

MacR6-Z0 & MacR6-Z0-P

Pulse / pressure / temperature recorder



USER MANUAL

PROGRAM VERSION: MacR6-Z0_H2.1.0_S001.04_V1307
MacR6-Z0-P_H2.0.1_S001.04_V1307

DOCUMENT REVISION:
11-2018



MAIN MENU



SAFETY (A)



SETTINGS (D)



MAINTENANCE (F)



TECHNICAL DATA (B)



TRANSMISSION (E)



DATA READOUT (G)



INSTALLATION (C)



EXPLOITATION (F)



ACCESSORIES (H)



SAFETY CONDITIONS

With the help of signs presented below there are important informations distinguished in order to make the main functionalities and safety rules more clarified.



Important information about safety rules or significant device feature



Important information about device usage

Directive WEEE 2012/19/UE

- Utilize the package at the end of usage period in proper recycling company.
- Do not dump the product with normal garbage.
- Do not burn the product.

SAFETY



Exploitation of the device is permitted only in areas, where turned GSM modem on will not interrupt other equipment, i.e. medical instruments.



MacR6 data logger is explosive-proof device designed to be installed in explosive hazardous zones 0, 1, 2. In order to ensure safety rules, before the installation it is highly required to read the INSTALLATION chapter cautiously.



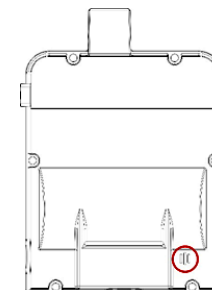
Do not install the device in vicinity of strong electric and magnetic field.



Always use the latest revision of this documentation, which can be obtained from the manufacturer. Please ensure that this documentation is related to current device performance including firmware version and serie.



Do not cover the pressure compensation holes designed for making the atmospheric pressure and internal device pressure equal.





CONTENTS – TECHNICAL DATA

MAIN MENU

BASIC INFORMATION B-2

TECHNICAL AND METROLOGICAL DATA B-3

HARDWARE VARIANTS B-6

TECHNICAL DATA



BASIC INFORMATION

MacR6-Z0 is the telemetric pulse from gas meter recorder. Programmed parameters, as pulse factor and combustion heat allow for calculation and registering gas energy and volume consumption.

MacR6-Z0 data logger has ability to count pulses from gas meter using internal terminal board - cable connection, or directly by magnetic coupling with gas meter totalizer. Universality of this solution makes MacR6-Z0 compatible with diaphragm, rotary and turbine gas meters. Depending on the hardware variant there is also possibility of gas pressure and temperature measurement. Recorder is supplied from internal battery. It communicates with GSM network using 2G internal modem (3G as an option) basing on GPRS technology and communication protocol GAZMODEM2.

The recorder is also equipped with an optical interface in accordance with IEC 62056-21 standard, which provides communication with device using GAZMODEM2 protocol to read and modify devices parameters. The recorder is equipped with accelerometric sensor, which allows for device position change (i.e. dismantling from gas meter) registration.

The recorder can be equipped with two digital OC-type outputs.



TECHNICAL DATA



TECHNICAL AND METROLOGICAL DATA

Ex marking:	Ⓔ II 1G Ex ia IIA T4 Ga
Certificate:	Certificate no. FTZÚ 16 ATEX 0051X
Special conditions of use in explosive hazardous zones:	The device is designed for work in explosive hazardous zones 0, 1, 2, and in the low risk of mechanical impacts environment according to EN-60079-0. It is recommended to install the device outside the cabinets, cages, places where resonances are not present. In order to prevent the electrostatic charges it is flatly denied to brush the housing using the dry baize.
Electrical inputs/outputs:	Two non-potential digital inputs (DI1, DI2) – pulses from the gas meter, from tamper switch security control. Two non-separated digital outputs OC-type to the control systems (as an option).
Interference sensors:	External magnetic field other than gas meter sensors. Case opening sensor. Dismantle from gas meter internal sensor.
Intrinsically safe circuit parameters:	DI terminals 1,2 (DI1); 3,4 (DI2) Uo=7,5V, Io=0,152mA, Ui=7,5V, Li=0, Ci=80pF DO terminals 5-6 (DO1); 6-7 (DO2) Ui=7,5V, Io=2mA, Ui=7,5V, Li=0, Ci=11nF;
Power supply:	D-size Lithium-thiolyn 3,6V/17Ah battery. LS33600 manufactured by SAFT
Battery lifetime:	Depending on registration period, amount of monthly reports, current temperature, GSM signal level. Example: minimum 5 years with transmission thrice a day (maximum 3 minutes each) , CSQ level 28, temperature 21°C, registration period 60 minutes.

TECHNICAL DATA



Battery replacement:	Outside the Ex zone, allowed only for qualified specialists.
GSM modem:	Double-band GSM modem 900/2100MHz
GSM antenna:	External or internal double-band GSM/DCS with 5dBi maximum gain
Communication port:	Optical interface in accordance with IEC 62056-21 Transmission speed 9600 N81
Ambient temperature range:	$-30^{\circ} \leq T_a \leq +55^{\circ}\text{C}$ Modem works in full temperatures range
Housing protection level:	IP66
Housing UV resistance	UL746C standard
Atmospheric conditions:	Open space conditions
Relative humidity:	Maximum 95% in 55°C temperature
Conditions of use:	Do not use in vicinity of strong electromagnetic fields sources, or in places which significantly muffle the GSM signal
Weight:	c.a. 300g
Dimensions:	136x90x40 136x114x40 (including cable gland)
Pressure sensor:	Gauge or absolute sensor ended with metric M12x1.5 screw Sensor dimensions: length with cable gland – 92mm, without cable gland – 72mm, diameter – 24mm

TECHNICAL DATA



Pressure sensor:	Maximum permissible errors for pressure	
	Ambient temperature	
	20 °C (± 3 °C)	(-30 ÷ 55) °C
0-0.1 bar G 0-6 bar G 0,8-6 bar Abs 2-10 bar G	$\pm 0,5$ % of range value	$\pm 0,75$ % of range value
Temperature sensor:	Pt1000 CT4-type sensor, casing diameter 5.8mm, casing length 48mm	
	Maximum permissible errors for temperature	
	Ambient temperature	
	20 °C (± 3 °C)	(-30 ÷ 55) °C
(-30 ÷ 65) °C	$\pm 0,3$ %	$\pm 0,5$ %

TECHNICAL DATA



HARDWARE VARIANTS

Depending on requirements PLUM Ltd. offers following variants of MacR6-Z0:

Type-Design	Version	Features	Distinguishing mark	Registered parameters
MacR6-Z0	data logger MacR6-Z0	<ul style="list-style-type: none">• Direct or cable gas meter connection• Two digital OC-type outputs	<ul style="list-style-type: none">• PG7 cable gland or plug• FME antenna socket	<ul style="list-style-type: none">• Gas volume• Gas energy
MacR6-Z0-P	Data logger MacR6-Z0-P/ LPT	<ul style="list-style-type: none">• Only cable gas meter connections• Gas pressure measurement• Gas temperature measurement• Two digital OC-type outputs as an option	<ul style="list-style-type: none">• PG7 cable gland or plug• External pressure sensor• External temperature sensor• Cable to connect gas meter• FME antenna socket	<ul style="list-style-type: none">• Gas volume• Gas energy• Gas pressure• Gas temperature
MacR6-Z0-P	Pressure logger MacR6-Z0-P	<ul style="list-style-type: none">• Gas pressure measurement• Two digital OC-type outputs as an option	<ul style="list-style-type: none">• External pressure sensor• FME antenna socket	<ul style="list-style-type: none">• Gas pressure
MacR6-Z0-P	Two pressure logger MacR6-Z0-P/ 2P	<ul style="list-style-type: none">• Two separated pressures measurement (before and after reduction)	<ul style="list-style-type: none">• Two external pressure sensors• FME antenna socket	<ul style="list-style-type: none">• Gas pressure
MacR6-Z0	data logger MacR6-Z0/ 2V	<ul style="list-style-type: none">• Two gas meter connection, only cable	<ul style="list-style-type: none">• Two PG7 cable glands• FME antenna socket	<ul style="list-style-type: none">• Gas volume• Gas energy

TECHNICAL DATA



- **MacR6-Z0** – volume logger

PG7 cable gland or plug, FME socket with GSM antenna; angle or cable type. Direct installation on gas meter using dedicated adapters and magnetic coupling or cable connection.

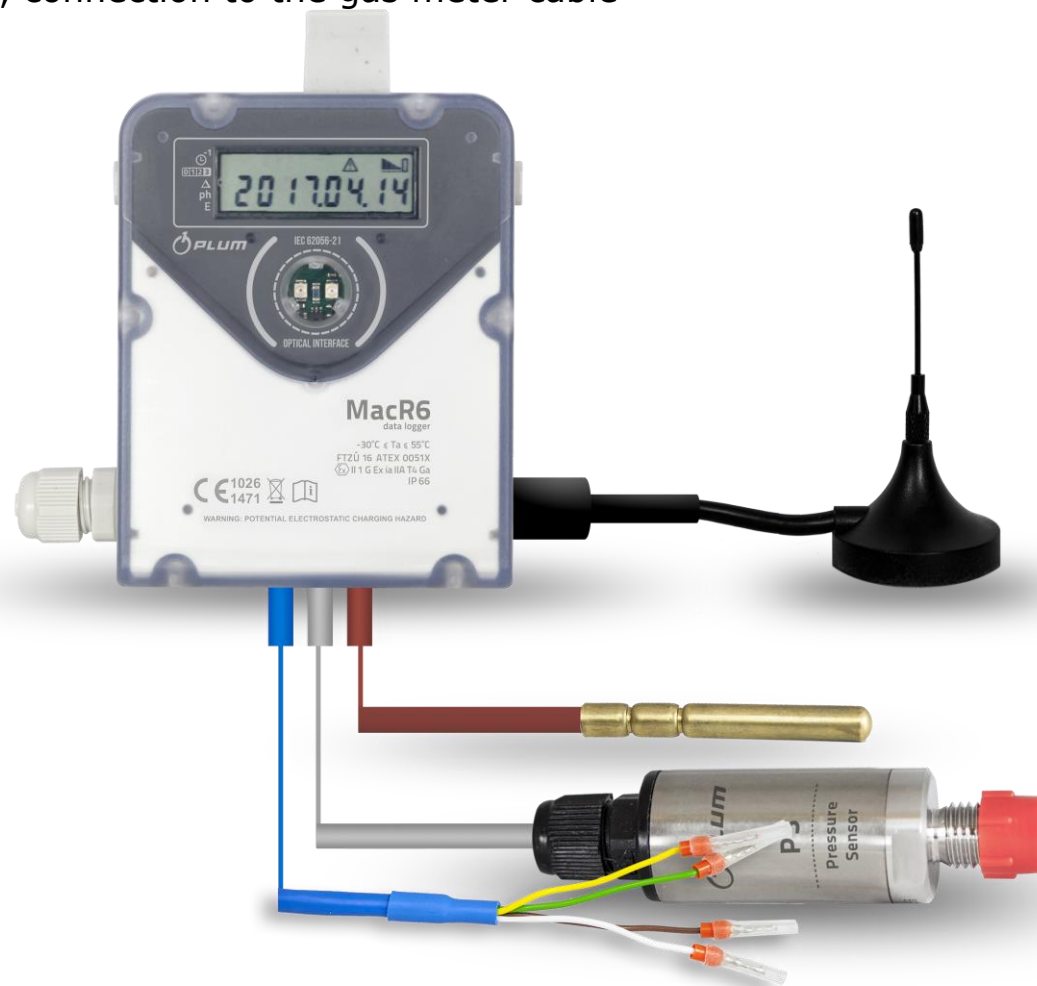


TECHNICAL DATA



- **MacR6-Z0-P/LPT** – pulse, temperature and pressure logger

PG7 cable gland or plug, FME socket with GSM antenna, external pressure sensor, Pt1000 temperature sensor, connection to the gas meter cable



TECHNICAL DATA



- **MacR6-Z0-P** – pressure logger

FME socket with GSM antenna, pressure sensor

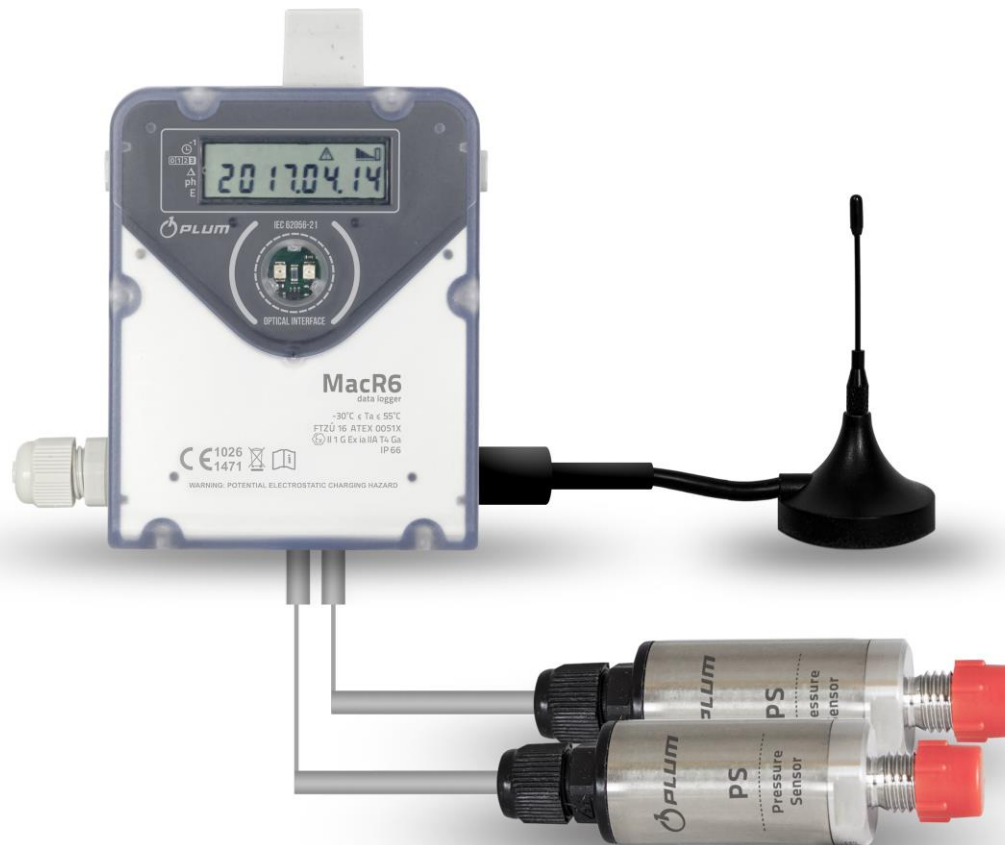


TECHNICAL DATA



- **MacR6-Z0-P/2P** – two pressure logger:

PG7 cable gland or plug, FME socket with GSM antenna, two pressure sensors



TECHNICAL DATA



- **MacR6-Z0/2V** – volume logger:

Two PG7 glands, FME socket with GSM antenna. Designed for work with two separated gas meters – two standalone counters. Only cable connection.





CONTENTS - INSTALLATION

MAIN MENU

SIM CARD ASSEMBLY	C-3
DEVICE ASSEMBLY	C-5
BK-TYPE AND UG-TYPE GAS METER ASSEMBLY	C-6

INSTALLATION



RF-1 – TYPE GAS METER ASSEMBLY	C-8
ASSEMBLY USING TERMINALS BOARD	C-15
SENSORS CONNECTION	C-20

INSTALLATION



SIM CARD ASSEMBLY

To insert the SIM card take off the front cover. Remove six TORX T10 screws from back of the cover. Next place the Micro SIM card into the holder as shown in the picture. There is no need to remove the battery to insert the SIM card. SIM card must meet the requirements of ETSI TS 102221 v 9.0.0 or Embedded-SIM - it is essential for proper device operation in whole temperatures range. In the next step put the device together and tighten the screws with 0,65-0,75Nm momentum.



SIM card assembly in MacR6-Z0



SIM card assembly is allowed only out of the hazardous explosive zone.

INSTALLATION



Delivered devices may have the display turned off. That is the storage mode in order to save the battery energy. Turning on the device is able by placing the magnet (i.e. OptoBTEx head) to the OPTICAL INTERFACE window. This will cause showing the "SLEEP 3" information on the display. All of indicators on the left side of the display will flash, and then they will be shutting down in a row. Repeated magnet closing before the indicators disappearing will result the "SLEEP 2" information on the display, next "SLEEP 1" and "START" - after the indicators shutdown the device will turn on. Correct execution of this action is shown in form of movie under the QR code.



INSTALLATION



DEVICE ASSEMBLY



MacR6-Z0 data logger is the device designed for installation in hazardous explosive zones 0, 1, 2.



Connecting external antenna cable is allowed only out of the explosive zone.



Antenna socket should be covered by special sleeve attached to the antenna cable.



Minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres are prescribed in Directive 1999/92/EC of the European Parliament and of the Council of 16 December 1999 (ATEX 137 'Worker Protection Directive').



Installation environment must guarantee the strong GSM network signal of the vendor whose SIM card is used in MacR6.

INSTALLATION

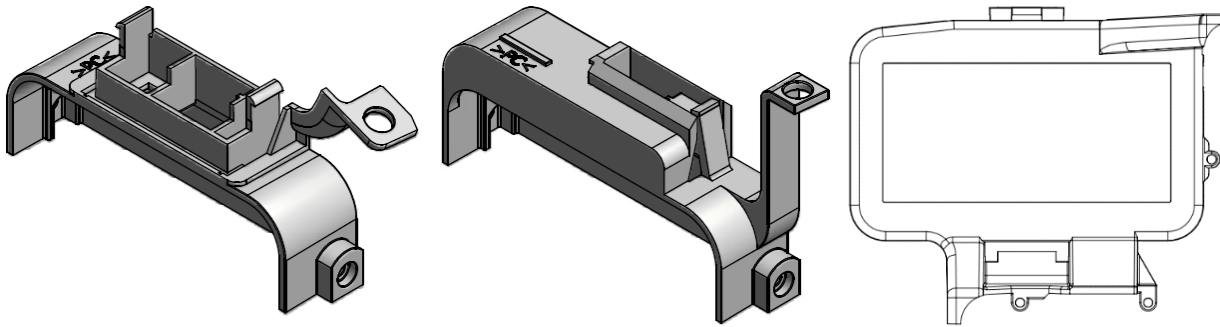


BK-TYPE AND UG-TYPE GAS METER ASSEMBLY

MacR6-Z0 allows for direct connection using magnetic coupling with BK-type and UG-type gas meter totalizers

MacR6-Z0 assembly process:

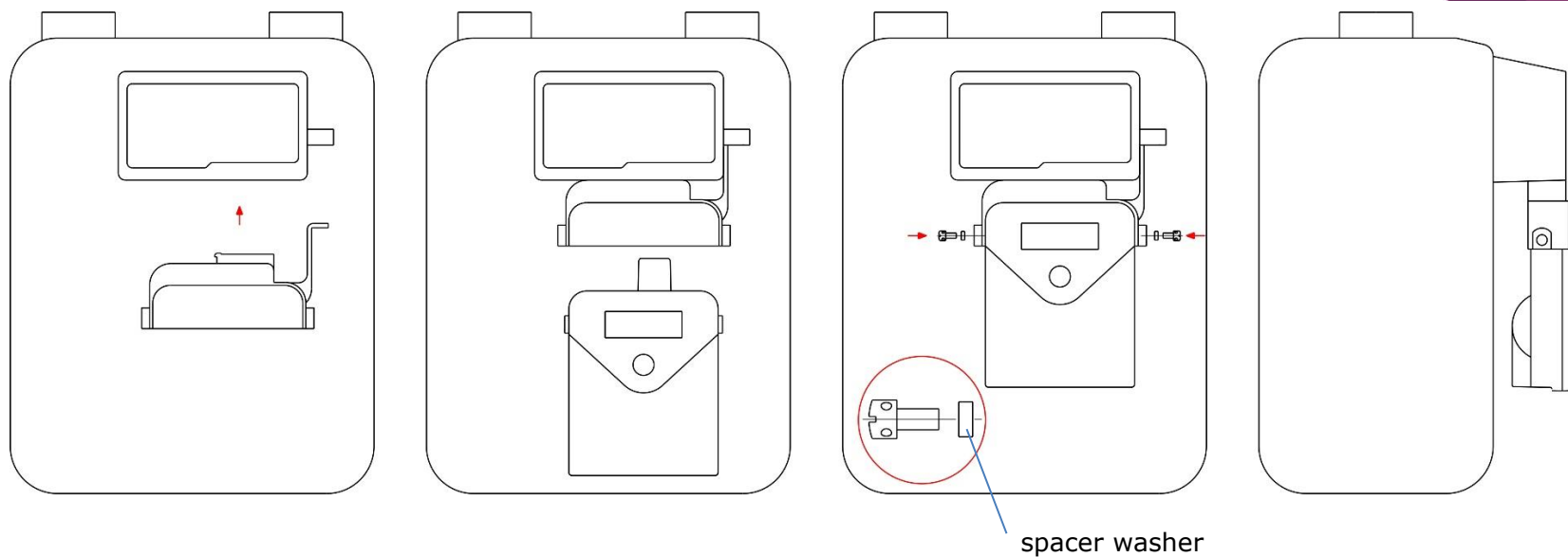
- Place the proper adapter to the gas meter totalizer



Adapters to the UG, GL-type, BK-type and RF-1 gas meters

- attach the data logger to the adapter by sliding it in with the exserted part on the top to the gas meter totalizer, and to tighten two side sealing screws.

INSTALLATION



UG, GL, BK - type gas meter assembly



MacR6-Z0-LPT logger does not support direct pulse counting. It is available only using cable connection.

INSTALLATION

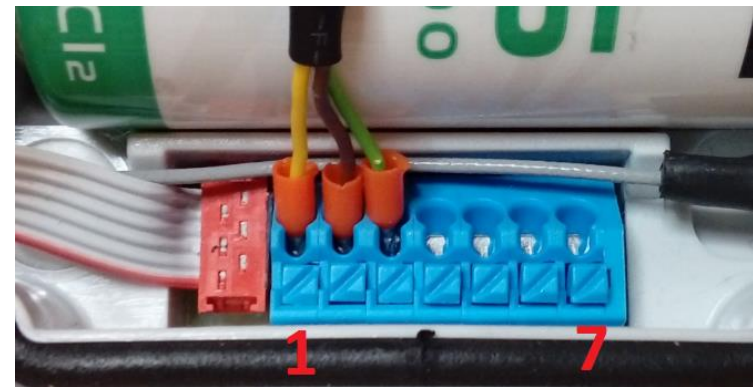


RF-1 – TYPE GAS METER ASSEMBLY

MacR6-Z0 on RF-1 gas meter type:

- replace the default front cover for the additional with emitter and cable inserted through – delivered with the adapter
- connect the wires to the terminals board in MacR6-Z0 device:

pin	Signal	Wire
1	Pulse input Digital Input (DI1+)	Yellow
2	GND	Brown
3	Tamper Switch (DI2+)	Green

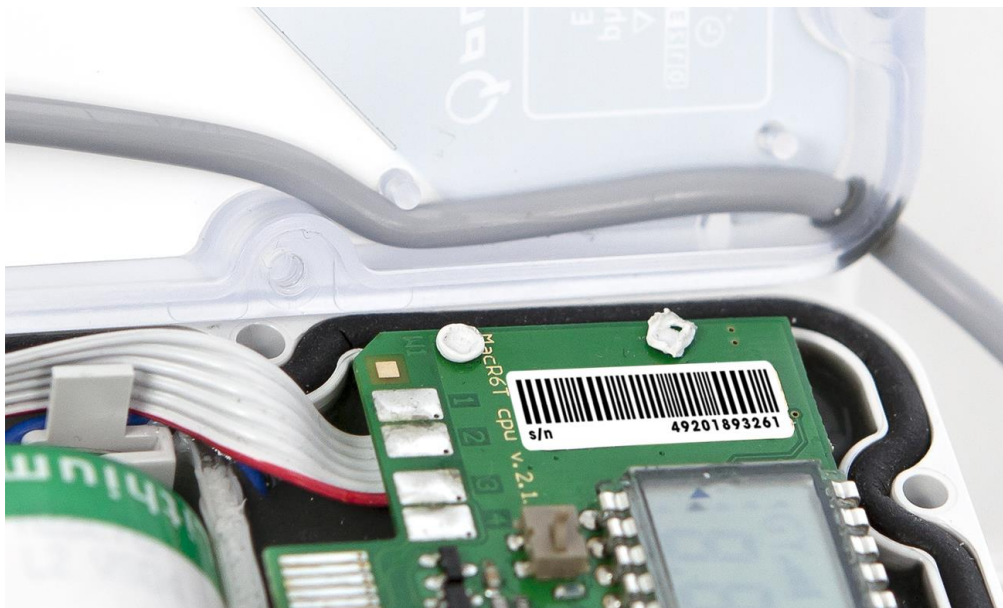


Terminals board in MacR6-Z0 recorder

INSTALLATION



- arrange the cable inside the device cover between the edge and blocking bolts to avoid the cable squeezing, or other damage caused by exerted elements of electronic parts

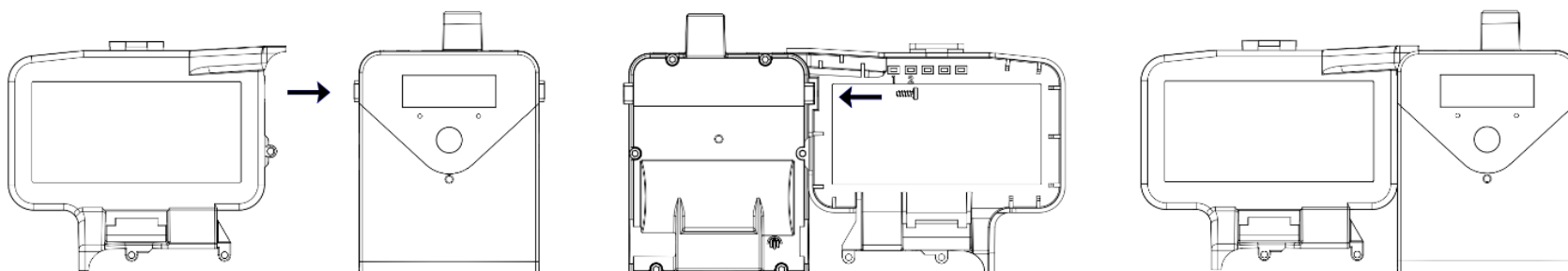
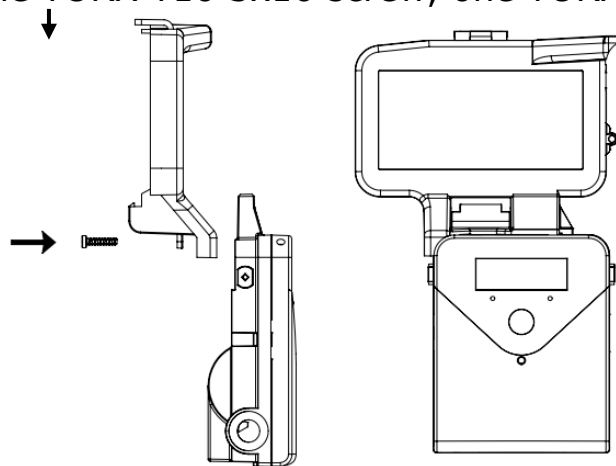


- preliminarily tighten the cover with screws only in holes, which will not be used to attach the adapter

INSTALLATION



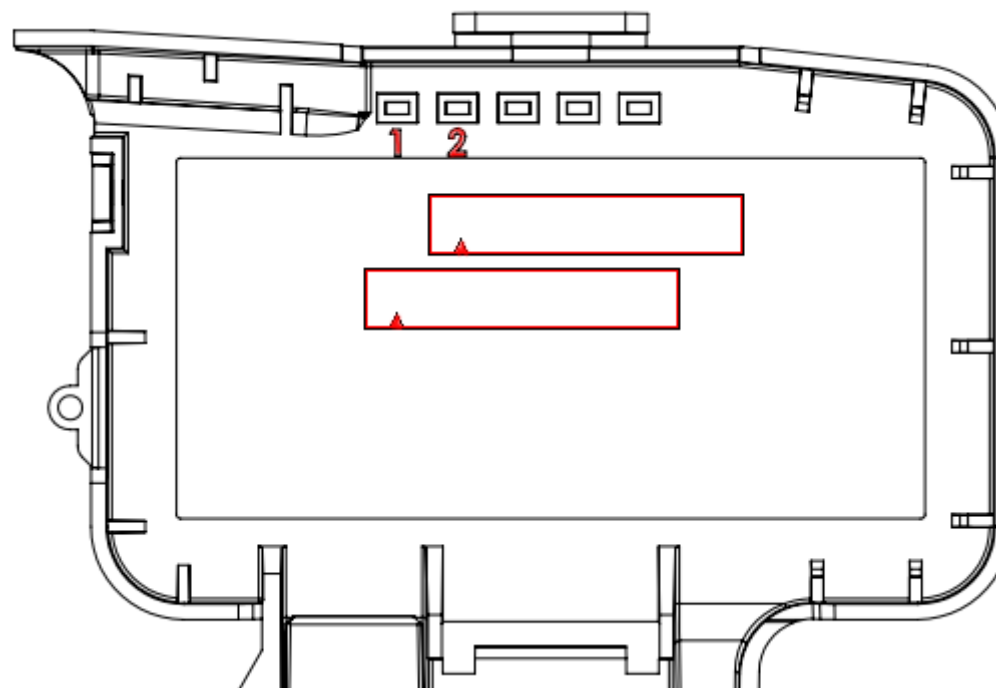
- Anchor the adapter on the recorder by tightening it on the top of the cover instead of two standard screws - top montage, use two TORX T10 3x16 screw. Instead of one screw on the left side and side screw - side montage - use one TORX T10 3x16 screw, one TORX T10 3x6 screw



INSTALLATION



- Place the pulse emitter in ① or ② position, according to signature on RF-1 totalizer

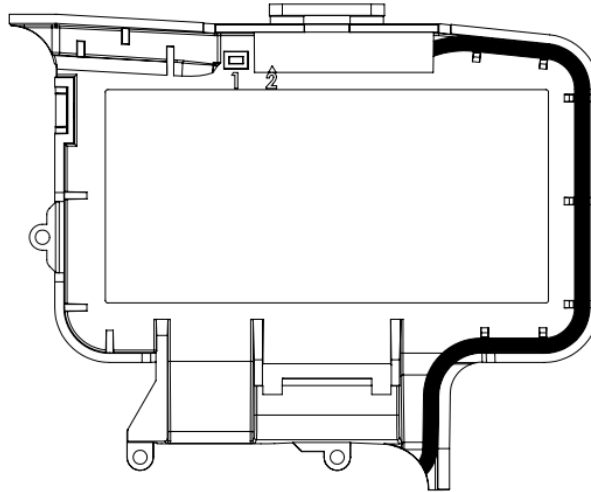


Pulse emitter position marking depending on RF-1 gas meter totalizer type (① or ②)

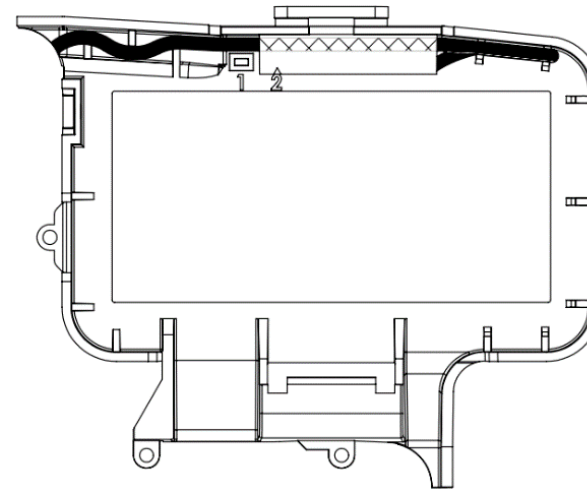
INSTALLATION



- Arrange the cable inside the adapter not let it to protrude out of its edges. In case of side montage arrange the cable before placing the pulse emitter, because it will be lead under the emitter.



Top montage pulse emitter cable arrangement

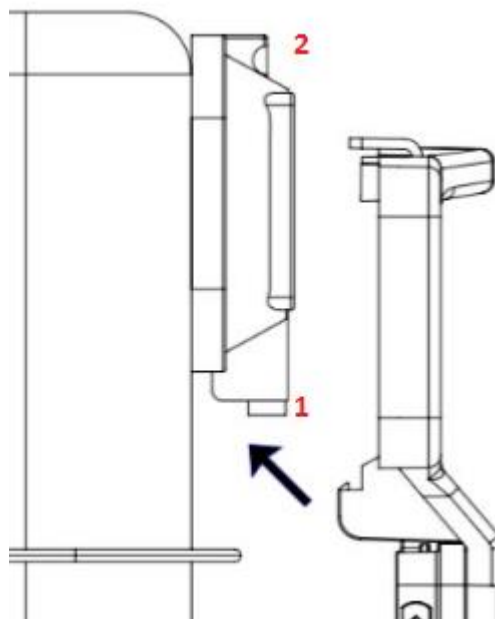


Side montage pulse emitter cable arrangement

INSTALLATION



- Anchor the adapter on gas meter totalizer - in first order place the lower part of the adapter, and then slide the upper part with pulse emitter in.

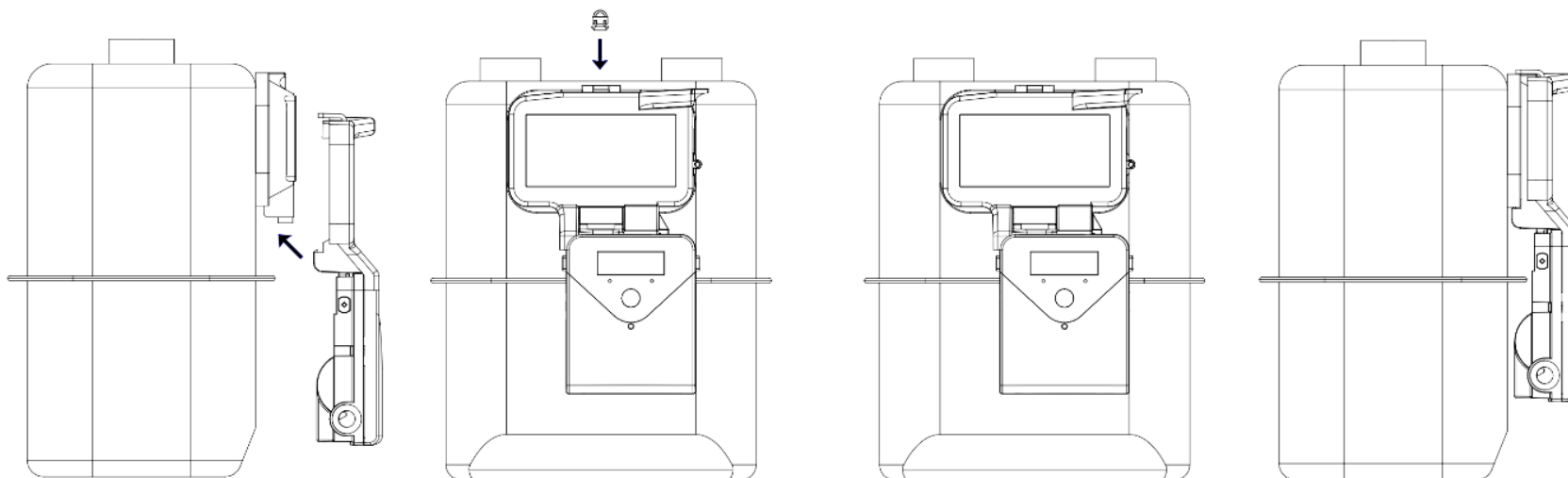


Anchoring the RF-1 adapter

INSTALLATION



- Lock the adapter using sealing plug



Sealing the RF-1 adapter

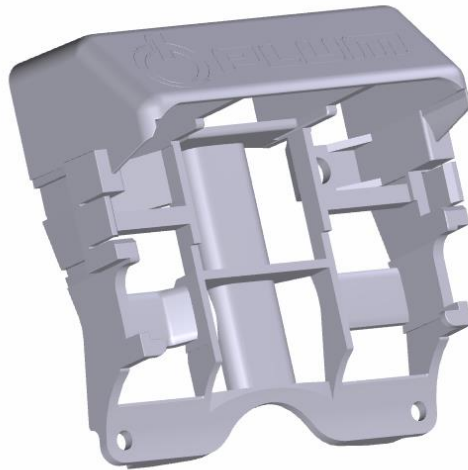
INSTALLATION



ASSEMBLY USING TERMINALS BOARD

Gas meters not specified above are also supported using the terminal gland and pulse cable. Data logger placement is utilized by using dedicated mounting kit.

- attach the holder to the wall using mounting pegs, or horizontally and vertically to the gas pipes using cable ties
- place the recorder inside the holder until it clicks



INSTALLATION



- Place the dedicated by the gas meter manufacturer pulse emitter, or connect the plug to the rotary or turbine gas meter pulse output
 - Replace the plug inside the device cover by the cable gland with external sealing ring.
- Remove the plug
 - insert the cable gland to the cover, and tighten it with 0,3Nm momentum - required key 14mm



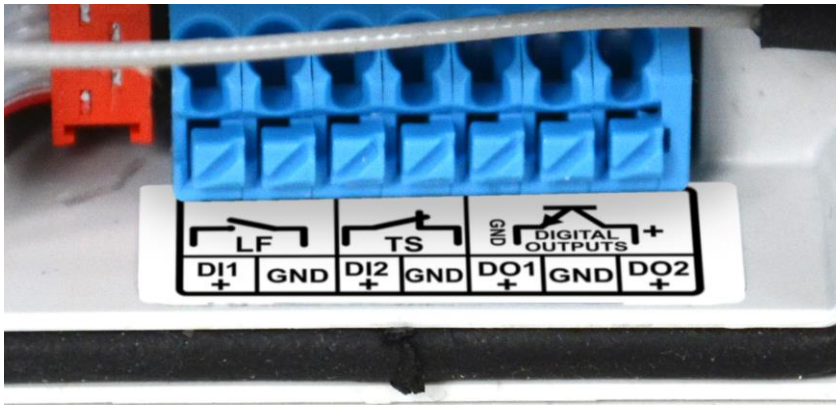
Plug and PG7 cable gland in MacR6-Z0 recorder

- Put the pulse emitter cable through cable gland. The diameter of the cable must fit the range from 3,5 to 6mm. Tighten the cable inside the gland using 13mm key simultaneously not letting the gland rotating itself in the recorders cover.

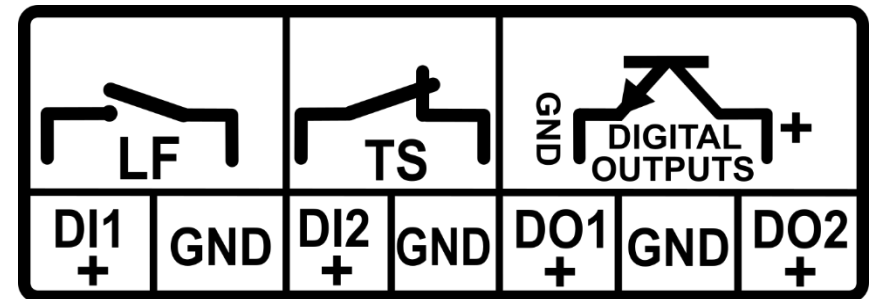
INSTALLATION



- Connect the wires of pulse emitter cable to the MacR6-Z0 terminal board.



MacR6-Z0 terminal board



In case of two-wire external emitter connection, make the short circuit between DI2+/GND [pin3/pin4] terminals.

INSTALLATION



CONNECTION EXAMPLE USING CABLE ENDED WITH RJ-11 CONNECTORS

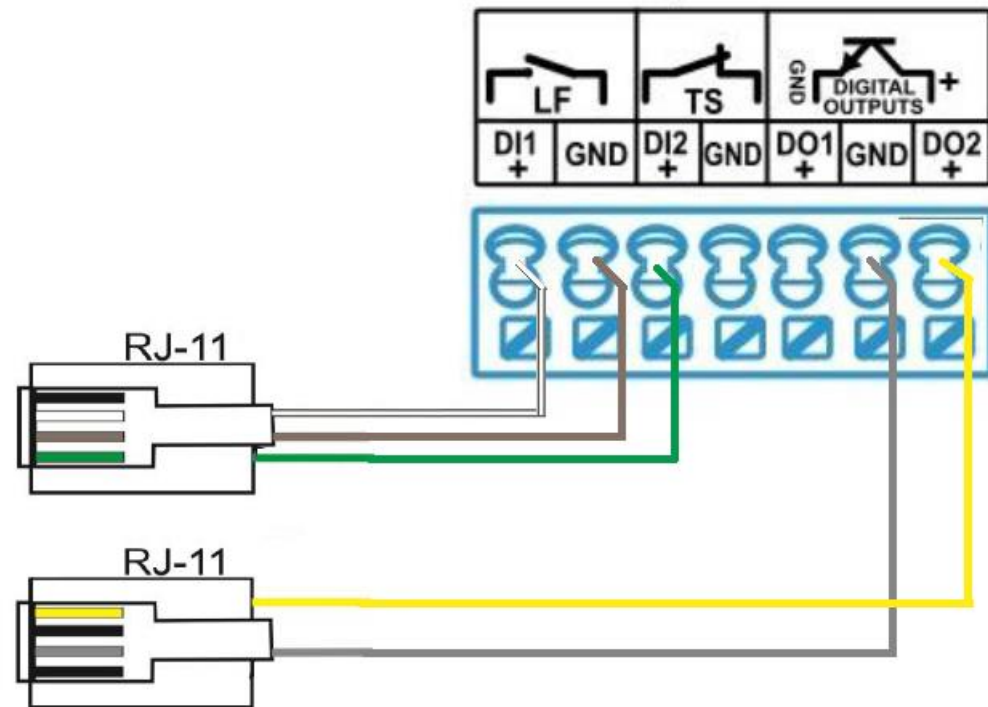
Connection example with the use of optional RJ-11 ended cables:

Connector 1:

1. NOT CONNECTED
2. WHITE – DI1+/LF
3. BROWN – GND
4. GREEN – DI2+/TS

Connector 2:

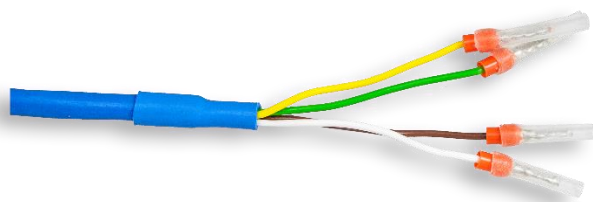
1. YELLOW – DO2+
2. NOT CONNECTED
3. GRAY – GND
4. NOT CONNECTED



INSTALLATION



- In MacR6-Z0-P connect the recorders blue pulse input cable with the pulse input plug coming from the gas meter or with external pulse emitter.



Wire colour	Signal
Green	Pulse input DI1+
Brown	GND
Yellow	Tamper switch DI2+/TS*
White	GND

* gape between TS and GND causes an alarm



If external pulse emitter is equipped with unchangeable cable it is required to connect it with recorders pulse input cable using Ex junction box according to EN 60079-14.

INSTALLATION



SENSORS CONNECTION

- **MacR6-Z0-P/LPT:** Connect the pressure sensor to the gas flow installation. It is required to connect the sensor using the shut-off valve.



Pressure sensor for MacR6-Z0-P device

Before assembly pressure sensor it is required to reset its indications (compensation of atmospheric pressure). It can be done via Android application (by option in menu Options/Pressure Zero/Make fixes and Save data) or via PlumCONF application (set „P offset st.” parameter to value: 1). „P CAL” will be shown on LCD.

After pressure sensor assembly it is recommended to perform SEr 8 menu to begin pressure measurement test (measurement every 5 seconds during one minute). Value of pressure will be shown on LCD.

INSTALLATION



- **MacR6-Z0-P/LPT:** Connect the temperature sensor to the gas flow installation.



Temperature sensor for MacR6-Z0-P device



Maximum cable length between external pulse emitter and MacR6-Z0 logger equals 10 meters.



In case of flooding the opened device immediately take off the battery. That device has to be examined by the manufacturer.



Protection level will be kept only with proper cables diameters usage, tightning cable glands, sealing ring arrangement and tightning the front cover with 0,65Nm momentum (maximum 0,75Nm).



Battery replacement, SIM card insertion and external antenna cable connection are allowed only out of the the hazardous explosive zone.



CONTENTS - SETTINGS

MAIN MENU	CONFIGURATION USING OPTOBTEX AND DATA LOGGER CONFIGURATOR APPLICATION	D-2
	CONFIGURATION PROCESS.....	D-3
	CONFIGURATION USING OPTICAL INTERFACE AND PLUMCONF SOFTWARE	D-5
	TRANSMITTED DATA	D-11
	REGISTERED DATA	D-12
	EMERGENCY REPORTS - ALARMS.....	D-13
	ON DISPLAY MENU	D-14
	SERVICE MENU.....	D-18

SETTINGS



CONFIGURATION USING OPTOBTEX AND DATA LOGGER CONFIGURATOR APPLICATION

Necessary elements for device configuration:

- OptoBTeX optical interface
- smartphone or tablet with Android OS equipped with Bluetooth adapter
- installed Data logger application on the device

Application available to download from Google Play website or Play Store.

<https://play.google.com/store/apps/details?id=com.plum.konfiguratorRejestratory> - „Plum APK” account

QR code redirects to application link:



SETTINGS



CONFIGURATION PROCESS

1. Turn on the OptoBTEx interface by closing



ferromagnetic element to the place marked as **ferromagnetic G**. On the front the blue indicator will start to blink.

- 2.

Put the OptoBTEx to the OPTICAL INTERFACE window. Blue LED has to be always at the right side of the recorder. On the display the icon (G) will appear. > more details: ON DISPLAY MENU



- 3.

Turn on the Data logger configurator application. Establish the connection between the smartphone and the OptoBTEx head.



If the Bluetooth is not enabled, the application will inform about this and will ask for turning it on. While establishing connection there is required to put PIN from the OptoBTEx side sticker (1234) - only at the first time.


- 4.


After the connection is established, the recorder ID will be read. On the display the icon (F) will

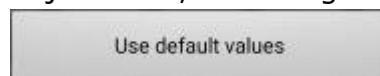


start to blink. > more details: ON DISPLAY MENU *Readout will cause the basic parameters configuration window appear such as: pulse factor, gas meter counter, connection with gas meter type.*

- 5.

 Settings option allows for opening window, where most common values for most devices - i.e. data server address can be programmed.


Choosing  more parameters allows user for additional parameters adjustment, including factory defaults.

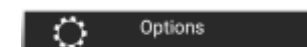


- 6.

To save the data press the button



By pressing  Options button the new window will appear where parameters like time synchronization are included. The application will recognize current time (daylight saving time, winter time).



SETTINGS



7.

During data saving on the device special autodiagnostic mode can be executed (in case of changing measurement data: counter value, pulse factor), which is displayed as "SEr 5" sign.



This mode lasts for about 60 seconds, and it causes DP structure, DP values, current data sending to the system. If this mode do not appear automatically it has to be done manually basing on SERVICE MENU

If during "SEr 5" display the diagnostic phone number will be programmed (from "Options" menu), then device will additionally send the text message with installation summary to this number.

8.

Remove the OptoBTE interface. (G) icon should disappear.

After finishing the installation check on the display if the counter value was set properly.

SETTINGS



CONFIGURATION USING OPTICAL INTERFACE AND PLUMCONF SOFTWARE

Necessary equipment:

- Optical interface which allows for local communication with PC - OptoBTEx or Opto - USB interface.
- PC computer with Windows 7 or newer, equipped with internal or external Bluetooth adapter or USB plug, and PlumCONF application

PlumCONF application is available free of charge:

<http://plummac.com/index.php/en/products/gas/software/macodczyt-2#download>

SETTINGS



List of specified parameters in DP table. It is recommended to program the parameters keeping the order from the table below. Depending on recorder variant part of the parameters can be inactive, invisible or have different index.

Parameters name	DP index no.	Description															
PIN	34	PIN code for installed SIM card.															
Serv Menu	53	Parameter allowing for starting the service menu using local transmission. 1 - SEr 1; 2 - SEr 2;... 5 - SEr 5 - installation mode															
V	0	Gas meter counter															
imp LF	31	<p>Gas meter pulse factor: Number of dm³/litres equal to 1 pulse [dm³/imp] (1dm³ = 0.001 m³), for example:</p> <table> <tr> <th colspan="3">Pulse factor</th></tr> <tr> <th>Gas meter [m³/imp]</th><th>Gas meter [imp/m³]</th><th>Type in MacR6 [dm³/imp]</th></tr> <tr> <td>0,01</td><td>100</td><td>10</td></tr> <tr> <td>0,1</td><td>10</td><td>100</td></tr> <tr> <td>0</td><td>1</td><td>1000</td></tr> </table>	Pulse factor			Gas meter [m ³ /imp]	Gas meter [imp/m ³]	Type in MacR6 [dm ³ /imp]	0,01	100	10	0,1	10	100	0	1	1000
Pulse factor																	
Gas meter [m ³ /imp]	Gas meter [imp/m ³]	Type in MacR6 [dm ³ /imp]															
0,01	100	10															
0,1	10	100															
0	1	1000															
Pulse Inputs Status	50	<p>Connection with gas meter: 2 - cable connection - terminal board 3 - direct connection - magnetic coupling Values 0 and 1 are being set automatically by the firmware. They are related to distinguish gas meter type (BK-type or UG-type)</p>															
Report Hour	24	End of the billing day hour / report hour															

SETTINGS



Report Day	25	<p>End of the billing month</p> <p>Typing value 1, when Report Hour is set to 6 means, that billing month ends at every 1st day of the month at 6am.</p> <p>Value 31 means that every last day of the month is the end of the billing month.</p>
Registration Report Hours	26	<p>Sequence of additional report sending hours - only registered data. Value of this parameter is calculated from 24-bit binary vector, where:</p> <p>bit 0 - 0 hour (midnight)</p> <p>bit 1 - 1 am</p> <p>bit 2 - 2 am</p> <p>...</p> <p>bit 13 - 1 pm</p> <p>bit 23 - 11pm</p> <p>For reports sent at 6am, 12 pm, 4pm, 0 am:</p> <p>Decimal value of the record above is "69697" to set in the parameter. Report on 6am is the result of end of the billing day. Setting this bit to 0 or 1 does not have any influence on sending this report.</p>
Report Delay	27	<p>Setting of the delay in report sending given in minutes according to report hour:</p> <p>0 - no delay (data sent immediately)</p> <p>10 - delay from 0 to 9 minutes</p> <p>20 - delay from 10 to 19 minutes</p> <p>30 - delay from 20 to 29 minutes from report hour</p>
Time Change Auto	41	<p>Clock adjustment:</p> <p>0 - automatic time change according to the local time</p> <p>1 - winter time only</p> <p>2 - daylight saving time only</p>

SETTINGS



NTP Server	46	NTP server address to synchronize devices clock. Can be the IP address or domain name i.e.: ntp.plum.com Address must be available in the SIM card APN space
APN	35	APNs name, which in the SIM card operates. i.e.: internet
Data Server Address	37	Data server address in form of address:port. Can be the IP address or domain name, i.e.: www.ewebtel.com:80, 192.168.0.2:5555
Schedule Type	23	Type of report sending schedule: 1 - report sent daily 2 - report sent weekly 3 - report sent monthly
Registration period	30	Data registration period: set from 1 to 60 minutes as total aliquots of 60.
Hs	33	Heat combustion value
Tel Num	58	Diagnostic phone number - used while installation process. Able to set only while "SEr 5" mode is performing. After setting this parameter the recorder will send the SMS with installation summary. Example: [country dial code w/o +][9-digits phone number] - 48601123456
P Min Alarm	65	Second Lower pressure value to activate alarm
P Max Alarm	66	Second Higher pressure value to activate alarm
P Min Warning	67	First Lower pressure value to activate alarm
P Max Warning	68	First Higher pressure value to activate alarm
P offset st	111	Gauge pressure reset. 1-start reset, 2-offset calculation, 0-calibration offset value reset
P offset val	112	Calibration offset value - calculated

SETTINGS



Additional parameters:

Parameters name	DP index no.	Description
GM Address	54	Serial port address. Programming range: 1-65534
GM Pass	55	USER-000 account password. Programming range: 1-65535
Limit OC	46	OC1 digital input limit [m ³]. 0 value disables this option. Programming range: 0-254
Gasmeter S/N	5	Gas meter serial number – text field up to 40 digits
Alarm Cfg	49	Parameter responsible for data sending in case of occurring alarms given in ZD table. Value of this parameter is calculated from binary vector related to alarms numbers. bit 0 - event with code 0 bit 1 - event with code 1 ... Output value is the decimal value of binary setting.

SETTINGS



PlumCONF software has ability to create the custom tabs (Menu File -> Add tab), where desirable parameters can be chosen from the list of all parameters, with adjusting the order on the list. Using this functionality allows for group values setting.

Custom tab example:

Lp	nr w DP	nazwa	opis	status	wartość parametru	jednostka	modyfikacja	inf.dodatkowe
1	78	DP Ver		10	DP4.32		--	0 ^string
2	34	S SSN		10	18296980			MO ^dword
3	7	Date/Time		10	2016.11.06 22:42:08 Sun		--	0 ^string
4	0	V		08	0	m3		RMO ^long
5	5	Gasmeter S/N		10			MO ^string
6	27	imp LF		10	100	dm3/imp		MO ^dword
7	29	PIN		10	xxxxxx			MO ^string
8	28	Hs		10	40,25	MJ/m3		MO ^short
9	66	Pulse Inputs Status		10	2			MO ^byte
10	57	Time Auto Change		10	1			MO ^byte
11	32	PB		10			MO ^string
12	51	S Report Hour		10	6			MO ^byte
13	52	S Report Day		10	1			MO ^byte
14	53	S Report Hour Type		10	1			MO ^byte
15	38	S Schedule 0		10	FFFFFFFF060001020511			MO ^string
16	39	S Schedule 1		10	FFFFFFFF0A0001020512			MO ^string
17	40	S Schedule 2		10	FFFFFFFF0E0001020512			MO ^string
18	63	Limit OC		10	0			MO ^short
19	69	GM Address		10	1			MO ^word
20	70	GM Pass		10	xxxxxx			MO ^string

N: 0 O: 0 P: 0 COM8 Pr: 9600 N81 OP: 0 NP: 0 Idle

SETTINGS



TRANSMITTED DATA

Report data are sent autonomically by the device according to programmed schedule.

Report data includes:

- Current data
- Data registered with programmed registration period
- Events and alarms

SETTINGS



REGISTERED DATA

Depending on variant the device can save in non-volatile memory parameters like:

- Counters and increments of gas volume and energy
- Pressure
- Temperature

Saving data frequency is determined by the **Registration period** parameter. Data registered by the device is stored in the device for 1 year. Complete readout is able by optical interface.

Automatic time change (winter-daylight saving and the opposite) occurs the uncontinuous in the registered data. Change from daylight saving time to the winter causes two registered samples e.g. from 2am with different registration indexes. Automatic time change can be blocked by setting **Time Auto Change** parameter to support only winter or daylight saving time.

Instead of registered data, the recorder saves also hourly counter value. Also this data is stored for one year, and the readout is able by the optical interface.



EMERGENCY REPORTS - ALARMS

Data is sent autonomically by the device after event occurrence. Example event which generates the alarm in MacR6-Z0 is the state change - circuit break - of the tamper switch. With the information about the alarm there are values of specified parameters, related to the alarm transmitted. Extended information about alarms and registered values can be acquired from the manufacturer.

For each variant there are some specified alarms. For MacR6-PT can be generated alarm about exceeding the pressure range.

SETTINGS

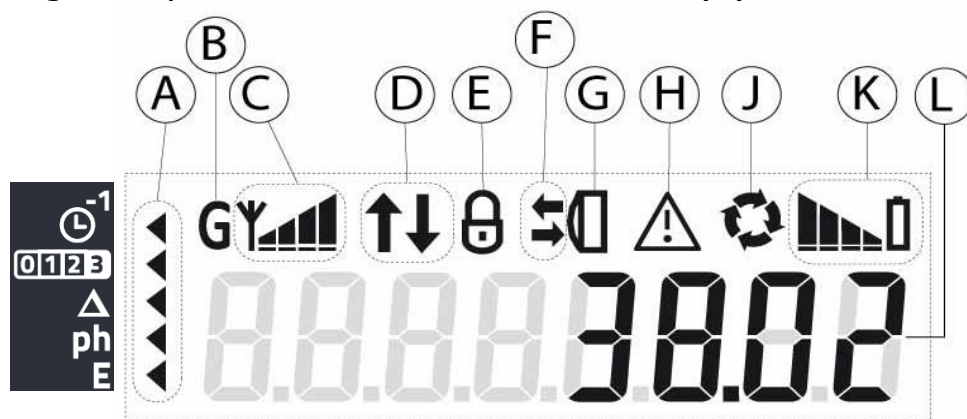


ON DISPLAY MENU

On devices display there are maintenance icons, and periodically basic informations (L):

Display description:

- maintenance icons (B) - (K)
- periodically presented values (L)
 - current date
 - current time
 - parameters signed by the markers on the left side (A)



SETTINGS



Function of the indicators (A):



- time indicator (muted - current billing month / flashing - previous billing month)
- counter indicator / MacR6-Z0 - V value / MacR6-V2 - V1 value / MacR6-PT - P value
- increments indicator
- peak hour indicator
- physical value indicator / MacR6-Z0: muted - volume / flashed - energy // MacR6-V2 - V2 value

Content presented on display, marked as A are pre-defined by the manufacturer. Parameters display configuration can be changed by the user using PlumCONF.

Combinations of the markers on MacR6-Z0 display:

Turned on indicators (A)	On display value (L)	Billing period
	Current date and time	current
0123 ◀	Current value of volume counter	
Δ ◀	Volume increment from the last registration period	
ph ◀	Volume peak hour	
0123 ◀ E ◀	Current value of energy counter	

SETTINGS



Turned on indicators (A)	On display value (L)	Billing period
	Date and time of the end of previous billing period	Previously ended
	Volume counter value from the end of the last billing period	
	Increment of volume from the last billing period	
	Volume peak hour from the last billing period	
	Energy counter value from the end of the last billing period	

SETTINGS



Description of display icons:

GSM MODEM WORK:

Blinking icon - active GPRS connection (connected to APN of SIM card)
Constantly flashing icon - last GPRS connection successful.
No icon - no connection in last attempt.



SIM CARD CONNECTION:

Blinking icon - active modem connection.
Constantly flashing icon - last modem connection successful.
No icon - no modem connection in last attempt.



GSM RANGE:

Blinking icon - SIM card issue.
Constantly flashing icon - SIM registering during last modem connection successful. Signal strength is indicated by the number of bars
No icon - SIM card not registered in GSM network or signal strength does not guarantee proper operation.



SIM LOCK:

Blinking icon - incorrect PIN code in last registration attempt.
Constantly flashing icon - incorrect PIN in last three attempts - SIM card locked, PUK code needed.
No icon - PIN code correct.



DATA TRANSMISSION:

Blinking icon - active data transmission
Constantly flashing icon - UP arrow: successful registered data upload to the server. DOWN arrow: successful configuration download.
No icon - no transmission in last attempt.



LOCAL TRANSMISSION:

Constantly flashing icon - presence of the interface near OPTICAL INTERFACE window.
No icon - no interface present.
Blinking arrows - local data transfer active.
No arrows - local data transfer inactive.



TAMPER SWITCH:

Constantly flashing icon - gas meter magnetic field interruption.
No icon - no interruption.



PULSE COUNTER:

Simultaneous blinking icons - gas meter type detection. Icons will turn to the animated while five pulses from the gas meter will be counted. These five pulses will be added to the counter.
Alternate blinking icons - counting pulse from the gas meter.
No icons - no changes on the pulse input - gas meter not connected.



BATTERY LEVEL:

Battery level is presented by number of bars. More = better.
Flashing icon - battery level below 10%.
No icon - battery level too low to turn the GSM modem on.



SETTINGS



SERVICE MENU

The device has service menu function implemented. To access the menu place the magnet three times closely to the OPTICAL INTERFACE icon - correctness of this operation is marked by appearing the (G) icon on the display. This will cause the first "SEr 1" option appear. Then, every of the (A) indicators will flash. They will start to mute from the top. In this time next placing the magnet will pass to the next "SEr 2" option. When desirable option will show on the display, wait the time to mute all of the (A) indicators - option related to current position of menu will be displayed.



SETTINGS



Communication protocol, firmware and hardware version presentation.



IP address acquired from the APN network.



ICCID number of installed SIM card.



Battery replacement procedure.



Autotest procedure required after installation - data sending to server.



Dynamic GSM signal control procedure (CSQ test). Estimated time to pass - 1 minute.



Forced data sending - from the beginning of the month.



Value of measured pressure by internal pressure sensor.*



Exit the Service Menu - no option, returning to the normal device state.

* - option available only in devices with integrated pressure sensor i.e. MacR6-PT (MacR6-Z0)



TRANSMISSION

CONTENTS - TRANSMISSION

MAIN MENU

GAZMODEM2 TRANSMISSION PROTOCOL.....	E-3
OPTICAL TRANSMISSION PORT	E-4



TRANSMISSION

GAZMODEM2 TRANSMISSION PROTOCOL

MacR6 utilizes the GAZMODEM2 protocol for data transmission.

In GAZMODEM2 protocol the following data can be transmitted: measurement data, registered data, alarms details, current time. Also remote modification is available.

Transmission of the data relies on the three tables: available parameters **DP**, events and alarm table **ZD**, and sending data order table **KWDB**.

Detailed information about transmission protocols are available in Plum Ltd.



TRANSMISSION

OPTICAL TRANSMISSION PORT

The device is equipped with Optical interface IEC 62056-21 standard. Work parameters: 9600b/s; N 81. Software with GAZMODEM2 protocol support is required to registered data local readout and configuration.



CONTENTS – EXPLOITATION AND MAINTENANCE

MAIN MENU

EXPLOITATION AND BATTERY REPLACEMENT	F-2
MAINTENANCE.....	F-4



EXPLOITATION AND BATTERY REPLACEMENT



Device does not need any actions after installation. Only the battery replacement if needed.



Lithium battery replacement is allowed only by qualified person ordered to do this. Replacement must be done out of the hazardous explosive zone. With detached device it is required to move out of the zone.



While connecting the battery keep its orientation. Opposite connection may cause the device damage.



To perform the battery replacement operation it is needed to have the strong magnet, or OptoBTEx head, to activate the SEr 4 service menu. Follow the battery replacement procedure described on the next page.

EXPLOITATION



Battery replacement procedure:

1.

Detach and open the device by removing six TORX T10 screws from the back of the cover.

2.

Using strong magnet or OptoBTEx activate the "SEr 4" option.



3.

When activated "bAt 3" information will appear. Close the magnet to the OPTICAL INTERFACE until the "bAt 0" information will appear. Wait until indicators on the left side will mute.



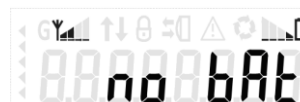
4.

"Lo bAt" information will appear. Take out the old battery, but **do not place the new one!**



5.

When "no bAt" information will appear place the new battery. During this operation the contrast on the display may be reducing. **Do not let the device to turn off completely.**



6.

New battery recognition will be signed by "Hi bAt" information. Battery level will be set to 100%, and the icon on display will show the full bar.



7.

Close the cover, place the recorder on the gas meter. Synchronize the counters.



It is forbidden to dump the empty batteries with common waste. Empty batteries should be handed over to the neutralization point according to manufacturers recommendation.

EXPLOITATION



MAINTENANCE

MacR6 data recorder is the device working in hazardous explosive zone. In order to keep the explosion-proof safety rules, the device should be periodically inspected according to EN 60079-17. Periodical and random inspections should be performed by qualified and eligible employees.

Inspection type	Inspection period	Inspection level
periodical	Minimum once per year	Precise examination
random	Depending on environmental conditions	visual inspection

Once per 5 years the device should be rigorously examined by the manufacturer, including the work efficiency.



CONTENTS – DATA READOUT

MAIN MENU

REMOTE READOUT - EWEBTEL.....	G-2
FORCED READOUT – SERVICE MENU	G-4
LOCAL READOUT.....	G-5



REMOTE READOUT - EWEBTEL

eWebTEL system - manufactured by Plum Ltd. measurement data aggregation platform. System based on the Internet browsers, and mobile devices. Installation is available in public network and clients private server.

eWebTEL is designed for billing supervision, gas distribution network maintenance, and measurement devices examination. Graphically presented data from the recorder i.e. volume, pressure, temperature in form of clear charts and tables.

Generated reports:

- usage of the medium during month by the group of receivers, or single receivers
- alarms with time stamp occurrence
- usage of the medium archive data

eWebTEL allows for devices grouping depending on various factors like: zone, site, technical attendant.

DATA READOUT



eWebTEL features:

- cooperation with all leading Internet browsers
- multi-language user support
- SMS or e-mail notifications implemented
- cooperation with various types of devices: data recorders, electronic volume correctors, GSM/GPRS modems, pressure and temperature meters



DATA READOUT



FORCED READOUT – SERVICE MENU

MacR6 generates reports periodically and sends them to the data acquisition server depending on programmed schedule. Schedule can be programmed to send data few times per day, once a day, once a week, once a month.

The data can be sent immediately if needed. This operation can be performed locally by entering the "SEr 7" option from the service menu. More details SERVICE MENU. In result the device will send the registered data from the beginning of the month.

DATA READOUT



LOCAL READOUT

MacR6-Z0 local readout is available using the optical interface i.e. PLUM OptoBTE_x, or Optical - USB cable head. Transmission through OPTICAL INTERFACE is supported by the GAZMODEM2 protocol with 9600b/s speed.

Software to read or configure the device:

Windows: PlumCONF, PlumREADER

Android: Data loggers configurator, MacREADER, MacREADER+



ACCESSORIES

CONTENTS - ACCESSORIES

MAIN MENU

OPTICAL TRANSMISSION INTERFACE OPTOBTEX.....	H-2
SOFTWARE.....	H-3



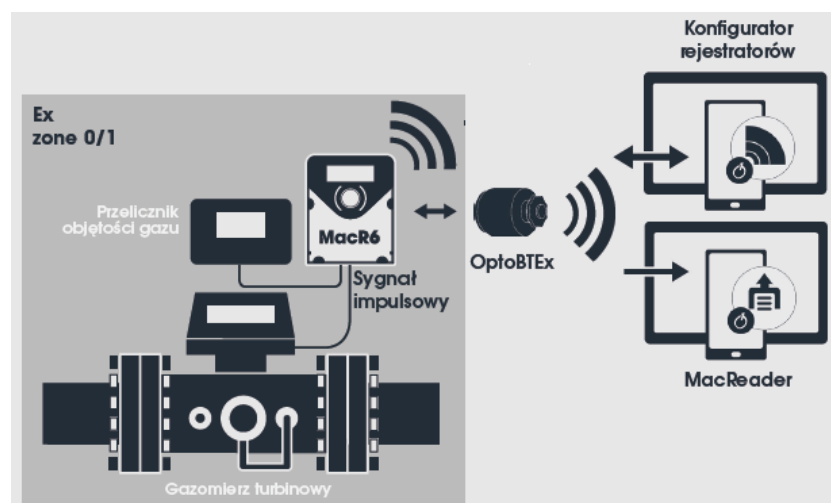
ACCESSORIES

OPTICAL TRANSMISSION INTERFACE OPTOBTEX

OptoBTE_x is a wireless transmitter of data from compatible devices. The transmission is performed in Bluetooth 2.1+EDR Class 2 standard. Data is transmitted to a compatible device, which has IEC 62056-21 standard and the readout software installed (usually a mobile device running MS Windows or Android operating system). OptoBTE_x does not modify data.

Detailed data can be found in "OptoBTE_x user manual" on the manufacturer website: www.plummac.com

OptoBTE_x connection with the readout device and computer is presented below.





ACCESSORIES

SOFTWARE

- **PlumCONF** - Software allowing for current data, configuration settings readout and to local or remote all available parameters change using the device with MS Windows OS.
- **PlumREADER** - Software allowing for current data, registered data, daily data, and list of saved alarms using the device with MS Windows OS. This software allows for monthly reports generation.

Detailed data can be found on the manufacturer website: www.plummac.com



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