A float is guided concentrically to a special shaped conic metal tube. The position of this float is magnetically transmitted to the indicator. The short-tube Rotameter is used for measurement of flow rates of liquids and gases. Its special application is in troubled, opaque or aggressive mediums. The instrument is mounted in a vertical pipeline with flow direction upwards. The indicators are exchangeable without influence on the accuracy.

FEATURES
- Different process connections like flanges according EN and ASME
- All wetted parts in stainless steel or PTFE
- Maximum flow 0.025 - 130 m³/h water resp. 0.75 - 1400 m³/h air (20 °C / 1.013 bar abs)
- Measuring accuracy acc. Directive VDI/VDE 3513 sheet 2 (qG =50%)
- Float damping to avoid float bouncing with gas applications
- Optional heat tracing (with steam or fluid heat carrier)
- Indicator in stainless steel, aluminium, protection class IP66/67
- Local indicator without additional power supply
- Microprocessor controlled transmitter with 24 V, 115 V or 230 V power supply
- Intrinsically safe version (Ex-i): ATEX, IECEx, FM, CSA, NEPSI, PESO, KOSHA
- Flame proof version (Ex-d): ATEX, IECEx, NEPSI, PESO, KOSHA
- Dust explosion proof: ATEX, IECEx, NEPSI, PESO, KOSHA
- Suitable for SIL application, FMEDA report available
- Limit switches, also available as “Fail Safe” version

Electronic transmitter as standard with local-controlling display with the following features:
- Flow indication (totalize, actual, percent)
- Indication of different volume- and mass flow units
- Second (manual) calibration storing
- Patented float blocking indication function
- Signal output damping
- Error message indication
- Temperature measurement in the electronic transmitter
- HART- communication
- Profibus PA- communication

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

MEASURING TUBE

Materials of wetted parts:
- Stainless steel AISI 316L (1.4404)
- PTFE
- Aramide fibres / NBR binder (Gasket for process connection R4 or T4)
- Other materials on request

Fluids to be measured:
suitable for a variety of liquids, gas and steam

Measuring range:
See table 11 and 12

Measuring range ratio:
10:1

Process connections / Stainless steel:
- Flanges:
  - acc. EN1092-1
  - DN100 – DN150 PN16
  - DN15 – DN100 PN40
  - DN50 – DN80 PN63
  - DN15 – DN50 PN100
- acc. ASME B 16.5
  - ½” – 6” Class 150 raised face
  - ½” – 6” Class 300 raised face
  - ½” – 3” Class 600 raised face

Roughness of sealing
Form B1: RA 3.2 - 6.3
Form B2: RA 0.8 - 3.2
ASME: RA 3.2 - 6.3

-Threaded connection:
- male acc. DIN 11851
- NPT- female
- G- female
- Clamp acc. DN25 / 1” – DN100 / 4”

Process pressure:
Depends on process connection, see table 10 to 12

higher pressure (up to 700 bar) on request

Process temperature:
- medium wetted parts made of stainless steel
  - -200 …+370 °C
- medium wetted parts made of PTFE
  - -80 … +130 °C

See fig. 7a to 7c

Measuring accuracy:
Table 1

<table>
<thead>
<tr>
<th>Material of wetted parts</th>
<th>Size</th>
<th>Measuring accuracy acc. Directive VDI/VDE 3513 sheet 2 (q,=50%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS</td>
<td>DN 15 - 100</td>
<td>1.6%</td>
</tr>
<tr>
<td>SS</td>
<td>DN 125 - 150</td>
<td>2.5%</td>
</tr>
<tr>
<td>PTFE</td>
<td>DN 15-100</td>
<td>2.5%</td>
</tr>
</tbody>
</table>

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

- Tubes:
  - Modul: H
  - Fluid Group: 1 (dangerous fluids)
  - Produced acc. to category III
  - Classification: Table 6 (piping)

Heating (options /T1 to /T6):
- Art. 3 section 3: (Volume < 1L)
- Fluid Group: 2 (non-dangerous fluids)
- Classification: Table 2 (vessels)

CANADIAN REGISTRATION NUMBERS (CRN) available upon request

Installation:
- Mounting direction: vertical
- Flow direction: upwards
- Mounting length: see tables 10, 12, 13, 14
- Straight pipe inlet length: DN 80/100 at least 5D, not necessary for smaller sizes

Weight:
See table 15

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, with a pointer.

Indicator housing:
- Materials:
  - Stainless steel (1.4301 / 304)
  - painted aluminium casting (housing type 91)
each with safety-glass window
- Degree of protection:
  - IP66/67

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

Transportation- and Storage condition:
-40°C to +110°C

ELECTRONIC TRANSMITTER
(Indicator/Transmitter Code -E, -H, -G)

Standard type (Code -E):

Power supply:
- 4- wire units with galvanic isolation:
  - 230 V AC ±10 %, 50/60 Hz, fuse 0.063 A, time lag, (5x20) mm
  - 115 V AC ±10%/-15 %, 50/60 Hz, fuse 0.125 A, time lag, (5x20) mm
- 2/3- wire units:
  - U = 14 V … 30 V DC

Output signal:
- 4- wire units:
  - 0 - 20 mA, 4 – 20 mA
  - pulse output (option GP)
    - max. frequency 4 Hz see fig. 3-5
- 3- wire units:
  - 0 - 20 mA, 4 - 20 mA
- 2- wire units:
  - 4 - 20 mA

The 20 mA point is selectable between 60% and 100% of Qnom.

Load resistance:
- 4- wire units: ≤ 500 Ω
- 2/3- wire unit: ≤ (U - 14 V) / 20 mA, max. 500 Ω

HART- communication type (Code -H):

Power supply:
- 2-wire units:
  - U = 14 V … 30 V DC

Output signal:
- 2- wire units:
  - 4 – 20 mA

Load resistance:
- HART-version:
  - 250 … 500 Ω

Profibus PA - communication type (Code -G):

- 2- wire bus connection not polarity sensitive:
  - 9 … 32 V DC acc. to IEC 61568-2 and FISCO model
- Basic current: 14 mA
- Failure current (FDE): 10 mA additional to basic current
- Transmission rate: 31.25 Kbaud
- AI block for volume flow or mass flow
- Configurable with PDM DD
- Supports I&M- functions

GS 01R01B02-00E-E  22nd edition, January 14, 2013-00
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LIMIT SWITCHES IN STANDARD VERSION
(option /K1 to /K3)
Type :
- Inductive proximity switch SC3.5-N0 acc. DIN EN 60947-5-6
Nominal voltage :
- 8 V DC
Output signal :
- ≤ 1 mA or ≥ 3 mA

LIMIT SWITCHES IN FAIL SAFE VERSION
(option /K6 to /K10)
Type :
- Inductive proximity switch SJ3.5-SN; SJ3.5-S1N acc. DIN EN 60947-5-6 (NAMUR)
Nominal voltage :
- 8 V DC
Output signal :
- ≤ 1 mA or ≥ 3 mA

HYSTERESIS OF LIMIT SWITCHES

Min-contact / Max-contact :
- pointer movement ≈ 0.8 mm
- float movement ≈ 0.8 mm
Minimum distance between 2 contacts :
≈ 2 mm

CABLE GLAND

Size :
- M16x1.5 (standard)
- Thread M20x1.5 (option /A13; standard for option /KF1)
- Thread ½” NPT (option /A5)
Cable diameter :
6 – 9 mm
Maximum cross section of core :
Ø 1.5 mm²

POWER SUPPLY FOR LIMIT SWITCHES (Option /W__)
Type :
acc. DIN EN 60947-5-6 (NAMUR)
- KFA5-SR2-Ex*-W (115 V AC), * = 1 or 2
- KFA6-SR2-Ex*-W (230 V AC), * = 1 or 2
- KFD2-SR2-Ex*-W (24 V DC), * = 1 or 2
- KHA6-SH-Ex1 (115/230 V AC), Fail Safe, 1 channel
- KFD2-SH-Ex1 (24 V DC), Fail Safe, 1 channel
Power supply :
- 230 V AC ± 10%, 45-65Hz
- 115 V AC ± 10%, 45-65Hz
- 24 V DC ± 25%
Relay output :
1 or 2 potential-free changeover contact(s)
Switching capacity :
max. 250 V AC, max. 2 A
Note :
If Fail-Safe limit switch option /K6 or /K7 is ordered, for power supply option /W2E or /W4E must be selected.
If Fail-Safe limit switch option /K8, /K9 or /K10 is ordered, for power supply option /W2F or /W4F must be selected.

Electromagnetic compatibility (EMC) :
- Acc. EN 61326-1: 2006, Class A, Table 2 and EN 61326-2-3: 2006 :
  Criterion A, restriction: HF- immunity between 500 MHz and 750 MHz: criterion B
  RAMC with Profibus PA :
  Criterion A: Burst, Surge, HF- Immunity
  Criterion B: ESD
In case of single sided grounding of the cable shield it is possible that for all tests criterion B is reached.

Unit safety acc. DIN EN 61010-1: 2001 :
- Over voltage category : II (acc. VDE 0110 or IEC 664)
- Pollution degree : I
- Safety class :
  I (with 115 / 230V AC power supply)
  III (with 24V DC power supply and Fieldbus type)

POWER SUPPLY FOR ELECTRONIC TRANSMITTER
(Option /UT)
Type :
- Power supply with galvanically separated input and output
  - RN221N-B1, HART- compatible
Supply voltage :
- 20 ... 250 V DC / AC 50/60 Hz
Maximum load :
- 700 Ω
Output signal :
- 4 - 20 mA

CABLE GLAND (for transmitter –E, -H and –G) :
Size :
- M16x1.5 (standard)
- Thread M20x1.5 (option /A13; standard for option /KF1)
  - Thread ½” NPT (option /A5)
Cable diameter :
- 6 – 9 mm
Maximum cross section of core :
- Ø 1.5 mm²

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. 7a to fig. 7c.
The internal temperature of the electronic transmitter can be indicated on the display or checked via HART communication.
Measurement of the internal transmitter temperature :
- Range :
  -25 °C to +70 °C
- Accuracy :
  ± 5 °C
Transportation- and Storage condition :
-40 °C to +70 °C
Linearity :
± 0.2 % f.s.
Hysteresis :
± 0.1 % f.s.
Repeatability :
± 0.1 % f.s.
Influence of power supply :
± 0.1 % f.s.
Temperature coefficient of the output signal :
± 0.5 % /10 K f.s.
AC-part of output signal :
± 0.15 % f.s.
Long-time stability :
± 0.2 % /year
Max. output signal :
21.5 mA
Output signal in case of failure :
≤ 3.6 mA (acc. NE 43)
Response time (99%) :
- About 1.5 s (damping 1s)

1) referenced to 20°C ambient temperature
SWITCHING LEVELS FOR LIMIT SWITCHES

Table 2 Min, Max and Min-Max-contact in standard version

<table>
<thead>
<tr>
<th>Function</th>
<th>Pointer</th>
<th>Option /K1</th>
<th>Option /K2</th>
<th>Option /K3</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAX</td>
<td></td>
<td>SC3,5-N0</td>
<td>SC3,5-N0</td>
<td>SC3,5-N0</td>
</tr>
<tr>
<td>above LV</td>
<td>below LV</td>
<td>1 mA</td>
<td>1 mA</td>
<td>3 mA</td>
</tr>
<tr>
<td>MIN</td>
<td></td>
<td>SC3,5-N0</td>
<td>SC3,5-N0</td>
<td>SC3,5-N0</td>
</tr>
<tr>
<td>above LV</td>
<td>below LV</td>
<td>3 mA</td>
<td>3 mA</td>
<td>3 mA</td>
</tr>
</tbody>
</table>

Note: LV = Limit value

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

<table>
<thead>
<tr>
<th>Function</th>
<th>Pointer</th>
<th>Option /K6</th>
<th>Option /K7</th>
<th>Option /K8</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAX</td>
<td></td>
<td>SJ3,5-SN</td>
<td>SJ3,5-SN</td>
<td>SJ3,5-SN</td>
</tr>
<tr>
<td>above LV</td>
<td>below LV</td>
<td>1 mA</td>
<td>3 mA</td>
<td>1 mA</td>
</tr>
<tr>
<td>Fail Safe</td>
<td></td>
<td>1 mA</td>
<td>3 mA</td>
<td>1 mA</td>
</tr>
<tr>
<td>MIN</td>
<td></td>
<td>SJ3,5-SN</td>
<td>SJ3,5-SN</td>
<td>SJ3,5-SN</td>
</tr>
<tr>
<td>above LV</td>
<td>below LV</td>
<td>3 mA</td>
<td>3 mA</td>
<td>3 mA</td>
</tr>
<tr>
<td>Fail Safe</td>
<td></td>
<td>1 mA</td>
<td>3 mA</td>
<td>1 mA</td>
</tr>
</tbody>
</table>

Note: LV = Limit value

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

<table>
<thead>
<tr>
<th>Function</th>
<th>Pointer</th>
<th>Option /K9</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIN</td>
<td></td>
<td>SJ3,5-S1N</td>
</tr>
<tr>
<td>above LV</td>
<td>below LV</td>
<td>3 mA</td>
</tr>
<tr>
<td>Fail Safe</td>
<td></td>
<td>1 mA</td>
</tr>
</tbody>
</table>

Note: LV = Limit value

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

<table>
<thead>
<tr>
<th>Function</th>
<th>Pointer</th>
<th>Option /K10</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAX</td>
<td></td>
<td>SJ3,5-SN</td>
</tr>
<tr>
<td>above LV</td>
<td>below LV</td>
<td>1 mA</td>
</tr>
<tr>
<td>Fail Safe</td>
<td></td>
<td>3 mA</td>
</tr>
<tr>
<td>MIN</td>
<td></td>
<td>SJ3,5-S1N</td>
</tr>
<tr>
<td>above LV</td>
<td>below LV</td>
<td>1 mA</td>
</tr>
<tr>
<td>Fail Safe</td>
<td></td>
<td>3 mA</td>
</tr>
</tbody>
</table>

Note: LV = Limit value

COMPLIANCE WITH IEC 61508

RAMC with local indicator and fail safe limit switches (-T][N][N][N]/K6 ... /K10):
Suitable for application in safety functions up to and including SIL2.

RAMC with local indicator and standard limit switches (-T][N][N][N]/K1 ... /K3):
Suitable for application in safety functions up to and including SIL2.

RAMC with 4-20mA output (-E][N][N]/424 and -H][N][424):
Suitable for application in safety functions up to and including SIL1, but only with activated Float Blocking Indication.

Reliability data available on request in FMEDA report.

COMPLIANCE WITH ISO 13849

For Safety Metrics acc. to ISO 13849-2 please refer to the FMEDA report.

METROLOGICAL REGULATION IN CIS (GOST)

RAMC has “Pattern Approval Certificate of Measuring Instruments” and is registered as a measuring instrument in Russia, Kazakhstan, Uzbekistan, Belarus and Ukraine. The calibration laboratory of Rota Yokogawa is approved by Federal Agency on Technical Regulating and Metrology in Russia and other Metrological Organizations in CIS countries to issue primary calibration confirmations for RAMC, option /QR[].

Furthermore RAMC is RTN (GGTN) approved for installation in hazardous areas.

For export to CIS countries please contact your Yokogawa representative.
# HAZARDOUS AREA SPECIFICATIONS

## Overview hazardous area certified instruments:

<table>
<thead>
<tr>
<th>Location</th>
<th>Europe</th>
<th>Global</th>
<th>USA</th>
<th>Canada</th>
<th>India</th>
<th>Korea</th>
<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certificate</td>
<td>ATEX</td>
<td>IECEx</td>
<td>FM</td>
<td>FM</td>
<td>PESO</td>
<td>KOSHA</td>
<td>NEPSI</td>
</tr>
</tbody>
</table>

### Electronic transmitter (WT-MAG)

<table>
<thead>
<tr>
<th>Protection</th>
<th>ia</th>
<th>ic</th>
<th>nL</th>
<th>ia/tb</th>
<th>ia</th>
<th>ic</th>
<th>ia/tb</th>
<th>IS/NI</th>
<th>IS/NI</th>
<th>ia</th>
<th>ia</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comments</td>
<td>*2)</td>
<td>*1)</td>
<td>*2)</td>
<td>*1)</td>
<td>*3)</td>
<td>*3)</td>
<td>*4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>See page</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>9</td>
<td>6</td>
<td>6</td>
<td>9</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>-</td>
</tr>
</tbody>
</table>

### Limit switches

<table>
<thead>
<tr>
<th>Protection</th>
<th>ia/iaD</th>
<th>ic</th>
<th>nL</th>
<th>ia/tb</th>
<th>ia</th>
<th>-</th>
<th>ia/tb</th>
<th>IS/NI</th>
<th>IS/NI</th>
<th>-</th>
<th>-</th>
<th>ia</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option</td>
<td>/KS1</td>
<td>/KS3</td>
<td>/KN1</td>
<td>/KS2</td>
<td>/ES1</td>
<td>-</td>
<td>/ES2</td>
<td>/FS1</td>
<td>/CS1</td>
<td>-</td>
<td>-</td>
<td>/NS1</td>
<td>-</td>
</tr>
<tr>
<td>Comments</td>
<td>*2)</td>
<td>*1)</td>
<td>-</td>
<td>-</td>
<td>*1)</td>
<td>*5)</td>
<td>*6)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>See page</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>9</td>
<td>7</td>
<td>7</td>
<td>9</td>
<td>7</td>
<td>7</td>
<td>-</td>
<td>7</td>
<td>7</td>
<td>-</td>
</tr>
</tbody>
</table>

### RAMC indicator

<table>
<thead>
<tr>
<th>Protection</th>
<th>d/tb</th>
<th></th>
<th>d/tb</th>
<th></th>
<th>d</th>
<th>d/tb</th>
<th>ia</th>
<th>d/DIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option</td>
<td>/KF1</td>
<td>-</td>
<td>/EF1</td>
<td>-</td>
<td>-</td>
<td>/KF1</td>
<td>/EF1</td>
<td>/NS1</td>
</tr>
<tr>
<td>Comments</td>
<td>*7)</td>
<td>-</td>
<td>*7)</td>
<td>-</td>
<td>-</td>
<td>*7)</td>
<td>*4)</td>
<td>*7)</td>
</tr>
<tr>
<td>See page</td>
<td>8</td>
<td>-</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>8</td>
<td>8</td>
<td>6</td>
</tr>
</tbody>
</table>

### Power supplies for intrinsic safe components (see page 7)

<table>
<thead>
<tr>
<th>Option</th>
<th>/UT</th>
<th>/W1A,B</th>
<th>/W2A,B</th>
<th>/W4A,B</th>
<th>/W2E,F</th>
<th>/W4E,F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Option /W1A,B</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Option /W2A,B</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Option /W4A,B</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Option /W2E,F</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Option /W4E,F</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>yes</td>
</tr>
</tbody>
</table>

### Notation

- IS = intrinsic safe; Nl = non incendive; DIP = dust ignition proof

### Comments

- *1) Dust proof by RAMC housing
- *2) For use in category 3G
- *3) Same certification for USA and Canada
- *4) PESO certificate available from Yokogawa Sales Office
- *5) Only for USA; power supply free selectable
- *6) For USA and Canada; power supply must be option /WxA or /WxB (x=1 or 2 or 4)
- *7) Only with housing 91
ELECTRONIC TRANSMITTER

Attention:
The maximum ambient temperature of the transmitter or of the limit switches according to the temperature class may not be exceeded because of heat transmission from the medium.

Table 6  Entity parameters of electronic transmitter

<table>
<thead>
<tr>
<th></th>
<th>$U_i$</th>
<th>$I_i$</th>
<th>$P_i$</th>
<th>$C_i$</th>
<th>$L_i$</th>
<th>$T_{amax}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>KS1/2/3</td>
<td>30</td>
<td>101</td>
<td>1.4</td>
<td>4.16</td>
<td>0.15</td>
<td>70</td>
</tr>
<tr>
<td>ES1/2/3</td>
<td>30</td>
<td>101</td>
<td>1.4</td>
<td>0.15</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>KN1</td>
<td>30</td>
<td>152</td>
<td>1.4</td>
<td>4.16</td>
<td>0.15</td>
<td>70</td>
</tr>
<tr>
<td>FS1/CS1</td>
<td>30</td>
<td>100</td>
<td>1.4</td>
<td>40</td>
<td>0.15</td>
<td>70</td>
</tr>
<tr>
<td>NS1</td>
<td>30</td>
<td>101</td>
<td>1.4</td>
<td>4.16</td>
<td>0.15</td>
<td>70</td>
</tr>
</tbody>
</table>

Intrinsically safe electronic transmitter 4 - 20mA (with/without HART-communication) with ATEX-certificate (option /KS1):
Certificate: PTB 12ATEX 2003
Output signal: 4–20 mA (2- wire unit, 3- wire unit); 0-20mA (3- wire unit)
Explosion proof: Ex ia IIC T6 Gb; group II ; category 2G
Entity parameter: see table 6

Intrinsically safe electronic transmitter Profibus PA - communication with ATEX- certification (option /KS1):
Certificate: PTB 96ATEX 2160X
Output signal: Profibus PA
Explosion proof: Ex ia IIC T6 Gc; group II ; category 2G
Entity parameter: see table 6

Intrinsically safe electronic transmitter with KOSHA- certification (Korea)
Option /ES1 must be selected.
Same data as for IECEx certification.

Intrinsically safe electronic transmitter with PESO- certification (India)
Option /KS1 must be selected. PESO- certificate is available at your Yokogawa Sales Office.

Intrinsically safe electronic transmitter with RAMC with NEPSI- certification (China) (option /NS1):
Certificate: GYJ0101551
Output signal: 4–20 mA (2- wire unit, 3- wire unit); 0-20mA (3- wire unit)
Explosion proof: Ex ia IIC T6 Max. Tamb. : 70°C
Entity parameter of electronic transmitter: see table 6
Limit switches: option /K1 to /K10
Entity parameter of limit switches: see certificate NEPSI GYJ06542X
LIMIT SWITCHES

Intrinsically safe and dust proof limit switches with ATEX-certification (option /K1 ... /K10 with /KS1):
Certificate:
- PTB 99 ATEX 2219X (SC3.5-NO) (/K1 ... /K3)
- PTB 00 ATEX 2049X (SJ 3.5-S.N) (/K6 ... /K10)
- ZELM 03 ATEX 0128X (for dust proof)

Explosion proof:
Ex ia IIC T6, group II category 2G
Dust proof (only indicator “T”):
Ex iaD 20 T 108 °C, group I I category 1D
Max. surface temperature: T108°C

Entity parameter:
see certificate of conformity

Intrinsically safe limit switches with ATEX-certification for use in category 3G (option /K1 ... /K10 with /KS3):

Explosion proof:
Ex in IIC T6 X, protection „NL“; group II ; category 3G

Entity parameter:
see specification of SC3.5-NO Blue (P&F)* (/K1 ... /K3)
see specification of SJ3.5-SN (P&F)* (/K6 ... /K10)
* P&F = Pepperl & Fuchs

Intrinsically safe limit switches with IECEx-certification (option /K1 ... /K10 with /ES1):

Certificate:
- IECEx PTB11.0091 (SC3.5-NO) (/K1 ... /K3)
- IECEx PTB11.0092 (SJ 3.5-S.N) (/K6 ... /K10)

Explosion proof:
Ex ia IIC T6 X, protection “nL”; group II ; category 3G

Entity parameter:
see specification of SC3.5-NO Blue (P&F)* (/K1 ... /K3)
see specification of SJ3.5-SN (P&F)* (/K6 ... /K10)

Intrinsically safe / non incendive limit switches with FM-certification (USA) (option /K1 ... /K10 with /FS1):

Explosion proof:
IS : Cl. I, Div. 1, Gp. ABCD, T6, Ta = 60°C,
Ni : Cl. I, Div. 2, Gp. ABCD, T5, Ta = 50°C
Cl. II, Div. 1, Gp. EFG
Cl. III, Div. 1

Entity parameter:
see FM-control drawing 116-0165 for IS
see FM-control drawing 116-0155 for NI

Intrinsically safe limit switches with CSA-certification (Canada) (option /K1 ... /K3 with /CS1):

Explosion proof:
Cl. I, II, III, Div. 1, Gp. ABCDEFG

Entity parameter:
see drawing 116-0047
Only in combination with option /WxA or /WxB.

Intrinsically safe limit switches with NEPSI-certification (China) (option /K1 ... /K10 with /NS1):

Certificate:
GYJ11.1505X (option /K1 ... /K3)
GYJ11.1507X (option /K6 ... /K10)

Explosion proof:
Ex ia IIC T1 ... T6

Entity parameter:
see certificate

POWER SUPPLIES FOR INTRINSIC SAFE COMPONENTS

Power Supply for the intrinsically safe electronic transmitter (option /UT)

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

Certificate:
ATEX: PTB 00 ATEX 2018
IECEx: PTB06.0089
FM: 3007835, Control Drawing 02 02 00 111
C SA: 1067708, Control Drawing 02 02 00 112
NEPSI: GYJ06495

Supply voltage:
20 ... 250 V DC / AC 50/60 Hz

Maximum load impedance:
700 Ω

Output signal:
4 - 20 mA

Control circuit:
Intrinsically safe [Ex ia] IIC; group II ; category (1)GD

Entity parameters:
see fig. 4

Power supply for intrinsically safe limit switches (option W__):

Type:
acc. DIN EN 50227 (NAMUR)
- KFA5-SR2-Ex*-W (115 V AC)
- KFA6-SR2-Ex*-W (230 V AC)
- KFD2-SR2-Ex*-W (24 V DC)
- KHA6-SH-Ex1 (115/230 V AC), Fail Safe, 1 channel
- KFD2-SH-Ex1 (24 V DC), Fail Safe, 1 channel

Certificates:
- KFA5-SR2-Ex*-W:
  ATEX : PTB 00 ATEX 2081
  CSA : 1029981 (LR 36087-19)
  IECEx: PTB11.0031
  PESO
  KOSHA : 2009-BO-0157
- KFA6-SR2-Ex*-W:
  ATEX : PTB 00 ATEX 2081
  CSA : 1029981 (LR 36087-19)
  IECEx: PTB11.0031
  PESO
  KOSHA : 2009-BO-0157
- KFD2-SR2-Ex*-W:
  ATEX : PTB 00 ATEX 2081
  CSA : 1029981 (LR 36087-19)
  IECEx: PTB11.0034
  NEPSI : GYJ091350
  KOSHA : 2009-BO-0157
- KFD2-SH-Ex1:
  ATEX : PTB 00 ATEX 2043
  CSA : 1029981 (LR 36087-19)
  IECEx: PTB11.0031
  PESO
  KOSHA : 2009-BO-0157

Control circuit (ATEX):
[Ex ia] IIC; group II ; category (1)GD

Entity parameter:
see fig. 4 (ATEX) and certificate
FLAME PROOF AND DUST PROOF RAMC

Flame proof and dust proof RAMC with ATEX-certificate (option /KF1):
Certificate: 
IBExU 05 ATEX 1086

Flame proof: 
Ex d IIC T1 ... T6 Gb ; group II ; category 2G

Dust proof: 
Ex tb IIIC TX Db IP6X; group III ; category 2D

Max. surface temperature TX :corresp. process temperature

Housing: 
Painted aluminium casting, type 91

Output signal (with electronic transmitter -E, -H): 
4–20 mA (2- wire unit, 3- wire unit) ; 0-20 mA (3- wire unit)

Power supply (with electronic transmitter -E, -H): 
2- or 3- wire unit

Limit switches: 
Options /K1 to /K10 possible

Ambient temperature: 
-20 °C to 60 °C

Minimum process temperature: 
-20 °C

Threads for cable glands: 
- M20x1.5 (standard) 
- ½" NPT (option /A5)

Temperature classification: 
Table 8
see table 8

Flame proof and dust proof RAMC with IECEx-certificate (option /EF1):
Certificate: 
IECEx IBE12.0007

Flame proof: 
Ex d IIC T1 ... T6 Gb ; group II ; category 2G

Dust proof: 
Ex tb IIIC TX Db IP6X; group III ; category 2D

Max. surface temperature TX :corresp. process temperature

Housing: 
Painted aluminium casting type 91

Output signal (with electronic transmitter -E or -H): 
4–20 mA (2- wire unit, 3- wire unit) ; 0-20 mA (3- wire unit)

Power supply (with electronic transmitter -E or -H): 
2- or 3- wire unit

Limit switches: 
Options /K1 to /K10 possible

Ambient temperature: 
-20 °C to 60 °C

Minimum process temperature: 
-20 °C

Threads for cable glands: 
- M16x1.5 (standard) 
- ½” NPT (option /A5)

Temperature classification: 
Table 8
see table 8

<table>
<thead>
<tr>
<th>Temp. class</th>
<th>No extension</th>
<th>On Extension</th>
<th>On extension with insulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>85°C</td>
<td>85°C</td>
<td>85°C</td>
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<tr>
<td>T5</td>
<td>100°C</td>
<td>100°C</td>
<td>100°C</td>
</tr>
<tr>
<td>T4</td>
<td>120°C</td>
<td>135°C</td>
<td>135°C</td>
</tr>
<tr>
<td>T3</td>
<td>120°C</td>
<td>200°C</td>
<td>200°C</td>
</tr>
<tr>
<td>T2</td>
<td>120°C</td>
<td>300°C</td>
<td>300°C</td>
</tr>
<tr>
<td>T1</td>
<td>120°C</td>
<td>370°C</td>
<td>350°C</td>
</tr>
</tbody>
</table>

Flame proof and dust proof RAMC with NEPSI-certificate (China) (option /NF1): 
Certificate: 
GYJ071430

Flame proof: 
Ex d IIC T6

Dust proof: 
DIP A20 TA T1 - T6 IP67
Max. surface temperature TA: corresponding process temperature

Housing: 
Painted aluminium casting type 91

Output signal (with electronic transmitter -E or -H): 
4–20 mA (2- wire unit, 3- wire unit) ; 0-20 mA (3- wire unit)

Power supply (with electronic transmitter -E or -H): 
2- or 3- wire unit

Limit switches: 
Options /K1 to /K10 possible

Ambient temperature: 
-20 °C to 60 °C

Minimum process temperature: 
-20 °C

Threads for cable glands: 
- M20x1.5 (standard) 
- ½” NPT (option /A5)

Temperature classification: 
Table 8
see table 8

Flame proof and dust proof RAMC with PESO-certificate (India): 
Option /KF1 must be selected. PESO-certificate is available at your Yokogawa Sales Office.

Flame proof and dust proof RAMC with KOSHA-certificate (Korea): 
Same data as IECEx-certified type (/EF1).
INTRINSIC SAFE COMPONENTS WITH DUST-PROOF

ATEX-certified intrinsically safe electronic transmitter 4 - 20mA, with/without limit switches with dust proof RAMC (option /KS2):

Certificate:
- PTB 12 ATEX2003 (Intrinsic safe electronic transmitter)
- PTB 99 ATEX2219X (Intrinsic safe limit switch SC3.5-N0)
- PTB 00 ATEX2049X (Intrinsic safe limit switch SJ 3.5-S.N)
- IBExU 05 ATEX1086 (Dust proof)

Output signal electronic transmitter:
- 4–20 mA (2-wire unit, 3-wire unit) ; 0-20mA (3-wire unit)

Explosion proof:
- Ex ia IIC T6 Gb; group II ; category 2G

Dust proof:
- Ex tb IIIC TX Db IP6X; group III ; category 2D
- Max. surface temperature TX : corresponding process temperature

Entity parameter:
- see table 6 for electronic transmitter (/KS1)
- see certificates for limit switches

Housing:
- Painted aluminium casting, type 91

Ambient temperature:
- -20 °C to 60 °C

Minimum process temperature:
- -20°C

Threads for cable glands:
- M20x1.5 (standard)
- ½” NPT (option /A5)

IECEx-certified intrinsically safe electronic transmitter 4 - 20mA, with/without limit switches with dust proof RAMC (option /ES2):

Certificate:
- IECEx PTB12.0020 (Intrinsic safe electronic transmitter)
- IECEx PTB11.0091 (Intrinsic safe limit switch SC3.5-N0)
- IECEx PTB11.0092 (Intrinsic safe limit switch SJ 3.5-S.N)
- IECEx IBE12.0007 (Dust proof)

Output signal electronic transmitter:
- 4–20 mA (2-wire unit, 3-wire unit) ; 0-20mA (3-wire unit)

Explosion proof:
- Ex ia IIC T6 Gb; group II ; category 2G

Dust proof:
- Ex tb IIIC TX Db IP6X; group II ; category 2D
- Max. surface temperature TX : corresponding process temperature

Entity parameter:
- see table 6 for electronic transmitter (/KS1)
- see certificates for limit switches

Housing:
- Painted aluminium casting, type 91

Ambient temperature:
- -20 °C to 60 °C

Minimum process temperature:
- -20°C

Threads for cable glands:
- M20x1.5 (standard)
- ½” NPT (option /A5)
INSTALLATION

fig. 1 RAMC 2- wire unit with inductive limit switches and transmitter relay

fig. 2 RAMC 3- wire unit with inductive limit switches and transmitter relay

fig. 3 RAMC 4-wire unit with pulse output
fig. 4 Intrinsic safe version according ATEX (option /KS1 or /KS2) : RAMC 2- wire unit with power supply, inductive limit switches and transmitter relay

fig. 5 RAMC 2- wire unit with HART-communication, inductive limit switches and transmitter relay
Planning and Installation Hints

- The user is responsible for the use of our flow meters regarding suitability and use as agreed.
- 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 medium.
- Ambient- and process temperature must be lower than the specified maximum values.
- If dirt accumulation is to be expected, we recommend to install a bypass pipe.
- To avoid float bouncing in case of gas application notice the recommendations of VDI/VDE 3513 Sheet 3.
- To avoid mutual magnetic influence in case of parallel design of several Rotameters take care that the distance between the tube middle axes is not less than 300 mm. The distance to other ferric materials should not be less than 250 mm.
- Avoid static magnetic fields next to the Rotameter.
# MODEL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix code</th>
<th>Description</th>
<th>Restrictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAMC01</td>
<td>RAMC23</td>
<td>Size DN 15 (½ inch)</td>
<td>for D4, D6, A1, A2, A3, T4, R4, T6, G6</td>
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<tr>
<td>RAMC02</td>
<td>RAMC03</td>
<td>Size DN 20 (¾ inch)</td>
<td>for D4, D6, A1, A2, A3, T4, R4, T6, G6</td>
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<tr>
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<td>RAMC04</td>
<td>Size DN 25 (1 inch)</td>
<td>for D4, D6, A1, A2, A3, S2, S4, S5, T4, R4, T6, G6</td>
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<td>RAMC05</td>
<td>Size DN 32 (1¼ inch)</td>
<td>for D4, D5, D6, A1, A2, A3, S2, S4, T4, R4</td>
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<tr>
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<td>RAMC06</td>
<td>Size DN 40 (1½ inch)</td>
<td>for D4, D5, A1, A2, A3, S2, S4, T4, R4, T6, G6</td>
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<td>RAMC08</td>
<td>Size DN 50 (2 inch)</td>
<td>for D4, D5, A1, A2, A3, S2, S4, T4, R4, T6, G6</td>
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<td>RAMC09</td>
<td>Size DN 65 (2½ inch)</td>
<td>for D4, D5, A1, A2, A3, S2, S4, T4, R4, T6, G6</td>
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<td>RAMC10</td>
<td>Size DN 80 (3 inch)</td>
<td>for D4, D5, A1, A2, A3, S2, S4, T4, R4, T6, G6</td>
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<tr>
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<td>RAMC12</td>
<td>Size DN 100 (4 inch)</td>
<td>for D2, D4, A1, A2, S4, S4</td>
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<td>RAMC15</td>
<td>Size DN 125 (5 inch)</td>
<td>for D2, D4, A1, A2, S2</td>
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<td>RAMCNN</td>
<td>Size DN 150 (6 inch)</td>
<td>for D2, A1, A2</td>
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## Process connection

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<th>-D2</th>
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<th>-D5</th>
<th>-D6</th>
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<tbody>
<tr>
<td>EN flange PN 16, process connection dimension + facing acc. EN 1092-2 Form B1</td>
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<td></td>
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<tr>
<td>EN flange PN 40, process connection dimension + facing acc. EN 1092-2 Form B1</td>
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<td>EN flange PN 63, process connection dimension + facing acc. EN 1092-2 Form B1</td>
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<td>EN flange PN 100, process connection dimension + facing acc. EN 1092-2 Form B1</td>
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## Material of wetted parts

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<thead>
<tr>
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<th>PF</th>
<th>NN</th>
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<tbody>
<tr>
<td>Stainless steel</td>
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<td></td>
</tr>
<tr>
<td>Teflon lining</td>
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<tr>
<td>Without wetted parts</td>
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</tbody>
</table>

## Cone / Float

<table>
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<tr>
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<th>-NNNN</th>
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</thead>
<tbody>
<tr>
<td>See tables 10 ... 12</td>
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<tr>
<td>Without measuring tube / without float</td>
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</table>

## Indicator / Transmitter

<table>
<thead>
<tr>
<th>-T</th>
<th>-E</th>
<th>-G</th>
<th>-H</th>
<th>-N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicatol local</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Indicatol electronic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicatol electronic with Profibus PA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicatol electronic with HART</td>
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<tr>
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## Housing / Type

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<tr>
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<th>91</th>
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<tbody>
<tr>
<td>Housing round blanc; SS</td>
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<tr>
<td>Housing round yellow; AI</td>
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<tr>
<td>Without housing</td>
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## Power supply / Output

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<thead>
<tr>
<th>240</th>
<th>244</th>
<th>140</th>
<th>144</th>
<th>430</th>
<th>434</th>
<th>424</th>
<th>429</th>
<th>NNN</th>
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</thead>
<tbody>
<tr>
<td>230 V AC ; 4- wire; 0-20 mA</td>
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<td></td>
</tr>
<tr>
<td>230 V AC ; 4- wire; 4-20 mA</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>115 V AC ; 4- wire; 0-20 mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>115 V AC ; 4- wire; 4-20 mA</td>
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<td></td>
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<td></td>
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<tr>
<td>24 V DC; 3- wire; 0-20 mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 V DC; 3- wire; 4-20 mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 V DC; 2- wire; 4-20 mA</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Profibus PA; 9 ... 32 V DC</td>
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## OPTIONS

<table>
<thead>
<tr>
<th>Options</th>
<th>Code</th>
<th>Description</th>
<th>Restriction</th>
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<tbody>
<tr>
<td>Indicator</td>
<td>/A5</td>
<td>Thread for cable gland ASME ½˝ NPT female</td>
<td>Not with /A13</td>
</tr>
<tr>
<td></td>
<td>/A12</td>
<td>US- engineering units</td>
<td>Only for indicator E, H</td>
</tr>
<tr>
<td></td>
<td>/A13</td>
<td>Thread for cable gland ISO M20 x 1,5 female</td>
<td>Not with /A5, /KF1, /NF1, /KS2</td>
</tr>
<tr>
<td></td>
<td>/A14</td>
<td>Housing color green</td>
<td>Only for housing 91</td>
</tr>
<tr>
<td></td>
<td>/A16</td>
<td>Indicator on 95 mm extension</td>
<td>Only for housing 90 + 91</td>
</tr>
<tr>
<td></td>
<td>/A17</td>
<td>Housing color green</td>
<td>Only for housing 90</td>
</tr>
<tr>
<td></td>
<td>/A18</td>
<td>Housing color yellow</td>
<td>Only for housing 90</td>
</tr>
<tr>
<td></td>
<td>/A20</td>
<td>Scale for type T66</td>
<td>Not with hazardous approval type; not with indicator</td>
</tr>
<tr>
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<td>/A21</td>
<td>Scale and EEPROM for type E66, H66, G66</td>
<td>Not with hazardous approval type not with indicator</td>
</tr>
<tr>
<td></td>
<td>/A22</td>
<td>Scale for type T90, T91</td>
<td>Not with hazardous approval type; not with indicator</td>
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<tr>
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<td>/A23</td>
<td>Scale and EEPROM for type E90, H90, E91, H91, G91</td>
<td>Not with hazardous approval type; not with indicator</td>
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<tr>
<td></td>
<td>/A25</td>
<td>Pressure balance element</td>
<td>Not with /KS2, /ES2, /KF1, /EF1, /NF1 and housing 91 with /A5 or /A13</td>
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<tr>
<td></td>
<td>/A26</td>
<td>Indicator for -40°C ambient temperature</td>
<td>Not with /K1, /K2, /K3, /K9, /K10, /KF1, /EF1, /NF1, /KS2, /ES2, /CS1, /NS1, /SS1, power supply 14n + 24n.</td>
</tr>
<tr>
<td>Marking</td>
<td>/B0</td>
<td>Tag plate (SS) on flange and customer specified tag number on scale</td>
<td>Plate 9 x 40 mm; max. 45 digits</td>
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<tr>
<td></td>
<td>/B1</td>
<td>Tag plate (SS) fixed by wire and customer specified tag number on scale</td>
<td>Plate 9 x 40 mm; max. 45 digits</td>
</tr>
<tr>
<td></td>
<td>/BT1</td>
<td>Software tag HART 5</td>
<td>8 digits for tag; 22 digits for long tag; only indicator H</td>
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<tr>
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<td>/BT2</td>
<td>Software tag, bus address for Profieldus PA</td>
<td>32 digits for tag; 4 digits bus address; only indicator G</td>
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<td>/B4</td>
<td>Neutral version</td>
<td>Not with hazardous approval type</td>
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<td>/B8</td>
<td>Customer provided marking on label</td>
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<td>/B10</td>
<td>Percent scale</td>
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<td></td>
<td>/BG</td>
<td>With customer specified tag number on scale</td>
<td>Max. 45 digits</td>
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<td>/BD</td>
<td>Dual scale</td>
<td>Adjustment only for the first mentioned fluid</td>
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<tr>
<td>Limit switches</td>
<td>/K1</td>
<td>MIN- contact</td>
<td>Not for power supply 14n + 24n</td>
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<td>MAX- contact</td>
<td>Not for power supply 14n + 24n</td>
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<td>/K3</td>
<td>MIN-MAX- contact, MIN-MIN- contact, MAX-MAX- contact</td>
<td>Not for power supply 14n + 24n</td>
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<td>MIN- contact &quot;Fail safe&quot; version</td>
<td>Not for power supply 14n + 24n</td>
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<td>MAX-MAX- contact &quot;Fail safe&quot; version</td>
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</tr>
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<td>Pulse output</td>
<td>/CP</td>
<td>Pulse output isolated</td>
<td>Only for power supply 14n + 24n</td>
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<td>Flange Facing</td>
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<td>EN raised face B2 : Ra 0.8 - 3.2</td>
<td>Only for EN- flanges (D2, D4)</td>
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<td>/D11</td>
<td>EN groove Form D</td>
<td>Only for EN- flanges (D2, D4)</td>
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<tr>
<td>Test and certificates</td>
<td>/H1</td>
<td>Oil + fat free for wetted surfaces acc. ASTM G93-03 level C</td>
<td>Only for metallic pressurized parts</td>
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<tr>
<td></td>
<td>/H3</td>
<td>Certificate pure water application</td>
<td>Only for SS material of wetted parts</td>
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<td>/P2</td>
<td>Certificate of compliance with the order acc. EN 10204: 2004 -2.1</td>
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<td>/P3</td>
<td>As /P2 + Test report acc. EN 10204: 2004 -2.2</td>
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<td>Material certificate acc. EN 10204: 2004 -3.1</td>
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<td>/PM3</td>
<td>PAMT test (3 points: Process connection inlet, measuring tube, process connection outlet)</td>
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<td>Pressure test report measuring system</td>
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<td>Dye penetration test of flange welding acc. to EN 571</td>
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<td>WPS acc. DIN EN ISO 15609-1 (Welding Procedure Specification)</td>
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<td>WPQR acc. DIN EN ISO 15614-1 (Welder Performance Qualification Record)</td>
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<td>WQC acc. DIN EN ISO 6906-4 (Welder Qualification Certificate), manual welding (nickel alloy)</td>
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<td>Damping</td>
<td>/SD</td>
<td>Float damping system</td>
<td>Only for SS; not for cone 81 + 82; only for gas application</td>
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<td>Flange protection</td>
<td>/OK</td>
<td>Flange covers (EN flange)</td>
<td>Only for EN- flanges (D2, D4)</td>
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<td>With KC-mark for Korea</td>
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<td>Only for power supply 424, 430, 434; for indicator T only with limit switches</td>
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<td>Only for power supply 424, 430, 434; for indicator T only with limit switches</td>
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<td>Only for power supply 424, 430, 434; for indicator T only with limit switches</td>
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<td>Only for power supply 424, 430, 434; for indicator T only with limit switches</td>
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<td>Only for power supply 424, 430, 434; for indicator T only with limit switches</td>
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<td>FM intrinsically safe / non incendive electr. transmitter (USA)</td>
<td>Only for power supply 424 (electronic transmitter); for indicator T only with limit switches</td>
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<td>FM intrinsically safe / non incendive electronic transmitter (Canada), CSA</td>
<td>Only for power supply 424 (electronic transmitter); for indicator T only with limit switches</td>
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<td>intrinsically safe limit switches (US)</td>
<td>Only for power supply 424 (electronic transmitter); for indicator T only with limit switches</td>
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<td>NEPSI intrinsically safe approval (China)</td>
<td>Only for power supply 424, 430, 434; not for indicator S; for indicator T only with limit switches</td>
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<td>ATEX flame proof “d” / dust proof “tb”</td>
<td>Only for power supply 424, 430, 434; for indicator T only with limit switches</td>
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<td>IECEx flame proof “d” / dust proof “tb”</td>
<td>Only for power supply 424, 430, 434; for indicator T only with limit switches</td>
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<td>/NF1</td>
<td>NEPSI flame proof “d” / dust proof approval (China)</td>
<td>Only for power supply 424, 430, 434; for indicator T only with limit switches</td>
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</table>

| Gost approval                | /QR1    | Primary Calibration and Test Confirmation valid in Russia                   | See page 4                                                                  |
|                              | /QR2    | Primary Calibration and Test Confirmation valid in Kazakhstan               | See page 4                                                                  |
|                              | /QR3    | Primary Calibration and Test Confirmation valid in Uzbekistan              | See page 4                                                                  |

| Heat tracing                 | /T1     | Heat tracing, process connection G ¼” PN 40 female thread                  | Only for SS material of wetted parts                                          |
|                              | /T2     | Heat tracing, process connection DN 15 PN 40                               | Only for SS material of wetted parts                                          |
|                              | /T3     | Heat tracing, process connection DN 25 PN 40                               | Only for SS material of wetted parts                                          |
|                              | /T4     | Heat tracing, process connection ASME ½” 150#                             | Only for SS material of wetted parts                                          |
|                              | /T5     | Heat tracing, process connection ASME 1” 150#                              | Only for SS material of wetted parts                                          |
|                              | /T6     | Heat tracing, process connection ¼” PN 40 NPT female thread                | Only for SS material of wetted parts                                          |

| Power supply for electronic transmitter | /JT     | RN221N-B1, 20… 250V DC/AC, Ex i, Hart compatible                           | Only for indicator E, H, J                                                  |

| Power supply for limit switches (transmitter relay) | /W1A    | KFA5-SR2-Ex1.W / 115 V AC, 1 channel                                       | Only for limit switches /K1, /K2, /K3                                      |
|                                                    | /W1B    | KFA5-SR2-Ex2.W / 115 V AC, 2 channel                                       | Only for limit switches /K1, /K2, /K3                                      |
|                                                    | /W2A    | KFA6-SR2-Ex1.W / 230 V AC, 1 channel                                       | Only for limit switches /K1, /K2, /K3                                      |
|                                                    | /W2B    | KFA6-SR2-Ex2.W / 230 V AC, 2 channel                                       | Only for limit switches /K1, /K2, /K3                                      |
|                                                    | /W2E    | KHA6-SH-Ex1 / 115/230 V AC, 1 channel, Fail Safe                          | Only for limit switches /K6 to /K7                                       |
|                                                    | /W2F    | 2x KHA6-SH-Ex1 / 115/230 V AC, 1 channel, Fail Safe                       | Only for limit switches /K8 to /K10                                      |
|                                                    | /W4A    | KFD2-SR2-Ex1.W / 24 V DC, 1 channel                                       | Only for limit switches /K1, /K2, /K3                                      |
|                                                    | /W4B    | KFD2-SR2-Ex2.W / 24 V DC, 2 channel                                       | Only for limit switches /K1, /K2, /K3                                      |
|                                                    | /W4E    | KFD2-SH-Ex1 / 24 V DC, 1 channel, Fail Safe                               | Only for limit switches /K8 to /K7                                       |
|                                                    | /W4F    | 2x KFD2-SH-Ex2.W / 24 V DC, 1 channel, Fail Safe                          | Only for limit switches /K8 to /K10                                      |

| Instruction manuals           | /En     | Quantity of instruction manuals in English                                | n = 1 to 9 selectable *)                                                   |
|                              | /Dn     | Quantity of instruction manuals in German                                 | n = 1 to 9 selectable *)                                                   |
|                              | /Fn     | Quantity of instruction manuals in French                                 | n = 1 to 9 selectable *)                                                   |

| Special order                | /Z      | Special design must be specified separately                            |                                                                           |

Specify the following when ordering:
1) Model, suffix code and option code
2) Fluid name; Process temperature; Process density; Process pressure; Process viscosity
3) For gases: Condition of the scale (st. or actual)
4) Options: Tag No.; Customer specific notes
### PROCESS CONNECTION TABLE FOR METAL TUBES

**Table 10**

<table>
<thead>
<tr>
<th>Code</th>
<th>Code</th>
<th>Code</th>
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<td>DN25</td>
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<td>DN32</td>
<td>DN40</td>
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<td>DN125</td>
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<tr>
<td>DN100</td>
<td>DN125</td>
<td>DN150</td>
</tr>
</tbody>
</table>

**Process connection:**

1. **ASME Flange**
   - L = face to face length
   - Accuracy: 2.5% instead of 1.6% (q = 50%)

2. **EN Flange**
   - PN10/PN16
   - Form B2 (Opt.: D10)

3. **Rosita Flange**
   - PN40
   - Form B2 (Opt.: D30)

4. **DN11851 Flange**
   - PN10/PN16
   - Form B2 (Opt.: D10)

5. **ASME-Flange with groove (Opt.):**
   - Code T4
   - PN40
   - Form B2 (Opt.: D30)

6. **Clamp:**
   - Code S2
   - Code S5

7. **Float:**
   - Code S4
   - Code S5

8. **Pipe Fitting:**
   - Code D2
   - Code D4

9. **Thread:**
   - DN20
   - DN25
   - DN32

10. **NPT:**
    - DN25
    - DN32
    - DN40

11. **Male thread:**
    - DN25
    - DN32
    - DN40

12. **Female thread:**
    - DN25
    - DN32
    - DN40

13. **Flange:**
    - DN25
    - DN32
    - DN40

14. **Valve:**
    - DN25
    - DN32
    - DN40

15. **Valve Body:**
    - DN25
    - DN32
    - DN40

16. **Valve Seat:**
    - DN25
    - DN32
    - DN40

17. **Float Valve:**
    - DN25
    - DN32
    - DN40

18. **Valve Handle:**
    - DN25
    - DN32
    - DN40

19. **Valve Stem:**
    - DN25
    - DN32
    - DN40

20. **Valve Bonnet:**
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    - DN32
    - DN40

21. **Valve Bonnet Seat:**
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    - DN32
    - DN40

22. **Valve Bonnet Stem:**
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    - DN40

23. **Valve Bonnet Handle:**
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    - DN40

24. **Valve Bonnet Stem Handle:**
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25. **Valve Bonnet Stem Handle Seat:**
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26. **Valve Bonnet Stem Handle Seat Stem:**
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27. **Valve Bonnet Stem Handle Seat Stem Handle:**
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28. **Valve Bonnet Stem Handle Seat Stem Handle Seat:**
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29. **Valve Bonnet Stem Handle Seat Stem Handle Seat Stem:**
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30. **Valve Bonnet Stem Handle Seat Stem Handle Seat Stem Handle:**
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31. **Valve Bonnet Stem Handle Seat Stem Handle Seat Stem Handle Seat:**
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33. **Valve Bonnet Stem Handle Seat Stem Handle Seat Stem Handle Seat Stem Handle:**
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36. **Valve Bonnet Stem Handle Seat Stem Handle Seat Stem Handle Seat Stem Handle Seat Handle Handle:**
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37. **Valve Bonnet Stem Handle Seat Stem Handle Seat Stem Handle Seat Stem Handle Seat Handle Handle Handle:**
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38. **Valve Bonnet Stem Handle Seat Stem Handle Seat Stem Handle Seat Stem Handle Seat Handle Handle Handle Handle:**
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39. **Valve Bonnet Stem Handle Seat Stem Handle Seat Stem Handle Seat Stem Handle Seat Handle Handle Handle Handle Handle:**
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<td>16.9</td>
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<td>21.2</td>
<td>21.2</td>
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</tbody>
</table>

- Pressure loss at the float with water or air.
- For higher viscosity the specified precision is no more guaranteed.
- Flow is referred to 20°C and 1 bar abs.
- Flow in US Gallons per minute at 70°F.
- Flow referred to 0°C and 1.013 bar abs at operation conditions of 20°C and 1.013 bar abs.
- 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.

For your special application please use the Rota Yokogawa Sizing-Program.
# PROCESS CONNECTION- AND FLOW-TABLE FOR TUBES WITH PTFE LINING

## Table 12

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1</td>
<td>-</td>
<td>250</td>
<td>1¼&quot;</td>
<td>1½&quot;</td>
<td>250</td>
<td>1.6</td>
<td>7</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>-</td>
<td>250</td>
<td>1½&quot;</td>
<td>2&quot;</td>
<td>300</td>
<td>3.3</td>
<td>12</td>
<td>-</td>
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<tr>
<td>3</td>
<td>-</td>
<td>250</td>
<td>2&quot;</td>
<td>2½&quot;</td>
<td>500</td>
<td>5.0</td>
<td>20</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>-</td>
<td>250</td>
<td>2½&quot;</td>
<td>3&quot;</td>
<td>800</td>
<td>8.0</td>
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<td>5</td>
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<td>250</td>
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<td>4&quot;</td>
<td>1100</td>
<td>11.0</td>
<td>35</td>
<td>-</td>
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<td>6</td>
<td>-</td>
<td>250</td>
<td>4&quot;</td>
<td>4½&quot;</td>
<td>1400</td>
<td>14.0</td>
<td>45</td>
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### Notes:

1. **L** = Mounting length
2. ** Pressure loss at the float with water or air.
3. ** As from this viscosity the specified precision is no more guaranteed.**
4. ** Flow is referred to 20°C and 1 bar abs.**
5. ** Flow in US Gallons per minute at 70°F.**
6. ** Flow referred to 0°C and 1.013 bar abs at operation conditions of 20°C and 1,013 bar abs.**
7. ** Flow in Standard cubic feet per minute referred to 60°F and 14.7 PSI at operation conditions of 70°F und 14.7 PSI abs.**

For your special application please use the Rota Yokogawa Sizing-Program.
The temperature graphs are reference values for size DN100. They may be influenced negative by trapped heat, external heat sources or radiated heat and influenced positive for smaller sizes.

Insulation means rock wool 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 explosion proof certification the temperature limits according the certificate of conformity must be regarded (see also page 4 to 6).
### Minimum ambient temperatures:

<table>
<thead>
<tr>
<th>Flow meter</th>
<th>Model code</th>
<th>Minimum ambient temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAMC with local indicator</td>
<td>RAMCxx-xxxx-xxxx-TxxNNN</td>
<td>-25°C; -40°C with option /A26 *)</td>
</tr>
<tr>
<td>RAMC with standard limit switches</td>
<td>RAMCxx-xxxx-xxxxx /K1.../K3</td>
<td>-25°C</td>
</tr>
<tr>
<td>RAMC with fail safe limit switches /K6.../K8</td>
<td>RAMCxx-xxxx-xxxxx /K6.../K8</td>
<td>-25°C; -40°C with option /A26 *)</td>
</tr>
<tr>
<td>RAMC with fail safe limit switches /K9.../K10</td>
<td>RAMCxx-xxxx-xxxxx /K9.../K10</td>
<td>-25°C</td>
</tr>
<tr>
<td>RAMC with electronic transmitter</td>
<td>RAMCxx-xxxx-xxxxx /K1.../K3</td>
<td>-25°C</td>
</tr>
<tr>
<td></td>
<td>RAMCxx-xxxx-xxxxx /K6.../K8</td>
<td>-25°C; -40°C with option /A26 *)</td>
</tr>
<tr>
<td></td>
<td>RAMCxx-xxxx-xxxxx /K9.../K10</td>
<td>-25°C; -40°C with option /A26 *)</td>
</tr>
<tr>
<td>RAMC with electronic transmitter PA</td>
<td>RAMCxx-xxxx-xxxxx /KS1</td>
<td>-25°C; -40°C with option /A26 *)</td>
</tr>
<tr>
<td></td>
<td>RAMCxx-xxxx-xxxxx /KS1 /K1.../K3</td>
<td>-25°C; -40°C with option /A26 *)</td>
</tr>
<tr>
<td></td>
<td>RAMCxx-xxxx-xxxxx /KS1 /K6.../K8</td>
<td>-25°C; -40°C with option /A26 *)</td>
</tr>
<tr>
<td></td>
<td>RAMCxx-xxxx-xxxxx /KS1 /K9.../K10</td>
<td>-25°C</td>
</tr>
<tr>
<td></td>
<td>RAMCxx-xxxx-xxxxx /KS3</td>
<td>-25°C; -40°C with option /A26 *)</td>
</tr>
<tr>
<td></td>
<td>RAMCxx-xxxx-xxxxx /KS3 /K1.../K3</td>
<td>-25°C</td>
</tr>
<tr>
<td></td>
<td>RAMCxx-xxxx-xxxxx /KS3 /K6.../K8</td>
<td>-25°C; -40°C with option /A26 *)</td>
</tr>
<tr>
<td></td>
<td>RAMCxx-xxxx-xxxxx /KS3 /K9.../K10</td>
<td>-25°C</td>
</tr>
<tr>
<td></td>
<td>RAMCxx-xxxx-xxxxx /KN1</td>
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<td>RAMCxx-xxxx-xxxxx /KN1 /K1.../K3</td>
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<tr>
<td></td>
<td>RAMCxx-xxxx-xxxxx /KN1 /K6.../K8</td>
<td>-25°C; -40°C with option /A26 *)</td>
</tr>
<tr>
<td></td>
<td>RAMCxx-xxxx-xxxxx /KN1 /K9.../K10</td>
<td>-25°C</td>
</tr>
<tr>
<td></td>
<td>RAMCxx-xxxx-xxxxx /ES1</td>
<td>-25°C; -40°C with option /A26 *)</td>
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<td></td>
<td>RAMCxx-xxxx-xxxxx /ES1 /K1.../K3</td>
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<td>RAMCxx-xxxx-xxxxx /ES1 /K6.../K8</td>
<td>-25°C; -40°C with option /A26 *)</td>
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<td>RAMCxx-xxxx-xxxxx /ES1 /K9.../K10</td>
<td>-25°C</td>
</tr>
<tr>
<td></td>
<td>RAMCxx-xxxx-xxxxx /ES3</td>
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<td></td>
<td>RAMCxx-xxxx-xxxxx /FS1 /....</td>
<td>-25°C</td>
</tr>
<tr>
<td></td>
<td>RAMCxx-xxxx-xxxxx /CS1 /....</td>
<td>-25°C</td>
</tr>
<tr>
<td></td>
<td>RAMCxx-xxxx-xxxxx /NS1 /....</td>
<td>-25°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RAMC intrinsic safe type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RAMC flame proof or dust proof type</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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</table>

*) Below -25°C the LC-display will not work. Also the push buttons should not be used below -25°C !
DIMENSIONS AND WEIGHTS

<table>
<thead>
<tr>
<th></th>
<th>a</th>
<th>b</th>
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<tbody>
<tr>
<td>Housing type 90</td>
<td>104</td>
<td>161</td>
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<tr>
<td>Housing type 91 standard</td>
<td>110</td>
<td>165</td>
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<tr>
<td>Housing type 91 flame proof, option /KF1</td>
<td>118</td>
<td>165</td>
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</table>

fig. 8a  Front view housing type 90

fig. 8b  Front view housing type 91

fig. 9  Metal version

fig. 10  Metal version with lining
### Table 13

#### Inner diameter of stainless steel flanges

<table>
<thead>
<tr>
<th>Pos.</th>
<th>EN-flange without groove</th>
<th>ASME-flange</th>
<th>Rosita-flange</th>
<th>Pos.</th>
<th>EN-flange</th>
<th>ASME-flange</th>
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<tr>
<td></td>
<td>Du mm</td>
<td>Do mm</td>
<td>Size</td>
<td>Du mm</td>
<td>Do mm</td>
<td>Du=Do mm</td>
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<tr>
<td>1</td>
<td>DN15-DN50</td>
<td>20.7</td>
<td>20.7</td>
<td>½” - 1”</td>
<td>20.7</td>
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<tr>
<td>2</td>
<td>DN15-DN50</td>
<td>29.5</td>
<td>29.5</td>
<td>⅜” - 2”</td>
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<td>3</td>
<td>DN25-DN50</td>
<td>45.2</td>
<td>45.2</td>
<td>1” - 2”</td>
<td>45.2</td>
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<tr>
<td>4</td>
<td>DN50-DN100</td>
<td>62.0</td>
<td>76.0</td>
<td>2” - 3”</td>
<td>62.0</td>
<td>65.5</td>
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<td>5</td>
<td>DN80-DN150</td>
<td>94.0</td>
<td>94.0</td>
<td>3” - 6”</td>
<td>94.0</td>
<td>94.0</td>
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<td>6</td>
<td>DN100-DN150</td>
<td>116.0</td>
<td>116.0</td>
<td>4” - 6”</td>
<td>116.0</td>
<td>116.0</td>
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</table>

*see table 10, 11, 12

---

**fig. 11** RAMC type 91 and Option /A16 and T2  
**fig. 12** RAMC with connection R4/ T4
**Table 14 Diameter for connection sizes S4**

<table>
<thead>
<tr>
<th>Position *)</th>
<th>Size [mm]</th>
<th>di [mm]</th>
<th>da [mm]</th>
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<tr>
<td>1</td>
<td>DN25 / 1’’</td>
<td>36</td>
<td>50.5</td>
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<td></td>
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<tr>
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<td>DN40 / 1 ½ ‘’</td>
<td>36</td>
<td>50.5</td>
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<td>2</td>
<td>DN25 / 1’’</td>
<td>36</td>
<td>50.5</td>
</tr>
<tr>
<td></td>
<td>DN32</td>
<td>36</td>
<td>50.5</td>
</tr>
<tr>
<td></td>
<td>DN40 / 1 ½ ‘’</td>
<td>36</td>
<td>50.5</td>
</tr>
<tr>
<td>3</td>
<td>DN50 / 2’’</td>
<td>47.8</td>
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<tr>
<td>4</td>
<td>DN65 / 3’’</td>
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<td>91</td>
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<tr>
<td>5</td>
<td>DN100 / 4’’</td>
<td>97.6</td>
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*) see table 10, 11, 12

**Table 15 Weights**

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<td>3 - 5</td>
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<td>6.5 - 8</td>
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<td>4</td>
<td>8.6 - 11</td>
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<td>13 - 16</td>
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<td>17 - 20</td>
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</table>

*) see table 10, 11, 12

Indicator on distance (option /A16) additional 1kg
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