OCTOGON

MANUAL

QGKB

PRECESSION VORTEX GAS FLOWMETER

Installation and user manual



Document	Version	Date	Applies to
Installation and user manual	V00x	11/2026	QGKB, DN15 … DN200, all versions

This manual describes the QGKB precession vortex gas flowmeter with temperature and pressure compensation: technical data, dimensions, installation, electrical connection, operation and parameter setting, calibration, commissioning, the RS485 registers, transport and storage.

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1 About this manual

Read this manual before installing the flowmeter and keep it available for later use. The correct installation of the instrument is essential for its normal operation: an improper installation impairs the accuracy, shortens the service life and may even damage the instrument. Values and versions refer to the QGKB order code (section 3.4).

1.1 Versions covered

Feature	Versions
Nominal size	DN15 ... DN200, flow range type A or B
Accuracy	class 1.0 (E1) or class 1.5 (E2)
Supply	internal 3.6 V battery (D1, without output and display) or 24 V DC (D2)
Nominal pressure	1.6 · 2.5 · 4.0 MPa
Body	stainless steel or aluminium alloy

1.2 Type marking

The device label carries the type designation FM310 together with the version data.

2 Safety

2.1 Intended use

The QGKB measures the flow of gas in pipes DN15 … DN200. It measures flow, temperature and pressure and automatically compensates temperature, pressure and compression factor. It is intended for gas measurement e.g. in the petroleum, chemical, electric power and metallurgy industries.

Important Observe the nominal pressure, the medium and ambient temperature ranges and the explosion protection marking of the version (section 3.2). The battery version (D1) has neither a display nor an output.

2.2 Transport

Keep the instrument in its original packing until it arrives at the installation site (chapter 9).

3 Product description

3.1 Working principle

A precession vortex meter: the gas is set spinning, the swirl centre precesses, and its frequency is counted. Pressure and temperature are measured in the same housing and the reading is corrected for both and for the compression factor. The accuracy class is the accuracy of the system after that correction.

3.2 Technical data

Measurement

Item	Value
Measuring principle	precession vortex
Flow range	0.3 … 3600 m³/h, depending on the nominal size - see section 3.3
Accuracy	class 1.0 or 1.5 · accuracy of the system after temperature and pressure correction
Repeatability	less than one third of the absolute value of the basic error limit
Nominal size	DN15 … DN200
Compensation	temperature, pressure and compression factor - automatic
Reference conditions	101.325 kPa · 293.15 K
Straight pipe run	10 × DN before the meter, 5 × DN after it
Mounting position	horizontal, vertical or at any angle · the arrow gives the flow direction

Materials and process

Item	Value
Medium	gas
Body	stainless steel or aluminium alloy (order code field 8)
Process connection	flange
Nominal pressure	1.6 · 2.5 · 4.0 MPa
Medium temperature	−20 … +80 °C
Ambient temperature	−30 … +65 °C
Relative humidity	5 … 95 %
Atmospheric pressure	86 … 106 kPa
Protection grade	IP65
Cable entry	M20 × 1.5 internal thread
Explosion protection	Ex d IIB T4 · Ex ia IIC T4

Electrical data and display

Item	Value
Supply, external	24 V DC ± 15 % · ripple < 5 % · below 2 W
Supply, internal	one 3.6 V lithium cell ER26500 · 1 mW average, over two years · undervoltage warning below 3.0 V
Analogue output	4 … 20 mA, isolated · 4 mA is 0 m³/h, 20 mA the set maximum standard flow
Pulse output	isolated · high ≥ 20 V, low ≤ 1 V
Calibration pulse	high ≥ 2.8 V, low ≤ 0.2 V · 0.001 … 100 m³ per pulse · ≤ 900 Hz
Alarm outputs	upper and lower limit, isolated · 12 … 24 V · 50 mA maximum
Communication	RS485, isolated · up to 1.2 km
Display	dot matrix: working volume flow, standard volume flow, totals, pressure, temperature
Head	turns 360°
Records	daily and monthly records over five years · 1200 interval records

3.3 Flow ranges

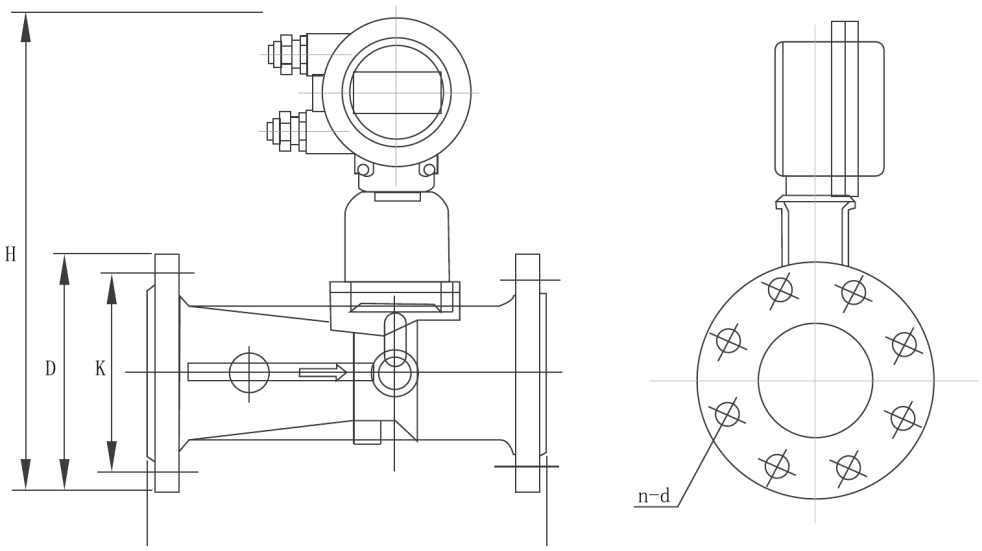
Nominal size	Flow range (m³/h)	Nominal size	Flow range (m³/h)
DN15	0.3 … 12	DN65	20 … 300
DN20	1.2 … 15	DN80	30 … 400
DN25	2.5 … 30	DN100	50 … 800
DN32	4.5 … 60	DN125	80 … 1000
DN40	7 … 70	DN150	190 … 1900
DN50	10 … 130	DN200	240 … 3600

3.4 Order code

Field	Code	Meaning
1 Series	QGKB	precession vortex gas flowmeter
2 Size	015 … 200	DN15 … DN200 · 025 is DN25
3 Range	A · B	type A or type B flow range
4 Connection	F	flange
5 Accuracy	E1 · E2	class 1.0 · class 1.5
6 Supply	D1 · D2	internal 3.6 V battery - without output and display · 24 V DC
7 Pressure	P1 · P2 · P3	1.6 · 2.5 · 4.0 MPa
8 Body	B1 · B2	stainless steel · aluminium alloy

Example: QGKB-025-A-F-E2-D2-P1-B1. Accessories: data collectors for RS485 networks - one collector of the first kind serves 15 meters through a telephone line, one of the second kind 8 meters over a broadband network; a management program reads and sets the parameters of every meter in the network.

4 Dimensions



Left the side view with the head, right the view along the pipe with the flange. The letters are the columns of the table.

L is the face-to-face length, H the height from the pipe axis to the top of the head, D the outside diameter of the flange, K the bolt circle, n × d the number and diameter of the holes. Dimensions in mm.

Nominal size	Version	PN (MPa)	Length L	Height H	Flange Ø D	Bolt circle K	Holes n × d
DN15	A	1.6 · 2.5 · 4.0	160	280	95	65	4 × Ø 14
DN15	B	1.6 · 2.5 · 4.0	200 (180)	280	95	65	4 × Ø 14
DN20	A	1.6 · 2.5 · 4.0	160	335	105	75	4 × Ø 14
DN20	B	1.6 · 2.5 · 4.0	200 (180)	335	105	75	4 × Ø 14
DN25	A	1.6 · 2.5 · 4.0	180	350	115	85	4 × Ø 14
DN25	B	1.6 · 2.5 · 4.0	200	350	115	85	4 × Ø 14
DN32	A · B	1.6 · 2.5 · 4.0	198	355	140	100	4 × Ø 18
DN40	A · B	1.6 · 2.5 · 4.0	232	330	150	110	4 × Ø 18
DN50	A · B	1.6 · 2.5 · 4.0	230	380	165	125	4 × Ø 18
DN65	A	1.6	300	405	185	145	4 × Ø 18
DN65	B	2.5 · 4.0	290	405	185	145	8 × Ø 18
DN80	A · B	1.6 · 2.5 · 4.0	330	410	200	160	8 × Ø 18
DN100	A	1.6	410	440	220	180	8 × Ø 18
DN100	B	2.5 · 4.0	410	440	235	190	8 × Ø 22
DN125	A	1.6	516	470	250	210	8 × Ø 18
DN125	B	2.5 · 4.0	516	470	270	220	8 × Ø 26
DN150	A	1.6	585	490	285	240	8 × Ø 22
DN150	B	2.5 · 4.0	575	490	300	250	8 × Ø 26
DN200	A · B	1.6	700 (670)	550	340	295	12 × Ø 22
DN200	A · B	2.5	700 (670)	550	360	310	12 × Ø 26
DN200	A · B	4.0	700 (670)	550	375	320	12 × Ø 30

5 Installation

5.1 Installation environment

– As far as possible, avoid strong electrical equipment, high-frequency equipment and strong switching power supplies. As far as possible, separate the power supply of the meter from that equipment.

– Avoid the direct effect of high-temperature heat sources and radiation sources. If the installation there is necessary, provide thermal insulation and ventilation.

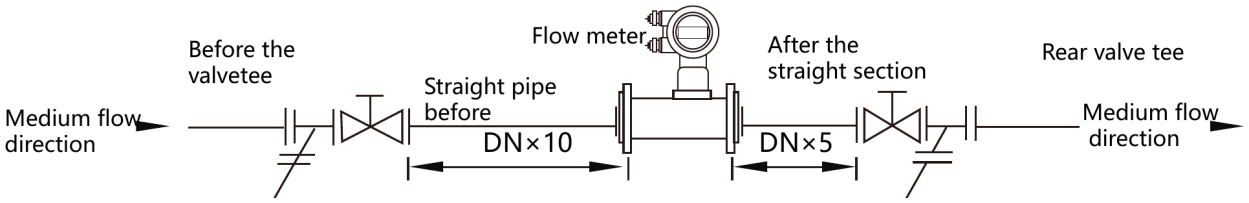
– Avoid a high-humidity environment and strongly corrosive gases. If the installation there is necessary, provide ventilation.

– Avoid pipes with strong vibration. If the installation there is necessary, fasten the pipe 2 D upstream and downstream of the meter and add vibration pads.

– Install the instrument indoors if possible; outdoors, protect it against water. Bend the cable into a U shape at the cable entry so that water cannot run along the cable into the housing.

– Leave ample space around the meter for installation, wiring and regular maintenance.

5.2 Straight pipe run



Straight pipe of 10 × DN before the meter and 5 × DN after it; valves and tees outside these sections.

Install a straight pipe of ten times the nominal diameter before the meter and five times after it. Install valves and tees outside these straight sections.

5.3 Mounting position

The meter can be installed horizontally, vertically or at any angle. The arrow on the body gives the flow direction. The head can be turned by 360°.

6 Electrical connection

The terminals are on the terminal board in the head; the cable entry is an M20 × 1.5 internal thread.

Terminal	Function	Note
24V+	supply +	24 V DC
24V–	supply –	
IOUT	4 … 20 mA +	load ≤ 500 Ω
ICOM	4 … 20 mA –	
POUT	frequency and pulse output +	
PCOM	frequency and pulse output, common	
ALM H	high alarm +	use a 24 V DC intermediate relay
ACOM	high alarm, common	
ALM L	low alarm +	use a 24 V DC intermediate relay
ACOM	low alarm, common –	
RS+	RS485 +	RS485 terminal
RS–	RS485 –	

6.1 Current output 4 … 20 mA

– Two-wire connection: IOUT and 24V+ to the current loop of the receiving instrument (the 250 Ω resistor is the measuring resistance inside the instrument).

– Three-wire connection: IOUT to the current input, 24V– to 0 V and 24V+ to the 24 V supply of the receiving instrument.

6.2 Pulse output

Three-wire connection to a pulse counter: POUT to the pulse input, 24V– to 0 V, 24V+ to the 24 V supply.

6.3 Alarm outputs and RS485

Connect the high and low alarm outputs (ALM H, ALM L with ACOM) to 24 V DC intermediate relays. Connect RS+ and RS– to the RS485 bus (chapter 8).

Important The flow, pressure and temperature sensors are connected to the main board at the factory. The converter is calibrated before delivery.

7 Operation

7.1 Display and keys

The display shows the medium setting (e.g. standard conditions), the instantaneous flow and unit (e.g. Nm³/h), the pressure (MPa), the temperature (°C) and the total and its unit (Nm³).

Key	Function
◄	OK key for parameter settings, exit from a submenu, return to the flow display; in value entry: confirm
▲	move up; in value entry: increase (+)
▼	move down; in value entry: decrease (–)
►	enter the parameter settings, open a submenu or parameter; in value entry: move the cursor (shift)

7.2 Menu structure

Main menu	Submenu
Flow parameters	instantaneous unit of flow · decimal digits · range (20 mA) · small signal cut-off · high alarm setting value · low alarm setting value · damping time
Total parameters	total units · decimal digits · default volume
Instrument calibration	zero current calibration · current full calibration · temperature calibration · pressure calibration
Output settings	signal output
Communication settings	mode · baud rate · parity · device address
Factory settings (password)	fluid type · sensor nominal size · instrument coefficient · linear correction · fluid density · local atmospheric pressure · working condition compressibility · standard compressibility factor · pressure selection · temperature selection · language

7.3 Setting parameters

- In the flow display press ► to open the main menu.
- Select a submenu with ▼ or ▲ and open it with ►; ◄ returns to the flow display.
- Select the parameter with ▼ or ▲ (it is highlighted) and press ► to set it.
- Change the value with ▼ or ▲; ► moves the cursor to the next digit.
- Press ◄ to save the setting and return to the parameter list.

Example: to change the flow unit from m³/h to m³/min, open the flow parameters, select the flow unit, press ►, change the unit with ▲ and save with ◄.

7.4 Flow parameters

Parameter	Setting
Flow unit	L/s · L/min · L/h · m³/s · m³/min · m³/h · Nm³/h · USG/s · USG/min · USG/h · kg/s · kg/min · kg/h · t/s · t/min · t/h; factory setting m³/h
Decimal places	0 · 1 · 2 · 3; factory setting 1
Range	0.00 … 99999999.00 (unit of the flow); factory setting 100.0 m³/h. At this flow the converter outputs 20 mA. Changing the range affects the current output and the high and low alarm. Observe the unit of this parameter.
Small signal cut-off	0.00 … 9.90 % of the range; factory setting 0.0 %
High alarm	1.00 … 99.00 % of the range; factory setting 90.0 %. Example: with 10 the high alarm is output and the high alarm contact closes when the absolute instantaneous flow is greater than 10 % of the range.
Low alarm	0.00 … 99.00 % of the range; factory setting 0.0 %. The low alarm contact closes when the absolute instantaneous flow is less than the set percentage of the range.
Damping time	0.1 … 30.0; factory setting 1

7.5 Total parameters

Parameter	Setting
Total unit	L · m^3 · Nm^3 · USG · kg · t; factory setting m^3
Decimal places	0 · 1 · 2 · 3; factory setting 1
Default volume	0.00 … 99999999.00; factory setting 0.0 - clears the total or sets it to a value

7.6 Output settings

Under **Signal output** the type of the pulse output is selected; the highlighted selection can be changed with ▼ or ▲, ► moves the cursor, ◄ saves and exits.

Parameter	Setting
Signal output	original signal output of the sensor. Nonlinear correction also affects it; it is related to the instrument coefficient K.
Equivalent output	pulse equivalent output: pulse width and pulse equivalent
Pulse width	0.0 … 1000.0 ms (low level); factory setting 0.0 - with 0 the duty ratio is 1:1
Pulse equivalent	0.0 … 9999.0 per pulse; units L/pulse, USG/P, kg/P, t/P, Nm^3/P, m^3/P
Frequency output	upper limit frequency 100.0 … 5000.0 Hz; factory setting 2000.0 Hz

Output frequency (Hz) = instantaneous flow (m^3/h) ÷ range (m^3/h) × upper limit frequency (Hz). Example: flow 100 m^3/h, range 200 m^3/h, upper frequency 2000 Hz → 1000 Hz.

7.7 Communication settings

Parameter	Setting
Mode	Modbus-RTU · Modbus-ASCII; factory setting Modbus-RTU
Baud rate	1200 · 2400 · 4800 · 9600 · 19200 · 38400; factory setting 19200 - do not set the baud rate below 9600
Parity	none · even · odd; factory setting odd
Device address	1 … 247; factory setting 1

7.8 Instrument calibration

Calibrate the current output and the temperature and pressure measuring circuits.

Parameter	Setting
Zero current calibration	3.0 … 5.0. Measure the current output with a multimeter; if it is not 4.0 mA, enter the value measured. The converter then completes the 4 mA calibration automatically. If the deviation is large, repeat the correction; maximum input per correction 5.0.
Current full calibration	19.0 … 21.0. Measure the current output; if it is not 20.0 mA, enter the value measured. The converter completes the 20 mA calibration. Repeat if necessary; maximum input per correction 21.0.
Temperature calibration	for the Pt1000 input: connect a stable 1000 Ω resistance to the resistance thermometer terminals and confirm when the value is stable; then a stable 2000 Ω resistance and confirm; this completes the temperature calibration.

Pressure calibration

- Zero calibration: with the pressure at zero the converter measures the sensor voltage automatically; enter the pressure value (gauge pressure) and confirm with ◄.
- Full scale: apply the actual pressure, enter the pressure value and confirm with ◄. Then ◄ ends the pressure calibration, ► opens the nonlinear correction.
- Nonlinear correction (optional, for a nonlinear pressure sensor): correction points 1 to 4, each with a pressure greater than zero and greater than the previous point; enter the pressure value and confirm with ◄; ► saves and goes to the next point, ◄ exits.

7.9 Factory settings

The factory settings are protected by the password 052500.

Parameter	Setting
Fluid type	gas operating flow or gas standard flow (the converter uses a different algorithm for each); select the medium before use. The 4 ... 20 mA, pulse and frequency outputs follow the selected flow.
Nominal size (CAL)	15 · 20 · 25 · 32 · 40 · 50 · 65 · 80 · 100 · 125 · 150 · 200 · 250 · 300 mm; factory setting 50 mm - set to the nominal size of the meter
Instrument coefficient	K factor in pulses per m^3; set automatically for each nominal size. After a real flow calibration, enter the final K factor here. Q (m^3/h) = 3600 × F (Hz) ÷ K.
Linear correction	five points (**Linear change-1** ... **-5**): for each point enter the test frequency (Hz) and the instrument coefficient for it. Start with the highest test frequency; set the frequencies from large to small. ◄ exits and saves.
Fluid density	density of the medium
Local atmospheric pressure	factory setting 0.101 MPa
Working condition compressibility	factory setting 1
Standard compressibility factor	factory setting 1
Pressure selection	type of pressure sensor: gauge pressure (G) or absolute pressure (A). Without a pressure sensor a fixed gauge pressure can be set.
Temperature selection	Pt100 · Pt1000 · set temperature; factory setting Pt1000
Language	Chinese or English; factory setting Chinese

7.10 Spectrum analysis

The spectrum analysis parameters are protected by the password 905250. Do not modify them unless you are familiar with spectrum analysis.

Parameter	Setting
Sampling rate	corresponds to the nominal size - do not change
Spectrum upper limit	upper limit of the signal frequency; default by nominal size, can be adapted to the upper limit of the flow range
Spectrum lower limit	lower limit of the signal frequency; default by nominal size, can be adapted to the lower limit of the flow range
Power threshold	default by nominal size, can be adapted to the actual signal; shown as **M** in the spectrum display
Power ratio	minimum value that meets the signal requirements; shown as **R** in the spectrum display

When there is actual flow, the DSP spectrum can be checked if necessary (generally not required): in the flow display press ◄ to open the spectrum screen, which lists the strongest frequencies (**F1**, **F2**, **F3**) with their power **M**. An interfering frequency (e.g. 50 Hz) can be selected and added to the filter list; several interfering signals can be filtered without affecting the measurement. All filtered signals are shown in the filter list, where a signal filtered by mistake can be selected and restored.

7.11 Commissioning

- In the factory settings select the medium (standard or operating flow) and the nominal size.
- In the flow parameters set the range, the unit and the other parameters.
- In the output settings select the output mode and set its parameters.
- If necessary, adapt the spectrum analysis parameters (password 905250).

Notes:

- The converter is calibrated before delivery: only select Pt100 or Pt1000 in the factory settings; a temperature calibration is not required.
- Select the type of pressure sensor in the factory settings, connect the pressure sensor and carry out the pressure calibration with the actual pressure.
- The outputs (4 ... 20 mA, pulse, frequency or original signal) correspond to the flow selected as medium: standard flow or operating flow.

8 Serial interface (RS485)

Mode, baud rate, parity and address are set in the communication settings (section 7.7). The registers are read with function code 0x04; the register for the total in m³ also with 0x03.

Variable	Start address	Length	Function code	Data type
instantaneous flow rate	0x01	0x02	0x04	floating point
instantaneous flow unit	0x03	0x01	0x04	integer
total	0x04	0x04	0x04	double
total unit	0x08	0x01	0x04	integer
temperature	0x09	0x02	0x04	floating point
pressure	0x0B	0x02	0x04	floating point
total (m³)	0x0D	0x02	0x03 · 0x04	floating point
instantaneous flow rate	0x14	0x02	0x04	floating point
total	0x16	0x02	0x04	floating point
temperature	0x18	0x02	0x04	floating point
pressure	0x1A	0x02	0x04	floating point
instantaneous flow rate	0x1E	0x02	0x04	floating point, reversed
total	0x20	0x02	0x04	floating point, reversed
temperature	0x22	0x02	0x04	floating point, reversed
pressure	0x24	0x02	0x04	floating point, reversed

8.1 Unit codes

Flow unit	Code	Flow unit	Code	Total unit	Code
Nm³/h	0x00	USG/h	0x09	Nm³	0x00
Nm³/min	0x01	USG/min	0x0A	m³	0x01
Nm³/s	0x02	USG/s	0x0B	L	0x02
m³/h	0x03	kg/h	0x0C	USG	0x03
m³/min	0x04	kg/min	0x0D	kg	0x04
m³/s	0x05	kg/s	0x0E	t	0x05
L/h	0x06	t/h	0x0F		
L/min	0x07	t/min	0x10		
L/s	0x08	t/s	0x11		

9 Packing, transport and storage

The instrument is delivered in a special foam box that protects it during transport. The accompanying documents include the operating manual, the certificate and the packing list. To prevent damage, keep the original packing during transport until the instrument arrives at the installation site.

Store the instrument indoors, protected from rain, moisture and mechanical vibration.