

General Specifications

Model RAGN Glass ROTAMETER

GS 01R01B10-00E-E

The Rotameter RAGN is designed for continuous flow measurement of liquids and gases.

The fluid passes through the metering tube from bottom to top and consequently needs to be installed vertically with flow direction upwards. The conical glass metering tube includes a free rotating float which provides self stabilization. The actual flow is indicated by the top of the float and can be directly read from the scale on the metering tube.

Features:

- All stainless steel design
- Turnable splinter shield
- Designed for aggressive applications
- Easy to install and maintain
- Wide measuring range selection for gases and liquids
- Low pressure loss
- Easy to read scale
- Optional limit switches with connection box
- FMEDA report available for SIL applications

Applications:

- Visual fluid monitoring
- Industrial gas measurement
- Controlling of water circuits



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STANDARD SPECIFICATIONS

RoHS Directive 2011/65/EU

RoHS conform according to EN 50581

Fluids to be measured : Liquids and gas

Measurable flow rates :

- Water (20 °C) : 0.002 l/h – 10 m3/h
- Air (20 °C; 1 bar abs.) : 0.1 l/h – 160 m3/h

Turndown:

- P metering tube : 10:1
- L metering tube : 20:1

Metering tubes : L6; L7; P0; P1; P2; P4 (length 300 mm)

Process temperature : -25 °C – 100 °C

Process pressure :

Metering tube	L6;L7	P0;P1	P2	P4
Pmax (bar)	16	10	8	6

Installation length:

Process connection	Thread	Clamp	Flange
Length [mm]	375	375	425

Weight : Depending on design (see page 7)

Accuracy:

Tube	Measuring accuracy acc. Directive VDI/VDE 3513 sheet 2 ($q_a = 50\%$)
L613 - L623	2.5 %
L624 - L747	1.6 %
P051 - P471	1.6 %

Materials:

- Threads G, NPT : AISI 316L (1.4404)
- Flange EN / ASME : AISI 316L (1.4404)
- Clamp ISO 2852 : AISI 316L (1.4404)
- Housing : AISI 304 (1.4301)
- Nut : AISI 316 (1.4401)
(or galvanized steel)
- Stoppers (L6, L7 tube) : PFA
- Stoppers (P0 - P4 tube) : PVDF, AISI 316L (1.4404)
- Measuring cone : Borosilicate glass
- Float (L6, L7 tube) : Titanium, PVDF
- Float (P0 - P4 tube) : PTFE, PVDF (FDA conform),
AISI 316Ti (1.4571)
- Gaskets : NBR, FKM, EPDM (FDA conform)

Pressure Equipment Directive (PED) Directive 2014/68/EU:

- Models : RAGN04, RAGN05, RAGN06
- Tubes:
 - Modul : A
 - Fluid Group : 1 (liquid, gases)
 - Produced acc. to category : I

FDA-Conformity:

- RAGN with P- ube, PVDF- or SS- float and EPDM- gaskets (option /ME).
- Stoppers and floats made of PVDF: 21 CFR § 177 2510(a)
- O-rings made of EPDM: 21 CFR § 177 2600-21

Following IEC 61508:

- RAGN with Read-switch (/GM1 – /GM5)
Suitable for application in safety functions up to and including SIL1.
- RAGN with Ring Initiator (/GR2 – /GR5)
Suitable for application in safety functions up to and including SIL1.
- Details see FMEDA report.

Following ISO 13849-1:

- Safety Metrics available for:
- RAGN with Read-switch (/GM1 – /GM5)
- RAGN with Ring Initiator (/GR2 – /GR5)
- Details see FMEDA report.

OPTION SPECIFICATIONS

Limit switch (option /GM1 – /GM5):

- (for P- tubes with PVDF- or SS- float with magnet only)
- Type : reed contact with bistable switching
 - Max. switching voltage : 230 V
 - Max. switching current : 2 A
 - Max. switching capacity: 40 W/VA
 - Temperature range : -10 °C – +70 °C
 - Protection : IP65
 - Internal capacity : 0 nF
 - Internal inductivity : 0 mH
 - Electrical connection : LIYY 2 x 0.34 mm²; length 1 m
 - Housing : Polystyrene
 - Weight : 35 g
 - Explosion proof :
 - Intrinsic safe acc. EN 60079-11 chapter 5.7,
 - IEC 60079-11 chapter 5.7 and ANSI/ISA 60079-11 chapter 5.7 as "Simple Apparatus".
 - Group : IIC
 - Category : 2G
 - Temperature class: T6
 - Entity parameter : $U_i = 15\text{ V}$; $I_i = 50\text{ mA}$; $P_i = 187\text{ mW}$
 $L_i \approx 0\text{ mH}$; $C_i \approx 0\text{ nF}$

Limit switch (option /GR2 – /GR8):

- (for L- tubes with PVDF float only)
- Type : Bistable inductive ring sensor
 - Power supply : 4.5 V – 15 V DC
 - Consumption : acc. DIN EN 60947-5-6 (NAMUR)
 - Float below ring sensor: < 1 mA
 - Float above ring sensor: > 2.2 mA
 - Temperature range : -25 °C – +65 °C non-Ex- type
 - Protection : IP 67
 - Electrical connection : 1 x 0.14 mm² , with shield 0.4 mm²,
2 m long

EMC Compliance:

- 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.
- 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 type (option /KS1, /ES1, /NS1):

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

Taiwan Safety label:

Registration Document:
 ML0412007043A3
 Option /ES1 must be selected.
 For export to Taiwan please contact
 your Yokogawa representative
 regarding Taiwan Safety Label

Safety relevant data (see also certificate for data):

Ui = 12 V, Ii = 22 mA, Pi = 66 mW,
 Li = 20 mH, Ci = 200 nF

CE-marking:



Power supply for limit switch (option /W□□)

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

- KFA5-SR2-Ex*-W (115 V AC), * = 1 or 2
- KFA6-SR2-Ex*-W (230 V AC), * = 1 or 2
- KFD2-SR2-Ex*-W (24 V DC), * = 1 or 2
- KHA6-SH-Ex1 (115/230 V AC), Fail Safe, 1 channel
- KFD2-SH-Ex1 (24 V DC), Fail Safe, 1 channel

Power supply:

- 230 V AC ± 10 %, 45-65 Hz
- 115 V AC ± 10 %, 45-65 Hz
- 24 V DC ± 25%

Relay output:

1 or 2 potential-free changeover contact(s)

Switching capacity:

max. 250 V AC, max. 2 A

Explosion proof: Intrinsic safe [Ex ia] IIC

PTB 00 ATEX 2081 (/W1A, /W1B, /W2A, /W2B)
 PTB 00 ATEX 2080 (/W4A, /W4B)
 PTB 00 ATEX 2042 (/W4E, /W4F)
 PTB 00 ATEX 2043 (/W2E, /W2F)
 IECEx PTB11.0031 (/W1A, /W1B, /W2A, /W2B)
 IECEx PTB11.0034 (/W4A, /W4B)

Note: For safety applications with options /GM□ fail safe power supply option /W2E, /W2F, /W4E or /W4F must be selected.

METROLOGICAL REGULATION IN CIS (GOST)

RAGN 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.

MODEL SPECIFICATIONS

Model	Suffix code	Description	Restrictions
RAGN01 RAGN23 RAGN02 RAGN04 RAGN05 RAGN06		Size DN 15 (½ inch) Size ¾ inch Size DN 25 (1 inch) Size DN 40 (1½ inch) Size DN 50 (2 inch) Size 2½ inch	for D4, A1, G0, T0, S4 with L6, L7, P0, P1 for G0, T0 with L6, L7, P0, P1 for D4, A1, G0, T0, S4 with L6, L7, P0, P1, P2 for D4, A1, G0, T0 with P2, P4 for D4, A1, with P2, P4; for G0, T0 with P4 for G0, T0 with P4
Process connection	-D4 -A1 -G0 -T0 -S4	EN flange PN 40, process connection dimension + facing acc. EN 1092-2 Form B1 ASME flange class 150, process connection dimension + facing acc. ASME B 16.5 Inner thread G Inner thread NPT Clamp ISO 2852	
Material of process connections	SS	Stainless steel	
Metering tube ¹⁾	-L -P	L-tube (300 mm) P-tube (300 mm)	
Diameter of metering tube ¹⁾	6 7 0 1 2 4	10 mm 17 mm 20 mm 34 mm 48 mm 81 mm	
Cone ¹⁾	13 14 17 21 22 23 24 27 31 32 33 34 37 41 42 43 44 47 51 52 53 54 57 61 62 63 64 67 71		
Float material ¹⁾	-SS -PF -PD -TT	1.4571 / AISI 316 Ti PTFE PVDF Titanium	
Diameter of float ¹⁾	A B C D 0 1 2 4	1.59 mm 3.18 mm 6.35 mm 9.53 mm 12.2 (P0-float) mm 21.6 (P1-float) mm 31.2 (P2-float) mm 54.1 (P4-float) mm	
Medium / Float factor ¹⁾	L G 2 3 6 7	For liquid For gas For water (factor 0.63) For water (factor 1) For air (factor 16) For air (factor 22-24)	
Float insertion ¹⁾	N M	Without magnet With magnet	

¹⁾ Combinations see tables on page 5 and 6

FLOW TABLE WITH METERING TUBE-FLOAT-COMBINATION FOR WATER / LIQUIDS

Flow table		Suffix code metering tube - float- combination							
Water / liquids 20 °C		Metering tube			Float				
Max. Flow in l/h	Pressure loss in mbar	-x	x	xx	-xx	x	x	x	
		Length	Diameter	Cone	Material	Diameter	Flow mark Code	Insertion Code	
		Code	Code	Code	Code	Code	Code	Code	
0.025	1	L	6	13	TT	A ¹⁾	L	N	
0.04	1	L	6	14					
0.063	2	L	6	17					
0.1	2	L	6	21					
0.16	3	L	6	22					
0.25	4	L	6	23					
0.4	1	L	6	24	TT;PD	B	L		
0.63	1	L	6	27					
1	2	L	6	31					
1.6	3	L	6	32					
2.5	4	L	6	33					
4	2	L	7	34					
6.3	2	L	7	37					
10	3	L	7	41					
16	4	L	7	42					
25	5	L	7	43					
40	5	L	7	44					
63	10	L	7	47					
63	10	P	0	51	PD	0	2		M
100	16	P	0	52					
100	16	P	0	51	SS	0	3		M ²⁾ ; N
160	24	P	0	52					
160	15	P	1	53	PD	1	2		M
250	16	P	1	54					
400	18	P	1	57					
630	26	P	1	61					
250	15	P	1	53	SS	1	3	M ²⁾ ; N	
400	16	P	1	54					
630	18	P	1	57					
1000	26	P	1	61					
1000	11	P	2	62	PD	2	2	M	
1600	13	P	2	63					
1600	26	P	2	62	SS	2	3	M ²⁾ ; N	
2500	30	P	2	63					
2500	16	P	4	64	PD	4	2	M	
4000	18	P	4	67					
6300	21	P	4	71					
4000	40	P	4	64	SS	4	3	M ²⁾ ; N	
6300	44	P	4	67					
10000	53	P	4	71					
	Description								
Length metering tube	300 mm	P							
	300 mm	L							
Diam. metering tube	10 mm – 81 mm		x						
Cone metering tube	See flow table			xx					
Float material	1.4571				SS				
	Titanium				TT				
	PTFE				PF				
	PVDF				PD				
Float diameter	1.6 mm to 54 mm					x			
Flow mark	For liquid						L		
	For water						2		
	For water						3		
Float insertion	Without magnet							N	
	With magnet							M ²⁾	

¹⁾ Max. viscosity 2 mPas*s

²⁾ For option limit switch /GM1 – /GM5

FLOW TABLE WITH METERING TUBE-FLOAT-COMBINATION FOR AIR / GASES

Flow table		Suffix code metering tube - float- combination								
Air/Gases 20 °C, 1 bar abs		Metering tube			Float					
Max. Flow in l/h	Pressure loss in mbar	-x	x	xx	-xx	x	x	x		
		Length Code	Diameter Code	Cone Code	Material Code	Diameter Code	Flow mark Code	Insertion Code		
1.9	1	L	6	13	TT	A	G	N		
3	1	L	6	14						
4.4	2	L	6	17						
6.5	2	L	6	21						
10	3	L	6	22						
14	4	L	6	23						
23	2	L	6	24	PD;TT	B	G			
33	2	L	6	27						
50	2	L	6	31						
70	3	L	6	32						
100	4	L	6	33						
180	3	L	7	34		C	G			
250	3	L	7	37						
400	3	L	7	41						
630	4	L	7	42						
1000	5	L	7	43	D	G				
1600	5	L	7	44						
2400	10	L	7	47	PF	0	6			
1600	4	P	0	51						
2500	6	P	0	52			PD		7	M ¹⁾
2400	8	P	0	51						
3800	11	P	0	52	PD	1	7		M ¹⁾	
6000	6	P	1	53						
9300	7	P	1	54						
14500	8	P	1	57						
23000	10	P	1	61						
400	5	P	1	53	PF	1	6	N		
6300	5	P	1	54						
10000	6	P	1	57						
16000	8	P	1	61						
35000	11	P	2	62	PD	2	7	M ¹⁾		
55000	13	P	2	63						
25000	8	P	2	62	PF	2	6	N		
40000	10	P	2	63						
88000	29	P	4	64	PD	4	7	M ¹⁾		
140000	32	P	4	67						
220000	34	P	4	71						
63000	13	P	4	64	PF	4	6	N		
100000	14	P	4	67						
160000	17	P	4	71						
	Description									
Length metering tube	300 mm	P								
	300 mm	L								
Diam. metering tube	10 mm – 81 mm		x							
Cone metering tube	See flow table			xx						
Float material	Titanium				TT					
	PTFE				PF					
	PVDF				PD					
Float diameter	1.6 mm to 54 mm					x				
Flow mark	For gas						G			
	For air						6			
	For air						7			
Float insertion	Without magnet							N		
	With magnet							M ¹⁾		

¹⁾ For option limit switch /GM1 – /GM5

OPTIONS

Options	Code	Description	Restriction
Marking	/B1	Tag plate (SS)	Plate 12 x 40 mm; max. 45 digits Not with /KS1 Max. 45 digits Only for tube P
	/B4	Neutral version	
	/BG	Customer specific notes on name plate	
	/B10	Percentage scale	
	/B11	Measuring tube without yellow background	
	/BD	Dual scale	
Limit switches	/GM1	Magnetic MIN-contact	Only for tube P0 to P4 and float insertion code M (with magnet) Only for tube P0 to P4 and float insertion code M (with magnet) Only for tube P0 to P4 and float insertion code M (with magnet) Only for tube P0 to P4 and float insertion code M (with magnet) Only for tube P0 to P4 and float insertion code M (with magnet) Only for tube P0 to P4 and float insertion code M (with magnet) Only for tube L6 with float code PDB Only for tube L7 with float code PDC Only for tube L7 with float code PDD Only for tube L6 with float code PDB Only for tube L7 with float code PDC Only for tube L7 with float code PDD Only with /GM1 – 2, /GR2 – 4 Only with /GM3 – 5, /GR6 – 8
	/GM2	Magnetic MAX-contact	
	/GM3	Magnetic MIN-MAX-contact	
	/GM4	Magnetic MIN-MIN-contact	
	/GM5	Magnetic MAX-MAX-contact	
	/GR2	Bistable inductive ring sensor	
	/GR3	Bistable inductive ring sensor	
	/GR4	Bistable inductive ring sensor	
	/GR6	2 bistable inductive ring sensors	
	/GR7	2 bistable inductive ring sensors	
	/GR8	2 bistable inductive ring sensors	
	/GD1	Connection box for 1 limit switch	
	/GD2	Connection box for 2 limit switches	
Ex-proof type	/KS1	ATEX intrinsically safe „ia“	Only for /GR2 – /GR8 Only for /GR2 – /GR8 Only for /GR2 – /GR8; only with /CN
	/ES1	IECEx intrinsically safe „ia“	
	/NS1	NEPSI intrinsically safe „ia“	
Installation lengths (s. also table on page 7)	/L12	Installation length 500 mm	Only for D4, A1 Only for size 01 and G0, T0 Only for size 01, 23, 02 and G0, T0 Only for size 02, 04 and G0, T0 Only for size 05, 06 and G0, T0
	/L13	Installation length 356 mm	
	/L14	Installation length 368 mm	
	/L15	Installation length 386 mm	
	/L16	Installation length 394 mm	
Valves (inner thread, double fitting is attached, not for FDA)	/V1	Valve made of 1.4571 G ½" (parts attached)	Only for G0 and tube L6, L7, P0 Only for G0 and tube P1 Only for G0 and tube P2 Only for G0 and tube L6, L7, P0 Only for G0 and tube P1 Only for G0 and tube P2
	/V2	Valve made of 1.4571 G 1" (parts attached)	
	/V3	Valve made of 1.4571 G 1½" (parts attached)	
	/V4	Valve made of brass G ½" (parts attached)	
	/V5	Valve made of brass G 1" (parts attached)	
	/V6	Valve made of brass G 1½" (parts attached)	
Test and certificates	/H1	Oil + fat free for wetted surfaces acc. Yokogawa specification	Not with /V1 – /V6 Only for insertion and flange connections Not with /V1 – /V6 Only for connections G0, T0, S4 except RAGN04-G0SS-P2 and RAGN04-T0SS-P2 Only for connections A1, D4 and RAGN04-G0SS-P2 and RAGN04-T0SS-P2
	/P2	Certificate of Compliance with the order acc. EN 10204: 2004- 2.1	
	/P3	As /P2 +Test report acc. to EN 10204: 2004- 2.2	
	/P6	Material certificate for Insertion parts or flange connections acc. EN 10204: 2004- 3.1	
	/PP	Pressure test report for metering system	
	/PT	With flow table for recalculation + mm- scale	
	/PM2	PAMI test (2 test points)	
/PM4	PAMI test (4 test points)		
Delivery to Korea	/KC	With KC-mark in Korea	
Delivery to China	/CN	For delivery to China	
Accessories for metering tube	/MV	Gasket FKM (Viton)	not for S4 and RAGN04 with P2
	/ME	Gasket EPDM (conform to FDA, -30 °C – +100 °C)	
	/MN	Nut galvanized steel	
Power supply for limit switches (transmitter relay)	/W1A	KFA5-SR2-Ex1.W / 115 V AC, 1 channel	not with /GR2 – /GR8 not with /GR2 – /GR8 not with /GR2 – /GR8 not with /GR2 – /GR8
	/W1B	KFA5-SR2-Ex2.W / 115 V AC, 2 channel	
	/W2A	KFA6-SR2-Ex1.W / 230 V AC, 1 channel	
	/W2B	KFA6-SR2-Ex2.W / 230 V AC, 2 channel	
	/W2E	KHA6-SH-Ex1 / 115/230 V AC, 1 channel, Fail Safe	
	/W2F	2x KHA6-SH-Ex1 / 115/230 V AC, 1 channel, Fail Safe	
	/W4A	KFD2-SR2-Ex1.W / 24 V DC, 1 channel	
	/W4B	KFD2-SR2-Ex2.W / 24 V DC, 2 channel	
Instruction manuals	/IE	Quantity of instruction manuals in English	n = 1 – 9 selectable *) n = 1 – 9 selectable *)
	/ID	Quantity of instruction manuals in German	
	/Z	Special design, must be specified separately.	
		If /Z is selected, several Suffix of Model-Suffix Code can be changed to Z.	
Special order	/Z	Special design, must be specified separately.	

*) If no instruction manual is selected, only a Short IM and in case of limit switches a DVD with instruction manuals is shipped with the flowmeter.

PROCEDURE TO SELECT THE MODEL CODE

Please specify in the following order

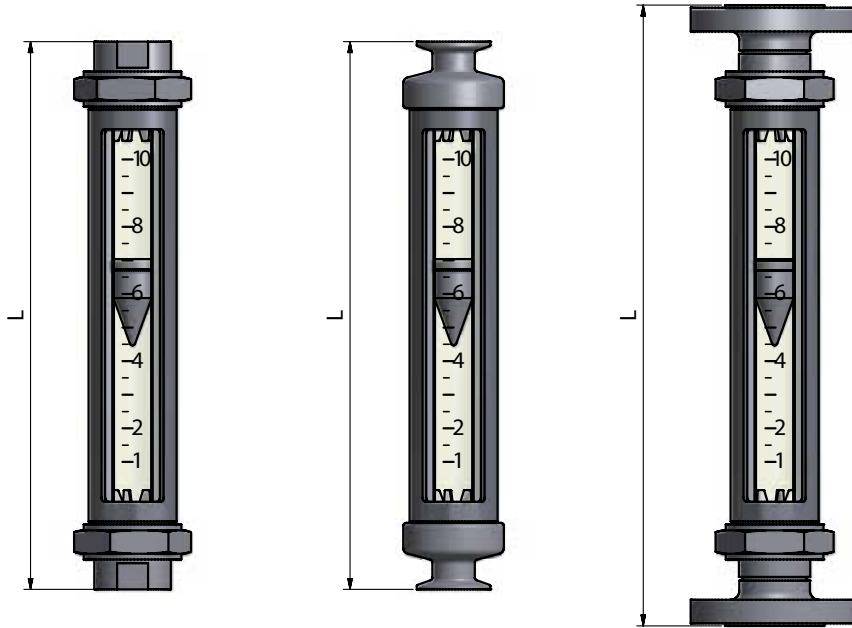
- Measuring range for water/liquid or air/gas
- With or without optional limit switch

First select the required measuring range from the flow table (last column) and specify the float insertion for the optional limit switch. Then the suffix code for the combination metering tube - float can be fixed.

To size the Rotameter for other media or process conditions, please contact one of our Yokogawa Representatives.

DIMENSIONS

METERING TUBE



Inner thread type (T0; G0)

Clamp type (S4)

Flange type (D4; A1)

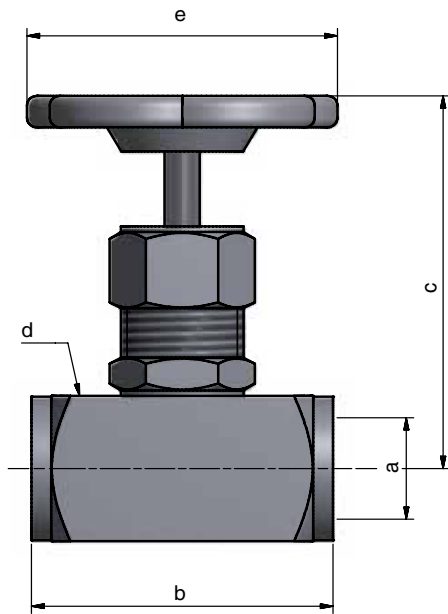
Installation lengths and weights:

Model	Process connection	Tube	Length L in mm	Weight in kg	
RAGN01	Inner thread	L6; L7; P0; P1	375	1.7	
	Clamp		375	1.9	
	Flange		425	2.5	
RAGN23	Inner thread		375	1.7	
RAGN02	Inner thread	L6; L7; P0; P1	375	1.7	
		P2		2.6	
	Clamp	L6; L7; P0; P1		2.0	
		P2		2.8	
	Flange	L6; L7; P0; P1		425	3.3
		P2			3.9
RAGN04	Inner thread	P2	375	2.6	
		P4		7.1	
	Flange	P2	425	5.2	
		P4		8.7	
RAGN05	Inner thread	P4	375	7.1	
	Flange	P2	425	6.6	
		P4		11.1	
RAGN06	Inner thread	P4	375	7.1	

Compatibility with former Rotameter RAGG / RAGH:

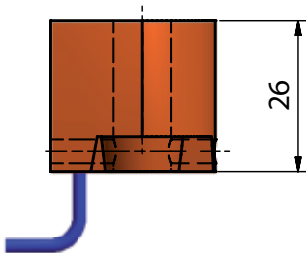
Former model	Tube	Installation length in mm	Model RAGN
RAGH01	L6;L7;G0	356	RAGN01..../L13
RAGH02	G1	368	RAGN02..../L14
RAGH04	G2	386	RAGN04..../L15
RAGH06	G4	394	RAGN06..../L16
RAGH23	G1	368	RAGN23..../L14
RAGH05	G4	394	RAGN05..../L16
RAGG01	G0;G1	500	RAGN01..../L12
RAGG02	G2	500	RAGN02..../L12
RAGG04	G4	500	RAGN04..../L12

VALVE /Vx

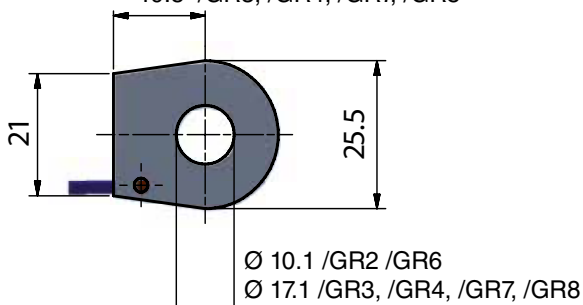


Option	a	b	c	d	e	KV value
	Thread	mm	mm	mm	mm	m ³ /h
/V1	G 1/2"	60	88	SW 30	63	0.66
/V2	G 1"	100	110	SW 45	90	2.2
/V3	G 1 1/2"	130	145	SW 70	100	17
/V4	G 1/2"	55	78	SW 25	63	0.66
/V5	G 1"	75	93	SW 41	63	2.2
/V6	G 1 1/2"	110	118	SW 60	90	17

LIMIT SWITCH /GRx

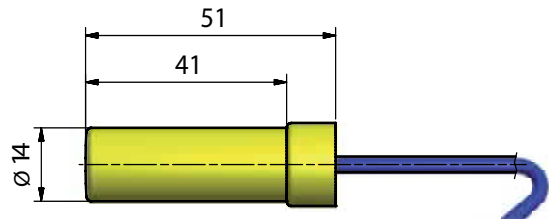


16 /GR2, /GR6
19.5 /GR3, /GR4, /GR7, /GR8



Dimensions in mm

LIMIT SWITCH /GMx



Dimensions in mm



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