xylem

**Additional Installation, Operation, and Maintenance Instructions**
P2007013 Rev 5

EN

# optimyze® and optimyze® Gateway

# Table of Contents

# 1 Introduction and safety

## 1.1 Introduction

Purpose of the manual

The purpose of this manual is to provide the necessary information for working with the unit. Read this manual carefully before starting work.

Read and keep the manual

Save this manual for future reference, and keep it readily available at the location of the unit.

Intended use

**WARNING:**

Operating, installing, or maintaining the unit in any way that is not covered in this manual could cause death, serious personal injury, or damage to the equipment and the surroundings. This includes any modification to the equipment or use of parts not provided by Xylem. If there is a question regarding the intended use of the equipment, please contact a Xylem representative before proceeding.

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## 1.2 Safety terminology and symbols

About safety messages

It is extremely important that you read, understand, and follow the safety messages and regulations carefully before handling the product. They are published to help prevent these hazards:

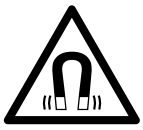
- Personal accidents and health problems
- Damage to the product and its surroundings
- Product malfunction

Hazard levels

| Hazard level | Indication |
|---|---|
|  **DANGER:** | A hazardous situation which, if not avoided, will result in death or serious injury |
|  **WARNING:** | A hazardous situation which, if not avoided, could result in death or serious injury |
|  **CAUTION:** | A hazardous situation which, if not avoided, could result in minor or moderate injury |
| **NOTICE:** | Notices are used when there is a risk of equipment damage or decreased performance, but not personal injury. |

Special symbols

Some hazard categories have specific symbols, as shown in the following table.

| Electrical hazard | | Magnetic fields hazard | |
|---|---|---|---|
|  | **Electrical Hazard:** |  | **CAUTION:** |

# 1.3 User safety

All regulations, codes, and health and safety directives must be observed.

The site

- Observe lockout and tagout procedures before starting work on the product, such as transportation, installation, maintenance, or service.
- Pay attention to the risks presented by gas and vapors in the work area.
- Always be aware of the area surrounding the equipment, and any hazards posed by the site or nearby equipment.

Qualified personnel

This product must be installed, operated, and maintained by qualified personnel only.

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Protective equipment and safety devices

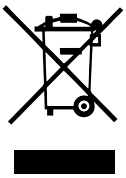
- Use personal protective equipment as needed. Examples of personal protective equipment include, but are not limited to, hard hats, safety goggles, protective gloves and shoes, and breathing equipment.
- Make sure that all safety features on the product are functioning and in use at all times when the unit is being operated.

# 1.4 Protecting the environment

Emissions and waste disposal

Observe the local regulations and codes regarding:

- Reporting of emissions to the appropriate authorities
- Sorting, recycling and disposal of solid or liquid waste
- Clean-up of spills



WEEE (EU/EEA) INFORMATION FOR USERS pursuant to art. 14 of the Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE). The crossed bin symbol on the appliance or on its packaging indicates that the product at the end of its useful life must be collected separately and not disposed of together with other mixed urban waste. Appropriate separate collection for the subsequent start-up of the disused equipment for recycling, treatment and environmentally compatible disposal helps to avoid possible negative effects on the environment and on health and favours the re-use and / or recycling of the materials of which the equipment is composed. WEEE from users other than private households[1]: the separate collection of this equipment at the end of its life is organized and managed by the producer[2]. The user who wants to get rid of this equipment can then contact the producer and follow the system that it has adopted to allow the separate collection of equipment at the end of life or select an organization independently authorized to manage waste.

1 Classification according to product type, use and current local laws

2 Producer of EEE as per Directive 2012/19/EU

WEEE (UK) INFORMATION TO USERS pursuant to art. 44 of the The Waste Electrical and Electronic Equipment Regulations 2013 (S. I. 2013 No. 3113). The crossed bin symbol on the appliance or on its packaging indicates that the product at the end of its useful life must be collected separately and not disposed of together with other mixed urban waste. Appropriate separate collection for the subsequent start-up of the disused equipment for recycling, treatment and environmentally compatible disposal helps to avoid possible negative effects on the environment and on health and favours the re-use and / or recycling of the materials of which the equipment is composed. WEEE from users other than private households[1]: the separate collection of this equipment at the end of its life is organized and managed by the producer[2]. The user who wants to get rid of this equipment can then contact the producer and follow the system that it has adopted to allow the separate collection of equipment at the end of life or select an organization independently authorized to manage waste.

1 Classification according to product type, use and current local laws

2 Producer of EEE as per WEEE Regulations 2013

## 1.5 Battery safety and disposal

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**WARNING:**

Do not crush, puncture, short, or expose batteries to a temperature above +85°C (185°F). Only use batteries supplied by Xylem Inc. for replacement. Do not ingest batteries, chemical burn hazard.

This product contains two replaceable lithium batteries. Consult the product instruction manual for replacement guidelines. All batteries must be disposed in an environmentally sound manner according to local regulations. Consult your local waste-management officials for information on how to safely dispose of used batteries.

## 1.6 Spare parts

**CAUTION:**

Only use the manufacturer’s original spare parts to replace any worn or faulty components. The use of unsuitable spare parts may cause malfunctions, damage, and injuries as well as void the warranty.

# 2 Transportation and storage

## 2.1 Examine the delivery

### 2.1.1 Examine the package

1. Examine the package for damaged or missing items upon delivery.
2. Record any damaged or missing items on the receipt and freight bill.
3. If anything is out of order, then file a claim with the shipping company.
4. If the product has been picked up at a distributor, make a claim directly to the distributor.

### 2.1.2 Examine the unit

1. Remove packing materials from the product.

   Dispose of all packing materials in accordance with local regulations.
2. To determine whether any parts have been damaged or are missing, examine the product.
3. If there is any issue, then contact a sales representative.



## 2.2 Storage guidelines

Storage location

The product must be stored in a covered and dry location free from heat, dirt, and vibrations.

**NOTICE:**

Protect the product against humidity, heat sources, and mechanical damage.

**NOTICE:**

Do not place heavy weights on the packed product.

# 3 Product description

## 3.1 optimyze

### 3.1.1 Usage

**optimyze**® [1] is a condition monitoring application that gives health guidance and predictive maintenance advice for the following rotating and fixed assets:

- Pumps
- Heat exchangers
- Motors
- Steam traps

Asset health data is stored in the xylem cloud and can be shared with multiple users

### 3.1.2 Features

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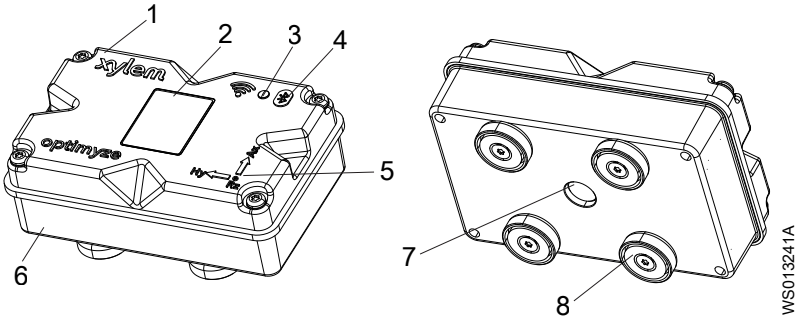
- Periodic measurement of asset vibration (three axis), temperature and pressure (optional)
- Uses the Bluetooth® wireless technology [2] to communicate the health and operating data to a smart device or gateway
- Shares data automatically with other local users through cloud
- Shows the asset health by using a traffic light warning system
- Graphical trending and waveform analysis
- Generates reports
- Shows maintenance logs
- Library of product documentation (IOM, data sheet, and parts)
- Schedules the routine preventive maintenance of assets

### 3.1.3 Compatibility

- iOS
- Android

### 3.1.4 Parts




1. Upper cover
2. QR code
3. LED
4. Bluetooth® icon
5. Axis alignment guide
6. Lower cover
7. Infrared (IR) sensor window
8. Magnetic feet

1 optimyze® is a trademark of Xylem, Inc. or one of its subsidiaries. All other trademarks or registered trademarks are property of their respective owners.

2 The Bluetooth® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by Xylem Inc is under license. Other trademarks and trade names are those of their respective owners.

# 3.2 Gateway (optional)

## 3.2.1 Usage

The **optimyze**® [3] Gateway provides remote connectivity for optimyze condition monitoring sensors. Once set up and paired, the Gateway will automatically connect to the sensors every 24 hours to collect asset health data. The data will then be securely sent to the xylem cloud over low-power LTE-M or NB-IoT, allowing users to access the latest information about their assets without physically being within Bluetooth® range.

## 3.2.2 Features

- Cellular connectivity: The optimyze Gateway gathers data from optimyze sensors through Bluetooth and then sends it over LTE-M or NB-IoT cellular networks to the cloud.
- Suitable for deployment around the world:
  - FCC, ISED, CE, UKCA
- Compact Form Factor: 110.3 mm (4.4 in) x 99.2 mm (3.9 in) x 35.4 mm (1.4 in)
- Visual status indication:
  - LED: Clear indication of optimyze Gateway status. See *Button locations* on page 14 for different status information.

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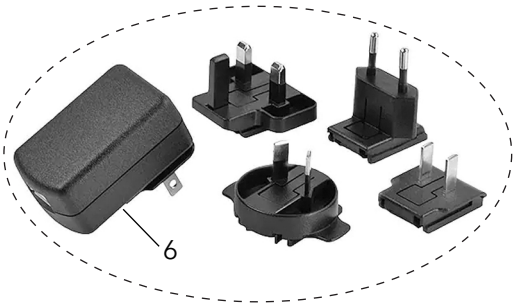
## 3.2.3 Compatibility

Developed for exclusive use with optimyze sensors.

## 3.2.4 Parts


[3] Xylem and optimyze® are trademarks of Xylem, Inc. or one of its subsidiaries. The use by Laird Connectivity LLC is under licence. The Bluetooth® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by Laird Connectivity LLC, Aanderaa Data Instruments AS and Xylem Inc. is under license. All other trademarks or registered trademarks are property of their respective owners.

1. optimyze Gateway
2. Antenna, Bluetooth (longer antenna)
3. Antenna, Dipole, Cellular (shorter antenna)
4. Power Switch
5. USB Power Connector (Micro USB Connector)
6. AC-DC Power Supply, with regional adaptor for US, UK, Australia and Europe. (sold separately)

# 4 User interface

## 4.1 optimyze

### 4.1.1 Common icon

The following icons are shown on the home page:

| Icon | Color | Description |
|---|---|---|
| | - | Show the following pages:<br>• **Dashboard**<br>• **View reports**<br>• **View reminders**<br>• **Setting**<br>• **Contact us** |
| | - | Allows the user to email information |
| | - | Displays the notifications and warnings |
| | - | Allows the user to add new asset or sensor |
| | Green | Shows that the asset health is satisfactory |
| | Yellow | Shows that the asset health has deteriorated |
| | Red | Shows that the asset health has become critical |
| | Green | Shows that the asset temperature is normal |
| | Red | Shows that the asset temperature is more than the recommended limit |
| | Green | Shows that the asset vibration is normal |
| | Yellow | Shows that the asset vibration has increased to warning level |
| | Red | Shows that the asset vibration has increased to critical level |
| | Green | Shows that the battery level is normal |
| | Red | Shows that the battery level is low |
| | - | Shows that the new data has been uploaded from the sensor today |
| | - | Shows that pressure sensor(s) are paired with the optimyze sensor. |
| | - | Shows that the new data has not been uploaded from the sensor today |
| | - | Shows the following parameters in the asset details menu:<br>• **Reports**<br>• **Maintenance**<br>• **Reminders**<br>• **Asset Setting**<br>• **Documents** |
| | - | Allows the user to edit the information |
| | - | Allows the user to delete the information or item |
| | - | Allows the user to select a calendar date |
| | - | Shows the drop-down list |
| | - | Allows the user to capture or upload photo |
| | Blue | Allows the user to enable feature |

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| Icon | Color | Description |
|---|---|---|
| | Gray | Allows the user to disable feature |
| | - | Allows the user to change the language of the application |
| | Green | Shows that the pressure monitoring system is satisfactory |
| | Yellow | Shows that the pressure monitoring system has deteriorated |
| | Red | Shows that the pressure monitoring system has become critical |
| | Green | Shows that the asset pressure values are normal |
| | Yellow | Shows that the pressure value has reached to warning level |
| | Red | Shows that the pressure value has reached to warning level |

## 4.1.2 Main menu

The ☰ icon contains the following tabs:

| Icon | Tab | Function |
|---|---|---|
| | **Dashboard** | Shows the following parameters of the assets and sensors:<br>• Health of the assets<br>• Battery life of the sensor<br>• Status of the data synchronization |
| | **View reports** | Allows the user to view and share the reports |
| | **View reminders** | Allows the user to view the maintenance reminders |
| | **Documents** | Allows the user to navigate to optimyze documentation on the web. |
| | **Setting** | Allows the user to edit the user profile information and application settings |
| | **Contact us** | Shows the email ID and phone number of the local sales and service representative<br>Allows the user to send the log history to the local sales and service representative |
| | **Sign out** | Allows the user to disconnect the user ID from the app. |

## 4.1.3 Asset health menu

The menu show the following parameters of sensors and assets:

| Parameter | Description |
|---|---|
| **Temperature** | Shows the last recorded temperature<br>Allows user to access the trend chart |
| **Vibration**<br>**Radial**, **Axial**, and **Horizontal** | Shows the last recorded RMS vibration level<br>Allows user to access the vibration trend charts for **RMS**, **Kurtosis**, and **FFT** |
| Battery life | Shows the last recorded battery level<br>Allows user to access the trend chart |
| **Force read** | Forces the sensor to collect the last data read by the device immediately |
| **Pressure** | Shows the last recorded pressure values<br>Allows user to access the trend chart |

Each asset shows the following parameters:

- Asset picture
- Name
- Location
- Sensor icon

The sensor icon changes color according to the health of the asset.

For more information, see *Common icon* on page 11.

## 4.1.4 Asset details menu

The ⋮ icon contains the following tabs:

| Tab | Function | Description |
|---|---|---|
| **Reports** | Allows the user to create, view, and share reports for a specific asset | - |
| **Maintenance** | Allows the user to create and view the maintenance logs for a specific asset | - |
| **Reminders** | Allows the user to create and view the maintenance reminders for a specific asset | Notifications must be turned on in the settings to create and receive reminders |
| **Asset Setting** | Asset setting shows the following parameters:<br>• Image of the asset<br>• **Asset name**<br>• **Manufacturing date**<br>• **Model**<br>• Sensors<br>• The sensor setting page shows the following parameters:<br>– **Learning mode**<br>– **Manufacturing date**<br>– **Sensor Placed on**<br>– **Sensor placed on the part**<br>– **Vibration Standard**<br>– **Classification**<br>– **Asset size**<br>– **Sampling frequency**<br>• Allows the user to select one of the following options for the **Sensor placed on the part**:<br>– **NDE Bearing** (Non-drive end)<br>– **DE Bearing** (Drive end)<br>– **Motor** and **Other** | • The asset size and classification selects the approved vibration thresholds for normal operation.<br>For more information, see *Vibration threshold selection* on page 23.<br>• If an incorrect power rating or classification is selected, the sensor may show the inaccurate warnings or alarms.<br>• **Learning mode** reads the natural steady state properties of the asset.<br>• The normal condition is selected during the learned time period that displays on the temperature and RMS plots as other color bands.<br>• After initial setup, the sensor must be in configuration mode to edit the sensor settings.<br>For more information, see *Set up the configuration mode* on page 22. |
| **Documents** | Shows the product-specific information, literature, and data | - |

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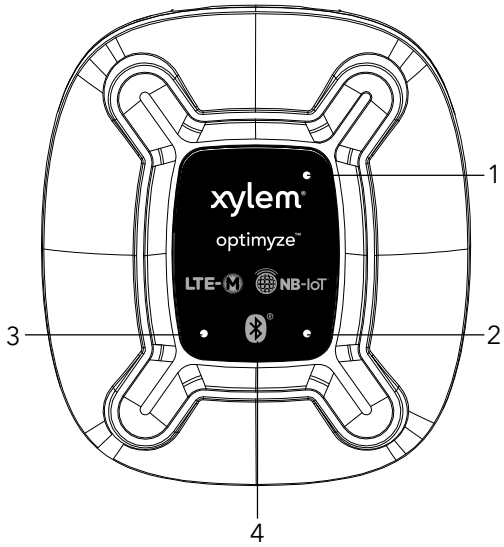
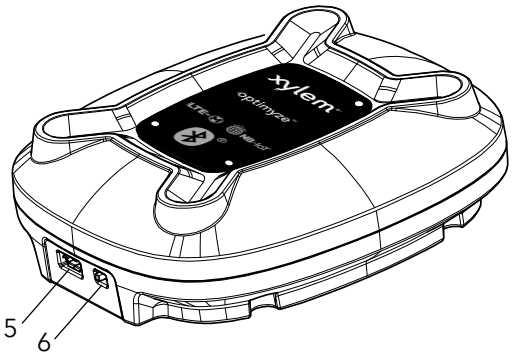
# 4.2 Gateway (optional)

## 4.2.1 Button locations




1. Red LED
2. Green LED
3. Blue LED
4. Bluetooth Button
5. USB Power Connector
6. Power Switch

## 4.2.2 LEDs

The LEDs are used to show different status information of the optimyze Gateway:

- Bluetooth status
- Cellular status and RAT (Radio Access Technology) modes.
- Xylem Cloud server connection status

The LED statuses are shown below:

| LED color | LED | Description |
|---|---|---|
| Blue | 5-second single blink | Normal mode |
| | 1-second blink | Pairing mode |
| | On | Connected over Bluetooth to optimyze sensor |
| | Triple blink | Successful new Bluetooth pairing with an optimyze sensor |
| | Double blink | Successfully unpaired with all devices |
| Green | On | Connected to xylem cloud |
| | Off | Not connected to xylem cloud |
| | Double blink (once every min): | device is connected to LTE-M. * |
| | Triple blink (once every min): | device is connected to NB-IoT. |

| LED color | LED | Description |
|---|---|---|
| Red | 3-second blink | Searching for network |
| | On | Network connected |
| | Off | Not connected to network |

* Note: For further details on network selection/ restrictions, refer to Section 6.4.

### 4.2.3 Buttons

Bluetooth button:

- Single press: Enter and refresh pairing mode.
- Hold 5 seconds: Change network selection.
- Hold 30 seconds: Unpair all sensors.

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# 5 Installation

## 5.1 optimyze

### 5.1.1 Precautions

Before starting work, make sure that the safety instructions in the chapter *Introduction and safety* on page 4 have been read and understood.

**WARNING:**

All work must be performed by qualified personnel trained in the proper application, installation, and maintenance of the equipment.

**WARNING:**

Always disconnect and lock out power to the sensor before you perform any installation or maintenance tasks. Failure to disconnect and lock out power will result in serious physical injury or property damage.

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**WARNING:**

Failure to follow all instructions can result in a fire hazard which may cause personal injury or property damage.

**WARNING:**

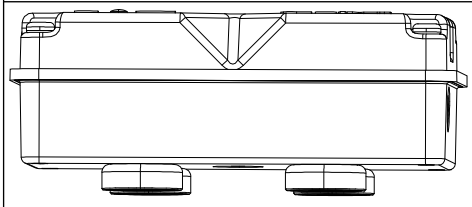
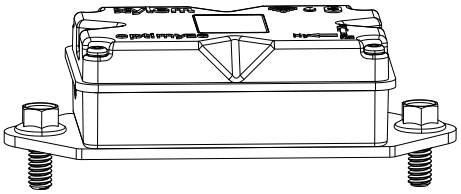
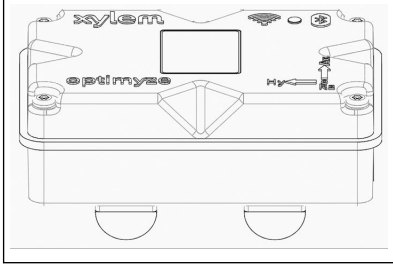
Magnetic Hazard. Magnetic fields can damage cardiac pacemaker and other medical implants.

**WARNING:**

The magnets in the sensor feet are extremely powerful. Beware of serious injury to fingers and hands. When not in use, keep magnetic (ferrous) components and magnetized tools apart by a minimum of 1 m (3 ft).

### 5.1.2 Mounting options

One of the following mountings must be used to install the sensor on a pump or motor:

| Standard magnetic mounting | Flat plate mounting (optional) |
|---|---|
|  |  |
| Round magnet mounting (optional) | |
|  | |

## 5.1.3 Requirements

5.1.3.1 Standard magnetic mounting

- The standard magnetic mounting must be installed on ferrous metals.
- The sensor must be mounted near bearings or other sources of vibration and increase in temperature.
- The standard magnetic mounting cannot be installed on special alloys or stainless steels.
- Before the sensor is installed, the pump or motor surface must be cleaned.
- If there is no correct surface to install the standard magnetic mounting, use the flat plate mounting.

5.1.3.2 Flat plate mounting/ Round magnet mounting

- The flat plate mounting can be used where the mounting surface is non-ferrous.
- The round magnet mounting can be used for irregular ferrous surfaces where a standard magnet does not make full contact.
- The sensor must be mounted near bearings or other potential sources of vibration and increase in temperature.
- For true close-coupled pumps, the mounting location must be near the motor bearings.
- There must be sufficient space to remove the sensor and mounting plate safely without harm or injury.

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5.1.3.3 Temperature sensor

- The infrared sensor window must be in direct line of sight with the surface of the asset being measured.
- Avoid installation of the sensor on any sheet metal enclosures surrounding the asset.
- The sensor must be mounted near bearings or other potential sources of vibration and increase in temperature.
- Follow the correct sensor orientation guidelines.

  For more information, see *Install the optimyze sensor* on page 18

## 5.1.4 Install the standard magnetic mounting

1. Install the standard magnetic mounting on one of the following surfaces of the asset:
   - Flat and dry
   - Curved: The minimum diameter must be 180 mm (7 in).
2. Check that the mounting is stable on the asset surface.

## 5.1.5 Prepare the flat plate mounting

1. On the asset, locate the surface to install the mounting.
2. Put the mounting plate on the location.
3. Use the outer most holes in the mounting plate to mark the position of holes on the surface of the asset.
4. Drill the holes at the marked position.
   - The flat plate mounting requires a size M6 or 1/4 in -20 tap.
   - The diameter of the hole must be 5 mm or 13/64 in.
   - The depth of hole must be 13 mm or 1/2 in.
   - The distance between the holes must be 105 mm (4.1 in).
5. Deburr the holes.
6. Use a M6x1 (1/4 in - 20) threading to tap the holes.

## 5.1.6 Install the flat plate mounting/ Round magnet mounting

1. Remove the magnetic mounting feet from the sensor.
2. Put the sensor face down.

   The infrared sensor window must not be blocked.
3. Put the flat plate mounting or round magnet mounting on the sensor.

   The countersunk holes must face away from the sensor.
4. To install flat plate mounting, align the four screw holes of the flat plate mounting and four blind holes of the sensor housing. To install the round magnet mounting, align the two screw holes of the magnet mounting with the two blind holes of the sensor housing for both round magnets.

   For more information, see *Install the optimyze sensor* on page 18.
5. Install the screws.
6. Use a torque wrench to tighten the screws.

   The torque must be 0.88 Nm (7.8 lbf.in).
7. Install the flat plate mounting and sensor on the pump, or install the round magnet mounting on the pump.
8. Tighten the screws for flat mounting plate.
9. Check that the mounting is stable on the asset surface.

   The mounting must be stable to obtain the accurate vibration data.

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## 5.1.7 Install the optimyze sensor

Install the sensor on the pump or motor surface in one of the following correct positions:

Table 1: Default position

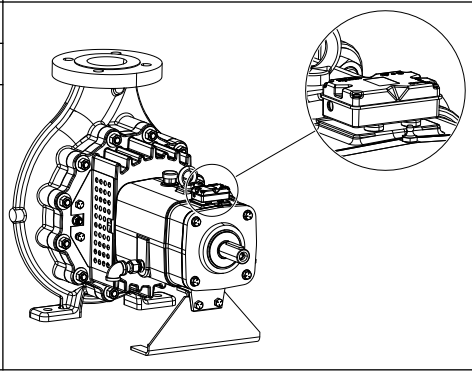
| Axis | Align | Position |
|---|---|---|
| X | Axially to the shaft |  |
| Y | Horizontally to the shaft | |
| Z | Radially to the shaft | |

Table 2: Alternate positions

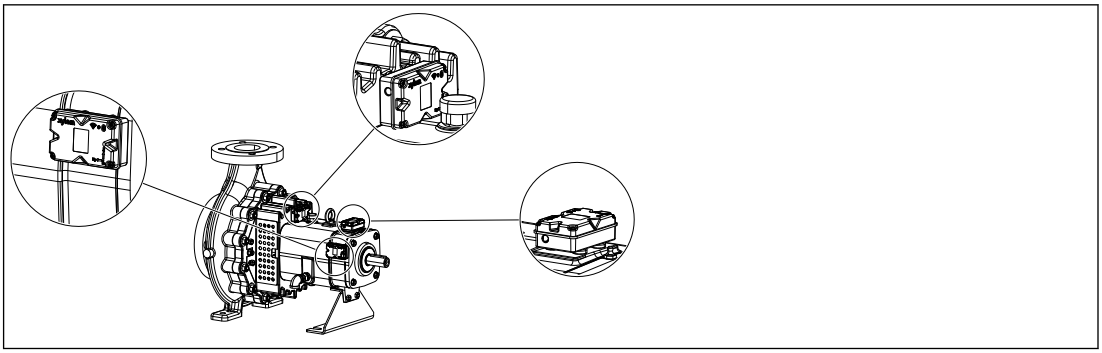
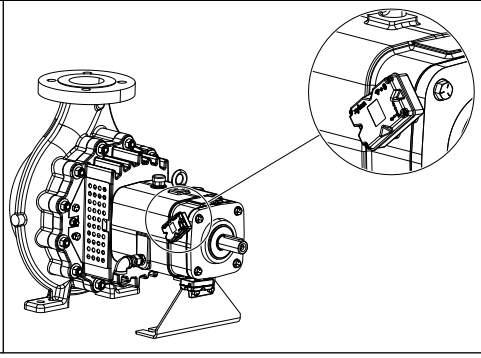
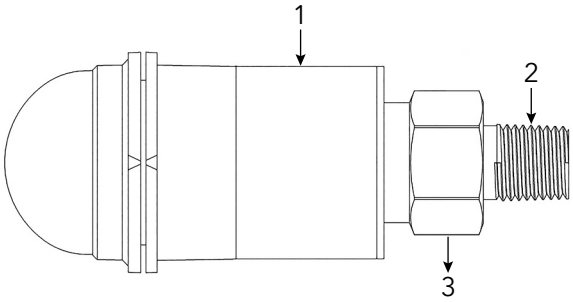


Table 3: Incorrect position

| Axis | Align | Position |
|---|---|---|
| X | Not aligned to major vibration axis |  |
| Y | | |
| Z | | |

## 5.1.8 Install the pressure sensor (optional)

All optimyze wireless pressure sensors are equipped with a ¼” NPT male threaded fitting.




1. Sensor casing
2. ¼" NPT male
3. 7/8 Hex nut

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1. Wrap the pressure sensor pipe fitting with Teflon tape to ensure a tight seal.
2. Mount the pressure sensor onto a ¼” NPT female fitting located on both the suction and discharge sides of the system if the differential pressure needs to be monitored. Or screw the sensor to the access valve of the system that requires monitoring.
3. Use a hex wrench to securely fasten the hex nut positioned above the fitting.

   Do not use the pressure sensor casing to apply torque.

# 5.2 Gateway (optional)

## 5.2.1 Precautions

Before starting work, make sure that the safety instructions in the chapter *Introduction and safety* on page 4 have been read and understood.

**WARNING:**

All work must be performed by qualified personnel trained in the proper application, installation, and maintenance of the equipment.

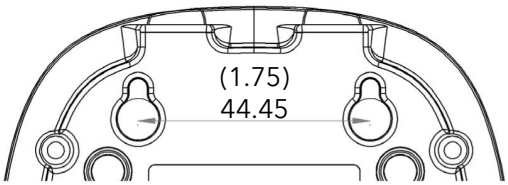
## 5.2.2 Mounting options

Location

The Gateways are intended to be positioned in clean, protected, and dry indoor environments.

Procedure

- The rear enclosure includes two key hole slots that accept screw heads to hang the unit on a vertical surface. The screw head diameter can be no larger than 7 mm with a maximum thread diameter of 3.75 mm and a head height of 3.2 mm.
- When the screw is installed in the mounting surface, the space between screw head and mounting surface shall be no less than 5 mm to account for the thickness of plastic and rubber feet.
- Space the mounting screws 44.45 mm (1.75 in) apart.




External Antenna positioning

For optimal performance, external antennas should be positioned vertically, tip pointing up, perpendicular to the ground regardless of mounting surface orientation.

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Precaution

To avoid damage, be sure to use appropriate anchors and screws when mounting on vertical surfaces.

# 6 Operation

## 6.1 optimyze

### 6.1.1 Precautions

Before starting work, make sure that the safety instructions in the chapter *Introduction and safety* on page 4 have been read and understood.

### 6.1.2 Download the optimyze application

Download the **optimyze** application by using one of the following methods:

- Search for the Xylem **optimyze** application in the application store.
- Scan the QR code by using the mobile camera to go to the application store.

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### 6.1.3 Register the user

1. On the landing page, tap the **Register** button.
2. If the user already has a Xylem cloud account, register by using the existing details.
3. On the **Register** page, follow these steps.
   a) Xylem register:
      - Email address,
      - Country Code,
      - Phone Number,
      - Organization Name,

      An email with the verification link is sent to the user.
4. Click the verification link to validate the email address.
   A set password window appears.
5. Type the password.
6. Click **Set Password**.

### 6.1.4 Start the application

1. Go to the **optimyze** application.
2. Login to Xylem **optimyze** Application is as follows:
   - Username
   - Password
3. Tap **Login** or sign in with Xylem.

## 6.1.5 Activate the sensor

Put the magnet in the handle of the supplied screwdriver on the Bluetooth® icon to activate the sensor.

The LED blinks white light shows that the sensor is awake from the sleep mode.

The LED blinks yellow light until the sensor is put in configuration mode.

If the sensor is not set to configuration mode in 2 minutes, the sensor goes into sleep mode.

## 6.1.6 Set up the configuration mode

Hold the magnet in the handle of the supplied screwdriver on the Bluetooth® icon to set up the configuration mode.

The LED blinks pink light shows that the configuration mode is on.

## 6.1.7 Connect a mobile phone to the sensor

1. Before connecting the mobile phone to sensor, check that the following procedures are completed:
   1. Bluetooth wireless technology is enabled.
   2. Camera permission is allowed for the **optimyze** application.
2. On the **Asset health** page, tap the ⊕ icon.
3. On the **Add a sensor** page, select one of the following options:

| Entry | Action |
|---|---|
| QR code | Use the mobile phone camera to scan the **QR code** on the sensor. |
| Manual entry | Type the nine-digit serial number<br>The serial number is located below the **QR code**. |

4. Tap **Enter**.

   A blinking blue LED shows that the mobile phone is connected to the sensor.
5. On the **Bluetooth Pairing Request** screen, tap the **Pair** button.

## 6.1.8 Configure the sensor

On the **Sensor configuration** page, follow these steps to configure the sensor.

a) Select the **Installation date**.

b) Select the following parameters from the drop-down list:
   - **Sensor Placed on**
   - **Sensor placed on the part**

c) Select one of the following **Vibration Standard**:
   - **ISO**
   - **ANSI/HI**
   - **User Defined**

   For more information, see *Vibration threshold selection* on page 23.

d) Select the following parameters from the drop-down list:

| Parameter | Description |
|---|---|
| Classification | Defines the vibration monitoring threshold<br>For more information, see *Vibration threshold selection* on page 23. |
| Asset size | |
| Sampling frequency | Shows the period in which sensor collects the data |

| Parameter | Description |
|---|---|
| Set up axis for vibration | For more information, see *Install the optimyze sensor* on page 18. |

e) Tap on **Add an asset** button.

## 6.1.9 Configure the asset

On the asset configuration page, follow these steps to configure the asset.

a) Type the asset name.
b) Select the **Manufacturing date**.
c) Select the asset location from the drop-down list.
d) Tap the icon to add an image of the asset.
e) Select the asset model from the drop-down list.
f) Tap **Save** button.

## 6.1.10 Vibration threshold selection

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| Pump category | Standard | Pump type | Vibration velocity (mm/s) and LED color | | |
|---|---|---|---|---|---|
| | | | LED | Power rating ≤200 kW | Power rating >200 kW |
| 1 | ISO 10816-7 | Category 1 - critical | Green | ≤ 4.0 | ≤ 5.0 |
| | | | Yellow | Between 4.0 and 6.6 | Between 5.0 and 7.6 |
| | | | Red | > 6.6 | > 7.6 |
| 2 | ISO 10816-7 | Category 2 - general | Green | ≤ 5.1 | ≤ 6.1 |
| | | | Yellow | Between 5.1 and 8.5 | Between 6.1 and 9.5 |
| | | | Red | > 8.5 | > 9.5 |
| 3 | ANSI/HI 9.6.4 | End suction, vertical inline, split case, and horizontal multistage | Green | ≤ 4.9 | ≤ 6.2 |
| | | | Red | > 4.9 | > 6.2 |
| 4 | ANSI/HI 9.6.4 | Vertical turbine and vertical multistage | Green | ≤ 4.3 | ≤ 5.6 |
| | | | Red | > 4.3 | >5.6 |
| 5 | User Defined | N/A | Green | User Defined | |
| | | | Yellow | | |
| | | | Red | | |

## 6.1.11 LED Status on optimyze sensor

| LED Status | Description |
|---|---|
| Blinking Green | Shows that the asset health is good. |
| | Shows that the asset temperature is normal. |
| | Shows that the asset vibration is normal. |
| | Shows that the asset battery level is normal. |
| Blinking Yellow | If the optimyze sensor has not yet been set up, the LED blinks yellow until the sensor is put into configuration mode. |
| | Shows that the asset health has deteriorated. |
| | Shows that the asset vibration has increased to warning level. |

| LED Status | Description |
|---|---|
| Blinking Red | Shows that the asset health has become critical. |
| | Shows that the asset vibration has increased to critical level. |
| | Shows that the battery level is low. |
| | Shows that the asset temperature is more than the recommended limit. |
| Blinking Pink | Shows that the configuration mode is active. |
| Blinking Blue | Shows that the mobile phone is connected to the sensor. |
| Blinking Light Blue | Shows that the pressure sensor is connected to the optimyze sensor. |
| Blinks White Once | Shows that the sensor is awake from the sleep mode. |
| | Indicates that the mobile phone has disconnected from the sensor. |

## 6.1.12 Add a wireless pressure sensor to the system (optional)

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### 6.1.12.1 Prerequisites

Before installation of a pressure sensor check that the standard optimyze sensor device is:

- Firmware must be version 2.0.2 or later.
- Configured successfully
- Collecting data according to the sensor configuration

### 6.1.12.2 Add the pressure sensor

1. From the optimyze mobile application **Asset health** (Dashboard) page, tap the ⊕ icon.
2. On the **Add a sensor** page, select one of the following options:

| Entry | Action |
|---|---|
| **QR code** | Use the mobile phone camera to scan the **QR code** on the sensor. |
| **Manual entry** | Type the nine-digit serial number<br>The serial number is located below the **QR code**. |

3. Tap **Enter**.
4. Select operating mode from the drop-down menu in the app.
5. If Differential Pressure mode is selected, scan the QR code or type the S/N manually of the second pressure sensor.
6. Put optimyze sensor in configuration mode: Place the magnet supplied with the sensor over the Bluetooth® icon until the LED blinks pink; and then scan QR code or type S/N manually of optimyze device. See *Set up the configuration mode* on page 22.
7. Set lower and higher threshold and click the "save" button, wait until the mobile application returns to the dashboard. If either the lower or higher threshold limit is set to 0, the corresponding alarm will be disabled.

   optimyze sensors must be less than 30 m (100 ft) from pressure sensor to pair.

   Note: To modify the settings after configuring the optimyze pressure sensor, follow steps 1 to 8 in section 6.12.3. Instead of removing the pressure sensor, press the Update button at the bottom of the page.
8. The optimyze sensor blinks light blue while communicating with the pressure sensor.

   Note: Before switching between any operating modes for the pressure sensor, please reset the optimyze device from the asset settings. See *Reset optimyze device* on page 25.

#### 6.1.12.3 Remove the pressure sensor

1. From the optimyze mobile app dashboard, select the optimyze sensor that is paired to the wireless pressure sensor.
2. Go inside the part which optimyze sensor placed on.
3. On top right corner, select three dots.
4. Select Asset Setting from the opened menu.
5. Click on part which optimyze device placed on from bottom Sensors Bar.
6. Select Remove Pressure Sensor.
7. The optimyze mobile app will show the serial numbers of respective pressure sensors on each selection.
8. Put optimyze sensor in configuration mode: Place the magnet supplied with the sensor over the Bluetooth® icon until the LED blinks pink; See *Set up the configuration mode* on page 22.
9. Press "Remove" button from the bottom of this page.
10. Mobile Application asks for confirmation to remove the pressure sensor.
11. Press “OK” to pop up warning.
12. Wait until the optimyze mobile application shows “Successfully disconnected pressure sensor”.
13. Press OK and wait until the application returns to the dashboard screen.

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### 6.1.13 Reset optimyze device

To access the reset options for the optimyze device, follow these steps:

1. From the optimyze mobile app dashboard, select the sensor to be reset.
2. In the top right corner, select the three dots.
3. Choose "Asset Setting" from the menu.
4. Click on the part where the sensor is placed from the bottom Sensors Bar.
5. Select "Reset optimyze device options."

   Choose either "Erase all content and settings" or "Reset all settings" based on requirements.

### 6.1.14 optimyze Sensor firmware updates

When a firmware update is available, a notification will pop up on the dashboard of the optimyze application.

To update the firmware, follow these steps:

1. Open the application dashboard and click on “Sensor update.”
2. Set a selected optimyze sensor to configuration mode and press on “update” for the corresponding sensor on the application.
3. Updates will begin; the application will display progress and notify when the update is complete.

   Note: Ensure that the application is not closed or interrupted in the process.
4. After completion, to view the updated Firmware version, go to Asset Setting and select sensor. Firmware version will be available under the “Details” section.

## 6.2 Gateway (optional)

### 6.2.1 Configure and install the optimyze sensors

Follow the optimyze Quick Start Guide to configure optimyze sensors before setting up Gateway.

## 6.2.2 Set up optimyze Gateway

1. Connect the antennas in the packaging to appropriate inserts. The longer antenna will fit the left insert (from top view) and the shorter antenna will fit the right insert (from top view).
2. Connect Gateway to power supply.
3. Turn on Gateway with the Power switch.
4. To pair with an optimyze sensor:
   a) Put the first optimyze sensor in configuration mode by positioning the magnet supplied with the sensor over the Bluetooth symbol until the LED blinks pink.
   b) When the sensor is in configuration mode, press Bluetooth button on the optimyze Gateway. Blue LED starts blinking with a one second interval indicating the pairing mode is active. Pairing mode is active for 90 seconds.
   c) When the sensor enters pairing mode, Gateway will automatically scan for optimyze sensors and try to connect. A succesful pairing is indicated by a (quick) blue LED triple blink on the Gateway.
   d) Gateway will initiate a short connection with the optimyze sensor (indicated by a solid blue LED on optimyze Gateway and blinking blue LED on optimyze sensor) before it re-enters pairing mode.
   e) After the Gateway leaves pairing mode, to connect another sensor, repeat steps (a) through (d).
   f) Once paired, the Gateway connects to the optimyze sensors every 24 hours.
5. The Gateway will connect to the cellular network and xylem cloud without any required intervention. (Based on region and radio environment, time to connect may vary from a few minutes to hours). Once it successfully connects, the red and green LED will enter a solid state. Gateway will connect to optimyze sensors every 24 hours and send data up to the cloud (which will be visible via your mobile application).

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#### 6.2.2.1 Number of sensors

- For LTE-M networks, the Gateway will support 6 sensors (with a default sampling frequency of 30 min).
- For NB-IoT, the Gateway will support 2 sensors (with a default sampling frequency of 30 min).

Note: This may vary if regional networks have any further restrictions or based on the radio environment of the Gateway's placement.

## 6.2.3 Unpairing

If the button is pressed and held for 30 or more seconds, upon release the Gateway will delete all BLE pairing information. A successful unpairing will be indicated with a double-blink of the blue LED.

## 6.2.4 Network Selection

optimyze Gateway can support both LTE-M and NB-IoT and has auto-network selection enabled by default (it will connect to appropriate network based on region's network support and radio environment*).

If a user must specify the network for any reason (please verify which network the Gateway supports in your region before doing so), user must hold the Bluetooth button for 5 seconds and observe the green LED indication to confirm that the network selection has been successful.

The default (recommended) setting for the Gateway is "auto-network selection mode". To change networks manually:

1. Hold bluetooth button for 5 seconds

   Device will enter manual selection mode: LTE-M

Indication for success: green LED will double blink.

2. Hold bluetooth button again for 5 seconds

   Device will enter manual selection mode: NB-IoT

   Indication for success: green LED will triple blink.

3. Hold Bluetooth button again for 5 seconds. Device will return to auto-network selection mode.

   Indication for success: green LED will blink once.

*Note: Due to a greater bandwidth, devices connected to LTE-M will support greater number of devices.

# 7 Avensor

## 7.1 About Avensor

Avensor is a cloud application for monitoring stations and devices. The following features are available in the application:

- Station and device management
- Data management and analytics
- Alarm management

Please contact your organization's Avensor administrator or your Xylem Sales contact person to set up an account on Avensor. The web platform can be accessed via *https://cloud.xylem.com/avensor*.

## 7.2 User roles



| User Role | Description |
|---|---|
| Customer Administrator (CA) | The user can manage stations and users that belong to the customer. |
| Service personnel (SP) | The user can manage stations that belong to the customer. |
| Service personnel read only (SPRO) | The user can do the following things for stations that belong to the customer.<br>• Monitor the stations.<br>• Create station notes.<br>• Be on a call list.<br>• Acknowledge alarms. |

## 7.3 Station and device management

The user can manage information about the stations and devices:

- Change the station or device names.
- Enter the location.
- Enable or disable services for the station.

## 7.4 optimyze Setup & Operation

### 7.4.1 Set up a station

Users that manage multiple customers must make sure that the customer exists in the system before the user creates the station.

1. Create a station.
2. Add the connected devices.
3. Create a call list.
4. Add the call list to the station.

### 7.4.2 Create a station

Follow these steps to create a station:

1. Go to **Stations**.
2. Click **Add station**.
3. Type the station details.

4. Click **Next**.
5. Add a device:
   a) Click **Add device**.
   b) For **Device type,** select **optimyze** from drop-down menu.
   c) Enter a name to identify the device and sensor serial number from the QR code.
   d) Click **Add device**. Avensor adds the device to the station.
   e) To add another device, click the Add device button and repeat the process.
   f) Click **Next**.
   g) For each station service, click the switch to enable or disable the service.
   h) Click **Next**.
   i) Review the preview:
      1. To edit any detail, select the applicable step in the stepper.
      2. To confirm the details, click **Finish**.
         – Avensor creates the station.

## 7.4.3 Add an optimyze sensor to a station

Follow these steps to add an optimyze sensor to an existing station:



1. Go to Stations.
2. Select the station.
3. Go to Devices.
4. Click the button Add device.
5. For Device type, select optimyze from drop-down menu.
6. Enter a name to identify the device and sensor serial number from the QR code.
7. Click Add device.

Avensor adds the device to the station and relevant data from the sensor should be available soon.

## 7.4.4 Data management & analytics

If you select a station, you can view the following tabs:

1. **Overview**: provides and overview of the station status such as connectivity, location, alarms etc.
2. **Alarms**: can view, filter, download all alarms from this page.
3. **Analytics**: All relevant analytics graphs from devices are present on this page to view, export or compare. This includes Temperature, Pressure, as well as Vibration Data for all axes including the RMS, kurtosis and FFT charts for each.
4. **Live Data**: data from the latest timestamp for all sensors can be viewed here.
5. **Notes**: users can add relevant notes and attachments here.
6. **Devices**: can view the list of devices on this station.
7. **Station Model**: data on this page is only available for stations with connected pumps.
8. **Settings**: review, edit and save all settings related to the station.

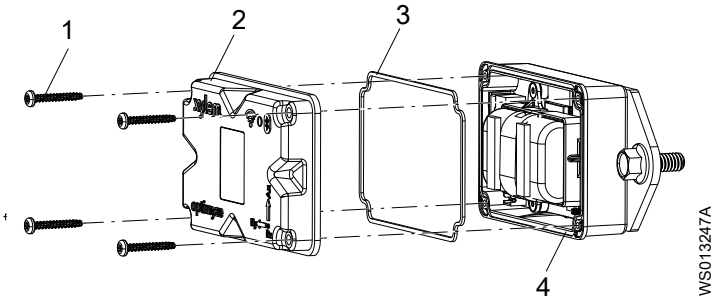
# 8 Maintenance

## 8.1 optimyze

### 8.1.1 Replace the battery

#### 8.1.1.1 Remove the battery

1. Use the supplied T10 screw driver to remove the screws from the casing.

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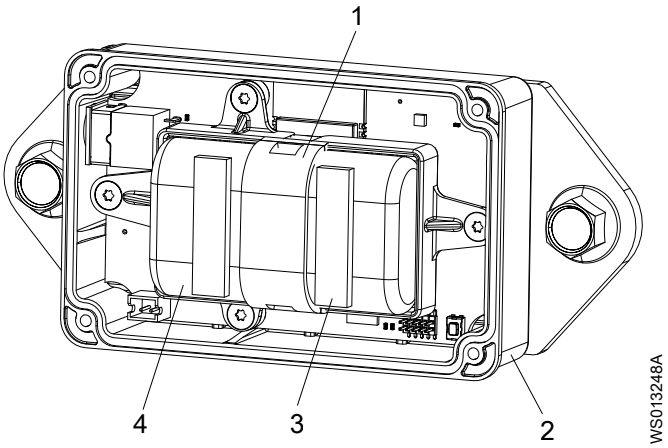
1. Screw
2. Upper cover
3. Gasket
4. Gasket groove

2. Remove the upper cover.
3. Pinch the white connector tips. Carefully remove the battery leads.
   Damage to the printed circuit board (PCB) must be avoided.
4. Carefully remove the battery clip by using a small flat head screwdriver.




1. Battery clip
2. Lower cover
3. Adhesive foam strip
4. Batteries

5. Remove the batteries.
6. Dispose the batteries in accordance with the local regulations.
   Batteries must not be reused.
7. Remove the gasket from the groove of lower casing.
8. Dispose the old gasket.
   Gasket must not be reused.

#### 8.1.1.2 Clean the gasket groove

1. Use a small cotton bud and rubbing alcohol to clean the gasket groove in the lower cover.
2. Repeat this procedure for the upper cover.

#### 8.1.1.3 Install the battery

1. Install the batteries into the battery holder.
   The positive terminals of the batteries must face the power connectors on the PCB.
   The negative terminals of the batteries must face the 5 V power connector located opposite of the battery connection pins.
2. Attach the battery clip on the batteries.
3. Check that the battery clip engages correctly.
4. Attach the supplied adhesive foam strips on the top of both the batteries.
   Distance must be 0.5 cm (1/4 in) from the end of each battery.
5. Plug the white connectors of batteries on the PCB.

#### 8.1.1.4 Install the cover

1. Install the new gasket in the gasket groove of the lower cover.
2. Carefully install the upper cover on the lower cover.
   The outer rim of the cover must surround the lip of the lower cover.
   The Xylem logo must align with the external power supply connector.
3. Use the T10 screw driver to install the screws on the cover.
4. Tighten the screws diagonally opposite of one another to prevent rolling or pinching of the gasket.
5. Use a torque wrench to tighten the screws of the cover.
   The torque must be 0.88 Nm (7.8 lbf.in).

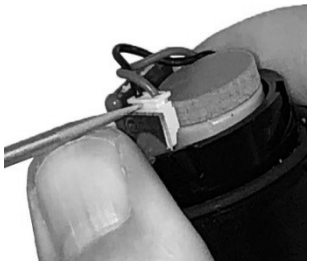


## 8.1.2 Replace the pressure sensor battery (optional)

To replace the optimyze pressure sensor battery, follow these steps:

1. Remove the pressure sensor cap by turning it counterclockwise.

2. Put a small screwdriver blade between plug and socket and pry up to remove plug from socket. The plug only installs one way. Remove the battery.



3. Wait a minimum of 90 seconds before inserting a new battery. The transducer must reset before connecting a new battery.
4. Replace the cap turning it clockwise until it stops. The arrow on the cap should align with an arrow on the sensor body.

# 9 Troubleshooting

## 9.1 optimyze

### 9.1.1 Symptoms and remedies

| Symptom | Cause | Remedy |
|---|---|---|
| The LED is off. | The sensor is in sleep mode. | 1. Activate the sensor.<br>For more information, see *Activate the sensor* on page 22.<br>2. Battery of the sensor is depleted.<br>3. If necessary, replace the battery. |
| The **optimyze** application icon is not visible on the mobile device. | – | Check the application page in mobile device for the **optimyze** application icon. |
| No information is displayed on the Scan QR code screen. | The camera of mobile device is turned off in privacy. | Turn on the camera in privacy for mobile device. |
| | The Bluetooth wireless technology is turned off in settings and privacy for mobile device. | Turn on the Bluetooth wireless technology. |
| Incorrect serial number is entered. | The **Valid serial number is 9 digits long and starts with 3** message is shown. | Check that the serial number is correct. |
| The **Enter** button is not seen on the bottom of the screen, after the serial number is entered. | The soft keyboard on the phone screen hides the **Enter** button at the bottom of the screen. | Tap **Done** button or the background to close the soft keyboard. |
| **Cannot find the device, try again.** message is shown. | The sensor is in sleep mode.<br>The configuration mode is off.<br>The incorrect serial number is entered. | 1. Activate the sensor.<br>For more information, see *Activate the sensor* on page 22.<br>2. Set up the sensor to configuration mode.<br>For more information, see *Set up the configuration mode* on page 22.<br>3. Check that the QR code or the serial number is correct. |
| **Device found, turn on configuration mode and try again** message is shown. | The configuration mode is off.<br>The configuration mode is on and does not connect with mobile device. | 1. Set up the sensor to configuration mode.<br>For more information, see *Set up the configuration mode* on page 22.<br>2. Check the Bluetooth wireless technology compatibility.<br>The Bluetooth wireless technology software version must be 5.0.<br>3. Connect the mobile device to sensor.<br>For more information, see *Connect a mobile phone to the sensor* on page 22. |

| Symptom | Cause | Remedy |
|---|---|---|
| The LED does not change from blink white to blink pink, after the magnet is kept near the Bluetooth® icon. | - | 1. Move the magnet away from the sensor for a short duration and then try again.<br>2. Hold the magnet along the side wall of the sensor near the Bluetooth® icon. |
| The sensor does not turn on after the magnet is kept near the Bluetooth® icon. | | |
| Pressure sensor is not connecting with optimyze device or optimyze app is not able to find the pressure sensor. | | 1. Move the pressure sensor closer.<br>2. Replace the battery. |
| Sensor firmware update failing | • The sensor is not in configuration mode.<br>• The mobile device may have moved out of connection range or been interrupted during update. | 1. Set the optimyze sensor to configuration mode before selecting “Update” on application.<br>2. Ensure mobile device stays within connection range and application is open until update is complete. |

# 9.2 Gateway (optional)

## 9.2.1 Symptoms and remedies

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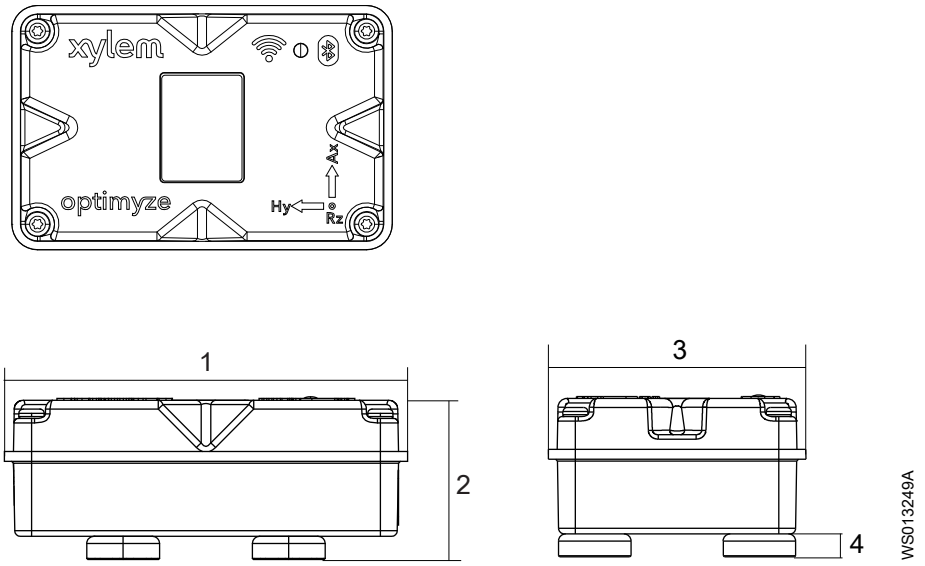
| Symptom | Cause | Remedy |
|---|---|---|
| No LEDs visible | No power or power switch is "off" | 1. Connect to USB power supply<br>2. Turn power switch on. |
| Device has been turned on and the red LED has been blinking for a long time. | Not successfully connecting to network | 1. Check if antennas are correctly connected.<br>2. Move the Gateway to a different location and check if it changes. If it is successful in the new location, the original location may not be suitable for the Gateway because of lacking network coverage. |
| optimyze sensor is in configuration mode and Gateway is in pairing mode but they are not pairing. | • optimyze sensor may not be in pairing range.<br>• 6 sensors may already be paired to the Gateway. | 1. Move Gateway closer to sensors.<br>2. If pairing is still unsuccessful, unpair and re-pair all sensors. |
| Pairing was unsuccessful. | | 1. Verify that the optimyze sensor has been configured with the optimyze mobile app<br>2. Repeat pairing process |
| Sensor was paired with Gateway previously but Gateway does not connect to sensor anymore. | • Repeated connection errors with sensor.<br>• optimyze sensor may not be in range. | 1. Bring Gateway closer to optimyze sensors.<br>2. Repeat pairing process. |

# 10 Technical specification

## 10.1 optimyze

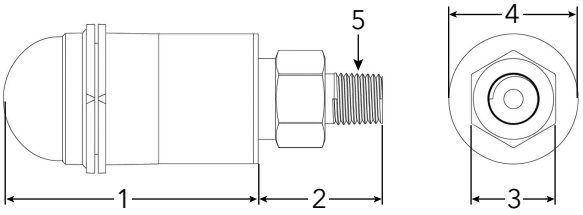
### 10.1.1 Dimensions

#### 10.1.1.1 optimyze sensor dimensions




| Item | Dimension |
|---|---|
| 1 | 88.6 mm (3.49 in) |
| 2 | 35.4 mm (1.39 in) |
| 3 | 56.9 mm (2.24 in) |
| 4 | 5.1 mm (0.20 in) |

#### 10.1.1.2 optimyze pressure sensor dimensions (optional)




| Item | Dimension mm (In) |
|---|---|
| 1 | 67.05 (2.64) |
| 2 | 32.76 (1.29) |
| 3 | 7/8 HEX |
| 4 | ø34.03 (1.34) |
| 5 | 1/4" NPT Male |

Dimensions are for reference only.

## 10.1.2 Approvals

| Optimyze Sensor | Optimyze Pressure sensor |
|---|---|
| • CE<br>• FCC and IC<br>• UL and cUL | • CE<br>• FCC and IC |

## 10.1.3 Environmental requirements

optimyze sensor

| Feature | Value |
|---|---|
| Operating location | Indoor use or outdoor use |
| Operating environment | Non-hazardous, non-corrosive |
| Operating temperature | -20°C to +50°C (-4°F to +122°F) |
| Storage temperature | -25°C to +65°C (-13°F to +149°F) |
| Operating humidity | 5% to 95% relative humidity, non-condensing |
| Protection rating | NEMA4 / IP56 |

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optimyze pressure sensor

| Feature | Value |
|---|---|
| Operating location | Indoor use or outdoor use |
| Compensated temperature | -10°C to +85°C (+14°F to +182°F) |
| Operating temperature | -40°C to +85°C (-40°F to +182°F) |
| Storage temperature | -40°C to +125°C (-49°F to +257°F) without battery |
| Total Error Band (TEB) | 3% Full Scale (FS) |
| Long term drift | 0.2% FS/year (non-cumulative) |
| Shock | 50g, 11 ms, 1/2 sine |
| Vibration | 10g, peak, 20 to 2400 Hz |
| EMI/RFI Protection | Yes |
| Ingress Rating | IP-67 |

## 10.1.4 Surface temperature measurement

| Feature | Value |
|---|---|
| Measurement range | -20°C to +135°C (-4°F to +275°F) |
| Measurement method | Non-contact infrared temperature sensor |
| Minor gradient accuracy (0°C to 25°C gradient) | +/-1°C |
| Moderate gradient accuracy (25°C to 50°C gradient) | +/-2°C |
| Large gradient accuracy (50°C to 100°C gradient) | +/-4°C |

## 10.1.5 Vibration measurement

| Feature | Description |
|---|---|
| Frequency range | 5 Hz to 1,100 Hz |
| Measurement method | Independent 3-axis |
| Primary output (per axis) | Single value RMS |

| Feature | Description |
|---|---|
| Other outputs | Kurtosis and FFT |
| Vibration limit (max acceleration) | 16 g |
| Threshold standard (Global) | ISO 10816-7 |
| Threshold standard (North America) | ANSI/HI 9.6.4 |

## 10.1.6 Power

optimyze sensor

| Feature | Description |
|---|---|
| Batteries (replaceable) | (2) 3.6 V AA, 2400 mAh, Lithium |
| Battery life[4] | 3 to 5 years |
| Default sampling rate | 1 sample per 30 minutes |
| Available sampling rates (one sample per unit of time) | 10 seconds to 12 hours |

optimyze pressure sensor

EN

| Feature | Description |
|---|---|
| Battery | 3.6 V Proprietary replacement battery |
| Battery life | 24 months, typical. Battery life is affected by high and low temperature |

## 10.1.7 Wireless communication

optimyze sensor

| Feature | Description |
|---|---|
| Network type | Bluetooth® Low Energy 5.01<br>2.4 GHz ISM band<br>RF 3.29 mW (5.17 dBm) |
| Connection range (without interference) | 30 meters (100 feet) |

optimyze pressure sensor

| Feature | Description |
|---|---|
| Network type | Bluetooth® Low Energy 4.2<br>2.4 GHz ISM band<br>RF 3.78 mW (5.78 dBm) |
| Connection range (without interference) | 30 meters (100 feet) |

## 10.1.8 Physical properties

optimyze sensor

| Feature | Description |
|---|---|
| Weight | 145 g (0.32 lb) |
| Status | LED |
| Mounting method (standard) | Magnetic (16 mm potted magnets) |
| Mounting method (optional) | Drill and tap with plate |

[4] using default sampling rate at 25°C, one connection for each day

### 10.1.9 Part numbers

| Part | Part number |
|---|---|
| optimyze (standard sensor) | P2007024 |
| optimyze battery replacement kit | P2007030 |
| optimyze optional flat plate mounting kit | P2007031 |
| optimyze round magnet mounting kit | P2007105 |
| optimyze pressure sensor 0 – 100 psi | P2004731 |
| optimyze pressure sensor 0 – 250 psi | P2004753 |
| optimyze pressure sensor 0 – 500 psi | P2004754 |
| optimyze pressure sensor battery | P2004732 |

## 10.2 Gateway (optional)

### 10.2.1 Dimensions

110.mm (4.4 in) x 99.2 mm (3.9 in) x 35.4 mm (1.4 in)



### 10.2.2 Conformity

Regulatory:

- FCC (US)
- ISED (Canada)
- CE (Europe)
- UKCA (United Kingdom)

Industry:

- PTCRB
- GCF

### 10.2.3 Environmental requirements

Gateway

| Feature | Value |
|---|---|
| Operating location | Indoor use |
| Operating environment | Non-hazardous, non-corrosive |
| Operating temperature | -40°C to +80°C (-40°F to +176°F) |
| Storage temperature | -40°C to +85°C (-40°F to +185°F) |
| Operating humidity | 10% to 95% non-condensing |
| Storage humidity | 5% to 95% non-condensing |

Power supply

| Feature | Value |
|---|---|
| Operating location | Indoor use |
| Operating environment | Non-hazardous, non-corrosive |
| Operating temperature | 0°C to +40°C (+32°F to +104°F) |
| Storage temperature | -20°C to +60°C (-4°F to +140°F) |
| Operating humidity | 20- 85%, non-condensing |
| Storage humidity | 5- 95%, non-condensing |

## 10.2.4 Power Input

Input voltage of 5 V and 1.2 A (standard USB power).

AC line power requirements

- Voltage input: 90 VAC ~ 264 VAC

## 10.2.5 Wireless communication

| Feature | Value |
|---|---|
| Bluetooth | Bluetooth Low Energy Secure Connections 4.2 |
| Cellular | • Multi-Band cellular operation for world-wide operation<br>• Supports LTE-M and NB-IoT |
| Bluetooth connection range (without interference) | 30 meters (100 feet) |

## 10.2.6 European Union (Directive 2014/53/EU) and Great Britain (S. I. 2017/1206)

EN

| Feature | Value |
|---|---|
| Frequency band(s) | 2.4 GHz ISM Band |
| Maximum radio-frequency power transmitted | RF 3.29 mW (5.17 dBm) |

## 10.2.7 Physical properties

| Feature | Value |
|---|---|
| Weight for Gateway boxed kit (without power supply) | 0.518 lbs (0.24 kg) |
| Weight for Power Supply (supplied separately) | 0.300 lbs (0.14 kg) |

## 10.2.8 Part numbers

| Part | Part number |
|---|---|
| optimyze Gateway w/USB cable | P2007065 |
| Power supply (supplied separately) | P2007067 |

# 11 Product warranty

## 11 Commercial warranty

**Warranty.** For goods sold to commercial buyers, Seller warrants the goods sold to Buyer hereunder (with the exception of membranes, seals, gaskets, elastomer materials, coatings and other "wear parts" or consumables all of which are not warranted except as otherwise provided in the quotation or sales form) will be (i) be built in accordance with the specifications referred to in the quotation or sales form, if such specifications are expressly made a part of this Agreement, and (ii) free from defects in material and workmanship for a period of twelve (12) months from the date of installation or eighteen (18) months from the date of shipment (which date of shipment shall not be greater than thirty (30) days sixty (60) days after receipt of notice that the goods are ready to ship), whichever shall occur first, unless a longer period is specified in the product documentation (the “Warranty”).

Except as otherwise required by law, Seller shall, at its option and at no cost to Buyer, either repair or replace any product which fails to conform with the Warranty provided Buyer gives written notice to Seller of any defects in material or workmanship within ten (10) days of the date when any defects or non-conformance are first manifest. Under either repair or replacement option, Seller shall not be obligated to remove or pay for the removal of the defective product or install or pay for the installation of the replaced or repaired product and Buyer shall be responsible for all other costs, including, but not limited to, service costs, shipping fees and expenses. Seller shall have sole discretion as to the method or means of repair or replacement. Buyer’s failure to comply with Seller’s repair or replacement directions shall terminate Seller’s obligations under this Warranty and render the Warranty void. Any parts repaired or replaced under the Warranty are warranted only for the balance of the warranty period on the parts that were repaired or replaced. Seller shall have no warranty obligations to Buyer with respect to any product or parts of a product that have been: (a) repaired by third parties other than Seller or without Seller’s written approval; (b) subject to misuse, misapplication, neglect, alteration, accident, or physical damage; (c) used in a manner contrary to Seller’s instructions for installation, operation and maintenance; (d) damaged from ordinary wear and tear, corrosion, or chemical attack; (e) damaged due to abnormal conditions, vibration, failure to properly prime, or operation without flow; (f) damaged due to a defective power supply or improper electrical protection; or (g) damaged resulting from the use of accessory equipment not sold or approved by Seller. In any case of products not manufactured by Seller, there is no warranty from Seller; however, Seller will extend to Buyer any warranty received from Seller’s supplier of such products.

**THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ANY AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, GUARANTEES, CONDITIONS OR TERMS OF WHATEVER NATURE RELATING TO THE GOODS PROVIDED HEREUNDER, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY EXPRESSLY DISCLAIMED AND EXCLUDED. EXCEPT AS OTHERWISE REQUIRED BY LAW, BUYER’S EXCLUSIVE REMEDY AND SELLER’S AGGREGATE LIABILITY FOR BREACH OF ANY OF THE FOREGOING WARRANTIES ARE LIMITED TO REPAIRING OR REPLACING THE PRODUCT AND SHALL IN ALL CASES BE LIMITED TO THE AMOUNT PAID BY THE BUYER FOR THE DEFECTIVE PRODUCT. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY OTHER FORM OF DAMAGES, WHETHER DIRECT, INDIRECT, LIQUIDATED, INCIDENTAL, CONSEQUENTIAL, PUNITIVE, EXEMPLARY OR SPECIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS OF PROFIT, LOSS OF ANTICIPATED SAVINGS OR REVENUE, LOSS OF INCOME, LOSS OF BUSINESS, LOSS OF PRODUCTION, LOSS OF OPPORTUNITY OR LOSS OF REPUTATION.**

# 12 Cybersecurity

## 12.1 optimyze

Defending against cybersecurity threats requires partnership and shared responsibility. Xylem's responsibility is to build products that include security features by design. The customer has a responsibility to understand the risks inherent in the processes and take steps to operate and maintain their solutions securely. This section gives an overview of existing security features and guidance that will help securely operate Optimyze.

### 12.1.1 Xylem Product Cybersecurity

Xylem performs appropriate due care in building security into products and solutions from design through end of life. For more information on Xylem cybersecurity practices or to contact the cybersecurity team please visit *xylem.com/security*.

- Based on the level of risk, product security experts perform **threat modeling** to recommend a **testable controls baseline** that impacts the requirements and design.
- During all product development and implementation, the code is scanned for flaws with **static analysis** tools to identify common security errors and the **product components are analyzed** to understand dependencies and identify and fix flaws in third party components.
- Xylem applies **security validation** once the product is materially built through a series of automated and manual tests to validate that the security protections built into each product perform as expected. The results from this testing are used to improve the security protections and the quality of the software in the product.
- Xylem maintains relationships with customers, integrators, and the cybersecurity research community and the **Product Security Incident Response Team (PSIRT)** coordinates the collection, analysis, remediation, and responsible disclosure of vulnerability and remediation information to keep products secure.
- Xylem monitors as components approach end-of-support and end-of-life and proactively communicate with customers regarding **product lifecycle** implications.
- Product security is **governed through a three lines of defense** model, in which product engineers are the first-line building security features in to their development backlogs and scheduling testing, the product security leaders and engineers provide credible challenges and shared resources to enhance native abilities, and the audit team monitors fulfillment of security development processes.

### 12.1.2 Optimyze Security Features

Xylem prioritizes the availability, integrity, and confidentiality in all products.

| Security consideration | Configuration |
|---|---|
| Physical | • Device is hardened with upgrades available via the mobile app<br>• Firmware is encrypted and digitally signed and verified at runtime<br>• Bootloader integrity is maintained by signing the binaries at the source and then verifying the same at the device.<br>• Authenticated and authorized Xylem developer is allowed to trigger the update to devices; end user needs to approve it from the mobile app.<br>• Protective coating is applied to the board to avoid physical tampering.<br>• Automatic reset of the device in the state of fault triggers by implementing watchdog timers.<br>• Strict BLE pairing with only authorized devices is implemented. |

| Security consideration | Configuration |
|---|---|
| Interfaces | • Enabled interfaces are limited (only BLE enabled).<br>• WiFi is disabled by default.<br>• Hardware-based debug is restricted (Physical connectors are removed) |
| Network | • Firewall-based access is enforced<br>• Data flow to headend is encrypted via TLS 1.2 with strong ciphers<br>• BLE 5.0 incorporated.<br>• Cloud back-end is continuously monitored by Xylem product security operations center (PSOC) |
| Mobile Application | • Mobile application authentication is implemented<br>• Application is hardened with upgrades available on App Store<br>• Sensitive data is not stored in mobile application storage<br>• Security-relevant events are logged |

## 12.1.3 Optimyze Security Recommendations for End-User

While such measures are desirable and are strictly implemented by Xylem during the development process and have been rigorously tested by the security engineers, it is also recommended that customers apply additional safeguards consistent with their cybersecurity policy.

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| Safeguard | Rationale | References |
|---|---|---|
| • Ensure access to customer-managed assets in the Customer's Operating Environment is limited. Include physical isolation to protect the environment and equipment therein.<br>• Ensure strict control over physical access in and out of the customer's facility.<br>• Report any security-related incidents associated with Optimyze device to Xylem. These might include unexpected operations, confirmed tampering, or theft of the device.<br>(*xylem.com/security*) | Supports the ability to further limit exposure (or damage) as associated with network-based threats and physical threats. | ATT&CK for ICS: M0801<br>NIST SP 800-53 Rev. 5: AC-3<br>ISA/IEC 62443-3-3:2013: SR 2.1<br>ISA/IEC 62443-4-2:2019: CR 2.1 |
| Role Based Access Control (RBAC) is recommended: User registration is performed by the user via app. Recommend that each account is tied to an individual. | Ensures low level accounts do not perform privileged actions. | ATT&CK for ICS: M0801<br>NIST SP 800-53 Rev. 5: AC-3 (7) |
| Ensure Magnet Key is removed after putting the device in Configuration Mode so that the device does not re-enter Configuration Mode unexpectedly and enable alternative access to your data. | Provides additional checks and ensures no unexpected connections from Bluetooth devices. | ISA/IEC 62443-4-2:2019: CR.4.1<br>NIST SP 800-53 Rev. 5: AC-18<br>ISA/IEC 62443-4-2:2019: NDR.1.6 |
| Ensure Bluetooth signal cannot be received outside the organization-controlled boundaries by employing emission security and purposefully positioning the device. | Reduces the likelihood of capturing or intercepting wireless signals. | ATT&CK for ICS: M0806<br>NIST SP 800-53 Rev. 5: AC-18<br>NIST SP 800-53 Rev. 5: SC-40 |

| Safeguard | Rationale | References |
|---|---|---|
| Implement specific inventory, logging and monitoring for hardware at customer premises. | Supports the ability to tell who did what and when (e.g. active threat detection and / or forensics). | ATT&CK for ICS: M0947<br>NIST SP 800-53 Rev. 5: SM-8<br>ISA/IEC 62443-3-3:2013: SR 1.11, SR 2.8, SR 3.4<br>ISA/IEC 62443-4-2:2019: CR 3.4 |
| Maintain updated firmware and software: Over the air (OTA) firmware updates for the device are be available on the Optimyze app as a “Sensor update” pop up option on the screen. Mobile App updates are available on the play store and all the customers will be notified about the updates available. | Mitigates exploitation risks and ensures security patching | ATT&CK for ICS ID: M0951<br>NIST SP 800-53 Rev. 5: MA-3(6)<br>ISA/IEC 62443-3-3:2013: SR 3.1.3, SR 7.1<br>ISA/IEC 62443-4-2:2019: CR 3.10 |
| Ensure cybersecurity policies, awareness, and training to the operators, administrators and other personnel. | Prevents Social Engineering attacks and promotes awareness related to cybersecurity. | NIST SP 800-53 Rev. 5: AT |

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For additional information see references:

1. ATT&CK for ICS available online: https://collaborate.mitre.org/attackics/index.php/Technique_Matrix
2. NIST SP 800-53 Rev 5 available online: https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-53r5.pdf
3. ISA/IEC 62443 standards available for purchase from ISA, IEC, or ANSI.

## 12.2 Gateway (optional)

Xylem values system security and resilience. Defending against cybersecurity threats is a shared responsibility. Xylem builds products that are secure by design. Our customers have a responsibility to understand the risks inherent in their processes and take steps to operate and maintain their solutions securely. This section reviews security features and provides guidance to help securely operate this product. For details and updates on Xylem product cybersecurity visit *https://www.xylem.com/en-us/about-xylem/cybersecurity/*.

### 12.2.1 Xylem Product Cybersecurity

Xylem performs appropriate due care in building security and resilience into products. Xylem performs the following security activities for defense-in-depth:

- security engineers perform **threat modeling** to identify **testable controls**
- code is scanned for flaws with **static analysis** tools and hardened
- product components are analyzed and hardened
- security controls are verified through **automated and manual tests**
- Xylem maintains relationships with customers, integrators, and the cybersecurity research community and the **Product Security Incident Response Team (PSIRT)** coordinates the collection, analysis, remediation, and responsible disclosure of vulnerability and remediation information to keep products secure
- cloud connections, data flows, and cloud infrastructure are continuously monitored by the **Product Security Operations Center (PSOC)**
- Product security is **governed through a three lines of defense** model that includes: product developers, product security engineers, and audit staff

## 12.2.2 Security Recommendations for End-User

optimyze Gateway has been tailored for very specific condition monitoring applications, as such most security hardening is already in place. The following guidance provides recommendation for customers for hardening the operating environment, secure operations, account management, and disposal. In the table below: *Safeguards* describe the security guidance, *Security Context & Rationale* provide overview of security features and value of the security safeguard, and *References* provide additional resources for further investigation for implementing the recommended safeguards.

| Safeguard | Security Context & Rationale | References |
|---|---|---|
| **Restrict physical access**<br>• Ensure physical access to assets is limited. Include physical isolation to protect the environment and equipment therein.<br>• Ensure strict control over physical access in and out of the facility. | Each of the communication ports have been hardened to restrict access and ensure integrity of device operations. For example, data transit to the cloud is encrypted and the device is provisioned before shipping. BLE pairing requires proximity and the magnetic key on the optimyze sensor. Command line connection requires authentication. This safeguard supports the ability to further limit exposure associated with physical threats to the device itself. | ATT&CK for ICS: M0801<br>NIST SP 800-53 Rev5: AC-3, PE-3<br>ISA/IEC 62443-3-3: SR 2.1 |
| **Each account should be tied to an individual. Organizations should control individual accounts through policy.** | Mobile application requires registration and authentication and security events are logged. This safeguard ensures all activities are traceable and non-repudiable. | ATT&CK for ICS: M0801<br>NIST SP 800-53 Rev5: AC-3(7)<br>ISA/IEC 62443-3-3: SR 1.1 |
| **Ensure Magnet Key is removed after putting the optimyze sensor in Configuration Mode so that the device does not re-enter Configuration Mode unexpectedly and enable alternative access to your data.** | Protections, such as the magnet key, are put in place to make pairing deliberate and to require physical proximity to the device. This safeguard provides additional checks and ensures no fingerprinting of BLE devices takes place. | NIST SP 800-53 Rev5: AC-18<br>ISA/IEC 62443-4-2: CR 4.1, NDR 1.6 |
| **Ensure Bluetooth signal cannot be received outside the organization-controlled boundaries by employing emission security and purposefully positioning the device.** | Multiple BLE pairing mechanisms are available to ensure availability of data. This safeguard reduces the likelihood of capturing or intercepting signals. | ATT&CK for ICS: M0806<br>NIST SP 800-53 Rev5: AC-18, SC-40<br>ISA/IEC 62443-3-3: SR 5.2 |
| **Implement specific inventory, logging and monitoring of hardware and report security-related incidents associated with optimyze devices to Xylem. These might include unexpected operations, confirmed tampering, or theft of the device.** | Devices are hardened and Xylem provides PSIRT to help customers investigate potential security incidents. This safeguard supports the ability to track assets and recognize potential security events. | ATT&CK for ICS: M0947<br>NIST SP 800-53 Rev5: SM-8<br>ISA/IEC 62443-3-3: SR 1.11, SR 2.8, SR 3.4 |
| **Maintain updated firmware and software on all devices and apps.** | Device firmware integrity is maintained by cryptographically signing at the source and then verifying the authenticity and integrity at runtime. It builds on modern tools provided by our partners. Sometime vulnerabilities are discovered, and we work with our partners to deploy updates to security and resilience. This safeguard mitigates exploitation risks and ensures security patching. | ATT&CK for ICS ID: M0951<br>NIST SP 800-53 Rev5: MA-3(6)<br>ISA/IEC 62443-3-3: SR 3.1.3, SR 7.1 |

EN

| Safeguard | Security Context & Rationale | References |
|---|---|---|
| **Ensure cybersecurity policies, awareness, and training to the operators, administrators and other personnel.** | While the system has been hardened in many ways, this safeguard prevents Social Engineering attacks and promotes awareness related to cybersecurity. | NIST SP 800-53 Rev5: AT-2<br>ISA/IEC 62443-2-4: SP.01 |
| **Before device disposal clear all paired connections and disable accounts.** | No data is persistent on the Gateway device, but BLE bonding is enabled for continuous gathering of sensor data. This safeguard ensures that no one can connect to your sensors using already-paired devices. | ATT&CK for ICS ID: M0942<br>NIST SP 800-53 Rev5: SR-12<br>ISA/IEC 62443-3-3: SR 4.2 |

For additional information see references:

1. ATT&CK for ICS available online: *https://collaborate.mitre.org/attackics/index.php/Mitigations*
2. NIST SP 800-53 Rev 5 available online: *https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-53r5.pdf*
3. ISA/IEC 62443 standards available for purchase from ISA, IEC, or ANSI.

EN

# 13 Certifications, conformity

## 13.1 optimyze

### 13.1.1 optimyze device: For US and Canada only

#### 13.1.1.1 FCC/IC statement

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.
2. This device must accept any interference received, including interference that may cause undesired operation.

#### 13.1.1.2 CAN ICES-3 (A)/NMB-3(A)

Any changes or modifications not expressly approved by Xylem Inc. Could void the user's authority to operate this equipment.

**NOTICE:**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their expense.



#### 13.1.1.3 FCC / IC RF radiation exposure statement

The device shall be used in such a manner that the potential for human contact normal operation is minimized. This equipment complies with FCC/IC RSS-102 radiation exposure limits 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 device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

#### 13.1.1.4 UL and cUL listed (E516095)

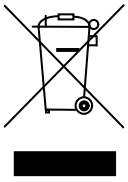
This product is listed by UL and cUL. Representative samples of this product have been evaluated by UL and meet applicable safety standards.

### 13.1.2 optimyze device: For EU countries

#### 13.1.2.1 RF radiation exposure statement

The device shall be used in such a manner that the potential for human contact normal operation is minimized. This equipment complies with EN 62311:2008 and basic restrictions listed in 1999/519/EC. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body. This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

#### 13.1.2.2 WEEE 2012/19/EU Notice



INFORMATION FOR USERS pursuant to art.14 of Directive 2012/19 / EU of the European Parliament and of the Council of July 4, 2012 on waste electrical and electronic equipment (WEEE). The crossed-out container symbol that appears on the appliance or on its packaging indicates that the product, at the end of its useful life, must be collected separately and must not be disposed of together with other mixed municipal waste. Appropriate selective collection that then allows the device that is no longer used to be subjected to recycling, treatment and disposal compatible with the environment, helps to avoid possible negative effects on the environment and health and favors reuse and / or recycling of the materials of which the device is composed.

The selective collection of this device at the end of its life is organized and managed by the producer. Therefore, if the user wants to eliminate this device, he or she can contact the producer and follow the system that he uses to allow the selective collection of the device at the end of its life, or independently select an authorized chain for its management.

## 13.1.3 optimyze pressure sensor: For US and Canada only

### 13.1.3.1 FCC/IC statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

EN

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

## 13.1.4 EU Declaration of Conformity

1. (RE-D) Radio equipment: optimyze

   (RoHS) Unique identification of the EEE: optimyze
2. Name and address of the manufacturer:

   Fluid Handling LLC, 8200 Austin Avenue, Morton Grove, IL 60053, USA

   Name and address of the authorized representative[5]:

   Xylem Service Italia S.r.l., Via Vittorio Lombardi 14, 36075 Montecchio Maggiore VI, Italy
3. This declaration of conformity is issued under the sole responsibility of the manufacturer.
4. Object of the declaration: monitoring device
5. The object of the declaration described above is in conformity with the relevant Union harmonization legislation:
   - directive 2014/53/EU of 16 April 2014 (radio equipment) and subsequent amendments.
   - directive 2011/65/EU of 8 June 2011 (restriction of the use of certain hazardous substances in electrical and electronic equipment) and subsequent amendments.
6. References to the relevant harmonized standards used or references to the other technical specifications, in relation to which conformity is declared:
   - EN 61010-1:2010+A1:2019, EN 62311:2008, EN 61000-6-2:2005, EN 61000-6-3:2007+A1:2011, EN 61326-1:2013, ETSI EN 301 489-1 V1.9.2 (2011-09) & V2.2.3 (2019-11), ETSI EN 301 489-17 V3.1.1 (2017-02), ETSI EN 300 328 V2.2.2 (2019-07).
   - EN 50581:2012.
7. Notified body: -
8. Accessories and components covered by the EU declaration of conformity: flat plate mounting kit (on request).
9. Additional information: -

Signed for and on behalf of: Fluid Handling LLC

Montecchio Maggiore, 14/01/2021

[5] as defined by the applicable product directives.

Amedeo Valente
(Director of Engineering and R&D)
rev.00

# 13.2 Gateway (optional)

The Gateway hosts the Pinnacle 100 module which holds current certifications in the following countries:

| Features | Regulatory ID |
|---|---|
| USA (FCC) | SQG-PINNACLE1 |
| Canada (ISED) | 3147A-PINNACLE1 |

The Gateway bears the following conformity markings:

| Countries | Reference |
|---|---|
| European Union and European Economic Area | CE |
| Great Britain | UKCA |

EN

## 13.2.1 For U.S.

The following FCC and ISED regulatory information applies to the Pinnacle 100 module which is hosted by the Gateway.

Federal Communication Commission (FCC) Radiation Exposure Statement

This EUT complies with SAR for general population/uncontrolled exposure limits in FCC Part 1.1307, Part. 1310 and FCC KDB 447498 – RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices.

This transceiver must not be co-located or operating in conjunction with any other antenna, transmitter, or external amplifiers. Further testing/evaluation of the end product will be required if the OEM's device violates any of these requirements.

The Pinnacle™ 100 is fully approved for mobile and portable applications.

**CAUTION**: Any changes or modifications not expressly approved by Xylem Inc. could void the user's authority to operate the equipment.

Federal Communication Commission Interference Statement

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 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.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

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.

**FCC Caution**: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

**IMPORTANT NOTE:**

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

***Applicable FCC rules to module*** – FCC Part 24/27; FCC Part 15.247

## 13.2.2 For Canada

The following regulatory information apply to the Pinnacle 100 module which is hosted by the Gateway.

EN

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- This device may not cause interference
- This device must accept any interference, including interference that may cause undesired operation of the device

Radiation Exposure Statement

This equipment complies with Canada radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

ISED ICES-003 Issue 7 Compliance Declaration

This device was originally tested to the requirements of ICES-003 Issue 6, Information Technology Equipment (Including Digital Apparatus) — Limits and Methods of Measurement; and evaluated to the updates published in ICES-003, Issue 7, Information Technology Equipment (Including Digital Apparatus). Based on this evaluation, this product continues to observe compliance to the requirements set forth by The Innovation, Science and Economic Development Canada (ISED), and complies with the updates published in ICES-003, Issue 7, Information Technology Equipment (Including Digital Apparatus).

## 13.2.3 For European Union and European Economic Area

CE marking indicates the conformity with the following relevant Union harmonization legislation: • Directive 2014/53/EU of 16 April 2014 and subsequent amendments (radio equipment). • Directive 2011/65/EU of 8 June 2011 and subsequent amendments including directive (EU) 2015/863 (restriction of the use of certain hazardous substances in electrical and electronic equipment). EU declarations of conformity available at the following internet address: *documentation/regulatory-information-mg100*. Product made by Laird Connectivity LLC (50 South Main Street, Suite 1100, Akron, Ohio 44308, USA) for Xylem Inc. (8200 Austin Avenue, Morton Grove, IL 60053 USA). EU/EEA importer: Lowara S.r.l. (Via dott. Vittorio Lombardi 14, 36075 Montecchio Maggiore VI – Italy)

## 13.2.4 For Great Britain (England, Scotland and Wales)

UKCA marking indicates the conformity with the following relevant UK legislative acts: • S.I. 2017/1206 - The Radio Equipment Regulations 2017 and subsequent amendments.

• S.I. 2012/3032 - The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 and subsequent amendments. UK declarations of conformity available at the following internet address: *documentation/regulatory-information-mg100*. Product made by Laird Connectivity LLC (50 South Main Street, Suite 1100, Akron, Ohio 44308, USA) for Xylem Inc. (8200 Austin Avenue, Morton Grove, IL 60053 USA). GB importer: Xylem Water Solutions UK Ltd (Private Road No.1 - Colwick Industrial Estate - Nottingham NG4 2AN Nottinghamshire – England)

Xylem Inc.
8200 N. Austin Avenue
Morton Grove, IL 60053

Tel: (847) 966–3700
Fax: (847) 965–8379
www.xylem.com/bellgossett

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