

## THERMAL GAS FLOW SENSOR



- THERMAL MASS · 2 ... 6000 L/MIN · RC1/2 ... G1-1/2
- COLOUR DISPLAY, REVERSIBLE 180° · TWO SWITCHES
- 1 ... 5 V · 4 ... 20 MA · RS485 · IP40

## KEY DATA

| Property           | Value                                        | Property            | Value                |
|--------------------|----------------------------------------------|---------------------|----------------------|
| Flow range         | 2 ... 2000 L/min, by size                    | Media               | Dry air · nitrogen   |
| Display accuracy   | ± 3 % F.S. ± 1 digit                         | Repeatability       | ± 1 % F.S. ± 1 digit |
| Working pressure   | 0 ... 1.0 MPa                                | Protection grade    | IP40                 |
| Output             | 2 switches + 1 ... 5 V, 4 ... 20 mA or RS485 | Supply voltage      | 12 ... 24 Vdc ± 10 % |
| Medium temperature | 0 ... +50 °C                                 | Ambient temperature | 0 ... +50 °C         |

A thermal mass meter: the sensor is heated and the gas stream carries heat away; how much it carries is the mass flow.



## MEASUREMENT

|                     |                                                                       |
|---------------------|-----------------------------------------------------------------------|
| Measuring principle | Thermal mass · heat carried away by the gas stream                    |
| Media               | Dry air, nitrogen (N <sub>2</sub> ) · non-corrosive and non-flammable |
| Direction           | Unidirectional                                                        |
| Rated flow          | 500 L/min 2 ... 500 · 1000 L/min 5 ... 1000 · 2000 L/min 10 ... 2000  |
| Display range       | 0 ... 525 · 0 ... 1050 · 0 ... 2100 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 · adjustable filter damping on the switch outputs            |

## MATERIALS AND PROCESS

|                     |                                                                                     |
|---------------------|-------------------------------------------------------------------------------------|
| Process connection  | Rc1/2 · G1/2 · Rc3/4 · G3/4 · G1 · R1 · G1-1/2, by size                             |
| Working pressure    | 0 ... 1.0 MPa                                                                       |
| Pressure resistance | 1.5 MPa                                                                             |
| Protection grade    | IP40                                                                                |
| Medium temperature  | 0 ... +50 °C · no dew and no ice                                                    |
| 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 Vdc between leads and plastic housing                                  |
| Withstand voltage   | 250 Vac for one minute between leads and plastic housing                            |
| Vibration           | 1.5 mm or 10 g, 10 ... 55 ... 10 Hz per minute, two hours in each of the three axes |
| Shock               | 100 m/s <sup>2</sup> (10 g), three times in each of the three axes                  |
| EMC                 | IEC 61000-6-2 and IEC 61000-6-4                                                     |
| Weight              | About 281.7 g for 500 and 1000 L/min · about 344 g for 2000 L/min, cable included   |

## ELECTRICAL PROPERTIES

|                |                                                                                                    |
|----------------|----------------------------------------------------------------------------------------------------|
| Supply voltage | 12 ... 24 Vdc ± 10 % · ripple ≤ 10 %                                                               |
| Consumption    | ≤ 50 mA                                                                                            |
| Switch outputs | Two open collectors, NPN or PNP · 125 mA maximum · internal drop ≤ 1.5 V · short-circuit protected |
| Switch modes   | Differential, window, cumulative flow, cumulative flow pulse                                       |
| Pulse          | Range / 6000 litres per pulse, or a set coefficient                                                |
| Voltage output | 1 ... 5 V · output impedance 1 kΩ                                                                  |
| Current output | 4 ... 20 mA · load ≤ 300 Ω                                                                         |
| External input | No-voltage contact · ≤ 0.4 V · ≥ 30 ms                                                             |
| Communication  | RS485                                                                                              |
| Cable          | Ø 4 mm oil-resistant PVC · 26 AWG (0.15 mm <sup>2</sup> ) · six cores                              |

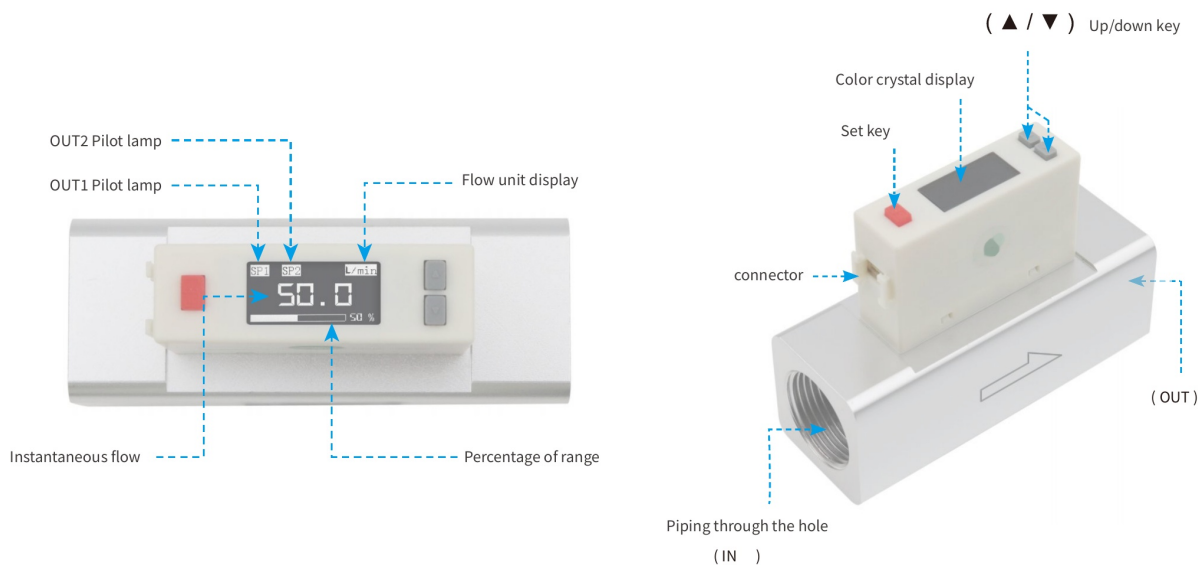
## DISPLAY

|                    |                                                                                 |
|--------------------|---------------------------------------------------------------------------------|
| Display            | Colour LCD · can be turned by 180°                                              |
| Shown              | Instantaneous flow, totalized flow, percentage of range, unit, two switch lamps |
| Instantaneous unit | 1 L/min or 0.1 ft <sup>3</sup> /min                                             |
| Totalized range    | 99 999 999 L                                                                    |
| Totalized unit     | 1 L or 1 ft <sup>3</sup>                                                        |
| Keys               | Set key and up/down key                                                         |

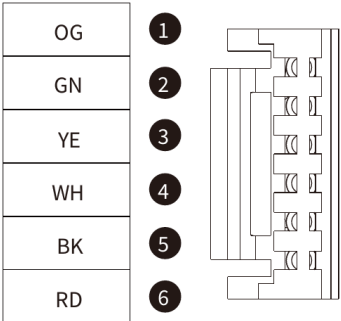
- (1) Measured with 600 kPa at the inlet, one atmosphere at the outlet and 25 °C.
- (2) Measured with one atmosphere at the outlet and 25 °C.
- (3) Measured over 0 ... 1.0 MPa with one atmosphere at the outlet and 25 °C.



PANEL AND WIRING



The controls: set key, up and down key, the colour display with instantaneous flow, unit, percentage of range and the two switch lamps, the connector and the flow direction.



The six cores and their pin numbers. What each core carries depends on the output version — see the table below.

Wire colours to IEC 60757: RD red, OG orange, BK black, WH white, YE yellow, GN green. The SR version moves the two switches from the black and white cores to the yellow and green ones, because black and white carry the RS485 pair — a cable made for one version therefore does not fit another.



## WIRING

| Core | Pin | SV · two switches + 1 ... 5 V                  | SA · two switches + 4 ... 20 mA                | SR · two switches + RS485                      |
|------|-----|------------------------------------------------|------------------------------------------------|------------------------------------------------|
| RD   | 6   | Supply +                                       | Supply +                                       | Supply +                                       |
| OG   | 1   | Supply –                                       | Supply –                                       | Supply –                                       |
| BK   | 5   | SP1 switch · PNP by default,<br>NPN on request | SP1 switch · PNP by default,<br>NPN on request | RS485 (A)                                      |
| WH   | 4   | SP2 switch · PNP by default,<br>NPN on request | SP2 switch · PNP by default,<br>NPN on request | RS485 (B)                                      |
| YE   | 3   | Not used                                       | Not used                                       | SP1 switch · PNP by default,<br>NPN on request |
| GN   | 2   | Analogue 1 ... 5 V                             | Analogue 4 ... 20 mA                           | SP2 switch · PNP by default,<br>NPN on request |

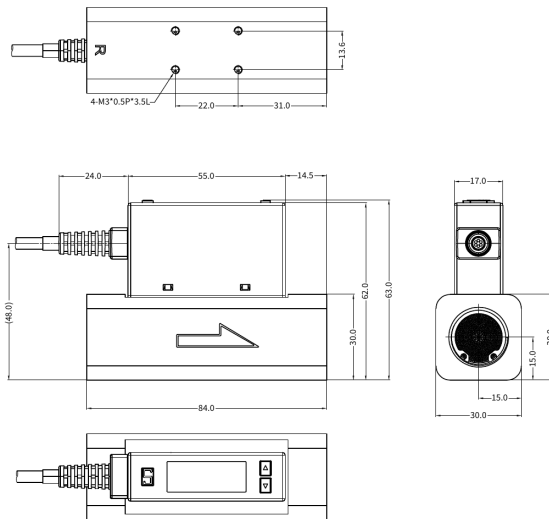
## VERSIONS

| Code | Rated flow (L/min) | Display range | Connection    | Bracket |
|------|--------------------|---------------|---------------|---------|
| 01   | 2 ... 500          | 0 ... 525     | Rc1/2 or G1/2 | BT-27   |
| 02   | 5 ... 1000         | 0 ... 1050    | Rc1/2 or G1/2 | BT-27   |
| 03   | 10 ... 2000        | 0 ... 2100    | Rc3/4 or G3/4 | BT-28   |

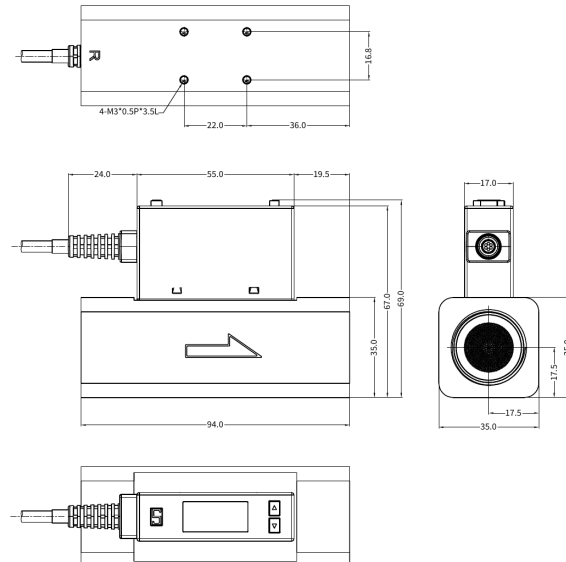


## DIMENSIONS (mm)

■ Joint aperture : Rc1/2, G1/2



■ Joint aperture : Rc3/4, G3/4



The two small versions: left Rc1/2 and G1/2, right Rc3/4 and G3/4.

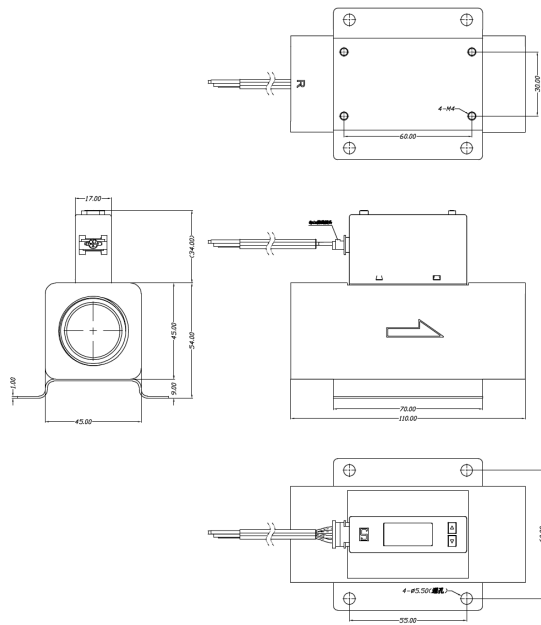
The length is measured over the connections, the width and the height over the body with the head, and the axis height from the base to the centre of the bore.

## OVERALL DIMENSIONS (mm)

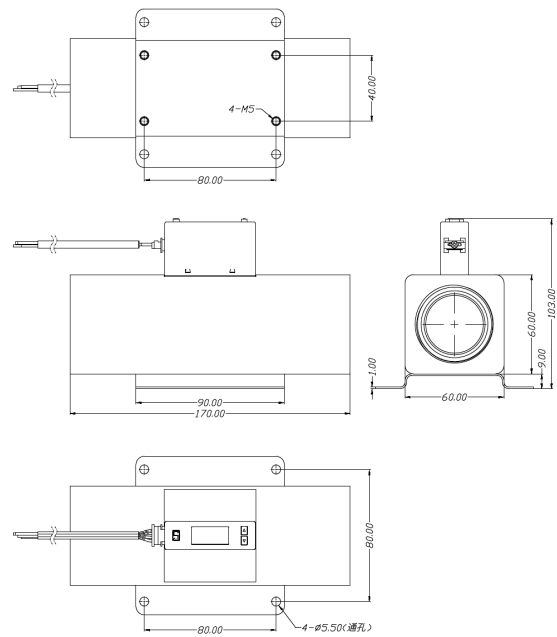
| Version                           | Length | Width | Height | Head width | Axis height | Mounting               |
|-----------------------------------|--------|-------|--------|------------|-------------|------------------------|
| Rc1/2 · G1/2 · 500 and 1000 L/min | 84.0   | 30.0  | 63.0   | 17.0       | 15.0        | 4 × M3 × 0.5, 3.5 deep |
| Rc3/4 · G3/4 · 2000 L/min         | 94.0   | 35.0  | 69.0   | 17.0       | 17.5        | 4 × M3 × 0.5, 3.5 deep |



■ 3000L/min



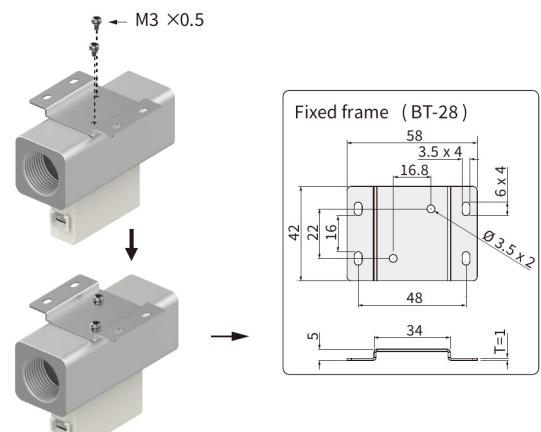
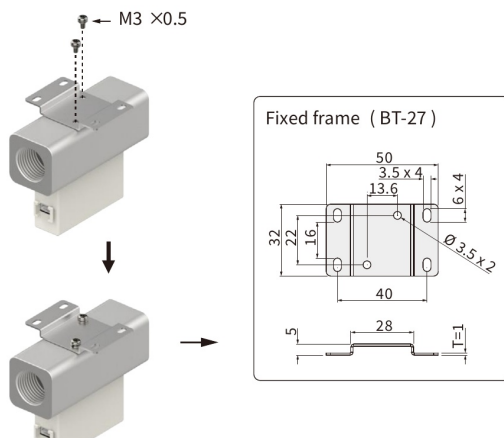
■ 6000L/min



The two large versions: left 3000 L/min, right 6000 L/min.

■ Fixed frame BT-27 (flow range  $\leq 1000$ L/min)

■ Fixed frame BT-28 (flow range  $\leq 2000$ L/min)



The two brackets, BT-27 up to 1000 L/min and BT-28 up to 2000 L/min, with their dimensions.



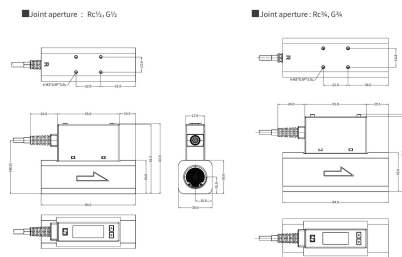
## COMPLIANCE AND CERTIFICATION

|                     |                                                                                                                                                 |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Protection grade    | IP40                                                                                                                                            |
| EMC                 | IEC 61000-6-2 and IEC 61000-6-4                                                                                                                 |
| Measuring principle | Thermal mass                                                                                                                                    |
| Accuracy            | $\pm 3\%$ F.S. $\pm 1$ digit on the display, $\pm 5\%$ F.S. on the analogue output, with the reference conditions stated — see notes (1) to (3) |
| Repeatability       | $\pm 1\%$ F.S. $\pm 1$ digit                                                                                                                    |
| Pressure rating     | 1.0 MPa working, 1.5 MPa resistance                                                                                                             |

## ORDER CODE

### Accessories

- The mounting bracket is the fifth field of the order code: BT-27 up to 1000 L/min, BT-28 up to 2000, BT-29 up to 3000 and BT-30 up to 6000. The BT-27 measures 50 × 32 mm with a 40 mm hole spacing, the BT-28 58 × 42 mm with 48 mm, both 1 mm thick and fastened with two M3 × 0.5 screws. The meter comes with two metres of six-core cable moulded on.



Bracket  
BT-27 ... BT-30

Cable  
2 m, six cores

Example: QGKE-01-SV-R12K. The fourth and the fifth field are bound to the second: the connection and the bracket follow the flow range. The bracket is the fifth field and optional.



## ORDER CODE

| Field        | Code          | Meaning                             |
|--------------|---------------|-------------------------------------|
| 1 Series     | QGKE          | QGKE thermal gas flow sensor        |
| 2 Range      | 01 · 02 · 03  | 500 · 1000 · 2000 L/min             |
|              | 04 · 05       | 3000 · 6000 L/min                   |
| 3 Output     | SV            | Two switches + analogue 1 ... 5 V   |
|              | SA            | Two switches + analogue 4 ... 20 mA |
|              | SR            | Two switches + RS485                |
| 4 Connection | R12K · G12K   | Rc1/2 · G1/2 — up to 1000 L/min     |
|              | R34K · G34K   | Rc3/4 · G3/4 — up to 2000 L/min     |
|              | R1K · G1K     | R1 · G1 — up to 3000 L/min          |
|              | G112K         | G1-1/2 — up to 6000 L/min           |
| 5 Bracket    | —             | None                                |
|              | BT-27 · BT-28 | For up to 1000 · up to 2000 L/min   |
|              | BT-29 · BT-30 | For up to 3000 · up to 6000 L/min   |

