

# General Specifications

## ROTAMETER RAMC Variable Area Flowmeter

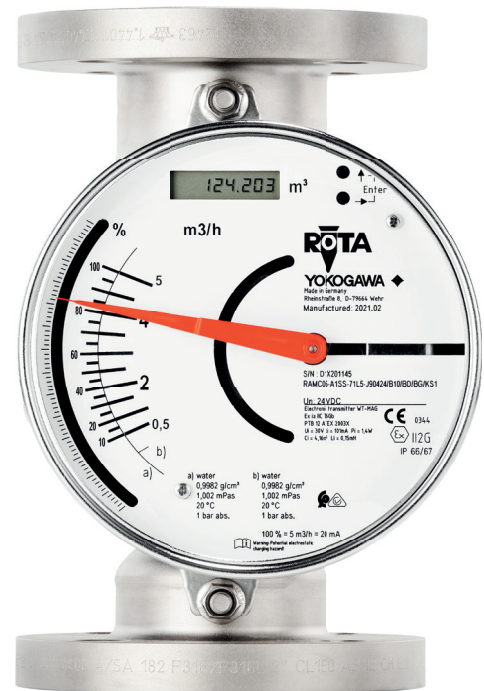
### GS 01R01B02-00E-E

The short-tube Rotameter is used for measurement of flow rates of liquids and gases. Its special application is in turbulent, opaque or aggressive fluids. The instrument is mounted in a vertical pipeline with flow direction upwards. Inside the special shaped conical metal tube, a float is guided concentrically. The position of this float is magnetically transmitted to the indicator.

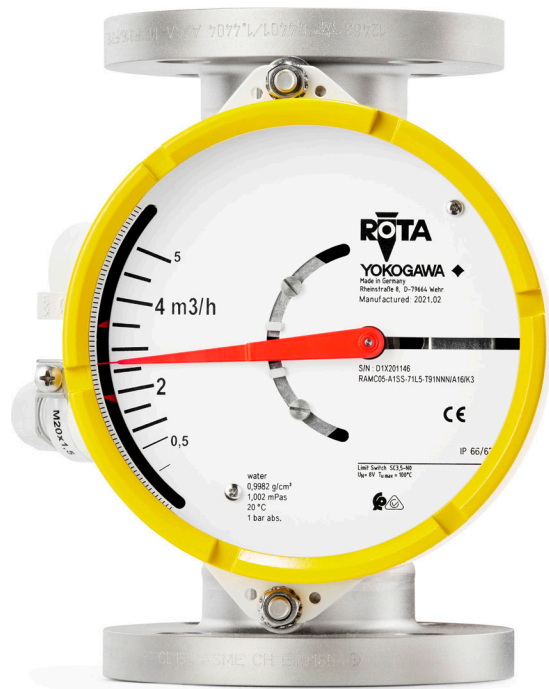
#### FEATURES

- Simple and low-cost installation, very robust and long-lasting device
- Energy efficient due to mechanical indication without power supply and very low pressure loss
- All common process connections available
- All wetted parts in stainless steel or PTFE
- Flow range water: 0.0025 to 130 m<sup>3</sup>/h (0.66 to 34342 gph)
- Flow range air: 0.075 to 1400 m<sup>3</sup>/h (2.65 to 49440 scfh) at 20 °C, 1 bar abs (68 °F, 14.5 psi)
- Measuring accuracy ±1.6 % acc. standard VDI/VDE 3513 sheet 2 (q<sub>G</sub> = 50 %)
- Float damping to avoid float bouncing with gas applications
- Optional heat tracing (with steam or fluid heat carrier)
- Indicator in stainless steel or aluminum, protection class IP66/67
- Microprocessor controlled transmitter with 24 V, 115 V or 230 V power supply
- Suitable for hazardous area applications
- FMEDA report available for SIL application
- Limit switches, also available as "fail-safe" version
- Electronic transmitter as standard with digital display with the following features:
  - ◆ Flow indication (totalizer, actual, percent)
  - ◆ Indication of different volume- and mass flow units
  - ◆ Possibility of user calibration in the field
  - ◆ Float blocking indication function
  - ◆ Adjustable signal output damping
  - ◆ Error message indication
  - ◆ Temperature measurement in the electronic transmitter
  - ◆ HART 7-, Profibus PA- or FOUNDATION Fieldbus Communication

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RAMC with housing type 90



RAMC with housing type 91

## STANDARD SPECIFICATIONS

### RoHS Directive 2011/65/EU, 2015/863/EU:

RoHS conform according to EN IEC 63000

### Intended use:

Rotameter RAMC 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.

### MEASURING TUBE

#### Materials of wetted parts:

- Stainless steel 1.4401/1.4404 (316/316L)
- PTFE (if selected)
- Gasket for process connection R4 or T4: Aramide fibres with NBR binder
- Other materials on request: e.g. Nickel base alloys, titanium, etc.

#### Fluids to be measured:

Clean liquids, gas and steam

#### Measuring range:

The measurable flow rates are depending from density and viscosity of the fluid. To find the fluid specific measuring range please use the Yokogawa Sizing Software: [www.FlowConfigurator.com](http://www.FlowConfigurator.com)

#### Measuring turndown ratio:

10:1

#### Process connections in stainless steel:

Flanges:

- Acc. to EN 1092-1
  - DN 100 to DN 150 PN 16
  - DN 15 to DN 100 PN 40
  - DN 50 to DN 80 PN 63
  - DN 15 to DN 50 PN 100
- Acc. to ASME B 16.5 (AISI 316/316L dual certified)
  - ½ in. to 6 in. Class 150 raised face
  - ½ in. to 6 in. Class 300 raised face
  - ½ in. to 3 in. Class 600 raised face
- Flange facing roughness
  - Form B1: Ra 3.2 to 6.3 µm
  - Form B2: Ra 0.8 to 3.2 µm
  - ASME: Ra 3.2 to 6.3 µm
- Threaded connection:
  - External thread acc. to DIN11851
  - Internal thread NPT
  - Internal thread G
  - Clamp: DN 25, 1 in. to DN 100, 4 in.

#### Process pressure:

Depends on process connection, see table 10, 11 and 12 higher pressure up to 700 bar (10152 psi) on request

#### Process temperature:

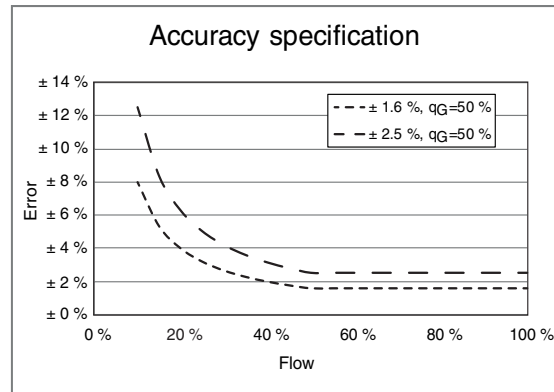
- Wetted parts made of stainless steel: -196 °C to +400 °C (-320.8 °F to 752 °F)
- Wetted parts made of PTFE: -80 °C to +130 °C (-112 °F to 266 °F)

See fig. 1a to fig. 1c

#### Measuring accuracy at calibration conditions:

Table 1

Material of wetted parts	Size	Measuring accuracy acc. standard VDI/VDE 3513 sheet 2 ( $q_G=50\%$ )
SS	DN 15 to DN 100	1.6 %
SS	DN 125 to DN 150	2.5 %
PTFE	DN 15 to DN 100	2.5 %



#### Calibration conditions:

Water, 1 to 2 bar, +15 °C to +25 °C (59 °F to 77 °F)

#### Pressure Equipment Directive (PED):

- Tubes:
  - Module: H
  - Fluid Group: 1 (dangerous fluids)
  - Produced acc. to category: III
  - Classification: Table 6 of PED directive (piping)
- Heating (options /T1 to /T6):
  - Art. 4 section 3: (Volume < 1 L)
  - Fluid Group: 2 (non-dangerous fluids)
  - Classification: Table 2 of PED directive (vessels)

#### Installation conditions:

- Please consider recommendations of VDI 3513-3
- Mounting direction: vertical
- Flow direction: upwards
- Mounting length: see table 10, 11 and 12
- Inlet- & outlet section (recommended for  $\geq$  RAMC08)
  - Inlet section:  $\geq 5 \times$  DN
  - Outlet section:  $\geq 3 \times$  DN

#### Weight:

See table 19

#### Canadian Registration Numbers (CRN)

Available upon request, only in combination with option /P15 or /P16

#### China Manufacturing License

- Licensing rules for special equipment and charging units TSG 07
- Pressure pipe supervision inspection rules TSG D7006

### MECHANICAL INDICATOR, type -T

#### Principle:

The flow value is indicated by a pointer with the aid of a magnet enclosed in the float and a magnet in the indicator unit which follows the movements of the float.

#### Indicator housing:

- Materials:
  - Housing type 90: stainless steel 1.4404/316L
  - Housing type 91: aluminum, Polyurethane, yellow, RAL 1021 acc. to EN 13195 material: AC 44200
  - Both housing types with safety-glass window
- Degree of protection:
  - IP66/67
  - NEMA 4, 4X, 6 (not for Ex d housing)

#### Scales:

- Standard: removable aluminum plate with scale (double scale as option)
- Marking: direct readable units or percentage of  $Q_{max}$ .

#### Transportation- and Storage condition:

-40 °C to +110 °C (-40 °F to 230 °F)

**ELECTRONIC TRANSMITTER, type -E, -J, -P, -F****Standard type -E:**

- **Power supply:**
    - 4-wire units with galvanic isolation:
      - 230 V AC +10 %/ -15 %, 50/60 Hz, fuse 0.063 A, time lag, 5x20 mm
      - 115 V AC +10 %/ -15 %, 50/60 Hz, fuse 0.125 A, time lag, 5x20 mm
    - 2/3-wire units: U = 14 to 30 V DC
  - **Output signal:**
    - 4-wire units:
      - 0 to 20 mA
      - 4 to 20 mA
      - Pulse output (option /CP): max. frequency 4 Hz
    - 3-wire units:
      - 0 to 20 mA
      - 4 to 20 mA
    - 2-wire units: 4 to 20 mA
- The 20 mA point is selectable between 60 % and 100 % of scale end value.
- **Load resistance:**
    - 4-wire units:  $\leq 500 \Omega$
    - 2/3-wire unit:  $\leq (U - 14 \text{ V}) / 20 \text{ mA}$
  - **Linearity<sup>1)</sup>:**
    - $\pm 0.2 \%$  of 20 mA
  - **Hysteresis<sup>1)</sup>:**
    - $\pm 0.1 \%$  of 20 mA
  - **Repeatability<sup>1)</sup>:**
    - $\pm 0.1 \%$  of 20 mA
  - **Influence of power supply<sup>1)</sup>:**
    - $\pm 0.1 \%$  of 20 mA
  - **Temperature coefficient of the output signal<sup>1)</sup>:**
    - $\pm 0.5 \%$  /10 °C of 20 mA
  - **AC-part of output signal<sup>1)</sup>:**
    - $\pm 0.15 \%$  of 20 mA
  - **Long-term stability<sup>1)</sup>:**
    - $\pm 0.2 \%$  per year
  - **Max. output signal:**
    - 21.5 mA
  - **Output signal in case of failure:**
    - < 3.6 mA (acc. NE 43)
  - **Response time (99 %):**
    - About 1.5 s with damping 1 s

**HART-communication type -J:**

Same specifications as type -E, except:

- **Power supply:**
  - 2-wire units: U = 14 to 30 V DC
- **Output signal:**
  - 2-wire units: 4 to 20 mA
- **Load resistance:**
  - 230 to 600  $\Omega$
- **Output signal in case of failure:**
  - < 3.6 mA (acc. NE 43)
  - > 21 mA (acc. NE 43)

**Profibus PA-communication type -P:**

- 2-wire bus connection not polarity sensitive
- AI block: Volume flow or mass flow
- TB block: Flow transducer block
- Profile version 3.02:
  - Condensed Status (NE 107)
  - Life Cycle Management (Automatic IDENT\_ NUMBER adaption)
- DP-V0: AI x 1
- IDENT\_NUMBER:
  - 0x0A45 (manufacturer specific)
  - 0x9700 (profile specific)
- Conditions of communication line:
  - Supply voltage from bus: 9 to 32 V DC
  - Current draw: 14 mA

- Failure current (FDE): 10 mA additional to basic current @RT
- Transmission rate: 31.25 kbit/s
- Supports I&M- functions

**FOUNDATION Fieldbus-communication type -F:**

- 2-wire bus connection not polarity sensitive
- AI block: Volume flow or mass flow
- TB block: Flow transducer block
- Conditions of communication line:
  - Supply voltage from bus: 9 to 32 V DC
  - Current draw: 14 mA
- Failure current (FDE): 10 mA additional to basic current @RT
- Transmission rate: 31.25 kbit/s

**Digital display:**

8 digits, 7 segment LC-display character height 6 mm

**Process-/ Ambient temperature:**

The dependency of the process temperature from the ambient temperature is shown in fig. 1a to fig. 1c. The internal temperature of the electronic transmitter can be indicated on the display or checked via communication protocols HART, Profibus PA and FOUNDATION Fieldbus.

**Measurement of the internal transmitter temperature:**

- Range: -25 °C to +70 °C (-13 °F to 158 °F)
- Accuracy:  $\pm 5 \text{ °C}$

**Transportation- and Storage condition:**

-40 °C to +70 °C (-40 °F to 158 °F)

**Electromagnetic compatibility (EMC):**

- Acc. EN 61326-1, Class A, Table 2 and EN 61326-2-3: Criterion A, restriction: HF-immunity between 500 MHz and 750 MHz: criterion B
- For Profibus PA- and Foundation Fieldbus type additional acc. EN 61326-2-5
- Approval for Morocco: Rotameter RAMC complies with the provisions of the Moroccan Regulations:
  - EN 61326-1
  - EN 61326-2-3
- Logo shown on the name plate (scale)

**Equipment safety acc. EN 61010-1:**

- Over voltage category: II (acc. to EN 60664-1)
- Pollution degree: I
- Safety class:
  - 115 V, 230 V AC: I
  - 24V DC: III

**POWER SUPPLY FOR ELECTRONIC TRANSMITTER, option /UT****Type:**

Power supply with galvanically separated input and output; RN221N-B1, HART-compatible

**Supply voltage:**

20 to 250 V DC/AC 50/60 Hz

**Maximum load:**

700  $\Omega$

**Output signal:**

4 to 20 mA

**CABLE GLAND for transmitter -E,-J, -P, -F****Size:**

- Standard: M16x1.5 for housing type 90
- Standard: M20x1.5 for housing type 91
- Option /A13: thread M20x1.5
- Option /A5: thread  $\frac{1}{2}$  - 14 NPT

**Cable diameter:**

6 to 9 mm (0.24 to 0.35 in.)

**Maximum cross section of core:**

$\varnothing 1.5 \text{ mm}^2$  (0.0023 in.<sup>2</sup>)

<sup>1)</sup> referenced to 20 °C ambient temperature

## SWITCHING LEVELS FOR LIMIT SWITCHES

Table 2 Limit switch as Min, Max, Min-Max, Min-Min and Max-Max contact in standard version

		Option /K1	Option /K2	Option /K3
Function	Pointer	Signal	Signal	Signal
		SC3,5-N0	SC3,5-N0	SC3,5-N0
MAX	above LV	----	1 mA	1 mA
	below LV	----	3 mA	3 mA
MIN	above LV	3 mA	----	3 mA
	below LV	1 mA	----	1 mA

Note: LV = Limit Value

Table 3 Limit switch as Min, Max and Min-Max contact in fail-safe version

		Option /K6	Option /K7	Option /K8
Function	Pointer	Signal	Signal	Signal
		SJ3,5-SN	SJ3,5-SN	SJ3,5-SN
MAX	above LV	----	1 mA	1 mA
	below LV	----	3 mA	3 mA
	fail-safe	----	1 mA	1 mA
MIN	above LV	3 mA	----	3 mA
	below LV	1 mA	----	1 mA
	fail-safe	1 mA	----	1 mA

Note: LV = Limit Value

Table 4 Limit switch as Min-Min contact in fail-safe version

		Option /K9
Function	Pointer	Signal
		SJ3,5-S1N
MIN	above LV	3 mA
	below LV	1 mA
	fail-safe	1 mA
Function	Pointer	Signal
		SJ3,5-SN
MIN	above LV	3 mA
	below LV	1 mA
	fail-safe	1 mA

Note: LV = Limit Value

Table 5 Limit switch as Max-Max contact in fail-safe version

		Option /K10
Function	Pointer	Signal
		SJ3,5-SN
MAX	above LV	1 mA
	below LV	3 mA
	fail-safe	1 mA
Function	Pointer	Signal
		SJ3,5-S1N
MAX	above LV	1 mA
	below LV	3 mA
	fail-safe	1 mA

Note: LV = Limit Value

### FOLLOWING IEC 61508

RAMC with fail-safe limit switches (/K6 to /K10):

Suitable for application in safety functions up to and including SIL2.

RAMC with standard limit switches (/K1 to /K3):

Suitable for application in safety functions up to and including SIL1.

Details see FMEDA report.

### FOLLOWING ISO 13849-1

Safety Metrics available for:

- RAMC with fail-safe limit switches (/K6 to /K10)
- RAMC with standard limit switches (/K1 to /K3)

Details see FMEDA report.

### LIMIT SWITCHES IN STANDARD VERSION, option /K1 to /K3

Type:

Inductive proximity switch SC3,5-N0  
acc. to EN 60947-5-6

Nominal voltage:

8 V DC

Output signal:

$\leq 1 \text{ mA}$  or  $\geq 3 \text{ mA}$

### LIMIT SWITCHES IN FAIL-SAFE VERSION, option /K6 to /K10

Type:

Inductive proximity switch SJ3,5-SN; SJ3,5-S1N  
acc. to EN 60947-5-6

Nominal voltage:

8 V DC

Output signal:

$\leq 1 \text{ mA}$  or  $\geq 3 \text{ mA}$

### HYSTERESIS OF LIMIT SWITCHES

Min-contact/ Max-contact:

- Pointer movement:  $\approx 0.8 \text{ mm}$  (0.03 in.)
- Float movement:  $\approx 0.8 \text{ mm}$  (0.03 in.)

Minimum distance between 2 contacts:

$\approx 2 \text{ mm}$  (0.08 in.)

### CABLE GLAND, option /K1 to /K10

Size:

- Standard: M16x1.5 for housing type 90
- Standard: M20x1.5 for housing type 91
- Option /A13: thread M20x1.5
- Option /A5: thread  $\frac{1}{2}$  - 14 NPT

Cable diameter:

6 to 9 mm (0.24 to 0.35 in.)

Maximum cross section of core:

$\varnothing 1.5 \text{ mm}^2$  (0.0023 in.<sup>2</sup>)

### POWER SUPPLY FOR LIMIT SWITCHES, option /W□□

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

Fail-safe

- KFD2-SH-Ex1 (24 V DC), 1 channel

Power supply:

- 230 V AC  $\pm 10 \%$ , 45 to 65 Hz
- 115 V AC  $\pm 10 \%$ , 45 to 65 Hz
- 24 V DC  $\pm 25 \%$

Relay output:

1 or 2 potential-free changeover contact(s)

Switching capacity:

Max. 250 V AC, max. 2 A

Note:

If fail-safe limit switch option /K6 or /K7 is ordered, for the power supply option /W4E must be selected.  
If fail-safe limit switch option /K8, /K9 or /K10 is ordered, for the power supply option /W4F must be selected.

## APPROVALS IN EAEU AND CIS COUNTRIES

### Eurasian Conformity (EAC)

RAMC complies to applicable Technical Regulations valid in EAEU countries Russia, Belarus, Kazakhstan, Armenia and Kyrgyzstan, option /VE.

- TR CU 004
- TR CU 020
- TR CU 032
- TR CU 012 can be added for hazardous area applications (options /GF1, /GS1, /GC1).

### Pattern Approval certificate of Measuring Instruments

RAMC has Pattern Approval certificates and is registered as a measuring instrument in Kazakhstan, Uzbekistan and Russia.

- Option /QR2 for Kazakhstan
- Option /QR3 for Uzbekistan
- Option /VR for Russia

## WEEE

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

## HAZARDOUS AREA SPECIFICATIONS

Table 6 Overview hazardous area certified instruments:

Location	Europe			Global			USA / Canada	United Kingdom		India	Korea	China	Russia, Belarus, Kazakhstan, Armenia, Kyrgyzstan			Taiwan	UAE
Certificate	ATEX			IECEX			FM/UL	UKEx		PESO	KOSHA	NEPSI	EAC			TS	
<b>Electronic transmitter</b>																	
Protection	ia	ia/tb	-	ia	ia/tb	IS/NI	ia	-	ia	-	-	-	ia	-	-	-	ia
Option	/KS1	/KS2	-	/ES1	/ES2	/FS1	/BS1	-	/KS1+ /Q11	-	-	-	/GS1	-	-	-	-
Comments	-	<sup>1)</sup>	-	-	<sup>1)</sup>	<sup>3)</sup>	-	-	-	-	-	-	-	-	-	-	-
See page	6/7	10	-	6/7	10	6	6/7	-	6	-	-	-	6	-	-	-	6
<b>Limit switches</b>																	
Protection	ia	ia/tb	-	ia	ia/tb	IS	ia	-	ia	ia	ia	ia	ia	-	-	-	-
Option	/KS1	/KS2	-	/ES1	/ES2	/FS1	/BS1	-	/KS1 + /Q11	/KS1 + /KC	/NS1	/GS1	-	-	-	-	-
Comments	-	<sup>1)</sup>	-	-	<sup>1)</sup>	-	-	-	-	-	-	-	-	-	-	-	-
See page	7	10	-	7	10	7	7	-	8	8	8	7	-	-	-	-	-
<b>Complete RAMC</b>																	
Protection	db/tb		h	db/tb		-	db/tb	h	db	d	ia	d/tD	db/tb	-	d/tb	db/tb	
Option	/KF1		/KC1	/EF1		-	/BF1	/BC1	/KF1+ /Q11	/EF1+ /KC	/NS1	/NF1	/GF1	/GC1	/EF1	-	
Comments	<sup>4)</sup>		<sup>5)</sup>	<sup>4)</sup>	-	-	<sup>4)</sup>	<sup>5)</sup>	<sup>4)</sup>	<sup>5)</sup>	-	<sup>4)</sup>	<sup>4)</sup>	<sup>5)</sup>	<sup>4)</sup>	<sup>4)</sup>	
See page	8		11	8		-	9	11	9	9	8	9	9	11	9	9	
<b>Power supplies for intrinsically safe components (see page 10)</b>																	
Option /UT	yes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Option /W1A,B	yes	-	yes	yes	-	-	yes	yes	yes	yes	yes	yes	-	-	-	-	-
Option /W2A,B	yes	-	yes	yes	-	-	yes	yes	yes	yes	yes	yes	-	-	-	-	-
Option /W4A,B	yes	-	yes	yes	-	-	yes	yes	yes	yes	yes	yes	-	-	-	-	-
Option /W4E,F	yes	-	yes	no	-	-	no	no	no	no	yes	yes	-	-	-	-	-
Notation	IS = Intrinsically Safe; NI = Nonincendive																
Comment <sup>1)</sup>	Dust proof by RAMC housing																
Comment <sup>2)</sup>	For use in zone 2																
Comment <sup>3)</sup>	Same certification for USA and Canada																
Comment <sup>4)</sup>	Only with housing 91																
Comment <sup>5)</sup>	Only indicator type -T without limit switches																

## HAZARDOUS AREA APPROVALS FOR ELECTRONIC TRANSMITTER, type -E, -J

### Attention:

The approvals for hazardous areas only apply to the defined conditions according to the temperature class. The maximum ambient temperature of the transmitter or limit switches must not be exceeded by the heat transfer of the liquid.

**Table 7 Entity parameters of electronic transmitter**

Option	U <sub>i</sub> in V	I <sub>i</sub> in mA	P <sub>i</sub> in W	C <sub>i</sub> in nF	L <sub>i</sub> in mH	max. T <sub>a</sub> in °C (°F)
/KS1/2	30	101	1.4	4.16	0.15	70 (158)
/ES1/2	30	101	1.4	4.16	0.15	70 (158)
/BS1/2	30	101	1.4	4.16	0.15	70 (158)
/FS1	30	100	1.4	40	0.15	70 (158)
/NS1	30	101	1.4	4.16	0.15	70 (158)
/GS1	30	101	1.4	4.16	0.15	70 (158)

### Intrinsically safe electronic transmitter with ATEX-approval, option /KS1

#### Certificate:

PTB 12 ATEX 2003 X

#### Output signal:

- 4 to 20 mA (2-/3-wire unit)
- 0 to 20 mA (3-wire unit)

#### Explosion proof:

Ex ia IIC T6 Gb; group II; category 2G

#### Entity parameter:

See table 7

### Intrinsically safe electronic transmitter with IECEx-approval, option /ES1

#### Certificate:

IECEx PTB 12.0020 X

#### Output signal:

- 4 to 20 mA (2-/3-wire unit)
- 0 to 20 mA (3-wire unit)

#### Explosion proof:

Ex ia IIC T6 Gb; group II; category 2G

#### Entity parameter:

See table 7

### Intrinsically safe/ nonincendive electronic transmitter with FM-approval (USA + Canada), option /FS1

#### Certificate:

No.: 3027471-3027471C

#### Output signal:

4 to 20 mA (2-wire unit)

#### Explosion proof:

- Intrinsically safe Cl. I, Div. 1, GP. A, B, C, D T6
- Intrinsically safe Cl. 1, Zone 0, AEx ia IIC T6
- Nonincendive Cl. I, Div. 2, GP. A, B, C, D T6

#### Entity parameter of electronic transmitter:

See table 7

### Intrinsically safe electronic transmitter with PESO-approval (India), option /KS1 with /Q11

Same data as ATEX- certified type, option /KS1

#### Certificate:

PESO Ref. No.: P442021/1

### Intrinsically safe electronic transmitter with EAC-approval Russia, Belarus, Kazakhstan, Armenia and Kyrgyzstan, option /GS1

#### Certificate:

RU C-DE.AA87.B.00398/20

#### Output signal:

- 4 to 20 mA (2-/3-wire unit);
- 0 to 20 mA (3-wire unit)

#### Explosion proof:

1Ex ia IIC T6 Gb X

#### Entity parameter:

See table 7

### Intrinsically safe electronic transmitter with ECAS-approval (UAE)

Same data as for IECEx certification, option /ES1.

#### Certificate:

20-04-10405 / E20-04-000725

### Intrinsically safe electronic transmitter with UKEx-approval, (UK) option /BS1

#### Certificate:

CML 21UKEX21080X

#### Output signal:

- 4 to 20 mA (2-/3-wire unit)
- 0 to 20 mA (3-wire unit)

#### Explosion proof:

Ex ia IIC T6 Gb; group II; category 2G

#### Entity parameter:

See table 7

## HAZARDOUS AREA APPROVALS FOR ELECTRONIC TRANSMITTER, type -P, -F

### Intrinsically safe electronic transmitter with

- ATEX- approval, option /KS1
- IECEx- approval, option /ES1
- UKEx- approval, option /BS1
- PESO- approval, option /KS1 with /Q11

#### Certificates:

- PTB 12 ATEX 2003 X
- IECEx PTB 12.0020 X
- CML 21UKEX21080X
- PESO Ref. No.: P505974/1

#### Output signal:

- Profibus PA
- Foundation Fieldbus

#### Explosion proof:

- Variant #1: Ex ia IIB/IIC T4 Gb
- Variant #2: Ex ia IIB/IIC T6 Gb
- Variant #3: Ex ia IIB T6 Gb
- Variant #4: Ex ia IIB/IIC T4 Gb

#### Ambient temperature:

- Variant #1: -40 °C to +70 °C
- Variant #2: -40 °C to +50 °C
- Variant #3: -40 °C to +60 °C
- Variant #4: -40 °C to +70 °C

#### Intrinsically safe parameter:

**Table 8a Variant #1 and #2 (Fuse 32 mA)**

	Fieldbus IIB	Fieldbus IIC	FISCO
Ui	17.5 V	24 V	According to IEC 60079-11: 2011 Annex G
Ii	380 mA	250 mA	
Pi	1.31 W	1.31 W	
Ci	negligible	negligible	
Li	negligible	negligible	

**Table 8b Variant #3 (Fuse 32 mA)**

	Fieldbus IIB	Fieldbus IIC	FISCO
Ui	17.5 V	---	According to IEC 60079-11: 2011 Annex G
Ii	380 mA	---	
Pi	0.95 W	---	
Ci	negligible	---	
Li	negligible	---	

**Table 8c Variant #4 (Fuse 62 mA)**

	Fieldbus IIB	Fieldbus IIC	FISCO
Ui	17.5 V	24 V	According to IEC 60079-11: 2011 Annex G
Ii	380 mA	250 mA	
Pi	2.53 W	2.53 W	
Ci	negligible	negligible	
Li	negligible	negligible	

## HAZARDOUS AREA APPROVALS FOR INTRINSICALLY SAFE LIMIT SWITCHES, option /K1 to /K10

### Intrinsically safe limit switches with ATEX- approval, option /K1 to /K10 with /KS1

#### Certificate:

- PTB 99 ATEX 2219X (SC3,5-N0), /K1 to /K3
- PTB 00 ATEX 2049X (SJ 3,5-S.N), /K6 to /K10

#### Explosion proof:

Ex ia IIC T6...T1 Gb

#### Entity parameter:

See certificate

### Intrinsically safe limit switches with IECEx- approval, option /K1 to /K10 with /ES1

#### Certificate:

- IECEx PTB11.0091 (SC3,5-N0) (/K1 to /K3)
- IECEx PTB11.0092 (SJ 3,5-S.N) (/K6 to /K10)

#### Explosion proof:

Ex ia IIC T6...T1 Gb

#### Entity parameter:

See certificate

### Intrinsically safe limit switches with UKEx- approval, option /K1 to /K10 with /BS1

#### Certificate:

- CML 21UKEX2893X (SC3,5-N0), /K1 to /K3
- CML 21UKEX2977X (SJ 3,5-S.N), /K6 to /K10

#### Explosion proof:

Ex ia IIC T6...T1 Gb

#### Entity parameter:

See certificate

### Intrinsically safe limit switches with UL-approval (USA + Canada), option /K1 to /K10 with /FS1

#### Certificates:

- 20190402-E501628 (SC3,5-N0) (/K1 to /K3)
- 20190619-E501628 (SJ 3,5-S.N) (/K6 to /K10)

#### Explosion proof:

Class I, Division 1, Groups A, B, C, D, T6...T1  
 Class II, Division 1, Groups E, F, G, T135°C  
 Class III, Division 1, T135°C  
 Class I, Zone 1 IIC  
 USL– Class I, Zone 1, AEx ia IIC T6...T1 Gb  
 Zone 21, AEx ia IIIC T135°C Db  
 CNL– Ex ia IIC T6...T1 Gb X  
 Ex ia IIIC T135°C Db X

#### Control drawings:

- 116-0453 (/K1 to /K3)
- 116-0454 (/K6 to /K10)

### Intrinsically safe limit switches with EAC- approval Russia, Belarus, Kazakhstan, Armenia and Kyrgyzstan, option /K1 to /K10 with /GS1

#### Certificate:

- RU C-DE.AA87.B.00398/20
- RU C-DE.AA87.B.00394 (from Pepperl & Fuchs)

#### Explosion proof:

0Ex ia IIC T6...T1 Gb X

#### Entity parameter:

See certificate

**Intrinsically safe limit switches with NEPSI-approval (China), option /K1 to /K10 with /NS1**  
**Certificate:**

- GYJ16.1391X (/K1 to /K3)
- GYJ16.1392X (/K6 to /K10)

**Intrinsically safe limit switches with PESO-approval (India), option /K1 to /K10 with /KS1 and /Q11**  
 Same data as ATEX- certified type, option /KS1.

- P471352/1 (/K1 to /K3)
- P471350/1 (/K6 to /K10)

**Intrinsically safe limit switches with KOSHA-approval (Korea), option /K1 to /K3 with /KS1 and /KC**  
 Same data as ATEX- certified type, option /KS1.

**Certificate:**  
 13-AV4BO-0352X/0353X

**HAZARDOUS AREA APPROVALS FOR COMPLETE ELECTRICAL RAMC**

**Intrinsically safe RAMC with NEPSI- approval (China), option /NS1**

**Certificate:**  
 GYJ20.1088X

**Electronic transmitter:**

- Output signal:
- 4 to 20 mA (2-/3-wire unit)
- 0 to 20 mA (3-wire unit)
- Explosion proof: Ex ia IIC T6

**Ambient temperature:**

-40 °C to +70 °C (-40 °F to 158 °F)

**Entity parameter:**

See table 7

**Limit switches:**

- Option /K1 to /K3 data see certificate GYJ16.1391X
- Option /K6 to /K10 data see certificate GYJ16.1392X



**NOTE**

No cable glands are included with flameproof devices.

**Flame proof and dust proof RAMC with ATEX-approval, option /KF1**

**Certificate:**  
 IBExU 05 ATEX 1086X

**Flame proof:**

Ex db IIC T6...T1 Gb

**Dust proof:**

Ex tb IIIC T85°C...370°C Db

**Housing:**

Painted aluminum casting, type 91

**Output signal with electronic transmitter -E,-J:**

- 4 to 20 mA (2-/3-wire unit)
- 0 to 20 mA (3-wire unit)

**Power supply with electronic transmitter -E, -J:**

2- or 3-wire unit

**Limit switches:**

Options /K1 to /K10 possible

**Indicator temperature:**

-20 °C to +60 °C (-4 °F to 140 °F)

**Threads for cable glands:**

- Standard: M20x1.5
- Option /A5: ½ - 14 NPT

**Temperature classification:**

See table 9

**Flame proof and dust proof RAMC with IECEx-approval, option /EF1**

**Certificate:**  
 IECEx IBE12.0007

**Flame proof:**

Ex db IIC T1...T6 Gb

**Dust proof:**

Ex tb IIIC TX Db

TX: max. surface temperature determined by the process temperature

**Housing:**

Painted aluminum casting, type 91

**Output signal with electronic transmitter -E, -J:**

- 4 to 20 mA (2- or 3-wire unit);
- 0 to 20 mA (3-wire unit)

**Power supply with electronic transmitter -E, -J:**

2- or 3-wire unit

**Limit switches:**

Options /K1 to /K10 possible

**Indicator temperature:**

-20 °C to +60 °C (-4 °F to 140 °F)

**Threads for cable glands:**

- Standard: M20x1.5
- Option /A5: ½ - 14 NPT

**Temperature classification:**

See table 9

**Flame proof and dust proof RAMC with PESO-approval (India), option /KF1 with /Q11**

Same data as ATEX- certified type, option /KF1.  
 But no dust proof Ex tb IIIC T85°C...370°C Db.

**Certificate:**

PESO Ref. No.: P432024/1

**Flame proof RAMC with KOSHA-approval (Korea), option /EF1 with /KC**

**Certificate:**  
 12-AV4BO-0721X

**Flame proof:**

Ex d IIC T1...T6

**Temperature classification:**

See table 9

**Flame proof RAMC with EAC- approval (Russia, Belarus, Kazakhstan, Armenia and Kyrgyzstan), option /GF1**

**Certificate:**  
 RU C-DE.AA87.B.00398/20

**Flame proof:**

1Ex db IIC T1...T6 Gb X

**Dust proof:**

Ex tb IIIC T\*\*°C Db X

Max. surface temperature T\*\*°C: corresp. process temperature

**Housing:**

Painted aluminum casting, type 91

**Output signal with electronic transmitter -E, -J:**

- 4 to 20 mA (2-/3-wire unit)
- 0 to 20 mA (3-wire unit)

**Power supply with electronic transmitter -E, -J:**

2- or 3-wire unit

**Limit switches:**

Options /K1 to /K10 possible

**Indicator temperature:**

-20 °C to +60 °C (-4 °F to 140 °F)

**Threads for cable glands:**

- Standard: M20x1.5
- Option /A5: ½ - 14 NPT

**Temperature classification:**

See table 9



**Flame proof and dust proof RAMC with NEPSI-approval (China), option /NF1****Certificate:**

GYJ23.1013X

**Flame proof:**

Ex db IIC T1...T6 Gb

**Dust proof:**

Ex tb IIIC T80°C Db

**Housing:**

Painted aluminum casting type 91

**Output signal with electronic transmitter -E, -J:**

- 4 to 20 mA (2-/3-wire unit)
- 0 to 20 mA (3-wire unit)

**Power supply with electronic transmitter -E, -J:**

2- or 3-wire unit

**Limit switches:**

Options /K1 to /K10 possible

**Indicator temperature:**

-20 °C to +60 °C (-4 °F to 140 °F)

**Threads for cable glands:**

- Standard: M20x1.5
- Option /A5: ½ - 14 NPT

**Temperature classification:**

See table 9

**Flame proof and dust proof RAMC with Taiwan Safety Mark****Registration Document:**

ML041200702782

Option /EF1 must be selected.

Same data as IECEx-certified type (/EF1)

For export to Taiwan please contact your Yokogawa representative regarding Taiwan Safety Mark.

**Flame proof RAMC with ECAS-approval (UAE)**

Same data as for IECEx certification, option /EF1.

**Certificate:**

20-04-10406 / E20-04-000726

**Flame proof and dust proof RAMC with UKEx-approval, option /BF1**

Same data as ATEX-certified type, option /KF1.

**Certificate:**

CML 21UKEX11333X

**Table 9 Temperatur rating for flameproof devices**

Temp. class	Max. Process temperature in °C (°F)		
	No extension	With extension	With extension with insulation
T6	85 (158)	85 (158)	85 (158)
T5	100 (212)	100 (212)	100 (212)
T4	120 (248)	135 (275)	135 (275)
T3	120 (248)	200 (392)	200 (392)
T2	120 (248)	300 (572)	300 (572)
T1	120 (248)	370 (698)	350 (662)

**INTRINSICALLY SAFE COMPONENTS WITH DUST-PROOF****Intrinsically safe electronic transmitter with/without limit switches in dust proof indicator ATEX-certified, option /KS2****Approval:**

- PTB 12 ATEX2003X (Intrinsically safe electronic transmitter)
- PTB 99 ATEX2219X (Intrinsically safe limit switch SC3,5-N0)
- PTB 00 ATEX2049X (Intrinsically safe limit switch SJ3,5-S.N)
- IBEExU 05 ATEX1086X (Dust proof)

**Output signal electronic transmitter:**

- 4 to 20 mA (2-/3-wire unit)
- 0 to 20 mA (3-wire unit)

**Explosion proof:**

Ex ia IIC T6 Gb (electronic transmitter)  
Ex ia IIC T6...T1 Gb (limit switches)

**Dust proof:**

Ex tb IIIC T85°C...370°C Db

**Entity parameter:**

- See table 7 for electronic transmitter (/KS1)
- See certificates for limit switches

**Housing:**

Painted aluminum casting, type 91

**Indicator temperature:**

-20 °C to +60 °C (-4 °F to 140 °F)

**Threads for cable glands:**

- Standard: M20x1.5
- Option /A5: ½ - 14 NPT

**Intrinsically safe electronic transmitter with/without limit switches in dust proof indicator IECEx-certified, option /ES2****Approval:**

- IECEx PTB12.0020X (Intrinsically safe electronic transmitter)
- IECEx PTB11.0091X (Intrinsically safe limit switch SC3,5-N0)
- IECEx PTB11.0092X (Intrinsically safe limit switch SJ3,5-S.N)
- IECEx IBE12.0007 (Dust proof)

**Output signal electronic transmitter:**

- 4 to 20 mA (2-/3-wire unit)
- 0 to 20 mA (3-wire unit)

**Explosion proof:**

Ex ia IIC T6 Gb (electronic transmitter)  
Ex ia T6...T1 Gb (limit switches)

**Dust proof:**

Ex tb IIIC TX Db

Max. surface temperature TX: corresponding process temperature

**Entity parameter:**

- See table 7 for electronic transmitter (/ES1)
- See certificates for limit switches

**Housing:**

Painted aluminum casting, type 91

**Indicator temperature:**

-20 °C to +60 °C (-4 °F to 140 °F)

**Threads for cable glands:**

- Standard: M20x1.5
- Option /A5: ½ - 14 NPT

**Intrinsically safe electronic transmitter with/without limit switches in dust proof indicator UKEx-certified, option /BS2**

**Approval:**

- CML 21UKEX21080X (Intrinsically safe electronic transmitter)
- CML 21UKEX2893X (Intrinsically safe limit switch SC3,5-N0)
- CML 21UKEX2977X (Intrinsically safe limit switch SJ3,5-S.N)
- CML 21UKEX11333X (Dust proof)

**Output signal electronic transmitter:**

- 4 to 20 mA (2-/3-wire unit)
- 0 to 20 mA (3-wire unit)

**Explosion proof:**

- Ex ia IIC T6 Gb (electronic transmitter)
- Ex ia T6...T1 Gb (limit switches)

**Dust proof:**

- Ex tb IIIC T85°C...370°C Db IP6X

**Entity parameter:**

- See table 7 for electronic transmitter
- See certificates for limit switches

**Housing:**

- Painted aluminum casting, type 91

**Indicator temperature:**

- 20 °C to +60 °C (-4 °F to 140 °F)

**Threads for cable glands:**

- Standard: M20x1.5
- Option /A5: ½ - 14 NPT

**POWER SUPPLIES FOR INTRINSICALLY SAFE COMPONENTS**

**Power Supply for the intrinsically safe electronic transmitter, option /UT**

**Type:**

- Power supply with galvanically separated input and output RN221N-B1, HART-compatible

**Approval:**

- ATEX: PTB 00 ATEX 2018
- Other certificates available on request.

**Supply voltage:**

- 20 to 250 V DC/AC 50/60 Hz

**Maximum load impedance:**

- 700 Ω

**Output signal:**

- 4 to 20 mA

**Control circuit:**

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

**Entity parameters:**

- See certificate

**Power supply for intrinsically safe limit switches, option /W□□**

**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

**Fail-safe:**

- KFD2-SH-Ex1 (24 V DC), 1 channel

**Approvals:**

- KFA5-SR2-Ex\*.W: ATEX: PTB 00 ATEX 2081  
UL: E106378  
IECEX: IECEX PTB11.0031  
EAC: RU C-DE.EX01.B.00102/19  
NEPSI/CCC: 2020322316001423  
KOSHA: 2009-BO-0223-1
- KFA6-SR2-Ex\*.W: ATEX: PTB 00 ATEX 2081  
UL: E106378  
IECEX: IECEX PTB11.0031  
EAC: RU C-DE.EX01.B.00102/19  
NEPSI/CCC: 2020322316001423  
KOSHA: 2009-BO-0224-1
- KFD2-SR2-Ex\*.W: ATEX: PTB 00 ATEX 2080  
UL: E106378  
IECEX: IECEX PTB11.0034  
PESO: P440216  
EAC: RU C-DE.EX01.B.00102/19  
NEPSI/CCC: 2020322316001439  
KOSHA: 2009-BO-0222-1
- KFD2-SH-Ex1: ATEX: PTB 00 ATEX 2042  
EAC: RU C-DE.EX01.B.00102/19

**Control circuit (ATEX):**

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

**Entity parameter:**

- See certificates

## HAZARDOUS AREA APPROVALS FOR COMPLETE MECHANICAL RAMC

### ATEX registered RAMC, option /KC1

#### Archive No.:

IBExU 099/15

#### Explosion proof:

II2G Ex h IIC TX Gb

II2D Ex h IIIC TX°C Db

TX°C: max. surface temperature determined by the process temperature

#### Ambient temperature:

-40 °C to +90 °C (-40 °F to 194 °F)

#### Max. process temperature

- Standard: +220 °C (428 °F)
- Indicator on distance: +370 °C (698 °F)

### RAMC with EAC-approval, option /GC1

#### Approval:

RU C-DE.AA87B.00398/20

#### Explosion proof:

• II Gb c IIC T\*\* X

• III Db c IIIC T\*\*°C X

#### Max. surface temperature:

T\*\*°C: corresponding process temperature

#### Ambient temperature:

-40 °C to +90 °C (-40 °F to 194 °F)

#### Max. process temperature:

- Standard: +220 °C (428 °F)
- Indicator on distance: +370 °C (698 °F)

### UKEx registered RAMC, option /BC1

#### Approval:

CML 21UKEXT969X

#### Explosion proof:

II2G Ex h IIC TX Gb

II2D Ex h IIIC TX°C Db

TX°C: max. surface temperature determined by the process temperature

#### Ambient temperature:

-40 °C to +90 °C (-40 °F to 194 °F)

#### Max. process temperature

- Standard: +220 °C (428 °F)
- Indicator on distance: +370 °C (698 °F)

## PLANNING AND INSTALLATION HINTS

- The user is responsible for the use of the flowmeters regarding suitability and use as designed.
- The actual operation pressure must be lower as the specified pressure limits of the Rotameter.
- Make sure that the wetted parts are resistant against the process fluid.
- Ambient- and process temperature must be lower than the specified maximum values.
- If dirt accumulation is to be expected, we recommend installing a bypass pipe.
- To avoid float bouncing in case of gas application notice the recommendations of VDI/VDE 3513 Sheet 3.
- To avoid mutual magnetic influence in case of parallel design of several Rotameters please make sure that the distance between the tube middle axes is at least 300 mm. The distance to other ferromagnetic materials should be at least 250 mm.
- Avoid static magnetic fields next to the Rotameter.

#### Specify the following when ordering:

- Model, suffix code and option code
- Fluid name, process temperature, fluid density, process pressure, fluid viscosity
- For gases: condition of the scale (st. or actual)
- Options: Tag No.: customer specific notes

For your special application please use the Yokogawa Sizing Software [www.FlowConfigurator.com](http://www.FlowConfigurator.com).

## MODEL SPECIFICATIONS

Model	Suffix code	Description	Restrictions
RAMC01 RAMC23 RAMC02 RAMC03 RAMC04 RAMC05 RAMC06 RAMC08 RAMC09 RAMC10 RAMC12 RAMC15 RAMCNN		Size DN 15 (½ in.) Size DN 20 (¾ in.) Size DN 25 (1 in.) Size DN 32 (1 ¼ in.) Size DN 40 (1 ½ in.) Size DN 50 (2 in.) Size DN 65 (2 ½ in.) Size DN 80 (3 in.) Size 3 ½ in. Size DN 100 (4 in.) Size DN 125 (5 in.) Size DN 150 (6 in.) Without measuring tube, only indicator	Refer to table 10 Refer to table 10 Refer to table 10 Refer to table 10 Refer to table 10 Refer to table 10 Refer to table 10 Refer to table 10 Refer to table 10 Refer to table 10 Refer to table 10 Refer to table 10 only as RAMCNN-NNNN-NNNN
Process connection	-D2 -D4 -D5 -D6 -A1 -A2 -A3 -T6 -G6 -R4 -S2 -S4 -T4 -S5 -NN	EN flange PN 16, process connection dimension + facing acc. to EN 1092-1 Form B1 EN flange PN 40, process connection dimension + facing acc. to EN 1092-1 Form B1 EN flange PN 63, process connection dimension + facing acc. to EN 1092-1 Form B2 EN flange PN 100, process connection dimension + facing acc. to EN 1092-1 Form B2 ASME flange class 150, process connection dimension + facing acc. to ASME B 16.5 ASME flange class 300, process connection dimension + facing acc. to ASME B 16.5 ASME flange class 600, process connection dimension + facing acc. to ASME B 16.5 Internal thread NPT, PN 40 Internal thread G, PN 40 Internal thread Rp, removable External thread acc. to DIN 11851 TRI-CLAMP PN 10, PN 16 acc. to DIN 32676 Internal thread NPT, removable Rosista flange, PN 10 Without measuring tube, only indicator	Refer to tables 10 and 15 Refer to tables 10 and 15 Refer to tables 10 and 15 Refer to tables 10 and 15 Refer to tables 10 and 15 Refer to tables 10 and 15 Refer to tables 10 and 15 Refer to tables 10 and 15 Refer to tables 10 and 15 Refer to tables 10 and 15 Refer to tables 10 and 15 Refer to tables 10 and 15 Refer to tables 10 and 15 Only with RAMCNN
Material of wetted parts	SS PF NN	Stainless steel PTFE lining Without measuring tube, only indicator	Only with RAMCNN
Measuring Cone/Float	-□ □ □ □ -NNNN	See tables 11 and 13 Without measuring tube, only indicator	Only with RAMCNN
Indicator/Transmitter	-T -E -J -P -F -N	Mechanical indicator Indicator with transmitter Indicator with transmitter, HART 7 (includes Software Tag for HART 7) Indicator with transmitter, Profibus PA (includes Software Tag for Profibus PA) Indicator with transmitter, Foundation Fieldbus (includes Software Tag for Foundation Fieldbus) Without indicator	Only with output 424 8 digits for tag, 24 digits for long tag Only with output 429; explosion proof type only with /KS1 or /ES1; not with /Q11; 32 digits for tag Only with output 429; explosion proof type only with /KS1 or /ES1; not with /VR, /Q11, /QRx; 32 digits for tag Only with housing NN
Housing type	90 91 NN	Housing SS Housing Al, yellow painted Without housing	Only with indicator -N
Power supply/Output	240 244 140 144 430 434 424 429 NNN	230 V AC; 4-wire; 0 to 20 mA 230 V AC; 4-wire; 4 to 20 mA 115 V AC; 4-wire; 0 to 20 mA 115 V AC; 4-wire; 4 to 20 mA 24 V DC; 3-wire; 0 to 20 mA 24 V DC; 3-wire; 4 to 20 mA 24 V DC; 2-wire; 4 to 20 mA 9 to 32 V DC; 2-wire; Profibus PA, FOUNDATION Fieldbus Without power supply	Only with indicator -E; not with limit switches Only with indicator -E; not with limit switches Only with indicator -E; not with limit switches Only with indicator -E; not with limit switches Only with indicator -E Only with indicator -E Only with indicator -E, -J Only with indicator -P or -F Only with indicator -T or -N

## OPTIONS

Options	Code	Description	Restrictions
Indicator	/A5	Internal thread for cable gland ASME 1/2 - 14 NPT	Not with /A13
	/A12	US-engineering units	Only for indicator -E; not with -J because already available as standard
	/A13	Internal thread for cable gland ISO M20x1.5	Only for housing 90
	/A16	Indicator on 95 mm extension	Only for housing 90, 91
	/A23	Scale and EEPROM for type E90, J90, P90, F90, E91, J91, P91, F91	Not with hazardous approval type; not with indicator; not with /A16; only with measuring tube
	/A26	Indicator for -40 °C (-40 °F) ambient temperature	Not with /K1, /K2, /K3, /K9, /K10, /KF1, /EF1, /NF1, /GF1, /KS2, /ES2, /FS1, power supply 14□ + 24□
Marking	/B0	Tag plate (1.4404/316L) on flange and marking on scale	Plate 9x40 mm; max. 45 digits
	/B1	Tag plate (SS) fixed by wire and customer specified tag number on scale	Plate 9x40 mm; max. 45 digits
	/B4	Neutral version	Not with hazardous approval type; not with /VR, /VE
	/B10	Percentage scale	
	/BG	Customer specific notes on scale	Max. 30 digits
	/BD	Dual scale	Adjustment of the transmitter for the first mentioned fluid
Limit switches	/K1	MIN-contact	Not for power supply 14□ + 24□; not with indicator P and F
	/K2	MAX-con tact	Not for power supply 14□ + 24□; not with indicator P and F
	/K3	MIN-MAX-contact, MIN-MIN-contact, MAX-MAX-contact	Not for power supply 14□ + 24□; not with indicator P and F
	/K6	MIN-contact "fail-safe" version	Not for power supply 14□ + 24□; not with indicator P and F
	/K7	MAX-contact "fail-safe" version	Not for power supply 14□ + 24□; not with indicator P and F
	/K8	MIN-MAX-contact "fail-safe" version	Not for power supply 14□ + 24□; not with indicator P and F
	/K9	MIN-MIN-contact "fail-safe" version	Not for power supply 14□ + 24□; not with indicator P and F
Pulse output	/K10	MAX-MAX-contact "fail-safe" version	Not for power supply 14□ + 24□; not with indicator P and F
	/CP	Pulse output isolated	Only for power supply 140, 144, 240, 244; not with limit switches
Flange Facing	/D10	Form B2 acc. to EN 1092-1	Only for EN-flanges (D2, D4); not with PTFE
	/D11	Form D acc. to EN 1092-1	Only for EN-flanges (D2, D4); not with PTFE
Damping	/SD	Float damping system	Only for SS; not for cone 81, 82; only for gas application
Flange protection	/QK	Flange covers	Only for flanges A1, A2, A3, D2, D4, D5, D6
Heat tracing	/T1	Heat trace connection internal thread G ¼ in. PN 40	Heating is only for metallic instruments "SS" available
	/T2	Heat trace connection EN flange DN 15 PN 40 Form B1	Heating is only for metallic instruments "SS" available
	/T3	Heat trace connection EN flange DN 25 PN 40 Form B1	Heating is only for metallic instruments "SS" available
	/T4	Heat trace connection ASME flange ½ in. Class 150 RF	Heating is only for metallic instruments "SS" available
	/T5	Heat trace connection ASME flange 1 in. Class 150 RF	Heating is only for metallic instruments "SS" available
	/T6	Heat trace connection internal thread ¼ - 18 NPT PN 40	Heating is only for metallic instruments "SS" available
Housing Coating	/X1	Single layer epoxy coating system for housing type 91; Cover and bottom in green RAL 6004	Not for housing 90; not with /KC1 or /GC1
	/X2	High Anti Corrosion coating (3 layers) for housing type 91; /A16 will also be coated; Cover in yellow RAL 1021, bottom (and /A16 if selected) in white RAL 9001	Not for housing 90; not with /KC1 or /GC1
Test and certificates	/H1	Oil + fat free acc. Yokogawa specification	Only for for wetted surfaces
	/H4	Oil + fat free acc. Yokogawa specification + add. control with UV lamp	Only for for wetted surfaces
	/P2	Certificate of compliance with the order acc. to EN 10204-2.1	
	/P3	Similar to /P2 + Test report acc. to EN 10204-2.2	
	/P6	Cert. of marking transfer and raw material cert. (Inspection Cert. 3.1 acc. to EN 10204), incl. IGC acc. to ISO 3651-2 Method A, ASTM A262 practice E, NACE remark acc. to MR0175 and MR0103	Only for metallic pressure bearing parts (process connection and metering tube) <sup>1)</sup>
	/PM3	PMI test (3 points: Process connection inlet, measuring tube, process connection outlet)	Only for metallic pressure bearing parts (process connection and metering tube) <sup>1)</sup>
	/PP	Pressure test report flow tube acc. to EN 12266-1	
	/PT	Flow table for conversion to other fluids	
	/P9	Dye penetration test acc. to EN ISO 3452-1 at the welding of the process connection, with certificate	
	/P14	Dye penetrant test of flange welding acc. to ASME V	
	/P15	ASME B31.3 compliance NORMAL FLUID SERVICE	Only RAMC□-A1SS, RAMC□-A2SS, RAMC□-A3SS; not for /T□
	/P16	ASME B31.3 compliance Category M FLUID SERVICE	Only RAMC□-A1SS, RAMC□-A2SS, RAMC□-A3SS; not for /T□; only with /RTA
	/WP	Welding documentation acc. to AD2000 HP2/1	Not for /T□; not with /P15 or /P16
	/WPA	Welding and certificates acc. to ASME BPVC, IX	Not for PTFE
/RTA	X-ray test acc. to ASME BPVC, V	Not for PTFE	

<sup>1)</sup> For details and exceptions please refer to Rota Yokogawa declaration about NACE conformity, document no. 8660001.

Options	Code	Description	Restrictions
Hazardous area approvals	/KS1	ATEX intrinsically safe "ia" in combination with /KC: KOSHA intrinsically safe "ia"	Only for power supply 424, 430, 434, 429; for indicator -T only with limit switches Only for indicator T; only with limit switches /K1 to /K3
	/KS2	ATEX intrinsically safe "ia"/ dust proof "tb"	Only for power supply 424, 430, 434; for indicator -T only with limit switches; only for housing 91
	/ES1	IECEX intrinsically safe "ia"	Only for power supply 424, 430, 434, 429; for indicator -T only with limit switches
	/ES2	IECEX intrinsically safe "ia"/ dust proof "tb"	Only for power supply 424, 430, 434; for indicator -T only with limit switches; only for housing 91
	/BS1	UKEx intrinsically safe "ia"	Only for power supply 424, 430, 434, 429; for indicator -T only with limit switches
	/BS2	UKEx intrinsically safe "ia"/ dust proof "tb"	Only for power supply 424, 430, 434; for indicator -T only with limit switches; only for housing 91
	/FS1	FM intrinsically safe/ nonincendive electr. transmitter (USA/Canada), UL intrinsically safe/ nonincendive-limit switches (USA/Canada)	Only for power supply 424 (electronic transmitter); for indicator -T only with limit switches
	/NS1	NEPSI intrinsically safe "ia" (China)	Only for power supply 424, 430, 434; for indicator -T only with limit switches; only with /CN
	/GS1	EAC intrinsically safe "ia"	Only for power supply 424, 430, 434; only with /VE or /VR; for indicator -T only with limit switches
	/KF1	ATEX flame proof "db"/ dust proof "tb"	Only for power supply 424, 430, 434; for indicator -T only with limit switches; only with housing 91
	/EF1	IECEX flame proof "db" / dust proof "tb"; in combination with /KC: KOSHA flame proof "d" (Korea)	Only for power supply 424, 430, 434; for indicator -T only with limit switches; only with housing 91
	/BF1	UKEx flame proof "db"/ dust proof "tb"	Only for power supply 424, 430, 434; for indicator -T only with limit switches; only with housing 91
	/NF1	NEPSI flame proof "d"/ dust proof "tb" (China)	Only for power supply 424, 430, 434; for indicator -T only with limit switches; only for housing 91; only with /CN
	/GF1	EAC-Ex flame proof "db" / dust proof "tb"	Only for power supply 424, 430, 434; for indicator -T only with limit switches; only for housing 91; only with /VE or /VR
	/KC1	ATEX non-electrical type	Only for indicator -T without limit switches
	/BC1	UKEx non-electrical type	Only for indicator -T without limit switches
/GC1	EAC-Ex non-electrical type	Only for indicator -T without limit switches; only with /VE or /VR	
Country-specific delivery	/VE	EAC-mark for EAEU countries	Not with /Q11; not with /B4
	/VR	EAC-mark and Pattern Approval marking for Russia	Not with /Q11; not with /B4
	/KC	KC-mark for Korea	Not with /Q11; for explosion proof see /EF1 and /KS1; not with /B4
	/UK	UKCA-marking for UK	
	/CN	China RoHS mark	Not with /Q11; not with /B4
Country-specific application	/QR2	Primary verification approval and Pattern Approval valid in Kazakhstan	See page 5, only with /VE
	/QR3	Primary verification approval and Pattern Approval valid in Uzbekistan	See page 5
	/Q11	PESO intrinsically safe "ia" or PESO flame proof "d"	Only with /KS1 or /KF1; not with /B4
	/TS1	China TSG Approval Pressure Class GC1	Only with /CN, /P3, /P6, /P9 or /P14, /PP, /WPA and /RTA; not with RAMC01, -23, -02, -03, -04, -NN
	/TS2	China TSG Approval Pressure Class GC2	Only with /CN, /P3, /P6, /P9 or /P14, /PP and /WPA; not with RAMC01, -23, -02, -03, -04, -NN
Power supply for electronic transmitter	/UT	RN221N-B1, 20 to 250 V DC/AC, Ex i, HART compatible	Only for indicator -E, -J, only ATEX or standard, only for output 424
Power supply for limit switches (transmitter relay)	/W1A	KFA5-SR2-Ex1.W/ 115 V AC, 1 channel	Only for limit switches /K1, /K2, /K3; not with indicator P and F
	/W1B	KFA5-SR2-Ex2.W/ 115 V AC, 2 channel	Only for limit switches /K1, /K2, /K3; not with indicator P and F
	/W2A	KFA6-SR2-Ex1.W/ 230 V AC, 1 channel	Only for limit switches /K1, /K2, /K3; not with indicator P and F
	/W2B	KFA6-SR2-Ex2.W/ 230 V AC, 2 channel	Only for limit switches /K1, /K2, /K3; not with indicator P and F
	/W4A	KFD2-SR2-Ex1.W/ 24 V DC, 1 channel	Only for limit switches /K1, /K2, /K3; not with indicator P and F
	/W4B	KFD2-SR2-Ex2.W/ 24 V DC, 2 channel	Only for limit switches /K1, /K2, /K3; not with indicator P and F
	/W4E	KFD2-SH-Ex1/ 24 V DC, 1 channel, fail-safe	Only for limit switches /K6, /K7; not with indicator P and F
/W4F	2x KFD2-SH-Ex1/ 24 V DC, 1 channel, fail-safe	Only for limit switches /K8, /K9, /K10; not with indicator P and F	
User's Manuals	/IEn	Quantity of instruction manuals in English	n = 1 to 9 selectable <sup>*)</sup>
	/IDn	Quantity of instruction manuals in German	n = 1 to 9 selectable <sup>*)</sup>
Special order	/Z	Special design must be specified separately. If /Z is selected, several Suffix of Model-Suffix Code can be changed to Z.	

<sup>\*)</sup> If no User's Manual is selected, only a DVD with User's Manuals is shipped with the flowmeter.

## PROCESS CONNECTION TABLE FOR METAL TUBES

Table 10

Pos.	Cone	Model	Installation length L in mm (inch)											
			-D2SS-	-D4SS-	-D5SS-	-D6SS-	-A1SS-	-A2SS-	-A3SS-	-S2SS-	-S4SS-	-T4SS- -R4SS-	-T6SS- -G6SS-	-S5SS-
1	43-51	RAMC01	-	250 (9.84)	-	250 (9.84)	250 (9.84)	250 (9.84)	250 (9.84)	-	-	295 (11.61)	295 (11.61)	-
		RAMC23	-	250 (9.84)	-	250 (9.84)	250 (9.84)	250 (9.84)	250 (9.84)	-	-	295 (11.61)	295 (11.61)	-
		RAMC02	-	250 (9.84)	-	260 (10.23)	250 (9.84)	250 (9.84)	260 (10.23)	275 (10.83)	250 (9.84)	-	295 (11.61)	250 (9.84)
		RAMC03	-	250 (9.84)	-	-	250 (9.84)	250 (9.84)	260 (10.23)	-	250 (9.84)	-	-	-
		RAMC04	-	250 (9.84)	-	-	250 (9.84)	250 (9.84)	280 (11.02)	-	250 (9.84)	-	-	-
		RAMC05	-	250 (9.84)	-	-	250 (9.84)	250 (9.84)	280 (11.02)	-	-	-	-	-
2	53-62	RAMC01	-	250 (9.84)	-	250 (9.84)	250 (9.84)	250 (9.84)	250 (9.84)	-	-	295 (11.61)	-	-
		RAMC23	-	250 (9.84)	-	250 (9.84)	250 (9.84)	250 (9.84)	250 (9.84)	-	-	295 (11.61)	295 (11.61)	-
		RAMC02	-	250 (9.84)	-	260 (10.23)	250 (9.84)	250 (9.84)	260 (10.23)	275 (10.83)	250 (9.84)	250 (9.84)	295 (11.61)	250 (9.84)
		RAMC03	-	250 (9.84)	-	-	250 (9.84)	250 (9.84)	260 (10.23)	-	250 (9.84)	-	-	-
		RAMC04	-	250 (9.84)	-	-	250 (9.84)	250 (9.84)	280 (11.02)	-	250 (9.84)	-	-	-
		RAMC05	-	250 (9.84)	-	-	250 (9.84)	250 (9.84)	280 (11.02)	-	-	-	-	-
3	63-64	RAMC02	-	250 (9.84)	-	270 (10.63)	250 (9.84)	250 (9.84)	270 (10.63)	-	-	310 (12.21)	-	250 (9.84)
		RAMC03	-	250 (9.84)	-	270 (10.63)	250 (9.84)	250 (9.84)	270 (10.63)	-	-	-	310 (12.21)	-
		RAMC04	-	250 (9.84)	-	270 (10.63)	250 (9.84)	250 (9.84)	280 (11.02)	-	-	-	310 (12.21)	250 (9.84)
		RAMC05	-	250 (9.84)	270 (10.63)	280 (11.02)	250 (9.84)	250 (9.84)	280 (11.02)	270 (10.63)	250 (9.84)	-	-	-
4	67-72	RAMC05	-	250 (9.84)	260 (10.23)	-	250 (9.84)	250 (9.84)	280 (11.02)	-	-	325 (12.8)	-	-
		RAMC06	-	250 (9.84)	260 (10.23)	-	250 (9.84)	260 (10.23)	280 (11.02)	275 (10.83)	300 (11.81)	325 (12.8)	325 (12.8)	250 (9.84)
		RAMC08	-	250 (9.84)	270 (10.63)	-	250 (9.84)	260 (10.23)	290 (11.41)	275 (10.83)	-	-	-	-
		RAMC10	250 (9.84)	250 (9.84)	-	-	-	-	-	-	-	-	-	-
5	73-77	RAMC08	-	250 (9.84)	270 (10.63)	-	250 (9.84)	260 (10.23)	-	-	-	-	-	-
		RAMC09	-	-	-	-	250 (9.84)	270 (10.63)	-	-	-	-	-	-
		RAMC10	250 (9.84)	250 (9.84)	-	-	250 (9.84)	270 (10.63)	-	300 (11.81)	250 (9.84)	-	-	-
		RAMC12	250 (9.84)	-	-	-	250 (9.84)	280 (11.02)	-	-	-	-	-	-
		RAMC15	250 (9.84)	-	-	-	260 (10.23)	280 (11.02)	-	-	-	-	-	-
6	81-82	RAMC10	250 (9.84)	250 (9.84)	-	-	250 (9.84)	270 (10.63)	-	-	-	-	-	
		RAMC12	250 (9.84)	-	-	-	250 (9.84)	280 (11.02)	-	300 (11.81)	-	-	-	
		RAMC15	250 (9.84)	-	-	-	260 (10.28)	280 (11.02)	-	-	-	-	-	

## FLOW TABLES FOR METAL TUBES

Table 11

Pos.	Measuring range for water and liquids					Measuring range for air and gases				
	Max. flow		Cone-Float-combin.	Pressure loss <sup>1)</sup>	Viscosity <sup>2)</sup>	Max. flow			Cone-Float-combin.	Pressure loss <sup>1)</sup>
	m <sup>3</sup> /h <sup>3)</sup>	gpm <sup>4)</sup>				Code	mbar	mPa*s		
1	0.025	0.11	43 S0	40	10	0.75	0.7	0.44	43 S0	45
	0.04	0.18	44 S0	40	80	1.2	1.1	0.7	44 S0	45
	0.063	0.28	47 S0	40	80	1.8	1.7	1.05	47 S0	45
	0.1	0.44	51 S0	40	80	3	2.8	1.75	51 S0	45
2	0.13	0.57	53 L1	12	50	4	3.6	2.3	53 L1	13
	0.16	0.7	53 M1	15	100	5.5	5	3.2	53 M1	21
	0.22	1.0	54 L1	12	50	-	-	-	-	-
	0.25	1.1	53 S1	40	100	6.5	6	3.8	54 L1	13
	0.32	1.4	57 L1	12	50	9	8.5	5	54 M1	21
	0.4	1.8	54 S1	40	50	10	9	5.7	57 L1	13
	0.5	2.2	61 L1	12	50	14	13	8	57 M1	21
	0.63	2.8	57 S1	40	50	16	15	9	61 L1	13
	0.8	3.5	62 L1	12	50	22	20	12	61 M1	21
	1.0	4.4	61 S1	40	100	25	23	14	62 L1	13
	1.6	7.0	62 S1	40	100	34	32	20	62 M1	21
3	2.2	10.1	62 V1	45	50	50	45	28	62 S1	45
	1.3	5.7	63 L2	17	50	40	36	23	63 L2	19
	2.1	9.2	64 L2	17	50	50	47	29	63 M2	23
	2.5	11.0	63 S2	42	30	60	55	35	64 L2	19
	4	17.6	64 S2	42	10	85	80	50	64 M2	23
4	6	26.4	64 V2	43	50	120	110	70	64 S2	47
	3.2	14	67 L5	13	50	100	90	57	67 L5	16
	5.0	22	71 L5	13	50	130	120	75	67 M5	25
	6.3	28	67 S5	47	30	160	150	90	71 L5	16
	8.5	37	72 L5	13	50	200	180	115	71 M5	25
	10	44	71 S5	47	5	250	230	140	72 L5	16
	16	70	72 S5	47	5	340	320	200	72 M5	25
5	25	110	72 V5	63	5	500	470	290	72 S5	54
	25	110	73 V8	60	10	550	500	320	73 L8	30
	40	176	74 V8	60	10	850	800	500	74 L8	30
6	63	277	77 V8	60	10	1400	1300	800	77 L8	30
	100	440	81 11	70	10	-	-	-	-	-
	130	572	82 11	70	10	-	-	-	-	-

<sup>1)</sup> Pressure loss at the float with water or air.

<sup>2)</sup> For higher viscosity the specified precision is no more guaranteed.

<sup>3)</sup> Flow is referred to +20 °C (68 °F) and 1 bar abs. (14.5 psi abs.)

<sup>4)</sup> Flow in US Gallons per minute at +70 °F.

<sup>5)</sup> Flow referred to 0 °C (32 °F) and 1.013 bar abs (14.7 psi abs.) at operation conditions of +20 °C (68 °F) and 1 bar abs. (14.5 psi abs.)

<sup>6)</sup> Flow in Standard cubic feet per minute referred to +60 °F and 14.7 psi at operation conditions of +68 °F and 14.5 psi abs.

For your special application please use the Yokogawa Sizing Software [www.FlowConfigurator.com](http://www.FlowConfigurator.com).



## PROCESS CONNECTION TABLE FOR PTFE-LINING

Table 12

Pos.	Cone	Model	Installation length in mm (inch)			
			-D2PF-	-D4PF-	-A1PF-	-A2PF-
2	51-61	RAMC01	-	250 (9.84)	-	-
		RAMC23	-	-	250 (9.84)	250 (9.84)
		RAMC02	-	250 (9.84)	250 (9.84)	250 (9.84)
3	62-63	RAMC02	-	250 (9.84)	-	-
		RAMC03	-	-	250 (9.84)	250 (9.84)
		RAMC04	-	250 (9.84)	250 (9.84)	250 (9.84)
		RAMC05	-	250 (9.84)	-	-
4	64-71	RAMC05	-	250 (9.84)	-	-
		RAMC06	-	250 (9.84)	260 (10.23)	270 (10.63)
		RAMC08	-	250 (9.84)	260 (10.23)	270 (10.63)
5	72-74	RAMC08	-	250 (9.84)	-	-
		RAMC09	-	-	270 (10.63)	270 (10.63)
		RAMC10	250 (9.84)	-	270 (10.63)	270 (10.63)
6	77	RAMC10	250 (9.84)	250 (9.84)	270 (10.63)	270 (10.63)

## FLOW-TABLE FOR TUBES WITH PTFE-LINING

Table 13

Measuring range for water and liquids					Measuring range for air and gases				
Max. Flow		Cone-Float-combination	Pressure loss <sup>1)</sup>	Viscosity <sup>2)</sup>	Max. flow			Cone-Float-combination	Pressure loss <sup>1)</sup>
m <sup>3</sup> /h <sup>3)</sup>	gpm <sup>4)</sup>	Code	mbar	mPa*s	m <sup>3</sup> /h <sup>3)</sup>	m <sup>3</sup> /h i.N. <sup>5)</sup>	scfm <sup>6)</sup>	Code	mbar
0.1	0.45	51 A1	16	50	3.5	3.3	2	51 A1	20
0.16	0.7	52 A1	16	50	5	4.7	2.9	52 A1	20
0.25	1.12	53 A1	16	50	8.5	8	5	53 A1	20
0.4	1.8	54 A1	16	50	13	12	7.5	54 A1	20
0.63	2.8	57 A1	16	50	20	18	11	57 A1	20
1	4.5	61 V1	18	50	34	32	20	61 V1	22
1.6	7	62 A2	20	30	50	47	29	62 A2	25
2.5	11.2	63 A2	20	10	85	80	50	63 A2	25
4	18	63 V2	22	50	-	-	-	-	-
4	18	64 A5	20	30	130	120	75	64 A5	25
6.3	28	67 A5	20	30	200	180	115	67 A5	25
10	45	71 A5	20	5	350	330	200	71 A5	25
16	70	71 V5	22	10	-	-	-	-	-
16	70	72 V8	25	10	500	470	290	72 V8	27
25	110	73 V8	25	10	850	800	500	73 V8	27
40	180	74 V8	25	10	-	-	-	-	-
63	280	77 10	30	10	-	-	-	-	-

<sup>1)</sup> Pressure loss at the float with water or air.

<sup>2)</sup> For higher viscosity the specified precision is no more guaranteed.

<sup>3)</sup> Flow is referred to +20 °C (68 °F) and 1 bar abs. (14.5 psi abs.)

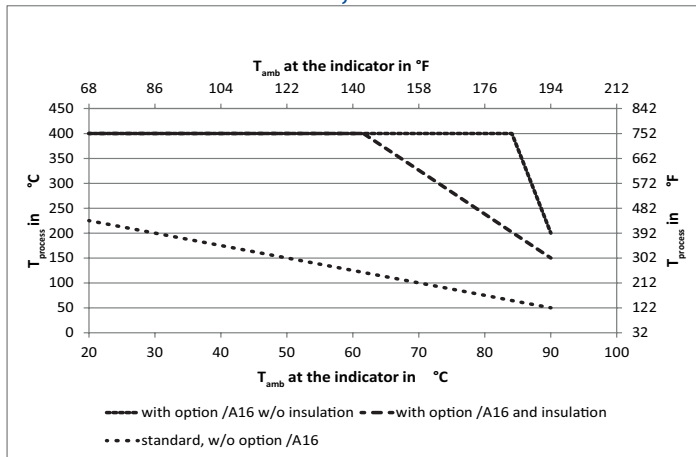
<sup>4)</sup> Flow in US Gallons per minute at +70 °F.

<sup>5)</sup> Flow referred to 0 °C (32 °F) and 1.013 bar abs (14.7 psi abs.) at operation conditions of +20 °C (68 °F) and 1 bar abs. (14.5 psi abs.)

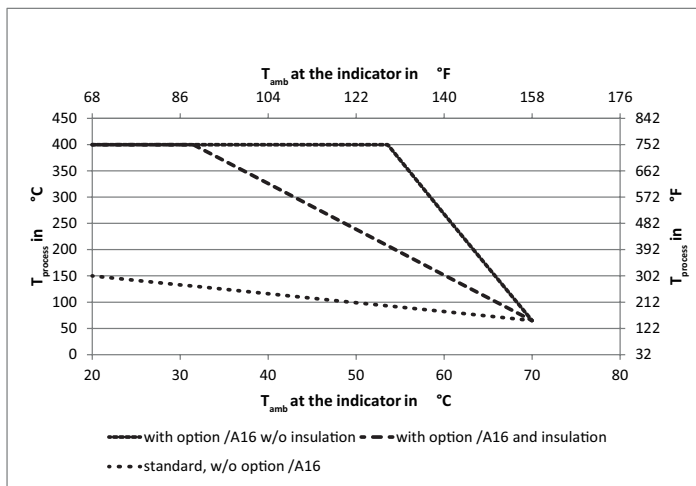
<sup>6)</sup> Flow in Standard cubic feet per minute referred to +60 °F and 14.7 psi at operation conditions of +68 °F und 14.5 psi abs.

For your special application please use the Yokogawa Sizing Software [www.FlowConfigurator.com](http://www.FlowConfigurator.com).

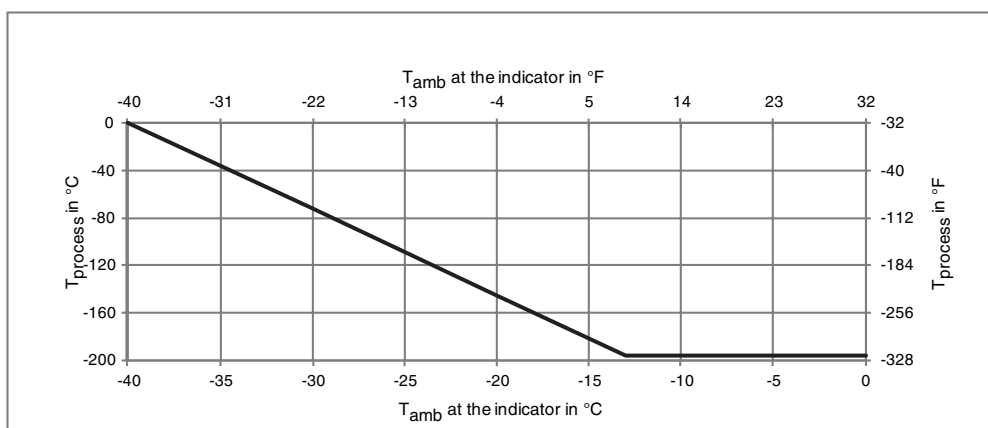
**TEMPERATURE LIMITATIONS, STANDARD AND INTRINSICALLY SAFE**



**fig. 1a RAMC: Type T90, T91 without limit switch(es) <sup>1)</sup>**



**fig. 1b RAMC: Type T90, T91 with limit switch(es),  
Type E90, J90, P90, F90, E91, J91, P91, F91 with/without limit switch(es) <sup>1)</sup>**



**fig. 1c RAMC: All indicator types except types with hazardous area approval <sup>1)</sup>**

<sup>1)</sup> The temperature graphs are reference values for size DN 100. They may be negatively influenced by trapped heat, external heat sources or radiated heat and more optimistic for smaller sizes.  
 Insulation means stone wool between tube and indicator, not touching the indicator. The indicator shall not be insulated.  
 Units with electronic transmitter can show the temperature of the internal transmitter on the display or can be indicated via communication protocols HART and Profibus PA. Units with PTFE-lining are usable up to +130 °C (266 °F).  
 For units with explosion proof certification, the temperature limits according to the certificate of conformity or Control Drawing must be regarded (see also page 5 to 11).



## PRESSURE TEMPERATURE (PT)-RATING

The pressure relevant temperature limits of the RAMC are:

-196 to +400 °C (-320.8 to 752 °F) for units with SS wetted parts

-80 to +130 °C (-112 to 266 °F) for units with PTFE wetted parts.

These limits are reduced by metrological boundary conditions (see temperature curves and table).

Table 15

Process connection		Process pressure p(T) in bar (psi)													
Code	Description	-196 °C (-321 °F)	-80 °C (-112 °F)	RT (68 °F)	50 °C (122 °F)	100 °C (212 °F)	130 °C (266 °F)	140 °C (284 °F)	150 °C (302 °F)	200 °C (392 °F)	250 °C (482 °F)	300 °C (572 °F)	350 °C (652 °F)	400 °C (752 °F)	
-A1SS- <sup>1)</sup>	Flange ASME Class 150 RF	19 (275.6)	19 (275.6)	19 (275.6)	18.4 (266.9)	16.2 (235)	15.4 (223.3)	15.1 (219)	14.8 (214.7)	13.7 (198.7)	12.1 (175.5)	10.2 (148)	8.4 (121.8)	6.5 (94.3)	
-A2SS- <sup>1)</sup>	Flange ASME Class 300 RF	49.6 (719.4)	49.6 (719.4)	49.6 (719.4)	48.1 (697.6)	42.2 (612)	40 (580)	39.2 (568.5)	38.5 (558.4)	35.7 (517.8)	33.4 (484.4)	31.6 (458.3)	30.3 (439.5)	29.4 (426.4)	
-A3SS- <sup>1)</sup>	Flange ASME Class 600 RF	99.3 (1440)	99.3 (1440)	99.3 (1440)	96.2 (1395)	84.4 (1224)	80 (1160.3)	78.5 (1138.5)	77 (1117)	71.3 (1034)	66.8 (968.8)	63.2 (916.6)	60.7 (880.4)	58.9 (824.3)	
-D2SS-	Flange EN PN 16	16 (232.1)	16 (232.1)	16 (232.1)	15.6 (226.3)	15.1 (219)	14.3 (207.4)	14 (203) (284.2)	13.7 (198.7)	12.7 (184.2)	11.9 (172.6)	11 (159.5)	10.5 (152.3)	10.2 (148)	
-D4SS-	Flange EN PN 40	40 (580)	40 (580)	40 (580)	38.9 (564.2)	37.9 (549.7)	35.1 (519.2)	35.1 (509)	34.4 (498.9)	31.8 (461.2)	29.9 (433.7)	27.6 (400.3)	26.4 (397.4)	25.7 (372.7)	
-D5SS-	Flange EN PN 63	63 (913.7)	63 (913.7)	63 (913.7)	61.5 (892)	59.7 (865.9)	56.5 (819.5)	55.4 (803.5)	54.3 (787.5)	50.1 (726.3)	47.1 (683.1)	43.5 (630.9)	41.7 (604.8)	40.5 (587.4)	
-D6SS-	Flange EN PN 100	100 (1450)	100 (1450)	100 (1450)	97.8 (1418)	94.7 (1373.5)	89.5 (1298)	87.8 (1273.4)	86.1 (1248.8)	79.5 (1153)	74.7 (1083.4)	69 (1000.7)	66.1 (958.7)	64.2 (931.1)	
-T4SS-/R4SS-	Internal thread ½ in. (RAMC01-...)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	20 <sup>2)</sup> (290)	20 <sup>2)</sup> (290)	20 <sup>2)</sup> (290)	20 <sup>2)</sup> (290)	-	-	
-T4SS-/R4SS-	Internal thread ¾ in. (RAMC23-...)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	20 <sup>2)</sup> (290)	20 <sup>2)</sup> (290)	20 <sup>2)</sup> (290)	20 <sup>2)</sup> (290)	-	-	
-T4SS-/R4SS-	Internal thread 1 in. (RAMC02-...)	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	16 <sup>2)</sup> (232.1)	16 <sup>2)</sup> (232.1)	16 <sup>2)</sup> (232.1)	16 <sup>2)</sup> (232.1)	-	-	
-T4SS-/R4SS-	Internal thread 2 in. (RAMC05-...)	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	10 <sup>2)</sup> (145)	10 <sup>2)</sup> (145)	10 <sup>2)</sup> (145)	10 <sup>2)</sup> (145)	-	-	
-T4SS-/R4SS-	Internal thread 2½ in. (RAMC06-...)	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	10 <sup>2)</sup> (145)	10 <sup>2)</sup> (145)	10 <sup>2)</sup> (145)	10 <sup>2)</sup> (145)	-	-	
-T6SS-/G6SS-	Internal thread	40 (580.1)	40 (580.1)	40 (580.1)	38.9 (564.2)	37.9 (549.7)	35.8 (519.2)	35.1 (509.1)	34.4 (498.9)	31.8 (461.2)	29.9 (433.7)	27.6 (400.3)	26.4 (382.9)	25.7 (372.7)	
-S2SS-	Fitting DIN11851 (RAMC02-...)	-	-	40 (580.1)	40 (580.1)	40 (580.1)	40 (580.1)	40 (580.1)	-	-	-	-	-	-	
-S2SS-	Fitting DIN11851 (RAMC05-...)	-	-	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	-	-	-	-	-	-	
-S2SS-	Fitting DIN11851 (RAMC06-...)	-	-	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	-	-	-	-	-	-	
-S2SS-	Fitting DIN11851 (RAMC08-...)	-	-	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	-	-	-	-	-	-	
-S2SS-	Fitting DIN11851 (RAMC10-...)	-	-	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	-	-	-	-	-	-	
-S2SS-	Fitting DIN11851 (RAMC12-...)	-	-	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	-	-	-	-	-	-	
-S4SS-	Tri-Clamp DIN 32676 (RAMC02-...)	-	-	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	-	-	-	-	-	-	
-S4SS-	Tri-Clamp DIN 32676 (RAMC03-...)	-	-	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	-	-	-	-	-	-	
-S4SS-	Tri-Clamp DIN 32676 (RAMC04-...)	-	-	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	-	-	-	-	-	-	
-S4SS-	Tri-Clamp DIN 32676 (RAMC05-...)	-	-	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	-	-	-	-	-	-	
-S4SS-	Tri-Clamp DIN 32676 (RAMC08-...)	-	-	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	-	-	-	-	-	-	
-S4SS-	Tri-Clamp DIN 32676 (RAMC10-...)	-	-	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	-	-	-	-	-	-	
-S5SS-	Flange Rosista (RAMC02-...)	-	-	10 (145)	-	-	-	-	-	-	-	-	-	-	
-S5SS-	Flange Rosista (RAMC04-...)	-	-	10 (145)	-	-	-	-	-	-	-	-	-	-	
-A1PF-	Flange ASME Class 150 RF	-	19 (275.6)	19 (275.6)	18.4 (266.9)	16.2 (235)	15.4 (210.3)	-	-	-	-	-	-	-	
-A2PF-	Flange ASME Class 300 RF	-	49.6 (719.4)	49.6 (719.4)	48.1 (697.6)	42.2 (612)	40 (580.1)	-	-	-	-	-	-	-	
-D2PF-	Flange EN PN 16	-	16 (232)	16 (232) (580.1)	15.6 (226.2)	15.1 (219)	14.3 (207.4)	-	-	-	-	-	-	-	
-D4PF-	Flange EN PN 40	-	40 (580.1)	40 (580.1)	38.9 (564.2)	37.9 (549.7)	35.8 (519.2)	-	-	-	-	-	-	-	
/T1	Heat trace connection internal thread G ¼ in. PN 40	40 (580.1)	40 (580.1)	40 (580.1)	38.9 (564.2)	37.9 (549.7)	35.8 (519.2)	35.1 (509.1)	34.4 (498.9)	31.8 (461.2)	29.9 (433.7)	27.6 (400.3)	26.4 (382.9)	25.7 (372.7)	
/T2	Heat trace connection EN flange DN 15 PN 40 Form B1	40 (580.1)	40 (580.1)	40 (580.1)	38.9 (564.2)	37.9 (549.7)	35.8 (519.2)	35.1 (509.1)	34.4 (498.9)	31.8 (461.2)	29.9 (433.7)	27.6 (400.3)	26.4 (382.9)	25.7 (372.7)	
/T3	Heat trace connection EN flange DN 25 PN 40 Form B1	40 (580.1)	40 (580.1)	40 (580.1)	38.9 (564.2)	37.9 (549.7)	35.8 (519.2)	35.1 (509.1)	34.4 (498.9)	31.8 (461.2)	29.9 (433.7)	27.6 (400.3)	26.4 (382.9)	25.7 (372.7)	
/T4	Heat trace connection ASME flange ½ in. Class 150 RF	19 (275.6)	19 (275.6)	19 (275.6)	18.4 (266.9)	16.2 (235)	15.4 (210.3)	15.1 (219)	14.8 (214.7)	13.7 (198.7)	12.1 (175.5)	10.2 (148)	8.4 (121.8)	6.5 (94.3)	
/T5	Heat trace connection ASME flange 1 in. Class 150 RF	19 (275.6)	19 (275.6)	19 (275.6)	18.4 (266.9)	16.2 (235)	15.4 (210.3)	15.1 (219)	14.8 (214.7)	13.7 (198.7)	12.1 (175.5)	10.2 (148)	8.4 (121.8)	6.5 (94.3)	
/T6	Heat trace connection internal thread ¼ - 18 NPT PN 40	40 (580.1)	40 (580.1)	40 (580.1)	38.9 (564.2)	37.9 (549.7)	35.8 (519.2)	35.1 (509.1)	34.4 (498.9)	31.8 (461.2)	29.9 (433.7)	27.6 (400.3)	26.4 (382.9)	25.7 (372.7)	

<sup>1)</sup> Dual certified AISI 316/316L

<sup>2)</sup> Please consider pressure/ temperature data of the gasket material KLINGERSIL® C-4400. A technical evaluation of the gasket material is recommended.

## DIMENSIONS AND WEIGHTS

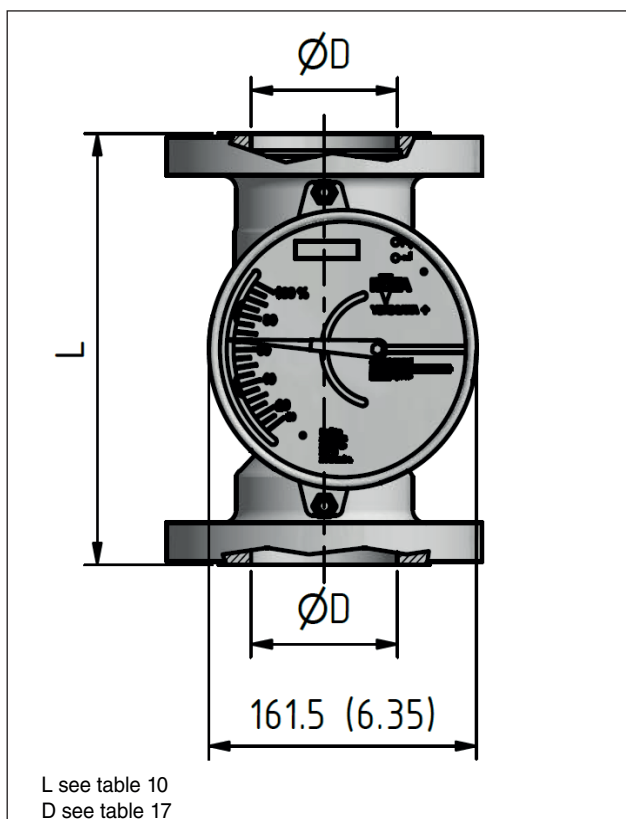


Fig. 2a Front view housing type 90 (SS) dimensions in mm (inch)

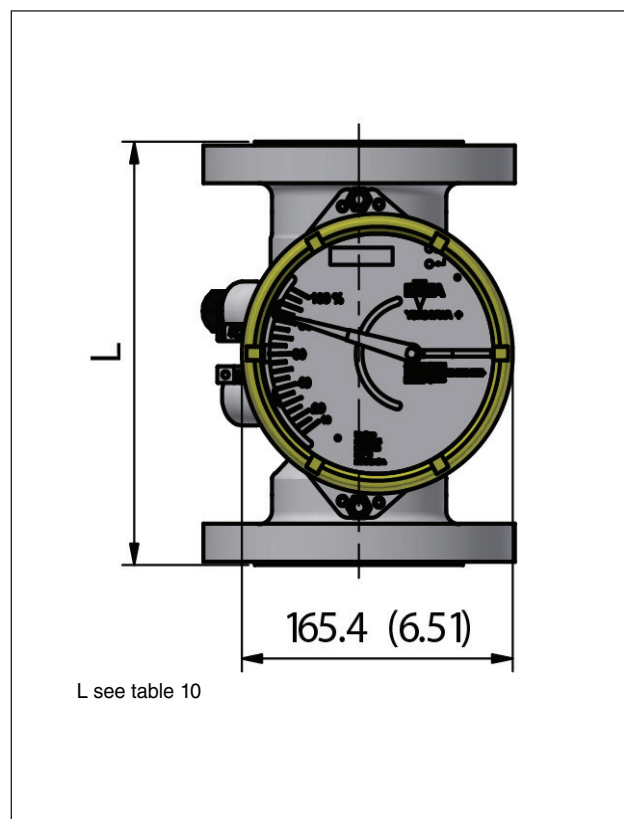


Fig. 2b Front view housing type 91 (Al) dimensions in mm (inch)

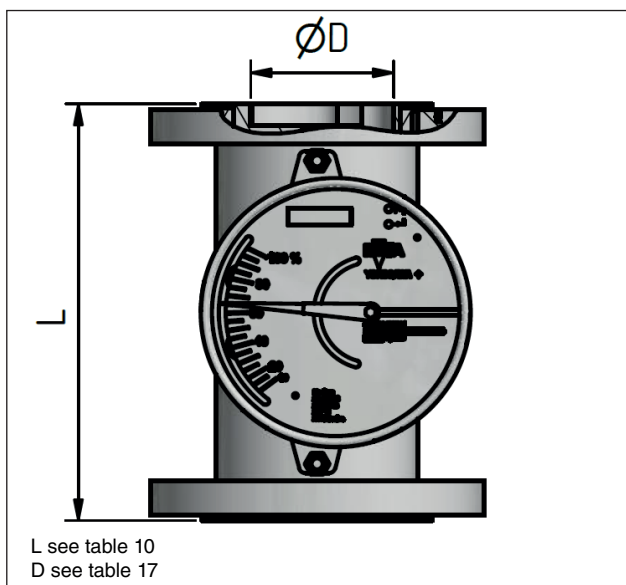


Fig. 3 SS metering tube with PTFE-lining

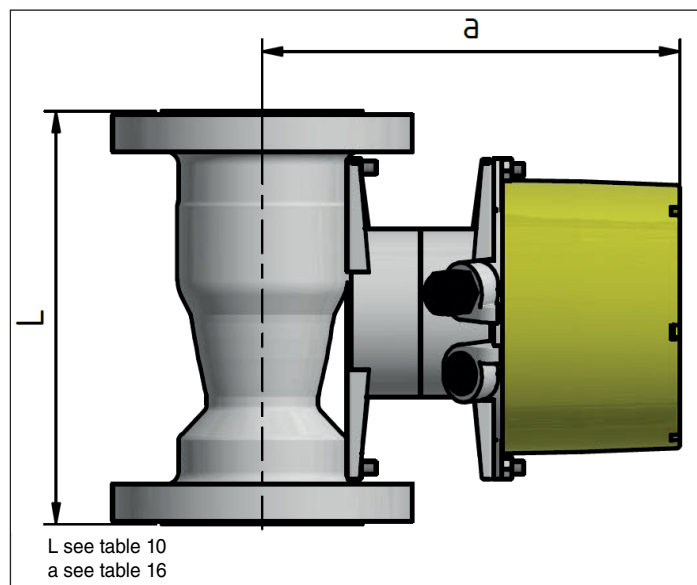


Fig. 4 RAMC type 91 and option /A16

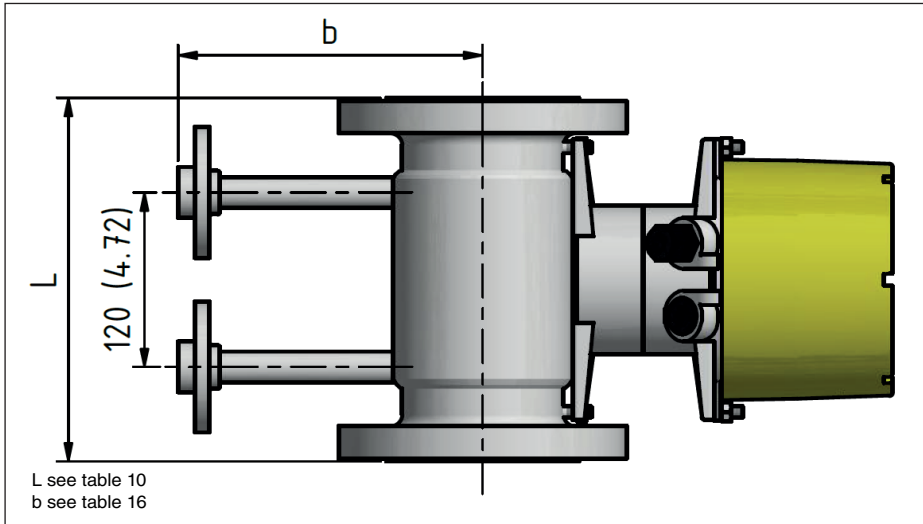


Fig. 5 RAMC type 91 and Option /A16 and /T□, dimensions in mm (inch)

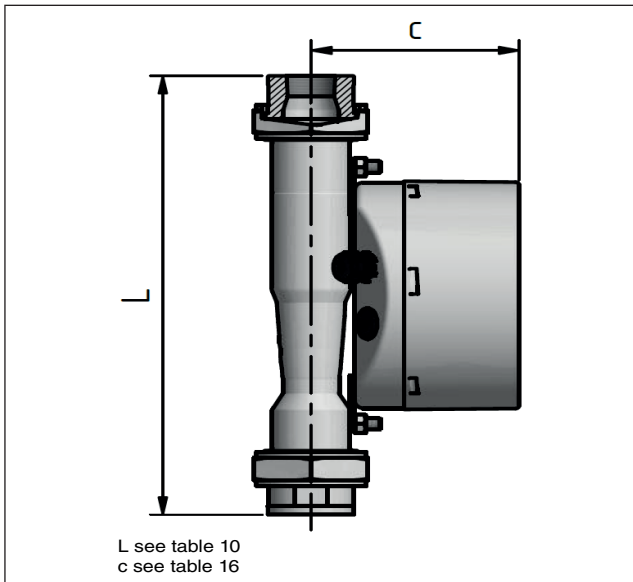


Fig. 6 RAMC with connection R4/T4

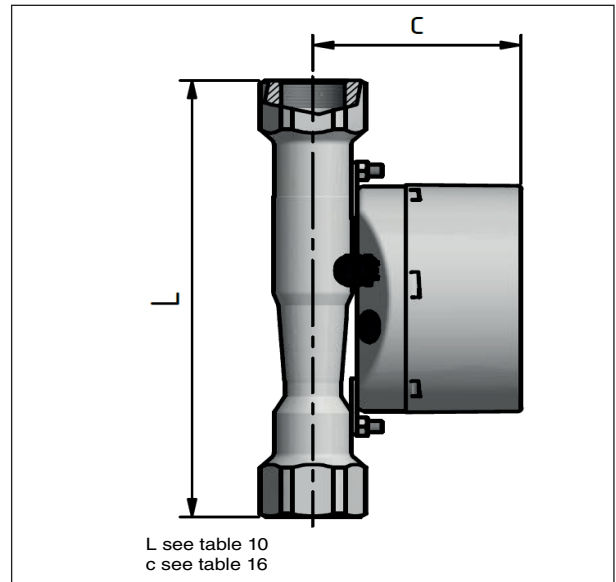


Fig. 7 RAMC with connection T6/G6

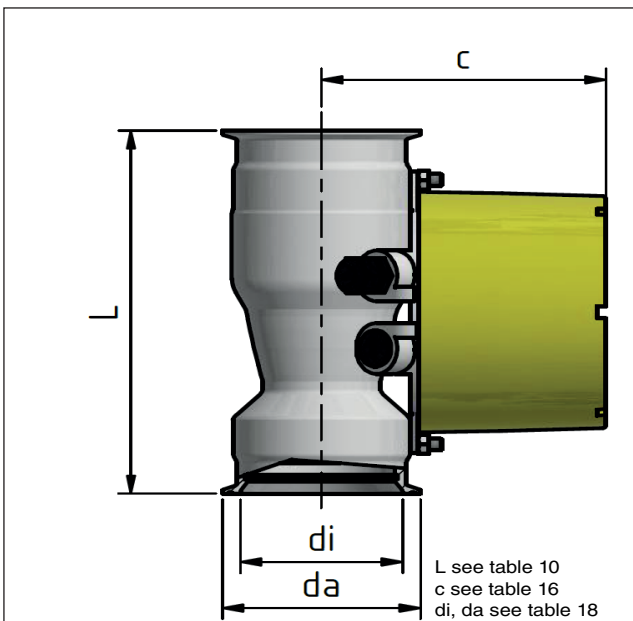


Fig. 8 RAMC with connection S4

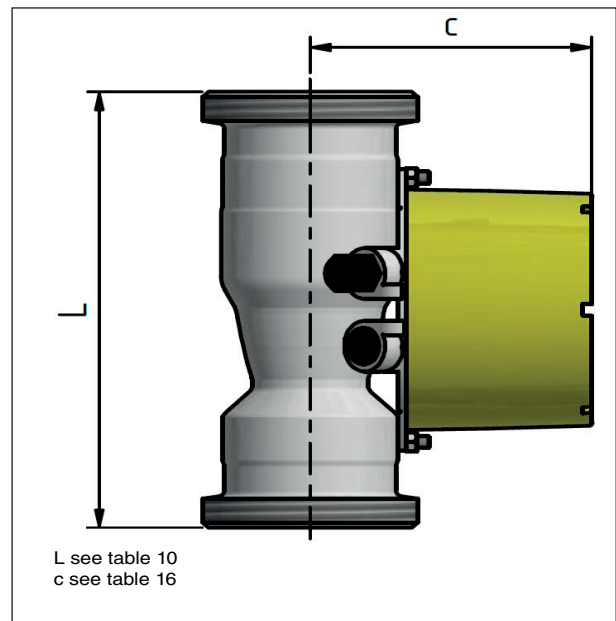


Fig. 9 RAMC with connection S2

Table 16 Variable dimensions

	a in mm (inch)		b in mm (inch)	c in mm (inch)	
	Housing type 90	Housing type 91		Housing type 90	Housing type 91
Cone 43-62	214 (8.42)	228 (8.97)	164.3 (6.46)	120 (4.72)	134 (5.27)
Cone 63-64	221 (8.70)	235 (9.25)	170.8 (6.72)	128 (5.03)	141 (5.55)
Cone 67-72	236 (9.29)	250 (9.84)	189.3 (7.45)	143 (5.62)	156 (6.14)
Cone 73-77	251 (9.88)	265 (10.43)	201.3 (7.92)	158 (6.22)	172 (6.77)
Cone 81-82	261 (10.27)	275 (10.82)	211.5 (8.32)	167 (6.57)	181 (7.12)

Table 17 Inner diameter of flanges

Inner diameter of stainless steel flanges				Inner diameter of flanges with PTFE-lining			
Pos. <sup>1)</sup>	Size		D in mm (inch)	Pos. <sup>1)</sup>	Size		D in mm (inch)
1	DN 15 to DN 50	½ to 2 in.	20.7 (0.81)	-	-	-	-
2	DN 15 to DN 50	½ to 2 in.	20.7 (0.81)	2	DN 15 to DN 25	¾ to 1 in.	23.5 (0.93)
3	DN 25 to DN 50	1 to 2 in.	32.2 (1.27)	3	DN 25 to DN 50	1 ¼ to 1 ½ in.	36 (1.42)
4	DN 50 to DN 100	2 to 3 in.	65.5 (2.58)	4	DN 50 to DN 80	2 ½ to 3 in.	66 (2.6)
5	DN 80 to DN 150	3 to 6 in.	88.2 (3.47)	5	DN 80 to DN 100	3 ½ to 4 in.	92 (3.62)
6	DN 100 to DN 150	4 to 6 in.	110.2 (4.34)	6	DN 100	4 in.	110 (4.33)

<sup>1)</sup> See table 10, 12

Table 18 Diameters for connection sizes S4

Pos. <sup>1)</sup>	Size	di in mm (inch)	da in mm (inch)
1	DN 25, 1 in.	36 (1.42)	50.5 (1.99)
	DN 32	36 (1.42)	50.5 (1.99)
	DN 40, 1 ½ in.	36 (1.42)	50.5 (1.99)
2	DN 25, 1 in.	36 (1.42)	50.5 (1.99)
	DN 32	36 (1.42)	50.5 (1.99)
	DN 40, 1 ½ in.	36 (1.42)	50.5 (1.99)
3	DN 50, 2 in.	47.8 (1.88)	64 (2.52)
4	DN 65, 3 in.	72.1 (2.84)	91 (3.58)
5	DN 100, 4 in.	97.6 (3.84)	119 (4.69)

<sup>1)</sup> See table 10, 12

Table 19 Weights

Pos. <sup>1)</sup>	Weight in kg (lbs)
1	3 to 5 (6.6 to 11)
2	3 to 5 (6.6 to 11)
3	6.5 to 8 (14.3 to 17.6)
4	8.6 to 11 (18.9 to 24.3)
5	13 to 16 (28.7 to 35.3)
6	17 to 20 (37.5 to 44.1)

<sup>1)</sup> See table 10, 11, 12

Indicator on distance (option /A16) additional 1 kg (2.2 lbs)

## REGISTERED TRADEMARKS

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Rheinstr. 8  
D-79664 Wehr  
Germany

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

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QUALITY SYSTEM  
CERTIFIED BY DNV GL**  
**= ISO 9001 =**