



Vortex flow sensor

Flow sensor for liquid media Type 240

The flow sensor Type 240 is based on the VORTEX principle and provides reliable measurement results of liquids with different specific viscosities – from cryogenic protection agents to drinking water. It operates without moving parts, which ensures a long service life and high accuracy.

It is ideal for precise and stable flow measurements even under difficult conditions. Thanks to its robust construction, it is insensitive to contamination and can also be used at high pressures or temperatures. At the same time, it has very good accuracy.

Starting from small diameters for precise measurements in DN 6 pipelines and extending to larger diameters in industrial processes, it covers a wide spectrum.

The compact design allows mounting directly on the manifold, which guarantees optimal use of space.



Flow range

0.5 ... 150 l/min

Nominal widths

DN 6 / 8 / 10 / 15 / 20 / 25

Temperature range

-40 ... +125 °C

- + Wear-free and long-term stable sensor design
- + Robust design for system pressure up to 16 bar
- + Up to 100 bar (high pressure shock wave)
- + Media temperature measurement (optional)
- + Media resistant sensor design
- + Drinking water approval *
- + UL 61010-1 *

* Expected authorisation Q4/2024

Product features

Sensor type	Flow sensor, optionally with temperature measurement
Measuring principle flow rate	Vortex
Measuring principle temperature	Resistance (Pt1000)
Measuring range flow rate	0.5 ... 150 l/min
Measuring range temperature	-40 ... +125 °C
Nominal widths	DN 6 / 8 / 10 / 15 / 20 / 25
Accuracy <50 % full scale (water)	±1 % Measuring range full scale
Accuracy >50 % full scale (water)	±2 % Measuring value
Repeatability	±0.5 %

Range of application

Applications	Industrial applications, heating circuits, ...
Media	Drinking water, heating water Water-glycol mixtures Other media on request
Media temperature (non-freezing / non-boiling)	-15 ... +125 °C
Recommended minimum system pressure	1 bar
Maximum test pressure at 90 °C (Media temperature)	16 bar
Maximum pressure impact strength at 90 °C ¹⁾ (Media temperature)	100 bar

Electrical data

Electrical connection	4-pole round plug M12x1 with A-coding
Supply voltage	8 ... 33VDC
Output signal flow rate	4 ... 20 mA
Measuring principle temperature	Resistance (Pt1000)
Signal limitation	20.5 mA
Load / burden against GND or IN	$< (U_{IN} - 8V) / 20 \text{ mA}$
Electrical protection	Reverse polarity protection: all against all Short-circuit protection: OUT against GND
Protection class	III
Power consumption	< 21 mA

Environmental conditions

Ambient temperature	-15 ... +85 °C
Storage temperature	-40 ... +85 °C
Protection class	IP65

Temperature measurement

Measuring principle temperature	Resistance (Pt1000)
Measuring range temperature	-40 ... +125 °C
Accuracy Pt1000 (ΔT referred to 0 °C)	$\pm 0.3K \pm 0.005 - \Delta T$ (class B DIN EN 60751)

¹⁾ Test conditions: Test medium water, 20 high pressure shock waves at 100 bar, media temp. 90 °C, rising flank $t_{10,90} = 1 \text{ ms}$, falling flank $t_{10,90} = 1 \text{ ms}$

Materials in contact with media

Sensor paddle	PPSU
Housing	PPS (40 % glass fibre)
Sealing material	EPDM (perox.) FKM

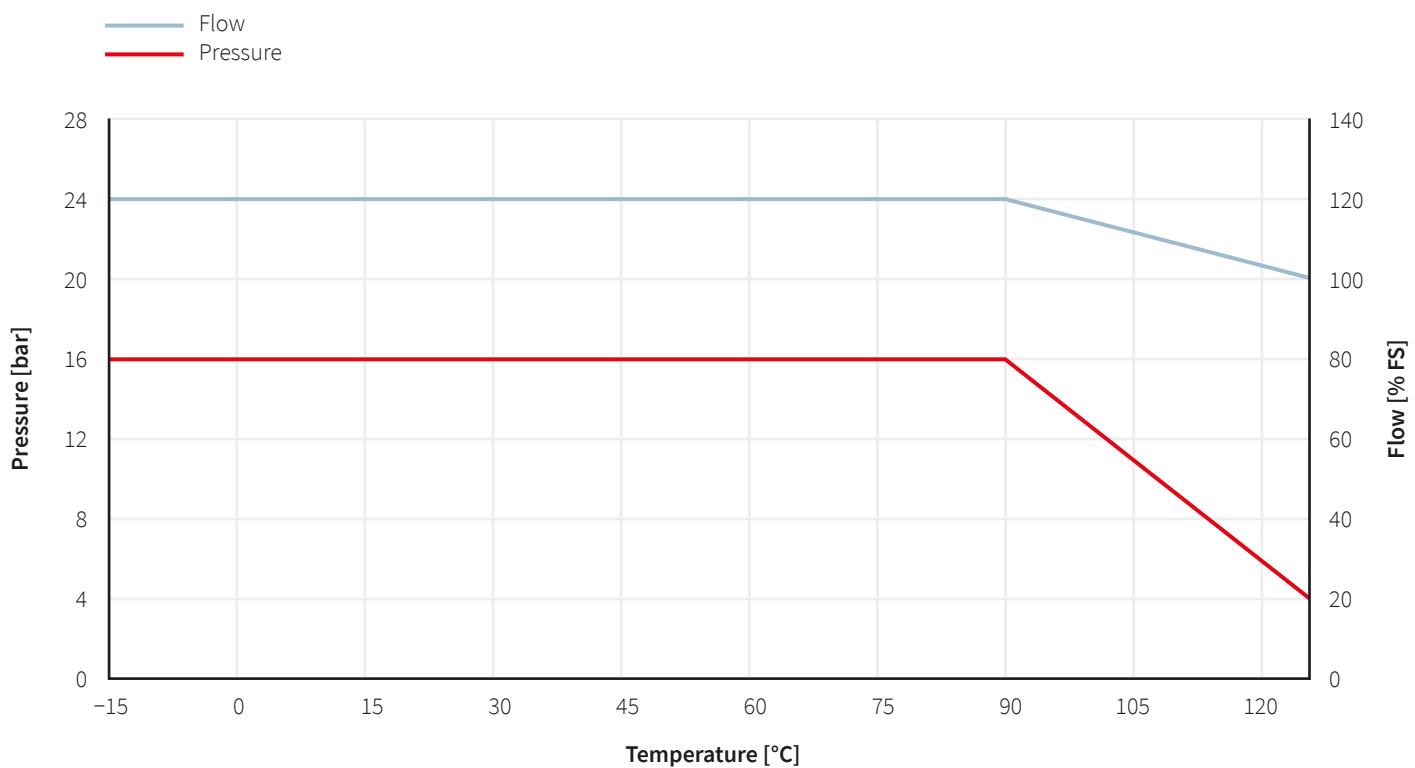
Admissions

Electromagnetic compatibility	CE-conform according to EN 61326-2-3 UKCA
Drinking water	WRAS ²⁾ ACS ²⁾ UBA ²⁾
UL	UL 61010-1 ²⁾

Packaging

DN	Packaging single	Packaging multiple
6 / 8 / 10	Individually in cardboard box	Blister tray 30x
15 / 20	Individually in cardboard box	Blister tray 20x
25	Individually in cardboard box	Blister tray 12x

Operating conditions



²⁾ Expected authorisation Q4/2024

Nominal diameter dependent on variant

DN	Measuring range [l/min]	Flow velocity [m/s]	Pressure losses [Pa]
6	0.5 ... 10	0.2 ... 6.9	$230 \cdot Q^2$
8	0.9 ... 15	0.3 ... 6.9	$80 \cdot Q^2$
10	1.8 ... 32	0.4 ... 7.3	$11.3 \cdot Q^2$
15	3.5 ... 50	0.3 ... 7.0	$7.9 \cdot Q^2$
20	5.0 ... 85	0.3 ... 7.2	$2.9 \cdot Q^2$
25	9.0 ... 150	0.3 ... 8.1	$0.95 \cdot Q^2$

Legend

Q Volume flow [l/min]

Flow calculation

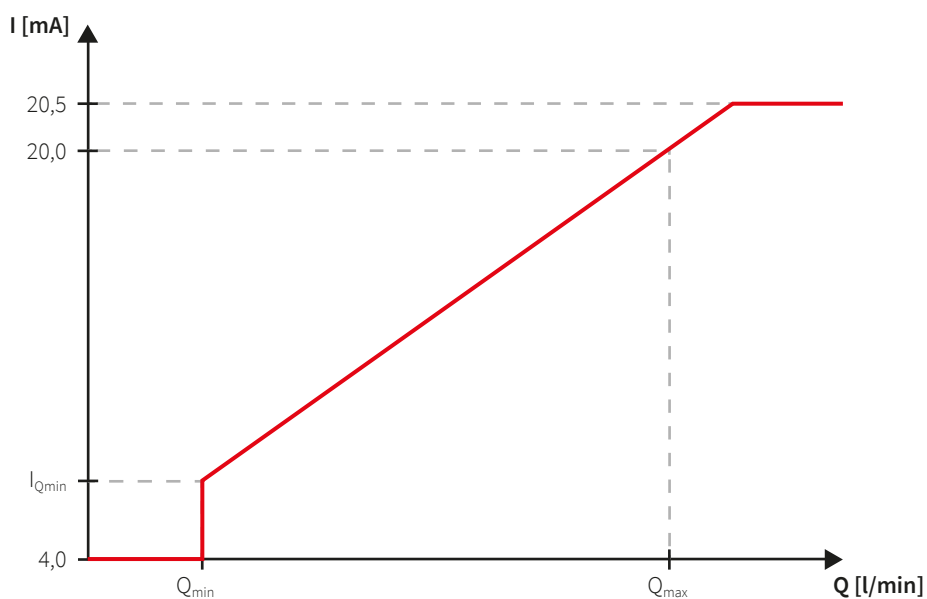
DN	Measuring range [l/min]	K_i [l/(mA · min)]	I_{Qmin}
6	0.5 ... 10	0.625	4.80
8	0.9 ... 15	0.938	4.96
10	1.8 ... 32	2.000	4.90
15	3.5 ... 50	3.125	5.12
20	5.0 ... 85	5.313	4.95
25	9.0 ... 150	9.375	4.96

Legend

Q_v Volume flow [l/min]

K_i Coefficient current output [(l/min)/mA]

I_{out} Current [mA]

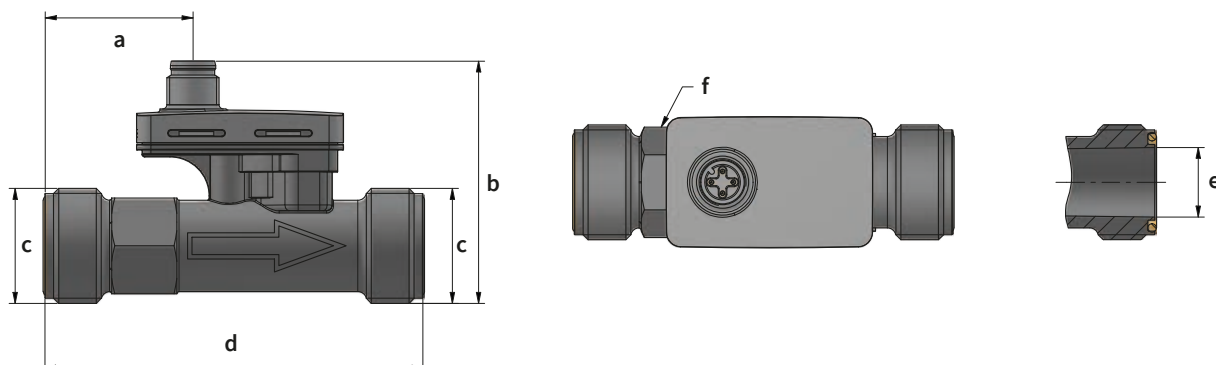


**Characteristic curve formula
for $Q_{max} \geq Q \geq Q_{min}$ [l/min]**

$$Q_v = K_i \cdot (I_{out} - 4 \text{ mA})$$

Dimensions

DN	Thread size	a [mm]	b [mm]	c	d [mm]	e [mm]	f [SW]	Weight [g]
6	K	27.4	52.7	G 1/2	77	11.5	12	48
8	K	27.4	52.6	G 1/2	77	11.5	12	47
10	G	34.2	53.7	G 3/4	90	16	15	60
15	K	34.1	55.7	G 3/4	87	16	22	59
20	K	52.1	61.1	G 1	105	20	27	80
25	K	53.7	68	G 1 1/4	120	26	34	113



Installation instructions

The following instructions must be observed for correct functioning of the sensor:

- Ensure that the internal diameter of the connection tubes on the sensor is never smaller than the internal diameter of the measuring tube
- Avoid repeated elbows in the same level at entry-side



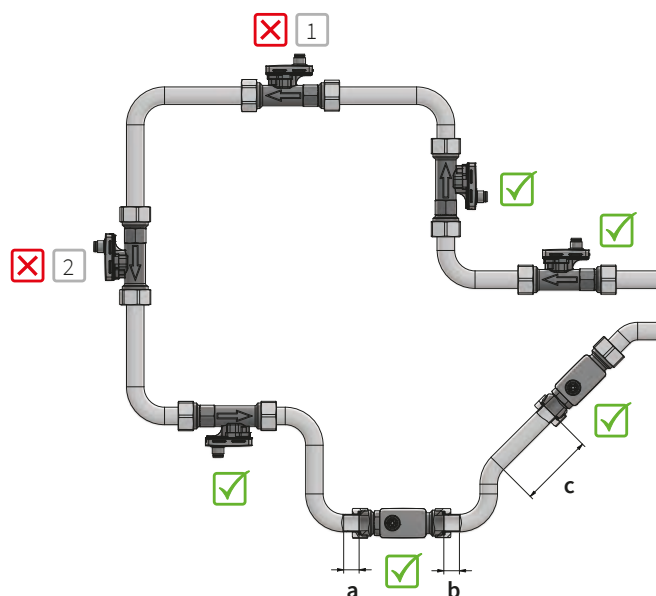
- Any air bubbles can escape upwards
- Low risk of dirt deposits



- Any air bubbles can accumulate (as highest point of the system)
- Danger of idling (measuring tube only part. filled)

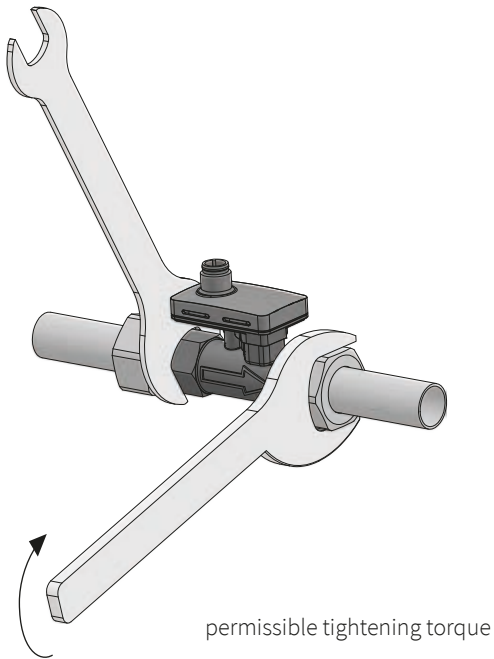


- Possible rising of air bubbles from below
- Danger of idling



The following minimum distances must be maintained:

a	b	c
$\geq 1 \cdot \text{DN}$ for recommended elbow with $\geq \text{R}1,8 \cdot \text{DN}$	$\geq 1 \cdot \text{DN}$	$\geq 5 \cdot \text{DN}$ for alternative elbows

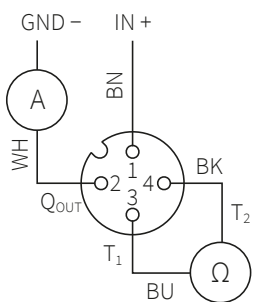


The table shows the min. and max. permissible tightening torques in Nm per nominal size:

DN	Thread size	Thread	Minimum tightening torque M_{\min} [Nm]	Maximum tightening torque M_{\max} [Nm]
6	K	G 1/2	1	12
8	K	G 1/2	1	12
10	G	G 3/4	1	12
15	K	G 3/4	1	12
20	K	G 1	2	12
25	K	G 1 1/4	2.5	15

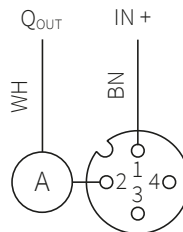
Electrical connections

Connector M12x1 with temperature measurement Pt1000



BN = brown
 WH = white
 BK = black
 BU = blue

Connector M12x1



BN = brown
 WH = white

Order code selection table

			Article number 240.	X	X	X	X	X	X	X
Versions	Flow and temperature	Pt1000 according to DIN EN 60751. class B	8							
	Flow rate		9							
Nominal diameter and flow range	DN 6	0.5 ... 10 l/min		0	6					K
	DN 8	0.9 ... 15 l/min		0	8					K
	DN 10	1.8 ... 32 l/min		1	0					G
	DN 15	3.5 ... 50 l/min		1	5					K
	DN 20	5.0 ... 85 l/min		2	0					K
	DN 25	9.0 ... 150 l/min		2	5					K
Power supply / output	8 ... 33 VDC	Analogue output 4 ... 20 mA					4			
Electrical connection	4-pole round plug	M12x1 (protection class IP 65) with condensation protection (temperature)						6		
Sealing material	EPDM	O-rings mounted								1
	FKM	O-rings mounted								2
	EPDM	O-rings enclosed separately (only with multipack)								3
	FKM	O-rings enclosed separately (only with multipack)								4
	EPDM	no O-rings supplied								5
	FKM	no O-rings supplied								6
Tube connection housing	PPS-GF40	External thread small (DN 6 / 8 → G 1/2, DN 15 → G 3/4, DN 20 → G 1, DN 25 → G 1 1/4)								K
		External thread large (DN 10 → G 3/4)								G

Accessories

				Order no.
Straight-wire box for connector M12x1 with cable	5-pole	200 cm	(Temperature)	114564
Corner-wire box for connector M12x1 with cable	5-pole	200 cm	(Temperature)	114563
Straight-wire box for connector M12x1 screwing terminal				115024

The accessories are packed separately.

Influence of viscosity

With the following specifications, the influence of media with higher viscosity than water (= media viscosity > 1.8 cSt) is largely corrected, so that a measuring accuracy of 3 % FS (fullscale) in the range of 1.8 - 4 cSt, and of 4 % FS in the range of 4 - 14 cSt is achieved (ν = kinematic viscosity in cSt).

DN	Formula response threshold Q_{min} [l/min]	Formula characteristic curve for $Q \geq Q_{min}$ [l/min]
6	$Q_{min} = 0.5 + (\nu - 1)$	$Q = 0.625 \cdot (I - 4 \text{ mA}) - 0.1\nu + 0.1$
8	$Q_{min} = 0.9 + (\nu - 1)$	$Q = 0.938 \cdot (I - 4 \text{ mA}) - 0.2\nu + 0.2$
10	$Q_{min} = 1.8 + (\nu - 1)$	$Q = 2.000 \cdot (I - 4 \text{ mA}) - 0.7\nu + 0.7$
15	$Q_{min} = 3.5 + (\nu - 1)$	$Q = 3.125 \cdot (I - 4 \text{ mA}) - 0.6\nu + 0.6$
20	$Q_{min} = 5.0 + (\nu - 1)$	$Q = 5.313 \cdot (I - 4 \text{ mA}) - 0.6\nu + 0.6$
25	$Q_{min} = 9.0 + (\nu - 1)$	$Q = 9.375 \cdot (I - 4 \text{ mA}) - 0.8\nu + 0.8$

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