General Specifications

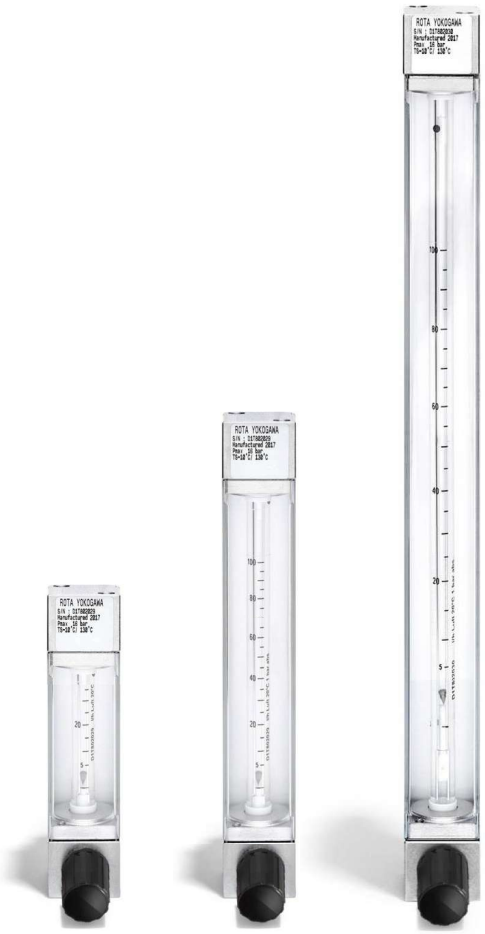
ROTA***METER*** RAGL
Glass Variable Area Flowmeter

GS 01R01B08-00E-E

Rotameter RAGL is designed for the measurement of clean liquids and gases.
The conical glass metering tube has a free rotating float. The Rotameter 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 a scale on the measuring tube or from an attached scale.

The glass tube of the RAGL is exchangeable without removing the meter from its installation.

Long glass tubes allow good reading for more resolution and accurate measurement.



with K-tube | with M-tube | with L-tube

FEATURES

- Large selection of measuring ranges
- High repeatability by a 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 regulation valve
- Optional limit switches
- Easy and fast glass tube replacement possible

Typical Applications

- Transparent liquids
- Low viscous liquids
- Gases

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YOKOGAWA

Rota Yokogawa GmbH & Co. KG
Rheinstr. 8
D-79664 Wehr
Germany

GS 01R01B08-00E-E

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15th edition, July 2024 (RYG)

STANDARD SPECIFICATIONS

RoHS Directive 2011/65/EU, 2015/863/EU:
RoHS conform according to EN IEC 63000

WEEE
Rota Yokogawa GmbH & Co. KG is registered at „Stiftung EAR“ as manufacturer of electronic devices.
WEEE-Reg.Nr. DE 93847364.

Intended use (for UAE):
Rotameter RAGK flow meter is specifically designed to both be installed and function within:
- large scale fixed installations
- means of transport for persons or goods, excluding electric two-wheel vehicles which are not type approved.

Measurable flow rates:
- Water, 20 °C (68 °F): 0.002 l/h to 110 l/h (0.0005 gph to 29 gph)
- Air, 20 °C (68 °F); 1 bar abs.: 0.2 l/h to 3500 l/h (0.05 gph to 951 gph)

Max. viscosity 2 mPas*s
The measureable flow rates are depending from density and viscosity of the fluid. To find the fluid specific measuring range please use the Yokogawa FlowConfigurator: www.FlowConfigurator.com.

Measuring range:
- K-, M-tube: ≈10:1
- L-tube: ≈20:1

For the exact range see the Yokogawa Sizing Software www.FlowConfigurator.com.

Measuring tubes:
K6xx; M6xx; L6xx; K7xx; M7xx; L7xx
K, M, L: length code
6, 7: diameter code
xx: cone code

Table 1: Measuring 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 %)
K631 - K743	75 mm	4 % (for ball 6 %)	-----
M613 - M622 M624 - M747	150 mm 150 mm	----- 2.5 %	4 % -----
L613 - L623 L624 - L747	300 mm 300 mm	----- 1.6 %	2.5% -----

For detailed accuracy calculation please use the Yokogawa FlowConfigurator: www.FlowConfigurator.com.
The accuracy is given under calibration conditions. For liquid service it has to be taken into account, that the indication is viscosity dependent and the accuracy can only be kept if the temperature is constant.

Calibration conditions:
Air, 18 °C to 25 °C (64.4 °F to 77 °F)
atmospheric pressure

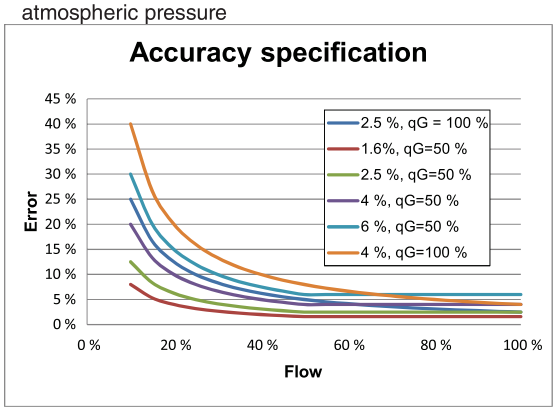


Fig. 1 Accuracy specification overview

Process and ambient temperature:
- Head material stainless steel(SS): -20 °C to 130 °C (-4 °F to 266 °F)
- Head material polypropylene(PP): 0 °C to 80 °C (32 °F to 176 °F)
- Scale G, N, D, F: max. 100 °C (212 °F)
- Scale with option /IB: max. 130 °C (266 °F)
- With option /GR□: -20 °C to 65 °C (32 °F to 149 °F)
- With option /NBR: -20 °C to 100 °C (-4 °F to 212 °F)
- With option /R1 or /R3: -20 °C to 80 °C (-4 °F to 176 °F)
- With option /KC1: -20 °C to 100 °C (-4 °F to 212 °F)

Material wetted parts:
SS is 1.4404/316L, 1.4571/316 Ti or 1.4408
- **Process connection:**
  - female thread: PP; SS

  The threads are directly machined in the head.
  - Cutting ring: SS
  - Nozzle for hose connection: SS
  - Swagelok® connection: SS
- **Heads:** PP; SS
- **O-rings in case of valves**:
  - standard: FPM (Viton)
  - option /NBR: NBR (Perbunan)
  - option /Kal: FFKM (Kalrez)
- **Glass:** Borosilicate 3.1
- **Floats:** SS, titan, glass ball, mu-metal, PVDF, aluminum oxide, SS ball, PVDF
- **Valve:** SS spindle, PTFE spindle seal, silver seat

  Valves are plug -in valves
- **Float stopper:**
  - standard: PTFE
  - option /S1: SS
- **Protection cover**: Polycarbonate
- **Valve knob:** Polyamide

Tube sealing: PTFE

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Installation length:
- with K-tubes: 100 mm (3.94")
- with M-tubes: 175 mm (6.9")
- with L-tubes: 325 mm (12.8")

Pressure loss: 2 mbar to 18 mbar at the float (0.029 psi to 0.261 psi)

The pressure loss at the float is given by the FlowConfigurator: www.FlowConfigurator.com.
Valves will create additional pressure loss.

Weight: see table 4

Attached scale:
Made from hard plastic material with milled letters black in white, for high visibility.
Limit switches are not possible with attached scale.

Marking:

ROTA YOKOGAWA
S/N: D1L123456
Manufactured: 2019.08
PS: 16 bar
TS: -10°C/+130°C
RAGL

FIC 1102

Fig. 2: Example of name plate

APPROVALS IN EAEU AND CIS COUNTRIES

Eurasian Conformity (EAC)
RAGL with options /GR□ complies to applicable Technical Regulations valid in EAEU countries Kazakhstan, Armenia and Kyrgyzstan.
- TR CU 004
- TR CU 020

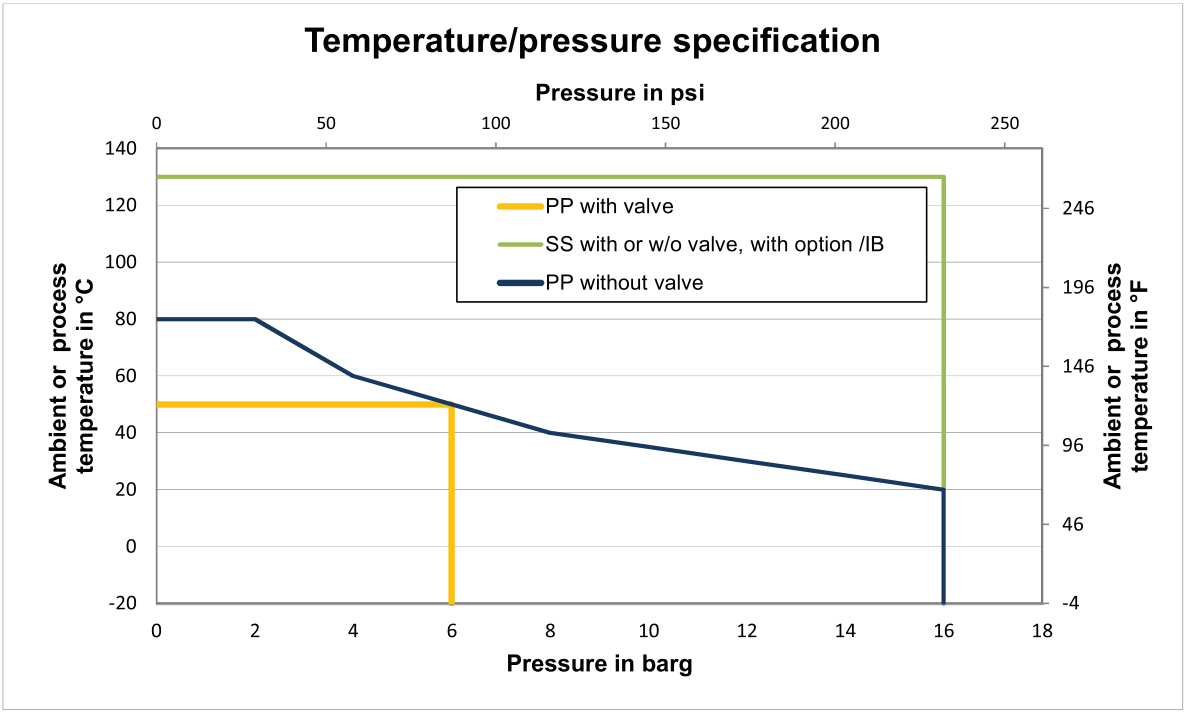


Fig.3: Temperature/pressure specification

Further temperature restrictions are applicable in case of option /NBR, /R1 and /R3.

Table 2: Kv_s and Cv_s value of the valves

Cone	13 to 21	22 to 41	42 to 47	52 to 57
Kv_s	0.024 m^3/h	0.06 m^3/h	0.24 m^3/h	1.125 m^3/h
Cv_s	0.028 gpm	0.07 gpm	0.28 gpm	1.316 gpm

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LIMIT SWITCH, option /GR1 to /GR8

With limit switches no protection cover for the tube is provided.

Floats:

- Mumetal (MU) or PVDF (PD)
- Qmin > 0.004 l/h water or 0.3 l/h air
  (Qmin > 0.001 gph water or 0.076 gph air)

Type:

Bistable inductive ring sensor to be used with the appropriate power supply

Power supply:	4.5 V to 15 V DC
Current levels:	acc. DIN EN 60947-5-6
Temperature range:	-20 °C to +65 °C (-4 °F to 149 °F)
Protection:	IP 67
Electrical connection:	2 x 0.14 mm², with shield 0.4 mm², 2 m (78") long

EMC compliance:

According to 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 mark.

Hazardous area use (option /KS1, /ES1):

Temperature range: -20 °C to +60 °C
(-4 °F to 140 °F)

Certificate No.:

- PTB 03 ATEX 2111 (/KS1)
- IECEx PTB13.0023 (/ES1)
- ECAS 24-05-111620/E24-05-115195/NB0010 (/ES1)

Protection: Ex ia IIC T6 Gb

Safety relevant input Parameter:

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

CE-marking: CE 0344 Ex II 2 G

Option /KS1 includes non-electrical Ex h, data see /KC1.

Markings on the label of the limit switch:
CE, EAC, China RoHS, RCM, Morocco

POWER SUPPLY FOR LIMIT SWITCHES, option /W□A and /W□B

Type:
Acc. to EN 60947-5-6
- 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

Alternative for AC types:
- KFU8-SR-Ex*.W (90 to 253 V AC); * = 1 or 2

Power supply:
- 230 V AC ± 10 %, 45 to 65 Hz
- 115 V AC ± 10 %, 45 to 65 Hz
- 24 V DC ± 25 %

Alternative for AC types:
- 90 to 253 V AC 50 to 60 Hz

Relay output:
- 1 or 2 potential-free change over contact(s)
- Switching capacity: Max. 250 V AC, max. 2 A

POWER SUPPLY FOR INTRINSICALLY SAFE LIMIT SWITCHES, option /W□A and /W□B

Type:
Acc. to EN 60947-5-6
Standard:
- 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

Alternative for AC types:
- KFU8-SR-Ex*.W (90 to 253 V AC); * = 1 or 2

Power supply:
- 250 V AC ± 10 %, 45 to 65 Hz
- 115 V AC ± 10 %, 45 to 65 Hz
- 24 V DC ± 25 %

Alternative for AC types:
- 90 to 253 V AC 50 to 60 Hz

Relay output:
- 1 or 2 potential-free change over contact(s)
- Switching capacity: Max. 250 V AC, max. 2 A

Approvals:
- KFA5-SR2-Ex*.W:
  ATEX: PTB 00 ATEX 2081
  IECEx: IECEx PTB11.0031
- KFA6-SR2-Ex*.W:
  ATEX: PTB 00 ATEX 2081
  IECEx: IECEx PTB11.0031
- KFU8-SR-Ex*.W:
  ATEX: FIDI 22 ATEX 0029X
  IECEx: IECEx FIDI 22.0003X
- KFD2-SR2-Ex*.W:
  ATEX: PTB 00 ATEX 2080
  IECEx: IECEx PTB11.0034

Entity parameters and marking:
See certificates

HAZARDOUS AREA APPROVAL FOR COMPLETE MECHANICAL RAGL

ATEX registrated RAGL, option /KC1

Archive No.: IBExU 096/24

Explosion proof:
- II2G Ex h IIC T6...T5 Gb
- II2D Ex h IIIC T100°C Db (w/o controller)
- II2D Ex h IIIC T80°C Db (with controller)

Ambient- / process- temperature:
- -20 °C to +100 °C (-4 °F to 212 °F) (w/o controller)
- -20 °C to +80 °C (-4 °F to 176 °F) (with controller)

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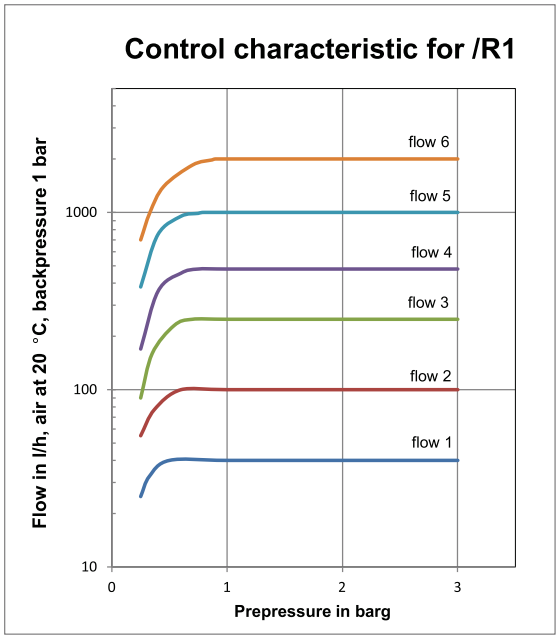
FLOW CONTROLLER, option /R1 and /R3
Flow regulator for constant flow in case of variations in process pressure.
These are no valves to reduce the pressure.

- **Flow Controller /R1 for liquids and gases**
  The regulator keeps the flow rate constant in case of a variable inlet pressure and constant back pressure. For gases the process conditions are the back conditions. The inlet pressure should be minimum 400 mbar larger than the back pressure (see Fig.3).
- **Flow Controller /R3 for gases with fluctuations of the back pressure and constant inlet pressure.**
  The process conditions are the inlet conditions. The inlet pressure should be minimum 400 mbar larger than the back pressure.

Max. liquid flow: 100 l/h (26.4 gph)
Max. gas flow: 3250 l/h (858.56 gph)
Max. pressure: 25 bar (362.6 psi)
Temperature range: -20 °C to +80 °C
(-4 °F to 176 °F)

Table 3: Material of the controllers

	Housing	Diaphragm	Springs
/R1 or /R3	SS	PTFE	SS



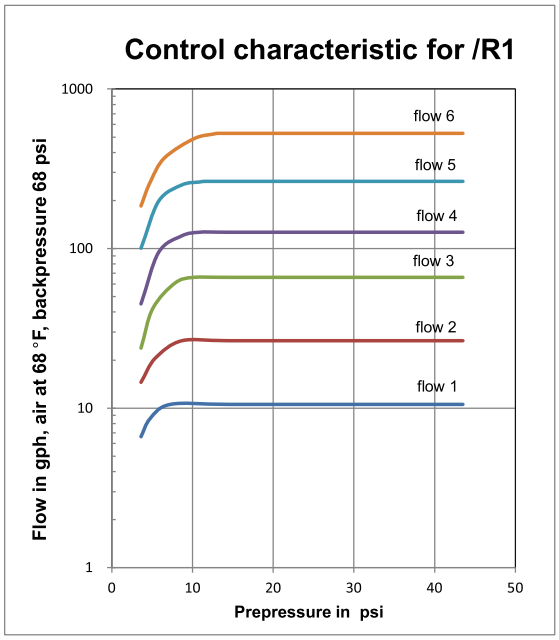


Fig. 4 Control characteristic for /R1

The above curves show the control characteristic of the inlet flow regulator /R1 with air for 6 different flowrates, each with fixed valve position, back pressure 1 bar (14.5 psi) (atmosphere conditions).
For the smallest flowrate the regulation works best from 0.4 bar (5.8 psi) to 3 bar (43.5 psi) (or more) inlet pressure change, for the largest flowrate from 0.9 bar (13 psi) to 3 bar (43.5 psi) (or more).

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MODEL SPECIFICATIONS

Model	Suffix code	Description	Restrictions
RAGL41		Model name	
Process connections	-T0	Internal thread ¼" NPT	
	-R0	Internal thread ¼" Rp	
Material process connections and heads	PP-PP	Polypropylene head	
	SS-SS	Stainless steel head	
Valve	NNN	Without valve	
	SV1	Inlet valve, silver seat	
	SV2	Outlet valve, silver seat	
Tube length	-K	75 mm (2.95")	
	-M	150 mm (5.91")	
	-L	300 mm (11.8")	
Tube diameter	6	10 mm (0.39") *)	
	7	17 mm (0.67") *)	
Tube cone combination	XX	*)	
Fluid scale	G	Fluid specification sticker scale on tube, recommended	Tmax = 100 °C (212 °F)
	A	Fluid specification attached scale, blank tube	Not with /GR□, Tmax = 100 °C (212 °F)
	N	mm scale, sticker scale on tube	Tmax = 100 °C (212 °F)
	D	Dual scale: G and A	Not with /GR□, Tmax = 100 °C (212 °F)
	F	Dual scale: N and A	Not with /GR□, Tmax = 100 °C (212 °F)
Float material	-AL	Float aluminum	*)
	-GL	Ball glass, black	For gases only *)
	-KR	Sintered float Al_2O_3, red	*)
	-MU	Float mumetal	*)
	-PD	Float PVDF, milky white	*)
	-SR	Ball SS	For liquids only *)
	-SS	Float SS	*)
	-TT	Float titan	*)
Float diameter	A	1.6 mm (0.06")	*)
	B	3.2 mm (0.13")	*)
	C	6.3 mm (0.25")	*)
	D	9.5 mm (0.37")	*)
Flow mark	L	Liquid	*)
	G	Gas	*)
Float insertion	N	Standard	

*)To be determined with the FlowConfigurator

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OPTIONS

Options	Option code	Description	Restrictions
Marking	/B1	Tag plate(SS) fastened with wire, plate: 12 x 40 mm; marking must be provided by the customer	max. 45 characters
	/BG	Customer specific notes	
Process adapters as added part	/C01	Cutting ring in SS for 6 mm outer diameter tubes	Only for RAGL41-T0
	/C02	Cutting ring in SS for 8 mm outer diameter tubes	Only for RAGL41-T0
	/C03	Cutting ring in SS for 10 mm outer diameter tubes	Only for RAGL41-T0
	/C04	Cutting ring in SS for 12 mm outer diameter tubes	Only for RAGL41-T0
	/P01	Nozzle in SS, for flexible hoses inner diameter 6 mm	Only for RAGL41-R0
	/P02	Nozzle in SS, for flexible hoses inner diameter 8 mm	Only for RAGL41-R0
	/W01	Swagelok® in SS for 6 mm outer diameter tubes	Only for RAGL41-T0
	/W02	Swagelok® in SS for 8 mm outer diameter tubes	Only for RAGL41-T0
	/W03	Swagelok® in SS for 10 mm outer diameter tubes	Only for RAGL41-T0
	/W04	Swagelok® in SS for 12 mm outer diameter tubes	Only for RAGL41-T0
Limit switches	/GR1	Bistable inductive ring sensor	Only for float MU A□N
	/GR2	Bistable inductive ring sensor	Only for float PD B□N or MU B□N
	/GR3	Bistable inductive ring sensor	Only for float PD C□N
	/GR4	Bistable inductive ring sensor	Only for float MU C□N, MU D□N, PD D□N
	/GR5	2 bistable inductive ring sensors (2 x /GR1)	Only for float MU A□N, not for K-tube
	/GR6	2 bistable inductive ring sensors (2 x /GR2)	Only for float PD B□N or MU B□N, not for K-tube
	/GR7	2 bistable inductive ring sensors (2 x /GR3)	Only for float PD C□N, not for K-tube
	/GR8	2 bistable inductive ring sensors (2 x /GR4)	Only for float MU C□N, MU D□N, PD D□N, not for K-tube
Hazardous area app.	/KS1	ATEX intrinsically safe “ia“	Only for /GR1 to /GR8
	/KC1	ATEX non-electrical Ex h	Material process connections and heads only stainless steel, not with /NBR
	/ES1	IECEx intrinsically safe “ia“	Only for /GR1 to /GR8
Scale	/IB	Scale imprinted on the tube and burned in	Not for scale A, T max = 130 °C (266 °F), must with /KC1
Tests and certificates	/H1	Oil and fat free for wetted surface acc. to Yokogawa specification	Not with /R1, /R3
	/P2	Certificate of compliance with the order acc. to EN 10204: 2004-2.1	
	/P3	As /P2 + Test report acc. to EN 10204: 2004-2.2	
	/PP	Pressure test report for measuring system	
	/PT	Flow table for recalculation to other fluid	Only for N and F scale, fluid data must be provided not for L-tubes
O-Rings	/NBR	NBR O-rings for valve (if ordered)	Temperature range: -20 °C to 100 °C (-4 °F to 212 °F)
	/KAL	Kalrez O-rings for valve (if ordered)	Tmax = 130 °C (266 °F)
Alternative float stop	/S1	Float spring stops made of SS 1.4571	
Accessories	/QP	Means for panel mounting	not for devices with /R1, /R3
	/QB	With tapped holes in the connecting heads for mounting	
	/QF	Foot stand	
	/QC	Colored caps for valve knob (red, blue, yellow, green)	Only with valve
Controller	/R1	Flow regulator for alternating pre-pressure	Only with SS-head, only with inlet valve
	/R3	Flow regulator for alternating back-pressure	Only with SS-head, only with outlet valve, only for gases
Country specific delivery	/KC	KC-mark for Korea	
	/CN	China RoHS mark	Only with option /GR□
Power supply	/W1A	115 V AC, 1 channel	For /GR1 to GR4
	/W1B	115 V AC, 2 channel	For /GR5 to GR8
	/W2A	230 V AC, 1 channel	For /GR1 to GR4
	/W2B	230 V AC, 2 channel	For /GR5 to GR8
	/W4A	24 V DC, 1 channel	For /GR1 to GR4
	/W4B	24 V DC, 2 channel	For /GR5 to GR8
Special order	/Z	Customer specific design, must be specified separately. If /Z is selected, several suffix of Model Code can be changed to Z.	

By use of the FlowConfigurator www.FlowConfigurator.com restrictions are automatically taken into account.

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DIMENSIONS AND WEIGHTS

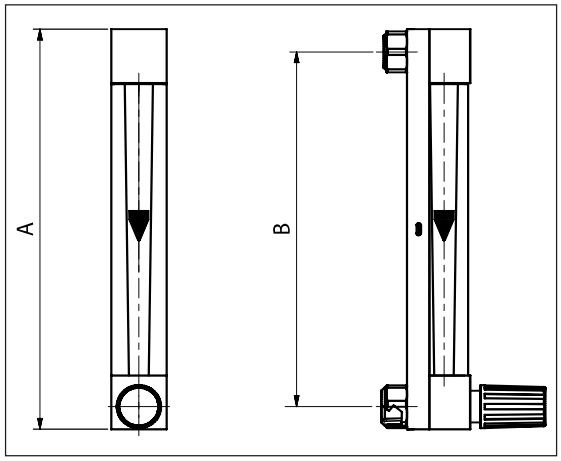


Fig. 5 RAGL with valve

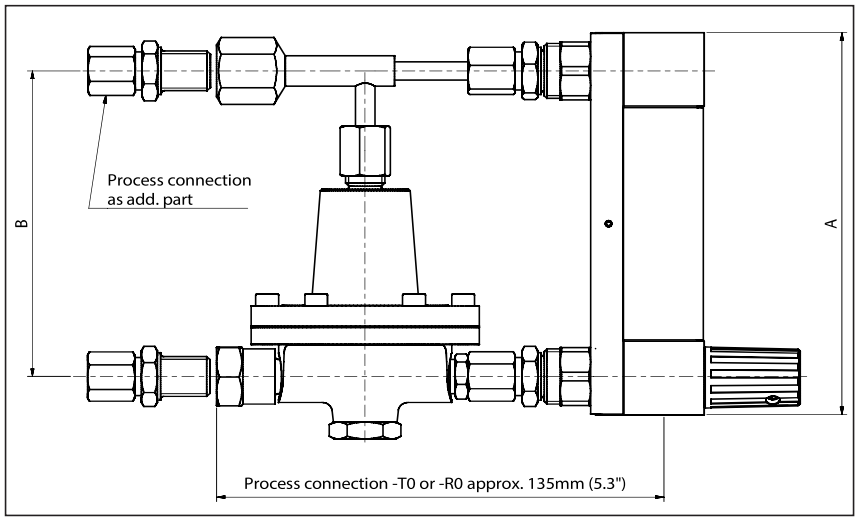


Fig. 6 Version with inlet valve and inlet flow controller option /R1

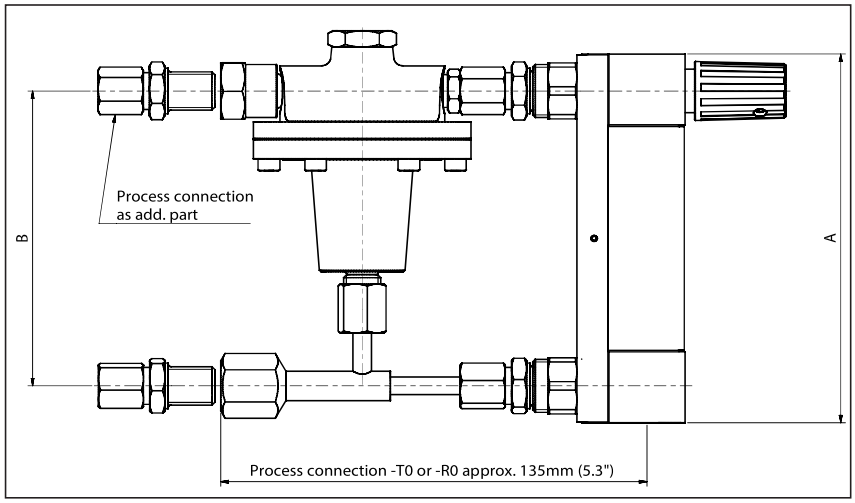


Fig. 7 Version with outlet valve and outlet flow controller option /R3

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Table 4: Weights and dimensions

Model	Dimensions in mm (inch)		Weight in g (lbs)		
	A	B	w/o controller PP	w/o controller SS	with controller SS
RAGL41 with K6□□/K7□□	125 (4.92")	100 (3.93")	230 (0.51)	505 (1.11)	1225 (2.7)
RAGL41 with M6□□/M7□□	200 (7.87")	175 (6.89")	265 (0.58)	550 (1.21)	1270 (2.8)
RAGL41 with L6□□/L7□□	350 (13.78")	325 (12.8")	350 (0.77)	640 (1.41)	1360 (3.0)

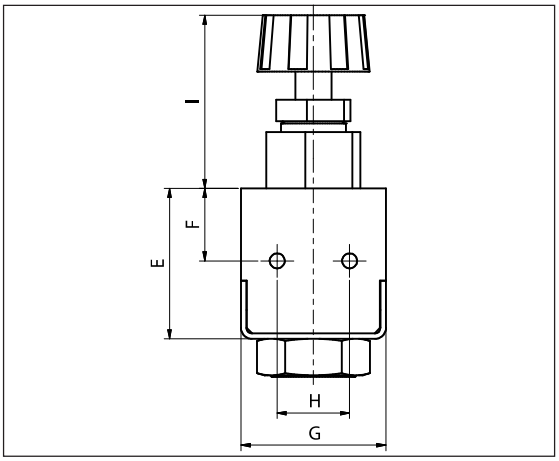


Fig. 8 Head dimensions (with or w/o valve) with tapped holes for option /QB

Table 5: Dimensions of heads

	Dimensions in mm (inch)					Drill hole diameter in mm
Measuring tube	E	F	G	H	I	
all	33.3 (1.31")	16.8 (0.66")	30 (1.18")	20 (0.79")	33 (1.3")	3 (M3 screw)

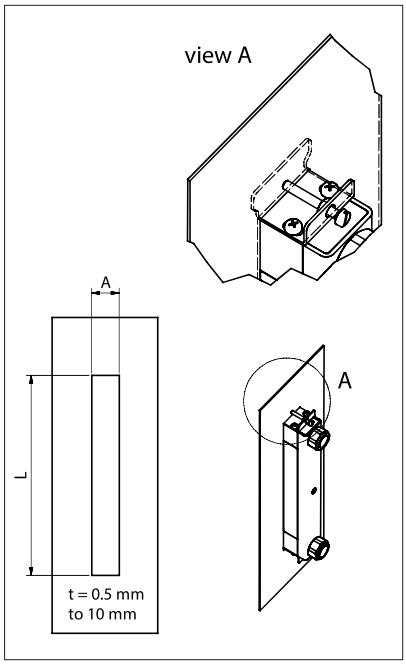


Table 6: Slot dimensions in the panel

	Dimensions in mm (inch)	
Measuring tube	A	L
K	31 (1.22)	128.3 (5.05)
M	31 (1.22)	203.3 (8)
L	31 (1.22)	353.3 (13.9)

Fig. 9 Option /QP, means for panel mounting

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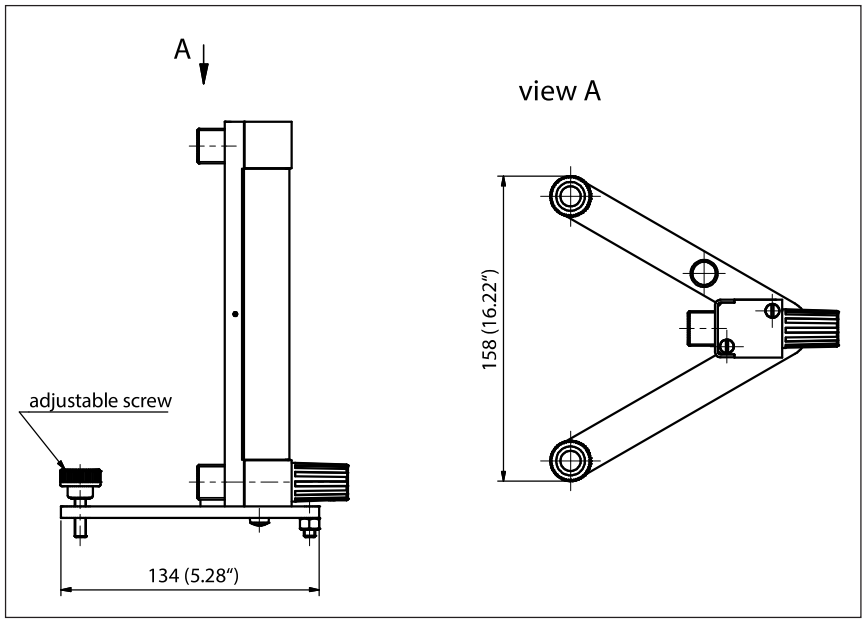


Fig. 10 Option /QF, foot stand, dimensions in mm (inch)

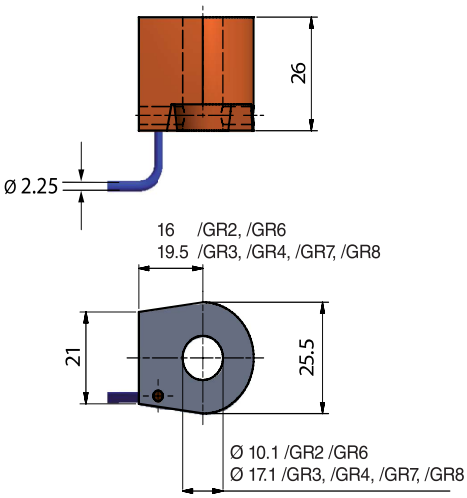


Fig. 11 Option /GR□, dimensions in mm

Identification:

The product has a QR Code pasted for efficient plant maintenance work and as-set information management. It enables confirming the specifications of purchased products and user's manuals. For more details, please refer to the following URL. (https://www.yokogawa.com/qr-code)

REGISTERED TRADEMARKS

Rotameter® is a trademark of Rota Yokogawa GmbH & Co. KG, a subsidiary of Yokogawa Electric Corporation, Japan.
In the United Kingdom Rotameter™ is a trademark of Brooks Instrument. LLC

Swagelok®: Registered trademark of Swagelok Company, Solon, Ohio, USA

Manufacturer:

Rota Yokogawa GmbH & Co. KG
Rheinstr. 8
D-79664 Wehr
Germany

For the actual manufacturing location of your device refer to the model code and/or serial number.

QUALITY SYSTEM CERTIFICATION
DNV
ISO 14001
ISO 45001
ISO 9001
ISO/IEC 27001

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