

# Technical Information

Rotameter  
RAGK and RAGL  
Detailed Description of Options

TI 01K01B04-01EN-R

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## **1 Purpose**

This document describes all relevant options of Glass Rotameter RAGK and RAGL produced at Rota Yokogawa.

## **2 Target model**

Rotameter Glass RAGK and Rotameter Glass RAGL.

## **3 Specification**

This document is complementary to the Rotameter Glass RAGK GS (GS 01R01B07-00E-E) and to the Rotameter Glass RAGL GS (GS 01R01B08-00E-E). All technical specifications and restrictions are specified in the GS. This TI is to explain the most relevant options further in detail.

## 4 Detailed description of options

### 4.1 Marking

#### 4.1.1 Option /B1 - Tag plate (1.4404/316L) fastened with wire, plate: 12 mm x 40 mm

A small SS tag plate is fastened to the instrument with a SS wire. Max characters: 45. The text has to be provided via ordering instructions. The text is asked by the FlowConfigurator after activating “complete sizing” and has to be transmitted with the order.

★ New project

✓ Device selection    ✓ Device configuration    ✓ Scale setting    **Completion**

**Ordering Instructions**    Summary

**ORDERING INSTRUCTIONS**

Quantity:

/B1 TAGNO. [M57]:  **/B1**

MS-Code Sensor: **RAGL41 -T0 PP -PP NNN -M 7 37 G -SS C L N /B1**

Show summary    Export ordering instructions    Copy MS-Code to clipboard    Generate data sheet    Reset

Fig. 1 Input of Tag. No. in FlowConfigurator



Fig. 2 Tag plate

### 4.1.2 Option /BG – Customer specific notes

The notes are printed on the name plate. Max 45 characters. The text is asked by the FlowConfigurator after activating “complete sizing” and has to be transmitted with the order.

\*New project

✓ Device selection    ✓ Device configuration    ✓ Scale setting    **Completion**

**Ordering Instructions**    Summary

**ORDERING INSTRUCTIONS**

Quantity:

TAG NO. [525]:  **/BG**

MS-Code Sensor: **RAGL41 -T0 PP -PP NNN -M 7 37 G -SS C L N /BG**






 Show summary   
  Export ordering instructions   
  Copy MS-Code to clipboard   
  Generate data sheet   
  Reset

Fig. 3 Input of Tag. No. in FlowConfigurator

## 4.2 Process adapters as added parts

The process adapters are added to the instrument as separate parts. The customer has to screw the adapters in the NPT process connections with a suitable sealing, normally Teflon sealing tape.

### 4.2.1 Options /C01, /C02, /C03 Cutting ring

Note: This document is applicable to the products manufactured at Rota Yokogawa GmbH & Co. KG

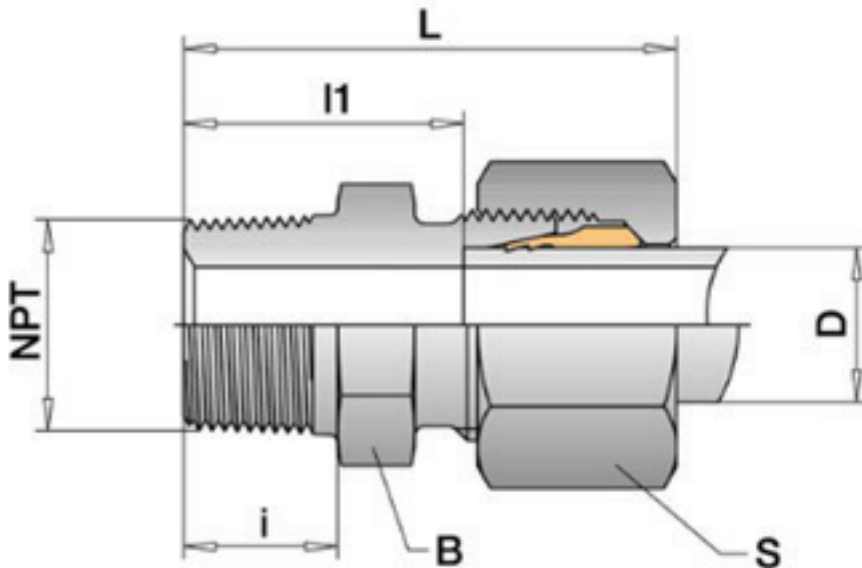


Fig. 4 Dimensions of cutting ring

Table 1 Dimensions of cutting ring (in mm)

	L	l1	B	S	i	D	Weight in g
6 mm	37.5	23	17	14	15	6	40
8 mm	38	23	17	17	15.1	8	44
10 mm	39	24	17	19	15.1	10	49
12 mm	49	25	19	22	15.1	15	62

#### 4.2.2 Options /P01, /P02, /P03 Nozzle for flexible hoses

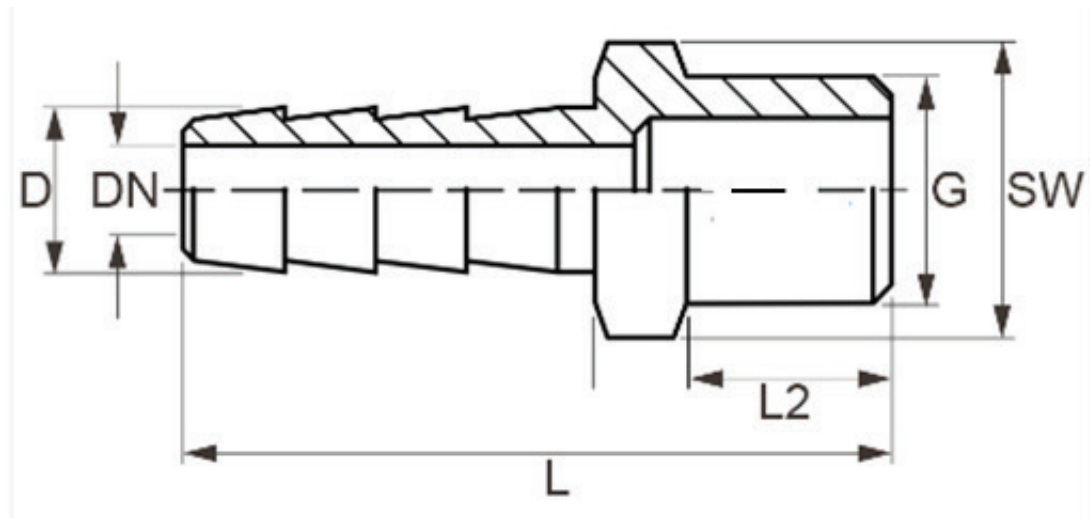


Fig. 5 Dimensions of nozzle

Table 2 Dimensions of nozzle (in mm)

	G	L	L1	SW	DN	Dmax	Dmin	Weight in g
6 mm	R1/4"	44	10	15	3.6	6	5	18
8 mm	R1/4"	43	8	15	5.6	9	7.5	18
10 mm	R3/8"	52	10	19	7	10	8.5	37

#### 4.2.3 Options /W01, /W02, /W03, /W04 Swagelok® cutting ring

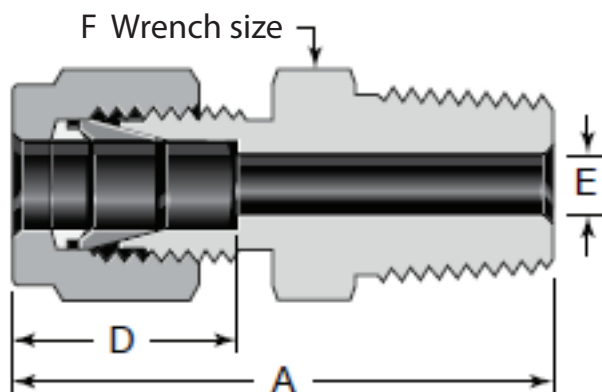


Fig. 6 Dimensions of Swagelok® cutting ring

Table 3 Dimensions of Swagelok® cutting ring (in mm)

	NPT	A	D	E <sup>1)</sup>	F
6 mm	R1/4"	37.9	15.3	4.8	14
8 mm	R1/4"	38.9	16.2	6.4	15
10 mm	R1/4"	40.9	17.2	7.1	18
12 mm	R1/4"	43.4	22.8	7.1	22

<sup>1)</sup> Minimum diameter

## 4.3 Limit switches

### 4.3.1 Options /GM1, /GM2, /GM3, /GM4, /GM5

These limit switches are for RAGK42. It is a reed contact, so if selected the float must incorporate a magnet. This limit switch is considered as a simple apparatus according to EN/IEC/ANSI/ISA 60079-11 and therefore does not require a specific hazardous area approval by a notified body. A self-declaration regarding the compliance to EN 60079 is available on the Flow Center Pages: RAGK\_RAGN\_Ex\_Declaration\_Option-GMx.

The /GM□ can be used together with a power supply option /W□A or /W□B.

The back panel of the meter has an opening for proper mounting of the contact.

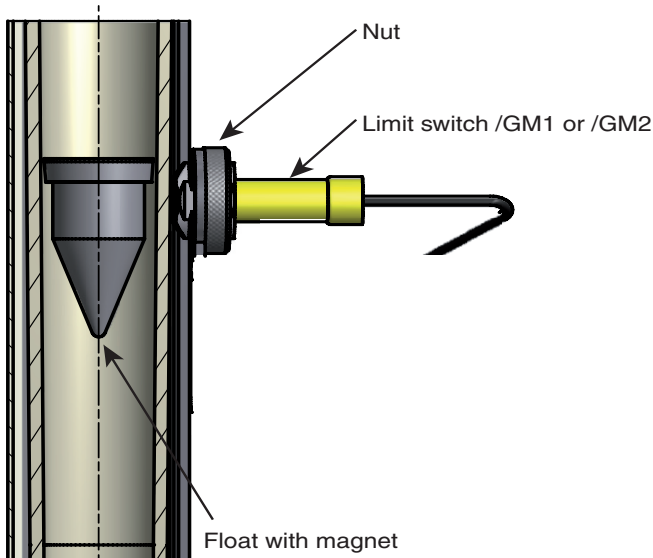


Fig. 7 Installation of limit switch /GM□

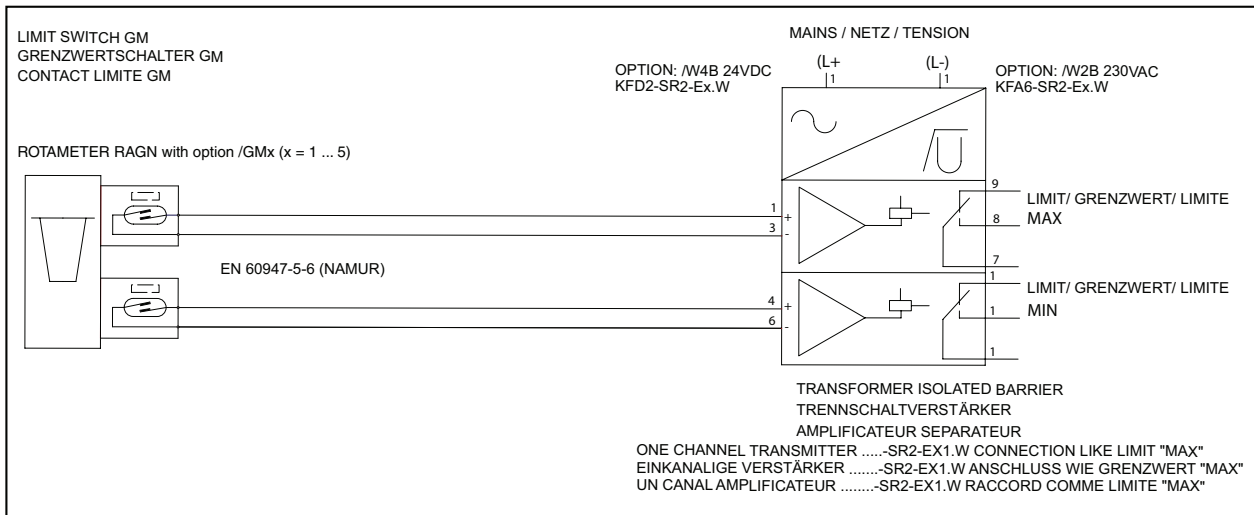


Fig. 8 Connection diagram of limit switch /GM□

### 4.3.2 Options /GR1, /GR2, /GR3, /GR4, /GR5, /GR6, /GR7, /GR8

These ring initiators are for RAGK41 and for RAGL41. These are inductive bipolar limit switches, which means that the float must have ferromagnetic features. The matching float must therefore be made from Mu-metal.

The /GR□ can be used together with a power supply option /W□A or /W□B.

The ring initiator is mounted directly over the tube, so the protection cover is not possible. By its design the ring initiator is sensitive to strong electromagnetic impulses, so installation should be on sufficient distance from such sources.



Fig. 9 Installation of limit switch /GR□

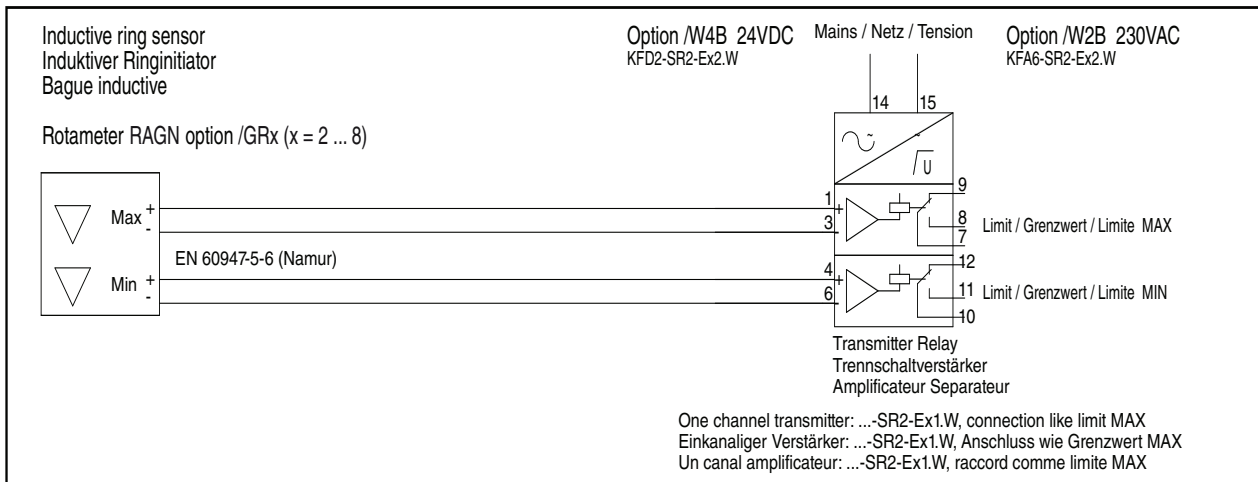


Fig. 10 Connection diagram of limit switch /GR□

## 4.4 Hazardous area approvals

Hazardous area approvals ATEX(/KS1) and IECEx(/ES1) are available for inductive ring sensor options /GR□.

The certificate can be found on the Flow Center pages:

RAGK\_RAGL\_RAGN\_Cert\_ATEX\_RI20\_Option-GR\_E,

RAGK\_RAGL\_RAGN\_Cert\_IECEx\_RI20\_Option-GR\_E.

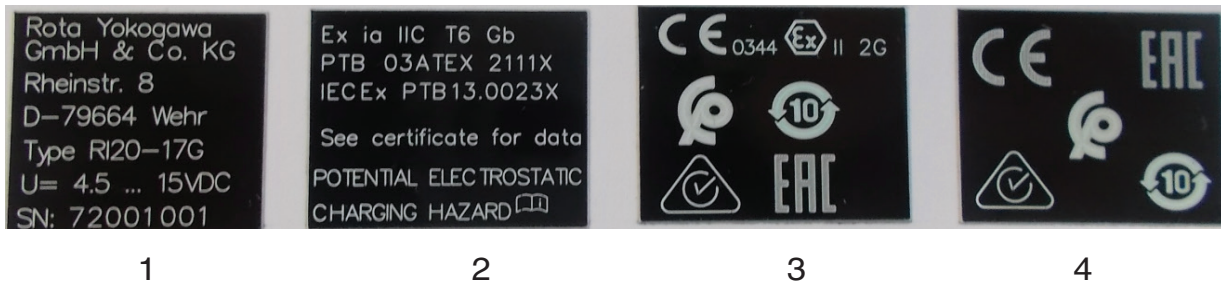


Fig. 11 Labels on limit switch /GR□

1: for all types

Additionally to 1:

2 and 3: for hazardous area types

4: for non- hazardous area types

## 4.5 Scale types

The offered scale types for RAGL and RAGK have the following characteristics:

Table 4

		Visibility	Chemical resistance	Chemical resistance with option /IB	Exchangable
G	Fluid spec. sticker scale on tube, recomm.	middle	middle	high	no
A	Fluid spec. attached scale, blank tube	high	high	----	yes
N	mm- scale, sticker scale on tube	middle	middle	high	no

### 4.5.1 Scale types G and N

If the atmosphere is very aggressive and the user might have concerns about the chemical resistance of the sticker scale, option /IB is very suitable. With option /IB the scale will be directly printed and burned in on the tube. The burned in scale will be printed permanently on the tube and cannot be exchanged. For normal atmosphere the sticker scale is completely sufficient.

The scale type A can be combined with the scale types G and N. In combination with /IB, scale types G or N are replaced by the burned-in scale.

### 4.5.2 Dual scale types, suffix code D and F

If two different fluids run through the meter or if two quite different process conditions exist (more typical for gas), two different scales can be provided with the meter.

With suffix code F only one scale design is sufficient. In this case the attached scale will be engraved with the fluid specific data, whereas the mm scale is fastened on the tube.

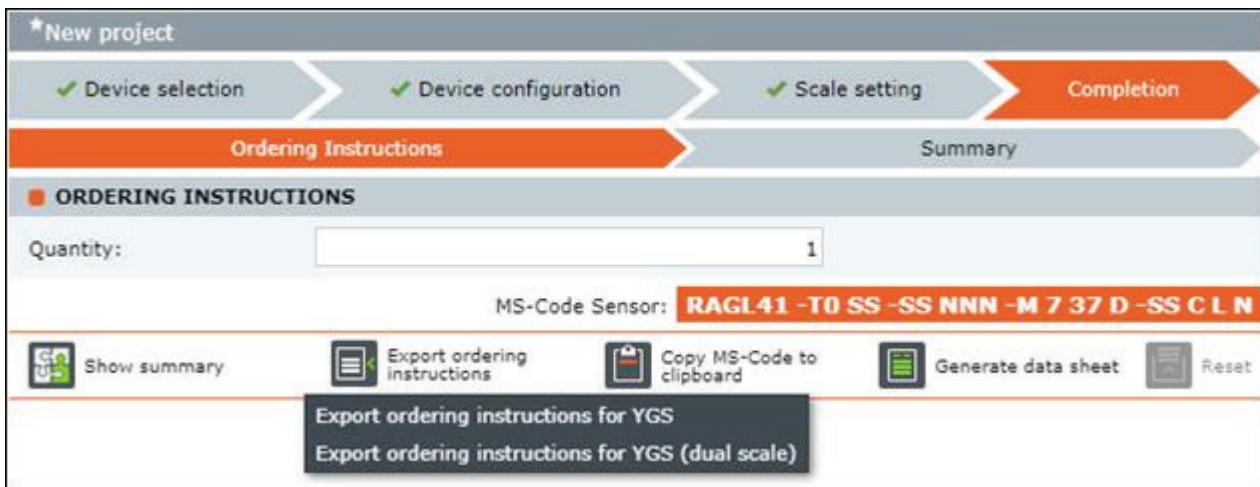
With suffix code D, two different sets of process conditions and scale designs must be delivered as ordering instructions to the manufacturing. The first scale design (a) is fastened as a sticker on the



tube, the second scale design (b) is engraved in the attached scale.

To generate the 2 sets of ordering instructions in the FlowConfigurator and SAP proceed as follows:

- Size first the fluid for the (a) scale
- Press “Export ordering instruction for YGS” and store the file ((a) scale)



**Fig. 12 Window Ordeing Instruction, FlowConfigurator**

- Note the Model Code from the first sizing.
- Start a second sizing. Make sure by varying the second max flow range, that you get the same model code. If the second sizing gets a different cone, the instrument is physically not producible. If the fluid data and flow ranges of the two fluids are too different, a dual scale may not be possible.
- Press “Export ordering instruction for YGS (dual scale)” and store the file ((b) scale).
- Import the model code in SAP and upload (a) scale first and then additional the (b) scale as ordering instructions with the same upload function.

## 4.6 Test and Certificates

### 4.6.1 Option /H1: Oil and fat free for wetted surfaces according Yokogawa specification

For specific description, please see document TI 01K01B03-01EN-R.

### 4.6.2 Option /P2: Certificate of compliance with the order acc. to EN 10204: 2004-2.1

At the final check a test will be processed which guarantees the compliance with the order. This compliance is guaranteed with a certificate. An example can be found on the Flow Center page: RAGK\_Cert\_example\_2-1 compliance with the order\_E\_D.

### 4.6.3 Option /P3: As /P2 + Test report acc. to EN 10204: 2004-2.2

The protocol of the test will be delivered additional to the certificate. An example can be found on the Flow Center page: RAGK\_Cert\_example\_2-2\_test\_report\_E\_D.

### 4.6.4 Option /PP: Pressure test report for measuring system

The instrument is pressurized with factor 1.6 above its nominal pressure (burst pressure test) and is inspected for tightness. A result report regarding the test is delivered. An example can be found on the Flow Center page: RAMC\_Cert\_PP\_Pressure test report Certificate Example.

#### 4.6.5 Option /PT: Flow table for recalculation to other fluid

In case of scale N and F, only mm graduation is on the tube. To “translate” the height in mm in flow units, a recalculation table is required. This table shows the fluid data the Rotameter is sized with. On the left side of the table you find the height of the float in mm and the calibration conditions, and on the left side the process fluid.

12.04.19 DFT 6/12-93

Durchflusstabelle für Rotameter® Table de débits pour Rotamètre Flow rate table for Rotameter		Kommission D1U901454 Commission Commission Messrohr M624 -TTBLN... tube de mesure metering tube		gültiges Kennlinienblatt feuille de caractéristiques graph form Schwebekörper floteur float		KL 1B * TTBLN		
1 $D_s =$	3.18 mm	$M_s =$	0.0960 g	$\rho_s =$	4.500 g/cm <sup>3</sup>			
2 Meßstoff	Fluid.	Luft		Wasser				
3 Temperatur	Temp. $t$ °C	23,5		20,0				
4 Druck	Press. $p_T$ bar abs.	1,000		1,000				
5 Dichte	Dens. $\rho_T$ g/cm <sup>3</sup>	0,0011750		0,9982000				
6 Zähigkeit	Visc. $\eta$ mPa · s	0,0180		1,0020				
7 $W$		0,01062		0,27308				
8 $R_u \cdot 10^6$		540,71		1170,51				
<b>MM</b>	<b>M-Wert</b>	<b>ALPHA</b>	<b>QV [l/h]</b>	<b>ALPHA</b>	<b>QV [l/h]</b>	<b>Qe ml/min</b>		
3,2	0,030	0,004968	1,609	0,002286	0,022	0,374	$W = \sqrt{M_s \rho_T (1 - \rho_T / \rho_s)}$	
6,8	0,033	0,006122	1,983	0,002820	0,028	0,461	$R_u 10^6 = 319 \eta / W$	
10,0	0,036	0,007377	2,389	0,003397	0,033	0,555	$q_v = \alpha \cdot 11,27 D_s W / \rho_T$ l/h	
14,1	0,040	0,009274	3,004	0,004262	0,042	0,696	$q_m = \alpha \cdot 11,27 D_s W$ kg/h	
19,8	0,045	0,011943	3,868	0,005496	0,054	0,898		
25,5	0,050	0,015025	4,867	0,006909	0,068	1,129	Anleitung zur Berechnung siehe Rückseite Voir au verso les indications pour les calculs Instructions for calculation see reverse side	
35,7	0,060	0,021871	6,084	0,009222	0,100	1,670	Werte ausserhalb des Standardmessbereichs unter Umständen nicht nach Klasse 1.6 Valeurs hors d'étendue de mesure standard possiblement pas selon classe 1.6 Values outside standard flow range possibly not as per class 1.6	
44,1	0,070	0,029319	7,497	0,012260	0,140	2,330		
52,7	0,080	0,037811	9,247	0,016054	0,187	3,115		
60,6	0,090	0,046150	11,148	0,020581	0,241	4,017		
68,6	0,100	0,055122	13,254	0,026375	0,301	5,022		
76,9	0,110	0,064942	15,585	0,033580	0,368	6,141		
85,1	0,120	0,075052	18,150	0,043300	0,446	7,440		
101,9	0,140	0,095800	23,030	0,061851	0,606	10,107		
Meßstelle/Kennz.:								
RP = 0,0 mm								

Fig. 13 Sample of flow table

#### 4.7 O-Rings

The small glass Rotameter are in standard equipped with Viton O-rings. However if other O-ring material is requested, /NBR (NBR, trivial names: Buna or Perbunan) or /KAL (Kalrez) can be selected. For RAGK O-rings are used in the valve and for the sealing of the tube. For RAGL O-rings are only used in the valve. The tube is sealed with a PTFE press fitting.

#### 4.8 Float stop

The standard float stoppers are made from PTFE. The standard float stoppers can be exchanged with spring SS stoppers via option /S1.

## 4.9 Accessories

### 4.9.1 Option /QP: means for panel mounting

At customer site, a suitable slot must be machined in the panel. The size of the slot is given in the GS.



Fig. 14 RAGK with option /QP

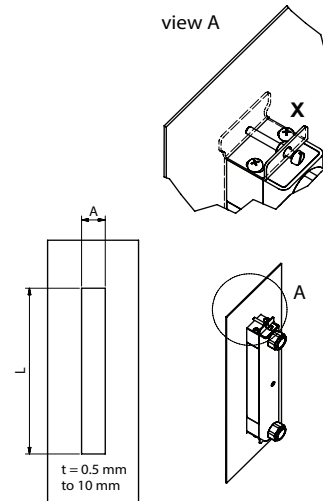


Fig. 15 Panel mounting

Two of the parts marked in the drawing (see Fig. 15) with the “X” are delivered with the instrument. The parts are inserted from the front as shown in the slot. The instrument is moved between the parts and fastened with the 4 cross-head screws. Then the total construction is fixed with the 2 long screws from the back side at the panel.

### 4.9.2 Option /QB: With tapped holes in the connecting heads for mounting

These holes for M3 screws are for example used for the foot stand or to screw the means for the panel mounting. They are offered for the case that the customer wants to establish his own fixing of the instrument. The detailed dimensions are given in the GS.

### 4.9.3 Option /QF: Foot stand

One possibility to fix the instrument. The foot stand incorporates a level for proper adjustment of the instrument. See also drawing in the GS

### 4.9.4 Option /QC: Colored caps for valve knob (red, blue, yellow, green)

The valve knob has a removable cap for mounting. Normally it is black. This option provides a small plastic bag with 4 caps in the colour red, blue, yellow, green to mark the valve knob. So in a row installation different fluids can be high visible marked by the colour of the knob cap.



Fig. 16 Colored caps for valve knob

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## 4.10 Controller

### 4.10.1 Option /R1: Flow regulator for changing pre- pressure

As described in the GS.

### 4.10.2 Option /R3: Flow regulator for changing back-pressure

As described in the GS.

## 4.11 Country specific delivery

### 4.11.1 Option /KC: KC-Mark for Korea

This option is necessary for delivery to to Korea. The KC mark is printed on a sticker and attached to the back side of the instrument. The equivalent certificates can be found on the Flow Center Page: RAGK\_Cert\_Korea\_KC-mark, RAGL\_Cert\_Korea\_KC-mark.



Fig. 17 KC-Mark

### 4.11.2 Option /CN: China RoHS mark

This option is necessary for delivery of electrical equipment to China. It confirms the agreement with Chinese RoHS regulations. The CN mark is printed on the name plate of the ring-initiator (/GR□) or the Reed-contact (/GM□). The conformation is declared with a special IM which is delivered with the instrument. It can be found on the FlowCenter Pages in the category Instruction Manuals: Rotameter\_IM\_option\_CN\_RoHS\_IM01A01B01-00ZH-R.



Fig. 18 China RoHS mark

### 4.11.3 Option /VR: Pattern Approval for Russia

The pattern approval certificate can be found on the Flow Center Pages: RAGN\_RAGK\_RAGL\_RAQN\_Pattern Approval\_RU.

The approval mark is not printed or attached to the instrument.

When option /VR is selected for RAGL and RAGK, option /QR is also required.

## 4.12 Country specific application

### 4.12.1 Option /QR: Primary Verification for Russia

The calibration certificate is sent to a notified body registered in Russia together with a technical passport.

The calibration rigs of RYG are approved by this notified body to be sufficient to do the primary verification. The notified body checks the calibration certificate and confirms the primary verification with a stamp in the technical passport. The technical passport is resent to Rota Yokogawa and later delivered with the instrument.

## 4.13 Power supply

The power supplies for the limit switches can be ordered with option /W□A or /W□B. These are available with one or two channels.

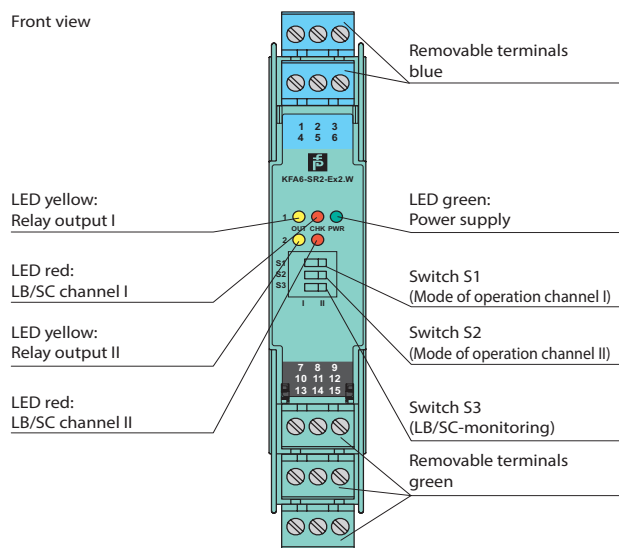


Fig. 19 Front view of power supply (Source: Pepperl & Fuchs)

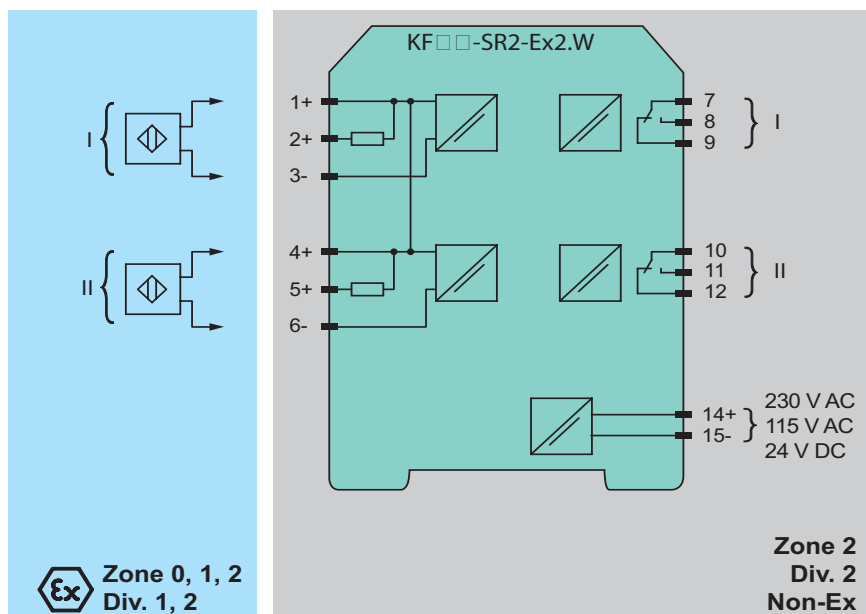


Fig. 20 Connections of 2- channel power supply (Source: Pepperl & Fuchs)