

General Specifications

Model RAGK Rotameter

This type of Rotameter is designed for measurement of liquids and gases.
The conical glass metering tube has a free rotating float. This float is mounted in a vertical pipeline with flow direction upwards. The flow is indicated by the top of the float and can be read from the standard scale on the metering tube or from a connected scale.

When the process conditions are changed the scale needs to be replaced by a new one of which the values should be calculated.

FEATURES

- Large selection of measuring ranges
- High accuracy of free rotating float even at low flow rates
- Low pressure loss
- Visual check of the medium
- Non-powered local indication
- Large selection of scales
- Optional built-in valve
- Exact scale calculation at changed process conditions according to VDE/VDI guidelines 3513 with the use of the flow table (option /PT)



with
K-metering tube



with
M3-metering tube

STANDARD SPECIFICATIONS

Measurable flow rates

- Water (20 °C) : 0.002 l/h bis 630 l/h
- Air (20 °C ; 1 bar abs.): 0.2 l/h bis 6 300 l/h

Measuring range

: 10:1 (20:1)

Metering tubes

: M3; K6; M6; K7; R7; M7

Accuracy

:

Glass Metering Tube	Length	Accuracy class acc. VDE / VDI 3513	Standard flow accuracy: full scale
K631 - K743	75mm	4 (for ball 6)	± 4 % (± 6 %)
R741 - R743	75mm	6 (only with ball)	± 6 %
M613 - M622	150mm	4 better on request	± 4 %
M624 - M747	150mm	2.5 , better on request	± 2.5%
M352 - M357	150mm	2.5 , better on request	± 2.5%

T1.EPS

Max. Temperature

- Fitting material SS : 100 °C
- With option /MV : 130 °C (not for PP-Rotameter)
- Fitting material PP : 80 °C

Max. Pressure

: 16 bar

Material process connection

- Inner thread : PP or 1.4571 (for option controller brass or 1.4571)
- Cutting ring : 1.4571 or steel
- Nozzle : 1.4571 or steel (PTFE)
- Swageloc connection : 1.4571

Material of fitting

: Polypropylen; 1.4571

Material of gaskets

: Buna

- With option /MV : PTFE / Viton

Design (valve)

: With or without built-in valve

Length approx.

: 90 mm; 165 mm or 175 mm

Weight

: Depending on design 0.3 to 1.2 kg (without stand and controller)

TECHNICAL DATA OF OPTIONS

LIMIT SWITCH (OPTION /GI1 to /GI4)

(For floats of Mumetall or PVDF with Fe-core only and $Q_{min} > 0.004$ l/h water or 0.3 l/h air)

Type : Bistable inductive ringsensor
Power supply : 4.5 V to 15 V DC
Consumption : acc. DIN EN 60947-5-6 (NAMUR)

For float below ring sensor : < 1 mA
 above ring sensor : > 2.2 mA

Temperature range : -25°C bis +65°C not Ex-type

Protection : IP 67

Electrical connection : 2 x 0.14 mm²,
 with shield 0.4 mm², 2 m long

EMC :

DIN EN 61000-4-2 : level 3
 DIN EN 61000-4-3 : level 2
 DIN EN 61000-4-4 : level 3
 DIN EN 61000-4-6 : level 2
 DIN EN 55011 : group 1 / class A

In general the RI20 complies with the above given criteria. However, in certain situations the switch may react from "off" to "on". In such cases the customer has to assure by himself that this does not happen. Normally the behavior can be improved by more distance to the EMC-source or by using a different cable position.

EXPLOSION PROOF (OPTION /KS1)

Temperature range : -25°C to +60°C

Marking acc. guideline 94/9/EG :

Manufacturer : Rota Yokogawa, Rheinstr.8,
 D-79664 Wehr

Type : RI20-10K/G or RI20-17K/G

Year of production : in serial number

Protection : EEx ia

Group : IIC

Category : 2

Explosive atmosphere : G

Temperature class : T6

Certificate No. : PTB 03 ATEX 2111

Safety relevant data :
 $U_i = 12V$, $I_i = 22mA$, $P_i = 66mW$,
 $L_i = 20mH$, $C_i = 200nF$
 or see certificate for data

CE-marking :   II 2 G

LIMIT SWITCH (OPTION /GM1 AND /GM2)

(For metering tube M3 and floats with magnet only)

Type : reed contact with bistable switching

Max. switching voltage : 230 V

Max. switching current : 0.6 A

Max. switching capacity : 12 VA or 12 W

Temperature range : -10 °C to +70 °C

Protection : IP 65

Internal capacity : 0 nF

Internal inductivity : 0 mH

Electrical connection : LIYY 2 x 0.34mm²; 1 m long

Housing : Polystyrol

Weight : 35 g

Explosion proof :

Intrinsic safe acc. EN50020 chapter 5.4 "Simple electrical instruments".

Group : IIC

Category : 2

Expl. atmosphere : G
Temperature class : T6
Entropy parameter : $U_i = 15V$; $I_i = 50mA$; $P_i = 187mW$
 $L_i \approx 0mH$; $C_i \approx 0nF$

POWER SUPPLY FOR LIMIT SWITCH (OPTION /W__)

Type : Transmitter relay acc.
 DIN EN 60947-5-6 (NAMUR)

Power supply : 230V AC (/W2_)
 115V AC (/W1_)
 24V DC (/W4_)

Switching capacity : max. 250 V AC; max. 4A
 or max. 500 VA

Relay output : 1 or 2 potential free changeover contacts

Explosion proof : Intrinsic safe [EEx ia] II C
 acc. PTB 00 ATEX 2081 (/W2_)
 acc. PTB 00 ATEX 2080 (/W4_)

CONTROLLER (OPTION /R1 AND /R3)

(not for tube M3)

Differential pressure controller for a constant flow at fluctuations of the pressure.

These are no pressure limiting valves.

- **The controller /R1** is for liquids with variable inlet or outlet pressure and for gases with variable inlet pressure and constant back pressure.

- **The controller /R3** is for gases with fluctuations of the back pressure.

Max. liquid flow : 100 l/h

Max. gas flow : 3000 l/h

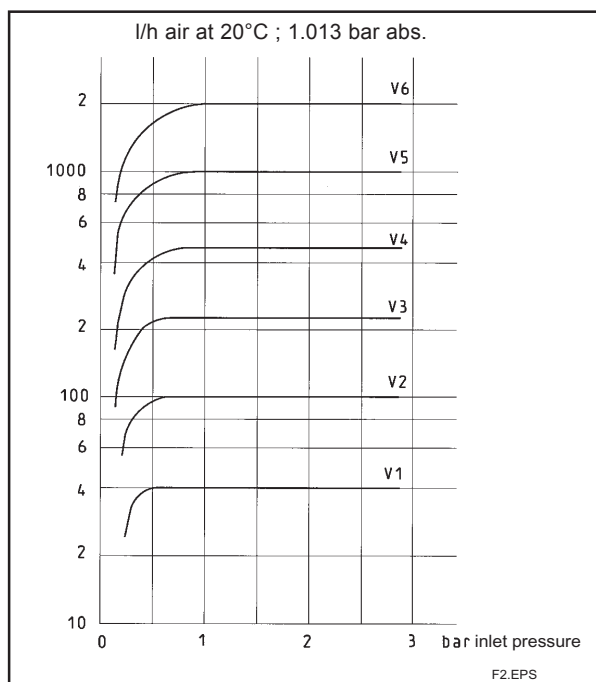
Max. temperature : 80°C

Recommended differential pressure : > 400 mbar

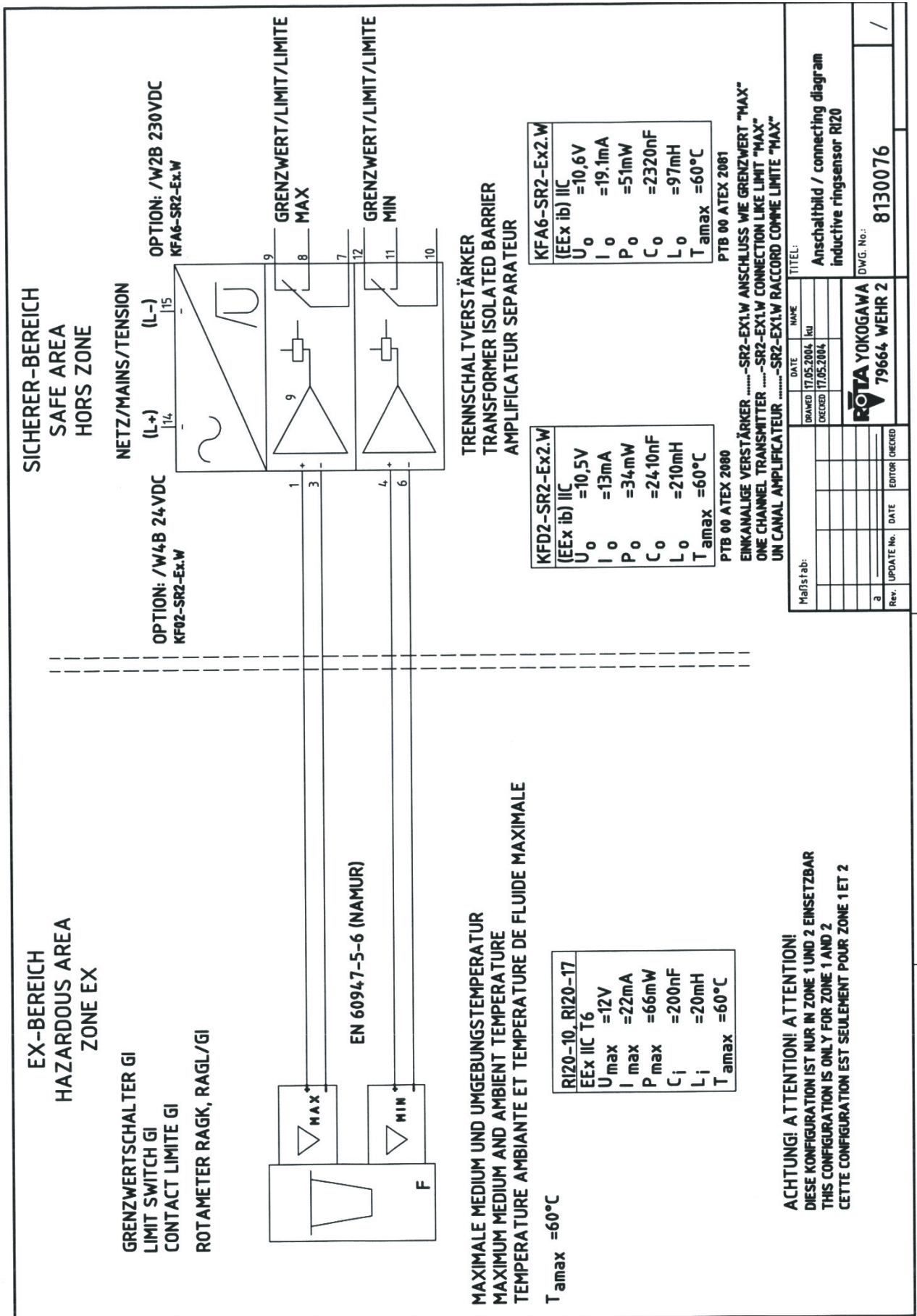
Materials

Housing	Membrane	Springs
CrNi-steel	PTFE	CrNi-steel

Control characteristic :



The curves V1 to V6 show how the flow depends on the inlet pressure for different valve settings. The back pressure at the outlet (ambient pressure) is 1 bar.



MODEL SPECIFICATIONS

Process connection	Model	Process connection				Material Process - connection	Material holder	Design (valve)	Metering tube length / diameter					
	Inner-thread	Cutting - ring	Nozzle	Swage-loc										
	Code	Code	Code	Code	Code	Code	Code	Code	Code					
¼ inch	RAGK41	T0	–	–	–	PP	PP							
	RAGK41	R0	–	–	–	PP	PP							
6 mm	RAGK53	--	C0	--	--	SS; ST	PP	NNN; SAE ; SBE; SAA; SBA	K6; K7; R7 M6; M7; L6; L7					
	RAGK53	–	–	P0	–	SS	PP							
	RAGK53	–	–	–	W0	SS	PP							
8 mm	RAGK54	–	C0	P0	–	SS; ST	PP							
	RAGK54	–	–	–	W0	SS	PP							
10 mm	RAGK55	–	C0	–	–	SS; ST	PP							
	RAGK55	–	–	–	W0	SS	PP							
12 mm	RAGK56	–	C0	–	–	SS; ST	PP							
¼ inch	RAGK41	T0	–	–	–	SS	SS							
	RAGK41	R0	–	–	–	SS	SS							
6 mm	RAGK53	--	C0	P0	W0	SS	SS							
8 mm	RAGK54	–	C0	P0	W0	SS	SS							
10 mm	RAGK55	–	C0	–	W0	SS	SS							
12 mm	RAGK56	–	C0	–	W0	SS	SS							
¾ inch	RAGK42	T0	–	–	–	PP	PP							
	RAGK42	R0	–	–	–	PP	PP							
	RAGK42	–	–	P0	–	ST	PP							
10 mm	RAGK55	–	C0	–	–	SS; ST	PP							
12 mm	RAGK56	T0	–	–	–	SS; ST	PP							
¾ inch	RAGK42	T0	–	–	–	SS	SS							
	RAGK42	R0	–	–	–	SS	SS							
10 mm	RAGK55	–	C0	–	–	SS	SS							
12 mm	RAGK56	–	C0	–	–	SS	SS							
Process connection	Inner thread NPT..... Inner thread RP Cutting ring..... Nozzle..... Swageloc - connection.....	– T0 – R0	– C0	– P0	– W0	PP SS ST	– PP – SS	NNN SAE SBE SAA SBA GDE GEE GDA GEA	M3					
Material of process connection	Polypropylene..... 1.4571..... Steel.....													
Material of holder	Polypropylene..... 1.4571.....													
Design	Without valve					PP SS ST	– PP – SS				NNN SAE SBE SAA SBA GDE GEE GDA GEA			
	For tubes K6; K7; M6; M7 with	Valve		Gasket	Valve seat									
		input		Buna	Silver									
		input		Viton	Silver									
		output		Buna	Silver									
	For tubes M3 with	output		Viton	Silver									
		Valve		Gasket	Valve seat									
		input		Buna	PTFE									
		input		Viton	PTFE									
	output		Buna	PTFE										
	output		Viton	PTFE										
	The suffix code of the metering tube-float-combination can be read from the flow table.....													xxxxx- xxxxx
Options (see separate table).....											/xx			

T2.EPS

Flow tables with metering tube- float combination for water / liquids

Flow table				Suffix code metering tube-float-combination							
Water 20°C / Liquid				Metering tube				Float			
Recommended comb. row 1		Alternative comb. row 2		– X	X	XX	X	– XX	X	X	X
Max. Flow [l/h]	Pressure- loss*) [mbar]	Max. Flow [l/h]	Pressure- loss*) [mbar]	Length Code	Diameter Code	Tube Cone Code	Scale Code	Material Code	Diameter Code	Flow mark Code	Insertion Code
1	2	–	–	K	6	31	G; A; N	row 1 SS; MU 1)	B	L	N
5	3	–	–	K	6	33					
4	4	–	–	K	6	34					
6	8	–	–	K	6	37					
10	4	–	–	K	7	41			C		
15	5	–	–	K	7	42					
26	6	–	–	K	7	43					
40	5	–	–	K	7	44			D		
63	8	–	–	K	7	47					
110	10	–	–	K	7	51					
10	4	–	–	R	7	41		SR	C		
16	4	–	–	R	7	42					
25	5	–	–	R	7	43			D		
40	5	–	–	R	7	44					
63	6	–	–	R	7	47					
100	6	–	–	R	7	51					
0.025	1	0.054	2	M	6	13		row 1 TT; KR	A4)		
0.063	2	0.15	3	M	6	17		row 2 SS; MU 1)			
0.16	3	0.36	4	M	6	22		row 1 TT; KR; PD 1)	B		
0.4	1	0.8	2	M	6	24					
1	2	2	3	M	6	31			C		
1.6	3	2.8	3	M	6	32					
2.5	4	4	4	M	6	33					
3.5	5	6	8	M	6	35		row 2 SS; MU 1)	D		
4	2	6.3	4	M	7	34					
6.3	3	10	5	M	7	37					
10	3	16	5	M	7	41					
16	4	27	6	M	7	42					
25	5	44	6	M	7	43					
40	5	66	8	M	7	44					
63	10	100	10	M	7	47					
63	3	--	--	M	3	52			PP; PF	3	1
160	10	100	5	M	3	52		row 1 SS	row 1 3		N; M 2)
250	13	160	7	M	3	53		row 2 PP; PF	row 2 2		
400	15	250	10	M	3	54					
630	18	400	12	M	3	57					
Tube length (type)		75 mm..... 150 mm.....		K M	X						
Tube diameter		10 mm; 17 mm; 28mm.....									
Tube cone		see flow table.....									
Tube medium scale		Scale on tube and mm-division.3)..... Connection scale and mm- division (recommended)... Metering tube with mm- division only.....					G A N				
Float material		1.4571..... Titanium..... Mumetal (for limit switch /GI1; /GI2 and /GI4)..... PVDF (for limit switch /GI2 to /GI4)..... Corundum..... CrNi-ball..... Polypropylene..... PTFE.....									
Float diameter		1.6 mm to 15.7 mm.....									
Flow mark		Liquid Factor 0.4 (Water)..... Factor 0.63 (Water)..... Factor 1 (Water).....								L 1 2 3	
Float insertion		Without magnet With magnet.....									N M 2)

1) For option limit switch /GI1 to /GI4

2) For option limit switch /GM1 and /GM2

3) Select option /MM if no mm-division is required

4) Max. viscosity is 2 mPas*s

*) The indicated flow drop is a pilot value and may deviate based on the type of Rotameter.

Additional tube-float-combinations with different float materials and different measuring ranges are available on request.

If the Rotameter should be used in other media- / process- conditions use the sizing software DUREP-v.

T3.EPS

Flow tables with metering tube- float combination for air / gas

Flow table				Suffix code metering tube-float-combination									
Air 20°C, 1 bar abs. / Gas				Metering tube				Float					
Recommended comb. row 1		Alternative comb. row 2		– X	X	XX	X	– XX	X	X	X		
Max. Flow [l/h]	Pressure- loss *) [mbar]	Max. Flow [l/h]	Pressure- loss *) [mbar]	Length Code	Diameter Code	Tube Cone Code	Scale Code	Material Code	Diameter Code	Flow mark Code	Insertion Code		
16	1	25	2	K	6	31	G; A; N	row 1 GL	B				
40	1	55	2	K	6	33							
63	2	85	3	K	6	34							
100	3	140	5	K	6	37			C				
160	2	240	3	K	7	41							
250	2	360	3	K	7	42		row 2 TT; KR; PD 1)	D				
400	2	600	4	K	7	43							
630	3	1 000	4	K	7	44							
1 000	4	1 600	5	K	7	47		A					
1 600	7	2 500	9	K	7	51							
3 500	10	–	–	K	7	51		SS; MU 1)					
1.9	1	3	2	M	6	13		row 1 TT; KR					
4.4	2	8	3	M	6	17		row 2 SS; MU 1)	B				
10	3	17	4	M	6	22		row 1 TT; KR; PD 1)					
23	2	36	3	M	6	24		C					
50	2	80	3	M	6	31							
70	3	110	4	M	6	32		row 2 SS; MU 1)	D				
100	4	160	4	M	6	33							
140	5	220	8	M	6	35							
180	3	260	5	M	7	34							
250	3	340	5	M	7	37							
400	3	550	5	M	7	41							
630	4	900	6	M	7	42							
1 000	5	1 400	6	M	7	43							
1 600	5	2 200	8	M	7	44							
2 400	10	3 300	10	M	7	47		row 1 PP	3	4	N; M 2)		
1 000	2	--	--	M	3	52				5		N	
1 600	3	--	--	M	3	52				6			
2 500	4	--	--	M	3	52				7			
4 000	8	--	--	M	3	52							
6 300	11	--	--	M	3	53							
Tube length (type)		75 mm.....		K	X								
		150 mm.....		M									
Tube diameter		10 mm; 17 mm; 28mm.....			X								
Tube cone		see flow table.....											
Tube medium scale		Scale on tube and mm-division.3)					G A N						
		Connection scale and mm- division (recommended)...											
		Metering tube with mm- division only.....											
Float material		1.4571.....						SS TT MU PD KR PP PF GL	X				
		Titanium.....											
		Mumetal (for limit switch /GI1; /GI2 und /GI4).....											
		PVDF (for limit switch /GI2 bis /GI4).....											
		Corundum.....											
		Polypropylen.....											
		PTFE.....											
		Glass ball.....											
Float diameter		1.6 mm to 15.7 mm.....											
Flow mark		Liquid								L			
		Factor 0.4 (Water).....								1			
		Factor 0.63 (Water).....								2			
		Factor 1 (Water).....								3			
Float insertion		Without magnet.....									N M 2)		
		With magnet.....											

1) For option limit switch /GI1 to /GI4

2) For option limit switch /GM1 and /GM2

3) Select option /MM if no mm-division is required

*) The indicated flow drop is a pilot value and may deviate based on the type of Rotameter.

Additional tube-float-combinations with different float materials and different measuring ranges are available on request.

If the Rotameter should be used in other media- / process- conditions use the sizing software DUREP-v.

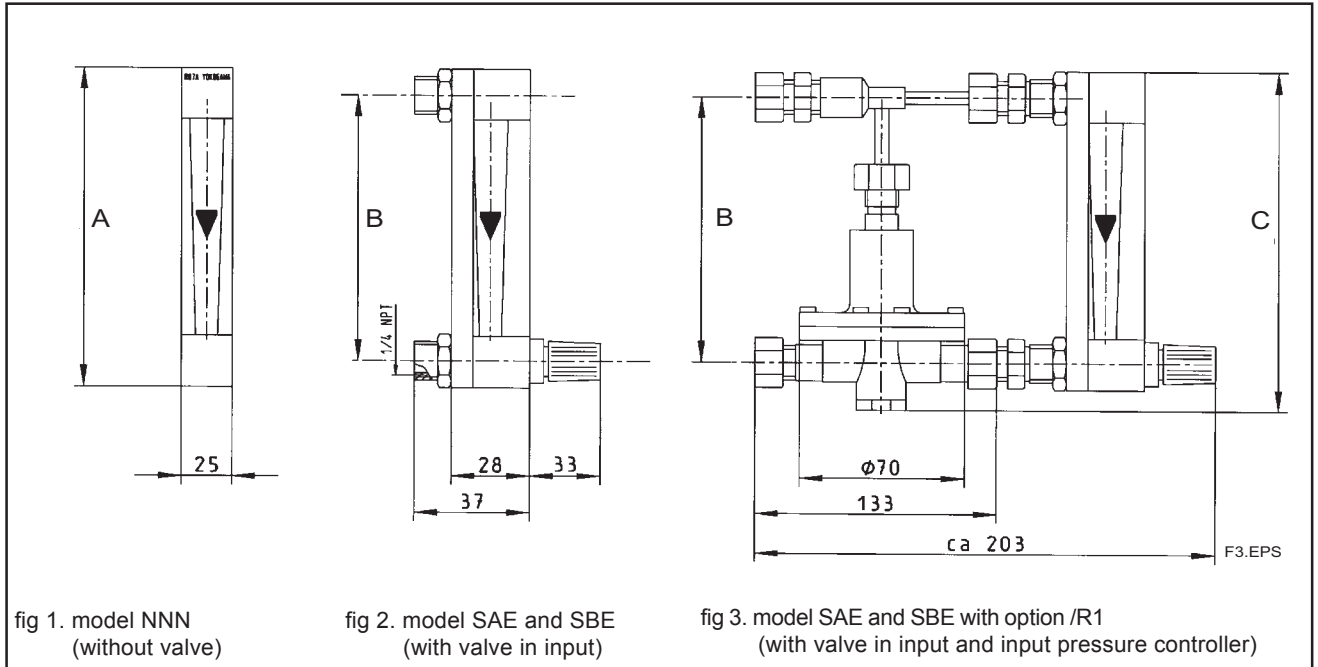
T4.EPS

OPTIONS

Options	Option code	Description	Restrictions
Marking	/B1 /B4 /B8 /BG	Tag plate (SS) Neutral version Customer provided marking on label Customer specific notes on scale	Plate 12 x 40 mm; max. 45 digits
Limit switches	/GI1 /GI2 /GI3 /GI4 /GM1 /GM2	Bistabile inductive ring sensor Bistabile inductive ring sensor Bistabile inductive ring sensor Bistabile inductive ring sensor Magnetic contact Magnetic contact	Only for float MU A_N Only for float PD B_N or MU B_N Only for float PD C_N Only for float MU C_N, MU D_N; PD D_N Only with float with magnet, tube M3 Only with float with magnet, tube M3
Ex-proof type	/KS1	ATEX intrinsically safe "ia"	Only for /GI1 to /GI4
Test and certificates	/H1 /P2 /P3 /PP /PT	Certificate of degrease Certificate of Compliance with the order acc. to EN 10204: 2004- 2.1 As /P2 +Test report acc. to EN 10204: 2004- 2.2 Pressure test report for measuring system With flow table for recalculation	
Accessoires metering tube	/MM /MV	No unit scale (1-10 or mm- division) (without calculation table) Viton PTFE- gasket and Viton O-ring	For high temperatures (100°C to 130°C) Only with SS holder material
Accessoires float stops	/S1	Spring stops made of SS 1.4571	
Accessoires	/QA /QB /QF	For mounting With tapped holes in the connection heads for mounting Stand	Not with /GI1 to /GI4 Not with metering tube M3
Controller	/R1 /R3	Pre-pressure controller 1.4571 (only with valve in inlet; for gas with variable pre pressure and liquids with variable pre- and back- pressure) Back- pressure controller 1.4571 (only with valve in outlet; for gas with variable back-pressure)	Not with metering tube M3 Not with metering tube M3
Power supply for limit switch(es) (transmitter relay)	/W1A /W1B /W2A /W2B /W4A /W4B	KFA5-SR2-Ex1.W / 115 V AC, 1 channel KFA5-SR2-Ex2.W / 115 V AC, 2 channels KFA6-SR2-Ex1.W / 230 V AC, 1 channel KFA6-SR2-Ex2.W / 230 V AC, 2 channels KFD2-SR2-Ex1.W / 24 V DC, 1 channel KFD2-SR2-Ex2.W / 24 V DC, 2 channels	

T5.EPS

DIMENSIONS WITH METERING TUBES K6; K7; M6 AND M7

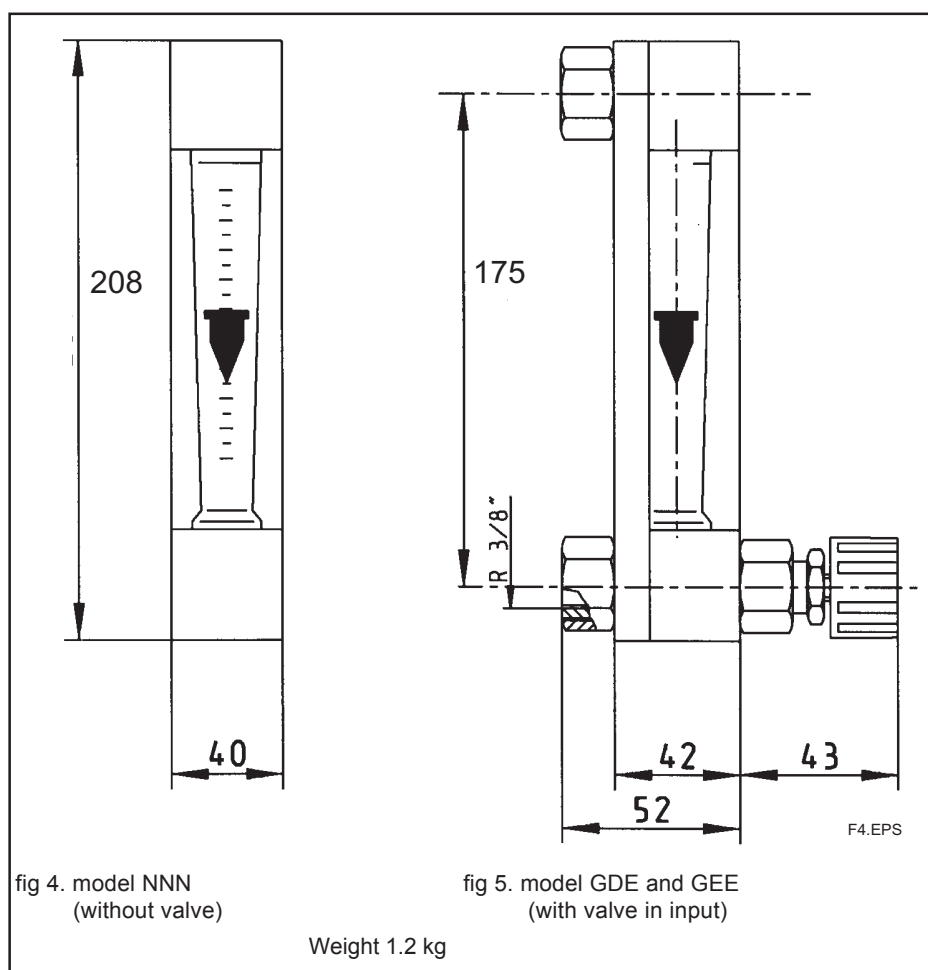


F3.EPS

	Dimensions [mm]			Weight [kg]	
Metering tube	A	B	C	without controller	with controller
K6 ; K7	111	90	121	0,3	1,0
M6 ; M7	186	165	196	0,4	1,1

T6.EPS

DIMENSIONS WITH METERING TUBE M3



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