



Instructions for use

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Temperature, relative humidity and atmospheric pressure transmitters with output to the LoRaWAN[®] network

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Content

CONTENT	3
INTRODUCTION	4
SAFETY PRECAUTIONS AND PROHIBITED HANDLING.....	5
INSTALLATION	6
Mounting.....	6
Switching the device on and off.....	7
Displaying the device data	8
Device usage and settings	10
Alarm functions	12
MANUFACTURED MODELS	14
APPLICATION NOTES	17
OPERATING AND MAINTENANCE RECOMMENDATIONS.....	21
TECHNICAL PARAMETERS	23
Power supply	23
Measurement and transmission of data	24
Radio part	24
Operating and storage conditions	25
Mechanical properties	25
Transmitter Input Parameters.....	26
Dimensional drawings	30
Declaration of Conformity.....	32
APPENDICES	33

Introduction

The LoRaWAN® network is used to transmit short data messages and is optimized for low power consumption. It operates in the unlicensed radio band, which brings cheaper traffic, but also legislative restrictions – messages can not be sent faster than with a 5 minute interval.

Ideal applications for transmitters working in the LoRaWAN® network are those where it is sufficient sending measured values with longer intervals (eg 1 h or longer). Conversely, inappropriate applications are those where fast system response (less than 5 minutes) is required.

The Wx9xx series transmitters with output to the LoRaWAN® network are designed to measure:

- air temperature
- relative air humidity
- atmospheric pressure

The transmitter performs a measurement every 1 minute. The measured values are displayed on the LCD and are sent over an adjustable time interval (5 min to 24 hour) via radio transmission in the LoRaWAN® network to the cloud data store. Through a common web browser, the cloud allows you to view both actual and historical measured values. Transmitter setup is done remotely via the cloud web interface or locally using a computer, connected communication cable SP003.

For each measured variable, it is possible to set two alarm limits. The alarm is signalled by the symbols on the LCD display and sending an extraordinary radio message. Depending on the capabilities of the cloud being used, the alarm information is then sent to the end user via email or mobile phone notification.

The device is powered by an internal Li battery whose lifetime is dependent on the transmission range and operating temperature and ranges from 1 year to 10 years. The battery status information is on the display and in each sent message.

The Wx9xx series transmitters are designed with increased resistance to external influences (especially water protection), see technical data.

Safety Precautions and Prohibited Handling



Read the following safety precautions carefully before using the appliance, and keep it in mind during use!

- The device includes a radio transmitter operating in the non-license frequency band with the power specified in the Technical Parameters. This band and performance are used in the countries of the European Union. If you are in another location, make sure you can use the device before turning it on for the first time.
- Do not use the device in places where the use of mobile phones, such as near sensitive medical devices, is restricted on the aircraft or in places where blasting is taking place.
- Observe the authorized storage and operating conditions listed in the Technical Specifications. Take care not to subject the unit to temperatures above 60 °C. Do not expose it to direct sunlight, including solar radiation. To comply with RF exposure requirements, a minimum separation distance of 20 cm must be maintained between the user's body and the device, including the antenna.
- It is forbidden to use the transmitter in a hazardous environment, especially in areas with the risk of explosion of flammable gases, vapours and dust.
- It is forbidden to operate the unit without a cover. After replacing the battery or changing the instrument settings using the SP003 cable, check the seal integrity and screw the device with the original screws. Always follow the instructions in this manual carefully.
- Do not expose the device to aggressive environments, chemicals or mechanical shock. Use a soft cloth to clean. Do not use solvents or other aggressive agents.
- Do not attempt to service yourself. Any repairs may only be performed by trained service personnel. If the device has unusual behaviour, unscrew the device cap and remove the battery. Contact the distributor from whom you purchased the device.
- The device uses wireless communications LoRa®. For this reason, the connection cannot always be guaranteed and under all circumstances. Never rely exclusively on wireless devices for critical communication purposes (rescue systems, security systems). Keep in mind that redundancy is required for systems with high operational reliability. More detailed information can be found e.g. in IEC 61508.
- The device contains a special type of battery with other parameters than conventional AA batteries. Use the type recommended by the manufacturer in the Technical Parameters (Tadiran SL-760/S, 3.6 V, AA size).
- Replace the battery only with a person who knows the principles of safe handling of lithium primary batteries. Apply the used batteries to hazardous waste. In any case, do not throw them into a fire, expose them to high temperatures, low air pressure and do not mechanically damage them.
- Only use the manufacturer's recommended accessories.

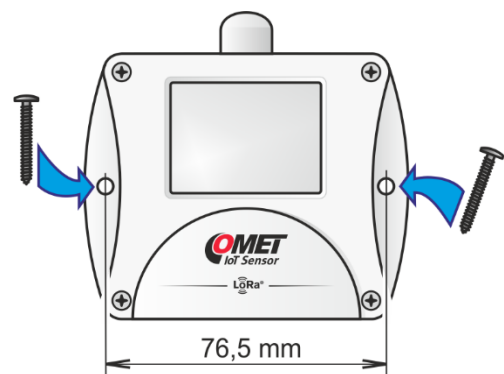
Installation



Installation, commissioning and maintenance must only be carried out by a qualified person in accordance with applicable regulations and standards.

Mounting

For the optimum operation of the Wx9xx Series, it is necessary to ensure their vertical position. Models without external probes or sensors may loosely stand on their bottom base as required, and other models are recommended to fix in the vertical position. Device boxes are fitted with a pair of 4.3 mm diameter holes for fixing, for example, with screws or straps.



Basic placement rules:

- Always install the transmitters vertically, with the antenna cover up
- The devices and probe cables should be placed away from electromagnetic interference sources.
- Temperature and relative humidity transmitters, or their probes, place so that the measured values are not affected by accidental heat sources (sunshine ...) and unwanted airflow
- probe of temperature and relative humidity sensors W3911 mount the cap vertically with the cap downwards to prevent accumulation of any water condensate in the sensor compartment (otherwise, it may increase the response time to change humidity or even damage the sensors)

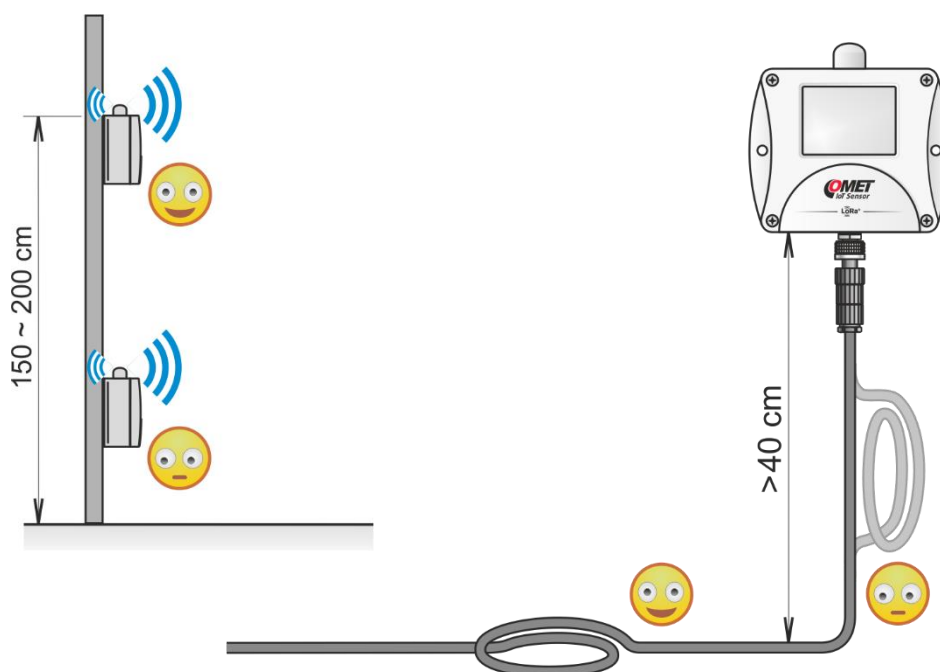
Optimal positioning of the transmitter in terms of radio range:

All materials absorb radio waves if they must pass through them. The most significant in terms of radio wave propagation are metal objects, concrete, reinforced concrete and walls. If you install the device at a greater distance from the base station (gateway) or in locations where the radio signal is difficult to penetrate, observe the following recommendations:

- place the device as high as possible
- in rooms place the device at least 150 cm above the floor

-
- place the device at a sufficient distance (at least 20 cm) away from all obstacles that could cause attenuation of the radio waves and at least 20 cm from the neighbouring device in the case that you use multiple devices
 - lead the cables of the external measuring probes first down to the distance of at least 40 cm from the instrument. If the cable is too long, install it by the figure.
 - do not use probes with a cable shorter than 1 m

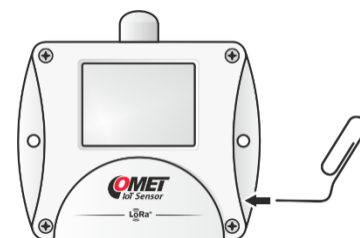
Examples of optimal and less suitable positioning of the device:



Switching the device on and off

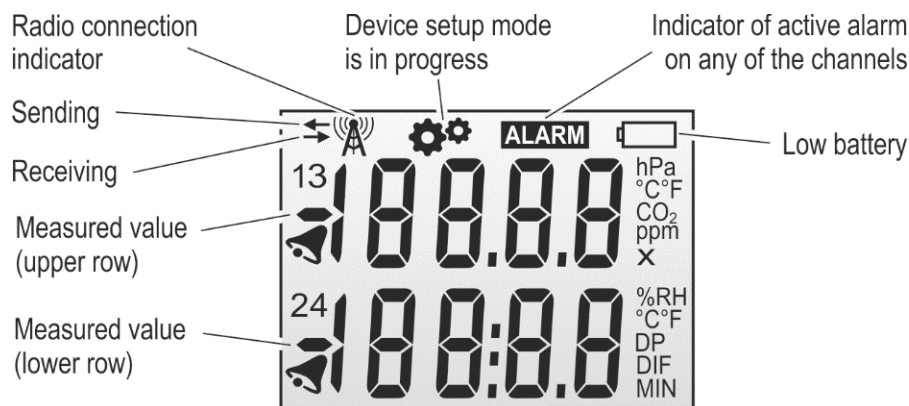
The device is supplied with installed battery, but in off state. During the power-on process, the device is also activated in the LoRaWAN® network, so the device should be within range of the network in which it will be used and ideally in its target position when powering on.

- to turn it on, use a paper clip to press the control button located behind the hole in the side wall of the device (see picture), and release it immediately as soon as the display lights up (within approx. 1 s)
- to turn off the switched-on device, press the control button with a paper clip and hold it until the sign OFF lights up (approx. 5 s)



In addition to turning the device on and off, the control button has other auxiliary functions, which are described in the following chapters.

Displaying the device data



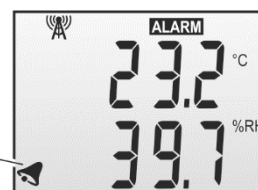
Radio Connection Indicator – indicates successful activation of the device in the LoRaWAN® network. If the device is within range of the network, the indicator lights up approx. 15 s after switching on the device and remains lit. The indicator starts flashing if no radio message from the network arrives to the device for more than 23 h. If this state lasts longer than 48 h, the indicator will go off, indicating a probable loss of connection to the network.

Low Battery Symbol – Illuminates if the battery is already weak and flashes when the battery is in critical condition (see the Battery replacement procedure chapter for details)

Information on the display – they are displayed cyclically in three steps (the images below contain only examples of the display, the content of the display always depends on the specific device model):

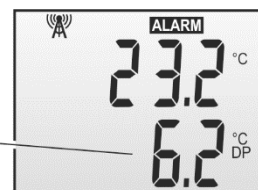
- 1. step** (lasts 4 sec) the display shows data on measured quantities on channels No.1 and No.2

This channel has an active alarm (currently relative humidity)



- 2. step** (lasts 4 sec) the display shows data on measured quantities on channels No.3 and No.4 (if the device is equipped with them)

Channel No.4 (currently the dew point temperature)



- 3. step** (lasts 2 sec.) the display shows service information about the data rate and the time of sending regular messages. This screen can optionally be turned off.



dr5 - information about the current data rate, which also determines the range of the device. A dot after the data rate (**dr0.**) indicates that the device is set for mobile operation with maximum range. The **x** symbol at the end of the top line lights up when remote sensor setup is disabled.

29 min - The time in minutes until a regular message with measured values is sent (the information decreases every minute from the currently set sending interval to 0).

Device usage and settings

Factory setting

- Message sending interval of 5 minutes
- Alarms deactivated
- Remote setting enabled
- For instruments with pressure measurement set altitude 0 m

Activation in the LoRaWAN® network

Activation by the OTAA system

After turning on the device with the control button, it will try to activate in the network with the OTAA system, with full transmission power and data rate set for maximum range. When switching on, the device should therefore be placed within range of the network in which it will be used and ideally it should also be in its final position so that the network sets the radio part of the device to the correct parameters. If the activation in the network is successful, the radio connection indicator lights up approx. 15 seconds after the sensor is switched on and remains lit.

If activation is unsuccessful or if you move the device to another location after powering on and the data transmission becomes unreliable, turn the device off and on again to re-activate and set the radio parameters.

Activation by the ABP system

The device does not support ABP activation, please set the network to OTAA system.

Working with the cloud

Device registration in the cloud

Cloud is an internet storage of data. You need a PC with internet connection and a web browser to work with. Navigate to the cloud address you use and sign in to your account - if you use COMET Cloud by a transmitter manufacturer, enter www.cometsystem.cloud and follow the instructions in the *COMET Cloud registration card* that you received with your device.

Viewing measured values

Each device is identified in the LoRaWAN® network by its unique DevEUI address. The device has a DevEUI printed on the product label along with its serial number. In COMET Cloud, the device is identified by its serial

number. In the *My Devices* list, select the device with the required serial number and start viewing the measured values.

Checking the signal quality during device installation.

The device in factory default setting will send the measured values every 5 minutes. Check on the device's display whether the radio connection indicator is lit. Next, check in the cloud for messages to be received. Place the device temporarily to the location where it will perform the measurements and check the quality of the radio signal – in COMET Cloud click on the correct device in the *My devices* list and then select *Installation*. If you have a problem with the signal, see the *Problems with receiving radio messages chapter*.

Change of device settings remotely

The transmitter can be set remotely from the cloud if the cloud you use supports this feature. Run the remote setting feature - in COMET Cloud click on the correct device in the *My devices* list and then select *Configure*. Set the desired sending interval (taking into account the fact that for short sending intervals the battery life decreases), the limits, delays and hysteresis of the alarms for the individual quantities (if used), or correction of the altitude atmospheric pressure (only models with air pressure measurement). Save the new setting. The device reads the new settings from the cloud after sending a message with the measured values, i.e. that the waiting time for a new setting depends on the current sending interval.

To speed up the setup of a device that you have physical access to and that has a long sending interval set, briefly press the control button on the powered-on sensor with a paper clip - the setting symbol  (gears) lights up and the device will start transmitting the new setting from the cloud within 5 minutes. The transfer itself will only take a few seconds. If the function is used repeatedly, in quick succession, the network may evaluate it as illegal use of the radio band and the transmission may be interrupted.

Working with the COMET Vision SW

Change of device settings by connecting to a PC

The transmitter can be set directly from the PC using the SW COMET Vision and Communication Cable SP003 (Optional accessory). Software COMET Vision is downloadable on the web www.cometsystem.com, as well as a manual for its installation and use.

Unscrew the device cover and connect it to the SP003 cable with the USB port on the computer. Start the Comet Vision program and make a new device setting. After you have saved the new settings, unplug the cable and screw the device cover carefully. Pay attention to the correct seal position.

Warning – do not leave the communication cable SP003 connected to the transmitter if the cable is not connected to the PC USB port at the same time or if the PC is switched off! The battery consumption in these cases increases and the battery is drained unnecessarily

Alarm functions

The transmitter sends the measured values in regular messages, according to the set sending interval. In addition, the transmitter can also send extraordinary alarm messages when a new alarm is generated on a tracked channel or the alarm in progress is extinguished. This feature allows you to extend the battery life by setting a longer sending interval for regular messages, and the user is informed about changes in the alarm status by extraordinary messages according to the current situation.

Overview of transmitter properties for correct alarm function settings

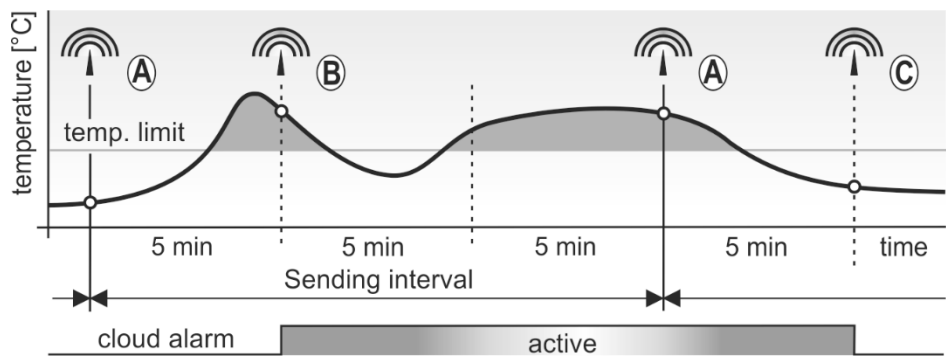
- Two alarms can be set for each measured quantity
- Each alarm has an adjustable limit, direction of exceeding the limit, delay and hysteresis
- The longer the period for sending regular messages, the greater the capacity of the battery is saved
- After a new alarm is triggered (or an alarm is ended), an extraordinary alarm message is sent within 5 minutes at the latest. Temporary interruption of the current alarm (max. 5 min) is not indicated. See the examples in pics below.
- The content of both regular and extraordinary alarm messages is identical, both contain the measured values of all channels and current alarm states on all channels
- No even a short-term alarm (i.e. with a duration of 1 to 5 min) will not be lost – the information will be sent no later than 5 min even if the alarm is currently inactive. Device in alarm message sends the maximum value measured during the alarm duration (or the minimum value, according to the current setting of the direction of exceeding the alarm limit). See the examples in pics below.
- Due to the regulation of the unlicensed radio band, the device can not send messages faster than every 5 minutes. If the device has fastest sending interval (i.e. 5 minutes), no extraordinary alarm messages can be sent.

Examples of sent alarm messages triggered by changes in the measured value (eg temperature)

Device configuration:

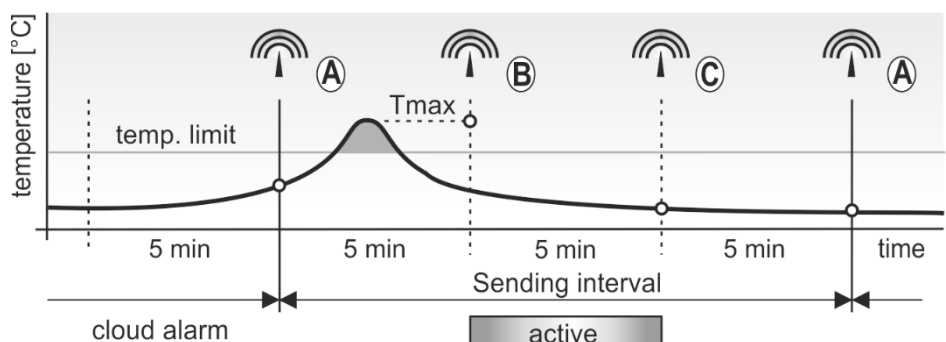
- alarm for channel temperature is on, sending interval 15 min
- any alarm limit value, none delay of alarm, hysteresis 0 °C
- alarm will be activated if: value is greater than limit

After a new alarm is triggered, an extraordinary alarm message is sent within 5 minutes at the latest. Temporary interruption of the current alarm (max. 5 min) is not indicated. After ended of alarm, an extraordinary alarm message is sent within 5 minutes at the latest.



- (A) regular message sent in sending interval
(B) extraordinary message – start of alarm
(C) extraordinary message – end alarm

No even a short-term alarm (i.e. with a duration of 1 to 5 min) will not be lost – the information will be sent no later than 5 min even if the alarm is currently inactive. Device in alarm message sends the maximum value measured during the alarm duration.



- (A) regular message sent in sending interval
(B) extraordinary message – start of alarm
(C) extraordinary message – end alarm

Manufactured models

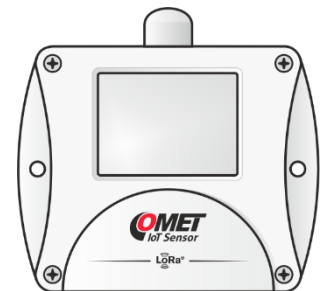
COMET's Wx9xx transmitters differ in the type of measured quantities (temperature, relative humidity, atmospheric pressure) and the location of the sensors (compact design with internal sensors or external probes on the cable).

The enclosure covers electronic circuits, internal sensors, and a battery. Depending on the type, the devices are fitted with connectors. The antenna is protected by a cap.

W0910

Compact temperature transmitter

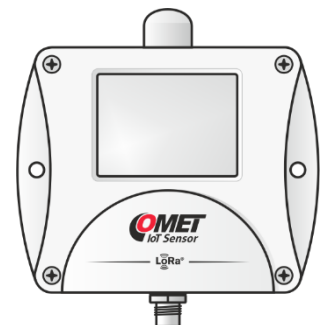
The transmitter only measures the temperature from the built-in internal sensor, no probes and sensors are connected to it. It features a simple compact design and a relatively long response to step change in temperature. It is placed directly into the measured area.



W0911

Temperature transmitter for external Pt1000 probe

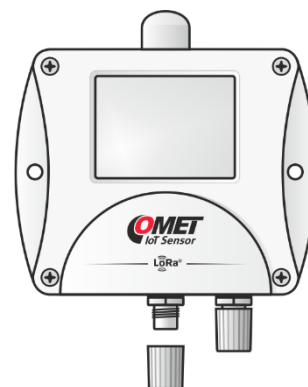
The transmitter measures the temperature from external probes of the Pt1000/E line (the probe is not part of the instrument). Response to the jump temperature change is usually much faster than the models from the internal sensor. The transmitter is often used to monitor locations where only a measuring probe is installed and the device itself is in a suitable location from a radio range point of view. The maximum recommended probe length is 15 m.



W0932

Thermometer with s built-in internal sensor and two inputs for external Pt1000 probe

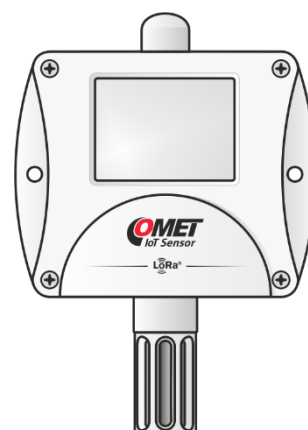
The device measures the temperature from two external probes of the Pt1000/E line (input No. 1 and No. 2) and from the built-in internal sensor (input No. 3). The probe is not part of the instrument. It features for internal sensor is a relatively long response to step change in temperature. Response to the temperature change for external probes is usually much faster. The transmitter is often used to monitor locations where only a measuring probe is installed and the device itself is in a suitable location from a radio range point of view. The maximum recommended probe length is 15 m. Unused inputs of temperature probes must be fitted with supplied connector caps.



W3910

Compact temperature and relative humidity transmitter

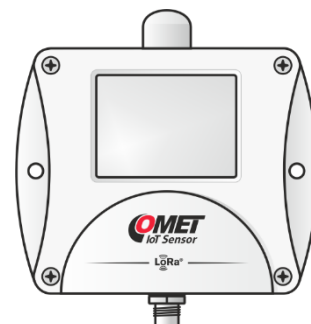
The transmitter measures the temperature, relative humidity and dew point temperature by means of internal sensors located under the cap with a stainless-steel air filter. The device is characterized by a simple compact design, but a relatively longer response to a step change in temperature and humidity than those with an external probe. The instrument is placed directly into the measured area.



W3911

Temperature and relative humidity transmitter for external Digi/E probes

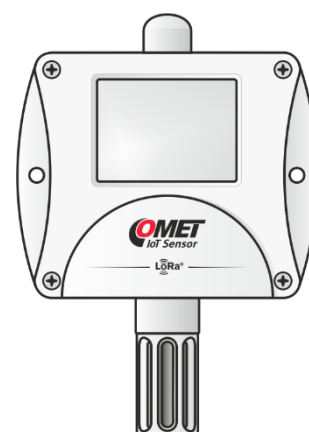
The transmitter measures the temperature, relative humidity and dew point temperature from the COMET Digi/E external probe (the probe is not part of the instrument). Response to jump-change of temperature and relative humidity is significantly faster than models with internal sensor. The device is often used to monitor locations where only the probe is placed and the instrument itself is not in the measured area. Therefore, during installation, it may be easier to find the right place for radio link optimization than for compact models. The maximum length of the probe must not exceed 15 m. Digi/E series probes provide calibrated measured values and are therefore interchangeable without having to interfere with the instrument settings.



W7910

Compact temperature, relative humidity and atmospheric pressure transmitter

The transmitter measures temperature, relative humidity, dew point and atmospheric pressure with internal sensors. The temperature and relative humidity sensors are located under the cap with a stainless-steel air filter, the atmospheric pressure sensor is inside the device. The transmitter is characterized by a simple compact design, but a relatively longer response to a step change in temperature and humidity than those with an external probe. The device is placed directly into the measured area.



Application notes

Operation of transmitter in various applications

Prior to commissioning, it is first necessary to assess whether its use is appropriate for the purpose, to determine its optimum setting and, if it is part of a larger measuring system, to prepare a metrological and functional control.

Inappropriate and risky applications: The transmitter is not intended for applications where the failure of its operation could directly endanger the lives and health of persons and animals or the function of other devices that support life functions. For applications where failure or malfunction could result in serious property damage, it is recommended that the system be supplemented by a suitable independent signalling device that evaluates this status and, in the event of a malfunction, prevents the damage (see chapter *Safety precautions and forbidden handling*).

Device location: Follow the guidelines and procedures in this manual. If possible, select the location for the device where it is minimally affected by external environmental influences. If you perform measurements in fridges, metal boxes, chambers, etc., place the device outside the exposed area and insert external probe(-s) only.

Location of temperature sensors: Place them in places where there is sufficient airflow and where you anticipate the most critical location (according to application requirements). The probe must be sufficiently inserted or otherwise sufficiently connected to the measured area to prevent any influence of the measured values by the undesirable heat supply on the wires. If you monitor the temperature in the air-conditioned store, do not place the sensor in the air conditioner direct flow. E.g. in large chamber refrigerators, the distribution of the temperature field can be very inhomogeneous, deviations may reach up to 10 ° C. You will also find the same deviations in the deep-freeze box (e.g. for blood freezing, etc.).

The location of the humidity sensors depends again on the application requirements. It is very problematic to measure moisture in refrigerators without moisture stabilization. Switching on / off cooling may cause significant changes in humidity to a range of tens of percent, even if the humidity mean value is correct. Humidity condensation on the walls of the chambers is common.

Measurement of calculated humidity variables

The instrument from the calculated humidity variables only provides the dew point temperature. Further calculated humidity quantities can be obtained at the level of further data processing in SW.

Measurement of atmospheric pressure

Models with atmospheric pressure measurement allow display on sea level pressure readings. In order for the conversion to be correct, you must, during device configure, enter the altitude at which the device will be located. Altitude can be entered either directly, in the form of altitude data, or indirectly, as an offset of absolute pressure. Offset of pressure is the subtraction of pressure required (i.e. converted to sea level) minus absolute pressure.

When converting pressure to sea level, the device takes into account the temperature of the air column at the point of air pressure measurement. Therefore, it is necessary to place the device with the altitude correction in the outdoor. If this device is placed in a heated room, the error in the recalculated pressure measurement will increase with the temperature difference between the device and the outdoor air increases.

Problems with measurement accuracy

Incorrect measured values of temperature and relative humidity are most often caused by inadequate probe position or measurement methodology. Some notes on this issue are listed in the chapter *Operation of transmitter in various applications*.

Another group of problems are random peaks in the measured values. Their most common cause is the source of electromagnetic interference near the instrument or cables. In addition, it is also necessary to focus on whether cable insulation is damaged in any place and that there are no accidental connections of conductors with other metal parts.

Problems with receiving radio messages

The causes of the problems can be many. If the receive of radio messages does not work at all, you can try the following steps:

- Check whether the display is on and whether a critically low battery is not indicated
- verify that the radio link indicator is lit on the transmitter display. If not, check whether your gateway is correctly connected and functional. You can verify the gateway in COMET Cloud by checking *Administration / LoRa Gateways* page - here you must see your gateway (according to the gateway EUI identifier) and the gateway must have the status Online. If the gateway is functional and still the radio connection indicator is not displayed, turn the sensor off and on again with its control button (see

chapter *Switching the device on and off*) and watch if the radio connection indicator lights up. After switching on the transmitter, the attempt to activate it in the network will be repeated automatically, while the radio parameters of the sensor are set to the maximum range.

- if you have problems with the reliability of radio message delivery, also check whether your gateway is properly connected and functional (see the procedure above). It is possible that your transmitter is connected to some far away gateway (perhaps a foreign one). In COMET Cloud, on the *My Devices / Installation* page, go to the *Signal Strength* tab and check whether your gateway is listed in the Gateway EUI drop-down list. If it is not listed, the transmitter is out of reach of the selected gateway. If you see more than one gateway in the list, choose your gateway - the graph will then show you how reliably messages from the problem transmitter are captured by the chosen gateway. If your gateway is functional and in range of the transmitter, you can try to improve the range by changing the position of the transmitter or gateway. You can also add an external antenna to the gateway to improve the range.
- if problems persist with radio message delivery reliability, verify the current data rate the transmitter is using to transmit messages. On the *My Devices / Installation* page, go to the *Data Rate* tab and check the graph to see what speed level is being used. The rule of thumb is that the higher the data rate level, the lower the radio range of the sensor. COMET transmitters use the data rate DR0 to DR5. This parameter is controlled automatically by the network.
- if you have been waiting unsuccessfully for a message from the transmitter for a long time, verify from the data on its display whether the set transmission interval corresponds to your expectations. The number of minutes remaining until the message is sent is displayed on the bottom line of the display with 10 s intervals every 2 s. However, this service screen may be disabled by previous settings. You can temporarily turn it on by briefly pressing the control button with a paper clip (the setting symbol  will light up on the display at the same time).
- if you use a public gateway (don't have your own), check from the coverage map <https://ttnmapper.org/heatmap/> whether the LoRaWAN® network is available for the sensor location from a nearby gateway and whether this gateway is not marked as offline (temporarily unavailable). Keep in mind that the functionality of public gateways cannot be forced - it is a voluntary involvement of their owners in a joint project.
- if you use a public gateway (it is usually at a greater distance from the sensor), we remind you that transmitting from the interior of some buildings

can be difficult, and from basements it is usually impossible. Therefore, for testing purposes, place the transmitter as high as possible above the floor, or place it near a window, or even on an outdoor windowsill (secure the device against falling). If possible, try placing the transmitter in other parts of the building relative to the cardinal points.

- if the transmitter is operating in a mobile application (e.g. environment monitoring during transport), it is not advisable for the network to try to automatically control the transmitter's radio parameters according to the signal strength, as this fluctuates greatly when the transmitter's location changes. Therefore, when operating the transmitter in a mobile application, select the *Mobile operation* option when configuring the transmitter. The transmitter then transmits permanently with maximum range, but at the cost of reducing battery life.

Operating and maintenance recommendations

Recommendations for metrological control

Metrological verification is performed according to the requirements of your own application in user-defined terms. In some cases, the calibration must be performed by an independent state-accredited laboratory.

Recommendations for regular checks

The manufacturer recommends that the system in which the device is incorporated be checked at regular intervals. The range and scope of the tour depends on the application and the user's internal regulations. It is recommended to perform these checks:

- Metrological verification
- Regular checks at intervals as specified by the user
- Evaluation of all the problems that have occurred since the last inspection
- Visual inspection of the device, check the condition of connectors and cables, and cover integrity

How to replace the battery



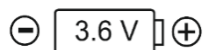
The battery may only be replaced by a person who knows the principles of safe handling of lithium primary batteries. Do not throw them into a fire, do not expose them to high temperatures, and do not mechanically damage them. Dispose the used batteries to hazardous waste.

If the low battery symbol  starts to appear in the COMET cloud received messages during operation, it is advisable to replace the transmitter battery in the next 2-3 weeks. The empty battery symbol also appears on the device display. A low battery indication may also occur if the device is operated at extremely low temperatures even when the battery is still usable (usually outdoors when in out-of-night messages). During the day (after temperature rise), the indication disappears. In this case, it is not necessary to change the battery.

A critically weak battery that can fail at any time is indicated by a blank battery symbol  in the COMET cloud and flashing the empty battery symbol on the device display. Replace the battery as soon as possible.

Note: When operating the transmitter at very low temperatures, the flashing of the blank battery symbol may not be on the transmitter display visible. Please also keep in mind that the battery status indication is related to the currently used power of the radio part of the transmitter. That is that, for example, after relocating a transmitter with a battery previously indicated like *Good* to a more distant position from the receiving gateway, the power of the radio part of the transmitter may automatically increase and the battery status will be newly indicated as *Low* or *Critical*.

To replace the battery, unscrew the device cover, remove the old battery by pulling on the glued handle, and insert the new battery with the **correct polarity**. Refer to the battery symbol **+** (plus pole) printed on the electronics board at the battery location:



If you order a new battery from the device manufacturer (COMET SYSTEM, s.r.o., order code A4203), you will also receive it with the glued handle. Check the seal integrity in the housing and reinstall the cover.

Service Recommendations

Technical support and service are provided by the distributor of this device. Contact is provided in the warranty sheet supplied with the device.

WARNING - Improper handling or use of the device results in a loss of warranty!

End of operation

Disconnect the measuring probes from the device. Return the device to the manufacturer or dispose it as an electronic waste.

Technical parameters

Power supply

The device is powered by an internal lithium battery, accessible after unscrewing the cover (see the section *How to replace the battery*).

Power batteries

Battery type:

Lithium battery 3.6 V, AA size, 2200 mAh

Recommended type: Tadiran SL-760/S, 3.6 V, 2200mAh

Battery life:

<u>interval sending</u>	<u>DR5, Pmax</u>	<u>mobile operation</u>
5 minutes	3 years	1 year
10 minutes	5 years	2 years
15 minutes	6 years	2.5 years
20 minutes	7 years	3 years
30 minutes	7.5 years	4 years
1 hour	8.5 years	6 years
2 hours	9 years	7 years
3 hours	9.5 years	8 years
4 hours	10 years	8.5 years
6 hours	>10 years	9 years
8 hours	>10 years	9 years
12 hours	>10 years	9.5 years
24 hours	>10 years	9.5 years

- *the values given is valid for the operation of the device in the temperature range -5 to + 35 ° C. Frequent operation outside this range reduces battery life by up to 25 %.*
- *these values apply in the case where extraordinary alarm messages are not used or only exceptionally*
- *radio parameters DR5, Pmax usually apply during normal operation, when the transmitter is not too far from the receiving gateway*
- *mobile operation is a mode for maximum radio range with radio parameters DR0 and Pmax. It is set when configuring the transmitter.*

Measurement and transmission of data

Measuring interval:

1 minute

Message sending interval:

Adjustable for 5-10-15-20-30 minutes,
1-2-3-4-6-8-12-24 hours

Radio part

Radio technology:

LoRa®

Working frequency:

Europe 863-870 MHz

LoRaWAN® version:

1.0.4

LoRaWAN® Regional parameters, version:

RP002, 1.0.1

Maximum transmission power:

25 mW (14 dBm)

Antenna:

Internal, gain 2.15 dBi

Maximum receiver sensitivity:

-136 dBm @BW=125 kHz, SF=12

Typical range from base station:

15 km in open field, 2 km in urban area

For correct operation, the device position must be maintained,
the antenna vertically upward!

Operating and storage conditions

Operating temperature:

(-30 to +60) °C

Display visibility is within range (-20 to +60) °C

Operating humidity:

(0 to 100) %RH without permanent condensation

Operating environment:

Chemically non-aggressive

Working position:

vertically, the antenna top

Storage temperature:

(-20 to +45) °C

Storage humidity:

(5 to 90) %RH

Mechanical properties

Dimensions (H x W x D):

126 x 89 x 40 mm without the cables and connectors attached (see dimensional drawings in detail below)

Weight including battery:

W0910 150 g

W0911, W3910, W3911, W7910 155 g

W0932 160 g

Case material:

ASA

Protection (unused the Pt1000 probe inputs must be sealed with supplied the connector caps):

W0910, W0911, W0932, W3911: IP65

W3910, W7910: IP65, sensors under the cap IP40

Transmitter Input Parameters

W0910

Measured variable:

Temperature from the built-in sensor

Range:

(-30 to +60) °C

Accuracy:

± 0.4 °C

Response time:

t₉₀ < 10 min (temperature change 20 °C, air flow approx. 1 m/s)

Resolution:

0.1 °C

Recommended calibration interval:

2 years

W0911

Measured variable:

1 x temperature from the COMET Pt1000/E external probe

Range:

(-90 to +260) °C, sensor Pt1000/3850 ppm

Input accuracy (without probes):

±0.2 °C in range -90 to +100 °C

±0.2 % of measured value in range +100 to +260 °C

Accuracy of the instrument with attached probe is defined by the above input accuracy and the accuracy of the probe used.

Connection method:

Two-wire connection with compensation of errors caused by resistance wire cable. The probe is terminated by a 3-pin M8 ELKA 3008V connector. The connection method is shown in Appendix 1.

Recommended length of probes Pt1000/E is up to 15 m, do not exceed a length of 30 m.

Response time:

is determined by the response time of the used probe.

Resolution:

0.1 °C

Recommended calibration interval:

2 years

W0932

Measured variable:

1 x internal temperature (input No. 3)

2 x temperature from external probe COMET Pt1000/E

Range:

Temperature internal: (30 až +60) °C

Temperature external: (-200 až +260) °C,
sensor Pt1000/3850 ppm

Accuracy of internal sensor:

± 0.4 °C

Accuracy inputs (without probes):

±0,2 °C in range -200 až +100 °C

±0.2 % of measured value in range +100 až +260 °C

Accuracy of the instrument with attached probe is defined by the above input accuracy and the accuracy of the probe used.

Connection method:

Two-wire connection with compensation of errors caused by resistance wire cable. The probe is terminated by a 3-pin M8 ELKA 3008V connector. The connection method is shown in Appendix 1. Recommended length of probes Pt1000/E is up to 15 m, do not exceed a length of 30 m.

Response time of internal sensor:

t₉₀ < 10 min (teplotní skok 20 °C, proudění vzduchu cca 1 m/s)

Response time of external probe:

is determined by the response time of the used probe

Resolution:

0.1 °C

Recommended calibration interval:

2 years

W3910**Measured variables:**

Temperature and relative humidity from internal sensor.

Dew point temperature calculated from measured temperature and relative humidity.

Range:

Temperature: (-30 to +60) °C

Relative humidity: (0 to 100) %RH without permanent condensation

Dew point temperature: -60 to +60 °C

Accuracy:

Temperature: ± 0.4 °C

Relative humidity:

- sensor accuracy ± 1.8 %RV

- (at 23 °C in the range of 0 to 90 %RV)

- hysteresis $< \pm 1$ %RV

- non-linearity $< \pm 1$ %RV

- temperature error: 0.05 % RH/°C (0 °C to +60 °C)

Dew point temperature: ± 1.5 °C

at ambient temperature $T < 25$ °C and

RV > 30 %, details see graphs in Appendix 3

Response time (air flow approx. 1 m/s):

Temperature: $t_{90} < 8$ min (temperature change 20 °C)

Relative humidity: $t_{90} < 50$ s (humidity change 30 %RV, constant temperature)

Resolution:

Temperature including dew point temperature: 0.1 °C

Relative humidity: 0.1 %.

Recommended calibration interval:

1 year

W3911

Measured variables:

The temperature and relative humidity measured by the Digi/E series external probe. Dew point temperature calculated from the measured temperature and relative humidity.

Range, accuracy and response time:

According to the connected Digi/E series probe

Connection method:

Digi/E series probe. The probe is terminated by a 4-pin M8 ELKA 4008V connector. The method of connection is shown in Appendix 2. The length of the Digi/E probe cable must not exceed 15 m.

Resolution:

Temperature including dew point temperature: 0.1 °C

Relative humidity: 0.1 %.

Recommended calibration interval:

1 year

W7910

Measured variables:

Temperature, relative humidity and atmospheric pressure from the built-in sensor.

Dew point temperature calculated from measured temperature and relative humidity.

Range:

Temperature: (-30 to +60) °C

Relative humidity: (0 to 100) % RH without permanent condensation

Dew point temperature: -60 to +60 °C

Atmospheric pressure: 600 to 1100 hPa

Accuracy:

Temperature: ± 0.4 °C

Relative humidity:

- sensor accuracy ± 1.8 %RV

(at 23 °C in the range of 0 to 90 %RV)

- hysteresis $< \pm 1 \text{ \%RV}$
- non-linearity $< \pm 1 \text{ \%RV}$
- temperature error: $0.05 \text{ \% RH/}^{\circ}\text{C}$ (0°C to $+60^{\circ}\text{C}$)

Dew point temperature: $\pm 1.5^{\circ}\text{C}$

at ambient temperature $T < 25^{\circ}\text{C}$ and
 $\text{RV} > 30\%$, details see graphs in Appendix 3

Atmospheric pressure: $\pm 1.3 \text{ hPa}$ at 23°C

Response time (air flow approx. 1 m/s):

Temperature: $t_{90} < 8 \text{ min}$ (temperature change
 20°C)

Relative humidity: $t_{90} < 50 \text{ s}$ (humidity change
 $30 \text{ \%RV}$, constant temperature)

Resolution:

Temperature including dew point temperature: 0.1°C

Relative humidity: $0.1 \text{ \%}$.

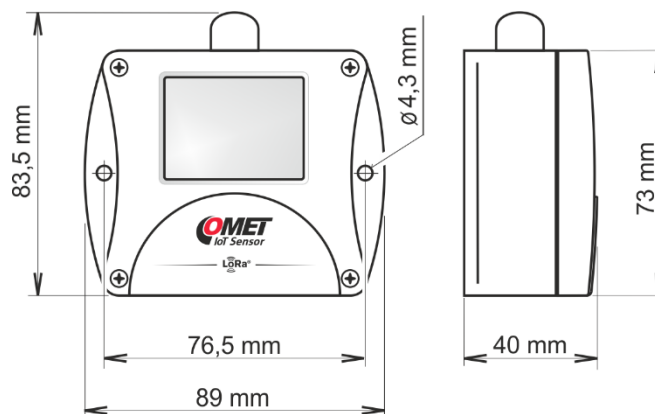
Atmospheric pressure: 0.1 hPa

Recommended calibration interval:

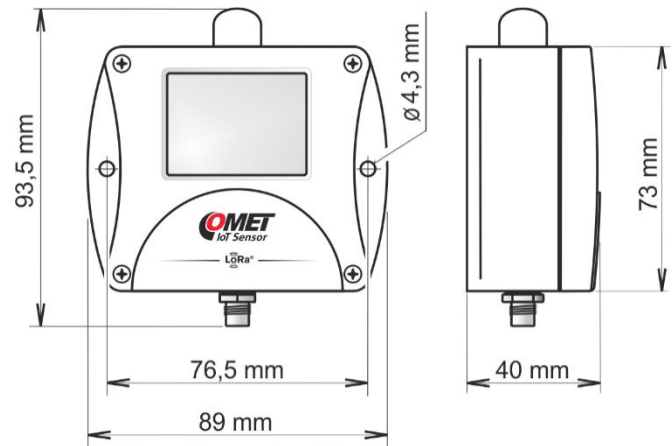
1 year

Dimensional drawings

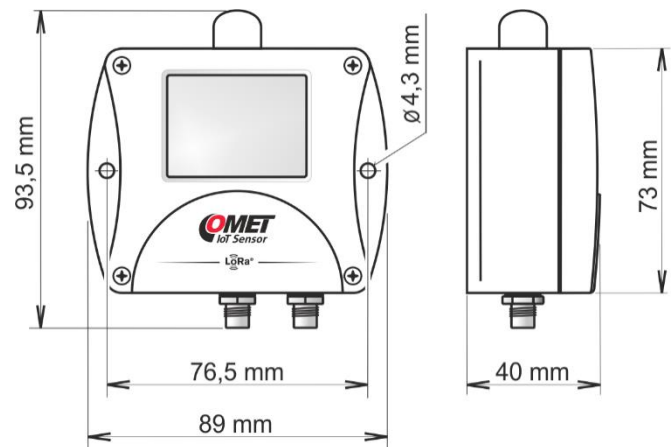
W0910



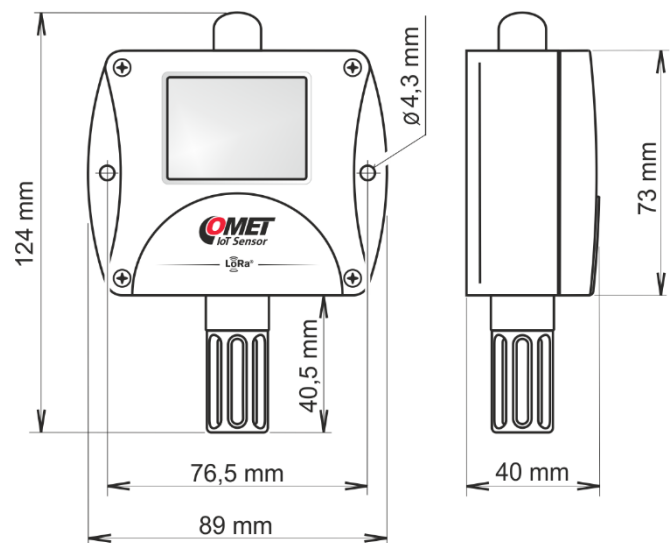
W0911
W3911



W0932



W3910
W7910

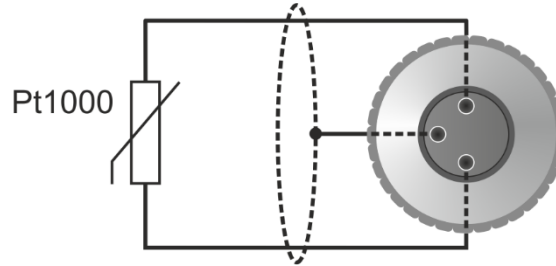


Declaration of Conformity

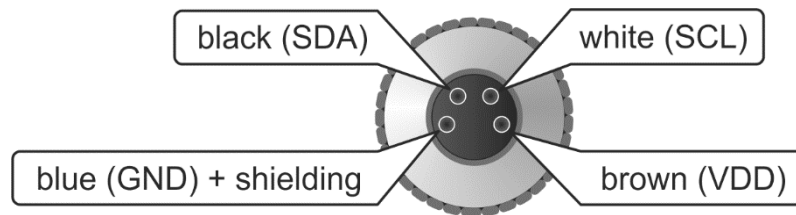
The transmitter complies with the requirements of Directive 2014/35 / EU. The original Declaration of Conformity can be found at www.cometsystem.com.

Appendices

Appendix 1: Connecting the Pt1000/E probe connector



Appendix 2: Connection of the Digi/E probe connector



Appendix 3: Accuracy of dewpoint temperature measurement

