



Gas flow meter

ENERGOFLOW GFE-404

Application purposes

The meter is designed for measurement (under operating conditions) of volumetric flow rate and cumulative volume of natural with density ranging from 0.67 to 1 kg/m³ and other gases with density not less than 0.4 kg/m³, when they are transported through circular pipelines in the forward and reverse directions.

The meters can be used for gas metering in industrial and public utility companies, including for custody transfer purpose.

The gas meters are calibrated on air. Under the Customer requirement, calibration on natural gas may be performed.

The meters are designed for continuous work mode and require very little maintenance. The meters can be incorporated into instrumentation systems, automated process control system (APCS), etc. The meters can be installed in explosive environments and other directive documents regulating application of electrical equipment in explosive environments.



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The meter components have input/output intrinsically safe circuits of "ib" level and are marked as explosion-proof

PCU-6.5 – II (2)G [Ex ib Gb] IIB
EU – II 2G Ex ib IIB T4
EAT – II 2G Ex ib IIB T4

Functionality of the meters:

- measurement of volumetric gas flow rate;
- measurement of gas volume by cumulative sum separately for the forward and reverse direction;
- display of values of the current gas flow rate and of the cumulative volume on the indicator (if LCD and EU are available);
- formation of pulse signals for measurement systems, correctors, flow computers and data acquisition systems;
- archiving values of cumulative volume in the non-volatile memory;
- automatic control of emergencies and failures, as well as recording their types and duration into relevant logs;
- protection of the archive data and setup parameters against unauthorized access;
- output of measurement, diagnostic, reference and archive information to external devices via the RS-485 interface by direct connection to EU or via the RS-232 or RS-485 interfaces when a PCU-6.5 is used.



Technical Parameters

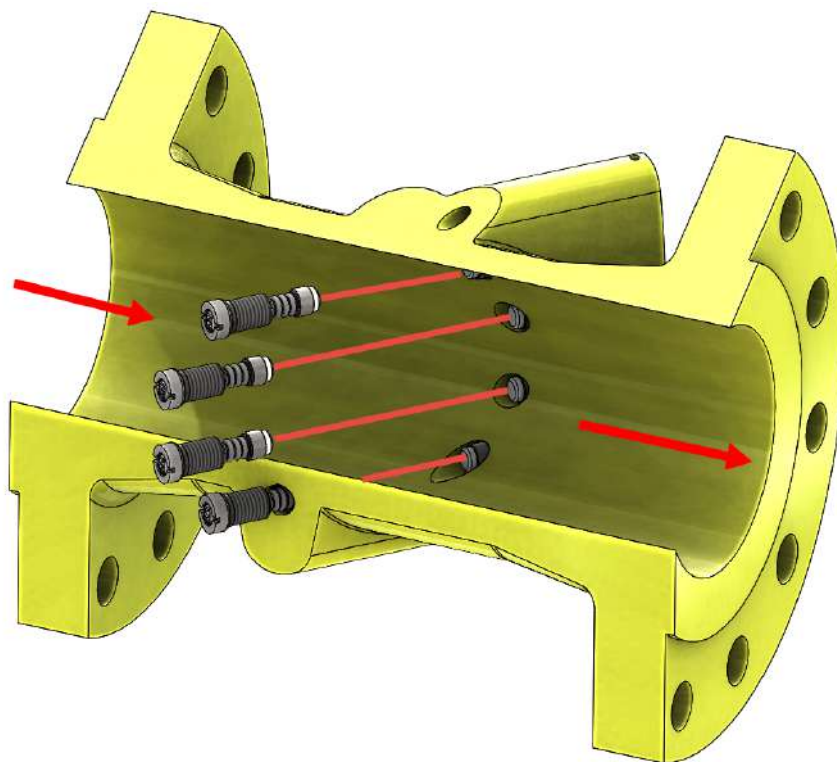
Depending on the gas flow rate measurement range, the meters have the following nominal sizes: G1600, G2500, G4000, G6500, G10000.

The meters provide measurement of volumetric flow rate and gas volume with a standardized error in the range of volumetric flow rates indicated in Table 1, which correspond to a gas flow rate from 0.15 to 40.0 m / s.

The meters provide a measurement of the volumetric flow and volume of the gas that has passed through the pipeline in the forward direction.

On request, meters providing measurement of the volume flow and volume of gas that has passed through the pipeline in both forward and reverse directions can be produced. In this case, the accumulation of the total volume of gas is carried out separately in two directions of the gas flow.

Basic relative error of the meters for gas volume measurement is specified in the two operating ranges: from the minimal Q_{min} to the transitional Q_t , and from the transitional Q_t (including) to the maximal Q_{max} (including).



Nominal values of volume flow rates corresponding to the IS standard sizes (pipeline nominal diameter DN) are presented in Table 1.

TECHNICAL CHARACTERISTICS				
Flow velocity, m/s	Inner Diameter(DN), mm	No. of measurement beams	Maximum pressure, MPa	Accuracy, %
0.15 to 40	150; 200;250;300;350;400	4	1.6; 6.3; 10.0; 16.0	±0.5 (0.2)*

*after HP calibration on natural gas

DN mm	Volume of Flowrate, m ³ /h			
	Threshold, Q _{th}	Minimum, Q _{min}	Transited, Q _t	Maximum, Q _{max}
150	7,0	10,0	80,0	2500
200	12,0	17,0	125,0	4000
250	19,0	26,0	200,0	6500
300	27,0	40,0	325,0	10000
400	47,0	67,0	500,0	16000

The limit of the permissible relative error of the meter when measuring the volumetric flow and volume of gas is given in Table 2.

Flow Rate Range	Meter Basic Relative Error, % not more than
from Q _{min} to Q _t (incl.)	± 2
from Q _t to Q _{max}	± 1

The IS supplied with the meter is designated for maximum working pressure of 1,6; 6,3; 10 and 16 MPa.

The meter IS do not provide aerodynamic resistance to the gas flow apart from the longitudinal pressure fall due to friction, and therefore they can be regarded as straight pipe runs.

The meter produces two output pulse-frequency signals one of which (pulse output No.5) is proportional to the positive gas volume flow rate and the second (impulse output No.4) – negative volume flow rate. Every pulse of the EU output pulse signal shaper corresponds to a fixed gas volume flown through the meter. Output signal type – meander.

The gas meter also forms the following information signals:

- "Flow direction" (impulse output No.3);
- "Increased error" (impulse output No.2);
- "Failure" (impulse output No.1).

Communication with the meter can be realized either directly by its EU via one or two RS-485 interfaces, or through the PCU-6.5 via one of the interfaces: RS-232 or RS-485. Information communication protocol – ModBus RTU. The communication speed is chosen during the meter configuration from the values: 9600; 19200; 38400; 57600; 115200 bit/s.

The communication line length: for RS-232 – up to 25 m; for RS-485 – up to 1200 m. The meter operating mode in a RS-485 network – «slave mode». The network address is set during the meter configuration. The maximum number of meters connected to the RS-485 mains – 16.

The power to the meter EU is supplied from a 10,6-15 V direct voltage source. The current consumed by EU is not higher than 0.1 A.

The power to the meter PCU is supplied from a general-purpose single-phased network with AC voltage ranging from 187 to 242 V and frequency of 50 ± 1 Hz, or from a 10,6-15 DC source. The PCU power consumption from a power source is not more than 6 W.

Environmental conditions / Influence quantities

Ambient and gas temperature range: - 25 °C to +55 °C

Temperature range for the storage of devices which are not in use: -30 °C to +55 °C

The gas meter may be used indoors and outdoors. Condensing humidity may occur in operation.

- Protection class: IP 67
- Mechanical factors M1
- Electromagnetic factors E2

Outside View and Possible Mounting Options for the Ultrasonic Gas Flow meter ENERGOFLOW GFE 404

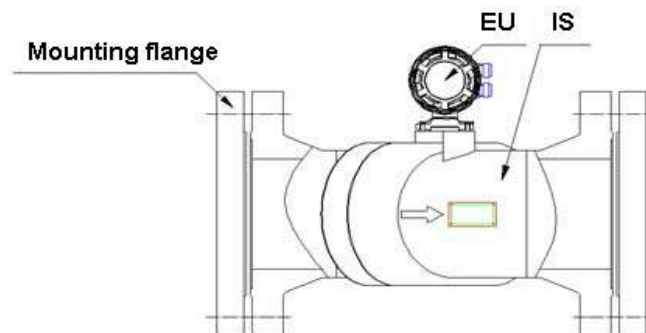


Figure 1 – Configuration 1 – the meter complete with the EU and the IS

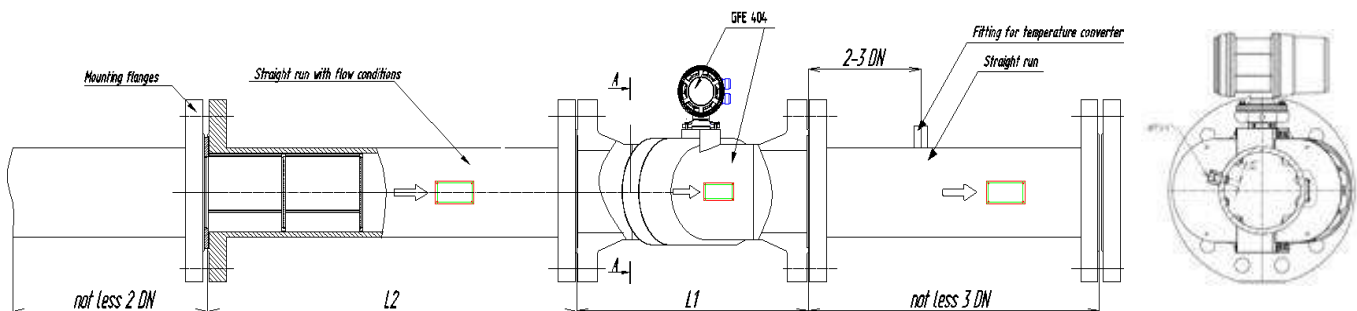


Figure 2 – Configuration 2 – the meter complete with the EU, IS and straight runs with flow straightener

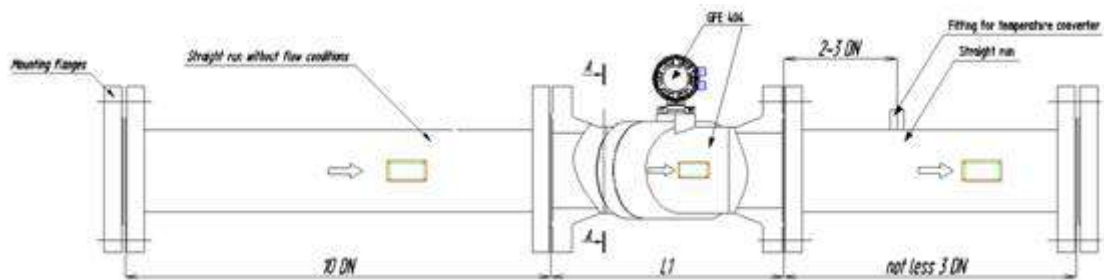


Figure 3 – Configuration 3 – the meter complete with the EU, IS and straight runs

Overall and Mounting Dimensions of in-line sections with a Straight Pipe Runs with Flow Straighteners

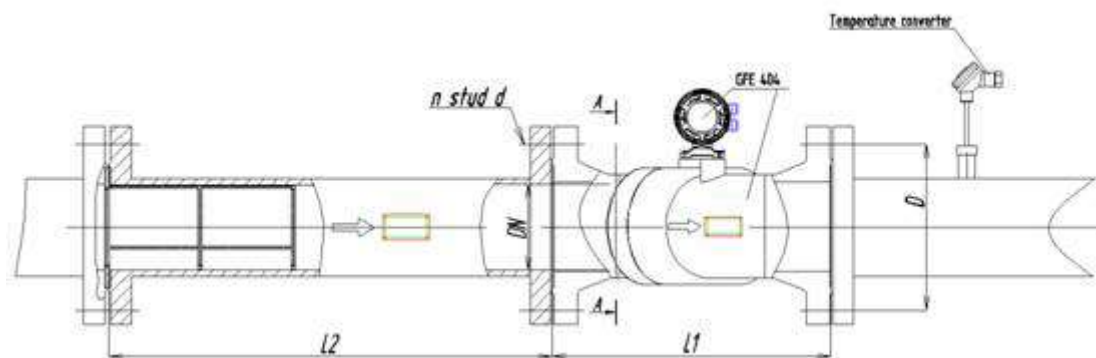


Table – Overall and mounting dimensions of the in-line sections with ANSI 16.5 flanges

DN, mm	PN, MPa	L1, mm	L2, mm	D, mm	n	d, mm	Weight, kg, not more	
							Conf. 1	Conf. 2
150	Class 150	450	750	241	8	22	25	133
	Class 600	490	750	292		29	123	174
	Class 900	570	750	317,5	12	32	140	187
200	Class 150	600	1000	298,5	8	22	41	209
	Class 600	740	1000	349	12	32	168	294
	Class 900	740	1000	393,5		39	186	315
250	Class 150	750	1000	362	12	26	62	310
	Class 600	800	1000	432	16	35,5	265	442
	Class 900	850	1000	470		39	314	487
300	Class 150	900	1000	431,8	12	25,5	101	434
	Class 600	900	1000	489	20	35	410	675
	Class 900	900	1000	533,5		39	507	734
400	Class 150	800	1200	525	16	29	141	960
	Class 600	1000	1200	585	20	42	650	1210
	Class 900	1000	1200	620		45	1398	2031

Table – Mounting Kit Weight

DN, mm	PN, MPa	Flange weight, kg, max.	Fasteners weight, kg, max
150	1,6	15,6	9
	6,3	50	31
200	1,6	20,4	14
	6,3	77	47
250	1,6	29,5	18,5
	6,3	108	115
300	1,6	35,5	21
	6,3	148	115
400*	1,6	62	45
	6,3	302	194

*- under special order DN500, DN600 are available for a full range of Rating