FAST
GROUPE CLAIRE

BIDI logger

The BiDI LTE acoustic noise logger

User manual

User manual: Version 01

Date de publication 06/2026

Table des matières

1. Document informations 5
1.1. Context 5
1.2. Symbols used in the document 5
1.3. Sticker description 5

2. Safety 7
2.1. General instructions 7
2.1.1. Instructions for preventing reasonably foreseeable misuse according to EN 62368-1 Annex M.10 8
2.2. EU compliance and norms 9
2.3. Maintenance Safety Waning 9
2.3.1. Safety Instructions for Maintenance Personnel 9

3. Description 10
3.1. Intended use 10
3.2. Operating mode 10
3.3. Functioning of the Default configuration 11
3.4. Equipement composition 12
3.5. Overall dimensions 13
3.6. Technical characteristics 14
3.6.1. BIDI LOGGER 14
3.6.2. Communication & use 16
3.6.3. Antenna 17
3.6.4. Sensor 18

4. Getting started 19
4.1. Commissioning - LTE connection and synchronisation to watercloud 19
4.2. Logger functioning modes 20
4.3. Displaying the functioning mode & connection status with the LED 21
4.3.1. LED blinking cycle 21
Red: Alarm status 23
Blue: Bluetooth status 23
Green: Device mode status 23
4.4. Changing the logger functioning mode 24
4.4.1. Switching from transport to field mode 24
4.4.2. Switching From field to transport mode 25
4.5. Forcing data transmission 26
4.6. Installation 27
4.6.1. Precautions and recommandations 27
4.6.2. Installing the antenna 27
Positioning 27

Distance from obstructions *28*
Interference electromagnetic *28*
Cable and Connector *28*
Resonance Volume *28*

5. Storage and transport 29
5.1. Transport mode 29
5.2. Avoiding unintentional wake up 29

6. Maintenance 30
6.1. Battery, SIM card & defect sensor change 30
6.1.1. Opening the logger 30
6.1.2. Internal check and cleaning 31
6.1.3. Sensor replacement 31
6.1.4. Battery replacement 31
6.1.5. SIM card change 32
6.1.6. O-ring change 33
6.2. Troubleshooting 34

7. Disposal 35
7.1. What to recycle? 35
7.2. Disassembing the product 35
7.3. What are the steps to separate each element of the product? 36

Chapitre 1. Document informations

1.1. Context

The measuring device was designed and manufactured in line with the latest technological advancements and complies with the requirements as laid down in existing European and national guidelines. Conformity has been proved, and the relevant declarations and documents are in the possession of the manufacturer. As the user, you must read and adhere to the following safety instructions to ensure that this condition is maintained and that no danger results from the use of this device.

1.2. Symbols used in the document

This symbol indicates a situation or use that could lead to damage, fault or malfunction of the product.

This symbol indicates additional information useful for understanding and using the product correctly.

This symbol indicates a prerequisite for carrying out a procedure.

1.3. Sticker description

The sticker on the product shows:

- the CE marking and EU compliance,
- name and logo of the company: “FAST GmbH”
- name of the product: “BiDi LTE Acoustic”
- the address of manufacturer
- the date of manufacturing
  - The date code is MM-YYYY (month and year)
- the product assigned unique serial number
  - The code is the following F 0070 26 00123
  - translated (F for FAST, 0070 for product family, 26 for year of production, and 5 digits for the unique serial number in actual year of production
- the product assigned code for the near-field interface (BLE)
  - all communication are encryption AES 128
  - all keys are unique per serial number
  - The key can be scanned and decoded with a smartphone.

- The serial number is a barecode format.
  - It is intended to automate scanning in production, reception and shipping.
- Indicator in orange logo to identify the position of the magnet detection
  - “Wake me up” symbol help to locate where to position the magnet
- Indicator at the bottom of the sticker for twist direction
  - For opening / closing the product intended for battery and SIM card change.

Serial number:

Unique product identifier

Barcode:

Scannable version of the serial number for asset management

"Wake me up" symbol:

Marks the exact spot for magnet activation

QR Code:

contains unique security info for local Blue tooth (BLE) access

Manufacturing date:

MM-YYYY-FORMAT

Chapitre 2. Safety

2.1. General instructions

Read this manual carefully and completely before you use the device for the first time. Damages or injuries caused by non- observance of the manual are excluded from our liability and not covered by our warranty.

- During transport, ensure that the individual loggers do not have any physical contact with each other. Keep the products inside the original cardboard box provided by **FAST GmbH**.
- Prevent any activation of the production during transport / storage: set your product in 'transport mode' using the procedure written in this document; this will prevent undesired enforced data transmission, and it will limit unnecessary communication during these phases; it saves energy on your battery and extends the battery lifetime.
- Ensure the product is stored and positioned in the water pit with the attached antenna in vertical position; it places the product with the positive pole of the battery in a vertical up-right position, which helps to extend the battery lifetime.
- The device must be only used as described in the instruction manual.
- Each setting directly affects the battery lifetime! Take this fact into consideration when you apply more energy-consuming settings such as extended transmission times or shorter transmission intervals.
- Use only the opening/closing tool provided by [FAST GmbH]. To avoid any cosmetic damage on the housing, on the label, on the protective sleeve, do not use alternative tools.
- Do not use any cleaning chemical solvent or liquid; you may clean your product with only clear water.
- Do not apply excessive force onto any surface of the product.
- Do not bend the antenna, nor bend excessively the optional antenna cable extension – keep a radius of 8 cm on cable.
- Do not scratch with sharp material or abrasive material the label.
- Do not use the product outside its intended primary function: water leak detection. The noise logger can be misused for recording audio, and it may infringe with any privacy regulation. Liability for damages resulting from misuse and disclaim all warranties unless required by law.
- This product contains non-rechargeable lithium battery. Please handle and dispose battery appropriately according to your local regulations.
- Use caution when working with and using lithium-ion batteries as they are very sensitive to charging characteristics and may explode, burn, or cause a fire if misused or mishandled. Always charge in or on a fire-proof surface. Never leave batteries charging unattended.

- The battery is classified as Miscellaneous Dangerous Goods (Class9 as per UN3090), encompassing lithium-metal (non-rechargeable) batteries due to risks like thermal runaway and fire. Ensure you have copy of the Material Safety Data Sheet for the Saft LSH14.

- Do not pressure wash your product, do not apply excessive direct water jets onto the product. This product is not IP69 rating, it is suited to permanent immerged location (IP68).

2.1.1. Instructions for preventing reasonably foreseeable misuse according to EN 62368-1 Annex M.10

CAUTION! Risk of explosion if the battery is replaced by an incorrect type. Use only SAFT LSH14 Batteries

CAUTION! Failure to observe the safety instructions can result in fire, electric shock and other injuries or damage to the product or other property. The housing is made of plastic with sensitive electronic components and batteries inside.

Do not pierce, break, crush or cut the device or the battery!

- Do not expose the product or the battery to an open flame or extremely high temperatures!
- Do not expose the product or the battery to liquids or extremely low air pressure!
- Do not drop the product or the battery!
- Do not try to change or charge the battery in the product!
- The device or the battery must be recycled or disposed of separately from household waste!

Disposal and WEEE compliance

*The crossed-out wheeled bin symbol indicates that this device **must not** be disposed of in the household waste. Old appliances may contain hazardous substances that could damage the environment or your health. Old appliances are recycled; they contain valuable raw materials that can be reused. At the end of its service life, please dispose of this product at a designated collection point (e.g., municipal recycling center or a local retailer).*

2.2. EU compliance and norms

- Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)
- Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE)
- Directive (EU) 2020/2184 of the European Parliament and of the Council of 16 December 2020 on the quality of water intended for human consumption
- Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)
- Regulation (EU) 2017/821 of the European Parliament and of the Council of 17 May 2017 laying down supply chain due diligence obligations for Union importers of tin, tantalum and tungsten, their ores, and gold originating from conflict-affected and high-risk areas
- Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators and waste batteries and accumulators
- Regulation (EU) 2024/1781 of the European Parliament and of the Council of 13 June 2024 establishing a framework for the setting of eco-design requirements for sustainable products
- Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment

2.3. Maintenance Safety Waning

2.3.1. Safety Instructions for Maintenance Personnel

CAUTION: Radio Frequency (RF) exposure !

This device contains an LTE-M cellular transmitter (23 dBm max) and a BLE transmitter (1 dBm max). To ensure compliance with the health and safety requirements of Directive 2014/53/EU (Article 3.1a), maintenance personnel must adhere to the following:

- **Safe Distance**: Maintain a minimum separation distance of 20 cm between the device antenna and any part of the body during active transmission.
- **Confined Space Entry**: When entering the water pit for extended maintenance, it is recommended to power down the device or disable transmissions via the software interface to eliminate RF exposure in the enclosed environment.
- **Antenna Integrity**: Do not operate the device if the antenna or the enclosure shows signs of physical damage or water ingress, as this may affect the safety shielding or electrical insulation
- **Battery Handling**: This device contains a high-capacity Lithium battery. If the pit has been flooded, inspect the unit for swelling or heat before handling. Only replace with manufacturer-approved battery packs certified to EN 62133-2

Chapitre 3. Description

3.1. Intended use

The use of the **BiDi LTE Noise Logger** is a noise monitoring device intended for the drinkable water distribution system. This logger is being attached to the valves, hydrants or in manholes and the audio recording being conducted usually during night-time. It's also called a monitoring system with multi-functional properties, which determines also in pre-locating and with correlation functions. The data recorded are transmitted to the cloud service named Watercloud. It is intended for use in water network; the cities' water suppliers and office of management of water is the final user. The product shall be attached to water pipe to detect potential leakage.

The product is installed underground in a manhole, water pit. The product uses its internal sensors to monitor, record and log the sound and vibration detected on the water pipe or devices attached to the pipe (valve). The outcome of the measurement and monitoring is transmitted to the **FAST GmbH** cloud server. The usage is exclusively industrial and for water leak identification.

FAST GmbH is not liable for any damage by misuse and/or improper operation, and as a result of non-compliance with the safety instruction and warning.

The BiDi LTE Noise Logger has the four principal functionalities in its name :

- **BiDi**: this is a device which is integrated in the eco-system of the existing noise logger family from FAST.
- **LTE**: this is a device with primary remote communication over fixed network driven by third-party operator.
- **Noise**: this is an acoustic-base sensor.
- **Logger**: this is a device with extended data-logging capabilities.

3.2. Operating mode

Besides recording the audio, the product has also some build-in logging functionalities. This allows to retrieve the data recorded (audio, signal, alarm, event, change of parameter, ...) over a longer period.

The product is a one-piece construction with no separated element; this allows a compact form for installation in confined space. The product is shipped from the factory with default parameters allowing an efficient (quick and easy) on-site activation; specific configurations are possible and on demand, these must be validated prior to deployment.

Taking the product from the box, using the magnet the product activates; the activation initiates the overnight measurement and the daily push of data to the cloud.

Additionally, the local interface is kept minimal with a magnet to interact with the product and 3-colours LED located on the top of the product next to the antenna;

- with this interface the change of configuration in the field is possible with no additional devices;
- with this interface the monitoring of the current status of the product is made easy without the need of additional devices.

The product is shipped calibrated to the lowest audio level from the factory. It is unlikely that the audio level is lower in field, therefore the product should record correct data from the very first usage.

If the product records a lower value, it will automatically calibrate again, and report to the [Watercloud] server a low-level value of 1. The noise level values are between 1 and 99, with a 1 being the lowest noise measured, and 99 being the most intense/loud noise.

The product has internally a calculated level that adjusts based on the previous lowest value recorded; the final reported value is a calculation based on the 21000 points of measure.

An BLE (Bluetooth low energy) interface is available on the product; it is a near-field interface allowing products analyse and configuration of the product. This interface is not promoted the primary use for field-application. This interface is intended for more experienced users and for factory.

3.3. Functioning of the Default configuration

Default configuration is:

- Daily measurement of noise levels for a period of 2 hours from 02:00am to 04:00am local time.
- Daily audio recording for a duration of 6 seconds at the end of the noise recording period (04:00am).
- Daily communication with **Watercloud** server with information transfer of the last 14 days; this ensures that the data is present in the server even after several days without any LTE network. This ensures continuity of the data available with no loss of information. The product provides a fully automated procedure to establish the initial connection to the server, and it has recovery mechanisms in cases of changes (new location, new operator, new SIM card).

The product connects to an LTE-M network based on the SIM card setting. It scans the available services from each operator and provides connectivity based on the settings written on the SIM card.

The configuration provides by FAST is a dual Radio Access Technologies (CatM1 and NB1/2); the product will find the most appropriate RAT network based on the available network and SIM card setting.

The modem prioritizes the CatM1 network over the NB1 network whenever it is available. The bandwidth limitation of the NB1 over the CatM1 must be considered for the use cases activated in the product.

If you choose to implement your SIM card in our product, it is highly recommended to engage with your network provider to get the appropriate settings to your need.

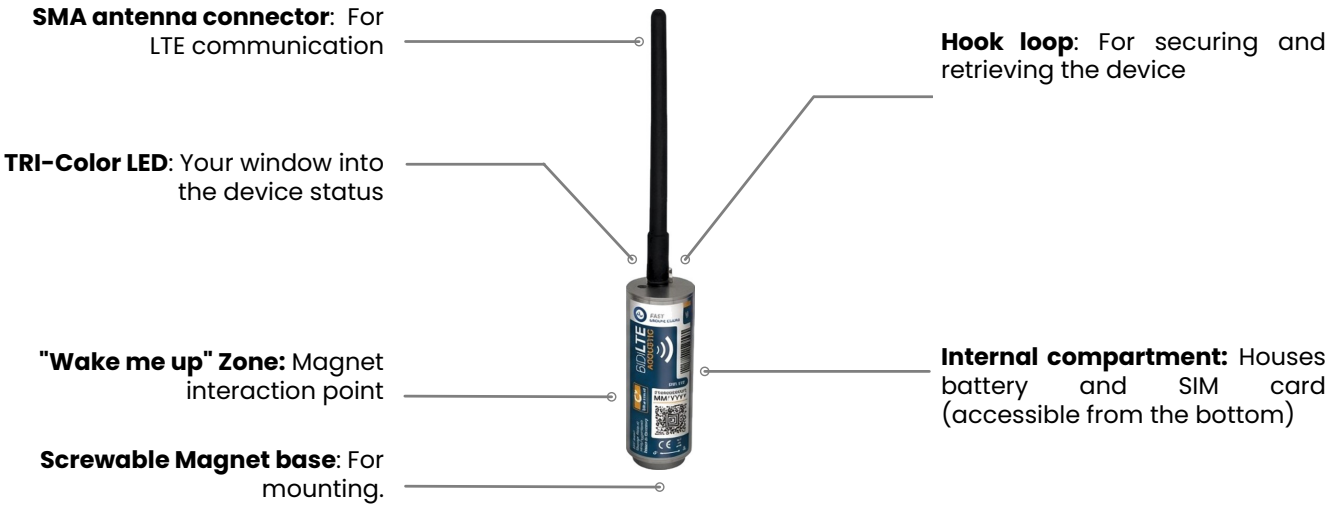
The LTE-M (CatM1 and NB1/2) do not provide mobility services as per the 3GPP standard; hence it is best suited to fixed-installation – on each network environment change, the protocol will restart its LTE-M link and configuration.

This is not an efficient process for the power consumption of the product, and it impacts directly the battery lifetime. It is recommended to keep such products for fixed installation.

Most of the configuration change can be managed remotely with the [Watercloud] server; the setting modification does not require a local visit for update; these can be programmed for the next windows of the communication programmed.

The BiDi LTE noise logger is part of an all-in-one solution with no repeaters, nor additional radio network devices needed for the installation. It uses the LTE-M network available to transfer the measured data.

3.4. Equipement composition



The Antenna connector has an SMA connector. It is expected to be a 50-ohm impedance. The antenna is multiband and covers all the LTE-M band listed below in this document. The antenna is detachable from the product, you should receive the antenna separated from the product to secure the transport (the weight of the product may damage the antenna during transport, it is recommended to disassemble the antenna when products are returned to FAST GmbH, and to use the original shipping box.

On the topside of the product, there is a window opening for the light of the LED. It is a 3 colors LED (red, green, blue); each function of the LED can be decoded using this manual (see the paragraph about decoding LED). The LED are blinking ONLY when the product is awakened, during the sleep mode the LED remains OFF.

There is a 6-mm hook loop on the top of the product allowing to attach a cable or an O-ring; this is useful to position the product in deep manhole and slowly position down the product onto its attachment on the water connection.

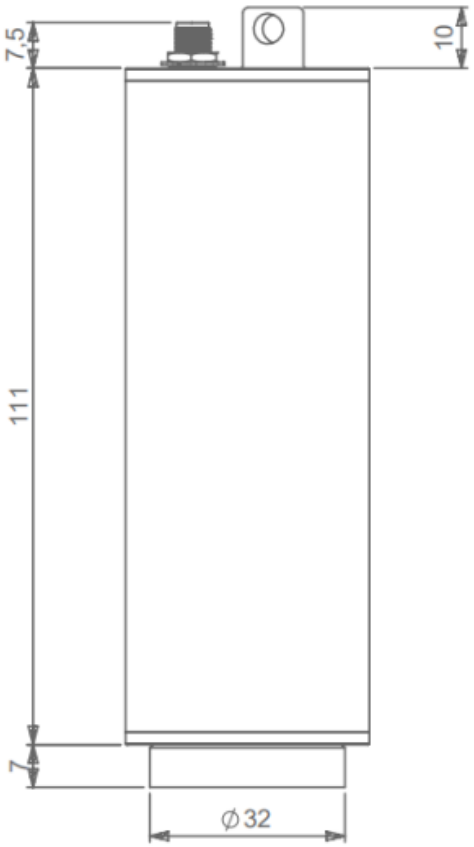
It is highly recommended to prevent drop higher than 1 meter as the shook may damage the product internal.

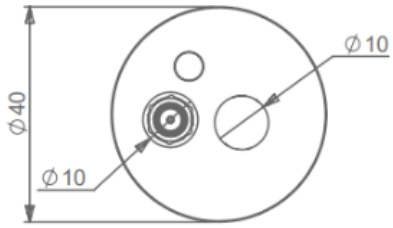
For quality and monitoring purposes, there is a detector inside the product that generates log whenever a drop or a shock has been recorded.

On the bottom side of the product, there is an 8-mm threaded hole to attach a magnet. The magnet is delivered mounted on the product, and it is replaceable in field.

The product can be opened from the bottom side (where the magnet is located). It is intended to have field replacement for the SIM card and/or the battery. The steps consist in removing the magnet from the body of the product (screwed in the counter clock direction) and using the opening tool sold/provided by FAST GmbH; the two locating holes on the bottom of the product are intended to position the tool and twist also counterclockwise to open the product. (Refer to *Battery, SIM card & defect sensor change*)

3.5. Overall dimensions





3.6. Technical characteristics

3.6.1. BIDI LOGGER

Dimension	Weight
Including magnet and antenna connector protrusion • Height 128 mm x Ø 40 mm: with regular version • Height 128 mm x Ø 44 mm: with protected sleeve version • Hook of Ø 5mm on the topside of the product to attach product	Without antenna + protective sleeve • 508 g with magnet, • 466 g without magnet

Power supply	
• Internal Li-Ion battery • Field replaceable • Nominal voltage: 3.6 Volts • Technology: Li-SOCl2 (lithium thionyl chloride) • Size: cylindrical C-cell 49.8 +/-0.6 mm length x 25.8 +/-0.2 diameter • Type: Saft LSH14	• Nominal capacity: 5.8 A.h • Max. current pulse capability: 2A • Max. continuous current capability: 1.3A • + symbol marked on cell to indicate polarity • Information from manufacturer: https://saft4u.saft.com/en/product/ls-lsh-lsp

Operating Time
- > 5 years in nominal operation without battery replacement - > 9 years on SIM card activation – network access and data package of 500 MB - > 15 years on mechanical parts – corrosion / deformation - > 5 years on sealing O-ring – those must be replaced upon each maintenance operation - > 2 min on date and time retention without battery, allowing field-replacement of the battery without reconfiguration of the product. - > 3 years data retention on saved configuration and log information

IP Protection class	Housing
IP 68 (> 6 weeks fully immerged under 1.5 m of water) with no water ingress, no noticeable humidity increased. Suitable for usage in immerged location	Stainless steel

Temperature and humidity condition	
Operating condition (product closed and sealed)	• -20°C ... +70°C • Variation of 5 °C per hour max. • 95% humidity constant max.
Storage condition (product closed and sealed)	• Period of 3 months max. • with 'Transport mode` activated (non-functional product) • -30°C ... +70°C • Variation of 5 °C per hour max. • 85% humidity constant max.
Transport condition (product closed and sealed in its original packaging)	• Period of 2 weeks max. • with 'Transport mode` activated (non-functional product – ensure compliance with Radio regulation) • -30°C ... +70°C • Variation of 10 °C per hour max for 4 consecutive times max • 95% humidity constant max.

Attachment type	**Strong magnet** • Removable / replaceable: M6 thread to attach to logger body • Shape: round disk • Type: neodymium magnet (NdFeB) • Diameter between 32 and 38 mm • Height between 6-8mm • Above 20 kg tractive force • Permanent magnetic field • Remanence exceeding 1.2 Tesla

3.6.2. Communication & use

Communication	• 3 colours LED (red, blue, green) for human interface locally on product
	• **Near field communication**
	  • BLE (Bluetooth low energy 5.1) for data transfer
	  • Internal antenna over frequency band 2.4 GHz
	• Far-field fixed network communication
	  • LTE-M over Radio Access Technology Cat-M1 and NB1/2
	  • cellular bands operated 1,2,3,4,5,8,12,13,18,19,20,25,26,28,66,71,85
	  • important operator's band for EU: 8 (900 MHz) and 20 (800 MHz)
	  • multi regions for Cat-M1 and NB1/2 half-duplex
	  • compatible with 3GPP Release 14
	• SIM card: mvno from 1NCE
	  • network coverage: https://www.1nce.com/en-eu/1nce-connect/coverage
	  • 10 years of service build in package
	  • 500 MB of data in build package: average of 136kBytes of daily data
	  • Multimode Compatible - Multi Bearer Support
	  • 4FFF (nano SIM) format
	• No 2G/3G fallback

Protocol LTE and architecture	• Time sync over NTP • Data transfer over HTTP • Security and encryption over LTE and BLE: AES128 Record of the last RSSI level (value is dynamic during the comm and dependant of the network load); values are between 0 (poor) and 34 (high), and 255 is no-network

Configuration	
Zero-touch product	• Preconfigured in factory upon user' specification (subject to approval) • Pre-mounted and activated SIM card (provided by FAST GmbH) • Possible third-party SIM card upon user' specification (subject to approval) • Register and connect to [Watercloud] upon product activation
Locally	• Through tablet or smartphone over BLE
Remote	• Cloud-based using [Watercloud] interface

Range of use	
Usable as	• Regular noise logger • Correlating noise logger • Network noise logger
Operational modes	• Permanent (preferred) • Lift-n-shift

3.6.3. Antenna

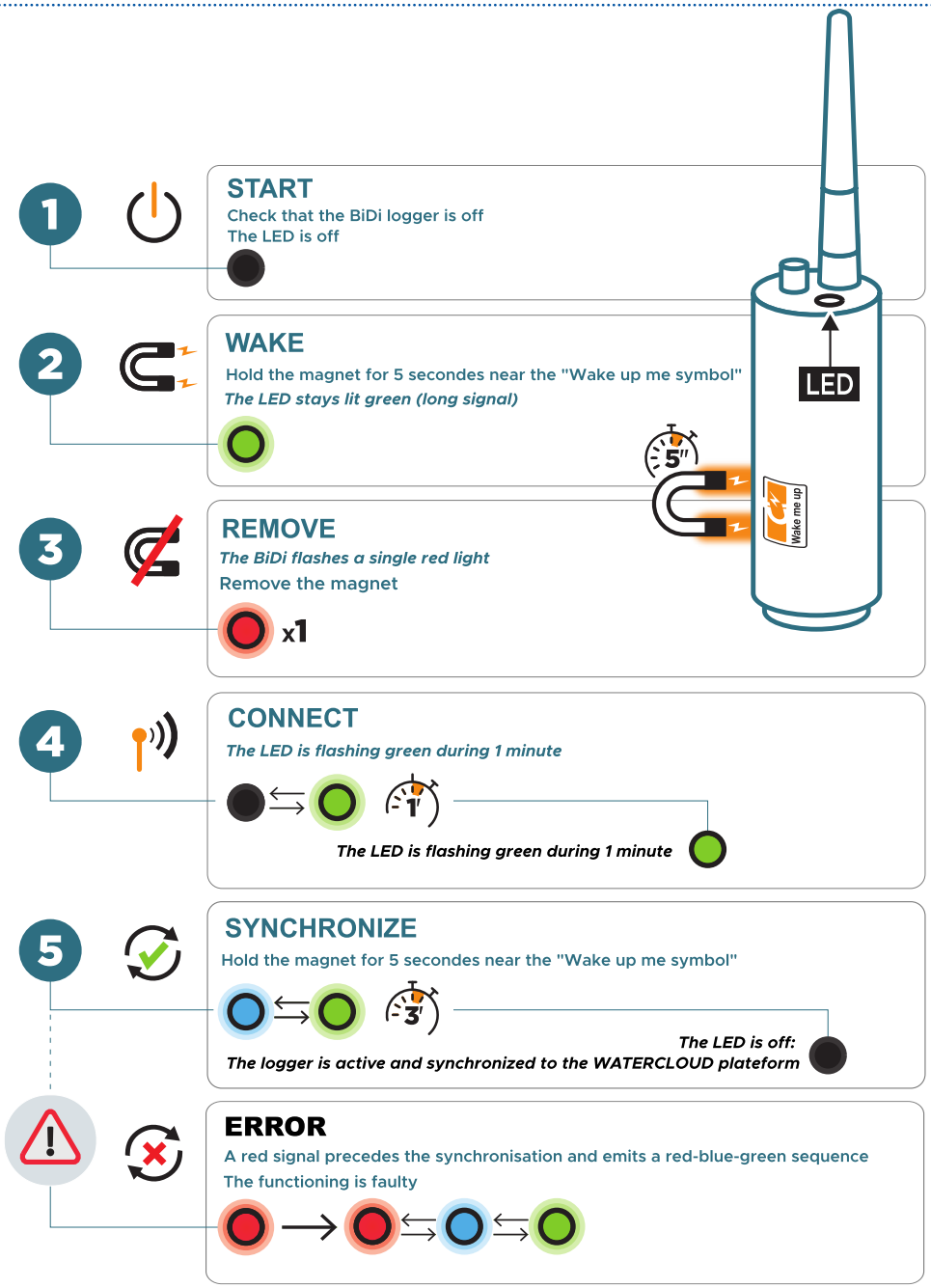
Antenna	External antenna LTE-M for CatM1 and NB1/2 networks. • Quad bands, with focus on lower bands 800-900 MHz for RF efficiency • Remote antenna installation is possible with cable extension • Connector type: sma

3.6.4. Sensor

Acoustic audio 5 Hz to 5000 Hz	• Sampling rate at 4000 Hz • Field replaceable if damaged
Temperature	• Recorded at the time of measure acoustic • -25 to 75 deg. C
Humidity	• Recorded at the time of measure acoustic • 0 to 99% relative humidity
3D motion/vibration	• Recorded at the time of measure acoustic • Detection of position change to 1 deg on all axes (x-y-z)
Reed contact	• Always active external magnet detection
Sensor Logs and Records	• Last 14 days stored levels • Levels are values between 1 and 99 • Log param change / event / alarm – last 100 items, rolling log with time stamp • Recall capability of the 500 days of audio levels (rolling log) • Audio level measure count configurable (default 2 hours period) • Audio raw wave file format save daily (default 6-sec long) • 16-bits quality, 4kHz sampling

Chapitre 4. Getting started

4.1. Commissioning - LTE connection and synchronisation to watercloud



- Refer to *LED flashing cycle* section for more information about LED cycle signification.

4.2. Logger functioning modes

The Bidi logger have two modes of functioning **Storage mode** and **Field mode**.

- The **Storage mode** is useful to transport and store the product. The communication is not working and the product is disabled to preserve his battery.
- The **Filed mode** is the mode when the product is listening to the water flow and communicating to Watercloud.

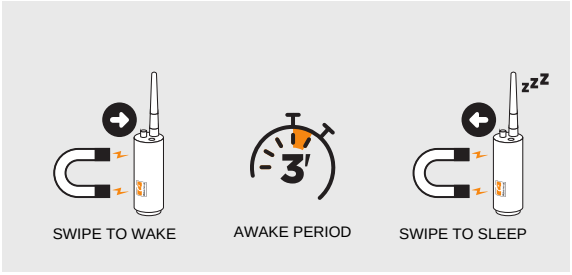
In each functioning mode, the logger can be awakened in order to check the global status of the logger via a LED blinking cyle.

Storage mode **(Storage / Transport)**	**Field mode** **(Deployed on field)**
Transport or storage mode All measurement and communication functions are disabled. Designed for maximum battery preservation. *LED blinking*  **2 long pulses** Hibernate mode Device is in a low-power state 	The standard operational mode for field use. The device will measure, record, and communicate on its progammed schedule. Consumes power as per its configuration. *LED blinking*  **1 short pulse (60ms)** Normal mode (heartbeat enabled) Device is active 

4.3. Displaying the functioning mode & connection status with the LED

The LED status give information about data information and details on the current mode, connectivity and signal on the Bidi logger. To active the LED blinking cycle, the logger must be awakened :

- Place the magnet near the wake me up icon for 2 seconds long.



This action will wake up the logger whatever it is in *Storage* mode or *Transport* mode.

-> *A 3 minutes LED cycles starts.* (see *LED status cycle* for more information)

Field mode	Transport mode
-> One short green pulse	-> Two long green pulses

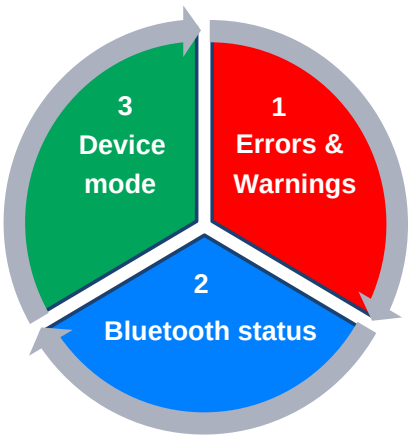
After the 3 minutes LED cycles, the logger goes back automatically into sleep.

During the awaking period, the logger can be put back to sleep by holding the magnet near the wake me up icon for 2 seconds long.

4.3.1. LED blinking cycle

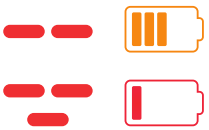
The full status is shown in a repeating sequence from RED->BLUE->GREEN. There is a pause between each group of LED blinks.

If the product is in the *Storage* mode, the communication is disabled, red LED might blink due to lack of communication with is normal.


3
Device
mode
1
Errors &
Warnings
2
Bluetooth status

Red: Alarm status

Long pulses: Battery status



2 long pulses for battery low, do plan a replacement – about 2-3 months left before the end-of-life of the battery

3 long pulses for battery critical level, replace **immediately** – the function are no longer guaranteed, and swap with new battery to prevent data loss.

Short pulses: LTE connection errors

Nb of Pulses	Icon	Error Type	What to do
		LTE connection failed	• Check network coverage
		Cloud error	• Check server status
		No network	• Move to area with better signal
		No SIM card	• Check SIM card is inserted properly
		No data configuration	• Configure device APN setting
		Authentification failed	• Check device credentials
		Signal too weak (RSSI < 10 dBm)	• Move to better signal area, check antenna

Blue: Bluetooth status

• Disabled and disconnected

• BLE is enabled and not connected to any master device

• BLE is enabled and connected

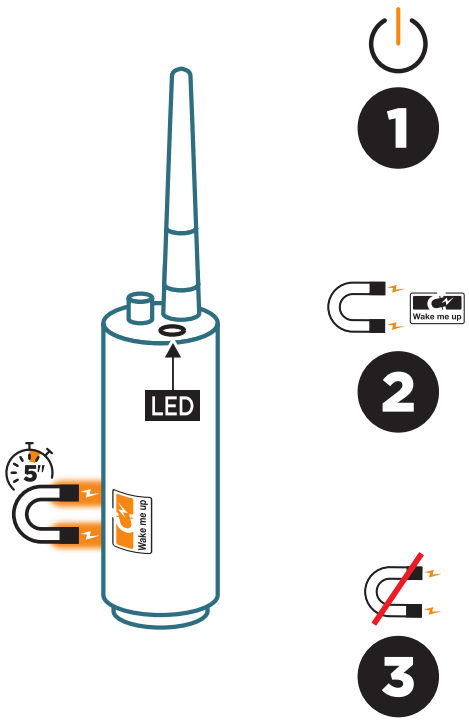
Green: Device mode status

- 1 short pulse = *Field* mode
  - The product is enabled.

- 2 long pulses = *Storage* mode
  - The product hibernates for storage/transport.

4.4. Changing the logger functioning mode

4.4.1. Switching from transport to field mode



1. **START**: Ensure that the device is sleeping (LED is off). If not, put the product back to sleep with a single swipe of magnet.
2. **WAKE**: Place the magnet directly on the "Wake me up" symbol and Keep the magnet in place for at least 5 seconds.
3. **RELEASE**: Continue holding until the Green and Red LEDs toggle and remove the magnet. The device is now the field mode.

-> The LEDs will blink blue and green for 3 minutes.

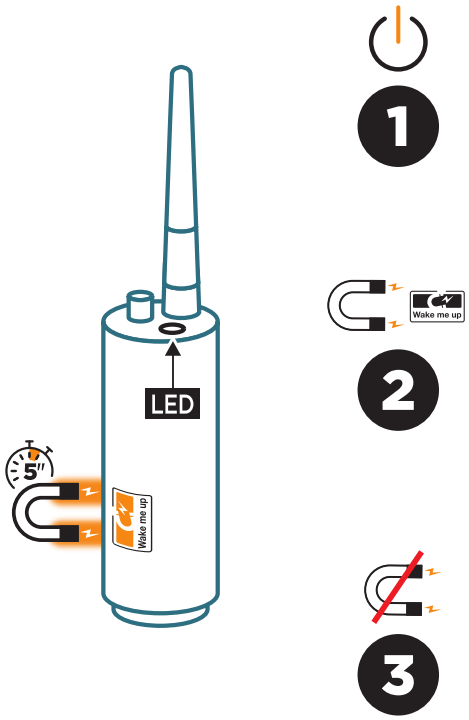
-> The device will then attempt a connection to WaterCloud to ensure that the the connectivity is working at the point of installation.

After the 3 minutes LED blinking cycles, the logger goes back automatically into sleep.

4.4.2. Switching From field to transport mode

When unused and during transport, the product shall be placed in `transport mode`: The measurement and the communication functions are disabled. It is highly recommended to place the product is `transport mode` to save battery consumption.

To return in transport mode:



1. **START**: Ensure that the device is sleeping (LED is off). If not, put the product back to sleep with a single swipe of magnet.
2. **WAKE**: Place the magnet directly on the "Wake me up" symbol and Keep the magnet in place for at least 5 seconds.
3. **RELEASE**: Continue holding until the Green and Red LEDs toggle and remove the magnet. The device is now in the *storage* mode

-> *A 3 minutes LED blinking cycles starts.* (see *LED status cycle* for more information)

After the 3 minutes LED blinking cycles, the logger goes back automatically into sleep.

4.5. Forcing data transmission

Basically, to force data transmission, you need to ensure the product is in *Storage* mode and then put the product in *field* mode: Upon a device mode change from *Storage* to *field* mode the product initiates a first connection with the cloud service automatically. This process can be repeated several times.

- If the product is in the *Storage* mode, refer to *Switching from transport to field mode*.
- If the product is in the *field* mode, refer to *Switching from transport to field mode*.

4.6. Installation

4.6.1. Precautions and recommandations

- Comply with your local safety regulation during installation.
- Use appropriate protective equipment (helmet, glove, visibility vest…) aligned with your local regulations.
- Use protective equipment to prevent cut from any sharp edges.

The **BiDi LTE Logger** attaches externally to water pipes via the integrated magnet located on its base. For optimal performance, position the logger on a metallic connector—such as a coupling, valve, or flange—that is an active component of the pipe system. This ensures accurate detection of internal pipe acoustics. It is preferred to have the product installed vertically. It is preferred to have the bottom attachment magnet fully covered to the metal surface in contact (and not partially). In some conditions, it is recommended to use and 90 degrees adaptors between the body of the product and the magnet position.

4.6.2. Installing the antenna

The **BiDi LTE Logger** is delivered with an antenna.

- Do not change the antenna with another model unless one approved by FAST GmbH.
- For optimal performance, it is recommended to use only the antenna tested and provided by FAST GmbH.
- Inspect carefully your antenna connectors on the body of the product, on the antenna rod, and eventually on the cable extension : the connector and its internal must be free of any contaminants and it must be free of any water; any water ingress in any contact points between the product and the tip of the antenna is affecting the performance of the product.
- Pay attention during any 'cleaning' to use non-abrasive element, and do not damage the threads or electrical contact point.
- Do not connect the **BiDi LTE Logger** to any other equipment on any point of the product (body or antenna connector) as it may damage the equipment – the **BiDi LTE Logger** is always powered ON and a possible source of energy may conflict.

- To ensure the optimal performance of the antenna, follow these following sections.

Positioning

- **Height**: Mount the antenna as high as possible, ideally near ground level or above obstructions.

  Position the antenna at the highest feasible point, ideally near ground level.

- Position the antenna vertically, with the tip pointing upward for optimal signal propagation.

- Mount the antenna vertically, with the tip directed upward.
- For best results, center it beneath the chamber cover.
- If the cover features a metallic perimeter, ensure a clearance of at least a dozen centimetre from the edge.

Distance from obstructions

- **Horizontal Clearance**: Maintain a minimum distance of dozen centimetre from metallic surfaces, such as chamber walls. (e.g., chamber walls, metal covers).
- **Volume of Air**: Ensure the antenna has a clear volume of air around it to resonate properly. Avoid confined spaces or proximity to obstacles, as this can degrade performance.

Interference electromagnetic

- To avoid Interference, keep the antenna away from sources of electromagnetic interference, such as power lines, motors, or other electronic devices.

Cable and Connector

- Minimize signal attenuation by checking the integrity of your cable and connectors.
- Ensure all connectors are properly tightened and free from water.

Resonance Volume

The antenna requires a clear volume of air around it to resonate properly.

- Avoid placing the antenna in confined spaces, such as a water pit, without sufficient clearance from obstacles. Inadequate air volume will result in reduced performance.

The product was successfully tested with 2 meters deep water pit and with a metal cover; when there is a sufficient LTE-M signal coverage, it is recommended :

- To install the product without antenna extension; conversely if you notice a lack of connectivity, you may bring the antenna horizontally toward the top of the metal cover.
- In last resort, drill a hole on the armed-water-pit may help on the connectivity.

Chapitre 5. Storage and transport

5.1. Transport mode

When unused and during transport, the product shall be placed in `Transport mode`: The measurement and the communication functions are disabled. It is highly recommended to place the product is `Storage mode` to save battery consumption.

- Refer to *Changing the logger functioning mode* .

5.2. Avoiding unintentional wake up

The product has an internal magnetic field detector; it is primarily used for product activation. It is likely that during the transport or maintenance of the product (or even several product) that a magnet come in contact with the body of any logger. At this point, it is highly recommended to monitor such event and put prevention measures in places to ensure that the product does not wake up unintentional.

- Use the original shipping box would ensure that the products are properly stored and shipped.
- Place all the product vertical on the shelf would also ensure that no magnet come close to the body of the logger.

Finally, the product will not function properly if a magnetic field or magnetic material are near the final installation. The product has a build in sensor that will report an alarm in case of such situation; upon reception of the alarm in the cloud server, it is mandatory to take corrective actions.

Chapitre 6. Maintenance

To keep the integrity of the product sealed, the O-ring must be change EACH TIME an opening/close maintenance operation. See *O-ring change* .

6.1. Battery, SIM card & defect sensor change

The SIM card and the battery can be replaced on the field using a 2-pin key.

BiDi logger with its 2-pin key

6.1.1. Opening the logger

The operation requires the opening of the bottom side of the product with a 2-pin key provided by **FAST GmbH**.

- Remove the magnet from the body of the product: unscrew the magnet from the bottom turning counterclockwise.
- Insert the key in the two-pin holes on the product and turn also counterclockwise to separate the product socle from the product body.

Once you have separate the sensor from the body of the product, you have to shutdown the product (no operation and no additional safety electrical risk). The battery is properly separated and no short-circuit may happen.

The clock is maintained without battery for 2 minutes. It is useful to prevent date and time loss during battery change; hence no need to additional tool to reset the clock on the product.

6.1.2. Internal check and cleaning

Pay attention during any 'cleaning' to use non-abrasive element, and do not damage the threads or electrical contact point.

6.1.3. Sensor replacement

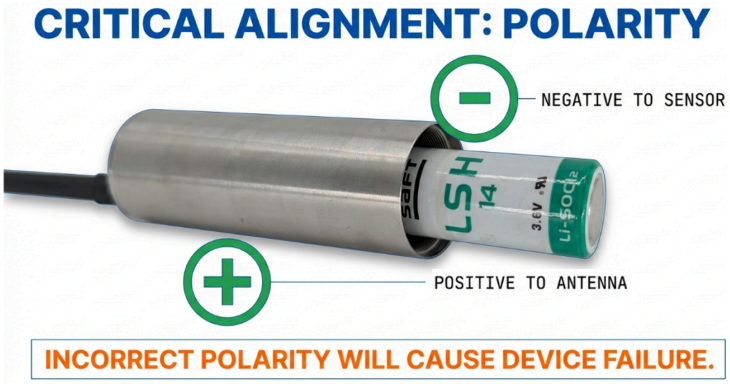
The sensor can be changed with a new sensor if a defect is identified: the positive pole of the sensor is identified with the body weight of the sensor (cylindrical heavy part), and the negative pole of the sensor is identified with the screw on top of the sensor.

There shall be no short-circuit between these two points, the control can be simply conducted with a multi-meter in impedance mode.

6.1.4. Battery replacement

CAUTIION ! Incorrect polarity will cause device failure.

The battery must have always the positive pole UP. On the Saft LSH14, the negative pole is identified by the green label with Li-SOCl2 mark, and the positive pole is identified by the + sign need the 'saft' mark.



It is critical to prevent any damage to insert:

- Any battery with model Saft LSH14 only.
- Any battery with the positive pole facing UP (in direction of antenna), and the negative pole in direction of the weight of the sensor.

6.1.5. SIM card change

From the outside, with a opened product (bottom sensor removed from the body of the product), you should see the following elements:

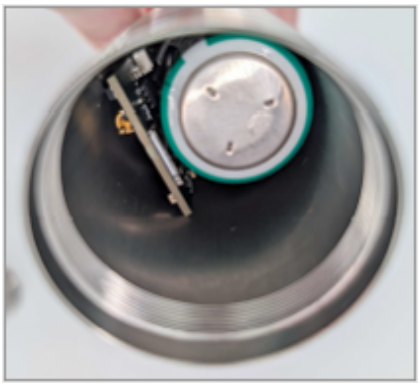
- A plastic battery holder,
- An attached PCBA,
- A SIM card inserted in the nano SIM connector onto the PCBA.

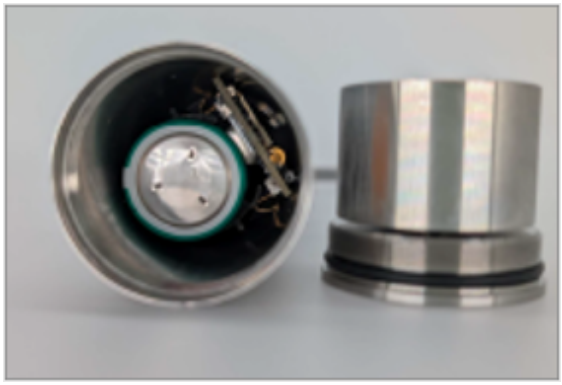
Do not apply excessive force, nor use sharp tool, use your fingers should be sufficient.

The SIM card connector is a push-pull mechanism: to remove or insert a SIM card:

- Push the card until the haptic click, then slowly retracted.
- To confirm that the sim card is properly positioned, it should not be possible to pull (and remove) the sim card; first a newly push motion is required (until the haptic click), and then slowly retract.

The gold-contacts of the SIM card are facing the PCBA side, the plastic part of the SIM card with the barecode and other identification information is facing the battery side. The connector on the PCBA is a nano SIM compatible and it is keyed – meaning that it prevents wrong insertion, provided that the force applied is similar to the force used for inserting a SIM card into a smartphone.





6.1.6. O-ring change

DO NOT REUSE OLD O-RINGS !

To keep the integrity of the product sealed, the O-ring must be change EACH TIME an opening/close maintenance operation. See *O-ring change* .

- Change the O-ring upon any opening/close maintenance operation :
  - When battery is replaced.
  - When SIM card is swapped.
- Close the product back together.

Ensure that the sensor is back in its fully seated position with no airgap.

- Engage fine-pitch threads carefully.
- Screw the sensor to end position.
- Ensure that the sensor does not turn further.

6.2. Troubleshooting

Refer to the LED blinking cycle paragraph *LED blinking cycle*.

Chapitre 7. Disposal

This chapter deals with compliance with the eco-design requirements from manufacturer to the end-user (EN14001). This page includes the disassembly method and the tools required to separate and dispose of each element of the product.

7.1. What to recycle?

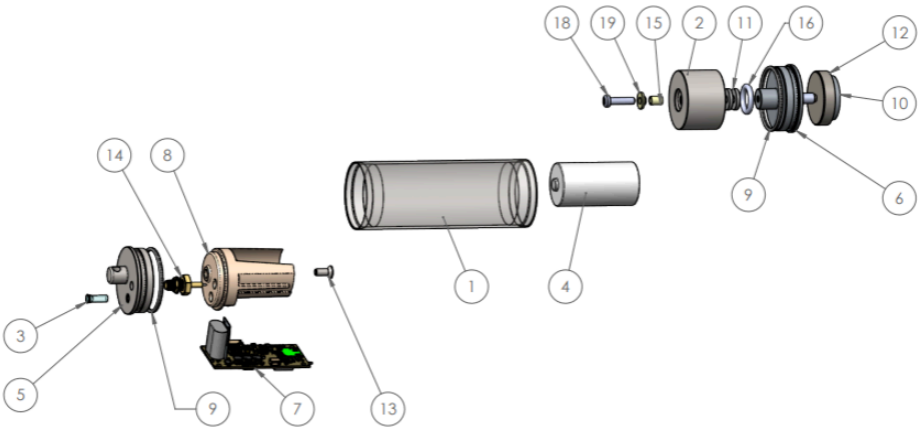
Following parts can be recycle :

- Paper and cardboard from shipping materials
- Metal, screw (5, 1, 13, 18, 2, 9, 10, 6, 12)
- Plastic (3, 8, 9, 11, 15, 16, 19)
- Battery (4)
- PCB, antenna, cable (7,14)

7.2. Disassembing the product

Separation is possible with screw drive

Opening tool from FAST GmbH: FAST.ACS-TOO-00054



7.3. What are the steps to separate each element of the product?

- Unscrew the magnet.
- Unscrew the bottom sensor.
- Unscrew the top lid.
- Separate the battery and discard it.
- Disconnect antenna.
- Separate the PCB and discard it.
- Remove the gasket and the O-ring (6,9).
- Unscrew the battery holder, separate and discard it.
- Cut the antenna cable, discard it with PCB.
- Unscrew the sensor (screw 18) and discard all metal parts.