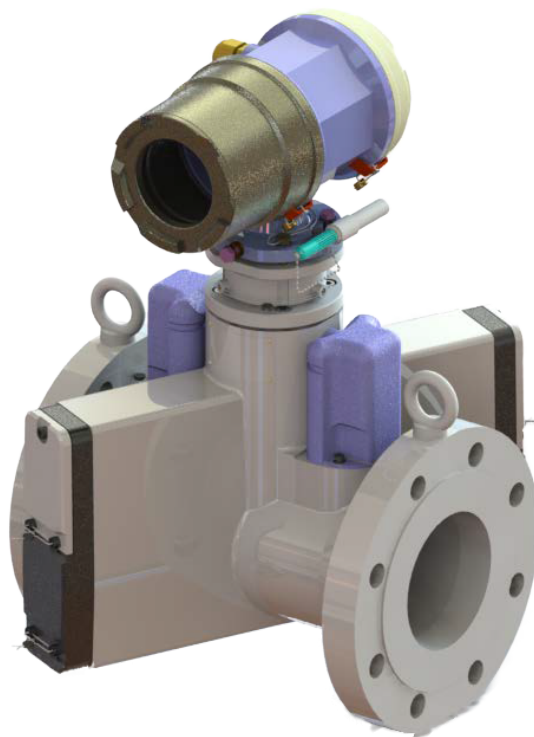


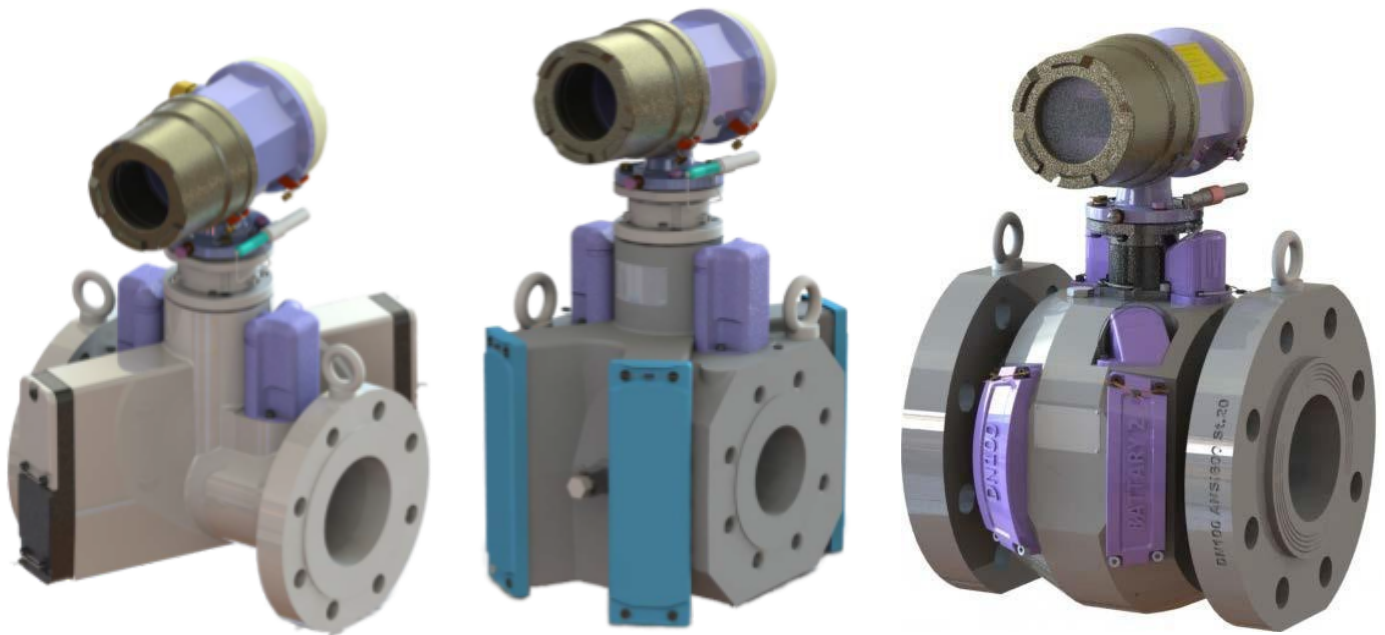


GFA414

ULTRASONIC GAS FLOW METER DATA SHEET



METER ASSEMBLY CONFIGURATIONS



a) with cast or welded IS
with flanges

b) with cast IS without
flanges

c) with machined steel IS with
flanges

- External view of the meter with different IS modifications

OVERVIEW

GFA414 gas meters are the next generation ultrasonic gas flow meters designed to measure the flow rate and volume of natural gas in the forward and reverse direction. The meters have an integrated flow corrector with pressure and temperature sensors for effective custody transfer measurements and can be used to measure the flow rate and volume of natural gas from wells at gas condensate fields with water factor of 0 to 200 ml and condensate content from 0 to 140 g/m³ as well as gas in pipelines. The meters comply with the requirements of OIML R137:2012 (w/amend.2014), EN 12405-1:2021, EN12405-2:2012 and the EU directive 2014/32/EU (MID). Operating conditions: ambient temperature - from minus 25°C to 55 °C, humidity up to 100%. Meters can be supplied for operation at ambient temperature from minus 25°C to 70 °C under order.

The GFA414 gas meter is designed with types of protection "explosion- proof enclosure "d" according to EN 60079-1:2014/AC:2018-09, "intrinsically safe electrical circuit "i" according to EN 60079-11:2012 and meets the requirements of EN IEC 60079-0:2018/AC:2020-02. The meters comply with the requirements of the EU directive 2014/34/ EU (ATEX). The explosion protection marking of the meter depending on the type of built-in modem is shown in Table 1.

Table 1 - Explosion protection marking of the meter depending on the type of built-in modem

Version	Built-in modem type	Explosion protection marking
GFA202-*-*-*-*-*Z-I-*-*-*	Without modem	II 2 (1) G Ex db ib [ia Ga] IIC T4 Gb
GFA202-*-*-*-*-*G-I-*-*-*	GSM/GPRS	II 2G Ex db ib [ib Gb] IIA T4 Gb
GFA202-*-*-*-*-*N-I-*-*-*	Nb-IoT	II 1/2G Ex ia/db ib [ib Gb] IIB T4 Gb

Technical Specifications

The meters are available in the following standard sizes depending on gas flow rate: G160, G250, G400; G650; G1000, G1600, G2500; G4000; G6500; G10000, G16000, G25000.

The meters are produced for maximum operating pressure 1.6; 2.5; 4.0; 6.3; 10; 16; 25 MPa.

The meter provides measurement of volumetric flow rate and gas flow rate with designated accuracy in the ranges of volume flow rates stated in Table 2, which correspond to gas flow velocities in the range 0.1 to 40.0 m/s.

The limits of relative accuracy of the meter at measurement conditions shall not exceed:

- in the flow range beginning from Q_{min} up to $Q_t \pm 2\%$;
- in the flow range beginning from Q_t up to $Q_{max} \pm 1\%$

The meter has two pulse outputs, which, depending on the meter configuration, can be either one or two low frequency pulse (LF) outputs, or one high frequency pulse (HF) outputs and one LF output.

In the autonomous operation mode, when the meter is powered by battery only, the meter generates one LF signal proportional to the volume of gas flowing through the meter in forward and reverse directions. The low-frequency pulse output can be used to connect the meter to an external volume corrector.

When operating from an external power supply, the meter can generate up to two LF pulse signals or one LF pulse signal and one HF pulse signal with a frequency of up to 600 Hz, proportional to the volume of gas passing through the meter. The HF outputs are designed to connect the meter to an automated verification system during its verification (calibration).

Table 2 – Nominal values of volumetric flow rates

DN	Meter standard size	Volumetric flow rate, m ³ /h				Measuring ranges $Q_{\min}:Q_{\max}$
		threshold Q_{thr}	minimal $Q_{\min}$	transitional Q_t	maximum $Q_{\max}$	
80	G160	0,5	2,5	32,5	250	1:100
	G250				400	1:160
	G400				650	1:250
100	G250	0,8	4,0	50,0	400	1:100
	G400				650	1:160
	G650				1000	1:250
150	G400	2,0	10,0	125,0	650	1:65
	G650				1000	1:100
	G1000				1600	1:160
	G1600				2500	1:250
200	G650	3,2	16,0	200,0	1000	1:65
	G1000				1600	1:100
	G1600				2500	1:160
	G2500				4000	1:250
250	G1000	5,0	25,0	325,0	1600	1:65
	G1600				2500	1:100
	G2500				4000	1:160
	G4000				6500	1:250
300	G1600	8,0	40,0	500,0	2500	1:65
	G2500				4000	1:100
	G4000				6500	1:160
	G6500				10000	1:250
400	G2500	12,8	64,0	800,0	4000	1:65
	G4000				6500	1:100
	G6500				10000	1:160
	G10000				16000	1:250
500	G4000	20,0	100,0	1250,0	6500	1:65
	G6500				10000	1:100
	G10000				16000	1:160
	G16000				25000	1:250
600	G6500	32,0	160,0	2000,0	10000	1:65
	G10000				16000	1:100
	G16000				25000	1:160
	G25000				40000	1:250

Available configurations of frequency outputs are shown in Table 3.

Table3 - configurations of frequency outputs

Type of frequency-pulse signal	Power supply from built-in battery		Power supply from external source	
	1-st pulse output	2-nd pulse output	1-st pulse output	2-nd pulse output
LF forward direction	+	+	+	+
LF reverse direction	-	+	+	+
LF forward direction (volume converted to base conditions)	-	+	-	+
LF reverse direction (volume converted to base conditions)	-	+	-	+
HF forward direction	-	-	+	-
HF reverse direction	-	-	+	-

The meters can be configured with additional outputs - one analog output (4...20) mA or RS-485 serial interface and 2 discrete outputs (NC, max. 50 mA, 24 V).

The LF and HF dry contact outputs of the meter are rated for supply voltage 5 V to 28 V and current up to 20 mA. The HF output is available only when there is an external power supply to the meter. Each pulse of the pulse output signal represents an increase of the gas volume by a fixed amount. The "Pulse Rate" values depending on the internal diameter and meter size are shown in Table 4 and 5.

DN	Pulse rate, imp./m ³	
	HF output	LF output
50	5000	5
80	2000	2
100	1000	1
150	500	0,5
200	500	0,2
250	200	0,2
300	200	0,1
400	100	0,1
500	50	0,05
600	50	0,02

Table 4 - value of "Pulse Rate" depending on internal diameter and meter size

Table 5 - "Pulse value" of the low-frequency output depending on the meter size and maximum pressure for standard conditions

DN, mm/ P, MPa	0,1	0,6	1	1,6	2	2,5	4	5	6,3	10	16	25
50	5	0,5	0,5	0,2	0,2	0,2	0,1	0,1	0,05	0,05	0,02	0,02
80	2	0,2	0,2	0,1	0,1	0,05	0,05	0,05	0,02	0,02	0,01	0,01
100	1	0,2	0,1	0,05	0,05	0,05	0,02	0,02	0,02	0,01	0,005	0,005
150	0,5	0,05	0,05	0,02	0,02	0,02	0,01	0,01	0,01	0,005	0,002	0,002
200	0,2	0,05	0,02	0,02	0,01	0,01	0,005	0,005	0,005	0,002	0,002	0,002
250	0,2	0,02	0,02	0,01	0,01	0,005	0,005	0,005	0,002	0,002	0,001	0,001
300	0,1	0,02	0,01	0,005	0,005	0,005	0,002	0,002	0,002	0,001	0,0005	0,0005
400	0,1	0,01	0,005	0,005	0,002	0,002	0,001	0,001	0,001	0,001	0,0005	0,0005
500	0,05	0,005	0,005	0,002	0,002	0,002	0,001	0,001	0,001	0,0005	0,0002	0,0002
600	0,02	0,005	0,002	0,002	0,001	0,001	0,0005	0,0005	0,0005	0,0002	0,0002	0,0001

The integrated volume corrector can calculate the gas compression factor using one of the following methods: NX19 mod., GERG-91 mod. or SGERG88.

Relative error of calculation of volume flow, volume of gas converted to base conditions and energy is not more than $\pm 0,02\%$.

The GFA414 flow meter has a built-in temperature sensor with nominal static characteristic Pt100, which corresponds to class A according to IEC 60751:2022. Absolute error of the thermal channel does not exceed $\pm 0,1\text{ }^{\circ}\text{C}$. Absolute error of temperature measurement in the range from minus $55\text{ }^{\circ}\text{C}$ to plus $70\text{ }^{\circ}\text{C}$ does not exceed $\pm 0,3\text{ }^{\circ}\text{C}$.

The meter has a built-in strain gauge type pressure transducer with temperature-compensation. The total error of pressure measurement in the range from $0,2 P_{\max}$ to $P_{\max}$ does not exceed $\pm 0,1\%$.

The meter automatically creates and stores in its non-volatile memory archives recording the values of measured parameters:

- hourly - for each previous hour. Depth of the archive is 1080 records (45 days);
- daily - for each preceding day. Depth of the archive is 365 records (12 months);
- periodic values of all parameters to be measured, with a configurable period in increments of 60s (default setting is 1800s (30 min)). Depth of the archive is 4320 records;
- instantaneous values of all measured parameters, with a configurable period in increments of 1s. Depth of the archive is 3000 records.

The meter logs in separate archives:

- emergencies & alarms - The depth of archive is 1000 records;
- interferences - message about changes to meter configuration (depth of archive - 1000 records).
- security archive - a message about user authorization and logout time, change

of username and password, adding and deleting users
Depth of the archive is 600 records.

Data from the meter can be read via RS-485 interface. The communication protocol is ModBus RTU. Baud rate can be selected from 1200; 2400; 4800; 9600; 19200; 38400; 57600; 115 200 bps. When connecting the external circuits, pin assignments marking shown on the back of the EU should be followed.

Terminal pin assignment and their correspondence to circuit terminals

Contact #	Circuit	Application
X1:1	+U	External power supply
X1:2	-U	
X2:1	A1	RS-485 interface
X2:2	B1	
X4:1	A2 (I+)	RS-485 interface / 4-20mA current output **
X4:2	B2 (I-)	
X5:1	+Fout1*	First pulse output (volume of gas passed through the meter in forward direction)
X5:2	-Fout1*	
X6:1	+Fout2*	Second pulse output (gas volume flowing through the meter in reverse direction)
X6:2	-Fout2*	
X7	Dout1	Discrete output 1
X8	Dout2	Discrete output 2
* - by default, the pulse outputs provide low-frequency signals; depending on the configuration, the meter can generate signals, see paragraph 1.2.8, Table 3. ** - the type of signal is determined by the meter version		

(Obligatory)

GFA	4	1	4-	-	-	-	-	-	-	-	-	-	-	-
Meter type														
Channel number: 4														
In-line section: 0, 1 - need for straight lines 2 - no need for straight lines														
Number of EAT pairs: 4														
Maximum operating pressure, MPa														
Type of calibration: A – air; G – natural gas; W – without calibration;														
IS nominal diameter, mm														
Meter standard size G according to Table 2														
Flange type: D –DIN; xxxx – PN, bar; A –ANSI; xxxx – pressure class; O – on order;														
Ambient temperature: S – Standard (-25.. +55 °C); H – High temperature (-25 .. +70 °C);														
Availability of a modem or discrete outputs: G – GSM/GPRS N – Nb-Iot; D – two discrete outputs; X – not available;														
Additional outputs: C - current; R - RS-485;														
Power supply: B – autonomous power with the possibility of connecting external power source; D – external;														
Flow correction features: C – with integrated flow corrector (PTZ); W– without volume correction feature (without integrated pressure and temperature measurement)														
Flow configuration: 1 – only in the forward direction; 2 – in the forward and reverse directions;														