



Instruction Manual

Flowmeter RAMC

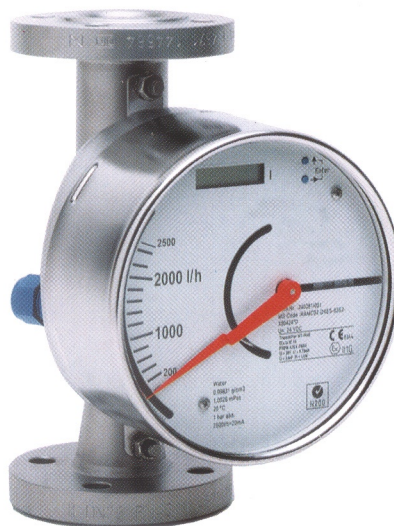


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1.0 Introduction

Before use, read this manual thoroughly and familiarize yourself fully with the features, operations and handling of Rotameter RAMC to have the instrument deliver its full capabilities and to ensure its efficient and correct use.

Notices Regarding This Manual

- This manual should be passed to the end user.
- The contents of this manual are subject to change without prior notice.
- All rights reserved. No part of this document may be reproduced or transmitted in any form or by any means without the written permission of Schmidt Mess- und Regeltechnik.
- This manual neither does warrant the marketability of this instrument nor it does warrant that the instrument will suit a particular purpose of the user.
- Every effort has been made to ensure accuracy in the contents of this manual. However, should any questions arise or errors come to your attention, please contact Schmidt Mess- und Regeltechnik from whom you purchased the product.
- This manual is not intended for models with custom specifications.
- Revisions may not always be made in this manual in conjunction with changes in specifications, constructions and/or components if such changes are not deemed to interfere with the instrument's functionality or performance.

Notices Regarding Safety and Modification

- For the protection and safety of personnel, the instrument and the system comprising the instrument, be sure to follow the instructions on safety described in this manual when handling the product. If you handle the instrument in a manner contrary to these instructions, Schmidt Mess- und Regeltechnik does not guarantee safety.
- If this instrument is used in a manner not specified in this manual, the protection provided by this instrument may be impaired.
- As for explosionproof model, if you yourself repair or modify the instrument and then fail to return it to its original form, the explosion protected construction of the instrument will be impaired, creating a hazardous condition. Be sure to consult Schmidt Mess- und Regeltechnik for repairs and modifications.



1.0 Introduction

The following safety symbols and cautionary notes are used on the product and in this manual:

Warning 

This symbol is used to indicate that a hazardous condition will result which, if not avoided, may lead to loss of life or serious injury. This manual describes how the operator should exercise care to avoid such a risk..

Caution 

This symbol is used to indicate that a hazardous condition will result which, if not avoided, may lead to minor injury or material damage. This manual describes how the operator should exercise care to avoid a risk of bodily injury or damage to the instrument.

Important 

This symbol is used to call your attention to a condition that must be observed in order to avoid the risk of damage to the instrument or system problems.

Note 

This symbol is used to call your attention to information that should be referred to in order to know the operations and functions of the instrument.

For Safe Use of Rotameter RAMC

Warning 

- If the process fluid is harmful to personnel, handle Rotameter RAMC carefully even after it has been removed from the process line for maintenance or other purposes. Exercise extreme care to prevent the fluid from coming into contact with human flesh and to avoid inhaling any residual gas.
- In case of Explosion proof type instrument, further requirements and differences are described in Chapter 10 "EXPLOSION PROTECTED TYPE INSTRUMENTS". The description in Chapter 10 is prior to other descriptions in this instruction manual.

Caution 

- When carrying Rotameter RAMC around, exercise extreme care to avoid dropping it accidentally and causing bodily injury.



1.0 Introduction

Warranty

- The warranty of this instrument shall cover the period noted on the quotation presented to the Purchaser at the time of purchase. The Seller shall repair the instrument free of charge when the failure occurred during the warranty period.
- All inquiries on instrument failure should be directed to the Seller's sales representative from whom you purchased the instrument or your nearest sales office of the Seller.
- Should the instrument fail, contact the Seller specifying the model and instrument number of the product in question. Be specific in describing details on the failure and the process in which the failure occurred. It will be helpful if schematic diagrams and/or records of data are attached to the failed instrument.
- Whether or not the failed instrument should be repaired free of charge shall be left solely to the discretion of the Seller as a result of an inspection by the Seller.

The Purchaser shall not be entitled to receive repair services from the Seller free of charge, even during the warranty period, if the malfunction or damage is due to:

- improper and/or inadequate maintenance of the instrument in question by the Purchaser.
- handling, use or storage of the instrument in question beyond the design and/or specifications requirements.
- use of the instrument in question in a location not conforming to the conditions specified in the Seller's General Specification or Instruction Manual.
- retrofitting and/or repair by an other party than the Seller or a party to whom the Seller has entrusted repair services.
- improper relocation of the instrument in question after delivery.
- reason of force measure such as fires, earthquakes, storms/floods, thunder/lightning, or other reasons not attributable to the instrument in question.

Warranty

- Rotameter RAMC is a heavy instrument. Please give attention to prevent that persons are injured by carrying or installing. It is preferable for carrying the instrument to use a cart and be done by two or more persons.
- When removing the instrument from hazardous processes, avoid contact with the fluid and the interior of the meter.
- In case of Explosion proof type instrument, further requirements and differences are described in Chapter 10 "EXPLOSION PROTECTED TYPE INSTRUMENTS". The description in Chapter 10 is prior to other descriptions in this instruction manual.



1.0 Introduction

Restriction on Use of Radio Transceiver

Important

Although the transmitter has been designed to resist high frequency electrical noise, if a radio transceiver is used near the transmitter or its external wiring, the transmitter may be affected by high frequency noise pickup. To test for such effects, bring the transceiver in use slowly from a distance of several meters from the transmitter, and observe the measurement loop for noise effects. Thereafter, always use the transceiver outside the area affected by noise.

1.1 General Description

This manual describes installation, operation and maintenance of the RAMC. Please read it carefully before using this device.

Further, please note that customer features are not described in this manual. When modifying specifications, construction or parts, this manual is not necessarily revised unless it can be assumed that these changes will impair RAMC functions or performance.

All units are thoroughly tested before shipping. Please check the received units visually to ensure that they have not been damaged during transport. In case of defects or questions please contact Schmidt Mess- und Regeltechnik. Please describe any defect precisely and indicate model code as well as serial number.

Schmidt Mess- und Regeltechnik refuses any liability for units which have been repaired by the user without prior consent and do not meet the specifications as a consequence.



1.2 Principle of Measurement

The RAMC is a Variable Area Flow Meter for volume and mass measurements of gases and liquids. A float, whose movement is nearly independent of viscosity is guided concentrically in a specially shaped cone.

The position of the float is transferred magnetically to the indicator, which shows the measurement values by a pointer on a scale. The indicator can be equipped with limit switches and an electronic transmitter.

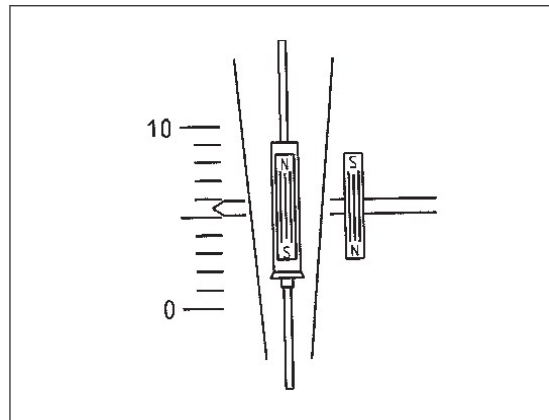


Fig. Principle of Measurement

All units are calibrated with water by the manufacturer. By adjusting the calibration values to the measured substance's state of aggregation (density, viscosity), the flow rate scale for each measuring tube can be determined.

Indication units can be exchanged without impairment of precision. However, the scale for the tube must be mounted on the new indicator (and in case of an electronic transmitter the calibration EEPROM, too).



1.3 Overview

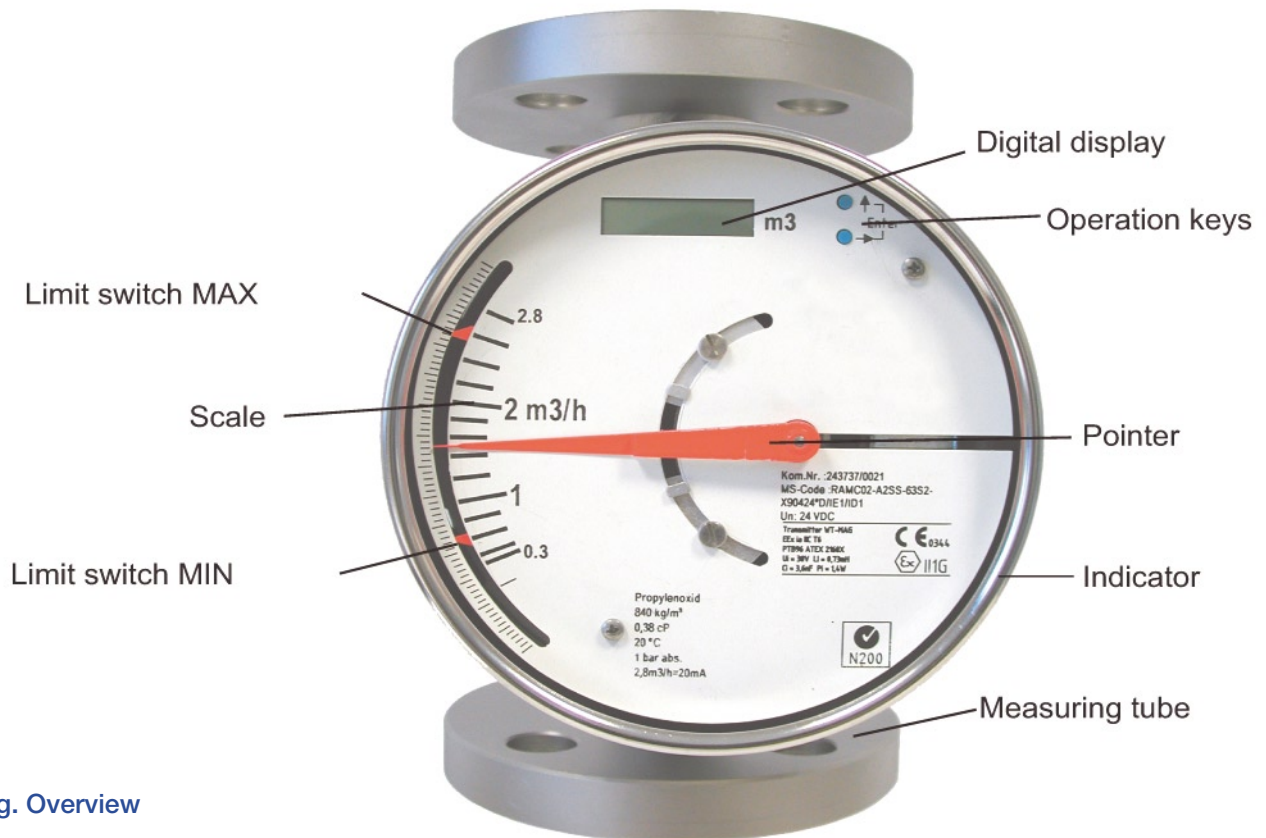


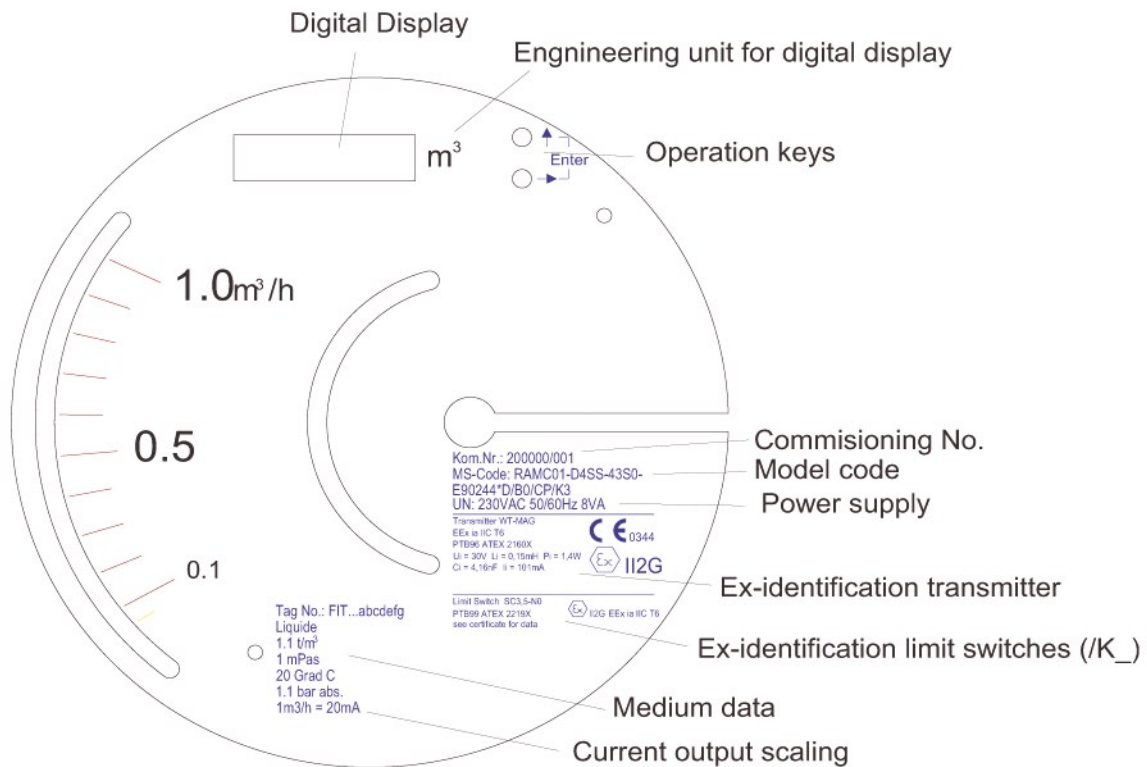
Fig. Overview

Explanations of specifications on flanges

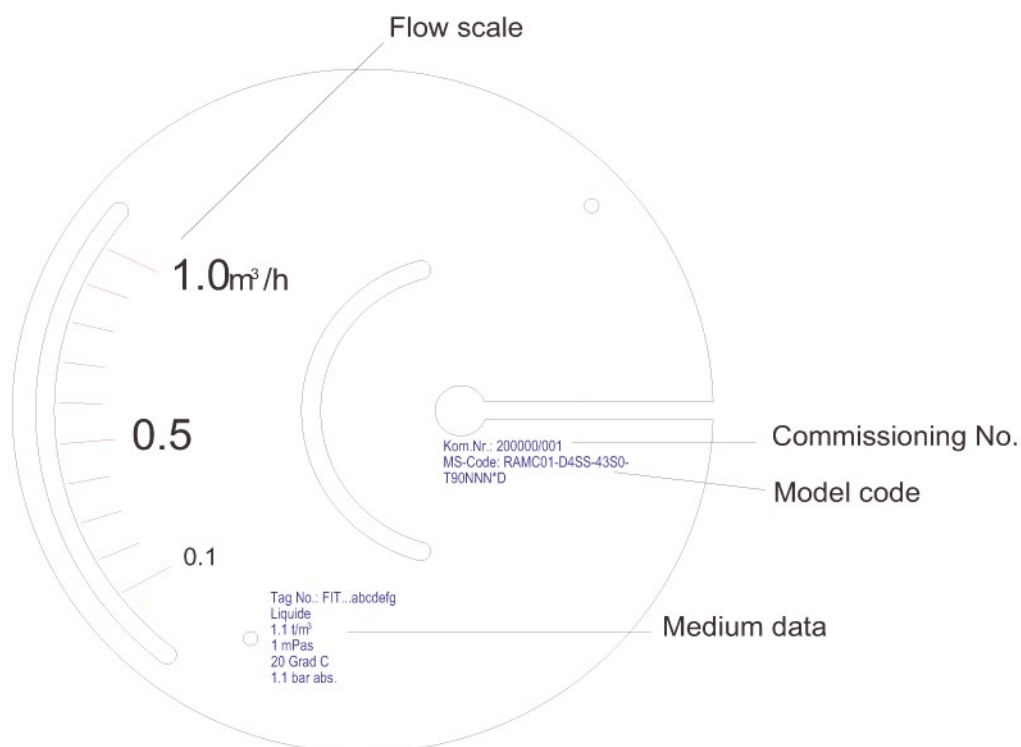
- type of flange e.g. DIN
- size of flange e.g. DN15
- Pressure range of flange and measuring tube e.g. PN40
- Material of wetted parts e.e. 1.4571
- Manufacturing code of flange manufacturer
- Lot. No.



Scale example for -E / -H-type (electronic transmitter)



Scale example of -T - Type





2.0 Precautions

2.1 Transportation and Storage

Before transporting the unit, it is recommended to fix the float with a card-board strip in the same way as when shipped from factory. Prevent foreign objects from entering the tube (e.g. by covering openings).

To protect the unit and especially the tube's interior from soiling, store it only at clean and dry locations.

2.2 Installation

Ambient temperature and humidity of the installation location must not exceed the specified ranges. Avoid locations in corrosive environments. If such environments are unavoidable, ensure sufficient ventilation. Although the RAMC features a very solid construction, the instrument should not be exposed to strong vibration or impact stress.

Please note that the RAMC's magnetic sensing system can be influenced by external inhomogeneous magnetic fields (such as solenoid valves). Alternating magnetic fields (10Hz) as well as homogeneous, static magnetic fields (in the area of the RAMC), like the geomagnetic field have no influence.

Asymmetric ferromagnetic bodies of considerable mass (e.g. steel girders) should be kept at a distance of at least 250 mm from the RAMC.

To avoid interference, the distance between two adjacent RAMCs must be at least 300 mm.

2.3 Pipe Connections

Ensure that the bolts of the flanges are tightened properly and that the gaskets are tight. Do not expose the unit to pressures higher than the indicated maximum operating pressure (refer to specifications).

While the system is pressurized the flange bolts must not be tightened or loosened.



3.0 Installation

3.1 Installation in the Pipeline

Be sure to remove the transport lock card-board strip from the measuring tube. Check that no cardboard remains in the tube.

The RAMC flow rate meter must be installed in a vertical pipeline, in which the medium flows upwards. The vertical position has to be checked at the outer edge of the flanges. Bigger nominal diameters (DN80/DN100) require straight pipe sections of at least 5D in front and behind the RAMC.

The nominal diameter of the RAMC should correspond to the nominal diameter of the pipeline.

To avoid stress in the connecting pipes, the connecting flanges must be aligned in parallel and axial direction. Bolts and gaskets have to be selected according to the maximum operating pressure, the temperature range and corrosion conditions. Centre gaskets and tighten nuts with a torque appropriate for the pressure range. If contamination or soiling of the RAMC is to be expected, a bypass should be installed to allow the removal of the instrument without interruption of the flow.

Please read also chapter 2-2.



4.0 Start of Operation

4.1 Hints on Flow Rate Measurement

The measured fluid should neither consist of a multi-phase mixture nor contain ferrite ingredients or large solidmass particles.

The RAMC scale is adjusted to the state of operation/aggregation of the measured fluid by the manufacturer. If the state of operation changes, it might become necessary to establish a new scale.

This depends on several factors:

- If the RAMC is operated in the given viscosity independent range, only the density of the float as well as the operational density of the previous and new substance have to be considered. In case the operational density only changes marginally ($\leq 0.5\%$), the present scale can be used.
- If the RAMC is operated outside the given viscosity independent range, the viscosities at the previous and new state of operation as well as the mass and diameter of the float have to be taken into account.
To establish a new scale, please refer to the folder "Anweisung zur Skalenumrechnung" (Instructions for Scale Conversion) as well as the conversion table or order a new scale.

Um eine neue Skala einzurichten, ziehen Sie bitte die Broschüre „Anweisung zur Skalenumrechnung“ sowie die Umrechnungstabelle zu Rate oder bestellen Sie eine neue Skala.

4.2 Pulsation and Pressure Shock

Pressure shock waves and pulsating flow influence measurement considerable or can destroy the meter. Surge conditions should be avoided. (→ open valves slowly, raise operating pressure slowly).

If float bouncing occurs in gases increase the line pressure until the phenomena stop. If this is not possible provide the float with a damper. A damping kit is available as spare part.



4.0 Start of Operation

4.3 Start of Operation of Electronic Transmitter

Ensure that the device has been connected correctly according to section 3.1 and that the used power supply meets the requirements indicated on the scale.

Switch on the power supply.

The digital display gives the totalizer value in the measuring unit, indicated on the right side of the display. The RAMC is now ready for operation.

Unit graduation, measuring unit, damping, etc. can be adjusted by an operating menu.

In case of an error, the bars beneath the 8 digits of the display will flash. The corresponding error message can be checked using the operating menu and then taking the appropriate counter measures.

The transmitter has been prepared and calibrated according to the model code as a 2-, 3- or 4-wire unit.

In 2-wire units, a jumper connects "A" and "-". When switching from a 2- to a 3-wire configuration, this jumper should be removed. The current output should then be adjusted.

When changing from a 3- to 2-wire configuration, the jumper should be set in place, and the current output has to be adjusted.



5.0 Maintenance

5.1 Function Test

Checking free movement of pointer:

- Remove housing cover (4 screws on housing type 66).
- After deflecting the pointer by hand, it must return to measurement value. If the pointer pivots to different values upon repeated deflections, there is too much friction in the bearings. In this case, send indication unit to service.

Checking free movement of float:

- First, free movement of pointer has to be ascertained.
- Check visually if pointer follows each flow rate change. If not, clean float and measuring tube.

Unit with electronic transmitter:

- The display must show values corresponding to indication function and measuring unit settings.
- The bars under the 8 digits must not flash. If an error occurs, the corresponding countermeasure (refer to section 6-2-8 error messages) has to be taken or the unit has to be sent to service.
- Without flow, the output current must be 0 or 4 mA. At a flow rate of 100% the current must be 20 mA.

Additional function test for HART®-units (-H):

- check HART® communication using a HART® Handheld terminal or a PC with HART® communication software.
- Setting: Device setup / Process variables
- PV AO shows the current value that should be delivered at output – Check this value using a multimeter.



5.0 Maintenance

5.2 Measuring Tube, Float

The RAMC is maintenance-free. If contamination of the measuring tube impairs the mobility of the float, the tube and the float have to be cleaned. To do this, the RAMC has to be removed from the pipe.

Replacement or cleaning of the float:

- Remove RAMC from the pipe.
- Remove upper retainer from measuring tube.
- Take float stopper and float out through the top of measuring tube.
- Clean float and measuring cone.
- Insert float and float stopper into the measuring tube.
- Set retainer into tube.
- Check float for free movement.
- Install RAMC to the pipe.

Attention:

Do not expose float to strong alternating magnetic fields. The float and especially its measuring edge must not be damaged.



6.0 Technical Data

6.1 RAMC Model- and Suffix-Codes

Model	Suffix code	Option code	Description	Restrictions
RAMC01	Size DN 15 (½ inch)	for D4, A1, A2, T6, G6
RAMC23	Size DN 20 (¾ inch)	for D4, A1, A2, T6, G6
RAMC02	Size DN 25 (1 inch)	for D4, A1, A2, S2, S4, T6, G6
RAMC03	Size DN 32 (1 ¼ inch)	for D4, A1, A2, S2, S4, T6, G6
RAMC04	Size DN 40 (1 ½ inch)	for D4, A1, A2, S4, T6, G6
RAMC05	Size DN 50 (2 inch)	for D4, A1, A2, S2, S4, T6, G6
RAMC06	Size DN 65 (2 ½ inch)	for D4, A1, A2, S2, T6, G6
RAMC08	Size DN 80 (3 inch)	for D4, A1, A2, S2, S4
RAMC09	3 ½ inch	for A1, A2
RAMC10	Size DN 100 (4 inch)	for D2, D4, A1, A2, S2, S4
RAMC12	Size DN 125 (5 inch)	for D2, A1, A2, S2
RAMC15	Size DN 150 (6 inch)	for D2, A1, A2
RAMCNN	Without measuring tube	
Process connection	-D2	EN flange PN 16, process connection dimensions + facing acc. EN1092 - 1 Form B1	
	-D4 .....	.....	EN flange PN 40, process connection dimensions + facing acc. EN1092 - 1 Form B1
	-A1 .....	.....	ASME flange class 150, process connection dimensions + facing acc. ASME B16.5
	-A2 .....	.....	ASME flange class 300, process connection dimensions + facing acc. ASME B16.5
	-T6 .....	.....	Thread female NPT - PN40
	-G6 .....	.....	Thread female G : PN40
	-R4 .....	.....	Thread female Rp : removable
	-S2 .....	.....	Thread male DIN 11851
	-S4 .....	.....	Triclamp PN10 ; PN16
	-T4 .....	.....	Thread female NPT : removable
-S5 .....	.....	Flanges Rosista PN10	
-NN .....	.....	Without process connection	
Material of wetted parts	SS	Stainless steel	Only with RAMCNN
	PF .....	.....	Teflon lining
	NN .....	.....	Without wetted parts
Cone / Float	-nnnn	See tables 14 and 15	Only with RAMCNN
	-NNNN.....	.....	Without measuring tube / without float
Indicator / Transmitter	-T	Indicator local	Only with housing NN
	-E .....	.....	Indicator electronic
	-H .....	.....	Indicator electronic HART
	-N .....	.....	Without indicator
Housing type	66	Housing rectangular : Polyamid	Only with option /A14 or /A15
	90	Housing round : SS	Only with option /A14 or /A15 Only with indicator N
	91 .....	.....	Housing round : Al
	NN .....	.....	Without housing
Power supply / Output	240	230 V AC : 4-wire : 0-20 mA	Not for indicator H. Not with limit switches Not for indicator H. Not with limit switches Not for indicator H. Not with limit switches Not for indicator H. Not with limit switches Not for indicator H Not for indicator H Only with indicator T or N
	244 ....	.....	230 V AC : 4-wire : 4-20 mA
	140 ....	.....	115V AC : 4-wire : 0-20 mA
	144 ....	.....	115V AC : 4-wire : 4-20 mA
	430 ....	.....	24V DC : 3-wire : 0-20 mA
	434 ....	.....	24V DC : 3-wire : 4-20 mA
	424 ....	.....	24V DC : 2-wire : 4-20 mA
NNN ...	.....	Without power supply	
Options		/[]	See separate table on next page	



6.0 Technical Data

6.2 Options

Options	Option code	Description	Restrictions
Indicator	/A5 /A8 /A12 /A13 /A14 /A15 /A16	Cable gland ASME 1/2" NPT female With scale for indicator US-engineering units Cable gland ISO M20 x 1.5 female Housing colour green Housing colour yellow Indicator on 95mm extension	Not with option /A13 Only without indicator Only for indicator E + H Not with option /KF1; not with option /A5 Not with option /A14 Only for housing 90 + 91
Marking	/B0 /B1 /B4 /BG /BD	Tag plate on flange stainless steel Tag plate fixed by wire stainless steel Neutral version Customer specific notes on scale Dual Scale	Maximum 24 digits; plate 12 x 40 mm Maximum 24 digits; plate 12 x 40 mm Not with option /P6,/KS1,/KN1,/SS1,/KF1 Maximum 45 digits Adjustment only for 1 fluid possible
Limit switches	/K1 /K2 /K3 /K6 /K7 /K8 /K9 /K10	MIN-contact MAX-contact MIN-MAX-contact; MIN-MIN-contact; MAX-MAX-contact MIN-contact "Fail Safe"- version MAX-contact "Fail Safe"- version MIN-MAX-contact "Fail Safe"- version MIN-MIN contact "Fail Safe"- version MAX-MAX-contact "Fail Safe"- version	Not for power supply 14n + 24n Not for power supply 14n + 24n Not for power supply 14n + 24n Not for power supply 14n + 24n Not for power supply 14n + 24n Not for power supply 14n + 24n Not for power supply 14n + 24n
Pulse output	/CP	Pulse output, isolated	Only for power supply 14n + 24n
Facing (process connection)	/D10 /D11	EN raised face B2 : Ra 0.8 - 3.2 EN groove	Only for EN-flanges (D2;D4) Only for EN-flanges (D2;D4)
Ex-proof type	/KS1 /KN1 /SS1 /NS1 /KF1	ATEX intrinsically safe "ia" ATEX category 3G "nL" / 3D SAA approval (Australia) NEPSI approval (China) ATEX flame proof "d" / dust proof	Only for power supply 434+430+424; for indicator T only with limit switches Only for power supply 434+430+424; for indicator T only with limit switches Only for power supply 424; for indicator T only with limit switches /K6 to /K10; only for housing 90 Only for power supply 424, 430, 434; only for indicator E + H; only for housing 90 Only for housing 91; only for power supply 434+430+424
Test and certificates	/H1 /H3 /P2 /P3 /P6 /PP /PT	Certificate oil + fat free wetted parts Certificate pure water application Certificate order compliance 2.1 Test report 2.2 (EN 10204) Certificate material 3.1 (EN 10204) Certificate hydro static pressure Flowtable for conversion	Only for metallic pressurized parts
Damping	/SD	Float damping system	Only for stainless steel; not for cone 81 + 82; only for gas application
Heat tracing	/T1 /T2 /T3 /T4 /T5 /T6	Heat tracing connection R 1/4" Heat tracing connection DN15 PN40 Heat tracing connection DN25 PN40 Heat tracing connection ASME 1/2" 150# Heat tracing connection ASME 1" 150# Heat tracing connection 1/4" NPT	Only for SS material of wetted parts Only for SS material of wetted parts Only for SS material of wetted parts Only for SS material of wetted parts Only for SS material of wetted parts Only for SS material of wetted parts
Power supply for electronic transmitter	/U2F /U3F	SINEAX B811-14, 230 V AC, EEx i SINEAX B811-13, 24 V AC/DC, EEx i	Only for indicator E + H Only for indicator E + H
Power supply for limit switch(es)	/W2A /W2B /W2E /W4A /W4B /W4E	KFA6-SR2-Ex1.W / 230 V AC, 1 channel KFA6-SR2-Ex2.W / 230 V AC, 2 channels KHA6-SH-Ex1 / 230 V AC, 1 channel, Fail Safe KFD2-SR2-Ex1.W / 24 V DC, 1 channel KFD2-SR2-Ex2.W / 24 V DC, 2 channels KHD2-SH-Ex1 / 24 V DC, 1 channel, Fail Safe	Only for limit switches /K1 + /K2 + /K3 Only for limit switches /K1 + /K2 + /K3 Only for limit switches /K6 to /K10 Only for limit switches /K1 + /K2 + /K3 Only for limit switches /K1 + /K2 + /K3 Only for limit switches /K6 to /K10
Flange protection	/QK	Flange covers (flange EN)	Only for flange EN
Instruction manuals	/IE n /ID n /IF n	Quantity of instruction manuals in English Quantity of instruction manuals in German Quantity of instruction manuals in French	n = 1 to 9 selectable *) n = 1 to 9 selectable *) n = 1 to 9 selectable *) *) if no instruction manual is selected, only a CD with instruction manuals is shipped with the flowmeter



6.0 Technical Data

6.3 Metering Tubes / Local Indicator

METERING TUBES

Materials of wetted parts

- Stainless steel AISI 316L (1.4404)
- PTFE
- other materials on request

Measurable fluids : suitable for a variety of liquids, gas and steam

Measuring range : see tables

Measuring range ratio
: 10:1

Process connections / Stainless steel

- Flanges : - acc. EN1092-1
DN15 – DN100 PN40
DN100 – DN150 PN16
- acc. ASME B 16.5
½" – 6" class 150 raised face
½" – 6" class 300 raised face
- Roughness of sealing: RA 3,2 bis 6,3
- Threaded connection
- male acc. DIN 11851
- NPT- female,
- G- female
- Clamp acc. DN25/1" – DN100/4"

Process pressure : depends on process connection
higher pressure
(up to 700 bar) on request

Process temperature :

- medium wetted parts made of stainless steel
: -180 ... +370°C
- medium wetted parts made of PTFE
: -80 ... +130°C

Accuracy class

acc. VDI / VDE 3513,

Size	Material wetted parts	
	Metal	PTFE-lining
15 - 100	1.6	2.5
125 - 150	2.5	-----

TO.EPS

Pressure Equipment Directive (PED) Directive 97/23/EG

- Modul : H
- Fluid Group : 1
- produced acc. category : III

Installation

- Mounting direction : vertical
- Flow direction : upwards
- Mounting length : see table
- Straight pipe inlet length
: DN 80/100 at least 5D,
not necessary for smaller sizes

Transportation- and Storage condition

- Local indicator : -40°C to +110°C
- Electronic transmitter : -40°C to +70°C

LOCAL INDICATOR

(Indicator/Transmitter Code –T)

Principle : The indication is made by magnetic coupling of a magnet enclosed in the float and a magnet in the indication unit, which follows the movements of the float.

Indicator housing

- Materials : - Stainless steel (1.4301)
- painted aluminium casting
- painted Polyamid with fiberglass
each with safety-glass window
- Degree of protection
: - IP65 (housing type 66 and 90)
- IP66/67 (housing type 91)

Scales

- Standard : removable aluminium plate with scale (double scale as option)
- Marking : direct readable units or percentage of Qmax.



6.0 Technical Data

6.4 Process Connection Tables Metal Tubes

Pos.	Process connection:												Cone / Float combination Code						
	EN-Flange				ASME-Flange				Clamp		Female thread								
	Form B1		with groove (Opt.: D11)		Form B2 (Opt.: D10)		150 lbs		300 lbs		Clamp			NPT					
	PN 16	PN40	PN 16	PN40	PN 16	PN40	Code	L ⁽¹⁾ [mm]	Code	L ⁽¹⁾ [mm]	Code	L ⁽¹⁾ [mm]		Code	L ⁽¹⁾ [mm]				
1	Code	D2	D4	D2	D4	D2	D4	1/2"	3/4"	1"	1/2"	3/4"	1"	1/2"	3/4"	1"	295	43 SO 44 SO 47 SO 51 SO	
	Code	DN15	DN20	DN25	DN32	DN40	DN50	1/2"	3/4"	1"	DN25	PN40	DN25 / 1"	DN32	DN40 / 1 1/2"	PN 16			
	L ⁽¹⁾ [mm]	250																	
	Code	DN15	DN20	DN25	DN32	DN40	DN50	1/2"	3/4"	1"	DN25	PN40	DN25 / 1"	DN32	DN40 / 1 1/2"	PN 16			
	L ⁽¹⁾ [mm]	250																	
2	Code	DN15	DN20	DN25	DN32	DN40	DN50	1/2"	3/4"	1"	1/2"	3/4"	1"	1/2"	3/4"	1"	295	53 L1; 53 M1 54 L1; 54 M1 57 L1; 57 M1 61 L1; 61 M1 62 L1; 62 M1 53 S1; 54 S1 57 S1; 61 S1 62 S1; 62 V1	
	Code	DN15	DN20	DN25	DN32	DN40	DN50	1/2"	3/4"	1"	DN25	PN40	DN25	PN40	PN 16				
	L ⁽¹⁾ [mm]	250																	
	Code	DN15	DN20	DN25	DN32	DN40	DN50	1/2"	3/4"	1"	DN25	PN40	DN25	PN40	PN 16				
	L ⁽¹⁾ [mm]	250																	
3	Code	DN25	DN32	DN40	DN50	DN25	DN32	DN40	DN50	1"	1 1/2"	1 1/2"	2"	1"	1 1/2"	1 1/2"	2"	310	63 L2; 64 L2 63 M2; 64 M2 63 S2; 64 S2 64 V2
	Code	DN25	DN32	DN40	DN50	DN25	DN32	DN40	DN50	1"	1 1/2"	1 1/2"	2"	DN50	PN25	DN50 / 2"	PN 16		
	L ⁽¹⁾ [mm]	250																	
	Code	DN25	DN32	DN40	DN50	DN25	DN32	DN40	DN50	1"	1 1/2"	1 1/2"	2"	DN50	PN25	DN50 / 2"	PN 16		
	L ⁽¹⁾ [mm]	250																	
4	Code	DN50	DN65	DN80	DN100	DN50	DN65	DN80	DN100	2"	2 1/2"	3"	2"	2"	2 1/2"	3"	325	67 L5; 67 M5 71 L5; 71 M5 72 L5; 72 M5 67 S5; 71 S5 72 S5; 72 V5	
	Code	DN50	DN65	DN80	DN100	DN50	DN65	DN80	DN100	2"	2 1/2"	3"	2"	DN65	DN80	DN65 / 3"	PN 10		
	L ⁽¹⁾ [mm]	250																	
	Code	DN50	DN65	DN80	DN100	DN50	DN65	DN80	DN100	2"	2 1/2"	3"	2"	DN65	DN80	DN65 / 3"	PN 10		
	L ⁽¹⁾ [mm]	250																	
5	Code	DN100	DN125 ⁽²⁾	DN150 ⁽²⁾	DN100	DN100	DN125 ⁽²⁾	DN150 ⁽²⁾	DN100	3"	3 1/2"	4"	5"	3"	3 1/2"	4"	250	73 L8; 73 V8 74 L8; 74 V8 77 L8; 77 V8	
	Code	DN100	DN125 ⁽²⁾	DN150 ⁽²⁾	DN100	DN100	DN125 ⁽²⁾	DN150 ⁽²⁾	DN100	3"	3 1/2"	4"	5"	DN100	DN125	DN100 / 4"	PN 10		
	L ⁽¹⁾ [mm]	250																	
	Code	DN100	DN125 ⁽²⁾	DN150 ⁽²⁾	DN100	DN100	DN125 ⁽²⁾	DN150 ⁽²⁾	DN100	3"	3 1/2"	4"	5"	DN100	DN125	DN100 / 4"	PN 10		
	L ⁽¹⁾ [mm]	250																	
6	Code	DN100	DN125 ⁽²⁾	DN150 ⁽²⁾	DN100	DN100	DN125 ⁽²⁾	DN150 ⁽²⁾	DN100	4"	5"	6"	4"	4"	5"	6"	270	81 11 82 11	
	Code	DN100	DN125 ⁽²⁾	DN150 ⁽²⁾	DN100	DN100	DN125 ⁽²⁾	DN150 ⁽²⁾	DN100	4"	5"	6"	4"	DN125	PN16				
	L ⁽¹⁾ [mm]	250																	
	Code	DN100	DN125 ⁽²⁾	DN150 ⁽²⁾	DN100	DN100	DN125 ⁽²⁾	DN150 ⁽²⁾	DN100	4"	5"	6"	4"	DN125	PN16				
	L ⁽¹⁾ [mm]	250																	

Bold = recommended

(1) L = Mounting length (2) Measuring precision classe 2,5 instead of 1,6



6.0 Technical Data

6.5 Flow Table for Metal Tubes

Pos.	Measuring ranges for water and liquids						Measuring ranges for air and gases					
	recommended combination			Alternative combination			recommended combination			Alternative combination		
	Max. Flow	Cone / Float combination	pressure loss a)	viscosity b)	Cone / Float combination	pressure loss a)	Max. Flow	Cone / Float combination	pressure loss a)	Cone / Float combination	pressure loss	
m ³ /h ^{e)}	Code	mbar	mPa*s	Code	mbar	m ² /h ^{e)}	Code	mbar	Code	mbar		
1	0.025	43 S0	40	10	-	-	0.75	43 S0	45	-	-	
	0.04	44 S0	40	80	-	-	1.2	44 S0	45	-	-	
	0.063	47 S0	40	80	-	-	1.8	47 S0	45	-	-	
	0.1	51 S0	40	80	-	-	3	51 S0	45	-	-	
2	0.13	53 L1	12	50	-	-	4	53 L1	13	-	-	
	0.16	07	-	-	53 M1	15	5.5	53 M1	21	-	-	
	0.22	0.5	12	50	-	-	6.5	54 L1	13	-	-	
	0.25	1.12	40	100	54 M1	15	9	54 M1	21	-	-	
	0.32	1.4	-	-	57 L1	12	10	57 L1	13	-	-	
	0.4	1.8	40	50	57 M1	15	14	57 M1	21	-	-	
	0.5	2.2	-	-	61 L1	12	16	61 L1	13	-	-	
	0.63	2.8	40	50	61 M1	15	22	61 M1	21	-	-	
	0.8	3.5	-	-	62 L1	12	25	62 L1	13	-	-	
	1.0	4.5	40	100	62 M1	15	34	62 M1	21	-	-	
3	1.6	7.0	40	100	-	-	40	63 L2	19	-	-	
	2.3	10.4	-	-	62 V1	45	50	62 S1	45	-	-	
	1.3	5.7	17	50	-	-	60	64 L2	19	-	-	
	2.1	9.2	-	-	64 M2	17	85	64 M2	23	-	-	
	2.5	11.2	42	30	64 M2	17	120	64 S2	47	-	-	
	4	18	42	10	-	-	100	67 L5	16	-	-	
	6	27	-	-	64 V2	43	130	71 L5	16	-	-	
	3.2	14	13	20	-	-	160	71 M5	25	-	-	
	5.0	22	-	-	71 L5	13	200	71 M5	25	-	-	
	6.3	28	47	30	-	-	250	72 L5	16	-	-	
4	8.5	37	-	-	72 L5	13	340	72 M5	25	-	-	
	10	45	47	5	72 M5	19	500	72 S5	54	-	-	
	16	70	47	5	-	-	550	73 L8	30	-	-	
	25	110	-	-	72 V5	63	850	74 L8	30	-	-	
5	25	110	60	10	-	-	1400	77 L8	30	-	-	
	40	180	60	10	-	-	-	-	-	-	-	
6	63	280	60	10	-	-	-	-	-	-	-	
	100	450	70	10	-	-	-	-	-	-	-	
	130	570	70	10	-	-	-	-	-	-	-	

Pos.	Measuring ranges for water and liquids						Measuring ranges for air and gases					
	recommended combination			Alternative combination			recommended combination			Alternative combination		
	Max. Flow	Cone / Float combination	pressure loss a)	viscosity b)	Cone / Float combination	pressure loss a)	Max. Flow	Cone / Float combination	pressure loss a)	Cone / Float combination	pressure loss	
m ³ /h ^{e)}	Code	mbar	mPa*s	Code	mbar	m ² /h ^{e)}	Code	mbar	Code	mbar		
1	0.025	43 S0	40	10	-	-	0.75	43 S0	45	-	-	
	0.04	44 S0	40	80	-	-	1.2	44 S0	45	-	-	
	0.063	47 S0	40	80	-	-	1.8	47 S0	45	-	-	
	0.1	51 S0	40	80	-	-	3	51 S0	45	-	-	
2	0.13	53 L1	12	50	-	-	4	53 L1	13	-	-	
	0.16	07	-	-	53 M1	15	5.5	53 M1	21	-	-	
	0.22	0.5	12	50	-	-	6.5	54 L1	13	-	-	
	0.25	1.12	40	100	54 M1	15	9	54 M1	21	-	-	
	0.32	1.4	-	-	57 L1	12	10	57 L1	13	-	-	
	0.4	1.8	40	50	57 M1	15	14	57 M1	21	-	-	
	0.5	2.2	-	-	61 L1	12	16	61 L1	13	-	-	
	0.63	2.8	40	50	61 M1	15	22	61 M1	21	-	-	
	0.8	3.5	-	-	62 L1	12	25	62 L1	13	-	-	
	1.0	4.5	40	100	62 M1	15	34	62 M1	21	-	-	
3	1.6	7.0	40	100	-	-	40	63 L2	19	-	-	
	2.3	10.4	-	-	62 V1	45	50	62 S1	45	-	-	
	1.3	5.7	17	50	-	-	60	64 L2	19	-	-	
	2.1	9.2	-	-	64 M2	17	85	64 M2	23	-	-	
	2.5	11.2	42	30	64 M2	17	120	64 S2	47	-	-	
	4	18	42	10	-	-	100	67 L5	16	-	-	
	6	27	-	-	64 V2	43	130	71 L5	16	-	-	
	3.2	14	13	20	-	-	160	71 M5	25	-	-	
	5.0	22	-	-	71 L5	13	200	71 M5	25	-	-	
	6.3	28	47	30	-	-	250	72 L5	16	-	-	
4	8.5	37	-	-	72 L5	13	340	72 M5	25	-	-	
	10	45	47	5	72 M5	19	500	72 S5	54	-	-	
	16	70	47	5	-	-	550	73 L8	30	-	-	
	25	110	-	-	72 V5	63	850	74 L8	30	-	-	
5	25	110	60	10	-	-	1400	77 L8	30	-	-	
	40	180	60	10	-	-	-	-	-	-	-	
6	63	280	60	10	-	-	-	-	-	-	-	
	100	450	70	10	-	-	-	-	-	-	-	
	130	570	70	10	-	-	-	-	-	-	-	

Bold = recommended

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

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

c) Flow is referred to 20°C and 1 bar abs

d) Flow in US Gallons per minute at 70°F

e) Flow referred to 0°C and 1.013 bar abs at operation conditions of 20°C and 1.013 bar abs

f) Flow in Standard cubic feet per minute referred to 60°F and 14.7 PSI at operation conditions of 70°F and 14.7 PSI abs



6.0 Technical Data

6.6 Dimensions and Weight

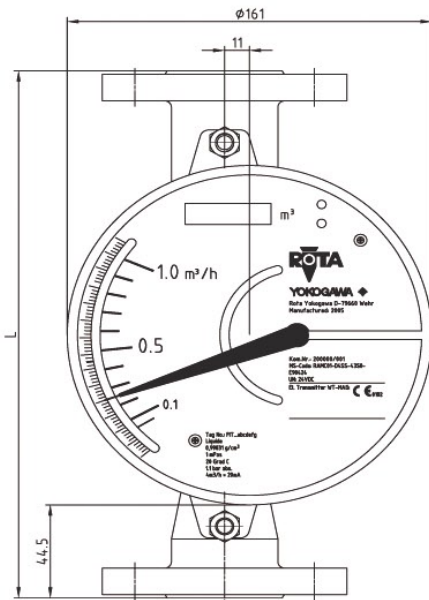


Fig. Front view type 90

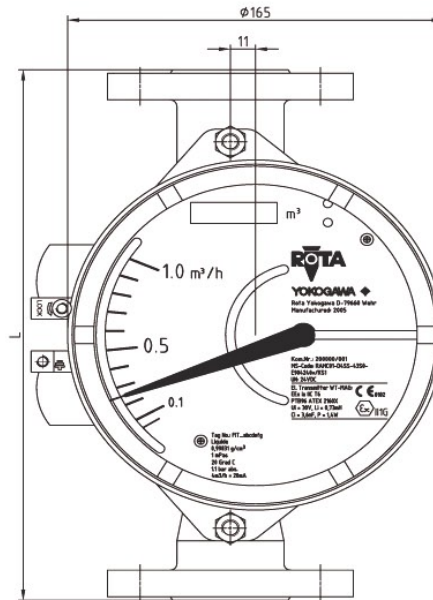


Fig. Front view type 91

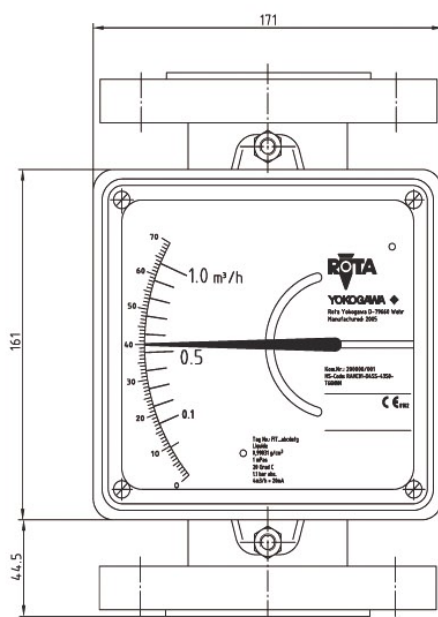


Fig. Front view type 66



6.0 Technical Data

6.6 Dimensions and Weight

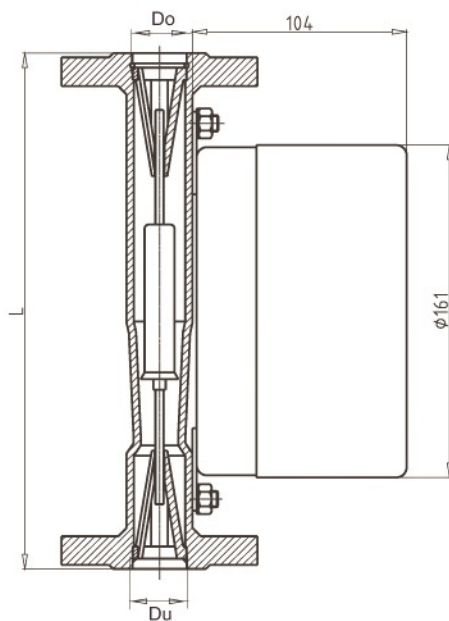


Fig. Metal version

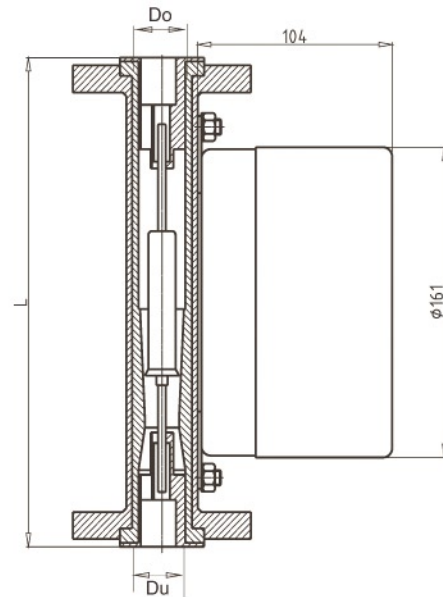


Fig. Metal version with lining

Inner diameter of stainless steel flanges								Inner diameter of flanges with PTFE-lining			
Pos.*)	EN- flange without groove		ASME- flange		Rosista- flange		Pos.*)	EN- flange	ASME- flange	Du = Do mm	
	Size	Du mm	Do mm	Size	Du mm	Do mm		Size	Size		
1	DN15 - DN50	20.7	20.7	½" - 1"	20.7	20.7					
2	DN15 - DN50	29.5	29.5	½"	20.7	20.7	2	DN15 - DN25	¾" - 1"	23.5	
				¾" - 2"	29.5	29.5					
3	DN25 - DN50	45.2	45.2	1"	32.2	32.2	3	DN25 - DN50	1¼" - 1½"	36.0	
				1¼" - 2"	45.2	45.2					
4	DN50 - DN100	62.0	76.0	2"	62.0	65.5	4	DN50 - DN80	2½" - 3"	66.0	
				2½" - 3"	62.0	76.0					
5	DN80 - DN150	94.0	94.0	3" - 6"	94.0	94.0	5	DN80 - DN100	3½" - 4"	82.0	
6	DN100 - DN150	116.0	116.0	4" - 6"	116.0	116.0	6	DN100	4"	110.0	



6.0 Technical Data

6.6 Dimensions and Weight

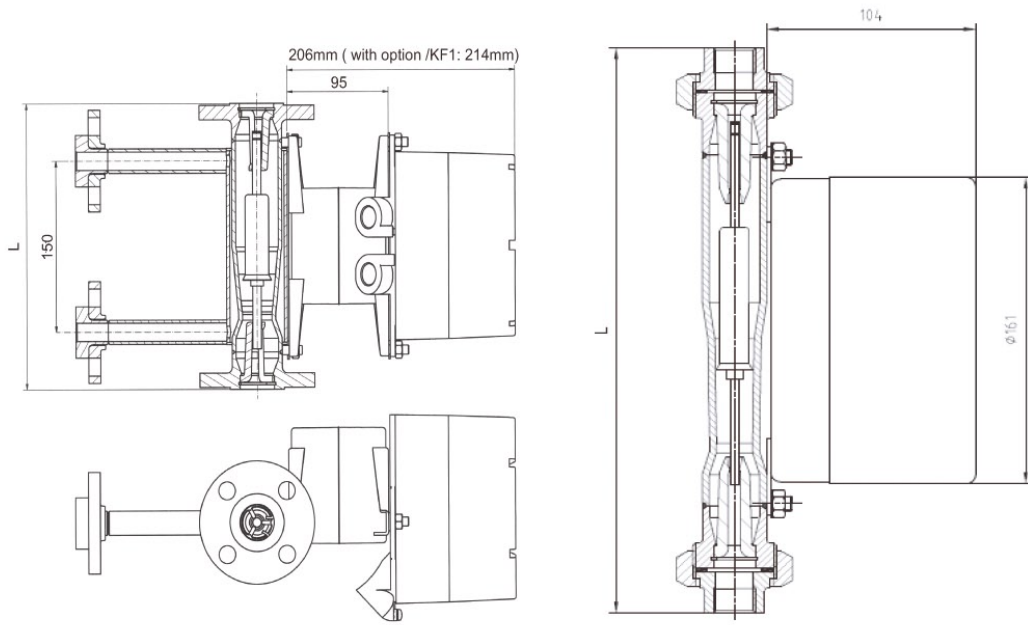


Fig. RAMC type 90 and option /A2 und T1

Fig. RAMC type 65 and Option /A2 und T2

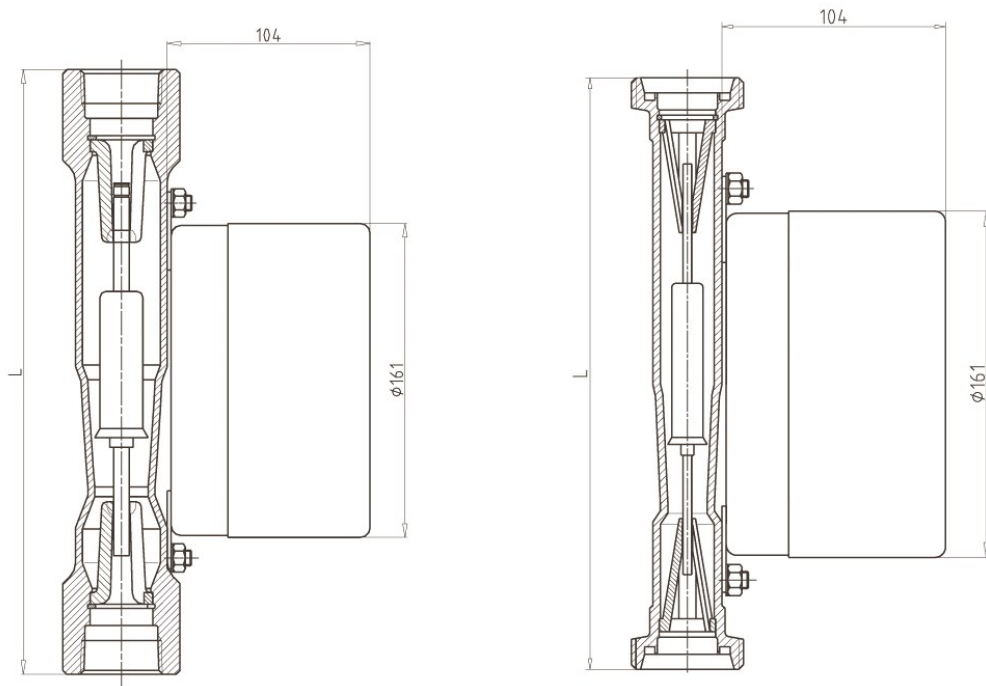


Fig. RAMC with connection T6 / G6

Fig. RAMC with connection S2



6.0 Technical Data

6.7 Temperature Graphs for RAMC Metal Design, Standard and Ex-i

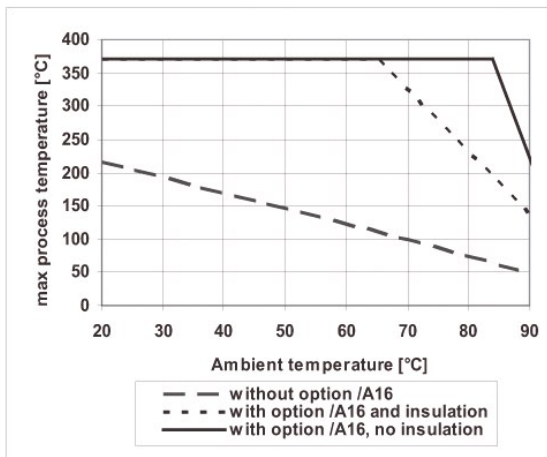


Fig. RAMC - type 90 / 91
- only with indicator

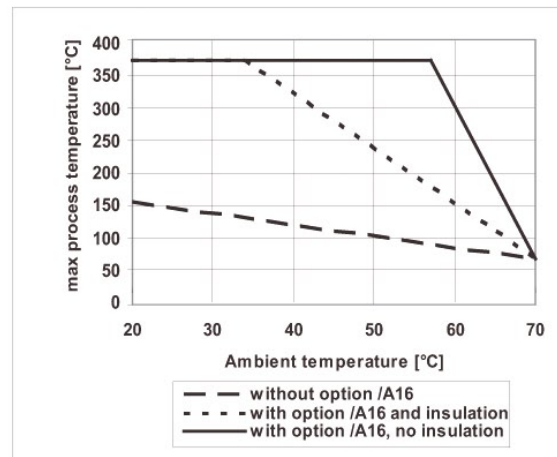


Fig. RAMC - type 90 / 91
- with limit switches
- with electronic transmitter

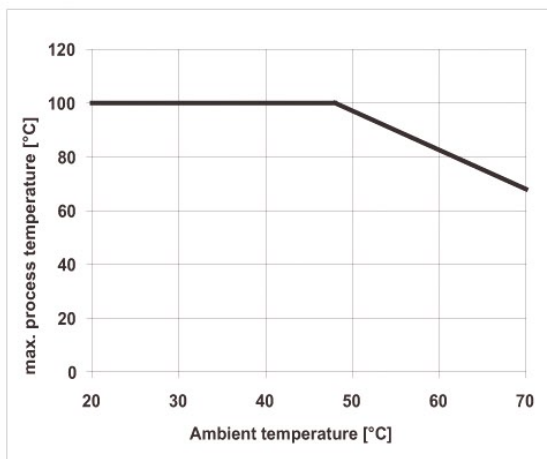


Fig. RAMC - type 66
- with or without limit switches
- with or without electronic transmitter

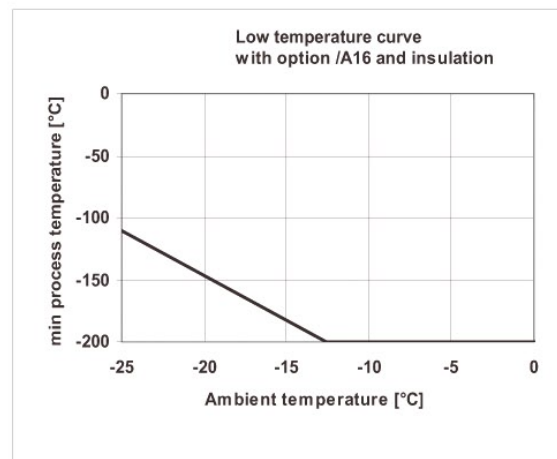


Fig. RAMC - type 90 / 91
- with or without limit switches
- with or without electronic transmitter

The temperature graphs are reference values for size DN100. They may be influenced negative by damed heat, external heat sources or radiated heat and influenced positive for smaller sizes.

Insulation means rockwool between tube and indicator.

Units with electronic transmitter can show the temperature of the internal transmitter on the display or HART-type can show and supervise the internal temperature by HART-communication.

Units with PTFE lining are usable up to 130°C.

For units with intrinsic safe transmitter the temperature limits according the certificate of conformity must be regarded.

The minimum ambient temperature for all indicators is -25°C (lower temperatures on request).