

General Specifications

Model RAGL Laboratory Glass ROTAMETER

GS 01R01B08-00E-E

This type of Rotameter is designed for measurement of liquids and gases.

The conical glass metering tube has a free rotating float. This metering tube 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.

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



with
K-metering tube

with
M-metering tube

with
L-metering tube

Contents	
Features	page 1
Standard Specifications	page 2
Metrological Regulations in CIS (Gost)	page 2
Option Specifications	page 4
Model Specifications	page 6
Flow Table for Water / Liquids	page 7
Flow Table for Air / Gases	page 8
Options	page 9
Dimensions RAGL	page 10
Dimensions frame for Panel mounting (option /QA)	page 11
Dimensions frame for Panel mounting (option /QB)	page 11
Dimensions foot (/QF)	page 12

STANDARD SPECIFICATIONS

RoHS Directive 2011/65/EU:

RoHS conform according to EN 50581

Measurable flow rates

- Water (20 °C) : 0.002 l/h – 110 l/h
- Air (20 °C; 1 bar abs.): 0.1 l/h – 3500 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	Measuring accuracy acc. VDI/VDE 3513 sheet 2 ($q_g=50\%$)	Measuring accuracy acc. VDI/VDE 3513 sheet 2 ($q_g=100\%$)
R741 - R743	75 mm	6 % (only with ball)	-----
K631 - K743	75 mm	4 % (for ball 6 %)	-----
M613 - M622	150 mm	-----	4 %
M624 - M747	150 mm	2.5 %	-----
L613 - L623	300 mm	-----	2.5 %
L624 - L747	300 mm	1.6 %	-----

Glass metering tube	Length	Flow accuracy full scale
R741 - R743	75 mm	± 6 %
K631 - K743	75 mm	± 4 % (± 6 %)
M613 - M622	150 mm	± 4 %
M624 - M747	150 mm	± 2.5 %
L613 - L623	300 mm	± 2.5 %
L624 - L747	300 mm	± 1.6 %

Material process connection

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

Material of fitting : Polypropylene; 1.4571

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

- With option /MV : PTFE / Viton

Length approx. : 100 mm; 175 mm or 325 mm

Weight : 0.3 – 1.3 kg, depending on design (without stand and controller)

METROLOGICAL REGULATION IN CIS (GOST)

RAGL has “Pattern Approval Certificate of Measuring Instruments” and is registered as a measuring instrument in Russia.

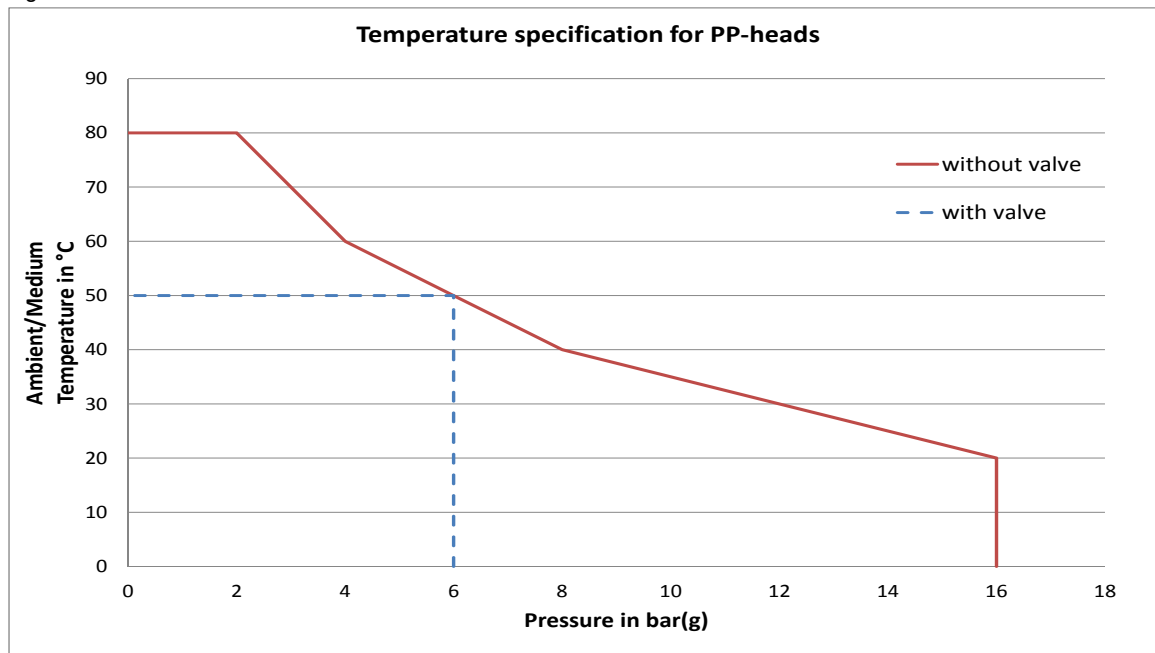
For export to CIS countries please contact your Yokogawa representative.

Max. Temperature (see Figure 1)

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

Max. Pressure (see Figure 1): 16 bar

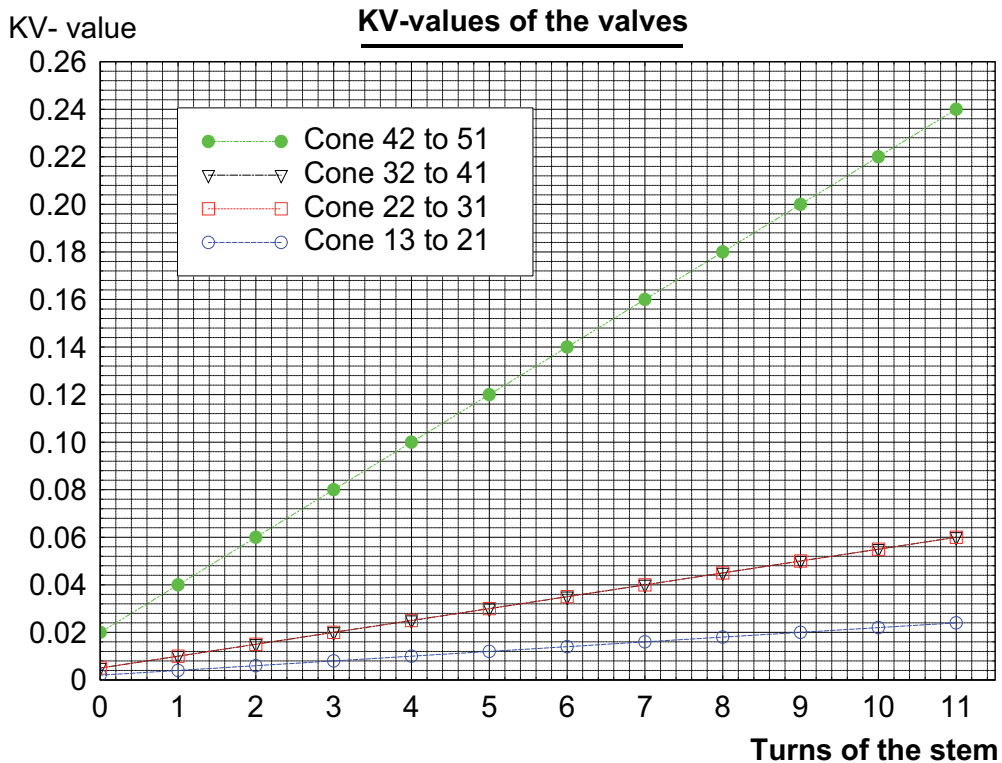
Figure 1:



Design (valve): With or without built-in valve

KV-value of valves (see Figure 2):

Figure 2:



OPTION SPECIFICATIONS

LIMIT SWITCH (OPTION /GR1 – /GR8)

(For floats of Mumetal 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 – 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 – +65 °C not Ex-type
Protection	: IP 67
Electrical connection	: 2 x 0.14 mm ² , with shield 0.4 mm ² , 2 m long

EMC :

EMC compliance according EN 60947-5-2 table 8 (for use in industrial locations). Based on EMC compliance the limit switch is marked with CE, EAC and RCM.

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, /ES1, /NS1):

Temperature range	: -25 °C – +60 °C
Type	: RI20-10K/G or RI20-17K/G
Certificate No.	: PTB 03 ATEX 2111 (/KS1) IECEX PTB13.0023 (/ES1) NEPSI GYJ14.1356 (/NS1)
Protection	: Ex ia IIC T6 Gb

Safety relevant data:

$$U_i = 12 \text{ V}, I_i = 22 \text{ mA}, P_i = 66 \text{ mW},$$

$$L_i = 20 \text{ mH}, C_i = 200 \text{ nF}$$

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 [Ex ia] II C PTB 00 ATEX 2081 (/W1A, /W1B, /W2A, /W2B) PTB 00 ATEX 2080 (/W4A, /W4B) IECEX PTB11.0031 (/W1A, /W1B, /W2A, /W2B) IECEX PTB11.0034 (/W4A, /W4B)

CONTROLLER (OPTION /R1 AND /R3)

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

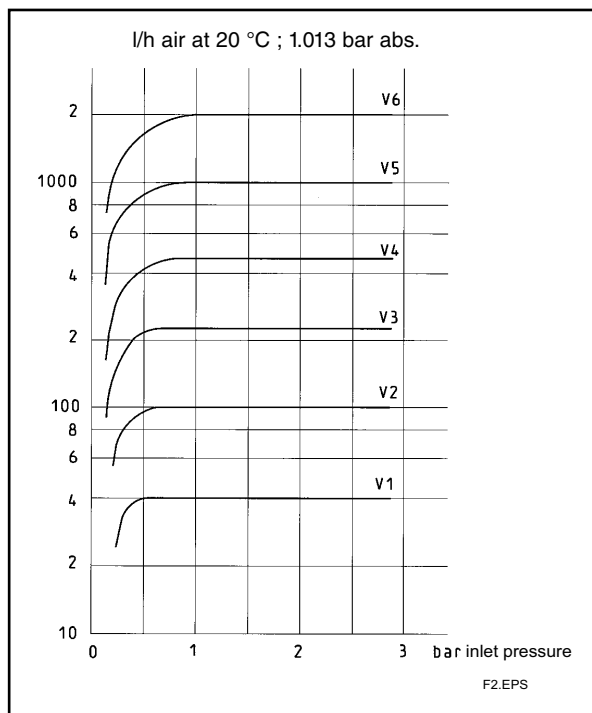
Max. temperature : 80 °C

Recommended differential pressure: > 400 mbar

Materials:

Housing, Tubes, Springs	Membrane
316L/316Ti (1.4404/1.4571)	PTFE

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.

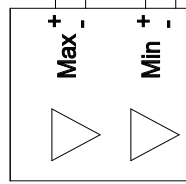
Hazardous Area
Ex- Bereich
Zone Ex

Safe Area
Sicherer Bereich
Hors Zone

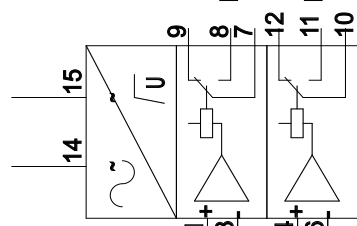
Inductive ring sensor RI20
 Induktiver Ringinitiator RI20
 Bague inductive RI20

Option /W4B 24VDC Mains / Netz / Tension
 KFD2-SR2-Ex2.W Option /W2B 230VAC
 KFA6-SR2-Ex2.W

Rotameter RAGL option /GRx (x = 1 ... 8)



EN 60947-5-6 (Namur)



Maximum medium- and ambient temperature :
 Maximale Mediums- und Umgebungstemperatur :
 Temperature ambiante et temperature de fluide maximale :

Tamax = 60 °C

Transmitter Relay
 Trennschaltverstärker
 Amplificateur Separateur

Limit / Grenzwert / Limite MAX
 Limit / Grenzwert / Limite MIN

RI20-10, RI20-17
Ex ia IIC T6
Ui = 12 V
Ii = 22 mA
Pi = 66 mW
Ci = 200 nF
Li = 20 mH
PTB 03 ATEX 2111X
IECEX PTB.13.0023X
NEPSI GYJ14.1356

KFD2-SR2-Ex2.W
EEx ia / Ib IIC
Uo = 10.5 V
Io = 13 mA
Po = 34 mW
Co = 2410 nF
Lo = 210 mH
PTB 00ATEX 2080
IECEX PTB.11.0034
NEPSI GYJ12.1081

KFA6-SR2-Ex2.W
EEx ia / Ib IIC
Uo = 10.6 V
Io = 19,1 mA
Po = 51 mW
Co = 2320 nF
Lo = 97 mH
PTB 00ATEX 2081
IECEX PTB.11.0031
NEPSI GYJ12.1079

One channel transmitter : ...-SR2-Ex1.W, connection like limit MAX
 Einkanaliger Verstärker : ...-SR2-Ex1.W, Anschluss wie Grenzwert MAX
 Un canal amplificateur : ...-SR2-Ex1.W, raccord comme limite MAX

MODEL SPECIFICATIONS

Process connection diameter	Model	Process connection				Material Process connection	Material Holder	Design (valve)	Metering tube length / diameter
		Inner-thread	Cutting-ring	Nozzle	Swageloc				
	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		
8 mm	RAGL53	-	-	-	W0	SS	PP		
	RAGL54	-	C0	P0	-	SS;ST	PP		
10 mm	RAGL54	-	-	P0	-	-	-		
	RAGL54	-	-	-	W0	SS	PP		
12 mm	RAGL55	-	C0	-	-	SS;ST	PP		
	RAGL55	-	-	-	W0	SS	PP		
¼ inch	RAGL56	-	C0	-	-	SS;ST	PP		
	RAGL41	T0	-	-	-	SS	SS		
6 mm	RAGL41	R0	-	-	-	SS	SS		
	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	
	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							NNN SAE SBE SAA SBA	
	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				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					
2.5	3	-	-	K	6	33					
4	4	-	-	K	6	34			B		
6	8	-	-	K	6	37					
10	4	-	-	K	7	41		row 1 SS;MU ¹⁾	C		
15	5	-	-	K	7	42			D		
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		SR	C		
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			
0.063	2	0.15	3	M	6	17		row 2 SS;MU ¹⁾	A ²⁾		
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	G;A;N; D			L	N
6.3	3	10	5	M	7	37					
10	3	16	5	M	7	41					
16	4	27	6	M	7	42		row 2 SS;MU ¹⁾	C		
25	5	44	6	M	7	43			D		
40	5	66	8	M	7	44					
63	10	100	10	M	7	47					
0.025	1	0.054	2	L	6	13		row 1 TT;KR			
0.04	1	0.074	2	L	6	14		row 2 SS;MU ¹⁾	A ²⁾		
0.063	2	0.15	3	L	6	17					
0.1	2	0.23	3	L	6	21					
0.16	3	0.36	4	L	6	22					
0.25	4	0.54	5	L	6	23					
0.40	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		row 2 SS;MU ¹⁾	C		
16	4	27	6	L	7	42					
25	5	44	6	L	7	43					
40	5	66	8	L	7	44					
63	10	110	10	L	7	47			D		
Tube length (type)	75 mm..... K										
	75 mm..... R										
	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 (recommended)..... G										
	Connection scale ³⁾ A										
	Metering tube with mm-division only..... N										
	Dual scale, scale on tube and connection scale ³⁾⁴⁾ D										
Float material	1.4571..... SS										
	Titanium..... TT										
	Mumetal (for limit switch /GR1,/GI2 and /GR4)..... MU										
	PVDF (for limit switch /GR2 to /GR4)..... 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 /GR1 – /GR8 ²⁾ Max. viscosity is 2 mPas*s ³⁾ Not with option limit switch /GR1 – /GR8
⁴⁾ With option /PT mm- scale on tube and product scale connected ^{*)} 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 Yokogawa Flow Configurator.

FLOW TABLES WITH METERING TUBE- FLOAT COMBINATION FOR AIR / GAS

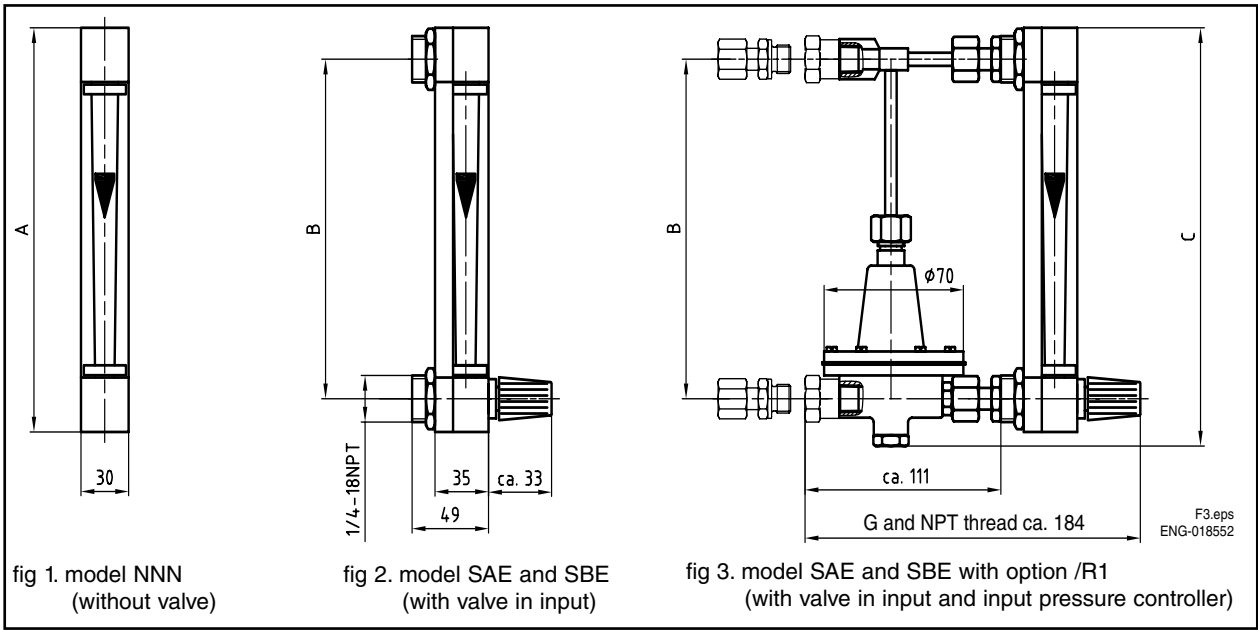
Flow table				Suffix code metering tube-float-combination								
Air 20 °C, 1 bar abs./Gas				Metering tube				Float				
Recommended comb. row 1		Recommended comb. row 2		-X	X	XX	X	-XX		X	X	X
Max. Flow [l/h]	Pressure-loss *) [mbar]	Max. Flow [l/h]	Pressure-loss *) [mbar]	Length Code	Diameter Code	Tube cone Code	Scale Code	Material Code row 1	Material Code row 2	Diameter Code	Flow mark Code	Insertion Code
16	1	25	2	K	6	31	G;A;N D	GL	TT; KR; PD ¹⁾	B	G	N
40	1	55	2	K	6	33						
63	2	85	3	K	6	34						
100	3	140	5	K	6	37						
160	2	240	3	K	7	41						
250	2	360	3	K	7	42						
400	2	600	4	K	7	43						
630	3	1000	4	K	7	44						
1000	4	1600	5	K	7	47						
1600	7	2500	9	K	7	51						
3500	10	-	-	K	7	51						
1.9	1	3	2	M	6	13						
4.4	2	7	3	M	6	17						
10	3	17	4	M	6	22						
23	2	36	3	M	6	24						
50	2	80	3	M	6	31						
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						
1000	5	1400	6	M	7	43						
1600	5	2200	8	M	7	44						
2400	10	3300	10	M	7	47						
1.9	1	3	2	L	6	13						
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						
1000	5	1500	6	L	7	43						
1600	5	2200	8	L	7	44						
2400	10	3500	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.....					XX						
Tube medium scale	Scale on tube (recommended)..... Connection scale ²⁾ Metering tube with mm-division only..... Dual scale, scale on tube and connection scale ²⁾³⁾						G A N D					
Float material	1.4571..... Titanium..... Mumetal (for limit switch /GR1, /GR2 and /GR4)..... PVDF (for limit switch /GR1 to /GR4)..... Corundum..... Glass ball.....							SS TT MU PD KR GL				
Float diameter	1.6 mm to 9 mm.....									X		
Flow mark	Gas.....										G	
Float insertion	Without magnet.....											N

¹⁾ For option limit switch /GR1 – /GR8 ²⁾ Not with option limit switch/GR1 – /GR8
³⁾ With option /PT mm- scale on tube and product scale connected
*) 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 Yokogawa Flow Configurator.

OPTIONS

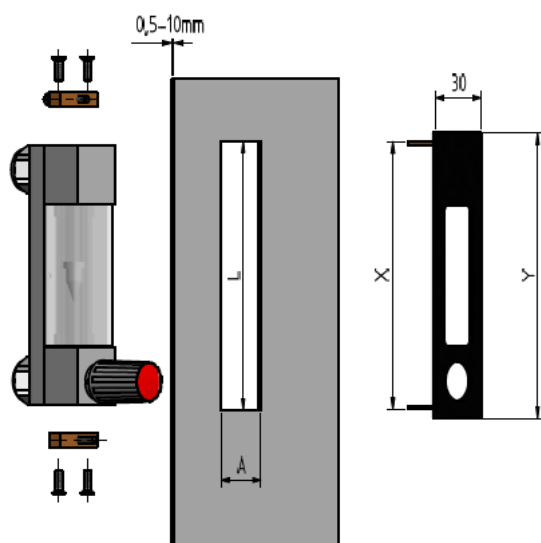
Options	Option code	Description	Restrictions
Marking	/B1 /B4 /BG	Tag plate (SS) Neutral version Customer specific notes on scale	Plate 12 x 40 mm; max. 45 digits
Limit switches	/GR1 /GR2 /GR3 /GR4 /GR5 /GR6 /GR7 /GR8	Bistable inductive ring sensor Bistable inductive ring sensor Bistable inductive ring sensor Bistable inductive ring sensor 2 bistable inductive ring sensors (2 x /GR1) 2 bistable inductive ring sensors (2 x /GR2) 2 bistable inductive ring sensors (2 x /GR3) 2 bistable inductive ring sensors (2 x /GR4)	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 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 /ES1 /NS1	ATEX intrinsically safe „ia“ IECEX intrinsically safe „ia“ NEPSI intrinsically safe „ia“	Only for /GR1 – /GR8 Only for /GR1 – /GR8 Only for /GR1 – /GR8; only with /CN
Test and certificates	/H1 /P2 /P3 /PP /PT	Oil and fat free for wetted surface acc. to Yokogawa specification 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 Flow table for recalculation (with mm-scale for D scale)	Not with /R1 or /R3 Only for N and D scale
Accessories metering tube	/MV	Viton PTFE-gasket and Viton O-ring	Not for valve with Buna gasket.
Accessories float stops	/S1	Spring stops made of SS 1.4571	
Accessories	/QA /QB /QF	Frame for panel mounting With tapped holes in the connecting heads for mounting Foot stand	Not with /GR1 – /GR8 Only for SS holder material
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)	
Delivery to Korea	/KC	With KC-mark in Korea	
Delivery to China	/CN	For delivery to China	
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-Ex1.W /230 V AC, 2 channels KFD2-SR2-Ex1.W /24 V DC, 1 channel KFD2-SR2-Ex2.W /24 V AC, 2 channels	
Special order	/Z	Special design, must be specified separately. If /Z is selected, several Suffix of Model-Suffix Code can be changed to Z.	

DIMENSIONS RAGL



Metering tube	Dimensions in mm			Weight in kg		
	A	B	C	without controller	with controller	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

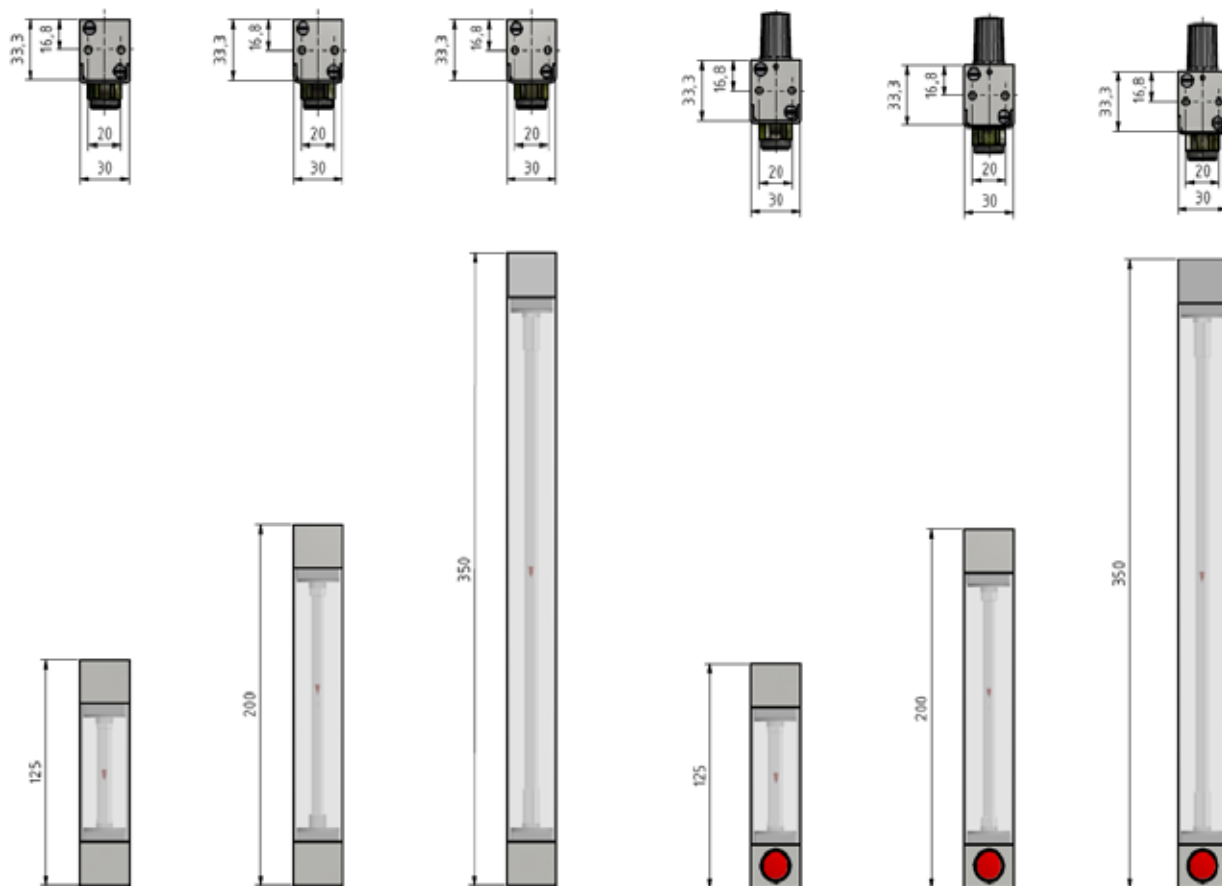
DIMENSIONS (OPTION /QA)



Dimensions in mm

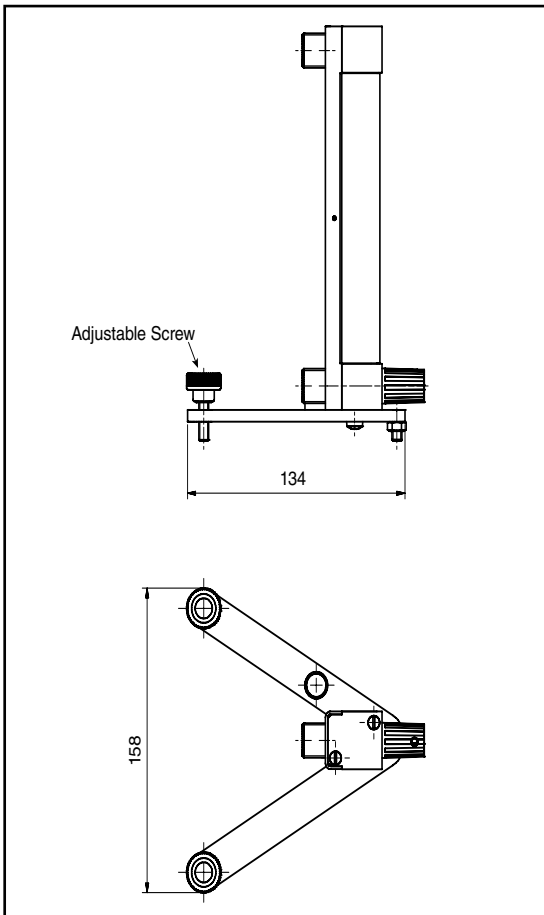
	A ±0.5	L ±0.5	X	Y
K- metering tube	31	128.3	128.3	136
M- metering tube	31	203.3	203.3	211
L- metering tube	31	353.3	353.3	361

DIMENSIONS WITH TAPPED HOLES IN THE CONNECTING HEADS FOR MOUNTING (OPTION /QB)



Dimensions in mm

DIMENSIONS FOOT STAND (OPTION /QF)



Dimensions in mm

<p>YOKOGAWA ELECTRIC CORPORATION World Headquarters 9-32, Nakacho 2-chome, Musashino-shi Tokyo 180-8750 Japan www.yokogawa.com</p>	<p>YOKOGAWA ELECTRIC ASIA Pte. LTD. 5 Bedok South Road Singapore 469270 Singapore www.yokogawa.com/sg</p>	<p>Yokogawa has an extensive sales and distribution network. Please refer to the European website (www.yokogawa.com/eu) to contact your nearest representative.</p>
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