

General Specifications

Model RAGK Small Glass ROTAMETER

GS 01R01B07-00E-E

Rotameter RAGK 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.

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

Typical Applications

- Transparent liquids
- Low viscous liquids
- Gases

Contents

Features	page 1
Standard Specifications	page 2
Model Specifications	page 6
Options	page 7
Dimensions and weights	page 8



RAGK41 with K-tube
without valve with valve



RAGK41 with M-tube
without valve with valve

STANDARD SPECIFICATIONS

RoHS Directive 2011/65/EU:

RoHS conform according to EN 50581

Measurable flow rates:

- Water, 20 °C (68 °F):
0.002 l/h to 630 l/h
(0.0005 gph to 166 gph)
- Air, 20 °C (68 °F), 1 bar abs.:
0.2 l/h to 6300 l/h
(0.05 gph to 1664 gph)

The measurable 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: ≈10:1

Measuring tubes: K6xx; M6xx; K7xx; M7xx; M3xx
K, M: length code
6, 7, 3: 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	150 mm	-----	4 %
M624 - M747	150 mm	2.5 %	-----
M352 - M357	150 mm	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

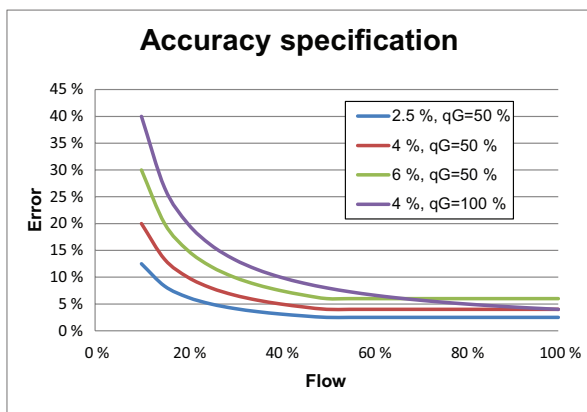


Fig. 1 Accuracy specification overview

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□ or /GM□: 0 °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)

Material wetted parts:

SS is 316L (1.4404), 316 Ti (1.4571) 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:

- 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, PP, PVDF
- Valve: SS spindle, PTFE spindle seal, RAGK41 with silver seat, RAGK42 with PTFE seat

Vales are plug -in valves

• Float stopper:

- standard: PTFE
- option /S1: SS

• Protection cover:

Polycarbonate

• Valve knob:

Polyamide

Installation length:

- with K-tubes: 90 mm (3.54")
- with M -tubes: 165 mm (6.5")
- RAGK42: 175 mm (6.89")

Pressure loss:

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

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:



Fig. 2: Example of name plate

APPROVALS IN EAEU AND CIS COUNTRIES

Eurasian Conformity (EAC)

RAGK with options /GR□ complies to applicable Technical Regulations valid in EAEU countries Russia, Belarus, Kazakhstan, Armenia and Kyrgyzstan.

- TR CU 004
- TR CU 020

Pattern Approval certificate of Measuring Instruments

RAGK has "Pattern Approval Certificate of Measuring Instruments"

and is registered as a measuring instrument in Russia.

Option /QR: Primary verification approval with technical passport

For export to other CIS countries please contact your Yokogawa representative.

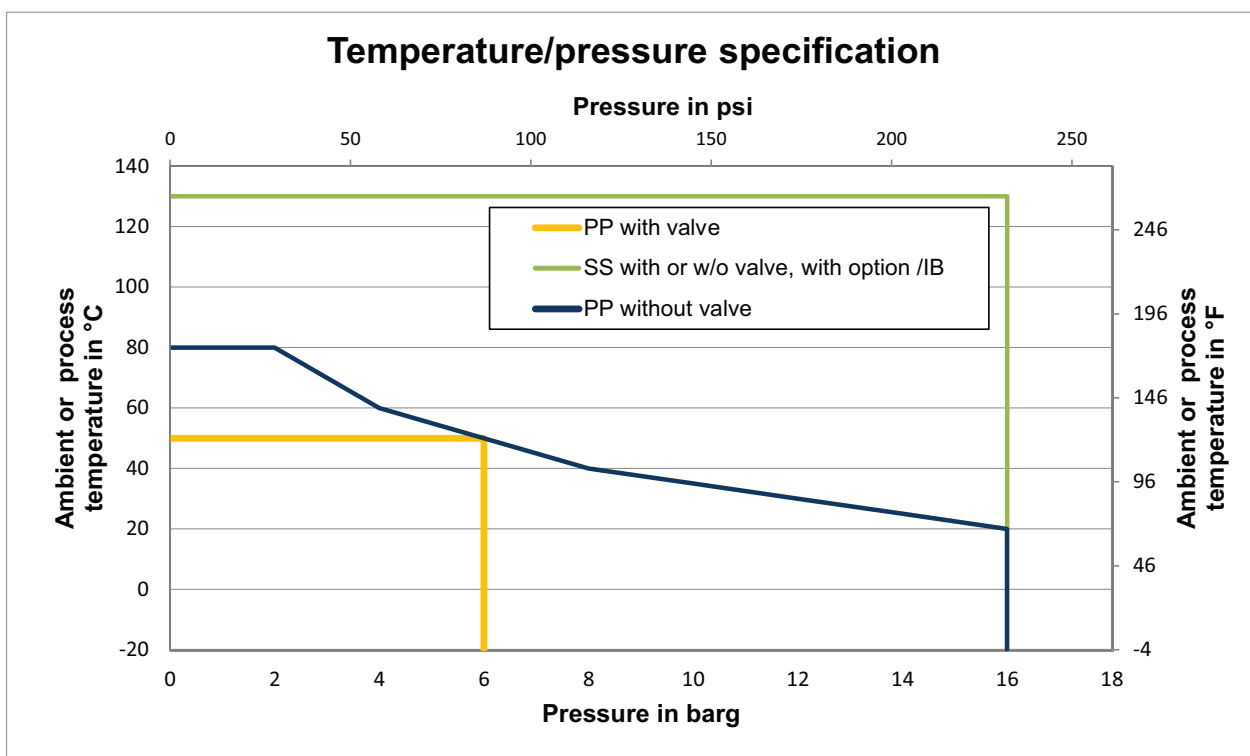


Fig.3: Temperature/pressure specification

Further temperature restrictions are applicable in case of option /GM□ (limit switches), option /NBR and option /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

LIMIT SWITCH, option /GR1 to /GR8 for RAGK41

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

Floats:

- Mumetal (MU) or PVDF (PD)
- $Q_{min} > 0.004$ l/h water or 0.3 l/h air
($Q_{min} > 0.001$ 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 mm ² , with shield 0.4 mm ² , 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.

LVD compliance:

EN 60010-1 and EN 60010-2-030 for option /GM□

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)

Protection: Ex ia IIC T6 Gb

Safety relevant input Parameter:

$U_i = 12$ V, $I_i = 22$ mA, $P_i = 66$ mW,
 $L_i = 20$ mH, $C_i = 200$ nF

CE-marking:**Markings on the label of the limit switch:**

CE, EAC, China RoHS, RCM, Morocco

LIMIT SWITCH, option /GM1 to /GM5 for RAGK42

Floats:	PP with insertion M
Type:	bistable reed contact
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 (-14 °F to 158 °F)
Protection:	IP 65
Internal capacity:	0 nF
Internal inductance:	0 mH
Connection cable:	LIYY 2 x 0.34 mm ² ; length: 1 m
Housing:	Polystyrene

Hazardous area use

Intrinsic safe acc. IEC 60079-11 chapter 5.7,
EN 60079-11 chapter 5.7 and ANSI/ISA 60079-11
chapter 5.7 as "Simple Apparatus" and therefore
does not require a specific hazardous area approval
by a notified body.

Temperature range:

-10 °C to +70 °C (14 °F to 158 °F)

Installation area (ATEX, IECEx):

IIC T6 2G

Installation area (NEC):

Class I, Zone 1, Groups A, B, C, D, T6

Safety relevant input Parameter:

$U_i = 15$ V; $I_i = 50$ mA; $P_i = 187$ mW

$L_i \approx 0$ mH; $C_i \approx 0$ nF

Markings on the label of the limit switch:

CE, 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

Power supply:

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

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

Technical data same as above.

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

Approvals:

- KFA5-SR2-Ex*-W:
 - ATEX: PTB 00 ATEX 2081
 - FM: ID 3011578
 - IECEx: PTB11.0031
 - EAC: RU C-DE.EX01.B.00102/19
 - NEPSI: GYJ17.1283
- KFA6-SR2-Ex*-W:
 - ATEX: PTB 00 ATEX 2081
 - FM: ID 3011578
 - IECEx: PTB11.0031
 - EAC: RU C-DE.EX01.B.00102/19
 - NEPSI: GYJ17.1283
- KFD2-SR2-Ex*-W:
 - ATEX: PTB 00 ATEX 2080
 - FM: ID 3011578
 - IECEx: PTB11.0034
 - EAC: RU C-DE.EX01.B.00102/19
 - NEPSI: GYJ17.1284

Control circuit (ATEX):

[Ex ia] IIC; group II; category (1)GD

Entity parameter:

See certificates

FLOW CONTROLLER, option /R1 and /R3 for RAGK41

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

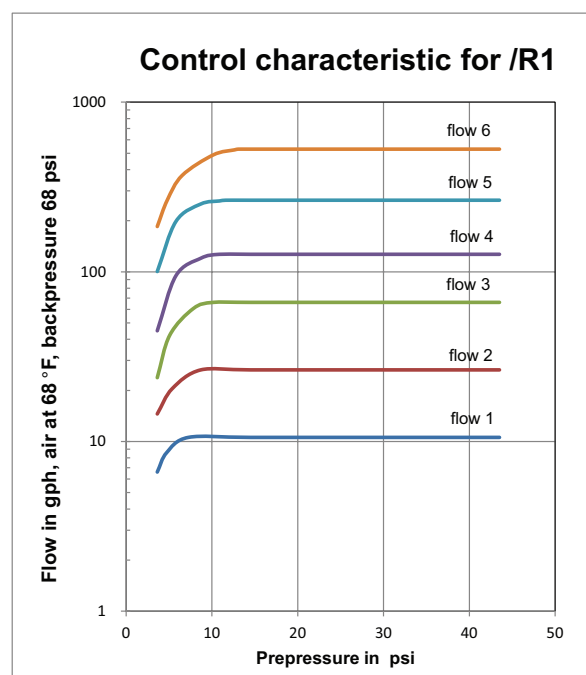
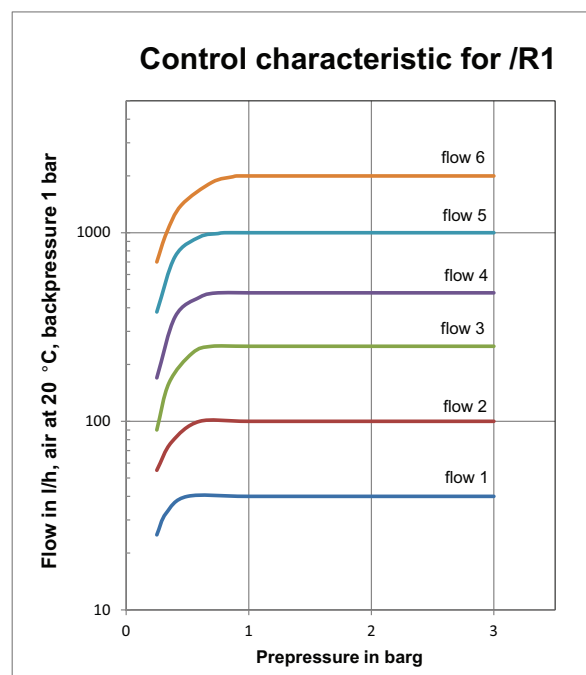


Fig. 4 Control characteristic for /R1

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).

MODEL SPECIFICATIONS

Model	Suffix code	Description	Restrictions
RAGK41 RAGK42		For K- and M-tubes For M3-tubes	
Process connections	-T0 -R0	RAGK41: Female thread, ¼" NPT RAGK42: Female thread, 3/8" NPT RAGK41: Female thread, ¼" Rp RAGK42: Female thread, 3/8" Rp	not with PP-PP
Material process connections and heads	PP-PP SS-SS	Polypropylene head Stainless steel head	
Valve	NNN SV1 SV2 GV1 GV2	Without valve RAGK41, inlet valve, silver seat RAGK41, outlet valve, silver seat RAGK42, inlet valve, PTFE seat RAGK42, outlet valve, PTFE seat	
Tube length	-K -M	75 mm (2.95") 150 mm (5.91")	
Tube diameter	6 7 3	10 mm (0.39") 17 mm (0.67") 28 mm (1.10")	*) *) *)
Tube cone combination	XX		*)
Fluid scale	G A N D F	Fluid specification sticker scale on tube, recommended Fluid specification attached scale, blank tube mm scale, sticker scale on tube Dual scale: G and A Dual scale: N and A	Tmax = 100 °C (212 °F) Not with /GR□ or /GM□ Tmax = 100 °C (212 °F) Not with /GR□ or /GM□, Tmax = 100 °C (212 °F) Not with /GR□ or /GM□, Tmax = 100 °C (212 °F)
Float material	-AL -GL -KR -MU -PD -PP -SR -SS -TT	Float aluminum Ball glass, black Sintered float Al ₂ O ₃ , red Float mumetal Float PVDF, milky white Float PP, light grey Ball SS Float SS Float titan	*) For gasses only *) *) *) *) *) *) For liquids only *) *) *)
Float diameter	A B C D 3	1.6 mm (0.06") 3.2 mm (0.13") 6.3 mm (0.25") 9.5 mm (0.37") 15.7 mm (0.62")	*) *) *) *) *)
Flow mark	L G 2 3 6 7	RAGK41, liquid RAGK41, gas RAGK42, liquid RAGK42, liquid RAGK42, gas RAGK42, gas	*) *) *) *) *) *)
Float insertion	N M	Standard Float with magnet insertion	Mandatory for option /GM□

*)To be determined with the FlowConfigurator

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 RAGK41-T0
	/C02	Cutting ring in SS for 8 mm outer diameter tubes	Only for RAGK41-T0
	/C03	Cutting ring in SS for 10 mm outer diameter tubes	Only for RAGK41-T0 or RAGK42-T0
	/C04	Cutting ring in SS for 12 mm outer diameter tubes	Only for RAGK41-T0 or RAGK42-T0
	/P01	Nozzle in SS, for flexible hoses inner diameter 6 mm	Only for RAGK41-R0
	/P02	Nozzle in SS, for flexible hoses inner diameter 8 mm	Only for RAGK41-R0
	/P03	Nozzle in SS, for flexible hoses inner diameter 10 mm	Only for RAGK42-R0
	/W01	Swagelok® in SS for 6 mm outer diameter tubes	Only for RAGK41-T0
/W02	Swagelok® in SS for 8 mm outer diameter tubes	Only for RAGK41-T0	
/W03	Swagelok® in SS for 10 mm outer diameter tubes	Only for RAGK41-T0	
/W04	Swagelok® in SS for 12 mm outer diameter tubes	Only for RAGK41-T0	
Limit switches	/GM1	Magnetic Min-contact	Only for RAGK42, insertion code M
	/GM2	Magnetic Max-contact	Only for RAGK42, insertion code M
	/GM3	Magnetic Min-Max-contact	Only for RAGK42, insertion code M
	/GM4	Magnetic Min-Min-contact	Only for RAGK42, insertion code M
	/GM5	Magnetic Max-Max-contact	Only for RAGK42, insertion code M
	/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
	/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)
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	
O-Rings	/NBR	NBR O-rings for tube and valve (if ordered)	Temperature range: -20 °C to 100 °C (-4 °F to 212 °F)
	/KAL	Kalrez O-rings for tube and valve (if ordered)	Only for RAGK41
Alternative float stop	/S1	Float spring stops made of SS 1.4571	
Accessories	/QP	Means for panel mounting	Only for RAGK41
	/QB	With tapped holes in the connecting heads for mounting	Only for RAGK41
	/QF	Foot stand	Only for RAGK41
	/QC	Colored caps for valve knob (red, blue, yellow, green)	Only with valve, only for RAGK41
Controller	/R1	Flow regulator for alternating pre-pressure	Only for RAGK41, only with SS-head, only with inlet valve
	/R3	Flow regulator for alternating back-pressure	Only for RAGK41, only with SS-head, only with outlet valve, only for gasses
Country specific delivery	/KC	KC-mark for Korea	
	/CN	China RoHS mark	Only with option /GM□ or /GR□
	/VR	Pattern Approval for Russia	
Country specific application	/QR	Primary Verification for Russia	Only with /VR. Not for cones 13 to 24
Power supply	/W1A	KFA5-SR2-Ex1.W, 115 V AC, 1 channel	For /GM1, GM2 and /GR1 to GR4
	/W1B	KFA5-SR2-Ex2.W, 115 V AC, 2 channels	For /GM3 to /GM5 and /GR5 to GR8
	/W2A	KFA6-SR2-Ex1.W, 230 V AC, 1 channel	For /GM1, GM2 and /GR1 to GR4
	/W2B	KFA6-SR2-Ex2.W, 230 V AC, 2 channels	For /GM3 to /GM5 and /GR5 to GR8
	/W4A	KFD2-SR2-Ex1.W, 24 V DC, 1 channel	For /GM1, GM2 and /GR1 to GR4
	/W4B	KFD2-SR2-Ex2.W, 24 V DC, 2 channels	For /GM3 to /GM5 and /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.

DIMENSIONS AND WEIGHTS

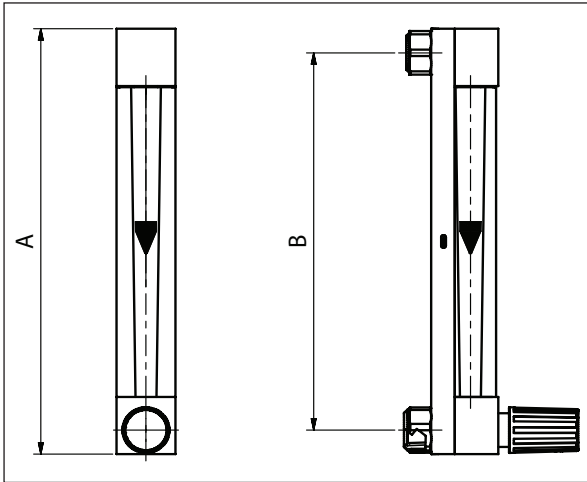


Fig. 5 RAGK41 with valve

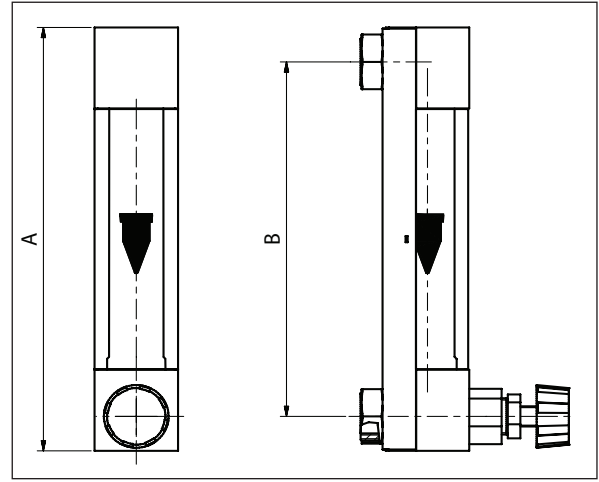


Fig. 6 RAGK42 with valve

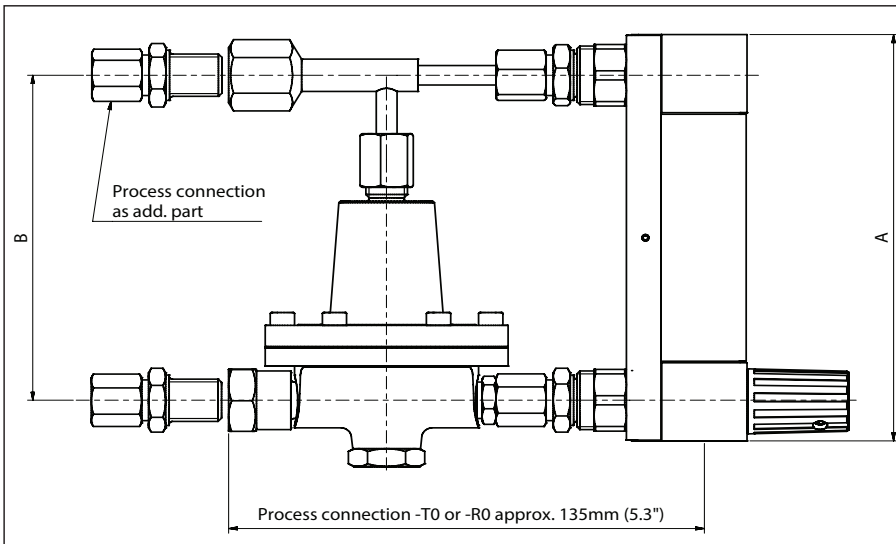


Fig. 7 Version with inlet valve and inlet flow controller option /R1

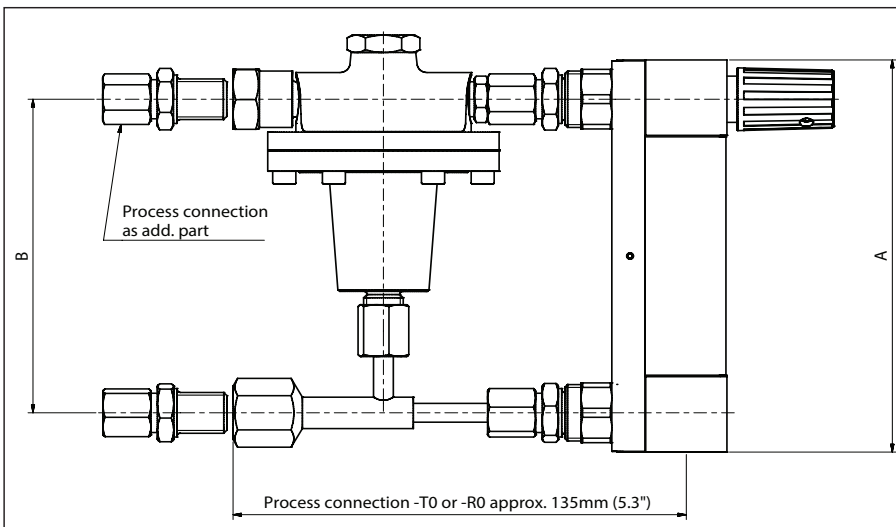


Fig. 8 Version with outlet valve and outlet flow controller option /R3

Table 4: Weights and dimensions

Measuring tube	Dimensions in mm (inch)		Weight in g (lbs)		
	A	B	w/o controller PP	w/o controller SS	with controller SS
K6; K7	111 (4.37)	90 (3.54)	150 (0.33)	340 (0.75)	1060 (2.33)
M6; M7	186 (7.32)	165 (6.5)	230 (0.51)	500 (1.1)	1220 (2.89)
M3	208 (8.19)	175 (6.89)	540 (1.19)	1160 (2.56)	---

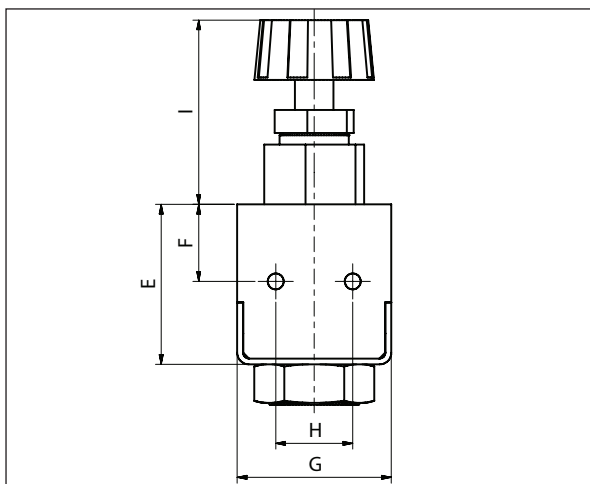


Fig. 9 Head dimensions (with or w/o valve) with tapped holes for option /QB

Table 5: Dimensions of heads

Model	Dimensions in mm (inch)					Drill hole diameter in mm
	E	F	G	H	I	
RAGK41 with K6□□/K7□□/ M6□□/ M7□□	29 (1.14)	12,5 (0.49)	25 (0.98)	19 (0.75)	33 (1.3)	3 (M3 screw)
RAGK42 with M3□□	42 (1.65)	20 (0.79)	40 (0.157)	20 (0.79)	42 (1.69)	5 (M5 screw)

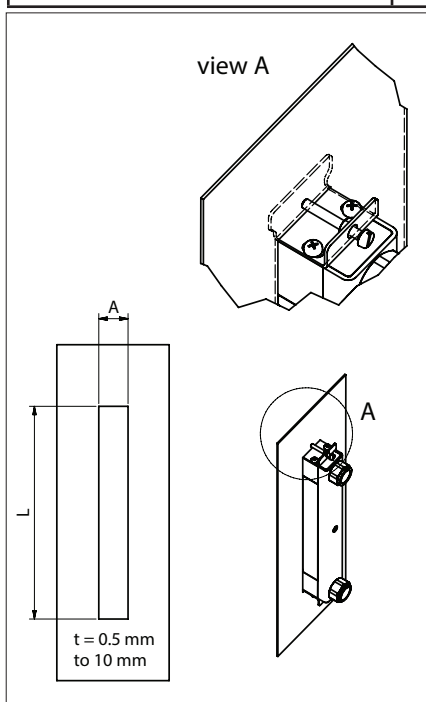


Fig. 10 Option /QP, means for panel mounting

Table 6: Slot dimensions in the panel

Model	Dimensions in mm (inch)	
	A	L
RAGK41 with K6□□/K7□□	26 (1.02)	115 (4.53)
RAGK41 with M6□□/M7□□	26 (1.02)	190 (7.45)

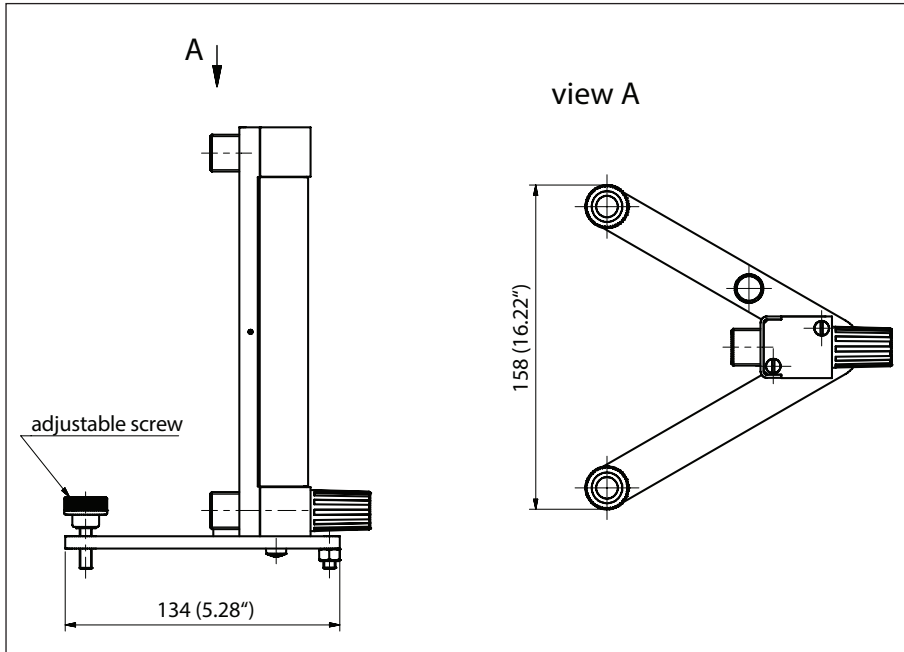


Fig. 11 Option /QF, foot stand, dimensions in mm (inch)

REGISTERED TRADEMARKS

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

<p>YOKOGAWA ELECTRIC CORPORATION Headquarters 2-9-32, Nakacho, Musashino-shi, Tokyo, 180-8750 JAPAN Phone : 81-422-52-5555 Branch Sales Offices Osaka, Nagoya, Hiroshima, Kurashiki, Fukuoka, Kitakyusyu</p>	<p>YOKOGAWA ELECTRIC CIS LTD. Grokholskiy per 13 Building 2, 4th Floor 129090, Moscow, RUSSIA Phone : 7-495-737-7868 Fax : 7-495-737-7869</p>	<p>YOKOGAWA INDIA LTD. Plot No.96, Electronic City Complex, Hosur Road, Bangalore - 560 100, INDIA Phone : 91-80-4158-6000 Fax : 91-80-2852-1442</p>
<p>YOKOGAWA CORPORATION OF AMERICA Head Office 12530 West Airport Blvd, Sugar Land, Texas 77478, USA Phone : 1-281-340-3800 Fax : 1-281-340-3838 Georgia Office 2 Dart Road, Newnan, Georgia 30265, USA Phone : 1-800-888-6400/ 1-770-253-7000 Fax : 1-770-254-0928</p>	<p>YOKOGAWA CHINA CO., LTD. 3F Tower D, No.568 West Tianshan RD, Shanghai CHINA, 200335 Phone : 86-21-62396262 Fax : 86-21-62387866</p>	<p>YOKOGAWA AUSTRALIA PTY. LTD. Tower A, 112-118 Talavera Road, Macquarie Park NSW 2113, AUSTRALIA Phone : 61-2-8870-1100 Fax : 61-2-8870-1111</p>
<p>YOKOGAWA AMERICA DO SUL LTDA. Praca Acapulco, 31 - Santo Amaro, São Paulo/SP, BRAZIL, CEP-04675-190 Phone : 55-11-5681-2400 Fax : 55-11-5681-4434</p>	<p>YOKOGAWA ELECTRIC KOREA CO., LTD. (Yokogawa B/D, Yangpyeong-dong 4-Ga), 21, Seonyu-ro 45-gil, Yeongdeungpo-gu, Seoul, 150-866, KOREA Phone : 82-2-2628-6000 Fax : 82-2-2628-6400</p>	<p>YOKOGAWA MIDDLE EAST & AFRICA B.S.C.(C) P.O. Box 10070, Manama, Building 577, Road 2516, Busaiteen 225, Muharraq, Kingdom of BAHRAIN Phone : 973-17358100 Fax : 973-17336100</p>
<p>YOKOGAWA EUROPE B. V. Euroweg 2, 3825 HD Amersfoort, THE NETHERLANDS Phone : 31-88-4641000 Fax : 31-88-4641111</p>	<p>YOKOGAWA ENGINEERING ASIA PTE. LTD. 5 Bedok South Road, Singapore 469270, SINGAPORE Phone : 65-6241-9933 Fax : 65-6241-2606</p>	