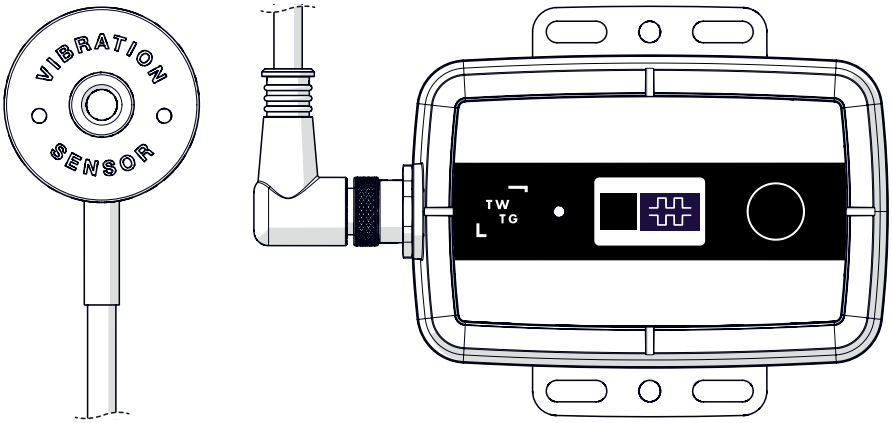
Vibration Sensor

Product Manual

This document applies to version 2 of the NEON Vibration Sensor (DS-LD-02-XX)



Contents

1 TWTG NEON

1.1 NEON Product Introduction

NEON stands for a standardised approach to collecting data points from the operational environment and in doing so, creates a general approach to integrated solutions within existing IT ecosystems.

The TWTG NEON product range supports all industrial customers moving towards LoRaWAN as the Industrial IoT network of the future.

The LoRaWAN network gives industrial operations a secure solution, which scales-up to tens of thousands of sensors, covers complete sites with only a small amount of gateways and best of all – the low-power approach means that the lifetime of the NEON products can be extended dramatically.

1.2 Related Documents

Document Name	Document Number
NEON Data Sheet	6016_N02-09_Data-Sheet-NEON-Vibration-Sensor
NEON Communication Protocol	6013_N02-09_Communication-Protocol-NEON-Vibration-Sensor
3M Scotch Weld Epoxy Datasheet	DP8405NS Green

Table 1: Related Documents

2 Getting Started

2.1 Compatibility of this manual

This manual is meant to be used with products of from a specific production batch. See Product Type Identification for an explanation on how to retrieve the production batch code from the serial number.

This manual is applicable to version 2 of the NEON Vibration Sensor.
See chapter Product Type Identification to determine the revision of the product.

2.2 What you will need

In order to deploy the NEON Transmitter, a compatible and operational LoRaWAN network architecture is required. This manual does not contain any instructions of how-to set-up and install LoRaWAN networks.
TWTG offers radio network planning and IT architecture design services to fully integrate the products in the NEON product line.

2.3 What is in the box

When the product is delivered check the components for damage and if all box items mentioned below are included.

Box Items	
NEON Transmitter	1 battery assembly, included in the product 1 mounting bracket, mounted on the product M12 connector and O-ring, mounted on the product
NEON Vibration Sensor	M6 Bolt
Declaration of Conformity	Declaration of Conformity, containing a link to the latest version of this product manual and other relevant product documentation

Table 2: Box Items

2.4 Product Specifications

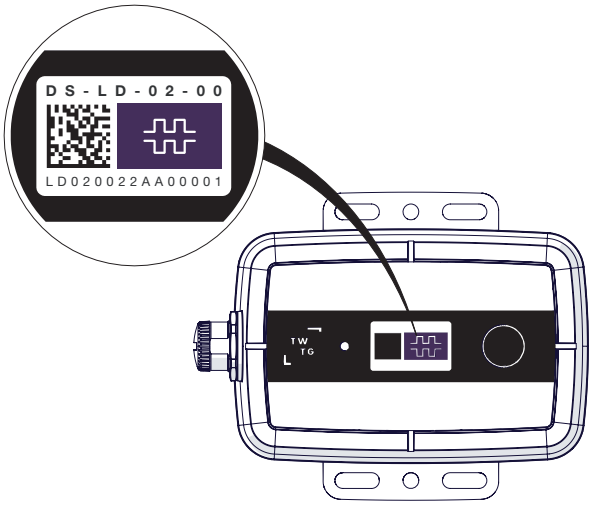
Product	
Product name	TWTG NEON Vibration Sensor
Type identification Transmitter	DS-LD-02-XX
Type identification Sensor	DS-VB-02-XX
Environmental conditions	
Operating temperature range Transmitter	-40 ℃ - 70 ℃
Storage temperature range	10 ℃ - 30 ℃
Operating humidity range	0% - 100% RH
Altitude	Up to 3000 m
Water & dust resistance	IP65
Pollution degree	3
Usage	Indoor and outdoor
Mechanical (Transmitter)	
Material	Molded plastic
Weight (including mounting bracket)	260 g
Dimensions	100x70x57 mm
Mechanical (Sensor)	
Material	Stainless steel and polyurethane
Weight	560 g
Dimensions	⌀40x21 mm
Installation	
Transmitter	Band clamp or bolts (not included)
Sensor	Bolt
	Chemically bonded adapter (not included)
	Magnet for curved surfaces (not included)
	Magnet for flat surfaces (not included)
Power Supply specifications	
Battery rated voltage	3.6 V
Battery rated capacity	17 Ah
Functional specifications	
Output	LoRaWAN
Input	M12 connector for thermocouple or RTD input
Input insulation rating	500VAC / 1 min
Connectivity	
Protocol	LoRaWAN
Frequency band	863-870 MHz
	902-928 MHz (compatible)
Maximum RF output power	+13 dBm
Provisioning	
QR / Serial number	Serial number (read only)
NFC	Serial number (read only)

Table 3: Product specifications. See also "NEON datasheet" in Related Documents for a detailed overview of specifications.

Certifications	
ATEX certificate number	DEKRA 20ATEX0004X
IECEx certificate number	IECEx DEK 20.0004X
ATEX IECex marking	Ex II 1G Ex ia IIC T4 Ga
Applicable ATEX/IECEx standards	EN 60079-0 EN 60079-11
FM US certificate number FM CA certificate number	FM22US0061X FM22CA0043X
US Marking	IS Class I, Division 1, Group ABCD T4 Class I, Zone 0 Ex ia IIC T4 Ga
CA Marking	IS Class I, Division 1, Group ABCD T4 Ex II 1G AEx ia IIC T4 Ga
IMDA Dealer License	DA108442
CE	EN 300 220-1 EN 300 220-2 EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019 EN 62311 EN 60529 EN 301 489-1 EN 301 489-3
UKCA	Radio Regulation 2017
FCC	FCC CFR 47, Part 15, Subpart C FCC CFR 47, Part 15, Subpart B
ISED	USA FCC Part 15.209, 15.247, 15.205 RSS-247, RSS-Gen
ICES	CAN ICES-003(B) / NMB-003(B)
Manufacturer information	
Name	TWTG R&D BV
Address	Schaardijk 386 2909 LA Capelle a/d IJssel The Netherlands

Table 4: Product specifications. See also "NEON datasheet" in Related Documents for a detailed overview of specifications.

2.5 Product Type Identification



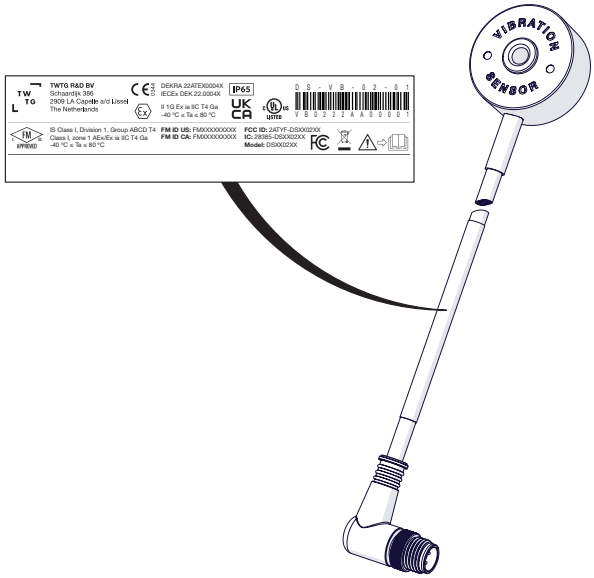
AA-BB-CC-DD	
AA - Product Family	DS
BB - Product Variant	LD = Transmitter
CC - Main Revision	02
DD - Region	E.g. 00 = Global

Product Nomenclature

AA-BB-CC-DD-EEEEE	
AA - Product Variant	LD = Transmitter
BB - Product Revision	E.g. 02
CC - Product Region	E.g. 00 = Global
DD - Production Year	E.g. 22 = 2022
EE - Production Batch	E.g. AA
FFFFF - Serial Number	E.g. 00001

Serial Number

Figure 1: Transmitter product identification



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Serial Number

Figure 2: Vibration Sensor product identification

2.6 Component Names

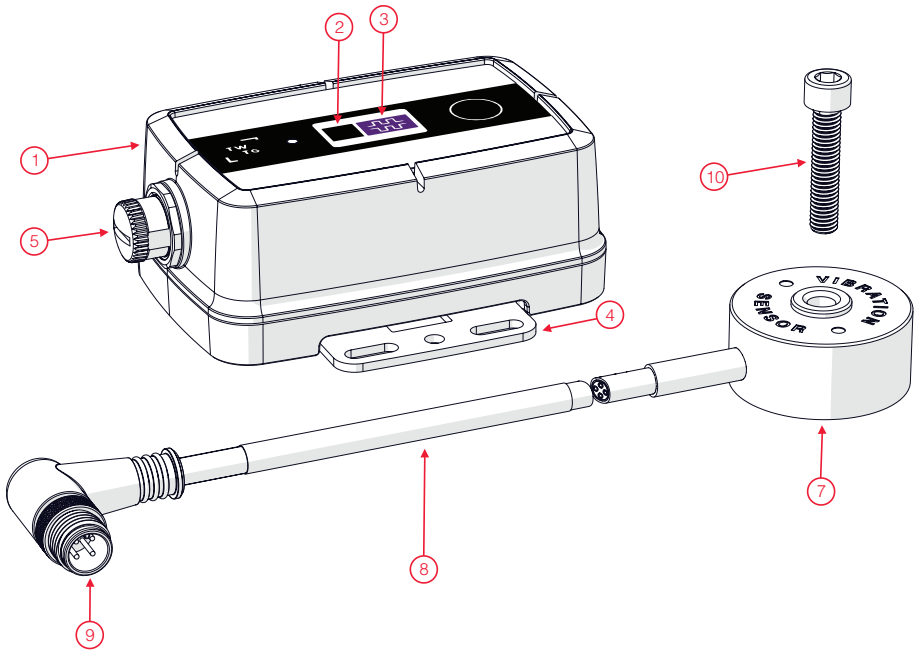


Figure 3: Component Names

Number	Description
1	Neon Transmitter
2	Data Matrix Code
3	NFC Tag
4	Mounting Bracket
5	M12 Connector Dust Cap
7	Vibration Sensor
8	Sensor Label
9	Sensor (M12) Connector
10	M6 Bolt

Table 5: Component Names

2.7 Product Dimensions

2.7.1 Transmitter

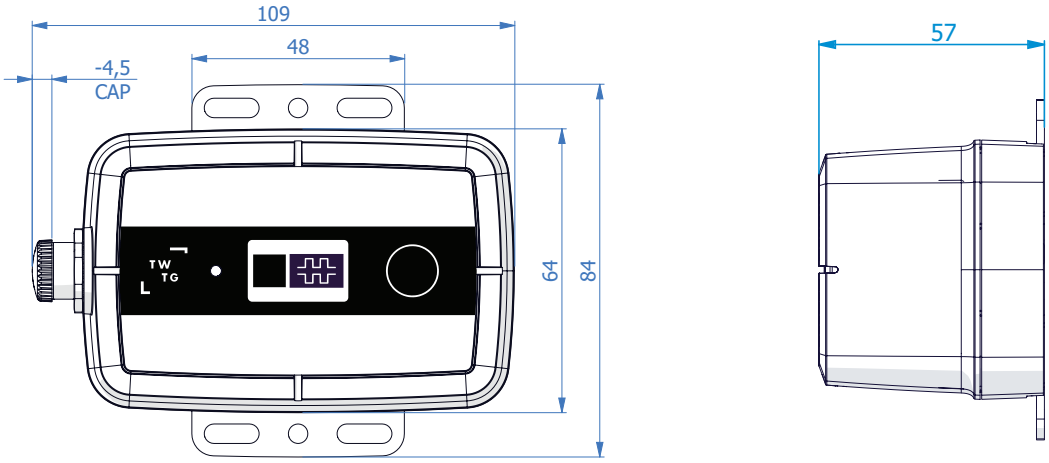


Figure 4: Neon Transmitter Dimensions (mm)

2.7.2 Sensor

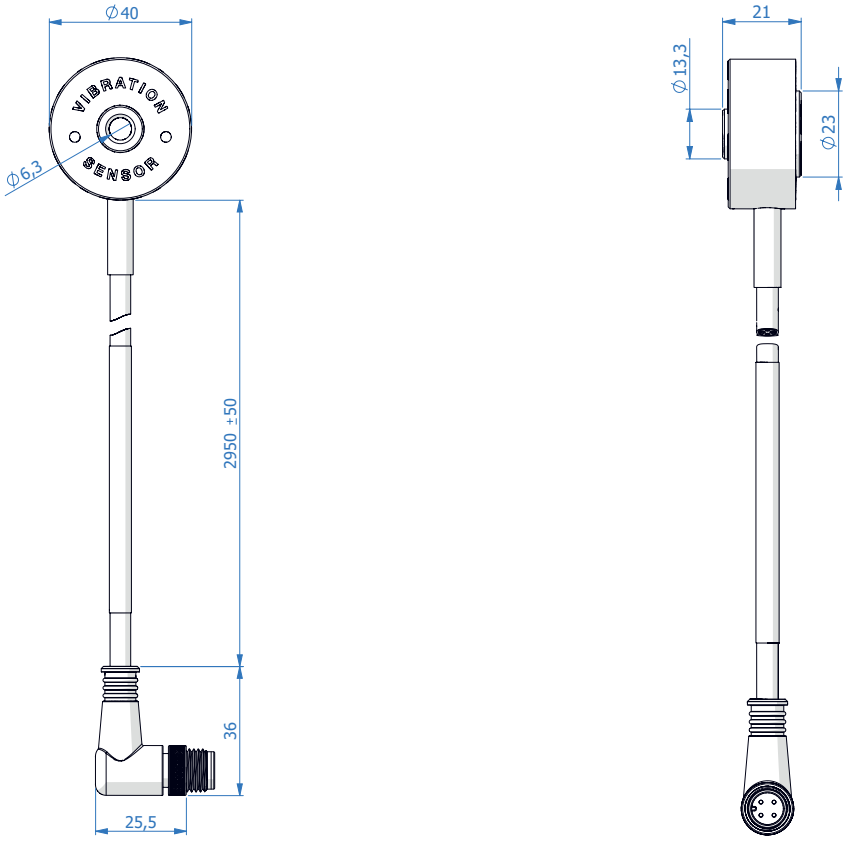


Figure 5: Neon Vibration Sensor Dimensions (mm)

3 Warnings

3.1 ATEX / IECEx

3.1.1 Specific Conditions of Use

WARNING - POTENTIAL ELECTROSTATIC CHARGING HAZARD

- The product shall be installed in such a way that the risk for electrostatic discharges is minimised;
- When the equipment is used in hazardous locations, avoid any actions which generate electrostatic discharge;
  - Cleaning: The equipment shall only be cleaned using a wet cloth;
  - Installation: Touch non-metallic parts with an insulating object;
  - Environment: Do not use the product in environments with powerful charge generating processes.

3.1.2 Installation

- This equipment shall be installed according to NEN-EN-IEC 60079-14 and the installation instructions;
- This equipment is intended for fixed installations only;
- This equipment is intended for use in restricted access areas only;
- To comply with FCC/IC RF exposure limits for general population / uncontrolled exposure, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

WARNING - DO NOT OPEN WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT

- Under no circumstances shall the equipment enclosure be opened within a hazardous area

3.1.3 Operation

The connector of this equipment may only be used with external equipment as listed in the “Product Matrix”;

- The connector of this equipment shall not be connected when an explosive atmosphere is present;
- This equipment shall only be used in environments where electromagnetic field strength is limited according to EN 60079-14;
- This equipment is only intended for use in combination with NFC Forum Tag 2 Type technical specification compatible readers;
- This equipment shall only be used within ambient temperatures between -40 ℃ and 70 ℃.
  - The DS-VB-02-XX may be used within ambient temperatures between -40 ℃ and 80 ℃.

3.1.4 Service

- This equipment shall only be opened by TWTG or by a competent instructed person;
  - The battery is serviceable by said persons;
  - Only replace the battery in a non-hazardous location;
  - Only use Tadiran S1P1/SL-2780/323/TWT battery assembly;
- Changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.
- If damage to the enclosure is evident, a trained and competent person shall be immediately informed, who shall remove the device from service as soon as possible;
- If the equipment is or has been in contact with chemical materials, clean it appropriately.

3.2 General

3.2.1 Transport and Storage

- The product must be kept in its original packaging until it reaches the installation site to prevent damage while in transit;
- The storage location must be dry;
- The product must not be exposed to vibrations or impact during transit and storage.

3.2.2 Warranty

- The warranty covers the period noted on the quotation;
- If the device doesn't function as documented, the customer should contact TWTG and provide the following information:
  - Model specification;
  - Serial number;
  - Circumstances under which the problems developed;
  - Any previously generated data;
- The party responsible for the costs of solving the problem shall be determined by TWTG on the basis of an investigation conducted by TWTG.

3.2.3 Warranty will be void in case of

- Malfunction due to ignoring the design specifications;
- Malfunction due to modification of the product carried out by the user;
- Deferred maintenance of the product or the installation location.

4 Avertissements

4.1 ATEX / IECEx

4.1.1 Conditions spécifiques d'utilisation

ATTENTION – RISQUE POTENTIEL DE DECHARGES ELECTROSTATIQUES

- Le produit doit obligatoirement être installé de manière à minimiser le risque de décharges électrostatiques;
- Lorsque l'équipement est utilisé dans un environnement dangereux, évitez strictement toute action générant une décharge électrostatique;
  - Nettoyage: L'équipement doit être nettoyé uniquement à l'aide d'un chiffon humide;
  - Installation: Toucher les parties non métalliques qu'avec un objet isolant;
  - Environnement: N'utilisez pas le produit dans des environnements générant de fortes charges d'électricité.

4.1.2 Installation

- Cet équipement doit être installé conformément à la norme NEN-EN-IEC 60079-14 et aux instructions d'installation;
- Cet équipement est uniquement destiné aux installations fixes;
- Cet équipement est uniquement destiné à être utilisé dans des zones à accès restreint.

ATTENTION – NE PAS OUVRIR DANS UNE ATMOSPHÈRE EXPLOSIVE

- Le boîtier de l'équipement ne doit en aucun cas être ouvert dans une zone dangereuse.

4.1.3 Fonctionnement

- Le connecteur de cet équipement ne doit être utilisé qu'avec un équipement externe tel qu'indiqué dans le "product matrix";
- Le connecteur de cet équipement ne doit jamais être connecté dans une atmosphère explosive;
- Cet équipement ne doit être utilisé que dans un environnement où l'intensité du champ magnétique est limitée conformément à la norme EN 60079-14;
- Cet équipement est uniquement destiné à être utilisé en combinaison avec des lecteurs compatibles dont les spécifications techniques respectent la norme des tags NFC de Type 2;
- Cet équipement ne doit être utilisé qu'à des températures comprises entre 40 °C et 70 °C;
  - Le DS-VB-02-XX ne doit que être utilisé qu'à des températures comprises entre -40 °C et 80 °C.

4.1.4 Entretien

- Cette pièce d'équipement ne doit être ouverte que par TWTG ou par une personne compétente et selon le guide d'utilisation;
  - La batterie peut être mise à neuf par ces personnes;
  - Ne remplacez la batterie que dans un endroit sans danger;
  - Utilisez uniquement l'ensemble de batterie Tadiran S1P1/SL-2780/323/TWT ;
- Si le boîtier est endommagé, informez immédiatement une personne compétente pour qu'elle vienne récupérer l'équipement;
- Si l'équipement est (ou a été) en contact avec des substances chimiques, nettoyez-le de manière appropriée.

4.2 Informations générales

4.2.1 Transport et stockage

- Le produit doit être conservé dans son emballage jusqu'à ce qu'il atteigne le site d'installation pour éviter tout dommage pendant le transit;
- Le lieu de stockage doit être sec;
- L'appareil ne doit pas être exposé à des vibrations ou à des chocs pendant le transport et le stockage.

4.2.2 Garantie

- La garantie couvre la période indiquée sur le devis;
- Si l'appareil ne fonctionne pas comme prévu, le client doit contactez TWTG et fournir les éléments suivants;
  - Spécifications du modèle;
  - Numéro de série;
  - Les circonstances dans lesquelles les problèmes sont survenus;
  - Toutes les données précédemment générées;
- La partie responsable des coûts de résolution du problème sera déterminée par TWTG sur la base d'une enquête privée menée par TWTG.

4.2.3 La garantie sera annulée dans les cas suivants:

- Non-respect des spécifications du modèle;
- Modification du produit effectuée par l'utilisateur;
- Entretient non conforme aux spécifications du produit;
- Utilisation dans un endroit non conforme aux spécifications.

5 Provisioning

5.1 User Interface

The product contains one Light Emitting Diode (LED) to communicate with the user. In order to interact with the device a button is present on the right side of the NFC label.

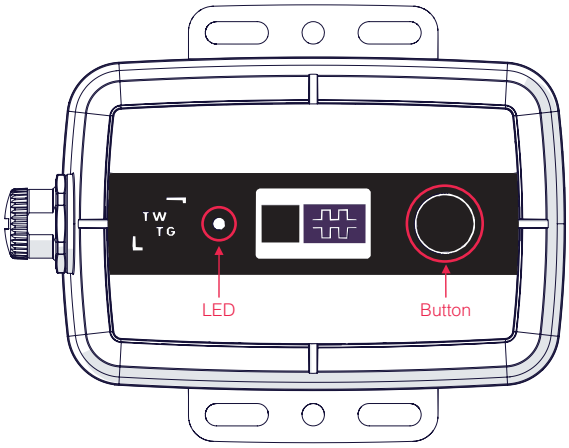


Figure 6: NEON Transmitter Interface

5.2 Operating the Device

Press and Release

Press and Hold

Release

Red (Illuminated 2 s)
Deactivated

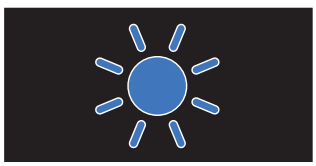
Red (Illuminated)
Failed

Green (Illuminated 2 s)
Activated

Green (Illuminated)
Passed

White (Blinking)
Connecting

White (Illuminated)
Calibrating



Blue (Illuminated)
Action / Handling Required

Blue (Flashing each second)
Button is being hold

5.2.1 Read device status

1. Press & release the button and the device will immediately show its status:

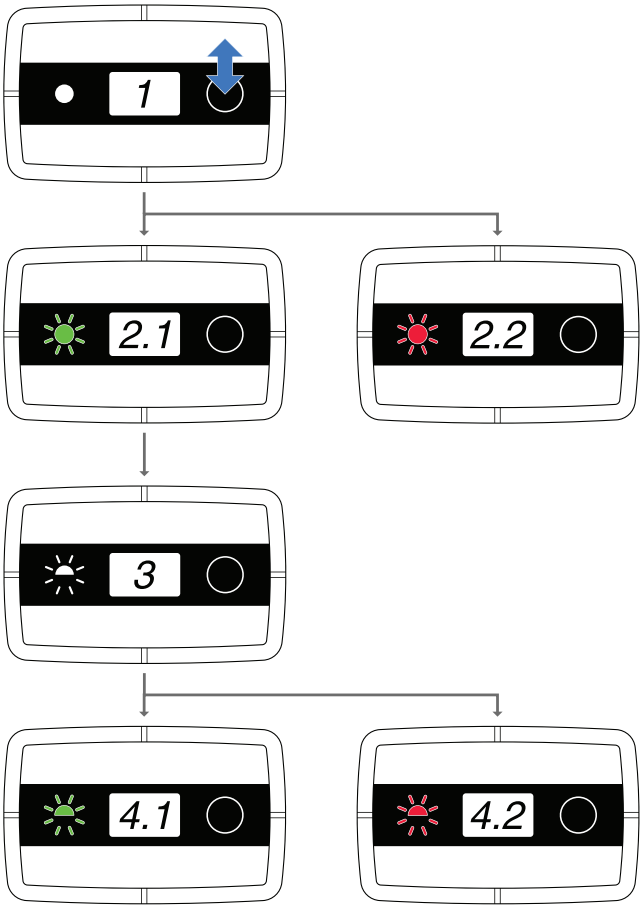
- **2.1 Green (Illuminated):** Device is activated
- **2.2 Red (Illuminated):** Device is deactivated

If the device is activated it will try to send the Device Status message over LoRa (using default configuration):

- **3. White (Blinking):** Connecting to network

Within a typical maximum of 3 minutes*, the device will show:

- **4.1 Green (Blink 2x):** Message sent, or
- **4.2 Red (Blink 2x):** Failed to connect to send message / connect to network



Notes:

- *The NEON Transmitter can be configured to send a Sensor Data message upon a button press. In this configuration the Sensor Data message will be sent after the Sensor Event message;*
- **All timeout and retry values are valid for the default configuration, the maximum timeout might be longer when process is performed repeatedly due to RF duty cycle limitations.*

5.2.2 Device Activation

1. Press & hold the button for 5 seconds
During the button hold the LED will blink Blue each second.

2. After holding the button for 5 seconds the device will first check the LoRa network:

- **3.1 White (Blinking):** Checking LoRa network

4. Within a typical maximum of 3 minutes* the device will show:

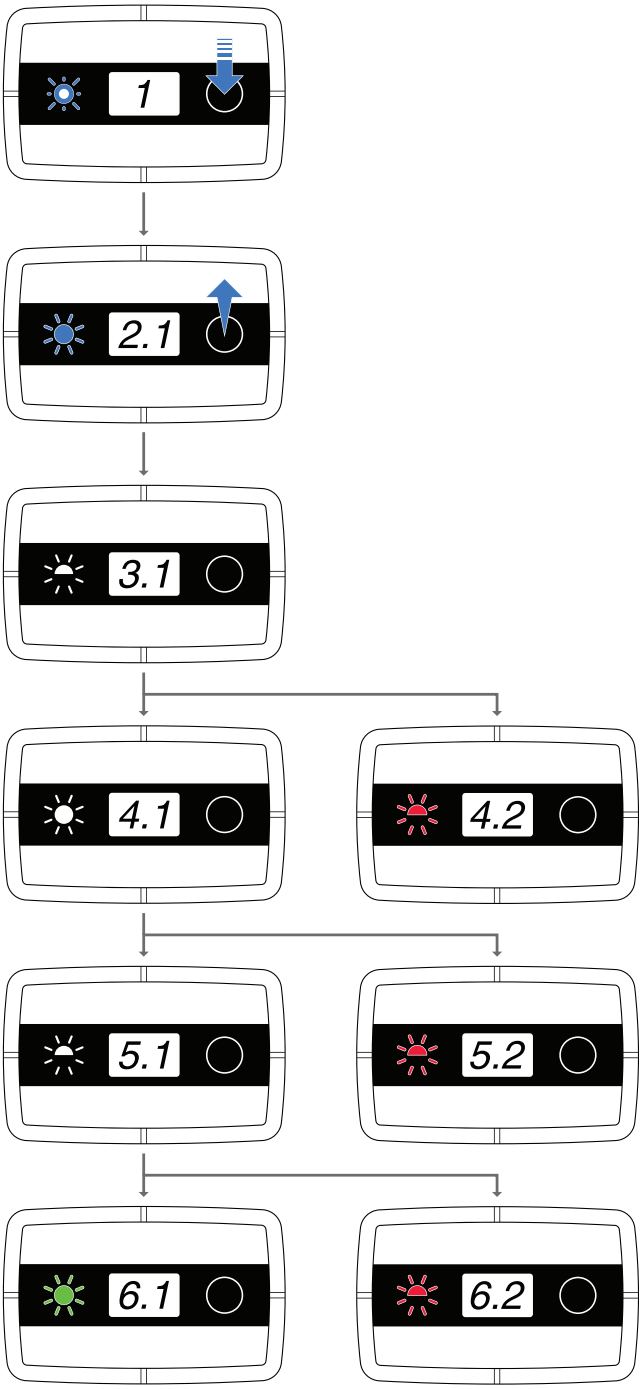
- **4.1 White (Illuminated):** Checking sensor communication
- **4.2 Red (Blink 2x):** Check network

5. Within 30 seconds max. the device will show:

- **5.1 White (Blinking):** Sending activation over LoRa
- **5.2 Red (Blink 2x):** Check sensor

6. After communicating over LoRa, within a typical maximum of 3 minutes*, the device will show:

- **6.1 Green (Illuminated):** Activated, or
- **6.2 Red (Blink 2x):** Check network



Notes:

- **All time out and retry values are valid for the default configuration, the maximum time out might be longer when process is performed repeatedly due to RF duty cycle limitations.*

5.2.3 Device Deactivation

1. Normal Configuration
During the button hold the LED will blink Blue each second.

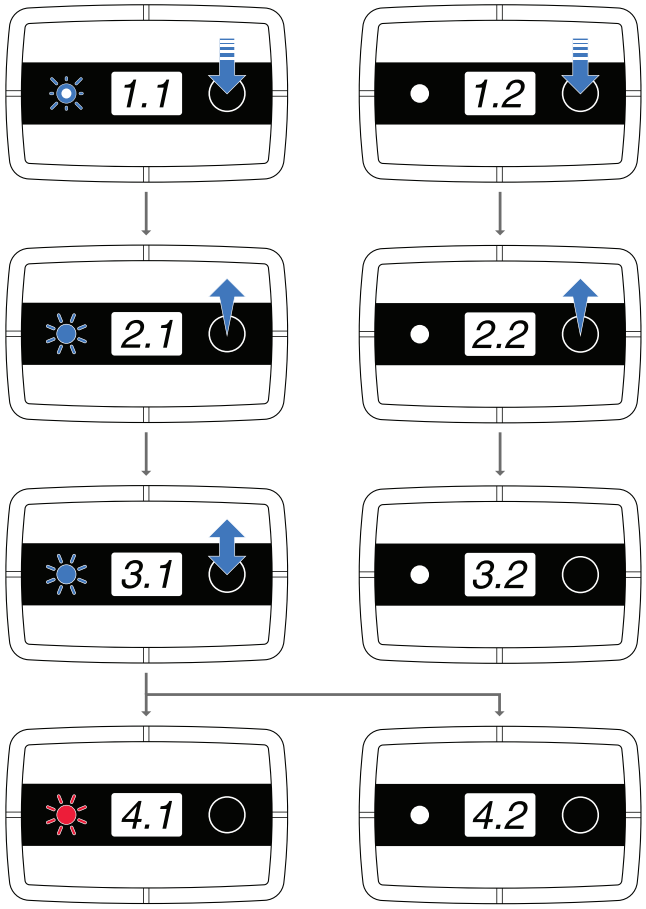
2. After holding the button for 5 seconds the device will show:

- **2.1 Blue (Illuminated):** Action required

3. The user can now release the button and press and release within 5 seconds:

4. If the button isn't pressed & released within these 5 seconds:

- **Red (Illuminated):** Deactivated
- **No LED:** Deactivation canceled



Notes:

- *Secured Configuration*
  - *If the device is in Secured Configuration it is not possible to deactivate the device using the button. The device will not react to a press and hold of the button and the LED will stay off. See diagram 1.2, 2.2 and 3.2 and "Communication Protocol" in Related Documents.*

5.3 Product Identification

5.3.1 NFC

The NFC label is located in the identification sticker and programmed with the serial number of the device. The serial number read from the NFC can be used as unique identifyer for provisioning and registration.

5.3.2 Data Matrix Code

The Data Matrix Code label also represents the serial number of the device. The serial number read from the Data Matrix Code code can be used as unique identifyer for provisioning and registration. See Product Type Identification for a detailed label description.

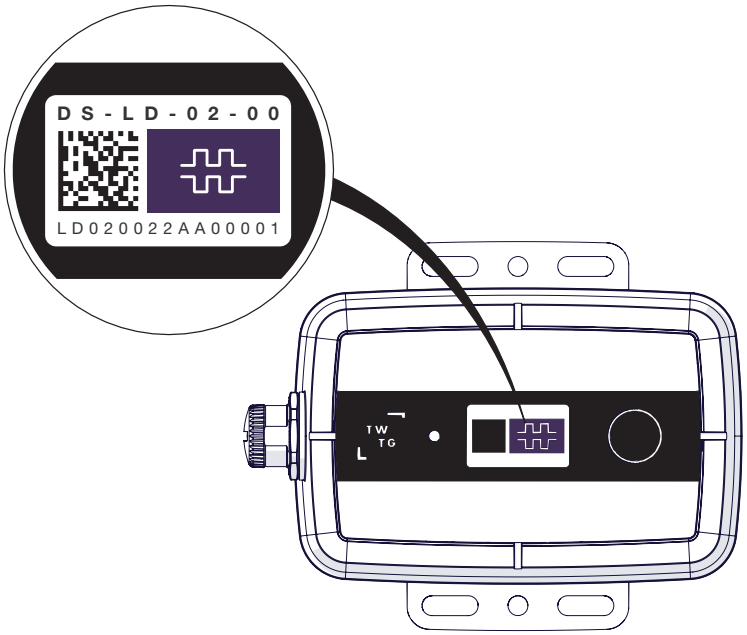


Figure 7: NFC and Data Matrix Code code Location

6 Installation of the Transmitter

6.1 Precautions

WARNING

- Avoid placing wiring close to noise sources such as large motors or power supplies;
- To comply with FCC/IC RF exposure limits for general population / uncontrolled exposure, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter;
- Only connect the M12 connector to the Transmitter when there is no explosive atmosphere present;
- The equipment must be installed in accordance with EN 60079-14.

6.2 Mounting Bracket Dimensions

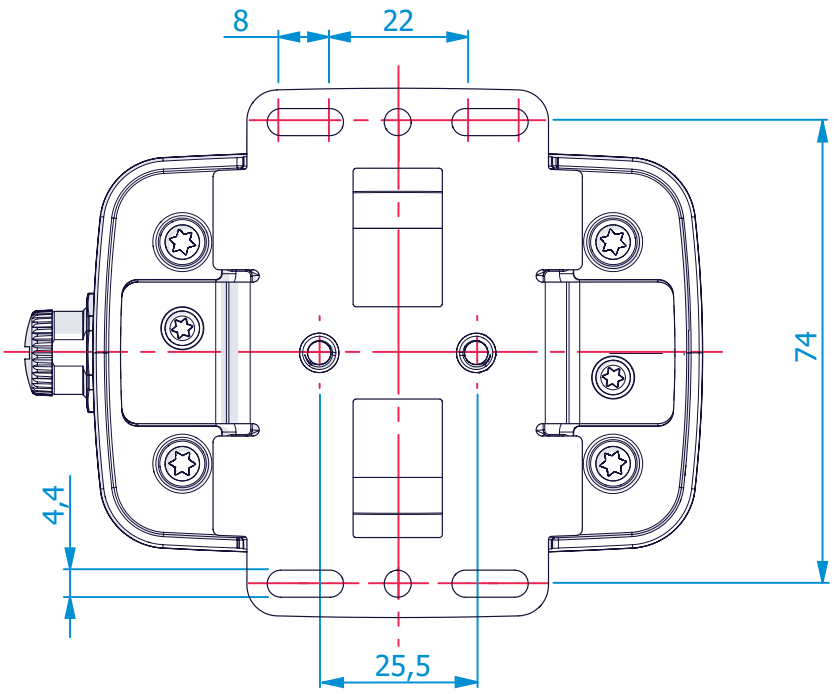


Figure 8: Mounting Bracket Dimensions (in mm)

6.3 Installation Methods

6.3.1 Installation using mounting holes

Place the bracket against the (flat) desired surface and use the screw holes or slots to fix in place.
Note: Slots and screw holes are designed for M4 fasteners.

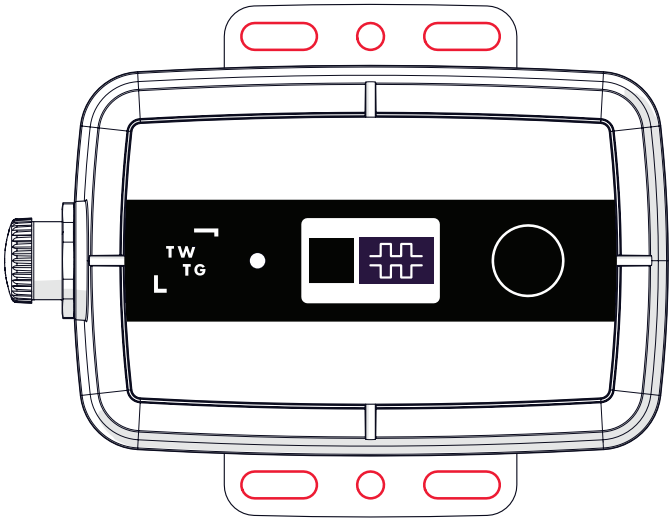


Figure 9: Product Mounting Holes

6.3.2 Installation using threaded holes

Note: Threaded screw holes are designed for M5 fasteners.

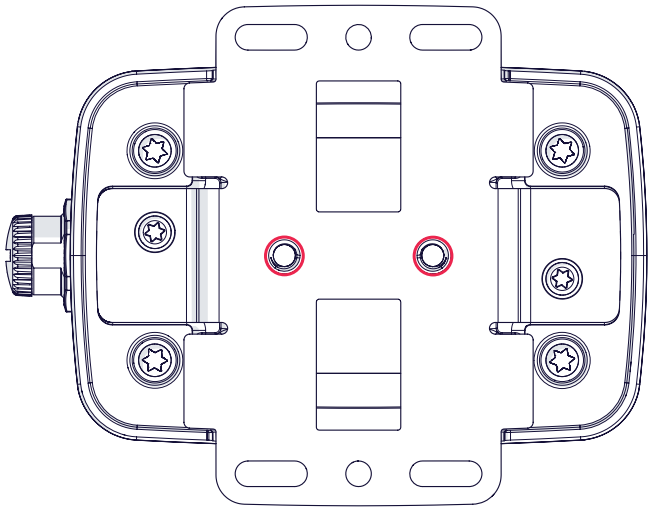


Figure 10: Product Threaded Mounting Holes

6.3.3 Installation using bandclamp

The Neon Transmitter can be mounted to a pole using a 14 mm wide band clamp, other sizes are not recommended.

Procedure:

1. Place the band clamp through the bracket;
2. Place the band clamp around the pole and cut to size;
3. Place the band clamp through the adjustable tightener and fold around the bottom with a plier;
4. Place the band clamp around the pole with the (adjustable) tightener and fix it in place.

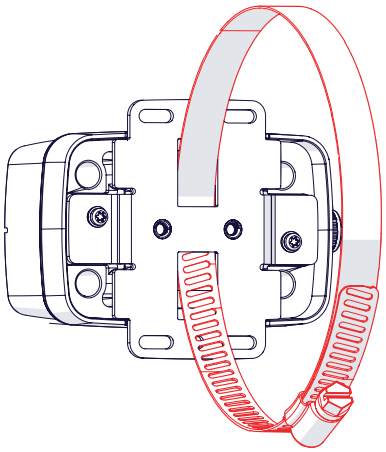


Figure 11: Installation using Bandclamp

7 Installation of the Vibration Sensor

7.1 General Installation Requirements

IMPORTANT

- Always use a torque wrench set to the listed torque to tighten the mounting screw;
- The mounting surface should be flat and always be cleaned before mounting the sensor;
  - Failure to do so may affect measurements;
- Install according to EN 60079-14.

7.2 Vibration Sensor Orientation

For correct operation the Vibration Sensor needs to be mounted in the correct orientation. Use the cable as a reference for the Y-axis direction.

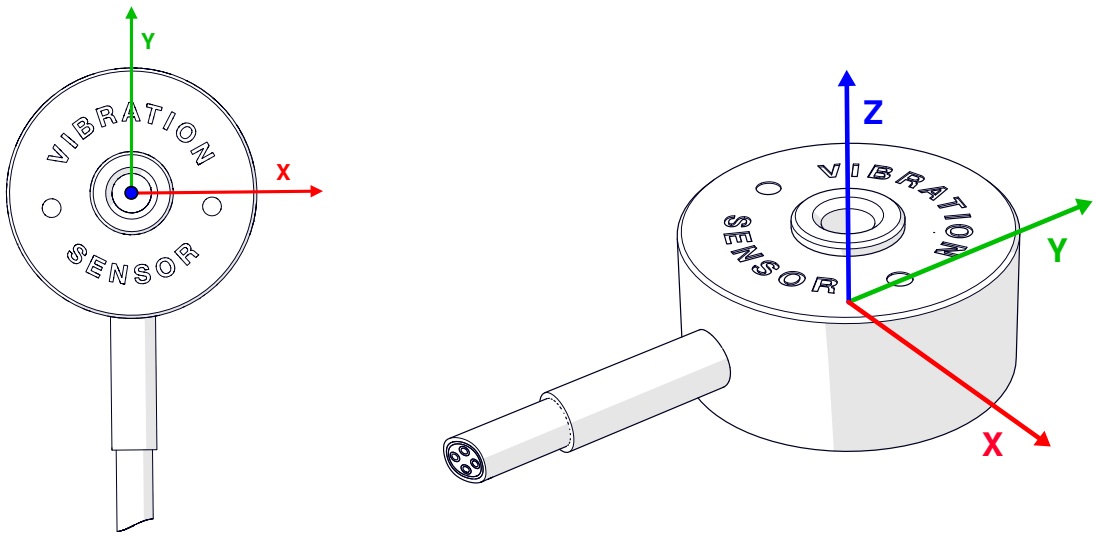


Figure 12: Mounting Orientation

7.3 Direct installation using the mounting hole

Procedure:

1. Find a flat surface of at least 40 mm in diameter;
2. The surface should be flat, undamaged and clean;
3. Create a threaded hole, size M6 with a thread depth of at least 8 mm;
4. Attach the Vibration Sensor using the supplied M6 bolt, according to Direct Mounting Assembly;
5. Ensure proper orientation according to Vibration Sensor Orientation;
6. Tighten the screw using a torque wrench:
   - Minimum torque: 14 Nm;
   - Maximum torque: 16,3 Nm.

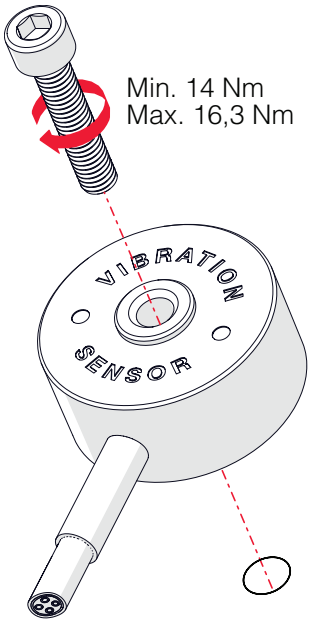


Figure 13: Direct Mounting Assembly

7.3.1 Dimensions

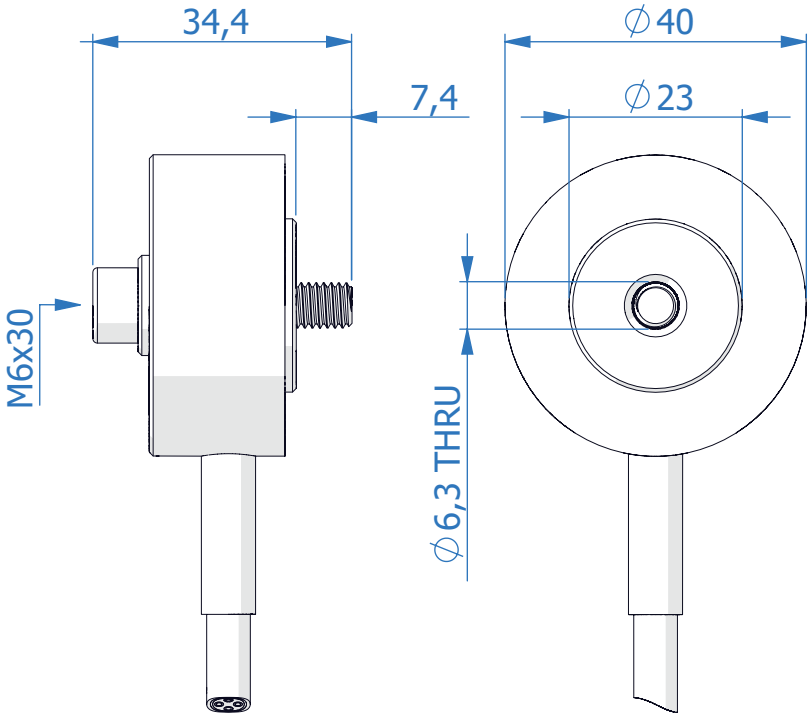


Figure 14: Direct Mounting Dimensions (mm)

7.4 Using Chemically Bonded Adapter

Procedure:

1. Find a flat and surface of at least 40 mm in diameter;
2. See "3M Scotch Weld Epoxy Datasheet" in Related Documents on how to prepare the surface;
3. Use "3M DP8405 Green" Acrylic Adhesive and compatible dispenser products. Attach adapter to the surface according to "3M Scotch Weld Epoxy Datasheet" in Related Documents. Make sure the adapter is parallel to the mounted surface;
4. Let the adhesive cure for the time as stated in the "3M Scotch Weld Epoxy Datasheet";
5. Attach the Vibration Sensor to the adapter using the supplied M6 bolt, according to Chemically Bonded Adapter Assembly;
6. Ensure proper orientation according to Vibration Sensor Orientation;
7. Tighten the screw using a torque wrench:
   - Minimum torque: 14 Nm;
   - Maximum torque: 16,3 Nm.

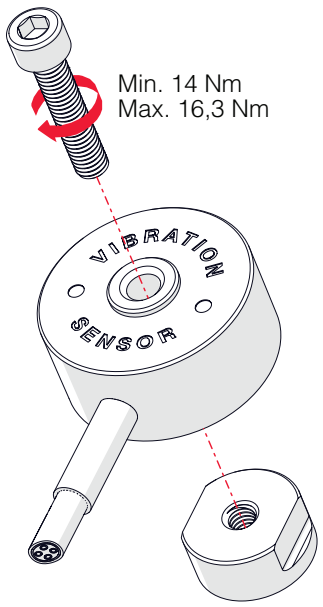


Figure 15: Chemically Bonded Adapter Assembly

7.4.1 Dimensions

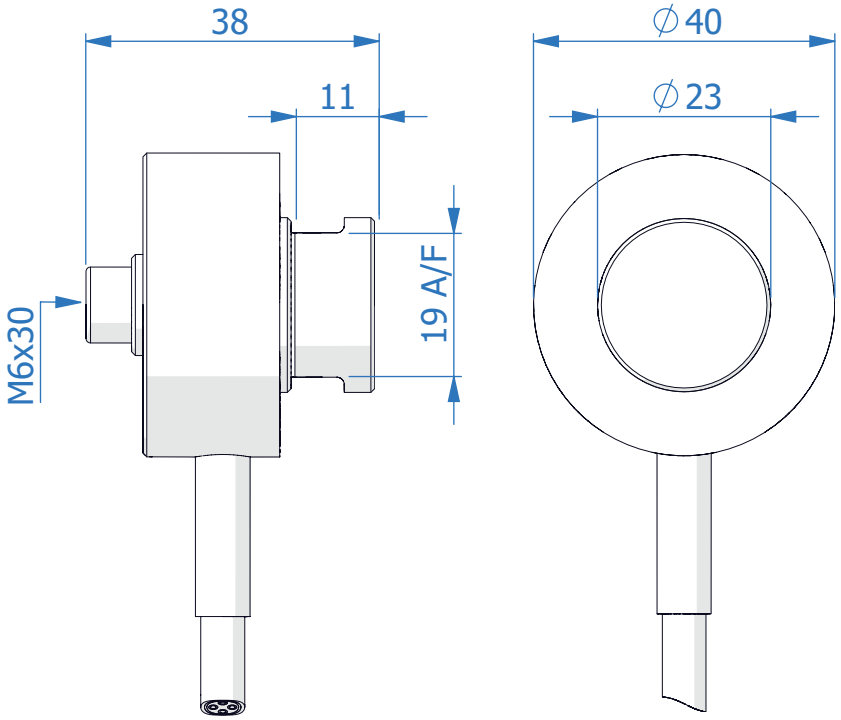


Figure 16: Chemically Bonded Adapter Dimensions (mm)

7.5 Using Magnet Adapter (Flat)

Procedure:

1. Hold the Magnet Adapter in position, using the proper tool;
2. Attach the Vibration Sensor using the supplied M6 bolt, according to Curved Magnet Adapter Assembly;
3. Tighten the screw using a torque wrench:
   - Minimum torque: 14 Nm;
   - Maximum torque: 16,3 Nm;
4. Find a flat and surface of at least 40 mm in diameter;
5. The surface should be flat, undamaged, and clean;
6. Attach the Vibration Sensor using the magnet;
7. Ensure proper orientation according to Vibration Sensor Orientation.

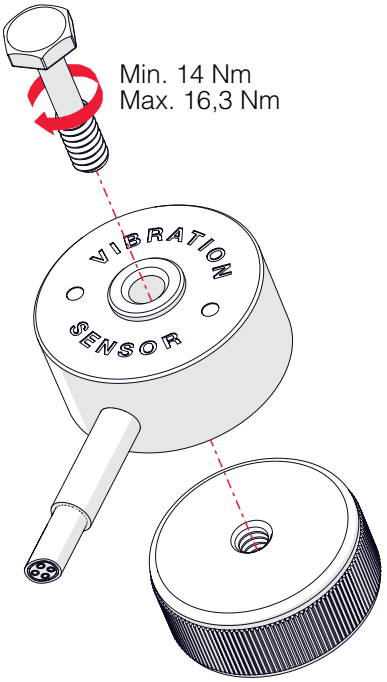


Figure 17: Flat Magnet Adapter Assembly

7.5.1 Dimensions

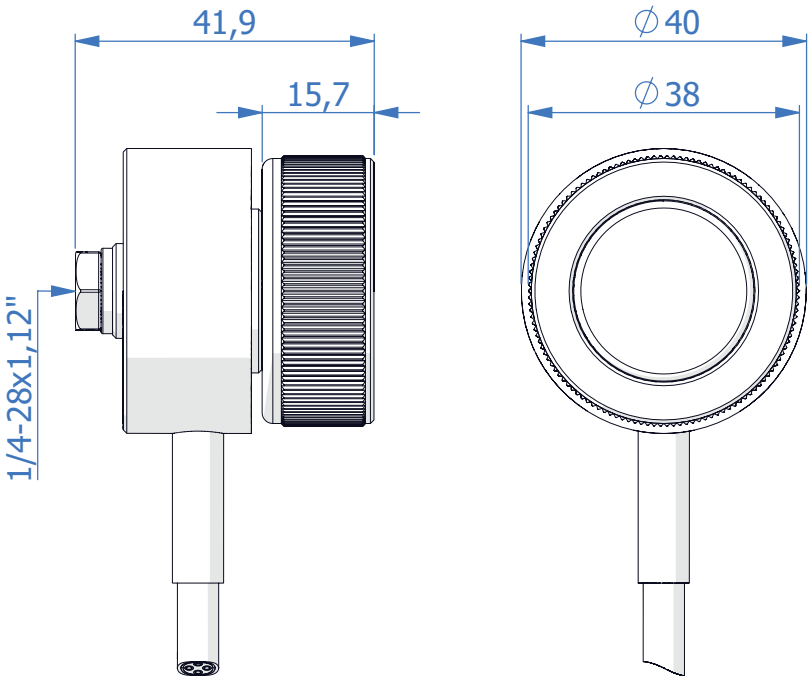


Figure 18: Flat Magnet Adapter Dimensions (mm)

7.6 Using Magnet Adapter (Curved)

Procedure:

1. Hold the Magnet Adapter in position;
2. Attach the Vibration Sensor using the supplied M6 bolt, according to Curved Magnet Adapter Assembly;
3. Tighten the screw using a torque wrench:
   - Minimum torque: 14 Nm;
   - Maximum torque: 16,3 Nm;
4. The surface should be undamaged and clean;
5. Attach the Vibration Sensor using the magnet;
6. Ensure proper orientation according to Vibration Sensor Orientation.

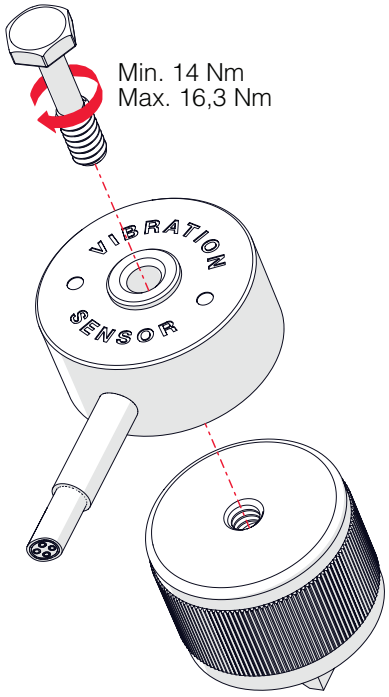


Figure 19: Curved Magnet Adapter Assembly

7.6.1 Dimensions

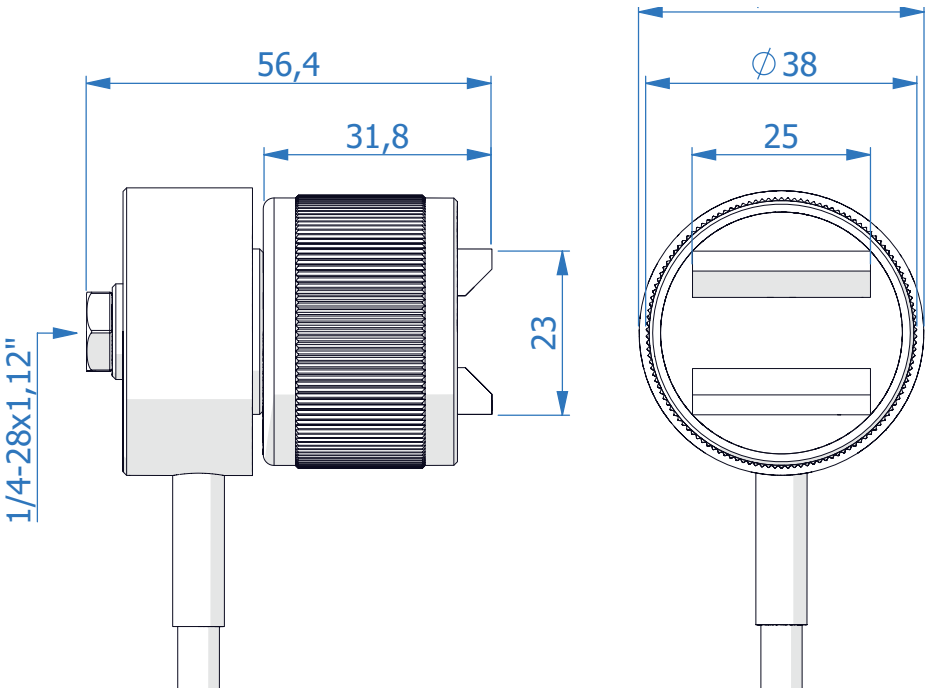


Figure 20: Curved Magnet Adapter Dimensions (mm)

7.7 Connecting the Vibration Sensor to the Transmitter

1. Unscrew the dust cap from the product. Check inside the M12 connector for correct placement of the O-Ring (marked in red). Without this O-Ring, the water and dust resistance rating of the product cannot be guaranteed.

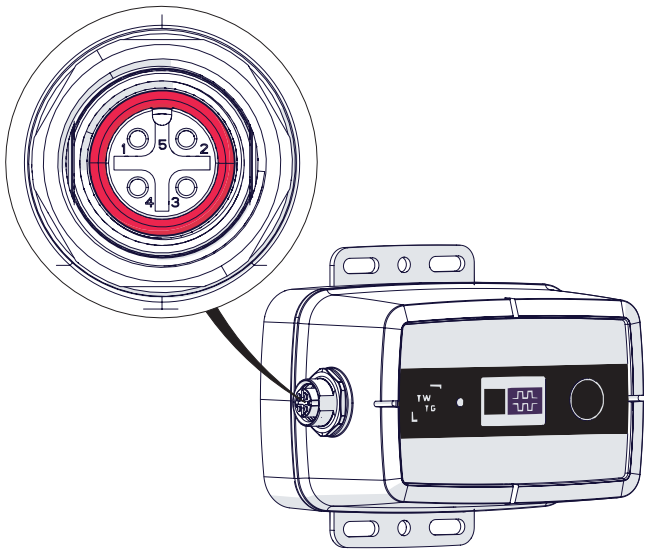


Figure 21: M12 Connector O-ring Location

2. Connect the Sensor connector to the Transmitter. Ensure correct polarity before inserting the connector. The polarity notch is facing up. Completely tighten the connector but do not use excessive force. If the connector is not fully inserted, water and dust resistance rating cannot be guaranteed.

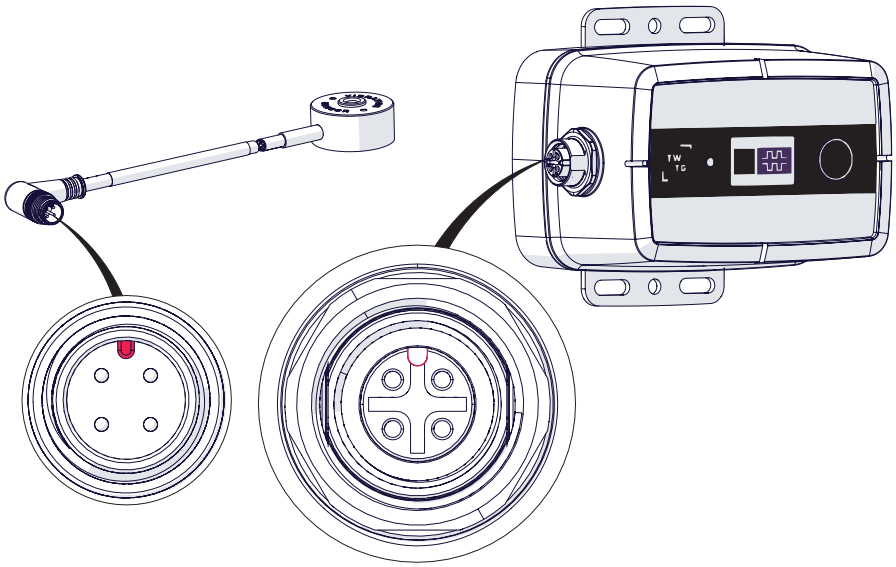


Figure 22: M12 Connector Polarity Mark

8 Product Functionalities

A detailled description of setting-up communication and configuring device settings can be found in "Communication protocol", refer to table 1. Related Documents.

8.1 Application Event Message

The Vibration Sensor measures and reports the vibrations either by set intervals (a timer-based trigger) or a condition-based trigger.

8.1.1 Event triggers

Event-messages are triggered on one of the following triggers:

- **Timer (periodic)**:
  The timer trigger is configurable through the following configurations:
  - *measurement_interval_seconds*
    Interval in seconds, at which the vibration sensor is read.
  - *periodic_event_message_interval*
    Interval in the number of measurements at which the application event messages are periodically sent. The periodic counter is reset on every event message.

- **Condition**:
  A condition-based trigger can be either of the following tresholds:
  - *rms velocity trigger_x*
  - *peak acceleration trigger_x*
  - *rms velocity trigger_y*
  - *peak acceleration trigger_y*
  - *rms velocity trigger_z*
  - *peak acceleration trigger_z*

8.1.2 Content application event message

- **Rms velocity**
  The measured rms velocity for each of the axis (X,Y,Z) in units of 0.01 mm/s.
  - Maximum;
  - Average;
  - Minimum.
- **Acceleration**
  The measured acceleration for each of the axis (X,Y,Z) in units of 0.01 m/s$\hat{2}$.
  - Maximum;
  - Average;
  - Minimum.
- **Temperature**
  The connected sensor temperature in units of 0.1 ℃:
  - Maximum;
  - Average;
  - Minimum.
- **Trigger**
  Source of the trigger for the application event message:
  - "timer" (0);
  - "condition_0" (1);
  - "condition_1" (2);
  - "condition_2" (3);

  - "condition_3" (4).
- **Condition_n**
  The current state of each condition.

8.2 Sensor Data Message

The FFT (sensor data message) is split between a configurable amount of messages. For a detailed explanation of available configurations see "Communication Protocol" in Related Documents. The sensor data message can be recombined to a full spectrum as shown in figure Example FFT.

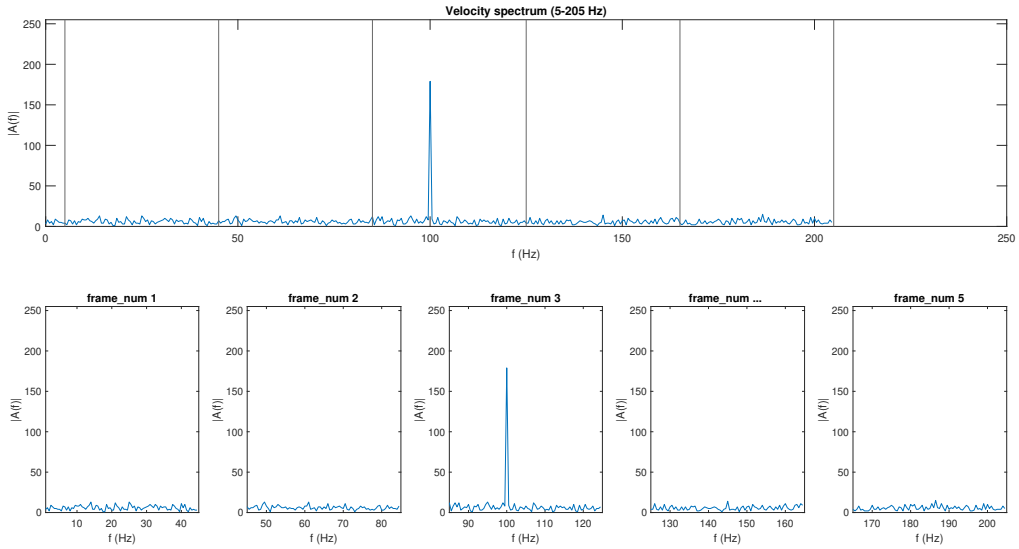


Figure 23: Example FFT

8.3 Device Status

Next to reporting the application events, the Vibration Sensor also reports on the device status itself. This is done through a device status messages. A device status message is sent periodically and includes a range of device health parameters, including the following:

- event_counter;
- battery_voltage;
- PCB temperature;
- tx_counter;
- avg_rssi;
- avg_snr.

See "Communication Protocol" in Related Documents for a detailed explanation.

8.4 Default Configuration

The Transmitter is delivered with a default configuration. The default configuration includes:

- Measurement interval of 15 mins;
- Event-based message at the time of each periodic trigger with an interval of 16 measurements. (16 * 15 = 240 minutes);
- Device status message interval of 24 hours;
- Enabled event confirmation messages;
- All triggers disabled;
- Disabled data messages confirmation (FFT);
- Disabled FFT.

See "Communication Protocol" in Related Documents for a detailed explanation of all default configuration values.

9 Maintenance

9.1 Battery Specifications

Specifications	
Manufacturer	Tadiran
Part number	Tadiran S1P1/SL-2780/323/TWT
Quantity	1
Battery Type / Size	Type D
Chemistry	Lithium Thionyl Chloride
Terminal Type	Standard
Dimensions	61 x 32.5 mm
Battery Life	>7 years*

Table 6: Battery Specifications

**Note: Applicable to default configuration. Battery lifetime depends on average ambient temperature, network quality and device configuration.*

9.2 Battery Replacement

The battery can be replaced using the battery replacement kit. See Accessories and Spare Parts. This kit consists of the following parts:

- 1X Tadiran S1P1/SL-2780/323/TWT battery assembly;
- 4X O-Ring;
- 1X Gasket

9.2.1 Required tools

- Torque screwdriver with TX10 bit;
  - See Assembly of device for torque settings;
- Loctite 243;
- ESD strap.

IMPORTANT: ESD Sensitive Electronics

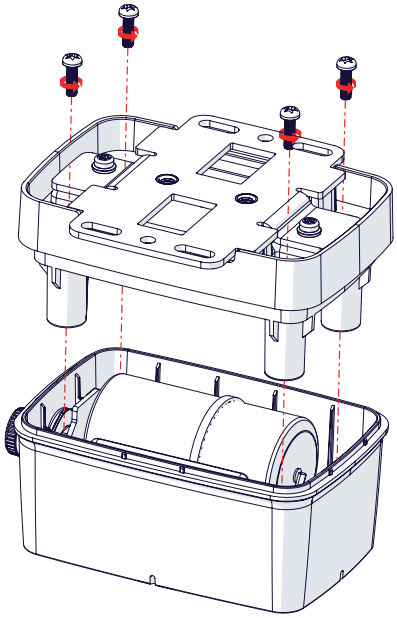
The product shall be installed in such a way that the risk for electrostatic discharges is minimised.

- Take proper precaution such as a grounded wrist strap and avoid touching the electronics board

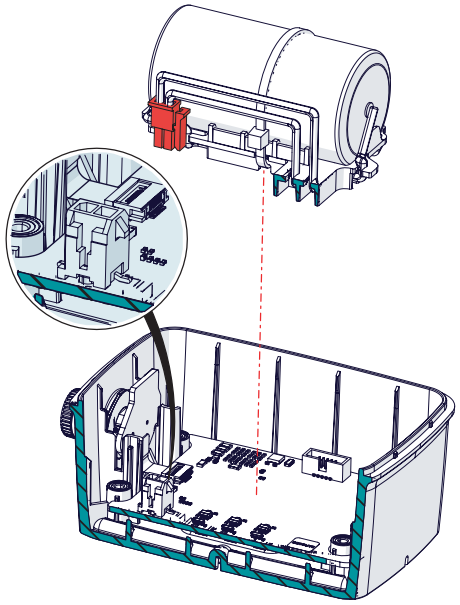
9.2.2 Disassembly of device

WARNING - DO NOT OPEN WHEN AN EXPLOSIVE ATHMOSPHERE IS PRESENT

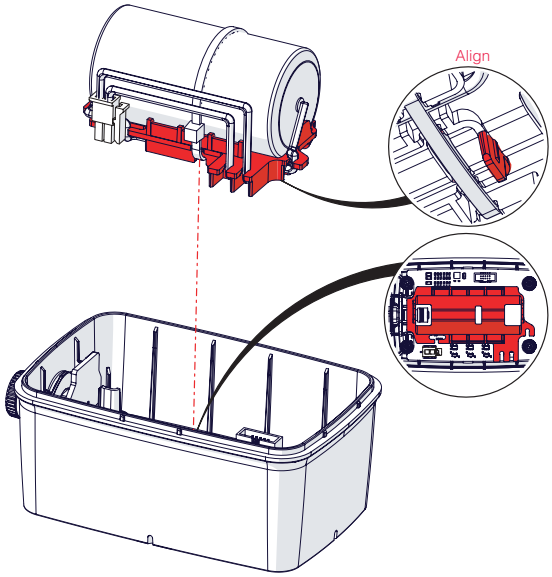
- This equipment shall only be opened by TWTG or by a competent instructed person;
  - The battery is serviceable by said persons;
  - Always disconnect M12 connector from Transmitter before replacing battery assembly



Step 1: Remove the four M3 screws and remove the bottom housing



Step 2: Before removing the battery assembly, disconnect the battery connector (marked in red)



Step 3: Place the new battery assembly. Use the rib on the battery cradle (marked in red) to align with main PCB in top housing and connect the new battery connector

9.2.3 Built-In Self-Test Procedure

When the device is deactivated a built-in self-test is performed upon insertion of the battery. This test is not executed when the device is already activated. Use the deactivation sequence as described in Device Deactivation and reinsert the batteries if a self-test is needed.

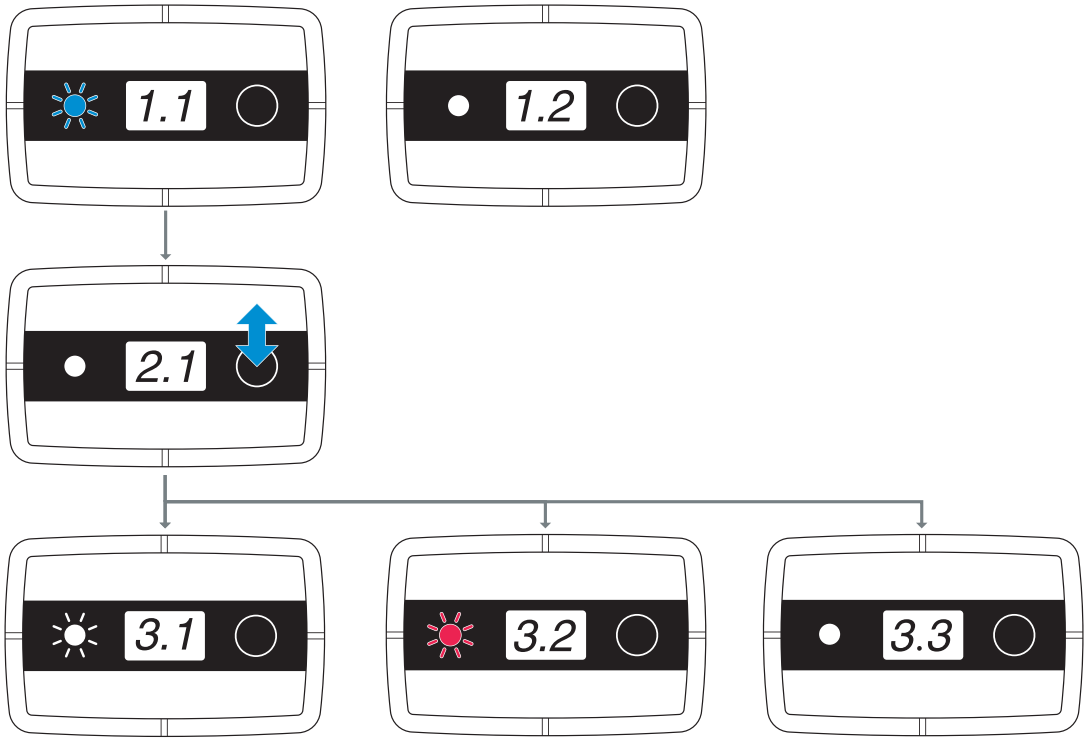


Figure 24: Built-in self-test

1: After successful replacement of the battery the device will go into self test mode. This mode is activated for 30 seconds;

1.1: A BLUE LED will show after inserting the battery;

1.2: If no LED is shown, check the battery and / or device;

2: Start the test;

2.1: Press and Release the button;

3: Test Results;

3.1: LED turns bright WHITE for 5 seconds. Self test passed;

3.2: LED turns RED, self test failed. Check device;

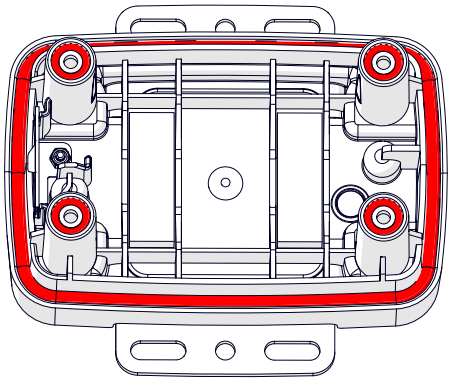
3.3: No LED, no response from device. Check device.

After pressing the button once and passing the self-test the device will leave the self-test mode. Pressing the button again will show the device status, as explained in Read device status.

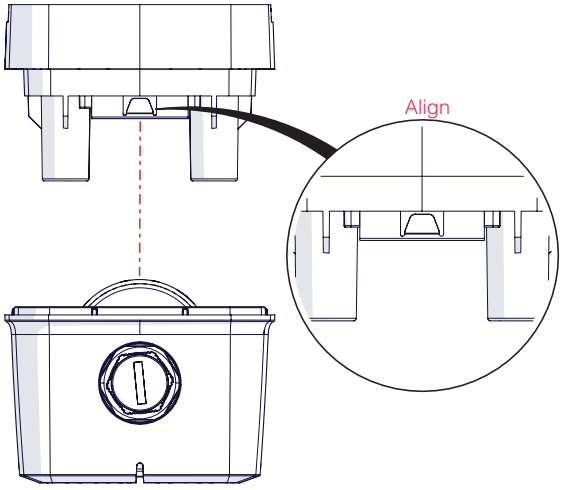
9.2.4 Assembly of device

IMPORTANT - USE THE SPECIFIED TORQUE SETTINGS

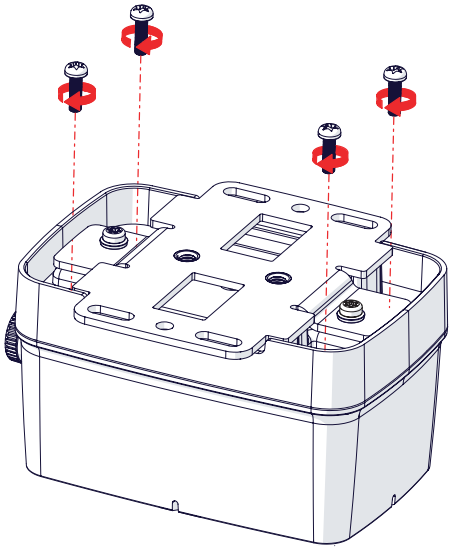
- Use a torque screwdriver to verify the applied torque;
- Failure to do so can result in water ingress;
- Improper assembly will void the warranty.



Step 4: Replace the 4 O-Rings surrounding the screws and the gasket in the outer edge of the bottom housing



Step 5: Place the bottom housing back onto the top housing. For correct orientation; Make sure that the bottom housing grounding plate is aligned with the top housing M12 connector



Step 6: Apply Loctite 243 and tighten the four M3 screws to fix the bottom housing. Use a torque screwdriver to set the maximum torque to 1 Nm

10 Accessories and Spare Parts

Type	Order code	Description
Battery Replacement Kit	5029_N02-09_Battery-Replacement-Kit	Including 1 battery assembly, 4 O-Rings, 1 gasket
Chemically Bonded Adapter	2013_P20-002_VB-Adapter-Bonded	Chemically Bonded Adapter
Magnetic Mounting Adapter (Flat)	080A122	Flat surface magnet, 1.5" diameter, 50 lbf, 1/4-28 threaded hole w/mounting stud Including mounting bolt
Magnetic Mounting Adapter (Curved)	080A132	Curved surface magnet, 1.5" diameter, 55 lbf, 1/4-28 threaded hole w/mounting stud Including mounting bolt

Table 7: Available Accessoires & Spare Parts

11 EU Declaration of Conformity

This product complies with the following standards:

1. ATEX Directive (2014/34/EU):
    - EN 60079-0:2012 +A11:2013
    - EN 60079-0:2018
    - EN 60079-11:2012
2. Radio Equipment Directive (2014/53/EU):
    - EN 300 220-1 V3.1.1
    - EN 300 220-2 V3.2.1
    - EN 301 489-1 V2.2.3
    - EN 301 489-3 V2.1.1
    - EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019
    - EN 62311:2020
    - EN 60529:1991 + A1:2000 + A2:2013
3. WEEE Directive 2003/1008/EC
4. RoHS (2011/65/EU)

For the full Declaration of Conformity see:

www.twtg.io/legal

12 FCC and ISED Declarations

This device complies with part 15 of the FCC Rules and to RSS of Industry Canada. 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.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. l'appareil ne doit pas produire de brouillage, et
2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This Class B digital apparatus complies with Canadian ICES-003. Cet appareil numérique de Classe B est conforme à la norme Canadienne ICES-003. CAN ICES-003(B) / NMB-003(B)

Revision History

Revision	Date	Author(s)	Description
A1	30-06-2022	SvW	Concept version
A2	22-07-2022	SvW	Added review comments
A3	05-10-2022	WK	- Updated product specifications and ratings - Added French warnings
A4	23-11-2022	WK	Updated FCC/ISED declaration