OCTOGON

MANUAL

QGKN

THERMAL GAS FLOW SENSOR IP65

Installation and user manual



Document	Version	Date	Applies to
Installation and user manual	V00x	11/2026	QGKN, all flow ranges and output versions

This manual describes the QGKN thermal gas flow sensor with colour display and IP65: technical data, dimensions, installation, electrical connection, operation and menus, the RS485 protocol and maintenance.

octogon GmbH · Roseggerstrasse 16 · 8700 Leoben · Austria · office@octogon.org

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1 About this manual

Read this manual before installing the sensor and keep it available for later use. Values and versions refer to the QGKN order code (section 3.4).

1.1 Versions covered

Feature	Versions
Flow range	500 · 1000 · 2000 · 3000 · 6000 L/min (codes 01 … 05)
Output	S2: two switches / pulse / IO-Link · SA: one switch + 4 … 20 mA · SV: one switch + 1 … 5 V · RS: RS485
Thread	G or Rc internal thread, size by flow range
Bracket	none or fixed frame

1.2 Type marking

The device label carries the type designation FM380 together with the version data.

2 Safety

2.1 Signal words

Safety instructions are intended to protect users from dangerous situations and/or prevent material damage. In this manual the severity of the potential risk is indicated by the following signal words:

Signal word	Meaning
Danger	An imminent danger to the user. Failure to comply may result in fatal injury.
Warning	An identifiable hazard. Failure to comply may result in fatal injury and damage to equipment or plant parts.
Caution	A potential danger. Failure to comply may result in minor injury and material damage to the device and/or the plant.
Important	Information that is important to the user.

2.2 Intended use

The QGKN measures the flow of dry air and nitrogen (N2) - non-corrosive and non-flammable gases - in one direction. Depending on the version it has two switch outputs, one switch output and one analogue output, or an RS485 interface.

Important The medium must be free of dew and freezing. Observe the working pressure 0 ... 1.0 MPa and the temperature ranges in section 3.2.

2.3 Disposal

Disposal The device must be disposed of correctly in accordance with the national or local regulations for electrical and electronic equipment. Do not dispose of the device with household waste.

3 Product description

3.1 Working principle

Thermal mass flow measurement: the sensor is heated and the gas stream carries heat away; how much heat it carries away is a measure of the mass flow.

3.2 Technical data

Measurement

Item	Value
Media	dry air, nitrogen (N2) · non-corrosive and non-flammable
Direction	one-way
Rated flow	5 ... 500 · 10 ... 1000 · 20 ... 2000 · 30 ... 3000 · 60 ... 6000 L/min
Display range	3 ... 525 · 8 ... 1050 · 15 ... 2100 · 25 ... 3100 · 50 ... 6100 L/min
Accuracy range	2 ... 100 % F.S.
Display accuracy	± 3 % F.S. ± 1 digit (1)
Analogue accuracy	± 5 % F.S. (1)
Repeatability	± 1 % F.S. ± 1 digit · ± 2 % F.S. at 50 ms (2)
Linearity	± 3 % F.S. (2)
Temperature effect	± 5 % F.S. (2)
Pressure effect	± 5 % F.S. ± 1 digit (3)
Response time	≤ 100 ms on the analogue output · 800 ms on the switches, selectable down to 50 ms

(1) Measured with 600 kPa at the inlet, one atmosphere at the outlet and 25 °C. (2) Measured with one atmosphere at the outlet and 25 °C. (3) Measured over 0 ... 1.0 MPa with one atmosphere at the outlet and 25 °C.

Process and environment

Item	Value
Process connection	Rc1/2 · G1/2 · G3/4 · G1 · G1-1/2, by size
Working pressure	0 … 1.0 MPa
Pressure resistance	1.5 MPa
Protection grade	IP65
Medium temperature	0 … +50 °C · no dew and no freezing
Ambient temperature	0 … +50 °C · storage –10 … +60 °C
Humidity	35 … 85 % RH, no dew · in operation and in storage
Insulation	≥ 2 MΩ at 50 V DC between leads and plastic housing
Withstand voltage	250 V AC for one minute
Vibration	1.5 mm or 10 g, 10 … 55 … 10 Hz per minute, two hours in each of the three axes
Shock	100 m/s² (10 g), three times in each of the three axes
EMC	IEC 61000-6-2 and IEC 61000-6-4

Electrical data and display

Item	Value
Supply voltage	18 … 28 V DC (connection diagram)
Consumption	≤ 50 mA
Switch outputs	two · PNP by default, or NPN · short-circuit protected
Switch modes	response difference, window, cumulative flow, cumulative flow pulse
Pulse	5 · 10 · 20 · 30 · 60 litres per pulse by size · full scale 100 Hz
Voltage output	1 … 5 V · output impedance 1 kΩ
Current output	4 … 20 mA · load ≤ 300 Ω
Communication	RS485 · IO-Link
Electrical connection	M8 × 1 four-pin plug
Display	colour LCD · can be turned by 180°
Instantaneous unit	1 L/min or 0.1 ft³/min
Totalized range / unit	99 999 999 L · 1 L or 1 ft³

3.3 Versions

Code	Rated flow (L/min)	Display range	Pulse	Thread
01	5 … 500	3 … 525	5 L	Rc1/2 or G1/2
02	10 … 1000	8 … 1050	10 L	Rc1/2 or G1/2
03	20 … 2000	15 … 2100	20 L	G3/4
04	30 … 3000	25 … 3100	30 L	G1
05	60 … 6000	50 … 6100	60 L	G1-1/2

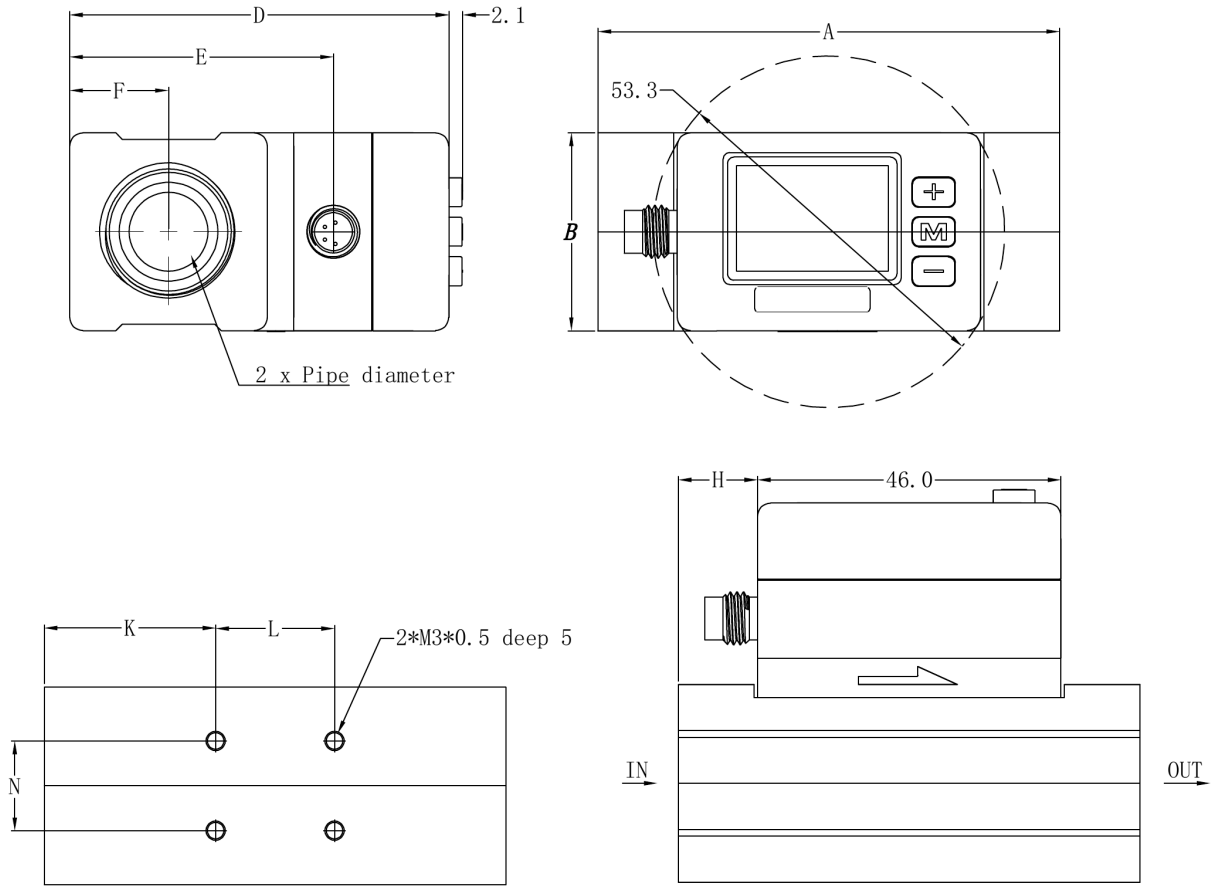
The pulse column is the cumulative pulse output in litres per pulse; in cubic feet 20, 40, 80, 120 and 240 ft³ per pulse.

3.4 Order code

Field	Code	Meaning
1 Series	QGKN	thermal gas flow sensor
2 Range	01 · 02 · 03 · 04 · 05	500 · 1000 · 2000 · 3000 · 6000 L/min
3 Output	S2	two switches / pulse frequency / IO-Link
	SA	one switch / pulse frequency / IO-Link + 4 … 20 mA
	SV	one switch / pulse frequency / IO-Link + 1 … 5 V
	RS	RS485
4 Thread	GK · RK	G internal thread · Rc internal thread
5 Bracket	– · T	none · fixed frame

Example: QGKN-01-S2-GK. The thread size is not part of the order code and has to be stated with the order.

4 Dimensions

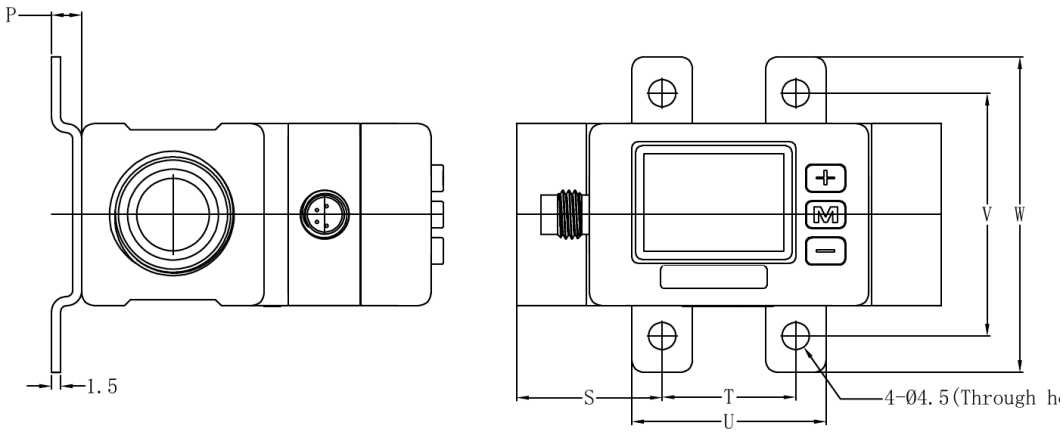


The letters are the columns of the table. Dimensions in mm.

Thread	A	B	D	E	F	H	K · L	N
Rc1/2	70	30	57.5	40	15	12	26 · 18	13.6
G1/2	76	30	57.5	40	15	12	26 · 18	13.6
G3/4	90	35	62.5	45	17.5	22	31 · 28	16.8
G1	110	45	73.5	56	22.5	32	25 · 60	30
G1-1/2	170	60	88.5	71	30	62	45 · 80	40

A overall length, B height of the body, D width over the head, E and F distances to the connection axis, H thread length, K and L mounting hole spacings, N distance between the two rows. The head is 46.0 mm deep and 2.1 mm proud of the body, the display diagonal 53.3 mm; mounting holes 2 × M3 × 0.5, 5 mm deep.

4.1 Fixed frame



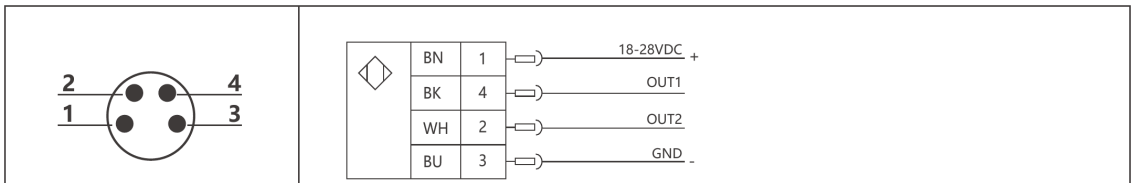
Fixed frame with the device fitted.

The fixed frame is the fifth field of the order code, one size per device (dimensions in mm): 24 / 22 / 32 / 40 / 50 for the two smallest, 30 / 30 / 42 / 48 / 58 for the G3/4, 27.5 / 55 / 70 / 60 / 71 for the G1 and 45 / 80 / 90 / 80 / 96 for the G1-1/2, each 1.5 mm thick with four Ø 4.5 through holes.

5 Installation

- Install the sensor so that the gas flows in the direction of the arrow on the body (IN → OUT).
- Fasten the sensor with the two M3 × 0.5 threaded holes (section 4) or with the fixed frame.
- Observe the working pressure 0 … 1.0 MPa and the medium temperature 0 … +50 °C.

6 Electrical connection



Left the four pins of the M8 plug, right the four cores with their pin numbers.

Core	Pin	S2 · two switches	SA · one switch + 4 … 20 mA	SV · one switch + 1 … 5 V	RS · RS485
BN	1	supply +	supply +	supply +	supply +
BU	3	supply –	supply –	supply –	supply –
BK	4	switch 1 (OUT1) · PNP by default, or NPN · original or linear frequency (100 Hz F.S.) · IO-Link	switch 1 (OUT1) · PNP or NPN · frequency · IO-Link	switch 1 (OUT1) · PNP or NPN · frequency · IO-Link	RS485 (A)
WH	2	switch 2 (OUT2) · PNP by default, or NPN	flow · 4 … 20 mA	flow · 1 … 5 V	RS485 (B)

Wire colours to IEC 60757: BN brown, BU blue, BK black, WH white. Supply 18 … 28 V DC. The connector is an M8 × 1 four-pin plug; moulded cables M84PC02G, M84PC05G, M84PC010G (2, 5, 10 m; 2 m is the factory configuration).

Important What the black and the white core carry depends on the output version. A cable made for one version fits another mechanically but not functionally.

7 Operation

7.1 Display and keys

Element	Function
Main display	instantaneous flow
Auxiliary display	cumulative flow (**V:** ... **m3**) and original frequency (**Freq:** ... **Hz**); switch to it with the + key
Key M	confirm; opens the menu and a value
Keys + and –	move between menu items; change a value

7.2 Switching function

When the flow rises above or falls below the set switching limits (SP, rP), the switching state of the output changes. The following switching functions can be selected:

Function	Description
Hysteresis, normally open / normally closed	First set the switch point SP, then the reset point rP. The difference between SP and rP is the hysteresis; if SP is changed again, the hysteresis changes with it.
Window, normally open / normally closed	SP is the upper limit value, rP the lower limit value. The width of the window is set by the difference between SP and rP.

OUT1 can also be set to pulse output (**F-Hz-OUT**) or to IO-Link (**IOLink**); OUT2 offers the switching functions only.

7.3 Menu navigation

- From the main display press M to open the level 1 menu.
- Move between the menu items; M opens the value, change it with – or +, M returns.
- At **Menu 2 Set** enter the level 2 menu, or return to the main display.
- After the last item of level 2 the device returns to the main display.
- **Factory Reset**: press and hold the key for 5 s (display **5S**) to restore the factory settings.

7.4 Level 1 menu

Display	Function	Factory setting
SP1 Set	switch 1 set value	20 % of full scale
RP1 Set	switch 1 reset value	SP1 – 0.5
SP2 Set	switch 2 set value	80 % of full scale
RP2 Set	switch 2 reset value	SP2 – 0.5
F-URV	flow range	–
Menu 2 Set	enter the level 2 menu	–

7.5 Level 2 menu

Display	Function	Factory setting
Factory Reset	restore the factory settings	–
OUT1 Set	OUT1 output mode: **F-H-NO** flow hysteresis normally open, **F-H-NC** hysteresis normally closed, **F-W-NO** window normally open, **F-W-NC** window normally closed, **F-Hz-OUT** flow pulse output, **IOLink**	**F-H-NO**
OUT2 Set	OUT2 output mode (S2): **F-H-NO**, **F-H-NC**, **F-W-NO**, **F-W-NC**	**F-H-NO**
ds1 Set	switch 1 output delay	0.0
dR1 Set	switch 1 reset delay	0.0
ds2 Set	switch 2 output delay	0.0
dR2 Set	switch 2 reset delay	0.0
0-ofst	zero offset	0.0
Flow-ofst	flow coefficient correction	–
Unit Set	unit	L/min

PNP/NPN Set	switch outputs PNP or NPN	PNP
F-L-data	historical minimum	–
F-H-data	historical maximum	–
F-PACE	filter damping	0.5
Low flow cut	low flow cut-off	–
d-P-set	decimal places	0.0
Digit colour	colour of the main value	–
BG colour	background colour	–

8 Serial interface (RS version)

The RS version has an RS485 interface (2-wire, half-duplex) and works as a MODBUS RTU slave that answers read and write requests from a master (PLC, host computer, DCS). The communication parameters are set at the device; changes are stored in the internal flash memory and are kept when the power fails.

8.1 Communication parameters

Parameter	Options / range	Factory setting
Protocol	MODBUS RTU (slave)	–
Baud rate (bit/s)	2400 · 4800 · 9600 · 14400 · 19200 · 28800 · 115200	9600
Data bits	8	8
Stop bits	1 · 1.5 · 2	1
Parity	none · odd · even	none
Device address	1 … 255 (broadcast address 0 is not supported)	1

Item	Description
Frame	address 1 byte · function code 1 byte · data N bytes · CRC 2 bytes
Timing	at least 3.5 character times between frames; at most 1.5 character times between the characters of a frame; the device answers a valid request within 100 ms; recommended polling interval ≥ 100 ms
CRC	standard MODBUS CRC-16, initial value 0xFFFF, low byte first

8.2 Function codes

Code	Function
0x03	read holding registers: start address 0x0000 … 0x0006, 1 … 7 registers; register data high byte first
0x06	write a single register: only register 0x0001 with value 0x0001 has an effect (clear the cumulative flow); writes to 0x0000 and 0x0002 … 0x0004 are acknowledged without effect

Exception responses: function code + 0x80 followed by the exception code - 01 invalid function code (not 03 or 06), 02 invalid data address (0x83 02 for reads outside 0x0000 … 0x0006, 0x86 02 for writes outside 0x0000 … 0x0004).

8.3 Registers

Register	MODBUS address	Type	Meaning
0x0000	40001	UINT16	instantaneous flow rate (filtered and linearised)
0x0001	40002	UINT16	cumulative flow, high 16 bits; write 0x0001 to clear
0x0002	40003	UINT16	cumulative flow, low 16 bits
0x0003 · 0x0004	40004 · 40005	UINT16	reserved, read as 0
0x0005	40006	UINT16	flow unit (read only): 0 = L/min, 1 = m³/h, 2 = mL/min
0x0006	40007	UINT16	decimal places (read only): 0 … 3

– Flow rate = register 0x0000 divided by 10^d, where d is the number of decimal places in register 0x0006; unit as register 0x0005. Example: 430 with d = 1 → 43.0.

– Cumulative flow (m³) = register 0x0001 × 65536 + register 0x0002; range 0 … 4 294 967 295 m³; kept in flash memory when the power fails.

– Unit and decimal places are changed only in the device menu.

8.4 Examples

Task	Request (hex)
read all 7 registers of the device with address 1	01 03 00 00 00 07 04 08
clear the cumulative flow	01 06 00 01 00 01 19 CA

The device answers the write command with the same frame. Example of a reading: register 0x0000 = 00 2B (43) with 0 decimal places → 43 L/min; registers 0x0001/0x0002 = 00 00 / 00 12 → cumulative flow 18 m³.

For a test with a MODBUS master program: 9600 Bd, 8 data bits, no parity, 1 stop bit, RTU mode; slave ID 1, function 03, start address 0, quantity 7, scan interval 100 ms.

9 Maintenance and removal

9.1 Maintenance and cleaning

The device does not require maintenance.

Warning Periodically check whether the device is working properly. If it does not work properly, stop the operation immediately.

Caution Use of an improper cleaning agent may damage the device.

The following cleaning agents can be used to clean polycarbonate:

– mild soap or detergent
– isopropyl alcohol

Immediately after cleaning, rinse with water. Do not leave cleaner on the surface of the product. Do not clean the product in high heat or in direct sunlight.

The following cleaning agents are known to affect the integrity of polycarbonate components and must not be used:

– ZEP Fast 505, Pinesol, Formula 409
– halogenated solvents (benzene, gasoline, acetone or carbon tetrachloride)
– strong alkalis
– methyl ethyl ketone
– abrasive substances

9.2 Removal

Danger Only remove the device when it is de-energised and depressurised (electrical, hydraulic/pneumatic). Disconnecting the device from pressure and power supply must be carried out by trained or instructed personnel in accordance with the state of the art.

Warning Be aware that the surface of the housing may become very hot at higher operating temperatures.