

General Specifications

ROTAMETER RAMC Metal Variable Area Flowmeter

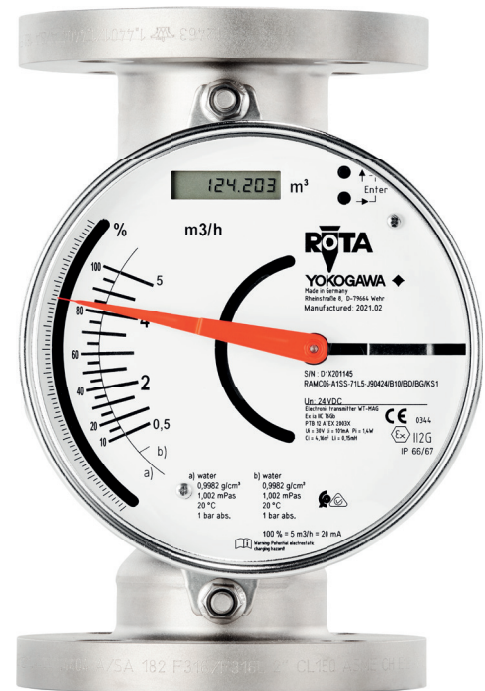
GS 01R01B02-00E-E

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.

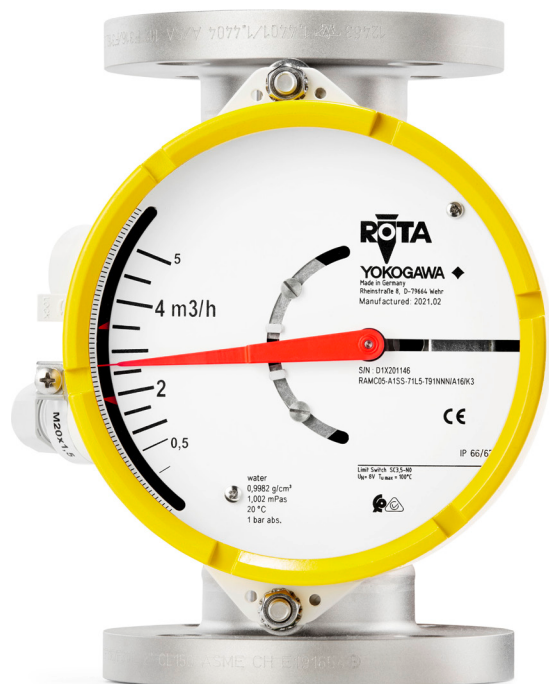
FEATURES

- 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 ±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 applications
- 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

Measuring turndown ratio:

≈ 10:1

For the exact range see the Yokogawa Sizing Software 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:

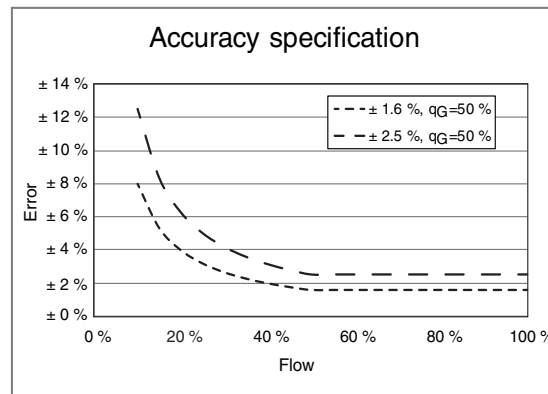
- Wetted parts made of stainless steel:
-196 °C to +400 °C (-320.8 °F to 752 °F)
- Wetted parts made of PTFE:
-80 °C to +130 °C (-112 °F to 266 °F)

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 ($q_G=50\%$)
SS	DN 15 to DN 100	1.6 %
SS	DN 125 to DN 150	2.5 %
PTFE	DN 15 to DN 100	2.5 %



Calibration conditions:

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

Pressure Equipment Directive (PED):

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

Installation conditions:

- Please consider recommendations of VDI 3513-3
- Mounting direction: vertical
- Flow direction: upwards
- Mounting length: see table 10, 11 and 12
- Inlet- & outlet section (recommended for ≥ 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

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:

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

Linearity¹⁾:

- $\pm 0.2 \%$ of 20 mA

Hysteresis¹⁾:

- $\pm 0.1 \%$ of 20 mA

Repeatability¹⁾:

- $\pm 0.1 \%$ of 20 mA

Influence of power supply¹⁾:

- $\pm 0.1 \%$ of 20 mA

Temperature coefficient of the output signal¹⁾:

- $\pm 0.5 \%$ / 10 °C of 20 mA

AC-part of output signal¹⁾:

- $\pm 0.15 \%$ 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 Ω

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.²)

¹⁾ 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.²)

POWER SUPPLY FOR 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 $\pm 25 \%$
- 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 / Canada	Brazil	India	Korea	China		Kazakhstan, Armenia, Kyrgyzstan		Taiwan	UAE	Ukraine Ex
Certificate	ATEX			IECEX		FM/UL	IN- METRO	PESO	KOSHA	NEPSI		EAC		TS	ECAS	
Angle transmitter Type WT-MAG																
Protection	ia	ia/tb	-	ia	ia/tb	IS/NI	ia	ia	-	-	ia	-	ia	ia	ia	
Option	/KS1	/KS2	-	/ES1	/ES2	/FS1	/US1	/KS1+ /Q11	-	-	/GS1	-	/ES1	/ES1	/KS1	
Comments	-	1)	-	-	1)	3)	-	-	-	-	-	-	-	-	-	
See page	6/7	10	-	6/7	10	6	6	6/7	-	-	6/7	-	6/10	6	8	
Limit switches																
Protection	ia	ia/tb	-	ia	ia/tb	IS	-	ia	ia	ia	-	-	-	-	ia	
Option	/KS1	/KS2	-	/ES1	/ES2	/FS1	-	/KS1 + /Q11	/KS1 + /KC	/NS1	-	-	-	-	/KS1	
Comments	-	1)	-	-	1)	-	-	-	-	-	-	-	-	-	-	
See page	7	10	-	7	10	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+/ Q11	/EF1+ /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	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															

APPROVALS FOR COMPONENTS IN POTENTIALLY EXPLOSIVE ATMOSPHERES FOR ANGLE TRANSMITTERS TYPE WT-MAG, 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 angle transmitters type WT-MAG or limit switch from third-party manufacturer Pepperl & Fuchs must not be exceeded by the heat transfer of the liquid.

Table 7 Entity parameters of electronic transmitter

Option	Ui in V	Ii in mA	Pi in W	Ci in nF	Li in mH	max. Ta 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 angle transmitter type WT-MAG with:

ATEX-approval for option /KS1

Certificate:

PTB 12 ATEX 2003 X

Output signal:

4 to 20 mA (2-wire)

Explosion proof:

II 2 G Ex ia IIC T6 Gb resp. -
II 2 G Ex ia IIB/IIC T4 Gb resp. -
II 2 G Ex ia IIB/IIC T6 Gb resp. -
II 2 G Ex ia IIB T6 Gb resp. -
II 2 G Ex ia IIB/IIC T4 Gb

Entity parameter:

See table 7

Marking:

Ex ia IIC T6 Gb
PTB 12ATEX2003 X

Intrinsically safe electronic angle transmitter type WT-MAG with:

IECEx-approval for option /ES1

Certificate:

IECEx PTB 12.0020 X

Output signal:

4 to 20 mA (2-wire)

Explosion proof:

Ex ia IIC T6 Gb resp. -
Ex ia IIB/IIC T4 Gb resp. -
Ex ia IIB/IIC T6 Gb resp. -
Ex ia IIB/IIC T4 Gb.

Entity parameter:

See table 7

Marking:

Ex ia IIC T6 Gb
IECEx PTB 12.0020 X

Intrinsically safe electronic angle transmitter type WT-MAG with:

ECAS-approval (UAE) for option /ES1

Certificate:

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

Output signal:

4 to 20 mA (2-wire)

Explosion proof:

Ex ia IIC T6 Gb;

Entity parameter:

See table 7

Marking:

Ex ia IIC T6 Gb
IECEx PTB 12.0020 X

Intrinsically safe electronic angle transmitter type WT-MAG with:

Taiwan Safety Mark for option /ES1

Registration Document:

ML041200702782 (Refers to Approval IECEx PTB 12.0020X)

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

Output signal:

4 to 20 mA (2-wire)

Explosion proof:

Ex ia IIC T6 Gb;

Entity parameter:

See table 7

Marking:

Ex ia IIC T6 Gb
IECEx PTB 12.0020 X

Intrinsically safe electronic angle transmitter type WT-MAG with:

Ukraine Ex-approval for option /KS1.

Certificate:

CL16.0017X#

Output signal:

4 to 20 mA (2-wire)

Explosion proof:

II 2 G Ex ia IIC T6 Gb resp. -
II 2 G Ex ia IIB/IIC T4 Gb resp. -
II 2 G Ex ia IIB/IIC T6 Gb resp. -
II 2 G Ex ia IIB T6 Gb resp. -
II 2 G Ex ia IIB/IIC T4 Gb

Entity parameter:

See table 7

Marking:

Ex ia IIC T6 Gb
PTB 12ATEX2003 X

Intrinsically safe/ nonincendive angle transmitter type WT-MAG with:

FM-approval (USA + Canada) for option /FS1

Certificate:

No.: 3027471-3027471C

Output signal:

4 to 20 mA (2-wire)

Explosion proof USA:

IS / I / 1 / ABCD/T6 Ta = 70°C – 8160190; Entity;
I / 0 / AEx ia IIC/T6 Ta = 70°C – 8160190; Entity;
NI-ANI / I / 2 / ABCD/T6Ta = 70°C – 8160191; NIFW

Explosion proof CSA:

IS / I / 1 / ABCD/T6 Ta = 70°C – 8160190; Entity;
NI / 0 / AEx ia IIC/T6 Ta = 70°C – 8160191;

Entity parameter of electronic transmitter:

See table 7

Marking:

IS-Class I, Division 1, GP. A, B, C, D T4
per dwg. RM-0602-Y-01 / 02
Class. I, Zone 0, AEx ia IIB/IIC T4

Intrinsically safe electronic angle transmitter type WT-MAG with:

PESO-approval (India) for option /KS1 with/Q11

Certificate:

PESO Ref. No.: P652989/1

Output signal:

4 to 20 mA (2-wire)

Explosion proof:

EX ia IIB/IIC T4...T6 Gb

Entity parameter:

See table 7 Option /KS1

Marking:

Ex ia IIC T6 Gb
IECEX PTB 12.0020X

Intrinsically safe electronic angle transmitter type

WT-MAG 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 angle transmitter type WT-MAG , type
-P, -F**

Attention:

The approvals for hazardous areas only apply to the defined conditions according to the temperature class. The maximum ambient temperature of the angle transmitters type WT-MAG or limit switch from third-party manufacturer Pepperl & Fuchs must not be exceeded by the heat transfer of the liquid.

Intrinsically safe electronic angle transmitter type

WT-MAG with:

ATEX-approval for option /KS1

Certificate:

PTB 12 ATEX 2003 X

Output signal:

FISCO-Fieldbus

Explosion proof:

II 2 G Ex ia IIC T6 Gb resp. -
II 2 G Ex ia IIB/IIC T4 Gb resp. -
II 2G Ex ia IIB/IIC T6 Gb resp. -
II 2G Ex ia IIB T6 Gb resp. -
II 2 G Ex ia IIB/IIC T4 Gb

Entity parameter:

See table 8a /8b /8c

Marking:

Ex ia IIC T6 Gb
PTB 12ATEX2003 X

Intrinsically safe electronic angle transmitter type

WT-MAG with:

IECEX-approval for option /ES1

Certificate:

IECEX PTB 12.0020 X

Output signal:

FISCO-Fieldbus

Explosion proof:

Ex ia IIC T6 Gb resp. -
Ex ia IIB/IIC T4 Gb resp. -
Ex ia IIB/IIC T6 Gb resp. -
Ex ia IIB/IIC T4 Gb.

Entity parameter:

See table 8a /8b /8c

Marking:

Ex ia IIC T6 Gb
IECEX PTB 12.0020 X

**Intrinsically safe electronic angle transmitter type
WT-MAG with:**

PESO-approval (India) for option /KS1 with/Q11

Certificate:

PESO Ref. No.: P652989/1

Output signal:

4 to 20 mA (2-wire)

Explosion proof:

EX ia IIB/IIC T4...T6 Gb

Entity parameter:

See table 8a /8b /8c

Marking:

Ex ia IIC T6 Gb
IECEX PTB 12.0020X

Intrinsically safe electronic angle transmitter type

WT-MAG 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 8a /8b /8c

Certificates:

- PTB 12 ATEX 2003 X
- IECEX PTB 12.0020 X
- CML 21UKEX21080X
- 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: II 2 G Ex ia IIB/IIC T4 Gb for ATEX
- Variant #2: II 2 G Ex ia IIB/IIC T6 Gb for ATEX
- Variant #3: II 2 G Ex ia IIB T6 Gb for ATEX
- Variant #4: II 2 G Ex ia IIB/IIC T4 Gb for ATEX
- 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 IEC 60079-11: 2011 Annex G
Ii	380 mA	250 mA	
Pi	1.31 W	1.31 W	
Ci	negligible	negligible	
Li	negligible	negligible	

Table 8b Variant #3 (Fuse 32 mA)

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

Table 8c Variant #4 (Fuse 62 mA)

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

HAZARDOUS AREA APPROVALS FOR INTRINSICALLY SAFE LIMIT SWITCHES, OF (THIRD PARTY) LIMIT SWITCHES

for 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:

- II 1 G Ex ia IIC T6...T1 Ga or
- II 2 G Ex ia IIC T6...T1 Gb or
- II 1 D Ex ia IIIC T₂₀₀ 135°C Da

Entity parameter:

See certificate

Intrinsically safe limit switches with:

IECEx- approval, option /K1 to /K10 with /ES1

Certificate:

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

Explosion proof:

- Ex ia IIC T6...T1 Ga or
- Ex ia IIC T6...T1 Gb or
- Ex ia IIIC T₂₀₀ 135°C Da

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 0 IIC
- USL- Class I, Zone 1, AEx ia IIC T6...T1 Gb
- Zone 21, AEx ia IIIC T135°C Db
- CNL- Ex ia IIC T6...T1 Gb X
- Ex ia IIIC T135°C Db X

Control drawings:

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

Entity parameter:

See certificate

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)

Explosion proof:

II 1G Ex ia IIC T6...T1 Ga

Entity parameter:

See certificate

Intrinsically safe limit switches with:

CCC NEPSI-approval (China), option /K1 to /K10 with /NS1

Certificate:

- 2020322315002307 (/K1 to /K3)
- 2020322315002281 (/K6 to /K10)

Explosion proof:

- Ex ia II C T6...T1 Ga
- Ex ia II C T6...T1 Ga
- Ex ia II C T200 135°C Da

Entity parameter:

See certificate

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

Explosion proof:

Ex ia II C T6...T1 Ga

Entity parameter:

See certificate

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

Explosion proof:

Ex h ia IIC T6 Gb X

Entity parameter:

See table 7

Intrinsically safe RAMC with ATEX-approval option /KS1

Certificate:

IB-16-6-001/203 archive no.: 099/15_E2

Output signal:

4 to 20 mA (2-wire)

Explosion proof:

II 2 G Ex h ia IIC T6 Gb X

Entity parameter:

See table 7

Intrinsically safe RAMC with Ukraine-Ex option /KS1

Certificate:

CU 16.0017X

Output signal:

4 to 20 mA

Explosion proof:

II 2 G Ex ia IIC T6...T4 Gb

Entity parameter:

See table 7

HAZARDOUS AREA APPROVALS FOR COMBINED RAMC DEVICE ASSEMBLED FROM APPROVED COMPONENTS



NOTE

COMBINED DEVICES MAY ONLY BE USED IN A GIVEN ZONE IF ALL ASSEMBLED COMPONENTS ARE CERTIFIED FOR USE IN THIS ZONE

Intrinsically safe electronic transmitter with/without limit switch combined in mechanical RAMC indicator for China, option /NS1

Certificate:

GYJ25.1057X

Output signal:

• 4 to 20 mA

Explosion proof:

Ex ia IIC T6

Ambient temperature:

-40 °C to +70 °C (-40 °F to 158 °F)

Entity parameter:

See table 7

Can be combined with:

Intrinsically safe limit switches:

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

Entity parameter:

See certificate or chapter Limit switch

Intrinsically safe electronic transmitter with/without limit switch combined in mechanical RAMC indicator for INMETRO, option /US1

Certificate:

DNV 24.0059X

Output signal:

• 4 to 20 mA

Explosion proof:

Ex ia IIC T6 Gb

Ambient temperature:

-40 °C to +70 °C (-40 °F to 158 °F)

Entity parameter:

See table 7

Can be combined with:

Intrinsically safe limit switches:

- Option /K1 to /K3 data see certificate TÜV 13.1131 X
- Option /K6 to /K10 data see certificate TÜV 14.0352 X

Entity parameter:

See certificate or chapter Limit switch

Intrinsically safe electronic transmitter with/without limit switch combined in mechanical RAMC indicator for USA and Canada, option /FS1

Electronic angle transmitter type WT-MAG

Certificate:

No.: 3027471-/3027471C

Entity parameter:

See certificate or Chapter Electronic angle transmitter type WT-MAG

Can be combined with:

Intrinsically safe limit switches:

- Option /K1 to /K3 data see certificate 20190402-E501628
- Option /K6 to /K10 data see certificate 20190619-

E501628

Entity parameter:

See certificate or chapter Limit switch

Intrinsically safe electronic transmitter with/without limit switch combined in mechanical RAMC indicator for option /ES1

Electronic angle transmitter type WT-MAG

Certificate:

No.: IECEx PTB 12.0020 X

Entity parameter:

See certificate or Chapter Electronic angle transmitter type WT-MAG

Can be combined with:

Intrinsically safe limit switches:

- Option /K1 to /K3 data see certificate IECEx PTB11.0091
- Option /K6 to /K10 data see certificate IECEx PTB11.0092

Entity parameter:

See certificate or chapter Limit switch

Intrinsically safe electronic transmitter with/without limit switch combined in mechanical RAMC indicator for PESO option /KS1/Q11

Electronic angle transmitter type WT-MAG

Certificate:

No.: P471352/1

Entity parameter:

See certificate or Chapter Electronic angle transmitter type WT-MAG

Can be combined with:

Intrinsically safe limit switches:

- Option /K1 to /K3 data see certificate P471352/1
- Option /K6 to /K10 data see certificate P471350/1

Entity parameter:

See certificate or chapter Limit switch

Intrinsically safe combined RAMC with ATEX approved components for KOSHA option /KS1/KC

Intrinsically safe limit switches:

- Option /K1 to /K3 data see certificate 13-AV4BO-0352X/0353X

Entity parameter:

See certificate or chapter Limit switch

Intrinsically safe electronic transmitter combined in mechanical RAMC indicator for Taiwan option /ES1 Electronic angle transmitter type WT-MAG

Certificate:

No.: ML041200702782

Entity parameter:

See certificate or Chapter Electronic angle transmitter type WT-MAG

Intrinsically safe electronic transmitter combined in mechanical RAMC indicator for ECAS option / ES1 Electronic angle transmitter type WT-MAG

Certificate:

No.: P471352/1

Entity parameter:

See certificate or Chapter Electronic angle transmitter type WT-MAG

**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 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 and dust proof RAMC with Ukraine Ex-approval

Same data as for ATEX certification, option /KF1.

Certificate:

CL16.0017X

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

Table 9 Temperature classification for flameproof devices except EACEx

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

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 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

INTRINSICALLY SAFE COMPONENTS WITH DUST-PROOF

Intrinsically safe electronic transmitter with/without limit switches in dust proof indicator Housing 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 $\pm$ 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

SITIAS 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 24.0794

• 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.

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 acc. to ISO 228-G, PN40	Refer to tables 10 and 15
	-R4		Internal thread acc. to ISO 228-G, 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	
Measuring Cone/Float	-□ □ □ □		See tables 11 and 13	
	-NNNN		Without measuring tube, only indicator	
Indicator/Transmitter	-T		Mechanical indicator	Only with output 424 8 digits for tag, 24 digits for long tag Only with output 429; explosion proof type only with /KS1 or /ES1; not with /Q11; 32 digits for tag Only with output 429; explosion proof type only with /KS1 or /ES1; not with /VR, /Q11, /QRx; 32 digits for tag Only with housing NN
	-E		Indicator with transmitter	
	-J		Indicator with transmitter, HART 7 (includes Software Tag for HART 7)	
	-P		Indicator with transmitter, Profibus PA (includes Software Tag for Profibus PA)	
	-F		Indicator with transmitter, Foundation Fieldbus (includes Software Tag for Foundation Fieldbus)	
	-N		Without indicator	
Housing type	90		Housing SS	Only with indicator -N
	91		Housing AI, yellow painted	
	NN		Without housing	
Power supply/Output	424		24 V DC; 2-wire; 4 to 20 mA	Only with indicator -E, -J Only with indicator -P or -F Only with indicator -T or -N
	429		9 to 32 V DC; 2-wire; Profibus PA, FOUNDATION Fieldbus	
	NNN		Without power supply	

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 number engraved on measuring tube (max. 30 digits)	max. 30 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
	/BD	Dual scale	Adjustment of the transmitter for the first mentioned fluid
Limit switches	/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
	/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
Flange Facing	/D10	Form B2 acc. to EN 1092-1	Only for EN-flanges (D2, D4); not with PTFE
	/D11	Form D acc. to EN 1092-1	Only for EN-flanges (D2, D4); not with PTFE
Damping	/SD	Float damping system	Only for SS; not for cone 81, 82; only for gas application
Flange protection	/QK	Flange covers	Only for flanges A1, A2, A3, D2, D4, D5, D6
Heat tracing	/T1	Heat trace connection internal thread G ¼ in. PN 40	Heating is only for metallic instruments "SS" available
	/T2	Heat trace connection EN flange DN 15 PN 40 Form B1	Heating is only for metallic instruments "SS" available
	/T3	Heat trace connection EN flange DN 25 PN 40 Form B1	Heating is only for metallic instruments "SS" available
	/T4	Heat trace connection ASME flange ½ in. Class 150 RF	Heating is only for metallic instruments "SS" available
	/T5	Heat trace connection ASME flange 1 in. Class 150 RF	Heating is only for metallic instruments "SS" available
	/T6	Heat trace connection internal thread ¾ - 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) ^{*)}
	/PM3	PMI test (3 points: Process connection inlet, measuring tube, process connection outlet)	Only for metallic pressure bearing parts (process connection and metering tube) ^{*)}
	/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	
	/RTA	X-ray test acc. to ASME BPVC, V	Only for A1,A2, A3 not for PTFE

^{*)} For details and exceptions please refer to Rota Yokogawa declaration about NACE conformity, document no. 8660001.

Options	Code	Description	Restrictions
Hazardous area approvals	/KS1	ATEX intrinsically safe "ia" in combination with /Q11: PESO intrinsically safe "ia" in combination with /KC: KOSHA intrinsically safe "ia"	Only for power supply 424, 429; for indicator -T only with limit switches Only for indicator T; only with limit switches /K1 to /K3
	/KS2	ATEX intrinsically safe "ia"/ dust proof "tb"	Only for power supply 424; 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"; in combination with /KC: KOSHA flame proof "d" (Korea) 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;
	/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
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
	/IEn	Quantity of instruction manuals in English	n = 1 to 9 selectable ^{*)}
Special order	/IDn	Quantity of instruction manuals in German	n = 1 to 9 selectable ^{*)}
	/Z	Special design must be specified separately. If /Z is selected, several Suffix of Model-Suffix Code can be changed to Z.	

^{*)} If no User's Manual is selected, only a DVD with User's Manuals is shipped with the flowmeter.

PROCESS CONNECTION TABLE FOR METAL TUBES

Table 10

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

* We suggest using low-profile screw nuts for mounting. If stud bolts and heavy hex nuts are to be used, consider ordering a device with larger installation length as special order.

FLOW TABLES FOR METAL TUBES

Table 11

Pos.	Measuring range for water and liquids					Measuring range for air and gases				
	Max. flow (Q _{max})		Cone-Float-combin.	Pressure loss ¹⁾	Viscosity ²⁾	Max. flow (Q _{max})			Cone-Float-combin.	Pressure loss ¹⁾
	m ³ /h ³⁾	gpm ⁴⁾	Code	mbar	mPa*s	m ³ /h ³⁾	m ³ /h i.N. ⁵⁾	scfm ⁶⁾	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	-	-	-	-	-

¹⁾ Pressure loss at the float with water or air.

²⁾ For higher viscosity the specified precision is no more guaranteed.

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

⁴⁾ Flow in US Gallons per minute at +70 °F.

⁵⁾ 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.)

⁶⁾ 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.

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 ¹⁾	Viscosity ²⁾	Max. flow (Qmax)			Cone-Float-combination	Pressure loss ¹⁾
m ³ /h ³⁾	gpm ⁴⁾				m ³ /h ³⁾	m ³ /h i.N. ⁵⁾	scfm ⁶⁾		
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	-	-	-	-	-

¹⁾ Pressure loss at the float with water or air.

²⁾ For higher viscosity the specified precision is no more guaranteed.

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

⁴⁾ Flow in US Gallons per minute at +70 °F.

⁵⁾ 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.)

⁶⁾ 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.

TEMPERATURE LIMITATIONS, STANDARD AND INTRINSICALLY SAFE

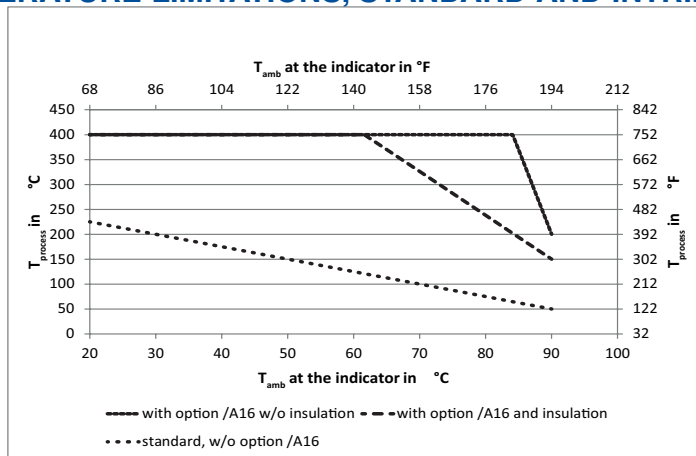


fig. 1a RAMC: Type T90, T91 without limit switch(es) ¹⁾

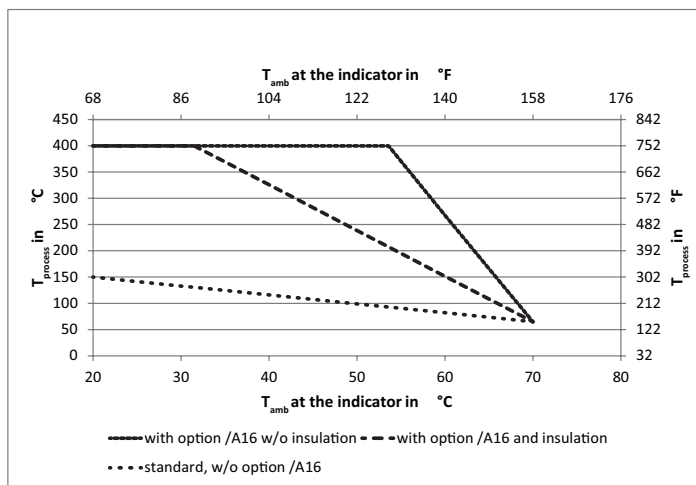


fig. 1b RAMC: Type T90, T91 with limit switch(es),
Type E90, J90, P90, F90, E91, J91, P91, F91 with/without limit switch(es) ¹⁾

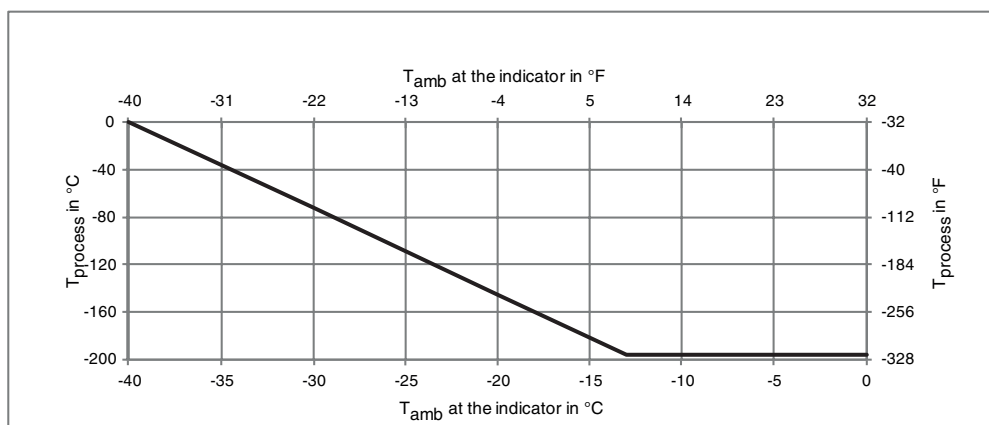


fig. 1c RAMC: All indicator types except types with hazardous area approval ¹⁾

¹⁾ 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 ¹⁾
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 ¹⁾
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 ¹⁾
	RAMC□□-□□□□-□□□□-□□□□J□□424	-25 °C (-13 °F); -40 °C (-40 °F) with option /A26 ¹⁾
	RAMC□□-□□□□-□□□□-□□□□P□□429	-25 °C (-13 °F); -40 °C (-40 °F) with option /A26 ¹⁾
	RAMC□□-□□□□-□□□□-□□□□F□□429	-25 °C (-13 °F); -40 °C (-40 °F) with option /A26 ¹⁾
RAMC intrinsically safe type	RAMC□□-□□□□-□□□□-□□□□□□ /KS1	-25 °C (-13 °F); -40 °C (-40 °F) with option /A26 ¹⁾
	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 ¹⁾
	RAMC□□-□□□□-□□□□-□□□□□□ /KS1, /K9, /K10	-25 °C (-13 °F)
	RAMC□□-□□□□-□□□□-□□□□□□ /ES1	-25 °C (-13 °F); -40 °C (-40 °F) with option /A26 ¹⁾
	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 ¹⁾
	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 ¹⁾
	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 ¹⁾
	RAMC□□-□□□□-□□□□-□□□□□□ /GS1	-25 °C (-13 °F); -40 °C (-40 °F) with option /A26 ¹⁾
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 ¹⁾
	RAMC□□-□□□□-□□□□-□□□□NNN /GC1	

¹⁾ 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 (-321 °F)	-80 °C (-112 °F)	-20 °C (-4 °F)	-10 °C (-14 °F)	RT (68 °F)	50 °C (122 °F)	100 °C (212 °F)	130 °C (266 °F)	140 °C (284 °F)	150 °C (302 °F)	200 °C (392 °F)	250 °C (482 °F)	300 °C (572 °F)	350 °C (552 °F)	400 °C (752 °F)
-A1SS- ¹⁾	Flange ASME Class 150 RF	19 (275.6)	19 (275.6)	19 (275.6)	19 (275.6)	19 (275.6)	18.4 (266.9)	16.2 (235)	15.4 (223.3)	15.1 (219)	14.8 (214.7)	13.7 (198.7)	12.1 (175.5)	10.2 (148)	8.4 (121.8)	6.5 (94.3)
-A2SS- ¹⁾	Flange ASME Class 300 RF	49.6 (719.4)	49.6 (719.4)	49.6 (719.4)	49.6 (719.4)	49.6 (719.4)	48.1 (697.6)	42.2 (612)	40 (580)	39.2 (568.5)	38.5 (558.4)	35.7 (517.8)	33.4 (484.4)	31.6 (458.3)	30.3 (439.5)	29.4 (426.4)
-A3SS- ¹⁾	Flange ASME Class 600 RF	99.3 (1440)	99.3 (1440)	99.3 (1440)	99.3 (1440)	99.3 (1440)	96.2 (1395)	84.4 (1224)	80 (1160.3)	78.5 (1138.5)	77 (1117)	71.3 (1034)	66.8 (968.8)	63.2 (916.6)	60.7 (880.4)	58.9 (824.3)
-D2SS-	Flange EN PN 16	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	15.6 (226.3)	15.1 (219)	14.3 (207.4)	14 (203)	13.7 (198.7)	12.7 (184.2)	11.9 (172.6)	11 (159.5)	10.5 (152.3)	10.2 (148)
-D4SS-	Flange EN PN 40	40 (580)	40 (580)	40 (580)	40 (580)	40 (580)	38.9 (564.2)	37.9 (549.7)	35.8 (519.2)	35.1 (509)	34.4 (498.9)	31.8 (461.2)	29.9 (433.7)	27.6 (400.3)	26.4 (397.4)	25.7 (372.7)
-D5SS-	Flange EN PN 63	63 (913.7)	63 (913.7)	63 (913.7)	63 (913.7)	63 (913.7)	61.5 (892)	59.7 (865.9)	56.5 (819.5)	55.4 (803.5)	54.3 (787.5)	50.1 (726.3)	47.1 (683.1)	43.5 (630.9)	41.7 (604.8)	40.5 (587.4)
-D6SS-	Flange EN PN 100	100 (1450)	100 (1450)	100 (1450)	100 (1450)	100 (1450)	97.8 (1418)	94.7 (1373.5)	89.5 (1298)	87.8 (1273.4)	86.1 (1248.8)	79.5 (1153)	74.7 (1083.4)	69 (1000.7)	66.1 (958.7)	64.2 (931.1)
-T4SS-/R4SS-	Internal thread ½ in. (RAMC01-...)	-	-	-	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	20 ²⁾ (290)	20 ²⁾ (290)	20 ²⁾ (290)	20 ²⁾ (290)	-	-
-T4SS-/R4SS-	Internal thread ¾ in. (RAMC23-...)	-	-	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	20 ²⁾ (290)	20 ²⁾ (290)	20 ²⁾ (290)	20 ²⁾ (290)	-	-
-T4SS-/R4SS-	Internal thread 1 in. (RAMC02-...)	-	-	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	16 ²⁾ (232.1)	16 ²⁾ (232.1)	16 ²⁾ (232.1)	16 ²⁾ (232.1)	-	-
-T4SS-/R4SS-	Internal thread 2 in. (RAMC05-...)	-	-	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	10 ²⁾ (145)	10 ²⁾ (145)	10 ²⁾ (145)	10 ²⁾ (145)	-	-
-T4SS-/R4SS-	Internal thread 2½ in. (RAMC06-...)	-	-	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	10 ²⁾ (145)	10 ²⁾ (145)	10 ²⁾ (145)	10 ²⁾ (145)	-	-
-T6SS-/G6SS-	Internal thread	40 (580)	40 (580)	40 (580)	40 (580)	40 (580)	38.9 (564.2)	37.9 (549.7)	35.8 (519.2)	35.1 (509.1)	34.4 (498.9)	31.8 (461.2)	29.9 (433.7)	27.6 (400.3)	26.4 (382.9)	25.7 (372.7)
-S2SS-	Fitting DIN11851 (RAMC02-...)	-	-	40 (580.1)	40 (580.1)	40 (580.1)	40 (580.1)	40 (580.1)	40 (580.1)	40 (580.1)	-	-	-	-	-	-
-S2SS-	Fitting DIN11851 (RAMC05-...)	-	-	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	-	-	-	-	-	-
-S2SS-	Fitting DIN11851 (RAMC06-...)	-	-	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	-	-	-	-	-	-
-S2SS-	Fitting DIN11851 (RAMC08-...)	-	-	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	-	-	-	-	-	-
-S2SS-	Fitting DIN11851 (RAMC10-...)	-	-	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	25 (362.6)	-	-	-	-	-	-
-S2SS-	Fitting DIN11851 (RAMC12-...)	-	-	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	-	-	-	-	-	-
-S4SS-	Tri-Clamp DIN 32676 (RAMC02-...)	-	-	-	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	-	-	-	-	-	-
-S4SS-	Tri-Clamp DIN 32676 (RAMC03-...)	-	-	-	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	-	-	-	-	-	-
-S4SS-	Tri-Clamp DIN 32676 (RAMC04-...)	-	-	-	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	-	-	-	-	-	-
-S4SS-	Tri-Clamp DIN 32676 (RAMC05-...)	-	-	-	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	16 (232.1)	-	-	-	-	-	-
-S4SS-	Tri-Clamp DIN 32676 (RAMC06-...)	-	-	-	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	-	-	-	-	-	-
-S4SS-	Tri-Clamp DIN 32676 (RAMC10-...)	-	-	-	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	-	-	-	-	-	-
-S5SS-	Flange Rosista (RAMC02-...)	-	-	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	-	-	-	-	-	-
-S5SS-	Flange Rosista (RAMC04-...)	-	-	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	10 (145)	-	-	-	-	-	-
-A1PF-	Flange ASME Class 150 RF	-	19 (275.6)	19 (275.6)	19 (275.6)	19 (275.6)	18.4 (266.9)	16.2 (235)	15.4 (210.3)	-	-	-	-	-	-	-
-A2PF-	Flange ASME Class 300 RF	-	49.6 (719.4)	49.6 (719.4)	49.6 (719.4)	49.6 (719.4)	48.1 (697.6)	42.2 (612)	40 (580.1)	-	-	-	-	-	-	-
-D2PF-	Flange EN PN 16	-	16 (232)	16 (232)	16 (232)	16 (232)	15.6 (226.2)	15.1 (219)	14.3 (207.4)	-	-	-	-	-	-	-
-D4PF-	Flange EN PN 40	-	40 (580.1)	40 (580.1)	40 (580.1)	40 (580.1)	38.9 (564.2)	37.9 (549.7)	35.8 (519.2)	-	-	-	-	-	-	-
/T1	Heat trace connection internal thread G ¼ in. PN 40	40 (580.1)	40 (580.1)	40 (580.1)	40 (580.1)	40 (580.1)	38.9 (564.2)	37.9 (549.7)	35.8 (519.2)	35.1 (509.1)	34.4 (498.9)	31.8 (461.2)	29.9 (433.7)	27.6 (400.3)	26.4 (382.9)	25.7 (372.7)
/T2	Heat trace connection EN flange DN 15 PN 40 Form B1	40 (580.1)	40 (580.1)	40 (580.1)	40 (580.1)	40 (580.1)	38.9 (564.2)	37.9 (549.7)	35.8 (519.2)	35.1 (509.1)	34.4 (498.9)	31.8 (461.2)	29.9 (433.7)	27.6 (400.3)	26.4 (382.9)	25.7 (372.7)
/T3	Heat trace connection EN flange DN 25 PN 40 Form B1	40 (580.1)	40 (580.1)	40 (580.1)	40 (580.1)	40 (580.1)	38.9 (564.2)	37.9 (549.7)	35.8 (519.2)	35.1 (509.1)	34.4 (498.9)	31.8 (461.2)	29.9 (433.7)	27.6 (400.3)	26.4 (382.9)	25.7 (372.7)
/T4	Heat trace connection ASME flange ½ in. Class 150 RF	19 (275.6)	19 (275.6)	19 (275.6)	19 (275.6)	19 (275.6)	18.4 (266.9)	16.2 (235)	15.4 (210.3)	15.1 (219)	14.8 (214.7)	13.7 (198.7)	12.1 (175.5)	10.2 (148)	8.4 (121.8)	6.5 (94.3)
/T5	Heat trace connection ASME flange 1 in. Class 150 RF	19 (275.6)	19 (275.6)	19 (275.6)	19 (275.6)	19 (275.6)	18.4 (266.9)	16.2 (235)	15.4 (210.3)	15.1 (219)	14.8 (214.7)	13.7 (198.7)	12.1 (175.5)	10.2 (148)	8.4 (121.8)	6.5 (94.3)
/T6	Heat trace connection internal thread ¾ - 18 NPT PN 40	40 (580.1)	40 (580.1)	40 (580.1)	40 (580.1)	40 (580.1)	38.9 (564.2)	37.9 (549.7)	35.8 (519.2)	35.1 (509.1)	34.4 (498.9)	31.8 (461.2)	29.9 (433.7)	27.6 (400.3)	26.4 (382.9)	25.7 (372.7)

¹⁾ Dual certified AISI 316/316L

²⁾ Please consider pressure/ temperature data of the gasket material KLINGERSIL® C-4400. Above 150°C, a technical evaluation of the gasket material is recommended.

DIMENSIONS AND WEIGHTS

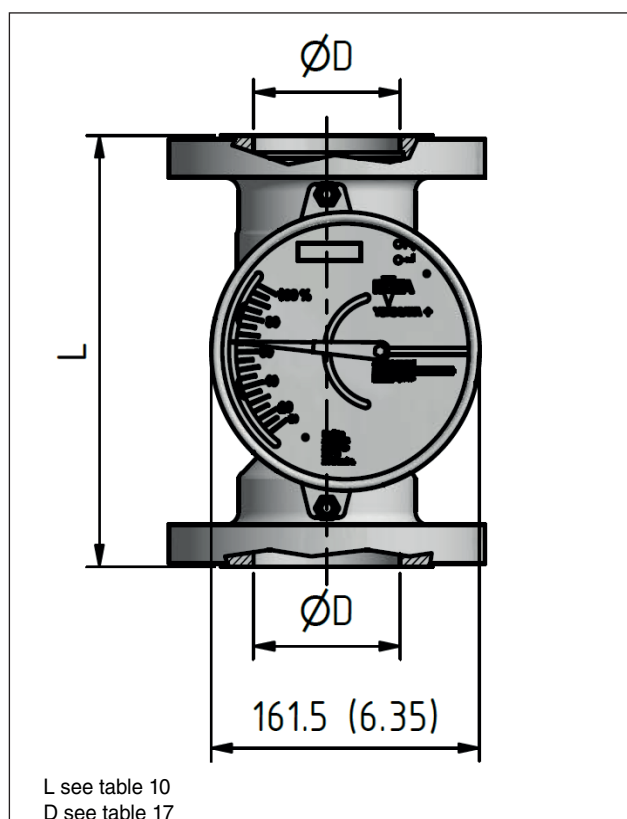


Fig. 2a Front view housing type 90 (SS)
dimensions in mm (inch)

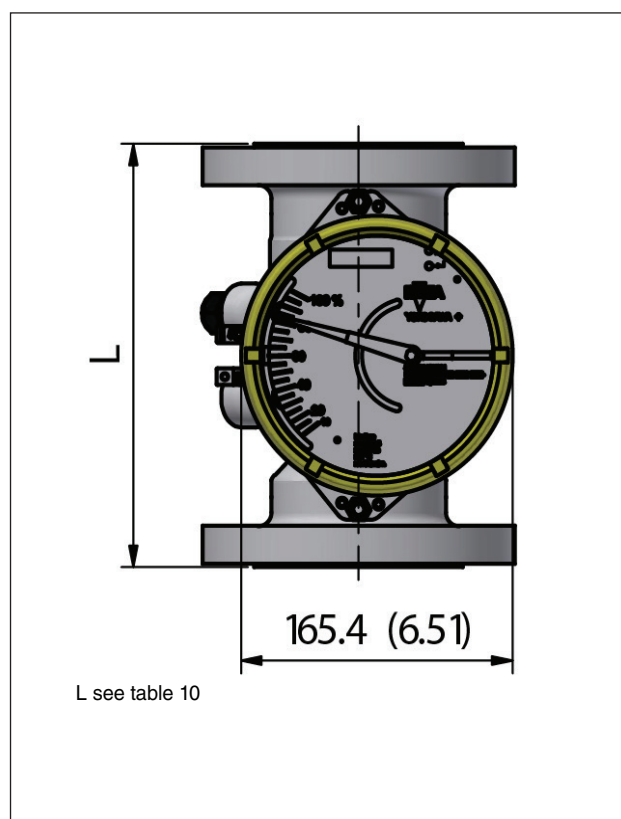


Fig. 2b Front view housing type 91 (Al)
dimensions in mm (inch)

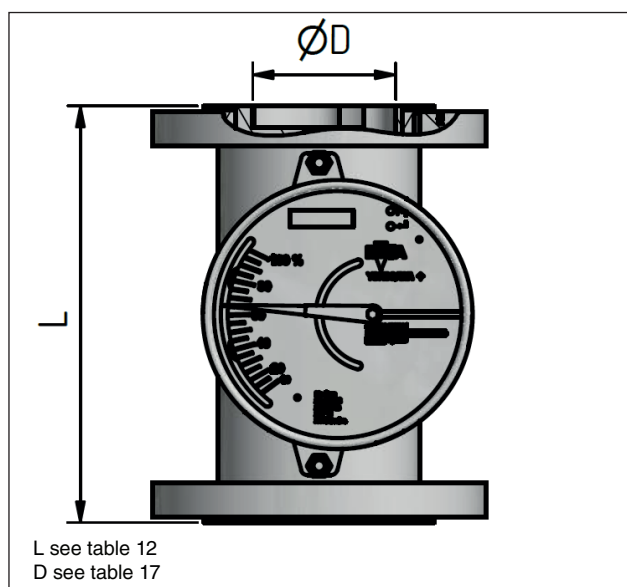


Fig.3 SS metering tube with PTFE-lining

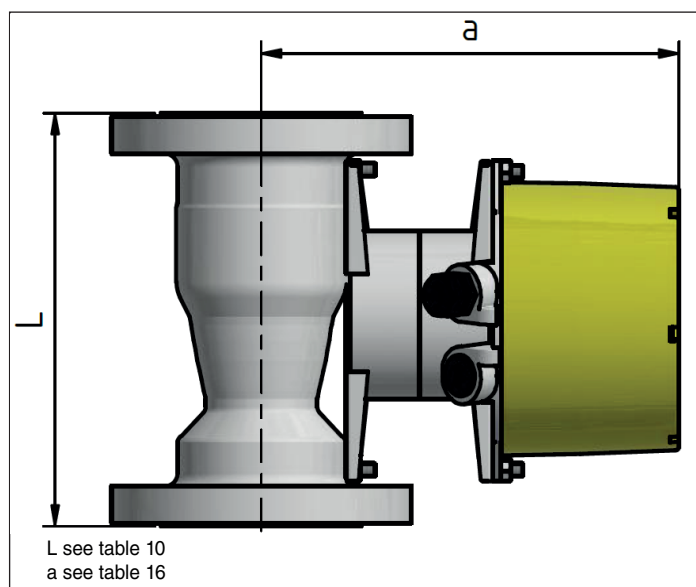


Fig.4 RAMC type 91 and option /A16

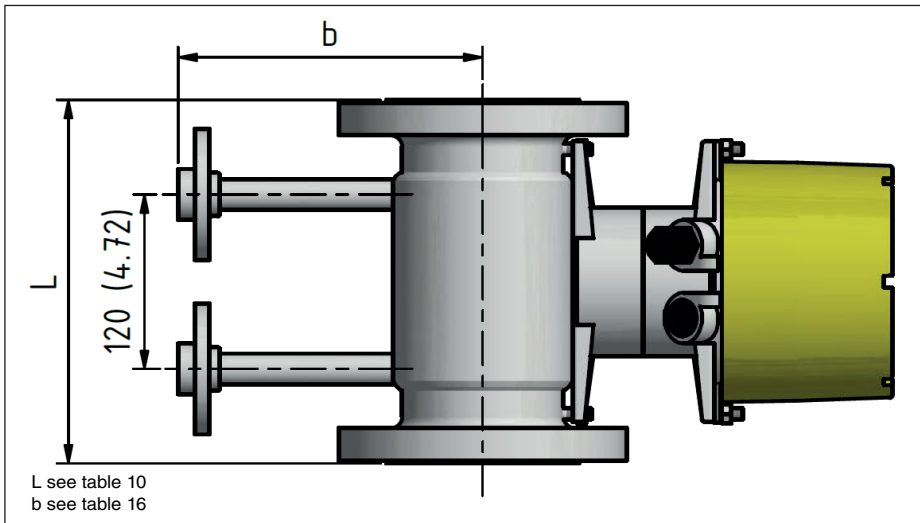


Fig. 5 RAMC type 91 and Option /A16 and /T , dimensions in mm (inch)

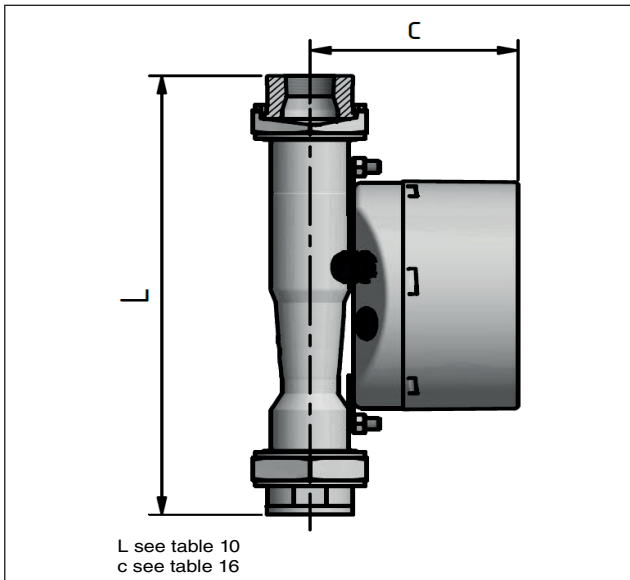


Fig. 6 RAMC with connection R4/T4

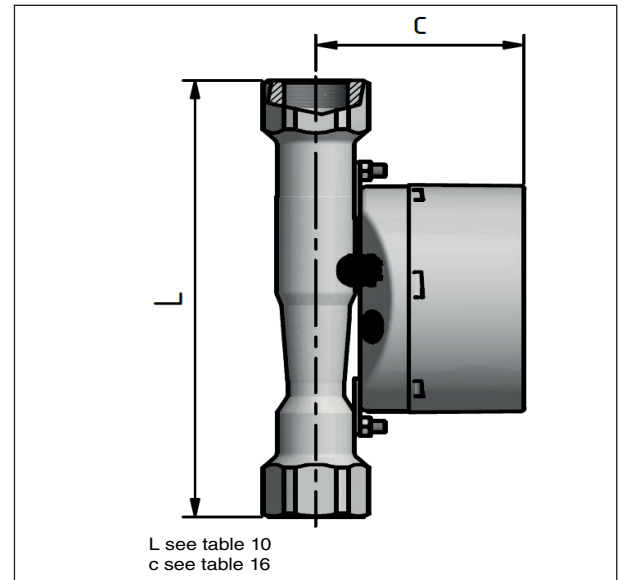


Fig. 7 RAMC with connection T6/G6

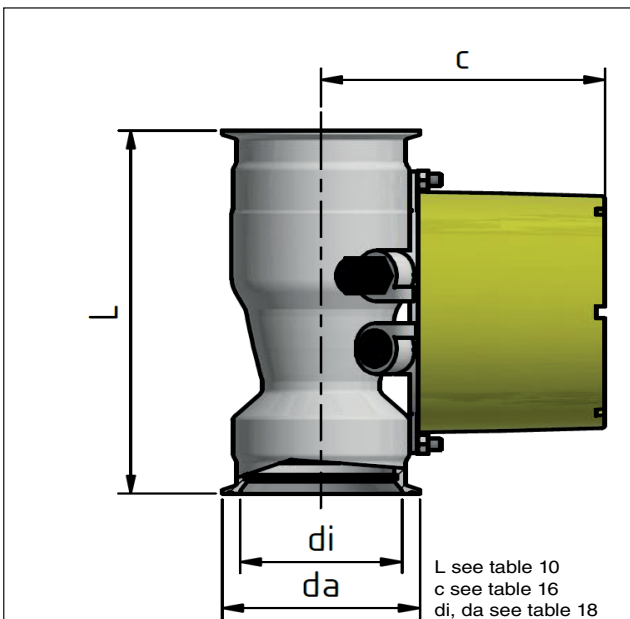


Fig. 8 RAMC with connection S4

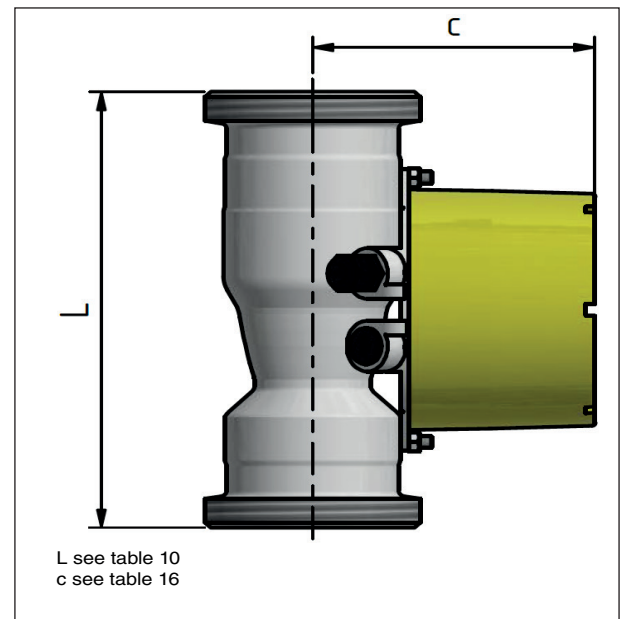


Fig. 9 RAMC with connection S2

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. ¹⁾	Size		D in mm (inch)	Pos. ¹⁾	Size		D in mm (inch)
1	DN 15 to DN 50	½ to 2 in.	20.7 (0.81)	-	-	-	-
2	DN 15 to DN 50	½ to 2 in.	20.7 (0.81)	2	DN 15 to DN 25	¾ to 1 in.	23.5 (0.93)
3	DN 25 to DN 50	1 to 2 in.	32.2 (1.27)	3	DN 25 to DN 50	1 ¼ to 1 ½ in.	36 (1.42)
4	DN 50 to DN 100	2 to 3 in.	65.5 (2.58)	4	DN 50 to DN 80	2 ½ to 3 in.	66 (2.6)
5	DN 80 to DN 150	3 to 6 in.	88.2 (3.47)	5	DN 80 to DN 100	3 ½ to 4 in.	92 (3.62)
6	DN 100 to DN 150	4 to 6 in.	110.2 (4.34)	6	DN 100	4 in.	110 (4.33)

¹⁾ See table 10, 12**Table 18 Diameters for connection sizes S4**

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

¹⁾ See table 10, 12**Table 19 Weights**

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

¹⁾ 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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Rheinstr. 8
D-79664 Wehr
Germany

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

