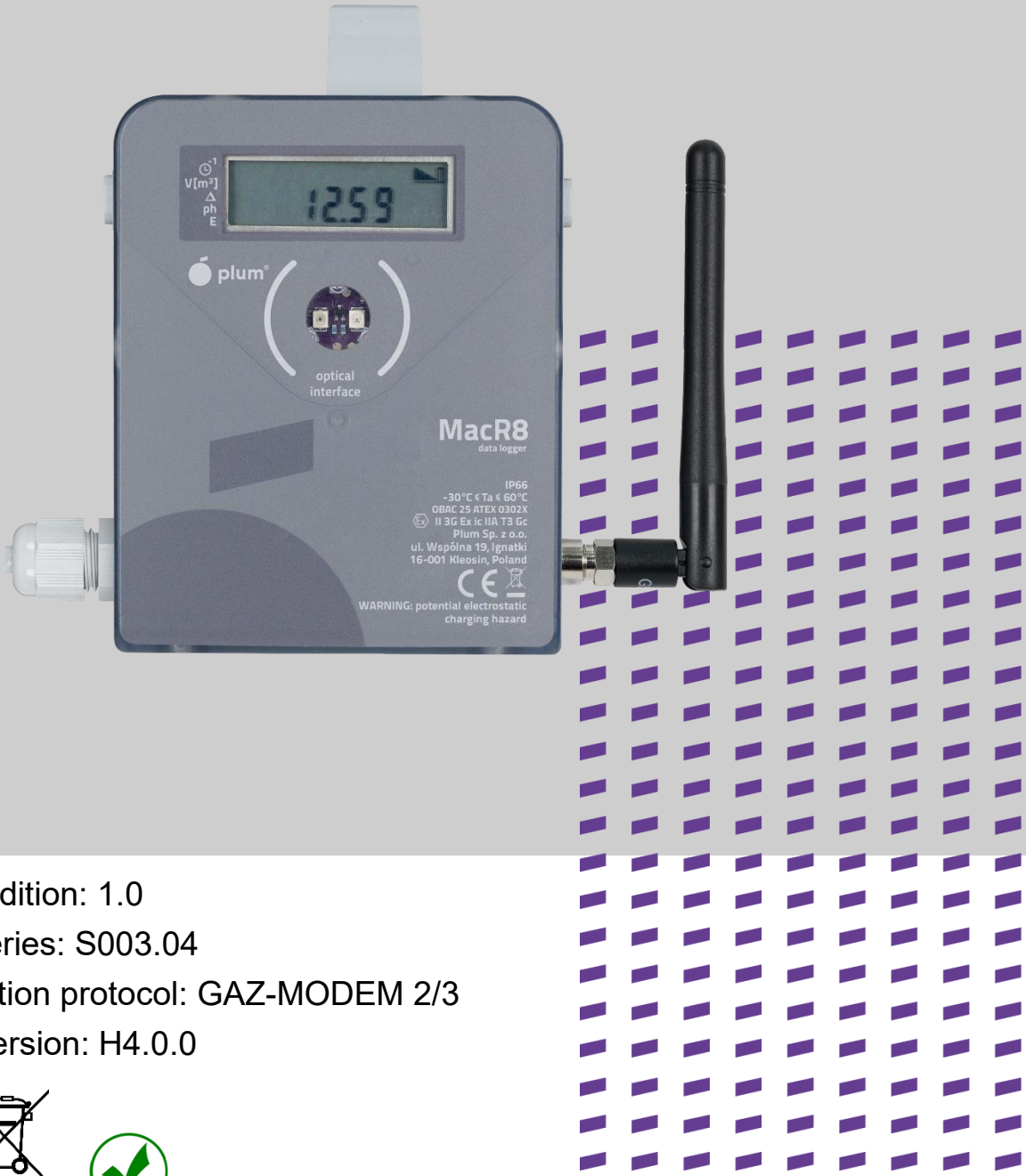
plum GAS

MacR8-IoT

Data logger

for gas meters

user manual



Document edition: 1.0

Firmware series: S003.04

Communication protocol: GAZ-MODEM 2/3

Hardware version: H4.0.0

Table of content

1. Introduction and safety rules

Compliance with all safety information and operating instructions contained in this operating manual is a prerequisite for safe operation and correct use of the device. In addition, the applicable guidelines, standards, local accident prevention regulations and general safety regulations for the area of application of the device must be observed.

This manual is an integral part of the product and must be kept in the immediate vicinity of the device and always available to installation, service, maintenance and cleaning personnel. The graphic illustrations used in this manual serve as a visual representation of the processes described and are therefore not necessarily to scale and may differ from the actual design of the device.

Mainly used characters:

- This symbol indicates important information concerning safety or security*

- This symbol indicates information related to the use of the product or an important technical issue*

* The symbols used do not definitively determine the type of information.

Customer service:

For customer technical support regarding the installation or use of this product, please contact the manufacturer's technical support channel.

PLUM Service Department

Phone no.: +48 85 749 71 63

E-mail: support@plum.pl

Safety measures

This measuring device may only be operated by an operator who has been trained in accordance with the technical conditions, safety regulations and standards. Any other legal regulations and safety regulations applicable to special applications must be observed. Similar measures also apply to special applications. Similar measures also apply to the use of accessories.

The information contained in this manual does not constitute a legal obligation on the part of the manufacturer. The manufacturer reserves the right to make changes. Any changes to the manual or to the product itself may be made at any time without prior notice for the purpose of improvement.

ATEX, IECEx safety and health

This device is an intrinsically safe device ‘i’ designed for use in potentially explosive atmospheres in accordance with the ATEX Certificate. Please read all documentation carefully.

Radio equipment safety and health

The device is equipped with a built-in modem and is a radio device according to the RED Directive.

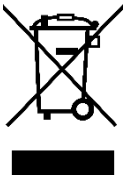
Directives:

ATEX - Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres.

RED - 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 and repealing Directive 1999/5/EC.

According to Directive WEEE 2012/19/EU:

The purchased product is designed and manufactured from the highest quality materials. The product complies with Directive 2012/19/EU of 4 July 2012 on waste electrical and electronic equipment (WEEE), in accordance with which it is marked with a crossed-out wheeled bin symbol (as shown below), indicating that the product is subject to separate collection.



Responsibilities after the end of the product's useful life:

- return the packaging and product to an appropriate recycling point at the end of their useful life,
- do not dispose of the product together with other unsorted waste,
- do not burn the product.

By complying with the obligations of controlled disposal of waste electrical and electronic equipment referred to above, you avoid harmful effects on the environment and human health.

1.1. Description of the device

MacR8-IoT (or alternatively MacR8) is a telemetric volume data logger designed to work with one or two gas meters with pulse outputs. The number of supported gas meters can be configured by the user. The data logger can count pulses from the gas meter transmitter via a pulse input on the internal terminal board or directly via magnetic coupling with the diaphragm gas meter counter. In both cases, it supports a measurement input and a control contact input (magnetic interference detection). Cooperation with two gas meters is only possible via the internal terminal board, and in this configuration the control contact is not supported. The data logger is powered by a built-in battery. It operates in licensed telecommunications networks working in NB-IoT or LTE-M standards, ensuring effective transmission of measurement data from difficult locations. The data logger uses the GAZ-MODEM 2 and GAZ-MODEM 3 transmission protocols. The device also allows remote software update using the UpIT! server.

The data logger also has an optical interface which ensures communication with the device in the GAZ-MODEM 2/3 standard. It allows you to read and modify device parameters and read logged data.

The data logger can be optionally equipped with one digital output DO (OD type – open drain). Data logger versions (number of inputs/outputs, antenna connection method, battery type) are marked with a 9-digit code located on the device's nameplate. Examples of versions are given in the chapter 1.3.

1.2. Simplified declaration of conformity

Plum Sp. z o.o. hereby declares that the MacR8 volume data logger complies with Directive 2014/53/EU. The full text of the Declaration of Conformity is available at: https://gas.plum.pl/en/product/macr8/

Direct link:

https://gas.plum.pl/wp-content/uploads/2025/12/MacR8_Z2_BG95_Declaration-of-conformity-gas_v1.0.pdf

1.3. Design variants

The hardware version code of the data logger is assigned by the manufacturer. The version code consists of 9 digits/letters, grouped in threes and separated by hyphens.

Hardware version code of the data logger: ABx_xxF_GxJ		
Position in the code	**Description**	**Available codes**
A	Available wireless communication module technologies	0 - NB-IoT / LTE-M / 2G (details in the technical data table, section 4.1)
B	Type of antenna	0 – internal antenna 1 – FME socket in logger housing for external antenna (default option)
F	Electrical digital inputs DI / Digital outputs DO	0 – none 2 – 2xDI (LF/TS), 1xDO, terminals board (default option) 3 – 2xDI (LF/TS), terminals board
G	Magneto-resistive inputs	0 – none 1 – direct mounting on Honeywell / Metrix gas meters
J	Communication protocol (remote)	0 – SMART-GAS (option, see section 10.2) 2 – GAZ-MODEM

Some of the options are mutually exclusive; for example, an internal antenna (B=0) excludes the possibility of using a terminal board (e.g. F=2).
The table provides examples of code designations for loggers.

Version code	Modem	Battery	Electrical inputs/outputs (wired connection)	Magneto-resistive inputs (direct connection)	Dedicated connection method to the gas meter	Antenna
011_002_100	NB-IoT/LTE-M/2G (EU/US)	FANSO ER34615H	2xDI(LF/TS), 1xDO, terminals board	Yes	Metrix, Honeywell, Itron (using an adapter), or the cable transmitter from gas meter mfr.	External
001_000_100	NB-IoT/LTE-M/2G (EU/US)	FANSO ER34615H	None	Yes	Metrix, Honeywell, Itron (using an adapter)	Internal
011_002_000	NB-IoT/LTE-M/2G (EU/US)	FANSO ER34615H	2xDI(LF/TS), 1xDO, terminals board	No	Itron (using an adapter), or the cable transmitter from gas meter mfr.	External
011_003_000	NB-IoT/LTE-M/2G (EU/US)	FANSO ER34615H	2xDI(LF/TS), terminals board	No	Itron (using an adapter), or the cable transmitter from gas meter mfr.	External

2. Safety

2.1. General safety

The MacR8 data logger is an explosion-proof device and can be installed in Zone 2 vapour and gas explosion hazard areas. Ex mark Ⓔx II 3G Ex ic IIA T3 Gc.
Installation in Zone 0 or 1 is not permitted.

Ambient temperature range in which the device can operate: -30°C≤Ta≤+60°C

This device can be operated: only by a trained person, according to technical requirements, regulations regarding safety and standards. It is necessary to consider all legal and safety regulations provided for special applications. Similar measures also apply to special applications and use of accessories.

The device may only be used in locations where the operating mobile network module does not interfere with the operation of other equipment (e.g. medical equipment).

Only MacR8 data logger with a dedicated factory-fitted adapter and a pulse transmitter installed in accordance with these instructions may be installed and operated in explosion hazard Zone 2.

To prevent the build-up of static electricity on the device casing, do not wipe the casing with a dry cloth.

The device is powered by a low-current Li-SOCl2 lithium thionyl chloride battery with a maximum short-circuit current of 1900mA, a nominal voltage of 3.6 V, maximum capacity of 20 Ah, size D, meeting the requirements of EN IEC 60079-0 and EN IEC 60079-11 standards.

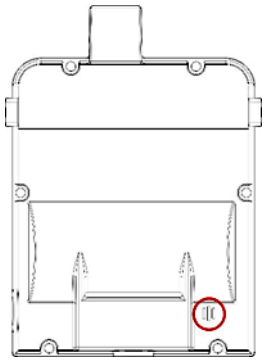
Only the following types and manufacturers of batteries should be used:
1) ER34615H, manufactured by Wuhan FANSO Technology Co., Ltd. (with a 70 mm cable terminated with PHR-2P plug)

There is a risk of explosion if the battery is replaced with an incorrect type. Battery replacement is possible in potentially explosive atmospheres. SIM card installation and connection of an external antenna cable are only permitted outside potentially explosive atmospheres.

For safety reasons, it is essential to read the following instructions before installing the device.

The enclosure provides dust resistance and protection against water ingress from a water jet, protection class IP66.

Do not cover the openings that allow the pressure inside the device to equalise with the ambient pressure.



2.2. Ex marking and parameters

Device is approved for usage in potentially explosive atmospheres.

Marking: Ex II 3G Ex ic IIA T3 Gc

Certificate: FTZÚ 14 ATEX 0037, OBAC 25 ATEX 0302X

Operating environment:

The device is approved for use in zone 2 explosion hazard areas: vapours, gases and explosive vapours mixed with air classified as explosion group IIA and temperature class T1, T2, T3.

The parameters of intrinsically safe terminals are given in the technical data table, section 4.1.

3. Cybersecurity

The MacR8-IoT data logger has a security system that prevents unauthorised third parties from accessing and changing its configuration. The security system complies with the GAZ-MODEM 3 communication protocol described in the ST-IGG-0207 standard ‘GAZ-MODEM 3 communication protocol’.

Any modification of the device configuration (local and remote) requires positive authentication and authorisation.

The device allows you to define a user password.

The security of the device's communication with the network is ensured by the implementation of an outgoing connection model. The device cannot function as a server and can only operate as a client, initiating connections only with servers with which communication is necessary for its operation (master system server collecting data, NTP time server, firmware update server – addresses are configured by the user) and does not accept any incoming connections from other directions. The adopted solution provides a higher level of security than a typical firewall, as it is not possible to communicate with the device from the outside.

By default, the built-in communication module is disabled, and its activation and connection to the mobile network occurs only according to the schedules set in it, so it is available on the network only for a specific time necessary to perform the planned activities.

4. Technical data

4.1. General data

Ex housing marking	II 3G Ex ic IIA T3 Gc
Certificate	FTZÚ 14 ATEX 0037 OBAC 25 ATEX 0302X
Approval for use	It is permissible to install the device in explosion hazard Zone 2 for gases classified as group IIA.
Special conditions for use in potentially explosive atmospheres	The device is designed for: installation in Zone 2 explosion hazard areas, use in locations with low exposure to mechanical impact in accordance with EN 60079-0. It is recommended to install it in a place where it will not be exposed to impacts, e.g. in cabinets, cages, etc. In order to prevent the build-up of electrostatic charges on the device housing, do not wipe the housing with a dry cloth.
Electrical digital inputs/outputs	Digital Inputs for pulses from the LF gas meter (DI1) and TS tamper switch (DI2) designed to work with potential-free contacts. Maximum length of the gas meter-data logger cable: 3 metres (other lengths available upon consultation with the manufacturer). One non-separated OD (open drain) digital output: DO1 (use of hourly increment limit or repetition of pulses from the gas meter to BMS systems). It is recommended to install the device in a place where it will not be exposed to impacts, e.g. in cabinets, cages, etc. In order to prevent the build-up of static electricity on the device housing, do not wipe the housing with a dry cloth.
Parameters of intrinsically safe terminals	pair of terminals (DI1, GND; DI2, GND) Ui=7,5 V, Li, Ci - insignificant; Uo=3,9 V, Io=175 µA, Lo=1 H, Co=1000 µF; pair of terminals (DO1, GND; DO2, GND) Ui=7,5 V, Li, Ci - insignificant; Uo=3,9 V, Io=27,37 mA, Lo=0,8 H, Co=1000 µF; L_o [mH] 100 50 20 5 2 1 0.5 0.2 0.1 0.05 0.02 0.01 C_o [µF] 36 40 46 59 71 84 100 140 190 290 760 1000
Magnetic inputs	A set of magneto-resistive sensors enabling pulse counting directly from BK and UG/GL diaphragm gas meters.
Built-in sensors	Housing cover opening sensor; magnetic intrusion sensor
Available wireless transmission technologies (first digit of the device version code, see section 1.3)	Module type: technologies LTE Cat.NB2 (NB-IoT) / LTE Cat.M1 (LTE-M) / 2G (Cat.NB2 technology is fully compatible with the older Cat.NB1 technology)

Frequency bands and power ratings (first digit of the device version code, see section 1.3)	Module type 0: • Class 5 (+21 dBm +1,7/-3 dB) for LTE HD-FDD bands: LTE-Cat.M1: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25/B26 /B27/B28/B66/B85 LTE-Cat.NB2: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25/B28 /B66/B71/B85 • Class 4 (33 dBm ±2 dB) for GSM850 • Class 4 (33 dBm ±2 dB) for EGSM900 • Class 1 (30 dBm ±2 dB) for DCS1800 • Class 1 (30 dBm ±2 dB) for PCS1900 • Class E2 (27 dBm ±3 dB) for GSM850 8-PSK • Class E2 (27 dBm ±3 dB) for EGSM900 8-PSK • Class E2 (26 dBm ±3 dB) for DCS1800 8-PSK • Class E2 (26 dBm ±3 dB) for PCS1900 8-PSK	
Supported SIM standards	3FF - microSIM card compliant with ETSI TS 102221 v 9.0.0, lor MFF2 – eSIM (embedded-SIM - ensures full functionality in Ta)	
SIM card data package	A data package larger than 4MB/month is recommended.	
Antenna	Internal ceramic dual-band (GSM/DCS) or external with FME plug with maximum energy gain of 5dBi.	
Local communication	Optical interface. Transmission baud rate 9600 N81	
Communication protocol	Primary: GAZ-MODEM 2/3 (compliant with ST-IGG-0207:2015 standard)	
Ambient temperature range (Ta)	-30°C ≤ Ta ≤ 60°C The modem operates within the full operating temperature range of the device.	
Housing material	Polycarbonate	
Housing protection class	IP66	
Housing UV resistance	UL746C f1 standard	
Operating environment	Open conditions excluding direct exposure to precipitation and solar radiation (under a roof). Can operate in conditions where water vapour condensation occurs.	
Relative humidity	Max 95% at temperature 60°C	
Terms of use	Do not use near sources of strong electromagnetic fields or in places that may significantly attenuate the mobile network signal.	
Weight	about 300g	
Dimensions (L x W x H)	124x90x40 124x104x40 (including antenna socket and cable gland)	
Power supply	Li-SOCl2 lithium thionyl chloride battery, low current with a nominal voltage of 3.6 V, maximum capacity of 20 Ah, size D. Permitted battery types: FANSO ER34615H with a 70 mm cable terminated with a PHR-2P plug (battery widely available on the market)	
Battery lifetime(1)	Technology	Daily report (2) + 20 additional (emergency) reports (2) per year
	LTE Cat.NB2 (NB-IoT)	10,1 years (without PSM mode) / 12 years (active PSM mode)
	LTE Cat.M1 (LTE-M)	10,1 years (without PSM mode) / 11 years (active PSM mode)
	2G	5 years
Battery replacement	Battery replacement is possible in potentially explosive atmospheres. Replacement may only be carried out by qualified personnel.	

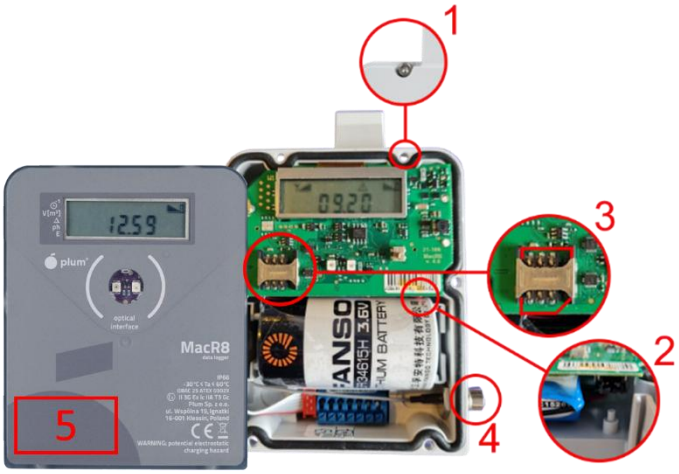
(1) The operating time depends on the device configuration settings. The following data (per year) was used for the values presented: 5 local readings (2 minutes each), 2 remote software updates, mobile network signal level CSQ>9, ambient temperature 21°C.

(2) Each report is extended with synchronous communication mode (it is possible to read the device from the system and reconfigure it remotely).

5. Device installation

5.1. Preliminary assembly / SIM card installation

In order to take full advantage of the device's functionality, the installed SIM card should have GPRS data transmission and sending services enabled. The recommended data package should be greater than 4MB/month.



- Remove the six TORX T10 screws from the rear of the housing (1) using a screwdriver.
- Remove the front cover.

  The battery has been disconnected for transport. Before assembling the device, remove the battery and insert the battery plug into the socket (2) on the right-hand side, at the bottom of the electronic board, and then place the battery in the device. The battery cable should be positioned so that it does not rest against the housing cover when the device is screwed together. This could cause damage.
- Insert the SIM card into the slot, ensuring it is correctly oriented (3). To facilitate installation of the SIM card, the battery may be removed for this operation.
- After inserting the SIM card, tighten the device with a torque of 0.65 Nm (maximum 0.75 Nm).
- Screw the antenna into the FME socket (4).
- After installation, affix one of the two enclosed stickers with the device identification data to the front cover (5); the installer should transfer the other sticker to the installation report.

The SIM card may only be installed outside the explosion hazard zone.

5.2. Installation of the device

The MacR8 Z2 data logger is an explosion-proof device and may be installed in Zone 2 vapour and gas explosion hazard areas. Installation in Zone 0 or 1 is not permitted.

Connecting an external antenna cable is only permitted outside the explosion hazard zone.

he device should be installed in a location where the mobile phone network signal, whose SIM card is installed in the device, will ensure the proper functioning of the logger.

The equipment is only suitable for installation at a height of ≤ 2 m.

Tools kit:

TORX T10 screwdriver

Crimping tool

OptoBTEx 2 interface

Android smartphone with Bluetooth support

MicroSIM card

Adjustable spanner

5.2.1. Installation on METRIX gas meters (APATOR group) (type GL, UG) and ELSTER gas meters (Honeywell group) (type BK)

The MacR8 data logger enables direct connection (via magnetic coupling) of bellows gas meters manufactured by Metrix (Apator Group) and Elster (Honeywell Group).

Adapter kit contents:

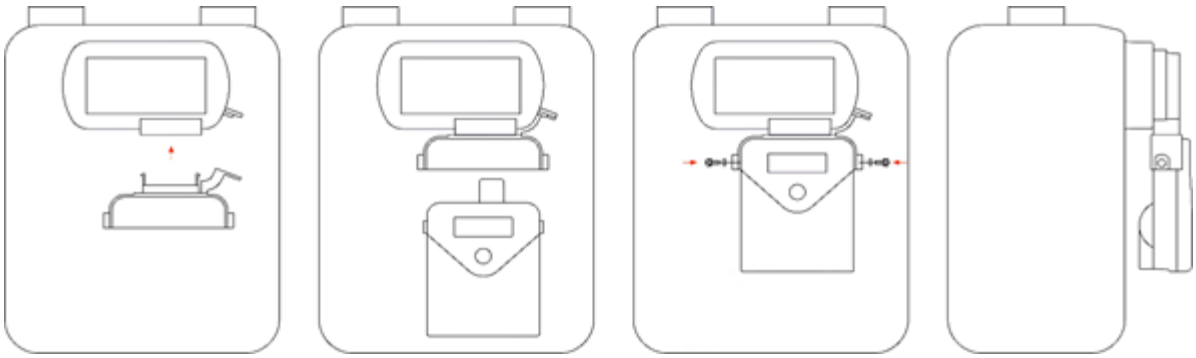
- METRIX or ELSTER adapter,
- Screws for attaching the adapter to the logger,
- Sealing cap.

Installing the MacR8 logger on a gas meter involves:

- attaching the appropriate adapter (cap) to the counter of the gas meter,

Adapters (caps) for METRIX (APATOR group) and ELSTER (Honeywell group) gas meters.

- Attach the data logger to the adapter by inserting the data logger with the tab into the counter and screwing in the two side locking screws (one of them through the sealing cap).



MacR8 – gas meter mounting bracket

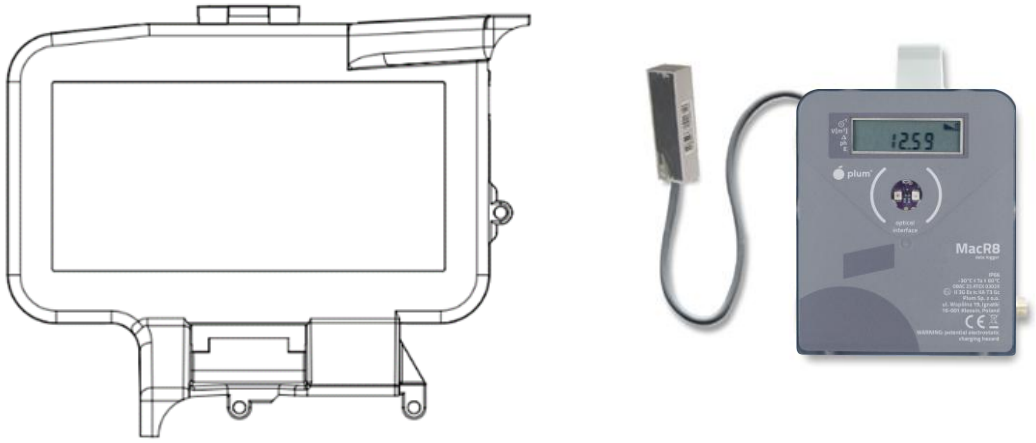
5.2.2. Installation on ITRON / ACTARIS gas meters (type RF1)

The MacR8 data logger enables connection of Itron bellows gas meters using a special adapter kit containing a wired reed switch transmitter.

When working in an explosion hazard zone, the cable leading through the cover must be secured against being pulled out and/or damaged, which is done by the data logger manufacturer. The installation method must ensure this. When installed in accordance with the instructions, the dedicated adapter provides the required protection for the cable.

Adapter kit contents:

- ITRON adapter,
- MacR8 logger cover with a reed switch pulse transmitter dedicated to the ITRON adapter,
- Screws for attaching the adapter to the logger,
- Sealing lock.

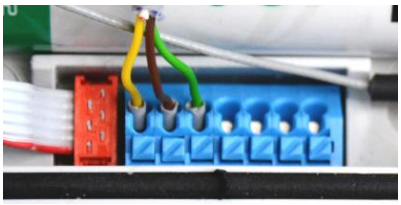


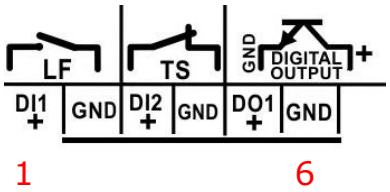
Adapter (cover) for ITRON gas meters and cover with pulse transmitter

Installing the MacR8 logger on a gas meter involves:

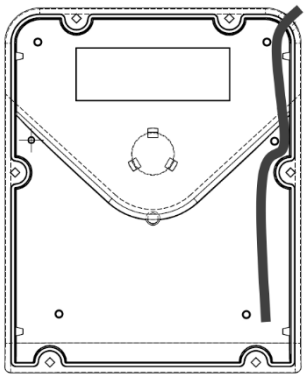
- Unscrew the current logger cover (it will no longer be needed),
- Use the data logger cover from the ITRON set with a built-in pulse transmitter and connect the cable terminated with sleeve terminals to the data logger terminal board.

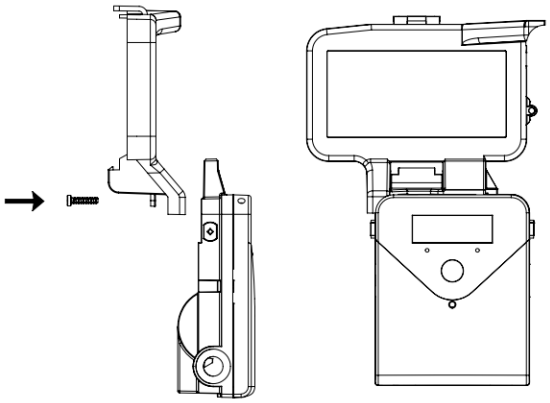
Signal	Transmitter cable
pulse input LF/DI1+	Yellow
GND	Brown
tamper switch TS/DI2+	Green



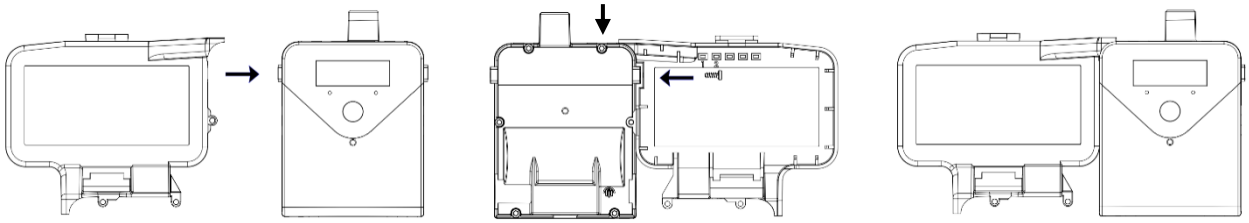


- Then place the cable in the cover (between its wall and the pins) and screw it to the housing.
- Then attach the adapter frame to the data logger by screwing it in place with two screws that secure the housing.
  For top mounting, use 2 TORX T10 3x16 screws) or in place of the screw on the left side and the side screw (for side mounting, use 1 TORX T10 3x16 screw and 1 TORX T10 3x8 screw).



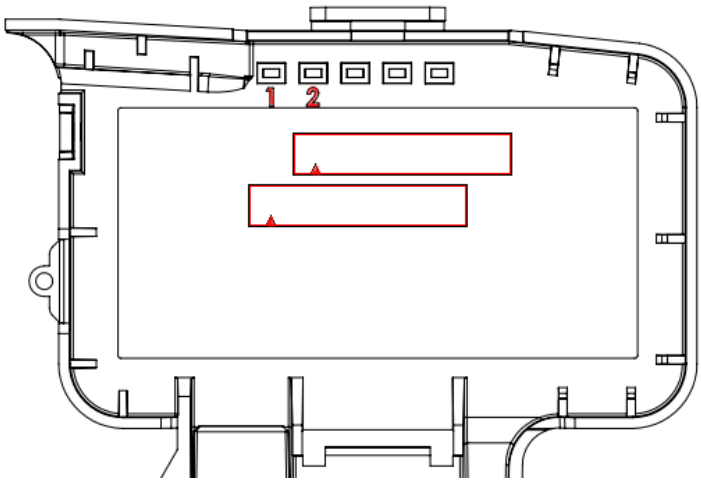


Upper mounting of the adapter (cover) for the MacR8 data logger (2 TORX T10 3x16 screws required).



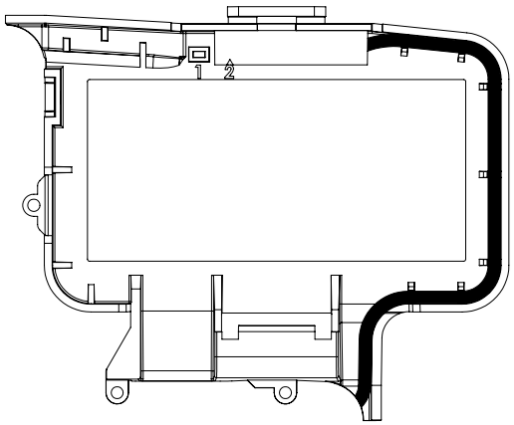
Side mounting of the adapter (cover) for the MacR8 data logger (requires 1 TORX T10 3x16 screw, 1 TORX T10 3x8 screw).

- Install the pulse transmitter in the adapter in position 1 or 2, depending on the ITRON gas meter type marked on its counter.

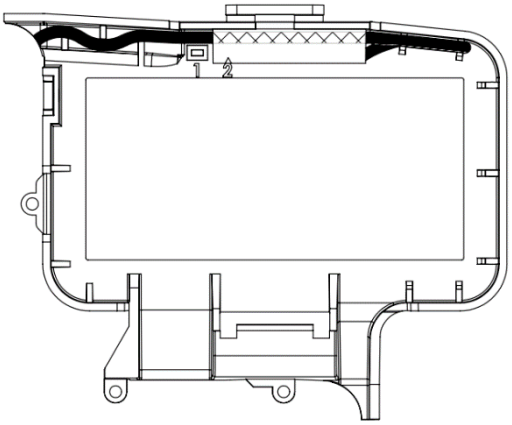


Method of installing the pulse transmitter depending on the type of ITRON gas meter (1 or 2).

- In the next step, arrange the cable inside the adapter depending on the installation method. The cable in the adapter should be arranged so that it does not protrude beyond its outline (in the case of side mounting, the cable should be pre-arranged before installing the pulse transmitter, as the cable will be located under the transmitter).

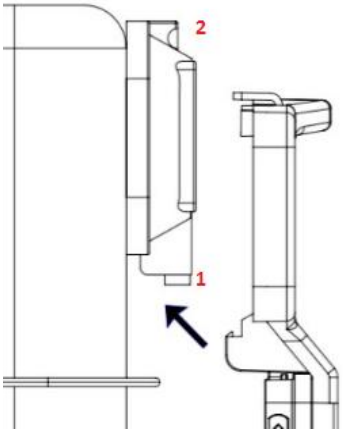


Method of routing the pulse transmitter cable – top mounting.



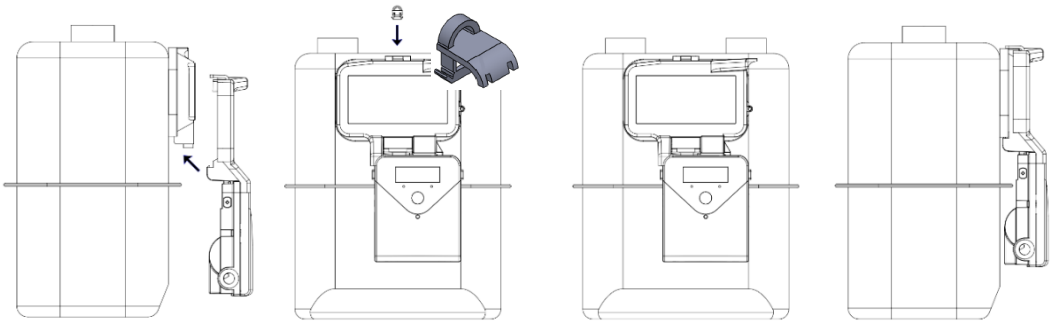
Method of routing the pulse transmitter cable – side mounting.

- Attach the adapter to the gas meter counter – first insert the lower part of the cover, then slide in the upper part with the pulse transmitter.



MacR8 installation on a gas meter counter.

- Seal the adapter on the gas meter counter using a sealing lock (latch).



MacR8 mounting for ITRON gas meter.

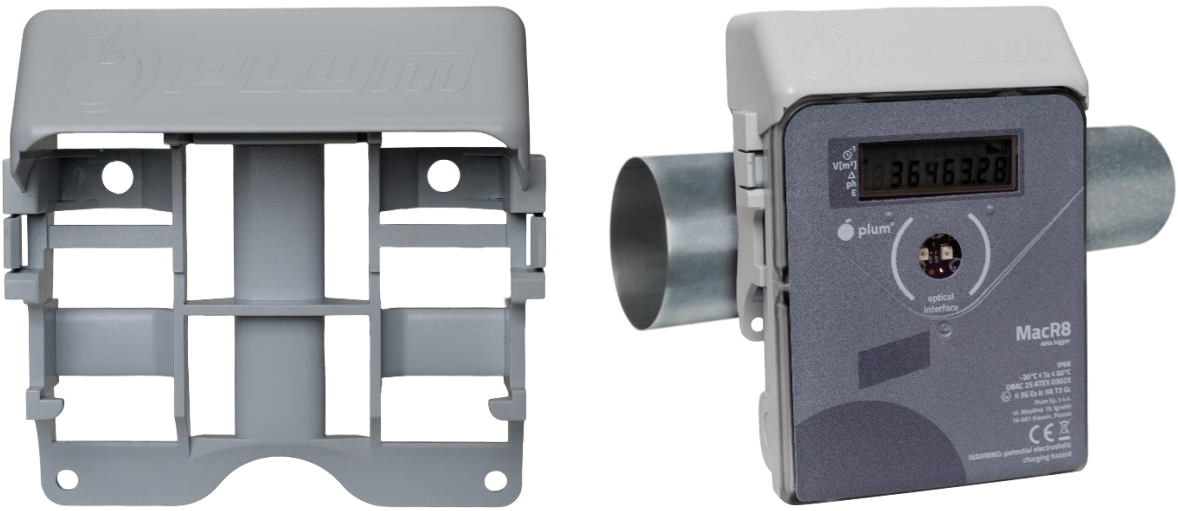
- Set the device to wired connection mode with the gas meter – for more information, see section 7.2.3,

Only MacR8 data loggers with a factory-dedicated ITRON adapter kit with an adapter and a pulse transmitter installed as shown in the diagram above may be installed and operated in explosion hazard zone Z2.

The pulse transmitter is factory-connected to the data logger cover included in the ITRON adapter set.

5.2.3. Installation using a pulse transmitter from a gas meter (wall or gas pipe mounting)

- For wall or pipe mounting, use the bracket shown in the illustration. First, mount the bracket using cable ties/self-locking ties or screws.



MacR8 installation using a dedicated bracket.

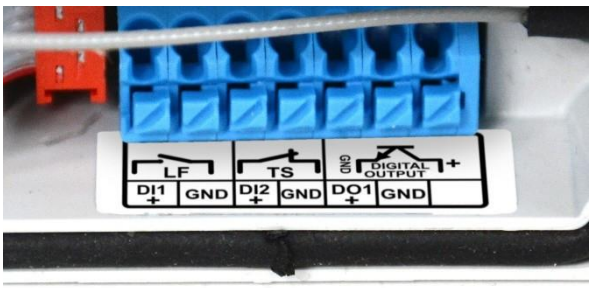
- Install a pulse transmitter dedicated by the gas meter manufacturer on the bellows gas meter counter, or connect the plug to the pulse output of a rotary or turbine gas meter.

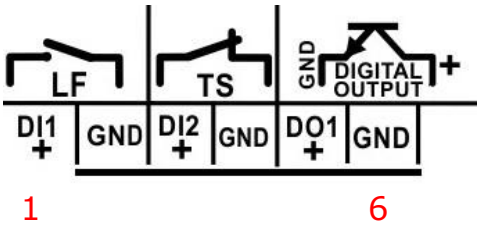
- If there is a blind plug in the device, replace it with a cable gland (with an external seal). The cable gland should be screwed into the housing with a maximum torque of 0.3 N·m (15 mm spanner).

- Pass the pulse transmitter cable (the outer diameter of the cable must be between 3.5 and 6.0 mm) through the cable gland and clamp the cable in the cable gland (15 mm spanner) while locking the cable gland in the housing socket (15 mm spanner),

- Use an unshielded cable, e.g. LIYY type, with a maximum length of 3 m (LF and TS inputs are used to work with potential-free contacts, e.g. reed switches, while the relay output and DO1 output are open drain outputs),
- Place the wire ends according to the markings on the terminal board.

The method of connecting external data pulse transmitters from manufacturers is described in section 5.3.





When connecting a two-wire external pulse transmitter, the control contact (TS/DI2+) [pin 3] must be shorted to GND [pin 4].

The maximum cable length between the external pulse transmitter and the MacR8 data logger is 3 metres.

If water gets into an open device, immediately disconnect the power supply! The device must be checked by the manufacturer and re-approved for use.

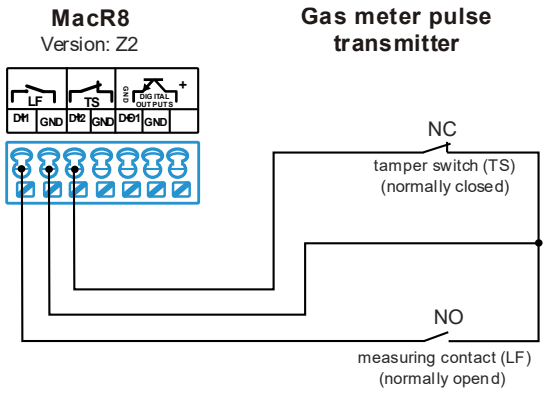
The degree of protection of the enclosure will only be maintained if the correct connection cable diameters are used, the cable glands are tightened correctly to a torque of 1 Nm, the seal is positioned correctly and the enclosure cover is tightened to a torque of 0.65 Nm (maximum 0.75 Nm).

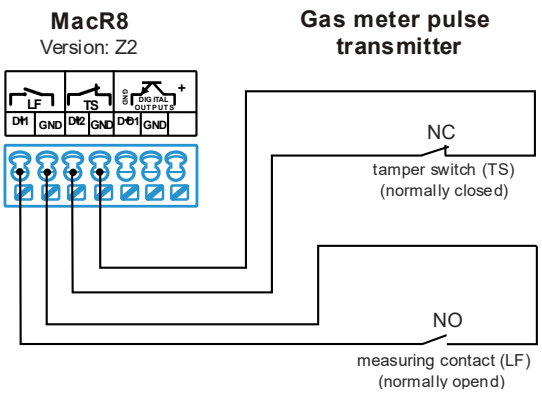
The battery may be replaced in potentially explosive atmospheres. The SIM card may only be inserted and the external antenna cable connected outside potentially explosive atmospheres.

5.3. Connection diagrams for pulse transmitters

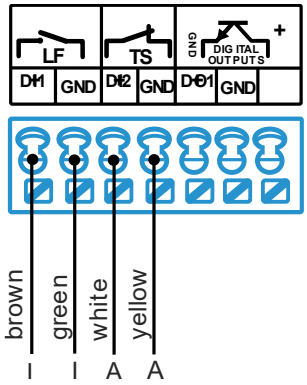
NOTE. The gas meter manufacturer may change the colour of the cables, so during installation, ensure that the connection is correct. Usually, the gas meter manufacturer provides a description of the transmitter connections on its housing or as a separate instruction manual.

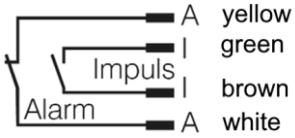
GENERAL DIAGRAMS



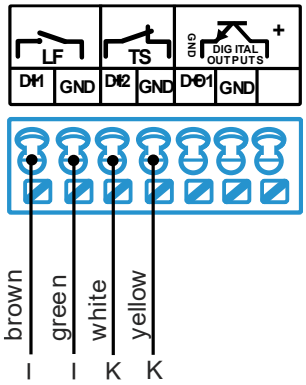


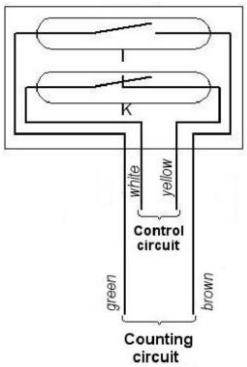
ELSTER / HONEYWELL (IN-Z61) [BK]



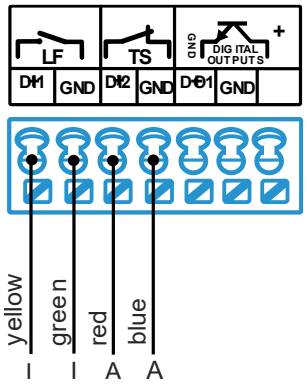


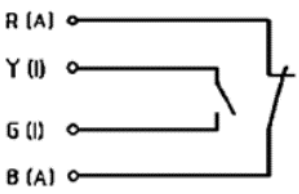
METRIX / APATOR (NI-3) [GL / UG]



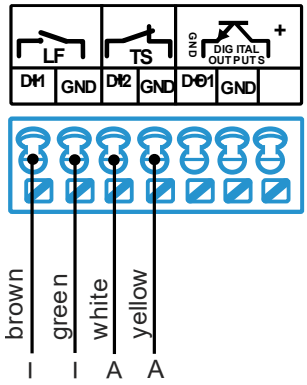


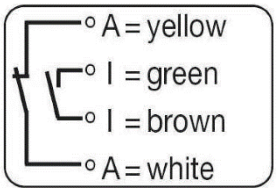
ITRON / ACTARIS (951-858-06) [RF1]



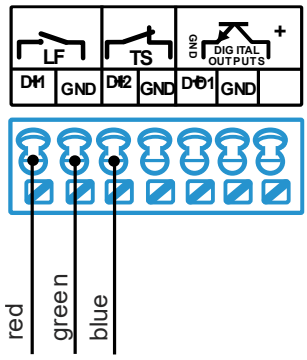


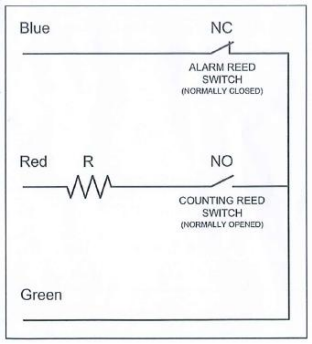
ELEKTROMETAL (IMP-11) [EM-Gx]

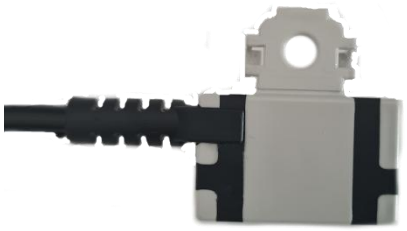




PIETRO FIORENTINI (RZ-10) [RS / RST]







6. Device start-up

If the device display is off, it means that the power battery is disconnected. First, open the data logger casing and connect the battery (see section 5.1).

If the device display shows **OFF** (it is in storage mode), bring the magnet or OptoBTEx (or OptoBTEx 2) head close to the OPTICAL INTERFACE window several times until the display shows **SLEEP 3**, **SLEEP 2**, **SLEEP 1** in sequence. When **StArt** appears, move the magnet away – the device will start working.

7. Device configuration

Configuration data for the data logger can be entered via the optical port (GAZ-MODEM3 standard) or remotely (GAZ-MODEM3 standard) via the telecommunications network data transmission channel. The ability to communicate with MacR8 via the optical port is activated automatically approximately 5 seconds after the optical interface is placed on the optical port. The port only supports a transmission speed of 9600 bps. The activity of the optical port is indicated by an icon on the screen, and it is automatically deactivated 5 minutes after the last transmission (or, if there was no transmission, from the moment the port was activated).

The following are intended for configuring MacR8 data loggers:

- **ConfIT! data loggers** mobile application dedicated to smartphones/tablets running Android
- **ConfIT!** application dedicated to PCs running MS Windows.

The **ConfIT! data loggers** application provides support for installation at the target facility and allows for configuration and diagnostics of basic device parameters. The application communicates with the gas meter via a Bluetooth connection using the OptoBTEx 2 head/interface through the data logger's optical channel. The application uses the GAZ-MODEM3 communication protocol.
The application is available for free download from Google Play:
https://play.google.com/store/apps/details?id=com.plum.pl.confit

ConfIT! data loggers
QR code link:

The ConfIT! application is available for free download at: https://gas.plum.pl/en/

7.1. Connection of devices

To connect your smartphone/tablet to MacR8, use:

- OptoBTEx head/interface (Bluetooth communication), or
- OptoBTEx 2 head/interface (BLE communication – Bluetooth Low Energy)

start it up (if required, e.g. OptoBTEx) and connect the interface to the OPTICAL INTERFACE window of the data logger.

To connect a PC to MacR8, use:

- OptoBTEx head/interface (from HW version: 1.2) and microUSB ⇔ USB A cable, or
- OptoBTEx 2 head/interface and USB-C ⇔ USB A cable, or
- cable interface

and connect the interface to the OPTICAL INTERFACE window of the data logger.
Depending on version of the MS Windows system and Bluetooth or BLE support in PC, connection between PC and MacR8 can be wireless. ConfIT! application supports serial port (for Bluetooth) and BLE communication.

7.2. Configuration via mobile application

7.2.1. Connecting the device to a smartphone and the ConfIT! data loggers application

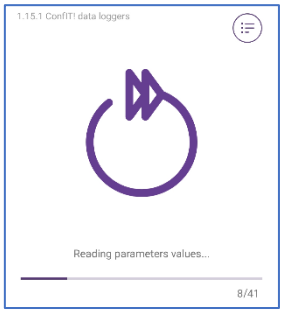
- In the ConfIT! data loggers application, select the communication channel type:

- Select the device type appropriate for the interface used: OptoBTEx or OptoBTEx 2 (in the case of OptoBTEx 2, if there is more than one such interface in the environment, you must first enable the device search engine in the application options).
  For OptoBTEx 2, select the correct interface from the list of devices found.

- The application will initiate communication and display a request to enter the Bluetooth pairing code for your smartphone with OptoBTEx. Please enter: 1234.

  The LED on the interface must be located on the right-hand side when looking at the front of the device and must remain lit during transmission.,

- Correct communication with the device results in the message “Parameter values read” being displayed. Once all parameters have been loaded, the application will proceed to the main configuration window.



When connecting via Bluetooth and using OptoBTEx, it is automatically maintained by the application, so there is no need to remove the interface from the data logger.

When using OptoBTEx 2, the connection is automatically established during the reading/writing of the data logger configuration.

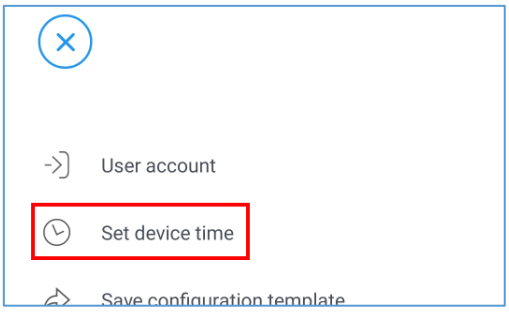
7.2.2. Setting the device clock

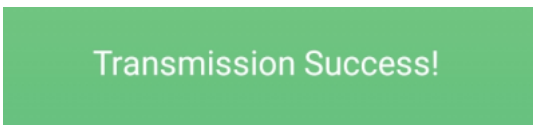
As the battery is disconnected during transport, the device clock is not set. It is essential to check that the date and time on the device are correct and set them accordingly.

Application in the header shows date and time of device, the same as displayed on the device's LCD screen

- Device clock can be set from the right-hand menu of the application by selecting the ‘Set device time’ option,

- The application will either automatically synchronise the device clock with the smartphone clock, taking into account the need for the data logger to operate on winter time, or allow manual setting,
- Correct clock setting will be confirmed by the message ‘Transmission Success!’.



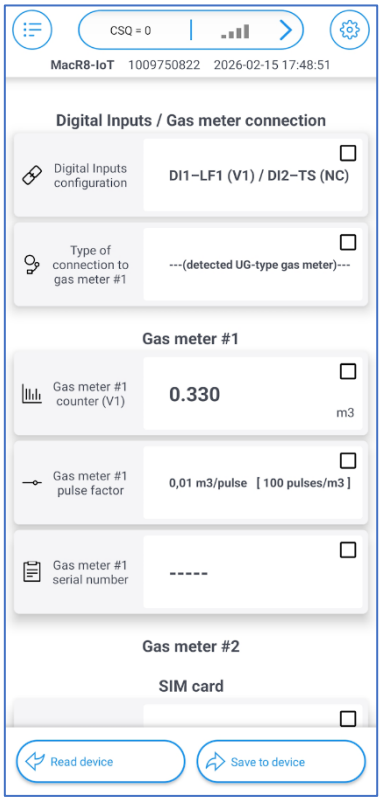


7.2.3. Configuration parameters

After launching, the main programme window displays the most important configuration parameters necessary for the device to operate correctly at a specific measuring point.

It is possible to set the value:

- Gas meter counter
- Gas meter pulse factor
- Gas meter serial number
- Type of connection to gas meter
- SIM card PIN code
- APN of SIM card
- Data server address and port number (e.g. **ewebtel.com, 9304**)
- Data sending schedules



ATTENTION! The correct type of connection to the gas meter determines the accuracy of pulse counting.
Types of conection:

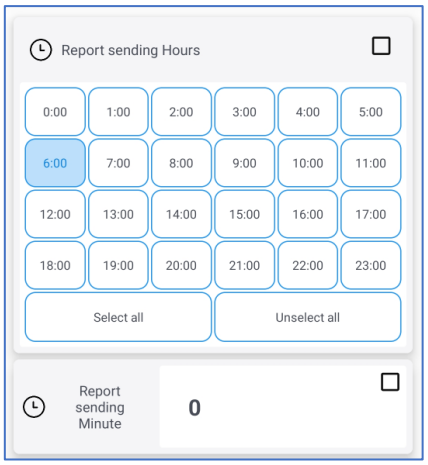
- **BK-type o UG-type adapter (detection)**
  (so-called direct connection) – applies to installation using dedicated ELSTER (HONEYWELL) or METRIX (APATOR) adapters (connection using built-in magneto-resistive sensors). The data logger will automatically detect the type of gas meter connected. This type of connection is available when the device code is **Z2**_xxx_xxx_**1**xx.

- **RF-1 type adapter or external pulse transmitter**
  (so-called wired connection) – applies to installation using dedicated ITRON (ACTARIS) adapters or an external wired gas meter pulse transmitter (the transmitter cable is inserted into the data logger through cable gland). This type of connection is available when the device code is **Z2**_xxx_xx**2**_xxx or **Z2**_xxx_xx**1**_xxx.

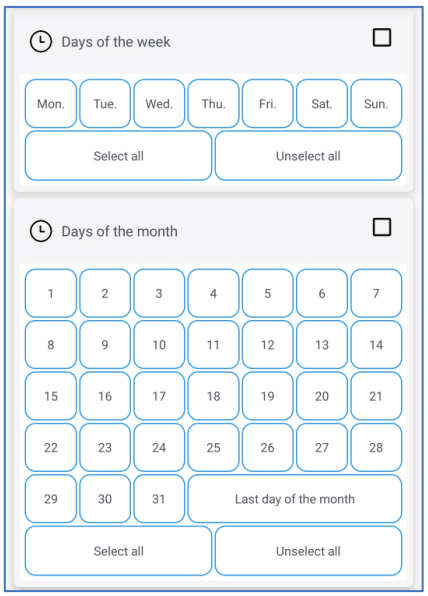
7.2.4. Data sending schedules

The application allows you to set between 1 and 24 daily schedules for reporting data to the server on the device. The setting involves selecting the times at which the device should send data to the server.

It is also possible to set the exact minute of data transmission.



It is also possible to send data only on specific days of the week or month.

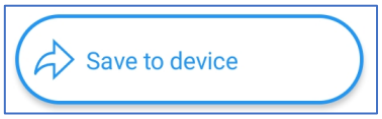


7.2.5. Configuring the device

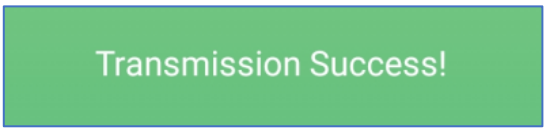
- Set all the desired device parameters,

  The modified parameter will be marked in blue and the ‘to be modified’ checkbox will be selected,

- After setting the new parameter values, use the ‘Save to device’ button.



- Correct programming of the device will be confirmed by the message ‘Transmission Success!’,



- Blue markers next to modified parameters will turn green,

- To check whether all parameters have been set correctly, use the ‘Read device’ button and ensure that the set values are correct.

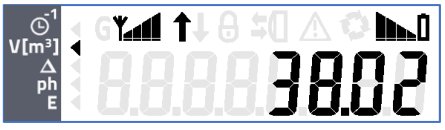
7.3. Installation mode / communication start-up

Start-up involves activating the ‘InStAL’ (device installation) service menu in the device by repeatedly bringing a magnet or OptoBTEx head close to the OPTICAL INTERFACE window until the display shows “InStAL”, ‘CSO.’, ‘rEPort’... until the message ‘InStAL’ appears. The installation process will start after all ◀ indicators disappear.

⚠ ATTENTION! The ‘InStAL’ installation mode should be performed with the gas box door closed, so that the mobile network signal level (CSQ) can be measured under actual operating conditions.

- Starting the ‘InStAL’ installation process will cause the antenna symbol Y---- to flash on the display. This indicates that the device's modem is switched on,

- After a few seconds, the mobile network signal strength indicator ▂▄▆ will light up permanently on the display. The number of bars indicates the signal strength,
- After a moment, the GPRS connection to the SIM card's APN will begin, indicated by **G** letter blinking.
- After several seconds, **G** symbol will appear permanently and the device will begin sending installation data to the server, which will be displayed on the screen by the flashing ‘up’ arrow symbol ↑, which will appear permanently once the data has been sent correctly.
- The antenna symbol Y---- will flash for approximately 3 minutes, then the device display will return to its normal cycle of displaying the date/time/counter/other parameters,
- The gas meter counter is displayed when the indicator ◀ is visible only next to the meter symbol V[m³],



- After starting the device, the following symbols will appear (or may appear) on the display:

	Battery status indicator
	The flashing of this indicator means that the gas meter detection mechanism is activated (when a direct connection to the gas meter is set). During detection, pulses from the gas meter are not added to the counter. The indicator will go out after the data logger has counted 5 pulses from the gas meter, and then these 5 pulses will be added to the counter.
	The alternating appearance of these indicators means that the data logger has counted the pulses from the gas meter.
	Magnetic interference indicator. The indicator will disappear at the beginning of the first gas day after the cause of the indicator has ceased. In the case of a 2-wire connection to the gas meter, short-circuit the DI2 input to GND.
	The indicator means that the device has logged into GPRS to the SIM card's APN.
	The indicator means that the device has sent data to the system.
	The indicator means that the device has received data (e.g. configuration data) from the system.

- Launching the ‘CSO’ service menu or the ‘Signal Level Test’ application from the right-hand menu allows you to check the cellular signal level (CSQ) and position the antenna correctly. The CSQ test takes 1 minute. In most cases, CSQ≥9 is sufficient for the data logger to function properly.

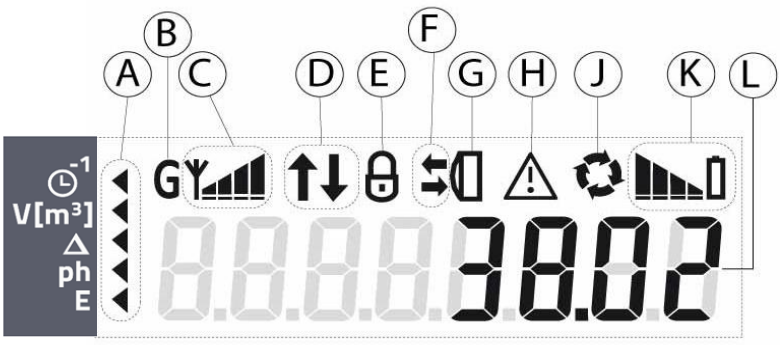
8. Operation of the device

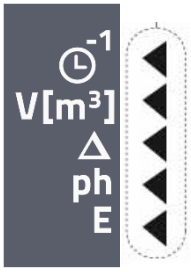
Once installed, the device operates maintenance-free. It only requires periodic replacement of the power battery. The expected battery life is specified in the technical data table. Battery replacement is described in section 11.2.

8.1. Display – Main menu

The device display shows:

- icons indicating operating status: (B) ÷ (K)
- periodically changing values (L):
- current date,
- current time,
- parameters specified by the indicator (A).



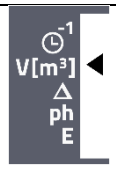
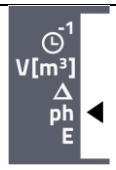
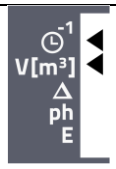
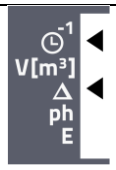


Indicator (A) functions:

- time indicator (off - current billing month / on - previous month)
- counter indicator,
- increment indicator,
- peak hour value indicator
- physical quantity indicator (off - volume / on - energy).

The content displayed on the screen, marked with (A), is configured by the manufacturer.

Examples of combinations of displayed indicators:

displayed indicators (A)	value on the display (L)	billing period
	current date and time	current
	current value of volume counter	
	volume increase since the beginning of the billing period	
	hourly peak of volume	
	current value of energy counter	
	date and time of the end of the previous billing period	recently completed
	value of volume counter at the end of the previous billing period	
	volume increase for the previous billing period	
	the highest hourly peak of volume in the previous billing period	
	value of energy counter at the end of the previous billing period	

Description of display icons:

MODEM OPERATION:

A flashing icon indicates that GPRS is currently in use. A steady light indicates the last successful connection. No icon: no connection during the last modem session.

COMMUNICATION WITH MODEM:

A flashing icon indicates a current connection to the modem. A steady light indicates the last successful connection. No icon: no connection during the last connection attempt.

MOBILE NETWORK RANGE:

A continuously lit icon indicates that the SIM card is correctly registered in the network while the modem is in operation. Coverage is indicated by the number of bars displayed. If the icon is not lit, it means that the SIM card is not registered in the mobile network or that the network signal is too weak to guarantee correct operation. A flashing icon indicates that there is no connection with the SIM card.

SIM LOCK:

A flashing icon indicates an incorrect PIN during the last SIM card registration. A steady light indicates that the SIM card is locked and a PUK code must be used (three incorrect PIN entries). No icon indicates that the PIN code is correct.

DATA COMMUNICATION:

The ↑ icon indicates that the report was sent correctly when the modem was last.

The ↓ icon indicates that data was retrieved from the server when the modem was last connected.

No icon indicates failure to send the report.

LOCAL COMMUNICATION:

The visible icon symbolises the presence of an interface at the OPTICAL INTERFACE connector. If the icon is not visible, this means that there is no interface or that it has been inactive for more than five minutes. The arrows next to it symbolise data transmission via the interface.

TAMPER SWITCH:

The presence of the icon indicates that magnetic interference with the gas meter has been detected. The absence of this icon indicates no interference – correct counting. The status of the TS input (tamper switch – control contact) is checked approximately every 5 minutes.

PULSES COUNTER:

Simultaneous flashing of icons symbolises gas meter detection. The marker will start animating when five pulses from the gas meter are counted (these five pulses will be added to the counter after the gas meter is detected). Alternating flashing of the marker indicates counting of pulses from the gas meter. No icon means no changes at the pulse input.

BATTERY LEVEL:

The battery level is indicated by the number of bars. Each bar corresponds to 20% of the battery. A flashing icon indicates that the battery level is below 10%. No icon means that the battery level is too low to switch on the modem.

8.2. Display – Service menu

The device has a built-in menu with service functions. It is activated by quickly placing a magnet three times on the OPTICAL INTERFACE window (this is indicated by the icon (G) lighting up three times). This will activate the first menu item marked ‘InStAL’. The indicator (A) will then light up with all segments, which will disappear one by one. At this time, placing the magnet on the window again will cause the display to move to the next menu item, ‘CSO,’ and so on. When you stop at the selected menu item, after the time indicated by the bar (A) has elapsed, the data assigned to that menu item will be displayed.

‘InStAL’ installation. Selecting this menu item will activate the modem and send the installation data to the server.

Initiation of the dynamic mobile network signal level control procedure (CSQ test) for approximately one minute.

Entering this menu item will force the sending of data logged for the current billing day. The display will show ‘rEPort’.

This mode can be used to check communication with the server.

Battery replacement procedure.

Basic information about the device:
- Software version
- Hardware version
- Pulse factor

This menu item allows you to not run any service functions and exit service mode without changing the device's operating mode.

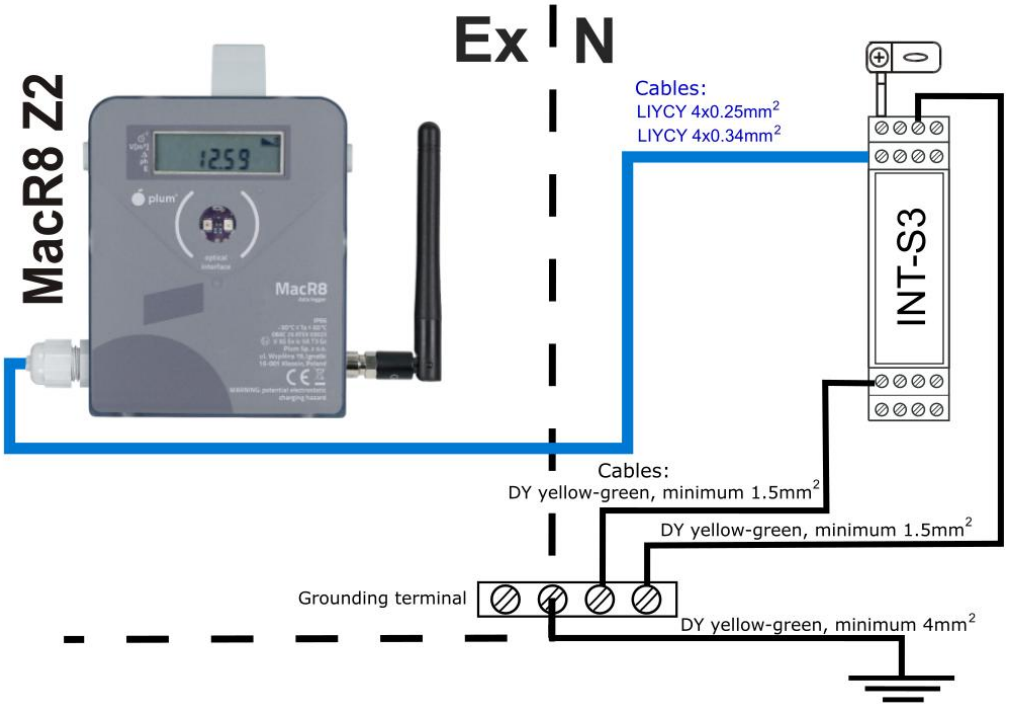
8.3. Optical transmission connector

The device is equipped with an optical interface with a transmission speed of 9600 N 81. To configure and read logged data, use software that utilises the GAZ-MODEM 2/3 transmission protocol (e.g. the **ConfIT! data loggers** mobile application).

8.4. Digital Output (DO)

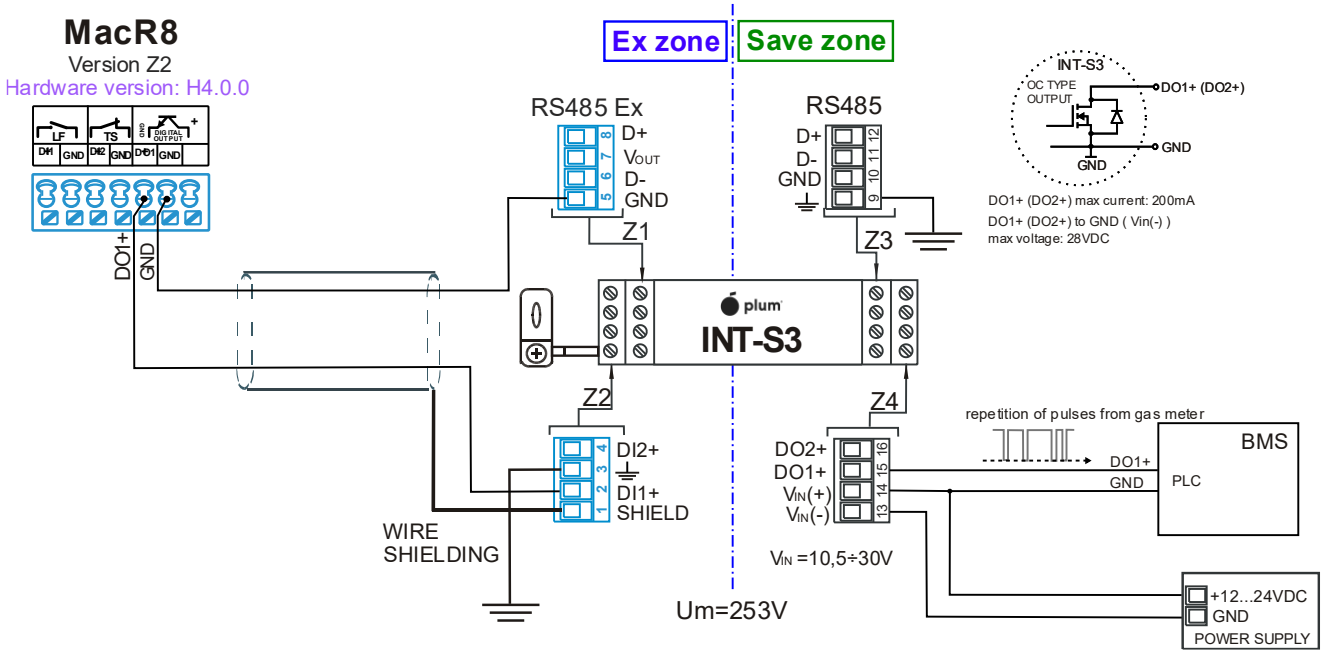
The MacR8 data logger can be equipped with an OD (Open Drain) type Digital Output DO. The output is configurable (DO Configuration parameter) and can perform one of two functions:

- Use in automation systems related to limiting gas consumption above the so-called 'ordered power'. The DO1 output changes to the opposite state (active closed) when the hourly volume increase determined by the data logger is equal to or greater than the value set in the 'OC Limit' parameter (Limit OC parameter). The DO1 output returns to its original state when the device clock starts a new hour.
- Repetition of pulses from the gas meter. Each pulse from the gas meter causes the output state to change to the opposite (active short-circuit), so the weight of the gas meter pulse is not taken into account. This output can be used in BMS systems that can count pulses.

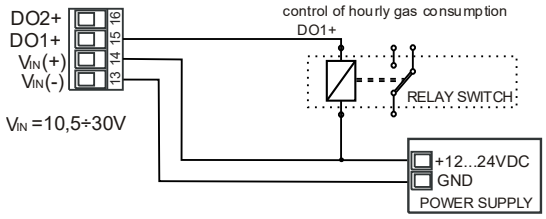


Typical application of the INT-S3 interface with the MacR8 data logger.

Please note that the MacR8 data logger is an explosion-proof device in an intrinsically safe design, therefore, when the data logger is operating in a potentially explosive atmosphere, connecting the DO outputs to devices operating in a safe area is only possible via a barrier/separator, e.g. the INT-S3 interface.



Electrical connection diagram for MacR8 (in hardware version H4.0.0) with INT-S3 interface and PLC controller.



Part of the MacR8 electrical connection diagram (in hardware version H4.0.0) with the INT-S3 interface and the so-called 'control of hourly gas consumption'

9. Data readout

9.1. Reading methods

MacR8 has the ability to read data contained in the device remotely and locally. This is achieved using the GAZ-MODEM protocol.

The table below presents information on what data is available, how it can be accessed, and by what means.

Type of data	Method of reading	
	Local	Remote
Current data	Yes	Yes
Archives data	Yes	Yes
Events	Yes	Yes

9.2. Reported data

The reported data is sent by the device autonomously, according to a pre-programmed schedule. The report may consist of the following data:

- PERIODICALLY LOGGED DATA - values of counters V1, V2 and volume increments dV1 and dV2 since the last report, stored in the device memory, in accordance with the selected *Registration period.*
- EVENTS – new events or events completed since the last report
- CURRENT DATA – current device parameter values in accordance with the available parameters (DP) table; it is possible to send the values of all or selected parameters.
- IDENTIFIER – device identifier compliant with the GAZ-MODEM 2/3 standard.
- STRUCTURE OF DP i ZD TABLES – (only during installation) description of the structure of the available parameters (DP) table and the events (ZD) table in accordance with the GAZ-MODEM 2/3 standard.

The user can configure what data is to be sent to the server using the *Report Composition* parameter.

The device can also be programmed to send data hourly. Please note that each additional schedule enabled increases the battery consumption of the data logger.

9.3. Periodically logged data

Urządzenie co okres rejestracji rejestruje w pamięci nieulotnej następujące dane:

- volume value calculated by counter 1– *V1*,
- increase of volume during registration period calculated on counter 1 – *dV1*,
- volume value calculated by counter 2 – *V2*,
- increase of volume during registration period calculated on counter 2 – *dV2*.

In the case of hourly registering, this data will be stored in the data logger's memory for one year. The entire memory can be read via an optical interface.

Automatic time change (summer-winter, winter-summer) causes discontinuity in the logged data. When switching from summer to winter time, two samples from 2 o'clock will appear. It is possible to block the automatic time change. By default, the device is configured to operate according to winter time, without automatic time change.

Discontinuity in data may also be caused by remote replacement of device software or modification of volume

counter values. In accordance with the GAZ-MODEM2 standard, this causes information about discontinuity to appear in the status of the next sample.

The *Data Logging Read* parameter allows you to configure which logged data is to be sent with the report.

9.4. Alarm reports

The device can log events/alarms that occurred during its operation and that are related to the operation of the device or changes to its configuration. The user can configure whether events are to be sent to the server using the *Report Composition* parameter.

There are two types of the alarms – lasting and momentary. In lasting alarms, beginning and end date and time is different, according to time when alarm started and ended. Momentary alarms have the same date and time of beginning and end.

CODE	NAME	DESCRIPTION	ALARM TYPE
0	Device Start	Device start after storage mode or after restart (firmware change)	Momentary
1	Time Change	Modification of internal clock	Momentary
2	Magnetic/Cable Interruption	There is a magnet or cable cut detected	Lasting
3	Battery Discharged	Battery level is below 10%	Lasting
4	Battery Replace	Battery has been replaced successfully	Momentary
5	Schedule Change	Modification of the reporting hours	Momentary
6	Modem/GSM Error	CSQ level is less than 7 during sending report. This does not have to mean report sending is failed. Data transmission can be successful even with low signal level.	Lasting
7	V1 Change	V1 counter value was changed	Momentary
8	V2 Change	V2 counter value was changed	Momentary
9	impLF 1 Change	Pulse factor for V1 was changed	Momentary
10	impLF 2 Change	Pulse factor for V2 was changed	Momentary
11	Counters Transition by 0	Counter reached it maximum capacity and reverted to 0	Momentary
12	Erasing	Device was erased	Momentary
13	Installation	InStAL installation menu has been performed	Momentary
14	Gasmeter 1 Change	Gas meter SN 1 was changed	Momentary
15	Gasmeter 2 Change	Gas meter SN 2 was changed	Momentary
16	Case Opened	Device case is opened	Lasting
17	Limit OC	Limit of hourly increment of volume reached	Lasting

10. Transmission

10.1. Types of transmission

The MacR8 data logger can exchange data in two ways:

Local communication:

- Data transmission is performed via an optical interface, which can be switched on and off at any time. Additionally, this connector switches off automatically 5 minutes after the last data exchange.

Remote communication:
Data transmission is performed using a permanently installed modem and a removable SIM card or a permanently installed eSIM card. Communication is packet-based and is carried out using TCP or UDP protocols. This communication can be activated using a set schedule, when a set event occurs, or during installation. For proper operation, it is necessary to set the correct communication parameters (e.g. SIM card PIN number), the address of the server to which the data will be sent, and the parameters related to the radio communication technology of the mobile operator. By design, this communication mode is one-way, but it can be activated with any synchronous mode schedule allowing two-way communication. This mode is activated after data is sent by the device and increases energy consumption, as the modem prolongs its operation while waiting for possible queries from the system.
MacR8 does not support SMS communication

10.2. Data transmission protocols

The MacR8 data logger software uses a single protocol:

- GazModem3 – basic communication protocol, enables device configuration as well as reading of archived data and events. The protocol is used for both remote and local communication.

A version of the MacR8 data logger is available that uses the SMART-GAS protocol for local and remote data transfer via GPRS transmission. It is not possible to use both protocols simultaneously.

Detailed information on data transmission protocols in the MacR8 data logger is available from Plum sp. z o.o.

10.3. Firmware updates

There are two ways to update the device's firmware:

- Local update:

The device software can be updated using the MacR6 Software Manager desktop application.

- Remote update:

Software updates are possible after prior configuration of the UpIT! update server and the UpdateManager update management application.

UpIT! is an update server from which devices will download firmware. Communication is possible thanks to TCP/UDP protocols. The server requires firewall configuration to allow access to the server. UpIT! requires a database to store log data, errors, and device information.

UpdateManager is a user interface for uploading updates to the server, managing them, checking logs and errors in device updates. Communication between the server (UpIT!) and the interface (UpdateManager) takes place via REST API. It uses TLS encryption, which ensures secure communication connections and verifies the client through certificates.

Details on the operation and use of the UpIT! update server are described in its user manual.

11. Device maintenance

The MacR8 pulse data logger is a device operating in potentially explosive atmospheres. In order to maintain explosion safety requirements, the device should undergo periodic inspections in accordance with EN 60079-17. Periodic and random inspections should be performed by authorised and trained personnel.

Type of inspection	Frequency of inspection	Grade of inspection
periodic	at least once a year	close
random	selected depending on the environmental conditions in which the instrument is used	visual

11.1. Battery operating time

Battery lifetime depends on a large number of factors, such as:

- Frequency of report transmission,
- Amount of data sent in reports,
- Frequency of synchronous mode activation (two-way communication activated after report transmission),
- Transmission technique used,
- Radio communication technology used,
- Quality and level of mobile network coverage at the installation site,
- Number of alarm events triggering immediate data transmission to the system,
- Number of remote software updates,
- LCD display activation time.

The estimated battery life is specified in the device's technical data table, section 4.1.

11.2. Battery replacement

The battery may only be replaced by a person trained to perform this task. Replacement is possible in an explosion hazard area. Only batteries approved by the manufacturer and listed in this document may be used. Always replace batteries with new, fully charged batteries that show no signs of damage (the casing is undamaged and not deformed, the insulating sleeve is undamaged, there are no signs of corrosion and no electrolyte leaks).

Before connecting a new battery, ensure that the battery connector has the correct polarity, matching the removed battery.

Incorrect connection may damage the device.

The data logger has an internal voltage backup system for when the battery is disconnected, which prevents the device from turning off.

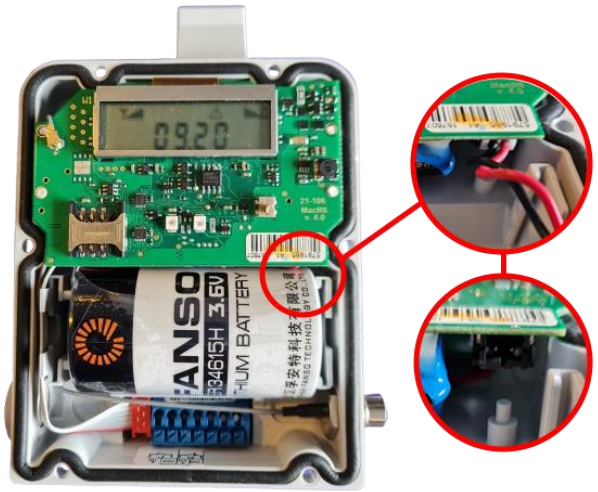
Permitted battery types are listed in the general information section 4.1.

Risk of explosion if the battery is replaced with an incorrect type.

Dispose of used batteries according to the instructions and local regulations. Do not dispose of batteries in regular waste bins. Used batteries should be disposed of in accordance with the manufacturer's recommendations.

Sequence of steps when replacing the battery:

- Remove the data logger from the gas meter or wall bracket
- Unscrew the 6 TORX T10 screws on the back of the housing and remove the front cover of the device
- Remove the battery and disconnect the battery harness from the socket on the right side, at the bottom of the electronics board
- Connect the plug of the new battery to the socket and place the battery in the device
- Replace and screw on the front cover of the device



- Set the battery level to 100% according to the procedure described below
- Mount the data logger on the gas meter or in the holder and synchronize the data logger volume counter with the gas meter

The sequence of steps for setting the battery level to 100%

1. Using the OptoBTEx interface or a strong magnet, activate the ‘r.bAtt’ option.

2. After activation, place the interface or magnet so that the counter counts down to ‘bAt 0’ and wait for the indicators on the left to go out.

3. he display will show ‘Lo bAt,’ which indicates that the old battery can be removed. Then install the new battery.

4. Repeat the steps from point 3 - apply the interface or magnet so that the counter counts down to ‘bAt 0’ and wait for the indicators on the left to go out.

5. The presence of a new battery will be indicated by the message ‘Hi bAt.’ After the message disappears, the battery level indicator should show all bars.

⚠ Please note that in some cases, the battery in the device may be so low that the display already shows the message “Lo bat” (point 3). In this case, skip points 2 and 3.

⚠ Do not dispose of batteries in regular waste bins. Used batteries should be disposed of in accordance with the manufacturer's instructions.

11.3. Troubleshooting

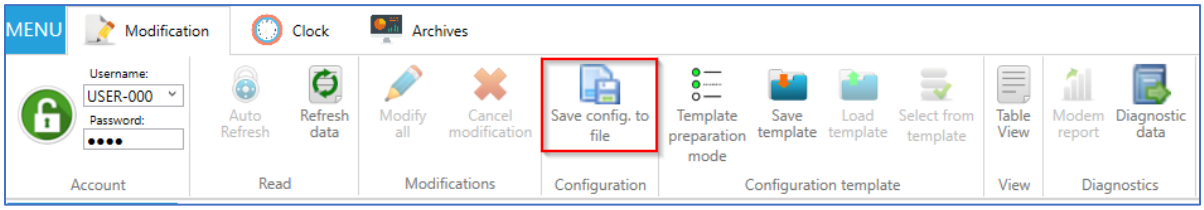
In some certain conditions device can work improperly, due to lasting alarms or configuration mistakes. In the table there are presented most common appearing malfunctions with reasons and solutions for these.

ISSUE	REASON	SOLUTION
Device does not start after removing divider from battery pole	Startup procedure not executed properly	Follow the SLEEP-3 to SLEEP-0 procedure to wake up the device
	Battery damaged/discharged	Measure the battery voltage, it should be around 3,6V. If any other, replace the battery.
	Device malfunction	If battery has correct voltage and despite replacement device is not waking up it can be malfunction of whole unit.
Fast battery discharging	Often data schedule	PLUM declares battery lifetime on 5 years in specific conditions. When device is sending data often, battery lifetime can be shortened.
	Battery damage	Measure the battery voltage, it should be around 3,6V. If any other, replace the battery.
	System reads out data too often or too long – in case of system working in call window modes	Check setting in the system. Typical time of connection should be not more than 2 minutes. If connection time is higher, check settings in the system.
	Constant low level of CSQ	Device requires more energy when time of sending data is extended what can be caused by low level of GSM signal. Replace the antenna or place it outside of the cabinet or hole.
Device does not measure gas volume	Wrong gas meter type chosen	Check in the configuration apps if the correct type of gas meter is chosen. Any other than Elster/Honeywell and Metrix/Apator must be cable type.
	Magnetic interferences	Check if the triangle icon is blinking on the devices display. This can mean magnetic field presence interrupts the measurements
	Wrong pulse factor chosen	Check in the configuration apps if the correct pulse factor is chosen. Wrong pulse factor can cause improper pulses counting
	Incorrect cable connection in terminals chamber	Check if the cables are correctly connected. Pulse cable shall be connected to terminals DI1+/GND. Tamper switch to DI2+/GND
	Damaged gas meter	Gas meter can be also damaged. Reed switch may not generate pulses – speaking of cable connection, or magnet in totalizer of diaphragm meter is not present or moved not allowing for pulse inputs activation.
Despite installed SIM card device does not send data	Not working SIM card or badly installed	Replace the SIM card and try once again to connect. Ensure if the SIM is placed correctly – especially for micro-nano SIM cards which are thinner than only micro SIM.
	Wrong APN	Ensure in the mobile or desktop app if the APN is correct. If yes, try the next steps.
	Wrong PIN	Ensure on the display if the lock icon is not present. If not – follow to the next step.
	Wrong data server address	Ensure in the mobile or desktop app if the destination address of data sending is correct. If yes – try the next steps.
	Low GSM signal level	In some certain conditions like installation in deep environment, underground, device can have limited GSM range what sometimes may cause data sending discontinuity. Try to use higher gain antenna or SIM of another provider
	Broken antenna	Replace the antenna and try again

11.4. Diagnostics data for Technical Staff

Data logger is an electronic device which may affect damage or malfunction. For Technical Staff it is mandatory to receive following data for the diagnosis. Lack of any file may occur in diagnosis process difficult or impossible.

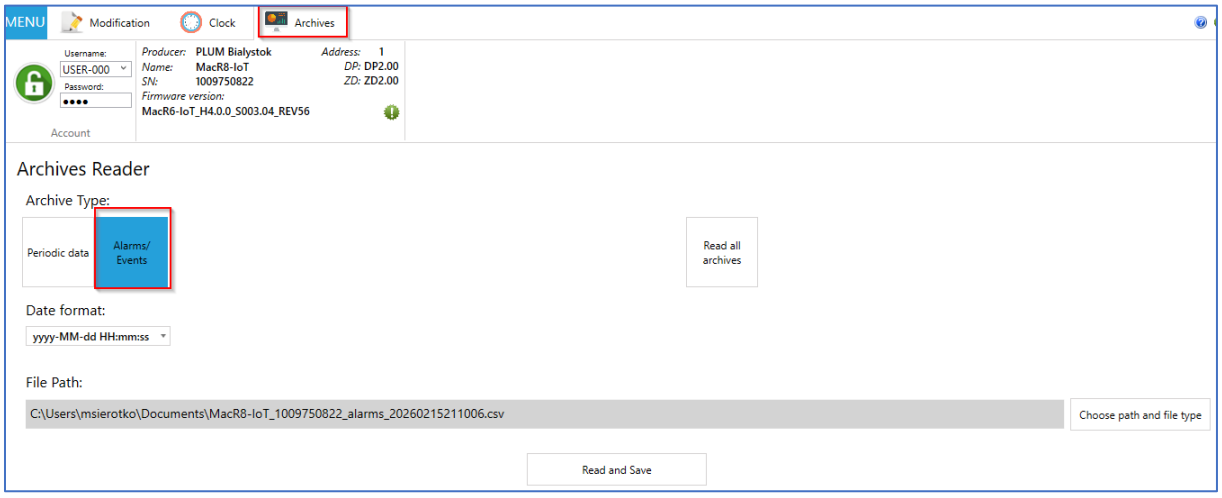
- **Device Parameters table**



Output file contains list of all parameters in the device – so called DP table in *.csv format.

Example Filename: _2553_1004178176_config.csv

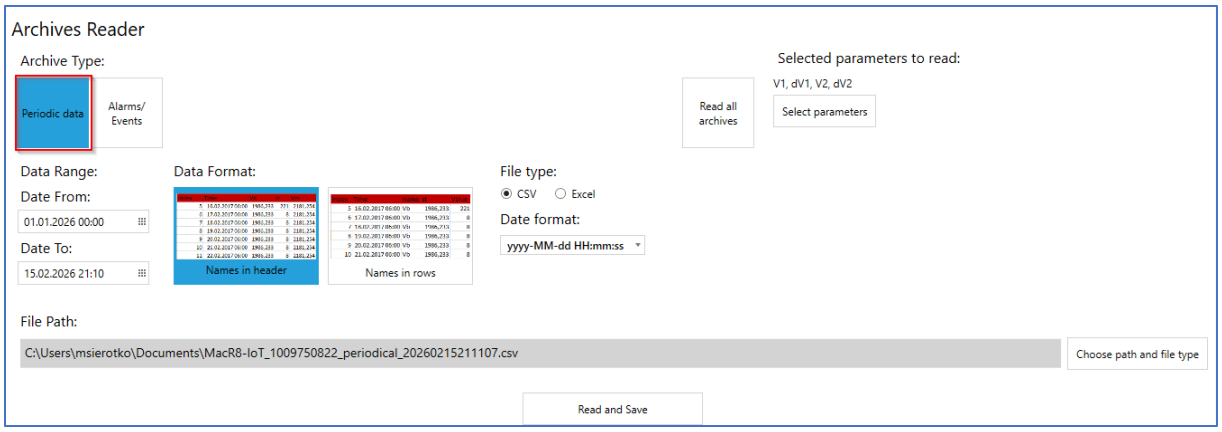
- **Events file**



Events file contains full list of events happened during device lifetime with the beginning and end date. Also lasting alarms are included in this list. Output file is saved in *.csv file format.

Example Filename: _1004178176_alarms_20220412123546.csv

- **Periodic data**



Output file contains a log with archival parameters which were registered by the device. Time range of this

parameter must not be shorter than 6 months, preferably longer. Output file is in *.csv file format.

Example Filename: _1004178176_periodical_20220412124044.csv

- **SUMMARY**

PLUM Technical Staff shall receive 3 files:

- Device Parameters table: data logger_2553_1004178176_**config**.csv
- Device Events table: data logger_1004178176_**alarms**_20220412123546.csv
- Device archives (at least 6 months back): data logger_1004178176_**periodical**_20220412124044.csv

11.5. Device erasing

Device erasing can be done using software or mobile app. Erasing requires additional authorization.

Steps to follow:

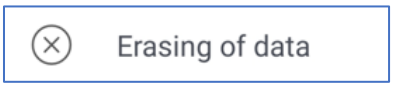
- Start the software, go to the Table view
- Find parameter ERASING
- Type in this parameter one of the following values

Values possible to set:

1	Settings reset – device erases settings and configuration
2	Counters reset – device erases values of the counter
4	Archives reset – device erases all the collected archives
8	Alarms reset – device erases alarms list

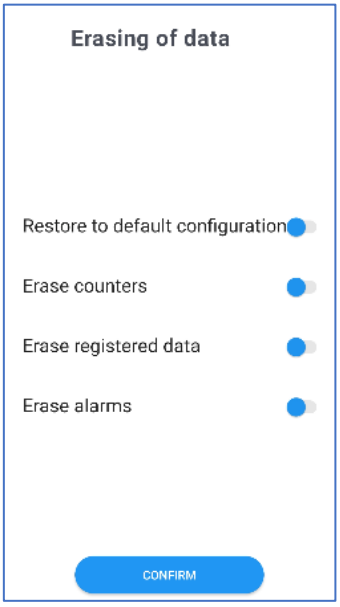
It is possible to combine the erasing types, by typing for example value 15, which means full device erasing (1+2+4+8).

Software erasing using mobile app:



Erasing of data is performed by choosing types of data to erase.

Once chosen app will ask for the password to perform the operation. Password required for this is a USER password.



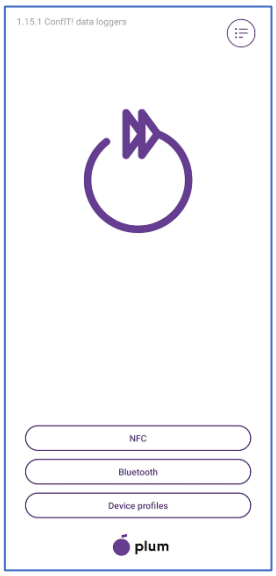
12. Accessories

12.1. Transmission interface

The OptoBTEx 2 transmission interface is designed to read data from data loggers, including MacR8, and battery converters equipped with an optical interface (OPTO-GAZ). Data can be read onto a laptop or other device equipped with a Bluetooth communication port. The transmission interface allows data to be read from devices located in potentially explosive atmospheres. Detailed technical data can be found in the "OptoBTEx 2 User Manual" documentation.

To correctly connect the MacR8 to this interface, attach the OptoBTEx2 optical sensor to the optical connector on the device with the "diode" on the right side.

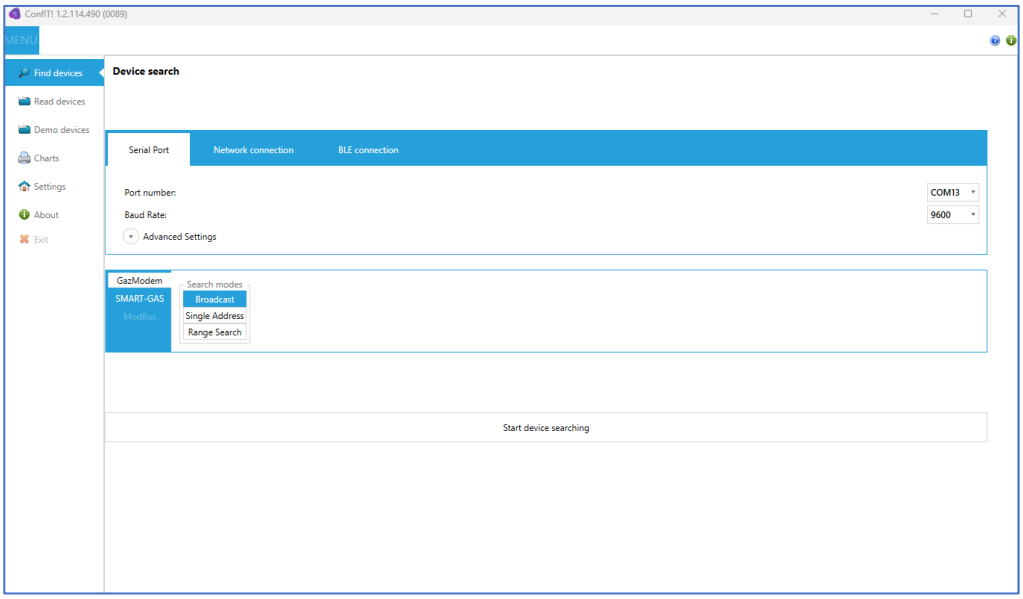
12.2. Software



- **ConfIT! data loggers** – an application designed for use on smartphones and tablets running Android 7.0 or later. The application allows you to configure the basic parameters of the device and read archived data. A description of how the application works is provided in its user manual. The application is available for download from the Google Play Store https://play.google.com/store/apps/details?id=com.plum.pl.confit

ConfIT! data loggers
QR code link:

- **ConfIT!** - application designed for use on a computer running MS Windows 7 or later. The application allows you to configure the device and read archived data. A description of how the application works is provided in its user manual. The application is available for download from the website https://gas.plum.pl/en/



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