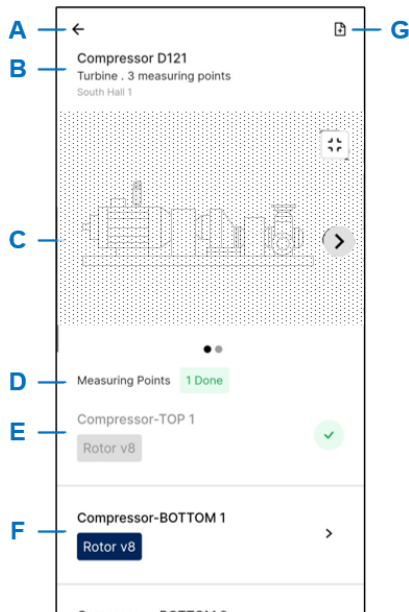
A. Back to the previous screen

B. Detailed information on the machine (name, number of measuring points)

C. Graphical representation of the machine
You can zoom and move the graphical representation.

D. Information on the measuring points

E. In the list of the sensors at the machine a green checkmark indicates that registration of the sensor is already done.

F. In the list of the sensors at the machine a black **>** arrow indicates that registration of the sensor is still pending. Tab on the **>** arrow to display the detail screen of the measuring point.

G. Tab on the **page+** icon to display the **Registration & Configuration** screen. There you can select measuring points you want to register.

Figure 6-4) Detail screen of a machine

6.7 Detail Screen of a Measuring Point
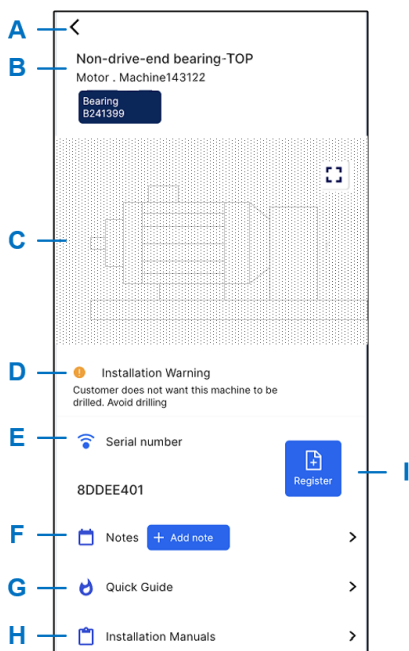
A. Back to the previous screen

B. Detailed information on the measuring point

C. Graphical representation of the measuring point

D. Installation warning about what to avoid when installing sensors

E. Serial number of the measuring point

F. **Notes** added to the measuring point
Tab on the **>**-arrow to list the already added notes.

G. **Quick Guide**
Tab on the **>**-arrow to display the quickstart guide.

H. **Installation Manuals**
Tab on the **>**-arrow to list the related installation manuals.

I. Tab on **Register** to display the **Registration & Configuration** screen.

Figure 6-5) Detail screen of a measuring point

6.8   Registration & Configuration screen 1 (Gateway)
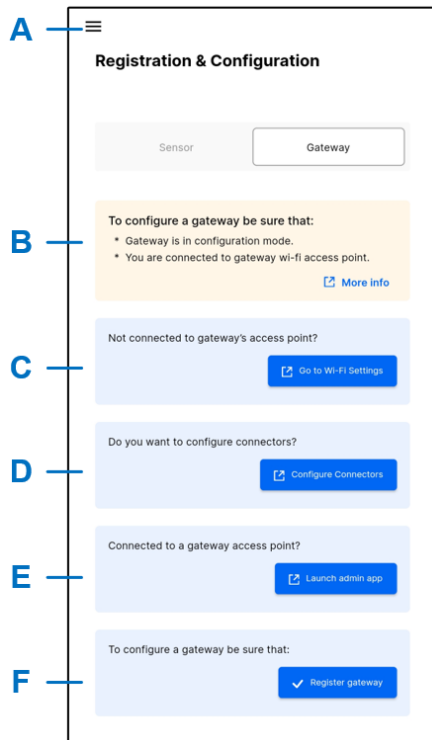
A. Opens the navigation drawer (refer to 6.4 Navigation Drawer).
B. Information on the prerequisites for registration
    Tab on **More info** to display a list of instructions for configuration.
C. Tab on **Go to Wi-Fi Settings** to open the Wi-Fi settings of your device.
D. Tap on **Configure Connectors** to choose if the gateway will be configured for BKV Beyond or Setpoint.
E. Tab on **Launch admin app** to open the configuration UI of the gateway.
    Refer to 6.8.1 Admin App (Gateway) before tabbing on **Register gateway**.
F. Tab on **Register gateway**.
    Result: The second **Registration & configuration** screen of the gateway is displayed.

Figure 6-6) Registration & configuration screen 1 (gateway)

6.8.1 Admin App (Gateway)

After tabbing **Launch admin app** in the **Registration & Configuration screen 1 (Gateway)**, see above, the home screen of the **Admin app** is displayed.

A. Tab on **CONTINUE** to open the second screen of the **Admin app**.

Figure 6-7) Admin app (gateway) 1
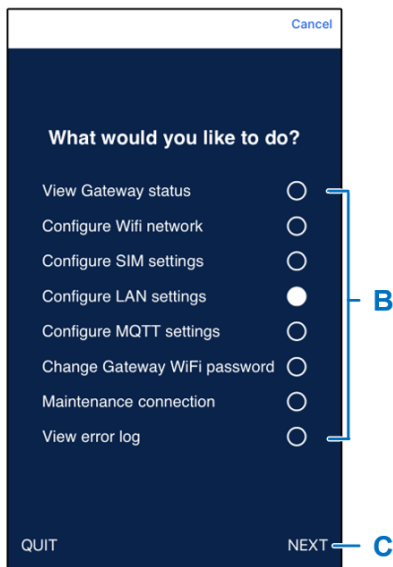
B. Select the settings you want to modify.
C. Tab on **NEXT.**

(**QUIT** will close the **Admin app** and the BKV Connect is relaunched).

After modifying the settings, go back to the **Registration & Configuration screen 1 (Gateway)**, see above, and tab on **Register gateway**.

Figure 6-8) Admin app (gateway) 2

6.9 Registration & Configuration screen 2 (Gateway)
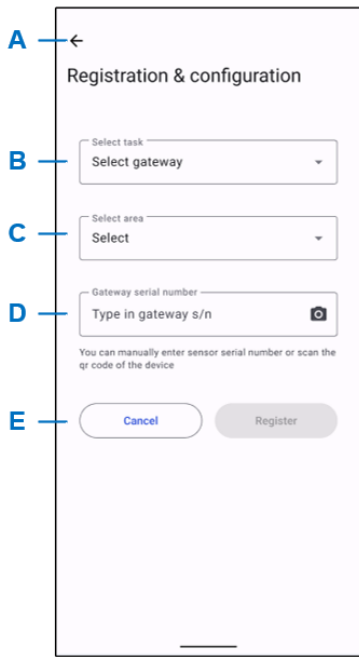
A. Back to the previous screen
B. Select a gateway task from the list.
C. Select an area from the list.
D. Enter the serial number of the gateway.
   You can also scan the QR code on the gateway.
E. Tab on **Register** (**Cancel** will discard your edits).
   If you tab on **Register**, a new screen informs you that the registration has been successfully completed.

Figure 6-9) Registration & configuration screen 2 (gateway)

6.10 Registration & Configuration screen (Sensor)
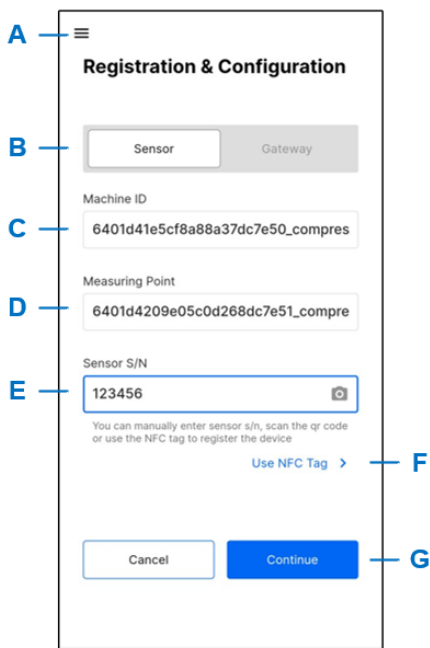
A. Opens the navigation drawer (refer to 6.4 Navigation Drawer).
B. Select **Sensor.**
C. Enter the **Machine ID.**
D. Enter the **Measuring Point**.
E. Enter the **Sensor S/N**.
   You can also scan the QR code on the sensor or see item **F** below.
F. Tab on **Use NFC tag** to get information on how to retrieve the NFC tag of the sensor with your mobile device.
G. Tab on **Continue**.
   The registration and configuration details of the sensor are displayed.
   There you can tab on **Confirm & Register.** (**Cancel** will discard your edits).

Figure 6-10) Registration & configuration screen (sensor)

6.11   Registering a Gateway (Step by Step)

- You can register a device from the home screen (as described below)
- You can register a device from the general **Registration & Configuration** screen. The procedure is very similar to the one described below
To go to the general **Registration & Configuration** screen, tab on the hamburger icon in the upper left corner of the home screen. There you can select whether you want to register a gateway or a sensor
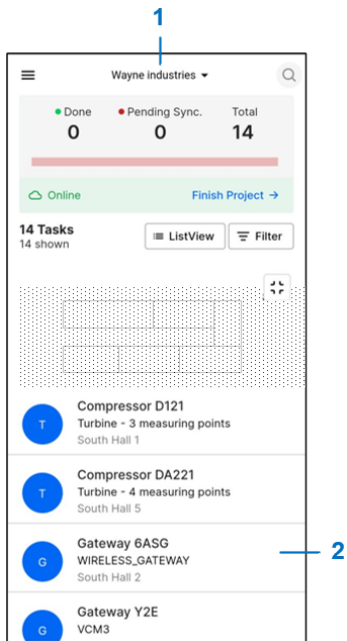
1) In the home screen, select a project.

2) Tab on a gateway in the list.
Result: The detail screen of the gateway is displayed.
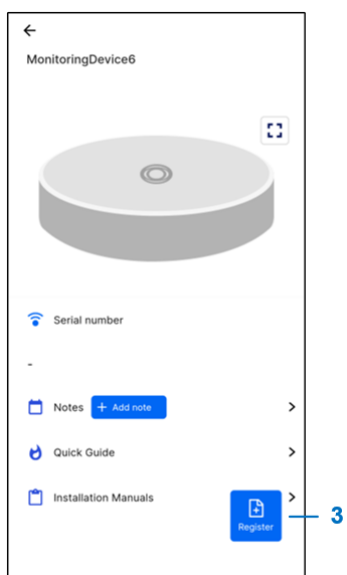
3) In the detail screen of the gateway, tab on **Register**.
Result: The first **Registration & Configuration** screen of the gateway is displayed.
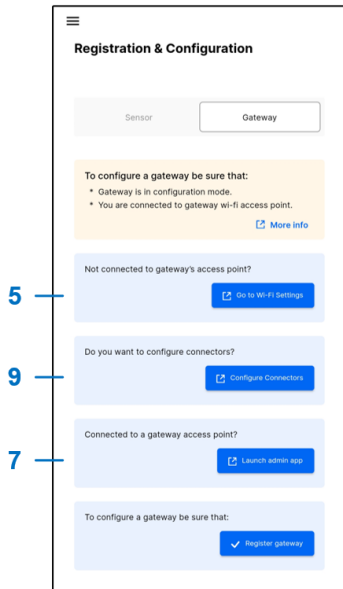
4) Switch to the configuration mode of the BKV Connect. Press the configuration button on the BKV Connect until the status light starts blinking. The gateway becomes a Wi-Fi access point. (Refer to 7.1.6 Configuring the Gateway).

5) **Go to Wi-Fi Settings** to connect your mobile device to the access point. Select *treongw1-serialnumber*, where *serialnumber* is the serial number of your gateway.

6) Enter your Wi-Fi password. The Wi-Fi password can be found on the type label of the BKV Connect.

7) **Launch admin app** and make needed configurations. (Refer to 6.8.1 Admin App (Gateway)).

8) Setpoint only: Within the **Admin app**, navigate to the network settings to configure the network settings, device time and time synchronization settings. It is highly recommended to activate time synchronization via NTP on the BKV Connect gateway. For more information refer to CMS_Instruction_S1176125.xxx.

9) **Configure Connectors** to use the BKV Connect for BKV Beyond or for Setpoint. (Setpoint: Enter the IP address of the computer where SETPOINT ® Connector is running).
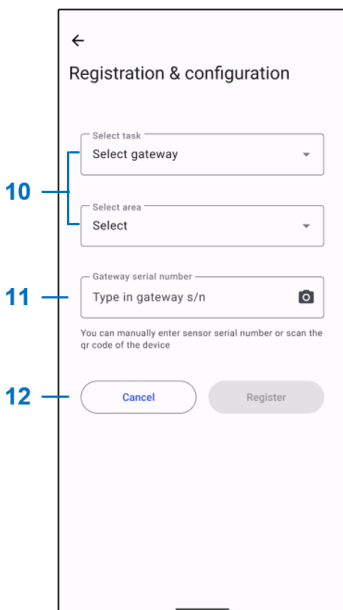
10) In the second **Registration & configuration** screen of the gateway, select a gateway task and an area.

11) Enter the serial number of the gateway. You can also scan the QR code on the gateway.

12) Tab on **Register** (**Cancel** will discard your edits). If you tab on **Register**, a new screen informs you that the registration has been successfully completed. After that, you can either register another device or go to the home screen.

6.12   Registering a Sensor (Step by Step)

- You can register a device from the home screen (as described below)
- You can register a device from the general **Registration & Configuration** screen. The procedure is very similar to the one described below
  To go to the general **Registration & Configuration** screen, tab on the hamburger icon in the upper left corner of the home screen. There you can select whether you want to register a gateway or a sensor
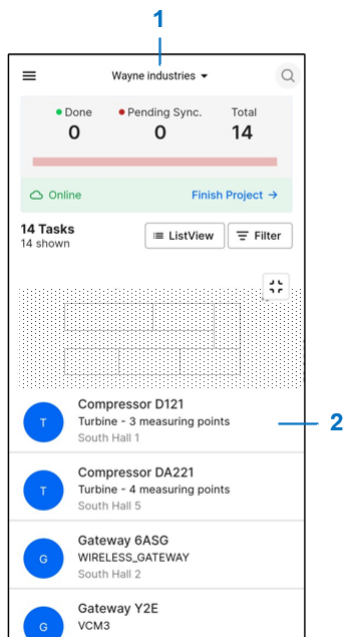
1) In the home screen, select a project.

2) Tab on a machine in the list.
   Result: The detail screen of the machine is displayed.
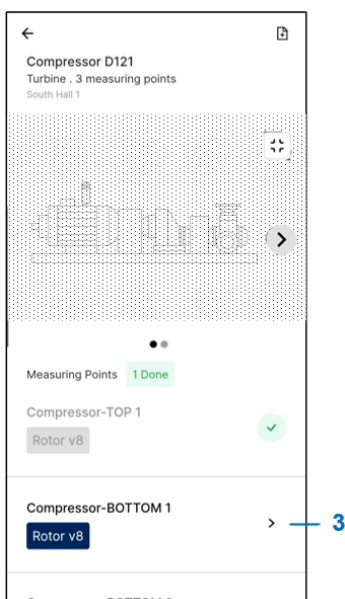
3) In the detail screen of the machine, select a measuring point.
   Result: The detail screen of the measuring point is displayed.
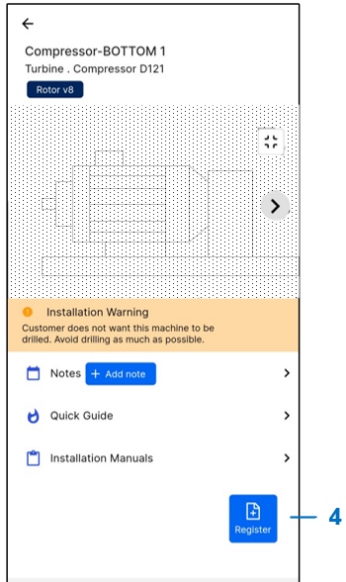
**4)** In the detail screen of the measuring point, tab on **Register**.
Result: The **Registration & Configuration** screen of the measuring point is displayed.
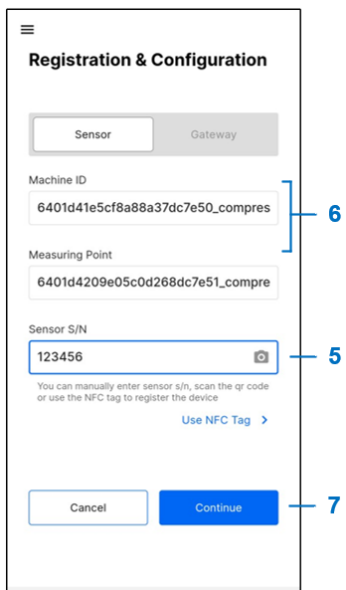
5) In the **Registration & Configuration** screen of the measuring point, enter the **Sensor S/N**.
You can also scan the QR code on the sensor or use the NFC tag functionality.

6) The machine ID and the measuring point are preselected.

7) Tab on **Continue** (**Cancel** will discard your edits).
If you tab on **Continue**, the registration and configuration details of the measuring point are displayed.
There you can tab on **Confirm & Register**.
(**Cancel** will discard your edits).
After that, you can either register another device or go to the home screen.

7 Mounting and Installation

7.1 Gateway

7.1.1 Keys and Parts

7.1.1.1 Protective Enclosure

A. Status light
B. Ethernet cable gland
C. Air vent
D. Power cable gland
E. Power cable (not included)
F. Adjustable mounting brackets
G. Lid screws

H. Gateway inside enclosure
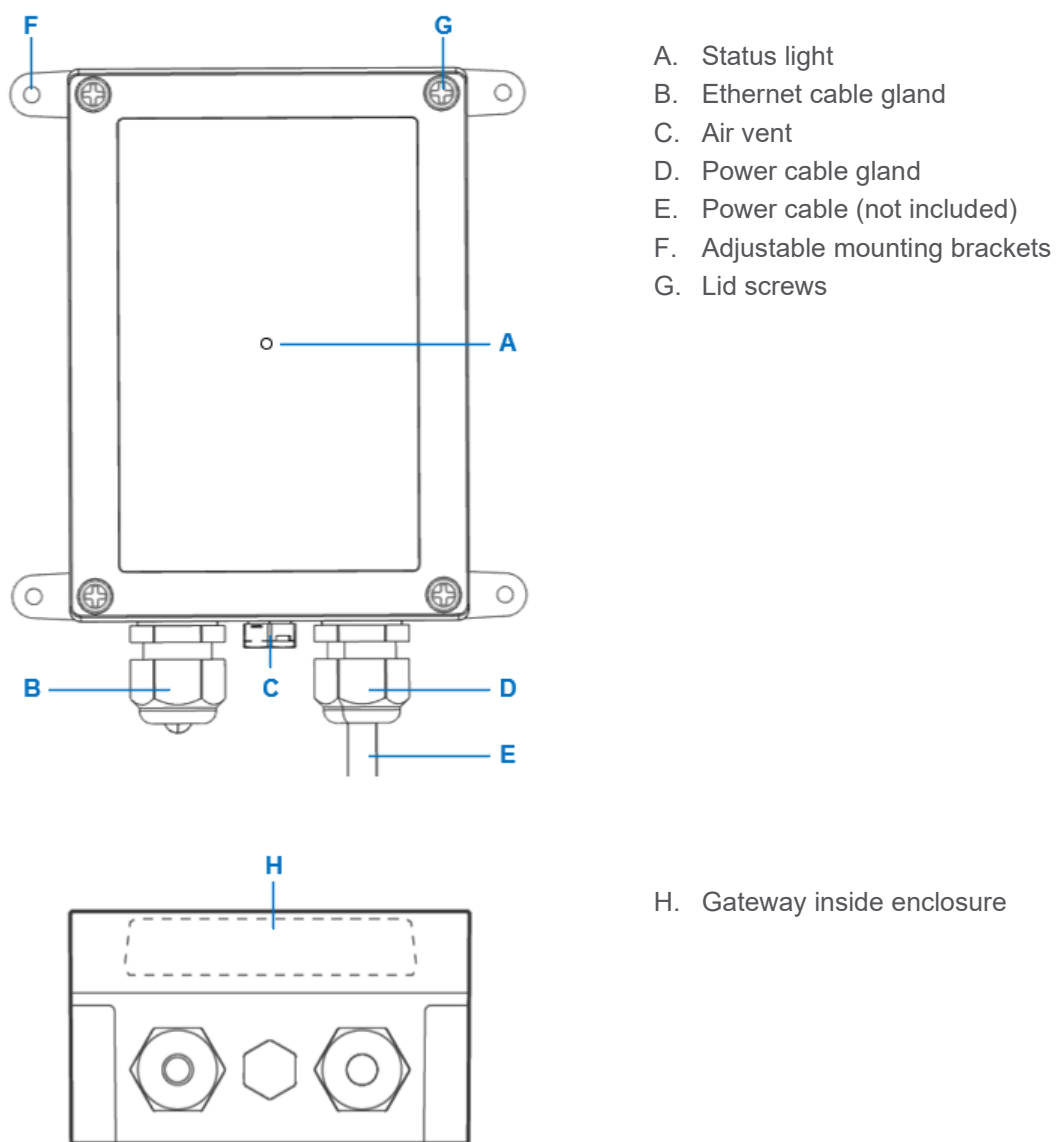
Figure 7-1) Keys and parts (protective enclosure)

7.1.1.2 Gateway
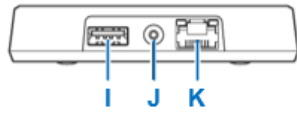
I. USB A host port

J. Power cable connector

K. Ethernet cable connector
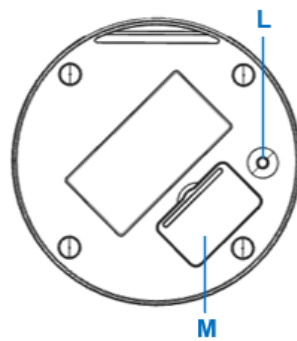
L. Configuration button

M. Micro SIM card slot

Figure 7-2) Keys and parts (gateway)

7.1.2 Gateway Without Enclosure

7.1.2.1 Mounting the Gateway (Wall Mount)

The gateway without enclosure can be mounted on the wall. For this, you need a wall mounting adapter (Wall mount for BKV Connect 1, AC-375).
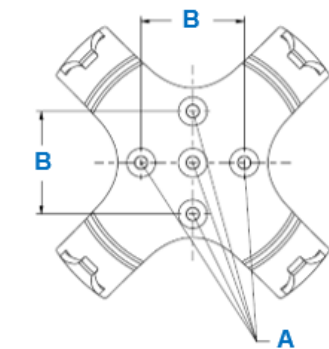
1) Attach the wall mount adapter to the surface with five screws (**A**), maximum diameter 3.5 mm (0.138 in). The screws are not included in sales package. The distance (**B**) between the mounting holes is 32 mm (1.26 in).
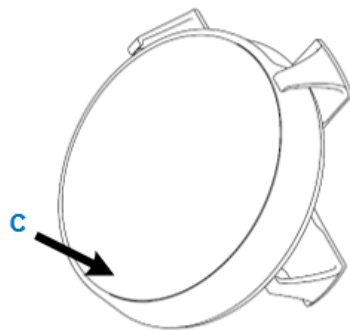
2) Carefully click the sensor into the wall mount adapter (**C**).

3) The sensor is held by the 4 clamps.

Figure 7-3) Mounting the gateway (wall mount)

7.1.2.2 Connecting the Power Cable Connector

The gateway without protective enclosure is delivered with a power supply and with four country-specific adapters.
Connect the power cable connector (J) to a power outlet using the appropriate adapter for your country.

7.1.3 Gateway in Protective Enclosure

7.1.3.1 Mounting the Gateway in Protective Enclosure

> **i**
>
> **NOTE!**
>
> AUSTRALIA, NEW ZEALAND:
> This device should be mounted at a height of less than 2 m (6.56 ft).
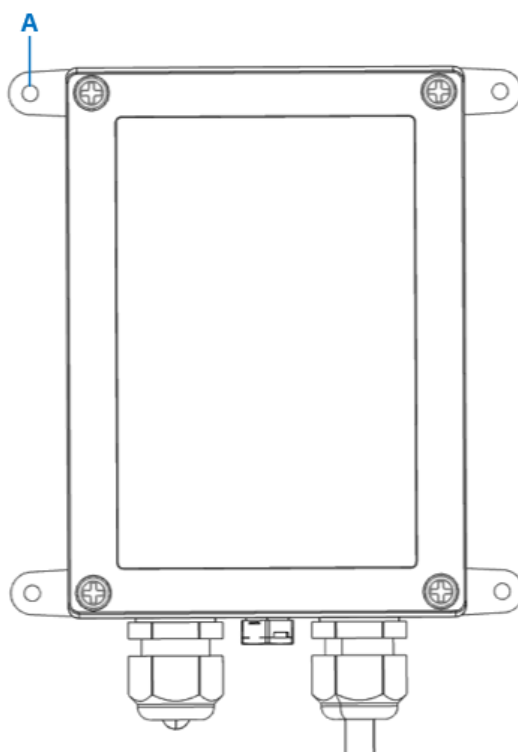
1) Turn the four adjustable mounting brackets (A) outwards.
2) Attach the enclosure to the surface with four screws, maximum diameter 4 mm (0.16 in). The screws are not included in sales package.
3) Ensure that the mains power plug is easily accessible.

Figure 7-4) Mounting the gateway

7.1.3.2 Opening the Protective Enclosure of the Gateway

⚠	**DANGER!**
	Hazardous Voltage/Electricity

- Do not work on the device when it is under voltage!
- Always disconnect the power cable from the mains before opening the enclosure
- Do not remove the finger guard of the power cable as this may result in electric shock
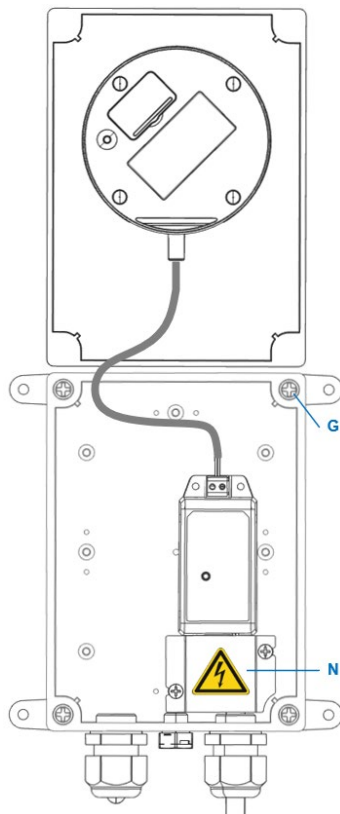
1) Always disconnect the power cable from the mains before opening the enclosure.
2) Unscrew the four lid screws (G) at the corners of the protective enclosure lid with a suitable screwdriver tool.
3) Open the lid carefully. Avoid bending the cable too much as it may damage the device.

Figure 7-5) Opening the gateway

7.1.3.3 Connecting the Power Supply of the Gateway

⚠️ **DANGER!**

Hazardous Voltage/Electricity

- Do not work on the device when it is under voltage!
- Always disconnect the power cable from the mains before connecting it to the device

---

ℹ️ **NOTE!**

It is a good practice to use a H07RN-F, 2x1.5 qmm (AWG 16), outer diameter about 9 mm (0.35 in), cable for connecting the power supply of the gateway.

---

1) Open the protective enclosure lid as described in section 7.1.3.2 Opening the Protective Enclosure of the Gateway.
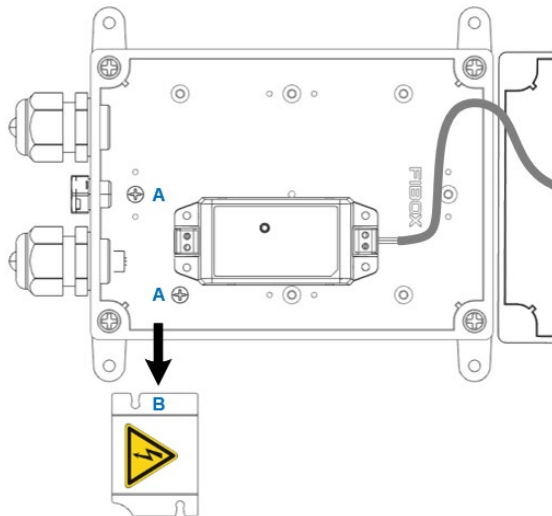
2) Loosen the fastening screws (A) of the finger guard and remove the finger guard (B).
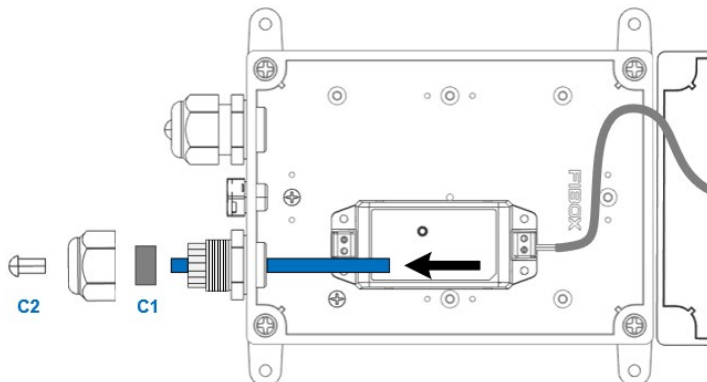
3) Unscrew the cap of the power cable gland (C). Remove the sealing rubber (C1) and the plug (C2) by pushing from inside out.
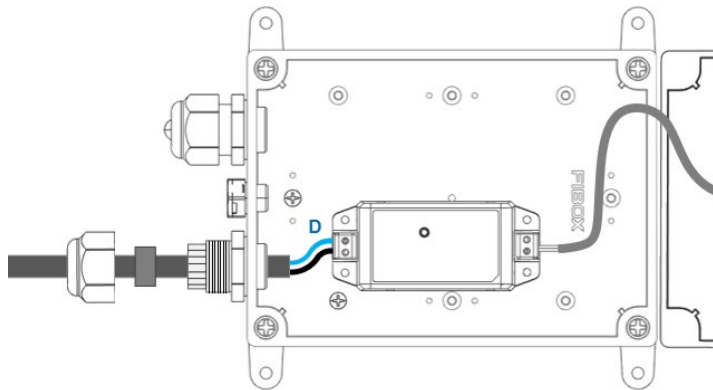
4) Pull the power cable through cable gland cap and install the rubber sealing around cable. Push the rubber sealing inside the cable gland.

5) Connect the two wires (D) of the power cable to the terminal block.
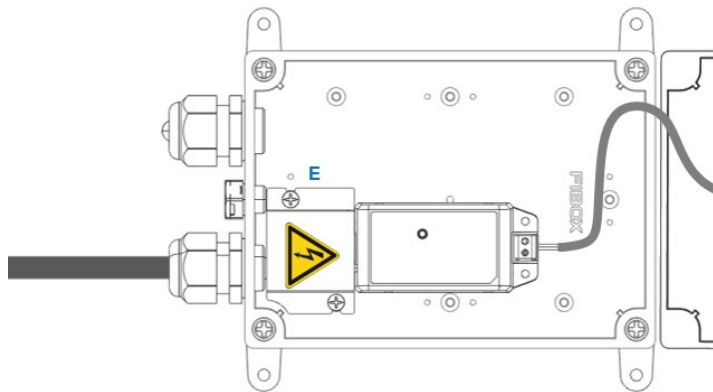
6) Re-install the finger guard (E).

7) Adjust the cable length to appropriate length and tighten the power cable gland cap.

8) Close the lid and tighten the screws.

Figure 7-6) Connecting the power supply of the gateway

7.1.4   Connecting the Gateway

You can connect the gateway:

- 7.1.4.1 Using an Ethernet Cable Connection
- 7.1.4.2 Using a Cellular Connection
- 7.1.4.3 Using a Wi-Fi Connection

---

i   **NOTE!**

The Ethernet and cellular connections automatically override the Wi-Fi connection.

---

i   **NOTE!**

- Ensure that port 8883 is open on the customer network so that the gateway can communicate with this network
- Ensure that outbound traffic to the Internet is allowed on ports 443, 8883, and 8443. HTTP/S and MQTT protocols must also be allowed on the network.

7.1.4.1 Using an Ethernet Cable Connection

1) Open the protective enclosure lid as described in section 7.1.3.2 Opening the Protective Enclosure of the Gateway.
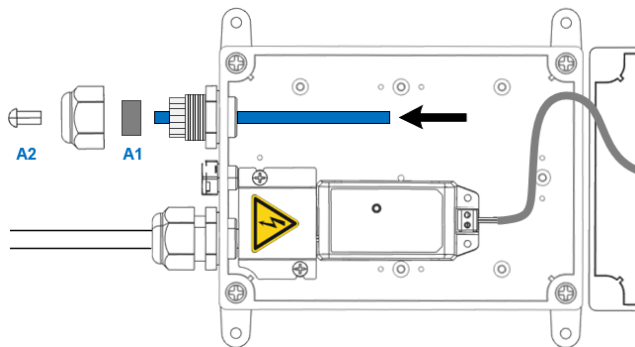
2) Unscrew the Ethernet cable gland cap (A). Remove the sealing rubber (A1) and plug (A2) by pushing from inside out.
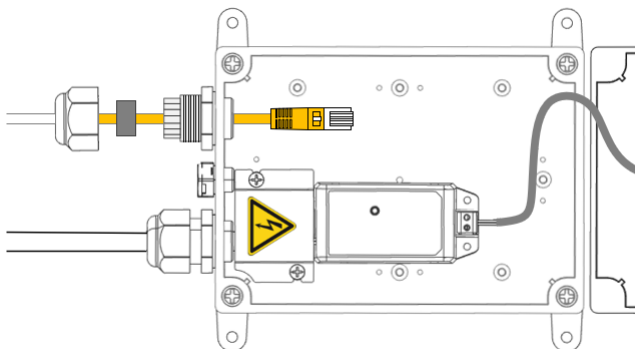
3) Pull the RJ45 cable through cable gland cap and install the rubber sealing around cable. Push the rubber sealing inside RJ45 cable gland.
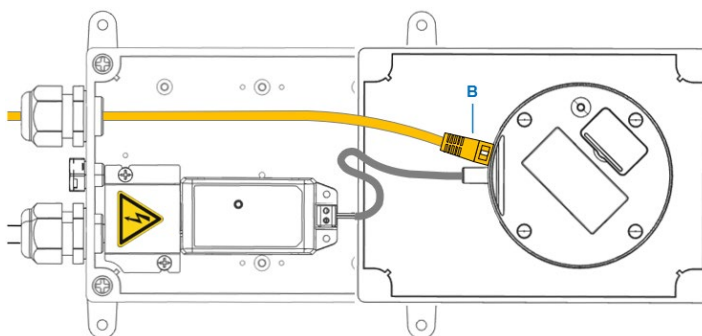
4) Attach the Ethernet cable to RJ45 connector (B)

5) Adjust the cable length to appropriate length and tighten the RJ45 cable gland cap.
6) Close the lid and tighten the screws.

Figure 7-7) Using an Ethernet cable connection

7.1.4.2 Using a Cellular Connection

> **i**
>
> **NOTE!**
>
> To investigate whether this connection type can be used in your region, please contact your local Brüel & Kjær representative.

1) Open the protective enclosure lid as described in section 7.1.3.2 Opening the Protective Enclosure of the Gateway.
2) Put your fingernail in the seam between the lid of the SIM card slot and the back cover of BKV Connect 1 and remove the lid.
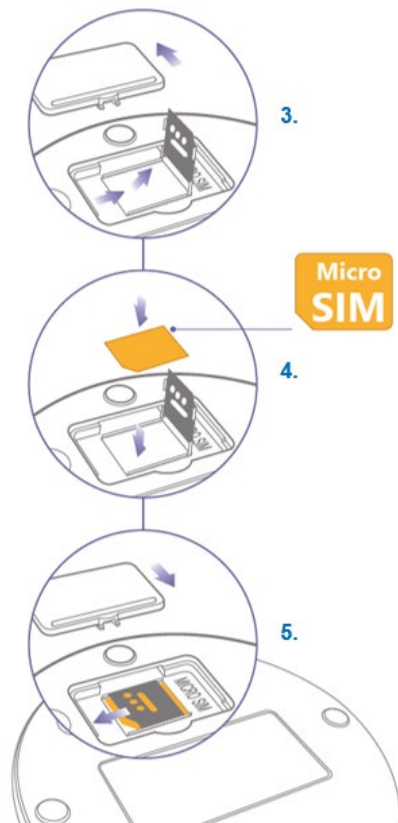
3) Slide the SIM card holder to the right until it unlocks and lift the holder up.

4) Place the SIM card in the holder with the contact area face down and close the holder.

5) Slide the holder to the left until it locks into place and put back the lid of the SIM card slot.

6) Close the protective enclosure lid and tighten the screws.

Figure 7-8) Using a cellular connection

7.1.4.3 Using a Wi-Fi Connection

Set up a Wi-Fi connection as instructed in section 7.1.6 Configuring the Gateway.

7.1.5 Powering Up the Gateway

1. Make sure that the power cable is attached to the gateway.
2. Close the protective enclosure lid.
3. Plug the gateway power cable into a wall outlet. The gateway switches on automatically.

	NOTE!
i	Use only the power supply unit provided together with the device.

Status light colors:

🟢	Green light:	The gateway is connected.
🔵	Blue light:	The gateway is trying to establish a connection.
🔵	Blinking blue:	The gateway is in the configuration mode.
🔴	Red light:	An error was detected on the gateway, or the gateway is not connected. Open the configuration mode to determine the error.

Figure 7-9) Powering up the gateway – status light colors

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7.1.6   Configuring the Gateway
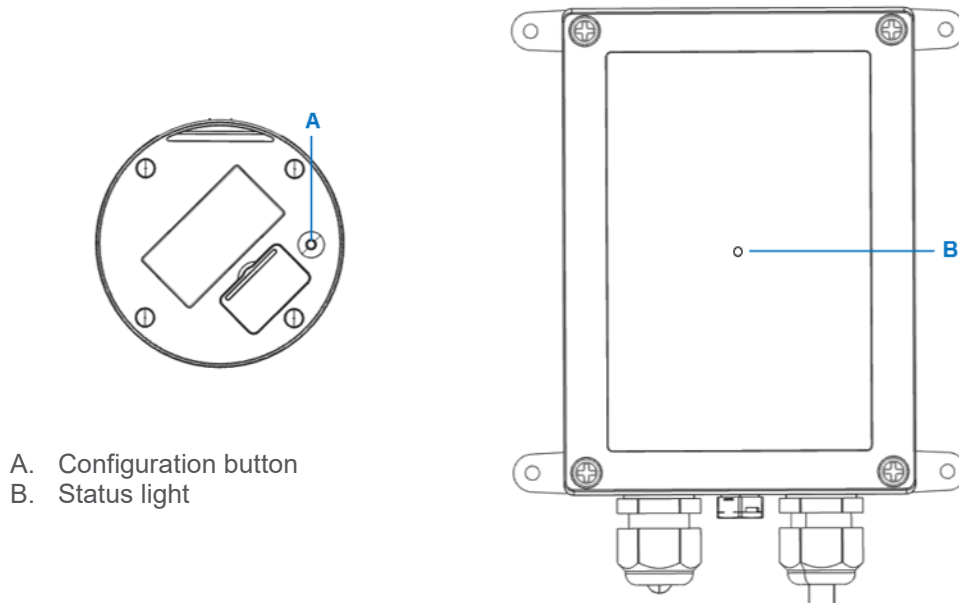
A. Configuration button
B. Status light

Figure 7-10) Configuring the gateway

1. Open the protective enclosure lid as described in section 7.1.3.2 Opening the Protective Enclosure of the Gateway.
2. Press the configuration button (A) until the status light (B) starts blinking. The gateway becomes a Wi-Fi access point.
3. Using your cell phone, computer, or tablet, connect to the access point:
   Select *treongw1-serialnumber*, where *serialnumber* is the serial number of your gateway.
4. Enter your Wi-Fi password. The Wi-Fi password can be found on the type label of the BKV Connect. Windows 10 and Windows 11 may ask for a pin code as a primary access point password. Please use the **Connect using a Security key instead** option instead.
   Remember to change the password later.
5. Open a browser on your cell phone, computer, or tablet and go to the address 192.168.1.1 to open the configuration of your BKV Connect.
6. Make the needed configurations. You can, for example, change the gateway access point password, check the error log, and set up a Wi-Fi connection.
7. To exit the configuration mode, select **Quit**, or press and hold the configuration button (A) until the status light stops blinking.
8. When needed configurations are done, close the protective enclosure lid and tighten the screws.

7.2   Sensors

7.2.1   Keys and Parts

A.   Status light
B.   Orientation notch
C.   Power button
D.   NFC tag
E.   M8 bolt
F.   Nut adapter
G.   Magnetic epoxy mount adapter*
H.   Glue mount adapter

* The adapter G is not included in the standard sales packaging.
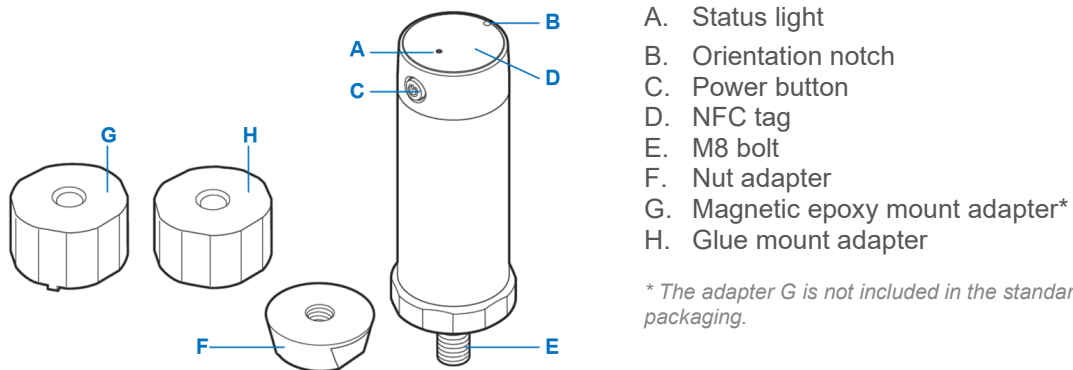
Figure 7-11) Keys and parts (sensors)

7.2.2   Mounting the Sensors

7.2.2.1   General

When mounting the sensors to a monitored equipment, it is important to consider the location of the sensor and the contact between the sensor and the machine. The best location to attach the sensor depends on the machine and the monitored vibration source.

For best measurement quality, the contact surface on the machine should be:
- Completely flat (within 0.03 mm (1 mil = 1/1000th inch))
- Smooth (surface texture no greater than Ra 0.8 (32 microinches))
- Larger than the base of the sensor.

i	**NOTE!**
	In cases where the surface of the machine is curved or uneven, epoxy must be used between the machine surface and the sensor.

⚠	**NOTICE!**
	Screwing the sensor to curved surface may lead to the sensor bolt twisting and permanent damage to the device.

i	**NOTE!**
	It is a good practice to mount the sensor via a glue mount adapter to the machine.

Generally, there are four installation methods:

Installation method	Bonding	Surface	Thread hole	Curved surface	Manual alignment
Glue mount adapter	Glue	32 mm (1.26 in)	None	No	Yes
Nut adapter	Mechanical / Epoxy	25 mm (0.98 in)	9.5 mm (0.37 in)	No	Yes
Magnetic epoxy mount adapter	Epoxy	32 mm (1.26 in)	None	Yes	Yes
Without adapter	Mechanical	32 mm (1.26 in)	18.5 mm (0.73 in)	No	No

Table 7-1) Installation methods

Glue mount adapter   Nut adapter   Magnetic epoxy mount adapter   Without adapter
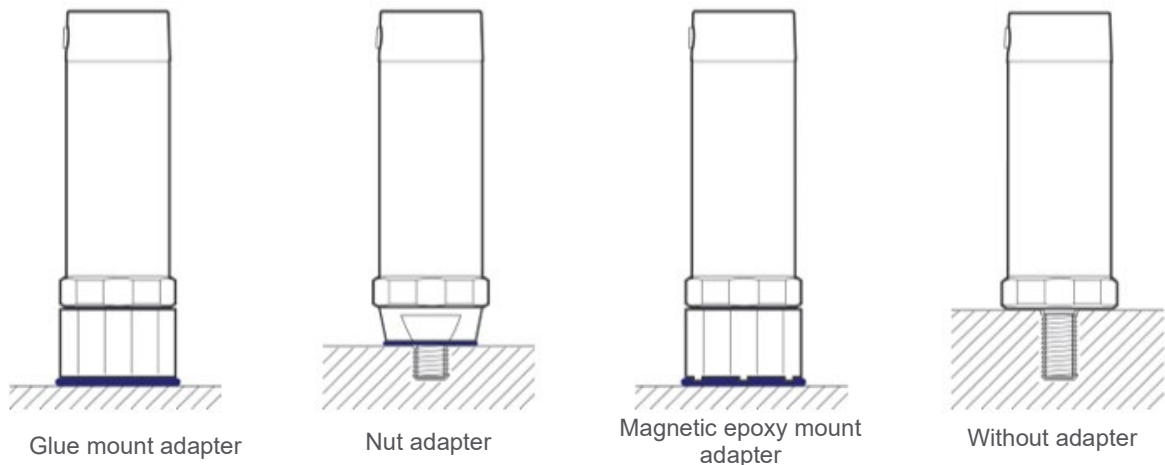
7.2.2.2   Temperature Measurement

- Without adapter
  In case you would also like to measure the temperature of the machine, the optimal installation method is without an adapter. Only with this way the measurement point of the sensor is deep enough below the machine surface to measure the temperature accurately.

- Nut adapter
  Installation with the nut adapter still provides valuable temperature data but is generally not as accurate as the installation without the adapter.

- Magnetic epoxy mount adapter or glue mount adapter
  Installation with a magnetic epoxy mount adapter or a glue mount adapter is not advised if you want accurate machine temperature measurements. These installation methods provide low resolution and low accuracy temperature data for your machine.

7.2.2.3 Mounting Ex-certified Sensors

The sensors in **Ex-certified** variant are certified for use in potentially explosive atmospheres.

> ⚠️ **DANGER!**
>
> When a sensor is installed in a potentially hazardous area, the following requirements must be met:
>
> - The installation for **Ex-certified** devices must be made in conformity to the international or national standards (IEC/EN 60079-17 and IEC/EN 60079-14)
> - The sensor must be installed in such a way that it is grounded or connected by electrostatic dissipative adhesive to the machine surface
> - Grounding can be achieved by mounting the device directly to the machine body using tap and drill
> - Electrostatic dissipative adhesive must be used when the sensor is mounted using glue mount adapter or magnetic epoxy mount adapter
> - Paint must be removed from machine surface before adhesive mounting

7.2.2.4 Installation with Glue Mount Adapter
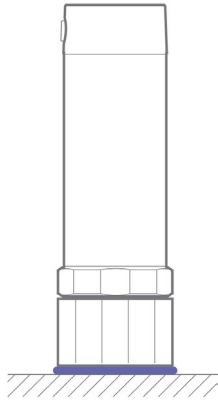
Using the glue mount adapter, a sensor can be mounted to a flat surface with glue without drilling a hole for a screw.
It is possible to align the sensor manually.

Installation with a glue mount adapter requires a flat surface of 32 mm (1.26 in) diameter.

There are two options for the manual alignment:

Option A: Alignment during installation:

- The sensor is first attached to the glue mount adapter. Then they are aligned together on the machine surface during the gluing process.

- This option is best suited for installation locations that have no space restrictions and are easy to reach.

Option B: Pre-alignment of the glue mount adapter:

- The glue mount adapter is pre-aligned and glued to the machine surface. Afterwards, the sensor is attached to the pre-installed glue mount adapter.

- This option is best suited for installation that are difficult to access or have limited space. Here, it is easier to first install only the glue mount adapter, and then attach the sensor afterwards.

⚠️ **NOTICE!**

There is a risk that the adhesion of the glue between the glue mount adapter and the machine surface will be compromised when the sensor is fastened to the glue mount adapter.

For this installation method you will need:

- A flat surface

- A glue mount adapter

- Silicon grease

- Glue (LOCTITE AA E330 or other suitable glue)

- Wrench, spanner width 30 mm (1.18 in)

- Torque wrench, spanner width 30 mm (1.18 in)

7.2.2.4.1   Option A: Alignment During Installation
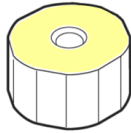
1) Thoroughly clean the machine surface at the location where the sensor should be attached and in a larger area around it.
2) Thoroughly clean the non-magnetic top surface of the glue mount adapter. If you are not sure which surface is the correct one, test the magnetic surface of the adapter with a metal surface and then choose the opposite surface for this step.
3) Apply silicone grease and spread it around the hole in the adapter with your finger. Therefore, use an unpowdered latex glove.

4) Carefully screw the glue mount adapter to the thread of the sensor. The greased side should face the sensor and the magnetic side should face away from the sensor. The recess around the screw hole in the glue mount adapter must point away from the sensor.
5) Hold the sensor with a wrench, spanner width 30 mm (1.18 in).
6) Set the torque wrench for the glue mount adapter with a spanner size of 30 mm (1.18 in) to a tightness of 8 Nm and carefully tighten the glue mount adapter to the sensor.

⚠ **NOTICE!**

Observe the specified torque. Excessive torque can damage the sensor and the machine. Insufficient torque can lead to insufficient contact between the sensor and the machine and thus to insufficient data acquisition.

7) First carefully apply the glue to the glue mount adapter.
8) Then apply the glue activator to the surface of your machine.
9) Place the sensor on the glue activator.
10) Align the sensor so that the sensor axis points directly toward the drive or the non-drive end of the machine.
Refer to 7.2.3 Aligning the Sensor. page 74.
11) Let the glue harden before switching on the machine

7.2.2.4.2   Option B: Pre-Alignment of the Glue Mount Adapter

1. Screw the glue mount adapter and the sensor together and tighten by hand.
2. Place the glue mount adapter with the sensor to the machine surface where it is planned to be installed.
3. Align the sensor so that the sensor axis points directly toward the drive or the non-drive end of the machine.
   Refer to 7.2.3 Aligning the Sensor. page 74.
4. Make a continuous line on the glue mount adapter and the machine surface, which you can use later to align the sensor.
5. Unscrew the glue mount adapter from the sensor.
6. Carefully apply the glue to the bottom of the glue mount adapter.
7. Apply the glue activator to the machine surface where it is planned to be install the sensor.
8. Place the glue mount adapter on the glue activator.
9. Align the glue mount adapter according to the marking (continuous line on the glue mount adapter and the machine surface) you made before.
10. Let the glue harden.
11. Carefully screw the sensor into the glue mount adapter.
12. Hold the glue mount adapter with a wrench, spanner width 30 mm (1.18 in).
13. Set the torque wrench for the sensor with a spanner size of 30 mm (1.18 in) to a tightness of 8 Nm and carefully tighten the sensor to the glue mount adapter.

⚠️ **NOTICE!**

There is a risk that the adhesion of the glue between the glue mount adapter and the machine surface will be compromised when the sensor is fastened to the glue mount adapter.

7.2.2.5   Installation with Nut Adapter
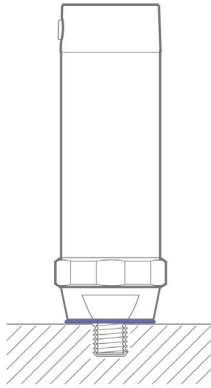
You can install the sensor either with or without epoxy.

Option A: Nut adapter installation with epoxy:

- Minimum thread length can be less than 9 mm (0.35 in) depending on the amount of epoxy.

- Manual sensor alignment is possible.

Option B: Nut adapter installation without epoxy:

- Minimum thread length for the hole is 9 mm (0.35 in)

i	**NOTE!**
	Manual alignment of the sensor is not possible with this installation method.

Using a nut adapter enables attaching the sensor to a spot with less available space in diameter, shorter M8 hole with less threading and with additional epoxy to uneven surface. Manual sensor alignment is possible.

Installation with a nut adapter requires a flat surface of 25 mm (0.98 in) diameter and a hole for M8 bolt with 9.5 mm (0.374 in) of threading.

For this installation method you will need:

- A nut adapter

- M8 hole drilled in the machine surface

- Silicon grease

- Wrench, spanner width 30 mm (1.18 in)

- Torque wrench, spanner width 22 mm (0.87 in)

- Epoxy (only for installation method with epoxy)

- Optional: Threadlocker

7.2.2.5.1   Connect the Nut Adapter to the Sensor
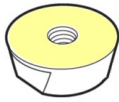
1) Thoroughly clean the larger surface of the nut adapter.

2) Apply silicone grease and spread it around the hole in the nut with your finger. Therefore, use an unpowdered latex glove.
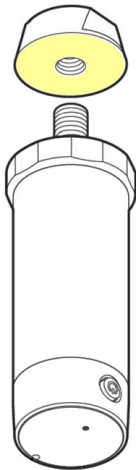
3) Carefully screw the nut adapter to the thread of the sensor.

4) Hold the sensor with a wrench, spanner width 30 mm (1.18 in).

5) Set the torque wrench for the nut adapter with a spanner size of 22 mm (0.87 in) to a tightness of 8 Nm and carefully tighten the nut adapter to the sensor.

⚠ **NOTICE!**

Observe the specified torque. Excessive torque can damage the sensor and the machine. Insufficient torque can lead to insufficient contact between the sensor and the machine and thus to insufficient data acquisition.

7.2.2.5.2   Clean and Grease the Machine Surface

1. Thoroughly clean the machine surface where the sensor should be attached.

2. Apply silicone grease and spread it around the drilled M8 hole with your finger. Therefore, use an unpowdered latex glove. Cover the whole area that the nut adapter will sit on.

7.2.2.5.3 Option A: Installation With Epoxy

> **ℹ️ NOTE!**
>
> We used the WÜRTH Epoxy-Stick Metal for this step and have had good experience with it. Of course, you can use any suitable high-quality epoxy resin.

1. Put on protective gloves.
2. Cut a suitable piece of the epoxy resin. Knead it between your fingers until the two components have mixed and the color is uniform.

> **ℹ️ NOTE!**
>
> Use the epoxy resin within 2 to 3 minutes after mixing!
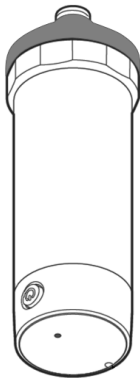
3) Apply the epoxy to the bottom of the nut adapter and mold it around the bolt.
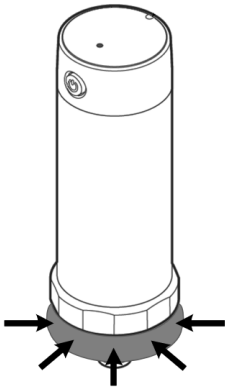
4) Carefully screw the sensor onto the surface of your machine by hand. When screwing it on, make sure that the epoxy resin remains between the nut adapter and the machine surface by pressing it on with your fingers.

> **ℹ️ NOTE!**
>
> Optionally, you can use a threadlocker if needed to secure the sensor in place.

5) After you have completely screwed the sensor into the machine, align the sensor so that the sensor axis points directly toward the drive or the non-drive end of the machine.
   Refer to 7.2.3 Aligning the Sensor. page 74.
6) Wait until the epoxy resin has fully hardened before switching on the machine.

7.2.2.5.4   Option B: Installation Without Epoxy

1. Carefully screw the sensor by hand onto the cleaned and greased surface of your machine.

---

i	**NOTE!** Optionally, you can use a threadlocker if needed to secure the sensor in place.

---

2. Set your torque wrench with a spanner size of 30 mm (11.81 in) to a tightness of 8 Nm and carefully tighten the sensor to the machine.


⚠	**NOTICE!** Observe the specified torque. Excessive torque can damage the sensor and the machine. Insufficient torque can lead to insufficient contact between the sensor and the machine and thus to insufficient data acquisition.

7.2.2.6   Installation with Magnetic Epoxy Mount Adapter
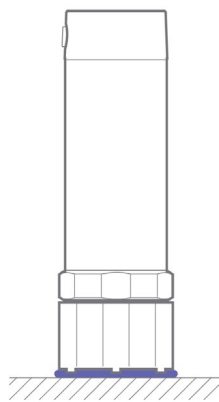
Using the magnetic epoxy mount adapter, a sensor can be mounted on uneven surfaces without drilling a hole for a screw.

The sensor will be pre-fixed with a magnet and must then be fixed with a suitable glue. It is possible to align the sensor manually.

Installation with a magnetic epoxy mount adapter requires a surface of 32 mm (1.26 in) diameter.

For this installation method you will need:

- A magnetic epoxy mount adapter
- Silicon grease
- Glue (LOCTITE EA 3450, LOCTITE HY 4070 or other suitable glue)
- Wrench, spanner width 30 mm (1.18 in)
- Torque wrench, spanner width 30 mm (1.18 in)

7.2.2.6.1 Connect the Magnetic Epoxy Mount Adapter to the Sensor
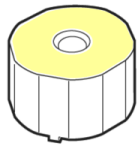
1) Thoroughly clean the non-magnetic top surface of the magnetic epoxy mount adapter. If you are not sure which surface is the correct one, test the magnetic surface of the adapter with a metal surface and then choose the opposite surface for this step.
2) Apply silicone grease and spread it around the hole in the adapter with your finger. Therefore, use an unpowdered latex glove.

3) Carefully screw the magnetic epoxy mount adapter to the thread of the sensor. The greased side should face the sensor and the magnetic side should face away from the sensor.
4) Hold the sensor with a wrench, spanner width 30 mm (1.18 in).
5) Set the torque wrench for the magnetic epoxy mount adapter with a spanner size of 30 mm (1.18 in) to a tightness of 8 Nm and carefully tighten the magnetic epoxy mount adapter to the sensor.

⚠ **NOTICE!**

Observe the specified torque. Excessive torque can damage the sensor and the machine. Insufficient torque can lead to insufficient contact between the sensor and the machine and thus to insufficient data acquisition.

7.2.2.6.2 Apply the Glue

1. Thoroughly clean the machine surface where the sensor should be attached.
2. Prepare the glue and then apply it to the surface of your machine according to the instructions of the glue manufacturer. Make sure that the two components of the glue are completely mixed.

i **NOTE!**

If you use an epoxy glue that is mixed in the nozzle, like the LOCTITE HY 4070, you can apply it directly to the machine surface.

7.2.2.6.3 Attach the Sensor to the Machine

1. Place the sensor on the glue.
2. Align the sensor so that the sensor axis points directly toward the drive or the non-drive end of the machine.
   Refer to 7.2.3 Aligning the Sensor. page 74.
3. Let the glue harden before switching on the machine

7.2.2.7 Installation without Adapter
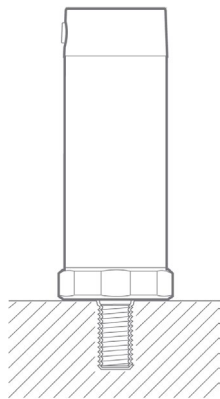
For this installation method, the sensor is directly attached to the machine surface. This minimizes the vibration transmission route for best measurement quality.

Installation without an adapter requires a flat surface of 32 mm (1.26 in) diameter, and a hole for an M8 bolt with 18.5 mm (0.73 in) depth of threading.

For this installation method you will need:

- M8 hole drilled in the machine surface
- Silicon grease
- Torque wrench, spanner width 30 mm (1.18 in)
- Optional: Threadlocker

---

i **NOTE!**

Manual alignment of the sensor is not possible with this installation method.
With this installation method you are not be able to align the sensor axis to the machine.
Use this installation method only if the sensor is used for single axis measurements.

---

1. Carefully drill an M8 hole into the machine surface at the location you have chosen for the measurements.

---

i **NOTE!**

Consider carefully where you drill the hole. If you are not sure, consult the instructions of the machine or the manufacturer.

---

i **NOTE!**

Make sure to drill the hole with the correct alignment to the machine. For most uses, an exact angle of 90° to the plane will be the right choice.

---

2. Thoroughly clean the machine surface where the sensor should be attached.
3. Apply silicone grease and spread it around the drilled M8 hole with your finger. Therefore, use an unpowdered latex glove. Cover the whole area that the sensor will sit on.
4. Screw the sensor into the M8 hole in the machine surface.

---

i **NOTE!**

Optionally, you can use a threadlocker if needed to secure the sensor in place.

---

5. Set your torque wrench with a spanner size of 30 mm (11.81 in) to a tightness of 8 Nm and carefully tighten the sensor to the machine.

> ⚠️ **NOTICE!**
>
> Observe the specified torque. Excessive torque can damage the sensor and the machine. Insufficient torque can lead to insufficient contact between the sensor and the machine and thus to insufficient data acquisition.

7.2.3 Aligning the Sensor
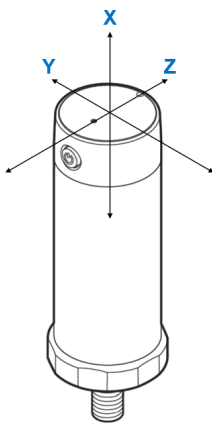
For accurate interpretation of the measurement data, the centerline of the sensor is often aligned with the shaft of the rotating machine.
This can be done by manually aligning the sensor with the shaft.

Manual alignment requires using the epoxy or glue mount adapter. After applying the fixative and hand tightening the sensor to the machine, align the sensor axis directly toward drive or non-drive end of monitored machine. Turn the sensor only clockwise.

> ℹ️ **NOTE!**
>
> It is a good practice to use the Z-axis for measuring the axial vibrations. Therefore, align the Z-axis with the shaft of the drive.

Figure 7-12) Aligning the sensor

7.2.4 Switching on the Sensor
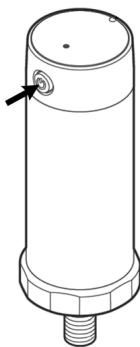
Press and hold the power button until the status light turns green, then the status light goes off again. The sensor is now on.

To switch the sensor off again, press the power button until the status light lights up red. The status light then goes off again after a few seconds and remains off.

Figure 7-13) Switching on the sensor

7.2.5   Verifying the Connection

To verify if the sensor is connected to the gateway, proceed as follows:

Press the power button briefly. The status light turns green (the sensor is on) and the status light goes off again.

The status light turns on a second time directly after that and lights up either:

CONNECTED

- **Green:** The sensor is connected to the gateway.

NOT CONNECTED

- **Red:** The sensor is not connected.

To switch the sensor off again, press the power button until the status light lights up red. The status light then goes off again after a few seconds and remains off.

Figure 7-14) Verifying the connection

If the sensor is not connected even though the gateway has been powered on and the sensor has had time to establish the connection, the sensor may be too far away from the gateway, or the environment may be blocking the wireless connection.

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i

NOTE!

In either case, the gateway needs to be moved closer to the sensor or an additional routing sensor can be added between the sensor and the gateway to help routing the data.

7.2.6   Reading the Sensor ID

Model:
Variant:
S/N: 00000000 — **ID**
Contains
FCC ID: XPYNINAB1
IC: 8595A-NINAB1
Anatel:
10468-20-12898
CMIIT ID:
2021DJ0827
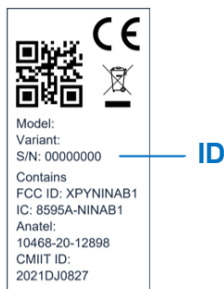
The identification number of the sensor is printed on the sticker attached to the sensor, and it can be as well read from the QR code.
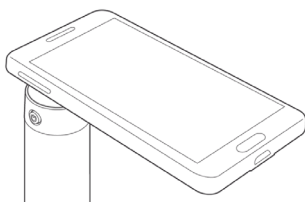
You can also use an NFC reader, such as an NFC-enabled mobile phone to read the identification number.
Switch on NFC on the reader and touch the top of the sensor with the reader.

Figure 7-15) Reading the sensor ID

8 SETPOINT Condition Monitoring Software based on AVEVA PI

A comprehensive online condition monitoring software solution for critical and non-critical machinery. It is designed for use in the hydrocarbon processing, petrochemical, power generation and other industries. Setpoint CMS provides powerful visualization tools for analysis and diagnostics of rotating and reciprocating machinery.

Refer to the SETPOINT Condition Monitoring Software, Installation and Operations Manual.

9 Maintenance

9.1 Cleaning Sensors and Gateways

- Use only a soft, clean, and dry cloth to clean the surface of the device. Do not clean the device with solvents, toxic chemicals, or strong detergents, as they may damage your device and void the warranty.
- The sensors are dust and splash proof. However, it is not recommended to immerse it in water.

9.2 Sensor Battery Life

The sensors are equipped with a 3.6 V A lithium thionyl chloride (LI-SOCl2) bobbin cell primary battery. The battery is not replaceable. If the battery is empty, replace the sensor.

The average battery life is approximately 5 years (standard ambient temperature range, sensor default monitoring settings, each sensor directly communicating to the gateway), but various factors and operating conditions affect the battery life:

- Ambient temperature
  Temperatures below -10 °C (14 °F) or above +60 °C (+140 °F) can result in a shorter service life
- Quality of wireless connection
- Number of wireless connections to subsequent sensors
- Frequency of measurement intervals
- Manual activation of individual measurements
- Type of data transmitted (scalar / FFT)

9.2.1 Impact of Routing Data on Sensor Battery Life

In addition to basic operation and sensor measurements, data transmission has a major impact on sensor power consumption and is the biggest drain on sensor battery life.

While transmitting scalar data has much less impact on battery life because fewer data fragments need to reach the gateway, transmitting FFT and especially raw data can cause issues when routing data from multiple sensors through a single sensor.

10   Disposal

Check the local regulations for proper disposal of electronic products.
The Directive on Waste Electrical and Electronic Equipment (WEEE), which entered into force as European law on 13th February 2003, resulted in a major change in the treatment of electrical equipment at end-of-life. The purpose of this Directive is, as a first priority, the prevention of WEEE, and in addition, to promote the reuse, recycling and other forms of recovery of such wastes so as to reduce disposal.

The crossed-out wheelie-bin symbol on your product, battery, literature, or packaging reminds you that all electrical and electronic products and batteries must be taken to separate collection at the end of their working life. Do not dispose of these products as unsorted municipal waste: take them for recycling. For info on your nearest recycling point, check with your local waste authority.

11   Technical Data

11.1   Technical Data Gateways (BKV Connect 1 & 2)

Type	Gateway to connect BKV Collect wireless sensors
Mesh network wireless communication	2.4 GHz ISM band low energy mesh radio network (maximum power +4 dBm)
Power source	BKV Connect 1: 5 V DC BKV Connect 2: Voltage range 85-264 VAC, frequency range 47-440 Hz, power consumption 30 VA maximum
Connectivity	2G, LTE CAT M1 Wi-Fi 2.4 GHz Ethernet RJ45
Cyber security - Sensor to gateway communication	All communication, including protocol headers, is protected by 128-bit encryption key
Cyber security - Gateway/App to host network communication	Usernames and passwords (unique to each gateway) Iptables for firewall MQTT over HTTPS/Secure Websockets using TLS 1.2
Sensor to gateway (direct) maximum range (depending on plant topology)	Theoretical: Up to 100 m (328 ft) with low complex data and infrequent data transmission Typical: Up to 50-60 m (164-197 ft) with default configuration Obstructions: < 10 m (< 32.8 ft) in case of obstructions (concrete walls, metal covers, etc.)
Dimensions	BKV Connect 1: ø95 x 18.3 mm (ø3.74 x 0.72 in) BKV Connect 2: 180 mm x 130 mm x 81 mm (7.1 x 5.12 x 3.19 in) (excluding cable sealing clamps)
Weight	BKV Connect 1: approx. 340 g (12 oz) BKV Connect 2: approx. 640 g (22.6 oz)
Material	BKV Connect 1: Polycarbonate BKV Connect 2: Polycarbonate & TPE (gaskets)
Operating temperature range	BKV Connect 1: 0 °C to +50 °C (+32 °F to +122 °F) BKV Connect 2: -20 °C to +50 °C (-4 °F to +122 °F)
Relative humidity range	20 – 90 % (non-condensing)
Storage temperature range	-40 °C to +85 °C (-40 °F to +185 °F)
Degree of protection	BKV Connect 1: IP20 BKV Connect 2: IP66/ IP67

Table 11-1) Technical data gateways (BKV Connect 1 & 2)

11.2 Technical Data Wireless Sensors (BKV Collect 6 & 6 Ex)

Type	Triaxial MEMS based vibration sensor with integrated temperature measurement
Vibration measurement	Acceleration: RMS, peak, peak-peak Velocity: RMS, peak, peak-peak Others: Kurtosis, Crest factor and raw data (time waveform)
Frequency range	10 - 6300 Hz +- 3dB
Dynamic range	2, 4, 8 or 16 g (configurable)
Sampling rate	26.7 kHz
Default configuration	Triaxial acceleration and temperature measurement A-RMS, Crest factor and v-RMS (10-1000 Hz): every 12 hours Raw data (time waveform): every 24 hours Sample amount: 36.864 per axis = 110.592 in total Dynamic range: 4G
Temperature measurement range	-40 °C to +105 °C (-40 °F to +221 °F)
Mesh network wireless communication	2.4 GHz ISM band low energy mesh radio network (maximum power +4 dBm)
Power source	Non replaceable 3.6 V A lithium thionyl chloride (LI-SOCI2) battery
Battery lifetime	Based on default configuration up to 5 years (depending on configuration and surrounding conditions). Main effect on battery life is caused by: Ambient temperature, update frequency, data processing, amount of samples, sending data and routing of sensors
Cyber security - Sensor to gateway communication	All communication, including protocol headers, is protected by 128-bit encryption key
Dimensions	78.5 x 28 mm (3.09 x 1.1 in)
Weight	129 g (4.55 oz)
Mounting	Inbuilt M8 threaded stud
Material	Body: 316 stainless steels Top cap: PE HD
Operating temperature range	-40 °C to +85 °C (-40 °F to +185 °F)
Storage temperature range	Not exceeding +30 °C (+86 °F) is recommended
Degree of protection	IP67

Table 11-2) Technical data wireless sensors (BKV Collect 6 & 6 Ex)

11.3   Order Codes

BKV Collect 6	Wireless sensor (with glue mount attached and nut adapter separate)	C108344.001
BKV Collect 6 Ex	Wireless sensor for hazardous areas (with glue mount attached and nut adapter separate)	C108345.001
BKV Connect 1	Gateway (including 4 adapters)	C108346.001
BKV Connect 2	Gateway in protective enclosure (without cable)	C108347.001
BKV Connect 2 NC	Gateway in protective enclosure NC (no cellular option) version (without cable)	C108347.010
AC-277	Magnetic epoxy mount adapter	C108348.001
AC-370	Glue mount adapter	C108349.001
AC-371	Nut adapter	C108350.001
AC-375	Wall mount for BKV Connect 1	C108393.001
BKV Ignite	Access to pre-configuration tool BKV Ignite	-

12   Explosion Protection

The following applies to the BKV Collect 6 Ex (sensor in Ex-certified variant):

ATEX & IECEx markings	II 2 G Ex ib IIC T4 Gb II 2 D Ex ib IIIC T135°C Db Ambient Temperature: -40 °C to +60 °C | -40 °F to +140 °F
MET markings	Class I Zone 1 AEx ib IIC T4 Gb Zone 21 AEx ib IIIC T135°C Db Class I, Division 2, Groups A,B,C,D T4 Class II, Division 2, Groups F,G T4 Class III, Division 2 Ex ib IIC T4 Gb Ex ib IIIC T135°C Db Ambient Temperature: -40 °C to +60 °C | -40 °F to +140 °F
Standards	ATEX: EN IEC 60079-0:2018 EN 60079-11:2012 IECEx: IEC 60079-0:2017 IEC 60079-11:2011 North America: UL 60079-11 (Edition 6) 2013 rev 2018 UL 60079-0 (Edition 7) 2019 rev 2020 CSA C22.2 NO 60079-11 (Edition 2) 2014 CSA C22.2 NO 60079-0 (Edition 4) 2019
Operating temperature range	In potentially explosive atmospheres: -40 °C to +60 °C (-40 to +140 °F) In other normal environments: -40 °C to +85 °C (-40 to +185 °F)
Operating frequencies	2400 MHz - 2483.5 MHz

Table 12-1) Explosion protection

13 Declaration of Conformity

13.1 Gateway (BKV Connect 1)

CERTIFICATIONS

Product name: Treon Gateway
Model number: 1111

EU DECLARATION OF CONFORMITY

CE

Hereby, Treon Oy declares that the radio equipment Treon Gateway
is in compliance with Directive 2014/53/EU.

https://www.treon.fi/documentation/

FCC NOTICE

FCC ID: 2AR86GW11

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

Radiofrequency radiation exposure information: this device complies with the radiation exposure limits prescribed for an uncontrolled environment for fixed and mobile use conditions. This device should be installed and operated with a minimum distance of 20 cm between device and the body of the user or nearby persons.

Canada

IC: 24716-GW11

This device complies with Industry Canada license-exempt RSS standard(s).
Operation is subject to the following two conditions:
1. This device may not cause interference, and
2. This device must accept any interference, including interference that may cause undesired operation of the device.
This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.
This Class B digital apparatus complies with Canadian ICES-003.
-
Cet appareil est conforme à la(aux) norme(s) RSS sans licence d'Industry Canada.
Son utilisation est soumise aux deux conditions suivantes:
1. Cet appareil ne doit pas causer d'interférences et
2. il doit accepter toutes interférences reçues, y compris celles susceptibles d'avoir des effets indésirables sur son fonctionnement.
Cet équipement respecte les limites d'exposition aux rayonnements IC RSS-102 définies pour un environnement non contrôlé. Il doit être installé et utilisé en maintenant une distance minimum de 20 cm entre le radiateur et votre corps.
Cet appareil numérique de classe B est conforme à la norme canadienne NMB-003.

Australia/New Zealand

ACMA Supplier's Declaration of Conformity

Brazil

Modelo: 1111
Anatel: 09553-20-12898
Para maiores informações, consulte o site da ANATEL www.anatel.gov.br
Este equipamento não tem direito à proteção contra interferência prejudicial e não pode causar interferência em sistemas devidamente autorizados.

Chile

No 8312/DO No 67056/F39

United Kingdom

UK CA

India
ETA-SD-20200100127

Morocco
2020000000000003732

Philippines

NTC

Type Approved
No: ESD-GEC-2006204

Thailand
This telecommunication equipment conforms to the standard or technical requirements of NBTC.
This telecommunication equipment has EMF radiation conforms to NTC EMF exposure standard NTC TS 5001-2550.
NTC ID. B69018-20-XXXX (XXXX = supplier code)

Turkey
According to EU Declaration of Conformity.

Cellular network connection is not supported in the following countries:

Saudi Arabia
TA 2022-2619

Signed for and behalf of,

At Tampere, 10h of October, 2022

Manufacturer: Treon Oy

Joni Korppi, CEO

13.2 Gateway in Protective Enclosure (BKV Connect 2)

CERTIFICATIONS

Product name: Treon Gateway in Protective Enclosure
Model number: 1131
Contains Treon Gateway 1111.

EU DECLARATION OF CONFORMITY

CE   Hereby, Treon Oy declares that the radio equipment Treon Gateway in Protective Enclosure
is in compliance with Directive 2014/53/EU.

https://www.treon.fi/documentation/

FCC NOTICE

FCC ID: 2AR86GW11

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help
Radiofrequency radiation exposure information: this device complies with the radiation exposure limits prescribed for an uncontrolled environment for fixed and mobile use conditions. This device should be installed and operated with a minimum distance of 20 cm between device and the body of the user or nearby persons.

Canada

IC: 24716-GW11
This device complies with Industry Canada license-exempt RSS standard(s).
Operation is subject to the following two conditions:
1. This device may not cause interference, and
2. This device must accept any interference, including interference that may cause undesired operation of the device.
This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.
This Class B digital apparatus complies with Canadian ICES-003.
-
Cet appareil est conforme à la(aux) norme(s) RSS sans licence d'Industry Canada.
Son utilisation est soumise aux deux conditions suivantes:
1. Cet appareil ne doit pas causer d'interférences et
2. il doit accepter toutes interférences reçues, y compris celles susceptibles d'avoir des effets indésirables sur son fonctionnement.
Cet équipement respecte les limites d'exposition aux rayonnements IC RSS-102 définies pour un environnement non contrôlé. Il doit être installé et utilisé en maintenant une distance minimum de 20 cm entre le radiateur et votre corps.
Cet appareil numérique de classe B est conforme à la norme canadienne NMB-003.

Australia/New Zealand

Brazil

Modelo: 1131
Anatel: 12729-20-12898
Para maiores informações, consulte o site da ANATEL www.anatel.gov.br
Este equipamento não tem direito à proteção contra interferência prejudicial e não pode causar interferência em sistemas devidamente autorizados.

Chile

Contains Treon Gateway 1111, certification No 8312/DO No 67056/F39

Colombia

Accepted to database of equipment not needing homologation in Colombia.

CERTIFICATION LEAFLET, TCL_1131_v1.7 (April, 2022) © 2022 Treon Oy. All rights reserved.

Ecuador
N° ARCOTEL-2022-031523

India
Contains: WPC ETA-SD-20200100127

Jordan
T/4/11/11/8915

Pakistan

Approved by PTA
9.1148/2020

Philippines

NTC

Type Approved
Contains: No: ESD-GEC-2006204

Qatar
CRA/SM/2020/S-0005808

Saudi-Arabia
TA 2022-736

Thailand
This telecommunication equipment conforms to the standard or technical requirements of NBTC.
This telecommunication equipment has EMF radiation conforms to NTC EMF exposure standard NTC TS 5001-2550.
NTC ID. B69019-20 -XXXX (XXXX = supplier code)

Turkey
According to EU Declaration of Conformity.

UAE

TRA – United Arab Emirates
Dealer ID : DA96537/20
TA RTTE : ER90975/20
Model : 1131
Type : Treon Gateway

Vietnam
A1894161121AA04A3

Cellular network connection is not supported in the following countries:

China
CMIIT ID: 2121CJ4263

Japan
当該機器には電波法に基づく、技術基準適合証明等を受けた特定無線設備を装着している
This equipment contains specified radio equipment that has been certified to the Technical Regulation Conformity Certification under the Radio Law.

Signed for and behalf of
At Tampere, 15th of February, 2022
Manufacturer: Treon Oy
Joni Korppi, CEO

13.3   Sensor (BKV Collect 6)

CERTIFICATIONS

Product name: Treon Industrial Node 6
Model number: 2111
Variant 6k

EU DECLARATION OF CONFORMITY

CE   Hereby, Treon Oy declares that the radio equipment Treon Industrial Node
is in compliance with Directive 2014/53/EU.

https://www.treon.fi/documentation/

FCC
SUPPLIER'S DECLARATION OF CONFORMITY

Unique Identifier: Treon Industrial Node, model 2111
Manufacturer:
Treon Oy
Visiokatu 3, FIN-33720 Tampere, Finland
https://www.treon.fi
Responsible Party – U.S. Contact Information:
OptoFidelity Inc.
19409 Stevens Creek Blvd. - Suite 250, Cupertino, CA 95014, USA
http://www.optofidelity.com
+1 (669) 241-8383
FCC Compliance Statement (for products subject to Part 15)
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.

Canada

This device complies with Industry Canada license-exempt RSS standard(s).
Operation is subject to the following two conditions:
1. This device may not cause interference, and
2. This device must accept any interference, including interference that may cause undesired operation of the device.
This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment.

Cet appareil est conforme à la(aux) norme(s) RSS sans licence d'Industry Canada.
Son utilisation est soumise aux deux conditions suivantes:
1. Cet appareil ne doit pas causer d'interférences et
2. il doit accepter toutes interférences reçues, y compris celles susceptibles d'avoir des effets indésirables sur son fonctionnement.
Cet équipement respecte les limites d'exposition aux rayonnements IC RSS-102 définies pour un environnement non contrôlé.

Brazil
Modelo: 2111
Anatel: 10468-20-12898
Para maiores informações, consulte o site da ANATEL www.anatel.gov.br
Este equipamento não tem direito à proteção contra interferência prejudicial e não pode causar interferência em sistemas devidamente autorizados.

Chile
Nº 10008/DO N° 68348/ F14

China
CMIIT ID: 2021DJ0827

India
ETA-SD-20200100131

Jordan
T/4/11/11/8914

Morocco
MR 23700 ANRT 2020

Pakistan

Approved by PTA
9.1170/2020

Qatar
CRA/SM/2020/S-0005693

Thailand
This telecommunication equipment conforms to the standard or technical requirements of NBTC.
This telecommunication equipment has EMF radiation conforms to NTC EMF exposure standard NTC TS 5001-2550.

UAE

TRA — United Arab Emirates
Dealer ID : __DA96537/20__
TA RTTE : __ER90654/20__
Model : ____2111____
Type : __Treon Industrial Node__

Signed for and behalf of,

At Tampere, 1ˢᵗ of August 2021

Manufacturer: Treon Oy

Joni Korppi, CEO

13.4   Sensor in Ex-certified variant (BKV Collect 6 Ex)

Certifications

Product name: Treon Industrial Node 6 Ex

Unique identifier: Treon Industrial Node, model 2111, variant 6k Ex

EU Declaration of Conformity

CE

Hereby, Treon Oy declares that the radio equipment Treon Industrial Node is in compliance with Directive 2014/53/EU.
https://www.treon.fi/documentation/

Hazardous areas

Ex

ATEX/IECEx
EESF 21 ATEX 014X
IECEx EESF 21.0009X

II 2 G Ex ib IIC T4 Gb
II 2 D Ex ib IIIC T135°C Db
-40°C ≤ Ta ≤ +60°C

North America
UL61010-1/CSA C22.2 No. 61010-1
UL/CSA 60950-22

(MET)us

UL 60079
CSA 60079
E115489

US
Class I Zone 1 AEx ib IIC T4 Gb
Zone 21 AEx ib IIIC T135°C Db
Class I, Division 2, Groups A,B,C,D T4
Class II, Division 2, Groups F,G T4
Class III, Division 2
-40°C ≤ Ta ≤ +60°C

Canada
Ex ib IIC T4 Gb
Ex ib IIIC T135°C Db
-40°C ≤ Ta ≤ +60°C

FCC Supplier's Declaration of Conformity

Unique Identifier: Treon Industrial Node, model 2111, variant 6k Ex
Manufacturer: Treon Oy, Visiokatu 3, FIN-33720 Tampere, Finland
https://www.treon.fi
Responsible Party – U.S. Contact Information:
OptoFidelity Inc.,19409 Stevens Creek Blvd. - Suite 250, Cupertino, CA 95014, USA
http://www.optofidelity.com
+1 (669) 241-8383
FCC Compliance Statement (for products subject to Part 15)
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) This device must accept any interference received, including interference that may cause undesired operation.

Canada
This device complies with Industry Canada license-exempt RSS standard(s).
Operation is subject to the following two conditions:
1. This device may not cause interference, and
2. This device must accept any interference, including interference that may cause undesired operation of the device.
This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment.
Cet appareil est conforme à la(aux) norme(s) RSS sans licence d'Industry Canada.
Son utilisation est soumise aux deux conditions suivantes:
1. Cet appareil ne doit pas causer d'interférences et
2. il doit accepter toutes interférences reçues, y compris celles susceptibles d'avoir des effets indésirables sur son fonctionnement.
Cet équipement respecte les limites d'exposition aux rayonnements IC RSS-102 définies pour un environnement non contrôlé.

Brüel & Kjær Vibro
A member of the NSK Group

Australia	
Brazil Modelo: 2111 Anatel: 10468-20-12898 Para maiores informações, consulte o site da ANATEL www.anatel.gov.br Este equipamento não tem direito à proteção contra interferência prejudicial e não pode causar interferência em sistemas devidamente autorizados.	**United Arab Emirates**
Chile Nº 10008/DO Nº 68348/ F14	**United Kingdom** UKCA
China CMIIT ID: 2021DJ0827	
Ecuador Nº ARCOTEL-NRH-2022-001098	
India ETA-SD-20200100131	
Japan	
Jordan T/4/11/11/8914	
Morocco MR 23700 ANRT 2020	
Pakistan PTA Approved by PTA 9.1170/2020	
Qatar CRA/SM/2020/S-0005693	
Taiwan CCAF22LP1320T0	
Thailand This telecommunication equipment conforms to the standard or technical requirements of NBTC. This telecommunication equipment has EMF radiation conforms to NTC EMF exposure standard NTC TS 5001-2550.	

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Contact

Brüel & Kjær Vibro GmbH
Wittichstraße 6
64295 Darmstadt
Germany

Phone: +49 6151 428 0
Fax: +49 6151 428 1000

Corporate E-Mail: info@bkvibro.com

Brüel & Kjær Vibro A/S
Lyngby Hovedgade 94, 5 sal
2800 Lyngby
Denmark

Phone: +45 69 89 03 00
Fax: +45 69 89 03 01

Homepage: www.bkvibro.com

BK Vibro America Inc.
1100 Mark Circle
Gardnerville NV 89410
USA

Phone: +1 (775) 552 3110