OPERATION AND INSTALLATION MANUAL

Carrying current conductivity sensor PowerTempHu

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General information

The PowerTempHu is advanced technology indoor sensor applied for the full sensing of the PVC and XLPE cable conductivity and temperature. PowerTempHu is enclosed in a room sensor box and is designed to be wall mounted. PowerTempHu is completely wireless and powered by 3.6V AA lithium batteries. The integrated advanced intelligent (AI) computational algorithm enables reliable capability of the measurement the magnitude of the temperature, humidity. The data transmitted from the sensor is based on Class A LoRaWAN® wireless network.

The main technical characteristics and benefits of PowerTempHu sensor:

- Compatible with LoRaWAN® specification 1.0.3;
- Measures XLPE, PVC cable conductivity measurement in critical points of the cable line and busbars;
- Carrying current conductivity factor XLPE cables: from 1,2065 up to 0,3895 for the temperatures @ -15 — 60°C, PVC cables: from 1,20 up to 0,475 for the temperatures @ -15 — 80°C
- Measurement of the temperature;
- Measurements at regular intervals with integrated advanced intelligent (AI) computational algorithms;
- Indoor use;
- Easy to use and deploy;
- Powered by batteries;
- Data transmission up to 10 km;
- Battery life is up to 13 years depending on settings and environmental conditions;

UAB " Nano sensorics"
Pakaunės g. 70, LT-47243 Kaunas
www.nanosensorics.com
info@nanosensorics.com

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Markings

One the back side of the senor there will be label indicating sensor name, serial number, production date and QR code.

Applications

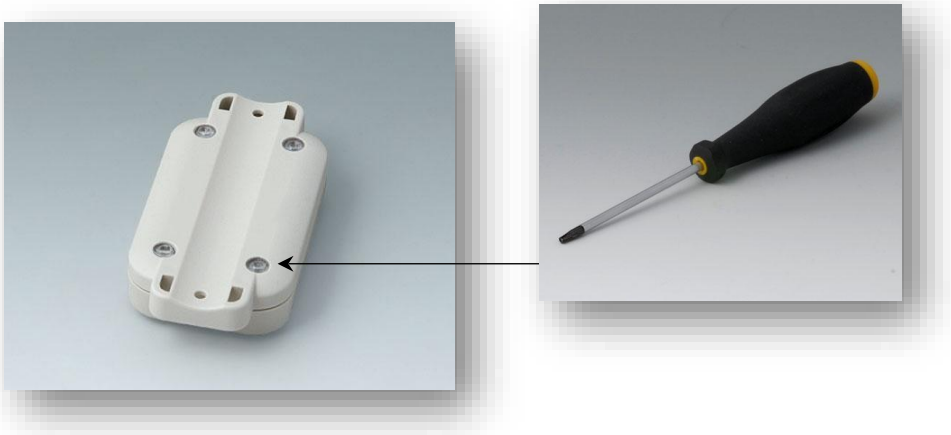
- Industrial and defence facility
- Smart buildings;
- Smart factory
- Data centers
- Factories
- Industrial facilities;
- Warehouses;

Product features

- LoRaWAN communication;
- Computational AI algorithm;
- Indoor electric current sensor;
- Configuration over the air;
- Robust enclosure;
- Auto self-calibration;

Installation and MAINTENANCE

- Use a screwdriver to open the back cover as showed in the picture:



- Use the lithium batteries type AA 3.6V (2 units) to install in the PowerTempHu sensor as showed in the picture:

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- Close the back cover as showed in the picture.
- Screw with two appropriate screws to the wall as showed in the picture.

Push button and LED indicator description:

- Once batteries are installed or reset button will be pushed in the sensor, it will automatically attempt to connect to the LoRaWAN network and the LED indicator will start to be blinking / flashing for 15 seconds.
- In case of the successful connection to the LoRaWAN network LED indicator will stay on for 3 seconds and LED indicator will stop flashing and go dark. This means sensor successfully connected to the LoRaWAN network.
- If the sensor will not connect on the initial try, it will attempt to connect to the LoRaWAN network after 10 seconds, then after 60 seconds, then after 10 minutes, then after 1 hour, then after 24 hours till successful connection to the LoRaWAN network.
- The sensor will restart by pressing the button on the sensor and it will attempt instantly to connect the LoRaWAN network.

The PowerTempHu sensor has to be installed reliably and with appropriate screws. The sensor must not be placed near any air vents windows, door openings where the constant fresh air flow is possible. The sensor is not suitable to be installed for the outdoor locations. The sensor cannot be stored at dusty or dirty areas with excess operation and storage temperature. The sensor is not washable, paintable. The open holes of the case must not be blocked, glued with any material. Do not throw the battery into a fire to prevent the battery from exploding. Damaged batteries may also explode. All of the above suggestions apply equally to your device, battery and accessories.

The PowerTempHu sensor is maintenance free except replacement of the batteries.

Calibration

Factory calibrates the PowerTempHu sensor when it is produced. The PowerTempHu sensor is maintenance-free in normal indoor environments due to the Nano sensorics integrated intelligent computational algorithms (AI) and Automatic Baseline Correction (ABC) technology.

Regulations

UAB “Nano sensorics” is the company which develops and produce highly innovative sensors with integrated intelligent computational algorithms (AI) enabling extremely low power data transmission. Declaration of conformity Hereby, UAB „Nano sensorics“ declares that PowerTempHu complies with the essential requirements and other relevant provisions of Directive CEM 2014/30/UE, BT 2014/35/UE, RED 2014/53/UE, CE, RoHS

This document contains proprietary technical information which is the property of UAB „Nano sensorics“. All information must not to be disclosed through any means is prohibited unless expressed, written consent of authorized representative of UAB „Nano sensorics“ is obtained.

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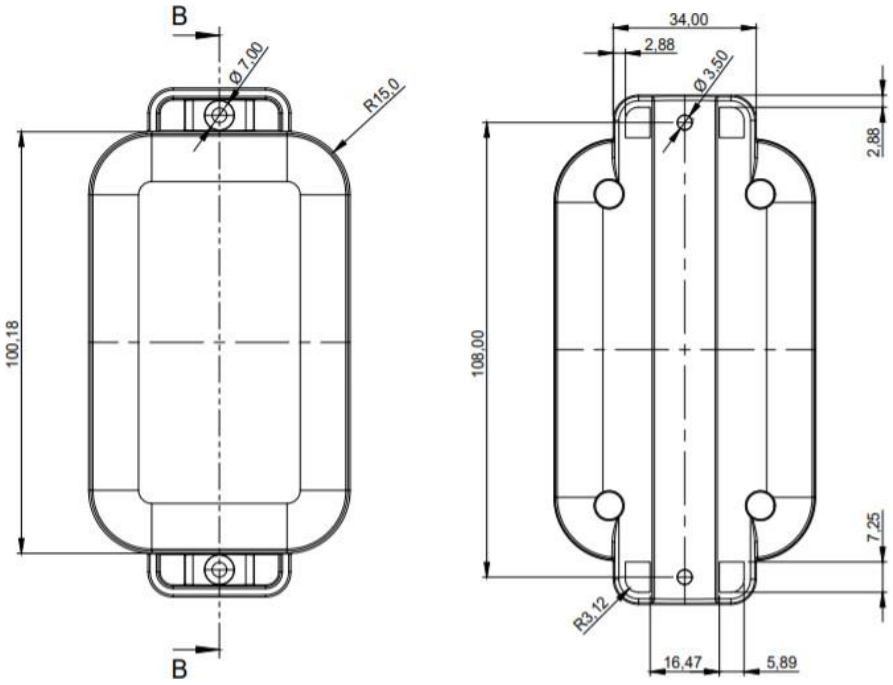
Sensor dimensions:



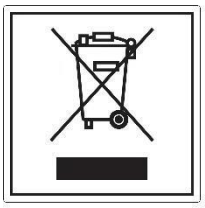
Important safety information

Read this manual before attempting to install the device. UAB „ Nano sensorics” will not accept responsibility for any damage or injury resulting from not following the instructions in this manual.

- The sensor is for indoor use;
- Do not disassemble, crush, puncture, short internal circuits;
- Remove batteries if the sensor is not used, discharged battery has to be removed from the battery sensor, in this case left batteries might leak and damage the sensor;
- Keep the battery or device dry and away from water or any liquid as it may cause a short circuit;
- Replace batteries only with the same or equivalent type recommended by the manufacturer;
- Discard used batteries according to the manufacturer’s instructions;
- Do not bend, deform, shred, microwave, paint the sensors, or other hardware;
- Do not insert external material into any opening on the sensors;

- Disassembling or puncturing the battery (whether integrated or removable) can cause an explosion or fire;
- Do not dry the sensors or battery with an external heat source such as a microwave oven or hairdryer;
- Observe proper precautions when handling batteries. Batteries may leak or explode if improperly handled;
- The sensor is not applied as a metrological, commercial accounting purposes and UAB „Nano sensorics“ will not be held liable for any damage which may result from inaccurate readings;
- Do not use any detergent or alcohol to clean the device;
- Clean gently with softly moisture cloth.

Waste disposal



The sensor disposed according to the Waste Electrical and Electronic Equipment Directive, (WEEE Directive) 2012/19/EU. The sensor and its individual parts has to be disposed according to local laws and regulations your product should be disposed of separately from household waste and industrial waste. When this product reaches its end of life, you have to bring the sensor, its components to the collection point designated by local authorities in order to protect the environment and to reduce waste through recycling. The battery must be disposed of separately.

Sensor technical details

Sensing characteristics	
Temperature	--40 to 85 °C
Temperature Accuracy	Max '+/-1°C@ -20— -10°C Max '+/-0.4°C@ -10°C—85°C
Conductivity Accuracy	Max carrying current conductivity factor +- 0,5-1%
Carrying current conductivity factor	XLPE cables: from 1,2065 up to 0,3895 for the temperatures @ -15— 60°C PVC cables: from 1,20 up to 0,475 for the temperatures @ -15— 80°C
Temperature sensing options	1 phase, 3 phase; low, medium, high voltage busbar duct enclosure
Sensing cable length	Up to 1,5 m
Mechanical specification	
Weight	120 g without battery, 170 g with battery
Dimensions	121 x 62 x 26 mm
Enclosure	Plastic ASA+PC-FF
Storage Temperature	-40 to 85 °C
Sensor Power Supply	
Battery Type and voltage	1x 3.6 V or 2x3.6 V AA Lithium Battery ER14505 AA lithium batteries (3.6V2700mAh/section)
Expected Battery Life	<13 years (Depending on configurations and environment)
Sensor logging Function	
Sampling Interval	Configurable via downlink, NFC configuration is optional
Data Upload Interval	Configurable via downlink, NFC configuration is optional

Radio / Wireless specification	
Wireless Technology	LoRaWAN® 1.0.3
Wireless Security	LoRaWAN® End-to-End encryption (AES)
LoRaWAN Device Type	Class A End-device
Supported LoRaWAN® features	OTAA, ABP, ADR, Adaptive Channel Setup
Supported LoRaWAN® regions	EU863 – 870 Optional: US902 – 928, EU863 – 870, AU915 – 928, EU433, IN865
Link Budget	137 dB (SF7) to 151 dB (SF12)
TX Power	14dBm±1dBm (Region specific)
Rx Sensitivity	132 dBm (LoRa, Spreading Factor=12, Bit Rate=293bps) -118 dBm (FSK, Frequency deviation=5kHz, Bit Rate=1.2kbps)
Communication range	10 km (line-of-sight, actual transmission distance depends on the environment)

Data sizes		
Measurement	Data size	Elaboration
Temperature	2	MSB byte -128 to +128 C, LSB byte, value after decimal point 0 to 100
PVC conductivity_Index	2	MSB byte represent before decimal point of factor, LSB byte represents 4 digits after decimal point expressed as unsigned 2 byte value, first byte – integer factor, second byte – factor(four digits after decimal point).
XLPE conductivity_Index	2	MSB byte represent before decimal point of factor, LSB byte represents 4 digits after decimal point expressed as unsigned 2 byte value, first byte – integer factor, second byte – factor(four digits after decimal point).
Battery	2	MSB byte represent Volts before decimal point , LSB byte represents two digits after decimal point expressed as unsigned 2 byte value, first byte – integer Volts, second byte – Volts (two digits after decimal point).

Transportation and Storage

Packed sensors may be transported in any type of covered vehicle. Equipment should be anchored reliably to avoid shock and possibility to shift inside vehicle. Sensors should be protected against mechanical damage and shock. No aggressive chemical substances should be stored together because of corrosion hazard.

Warranty

Manufacturer gives warranty that sensor parameters will meet the technical requirements, listed in the “Sensor technical details” paragraph of this document, if transportation, installation, storage and operation conditions will be followed. Warranty period is 12 month from manufacturing date, with additional possibility to extend it for

additional charge. Warranty apply, when device is used as intended and if there was no tampering done with the device or other external damage done to the device from outside sources.

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