Instruction manual

Gas pressure sensor
GPT-100

ENGLISH

Contents

General

Warranty

The warranty period begins with the purchase of the device. Please provide proof of purchase (receipt, invoice, delivery note, etc.). Please keep these documents in a safe place.
Our warranty service is based on our warranty conditions valid at the time of purchase. In the event of a repair, please return the device.

The device is labelled with the CE mark and therefore complies with the essential requirements of the European Directives 2014/30/EU, electromagnetic compatibility and 2014/35/EU, electrical safety; as well as the European Radio Equipment Directive 2014/53/EU; and the Ecodesign Directive 2009/125/EC; as well as 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

All devices sold by us comply with the safety regulations valid at the time of purchase and are fundamentally safe when used as intended!

The operating instructions must be carefully read and understood before starting any work.
The operating instructions are part of the equipment and must be kept accessible at all times.

Please follow the instructions in the operating manual to avoid possible hazards, damage or malfunctions.

Observe the local safety regulations and accident prevention regulations that apply to the area in which the appliance is used.

Scope of delivery

- Gas pressure sensor GPT-100
- Pre-assembled with LoRa device and battery
- User manual

Note: There are additional inscriptions on the label on the sensor housing.

Subject to technical changes and errors

Intended use

These gas pressure sensors are designed for use in systems filled with SF6 gas.
Pressure and temperature are measured continuously. The density of the insulation gas can be calculated from this to assess the condition of the system. These parameters can be transmitted wirelessly via the radio interface using LoRa®. The condition parameters in the gas tanks are thus permanently monitored. The device may only be operated with non-hazardous media in accordance with Regulation (EC) 1272/2008.

The use of the device in hazardous process fluids (see Pressure Equipment Directive Fluid Group 1, see 2014/68/EU Article 13) is excluded.

The device is designed and constructed exclusively for the intended use described here and may only be used accordingly.

Remote monitoring of measured values using LoRaWAN is only suitable for non-critical and non-safety-relevant applications.

The manufacturer or operator of the machine or system in which the device is used must ensure that the parts in contact with the medium are compatible with the medium used.
The technical performance limits of the device must not be exceeded.

The operator must ensure that the fluid is compatible with the materials used.

The appliance is not authorised for use in potentially explosive atmospheres.

The technical specifications in these operating instructions, see section "General", must be observed. Proper handling and operation of the appliance within the technical specifications is assumed.
Otherwise, immediate decommissioning and inspection by an authorised service technician is required.

Claims of any kind are excluded if the appliance is not used as intended!

Improper use
- The appliance must not be modified without authorisation.
- The appliance must not be overloaded during operation.
- If the appliance is used other than as intended, this is considered improper use.
- This appliance must not be used in emergency stop or safety devices.

Skilled personnel
Only trained specialist personnel may carry out the activities described in these operating instructions. Due to their specialist training, knowledge of measurement and control technology, experience and knowledge of the country-specific regulations, applicable standards and guidelines, the specialist personnel authorised by the operator are able to carry out the work described and independently identify potential hazards.
Special operating conditions require further appropriate knowledge, e.g. of hazardous media.

Safety instructions

Personal protective equipment
Personal protective equipment is used to protect people against risks that could jeopardise their health or safety.
The appropriate personal protective equipment must be used depending on the area of application.

Wear safety glasses
Safety glasses are intended to protect the eyes from harmful influences such as chemicals, dust, splinters, etc.

Wear protective gloves
To protect hands from injuries, contact with dangerous substances or burns.

Wear a respirator mask
To protect the respiratory tract from harmful gases and atmospheres.

Handling batteries
During use, storage or transport, the battery must not be exposed to high or low extreme temperatures and low air pressure (e.g. at high altitudes).
This may result in leakage of flammable liquids/gases or cause an explosion.
This can also occur due to mechanical crushing or cutting.

Only operate the gas pressure sensor with the battery approved for this device (LSP17500-H).
Attention: This battery must not be recharged!

Batteries must not be reactivated by other means, dismantled, heated or thrown into an open fire (risk of explosion!).
Replace batteries only with batteries of the correct type.
Do not place it on radiators or expose it to direct sunlight!
Leaked or damaged batteries can cause chemical burns if they come into contact with the skin.
In this case, use suitable protective gloves.
Batteries can contain toxins that are harmful to health and the environment.

Battery disposal
Batteries/rechargeable batteries are subject to European Directive 2006/66/EC.
These must not be disposed of with normal household waste.
As a consumer, you are legally obliged to return used batteries.
You can return your old batteries free of charge to public collection points in your municipality or wherever batteries of this type are sold.

You will find this symbol on batteries containing harmful substances:

Pb = battery contains lead
Cd = Battery contains cadmium
Hg = Battery contains mercury

Safety instructions for use in switchgear systems

WARNING!
Residual measuring fluid in the removed gas pressure sensor can endanger people, the environment and equipment.

SF6 decomposition products may be corrosive or toxic and may cause serious bodily injury if they come into contact with skin or are inhaled.
▶ Take adequate precautions.
▶ In the event of a fault, aggressive media may be present on the device.

The operator must ensure that the handling of SF6 gas is carried out by a qualified company or by employees trained in accordance with IEC 61634 section 4.3.1 or IEC 60480 section 10.3.1.

There must be no installation and system conditions that could lead to the formation of atomic hydrogen in the transmitter connection channel.
The maximum permissible pressures must be observed.

Valid standards and directives for SF6 gas

Installation, assembly, commissioning:
- BGI 753 (SF6 plants and equipment in Germany)
- IEC 61634 (Handling of SF6-gas)
- IEC 60376 (New SF6-gas, technical grade SF6-gas)
- IEC 60480 (Used SF6-Gas)
- CIGRE report 276, 2005 (Practical SF6 gas handling instructions)

Leakages during operation:
- IEC 60376 (New SF6-gas, technical grade SF6-gas)
- IEC 60480 (used SF6-gas)
- CIGRE 2002 („SF6 gas in the electrical industry")

Repair work and maintenance:
- IEC 61634 (Use and handling of SF6 gas in high-voltage switchgear and controlgear)
- CIGRE 1991 (Handling of SF6-gas)
- CIGRE report 276, 2005 (Practical SF6 gas handling instructions)
- CIGRE report 163, 2000 (Guide for SF6 gas mixtures)

Information:

SF_6 gas is colourless and odourless, chemically neutral, inert, non-flammable and about five times heavier than air, non-toxic and non-ozone depleting.
Detailed information can be found in IEC 60376 and IEC 61634

Transport, packaging and storage

Transport

Only transport the appliance in its original packaging.
Improper transport may result in material damage.
Check the appliance for any damage after unpacking.
In the event of damage, do not operate the appliance and contact the manufacturer immediately.

If the appliance is moved from a cold to a warm place, condensation may form on the appliance and possibly cause the appliance to malfunction.
In this case, wait for the appliance temperature to equalise with the room temperature before restarting the appliance.

Packaging and storage

Do not remove the packaging until immediately before installation.
Keep the packaging, e.g. for possible return shipment.

Permissible conditions at the storage location:
Storage temperature: -40 ... +80 °C

Functional description

The device is equipped with a gas pressure sensor.
The measured values can be transmitted wirelessly using the integrated LoRa radio module.
The battery-operated radio transmission via LoRa® ("Long Range") is based on LPWAN technology ("Low Power Wide Area Network") to enable long transmission ranges and a long battery life.

Mode of operation

The device uses the LoRaWAN® wireless standard.
This means that communication with a suitable gateway mainly consists of uplinks (messages from the measuring device).
An uplink always takes place in regular, preset cycles, but can be triggered immediately if alarm limits are exceeded or not reached.
A downlink (message to the measuring device), on the other hand, can only ever be sent after an uplink has been received.

Typical Uplinks:
▶ Measured values
▶ Alarm parameters
▶ Notifications for fault diagnosis
▶ Configuration ID (to identify changes in the measurement and transmission rate)

Typical downlink:
Configuration change recognised by the system.
The LoRaWAN® automatically recognises messages to be acknowledged (e.g. alarms) if the transmission packet has not arrived.
The LoRaWAN® automatically recognises if the transmission packet has not arrived and resends with modified transmission properties (spreading factors) until receipt is confirmed by the system.

Commissioning and operation

Personnel: Skilled personnel
Protective equipment: Protective gloves, safety glasses

WARNING!
Physical injury, environmental damage and damage to property due to hazardous media
In the event of contact with hazardous media (e.g. oxygen, acetylene, flammable or toxic substances) and hazardous substances (e.g. corrosive substances (e.g. corrosive, toxic, carcinogenic, radioactive), there is a risk of physical injury, damage to property and the environment.
In the event of a fault, hazardous measuring substances can adhere to the device or leak from the device or be present under high pressure or vacuum.

▶ In addition to the overall general rules, the relevant regulations must be be observed.

▶ Wear the necessary protective equipment, see chapter "Personal protective equipment".

WARNING!
Physical injury and/or damage to property due to the selection of the wrong device version
If the measuring range is too small (pressure load capacity exceeded), gas leaks can occur and the measuring cell can burst, which can lead to serious personal injury.

▶ Before installation, commissioning and operation, ensure that the correct gas pressure sensor in terms of measuring range, design and specific measuring conditions have been selected.

WARNING!
Physical injury, property damage and environmental damage caused by hazardous measured substances
In the event of contact with hazardous media (e.g. oxygen, acetylene, flammable or toxic substances) and hazardous media (e.g. corrosive, toxic, carcinogenic, radioactive), there is a risk of physical injury, damage to property and the environment.
In the event of a fault, hazardous media may be present on the device under high pressure or vacuum.

▶ In addition to the overall general rules, the relevant regulations must be observed.

▶ Wear the necessary protective equipment, see chapter "Personal protective equipment".

WARNING!

Physical injury, property damage and environmental damage due to exceeding the performance limits

Exceeding the performance limits can destroy the device and lead to hazards in the end application.

▶ Any permanent operation in the overload range is not permissible. Above the highest permissible operating pressure, up to the overload limit, the gas density sensor is operating outside its specification. The overload range is intended to prevent damage to the gas density sensor, as part of a pressure vessel system, during the pressure containment test.

▶ The overload limit must never be exceeded, even when failures occur in the end-use application. Loads above the overload limit can cause irreversible damage, which can lead, for example, to permanent measured errors.

▶ The manufacturer or operator of the machine or plant in which the product is used must ensure the compatibility of the materials of the wetted parts with the medium used.

▶ The gas density sensor should not be used with abrasive or unstable fluids, in particular not with hydrogen.

WARNING!

Damage to property due to electrostatic discharge (ESD)

When working on open circuits (PCBs) there is a danger of damaging sensitive electronic components through electrostatic discharge.

▶ When the sensor housing is open, e.g. when connecting or changing the battery pack battery pack, ensure adequate ESD protection.

▶ Do not touch the circuit board or electrical components.

▶ Before removing the case, touch any part of the grounded metal case or an adjacent grounded metal object (e.g. radiator, pipelines) (static charges are dissipated from the body).

▶ Avoid contact between the electronics and clothing.

WARNING!
Physical injury, property damage and environmental damage
Lithium thionyl chloride batteries are not rechargeable.
Improper handling can lead to leaks or to the escape of vaporised electrolyte vapours and cause a fire or explosion.

▶ Do not open the battery pack.

▶ Do not damage the battery pack.

▶ Do not short-circuit the positive and negative connections with conductors.

▶ Do not reverse the polarity.

▶ Do not expose the battery pack to excessive mechanical stress.

▶ Do not allow the battery pack to come into contact with water or condensation.

▶ Do not heat or solder the battery pack or bring it into contact with fire.

▶ Do not use rechargeable batteries (rechargeable battery packs).

▶ Do not continue to use battery packs that have been knocked onto the floor.

Information:
On the wetted parts of the instrument, small residual amounts of the adjustment medium (e.g. compressed air, water, oil) can adhere from production.
With increased requirements for technical cleanliness, suitability for the application must be checked by the operator before commissioning.

Mechanical mounting

Prior to commissioning, the gas density sensor must be subjected to a visual inspection.

▶ Leaking liquid is indicative of damage.

▶ Only use the gas density sensor if it is in perfect condition with respect to safety.

▶ The thread must not be damaged.

Requirements for mounting point

The mounting point must meet the following conditions:

▶ Sealing faces are clean and undamaged.

▶ Sufficient space for a safe electrical installation.

▶ Avoid exposing the gas pressure sensor to direct sunlight. Permanent exposure to UV light/sunlight can lead to excessive temperatures and a change in colour of the plastic parts.
If necessary, use suitable sun protection.
If needed, please contact the manufacturer.
The maximum operating temperature of +60°C must not be exceeded in order to avoid damage to the sensor avoid damage to the sensor.

▶ Under corrosive ambient conditions (such as salty, humid air), restrictions in the gloss level of the metal surfaces, or even corrosion on the instrument, may occur, which e. g. make readability of the product label more difficult.

▶ Permissible ambient and medium temperatures remain within the performance limits.
Consider possible restrictions on the ambient temperature range caused by mating connector used.

▶ For performance limits, see "Technical data".

Information:

The measuring location should preferably be positioned directly at the gas compartment.
The measurement at the end of measuring lines prevents optimal results (unwanted temperature differences to the main tank).

Installation using an adapter and measuring chambers

WARNING!

Damage to property due to dismounting

Dismounting compromises the leak tightness of the measuring assembly and renders it unserviceable – damage to property is caused.
If the instrument is delivered with an adapter or measuring chamber, it is completely mounted and tested for leak tightness ex-works.

▶ The process connections of the available adapters or measuring chambers must be properly sealed and connected to the measuring location.

Installing the device

Design according to DIN EN ISO 1179-2 (sealing with profile seal)

1. Seal the sealing surface.
2. Screw the gas pressure sensor hand-tight into the installation point.
3. Tighten over the spanner flat using a torque spanner. Tightening torque for gas pressure sensor is 20 Nm.

The max. tightening torque also depends on the mounting point and must be observed (e.g. material and shape)!

Integration guide

The device comes with a sticker with the parameters DEV EUI, JOIN EUI and APPKEY required for integration.
The DEV EUI is both numerical and a barcode and can be read using a scanner or appropriate app and entered into the network server.

Networkparameters

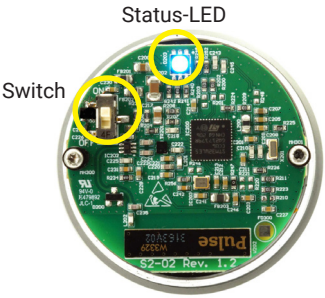
DEV EUI	Barcode/label
APP/JOIN EUI	Barcode/label
APP KEY	see Integration Guide
Regional Parameters	RP002 V1.0.1
LoRaWAN version	V1.0.4
Frequency plan	EU868
Downlink port	2

Initial startup and join process

Notice:
The battery is already installed and connected to the circuit board.

Use a size 32 mm open-end spanner to hold the sensor housing in place, then unscrew the plastic cap (counterclockwise) from the sensor housing.

Switch on the device using the switch on the circuit board (ON)



- Initially, the status LED will light up in green, yellow, and red.
- A solid green light indicates that the sensor has been initialized correctly.
- If the sensor fails to initialize properly, the LED will glow red.
- Following the sensor initialization, the join process will commence, indicated by a blue blinking LED. During this phase, the device will send out 12 join requests.
- If a join request fails, the LED will briefly illuminate red.
- Upon a successful join, the LED will blink green for one minute.

After completing the settings, the plastic cap must be firmly screwed (clockwise) onto the sensor housing.

Make sure that there is no gap between the plastic cap and the sensor housing.
Only then is the pressure sensor properly sealed and ready for operation.

LoRa Downlink messages

The downlink frame begins with a frame code that identifies the type of message being transmitted. To differentiate between the various configuration frames, the frame code is followed by a frame ID that specifies the particular configuration message. All downlink bytes must be provided in hexadecimal format, and every byte described in the message should be fully populated. For all downlink messages, please use Port 2 to ensure proper communication with the device.

Device configuration

Set the device configuration parameters.

Frame code	Frame ID	Description
0x01 (Downlink configuration frame)	0x00	Device configuration

Data 0	Data 1	Data 2	Data 3	Data 4	Data 5	Data 6	Data 7	Data 8	Data 9
0x01	0x00	Reboot timeout [h]	Rejoin timeout [h]	0x01	0x01	MSB Keep-alive timeout [min]	LSB Keep-alive timeout [min]	-	-

Reboot timeout:
This is set in Byte[2]. Configure the timeout as a hexadecimal value representing hours. The end node will periodically perform a reboot and a rejoin based on the configured timeout.

Rejoin timeout:
This is set in Byte[3]. Similarly, configure the timeout as a hexadecimal value representing hours. After a failed join process, the device will initiate a new join attempt after the configured timeout.

Keep-alive timeout:
This is configured in Byte[6] and Byte[7]. Calculate the hexadecimal value for the timeout in seconds and split it into the Most Significant Byte (MSB) in Byte[6] and the Least Significant Byte (LSB) in Byte[7]. This timeout defines the interval at which a keepalive frame is sent over LoRa.

Example:
Reboot Timeout set to 24[h], Rejoin timeout set to 1[h] and keepalive timeout set to 1[h](3600[s]).

Data 0	Data 1	Data 2	Data 3	Data 4	Data 5	Data 6	Data 7	Data 8	Data 9
0x01	0x00	0x18	0x01	0x01	0x01	0x00	0x3C	-	-
		24[h]	1[h]			60[min]/1[h]			

LoRa configuration

Set the LoRa-network parameters

Frame code	Frame ID	Description
0x01 (Downlink configuration frame)	0x01	LoRa configuration

Data 0	Data 1	Data 2	Data 3	Data 4	Data 5	Data 6	Data 7
0x01	0x01	Device class	ADR enable	TX confirmed	Default data rate	Rejoin at boot	Activation type

Device class:
This is set in Byte[2]. Assign "0" for Class A, "1" for Class B, or "2" for Class C.

Auto Data Rate (ADR):
Enable or disable ADR in Byte[3]. Set Byte[3] to "1" to enable ADR or "0" to disable it.

Transmission Confirmation:
This is configured in Byte[4]. Set Byte[4] to "1" to enable transmission confirmation or "0" to disable it.

Default Data Rate:
Configure the default data rate in Byte[5]. The end node supports data rates ranging from "0" to "7"

Rejoin at boot:
Set the Byte[6] to “1”, if you want the device to rejoin after every boot. Disable the rejoin by setting the Byte[6] to “0”.

Activation type:
Byte[7] sets the LoRa activation type. Set it to “2” for OTAA activation and to “1” for ABP.

Example:
Device class set to Class C, ADR enabled, default data rate 0, Tx confirmation disabled, Rejoin at boot and OTAA activation

Data 0	Data 1	Data 2	Data 3	Data 4	Data 5	Data 6	Data 7
0x01	0x01	0x02	0x01	0x00	0x00	0x01	0x02
		Class C	ADR enabled	Tx confirmation disabled	Default datarate 0	Rejoin at boot	OTAA Activation

Sensor configuration

Setup the measurement and transmission.

Frame code	Frame ID	Description
0x01 (Downlink configuration frame)	0x02	Sensor configuration

Data 0	Data 1	Data 2	Data 3	Data 4
0x01	0x02	MSB Measurement period [s]	LSB Measurement period [s]	send multiplicator

Measurement period:
Set the measurement period in Byte[2] and Byte[3] in seconds. The value
should be split into the Most Significant Byte (MSB) in Byte[2] and the Least Significant Byte (LSB) in Byte[3].

Send multiplicator:
Send multiplikator: Set the send multiplikator in Byte[4]. This setting determines after how many measured values an average value is transmitted.

Example:
Measurement periode is set to 1 minute, send multiplikator is set to 5.

Data 0	Data 1	Data 2	Data 3	Data 4
0x01	0x02	0x00	0x3C	0x05
		1[min]/60[s]		Every 5 samples, the average value is transmitted

Reboot device

The end node can be remotely forced to reboot and re-join the LoRa network.

Frame code (byte[0])	Frame ID (byte[1])	Description
0x08	-	Trigger a device reboot with LoRa re-join

Example:
Reboot the device

Data 0	Data 1	Data 2	Data 3	Data 4	Data 5	Data 6	Data 7	Data 8	Data 9
0x08	-	-	-	-	-	-	-	-	-

LoRa Uplink messages

The device supports following uplink messages:

Configuration Fault code message

After sending a configuration downlink, the end node checks all parameters for validity. If any of the parameters fall outside the specified range, the configuration is canceled, and a fault message is sent as a LoRa uplink.

Frame code	Description
0x02	Receive fault code

Data 0	Data 1
0x02	0xFF

Periodic sensor data uplink

After the period of the send interval has expired, the end node transmits the data from the sensor readout as an uplink message.

Frame code	Description
0x05	Receive periodic sensor data

Data 0	Data 1	Data 2	Data 3	Data 4	Data 5	Data 6	Data 7
0x05	faultcode	MSB Temp	LSB Temp	MSB Press	LSB Press	MSB Voltage	LSB Voltage

The fault code is set to 0x00 if no sensor faults occur.
The following table describes the various fault codes.

Faultcode	0x01	0x02
Description	Readout failed	Initialization failed

Receive Keep alive frames

The end node sends a keep-alive frame periodically. The time period for sending these frames can be configured in the downlink device configuration message, as explained earlier in the “Device Configuration” section.

Frame code	Description
0x07	Receive keep alive frame

Receive Firmware version
After boot, the device sends it firmware version.

Frame code	Description		
0x0B	Firmware version main	Firmware version Sub1	Firmware version Sub2

Get configuration
To get the configuration parameters, a request must be sent.
Following requests are supported.

Data 0	Data 1	Data 2
0x02 (Get configuration frame)	0x00 (Device configuration)	-
0x02 (Get configuration frame)	0x01 (LoRa configuration)	-
0x02 (Get configuration frame)	0x02 (Sensor configuration)	-

Factory settings

PARAMETER	VALUE	
REBOOT TIMEOUT	168 [h]	Device settings
REJOIN TIMEOUT	1 [h]	
KEEP ALIVE TIMEOUT	24 [h]	
MEASUREMENT INTERVALL	3 [h], 8 times a day	Sensor settings
SEND MULTIPLIKATOR	2	
DEVICE CLASS	Class A	LoRa settings
AUTO DATARATE	enabled	
DEFAULT DATARATE	DR_0	
TX CONFIRMED	disabled	
FORCE REJOIN AT BOOT	enabled	
ACTIVATION TYPE	OTAA	

Javascript Payload formatter Uplink

```
function decodeUplink(input) {
var decoded = {};
var bytes = input.bytes;
var warnings = [];
var frametype = {
1: "Default",
2: "receive_settings",
3: "receive_fault",
4: "default",
5: "receive_sensordata",
6: "default",
7: "keep_alive",
8: "reserved",
9: "reserved",
10: "reserved",
11: "firmware_version"
};
decoded.message = frametype[bytes[0]];
//Configtransmission
if (bytes[0]== 2) {
if(bytes[1]===0)
{
decoded.reboottimeout = bytes[2];
decoded.rejointimeout = bytes[3];
decoded.useraccess = bytes[5];
decoded.alivetimeout = bytes[6]<<8 | bytes[7];
}
else if(bytes[1]==1)
{
decoded.deviceclass = bytes[2];
decoded.adrenable = bytes[3];
decoded.txconfirmed = bytes[4];
decoded.datarate = bytes[5];
decoded.forcerejoin = bytes[6];
decoded.activationtype = bytes[7];
}
else if(bytes[1]==2)
{
decoded.measinterval = bytes[2]<<8 | bytes[3];
decoded.sendinterval = bytes[4] * decoded.mea-
sinterval;
}
else if(bytes[1]==0xFF)
{
decoded.message = "wrong settings param";
}
}
else if(bytes[0]== 3){
warnings.push("Fault");
}
//Sensor Data
else if(bytes[0]== 5){
decoded.faultcode = bytes[1];
decoded.temperature = (bytes[2] << 8 |
bytes[3])/1000 ;
decoded.pressure = (bytes[4] << 8 | bytes[5]);
decoded.voltage = bytes[6] << 8 | bytes[7] ;
switch(decoded.faultcode) {
case 1:
warnings.push("sensor readout fault");
break;
case 2:
warnings.push("sensor init fault");
break;
default:
warnings.push("Unknown Error");
break;
}
}
else if(bytes[0]== 11)
{
decoded.fwversionmain = bytes[1];
decoded.fwversionsub1 = bytes[2];
decoded.fwversionsub2 = bytes[3];
}
return {
data: decoded,
warnings: warnings
};
}
```

Battery replacement

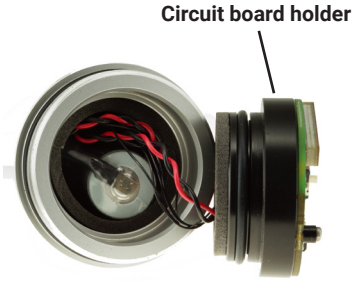
The pressure sensor may only be operated with the battery (LSP17500-H) approved for this device.

Note:
Only replace the battery in a dry environment!

Use a size 32 mm open-end spanner to hold the sensor housing in place, then unscrew the plastic cap (counterclockwise) from the sensor housing.

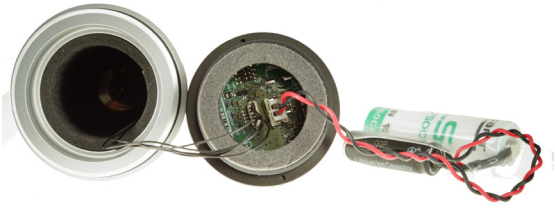
Switch off the device using the switch on the circuit board (OFF).

Now remove the circuit board holder from the sensor housing and disconnect the battery plug (2-wire cable) from the circuit board.



Then carefully remove the battery from the sensor housing.
Make sure that you do not accidentally pull the 4-wire sensor cable from the sensor in the housing.

Now connect the new battery to the circuit board and carefully reinsert it together with the the two cables back into the sensor housing.



Check the seal ring of the circuit board holder for damage and replace if necessary.

Push the circuit board holder firmly into the sensor housing.
Ensure that no components on the circuit board are damaged.
Only apply pressure to the two PCB screws.

Switch on the device using the switch on the circuit board (ON).

Check the seal ring of the sensor housing for damage and replace if necessary.

After completing the battery replacement, the plastic cap must be firmly screwed, clockwise, onto the sensor housing.

Make sure that there is no gap between the plastic cap and the sensor housing.
Only then is the pressure sensor properly sealed and fulfils the ambient conditions.

Maintenance and care

Personnel: Skilled personnel

Maintenance

An external visual inspection should be carried out once a year.
The sealing lacquer must be undamaged. Also look for signs of wear, e.g. on the plastic cap.

Care

Physical injuries and damage to property and the environment

Residual media can result in a risk to persons, the environment and equipment.

▶ Wear the requisite protective equipment.
▶ Carry out the cleaning process in accordance with the manufacturer's instructions.

Damage to property due to improper cleaning

Improper cleaning may lead to damage to the instrument.

▶ Do not use any aggressive cleaning agents
▶ Do not use any hard or pointed objects for cleaning.
▶ Do not use any abrasive cloths or sponges.

Malfunctions

Personnel: Skilled personnel
Protective equipment: Protective gloves, safety glasses and respirator mask (gas is to be expected in the event of contamination)

WARNING!
Physical injuries and damage to property and the environment through hazardous media
Upon contact with hazardous media (e.g. oxygen, acetylene, flammable or toxic substances) and harmful media (e.g. corrosive, toxic, carcinogenic, radioactive), there is a danger of physical injuries and damage to property and the environment.
Should a failure occur, hazardous media under high pressure or vacuum may be present at the instrument.

▶ For these media, in addition to all standard regulations, the appropriate existing codes or regulations must also be followed.

▶ Wear the requisite protective equipment, see chapter “Personal protective equipment”.

Information:
If faults cannot be rectified with the help of the measures listed, put the appliance out of operation immediately.

▶ Contact the manufacturer.

In the event of faults, first check whether the gas pressure sensor is mechanically and electrically correctly installed.

Dismounting, return and disposal

Personnel: Skilled personnel
Protective equipment: Protective gloves, safety glasses and respirator mask
(gas is to be expected in the event of contamination)

WARNING!
Physical injury
When dismounting, there is a danger from hazardous media and high pressures.

▶ Wear the requisite protective equipment, see chapter "Personal protective equipment".
▶ Observe the information in the material safety data sheet for the corresponding medium.
▶ Only disconnect the pressure measuring instrument / measuring assembly once the system has been depressurised and cooled down.
▶ Wash or clean the dismounted instrument (following operation), in order to protect persons and the environment from exposure to residual media.

WARNING!
Physical injuries and damage to property and the environment through hazardous media
Upon contact with hazardous media (e.g. oxygen, acetylene, flammable or toxic substances) and harmful media (e.g. corrosive, toxic, carcinogenic, radioactive), there is a danger of physical injuries and damage to property and the environment. Hazardous media may adhere to or escape from the instrument should a failure occur.

▶ For these media, in addition to all standard regulations, the appropriate existing codes or regulations must also be followed.
▶ Wear the requisite protective equipment, see chapter "Personal protective equipment".

WARNING!
Physical injuries and damage to property and the environment through hazardous media
Upon contact with hazardous media (e.g. oxygen, acetylene, flammable or toxic substances) and harmful media (e.g. corrosive, toxic, carcinogenic, radioactive), there is a danger of physical injuries and damage to property and the environment. Should a failure occur, hazardous media under high pressure or vacuum may be present at the instrument.

▶ For these media, in addition to all standard regulations, the appropriate existing codes or regulations must also be followed.
▶ Wear the requisite protective equipment, see chapter "Personal protective equipment".

Dismounting
When removing the appliance, the force required for this must not be applied via the housing, but only with a suitable tool via the spanner flat provided for this purpose.
Only remove the gas pressure sensor when it is depressurised.

Return

When shipping the device, please note the following

▶ All appliances must be free of hazardous substances (acids, alkalis, solutions, etc.) before they are returned and must therefore be cleaned before being returned, see section "Maintenance and care".

▶ To return the appliance, use the original packaging or suitable transport packaging.

▶ Remove the battery before returning the device. See section "Battery replacement"

Devices with lithium metal batteries

The contained lithium metal battery is subject to the requirements of hazardous goods legislation.
Special packaging and labelling requirements must be observed when shipping.
Do not ship damaged batteries.

Observe the different dangerous goods regulations of the respective modes of transport and any additional national regulations.

Technical Data

General		
Ambient temperature range	-20°C ... +40°C	Avoid exposing the GPT-100 to direct sunlight. If necessary, use suitable sun protection. If needed, please contact the manufacturer. The maximum operating temperature of +60°C must not be exceeded in order to avoid damage to the sensor.
Protection class	IP55	
Pressure measuring		
Pressure measuring range	0.1...10 bar abs.	
Proof pressure	30 bar	
Accuracy @ RT (20...25 °C)	± 0,25% FS typ.	Non-linearity (best fitted straight line BFSL), pressure hysteresis, non-repeatability.
	± 0,50% FS max.	
Total error band	±0.7% FS	
Compensated temperature range	-10...80 °C	Other temperature ranges within -40...125 °C possible as an option.
Long-term stability	≤ ± 0,20% FS	Per year under reference conditions.
Degree of dependency on location	≤ 2 mbar	
Temperature measuring range	-20…100 °C	
Accuracy temperature	± 2 °C typ.	
Materials in contact with fluid		Pressure connection: Stainless steel AISI 316L Pressure transducer diaphragm: Stainless steel AISI 316L Pressure connection seal: EPDM

Materials in contact with environment	Housing of pressure sensor: Stainless steel AISI 316L Housing of electronic part: AL 6082-T6 Cover: High performance plastic Cover seal: EPDM
Pressure connection	G1/4“
Electronic	
Micro controller	32-bit Arm® Cortex® -M4 MCU
LoRaWAN® standard	868MHz
LoRaWAN® version	1.0.4
Functions	Join Configuration via LoRa downlink Transmission of measuring data, e.g. gas pressure, temperature, battery status Fimware update over the air (FUOTA) Secure Boot Key Management
Power supply	Longlife Batterie SAFT LSP 17500-20F, 3.6V
Dimensions and weights	L 130 x W 50 x H 50 mm; Weight: 350 g
Materials	Housing & connections: AL 6082-T6 Internal seal rings: EPDM Plastic cover M45x2 connector: ABS
Tightening torque for gas pressure sensor	20 Nm

Subject to technical changes and errors December 2024

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