plum® GAS

efficient
measurements

# plum GAS portfolio

## metering gas transfer

plum® GAS

# table of contents

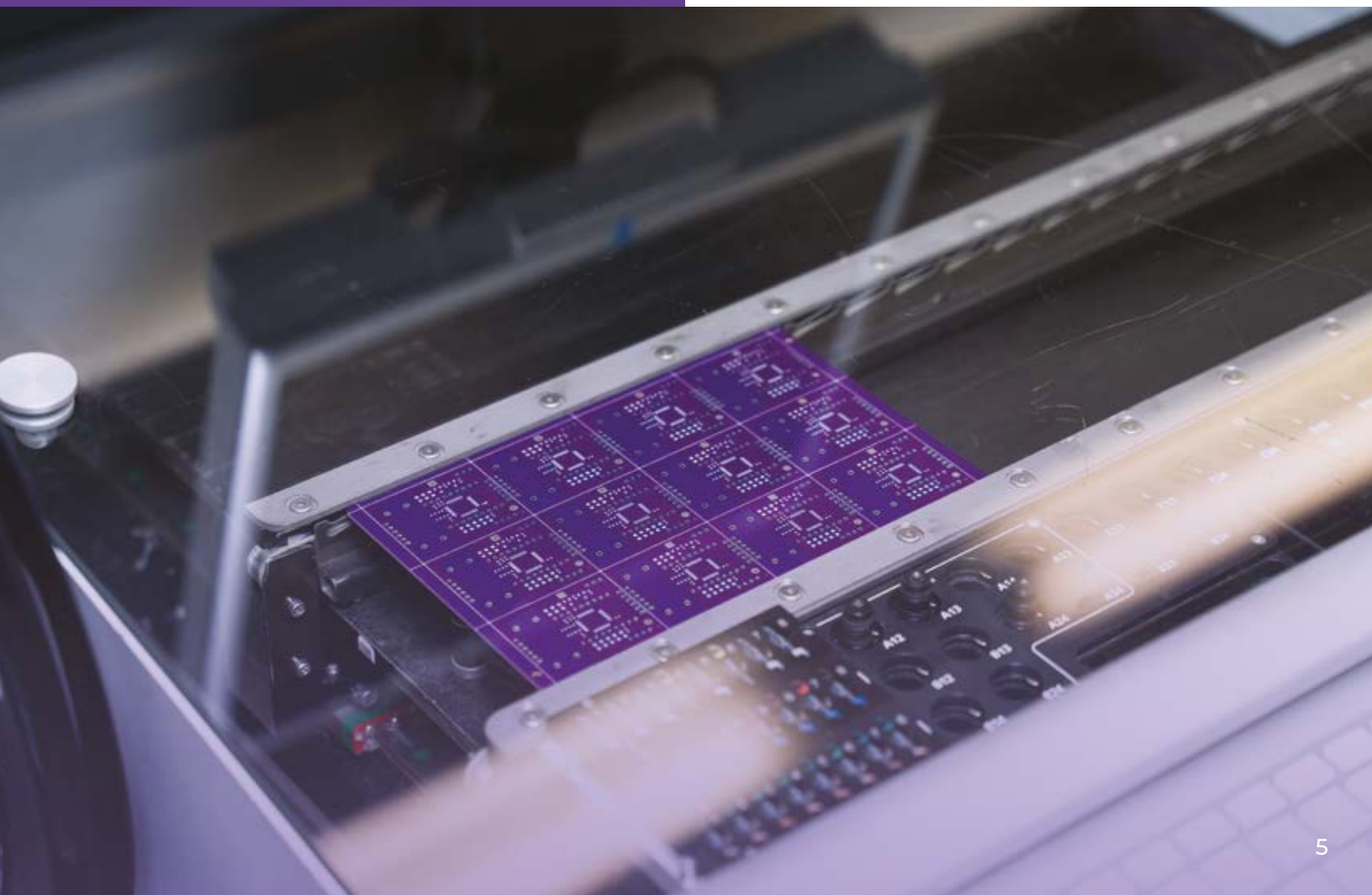
# we are the manufacturer of electronics for intelligent management of the natural gas transmission and distribution system

**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.

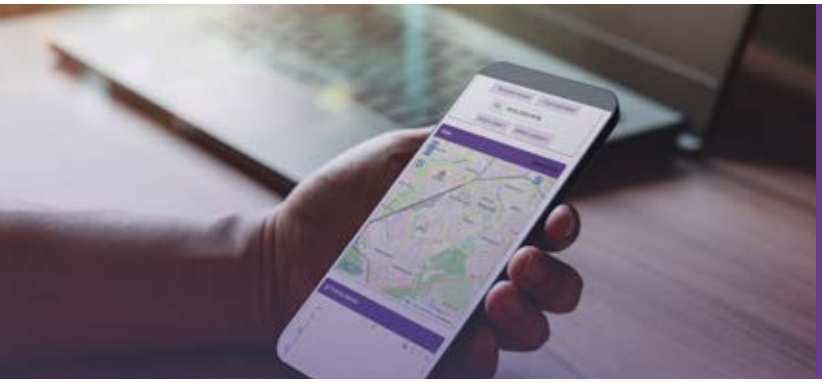
Solution enables enhancements in the natural gas metering stations by adding management and maintenance, archiving measurement data, fast tracking of the malfuntions of whole metering station and single equipment.

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**

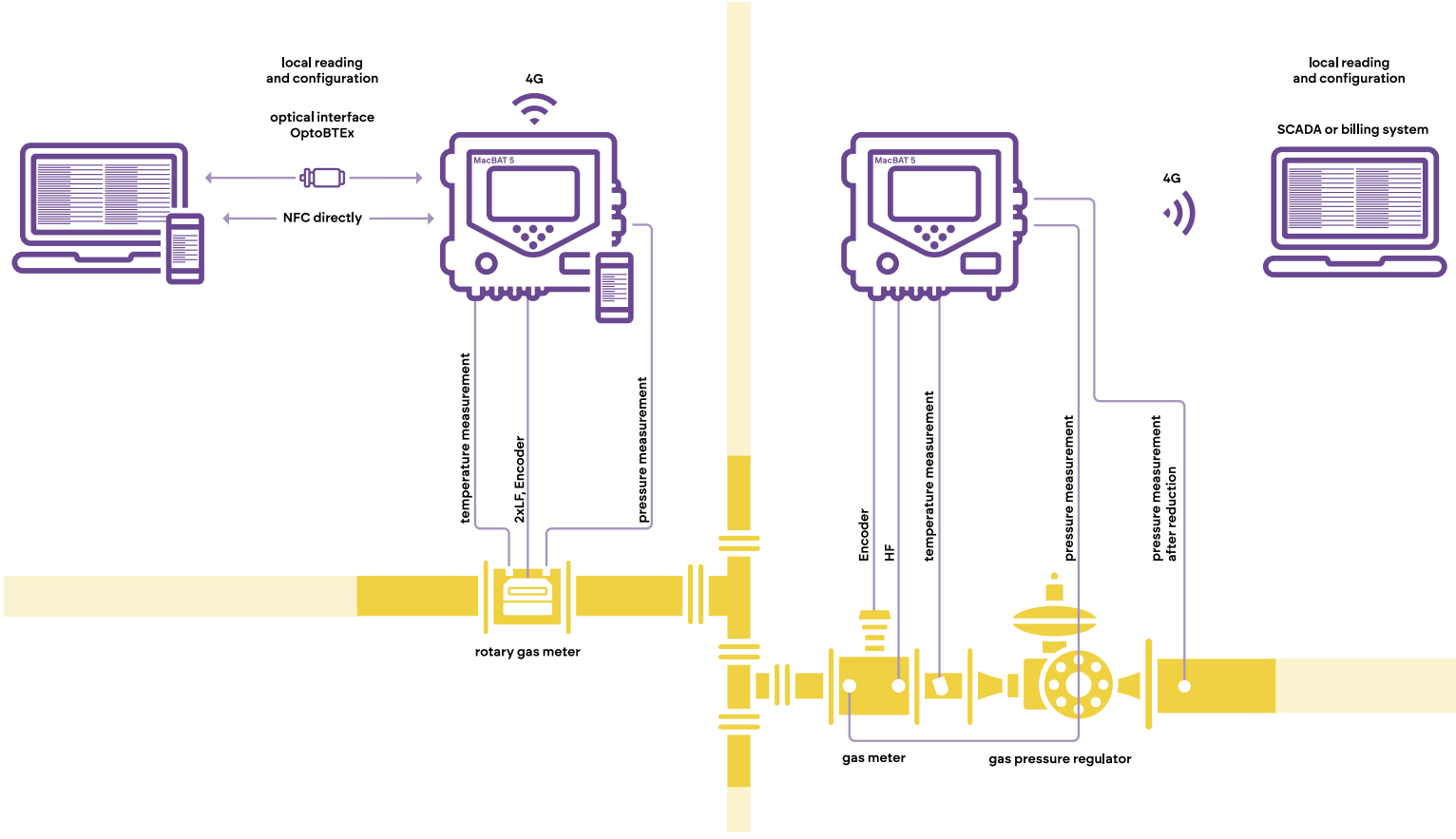
- volume correction for every type of gas meter regardless of pressure, type, or natural gas mixture composition
- gathering diagnostic information from binary sensors, pressure and temperature sensors, connected digital sensors, and attached devices such as odorizers or process chromatographs
- intuitive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

MacR6 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**

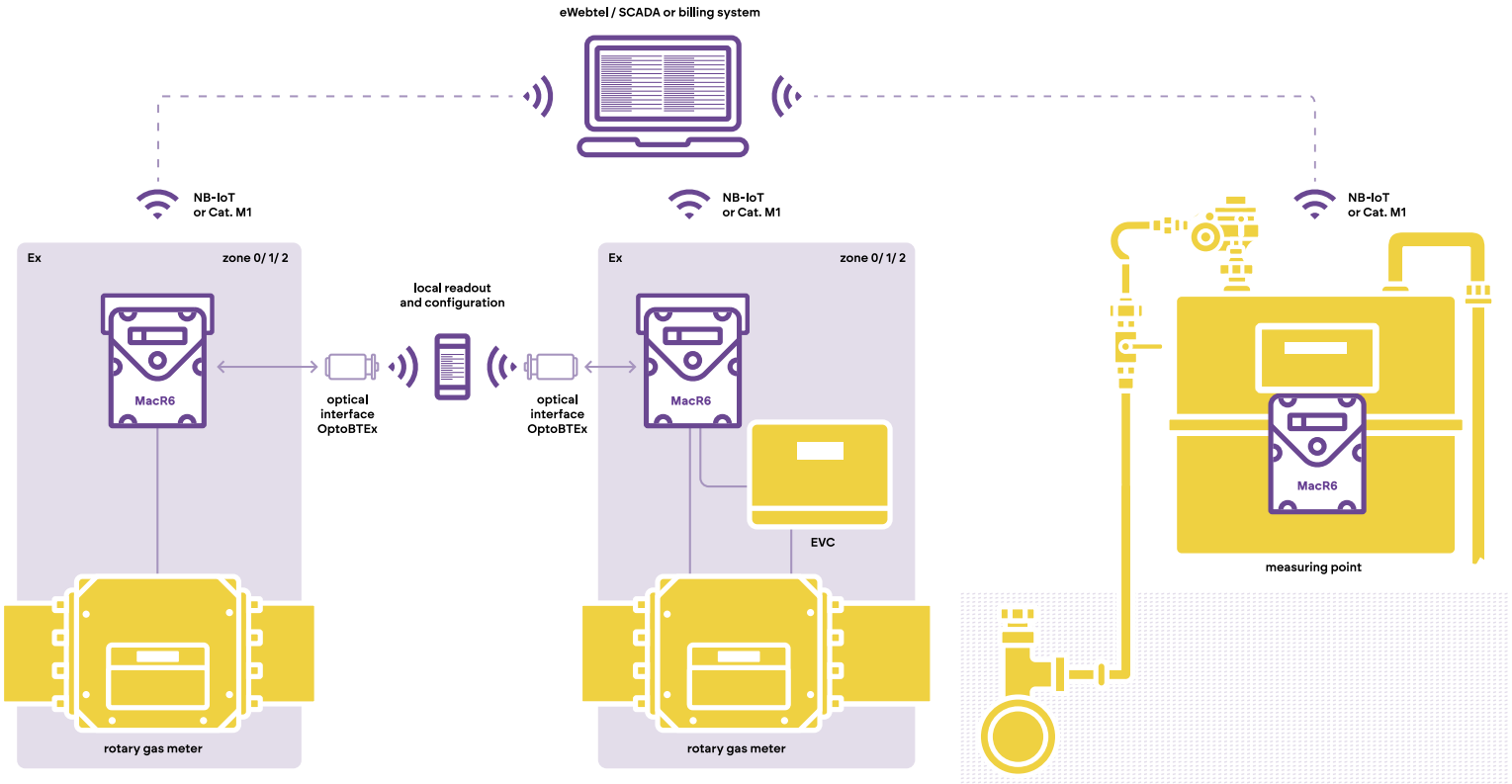
- efficient IoT data transmission technology
- NB-IoT and LTE Cat.M1 offers ability to operate in low network signal level
- a patented flow detection method from the gas meter (for selected types) ensures correct meter reading
- the built-in battery provides up to 15 years of operation


# Automatic meter reading solutions with NB-IoT/ LTE Cat.M1 technology.

MacR6 is the device designed to enable remote volume readings of standard industrial mechanical gas meters. MacR6 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**

- MacR6 read more: p. 32



# 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.

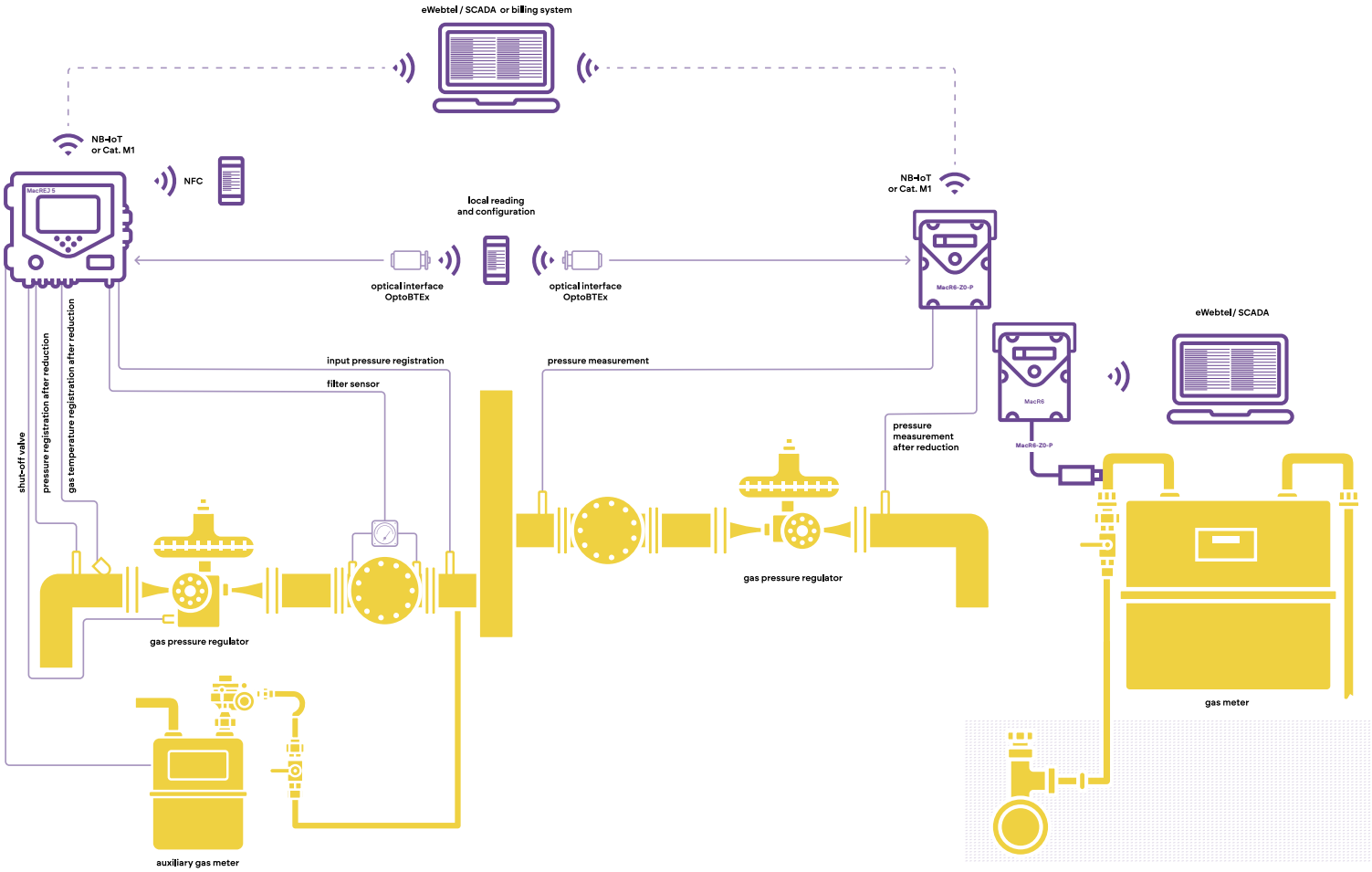
**key benefits**

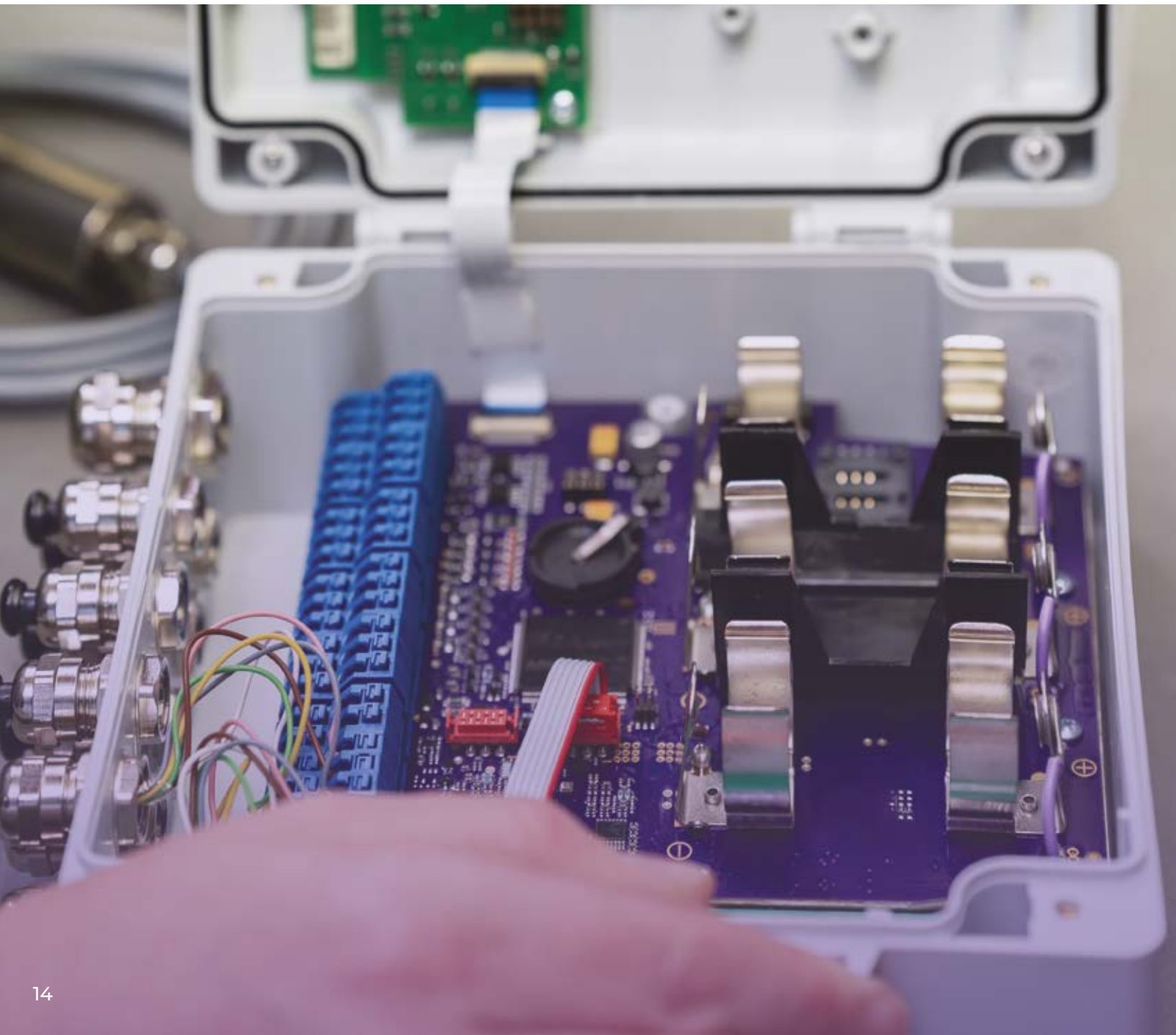
- solutions for simple and advanced applications
- instant measurements, archiving, remote communication modules in one enclosure, no need for building big solution
- plug & play solution

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. 36





# products

volume correctors

flow and pressure data loggers

data acquisition system

configuration tools

accessories

devices dedicated to the US market

# 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.

**accessories**


- eWebtel p. 40
- ConfIT! PC p. 42
- ConfIT! volume corrector p. 43
- OptoBTEx p. 44
- INT-S3 p. 44
- EM-1 p. 44
- EM-2 p. 44
- EM-2Ex p. 44


**key benefits**

- two variants of housing - aluminum and polycarbonate
- 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
- Ex compatible backlight of the terminals in Aluminum version
- 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

## 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 backflow
- measurement of volume every second from the HF input - also possible during battery backup back-up operation
- 3 independent serial transmission ports (RS485 or RS232, Optical Interface)
- 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, including two NAMUR inputs for inductive sensors, also functional when battery powered, additional 8 inputs available when EM-2/ EM-2 Ex 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
- interfacing to the BMS (Building Management System) via Modbus RTU, Modbus TCP or pulse-controlled counters Vb and Vm
- 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** | poycarbonate (version 1)/ aluminum (version 2) |
| **dimensions/ weight** | 207 x 194 x 77 mm/ 1.3 kg (version 1)<br>202 x 167 x 93 mm/ 3.5 kg (version 2) |
| **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 (version 1)/ 18 pushbuttons (version 2) |
| **display** | graphical, 4", backlight, operation in the full range of operating temperatures |
| **Ex feature** | II 1G Ex ia IIB T4 Ga<br>certificate: FTZÚ 17 ATEX 0047X |
| **meets the requirements of 2014/ 32/ UE (MID)** | certificates:<br>• DE-19-MI002-PTB004 - Plum PTZ converter<br>• DE-21-M-PTB-0012 - Plum load recorder |
| **internal power supply** | 3 lithium D-size batteries:<br>• 1 battery to supply volume converter<br>• 2 batteries to supply internal modem (1 battery for aluminium housing in special conditions) |
| **external power supply** | dedicated 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 COM1 - RS485 or optional RS232, COM2 - RS485 - shared with Modbus MASTER input, speed up to 256 kb/s, optical interface<br>• NFC IEC 14443 interface<br>• optional integrated modem 4G LTE/ 2G |
| **resistance to mechanical and electromagnetic conditionse** | M2/ E2 |
| **base conditions** | set by authorized personnel; available options:<br>• base pressure (absolute) pb: range (0.95÷1.05) bar, default 1.01325 bar<br>• base temperature Tb: range (270÷300) K, default 273.15 K (0 °C)<br>• reference temperature determined for combustion process T1: range (270÷300) K, default 298.15K (25 °C) |
| **maximum permissible error (MPE) according to standard „EN 12405-1"** | • 0.5% at reference conditions<br>• 1% at nominal operating conditions<br>• 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)<br>• hourly data – over 16 months<br>• daily data – over 4 years<br>• monthly data – over 10 years<br>• alarms/ events memory – over 6000 records |

## technical data
## of the MacBAT 5 corrector

**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÷20mA outputs triggered by measured value (p1, t, Qb, Qm etc.) realized by extension module EM-1

**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 digital inputs NAMUR type:
  - 2 equipped on board of MacBAT 5: 2 HF inputs, frequency 0-5000Hz, EN60947 5-6; temporary working on battery in case of power loss ensure measurement continuity; when not used as HF counters, work as NAMUR proximity sensors on battery
  - 8 additional NAMUR inputs realized by extension module EM-2 Ex
  - 1 ENCODER (NAMUR type)
- 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 |

typisal error of p1 pressure measurement: 0.15% 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% |

typisal error of temperature measurement: 0.08%

- 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; typisal error of p2 pressure measurement (gauge): 0.15% of range
- RS485 Modbus MASTER input (with 3.6V 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

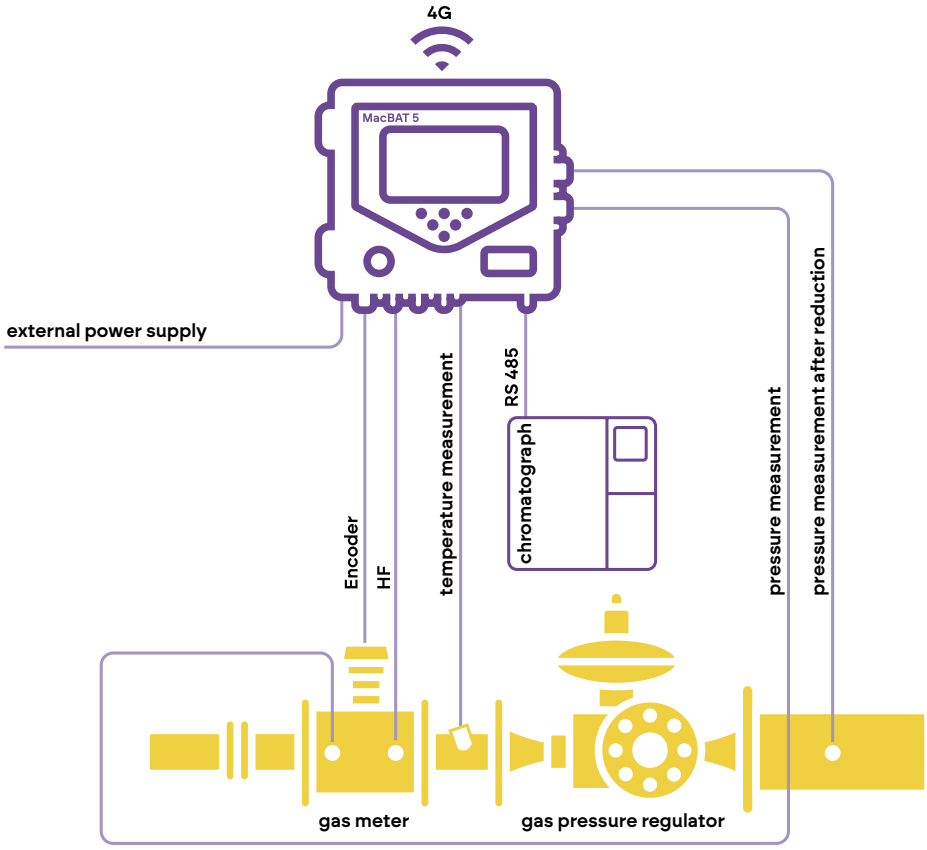
**accessories**

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

## application
## of the MacBAT 5 corrector

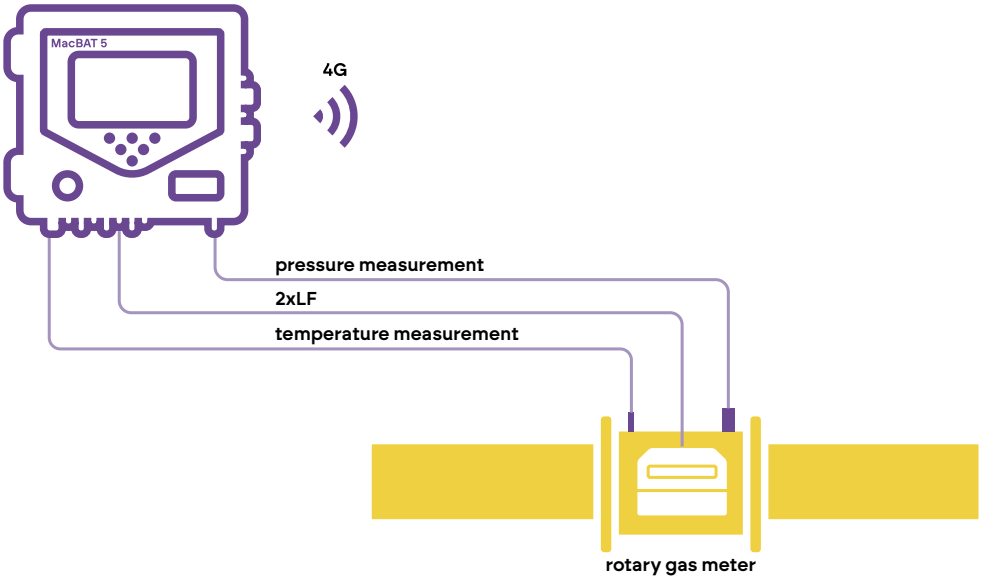
- **pressure regulator monitoring using additional pressure sensor in MacBAT 5**

  System recommended for operating a high-pressure gas meter.

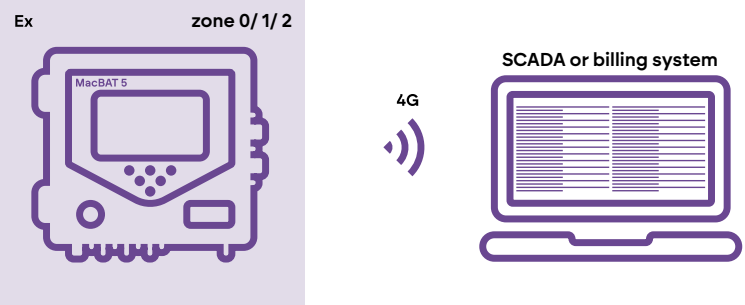



- **MacBAT 5 connected with a rotary gas meter**

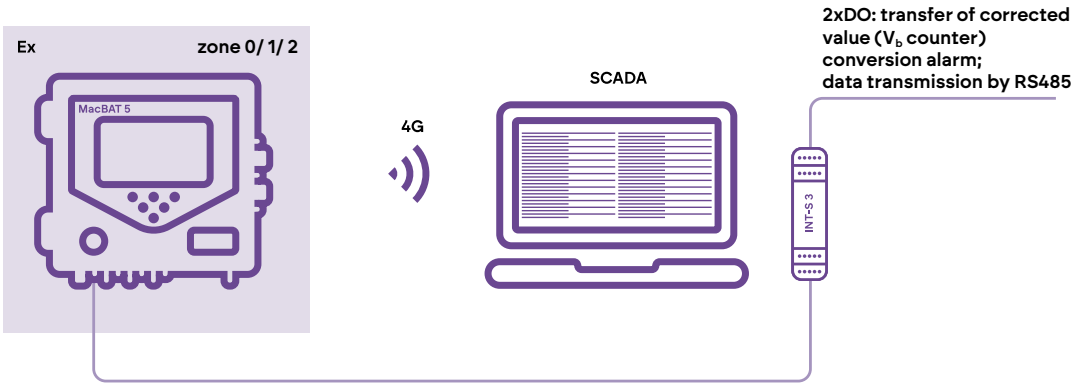
  Connection via 2 x LF ensures precise synchronization between the gas meter and the corrector, taking into account volume reverse flow on the gas meter.



- **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 power supply interface and the built-in 4G LTE modem.




# flow and pressure data loggers

- MacREJ 5
- MacREJ 5 R
- MacR6-Z0-P
- MacR6

- 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**



**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 natural gas metering 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

- integrated GSM modem (optional) operating in 4G LTE 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
- built-in illumination of the connection terminals (aluminum housing version)
- low operating costs due to the use of standard lithium batteries

## technical data
## of the MacREJ 5 data logger

| | |
|---|---|
| **housing material** | poycarbonate (version 1)/ aluminum (version 2) |
| **dimensions/ weight** | 207 x 194 x 77 mm/ 1.3 kg (version 1)<br>202 x 167 x 93 mm/ 3.5 kg (version 2) |
| **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 (version 1)/ 18 pushbuttons (version 2) |
| **display** | graphical, 4", backlight, operation in the full range of operating temperatures |
| **Ex feature** | II 1G Ex ia IIB T4 Ga<br>certificate: FTZÚ 17 ATEX 0047X |
| **internal power supply** | 3 lithium D-size batteries:<br>• 1 battery to supply data logger<br>• 2 batteries to supply internal modem (1 battery for aluminium housing in special conditions) |
| **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 (COM1 - RS485 or optional RS232, COM2 - RS485 - shared with Modbus MASTER input), speed up to 256 kb/s, optical interface<br>• NFC IEC 14443 interface<br>• 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 – 36000 records (over 4 years @60min)<br>• hourly data – over 16 months<br>• daily data – over 4 years<br>• monthly data – over 10 years<br>• alarms/ events memory – over 6000 records |
| **control outputs** | • up to 4 intrinsically safe, configurable digital outputs (OC type):<br>- 1 configurable as binary or frequency (0÷5000 Hz) output<br>- 3 binary outputs<br>• binary outputs triggered by alarm/event or counter<br>• frequency output triggered by measured value (p1, p2, t, Qm)<br>• 2 4÷20 mA outputs triggered by measured value (p1, p2, t, Qm) realized by extension module EM-1 |
| **accessories** | • eWebtel - measuring data acquisition system<br>• ConfIT! - configuration software for PC<br>• ConfIT! data loggers - mobile application<br>• OptoBTEx - optical interface<br>• INT-S3 - power supply interface<br>• EM-1/EM-2/EM-2Ex - extension module |

**inputs**

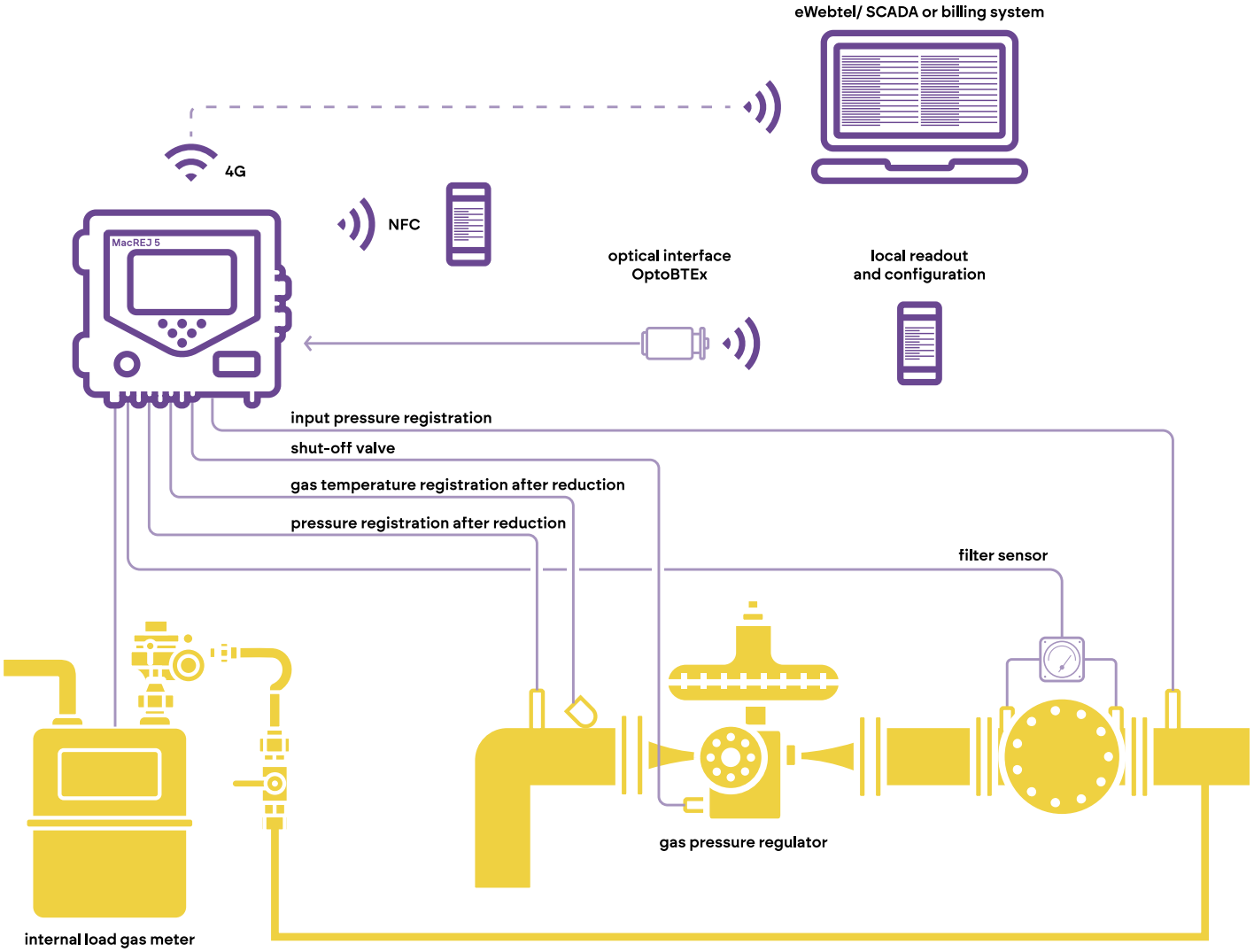
- up to 6 intrinsically safe, configurable, binary digital inputs, shared with:
  - 2 LF inputs, frequency 0÷2 Hz, WIEGAND standard 0÷60 Hz (option), flow direction detection
  - 1 tamper switch input - normally closed
- up to 10 intrinsically safe digital inputs NAMUR type:
  - 2 equipped on board of MacREJ 5: 2 HF inputs, frequency 0-5000Hz, EN60947 5-6; temporary working on battery in case of power loss ensure measurement continuity; when not used as HF counters, work as NAMUR proximity sensors on battery
  - 8 additional NAMUR inputs realized by extension module EM-2 Ex
- pressure sensor p1/p2 - 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; typisal error of p2 pressure measurement (gauge): 0.15% of range
- 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% |

typisal error of temperature measurement: 0.08%

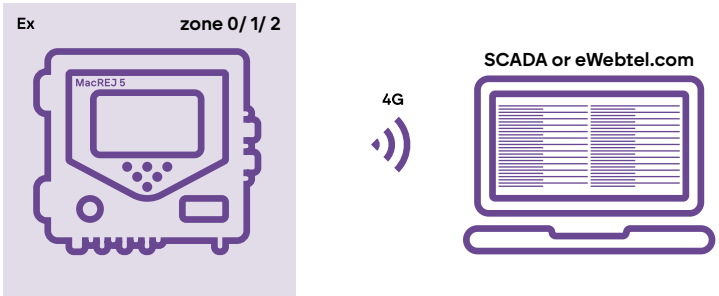
- RS485 Modbus MASTER input (with 3.6V power supply output) for readout of up to 16 external devices with Modbus RTU output (e.g. digital pressure or temperature transducers), capable to operate on battery

## 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**

## functionalities
## of the MacREJ 5 R data logger

- built-in GSM modem operating in 4G LTE 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/HF pulses and Encoder - digital communication with gas meter
- 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** | poycarbonate |
| **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<br>certificate: FTZÚ 17 ATEX 0047X |
| **internal power supply** | 3 lithium D-size batteries:<br>• 1 battery to supply data logger<br>• 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<br>• NFC IEC 14443 interface<br>• 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 – 36000 records (over 4 years @60min)<br>• momentary data<br>• hourly data – over 16 months<br>• daily data – over 4 years<br>• monthly data – over 10 years<br>• alarms/ events memory – over 6000 records |

| | |
|---|---|
| **control outputs** | • up to 4 intrinsically safe, configurable digital outputs (OC type):<br>- 1 configurable as binary or frequency (0÷5000 Hz) output<br>- 3 binary outputs<br>• binary outputs triggered by alarm/event or counter<br>• frequency output triggered by measured value (Qm, Qm2 etc.) |
| **inputs** | • up to 6 intrinsically safe, configurable, binary digital inputs, shared with:<br>- 2 LF inputs, frequency 0÷2 Hz, WIEGAND standard 0÷60 Hz (option), flow direction detection<br>- 1 tamper switch input - normally closed<br>• 2 intrinsically safe digital inputs NAMUR type:<br>- 2 equipped on board of MacREJ 5 R: 2 HF inputs, frequency 0-5000Hz, EN60947 5-6; temporary working on battery in case of power loss ensure measurement continuity; when not used as HF counters, work as NAMUR proximity sensors on battery<br>- 1 ENCODER (NAMUR type) |
| **accessories** | • eWebtel - measuring data acquisition system<br>• ConfIT! - configuration software for PC<br>• ConfIT! data loggers - mobile application<br>• OptoBTEx - optical interface<br>• INT-S3 - power supply interface |

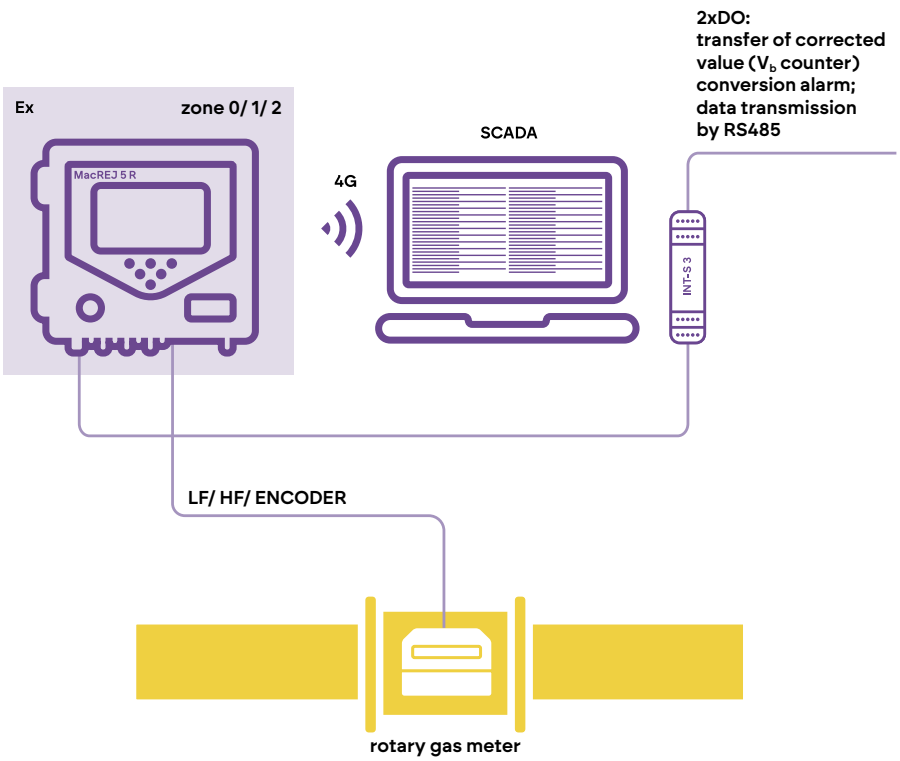
## application of the MacREJ 5 R data logger

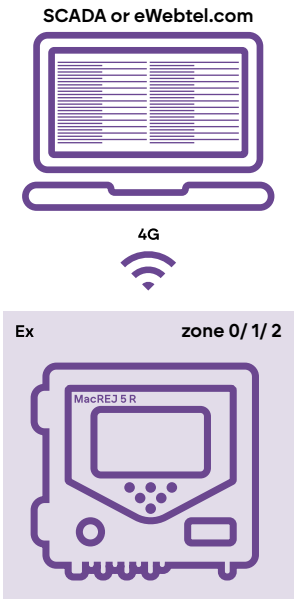
- **remote data reading**

  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.



# MacR6

## data logger for gas meters


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

MacR6 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 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.

Device exists in two versions:

- dedicated for diaphragm meters working in Ex Zone 2
- dedicated for any solutions working even in Ex Zone 0

**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
- can work as a Ex telemetry unit for Volume Converters without internal modems

**accessories**

## functionalities of the MacR6 data logger

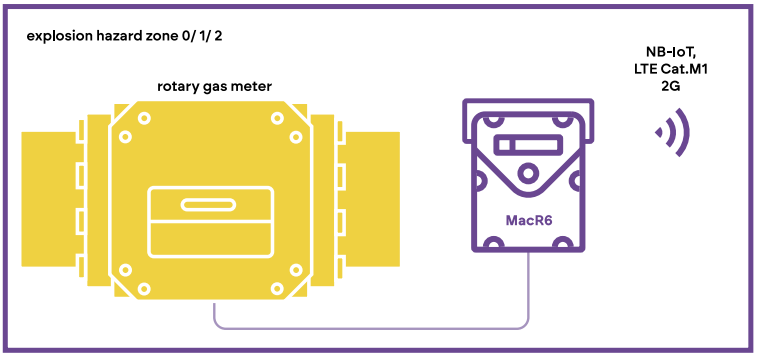
- support for LPWAN mobile network data transmission technologies: LTE Cat.M1 and NB-IoT (LTE Cat.NB2)
- supports Mobile Virtual Network Operators (MVNOs)
- standard commercially available D-size lithium battery
- LCD display presenting connection status, network level, battery status and volume increment 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 data logger

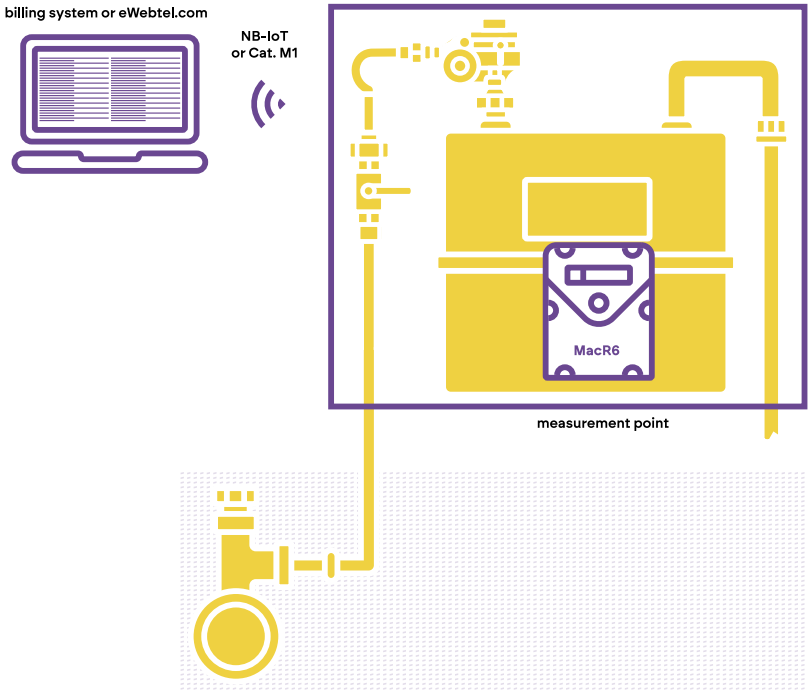
| | |
|---|---|
| **dimensions/ weight** | 124 x 90 x 40 mm/ 0.3 kg |
| **housing material** | polycarbonate |
| **relatyive humidity** | maximum 95% at temperature of 55 °C |
| **ambient temperature range** | Ex Zone 0 variant: from -30 °C to 55 °C<br>Ex Zone 2 variant: from -30 °C to 60 °C |
| **housing protection class** | IP66 in accordance with EN 60529 for outdoor installations |
| **Ex feature** | Ex Zone 2 variant: II 3G Ex ic IIA T3 Gc<br>Ex Zone 0 variant: II 1G Ex ia IIA T4 Ga<br>certificates:<br>Ex Zone 2 variant: FTZÚ 14 ATEX 0037<br>Ex Zone 0 variant: 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<br>support for TCP/UDP/NTP/HTTPS |
| **resistance to mechanical and electromagnetic conditions** | M2/ E2 |
| **power supply** | replacable lithium battery D-size |
| **transmission** | • optical interface<br>• support for 3FF (Micro SIM) or MFF2 (MIM) standard cards<br>• Cat. M1: B1/ B2/ B3/ B4/ B5/ B8/ B12/ B13/ B18/ B19/ B20/ B25/ B26/ B27/ B28/ B66/ B85<br>• Cat. NB2 (nb-IoT): B1/ B2/ B3/ B4/ B5/ B8/ B12/ B13/ B18/ B19/ B20/ B25/ B28/ B66/ B71/ B85<br>• EGPRS: 850/ 900/ 1800/ 1900 MHz |
| **outputs** | Ex Zone 2 variant:<br>• two built-in DO type OC outputs (optional version)<br>- DO1 - two-state output for gas consumption limitation control in case of consumption of ordered tariff power (dVh limit),<br>- DO2 - volume pulse output, e.g. for BMS systems<br>Ex Zone 0 variant:<br>• two built-in configurable DO type OC outputs (standard available)<br>- to replicate the volume from two inputs<br>- programmable per each alarm if appears, pulse is generated |
| **compatibility with gas meters** | • direct connection: Honeywell/ Elster BK-Gxx series, Itron RF1 counter „o" Apator/ Metrix UG<br>• cable connection to any gas meter with reed switch or OC output through LF input (DI1) and magnetic field control contact - TS<br>• cable connection to two independent gas meters with reed switch, or to be used with Electronic Volume Converter to obtain information about Vb and Vm through OC output |
| **accessories** | eWebtel - measuring data acquisition system<br>ConfIT! - configuration software for PC<br>ConfIT! data loggers- mobile application<br>OptoBTEx - optical interface |

## application
## of the MacR6 data logger

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

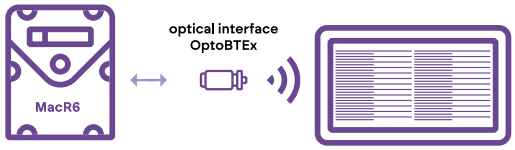



- **remote**
  **data reading**
  Direct installation on gas meter totalizer.




- **system diagram**
  Automatic control system diagram for ordered power usage.


- **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 Cat. M or 2G.

Device is equipped with two pressure sensors with possibility to cover the wide range, up 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
- option of work without any configuration on the object, using eWebtel platform configuration can be finished remotely

**accessories**


- eWebtel p. 40
- ConfIT! PC p. 42
- ConfIT! data loggers p. 43
- OptoBTEx p. 44

## functionalities
## of the MacR6-Z0-P gas pressure logger

- support for data transmission technologies LPWAN in cellular networks: 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

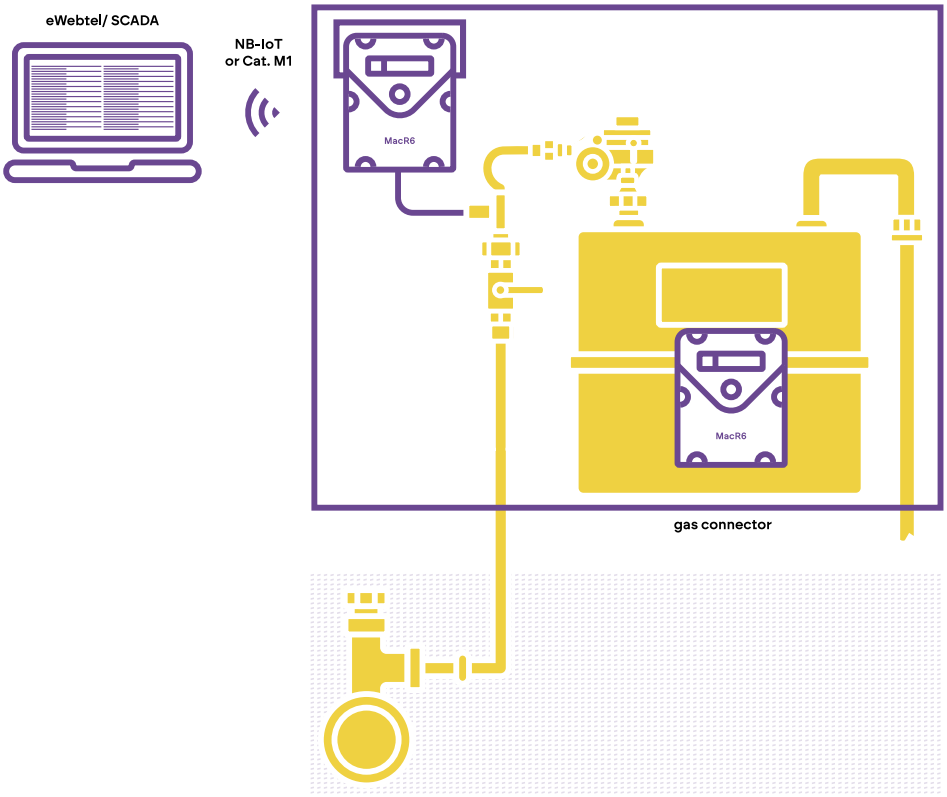
## technical data
## of the MacR6-Z0-P gas pressure logger

| | |
|---|---|
| **dimesnions/ weight** | 124 x 90 x 40mm/ 1 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 1G Ex ia IIA T4 Ga<br>certificate: FTZÚ 16 ATEX 0051X |
| **display** | graphical LCD display allowing device diagnostics and showing current pressure value |
| **transmission protocols** | GAZ-MODEM 2/3<br>support for TCP/UDP/NTP/HTTPS |
| **resistance to mechanical and electromagnetic conditions** | M2/ E2 |
| **power supply** | replacable lithium battery D-size; up to 10 years of operation |
| **transmission** | • optical interface<br>• Cat M1: B1/ B2/ B3/ B4/ B5/ B8/ B12/ B13/ B18/ B19/ B20/ B25/ B26/ B27/ B28/ B66/ B85<br>• Cat NB2: B1/ B2/ B3/ B4/ B5/ B8/ B12/ B13/ B18/ B19/ B20/ B25/ B28/ B66/B71/ B85<br>• EGPRS: 850/ 900/ 1800/ 1900 MHz |
| **registration period** | • data registered at intervals of 1-60 minutes; around 6 months of data storage<br>• memory of events - 128 records |
| **inputs/ sensors** | • housing opening sensor<br>• up to 2 pressure sensors with ranges 0÷0.1/ 0÷0.3/ 0÷1/ 0÷6/ 0÷16/ 0÷35 bar<br>• pressure sensors ended wirh metric thread M12 x 1.5 (Ermeto) or NPT 1/4” |
| **accessories** | eWebtel - measuring data acquisition system<br>ConfIT! - configuration software for PC<br>ConfIT! data loggers- mobile application<br>OptoBTEx - optical interface |

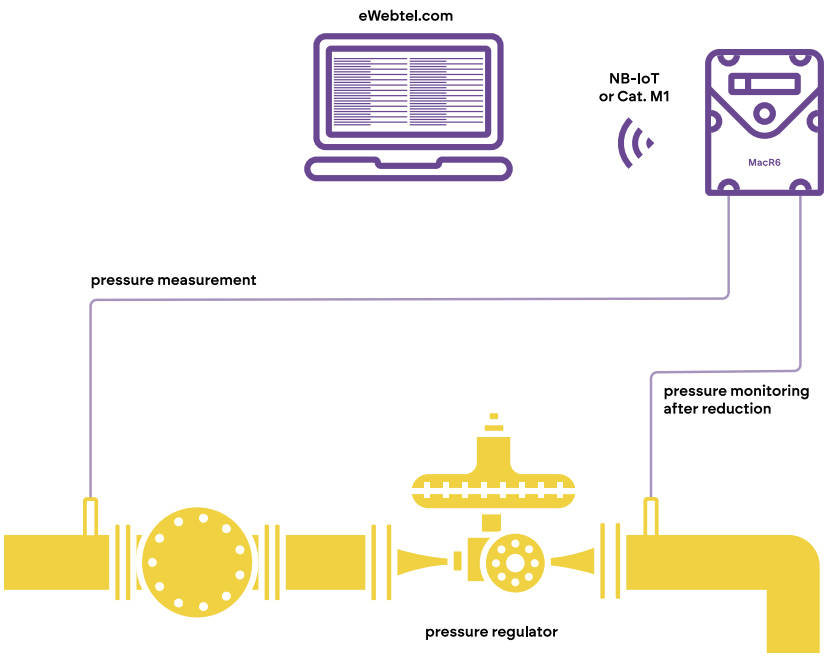
## application
## of the MacR6-Z0-P gas pressure logger

- **pressure monitoring**

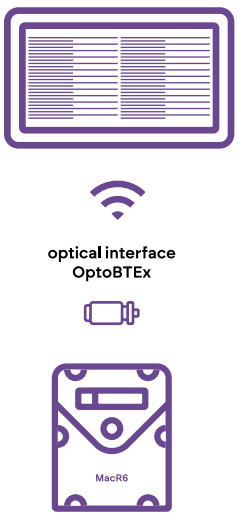
  Monitoring pressure at the end of the gas grid using MacR6-Z0-P.




- **application diagram**

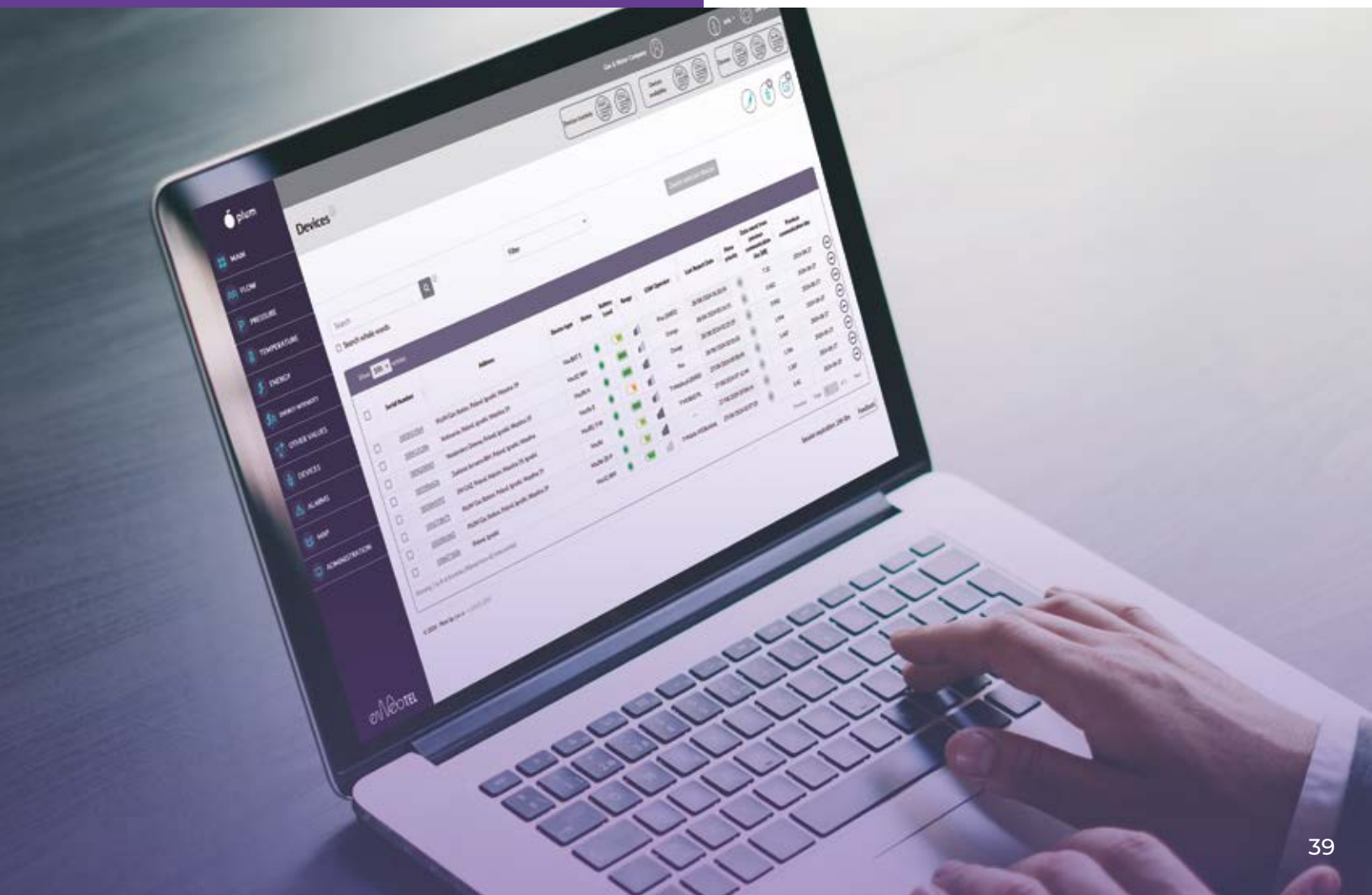



- **local reading and configuration**



# 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.

**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

**related devices**

- MacBAT 5
- MacREJ 5
- MacREJ 5 R
- MacR6-Z0-P
- MacR6

# 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 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 head through the optical channel, and directly using NFC.

download
the ConfIT! data loggers application

GET IT ON Google Play

# accessories

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

## OptoBTEx

**optical interface**

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

Optical interface is powered by an internal rechargeable battery.

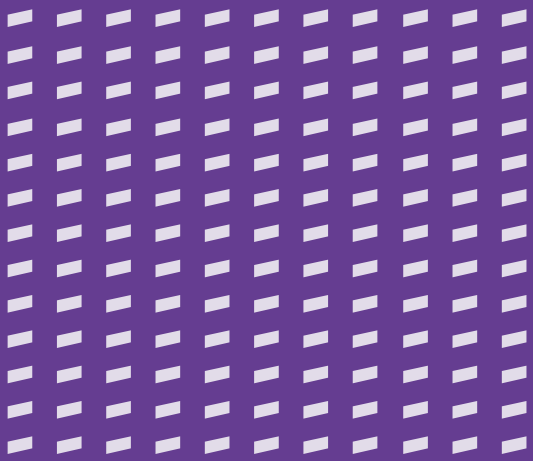
Ex feature: II 3G  Ex ic IIA T4 Gc

## INT-S3

**power supply interface**

INT-S3 is dedicated to power supply (VOUT=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 power supply interface what means it does not affect the transmission, does not change transmitted data in any way.

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



## 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 and four two-state OC outputs. 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 MacBAT 5 corrector and MacREJ 5 data logger 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 MacBAT 5 corrector and MacREJ 5 data logger 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.

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

# devices dedicated to the US market

- **ProVEC 1**
- **ProDAT 1**

**company branch in Houston**

1127 Eldridge Parkway, Suite 300-368, Houston, Texas 77077 USA

**contact:**

Mark Cangany
Business Development Manager

phone: 832 267 7931
e-mail: mark.cangany@plum.pl

**plumgas.us**

# ProVEC 1

## gas volume and energy corrector

ProVEC 1 Electronic Volume Corrector is a complete measurement unit designed for installation in Class 1 Div 1.

ProVEC 1 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 ProVEC 1 to be a significant part of meter installation accuracy and monitoring device instead of only being standard electronic volume conversion device.

**key benefits**

- real time gas composition acquisition from chromatograph
- remote two-way 4G LTE communication module compatible with various data acquisition platforms
- possibility to add any sensor communicating in Modbus protocol
- quick gas meter load diagnostics by using dynamically generated bar graphs

**accessories**

## technical data
## of the ProVEC 1 gas volume and energy corrector

| | |
|---|---|
| **housing material** | poycarbonate |
| **dimensions/ weight** | 8.5 x 7.6 x 3 in/ 2.9 lb |
| **relative humidity** | maximum 95% at temperature of 160 °F |
| **ambient temp. range** | from -40 °F to 160 °F |
| **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<br>certificate: FTZÚ 17 ATEX 0047X |
| **meets the requirements of 2014/ 32/ UE (MID)** | certificates:<br>• DE-19-MI002-PTB004 - Plum PTZ converter<br>• DE-21-M-PTB-0012 - Plum load recorder |
| **internal power supply** | 3 lithium D-size batteries:<br>• 1 battery to supply volume converter<br>• 2 batteries to supply internal modem (1 battery for aluminium housing in special conditions) |
| **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<br>• NFC IEC 14443 interface<br>• optional integrated modem 4G LTE/ 2G |
| **resistance to mechanical and electromagnetic conditionse** | M2/ E2 |
| **base conditions** | set by authorized personnel; available options:<br>• base pressure (absolute) pb: range (13.7786÷15.229) psi, default 14.6959 psi<br>• base temperature Tb: range (270÷300,2) K, default 273.15 K (32 °F)<br>• reference temperature determined for combustion process T1: range (270÷300,2) K, default 298.15K (77 °F) |
| **maximum permissible error (MPE) according to standard „EN 12405-1”** | • 0.5% at reference conditions<br>• 1% at nominal operating conditions<br>• typical error < 0.15% |
| **maximum permissible error (MPE) according to standard „EN 12405-2”** | • ECD class A |
| **algorithms for calculation of compressibility factor** | AGA8-92DC, AGA8-G1, AGA8-G2, AGA NX-19 mod, SGERG-88, SGERG-mod-H2 (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)<br>• hourly data – over 16 months<br>• daily data – over 4 years<br>• monthly data – over 10 years<br>• momentary data (triggered 1-second logging)<br>• 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)
- support for gas meters through LF, HF, ENCODER NAMUR, ENCODER SCR, WIEGAND and 10-point gas meter characteristics correction
-

| **68 °F (± 5 °F)** | **(-40 ÷ 160) °F** |
|---|---|
| ± 0.2% of measured value | ± 0.5% of measured value |

typical error of p1 pressure measurement: 0.15% of measured value

- temperature sensor Pt1000 class A or B with cable length compensation, four wires, diameter 0.22 in or 0.24 in; maximum permissible error for measurements:

| **68 °F (± 5 °F)** | **(-40 ÷ 160) °F** |
|---|---|
| ± 0.1% | ± 0.2% |

typical error of temperature measurement: 0.08%

- 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.)

# ProDAT 1

## electronic gas volume, pressure and temperature data logger


ProDAT 1 is a complete data logger solution designed to record and inspect the performance and stability of the whole Pressure Regulating and Metering Stations. 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 Class 1 Div 1. 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 and prevent upcoming replacement of pressure regulators.

**key benefits**

- configurable bar graphs with historical records of pressure allowing for instant pressure regulator inspection on site, showing unwanted pressure fluctuations
- significance level of the alarms - thresholds with flag of alarm and warning
- possibility to add any sensor communicating in Modbus protocol

**accessories**


- eWebtel p. 40
- ConfIT! PC p. 42
- ConfIT! data loggers p. 43
- OptoBTEx p. 44

## technical data
## of the ProDAT 1 electronic gas volume, pressure and temperature data logger

| | |
|---|---|
| **housing material** | poycarbonate |
| **dimensions/ weight** | 8.5 x 7.6 x 3 in/ 2.9 lb |
| **relative humidity** | maximum 95% at temperature of 160 °F |
| **ambient temp. range** | from -40 °F to 160 °F |
| **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:<br>• 1 battery to supply data logger<br>• 2 batteries to supply internal modem |
| **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<br>• NFC IEC 14443 interface<br>• 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)<br>• hourly data – over 2 years<br>• daily data – over 4 years<br>• monthly data – over 10 years<br>• momentary data (triggered 1-second logging)<br>• alarms/ events memory – over 6000 records |
| **inputs** | • up to 6 intrinsically safe, configurable, binary digital inputs, shared with:<br>- 2 LF inputs, frequency 0÷2 Hz, WIEGAND standard 0÷60 Hz (option), flow direction detection<br>• up to 10 intrinsically safe, configurable digital inputs NAMUR type (EN60947-5-6):<br>- 2 binary inputs, work with NAMUR proximity sensors on battery mode<br>- 8 additional NAMUR inputs realized by extension module EM-2Ex<br>• temperature sensor Pt1000 class A or B with cable length compensation, four wires, diameter 0.22 in or 0.24 in; |

| **68 °F (± 5 °F)** | **(-40 ÷ 160) °F** |
|---|---|
| ± 0.1% | ± 0.2% |

typical error of temperature measurement: 0.08%

• 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

## functionalities
## of the ProDAT 1 electronic gas volume, pressure and temperature data logger

- optional built-in modem for 4G LTE and 2G networks
- support for NFC communication standard, optical connection and two RS485 serial ports
- graphical 4” display with backlight works in temperatures down to -22 °F
- configurable main screen widgets with pressure stability trends and other configured values as bar graphs
- EX-certified for operation in any explosion hazardous zone (up to Class 1 Div 1), 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

# 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

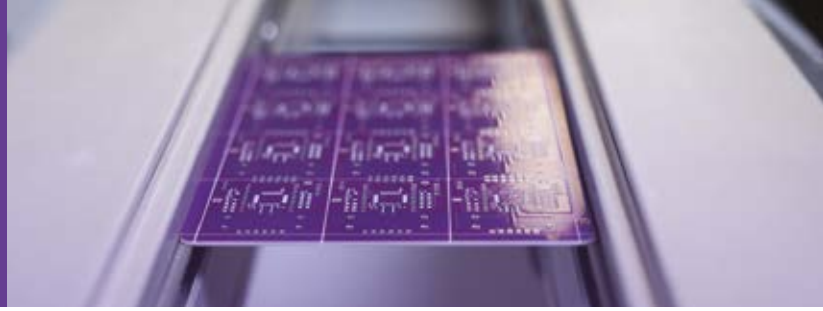
# cooperation process

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**

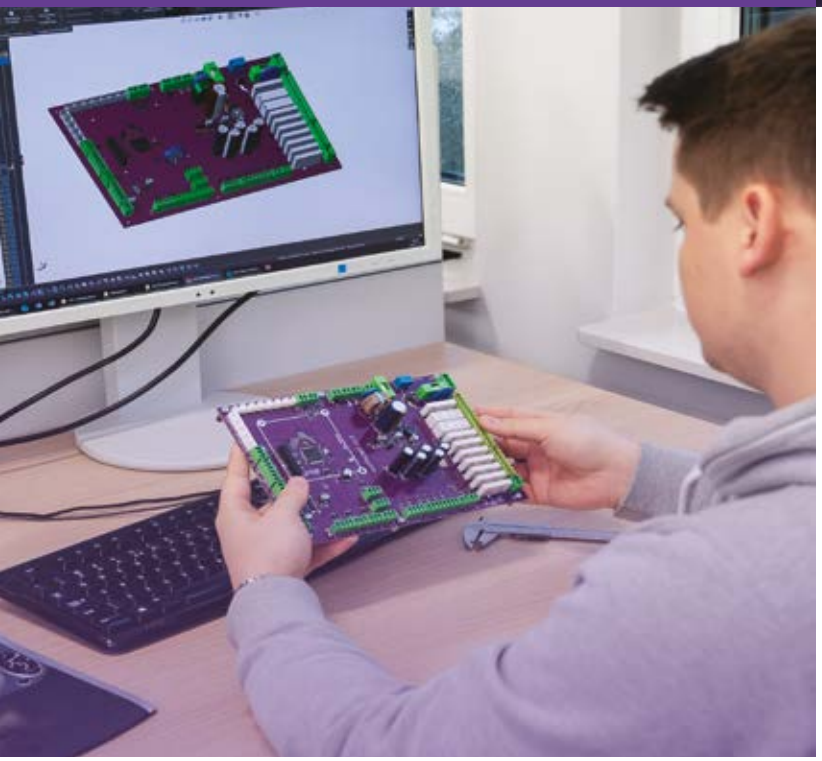
We operate an Accredited Calibration Laboratory AP 074, and an Accredited Electromagnetic Compatibility (EMC) Laboratory AB 1765.

# 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.

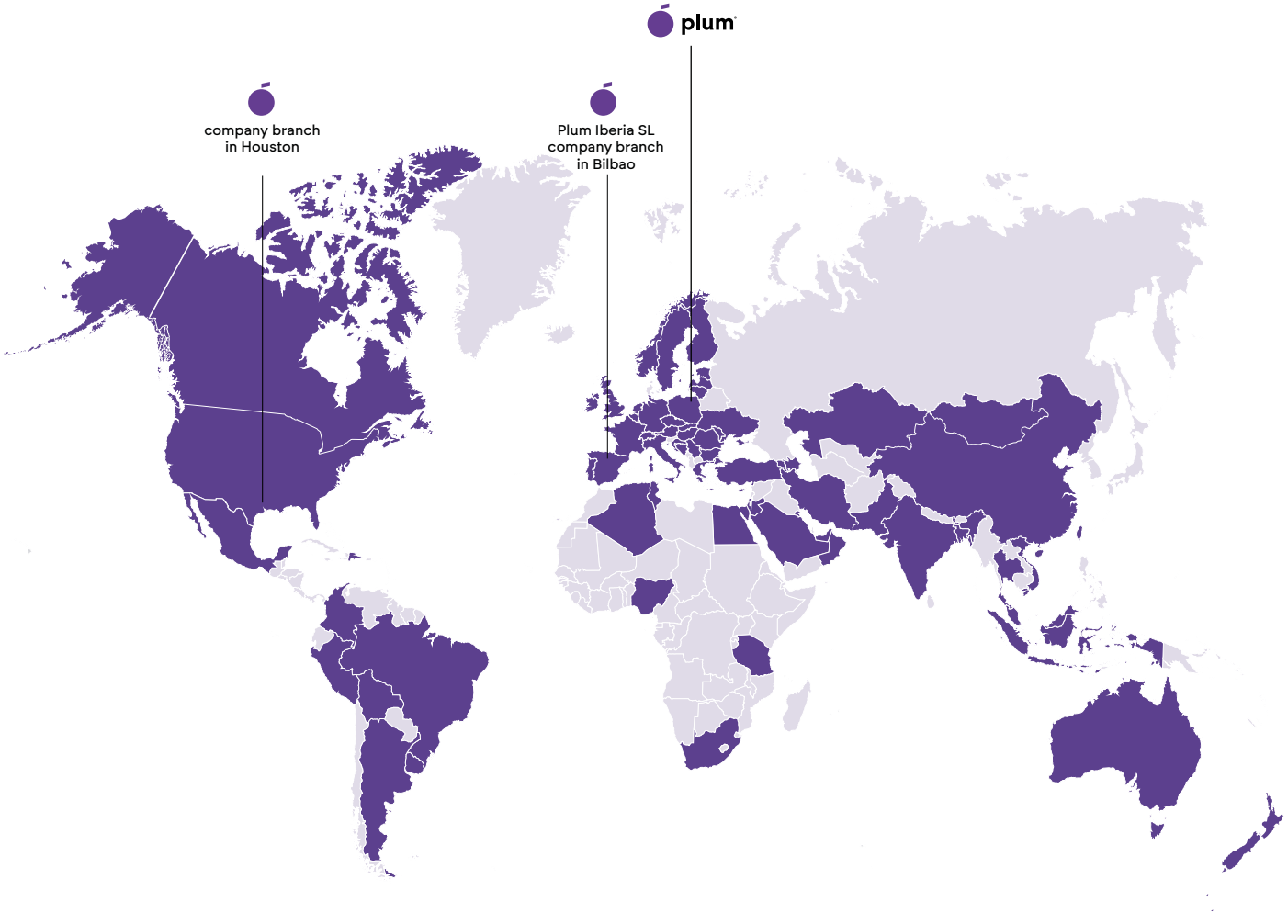
We continuously improve the efficiency of our design and production processes to quickly respond to changing market requirements and customer needs.

- **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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