ICARUS

ELECTRONIC VOLUME CONVERTER TYPE 1 Class I and II

1. INTRODUCTION

ICARUS is an electronic gas volume converter that, combined with a gas meter, provides gas measurement in m^3, calculated at base conditions of +15°C and 1,01325 bar. In accordance with the UNI 9167 standard, it is installed in the measurement points of the transport network to carry out the fiscal measurement of gas.
ICARUS complies to MID Directive n°2014/32/UE.

ICARUS is a type 1 device, realized with integrated pressure and temperature sensors.

2 TECHNICAL SPECIFICATIONS

2.1 Pressure Measurement

ICARUS is equipped with an external absolute pressure transductor connected to the body with a cable 3 m long. Pressure connection is a ¼"GAS M fitting.

- Available pressure range: 0÷2,5 ; 6; 10; 30; 81; 150; 250 bar A.
- Precision on pressure: 0,1% of the full scale

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2.2 Temperature Measurement

ICARUS is equipped with a class A 4-wire PT 1000 transducer, compliant with the European Standard EN IEC 60751 (its resistance at 0 ° C is 1000Ω). The 4 wire connection guarantees high accuracy measurement independent from cable length. The sensor is connected to the computing unit from a cable typically long 3 meters. Typical transducer measuring range is of -20°C÷+60°C.

2.3 Input

- N.4 available digital signal inputs:
  - LF input
  - HF Namur input
  - Counter tamper input
  - Status input
- N.1 Pressure measurement input
- N.1 Relative pressure input
- N.1 PT1000 input

When connected to a LF pulse emitter, gas meter pulses are divided by a "pulse weight factor" [pulse/m^3] which is set in the device. When it is connected through the HF input, the input must be set specifying:

- Impulse weight
- The frequency value of the pulse train, corresponding to the maximum flow rate

HF input can operate only if it is powered by an external power supply.

2.4 Conversion function

ICARUS calculates gas volumes at basic conditions conforming to ISO ENI 12405 Standard.

N°3 different algorithms to calculate compressibility factor:

- SGERG 88
- AGA8 Gross 1
- AGA NX19

2.5 Outputs

- N° 1 optical serial port to communicate with a local PC (programming, data download), to use in compliance with intrinsic safety regulations.
- N° 1 RS 232 serial port to connect with a PC or GSM modem, installed in a safe zone. Communication takes place with CTE protocol.
- N° 3 impulse outputs of the open collector type, programmable for the repetition of the following values: correct volumes, non-correct volumes, alarms.
- N° 1 RS 485 serial port, used for communication, with MODBUS RTU protocol, with an external data logger, or with a device for Safe Area with multiple interface, ICA4
  ICA4 device specifications at the end of the document.

2.6 Flow Rate Calculation

ICARUS calculates and makes available the data of average and instantaneous flow, both at the measurement conditions and at the basic conditions.

The instantaneous flow rate at measurement conditions (Q_m) is obtained by counting the number of pulses read and measuring the time interval since the last calculation made (minimum interval 15s).

The instantaneous flow rate at basic conditions is obtained through the following formula:

$$Q_b = Q_m * C$$

The average flow rate Q_b and Q_m (recorder every 15 minutes) is calculate following UNI TS 11291-4 Standard.

2.7 Keypad

The keypad is composed by 5 buttons:

- Four buttons with arrows (Up, Down, Left, Right)
- A confirmation button (OK)

The directional buttons Up/Down:

- scroll menu voices Up/Down.
- move display cursor from an upper/lower row.

The directional buttons Left/Right:

- access a menu page
- move display cursor Left/Right

The OK button permit to:

- select a menu voice
- confirm a parameter

2.8 Display

The display can:

- visualize pressure data in real time
- visualize temperature data in real time
- visualize/modify the setup
- visualize/modify calibration value for pressure and temperature

2.9 Power

ICARUS may be powered with:

- internal lithium battery (3,6 V)
- external power (15 Vdc max)
- solar panel

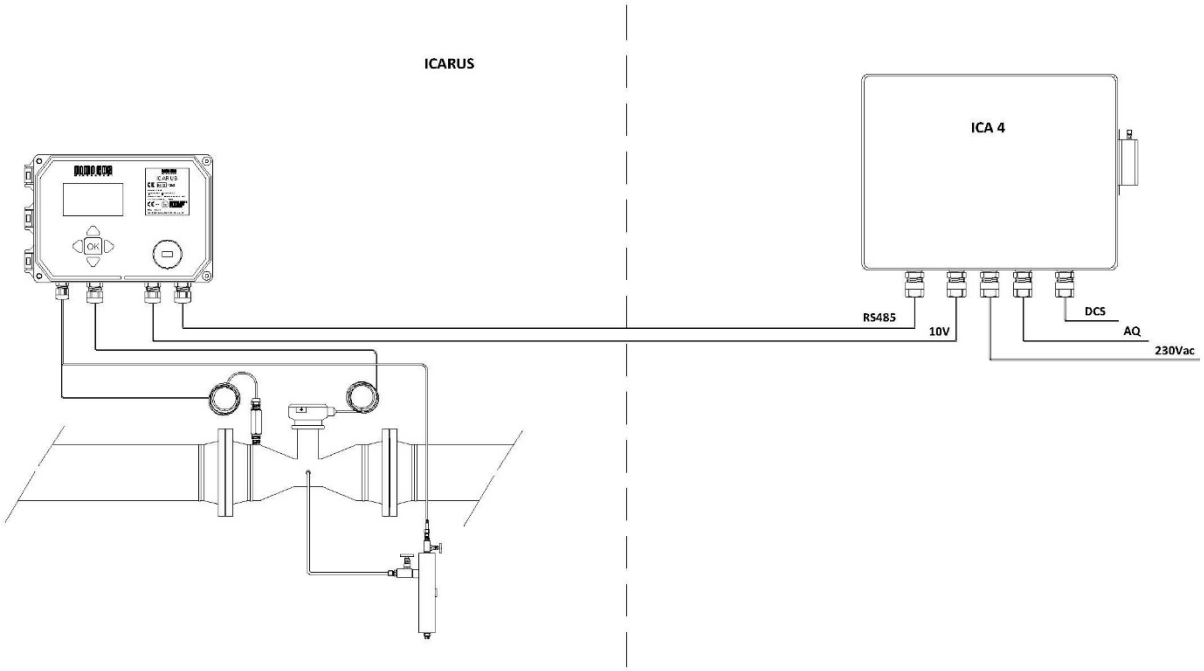
The internal battery, that satisfies ATEX requirement, guarantees a life autonomy of 5 years in normal user conditions.
In presence of external power, the battery works as a back-up.

3 INSTALLATION

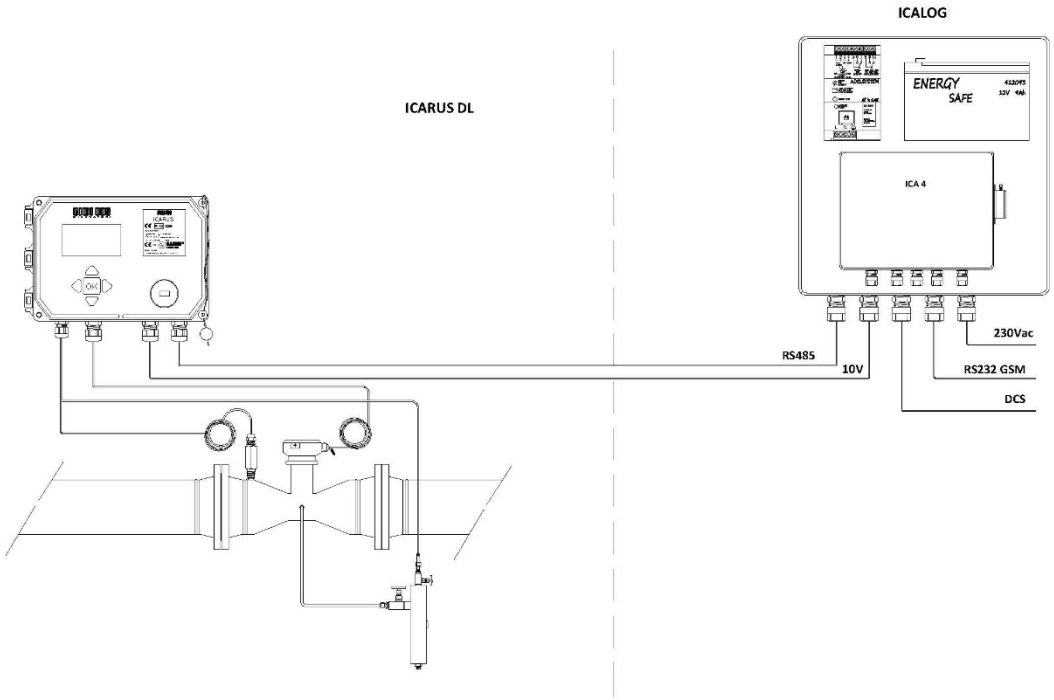
ICARUS is generally installed in a classified "Zone 1" hazardous area, next to gas pipelines. In its fiscal measurement function, it is always connected to a communication device for the transfer of gas consumption data. At the measurement points of the Transport Network, the ICA4 interface device is installed in a safe area and is connected to the ICARUS via intrinsically safe barriers.

The enclosure of ICARUS is provided with 4 fixing threaded holes positioned at the corners. The internal diameter of the holes is 4mm.
By these holes, ICARUS can be both wall-fixed and plate-fixed using M4 screws.

Note: The installer must always make sure that the enclosure is electrically earthed. When necessary, he will have to connect a ground wire between one of the fixing screws and the ground point of the electrical system.



Typical installation examples

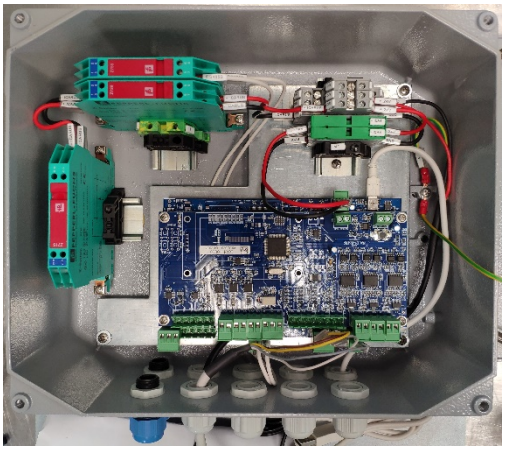


4 ICA4 DEVICE

The data logger ICARUS DLC communicates with its ICA4 interface for safe zone, that works also as a remote power supply.
The communication between ICARUS DLC and ICA4 works using Modbus protocol with a serial connection RS485.
ICA4 consists of:

- Input:
  - N.1 RS485 to communicate with ICARUS
  - N.4 digital inputs of optional status (through interposed safety barriers)
- Output:
  - N.1 RS485 to communicate with quality analyzer
  - N.1 RS485 to communicate with SNAM NETWORK GAS
  - N.1 RS232 to communicate with a GSM external optional modem
  - N.1 service micro USB
  - N.3 analogical outputs 4.20 mA
  - N.1 digital output Relè type
  - N.3 digital exits open collector type
  - N.2 12v power output

ICA4 device is powered by 230Vdc/24



5 ENVIRONMENT CONDITIONS

- Environment temperature: -25°C - +55°C
- Storage temperature: -40°C - +80°C
- Relative humidity: 0% - 100%

MID CERTIFICATION

ICARUS is certified in accordance with the MID Directive n°2014/32/EU concerning measuring instruments.

ATEX CERTIFICATION

ICARUS is an INTRINSICALLY SAFE electrical appliance.
ATEX certificate:

- II 1G Ex ia IIC T4 Ga
- II (1) G [Ex ia Ga] IIC