

OEM Flow sensor for liquid media type 200

Flow range

0.5 ... 150 l/min

Nominal diameters

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

Temperature measurement

-40 ... +125 °C



The flow sensor type 200 is based on the Kármán vortex trail. Vortex trail principle and is available in various options with and without temperature measurement. With no moving parts the flow sensor is not sensitive to debris, has marginal pressure loss and high accuracy.

- Low cost product with high levels of accuracy
- Temperature non-sensitive measuring principle
- Excellent media resistance (measuring element not in contact with the media)
- Wide application temperature range
- Marginal loss of pressure
- Measuring element not sensitive to debris
- Direct temperature measurement in the medium with PT1000 or NTC
- Drinking water approval KTW, W270, WRAS

Technical overview

Flow measurement

Measuring principle		Vortex	Piezoelectric sensor element
Measuring range			0.5 ... 150 l/min
Nominal diameters			DN 6 / 8 / 10 / 15 / 20 / 25
Accuracy at < 50% fs (water)			< 1% fs
Accuracy at > 50% fs (water)			< 2% measuring value
Response time	Immediately Therefore suitable for spigot use.	Signal delay	< 100 ms
		Response time	< 5 ms

Temperature measurement (≥ DN 8)

Measuring principle	Resistance		PT1000 NTC	
PT1000	Measuring range		-40 ... +125 °C	
	Accuracy	Class B DIN EN 60751	@ T = 0 °C @ T ≠ 0 °C	
	Measuring range		± 0.3 K ± 0.3 K ± 0.005 * T -40 ... +125 °C	
NTC	Accuracy	NTC 10 kOhm @ 25 °C β = 4050	@ T = +25 °C	± 0.7 K
			@ T < +25 °C	± 0.7 K ± 0.025 * T
			@ T > +25 °C	± 0.7 K ± 0.050 * T
Temperature influences		Self-heating at temperature sensor Conduction resistance to connector	1 K/mW 0.8 Ohm	

Operating conditions

Medium	Suitable for heating circuit water with the usual additives Drinking water		Other medium on request
Temperature		Media	< +125 °C
		Ambient	-15 ... +85 °C
		Storage	-30 ... +85 °C
Max pressure and medium temperature		(for lifetime)	12 bar at +40 °C
		(for lifetime)	6 bar at +100 °C
		(for 600 hours)	4 bar at +125 °C
		(for 2 hours)	4 bar at +140 °C
Cavitation	The following equation is valid to prevent cavitation:	(max. test pressure)	18 bar at +40 °C
			$P_{abs, outlet} / P_{difference} > 5.5$

Materials in contact with medium (FDA-conform)

Sensor paddle		ETFE
Case with damming body		PA6T/6I (40% GF)
Sealing material		EPDM (perox.)

Electrical overview

Power supply		U_{IN}	5 VDC ±5%
Output flow (Q)	Frequency Square pulse signal	$U_{OUT, Q, Frequency}$	< 0.1 ... > 4.75 V
Output temperature (T)	Resistant signal	$R_{OUT, PT1000}$	PT1000 class B DIN EN 60751
		$R_{OUT, NTC}$	NTC 10 kOhm @ 25 °C; β = 4050
Electrical connection and protection class	Connector RAST 2.5 / 2.54		IP 20
	Connector M12x1		IP 65
Load against GND or IN			> 10 kOhm / < 10 nF
Current consumption I_{IN} load free		Version OEM	< 6 mA
		Version standard	< 10 mA

Weight

DN 6 / 8		~ 47 g
DN 10		~ 57 g
DN 15		~ 68 g
DN 20		~ 92 g
DN 25		~ 100 g

Test / Admissions

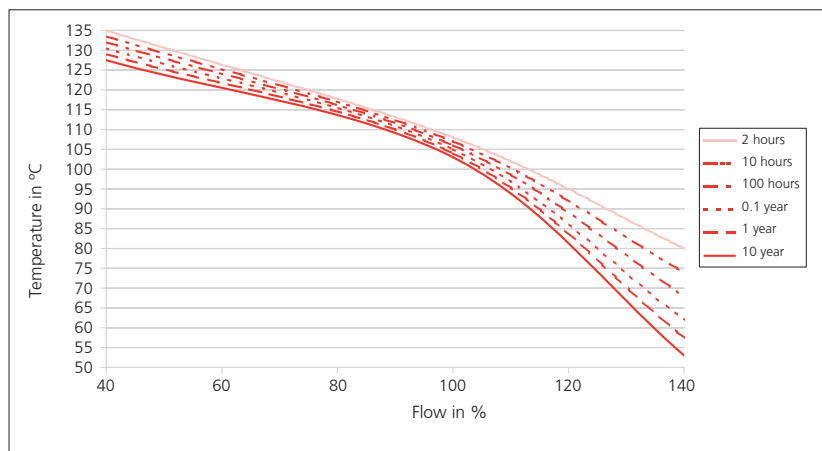
Drinking water approval		KTW / W270 / WRAS
Electromagnetic compatibility		acc. to EN 61326-2-3 (no protection at surge)

Packaging (multiple packaging)	Connection copper tube	Outside thread K	Outside thread G
DN 6	–	Blister 30x	Blister 30x
DN 8 / 10	Blister 30x	Blister 30x	Blister 30x
DN 15	Blister 30x	Blister 30x	Blister 20x
DN 20	Blister 20x	Blister 20x	Blister 15x
DN25	–	Blister 15x	Blister 15x

Nominal diameters dependent variables

Nominal diameters	Connection	Measuring range	Quantity per puls	Flow rate	Characteristic line frequency output	Frequency range	Pressure drop ^{1), 2)}
DN 6	Outside thread small	0.5 ... 10 l/min	0.386 ml	0.074 ... 1.474 m/s	0.0238 * f - 0.14	27 ... 426 Hz	240 * Q ²
	Outside thread heavy						
DN 8	Outside thread small	0.9 ... 15 l/min	0.638 ml	0.133 ... 2.210 m/s	0.0398 * f - 0.3	30 ... 384 Hz	85.00 * Q ²
	Outside thread heavy		0.631 ml		0.0394 * f - 0.3	30 ... 388 Hz	
	Connection copper tube		0.614 ml		0.0383 * f - 0.3	31 ... 399 Hz	
DN 10	Outside thread small	1.8 ... 32 l/min	1.399 ml	0.265 ... 4.716 m/s	0.0850 * f - 0.2	24 ... 379 Hz	22.50 * Q ²
	Outside thread heavy		1.370 ml		0.0832 * f - 0.2	24 ... 387 Hz	
	Connection copper tube		1.384 ml		0.0841 * f - 0.2	24 ... 383 Hz	
DN 10	Outside thread small	2.0 ... 40 l/min	1.403 ml	0.295 ... 5.895 m/s	0.0850 * f - 0.2	26 ... 473 Hz	22.50 * Q ²
	Outside thread heavy		1.373 ml		0.0832 * f - 0.2	26 ... 483 Hz	
	Connection copper tube		1.388 ml		0.0841 * f - 0.2	26 ... 478 Hz	
DN 15	Outside thread small	3.5 ... 50 l/min	3.047 ml	0.290 ... 4.145 m/s	0.1843 * f - 0.2	20 ... 272 Hz	6.70 * Q ²
	Outside thread heavy		3.016 ml		0.1824 * f - 0.2	20 ... 275 Hz	
	Connection copper tube		3.077 ml		0.1861 * f - 0.2	20 ... 270 Hz	
DN 20	Outside thread small	5.0 ... 85 l/min	6.213 ml	0.265 ... 4.509 m/s	0.3754 * f - 0.3	14 ... 227 Hz	2.50 * Q ²
	Outside thread heavy		6.125 ml		0.3701 * f - 0.3	14 ... 230 Hz	
	Connection copper tube		6.208 ml		0.3751 * f - 0.3	14 ... 227 Hz	
DN 25	Outside thread small	9.0 ... 150 l/min	12.412 ml	0.283 ... 4.709 m/s	0.7467 * f - 0.2	12 ... 201 Hz	0.92 * Q ²
	Outside thread heavy		12.251 ml		0.7370 * f - 0.2	12 ... 204 Hz	

Minimum life span on high flow rate and high temperature



¹⁾ incl. 3xDi inlet and outlet side

²⁾ Pv in Pa; Q in l/min

Order code selection table				200.	X	X	X	X	X	X	X	
Version	Flow			9								
	Flow and temperature (PT1000)			8				1				
	Flow and temperature (NTC)			7				1				
Nominal diameters / flow range	DN 6	0.5 ... 10 l/min.		9	0	6	1				K,G	
	DN 8	0.9 ... 15 l/min.			0	8	1					
	DN 10	1.8 ... 32 l/min.			1	0						
	DN 10	2.0 ... 40 l/min.			1	1						
	DN 15	3.5 ... 50 l/min.			1	5						
	DN 20	5.0 ... 85 l/min.			2	0						
	DN 25	9.0 ... 150 l/min.			2	5					K,G	
Output / power supply	Frequency output, 0 ... 5 VDC (Square pulse signal)		5 VDC	OEM	9			0				
	Frequency output, 0 ... 5 VDC (Square pulse signal)		5 VDC	Standard				1				
Electrical connection	3-pole connector RAST 2.5				9				0			
	2x3-pole connector RAST 2.5				7,8			1	1			
	3-pole connector RAST 2.5 (condensation protection)				9				2			
	2x3-pole connector RAST 2.5 (condensation protection)				7,8			1	3			
	3-pole circular connector M12x1 (condensation protection)				9			1	4			
	5-pole circular connector M12x1 (condensation protection)				7,8			1	5			
Sealing material	EPDM	Ethylene propylene rubber (peroxidically cross-linked)								1		
Tube connection	Plastic PA6T/6I connection copper tube (max. DN 20)										N	
	Plastic PA6T/6I outside thread K (see dimension diagram)											K
	Plastic PA6T / 6I outside thread G (see dimension diagram)											G

Accessories ¹⁾

				Order number	
Connection kit ²⁾ DN 8, 10 with copper tube				113775	
Connection kit ²⁾ DN 8, 10 with adapter Rp 3/8			Stainless steel 1.4305/AISI 303	113776	
Connection kit ²⁾ DN 15 with copper tube				113777	
Connection kit ²⁾ DN 15 with adapter Rp 1/2			Stainless steel 1.4305/AISI 303	113778	
Connection kit ²⁾ DN 20 with copper tube				113779	
Connection kit ²⁾ DN 20 with adapter Rp 3/4			Stainless steel 1.4305/AISI 303	113780	
Connector RAST 2.5 with cable		3-pole	30 cm	111668	
Connector RAST 2.5 with cable		3-pole	110 cm	101817	
Straight-wire box for connector M12x1 with cable		3-pole	200 cm	114605	
Corner-wire box for connector M12x1 with cable		3-pole	200 cm	114604	
Connector RAST 2.54 with cable		2x3 pole	110 cm (with temperature)	114629	
Straight-wire box for connector M12x1 with cable		5-pole	200 cm (with temperature)	114564	
Corner-wire box for connector M12x1 with cable		5-pole	200 cm (with temperature)	114563	
Straight-wire box for connector M12x1 screwing terminal		5-pole		115024	
Clip for DN 8,10				112116	
Clip for DN 15				110941	
Clip for DN 20				112122	
O-Ring for DN 8, DN 10		EPDM	ø 13.95 x 2.62	Copper tube and adapter	112124
O-Ring for DN 15		EPDM	ø 17.86 x 2.62	Copper tube and adapter	112265
O-Ring for DN 20		EPDM	ø 21.89 x 2.62	Copper tube and adapter	112723
O-Ring for DN 25		EPDM	ø 31 x 3	(as a replacement, already assembled)	112792
Connection copper tube for DN 8, 10		L=150 mm		112121	
Connection copper tube for DN 15		L=150 mm		112211	
Connection copper tube for DN 20		L=150 mm		112306	
Adapter for DN 8 und DN 10		Rp 3/8	Stainless steel 1.4305/AISI 303	112655	
Adapter for DN 15		Rp 1/2	Stainless steel 1.4305/AISI 303	112660	
Adapter for DN 20		Rp 3/4	Stainless steel 1.4305/AISI 303	112661	

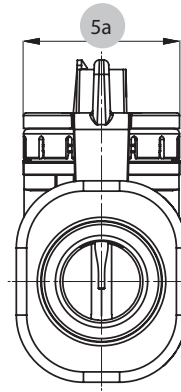
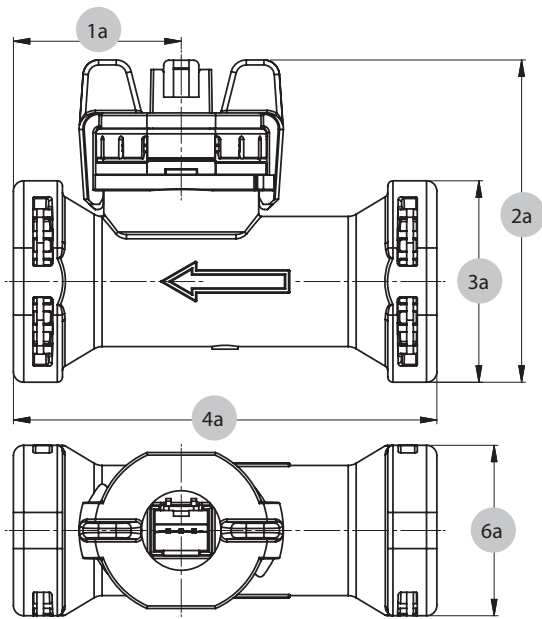
AMP connector ³⁾	Manufacturers order number	Colour	for flexible wire
	3-829868-3	grey	7 x 0.20 mm = 0.22 mm ² 12 x 0.20 mm = 0.35 mm ²
	1-966194-3	beige	7 x 0.25 mm = 0.35 mm ²

¹⁾ Accessories supplied loose

²⁾ Connection set includes: 2x Clip, 2x Copper tube or Adapter and 2x O-Ring

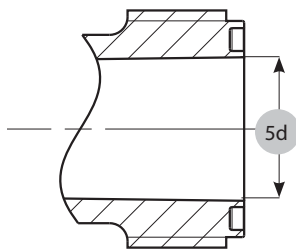
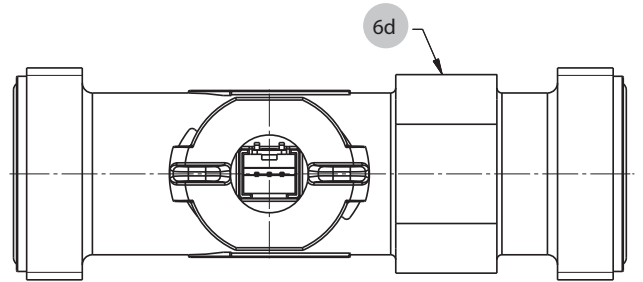
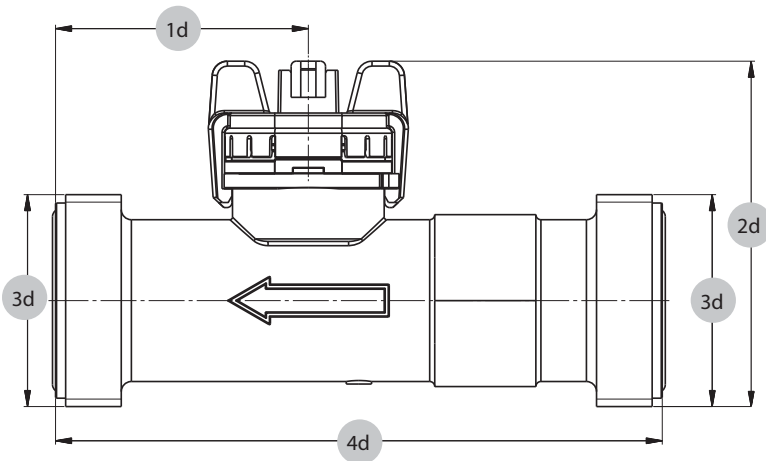
³⁾ To order separately directly from the manufacturer. Find further information in the manufacturers specification no. 114 18049

Dimension diagram DN 8, 10, 15, 20



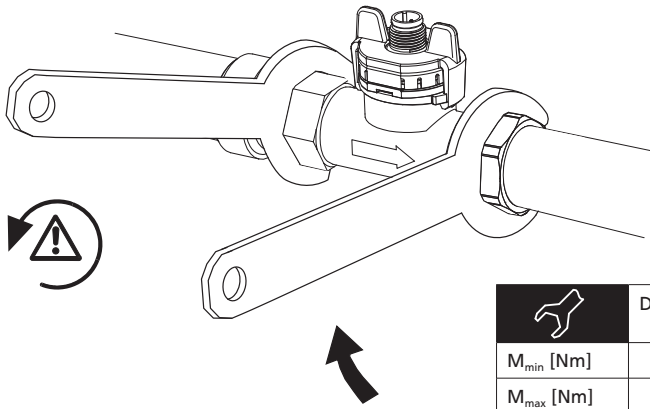
	1a	2a	3a	4a	5a	6a
DN8	29.5	59.0	32.9	72	30.2	28.9
DN10	32.5	57.3	32.9	77	30.2	28.9
DN15	32.5	62.4	39.0	82	30.2	33.0
DN20	39.3	66.3	43.0	105	30.2	37.4

Dimension diagram DN 6, 8, 10, 15, 20, 25



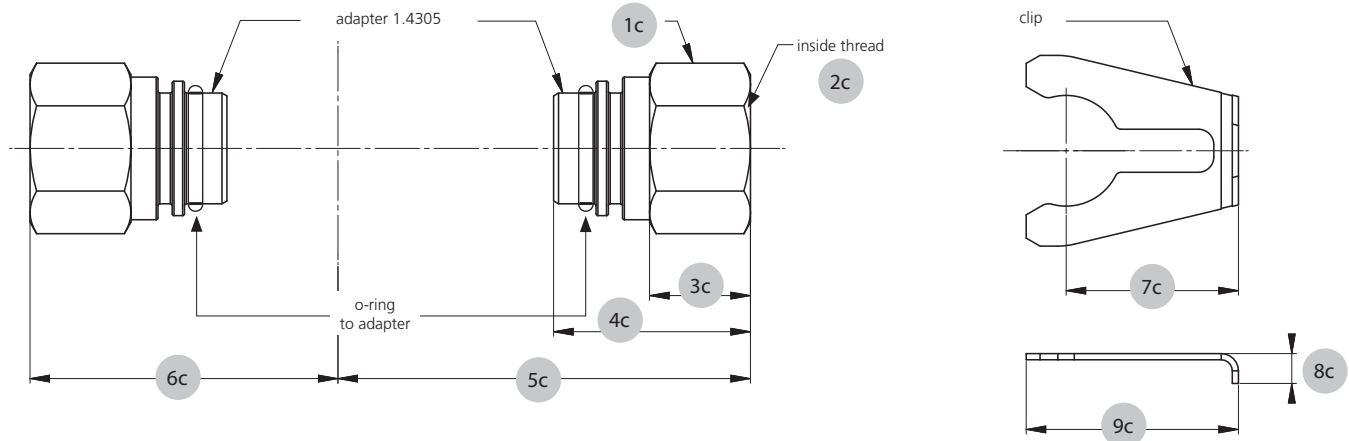
		1d	2d	3d	4d	5d	6d
DN6	K	43.7	53.0	G ½	77	12	12
DN6	G	48.2	55.7	G ¾	86	12	12
DN8	K	43.7	53.0	G ½	77	12	12
DN8	G	48.2	55.7	G ¾	86	12	12
DN10	K	35.0	51.3	G ½	81	12	19
DN10	G	39.5	54.1	G ¾	90	12	19
DN15	K	36.6	56.1	G ¾	87	16	22
DN15	G	41.6	59.5	G 1	97	16	22
DN20	K	36.6	61.5	G 1	105	20	27
DN20	G	42.6	65.8	G 1¼	117	20	27
DN25	K	50.0	68.3	G 1¼	120	26	34
DN25	G	56.0	71.3	G 1½	132	26	34

Admissible locking torque



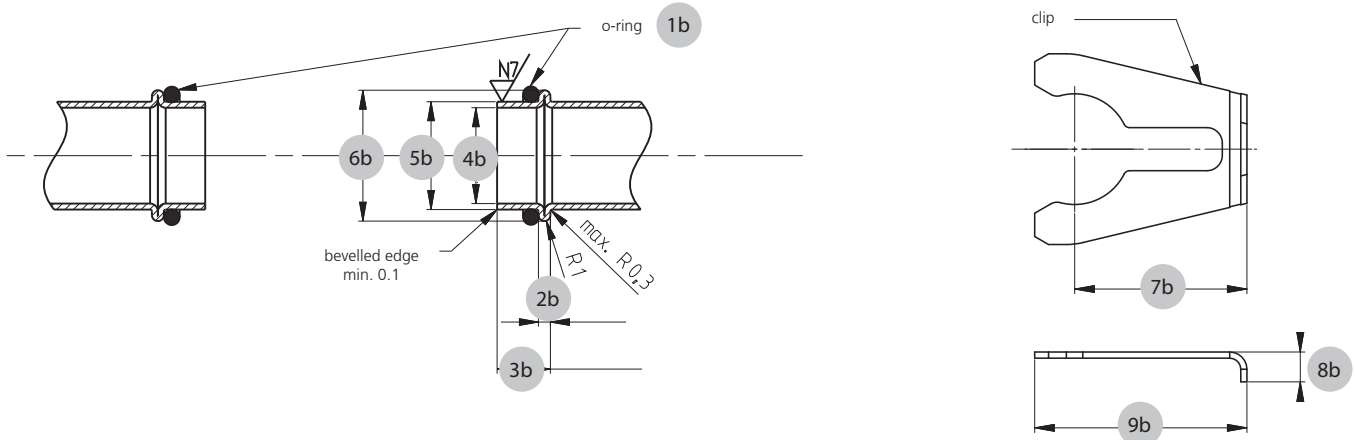
	DN6/8/10 G ½	DN6/8/10 G ¾	DN15 G ¾	DN15 G1	DN20 G1	DN20 G1 ¼	DN25 G1 ¼	DN25 G1 ½
M_{min} [Nm]	1	1	1	2	2	2.5	2.5	2.5
M_{max} [Nm]	12	12	12	12	12	15	15	15

Accessories DN 8, 10, 15, 20



	1c	2c	3c	4c	5c	6c	7c	8c	9c
DN8	22	Rp ¾ DIN 2999 length min. 9	14.0	29	57.65	44.65	24.5	6.00	30.8
DN10	22	Rp ¾ DIN 2999 length min. 9	14.0	29	59.65	47.55	24.5	6.00	30.8
DN15	24	Rp ½ DIN 2999 length min. 11.5	16.4	32	67.05	50.05	28.0	7.30	34.5
DN20	30	Rp ¼ DIN 2999 length min. 13	18.5	38	82.25	58.85	28.0	8.00	34.5

Geometry of customer's connection tube DN 8, 10, 15, 20

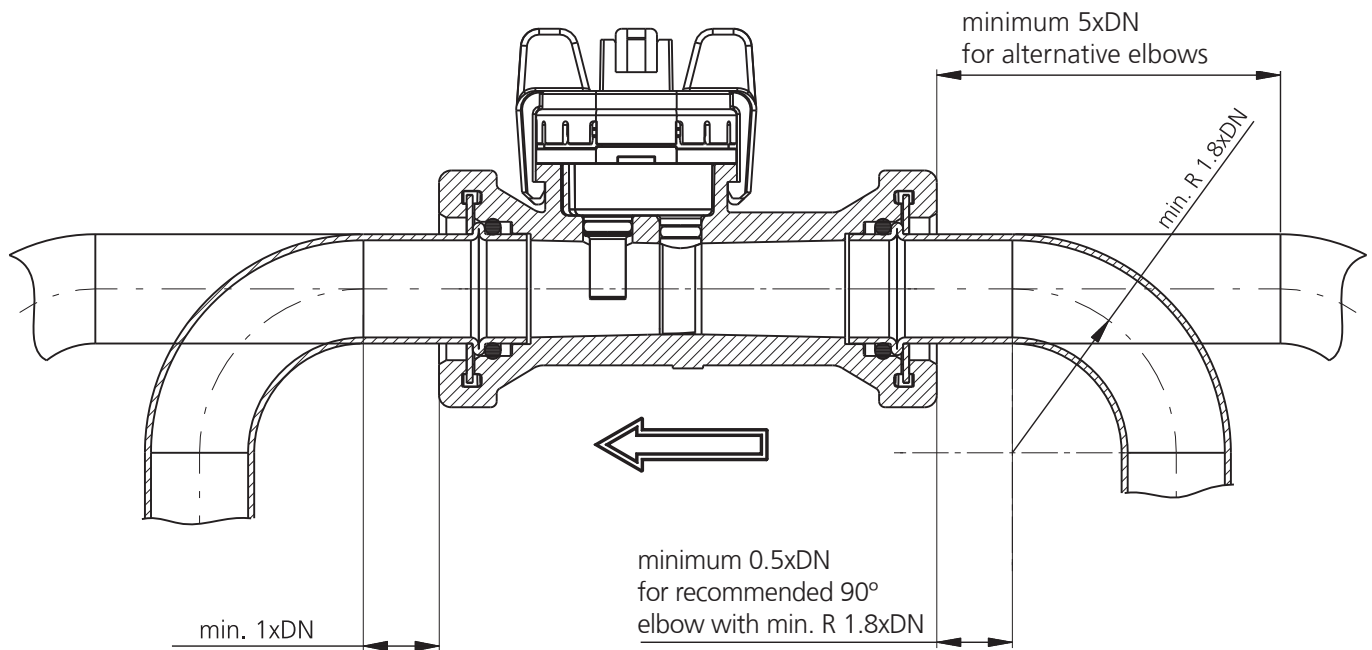


	1b	2b	3b	4b	5b	6b	7b	8b	9b
DN8	∅ 13.95x262	2 ± 0.2	8.9 ± 0.2	∅ 13 ± 0.2	∅ 15.00 ± 0.08	∅ 18.88 ± 0.1	24.5	6.00	30.8
DN10	∅ 13.95x262	2 ± 0.2	8.9 ± 0.2	∅ 13 ± 0.2	∅ 15.00 ± 0.08	∅ 18.88 ± 0.1	24.5	6.00	30.8
DN15	∅ 17.86x2.62	2 ± 0.2	8.9 ± 0.3	∅ 16 ± 0.2	∅ 18.00 ^{+0.08} _{-0.06}	∅ 21.85 ± 0.1	28.0	7.30	34.5
DN20	∅ 21.89x2.62	2 ± 0.2	12.9 ± 0.3	∅ 20 ± 0.2	∅ 22.00 ^{+0.08} _{-0.06}	∅ 25.85 ± 0.1	28.0	8.00	34.5

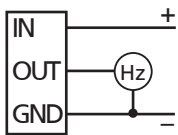
Tube mounting instructions

Consider the following to ensure the correct function of the sensor.

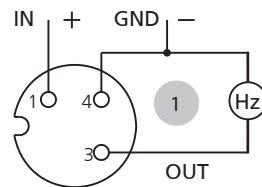
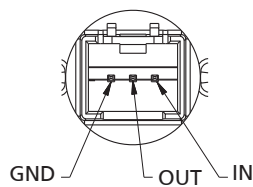
- Only diameter changes from large to small are allowed.
- Avoid repeated elbows in the same level at entryside



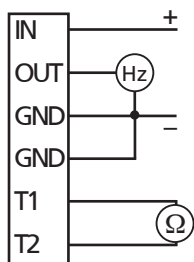
Electrical connections



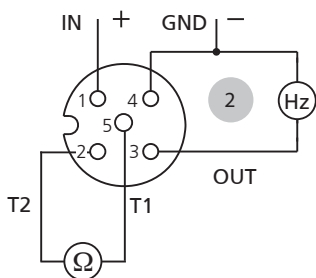
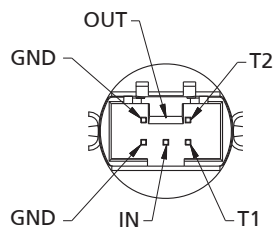
RAST 2.5 without temperature output



Connector M12x1 without temperature output



Connector 2x3-poles with temperature output

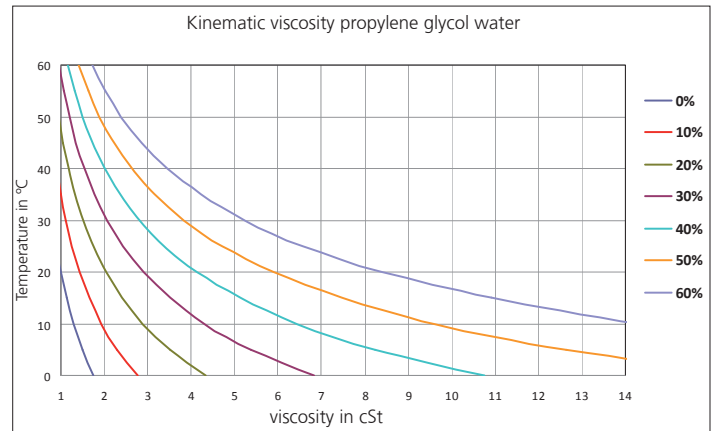
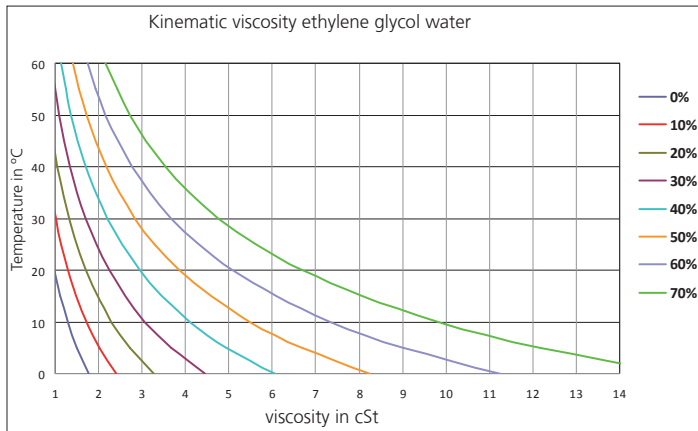


Connector M12x1 with temperature output

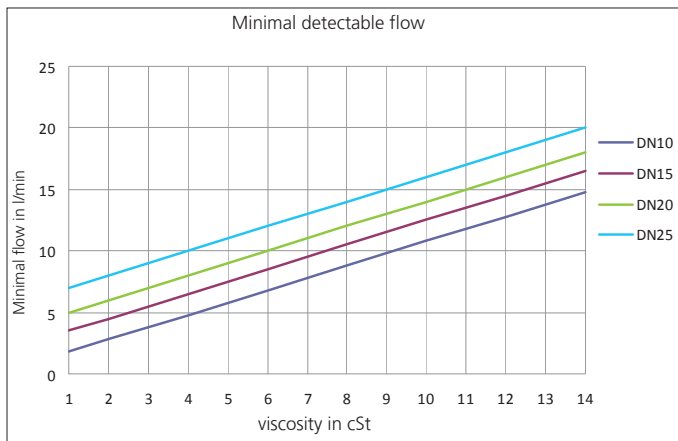
Pin	Colour
1	brown
3	blue
4	black
1	brown
2	white
3	blue
4	black
5	gray

With the following definitions we are able to correct the influence of media with higher viscosity than water (= media viscosity > 1.8 cSt) in order to reach a measuring accuracy of 3% fs in the range of 1.8 - 4 cSt and of 4% in the range of 4 - 14 cSt (ν = viscosity in cSt).

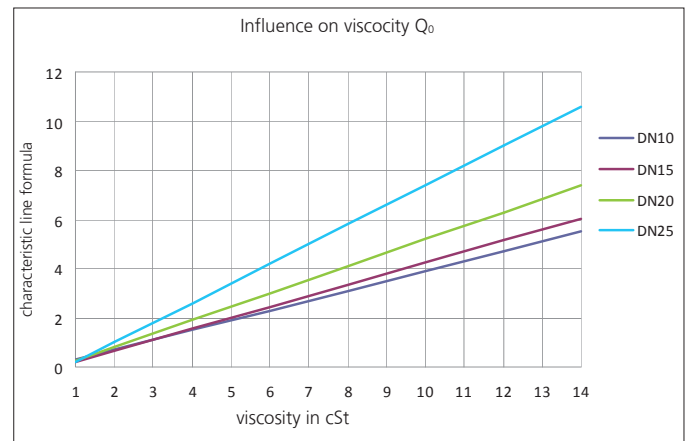
Definition of viscosity of glycol-water-compound



Definition of respond threshold Q_{min}



Definition of characteristic line formula $Q = k * f - Q_0$



Formula respond threshold Q_{min} in l/min
< DN 10 not possible

DN 10: $Q_{min} = \nu + 0.8$
 DN 15: $Q_{min} = \nu + 2.5$
 DN 20: $Q_{min} = \nu + 4.0$
 DN 25: $Q_{min} = \nu + 6.0$

Formula characteristic line for $Q \geq Q_{min}$ in l/min
< DN 10 not possible

Frequency output:
 DN10: $Q = 0.0832 * f - 0.40\nu + 0.20$
 DN15: $Q = 0.1843 * f - 0.45\nu + 0.25$
 DN20: $Q = 0.3754 * f - 0.55\nu + 0.25$
 DN25: $Q = 0.7467 * f - 0.80\nu + 0.60$