plum GAS

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 gas 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

Plum Sp. z o.o.
ul. Wspólna 19, Ignatki, 16-001 Kleosin, Poland
National Waste Database No.: 000009381

gas.plum.pl
gas@plum.pl

edition
1.2b, 09.10.2025

technical data

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

measurement data acquisition system

The eWebtel system is a platform that collects measurement results intended for comprehensive control of the gas network. It enables the location of devices and allows for graphical visualization of data sent from position sensors, manometers, and recorders.

OptoBTEx 2

optical interface

OptoBTEx 2 is used for reading and wireless (BLE - Bluetooth Low Energy) data transmission from devices equipped with an optical communication interface compliant with the IEC 62056-21 standard to configuration software installed mainly on mobile devices with MS Windows and Android operating systems (tablet, smartphone, laptop).

ConfIT!

configuration and diagnostic tool - PC application

The ConfIT! program allows for the configuration of Plum products based on a clear graphical interface and other modules supporting device supervision, such as the software exchange module.

ConfIT!

volume converters - mobile application

The ConfIT! Volume Converters application is designed for the configuration of gas volume converters produced by Plum. The application supports installation at the target site and allows for device configuration, editing of basic converter parameters, and reading of historical data.

INT-S3

Ex interface/ barrier

The interface provides power and isolation for connected measuring devices in stationary telemetry systems, powered by a 230V network or batteries. It allows for reading data from devices located in explosive hazard zones.

EM-1
extension module

The EM-1 module is a device that extends the functionality of the MacBAT 5 converter with two additional current outputs operating in the 4-20mA current loop standard.

EM-2
extension module

The EM-2 module is a device that extends the functionality of the MacBAT 5 converter with an additional 8 binary inputs (NAMUR type) in a standard configuration.

EM-2Ex
extension module

The EM-2Ex module is a device that extends the functionality of the MacBAT 5 converter with an additional 8 binary inputs (NAMUR type) in an intrinsically safe configuration.

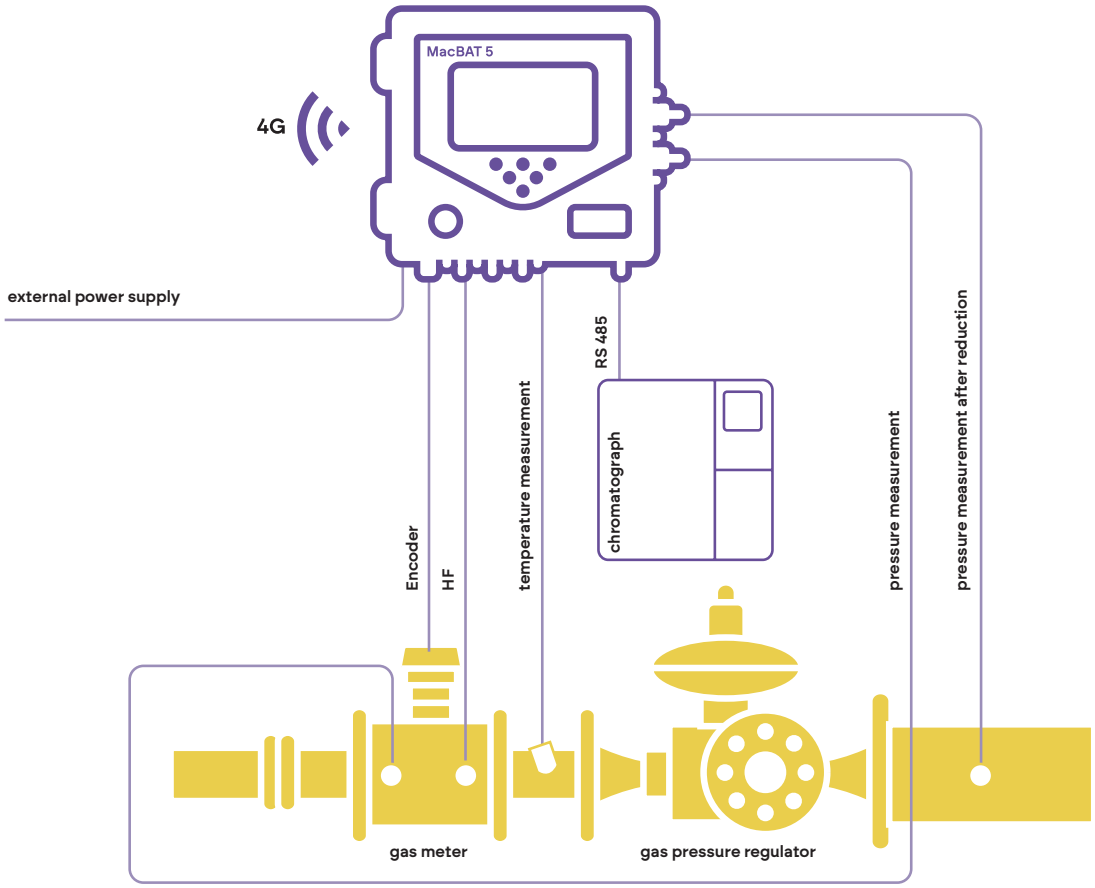
features

- 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

application

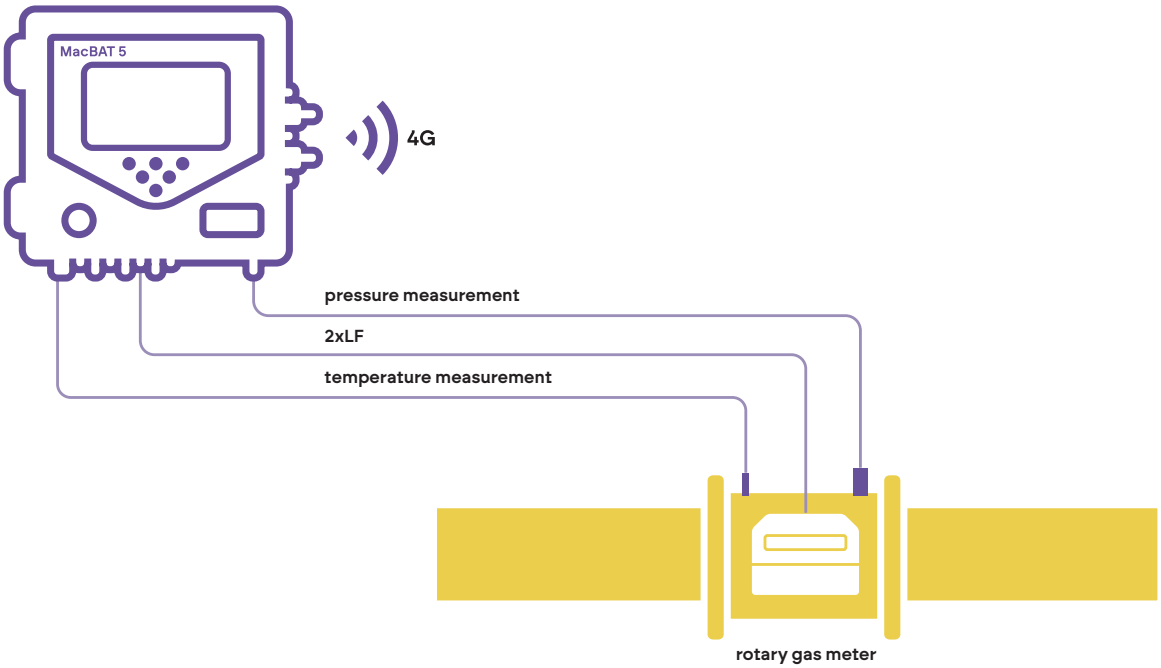
- **pressure regulator monitoring using additional pressure sensor in MacBAT 5**

  System recommended for high-pressure gas meter operation.



- **connection with a rotary gas meter**

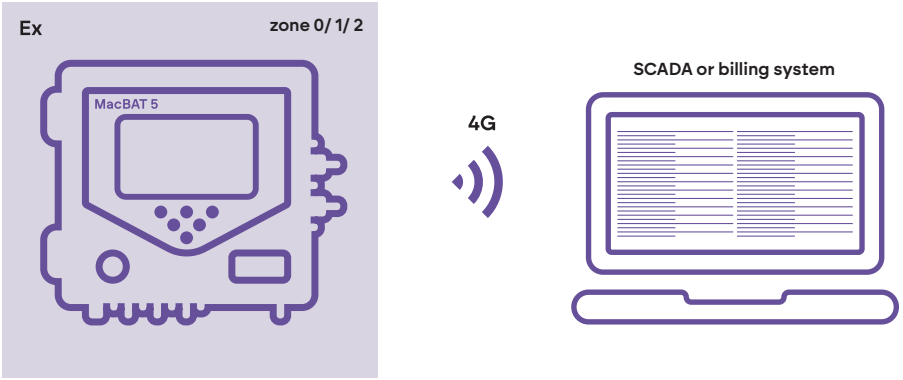
  Connection via 2 x LF ensures precise synchronization between the gas meter and the corrector, taking into account volume reverse flow on the gas meter.



- **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.