

# General Specifications

## ROTAMETER RAMC Metal Variable Area Flowmeter

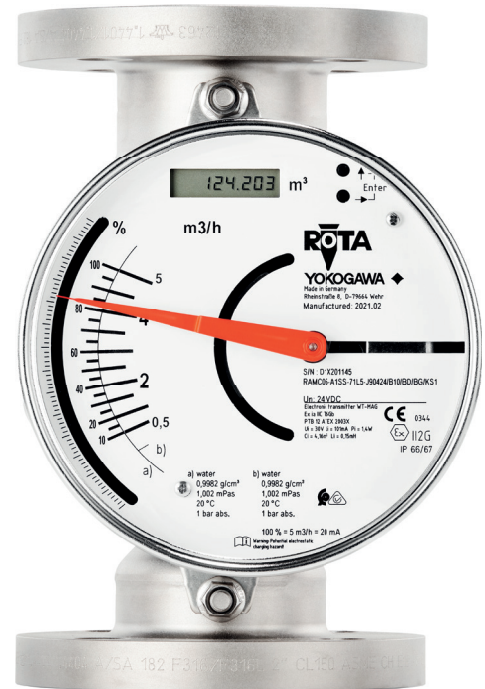
### GS 01R01B02-00E-E

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.

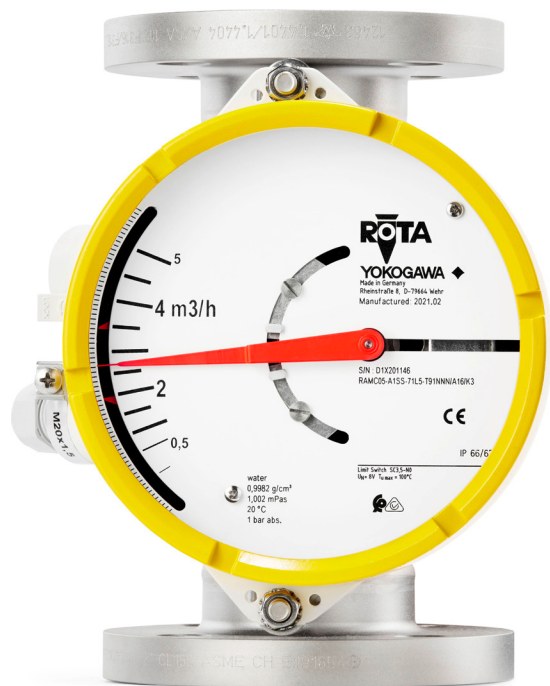
#### FEATURES

- 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 m³/h (0.66 to 34342 gph)
- Flow range air: 0.075 to 1400 m³/h (2.65 to 49440 scfh) at 20 °C, 1 bar abs (68 °F, 14.5 psi)
- Measuring accuracy  $\pm 1.6$  % acc. standard VDI/VDE 3513 sheet 2 ( $q_G = 50$  %)
- 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 2-wire with 24 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
  - ◆ Quick to open bayonet catch housing
  - ◆ 48-hour delivery ex works optionally available

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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

### WEEE

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

### Intended use (for UAE):

Rotameter 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

For the exact range see the Yokogawa Sizing Software [www.FlowConfigurator.com](http://www.FlowConfigurator.com).

#### 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:

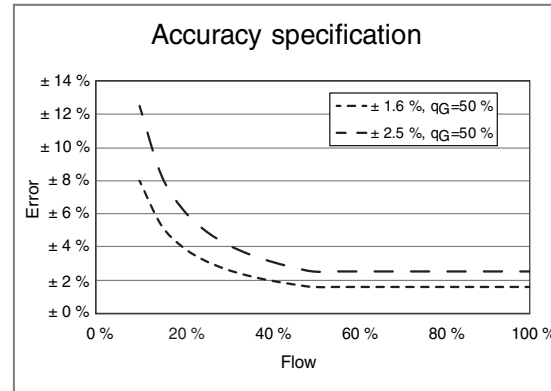
- Wetted parts made of stainless steel:  
-196 °C to +400 °C (-320.8 °F to 752 °F)
- Wetted parts made of PTFE:  
-80 °C to +130 °C (-112 °F to 266 °F)

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 <sub>G</sub> =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 ≥ RAMC08)
  - Inlet section: ≥ 5 x DN
  - Outlet section: ≥ 3 x 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:**

U = 14 to 30 V DC

**Output signal:**

4 to 20 mA

The 20 mA point is selectable between 60 % and 100 % of scale end value.

**Load resistance:**

$\leq (U - 14 \text{ V}) / 20 \text{ mA}$

**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:**

- $\pm 0.2 \%$  per year

**Max. output signal:**

- 21.5 mA

**Output signal in case of failure:**

- < 3.6 mA (acc. NAMUR NE 43)

**Response time (99 %):**

- About 1.5 s with damping 1 s

**HART-communication type -J:**

Same specifications as type -E, except:

**Load resistance:**

230 to 600  $\Omega$

**Output signal in case of failure:**

- < 3.6 mA (acc. NAMUR NE 43)
- > 21 mA (acc. NAMUR 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 (NAMUR 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:
  - 24V DC: III

**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

Standard:

- KF08-SR-Ex\*.W (90 to 253 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:

- 90 to 253 V AC 50 to 60 Hz
- 24 V DC  $\pm 25 \%$
- 1 or 2 potential-free change over 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, 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 and Uzbekistan.

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

## HAZARDOUS AREA SPECIFICATIONS

Table 6 Overview hazardous area certified instruments:

| Location                                                       | Europe                                        |       |      | Global |       | USA /<br>Canada | Brazil       | India          | Korea         | China |      | Kazakhstan,<br>Armenia,<br>Kyrgyzstan |      | Taiwan | UAE   | Ukraine<br>Ex |
|----------------------------------------------------------------|-----------------------------------------------|-------|------|--------|-------|-----------------|--------------|----------------|---------------|-------|------|---------------------------------------|------|--------|-------|---------------|
| Certificate                                                    | ATEX                                          |       |      | IECEX  |       | FM/UL           | IN-<br>METRO | PESO           | KO-<br>SHA    | NEPSI |      | EAC                                   |      | TS     | ECAS  |               |
| Electronic transmitter                                         |                                               |       |      |        |       |                 |              |                |               |       |      |                                       |      |        |       |               |
| Protection                                                     | ia                                            | ia/tb | -    | ia     | ia/tb | IS/NI           | ia           | ia             | -             | -     | ia   | -                                     | -    | ia     | ia    |               |
| Option                                                         | /KS1                                          | /KS2  | -    | /ES1   | /ES2  | /FS1            | /US1         | /KS1+<br>/Q11  | -             | -     | /GS1 | -                                     | -    | /ES1   | /KS1  |               |
| Comments                                                       | -                                             | 1)    | -    | -      | 1)    | 3)              | -            | -              | -             | -     | -    | -                                     | -    | -      | -     |               |
| See page                                                       | 6/7                                           | 10    | -    | 6/7    | 10    | 6               | 6            | 6/7            | -             | -     | 6/7  | -                                     | -    | 6      | 8     |               |
| Limit switches                                                 |                                               |       |      |        |       |                 |              |                |               |       |      |                                       |      |        |       |               |
| Protection                                                     | ia                                            | ia/tb | -    | ia     | ia/tb | IS              | ia           | ia             | ia            | ia    | -    | -                                     | -    | -      | ia    |               |
| Option                                                         | /KS1                                          | /KS2  | -    | /ES1   | /ES2  | /FS1            | /US1         | /KS1 +<br>/Q11 | /KS1 +<br>/KC | /NS1  | -    | -                                     | -    | -      | /KS1  |               |
| Comments                                                       | -                                             | 1)    | -    | -      | 1)    | -               | -            | -              | -             | -     | -    | -                                     | -    | -      | -     |               |
| See page                                                       | 7                                             | 10    | -    | 7      | 10    | 7               | 7            | 7              | 7             | 7     | -    | -                                     | -    | -      | 8     |               |
| Complete RAMC                                                  |                                               |       |      |        |       |                 |              |                |               |       |      |                                       |      |        |       |               |
| Protection                                                     | db/tb                                         |       | h    | db/tb  |       | -               | db/tb        | db             | d             | ia    | d/tD | db/tb                                 | -    | d/tb   | db/tb | db/tb         |
| Option                                                         | /KF1                                          |       | /KC1 | /EF1   |       | -               | /UF1         | /KF1+/<br>Q11  | /EF1+<br>/KC  | /NS1  | /NF1 | /GF1                                  | /GC1 | /EF1   | /EF1  | /KF1          |
| Comments                                                       | 4)                                            |       | 5)   | 4)     | -     | -               | 4)           | 4)             | 4)            | -     | 4)   | 4)                                    | 5)   | 4)     | 4)    | 4)            |
| See page                                                       | 8                                             |       | 11   | 8      |       | -               | 9            | 9              | 9             | 8     | 9    | 9                                     | 11   | 9      | 9     | 9             |
| Power supplies for intrinsically safe components (see page 11) |                                               |       |      |        |       |                 |              |                |               |       |      |                                       |      |        |       |               |
| Option /W1A,B                                                  | yes                                           | -     | yes  | yes    | -     | no              | yes          | yes            | yes           | no    | -    | -                                     | -    | -      | -     |               |
| Option /W2A,B                                                  | yes                                           | -     | yes  | yes    | -     | no              | yes          | yes            | yes           | no    | -    | -                                     | -    | -      | -     |               |
| Option /W4A,B                                                  | yes                                           | -     | yes  | yes    | -     | yes             | yes          | yes            | yes           | no    | -    | -                                     | -    | -      | -     |               |
| Option /W4E,F                                                  | yes                                           | -     | no   | no     | -     | no              | -            | no             | no            | no    | -    | -                                     | -    | -      | -     |               |
| Notation                                                       | IS = Intrinsically Safe; NI = Nonincendive    |       |      |        |       |                 |              |                |               |       |      |                                       |      |        |       |               |
|                                                                |                                               |       |      |        |       |                 |              |                |               |       |      |                                       |      |        |       |               |
| Comment 1)                                                     | Dust proof by RAMC housing                    |       |      |        |       |                 |              |                |               |       |      |                                       |      |        |       |               |
| Comment 2)                                                     | For use in zone 2                             |       |      |        |       |                 |              |                |               |       |      |                                       |      |        |       |               |
| Comment 3)                                                     | Same certification for USA and Canada         |       |      |        |       |                 |              |                |               |       |      |                                       |      |        |       |               |
| Comment 4)                                                     | Only with housing 91                          |       |      |        |       |                 |              |                |               |       |      |                                       |      |        |       |               |
| Comment 5)                                                     | 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 | Ui<br>in V | Ii<br>in mA | Pi<br>in W | CI<br>in nF | Li<br>in mH | max. Ta<br>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)              |
| /US1   | 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-wire)

#### 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-wire)

#### 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)

#### 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.: P505974/1

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

Same data as for IECEx certification, option /ES1.

Only with electronic transmitter, not with limit switches.

#### Certificate:

25-07-24092/Q25-07-050486/NB0010

### Intrinsically safe electronic transmitter with Taiwan Safety Mark

#### Registration Document:

ML041200702782

Option /ES1 must be selected.

Same data as IECEx- certified type (/ES1)

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

### Intrinsically safe electronic transmitter with Ukraine Ex-approval

Same data as for ATEX certification, option /KS1.

#### Certificate:

CU16.0017X

### Intrinsically safe electronic transmitter with INMETRO Ex-approval, Brazil, option /US1

#### Certificate:

DNV 24.0059X

#### Output signal:

4 to 20 mA (2-wire)

#### Explosion proof:

Ex ia IIC para EPL Gb

#### 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
- PESO- approval, option /KS1 with /Q11
- INMETRO- approval, option /US1
- EACEx- approval, option /GS1

#### Certificates:

- PTB 12 ATEX 2003 X
- IECEx PTB 12.0020 X
- CML 21UKEX21080X
- PESO Ref. No.: P505974/1
- INMETRO DNV 24.0059 X
- EACEx RU C-DE.AA87.B.01500/25

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

#### 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<br>IEC 60079-11:<br>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<br>IEC 60079-11:<br>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<br>IEC 60079-11:<br>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 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 IIC T135°C Db  
CNL- Ex ia IIC T6...T1 Gb X  
Ex ia IIC T135°C Db X

#### Control drawings:

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

### Intrinsically safe limit switches with INMETRO- approval (Brazil), option /K1 to /K10 with /US1

#### Certificate:

- TÜV 13.1131 X (SC3,5-N0), /K1 to /K3
- TÜV 14.0352 X (SJ 3,5-S.N), /K6 to /K10

#### Explosion proof:

Ex ia IIC para EPL Gb

### Intrinsically safe limit switches with CCC NEPSI- approval (China), option /K1 to /K10 with /NS1

#### Certificate:

- 2020322315002306 (/K1 to /K3)
- 2020322315002308 (/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

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

#### Certificate:

CL16.0017X

#### Explosion proof:

Ex ia IIC T6...T1 Gb

### HAZARDOUS AREA APPROVALS FOR COMPLETE ELECTRICAL RAMC

### Intrinsically safe RAMC with EACEx-approval (Kazakhstan, Armenia and Kyrgyzstan), option /GS1

#### Certificate:

RU C-DE.AA87.B.01500/25

#### Output signal:

4 to 20 mA (2-wire)

#### Explosion proof:

1Ex h ia IIC T6 Gb X

#### Entity parameter:

See table 7

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

#### Certificate:

GYJ20.1088X

#### Electronic transmitter:

- Output signal:
- 4 to 20 mA (2-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-wire unit)

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

2-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-wire unit)

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

2-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 /EF1 with /Q11

Same data as IECEx- certified type, option /EF1.

But no dust proof Ex tb IIIC T85°C...370°C Db.

#### Certificate:

PESO Ref. No.: P567422/1

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

Same data as IECEx- certified type, option /EF1.

#### Certificate:

12-AV4BO-0721X

#### Flame proof:

Ex d IIC T1...T6

#### Temperature classification:

See table 9

### Flame proof and dust proof RAMC with EACEx-approval (Kazakhstan, Armenia and Kyrgyzstan), option /GF1

#### Certificate:

RU C-DE.AA87.B.01500/25

#### Flame proof:

1Ex db IIC T6...T1 Gb X

#### Dust proof:

Ex tb IIIC T80°C...370°C Db X

#### Housing:

Painted aluminum casting, type 91

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

4 to 20 mA (2-wire unit)

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

2-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:

| Temp. class | Max. Process temperature in °C (°F) |                |                                |
|-------------|-------------------------------------|----------------|--------------------------------|
|             | No extension                        | With extension | With extension with insulation |
| T6          | 80                                  | 80             | 80                             |
| T5          | 95                                  | 95             | 95                             |
| T4          | 120                                 | 130            | 130                            |
| T3          | ----                                | 195            | 195                            |
| T2          | ----                                | 290            | 290                            |
| T1          | ----                                | 370            | 350                            |

### 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-/wire unit)

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

2-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 Ukraine Ex-approval

Same data as for ATEX certification, option /KF1.

#### Certificate:

CLQ16.0017X

**Table 9 Temperatur classification for flameproof devices except EACEx**

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

### 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:

25-07-24091/Q25-07-050485/NB0010

### Flame proof and dust proof RAMC with INMETRO-approval, (Brazil) option /UF1

#### Certificate:

DNV 24.0058X

#### 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-/wire unit)

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

2-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

## 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)
- IBExU 05 ATEX1086X (Dust proof)

### Output signal electronic transmitter:

4 to 20 mA (2-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-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

## POWER SUPPLIES FOR INTRINSICALLY SAFE COMPONENTS

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

### Type:

Acc. to EN 60947-5-6

Standard:

- KFU8-SR-Ex\*.W (90 to 253 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:

- 90 to 253 V AC 50 to 60 Hz
- 24 V DC ± 25 %

### Relay output:

1 or 2 potential-free changeover contact(s)

### Switching capacity:

Max. 250 V AC, max. 2 A

### Approvals:

- KFU8-SR-Ex\*.W:

ATEX: FIDI 22 ATEX 0029X  
IECEX: IECEX FIDI 22.0003X  
UL: E106378  
SITIIAS CCC: 2023322316005169  
INMETRO: TÜV 23.0468 X

- KFD2-SR2-Ex\*.W:

ATEX: PTB 00 ATEX 2080  
UL: E106378  
IECEX: IECEX PTB11.0034  
PESO: P574609/1  
NEPSI/CCC: 2020322316001439  
KOSHA: 2009-BO-0222-1  
INMETRO: TÜV 13.1125

- KFD2-SH-Ex1:

ATEX: PTB 00 ATEX 2042

### Entity parameters and marking:

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 EACEx-approval, option /GC1

#### Approval:

RU C-DE.AA87.B.01500/25

#### Explosion proof:

- 1 Ex h IIC T\* Gb X
- Ex h IIIC T\*\*°C Db X

T\* and T\*\* see table temperature classification

#### Temperature classification:

| Temp. class T* | Ambient temp. range in °C | Max. surface temperature T** in °C |                | Max. process temperature in °C |                |
|----------------|---------------------------|------------------------------------|----------------|--------------------------------|----------------|
|                |                           | No extension                       | With extension | No extension                   | With extension |
| T6             | -40 to 80                 | +80                                | +80            | +80                            | +80            |
| T5             | -40 to 90                 | +95                                | +95            | +95                            | +95            |
| T4             | -40 to 90                 | +130                               | +130           | +130                           | +130           |
| T3             | -40 to 90                 | +195                               | +195           | +195                           | +195           |
| T2             | -40 to 90                 | +220                               | +290           | +220                           | +290           |
| T1             | -40 to 90                 | ----                               | +370           | ----                           | +370           |

## 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 applications secure that the operating pressure should be at least five times the pressure loss. More recommendations can be found in 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                   |             | Size DN 15 (½ in.)                                                                              | Refer to table 10                                                                                              |
| RAMC23                   |             | Size DN 20 (¾ in.)                                                                              | Refer to table 10                                                                                              |
| RAMC02                   |             | Size DN 25 (1 in.)                                                                              | Refer to table 10                                                                                              |
| RAMC03                   |             | Size DN 32 (1 ¼ in.)                                                                            | Refer to table 10                                                                                              |
| RAMC04                   |             | Size DN 40 (1 ½ in.)                                                                            | Refer to table 10                                                                                              |
| RAMC05                   |             | Size DN 50 (2 in.)                                                                              | Refer to table 10                                                                                              |
| RAMC06                   |             | Size DN 65 (2 ½ in.)                                                                            | Refer to table 10                                                                                              |
| RAMC08                   |             | Size DN 80 (3 in.)                                                                              | Refer to table 10                                                                                              |
| RAMC09                   |             | Size 3 ½ in.                                                                                    | Refer to table 10                                                                                              |
| RAMC10                   |             | Size DN 100 (4 in.)                                                                             | Refer to table 10                                                                                              |
| RAMC12                   |             | Size DN 125 (5 in.)                                                                             | Refer to table 10                                                                                              |
| RAMC15                   |             | Size DN 150 (6 in.)                                                                             | Refer to table 10                                                                                              |
| RAMCNN                   |             | Without measuring tube, only indicator                                                          | only as RAMCNN-NNNN-NNNN                                                                                       |
| Process connection       | -D2         | EN flange PN 16, process connection dimension + facing acc. to EN 1092-1 Form B1                | Refer to tables 10 and 15                                                                                      |
|                          | -D4         | EN flange PN 40, process connection dimension + facing acc. to EN 1092-1 Form B1                | Refer to tables 10 and 15                                                                                      |
|                          | -D5         | EN flange PN 63, process connection dimension + facing acc. to EN 1092-1 Form B2                | Refer to tables 10 and 15                                                                                      |
|                          | -D6         | EN flange PN 100, process connection dimension + facing acc. to EN 1092-1 Form B2               | Refer to tables 10 and 15                                                                                      |
|                          | -A1         | ASME flange class 150, process connection dimension + facing acc. to ASME B 16.5                | Refer to tables 10 and 15                                                                                      |
|                          | -A2         | ASME flange class 300, process connection dimension + facing acc. to ASME B 16.5                | Refer to tables 10 and 15                                                                                      |
|                          | -A3         | ASME flange class 600, process connection dimension + facing acc. to ASME B 16.5                | Refer to tables 10 and 15                                                                                      |
|                          | -T6         | Internal thread NPT, PN 40                                                                      | Refer to tables 10 and 15                                                                                      |
|                          | -G6         | Internal thread G, PN 40                                                                        | Refer to tables 10 and 15                                                                                      |
|                          | -R4         | Internal thread Rp, removable                                                                   | Refer to tables 10 and 15                                                                                      |
|                          | -S2         | External thread acc. to DIN 11851                                                               | Refer to tables 10 and 15                                                                                      |
|                          | -S4         | TRI-CLAMP PN 10, PN 16 acc. to DIN 32676                                                        | Refer to tables 10 and 15                                                                                      |
|                          | -T4         | Internal thread NPT, removable                                                                  | Refer to tables 10 and 15                                                                                      |
|                          | -S5         | Rosista flange, PN 10                                                                           | Refer to tables 10 and 15                                                                                      |
|                          | -NN         | Without measuring tube, only indicator                                                          | Only with RAMCNN                                                                                               |
| Material of wetted parts | SS          | Stainless steel                                                                                 |                                                                                                                |
|                          | PF          | PTFE lining                                                                                     |                                                                                                                |
|                          | NN          | Without measuring tube, only indicator                                                          | Only with RAMCNN                                                                                               |
| Measuring Cone/Float     | -□ □ □ □    | See tables 11 and 13                                                                            |                                                                                                                |
|                          | -NNNN       | Without measuring tube, only indicator                                                          | Only with RAMCNN                                                                                               |
| Indicator/Transmitter    | -T          | Mechanical indicator                                                                            |                                                                                                                |
|                          | -E          | Indicator with transmitter                                                                      |                                                                                                                |
|                          | -J          | Indicator with transmitter, HART 7 (includes Software Tag for HART 7)                           | Only with output 424<br>8 digits for tag, 24 digits for long tag                                               |
|                          | -P          | Indicator with transmitter, Profibus PA (includes Software Tag for Profibus PA)                 | Only with output 429; explosion proof type only with /KS1 or /ES1; not with /Q11; 32 digits for tag            |
|                          | -F          | Indicator with transmitter, Foundation Fieldbus (includes Software Tag for Foundation Fieldbus) | Only with output 429; explosion proof type only with /KS1 or /ES1; not with /VR, /Q11, /QRx; 32 digits for tag |
| Housing type             | -N          | Without indicator                                                                               | Only with housing NN                                                                                           |
|                          | 90          | Housing SS                                                                                      |                                                                                                                |
|                          | 91          | Housing Al, yellow painted                                                                      |                                                                                                                |
|                          | NN          | Without housing                                                                                 | Only with indicator -N                                                                                         |
| Power supply/Output      | 424         | 24 V DC; 2-wire; 4 to 20 mA                                                                     | Only with indicator -E, -J                                                                                     |
|                          | 429         | 9 to 32 V DC; 2-wire; Profibus PA, FOUNDATION Fieldbus                                          | Only with indicator -P or -F                                                                                   |
|                          | NNN         | Without power supply                                                                            | 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                   |
| 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 (No YOKOGAWA logo)                                                                                                                                                           | Not with hazardous approval type; not with /VR, /VE                                           |
|                       | /B10 | Percentage scale                                                                                                                                                                             |                                                                                               |
|                       | /BG  | Customer specific notes on scale                                                                                                                                                             | Max. 30 digits                                                                                |
| Limit switches        | /BD  | Dual scale                                                                                                                                                                                   | Adjustment of the transmitter for the first mentioned fluid                                   |
|                       | /K1  | MIN-contact                                                                                                                                                                                  | Not with indicator P and F; not with /GS1                                                     |
|                       | /K2  | MAX-con tact                                                                                                                                                                                 | Not with indicator P and F; not with /GS1                                                     |
|                       | /K3  | MIN-MAX-contact, MIN-MIN-contact, MAX-MAX-contact                                                                                                                                            | Not with indicator P and F; not with /GS1                                                     |
|                       | /K6  | MIN-contact "fail-safe" version                                                                                                                                                              | Not with indicator P and F; not with /GS1                                                     |
|                       | /K7  | MAX-contact "fail-safe" version                                                                                                                                                              | Not with indicator P and F; not with /GS1                                                     |
| Flange Facing         | /K8  | MIN-MAX-contact "fail-safe" version                                                                                                                                                          | Not with indicator P and F; not with /GS1                                                     |
|                       | /K9  | MIN-MIN-contact "fail-safe" version                                                                                                                                                          | Not with indicator P and F; not with /GS1                                                     |
|                       | /K10 | MAX-MAX-contact "fail-safe" version                                                                                                                                                          | Not with indicator P and F; not with /GS1                                                     |
|                       | /D10 | Form B2 acc. to EN 1092-1                                                                                                                                                                    | Only for EN-flanges (D2, D4); not with PTFE                                                   |
| Damping               | /D11 | Form D acc. to EN 1092-1                                                                                                                                                                     | Only for EN-flanges (D2, D4); not with PTFE                                                   |
|                       | /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, RAMC□-G6SS, RAMC□-T6SS; not for /T□                  |
|                       | /P16 | ASME B31.3 compliance Category M FLUID SERVICE                                                                                                                                               | Only RAMC□-A1SS, RAMC□-A2SS, RAMC□-A3SS, RAMC□-G6SS, RAMC□-T6SS; 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                                                                                                                                                              | Only for A1,A2, A3 and not for T4, T5, T6; 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"<br><br>in combination with /Q11: PESO intrinsically safe "ia"<br>in combination with /KC: KOSHA intrinsically safe "ia"          | Only for power supply 424, 429; for indicator -T only with limit switches<br><br>Only for indicator T; only with limit switches /K1 to /K3 |
|                                                     | /KS2  | ATEX intrinsically safe "ia"/ dust proof "tb"                                                                                                                 | Only for power supply 424; for indicator -T only with limit switches; only for housing 91                                                  |
|                                                     | /ES1  | IECEx intrinsically safe "ia"                                                                                                                                 | Only for power supply 424, 429; for indicator -T only with limit switches                                                                  |
|                                                     | /ES2  | IECEx intrinsically safe "ia"/ dust proof "tb"                                                                                                                | Only for power supply 424, for indicator -T only with limit switches; only for housing 91                                                  |
|                                                     | /FS1  | FM intrinsically safe/ nonincendive electr. transmitter (USA/Canada), UL intrinsically safe 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; for indicator -T only with limit switches; only with /CN                                                        |
|                                                     | /GS1  | EACEx intrinsically safe "ia"                                                                                                                                 | Only for power supply 424, 429; only with /VE;                                                                                             |
|                                                     | /US1  | INMETRO intrinsically safe "ia"                                                                                                                               | Only for power supply 424, 429; for indicator -T only with limit switches                                                                  |
|                                                     | /KF1  | ATEX flame proof "db"/ dust proof "tb"                                                                                                                        | Only for power supply 424; for indicator -T only with limit switches; only with housing 91                                                 |
|                                                     | /EF1  | IECEx flame proof "db" / dust proof "tb";<br>in combination with /KC: KOSHA flame proof "d" (Korea)<br>in combination with /Q11: PESO flame proof "d" (India) | Only for power supply 424; 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; for indicator -T only with limit switches; only for housing 91; only with /CN                                   |
|                                                     | /GF1  | EACEx flame proof "db" / dust proof "tb"                                                                                                                      | Only for power supply 424; for indicator -T only with limit switches; only for housing 91; only with /VE                                   |
|                                                     | /UF1  | INMETRO-Ex flame proof "db" / dust proof "tb"                                                                                                                 | Only for power supply 424; for indicator -T only with limit switches; only for housing 91                                                  |
|                                                     | /KC1  | ATEX non-electrical type                                                                                                                                      | Only for indicator -T without limit switches                                                                                               |
|                                                     | /GC1  | EACEx non-electrical type                                                                                                                                     | Only for indicator -T without limit switches; only with /VE                                                                                |
| Country-specific delivery                           | /VE   | EAC-mark for EAEU countries                                                                                                                                   | Not with /Q11; not with /B4                                                                                                                |
|                                                     | /KC   | KC-mark for Korea                                                                                                                                             | Not with /Q11; for explosion proof see /EF1 and /KS1; not with /B4                                                                         |
|                                                     | /CN   | China RoHS mark                                                                                                                                               | Not with /Q11; not with /B4                                                                                                                |
| Special delivery options                            | /QD   | Quick delivery                                                                                                                                                | On request; Order ready for shipping in 48h on request                                                                                     |
| 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 /EF1; 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 limit switches (transmitter relay) | /W1A  | 115 V AC, 1 channel                                                                                                                                           | Only for limit switches /K1, /K2, /K3; not with indicator P and F                                                                          |
|                                                     | /W1B  | 115 V AC, 2 channel                                                                                                                                           | Only for limit switches /K1, /K2, /K3; not with indicator P and F                                                                          |
|                                                     | /W2A  | 230 V AC, 1 channel                                                                                                                                           | Only for limit switches /K1, /K2, /K3; not with indicator P and F                                                                          |
|                                                     | /W2B  | 230 V AC, 2 channel                                                                                                                                           | Only for limit switches /K1, /K2, /K3; not with indicator P and F                                                                          |
|                                                     | /W4A  | 24 V DC, 1 channel                                                                                                                                            | Only for limit switches /K1, /K2, /K3; not with indicator P and F                                                                          |
|                                                     | /W4B  | 24 V DC, 2 channel                                                                                                                                            | Only for limit switches /K1, /K2, /K3; not with indicator P and F                                                                          |
|                                                     | /W4E  | 24 V DC, 1 channel, fail-safe                                                                                                                                 | Only for limit switches /K6, /K7; not with indicator P and F                                                                               |
| User's Manuals                                      | /W4F  | 2x 24 V DC, 1 channel, fail-safe                                                                                                                              | Only for limit switches /K8, /K9, /K10; not with indicator P and F                                                                         |
|                                                     | /IE n | Quantity of instruction manuals in English                                                                                                                    | n = 1 to 9 selectable <sup>*)</sup>                                                                                                        |
| Special order                                       | /ID n | Quantity of instruction manuals in German                                                                                                                     | n = 1 to 9 selectable <sup>*)</sup>                                                                                                        |
|                                                     | /Z    | Special design must be specified separately.<br>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-<br>-R4SS- | -T6SS-<br>-G6SS- | -S5SS-        |
| 1    | 43-51 | RAMC01 | -                                  | 250<br>(9.84) | -              | 250<br>(9.84)  | 250<br>(9.84)  | 250<br>(9.84)  | 250 *<br>(9.84) | -              | -              | 295<br>(11.61)   | 295<br>(11.61)   | -             |
|      |       | RAMC23 | -                                  | 250<br>(9.84) | -              | 260<br>(10.23) | 250<br>(9.84)  | 250<br>(9.84)  | 250 *<br>(9.84) | -              | -              | 295<br>(11.61)   | 295<br>(11.61)   | -             |
|      |       | RAMC02 | -                                  | 250<br>(9.84) | -              | 260<br>(10.23) | 250<br>(9.84)  | 250<br>(9.84)  | 260<br>(10.23)  | 275<br>(10.83) | 250<br>(9.84)  | -                | 295<br>(11.61)   | 250<br>(9.84) |
|      |       | RAMC03 | -                                  | 250<br>(9.84) | -              | -              | 250<br>(9.84)  | 250<br>(9.84)  | 260<br>(10.23)  | -              | 250<br>(9.84)  | -                | -                | -             |
|      |       | RAMC04 | -                                  | 250<br>(9.84) | -              | -              | 250<br>(9.84)  | 250<br>(9.84)  | 280<br>(11.02)  | -              | 250<br>(9.84)  | -                | -                | -             |
|      |       | RAMC05 | -                                  | 250<br>(9.84) | -              | -              | 250<br>(9.84)  | 250<br>(9.84)  | 280<br>(11.02)  | -              | -              | -                | -                | -             |
| 2    | 53-62 | RAMC01 | -                                  | 250<br>(9.84) | -              | 250<br>(9.84)  | 250<br>(9.84)  | 250<br>(9.84)  | 250<br>(9.84)   | -              | -              | 295<br>(11.61)   | -                | -             |
|      |       | RAMC23 | -                                  | 250<br>(9.84) | -              | 260<br>(10.23) | 250<br>(9.84)  | 250<br>(9.84)  | 250<br>(9.84)   | -              | -              | 295<br>(11.61)   | 295<br>(11.61)   | -             |
|      |       | RAMC02 | -                                  | 250<br>(9.84) | -              | 260<br>(10.23) | 250<br>(9.84)  | 250<br>(9.84)  | 260<br>(10.23)  | 275<br>(10.83) | 250<br>(9.84)  | 250<br>(9.84)    | 295<br>(11.61)   | 250<br>(9.84) |
|      |       | RAMC03 | -                                  | 250<br>(9.84) | -              | -              | 250<br>(9.84)  | 250<br>(9.84)  | 260<br>(10.23)  | -              | 250<br>(9.84)  | -                | -                | -             |
|      |       | RAMC04 | -                                  | 250<br>(9.84) | -              | -              | 250<br>(9.84)  | 250<br>(9.84)  | 280<br>(11.02)  | -              | 250<br>(9.84)  | -                | -                | -             |
|      |       | RAMC05 | -                                  | 250<br>(9.84) | -              | -              | 250<br>(9.84)  | 250<br>(9.84)  | 280<br>(11.02)  | -              | -              | -                | -                | -             |
| 3    | 63-64 | RAMC02 | -                                  | 250<br>(9.84) | -              | 270<br>(10.63) | 250<br>(9.84)  | 250<br>(9.84)  | 270<br>(10.63)  | -              | -              | 310<br>(12.21)   | -                | 250<br>(9.84) |
|      |       | RAMC03 | -                                  | 250<br>(9.84) | -              | 270<br>(10.63) | 250<br>(9.84)  | 250<br>(9.84)  | 270<br>(10.63)  | -              | -              | -                | 310<br>(12.21)   | -             |
|      |       | RAMC04 | -                                  | 250<br>(9.84) | -              | 270<br>(10.63) | 250<br>(9.84)  | 250<br>(9.84)  | 280<br>(11.02)  | -              | -              | -                | 310<br>(12.21)   | 250<br>(9.84) |
|      |       | RAMC05 | -                                  | 250<br>(9.84) | 270<br>(10.63) | 280<br>(11.02) | 250<br>(9.84)  | 250<br>(9.84)  | 280<br>(11.02)  | 275<br>(10.83) | 250<br>(9.84)  | -                | -                | -             |
| 4    | 67-72 | RAMC05 | -                                  | 250<br>(9.84) | 260<br>(10.23) | -              | 250<br>(9.84)  | 250<br>(9.84)  | 280<br>(11.02)  | -              | -              | 325<br>(12.8)    | -                | -             |
|      |       | RAMC06 | -                                  | 250<br>(9.84) | 260<br>(10.23) | -              | 250<br>(9.84)  | 260<br>(10.23) | 280<br>(11.02)  | 275<br>(10.83) | 300<br>(11.81) | 325<br>(12.8)    | 325<br>(12.8)    | 250<br>(9.84) |
|      |       | RAMC08 | -                                  | 250<br>(9.84) | 270<br>(10.63) | -              | 250<br>(9.84)  | 260<br>(10.23) | 290<br>(11.41)  | 275<br>(10.83) | 300<br>(11.81) | -                | -                | -             |
|      |       | RAMC10 | 250<br>(9.84)                      | 250<br>(9.84) | -              | -              | -              | -              | -               | -              | -              | -                | -                | -             |
| 5    | 73-77 | RAMC08 | -                                  | 250<br>(9.84) | 270<br>(10.63) | -              | 250<br>(9.84)  | 260<br>(10.23) | -               | -              | -              | -                | -                | -             |
|      |       | RAMC09 | -                                  | -             | -              | -              | 250<br>(9.84)  | 270<br>(10.63) | -               | -              | -              | -                | -                | -             |
|      |       | RAMC10 | 250<br>(9.84)                      | 250<br>(9.84) | -              | -              | 250<br>(9.84)  | 270<br>(10.63) | -               | 300<br>(11.81) | 250<br>(9.84)  | -                | -                | -             |
|      |       | RAMC12 | 250<br>(9.84)                      | -             | -              | -              | 250<br>(9.84)  | 280<br>(11.02) | -               | -              | -              | -                | -                | -             |
|      |       | RAMC15 | 250<br>(9.84)                      | -             | -              | -              | 260<br>(10.23) | 280<br>(11.02) | -               | -              | -              | -                | -                | -             |
| 6    | 81-82 | RAMC10 | 250<br>(9.84)                      | 250<br>(9.84) | -              | -              | 250<br>(9.84)  | 270<br>(10.63) | -               | -              | -              | -                | -                | -             |
|      |       | RAMC12 | 250<br>(9.84)                      | -             | -              | -              | 250<br>(9.84)  | 280<br>(11.02) | -               | 300<br>(11.81) | -              | -                | -                | -             |
|      |       | RAMC15 | 250<br>(9.84)                      | -             | -              | -              | 260<br>(10.28) | 280<br>(11.02) | -               | -              | -              | -                | -                | -             |

\* We suggest using low-profile screw nuts for mounting.

## FLOW TABLES FOR METAL TUBES

Table 11

| Pos. | Measuring range for water and liquids |                   |                    |                             |                         | Measuring range for air and gases |                         |                    |                    |                             |
|------|---------------------------------------|-------------------|--------------------|-----------------------------|-------------------------|-----------------------------------|-------------------------|--------------------|--------------------|-----------------------------|
|      | Max. flow (Qmax)                      |                   | Cone-Float-combin. | Pressure loss <sup>1)</sup> | Viscosity <sup>2)</sup> | Max. flow (Qmax)                  |                         |                    | Cone-Float-combin. | Pressure loss <sup>1)</sup> |
|      | m³/h <sup>3)</sup>                    | gpm <sup>4)</sup> | Code               | mbar                        | mPa*s                   | m³/h <sup>3)</sup>                | m³/h i.N. <sup>5)</sup> | scfm <sup>6)</sup> | Code               | mbar                        |
| 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                          |
|      | 2.2                                   | 10.1              | 62 V1              | 45                          | 50                      | 50                                | 45                      | 28                 | 62 S1              | 45                          |
| 3    | 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                          |
|      | 6                                     | 26.4              | 64 V2              | 43                          | 50                      | 120                               | 110                     | 70                 | 64 S2              | 47                          |
| 4    | 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                          |
|      | 25                                    | 110               | 72 V5              | 63                          | 5                       | 500                               | 470                     | 290                | 72 S5              | 54                          |
| 5    | 25                                    | 110               | 73 V8              | 60                          | 10                      | 550                               | 500                     | 320                | 73 L8              | 30                          |
|      | 40                                    | 176               | 74 V8              | 60                          | 10                      | 850                               | 800                     | 500                | 74 L8              | 30                          |
|      | 63                                    | 277               | 77 V8              | 60                          | 10                      | 1400                              | 1300                    | 800                | 77 L8              | 30                          |
| 6    | 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 und 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 (Qmax)                      |                   | Cone-Float-combination | Pressure loss <sup>1)</sup> | Viscosity <sup>2)</sup> | Max. flow (Qmax)                  |                                      |                    | Cone-Float-combination | Pressure loss <sup>1)</sup> |
| m <sup>3</sup> /h <sup>3)</sup>       | gpm <sup>4)</sup> |                        |                             |                         | m <sup>3</sup> /h <sup>3)</sup>   | m <sup>3</sup> /h i.N. <sup>5)</sup> | scfm <sup>6)</sup> |                        |                             |
| 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.

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## TEMPERATURE LIMITATIONS, STANDARD AND INTRINSICALLY SAFE

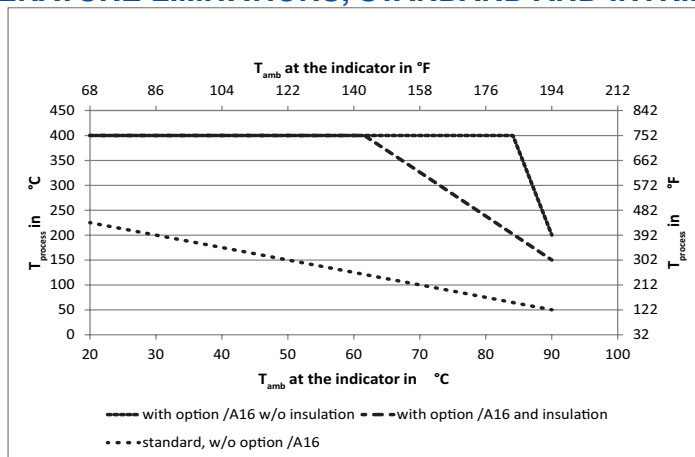


fig. 1a RAMC: Type T90, T91 without limit switch(es) <sup>1)</sup>

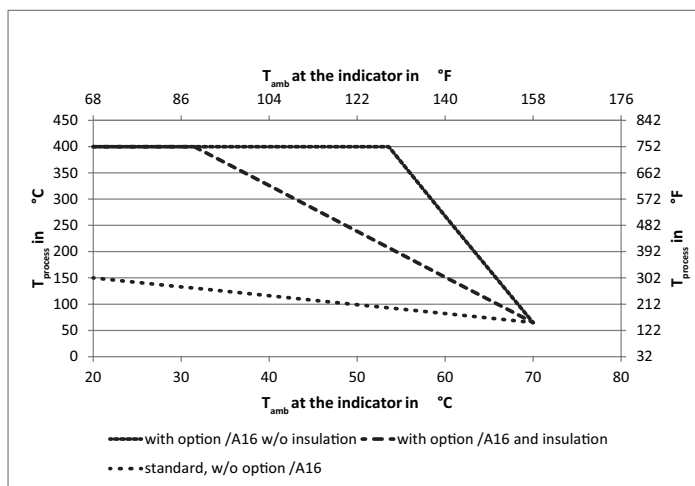


fig. 1b RAMC: Type T90, T91 with limit switch(es),  
Type E90, J90, P90, F90, E91, J91, P91, F91 with/without limit switch(es) <sup>1)</sup>

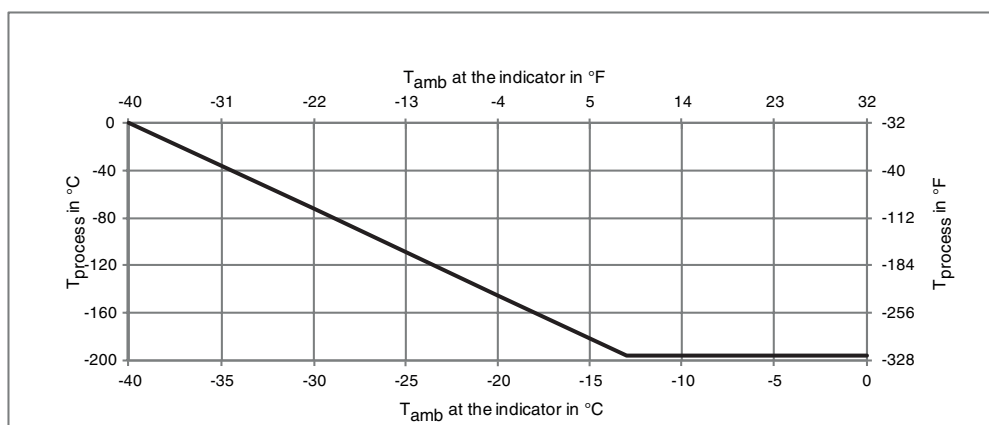


fig. 1c RAMC: All indicator types except types with hazardous area approval <sup>1)</sup>

<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).

## MINIMUM AMBIENT TEMPERATURE

Table 14

| Flowmeter                                        | Model code                                             | Minimum ambient temperature                                     |
|--------------------------------------------------|--------------------------------------------------------|-----------------------------------------------------------------|
| RAMC with mechanical indicator                   | RAMC□□-□□□□-□□□□-□□□□NNN                               | -25 °C (-13 °F); -40 °C (-40 °F) with option /A26 <sup>1)</sup> |
| RAMC with standard limit switches /K1, /K2, /K3  | RAMC□□-□□□□-□□□□-□□□□□□ /K1, /K2, /K3                  | -25 °C (-13 °F)                                                 |
| RAMC with fail-safe limit switches /K6, /K7, /K8 | RAMC□□-□□□□-□□□□-□□□□□□ /K6, /K7, /K8                  | -25 °C (-13 °F); -40 °C (-40 °F) with option /A26 <sup>1)</sup> |
| RAMC with fail-safe limit switches /K9, /K10     | RAMC□□-□□□□-□□□□-□□□□□□ /K9, /K10                      | -25 °C (-13 °F)                                                 |
| RAMC with electronic transmitter                 | RAMC□□-□□□□-□□□□-□□□□E□□424                            | -25 °C (-13 °F); -40 °C (-40 °F) with option /A26 <sup>1)</sup> |
|                                                  | RAMC□□-□□□□-□□□□-□□□□J□□424                            | -25 °C (-13 °F); -40 °C (-40 °F) with option /A26 <sup>1)</sup> |
|                                                  | RAMC□□-□□□□-□□□□-□□□□P□□429                            | -25 °C (-13 °F); -40 °C (-40 °F) with option /A26 <sup>1)</sup> |
|                                                  | RAMC□□-□□□□-□□□□-□□□□F□□429                            | -25 °C (-13 °F); -40 °C (-40 °F) with option /A26 <sup>1)</sup> |
| RAMC intrinsically safe type                     | RAMC□□-□□□□-□□□□-□□□□□□ /KS1                           | -25 °C (-13 °F); -40 °C (-40 °F) with option /A26 <sup>1)</sup> |
|                                                  | RAMC□□-□□□□-□□□□-□□□□□□ /KS1, /K1, /K2, /K3            | -25 °C (-13 °F)                                                 |
|                                                  | RAMC□□-□□□□-□□□□-□□□□□□ /KS1, /K6, /K7, /K8            | -25 °C (-13 °F); -40 °C (-40 °F) with option /A26 <sup>1)</sup> |
|                                                  | RAMC□□-□□□□-□□□□-□□□□□□ /KS1, /K9, /K10                | -25 °C (-13 °F)                                                 |
|                                                  | RAMC□□-□□□□-□□□□-□□□□□□ /ES1                           | -25 °C (-13 °F); -40 °C (-40 °F) with option /A26 <sup>1)</sup> |
|                                                  | RAMC□□-□□□□-□□□□-□□□□□□ /ES1, /K1, /K2, /K3            | -25 °C (-13 °F)                                                 |
|                                                  | RAMC□□-□□□□-□□□□-□□□□□□ /ES1, /K6, /K7, /K8            | -25 °C (-13 °F); -40 °C (-40 °F) with option /A26 <sup>1)</sup> |
|                                                  | RAMC□□-□□□□-□□□□-□□□□□□ /ES1, /K9, /K10                | -25 °C (-13 °F)                                                 |
|                                                  | RAMC□□-□□□□-□□□□-□□□□□□ /FS1, /K1, /K2, /K3, /K9, /K10 | -25 °C (-13 °F)                                                 |
|                                                  | RAMC□□-□□□□-□□□□-□□□□□□ /FS1, /K6, /K7, /K8            | -25 °C (-13 °F); -40 °C (-40 °F) with option /A26 <sup>1)</sup> |
|                                                  | RAMC□□-□□□□-□□□□-□□□□□□ /FS1                           | -25 °C (-13 °F)                                                 |
|                                                  | RAMC□□-□□□□-□□□□-□□□□□□ /J□□□□□ /FS1                   | -25 °C (-13 °F)                                                 |
|                                                  | RAMC□□-□□□□-□□□□-□□□□□□ /NS1                           | -25 °C (-13 °F); -40 °C (-40 °F) with option /A26 <sup>1)</sup> |
|                                                  | RAMC□□-□□□□-□□□□-□□□□□□ /GS1                           | -25 °C (-13 °F); -40 °C (-40 °F) with option /A26 <sup>1)</sup> |
| RAMC flame proof or dust proof type              | RAMC□□-□□□□-□□□□-□□□□□□ /KF1                           | -20 °C (-4 °F)                                                  |
|                                                  | RAMC□□-□□□□-□□□□-□□□□□□ /EF1                           |                                                                 |
|                                                  | RAMC□□-□□□□-□□□□-□□□□□□ /NF1                           |                                                                 |
|                                                  | RAMC□□-□□□□-□□□□-□□□□□□ /GF1                           |                                                                 |
|                                                  | RAMC□□-□□□□-□□□□-□□□□□□ /KS2                           |                                                                 |
|                                                  | RAMC□□-□□□□-□□□□-□□□□□□ /ES2,                          |                                                                 |
| RAMC non-electrical type                         | RAMC□□-□□□□-□□□□-□□□□NNN /KC1                          | -25 °C (-13 °F); -40 °C (-40 °F) with option /A26 <sup>1)</sup> |
|                                                  | RAMC□□-□□□□-□□□□-□□□□NNN /GC1                          |                                                                 |

<sup>1)</sup> Below -25 °C (-13 °F) the LC-display will not work. Also the push buttons should not be used below -25 °C (-13 °F).

## 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).

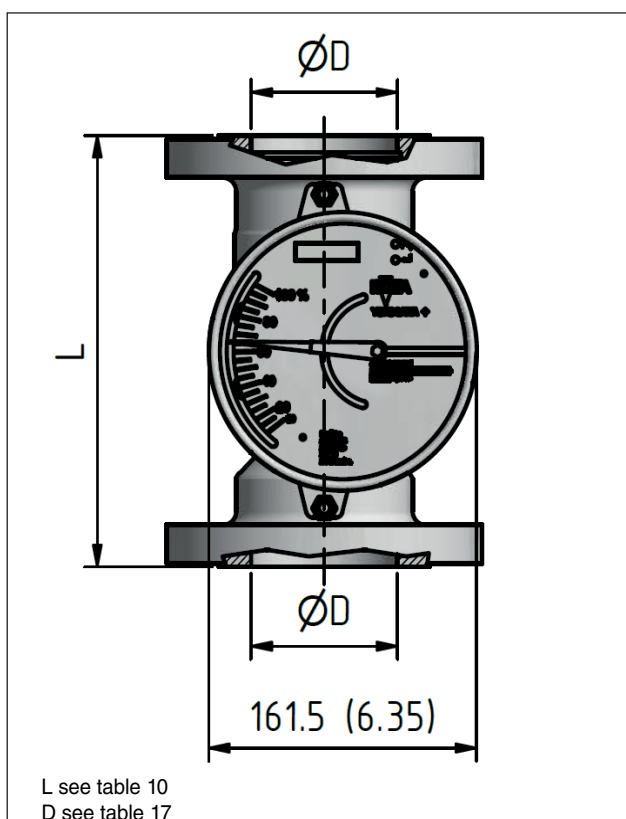
**Table 15**

| Process connection   |                                                        | Process pressure p(T) in bar (psi) |                     |                 |                   |                    |                    |                    |                             |                             |                             |                             |                    |                    |  |
|----------------------|--------------------------------------------------------|------------------------------------|---------------------|-----------------|-------------------|--------------------|--------------------|--------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|--------------------|--------------------|--|
| Code                 | Description                                            | -196 °C<br>(-321 °F)               | -80 °C<br>(-112 °F) | RT<br>(68 °F)   | 50 °C<br>(122 °F) | 100 °C<br>(212 °F) | 130 °C<br>(266 °F) | 140 °C<br>(284 °F) | 150 °C<br>(302 °F)          | 200 °C<br>(392 °F)          | 250 °C<br>(482 °F)          | 300 °C<br>(572 °F)          | 350 °C<br>(552 °F) | 400 °C<br>(752 °F) |  |
| -A1SS- <sup>1)</sup> | Flange ASME Class 150 RF                               | 19<br>(275.6)                      | 19<br>(275.6)       | 19<br>(275.6)   | 18.4<br>(266.9)   | 16.2<br>(235)      | 15.4<br>(223.3)    | 15.1<br>(219)      | 14.8<br>(214.7)             | 13.7<br>(198.7)             | 12.1<br>(175.5)             | 10.2<br>(148)               | 8.4<br>(121.8)     | 6.5<br>(94.3)      |  |
| -A2SS- <sup>1)</sup> | Flange ASME Class 300 RF                               | 49.6<br>(719.4)                    | 49.6<br>(719.4)     | 49.6<br>(719.4) | 48.1<br>(697.6)   | 42.2<br>(612)      | 40<br>(580)        | 39.2<br>(568.5)    | 38.5<br>(558.4)             | 35.7<br>(517.8)             | 33.4<br>(484.4)             | 31.6<br>(458.3)             | 30.3<br>(439.5)    | 29.4<br>(426.4)    |  |
| -A3SS- <sup>1)</sup> | Flange ASME Class 600 RF                               | 99.3<br>(1440)                     | 99.3<br>(1440)      | 99.3<br>(1440)  | 96.2<br>(1395)    | 84.4<br>(1224)     | 80<br>(1160.3)     | 78.5<br>(1138.5)   | 77<br>(1117)                | 71.3<br>(1034)              | 66.8<br>(968.8)             | 63.2<br>(916.6)             | 60.7<br>(880.4)    | 58.9<br>(824.3)    |  |
| -D2SS-               | Flange EN PN 16                                        | 16<br>(232.1)                      | 16<br>(232.1)       | 16<br>(232.1)   | 15.6<br>(226.3)   | 15.1<br>(219)      | 14.3<br>(207.4)    | 14 (203)           | 13.7<br>(198.7)             | 12.7<br>(184.2)             | 11.9<br>(172.6)             | 11<br>(159.5)               | 10.5<br>(152.3)    | 10.2<br>(148)      |  |
| -D4SS-               | Flange EN PN 40                                        | 40<br>(580)                        | 40<br>(580)         | 40<br>(580)     | 38.9<br>(564.2)   | 37.9<br>(549.7)    | 35.8<br>(519.2)    | 35.1<br>(509)      | 34.4<br>(498.9)             | 31.8<br>(461.2)             | 29.9<br>(433.7)             | 27.6<br>(400.3)             | 26.4<br>(397.4)    | 25.7<br>(372.7)    |  |
| -D5SS-               | Flange EN PN 63                                        | 63<br>(913.7)                      | 63<br>(913.7)       | 63<br>(913.7)   | 61.5<br>(892)     | 59.7<br>(865.9)    | 56.5<br>(819.5)    | 55.4<br>(803.5)    | 54.3<br>(787.5)             | 50.1<br>(726.3)             | 47.1<br>(683.1)             | 43.5<br>(630.9)             | 41.7<br>(604.8)    | 40.5<br>(587.4)    |  |
| -D6SS-               | Flange EN PN 100                                       | 100<br>(1450)                      | 100<br>(1450)       | 100<br>(1450)   | 97.8<br>(1418)    | 94.7<br>(1373.5)   | 89.5<br>(1298)     | 87.8<br>(1273.4)   | 86.1<br>(1248.8)            | 79.5<br>(1153)              | 74.7<br>(1083.4)            | 69<br>(1000.7)              | 66.1<br>(958.7)    | 64.2<br>(931.1)    |  |
| -T4SS-/R4SS-         | Internal thread ½ in. (RAMC01-...)                     | 25<br>(362.6)                      | 25<br>(362.6)       | 25<br>(362.6)   | 25<br>(362.6)     | 25<br>(362.6)      | 25<br>(362.6)      | 25<br>(362.6)      | 20 <sup>2)</sup><br>(290)   | 20 <sup>2)</sup><br>(290)   | 20 <sup>2)</sup><br>(290)   | 20 <sup>2)</sup><br>(290)   | -                  | -                  |  |
| -T4SS-/R4SS-         | Internal thread ¾ in. (RAMC23-...)                     | 25<br>(362.6)                      | 25<br>(362.6)       | 25<br>(362.6)   | 25<br>(362.6)     | 25<br>(362.6)      | 25<br>(362.6)      | 25<br>(362.6)      | 20 <sup>2)</sup><br>(290)   | 20 <sup>2)</sup><br>(290)   | 20 <sup>2)</sup><br>(290)   | 20 <sup>2)</sup><br>(290)   | -                  | -                  |  |
| -T4SS-/R4SS-         | Internal thread 1 in. (RAMC02-...)                     | 16<br>(232.1)                      | 16<br>(232.1)       | 16<br>(232.1)   | 16<br>(232.1)     | 16<br>(232.1)      | 16<br>(232.1)      | 16<br>(232.1)      | 16 <sup>2)</sup><br>(232.1) | 16 <sup>2)</sup><br>(232.1) | 16 <sup>2)</sup><br>(232.1) | 16 <sup>2)</sup><br>(232.1) | -                  | -                  |  |
| -T4SS-/R4SS-         | Internal thread 2 in. (RAMC05-...)                     | 10<br>(145)                        | 10<br>(145)         | 10<br>(145)     | 10 ( 145)         | 10 (145)           | 10<br>(145)        | 10<br>(145)        | 10 <sup>2)</sup><br>(145)   | 10 <sup>2)</sup><br>(145)   | 10 <sup>2)</sup><br>(145)   | 10 <sup>2)</sup><br>(145)   | -                  | -                  |  |
| -T4SS-/R4SS-         | Internal thread 2½ in. (RAMC06-...)                    | 10<br>(145)                        | 10<br>(145)         | 10<br>(145)     | 10<br>(145)       | 10<br>(145)        | 10<br>(145)        | 10<br>(145)        | 10 <sup>2)</sup><br>(145)   | 10 <sup>2)</sup><br>(145)   | 10 <sup>2)</sup><br>(145)   | 10 <sup>2)</sup><br>(145)   | -                  | -                  |  |
| -T6SS-/G6SS-         | Internal thread                                        | 40<br>(580.1)                      | 40<br>(580.1)       | 40<br>(580.1)   | 38.9<br>(564.2)   | 37.9<br>(549.7)    | 35.8<br>(519.2)    | 35.1<br>(509.1)    | 34.4<br>(498.9)             | 31.8<br>(461.2)             | 29.9<br>(433.7)             | 27.6<br>(400.3)             | 26.4<br>(382.9)    | 25.7<br>(372.7)    |  |
| -S2SS-               | Fitting DIN11851 (RAMC02-...)                          | -                                  | -                   | 40<br>(580.1)   | 40<br>(580.1)     | 40<br>(580.1)      | 40<br>(580.1)      | 40<br>(580.1)      | -                           | -                           | -                           | -                           | -                  | -                  |  |
| -S2SS-               | Fitting DIN11851 (RAMC05-...)                          | -                                  | -                   | 25<br>(362.6)   | 25<br>(362.6)     | 25<br>(362.6)      | 25<br>(362.6)      | 25<br>(362.6)      | -                           | -                           | -                           | -                           | -                  | -                  |  |
| -S2SS-               | Fitting DIN11851 (RAMC06-...)                          | -                                  | -                   | 25<br>(362.6)   | 25<br>(362.6)     | 25<br>(362.6)      | 25<br>(362.6)      | 25<br>(362.6)      | -                           | -                           | -                           | -                           | -                  | -                  |  |
| -S2SS-               | Fitting DIN11851 (RAMC08-...)                          | -                                  | -                   | 25<br>(362.6)   | 25<br>(362.6)     | 25<br>(362.6)      | 25<br>(362.6)      | 25<br>(362.6)      | -                           | -                           | -                           | -                           | -                  | -                  |  |
| -S2SS-               | Fitting DIN11851 (RAMC10-...)                          | -                                  | -                   | 25<br>(362.6)   | 25<br>(362.6)     | 25<br>(362.6)      | 25<br>(362.6)      | 25<br>(362.6)      | -                           | -                           | -                           | -                           | -                  | -                  |  |
| -S2SS-               | Fitting DIN11851 (RAMC12-...)                          | -                                  | -                   | 16<br>(232.1)   | 16<br>(232.1)     | 16<br>(232.1)      | 16<br>(232.1)      | 16<br>(232.1)      | -                           | -                           | -                           | -                           | -                  | -                  |  |
| -S4SS-               | Tri-Clamp DIN 32676 (RAMC02-...)                       | -                                  | -                   | 16<br>(232.1)   | 16<br>(232.1)     | 16<br>(232.1)      | 16<br>(232.1)      | 16<br>(232.1)      | -                           | -                           | -                           | -                           | -                  | -                  |  |
| -S4SS-               | Tri-Clamp DIN 32676 (RAMC03-...)                       | -                                  | -                   | 16<br>(232.1)   | 16<br>(232.1)     | 16<br>(232.1)      | 16<br>(232.1)      | 16<br>(232.1)      | -                           | -                           | -                           | -                           | -                  | -                  |  |
| -S4SS-               | Tri-Clamp DIN 32676 (RAMC04-...)                       | -                                  | -                   | 16<br>(232.1)   | 16<br>(232.1)     | 16<br>(232.1)      | 16<br>(232.1)      | 16<br>(232.1)      | -                           | -                           | -                           | -                           | -                  | -                  |  |
| -S4SS-               | Tri-Clamp DIN 32676 (RAMC05-...)                       | -                                  | -                   | 16<br>(232.1)   | 16<br>(232.1)     | 16<br>(232.1)      | 16<br>(232.1)      | 16<br>(232.1)      | -                           | -                           | -                           | -                           | -                  | -                  |  |
| -S4SS-               | Tri-Clamp DIN 32676 (RAMC06-...)                       | -                                  | -                   | 10<br>(145)     | 10<br>(145)       | 10 (145)           | 10<br>(145)        | 10<br>(145)        | -                           | -                           | -                           | -                           | -                  | -                  |  |
| -S4SS-               | Tri-Clamp DIN 32676 (RAMC10-...)                       | -                                  | -                   | 10<br>(145)     | 10<br>(145)       | 10<br>(145)        | 10<br>(145)        | 10<br>(145)        | -                           | -                           | -                           | -                           | -                  | -                  |  |
| -S5SS-               | Flange Rosista (RAMC02-...)                            | -                                  | -                   | 10<br>(145)     | -                 | -                  | -                  | -                  | -                           | -                           | -                           | -                           | -                  | -                  |  |
| -S5SS-               | Flange Rosista (RAMC04-...)                            | -                                  | -                   | 10<br>(145)     | -                 | -                  | -                  | -                  | -                           | -                           | -                           | -                           | -                  | -                  |  |
| -A1PF-               | Flange ASME Class 150 RF                               | -                                  | 19<br>(275.6)       | 19<br>(275.6)   | 18.4<br>(266.9)   | 16.2<br>(235)      | 15.4<br>(210.3)    | -                  | -                           | -                           | -                           | -                           | -                  | -                  |  |
| -A2PF-               | Flange ASME Class 300 RF                               | -                                  | 49.6<br>(719.4)     | 49.6<br>(719.4) | 48.1<br>(697.6)   | 42.2<br>(612)      | 40<br>(580.1)      | -                  | -                           | -                           | -                           | -                           | -                  | -                  |  |
| -D2PF-               | Flange EN PN 16                                        | -                                  | 16<br>(232)         | 16 (232)        | 15.6<br>(226.2)   | 15.1<br>(219)      | 14.3<br>(207.4)    | -                  | -                           | -                           | -                           | -                           | -                  | -                  |  |
| -D4PF-               | Flange EN PN 40                                        | -                                  | 40<br>(580.1)       | 40<br>(580.1)   | 38.9<br>(564.2)   | 37.9<br>(549.7)    | 35.8<br>(519.2)    | -                  | -                           | -                           | -                           | -                           | -                  | -                  |  |
| /T1                  | Heat trace connection internal thread G ¼ in. PN 40    | 40<br>(580.1)                      | 40<br>(580.1)       | 40<br>(580.1)   | 38.9<br>(564.2)   | 37.9<br>(549.7)    | 35.8<br>(519.2)    | 35.1<br>(509.1)    | 34.4<br>(498.9)             | 31.8<br>(461.2)             | 29.9<br>(433.7)             | 27.6<br>(400.3)             | 26.4<br>(382.9)    | 25.7<br>(372.7)    |  |
| /T2                  | Heat trace connection EN flange DN 15 PN 40 Form B1    | 40<br>(580.1)                      | 40<br>(580.1)       | 40<br>(580.1)   | 38.9<br>(564.2)   | 37.9<br>(549.7)    | 35.8<br>(519.2)    | 35.1<br>(509.1)    | 34.4<br>(498.9)             | 31.8<br>(461.2)             | 29.9<br>(433.7)             | 27.6<br>(400.3)             | 26.4<br>(382.9)    | 25.7<br>(372.7)    |  |
| /T3                  | Heat trace connection EN flange DN 25 PN 40 Form B1    | 40<br>(580.1)                      | 40<br>(580.1)       | 40<br>(580.1)   | 38.9<br>(564.2)   | 37.9<br>(549.7)    | 35.8<br>(519.2)    | 35.1<br>(509.1)    | 34.4<br>(498.9)             | 31.8<br>(461.2)             | 29.9<br>(433.7)             | 27.6<br>(400.3)             | 26.4<br>(382.9)    | 25.7<br>(372.7)    |  |
| /T4                  | Heat trace connection ASME flange ½ in. Class 150 RF   | 19<br>(275.6)                      | 19<br>(275.6)       | 19<br>(275.6)   | 18.4<br>(266.9)   | 16.2<br>(235)      | 15.4<br>(210.3)    | 15.1<br>(219)      | 14.8<br>(214.7)             | 13.7<br>(198.7)             | 12.1<br>(175.5)             | 10.2<br>(148)               | 8.4<br>(121.8)     | 6.5<br>(94.3)      |  |
| /T5                  | Heat trace connection ASME flange 1 in. Class 150 RF   | 19<br>(275.6)                      | 19<br>(275.6)       | 19<br>(275.6)   | 18.4<br>(266.9)   | 16.2<br>(235)      | 15.4<br>(210.3)    | 15.1<br>(219)      | 14.8<br>(214.7)             | 13.7<br>(198.7)             | 12.1<br>(175.5)             | 10.2<br>(148)               | 8.4<br>(121.8)     | 6.5<br>(94.3)      |  |
| /T6                  | Heat trace connection internal thread ¼ - 18 NPT PN 40 | 40<br>(580.1)                      | 40<br>(580.1)       | 40<br>(580.1)   | 38.9<br>(564.2)   | 37.9<br>(549.7)    | 35.8<br>(519.2)    | 35.1<br>(509.1)    | 34.4<br>(498.9)             | 31.8<br>(461.2)             | 29.9<br>(433.7)             | 27.6<br>(400.3)             | 26.4<br>(382.9)    | 25.7<br>(372.7)    |  |

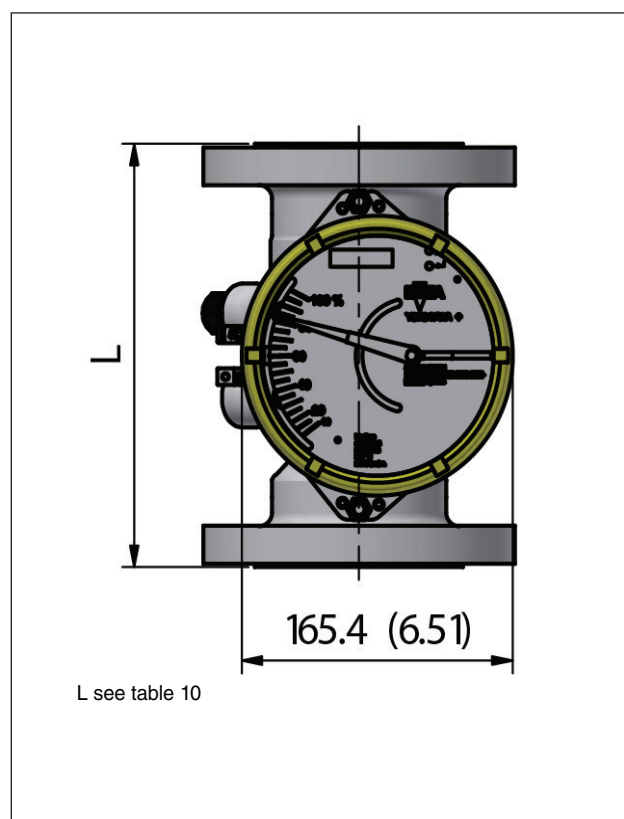
<sup>1)</sup> Dual certified AISI 316/316L

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

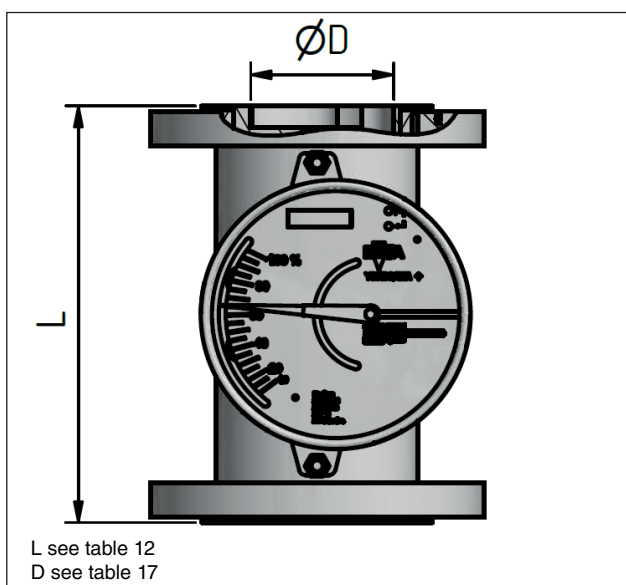
## DIMENSIONS AND WEIGHTS



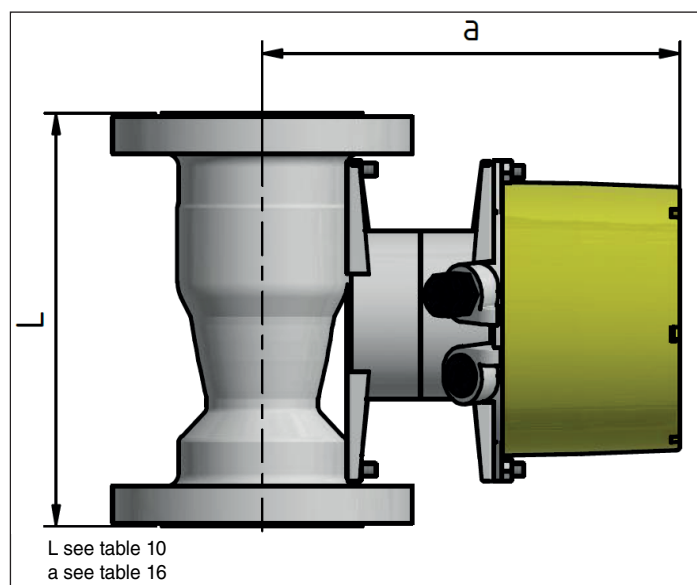
**Fig. 2a** Front view housing type 90 (SS)  
dimensions in mm (inch)



**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

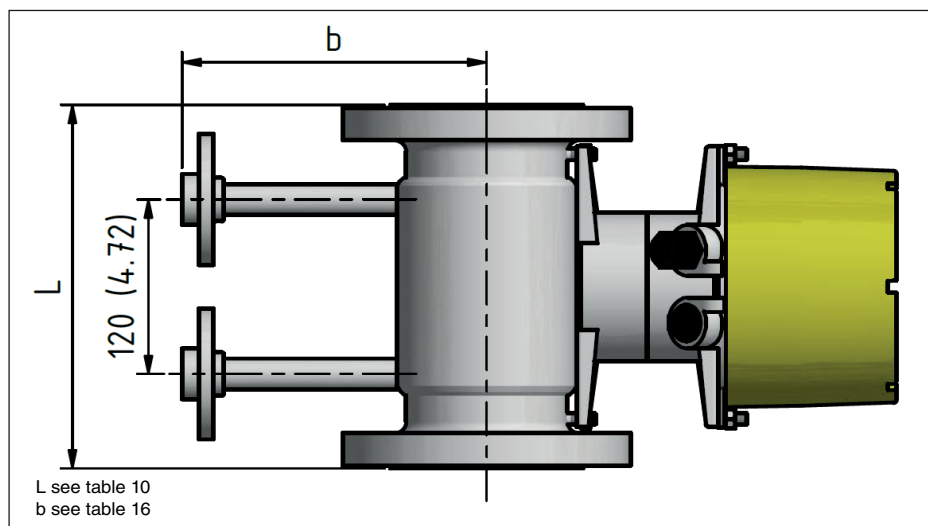


Fig. 5 RAMC type 91 and Option /A16 and /T□, dimensions in mm (inch)

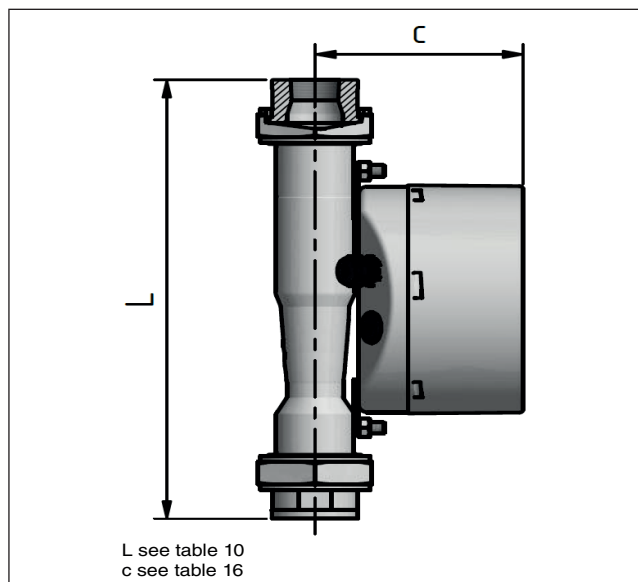


Fig. 6 RAMC with connection R4/T4

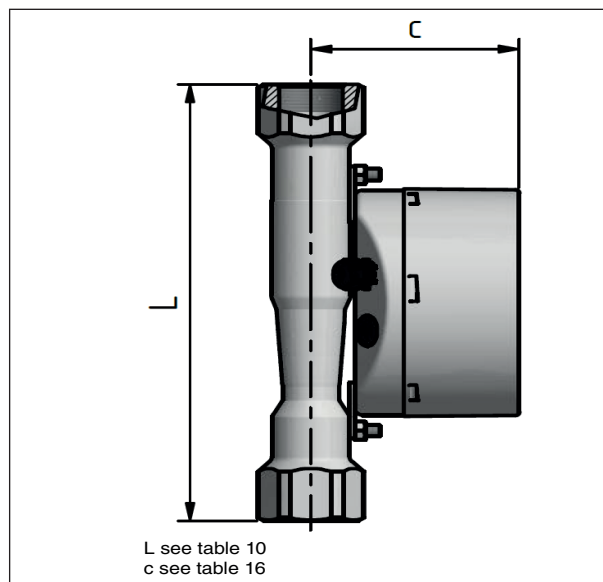


Fig. 7 RAMC with connection T6/G6

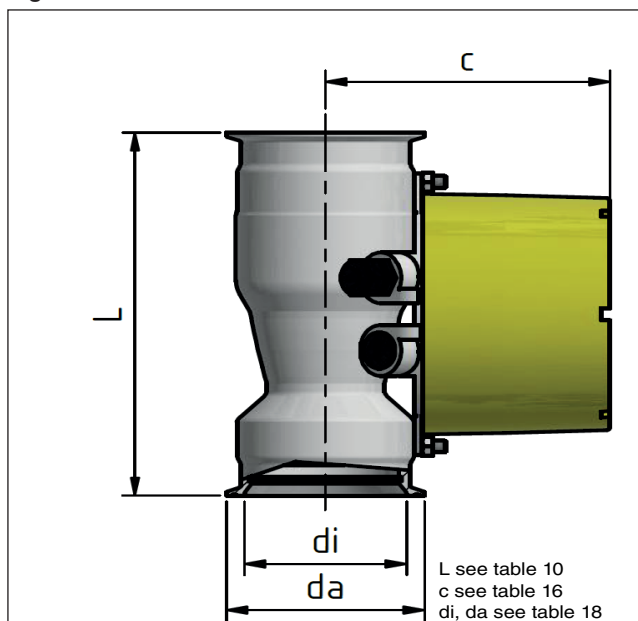


Fig. 8 RAMC with connection S4

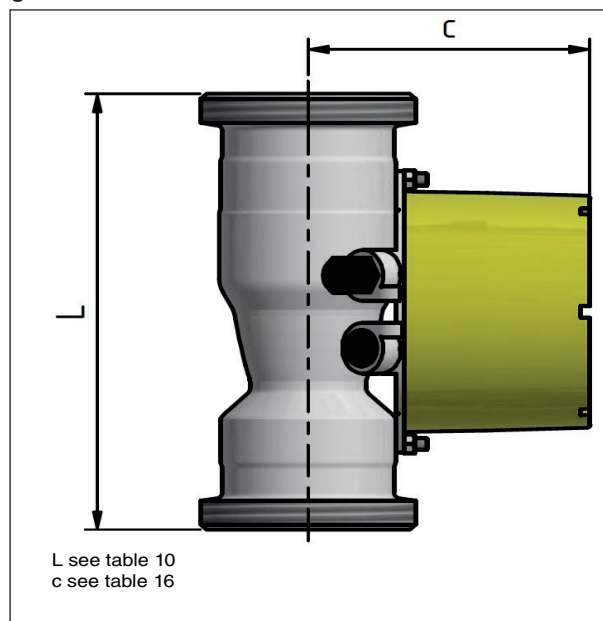


Fig. 9 RAMC with connection S2

**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<br>in mm (inch) | Pos. <sup>1)</sup>                         | Size            |                | D<br>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<br>in mm (inch) | da<br>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<br>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)

## IDENTIFICATION:

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

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### Manufacturer:

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

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

