

## Gardex flowmeter



Fig. 3/122 Gardex flowmeter

### Application

The Gardex flowmeter is a robust device for measuring and monitoring the flow of liquid and gaseous media in any flow direction. The measured value is indicated on a scale, and is optionally available via contact switches or a current output. Standard scales are available for liquids with a density of 1 kg/l (62.43 lbs/cu.ft). The accuracy corresponds to  $\pm 3\%$  of the full-scale value. When selecting the size, it is recommendable for the normal flow (operating point) to be approx. 75% of the maximum flow listed in Table on page 4.

### Special features

- Product scale for liquids and gases
- Simple installation resulting from rugged sandwich design
- Can be optionally fitted with limit contact and remote transmitter.

### Design and mode of operation

The sensor of Gardex flowmeter consists of a baffle plate with balance beam and operates according to the

deflection method (Fig. 3/123). The baffle plate (b) causes a back-pressure in the medium, and the balance beam (c) is deflected. This movement is transmitted via the beam to the indicator mechanism (e) using a bellows bushing (d). A gear unit (f) converts the deflection of the balance beam into a rotary movement of the pointer (h). The pointer movement is damped by an eddy-current brake (g). The bellows bushing isolates the measured medium from the display unit.

### Connection and installation instructions

The flowmeter can be used for any flow direction and in any mounting position. However, because of the possibility of contamination of the bellows, installation with the indicator pointing downwards should be avoided. The desired flow direction must already be specified when ordering so that the weight of the sensor (baffle plate) can be taken into consideration in the calibration. Subsequent changing of the flow direction may result in larger inaccuracies and may necessitate a subsequent correction of the zero point.

The calibration is carried out at defined conditions of the medium. Deviations in the density, pressure or temperature of gases, or changes in the density or viscosity of liquids, result in errors. It is therefore essential to observe the calibration conditions which are specified on the scale. Therefore the measured medium, density and viscosity at operating temperature and pressure must be specified when ordering. With gases, it is additionally necessary to specify the exact pressure reference point (pressure above atmospheric, or absolute pressure).

To avoid oscillations of the baffle plate when measuring gases, the full static pressure must be applied to the device. The valve must therefore be installed downstream of the flowmeter. The position of the valve is unimportant when measuring liquids. The recommended inlet and outlet pipe sections must always be provided.

The ring (sandwich design) is installed, centered and screwed tight together with the corresponding gaskets between two flanges of the pipeline. The arrow on the device indicates the flow direction for the medium.

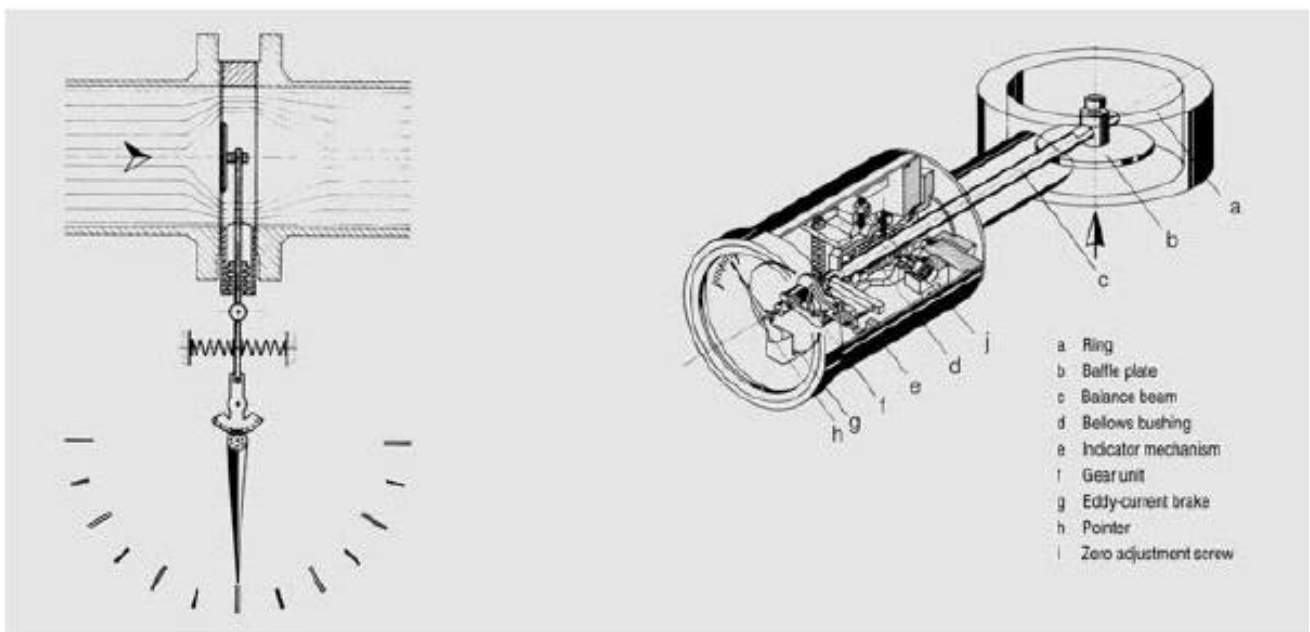


Fig. 3/123 Gardex flowmeter, design

## Gardex flowmeter

### Contact assembly

Various contacts/remote transmitters are available:

- Magnet spring contacts as twin contacts
- Inductive contacts as single or twin contacts
- Current output.

### Maintenance

No maintenance work is necessary.

### Zero correction

A corresponding correction can be made if the pointer zero is offset (e.g. resulting from a changed mounting position). The flowmeter need not be dismantled to do this.

Remove the housing cover to the front by loosening the three screws and rotating. You can then adjust the zero point using the screw (j, Fig. 3/123). It is recommendable to first bring the pointer into a positive indication, and to then turn it back until it rests properly on the limit pin.

It is recommendable to subsequently check the function. To do this, apply a flow to move the indicator up to 60 to 100%. Alternatively, you can press in the bushing rod. With a zero flow, the pointer must again rest on the limit pin.

### Technical data of Gardex flowmeter

<b>Application</b>	See page 1
<b>Design and mode of operation</b>	See page 1
Measuring principle	Baffle plate
<b>Input</b>	
Measuring range	See table on page 4
• For liquids	0.4 to 1350 m <sup>3</sup> /h (1.76 to 594.4 USgpm)
• For gases	12 to 40500 m <sup>3</sup> /h (53 to 178322 USgpm)
Dynamic range	1 : 5
Dimension of measured variable	m <sup>3</sup> /h
Max. permissible pressure	
• DN 25 to DN 150 (1 to 6 inch)	16 bar (232 psi)
• DN 200 (8 inch)	10 bar (145 psi)
• DN 250 (10 inch)	6 bar (87 psi)
• DN 300 (12 inch)	4 bar (58 psi)
• Option: ASME B16.5	

### Rated operation conditions

Mounting position

Flow direction

Inlet and outlet pipe sections

- DN 25 (1") to DN 150 (6")
- DN 200 (8") to DN 300 (12")

### Medium conditions

- Accuracy

Temperature of medium

- Standard version
- With temperature shield

### Viscosity limits

Q<sub>max</sub>

m <sup>3</sup> /h	(USgpm)
≤ 0,1	( ≤ 0,44)
> 0,1 to 0,5	( >0,44 to 2,20)
> 0,5 to 3	( >2,20 to 13)
> 3 to 10	( >13 to 44)
> 10 to 25	( >44 to 110)
> 25 to 50	( >110 to 220)
> 50 to 100	( > 220 to 440)
> 100	( > 440)

### Design

Ring connection

### Material

- Indicator housing
- Ring and transverse pipe, baffle plate, balance beam, bellows and gasket
- Degree of protection (indicator unit)
  - Standard design
  - Version with contact/remote transmitter
- Weight

### Certificates and approvals

Classification according to pressure equipment directive (DGRL 97/23/EC)

Vertical or horizontal  
No limitations

At least 5 D (with v < 2.5 m/s (8.2 ft/s)), otherwise 10 D  
At least 10 D (with v < 2.5 m/s (8.2 ft/s)), otherwise 20 D

± 3% of full-scale value;  
± 5% of full-scale value with magnet spring contact and electric remote transmitter  
Dependent on gasket material and version  
≤ 90 °C/194 °F  
≤ 130 to 250 °C/266 to 482 °F

Viscosity  
mPa·s (cp)  
1,0  
1,0 to 3,0  
1,0 to 5,0  
1,0 to 8,0  
1,0 to 10  
1,0 to 15  
1,0 to 25  
1,0 to 50

DN 25 to DN 300: DIN 2501  
1" to 12": ANSI B 16.5 RF

Mat. No. 1.4301/304

See Table on page 4

IP65

IP54

See Table on page 4

For gases of fluid group 1 and liquids of fluid group 1; complies with requirements of article 3, paragraph 3 (sound engineering practice SEP)

## Gardex flowmeter

### Technical data of contacts

<u>Switching principle</u>	<b>Magnet spring contact, twin contact</b>
Connection	Pg 9
Hysteresis	± 3% of full-scale value
Degree of protection	IP54
Ambient temperature	- 20 to + 70 °C ( -4 to 158°F)
Max. switching frequency	5/ min
Max. rating	AC 250 V / 1 A / 50 VA DC 250 V / 1 A / 30 W Rating data apply to resistive loads; a suppressor circuit is required for inductive loads.

<u>Switching principle</u>	<b>Inductive contact, single contact, twin contact as option</b>
Connection	Pg 9
Rated voltage	DC 8 V
Degree of protection	IP65
Self-inductance	100 µ H
Self-capacitance	30 nF
Ambient temperature	
• Without Ex protection	-20 to +70 °C (-4 to 158 °F)
• With Ex protection T6	-20 to +55 °C (-4 to 131 °F)
Ex approval	EEx ia IIC T6

### Technical data of contacts

<u>Switching principle</u>	<b>Rotation angle transmitter</b> (see Fig. 3/123)
Connection	Appliance plug with Pg 7
Rated voltage	DC 24V (- 5 to +25 %)
Self-capacitance	1 µ F
Short-circuit current	max. 100 mA
Output, three-wire system	0 to 20 mA bzw. 4 to 20 mA
Load at 24 V	max. 750 Ω
Ambient temperature	- 20 to + 80°C ( -4 to 176 °F)
Ex approval	None
Remark	To comply with EN 50 082-2 (EMC), a screened cable must be used which is earthed at one end

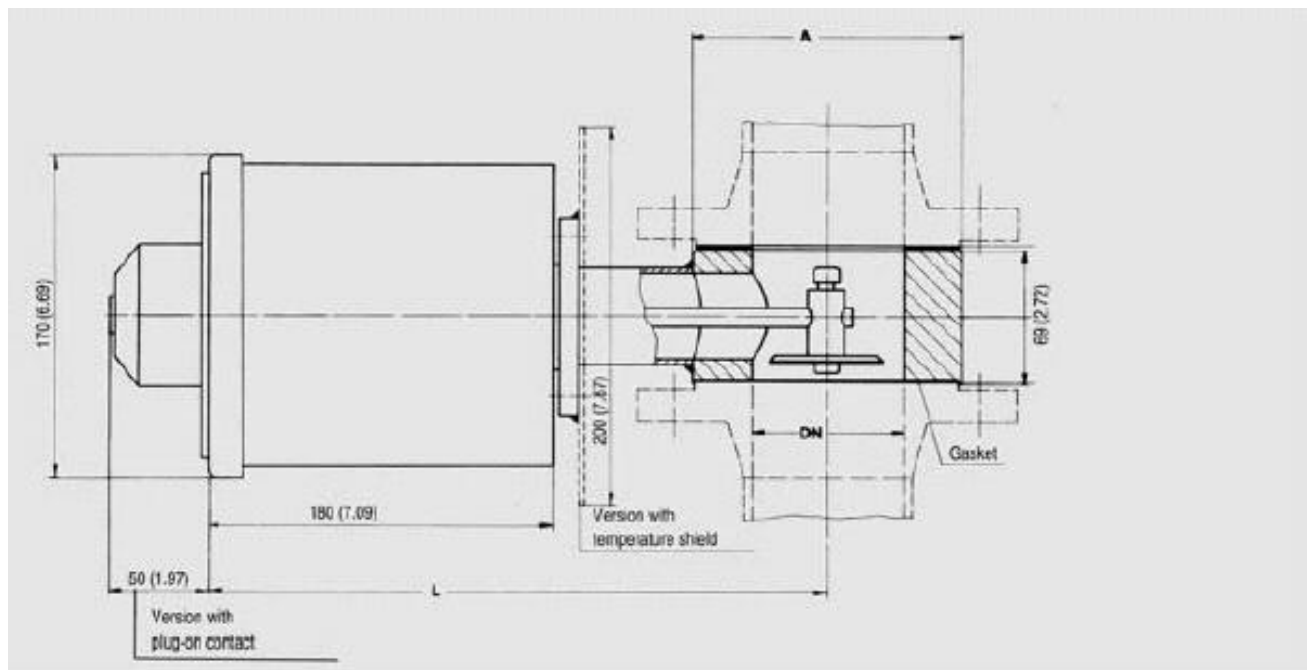


Fig. 3/125 Gardex Flowmeters, dimensions in mm (inches)

## Gardex flowmeter

### Measuring ranges, pressure losses and dimensions (liquids and gases)

Nom. Dia- meter of pipe DN	Full-scale value for water [m <sup>3</sup> /h]			Full-scale value for air [m <sup>3</sup> /h]			Min. inlet pressure [bar]	Pressure loss *) [mbar]	PN 10/16 dimensions (mm)		Weight (kg)
	Measuring range			Measuring range					L	A	
	Small	Medium	Large	Small	Medium	Large					
25	2	4	6	60	120	180	0,6	270 - 380	280	71	6,5
40	3	9	15	90	270	450	0,5	100 - 250	295	92	7,5
50	9	27	45	270	810	1.350	0,4	50 - 150	305	106	8,5
65	12	36	60	360	1.080	1.800	0,4	50 - 150	315	126	9,5
80	18	54	90	540	1.620	2.700	0,4	50 - 150	325	142	10,5
100	30	90	150	900	2.700	4.500	0,4	50 - 150	330	162	11,5
125	55	160	270	1.650	4.875	8.100	0,4	50 - 150	345	192	13,5
150	70	205	345	2.100	6.225	10.350	0,3	40 - 120	365	217	15,5
200	120	360	600	3.600	10.800	18.000	0,3	40 - 120	390	273	19,5
250	200	585	975	6.000	17.625	29.250	0,3	40 - 120	425	327	23,5
300	270	810	1.350	8.100	24.300	40.500	0,3	40 - 120	450	377 (PN 10) 385 (PN 16)	27,0

### Measuring ranges, pressure losses and dimensions (liquids and gases)

Nom. Dia- meter of pipe DN	Full-scale value for water [USgpm]			Full-scale value for air (USgpm)			Min. inlet pressure (psi)	Pressure loss *) (psi)	PN 10/16 dimensions (inch)		Weight (lb)
	Measuring range			Measuring range					L	A	
	Small	Medium	Large	Small	Medium	Large					
1	8,8	17,6	26	264	528	793	8,7	3,9 - 5,5	11,02	2,80	14,3
1 ½	13,2	40	66	396	1.189	1.981	7,25	1,45 - 3,6	11,61	3,62	16,5
2	40	119	198	1.189	3.566	5.944	5,8	0,73 - 2,2	12,01	4,17	18,7
2 ½	53	159	264	1.585	4.755	7.925	5,8	0,73 - 2,2	12,40	4,96	20,9
3	79	238	396	2.378	7.133	11.888	5,8	0,73 - 2,2	12,80	5,59	23,1
4	132	396	660	3.963	11.888	19.814	5,8	0,73 - 2,2	12,99	6,38	25,4
5	242	704	1.189	7.265	21.465	35.664	5,8	0,73 - 2,2	13,58	7,56	29,8
6	308	903	1.519	9.246	27.409	45.571	4,4	0,58 - 1,74	14,37	8,54	34,2
8	528	1.585	2.642	15.851	47.552	79.254	4,4	0,58 - 1,74	15,35	10,75	43,0
10	881	2.576	4.293	26.418	77.603	128.788	4,4	0,58 - 1,74	16,73	12,87	51,8
12	1189	3.566	5.944	35.664	106.993	178.322	4,4	0,58 - 1,74	17,72	14,8 (PN 10) 15,2 (PN 16)	59,5

### Gardex flowmeters versions

Version	Type 1	Type 2	Type 3	Type 4	Type 5
Ring and transverse pipe	Steel  DN 25 to 40 (1 to 1½") ST-37 DN 50 to 65 (2 to 2½") ST-52.3 ab DN 80 (3") ST-37	Stainless steel  Mat. No. 1.4571/316Ti	Steel  DN 25 to 40 (1 bis 1½") ST-37 DN 50 to 65 (2 bis 2½") ST-52.3 ab DN 80 (3") ST-37	Steel	
Liner			Hard rubber		Hastelloy C
Baffle plate, balance beam, bellows	Stainless steel, mat. No. 1.4571/316Ti		Stainless steel, mat. No. 1.4571/316Ti	Hastelloy C	Hastelloy C
Gasket (between transverse pipe flange and cast housing)	Buna N up to 90 °C (194 °F) Viton up to 160 °C (320 °F) Klinger SIL C 4500 up to 250 °C (482 °F)		Buna N up to 90 °C (194 °F) Viton up to 90 °C (194 °F)		PTFE up to 160 °C (320 °F)