plum® GAS

plum GAS portfolio

metering gas transfer

efficient measurements

plum® GAS

table of contents

we are the manufacturer of electronics for intelligent management of the natural gas transmission and distribution system

We deliver comprehensive metrological and telemetry solutions for the gas industry. Our solutions provide remote transmission and reading of data from natural gas measuring devices installed at our clients' measurement stations.

We provide solutions that meet the technical requirements of European and global markets. We offer OEM solutions tailored to individual client needs in gas metering. We provide full implementation and after-sales support in product development and operation.

Partnership with us means more than just a reliable product, it is a full package of additional services. We provide after-sales support in product R&D, marketing activities, technical trainings and remote technical support.

Our manufacturing facility is located in Poland, what ensures product delivery reliability through local manufacturing and comprehensive quality control. Our devices are designed to be competitive and interoperable, meaning they can be used with equipment from other vendors.

our solutions for the gas industry

While working on solutions for natural gas metering, we were guided by the vision of comprehensive fulfillment of the needs of various customer groups within this sector.

Our long-term global experience in the natural gas industry helped us to propose solutions for effective management of pressure reducing and metering stations (PRMS), remote gas consumption reading, and gas network monitoring.

Our products are designed according to both commercial and industrial solution requirements. We effectively utilize the concept of remote data access and IoT solutions.

pressure reducing and metering stations management

Automatic Meter Reading (AMR) and peak volume recording

gas grid monitoring

pressure reducing and metering stations management

Comprehensive solution for gas measurement and telemetry.

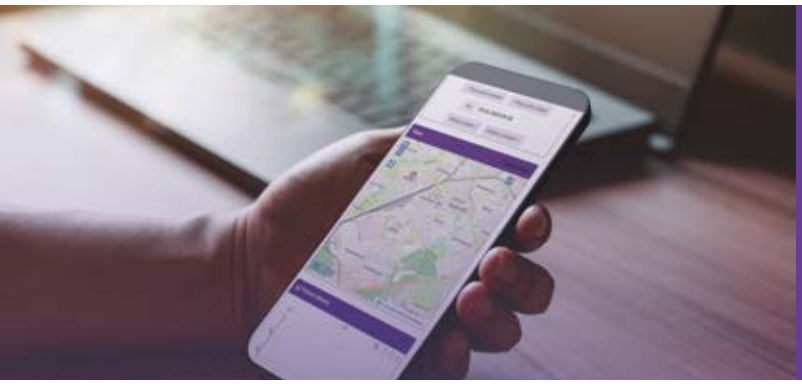
Solution enables enhancements in the natural gas metering stations by adding management and maintenance, archiving measurement data, fast tracking of the malfuntions of whole metering station and single equipment.

Equipped with network communication units, devices bring new value for the metering stations management which is remote archives acquiring and immediate alarming functionality without necessity for additional adjustment, as whole solution can work on internal batteries.

key benefits

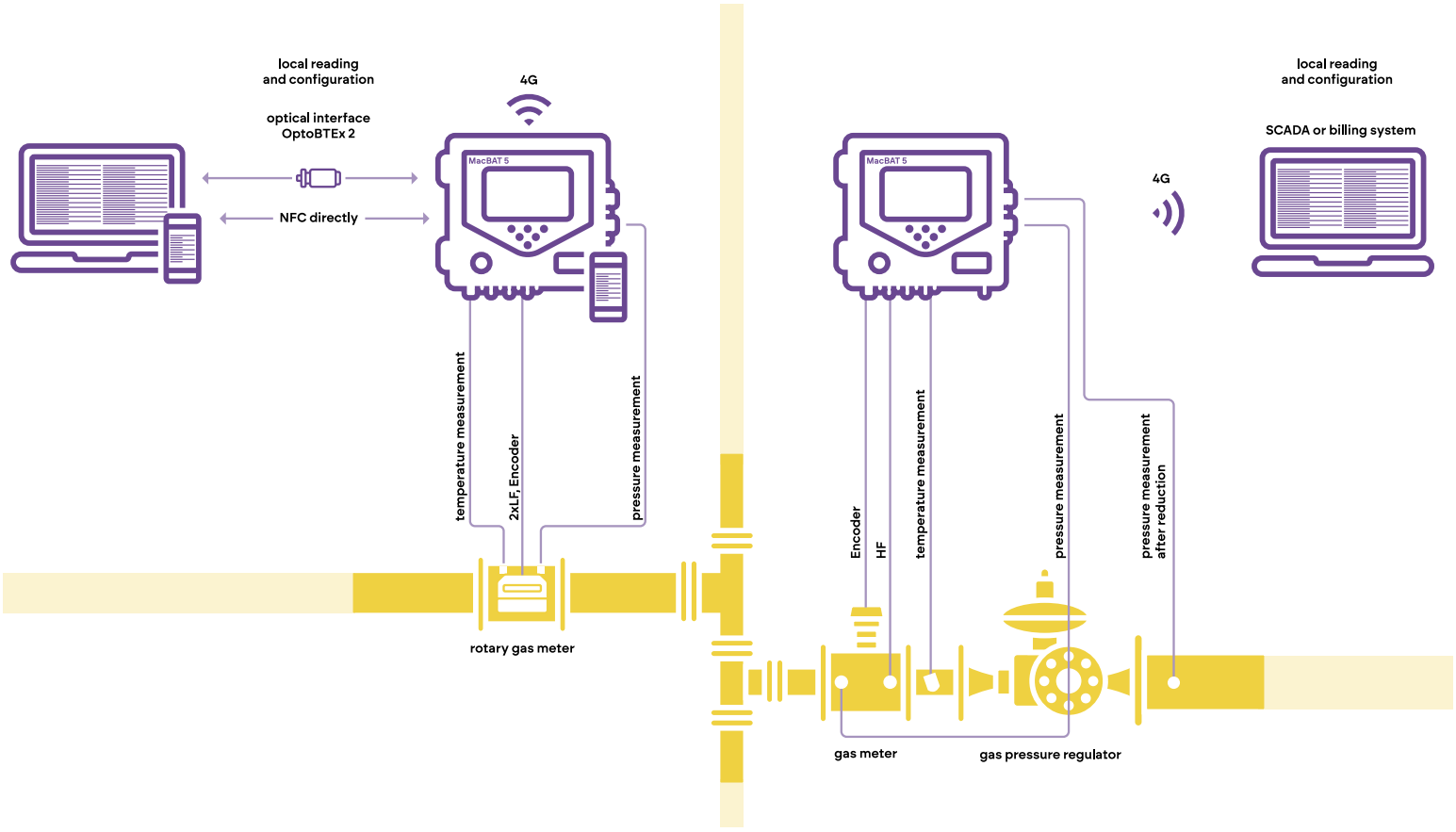
- volume correction for every type of gas meter regardless of pressure, type, or natural gas mixture composition
- gathering diagnostic information from binary sensors, pressure and temperature sensors, connected digital sensors, and attached devices such as odorizers or process chromatographs
- intuitive configuration and control of device operation

Solution can be extended with MacREJ 5 data logger and dedicated extension modules for monitoring the operation of the gas pressure reduction system.



devices
used in this solution

- MacBAT 5 read more: p. 17
- MacREJ 5 read more: p. 24



Automatic Meter Reading (AMR) and peak volume recording

Remote natural gas reading. Compact solution that tariffs consumption and provides remote gas meter reading.

MacR8 can be installed on chosen types of the diaphragm meters and can also cooperate together with any gas meter or Electronic Volume Converter with low frequency pulse output through typical cable connection and also act as an AMR device.

key benefits

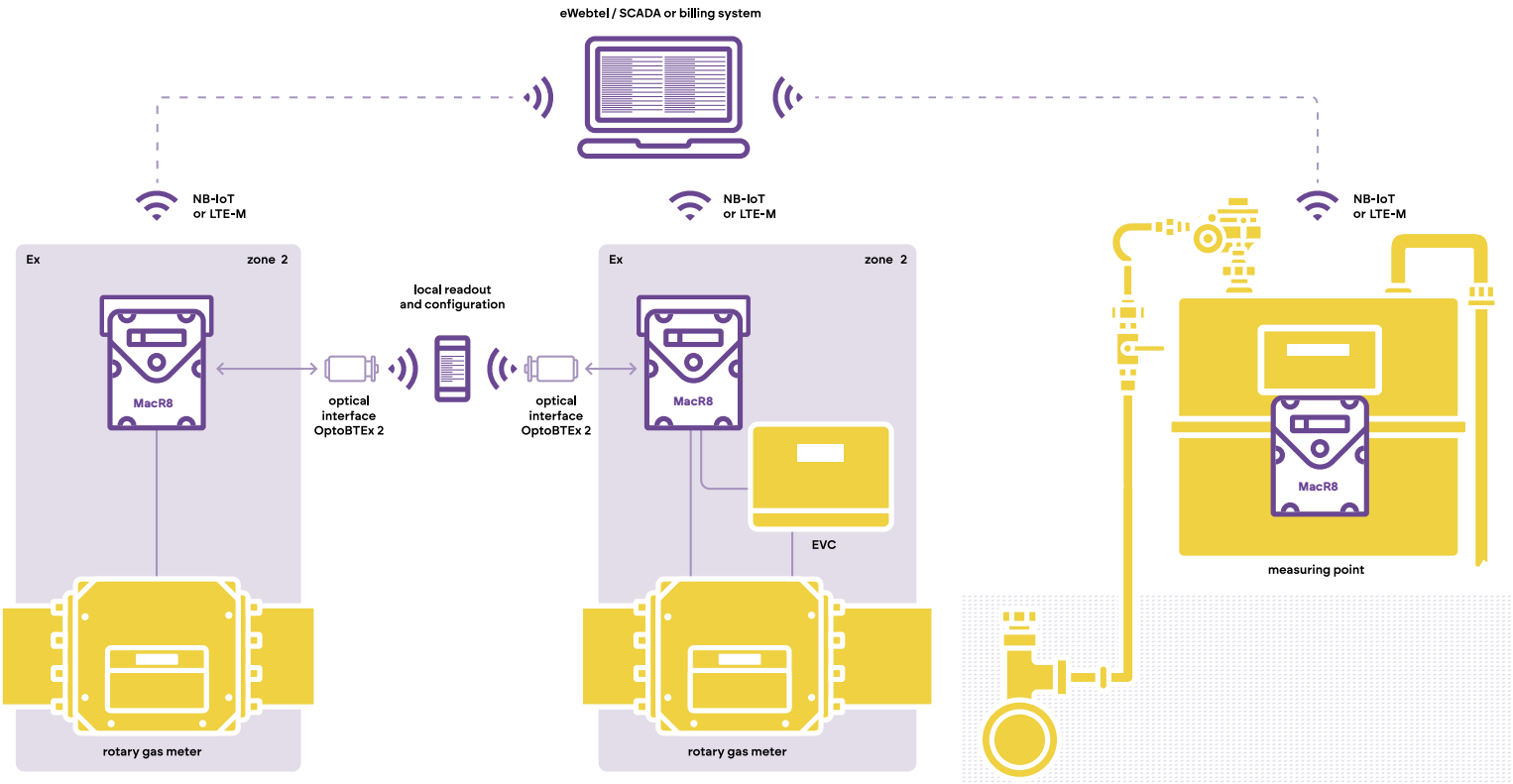
- efficient IoT data transmission technology
- NB-IoT and LTE-M offers ability to operate in low network signal level
- a patented flow detection method from the gas meter (for selected types) ensures correct meter reading
- the built-in battery provides up to 15 years of operation

Automatic meter reading solutions with NB-IoT/ LTE-M technology.

MacR8 is the device designed to enable remote volume readings of standard industrial mechanical gas meters. MacR8 can be installed on chosen types of the diaphragm meters using dedicated installation kit and work as a smart extension of the mechanical totalizer.

devices
used in this solution

- MacR8 read more: p. 33



gas grid monitoring

IoT solutions for gas networks.

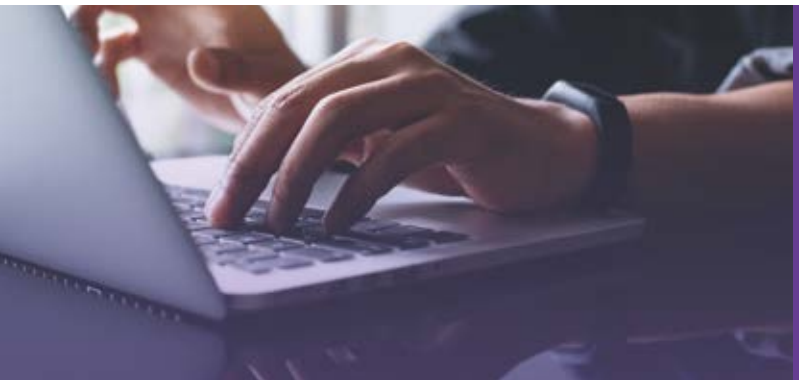
Solution designed for remote management of crucial technology processes on the natural gas metering stations.

Thanks to variety of inputs measuring all necessary and important quantities like volume, pressure, temperature, it is possible to monitor the stability of the metering stations equipment and overall security.

key benefits

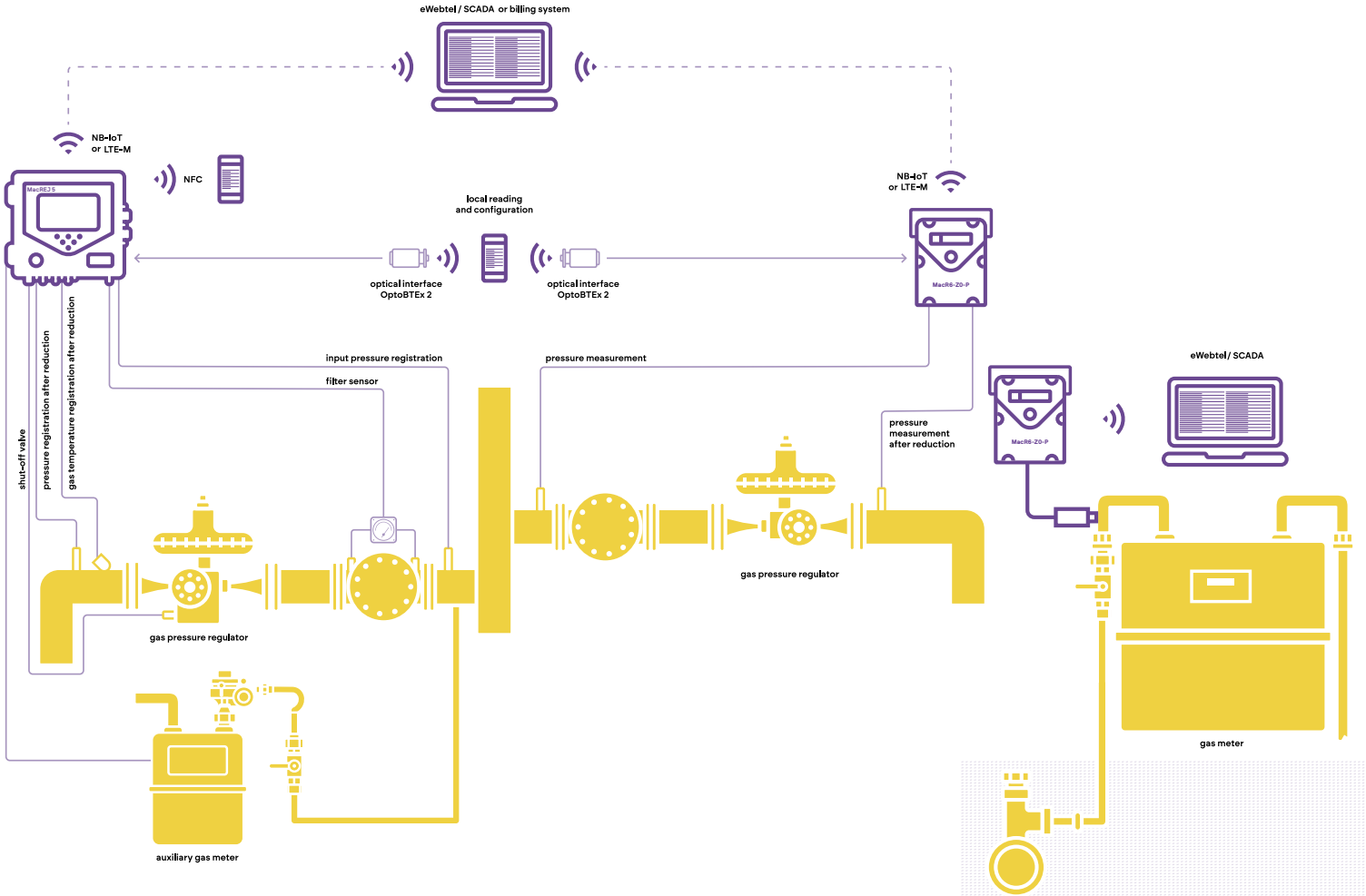
- solutions for simple and advanced applications
- instant measurements, archiving, remote communication modules in one enclosure, no need for building big solution
- plug & play solution

Solution is based on the data loggers with remote communication units. They are divided per their basic functionality and the structure of the metering station to be used.



devices
used in this solution

- MacREJ 5 read more: p. 24
- MacR6-Z0-P read more: p. 41



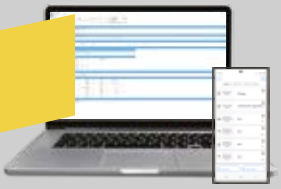
products

volume correctors

flow and pressure data loggers

data acquisition system

configuration tools



accessories

volume correctors

MacBAT 5

- metrologically certified devices with accuracy twice better than expected by standard minimums
- wide portfolio of tools to manage and maintain the device operation; device display and dedicated apps
- tampering attempts, abnormal consumption, process alarms registered in device memory and transmitted immediately when appearing
- manage, configure, and analyze gas transmission processes remotely using your own data acquisition system

MacBAT 5

gas volume and energy corrector

MacBAT 5 Electronic Volume Corrector is a complete measurement unit designed for installation in Ex Zone 0.

MacBAT 5 can be used in wide applications extending typical volume conversion thanks to variety of measurement and diagnostic inputs available in standard hardware variant.

Additional dedicated interfaces, modules and sensors are extending MacBAT 5 to be a significant part of natural gas metering station accuracy and monitoring device instead of only being standard electronic volume conversion device.

key benefits

- LF/HF/Encoder inputs available in standard variant without additional modules
- real time gas composition acquisition from chromatograph
- remote two-way 4G communication module compatible with various data acquisition platforms
- internal modem presence does not affect Ex feature of the complete unit
- NAMUR inputs for proximity sensors working on battery
- possibility to add any sensor communicating in Modbus protocol
- quick gas meter load diagnostics by using dynamically generated bar graphs

accessories

functionalities
of the MacBAT 5 corrector

- designed to work with turbine, rotary or ultrasonic gas meters via direct connection: LF, HF, Encoder
- support of digital transmission with all the gas meters working on NAMUR communication standard with a built-in encoder in battery operation
- MID-certified volume measurement of gas mixtures containing up to 30% hydrogen H2
- MID-certified gas meter characteristic correction function
- advanced solutions to prevent measurement discrepancies between the gas meter and the corrector, detection of gas meter reverse flow
- measurement of volume every second from the HF input - also possible during battery backup operation
- 3 independent serial transmission ports (2xRS485, Optical Interface 62056-21)
- interface-free configuration using NFC standard through Android phones
- optional built-in modem for 4G LTE Cat.1 and 2G networks
- up to 16 intrinsically safe configurable binary inputs; 8 built-in, including two NAMUR inputs for proximity sensors, also functional when battery powered; additional 8 inputs available when EM-2 / EM-2Ex module is used
- binary and frequency outputs in intrinsically safe design
- optional additional internal or external pressure transducers
- built-in function for analysing the load profile of the gas meter with presentation in the form of a bar graph on display or statistics in data
- support for biogas measurement
- cooperation with BMS (Building Management System) via Modbus RTU, Modbus TCP or pulse outputs (controlled by Vb and Vm counters)
- possibility of reading/ controlling in Modbus MASTER mode up to 16 external devices in Modbus RTU protocol via RS485 (e.g. digital pressure transmitters, EM series extensions modules)
- pulse and current control of the odorizer possible (using a frequency/ current converter or EM-1 extension module)
- direct cooperation with the chromatograph without the PLC intermediary

technical data
of the MacBAT 5 corrector

housing material	polycarbonate
dimensions/ weight	207 x 194 x 77 mm/ 1.3 kg
relative humidity	maximum 95% at temperature of 70 °C
ambient temp. range	from -25 °C to 70 °C
housing protection class	IP66 for outdoor installations
keyboard	6 pushbuttons
display	graphical, 4", backlight, operation in the full range of operating temperatures
Ex feature	II 1G Ex ia IIB T4 Ga certificate: FTZÚ 17 ATEX 0047X
meets the requirements of 2014/ 32/ UE (MID)	certificates: • DE-19-MI002-PTB004 - Plum PTZ converter • DE-21-M-PTB-0012 - Plum load recorder
internal power supply	3 lithium D-size batteries: • 1 battery to supply volume converter • 2 batteries to supply internal modem
external power supply	dedicated power supply interface INT-S3, intrinsically safe power supply source for EVC and internal modem at the same time; technical data: 11÷30 VDC input voltage, 5.7 VDC output voltage (Ex side), inputs and outputs separation, transmission separation
transmission protocols	Modbus RTU, Modbus TCP (available in version with integrated modem), Modbus RTU MASTER MODE, GAZ-MODEM 1, 2, 3 (other protocols per request)
transmission ports	• three independent serial transmission ports COM1 - RS485 or optional RS232, COM2 - RS485 - shared with Modbus MASTER input, baud rate up to 256 kb/s, optical interface IEC 62056-21 • NFC IEC 14443 interface • optional integrated modem 4G LTE/ 2G
resistance to mechanical and electromagnetic conditionse	M2/ E2
base conditions	set by authorized personnel; available options: • base pressure (absolute) pb: range (0.95÷1.05) bar, default 1.01325 bar • base temperature Tb: range (270÷300,2) K, default 273.15 K (0 °C) • reference temperature determined for combustion process T1: range (270÷300,2) K, default 298.15 K (25 °C)
maximum permissible error (MPE) according to standard „EN 12405-1"	• 0.5% at reference conditions • 1% at nominal operating conditions • typical error < 0.15%
maximum permissible error (MPE) according to standard „EN 12405-2"	• ECD class A
algorithms for calculation of compressibility factor	SGERG-88, SGERG-mod-H2, AGA8-92DC, AGA8-G1, AGA8-G2, AGA NX-19 mod (all algorithms with possibility of using full gas composition), fixed compressibility factor value K=1
horizon of data registration	• data registered in period 1-60 minutes – 36000 records (over 4 years @60min) • hourly data – over 16 months • daily data – over 4 years • monthly data – over 10 years • momentary data (triggered 1-second logging) • alarms/ events memory – over 6000 records

inputs

- up to 6 intrinsically safe, configurable, binary digital inputs, shared with:
  - 2 LF inputs, frequency 0÷2 Hz, WIEGAND standard 0÷60 Hz (option), flow direction detection
  - 1 tamper switch input - normally closed
  - 1 SCR ENCODER input (interchangeable with 1 binary digital input as an option
- up to 10 intrinsically safe, configurable digital inputs NAMUR type (EN60947-5-6):
  - 2 inputs shared with: 2 configurable HF inputs, frequency 0-5000Hz (temporary working on battery in case of power loss ensure measurement continuity); when not used as HF inputs, work with NAMUR proximity sensors on battery mode. 1 input shared with ENCODER (NAMUR type)
  - 8 additional NAMUR inputs realized by extension module EM-2Ex
- MID-certified support for gas meters through LF, HF, ENCODER NAMUR, ENCODER SCR, WIEGAND and 10-point gas meter characteristics correction
- pressure sensor p1 – measuring range up to 6 bar abs as standard. Internal or external sensor. Sensor ended with M12 x 1.5 (internal or external sensor) or 1/4" NPT (external sensor) thread. Pressure ranges: 0.8÷6/ 0.8÷10/ 2÷10/ 4÷20/ 7÷35/ 4÷70/ 10÷70/ 10÷100 bar abs; maximum permissible error for pressure measurements:

20 °C (± 3 °C)	**(-25 ÷ 70) °C**
± 0.2% of measured value	± 0.5% of measured value

typical error of p1 pressure measurement: 0.12% of measured value

- temperature sensor Pt1000 class A or B with cable length compensation, four wires, diameter 5.7 mm; maximum permissible error for measurements:

20 °C (± 3 °C)	**(-25 ÷ 70) °C**
± 0.1%	± 0.2%

typical error of temperature measurement: 0.04%

- pressure sensor p2 – optional, internal or external – absolute or gauge pressure sensor. Gauge pressure ranges: 0÷0.1/ 0÷0.3/ 0÷6/ 0÷10/ 0÷20/ 0÷40/ 0÷70/ 0÷100 bar G; absolute pressure ranges the same as for p1 sensor; typical error of p2 pressure measurement (gauge): 0.12% of range
- RS485 Modbus MASTER input (shared with COM2 port; with 3.6 V power supply output) for readout of up to 16 external devices with Modbus RTU output (e.g. digital pressure or temperature transducers, gas chromatograph), capable to operate on battery

control outputs

- up to 4 intrinsically safe, configurable digital outputs (OC type):
  - 1 configurable as binary or frequency (0÷5000 Hz) output
  - 3 binary outputs
- binary outputs triggered by alarm/ event or counter (Vb, Vm, E, M etc.)
- frequency output triggered by measured value (p1, t, Qb, Qm etc.)
- 2 4÷20 mA outputs triggered by measured value (p1, t, Qb, Qm etc.) realized by extension module EM-1

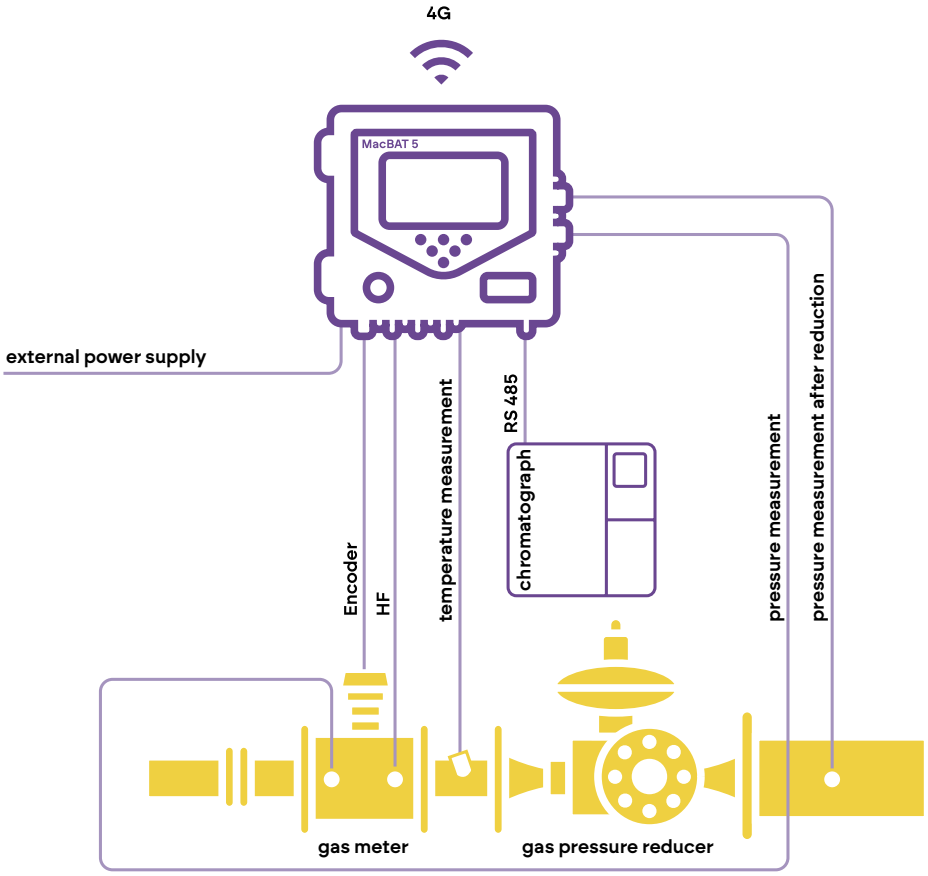
accessories

- eWebtel - measuring data acquisition system
- ConfIT! - configuration software for PC
- ConfIT! volume corrector - mobile application
- OptoBTEx 2 - optical interface
- INT-S3 - power supply interface
- EM-1/EM-2/EM-2Ex - extension module

application
of the MacBAT 5 corrector

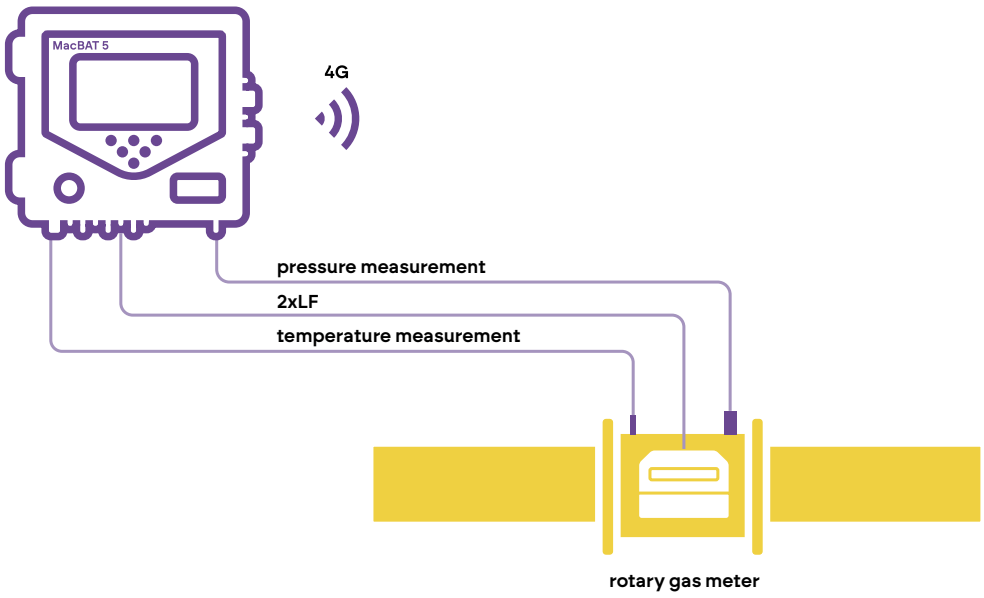
- **pressure regulator monitoring using additional pressure sensor in MacBAT 5**

  System recommended for operating a high-pressure gas meter.



- **MacBAT 5 connected with a rotary gas meter**

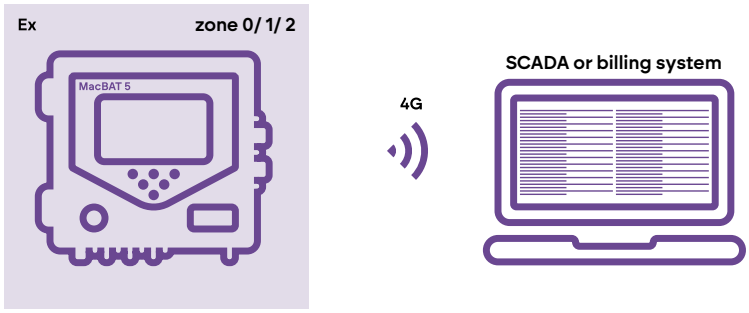
  Connection via 2 x LF ensures precise synchronization between the gas meter and the corrector, taking into account volume reverse flow on the gas meter.



- **direct data transmission**

  to the system

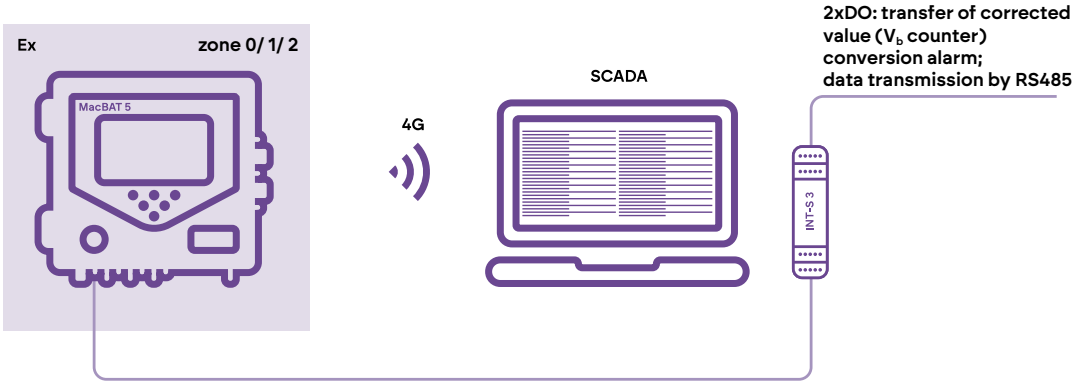
  Data reading through the built-in 4G LTE modem with battery power supply.



- **remote**

  data reading

  Connection via the INT-S3 communication interface and the built-in 4G LTE modem.



flow and pressure data loggers

- MacREJ 5
- MacREJ 5R
- MacR8
- MacR6-Z0-V
- MacR6-Z0-P

- supervise operation of pressure regulation and monitoring metering station even in real time
- metering station history and faults logging in non volatile memory
- synchronize measurement data with third party systems, e.g., SCADA
- accurately and timely bill gas consumption
- reduce meter reading cost and remove difficulties caused by local readout such as lack of possibility to get access to the meter
- safely and interference-free transmit data using NB-IoT technology
- record data from any gas meter

MacREJ 5

electronic gas volume, pressure and temperature data logger

MacREJ 5 is a complete data logger solution designed to record and inspect the performance and stability of the whole Pressure Regulating and Metering Stations (PRMS). It can work supplied from internal batteries or be connected to the external power source, what converts it to online metering station monitor for SCADA systems.

Design of the device allows for its work directly on the metering station even in Ex Zone 0. Device equipped with pressure and temperature sensors can work as a remote pressure regulator maintenance device.

Installed internal modem working in various modes can inform immediately metering station service about malfunction or predict upcoming replacement of pressure regulators.

accessories

- eWebtel p. 49
- ConfIT! PC p. 51
- ConfIT! data loggers p. 52
- OptoBTEx 2 p. 54
- INT-S3 p. 54
- EM-1 p. 55
- EM-2 p. 55
- EM-2 Ex p. 55

key benefits

- configurable bar graphs with historical records of pressure allowing for instant pressure regulator inspection on site, showing unwanted pressure indications
- immediate alarming of gas station service when quantities are out of programmed ranges
- significance level of the alarms - thresholds with flag of alarm and warning
- interface-free configuration using NFC
- internal modem presence does not affect Ex feature of the complete unit
- NAMUR inputs for proximity sensors working on battery
- possibility to add any sensor communicating in Modbus protocol

functionalities
of the MacREJ 5 data logger

- optional built-in modem for 4G LTE Cat.1 and 2G networks
- support for NFC communication standard, optical connection and two RS485/ RS232 serial ports
- graphical 4” display with backlight works in temperatures down to -30 °C
- configurable main screen widgets pressure stability trends and other configured values as bar graphs
- ATEX-certified for operation in any explosion hazardous zone (up to zone 0, 1, 2), also with integrated modem
- internal or external pressure sensors
- configurable two LF pulse inputs for gas meters
- possibility of reading/controlling in Modbus MASTER mode up to 16 external devices in Modbus RTU protocol via RS485 (e.g. digital pressure transmitters, EM series expansion modules)
- 10 cable glands for connection of signal and measurement circuits
- low operating costs due to the use of standard lithium batteries

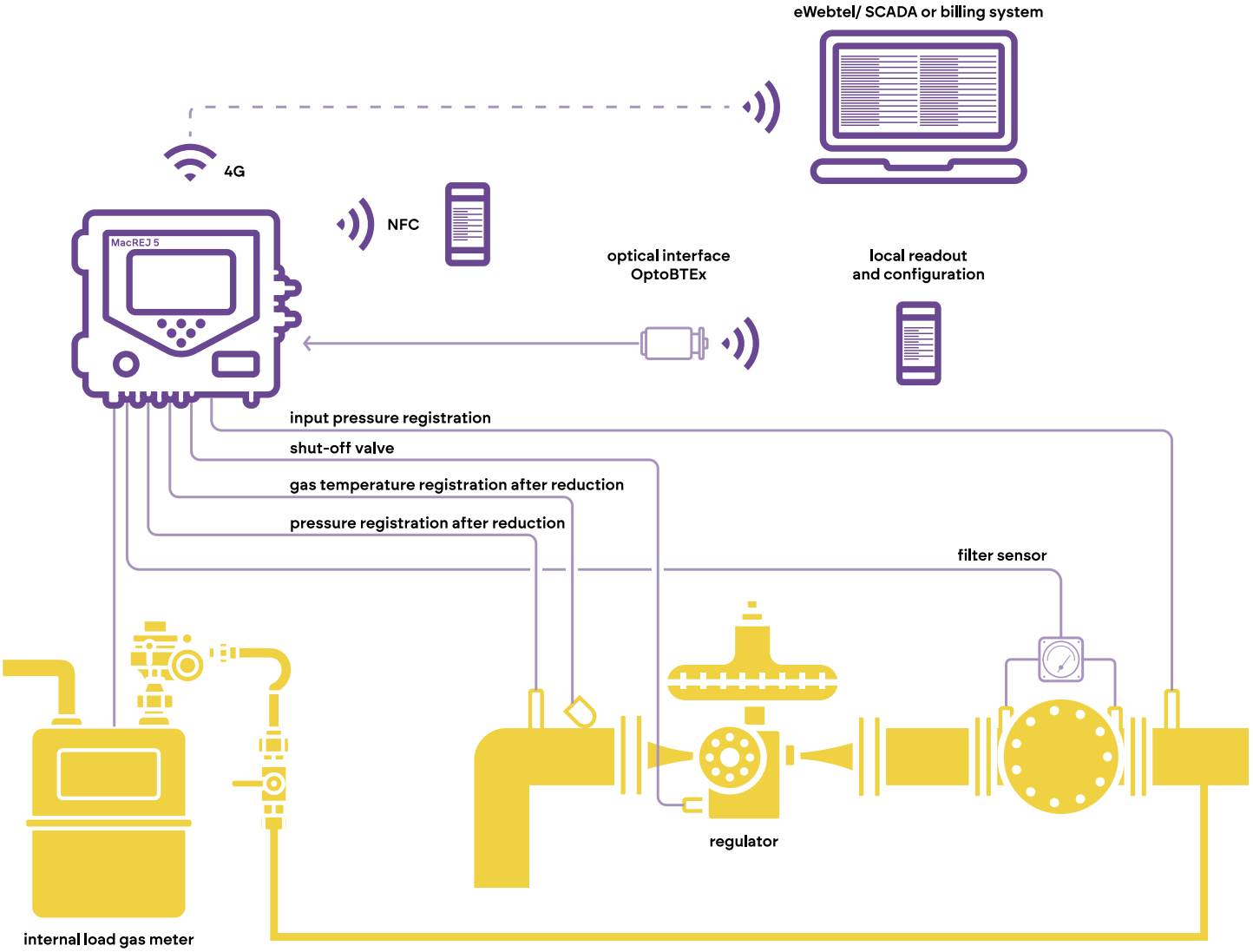
technical data
of the MacREJ 5 data logger

<table>
<tr><td>housing material</td><td>polycarbonate</td></tr>
<tr><td>dimensions/ weight</td><td>207 x 194 x 77 mm</td></tr>
<tr><td>relative humidity</td><td>maximum 95% at temperature of 70 °C</td></tr>
<tr><td>ambient temp. range</td><td>from -25 °C to 70 °C</td></tr>
<tr><td>housing protection class</td><td>IP66 for outdoor installations</td></tr>
<tr><td>keyboard</td><td>6 pushbuttons</td></tr>
<tr><td>display</td><td>graphical, 4”, backlight, operation in the full range of operating temperatures</td></tr>
<tr><td>Ex feature</td><td>II 1G Ex ia IIB T4 Ga
certificate: FTZÚ 17 ATEX 0047X</td></tr>
<tr><td>internal power supply</td><td>3 lithium D-size batteries:
• 1 battery to supply data logger
• 2 batteries to supply internal modem</td></tr>
<tr><td>external power supply</td><td>dedicated power supply interface INT-S3, intrinsically safe power supply source for EVC and internal modem at the same time; technical data: 11÷30 VDC input voltage, 5.7 VDC output voltage (Ex side), inputs and outputs separation, transmission separation</td></tr>
<tr><td>transmission protocols</td><td>Modbus RTU, Modbus TCP (available in version with integrated modem), Modbus RTU MASTER MODE, GAZ-MODEM 1, 2, 3 (other protocols per request)</td></tr>
<tr><td>transmission ports</td><td>• three independent serial transmission ports (COM1 - RS485 or optional RS232, COM2 - RS485 - shared with Modbus MASTER input baud rate up to 256 kb/s, optical interface IEC 62056-21
• NFC IEC 14443 interface
• optional integrated modem 4G LTE/ 2G</td></tr>
<tr><td>resistance to mechanical and electromagnetic conditionse</td><td>M2/ E2</td></tr>
<tr><td>inputs</td><td>• up to 6 intrinsically safe, configurable, binary digital inputs, shared with:
- 2 LF inputs, frequency 0÷2 Hz, WIEGAND standard 0÷60 Hz (option), flow direction detection
• up to 10 intrinsically safe, configurable digital inputs NAMUR type (EN60947-5-6):
- 2 binary inputs, work with NAMUR proximity sensors on battery mode
- 8 additional NAMUR inputs realized by extension module EM-2Ex
• up to 2 pressure sensors (p1/p2) - internal or external – gauge or absolute (option) pressure sensors; gauge pressure ranges: 0÷0.1/ 0÷0.3/ 0÷6/ 0÷10/ 0÷20/ 0÷40/ 0÷70/ 0÷100 bar G; typical error of p1/p2 pressure measurement (gauge): 0.12% of range
• temperature sensor Pt1000 class A or B with cable length compensation, four wires, diameter 5.7 mm;
<table><tr><td>20 °C (± 3 °C)</td><td>(-25 ÷ 70) °C</td></tr><tr><td>± 0,1%</td><td>± 0,2%</td></tr></table>typical error of temperature measurement: 0.04%
• RS485 Modbus MASTER input (shared with COM2 port; with 3.6 V power supply output) for readout of up to 16 external devices with Modbus RTU output (e.g. digital pressure or temperature transducers), capable to operate on battery</td></tr>
</table>

technical data
of the MacREJ 5 data logger

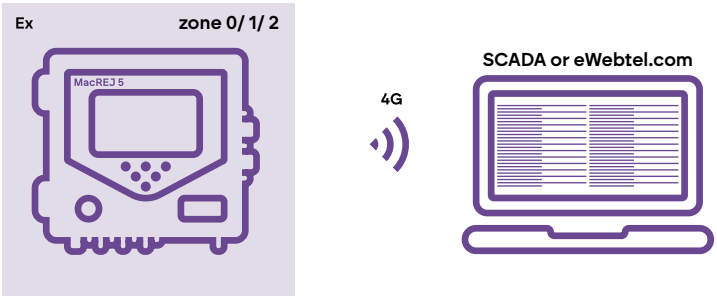
control outputs	• up to 4 intrinsically safe, configurable digital outputs (OC type): - 1 configurable as binary or frequency (0÷5000 Hz) output - 3 binary outputs • binary outputs triggered by alarm/event or counter • frequency output triggered by measured value (p1, p2, t, Qm) • 2 4÷20mA outputs triggered by measured value (p1, p2, t, Qm) realized by extension module EM-1
horizon of data registration	• data registered in period 1-60 minutes – 55000 records (over 6 years @60min) • hourly data – over 2 years • daily data – over 4 years • monthly data – over 10 years • momentary data (triggered 1 second logging) • alarms/ events memory – over 6000 records
accessories	• eWebtel - measuring data acquisition system • ConfIT! - configuration software for PC • ConfIT! data loggers - mobile application • OptoBTEx 2 - optical interface • INT-S3 - signal barrier, power supply source, transmission interface • EM-1/EM-2/EM-2Ex - extension module

application
of the MacREJ 5 data logger



direct
data transmission

Direct data transmission to the IT system via built-in 4G LTE modem.



MacREJ 5 R

electronic gas volume data logger

MacREJ 5 R is a solution designed to transmit in real time information about gas consumption on the metering station to the head-end systems or SCADA using remote transmission by internal 4G modem or serial communication in Modbus protocol.

MacREJ 5 R is compatible with any type of gas meter having pulse outputs and also digital transmission thanks to support of digital communication by Encoders.

key benefits

- uninterrupted and stable multiple data transmission channels
- possibility to use with any gas meter on the market
- easy and quick adaptation to the automatic process of the industry thanks to Modbus compatibility and real time data exchange
- work with multiple data exchange platforms in the same time without impact on the readings accuracy and other communication channels
- inbuilt mechanism of gas meter load profile reporting if the meter size is adjusted properly

accessories

- eWebtel p. 49
- ConfIT! PC p. 51
- ConfIT! data loggers p. 52
- OptoBTEx 2 p. 54
- INT-S3 p. 54

functionalities
of the MacREJ 5 R data logger

- optional built-in modem for 4G LTE Cat.1 and 2G networks
- support for proximity NFC communication standard, optical interface link, and two RS485 serial links
- 4" graphical display with backlight, works in temperatures up to -30 °C
- configurable widgets presenting gas consumption, gas meter load profile in form of bar graphs
- ATEX-certified, suitable for operation in any explosion hazard zone (up to zone 0, 1, 2), no modem influence on the ATEX class
- compatibility with rotary, turbine and diaphragm meters using LF pulses and digital communication with gas meter by Encoder (option)
- low operating costs thanks to the use of standard lithium batteries
- integration with BMS, SCADA, automatic systems, external platforms using Modbus RTU/TCP

technical data
of the MacREJ 5 R data logger

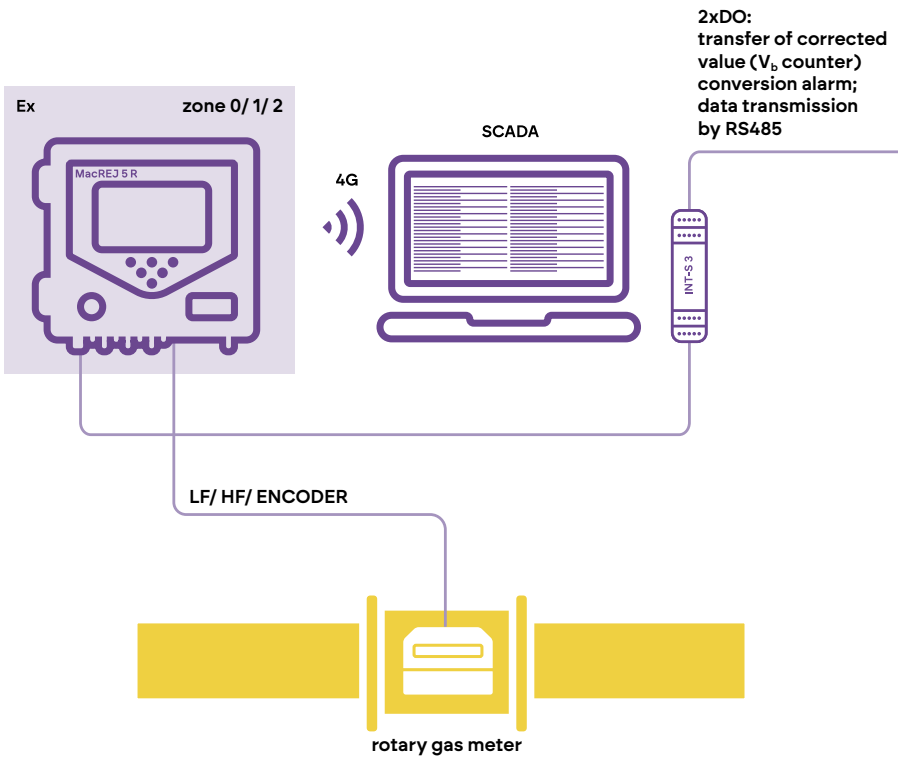
housing material	polycarbonate
dimensions/ weight	207 x 194 x 77 mm/ 1.3 kg
relative humidity	maximum 95% at temperature of 70 °C
ambient temp. range	from -25 °C to 70 °C
housing protection class	IP66 for outdoor installations
keyboard	6 pushbuttons
display	graphical, 4", backlight, operation in the full range of operating temperatures
Ex feature	II 1G Ex ia IIB T4 Ga certificate: FTZÚ 17 ATEX 0047X
internal power supply	3 lithium D-size batteries: • 1 battery to supply data logger • 2 batteries to supply internal modem
external power supply	dedicated power supply interface INT-S3, safe power supply source for EVC and internal modem at the same time; technical data: 11÷30 VDC input voltage, 5.7 VDC output voltage (safe side), inputs and outputs separation, transmission separation
transmission protocols	Modbus RTU, Modbus TCP (available in version with integrated modem), Modbus RTU MASTER MODE, GAZ-MODEM 1, 2, 3 (other protocols per request)
transmission ports	• three independent serial transmission ports (2x RS485 Ex port), speed up to 256 kb/s, optical interface IEC 62056-21 • NFC IEC 14443 interface • optional integrated modem 4G LTE/ 2G
resistance to mechanical and electromagnetic conditionse	M2/ E2
horizon of data registration	• data registered in period 1-60 minutes – 55000 records (over 6 years @60min) • hourly data – over 2 years • daily data – over 4 years • monthly data – over 10 years • momentary data • alarms/ events memory – over 6000 records

control outputs	• up to 4 intrinsically safe, configurable digital outputs (OC type): - 1 configurable as binary or frequency (0÷5000 Hz) output - 3 binary outputs • binary outputs triggered by alarm/event or counter • frequency output triggered by measured value (Qm, Qm2 etc.)
inputs	• up to 6 (5 by default) intrinsically safe, configurable, binary digital inputs, shared with: - 2 LF inputs, frequency 0÷2 Hz, WIEGAND standard 0÷60 Hz (option), flow direction detection • optional, up to 2 intrinsically safe, configurable digital inputs NAMUR type (EN60947-5-6): - 2 binary inputs, work with NAMUR proximity sensors on battery mode; 1 input shared with ENCODER (NAMUR type)
accessories	• eWebtel - measuring data acquisition system • ConfIT! - configuration software for PC • ConfIT! data loggers - mobile application • OptoBTEx 2 - optical interface • INT-S3 - power supply interface

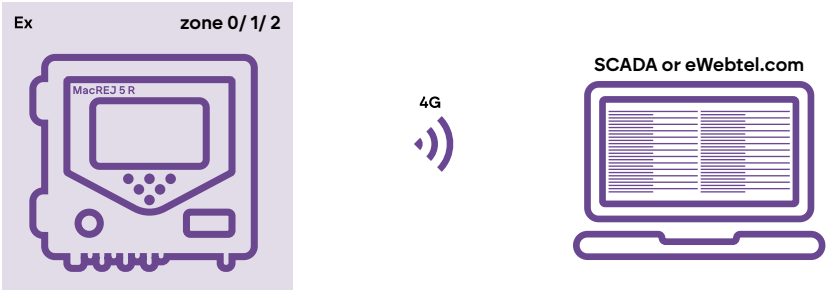
application of the MacREJ 5 R data logger

- **remote data reading**

  Connection via the INT-S3 communication power supply interface and the built-in 4G LTE modem.



- **direct data transmission to the system**
  Data transmission via the built-in 4G LTE modem.



MacR8

data logger for gas meters

MacR8 is the device designed to enable remote readings of the gas consumption from standard mechanical gas meters in industry segment.

MacR8 can be installed on chosen types of the diaphragm meters using dedicated installation kit and work as a smart extension of the mechanical totalizer of that meter.

MacR8 works with diaphragm, turbine and rotary gas meters using pulse cable connection and direct coupling with certain types of diaphragm gas meters meter totalizer using mature PLUM solution for automatic detection and volume counting algorithm.

key benefits

- gas usage profile transmission to the head-end system
- enabling readouts from low accessibility places - high installed meters, closed buildings requiring personal access
- gas flow control and immediate alarming about potential fraud on the object
- enabling access to historical gas consumption in high resolution, consumption even from every minute
- quick installation and minimum effort configuration using modern mobile application
- integrated pulse replication module to copy and retransmit input volume to external systems or devices
- modern transmission technologies with long-term availability

accessories

functionalities
of the MacR8 data logger

- support for LPWAN mobile network data transmission technologies: LTE-M (LTE Cat.M1) and NB-IoT (LTE Cat NB2)
- supports Mobile Virtual Network Operators (MVNOs)
- standard commercially available D-size lithium battery pack
- LCD display presenting connection status, network level, battery status and volume increment logging
- optical interface for configuration
- effective data transmission in harsh environments
- dedicated mobile application for device configuration and reading logged data
- cooperation with diaphragm, rotary, and turbine gas meters with reed switch or OC output type
- built in output for replication of input pulses and alarm state indication

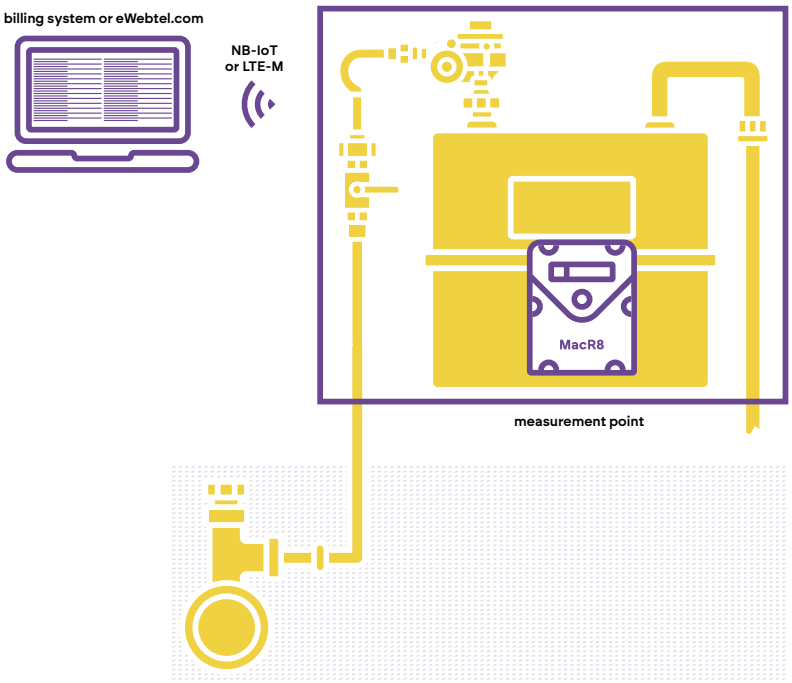
technical data
of the MacR8 data logger

dimensions/ weight	124 x 115 x 40 mm/ 0.3 kg
housing material	polycarbonate
relative humidity	maximum 95% at temperature of 60 °C
ambient temperature range	from -30 °C to 60 °C
housing protection class	in accordance with EN 60529 for outdoor installations: IP 66
Ex feature	II 3G Ex ic IIA T3 Gc certificates: OBAC 25 ATEX 0302X
display	segmented LCD display allowing device diagnostics and showing values: counter, monthly increments and hourly peaks
transmission protocols	GAZ-MODEM 2/3, support for TCP/UDP/NTP
resistance to mechanical and electromagnetic conditions	M2/E2
power supply	standard replaceable lithium battery pack, size D
transmission	• optical interface • support for 3FF (Micro SIM) or MFF2 (MIM) standard cards • LTE-M (LTE Cat.M1): B1/ B2/ B3/ B4/ B5/ B8/ B12/ B13/ B18/ B19/ B20/ B25/ B26/ B27/ B28/B66/ B85 • NB-IoT (LTE Cat NB2): B1/ B2/ B3/ B4/ B5/ B8/ B12/ B13/ B18/ B19/ B20/ B25/ B28/B66/ B71/ B85 • EGPRS: 850/ 900/ 1800/ 1900 MHz
compatibility with gas meters	• direct connection (LF, TS tamper switch): - via magnetic sensors: Honeywell/ Elster BK-Gxx series, Apator/ Metrix UG/ GL series - via reed switch sensors: Itron RF1 counter „o" series • cable connection to any gas meter with reed switch or OC output through LF input (DI1) and magnetic field control contact TS (DI2) • cable connection to two independent gas meters with reed switch output
outputs	optional, one built-in configurable digital output OC type, capable to operate as: • two-state output for gas consumption limitation control in case of consumption of ordered tariff power (dVh limit), • volume pulse output, e.g. for BMS systems
accessories	• eWebtel - measuring data acquisition system • ConfIT! - configuration software for PC • ConfIT! data loggers- mobile application • OptoBTEx 2 - optical interface

application
of the MacR8 data logger

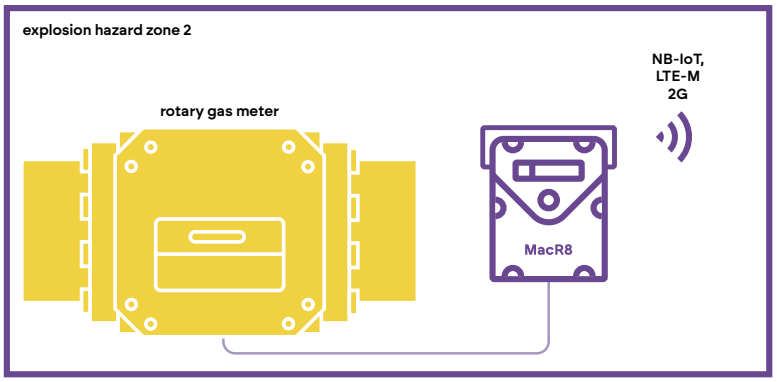
- **remote data reading**

  Direct installation on gas meter totalizer.



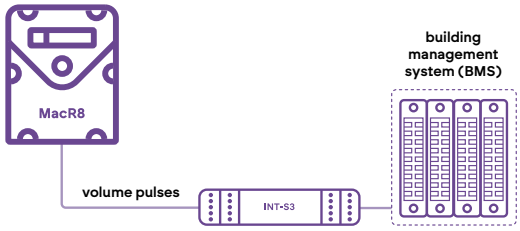
- **remote data reading**

  Installation with i.e. rotary gas meter with pulse output. MacR8 installed near the gas meter.

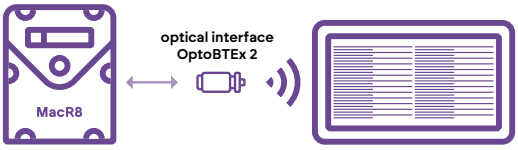


- **application diagram**

  Cooperation with building management system (BMS).



- **local reading and configuration**



MacR6 for Ex Zone 0

data logger for gas meters

MacR6-Z0-V is the device designed to enable remote readings of the gas consumption from standard mechanical gas meters in industry segment.

MacR6-Z0-V can be installed on chosen types of the diaphragm meters using dedicated installation kit and work as a smart extension of the mechanical totalizer of that meter.

MacR6-Z0-V can also cooperate together with any gas meter or Electronic Volume Converter with low frequency pulse output through typical cable connection and also act as an AMR device.

key benefits

- work in Ex Zone 0
- can work as a Ex telemetry unit for Volume Converters without internal modems
- gas usage profile transmission to the head-end system
- enabling readouts from low accessibility places - high installed meters, closed buildings requiring personal access
- gas flow control and immediate alarming about potential fraud on the object
- enabling access to historical gas consumption in high resolution, consumption even from every minute
- quick installation and minimum effort configuration using modern mobile application

accessories

functionalities
of the MacR6-Z0-V data logger

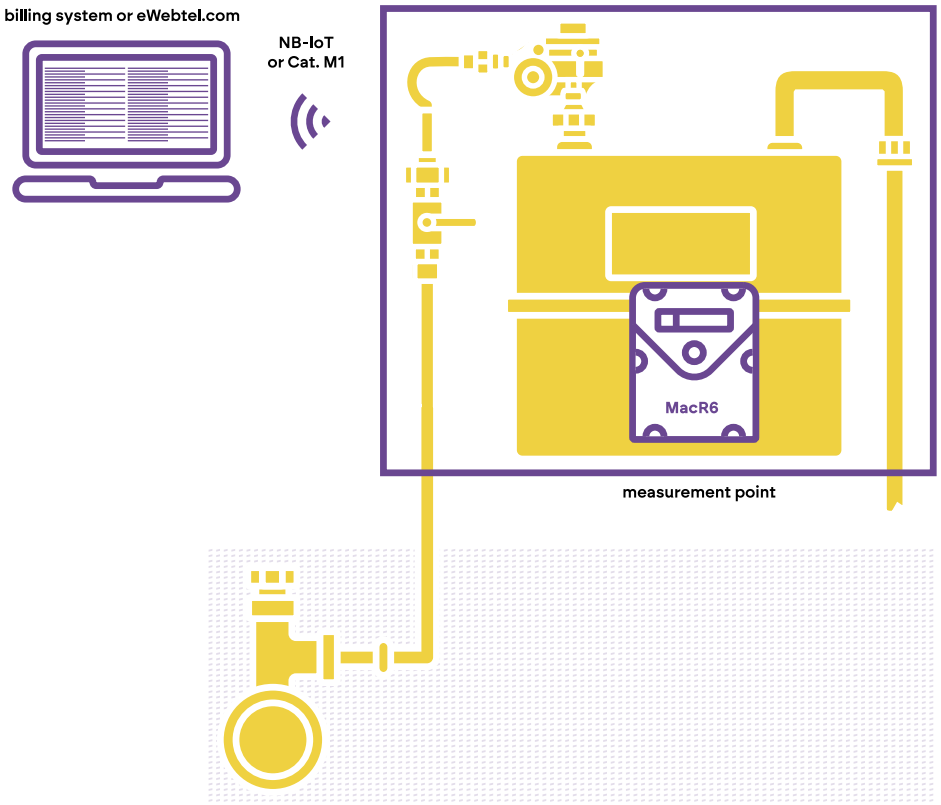
- support for LPWAN mobile network data transmission technologies: LTE-M (LTE Cat.M1) and NB-IoT (LTE Cat NB2)
- supports Mobile Virtual Network Operators (MVNOs)
- standard commercially available D-size lithium battery
- LCD display presenting connection status, network level, battery status and volume increment logging
- optical interface for configuration
- effective data transmission in harsh environments
- dedicated mobile application for device configuration and reading logged data
- cooperation with diaphragm, rotary, and turbine gas meters with reed switch or OC output type
- built in outputs for replication of input pulses and alarm state indication

technical data
of the MacR6-Z0-V data logger

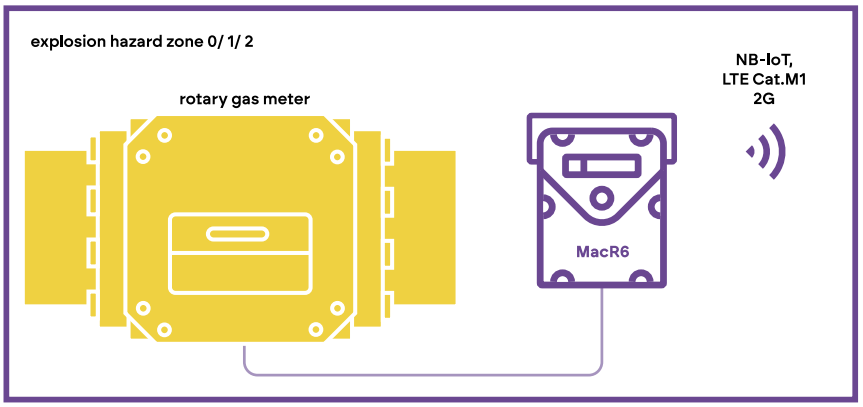
dimensions/ weight	146 x 114 x 40 mm/ 0.3 kg
housing material	polycarbonate
relatyive humidity	maximum 95% at temperature of 55 °C
ambient temperature range	from -30 °C to 55 °C
housing protection class	in accordance with EN 60529 for outdoor installations: IP66
Ex feature	II 1G Ex ia IIA T4 Ga certificates: FTZÚ 16 ATEX 0051X
display	segmented LCD display allowing device diagnostics and showing values: counter, monthly increments and hourly peaks
transmission protocols	GAZ-MODEM 2/3 support for TCP/UDP/NTP
resistance to mechanical and electromagnetic conditions	M2/E2
power supply	replacable lithium battery D-size
transmission	• optical interface • support for 3FF (Micro SIM) or MFF2 (MIM) standard cards • LTE-M (LTE Cat.M1): B1/ B2/ B3/ B4/ B5/ B8/ B12/ B13/ B18/ B19/ B20/ B25/ B26/ B27/ B28/B66/ B85 • NB-IoT (LTE Cat NB2): B1/ B2/ B3/ B4/ B5/ B8/ B12/ B13/ B18/ B19/ B20/ B25/ B28/B66/ B71/ B85 • EGPRS: 850/ 900/ 1800/ 1900 MHz
compatibility with gas meters	• direct connection (LF, TS tamper switch): - via magnetic sensors: Honeywell/ Elster BK-Gxx series, Apator/ Metrix UG/GL series - via reed switch sensors: Itron RF1 counter „o" series • cable connection to any gas meter with reed switch or OC output through LF input (DI1) and magnetic field control contact TS (DI2) • cable connection to two independent gas meters with reed switch output, or to be used with Electronic Volume Converter to obtain information about Vb and Vm through OC output
outputs	• two built-in configurable digital outputs OC type, capable to operate as: - volume pulse outputs (replication of pulses from two inputs) - programmable per each alarm
accessories	• eWebtel - measuring data acquisition system • ConfIT! - configuration software for PC • ConfIT! data loggers- mobile application • OptoBTEx 2 - optical interface

application
of the MacR6-Z0-V data logger

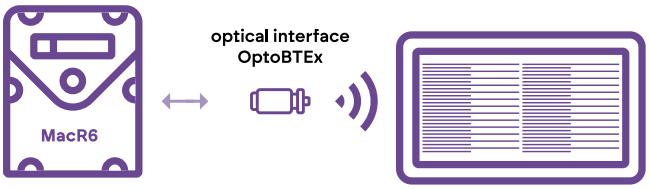
- **remote**
  data reading
  Direct installation on gas meter totalizer.



- **remote**
  data reading
  Installation with i.e. rotary gas meter with pulse output. MacR6-Z0-V installed near the gas meter.



- **local reading**
  and configuration



MacR6-Z0-P

gas pressure data logger with built-in IoT telemetry module

MacR6-Z0-P is an instrument designed to monitor gas pressure and immediately inform about exceeding of adjusted thresholds through cellular network thanks to internal modem working in NB- IoT, LTE-M or 2G.

Device is equipped with up to two pressure sensors with possibility to cover the range from 0.1 to 100 bar, which can be installed in Ex Zone 0.

Main purpose of the device is to monitor the grid endpoints and the gas regulators stability.

key benefits

- instant alarming about pressure unwanted and sudden changes
- pressure trend monitoring with minimum and maximum value from each hour
- possibility to add the significance to the alarming - various alarm thresholds with flag of alarm and warning
- two independent pressure measurement channels with own adjustable limits
- quick installation requiring minimal amount of tools
- factory set-up option to install without any configuration on the object, using eWebtel platform configuration can be finished remotely

accessories

- eWebtel p. 49
- ConfIT! PC p. 51
- ConfIT! data loggers p. 52
- OptoBTEx 2 p. 54

functionalities
of the MacR6-Z0-P gas pressure logger

- support for LPWAN mobile network data transmission technologies: LTE-M (LTE Cat.M1) and NB-IoT (LTE Cat.NB2)
- support for Mobile Virtual Network Operators (MVNOs)
- optical interface for configuration
- data transmission in difficult conditions
- event-based sending of data on exceeding pressure limits
- 2 independent pressure monitoring channels in one device

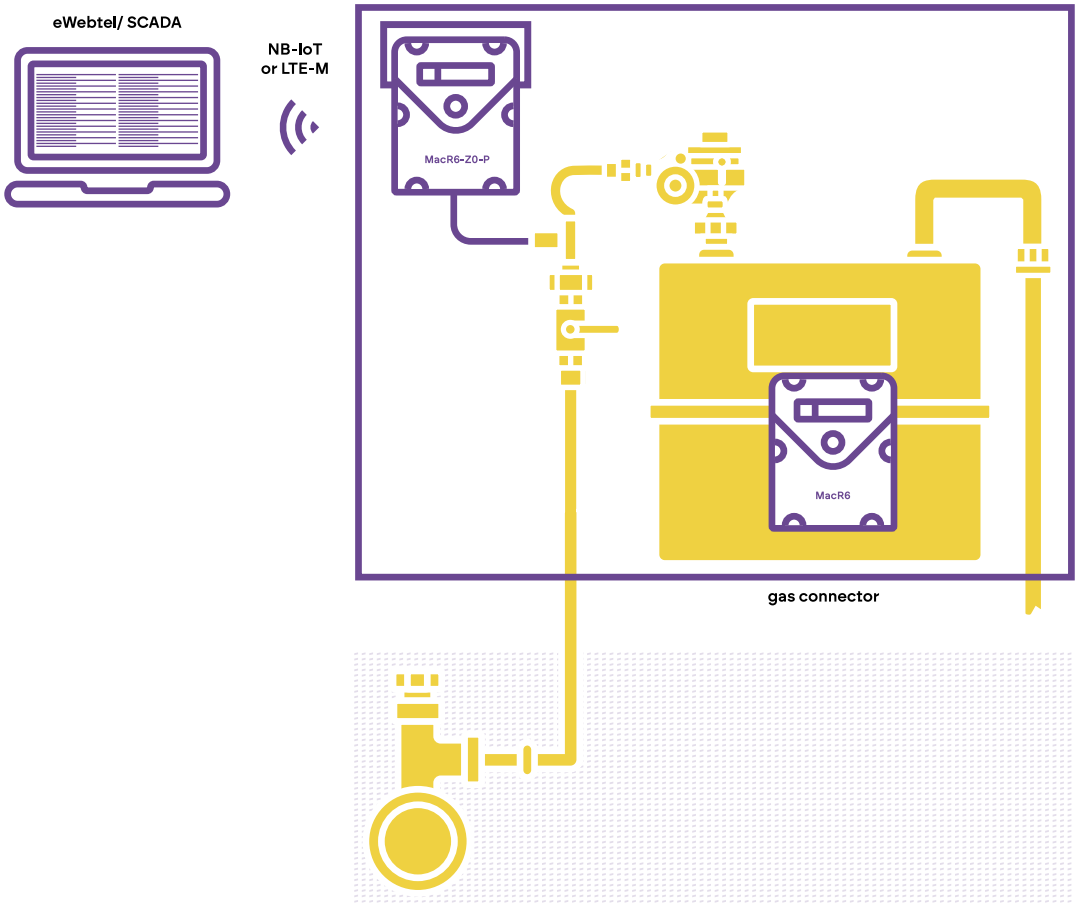
technical data
of the MacR6-Z0-P gas pressure logger

dimesnions/ weight	124 x 90 x 40mm/ 1.0 kg
housing material	polycarbonate
relative humidity	maximum 95% at temperature of 55 °C
ambient temperature range	from -30 °C to 55 °C
housing protection class	IP66 in accordance with EN 60529 for outdoor installations
Ex feature	II 1 G Ex ia IIA T4 Ga certificate: FTZÚ 16 ATEX 0051X
display	graphical LCD display allowing device diagnostics and showing current pressure value
transmission protocols	GAZ-MODEM 2/3 support for TCP/UDP/NTP
resistance to mechanical and electromagnetic conditions	M2/ E2
power supply	replacable lithium battery D-size, 3,6 V/ 17 Ah; operation time: LTE-M/ NB-IoT - up to 10 years, 2G - up to 5 years
transmission	• optical interface • LTE-M (LTE Cat.M1), bands: B1/ B2/ B3/ B4/ B5/ B8/ B12/ B13/ B18/ B19/ B20/ B25/ B26/ B27/ B28/ B66/ B85 • NB-IoT (LTE Cat.NB2), bands: B1/ B2/ B3/ B4/ B5/ B8/ B12/ B13/ B18/ B19/ B20/ B25/ B28/ B66/ B71/ B85 • 2G (EGPRS): 850/ 900/ 1800/ 1900 MHz
registration period	• data registered at intervals of 1-60 minutes; around 6 months of data storage • memory of events - 128 records
inputs/ sensors	• housing opening sensor • up to 2 pressure sensors with ranges 0÷0.1/ 0÷0.3/ 0÷6/ 0÷10/ 0÷16/ 0÷35/ 0÷70/ 0÷100 bar • pressure sensors ended with metric thread M12 x 1.5 (Ermeto) or NPT 1/4”
accessories	• eWebtel - measuring data acquisition system • ConfIT! - configuration software for PC • ConfIT! data loggers- mobile application • OptoBTEx 2 - optical interface

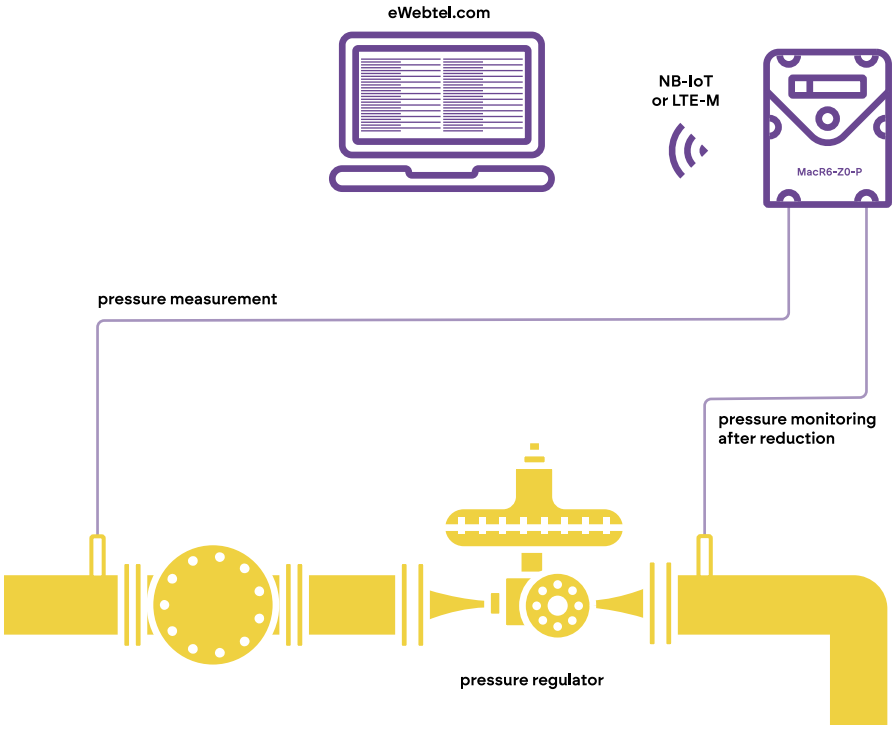
application
of the MacR6-Z0-P gas pressure logger

- **pressure monitoring**

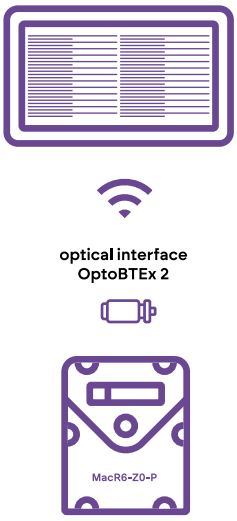
  Monitoring pressure at the end of the gas grid using MacR6-Z0-P.



- **application diagram**



- **local reading and configuration**



smart gas meter

- **MacSM G4**

- **complete measurement and telemetry solution**
- **remote customers management**
- **metrology approved solution**

MacSM G4

smart gas meter

Diaphragm gas meter with digital totalizer module integrated with IoT telemetry module MacSM G4 is an intelligent gas meter designed to measure the volume of the natural gas. Device contains the integrated telemetry module to send the measurement data, archives and events caused by intrusions or maintenance failures to the data acquisition system.

Gas meter can be equipped with additional features extending its billing capabilities such as remote controlled valve and temperature sensor.

Integrated battery in the device can allow it to work up to 20 years.

key benefits

- untinterrupted work in any outdoor conditions
- eco-friendly solution allowing for using less batteries for mass applications
- meter with inbuilt data logging and diagnostics module as a complex solution for billing, fraud detection and payment avoiding detection
- volume measurement design independent from magnetic interference, minimized risk of tampering
- no risk of unauthorized access to the meter on any level

accessories

technical data
of the MacSM G4 smart gas meter

nominal size	G4, capacity of the chamber 1.2 dm^3	
connection	inch connection 1 1/4" or 7/8" according to ISO 228-1 110/ 130/ 160 mm spacing between connectors	
nominal flow rate [m^3/h]	4	
qmax [m^3/h]	6	
qmin [m^3/h]	0.04	
basic error	± 1.5% - 0.1 Qmax ≤ Q ≤ Qmax ± 3% - Qmin ≤ Q < 0.1 Qmax	
maximum pressure [kPa]	50	
maximum pressure drop [kPa]	≤ 0.2	
volume of the measurement chamber	1.2 dm^3	
weight	up to 2.4 kg	
ambient temperature	-25 ÷ 55 °C	
enclosure protection class	IP 65	
ex (applies to design /Ex)	II 3G Ex ic IIB T3 Gc OBAC 25 ATEX 0047X	
metrology approval	EU Type examination Certificate no I-2142-MI002-TG071	
design type	design of the AFD1 gas meter with a communication module built into the gas meter in accordance with EN 16314:2013	
keypad	1 monostable button, performing the following functions: short press: navigation, long press: selection of an option	
display	alphanumeric, 2 lines, 12 characters, function and unit icons	
built-in sensors	opening of the housing cover, metrological lock	
application approval	permissible for installation in zone Z2 of explosion hazard for gases classified as group IIB	
resistance to high temperatures	T (according to EN1359)	
suitable for use in open environment	H3 (according to EN1359)	
electromagnetic environment class	E2 (the instrument may be installed in areas exposed to disturbances in industrial buildings)	
mechanical class	M1	
transmission technology	LTE Cat M1 + NB IoT	
built-in LPWAN licensed module	**LTE Cat M1** **B1/B2/B3/B4/B5/B8/ B12/B13/B18/B19/ B20/B25/B26/B27/B28/B66/B85** **Class 5 (21 dBm +1.7/-3 dB)**	**NB-IoT** **B1/B2/B3/B4/B5/B8/ B12/B13/ B18/ B19/ B20/ B25/B28/B66/ B71/B85** **Class 5 (21 dBm +1.7/-3 dB)**
SIM standards supported	3FF and MFF2	
communication protocol	GAZ-MODEM (for local connections); DLMS/COSEM (for local and remote connections)	
local communication	optical interface	
power supply	single D-size battery or extended double-D battery	
battery life	up to 20 years - the operating time depends on the profile of usage of the device, the scenario for up to 20 years of operaing: • communication every one day (daily report) without retransmission • good or excellent signal quality • configuration of the device - 5 times per year • FW update - 1 time per 2 years • display activation - 2 times per year (each time for 5 minutes)	

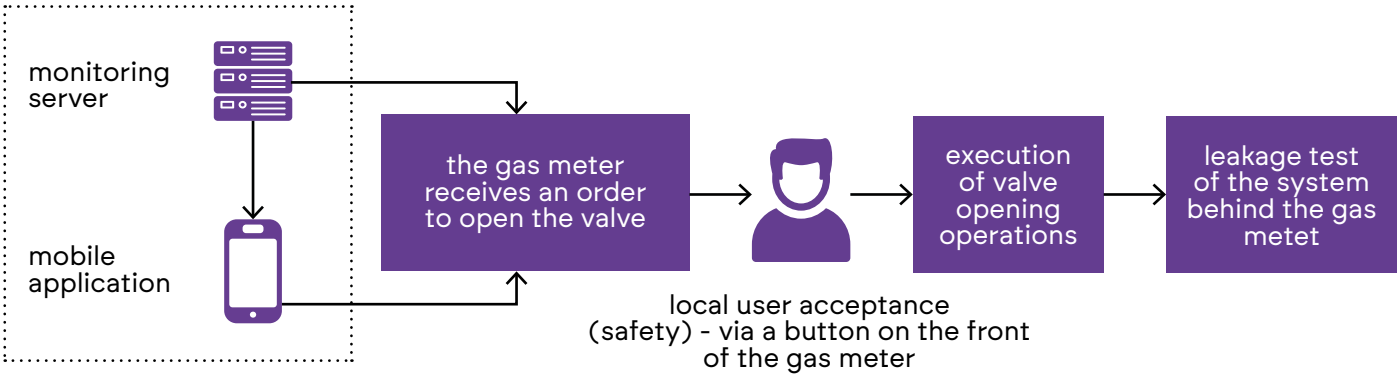
counting process
of the MacSM G4 smart gas meter

Pressurized gas is injected into the measurement chambers inside the meter. Gas fills chambers one after another. Each cycle of filling and emptying the chambers represents flow of the same amount of gas. The electronic counter records consumption data continuously, providing detailed information on flow / consumption over a specified period of time. It also provides 100% tamper resistance. The counter cannot be stopped by a magnet. The counting cannot be stopped by the end user.

valve
operation

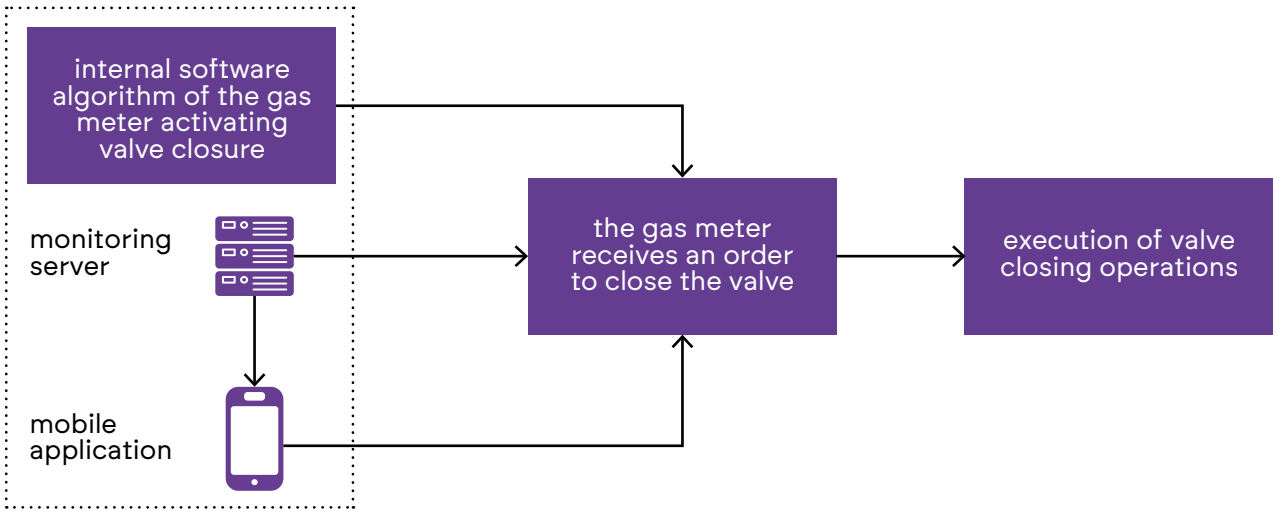
opening the valve

source issuing the open order



closing the valve

source issuing the closing order



data acquisition system

- **eWebtel**

eWebtel

measurement data acquisition system

eWebtel system is a measurement data acquisition system, operating both on the internet and in a dedicated private network. eWebtel is designed to handle billing, monitor network parameters, and access the selection of measurement devices.

System enables graphical presentation of received data, which is displayed in the form of functional charts, tables, and text-graphic reports.

related devices

- MacBAT 5
- MacREJ 5
- MacREJ 5 R
- MacR8
- MacR6-Z0-V
- MacR6-Z0-P
- MacSM G4

key benefits

- monthly gas consumption reports for individual recipients or recipient groups
- notifications about alarm events, such as pressure exceedance or magnetic interference
- access to consumption history for individual recipients or recipient groups

functionalities

- gas network monitoring
- easy data analysis based on charts
- ability to define the scope and type of transmitted data
- creation of measurement points and groups
- remote configuration of devices, including setting flow and pressure limits and scheduling data transmissions
- easy data analysis
- available as SaaS or installation at your own server
- visualization of devices on a map using geolocation
- data export capabilities to CSV, XML, Excel files
- support for encrypted TCP protocol
- simple user account management system

configuration tools

- ConfIT! PC
- ConfIT! volume correctors
- ConfIT! data loggers

ConfIT! PC

software
for PC configuration

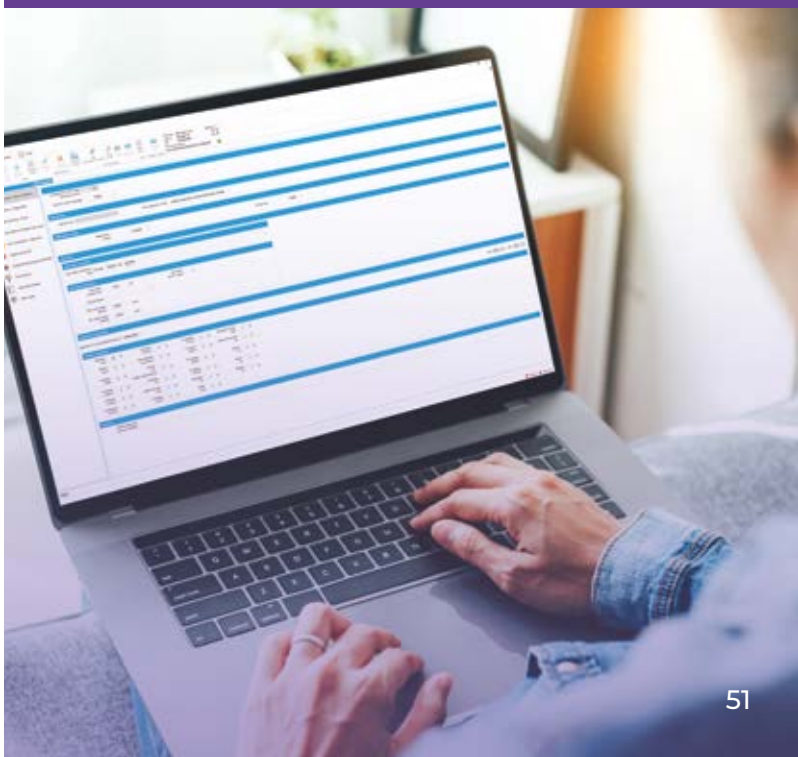
The ConfIT! PC software enables configuration of Plum products through a clear graphical interface that can be customized if needed.

The basic functionality of graphical device profiles allows configuration in both basic and advanced modes. Table based configuration is also available. Each modified and unsaved value is highlighted with a distinct color, ensuring the user is aware of every change made. Firmware can be upgraded on Plum devices without the need for additional interfaces or softwares. ConfIT! PC remembers the list of recently used devices, eliminating the need to search for a new device each time. The software is designed for installation and operation in the Windows operating system.

key
benefits

- complete platform for devices configuration, data readout and firmware upgrade
- implemented mechanisms to configure devices remotely using TCP
- configuration template creator for multiple device types
- devices performance report

download
the ConfIT! PC application



ConfIT! volume correctors

mobile application for gas volume correctors

Application supports on-site installation and allows for configuration of the device and editing of basic volume conrrector parameters.

Application communicates with devices via bluetooth standard, using the OptoBTEx 2 head through the optical channel, and directly using NFC.

ConfIT! volume correctors application is designed for configuring gas volume correctors produced by PLUM.

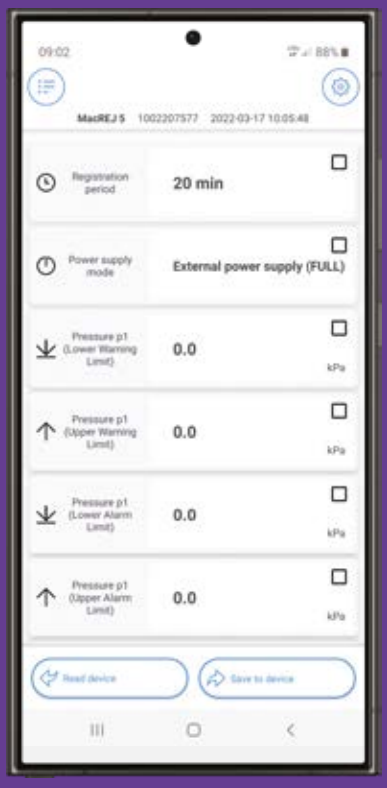
download
the ConfIT! volume correctors application

GET IT ON Google Play

ConfIT! data loggers

mobile application for data loggers configuration

Mobile application ConfIT! data loggers is designed for configuring telemetry modules and pressure recorders produced by Plum. The application supports on-site installation and allows for configuration of the device and editing of basic logger parameters. The application communicates with devices via bluetooth standard, using the OptoBTEx 2 head through the optical channel, and directly using NFC.



download
the ConfIT! data loggers application

GET IT ON Google Play

accessories

- INT-S3
- OptoBTEx 2
- EM-1
- EM-2
- EM-2Ex

INT-S3

power supply interface

INT-S3 is dedicated to power supply (V_{OUT} = 5.7 V) devices installed in Ex zone, and it can be also used as Ex barrier for RS485 communication channel and for Digital Outputs.

INT-S3 is transparent interface what means it does not affect the transmission, does not change transmitted data in any way.

Ex feature: II (2)G [Ex ib Gb] IIA

OptoBTEx 2

optical interface

OptoBTEx 2 is a wireless transmitter of data from compatible devices. The communication is performed in Bluetooth Low Energy Standard. Data is transmitted from device to the readout software installed (usually a device running MS Windows or Android operating system).

Interface is powered by an internal rechargeable battery.

Ex feature: II 3G Ex ic IIA T4 Gc

EM-1

extension module

EM-1 module is an extension device that enhances the functionality of the compatible Plum devices with two additional current outputs operating in the 4-20 mA current loop standard. The module can also operate as a standalone device. It has its own table of available parameters, which can be remotely programmed using the GAZ-MODEM 2 and Modbus transmission protocols. Data reading and modification can be performed from a computer or other battery-powered/ network-powered device equipped with an RS485 serial port.

EM-2

extension module

EM-2 module is an extension device that enhances the functionality of the compatible Plum devices with an additional 8 normal state digital inputs. It can also operate as a standalone device, as it has its own parameter table for remote modification using Modbus RTU transmission protocols. Data reading and modification can be performed using a SCADA system.

EM-2Ex

extension module

EM-2Ex module is an extension device that enhances the functionality of the compatible Plum devices with an additional 8 intrinsically safe digital inputs. It can also operate as a standalone device, as it has its own parameter table for remote modification using Modbus RTU transmission protocols. Data reading and modification can be performed using a SCADA system.

Ex feature: II (1)G [Ex ia Ga] IIC

why you should choose our measurement solutions

- complex approach to the entire implementation process
- provide a technically refined product, providing remote data transfer from the system, operating in battery mode
- we organize dedicated technical training
- we provide marketing support
- easy configuration and operation through dedicated communication interfaces, web systems and mobile applications
- we focus on business partnership, that is, we help solve technical problems and technological challenges

We develop complete metrology and telemetry solutions for the natural gas industry. Products are developed according to the needs and technical standards of the installation and the customer. Cooperation with us means, in addition to products, a full package of additional services such as marketing activities and dedicated training from the technical department.

We specialise in the development of comprehensive metrology and telemetry solutions for gas meter readings. Our products are developed in accordance with the specific requirements and technical standards of the installation, as well as the customer's specifications. Our cooperation includes not only our products, but also a full range of additional services, such as marketing activities and dedicated training from our technical department.

To whom are our solutions created?

- gas distribution operators
- gas transfer providers
- metering devices suppliers
- commercial customers
- manufacturer of the natural gas equipment

cooperation process

We create OEM solutions. However, we treat each product and its implementation individually. We guarantee full implementation and post-sales support from our R&D department.

We are Agile. We develop all our projects in SCRUM methodology, which allows us to implement our devices faster and more effectively.

We design competitive and interoperable devices, meaning they cooperate with devices from other suppliers.

We manufacture in Poland. We ensure product delivery reliability through local production.

cooperation process

step 1.

establishing technical requirements

Analysis of technical requirements of end customers.

step 2.

testing

Start of testing, pilots with our active participation and preparation for operation with information systems.

step 3.

acceptance of solutions

After testing period, we wait for acceptance of solutions.

step 4.

bidding

Negotiation of business terms and conditions.

step 5.

order

Our customers service department proceed with your order.

step 6.

production

Your devices are being produced and tested in our headquaters in Poland.

step 7.

technical support

We guarantee implementations, training and technical support.

what sets us apart

The interdisciplinary nature of our activities enables us to draw conclusions and implement the best solutions across all our brand products. We gather experience and utilize knowledge in the most effective way possible.

The quality of Plum solutions is confirmed by many years of cooperation and trust with the various gas distribution companies and transmission operators (TSO) all over the world.

plum EMS

electronics
assembly on demand

We provide comprehensive electronics assembly services on demand. We handle the entire production process from design, purchasing necessary materials, assembling printed circuit boards, soldering wires, to assembling finished device enclosures. We cater to both small and large production runs as well as prototypes. We produce over a million printed circuit boards annually and serve companies from all around the world.

plum LAB

Accredited Laboratories

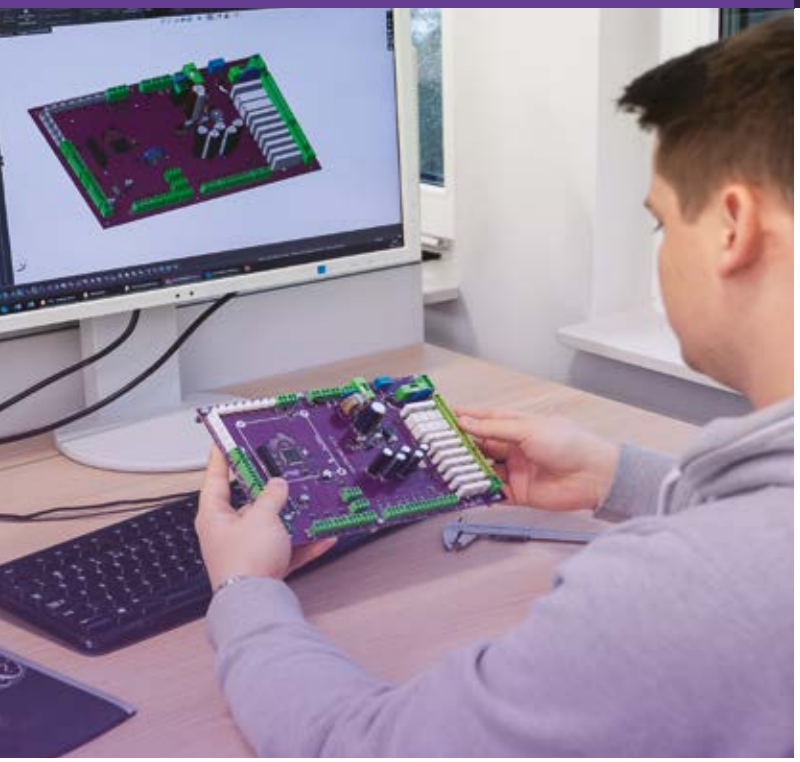
We operate an Accredited Calibration Laboratory AP 074, and an Accredited Electromagnetic Compatibility (EMC) Laboratory AB 1765.

about Plum

We are an electronics manufacturer focusing on the development of systems for intelligent energy management in hvac, gas, and water areas using IoT technology.

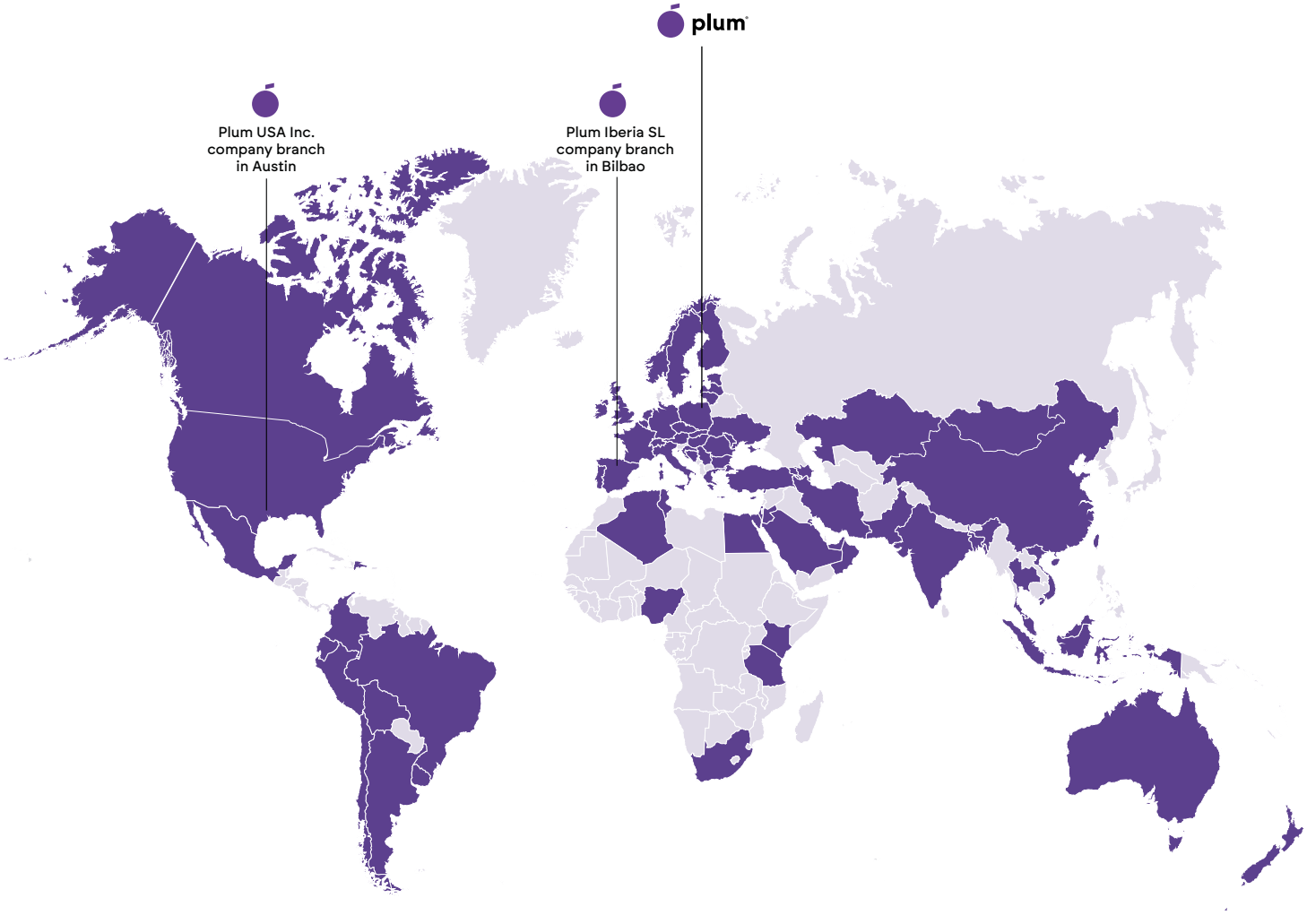
We continuously improve the efficiency of our design and production processes to quickly respond to changing market requirements and customer needs.

- **the electronics manufacturer and provider of energy management systems utilizing IoT technology**
- **solutions dedicated to the hvac, gas, and water industries**
- **accredited calibration and testing laboratories**
- **family-owned business**
- **company established in 1986**
- **integrated ISO management system**



We develop our electronics with several areas in mind. We manage 5 brands: plum HVAC, plum GAS, plum WATER, plum LAB, plum EMS. The accumulated experience serves as added value for all our activities and projects.

Our headquarters are located in Ignatki near Białystok. We sell our products both domestically and internationally.



get in touch with us

Customer service and Sales department:

gas@plum.pl

Scan the QR code to access detailed contact information:

gas.plum.pl/en/contact/

Go to our website.

gas.plum.pl

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