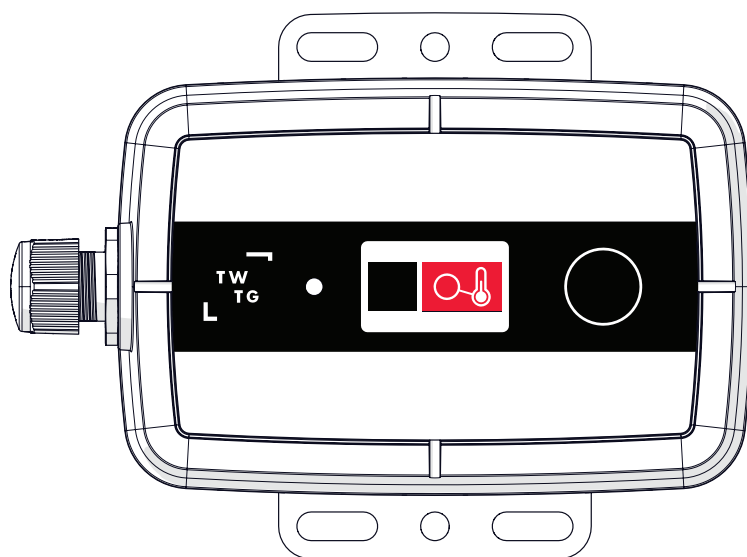


Temperature Transmitter

Product Manual

This document applies to version 2 of the NEON Temperature Transmitter (DS-TT-02-XX)



Contents

1	TWTG NEON	4
1.1	NEON Product Introduction	4
1.2	Related Documents	4
2	Getting Started	5
2.1	Compatibility of this manual	5
2.2	What you will need	5
2.3	What is in the box	5
2.4	Product Specifications	6
2.5	Product Type Identification	8
2.6	Component Names	9
2.7	Product Dimensions	9
3	Warnings	10
3.1	ATEX / IECEx	10
3.1.1	Specific Conditions of Use	10
3.1.2	Installation	10
3.1.3	Operation	10
3.1.4	Service	10
3.1.5	Output parameters	11
3.2	General	11
3.2.1	Transport and Storage	11
3.2.2	Warranty	11
3.2.3	Warranty will be void in case of	11
4	Avertissements	12
4.1	ATEX / IECEx	12
4.1.1	Conditions spécifiques d'utilisation	12
4.1.2	Installation	12
4.1.3	Fonctionnement	12
4.1.4	Entretien	12
4.1.5	Output parameters	13
4.2	Informations générales	13
4.2.1	Transport et stockage	13
4.2.2	Garantie	13
4.2.3	La garantie sera annulée dans les cas suivants:	13
5	Provisioning	14
5.1	User Interface	14
5.2	Operating the Device	15
5.2.1	Read device status	15
5.2.2	Device Activation	16
5.2.3	Device Deactivation	17
5.3	Product Identification	18
5.3.1	NFC	18
5.3.2	Data Matrix Code	18

6	Installation	19
6.1	Precautions	19
6.2	Mounting Bracket Dimensions	19
6.3	Installation Methods	20
6.3.1	Installation using mounting holes	20
6.3.2	Installation using threaded holes	20
6.3.3	Installation using bandclamp	21
6.4	Using the Temperature Transmitter with Thermocouples	22
6.4.1	Cold Junction Compensation	22
6.4.2	Assessed Connectors	22
6.4.3	Selecting a thermocouple wire	22
6.4.4	Connecting a thermocouple wire to the temperature interface	23
6.5	Using the Temperature Transmitter with a RTD (3-wire)	24
6.5.1	Connecting a RTD (3-wire) sensor to the temperature interface	24
7	Product Functionalities	25
7.1	Application Event Message	25
7.1.1	Event-triggers	25
7.1.2	Content application event message	26
7.2	Device Status	26
7.3	Default Configuration	26
8	Maintenance	27
8.1	Battery Specifications	27
8.1.1	Battery Replacement	27
8.1.2	Required tools	27
8.1.3	Disassembly of device	28
8.1.4	Built-In Self-Test Procedure	29
8.1.5	Assembly of device	30
9	Accessories and Spare Parts	31
10	EU Declaration of Conformity	32
11	FCC and ISED Declarations	33

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 data collection 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 is extended dramatically.

1.2 Related Documents

Document Name	Document Number
NEON Data Sheet	6015_N02-09_Data-Sheet-NEON-Temperature-Transmitter
NEON Communication Protocol	6020_N02-09_Communication-Protocol-NEON-Temperature-Transmitter

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 [Serial Number](#) 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 Temperature Transmitter.
See chapter [Product Type Identification](#) to determine the revision of the product.

2.2 What you will need

In order to deploy the NEON Temperature Transmitter, a compatible and operational LoRaWAN network architecture is required. This manual does not contain any instructions of how to setup and install LoRaWAN networks.
TW TG 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 whether all box items mentioned below are included.

Box Items	
NEON Temperature Transmitter	1 battery assembly (included in the product) 1 mounting bracket (mounted on the product) M12 connector (mounted on the product)
Declaration of Conformity	Declaration of Conformity, containing a link to latest version of this product manual and other relevant product documentation

Table 2: Box Items

2.4 Product Specifications

Product	
Product name	TWTG NEON Temperature Transmitter
Type identification	DS-TT-02-XX
Supported temperature sensors	Thermocouple Type-K (other types configurable over LoRa) RTD PT100
Environmental conditions	
Operating temperature range Transmitter	-40 °C - 70 °C
Storage temperature range	10 °C - 30 °C
Operating humidity range	0% - 100% RH
Altitude	Up to 3000 m
Water & dust resistance	IP65
Pollution degree	3
Usage	Indoor and outdoor
Mechanical	
Material	Molded plastic
Weight (including mounting bracket)	330 g
Dimensions	100x70x57 mm
Installation	
Transmitter	Band clamp or bolts (not included)
Maximum cable length	Limited by equipment output parameters, see Selecting a thermocouple wire
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)

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	FM22US0061X
FM CA certificate number	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 3: Product specifications. See also "NEON datasheet" in [Related documents](#) for a detailed overview of specifications.

2.5 Product Type Identification

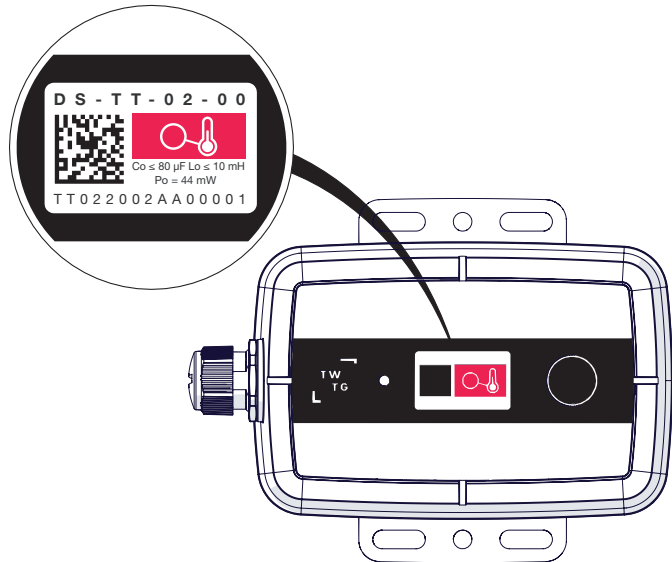


Figure 1: Example Drawing "Front Panel"

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

Table 4: Product Nomenclature

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

Table 5: Serial Number

2.6 Component Names

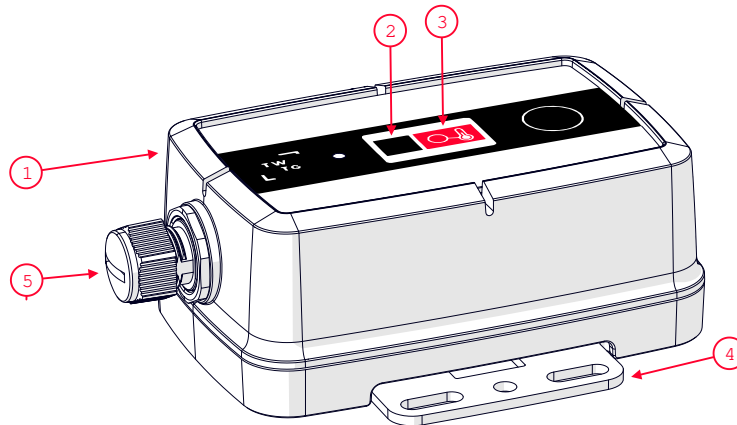


Figure 2: Component Names

Number	Description
1	Neon Transmitter
2	Data Matrix Code
3	NFC
4	Mounting Bracket
5	M12 Connector Dust Cap

Table 6: Component Names

2.7 Product Dimensions

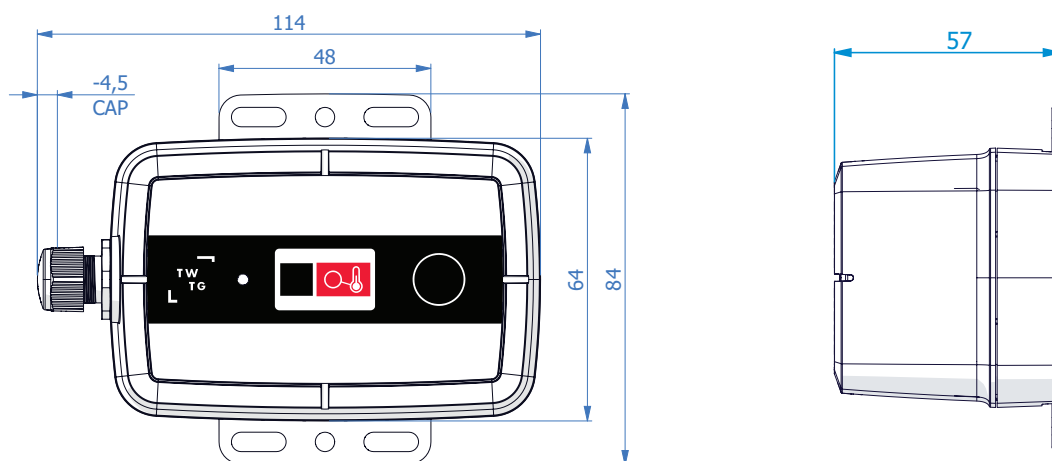


Figure 3: Neon Transmitter Dimensions (mm)

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 shall not be connected when an explosive atmosphere is present;
- The thermocouple or RTD shall either be earthed or have an infallible isolation to earth with an dielectric strength of 500 VAC/1minute or greater;
- This equipment shall only be used in environments where electromagnetic field strength is limited according to NEN-EN-IEC 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 °C and +70 °C.

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.

3.1.5 Output parameters

The maximum output parameters are limited by the NEON Transmitter. When selecting the temperature sensor to be used with the transmitter, the following values must be taken into account:

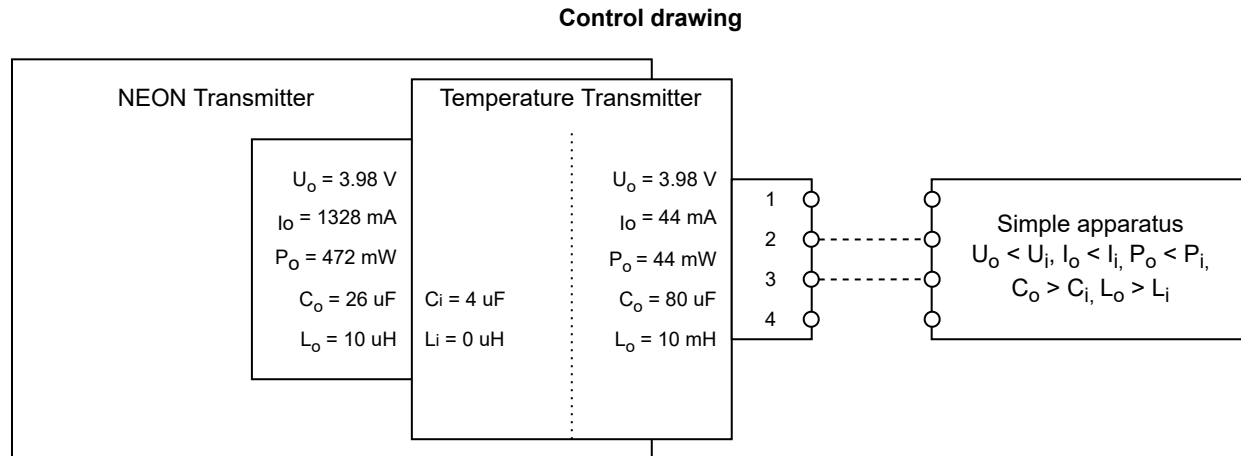


Figure 4: Intrinsic Safety Limiting Values

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 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;
- Le thermocouple ou le détecteur de température à résistance doit être mis à la terre ou avoir une isolation absolue avec une rigidité diélectrique de 500 V/1 minute ou plus;
- 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.

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.

4.1.5 Output parameters

The maximum output parameters are limited by the NEON Transmitter. When selecting the temperature sensor to be used with the transmitter, the following values must be taken into account:

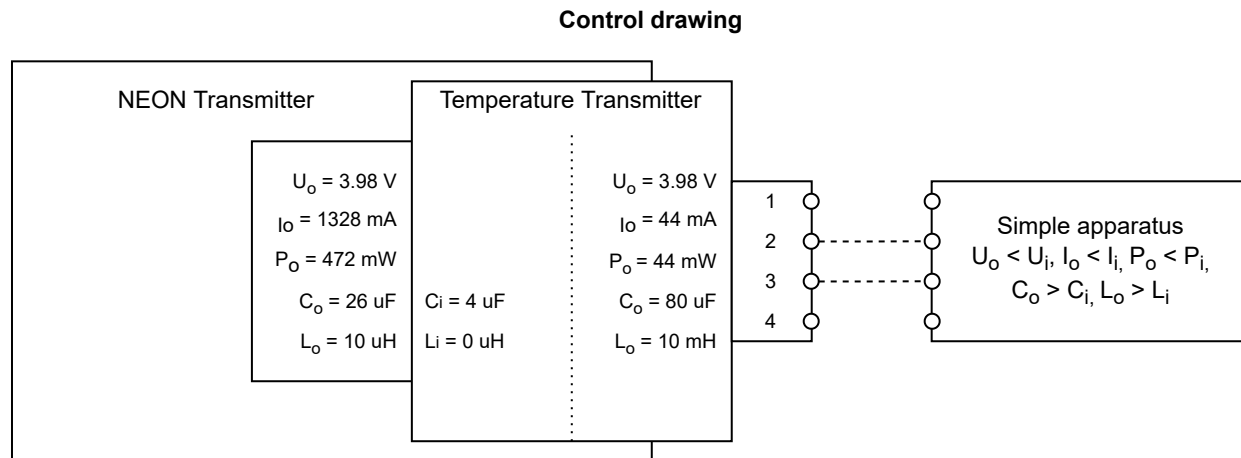


Figure 5: Intrinsic Safety Limiting Values

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 contacter 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;
- Entretien 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.

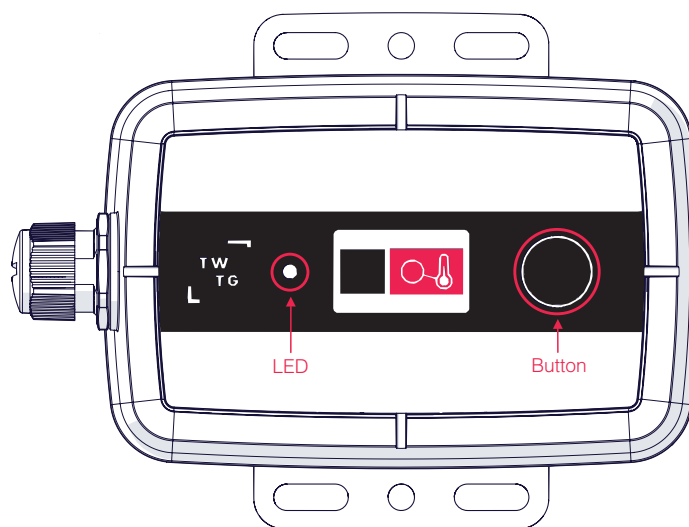
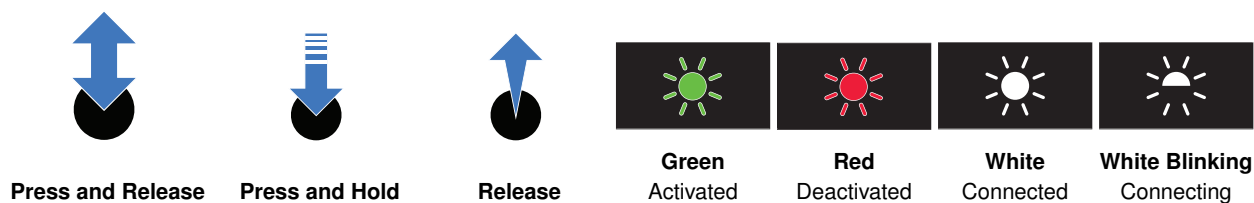


Figure 6: NEON Temperature Transmitter Interface

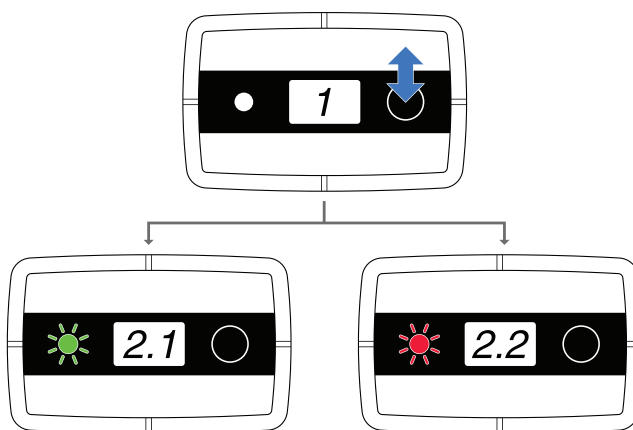
5.2 Operating the Device

5.2.1 Read device status

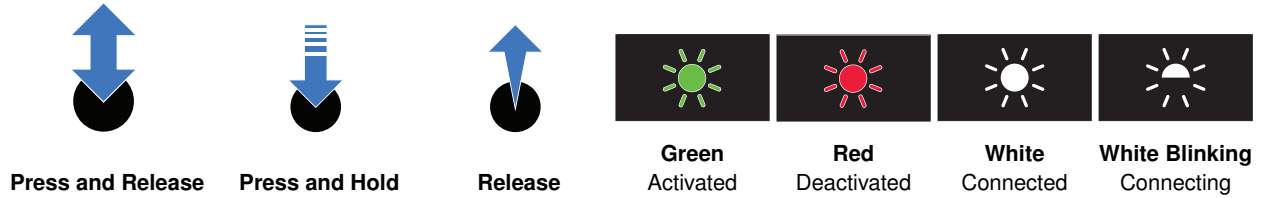


1. Press and Release the button button:

- **2.1 Green:** Device is activated
- **2.2 Red:** Device is deactivated



5.2.2 Device Activation



1. Press & hold the button and the device will immediately show it's status:

- 2.1 Red: Deactivated, or
- 2.2 Green: Already Activated

Note: Release the button if it's already activated otherwise the deactivation procedure will start.

3. Hold the button for 5 more seconds to start activation:

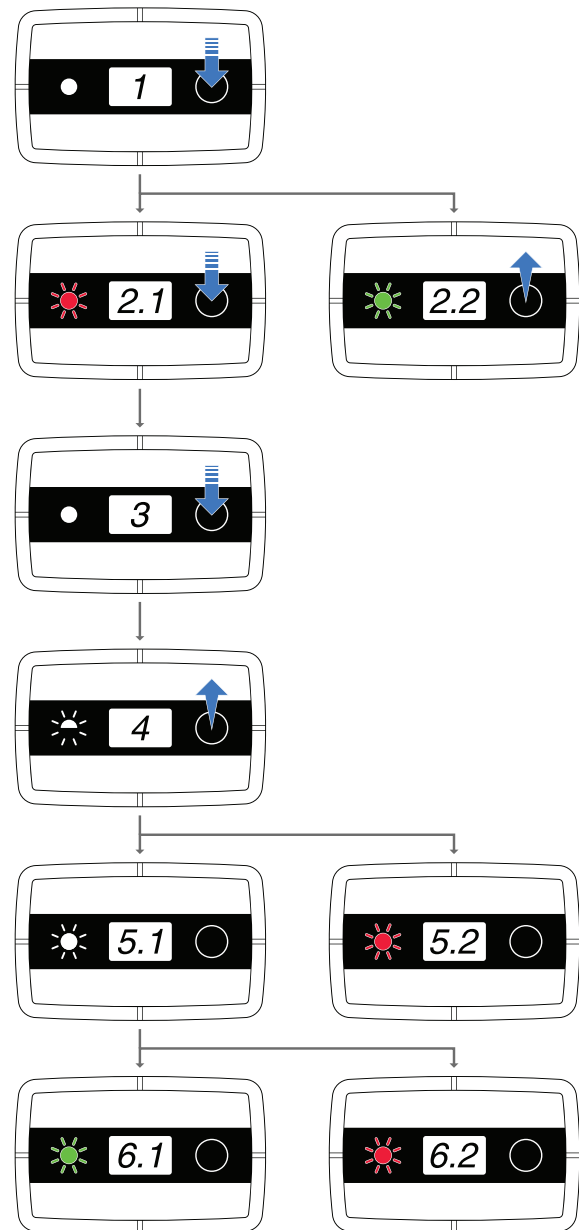
- 4. Blanking White: Connecting to the Network

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

- 5.1 White: Sending activation message, or
- 5.2 Red: Network failure

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

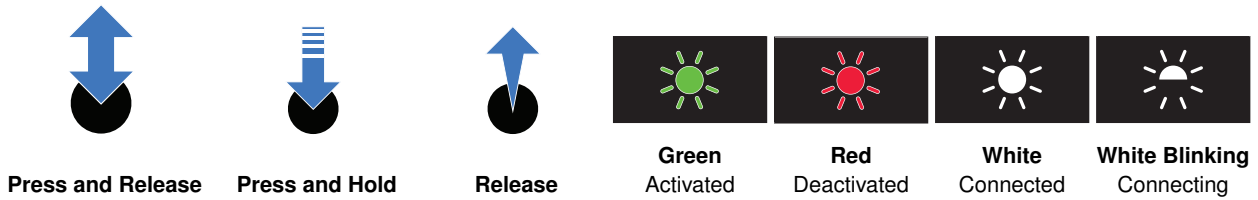
- 6.1 Green: Activation succeeded, or
- 6.2 Red: Network failure



Notes:

- *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.

5.2.3 Device Deactivation



1. Press and hold the button, the device will show:

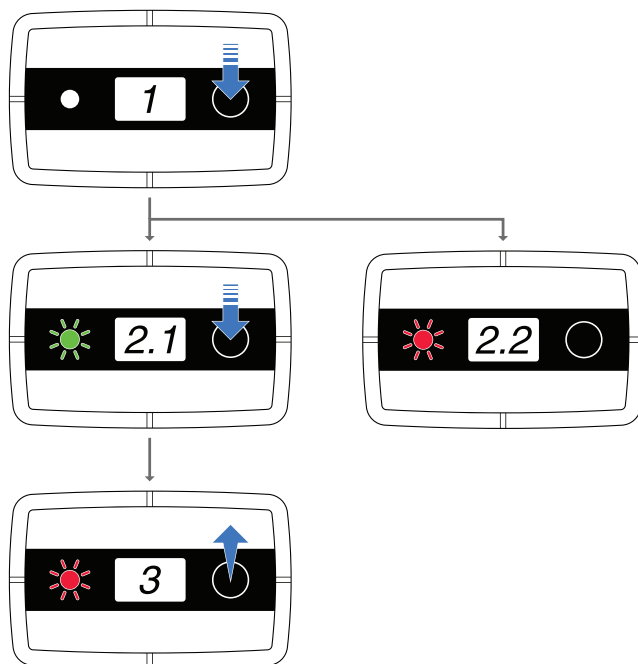
- **2.1 Green:** Activated
- **2.2 Red:** Already Deactivated, or

Note: Release the button if it is already deactivated otherwise the activation procedure will start.

Hold the button for 5 more seconds if the device is activated:

- **3. Red:** Deactivation Succeeded

NOTE: The deactivation procedure will always succeed. An attempt for sending a status message will be performed. This will not be shown as blinking white LED.



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 identifier 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 QR code can be used as unique identifier for provisioning and registration. See [Serial Number](#) for a detailed label description.

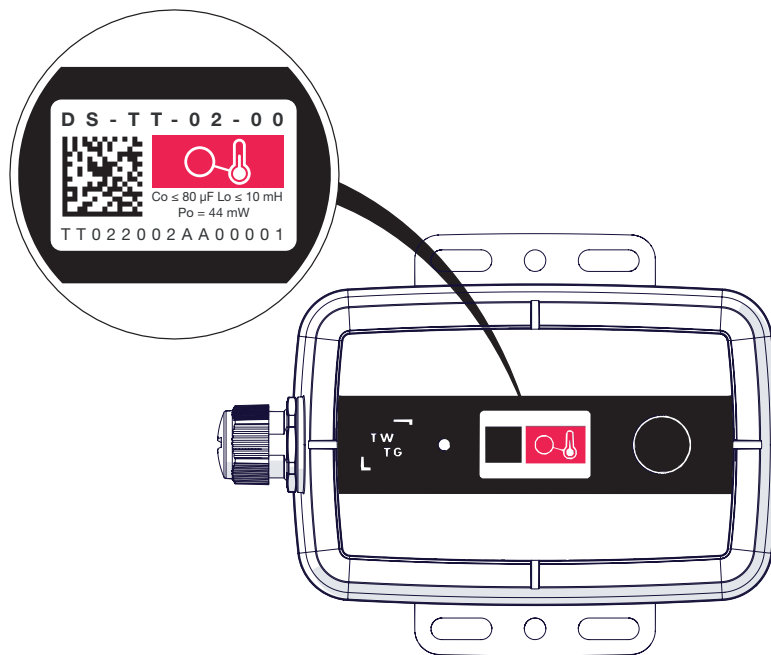


Figure 7: NFC and Data Matrix Code code Location

6 Installation

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 Temperature Transmitter when there is no explosive atmosphere present;
- The equipment must be installed in accordance with EN 60079-14.

6.2 Mounting Bracket Dimensions

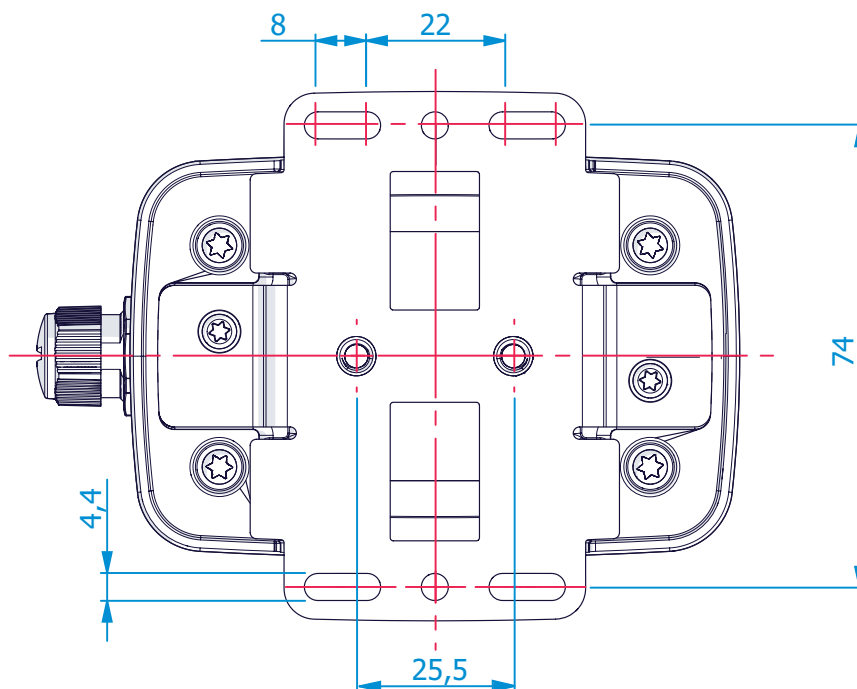


Figure 8: Product Dimensions

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.

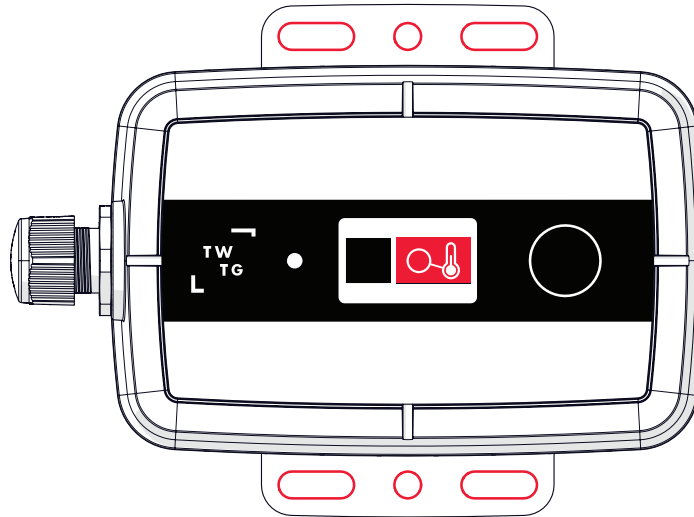


Figure 9: Product Mounting Holes

6.3.2 Installation using threaded holes

Note: Threaded hole accepts M5 bolts.

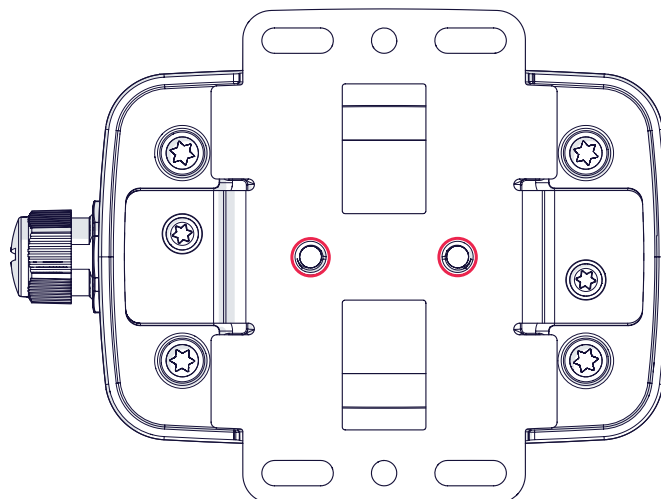


Figure 10: Product Threaded Mounting Holes

6.3.3 Installation using bandclamp

The Neon Temperature 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.

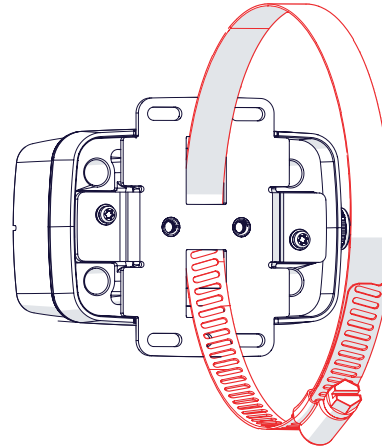


Figure 11: Installation using bandclamp

6.4 Using the Temperature Transmitter with Thermocouples

6.4.1 Cold Junction Compensation

The interface to the NEON Temperature Transmitter uses an M12 connector with Type-A polarisation. This interface can be used for reading out both thermocouples and RTDs. For use with thermocouples the Temperature Transmitter has a built-in cold junction compensation (CJC):

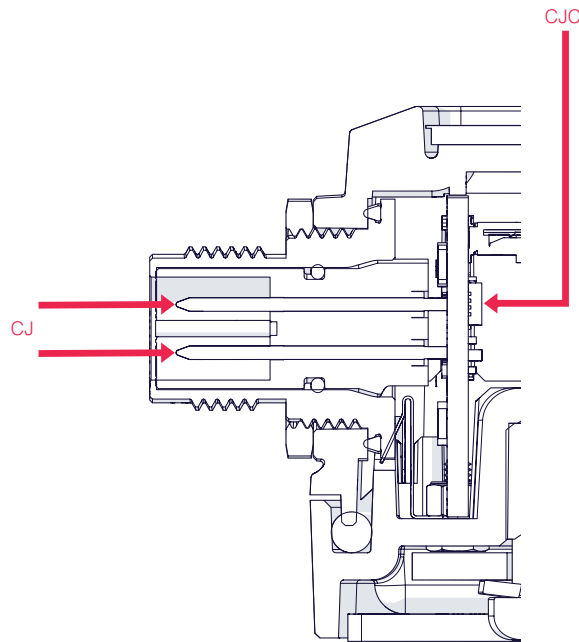


Figure 12: CJC Section Overview

The temperature transmitter uses the copper pins of the M12 connector as the cold junction, as seen in figure 12. [CJC Section Overview](#). The cold junction compensation uses the temperature of the copper contacts as measured by the internal reference temperature sensor. The internal reference temperature is directly in thermal contact with the cold junction.

6.4.2 Assessed Connectors

The following connectors have been assessed by TWTG and can be used in combination with the Neon Transmitter:

Manufacturer	Part Number	Type
Phoenix Contact	1424656	Push-in, metal, right angle (female) connector
Phoenix Contact	1424655	Push-in, metal, straight (female) connector

Table 7: Compatible M12 connectors

6.4.3 Selecting a thermocouple wire

A suitable thermocouple wire needs to be assessed as simple apparatus and needs to be assessed as safe with regards to thermal and spark ignition.

Select a cable with cross section of 0.14mm^2 to 0.75mm^2 with a round outer shell with a diameter of 4 to 8 mm. If the sensor is mounted in a noisy environment a shielded cable can be used.



WARNING

- Do not connect the shield to the M12 connector shield to prevent a multi-point ground, only connect the shield at the thermocouple junction.

Use the values as listed in table 8 to determine compliance. The maximum permitted cable length is determined by cable L_i and C_i and limited to the maximum installation cable length of 3 meters.

Limiting Value		Thermocouple wire requirements
C_o	100 μF	$C_i < C_o$
L_o	10 mH	$L_i < L_o$
P_o	37 mW	Assess heat-up of cable with P_o and U_o parameters for all lengths between 0 meter and required cable length
U_o	3.9 V	Assess heat-up of cable with P_o and U_o parameters for all lengths between 0 meter and required cable length

Table 8: Thermocouple limiting values

6.4.4 Connecting a thermocouple wire to the temperature interface

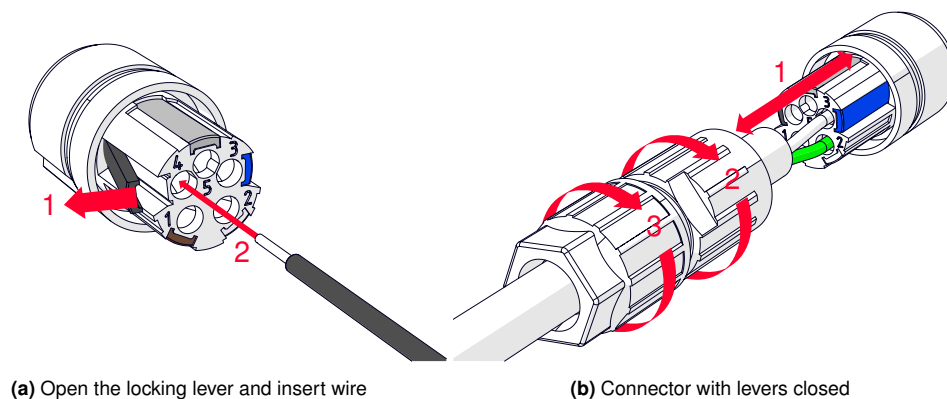


Figure 13: Cable connection example

Pin	Connection
Pin 1	Not used
Pin 2	Thermocouple Positive Connection
Pin 3	Thermocouple Negative Connection
Pin 4	Not used

Table 9: Thermocouple pinout

- Strip the wires down by 7mm;
- Insert the cable through the waterproofing O-Ring and cable gland nut;

3. Open the locking lever of the push in connector;
4. Press the thermocouple wire in the connector, use table. 9 to verify polarity. Do not use excessive force;
 - Ensure the correct polarity, as the device will not function properly with reversed polarity;
5. Close the locking lever of the push in connector;
6. Tighten the nut with the O-Ring.

6.5 Using the Temperature Transmitter with a RTD (3-wire)

The Temperature Transmitter can be used in combination with a 3-wire RTD. To do so, the default configuration of the device needs to be changed. See "Communication Protocol" in [Related documents](#).

6.5.1 Connecting a RTD (3-wire) sensor to the temperature interface

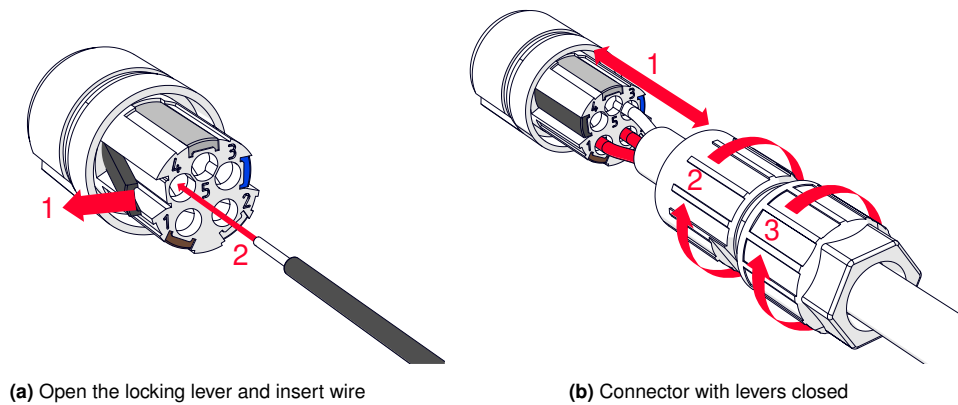


Figure 14: Cable connection example

Pin	Connection
Pin 1	RTD Sense (red)
Pin 2	RTD + (red)
Pin 3	RTD - (white)
Pin 4	Do not use

Table 10: RTD pinout

1. Strip the wires down by 7mm;
2. Insert the cable through the waterproofing O-Ring and cable gland nut;
3. Open the locking lever of the push in connector;
4. Press the RTD wire in the connector, use table. 10 to verify polarity. Do not use excessive force;
 - Ensure the correct polarity, as the device will not function properly with reversed polarity;
5. Close the locking lever of the push in connector;
6. Tighten the nut with the O-Ring.

7 Product Functionalities

A detailed description of setting-up communication and configuring device settings can be found in "Communication protocol", refer to table 1. [Related documents](#).

7.1 Application Event Message

The temperature transmitter measures and reports the temperature either by set intervals (a timer-based trigger) or a condition-based trigger.

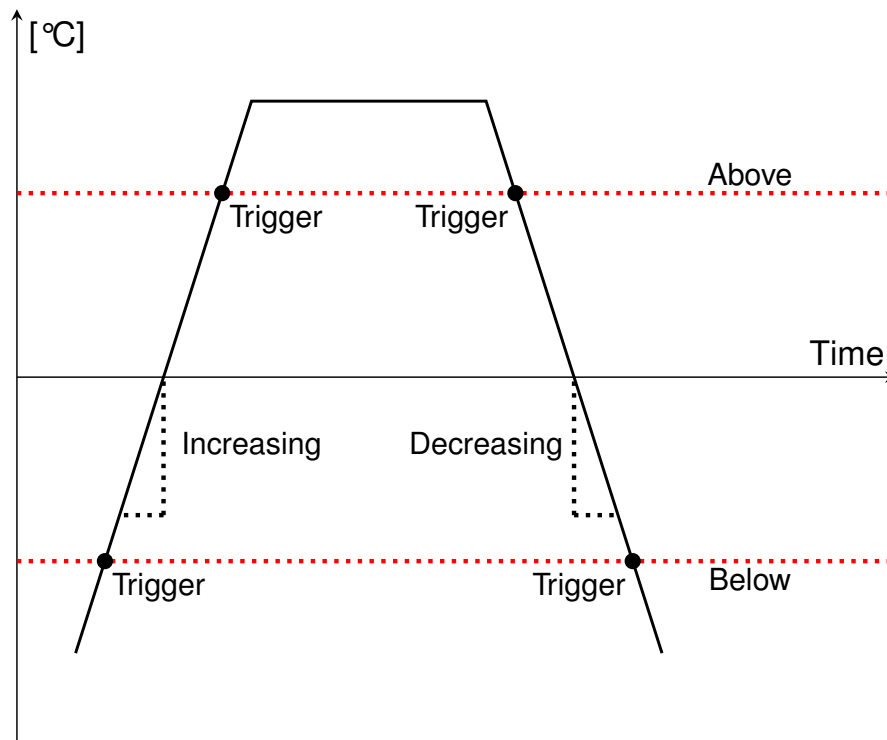


Figure 15: Application trigger event message

7.1.1 Event-triggers

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

- **Timer (periodic):**

The timer trigger is configurable through the following configurations:

- *temperature_measurement_interval_seconds*
Interval in seconds, at which the temperature 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 triggers:

- *Above*
If the maximum temperature is above the *temperature_threshold* then the condition is true. A transition of the condition from false to true or true to false will trigger an event message.

- *Below*
If the minimum temperature is below the temperature_threshold then the condition is true. A transition of the condition from false to true or true to false will trigger an event message.
- *Increasing*
The condition is true when the current temperature is at least temperature_threshold higher than the minimum temperature in the measurement_window (The maximum number of measurements to observe delta temperature to trigger an event). A transition of the condition from false to true or true to false will trigger an event message.
- *Decreasing*
The condition is true when the current temperature is at least temperature_threshold lower than the maximum temperature in the measurement_window (The maximum number of measurements to observe delta temperature to trigger an event). A transition of the condition from false to true or true to false will trigger an event message.

7.1.2 Content application event message

- **Temperature**
The connected sensor temperature in units of 0.1 °C:
 - Maximal;
 - Average;
 - Minimal.
- **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.

7.2 Device Status

Besides reporting the application temperature as discussed previously, the Temperature Transmitter 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.

7.3 Default Configuration

The Temperature 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 15 measurements. ($15 * 15 = 225$ mins);
- Device status message interval of 24 hours;
- Enabled confirmation message on all messages.

See "Communication Protocol" in [Related documents](#) for a detailed explanation of all default configuration values.

8 Maintenance

8.1 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 11: Battery Specifications

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

8.1.1 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 ;
- 4X O-Ring;
- 1X Gasket

8.1.2 Required tools

- Torque screwdriver with TX10 bit;
 - See [Assembly of device](#) for torque settings;
- ESD strap.



IMPORTANT: ESD Sensitive Electronics

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

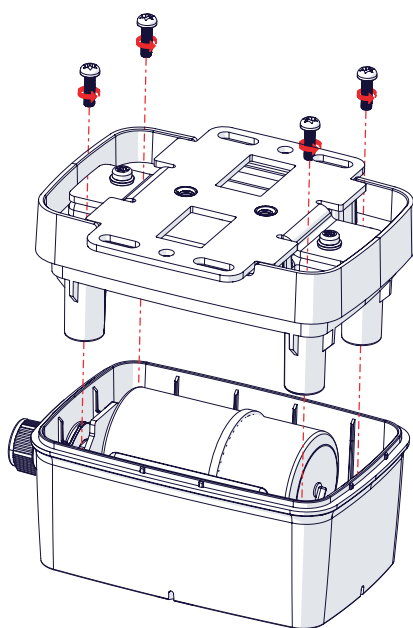
- Take proper precaution such as a grounded wrist strap and avoid touching the electronics board

8.1.3 Disassembly of device

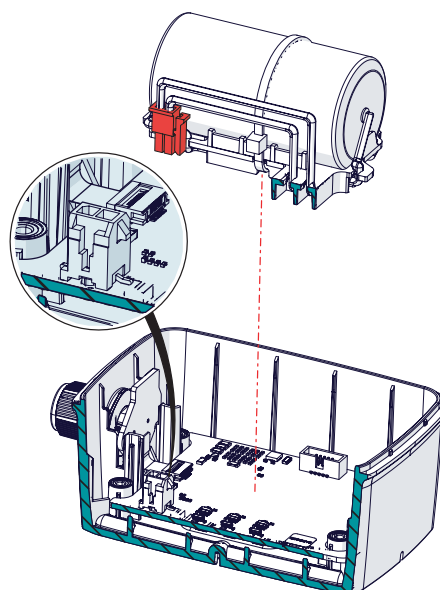


WARNING - DO NOT OPEN WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT

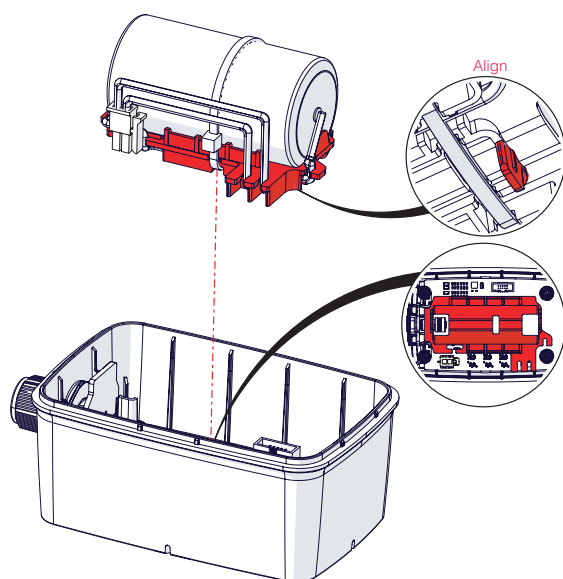
- This equipment shall only be opened by TWTG or by a competent instructed person;
 - The battery is serviceable by said persons;
 - Always disconnect M12 connector from Transmitter before replacing battery assembly



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 designated cut out in top housing and connect the new battery connector

8.1.4 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.

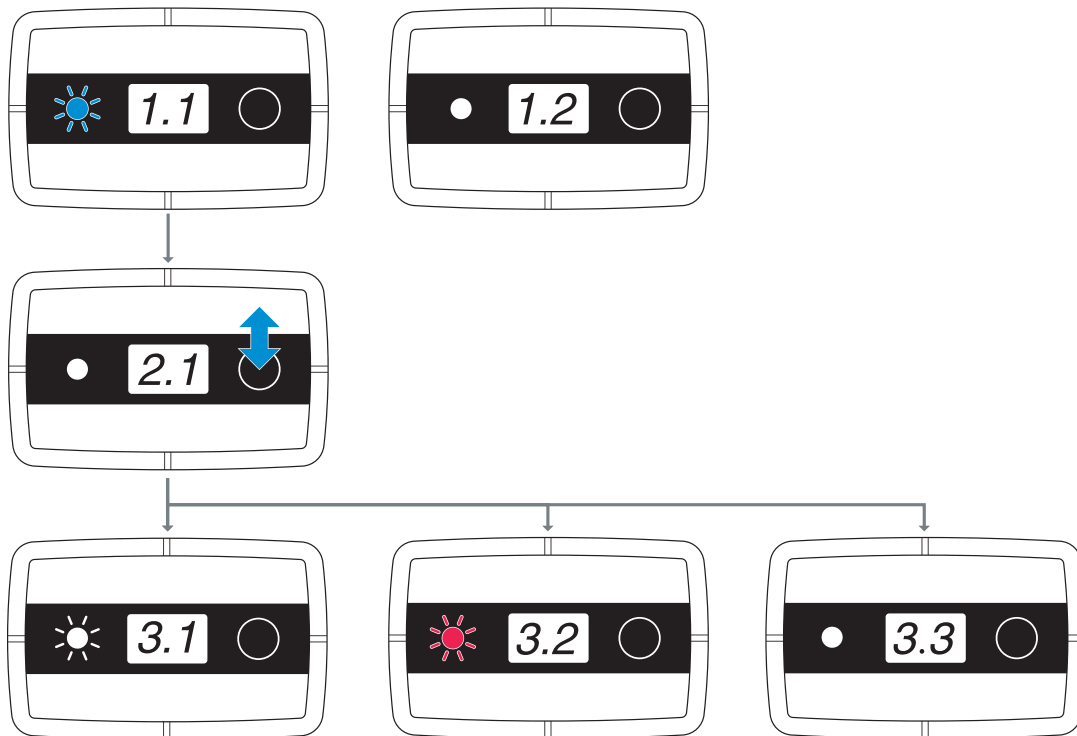


Figure 16: Built-in self-test

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.

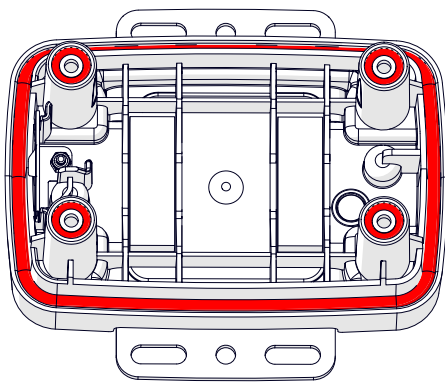
After pressing the button once and passing the self-test the device will leave the self-test mode. Pressing the button again will show the device status, as explained in [Read device status](#).

8.1.5 Assembly of device

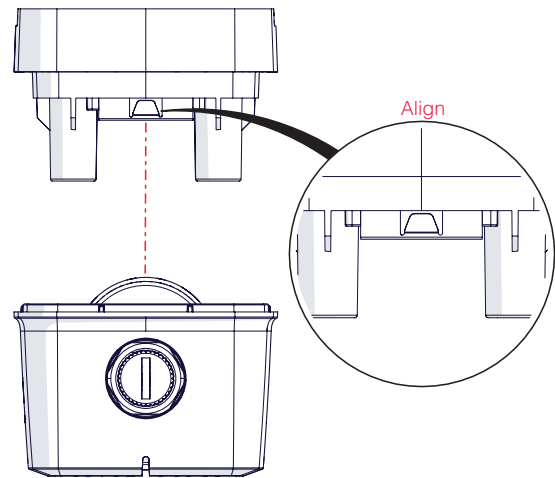


IMPORTANT - USE THE SPECIFIED TORQUE SETTINGS

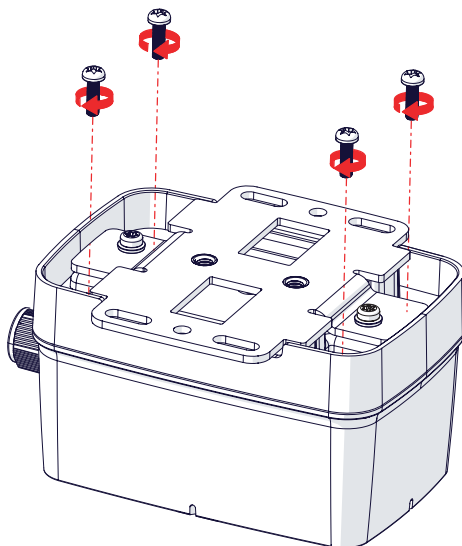
- Use a torque screwdriver to verify the applied torque;
- Failure to do so can result in water ingress;
- Improper assembly will void the warranty.



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: Tighten the four M3 screws to fix the bottom housing. Use a torque screwdriver to set the maximum torque to 1 Nm

9 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
M12 compatible connector	Phoenix 1424655	Contact Push-in, metal, straight connector
M12 compatible angled connector	Phoenix 1424656	Contact Push-in, metal, right angle connector

Table 12: Available Accessoires & Spare Parts

10 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

11 FCC and ISD 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	29-07-2022	SvW	- Concept version
A2	05-10-2022	WK	- Updated product specifications and ratings - Added French warnings
A3	24-11-2022	WK	- Updated FCC/ISED declaration