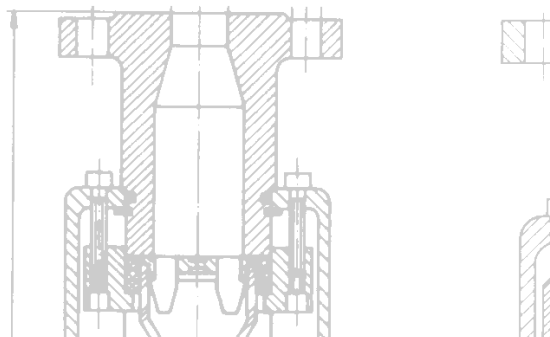
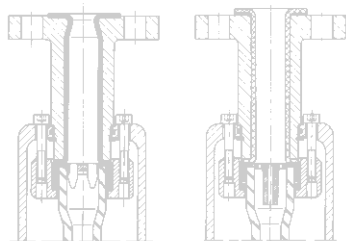
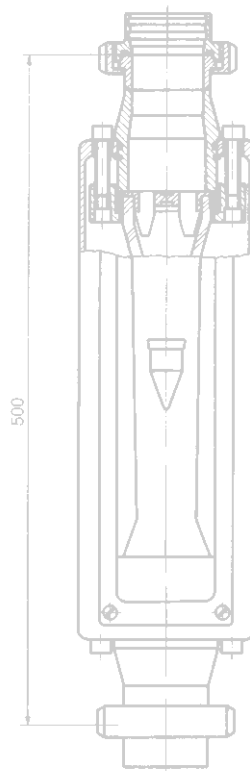
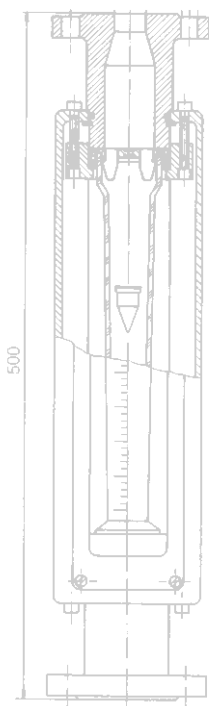


# GA 24 Heavy-duty variable area flowmeter



# Variable area flowmeter GA 24

**Heavy-duty flowmeter with rotating connections  
for liquids and gases**

## Description

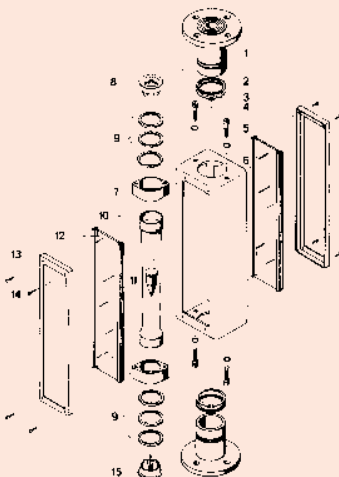
The GA 24 is a flowmeter with glass metering cone that operates on the float measuring principle.

The flowmeter is installed in a vertical pipe run with flow from bottom to top.

The glass measuring cone allows direct indication of the flow value.

## Component parts

- 1 Instrument head
- 2 O-ring
- 3 Seeger circlip ring
- 4 Socket-head cap screw
- 5 Washer
- 6 Housing
- 7 Gland
- 8 Float stop
- 9 Gasket, complete
- 10 Glass metering cone
- 11 Float
- 12 Laminated glass pane
- 13 Window frame
- 14 Raised countersunk head screw
- 15 Float stop (bottom)



## Special features

- Large sight window allows visual control of the process fluid.
- Millimetre scale on the glass cone (cones G 13.11 to G 17.12: also in flow units). A replaceable scale in flow units can additionally be attached to the housing of flowmeters fitted with cones N 18.07 to N 51.21.  
The scale is calculated to the KROHNE calculation method in conformity with VDE/VDI 3513.
- The special instrument design allows cone replacement without removing the flowmeter from the pipe run.
- The GA 24 can be equipped with a maximum of two adjustable limit switches, also suitable for use in hazardous areas (intrinsically safe voltage supply required).  
This option can also be retrofitted by the user.
- The standard connections made of GG15 cast iron are also available with stainless steel or PVDF liner.

## Technical data

### Measuring range (100% values)

Water at 20°C (68°F)	0.16 to 10 000 l/h (0.04 to 2 642 US GPH)
Air at 1.013 bar abs., 20°C (14.7 psia, 68°F)	0.007 to 200 m <sup>3</sup> /h (0.004 to 124 SCFM)
Select measuring range from flow table	

<b>Turn-down ratio</b>	10 : 1
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<b>Accuracy class</b> to VDI / VDE Code 3513, Sh. 2	1.0
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<b>Glass metering cone</b>	length 300 mm (11.81")
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### Scale

Cone G 13.11 to G 17.12	millimetre scale division or flow units on cone
Cone N 18.07 to N 51.21	millimetre scale division on cone flow units (additional scale on housing)

<b>Overall height</b> (excluding gaskets)	500 mm (19.69")
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<b>Float</b>	A III (A III guided cone N 19.09 and larger, on request)
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### Connection

Flanges to DIN 2501	DN 15, DN 25 / PN 25 DN 40, DN 50 / PN 10
Flanges to ANSI B 16.5 for the food and beverage industry	1/2", 1", 1 1/2", 2" Class 150 lbs / RF or 300 lbs / RF DN 15, DN 25, DN 40 / PN 40 (1/2", 1", 1 1/2" / 580 psig) DN 50 / PN 25 (2" / 363 psig)
Information on higher pressure ratings and other standards supplied	on request.

<b>Max. allowable operating pressure</b> at 20°C (68°F) (at temperatures > 20°C pressure drops at the rate of 1% per degree C)	DN 15 (1/2"), DN 25 (1"), 10 bar (145 psig) DN 40 / 9 bar (1 1/2" / 130 psig), DN 50 / 7 bar (2" / 101 psig)
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### Max. process temperature

GA 24 / N, GA 24 / R	- 40°C to +120°C (- 40°F to + 248°F)
GA 24 / PVDF	- 40°C to +120°C (- 40°F to + 248°F)
with hard rubber float	- 10°C to + 60°C (+14°F to + 140°F)
GA 24 with TG 21	- 25°C to +100°C (- 13°F to + 212°F)
GA 24 with MS 14/I	- 25°C to + 60°C (- 13°F to + 140°F)

### Materials

#### Instrument connections

GA 24 / N	Cast iron GG 15
GA 24 / R	Cast iron GG 15 with liner of CrNi steel 1.4571 (316 Ti)
GA 24 / PVDF	Cast iron GG 15 with liner of PVDF
GA 24 with screw connection to DIN 11851	Stainless steel 1.4571 (316 Ti)
GA 54 / R (Option)	Stainless steel 1.4571 (316 Ti)

#### Metering cone

Borosilicate glass

#### Housing

sheet steel housing  
(galvanized, with epoxy/polyester coating)  
PVDF

#### Float stop

#### Float

##### Standard

Stainless steel 1.4571 (316 Ti), aluminium, hard rubber,  
(steatite, on request)

##### Option

Hastelloy C4 or B2, PTFE with inlay

#### GA 24 with screw connection to DIN 11851

Stainless steel 1.4571 (316 Ti)

#### Gaskets

##### Standard

Neoprene, silicone, PTFE shear ring gasket  
PTFE sleeve with Neoprene inlay  
information supplied on request

##### Option

#### GA 24 with screw connection to DIN 11851

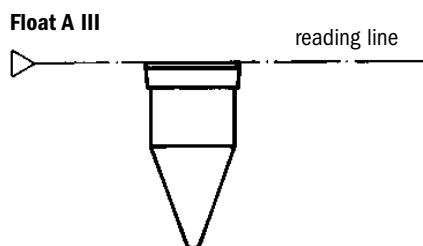
PTFE shear ring gasket  
PTFE shear ring gasket with Neoprene inlay

## Glass measuring cones

The measuring cones are made of high temperature-resistant stress-free borosilicate glass. Cones and floats are individually replaceable (accuracy class 1.6).

Sizes G 13.11 to G 17.12 inclusive are double-walled to provide increased mechanical strength. Individual cone and float replaceability does not apply in these instances.

The measuring cones are operated with A III floats. These floats feature three notches on the top guiding edge which cause the float to rotate and maintain a stable position during flow.



## Flow table

### Flow material

- 1 stainless steel 1.4571 (316 Ti), Hastelloy B2 or C4
- 2 PTFE / inlay
- 3 steatite (on request)
- 4 aluminium
- 5 hard rubber

Float shape A III, (A III guided, on request)

100 % flow values, turn-down ratio 10:1

### Reference conditions

Water at 20 °C (68 °F)

Air at 20 °C, 1.013 bar abs. (68 °F, 14.7 psia)

Meter size		Cone No.	Water			Air			max. pressure loss				
DIN	ANSI		1	2	3	1	3 + 4	5	1	2	3	4	5
DN mm	inches		l/h (US GPH)	l/h (US GPH)	l/h (US GPH)	m <sup>3</sup> /h (SCFM)	m <sup>3</sup> /h (SCFM)	m <sup>3</sup> /h (SCFM)	mbar (psig)	mbar (psig)	mbar (psig)	mbar (psig)	mbar (psig)
15	1/2	G 13.11	0.4 (0.11)	- -	- -	0.016 (0.01)	0.007 (0.004)	- -	2 (0.03)	- -	1 (0.01)	1 (0.01)	- -
		G 14.06	0.63 (0.17)	- -	0.16 (0.04)	0.025 (0.02)	0.012 (0.007)	- -	3 (0.04)	- -	2 (0.03)	2 (0.03)	- -
		G 14.08	1 (0.26)	- -	0.25 (0.07)	0.04 (0.02)	0.02 (0.012)	- -	4 (0.06)	- -	3 (0.04)	3 (0.04)	- -
		G 15.07	1.6 (0.42)	- -	0.5 (0.13)	0.06 (0.04)	0.03 (0.019)	- -	4 (0.06)	- -	3 (0.04)	3 (0.04)	- -
		G 15.09	2.5 (0.66)	- -	0.8 (0.21)	0.09 (0.06)	0.04 (0.025)	- -	5 (0.07)	- -	4 (0.06)	4 (0.06)	- -
		G 15.12	4 (1.06)	- -	1.4 (0.37)	0.14 (0.09)	0.06 (0.037)	- -	6 (0.09)	- -	5 (0.07)	5 (0.07)	- -
		G 16.08	6.3 (1.66)	- -	2.2 (0.58)	0.2 (0.12)	0.1 (0.06)	- -	6 (0.09)	- -	5 (0.07)	5 (0.07)	- -
		G 16.12	10 (2.64)	- -	4 (1.06)	0.3 (0.19)	0.16 (0.10)	- -	7 (0.10)	- -	6 (0.09)	6 (0.09)	- -
		G 17.08	16 (4.23)	- -	6 (1.59)	0.5 (0.31)	0.25 (0.16)	- -	7 (0.10)	- -	6 (0.09)	6 (0.09)	- -
G 17.12	25 (6.61)	- -	10 (2.64)	0.8 (0.50)	0.4 (0.25)	- -	8 (0.12)	- -	7 (0.10)	7 (0.10)	- -		
15	1/2	N 18.07	40 (10.57)	25 (6.61)	16 (4.23)	1.2 (0.74)	0.6 (0.37)	0.4 (0.25)	10 (0.15)	6 (0.09)	4 (0.06)	4 (0.06)	2 (0.03)
		N 18.09	63 (16.64)	40 (10.57)	25 (6.61)	2 (1.24)	1 (0.62)	0.6 (0.37)	11 (0.16)	7 (0.10)	5 (0.07)	5 (0.07)	2 (0.03)
		N 18.13	100 (26.42)	63 (16.64)	40 (10.57)	3 (1.86)	1.6 (0.99)	1 (0.62)	12 (0.17)	8 (0.12)	6 (0.09)	6 (0.09)	2.5 (0.04)
		N 19.09	160 (42.27)	100 (26.42)	63 (16.64)	5 (3.10)	2.5 (1.55)	1.6 (0.99)	17 (0.25)	9 (0.13)	7 (0.10)	7 (0.10)	3 (0.04)
		N 19.13	250 (66.05)	160 (42.27)	100 (26.42)	8 (4.96)	4 (2.48)	2.5 (1.55)	20 (0.29)	11 (0.16)	8 (0.12)	8 (0.12)	4 (0.06)
		N 19.19	400 (105.7)	250 (66.05)	160 (42.27)	- -	- -	- -	25 (0.36)	14 (0.20)	9 (0.13)	9 (0.13)	6 (0.09)
		N 19.26	630 (166.4)	400 (105.7)	250 (66.05)	- -	- -	- -	30 (0.44)	17 (0.25)	11 (0.16)	11 (0.16)	6 (0.09)
25	1	N 21.09	630 (166.4)	400 (105.7)	250 (66.05)	20 (12.4)	10 (6.20)	6 (3.72)	28 (0.41)	14 (0.20)	10 (0.15)	10 (0.15)	4 (0.06)
		N 21.13	1000 (264.2)	630 (166.4)	400 (105.7)	30 (18.6)	16 (9.93)	10 (6.20)	40 (0.58)	17 (0.25)	12 (0.17)	12 (0.17)	5 (0.07)
		N 21.18	1600 (422.7)	1000 (264.2)	630 (166.4)	- -	- -	- -	50 (0.73)	25 (0.36)	17 (0.25)	17 (0.25)	6 (0.09)
		N 21.25	2500 (660.5)	1600 (422.7)	1000 (264.2)	- -	- -	- -	60 (0.87)	40 (0.58)	22 (0.32)	22 (0.32)	7 (0.10)
		N 41.09	1600 (422.7)	1000 (264.2)	630 (166.4)	50 (31.0)	25 (15.5)	16 (9.93)	34 (0.49)	18 (0.26)	13 (0.19)	13 (0.19)	6 (0.09)
40	1 1/2	N 41.13	2500 (660.5)	1600 (422.7)	1000 (264.2)	80 (49.6)	40 (24.8)	25 (15.5)	40 (0.58)	20 (0.29)	14 (0.20)	14 (0.20)	7 (0.10)
		N 41.19	4000 (1057)	2500 (660.5)	1600 (422.7)	- -	- -	- -	50 (0.73)	24 (0.35)	16 (0.23)	16 (0.23)	8 (0.12)
		N 51.10	4000 (1057)	2500 (660.5)	1600 (422.7)	- -	- -	- -	50 (0.73)	25 (0.36)	16 (0.23)	16 (0.23)	8 (0.12)
50	2	N 51.10	4000 (1057)	2500 (660.5)	1600 (422.7)	120 (74.4)	63 (39.1)	40 (24.8)	48 (0.70)	25 (0.36)	16 (0.23)	16 (0.23)	8 (0.12)
		N 51.15	6300 (1664)	4000 (1057)	2500 (660.5)	200 (124)	100 (62.0)	63 (39.1)	65 (0.94)	30 (0.44)	20 (0.29)	20 (0.29)	9 (0.13)
		N 51.21	10000 (2642)	6300 (1664)	4000 (1057)	- -	- -	- -	85 (1.23)	42 (0.61)	30 (0.44)	30 (0.44)	10 (0.15)

For liquids, the operating pressure should be twice the pressure loss, and for gases 5 times the pressure loss. The specified pressure losses apply to water and to air at maximum flowrate. Conversion to other products or operating conditions (pressure, temperature, density, viscosity) is carried out using the calculation method to VDE/VDI Code 3513.

## Limit switches

Limit switches initiate an electrical signal on reaching a preset flow value.

The flowmeters can be equipped with a maximum of 2 limit switches. A float with built-in magnet is required to actuate the limit switches. The limit switches can be used as either N/O or N/C contacts.

### TG 21

The TG 21 is a bistable limit switch. The built-in slot sensor is activated by the dipping action of an aluminium vane.

TG 21 can only be used for the following measuring cones:  
N 21.09 to N 51.21

### Technical data TG 21

<b>Rated voltage</b>	8 V DC
<b>Power consumption</b>	
active area clear	3 mA
active area obscured	1 mA
<b>Protection category</b> to EN 60529 / IEC 529	IP 67 (NEMA 6)
<b>Ambient temperature</b>	- 25 °C to +100 °C (- 13 to +212 °F)

**Electromagnetic compatibility (EMC)** to EN 50081-1  
EN 50082-2

Electrical characteristics to DIN EN 50227 (NAMUR)

Only applicable when used in hazardous areas:

Only for connection to intrinsically safe circuits with the following peak values:

No-load voltage $U_0$	15.5 V
Short-circuit voltage $I_k$	52 mA
Power P	169 mW
Self-inductance (Li)	150 $\mu$ H
Self-capacitance (Ci)	150 nF
Individual approval	PTB No. Ex-95.D.2195X

The bistable function of the limit switch enables identification of the direction of movement of the float. The limit switches are adapted for isolation switching amplifiers in an intrinsically safe control circuit to DIN EN 50227 (NAMUR).

### MS 14/I

The MS 14/I limit switch is a bistable reed contact.

MS 14/I can be used together with the following measuring cones:  
N 18.07 to N 21.25.

### Technical data MS 14/I

<b>Contact type</b>	bistable reed contact, suitable as N/O or N/C contact
<b>Switching capacity</b>	12 VA (0.5 A/250 V AC, 50 Hz)
<b>Ambient temperature</b>	- 25 °C to + 60 °C (- 13 °F to + 140 °F)
<b>Protection category</b> to EN 60529/IEC 529	IP 44

The following isolation switching amplifiers are available for this purpose:

Type	Power supply	Channel	Order No.
KHA6-SR2-Ex1.W	230 V AC	1	5015262000
KHA5-SR2-Ex1.W	110 V AC	1	5015262100
KHD2-SR2-Ex1.W	24 V DC	1	5015262200
KHA6-SR2-Ex2.W	230 V AC	2	5015262300
KHA5-SR2-Ex2.W	110 V AC	2	5015262400
KHD2-SR2-Ex2.W	24 V DC	2	5015262500

**Dimensions and weights in mm (inches)**

Meter size to ...		Dimensions in mm and (inches)		Approx. weights			
DIN 2501	ANSI B 16.5			DIN 2501		DIN 11851	
DIN 11851				ANSI B 16.5			
DN mm	inches	a	b	kg	lbs	kg	lbs
15	1/2	84 (3.31")	82 (3.23")	6	13.22	4	8.82
25	1	105 (4.13")	102 (4.02")	10	22.05	7	15.43
40	1 1/2	125 (4.92")	122 (4.80")	13	28.66	10	22.05
50	2	165 (6.50")	147 (5.74")	18	39.68	15	33.07

**GA 24 / N**

**GA 24 / R**

**GA 24 / PVDF**

**GA 24 with screw connection to DIN 11851**

