

# General Specifications

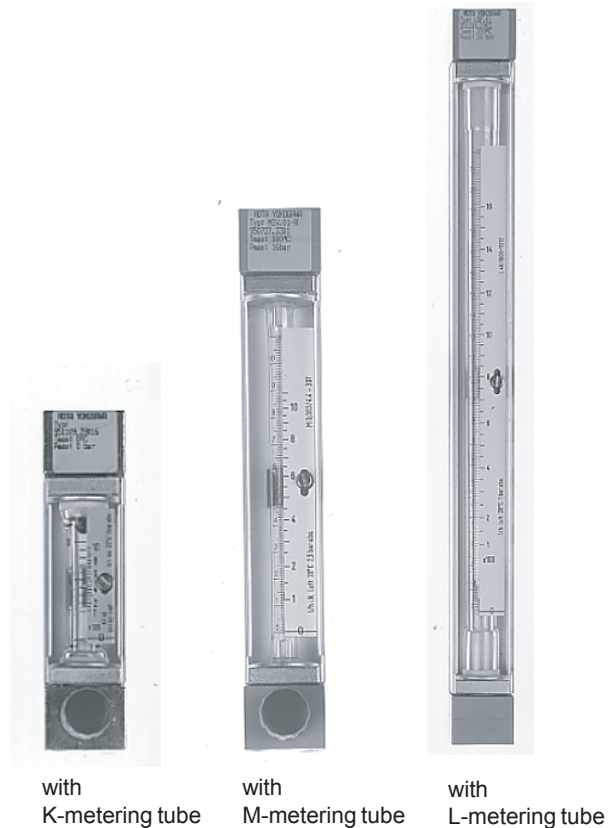
## Model RAGL Rotameter

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
- Anti-static metering tubes for measurement of small quantities of gas
- 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)



### STANDARD SPECIFICATIONS

#### Measurable flow rates

- Water (20 °C) : 0.002 l/h bis 110 l/h
- Air (20 °C ; 1 bar abs.): 0.1 l/h bis 3 500 l/h

#### Measuring range

- K metering tube : 10:1
- M metering tube : 20:1 (10:1)
- L metering tube : 20:1

**Metering tubes** : K6; M6; L6; K7; R7; M7; L7

#### Accuracy

Glass Metering Tube	Length	Accuracy class acc. VDE / VDI 3513	Standard flow accuracy: full scale
R741 - R743 K631 - K743	75mm 75mm	6 (only with ball) 4 (for ball 6)	± 6 % ± 4 % (± 6 %)
M613 - M622 M624 - M747	150mm 150mm	4 , better on request 2.5 , better on request	± 4 % ± 2.5 %
L613 - L623 L624 - L747	300mm 300mm	2.5 , better on request 1.6 , better on request	± 2.5 % ± 1.6 %

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 1.4581 (for option controller 1.4571)
- Cutting ring : 1.4571 or steel
- Nozzle : 1.4571 or steel (PTFE)
- Swageloc connection : 1.4571

#### Material of fitting

: Polypropylen; 1.4581

#### Material of gaskets

: PE / Buna (for M-, K-, R- tube)  
PTFE / Buna (for L-tube)

- With option /MV : PTFE / Viton

#### Design (valve)

: with or without built-in valve

#### Length approx.

: 100 mm; 175 mm or 325 mm

#### Weight

: depending on design 0.3 to 1.3 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 ring sensor  
**Power supply** : 4.5 V to 15 V DC  
**Consumption** : acc. DIN EN 60947-5-6 (NAMUR)  
 For float  
 below ring sensor : < 1mA  
 above ring sensor : > 2.2 mA  
**Temperature range** : -25°C bis +70°C not Ex-type  
**Protection** : IP 67  
**Electrical connection**: 2 x 0.14 mm<sup>2</sup>,  
 with shield 0.4 mm<sup>2</sup>, 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** : 1  
**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

### 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)

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

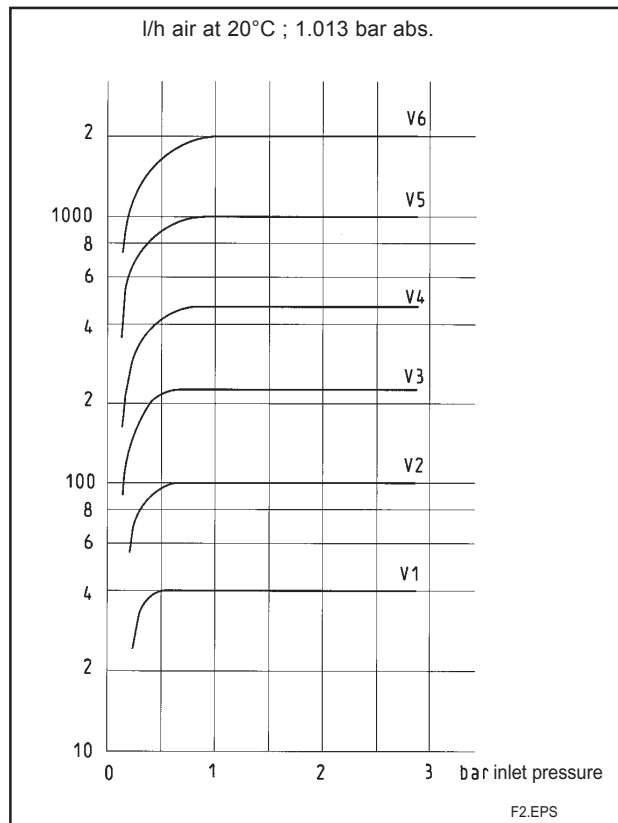
**Max. temperature** : 80°C

**Recommended differential pressure** : > 400 mbar

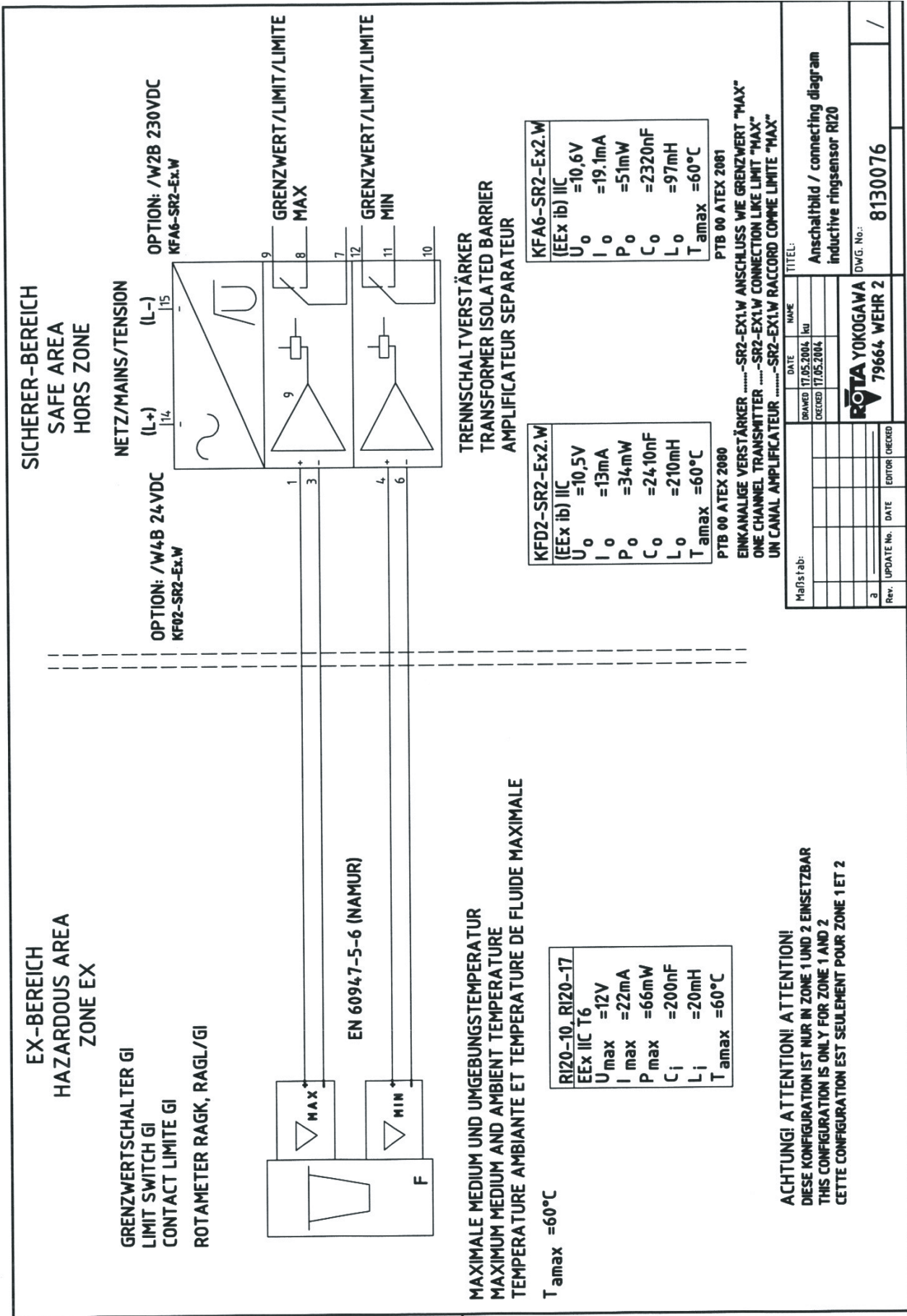
#### Materials

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	Code 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	
¼ inch	RAGL41	T0	-	-	-	PP	PP	NNN; SAE; SBE; SAA; SBA	K6; K7; R7 M6; M7; L6; L7
	RAGL41	R0	-	-	-	PP	PP		
6 mm	RAGL53	-	C0	-	-	SS; ST	PP		
	RAGL53	-	-	P0	-	SS	PP		
	RAGL53	-	-	-	W0	SS	PP		
8 mm	RAGL54	-	C0	P0	-	SS; ST	PP		
	RAGL54	-	-	P0	-	-	-		
	RAGL54	-	-	-	W0	SS	PP		
10 mm	RAGL55	-	C0	-	-	SS; ST	PP		
	RAGL55	-	-	-	W0	SS	PP		
12 mm	RAGL56	-	C0	-	-	SS; ST	PP		
¼ inch	RAGL41	T0	-	-	-	SS	SS		
	RAGL41	R0	-	-	-	SS	SS		
6 mm	RAGL53	-	C0	P0	W0	SS	SS		
8 mm	RAGL54	-	C0	P0	W0	SS	SS		
10 mm	RAGL55	-	C0	-	W0	SS	SS		
12 mm	RAGL56	-	C0	-	W0	SS	SS		
Process connection Inner thread. NPT...	- T0							NNN	
Process connection Inner thread RP.....	- R0								
Cutting ring.....	- C0								
Nozzle.....			- P0						
Swageloc - connection.....				- W0					
Material of process connection	Polypropylene .....					PP			
	1.4571.....					SS			
	Steel.....					ST			
Material of holder	Polypropylene.....						- PP		
	1.4571.....						- SS		
Design	Without valve							SAE SBE SAA SBA	
	With valve		Gasket	Valve seat					
	input		Buna	Silver	.....				
	input		Viton	Silver	.....				
	output		Buna	Silver	.....				
output		Viton	Silver	.....					
The suffix code of the metering tube-float-combination can be read from the flow table.									xxxxx- xxxxx
Options (see separate table).....									/xx

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

Flow table Water 20°C / Liquid				Suffix code metering tube-float-combination							
Recommended comb. Row 1		Alternative comb.. Row 2		Tube			Float				
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	–	–	– X	X	XX	X	– XX	X	X	X
5	3	–	–	K	6	33			B		
4	4	–	–	K	6	34					
6	8	–	–	K	6	37					
10	4	–	–	K	7	41		Row 1 SS; MU 1)	C		
15	5	–	–	K	7	42					
26	6	–	–	K	7	43					
40	5	–	–	K	7	44					
63	8	–	–	K	7	47					
110	10	–	–	K	7	51					
10	4	–	–	R	7	41					
16	4	–	–	R	7	42					
25	5	–	–	R	7	43		SR	C		
40	5	–	–	R	7	44					
63	6	–	–	R	7	47			D		
100	6	–	–	R	7	51					
0.025	1	0.054	2	M	6	13		Row 1 TT; KR			
0.063	2	0.15	3	M	6	17		Row 2 SS; MU 1)	A 3)		
0.16	3	0.36	4	M	6	22					
0.4	1	0.8	2	M	6	24					
1	2	2	3	M	6	31					
1.6	3	2.8	3	M	6	32		Row 1 TT; KR; PD 1)	B		
2.5	4	4	4	M	6	33					
3.5	5	6	8	M	6	35					
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		Row 2 SS; MU 1)	C	L	N
40	5	66	8	M	7	44			D		
63	10	100	10	M	7	47					
0.025	1	0.054	2	L	6	13					
0.04	1	0.074	2	L	6	14		Row 1 TT; KR			
0.063	2	0.15	3	L	6	17			A 3)		
0.1	2	0.23	3	L	6	21					
0.16	3	0.36	4	L	6	22		Row 2 SS; MU 1)			
0.25	4	0.54	5	L	6	23					
0.4	1	0.8	2	L	6	24					
0.63	1	1.2	2	L	6	27					
1	2	2	3	L	6	31		Row 1 TT; KR; PD 1)	B		
1.6	3	2.8	3	L	6	32					
2.5	4	4	4	L	6	33					
4	2	6.3	4	L	7	34					
6.3	2	10	4	L	7	37					
10	3	16	5	L	7	41					
16	4	27	6	L	7	42					
25	5	44	6	L	7	43		Row 2 SS; MU 1)	C		
40	5	66	8	L	7	44					
63	10	110	10	L	7	47			D		
Tube length (type)	75 mm.....			K							
	150 mm.....			M							
	300 mm.....			L							
Tube diameter	10 mm; 17 mm.....				X						
Tube cone	See flow table.....					X					
Tube medium scale	Scale on tube and mm-division..... 2)						G				
	Connection scale and mm- division (recommended)...						A				
	Metering tube with mm- division only.....						N				
Float material	1.4571.....							SS			
	Titanium.....							TT			
	Mumetal (for limit switch /G1; /G2 and /G4).....							MU			
	PVDF (for limit switch /G2 to /G4).....							PD			
	Corundum.....							KR			
	CrNi-ball.....							SR			
Float diameter	1.6 mm to 9 mm.....								X		
Flow mark	Liquid.....									L	
Float insertion	Without magnet.....										N

1) For option limit switch /G1 to /G4

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

T3.EPS

3) 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.

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

Flow table Air 20°C, 1 bar abs. / Gas				Suffix code metering tube-float-combination							
Recommended comb. Row 1		Alternative comb. Row 2		Metering tube				Float			
Max. Flow [l/h]	Pressure-loss *) [mbar]	Max. Flow [l/h]	Pressure-loss *) [mbar]	- X	X	XX	X	- XX	X	X	X
Code	Code	Code	Code	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					
40	1	55	2	K	6	33		Row 1 GL	B		
63	2	85	3	K	6	34		Row 2 TT; KR; PD 1) SS; MU 1)	C		
100	3	140	5	K	6	37			D		
160	2	240	3	K	7	41					
250	2	360	3	K	7	42					
400	2	600	4	K	7	43					
630	3	1 000	4	K	7	44					
1 000	4	1 600	5	K	7	47					
1 600	7	2 500	9	K	7	51					
3 500	10	–	–	K	7	51					
1.9	1	3	2	M	6	13			Row 1 TT; KR	A	
4.4	2	8	3	M	6	17		Row 2 SS; MU 1)			
10	3	17	4	M	6	22					
23	2	36	3	M	6	24		Row 1 TT; KR; PD 1) Row 2 SS; MU 1)	B		
50	2	80	3	M	6	31			C		
70	3	110	4	M	6	32					
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					
1.9	1	3	2	L	6	13		Row 1 TT; KR Row 2 SS; MU 1)	A		
3	1	4.5	2	L	6	14					
4.4	2	8	3	L	6	17					
6.5	2	11	3	L	6	21					
10	3	16	4	L	6	22					
14	4	23	5	L	6	23					
23	2	40	3	L	6	24					
33	2	55	3	L	6	27					
50	2	80	3	L	6	31					
70	3	110	4	L	6	32					
100	4	160	4	L	6	33					
180	3	260	5	L	7	34					
250	3	360	5	L	7	37					
400	3	600	5	L	7	41					
630	4	950	6	L	7	42					
1 000	5	1 500	6	L	7	43					
1 600	5	2 200	8	L	7	44					
2 400	10	3 500	10	L	7	47					
Tube length (Type)	75 mm.....			K							
	150 mm.....			M							
	300 mm.....			L							
Tube diameter	10 mm; 17 mm.....				X						
Tube cone	See flow table.....					X					
Tube medium scale	Scale on tube and mm-division. 2).....						G				
	Connection scale and mm- division (recommended)...						A				
	Metering tube with mm- division only.....										
Float material	1.4571.....							SS			
	Titanium.....							TT			
	Mumetal (for limit switch /GI1; /GI2 to /GI4).....							MU			
	PVDF (for limit switch /GI2 to GI4).....							PD			
	Corundum.....							KR			
	Glas ball.....							GL			
Float diameter	1.6 mm to 9 mm.....								X		
Flow mark	Gas.....									G	
Float insertion	Without magnet.....										N

1) For option limit switch /GI1 bis /GI4

T4.EPS

2) 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.

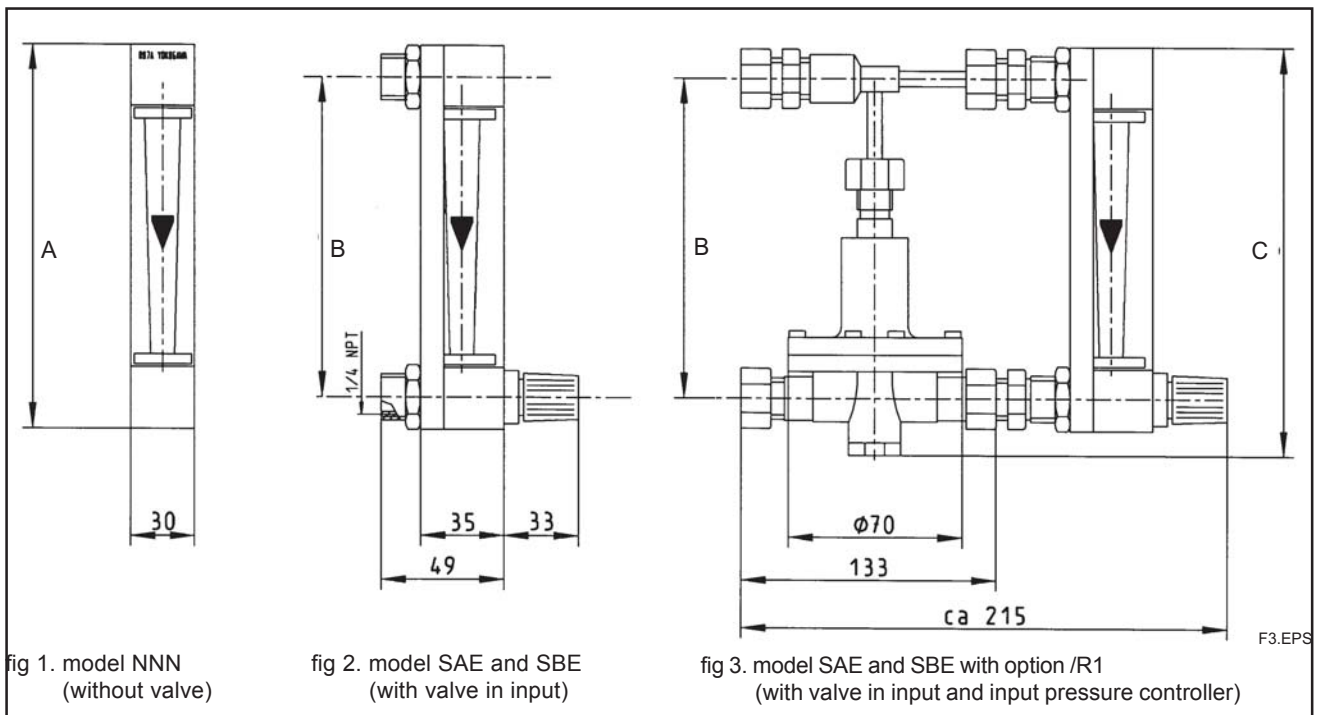
## OPTIONS

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	Bistable inductive ring sensor <sup>1)</sup> Bistable inductive ring sensor <sup>1)</sup> Bistable inductive ring sensor <sup>1)</sup> Bistable inductive ring sensor <sup>1)</sup>	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
Ex-proof type	/KS1	ATEX intrinsically safe "ia"	Only for /GI1 to /GI4
Test and certificates	/H1 /P2 /P3 /PP /PT	Certificate of degree 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	

1) Not delivered with plastic cover

T5.EPS

## DIMENSIONS



F3.EPS

Unit with meter.tube	Dimensions			Weights		
	A [mm]	B [mm]	C [mm]	without valve [kg]	with valve [kg]	Laboratory-Rotameter-Set with case, stand and metering tube
K6 ; K7	125	100	135	0.3	1.0	---
M6 ; M7	200	175	210	0.4	1.1	---
L6 ; L7	350	325	360	0.6	1.3	about 3.5 kg

T6.EPS

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