

General Specifications

Model RAKD Small Metal Rotameter

GS 01R01B30-00E-E

A float is guided concentrically in a conic metal tube.
The position of this float is magnetically transmitted to the indicator.
The short-tube Rotameter is used for measurement of low flow rates of liquids and gases.
Its special application is in troubled, opaque or aggressive mediums and under high pressure.
The instrument is mounted in a vertical pipeline with flow direction upwards.
When the process conditions are changed the scale needs to be replaced by a new one of which the values should be calculated.

FEATURES

- Different process connections like internal threads and flanges
- With fine control valve (horizontal connection) and without valve (vertical connection)
- All wetted parts of stainless steel AISI 316Ti (1.4571)
- Measuring accuracy acc. Directive VDI/VDE 3513 sheet 2 ($q_G = 50\%$)
- Round industrial standardized stainless steel housing with degree of protection IP 66/67
- Light, guided floats resulting in low pressure loss and stable float movement
- Maximum flow range 1-250 l/h water resp. 40-8000 l/h air, portioned in 13 flow ranges with a relation of 1:10
- Pressure controller (normal up to 25 bar at 20°C) for a maximum flow of 100 l/h water resp. 3.250 l/h air (only in combination with valve)
- Electronic μ P-controlled transmitter with linearized output
- Electrical connection by fast connection technique (Quickon)
- Limit switches, also available as "Fail Safe" version
- Connection of common transformer isolated barriers and transmitter power supplies possible
- Intrinsically safe version (Ex-i): ATEX, FM, CSA, SAA, NEPSI, CCOE
- Suitable for SIL application, FMEDA report available



Fig. 1a Indicator RAKD with tube without valve



Fig. 1b Tube RAKD with valve

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STANDARD SPECIFICATIONS

The responsibility with respect to the suitability and according application of our flowmeter is only situated by the customer.

MEASURING TUBE

| | |
|----------------------------------|--|
| Materials of wetted parts | : Stainless steel AISI 316Ti (1.4571) other materials on request |
| Fluids to be measured | : Liquid or gas |
| Measuring range | : see flow table |
| Measuring range ratio | : 10:1 |
| Process connections | : |
| - Inner thread | : G1/4; 1/4 NPT; G 3/8; 3/8; NPT |
| - Cutting ring | : 6 mm; 8 mm; 10 mm; 12 mm |
| - Cutting ring (Swagelok) | : 6 mm; 8 mm; 10 mm; 12 mm |
| - Nozzle | : 6 mm; 8 mm |
| - Flange | : - acc. EN 1092-1 DN15 and DN25 PN40; - acc. ASME B 16.5 1/2" and 1" 150 lbs, 300 lbs - gasket PTFE |
| Process pressure | : depends on process connection; see model code |
| Process temperature | : without valve -25°C to 250°C with valve -25°C to 150°C See also fig. 6. Lower temperatures on request. |
| Measurement accuracy | : acc. Directive VDI/VDE 3513 sheet 2 ($q_G=50\%$) 4% |
| Installation | : |
| - Installation position | : vertical |
| - Flow direction | : upwards |
| - Face to face length | : 125 mm (with flange 250 mm) |
| Weight | : see table 12 |

LOCAL INDICATOR

(Indicator/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. | |
| Indication scale | : Flow units |
| Indicator housing | : |
| - Material | : Stainless steel AISI 304 (1.4301) |
| - Degree of Protection | : IP66/67 |
| Scales : | |
| - Standard : | removable aluminium plate with scale (double scale as option) |
| Transportation and storage condition | : - 40°C to +110°C |

ELECTRONIC TRANSMITTER

(Indicator/Code -E)

| | |
|---|--|
| Temperature range | : -25°C to +65°C |
| Transportation and storage condition | : -40°C to +70°C |
| Process-/ Ambient temperature : | |
| The dependency of the process temperature from the ambient temperature is shown in fig.6. | |
| Power supply | : 13.5 ... 30 V DC |
| Load resistance | : (U-13.5V) /20mA |
| Analog output | : 4-20 mA |
| Linearity | : $\leq \pm 0.25\%$ f.s. |
| Hysteresis | : $\leq \pm 0.15\%$ f.s. |
| Repeatability | : $\leq \pm 0.16\%$ f.s. |
| Influence of power supply | |
| | : $\leq \pm 0.1\%$ f.s. |
| Temp. coefficient of analog output | |
| | : $\leq \pm 0.5\%$ /10 K f.s. |
| AC-part of analog output | |
| | : $\leq \pm 0.15\%$ f.s. |
| Long time stability | : $\leq \pm 0.2\%$ / year |
| Maximum output current | |
| | : 21.5 mA |
| Output current in case of failure | |
| | : ≤ 3.6 mA (NAMUR NE 43) |
| Response time (99%) | |
| | : approx. 1 s |
| Pulse output (Option /CP) | |
| | : Electronic switch with galvanic isolation acc. EN 60947-5-6 (NAMUR) |
| - Pulse length | : 200 ms |
| - Max. frequency | : 4 Hz |
| - Pulse rate | : $Q_{max} \leq 1 \rightarrow 0.0001$ $1 < Q_{max} \leq 10 \rightarrow 0.001$ etc. e.g.. $Q_{max} = 1$ m ³ /h \rightarrow 1 Puls = 0.0001 m ³ = 0.1 |
| Electromagnetic compatibility (EMC) | |
| - Acc. EN 61326-1: 2006, Class A, Table 2 and EN 61326-2-3: 2006 | |

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 |

ELECTRICAL CONNECTION (Indicator/Code -E) :

| | |
|--------------------------------------|--|
| Type | : Quickon |
| Cable diameter | : 4 – 6 mm |
| Maximum cross section of core | : \varnothing 0.34 to 0.75 mm ² |

LIMIT SWITCHES IN STANDARD VERSION

(option /K1 to /K3)

Type : Inductive proximity switch SC2-NO
acc. DIN EN 60947-5-6

Nominal voltage : 8V DC

Output signal : ≤ 1 mA or ≥ 3 mA

Hysteresis : < 0.5 mm

LIMIT SWITCHES IN FAIL SAFE VERSION

(option /K6 to /K10)

Type : Inductive proximity switch
SJ2-SN; SJ2-S1N acc. DIN EN 60947-5-6

Nominal voltage : 8V DC

Output signal : ≤ 1 mA or ≥ 3 mA

Hysteresis : < 0.5 mm

HYSTERESIS OF LIMIT SWITCHES**Min-contact / Max-contact :**

- pointer movement : ≈ 0.8 mm

- float movement : ≈ 0.8 mm

Minimum distance between 2 contacts

: ≈ 8 mm

ELECTRICAL CONNECTION (option /K1 to /K10) :

Type : Quickon

Cable diameter : 4 – 6 mm

Maximum cross section of core

: $\varnothing 0.34$ to 0.75 mm²

POWER SUPPLY FOR LIMIT SWITCHES (Option /W___)

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

- KFD2-SH-Ex1 (24 V DC),
Fail Safe, only one channel

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

Relay output : 1 or 2 potential-free change over contact(s)

Switching capacity

: max. 250V 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.

SWITCHING LEVELS FOR LIMIT SWITCHES**Table 1** Min, Max and Min-Max-contact in standard version

| | | Option /K1 | Option /K2 | Option /K3 |
|----------|----------|------------|------------|------------|
| Function | Pointer | Signal | Signal | Signal |
| | | SC2-NO | SC2-NO | SC2-NO |
| MAX | above LV | ---- | 1 mA | 1 mA |
| | below LV | ---- | 3 mA | 3 mA |
| | | | | |
| Function | Pointer | Signal | Signal | Signal |
| | | SC2-NO | SC2-NO | SC2-NO |
| MIN | above LV | 3 mA | ---- | 3 mA |
| | below LV | 1 mA | ---- | 1 mA |

Note: LV = Limit value

Table 2 Min, Max and Min-Max-contact in fail-safe version

| | | Option /K6 | Option /K7 | Option /K8 |
|----------|-----------|------------|------------|------------|
| Function | Pointer | Signal | Signal | Signal |
| | | SJ2-SN | SJ2-SN | SJ2-SN |
| MAX | above LV | ---- | 1 mA | 1 mA |
| | below LV | ---- | 3 mA | 3 mA |
| | Fail Safe | ---- | 1 mA | 1 mA |
| | | | | |
| Function | Pointer | Signal | Signal | Signal |
| | | SJ2-SN | SJ2-SN | SJ2-SN |
| MIN | above LV | 3 mA | ---- | 3 mA |
| | below LV | 1 mA | ---- | 1 mA |
| | Fail Safe | 1 mA | ---- | 1 mA |

Note: LV = Limit value

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

| | | Option /K9 |
|----------|-----------|------------|
| Function | Pointer | Signal |
| | | SJ2-S1N |
| MIN | above LV | 3 mA |
| | below LV | 1 mA |
| | Fail Safe | 1 mA |
| | | |
| Function | Pointer | Signal |
| | | SJ2-SN |
| MIN | above LV | 3 mA |
| | below LV | 1 mA |
| | Fail Safe | 1 mA |

Note: LV = Limit value

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

| | | Option /K10 |
|----------|-----------|-------------|
| Function | Pointer | Signal |
| | | SJ2-SN |
| MAX | above LV | 1 mA |
| | below LV | 3 mA |
| | Fail Safe | 1 mA |
| | | |
| Function | Pointer | Signal |
| | | SJ2-S1N |
| MAX | above LV | 1 mA |
| | below LV | 3 mA |
| | Fail Safe | 1 mA |

Note: LV = Limit value

CONTROLLER (Option /R1 and R3)

Differential pressure controller for a constant flow at fluctuations of the process pressure.

These are no valves to reduce the pressure.

- **Controller /R1** for liquids with variable inlet or outlet pressure and for gases with variable inlet pressure and constant back pressure.

- **Controller /R3** for gases with fluctuations of the back pressure.

- Max. liquid flow** : 100 l/h
- Max. gas flow** : 3250 l/h
- Max. pressure** : 25 bar
- Recommended differential pressure** : >400 mbar
- Temperature range** : -25°C to + 80°C

Materials :

Table 5

| | Housing | Diaphragm | Springs |
|-----------|------------|-----------|------------|
| /R1 / /R3 | CrNi-Steel | PTFE | CrNi-Steel |

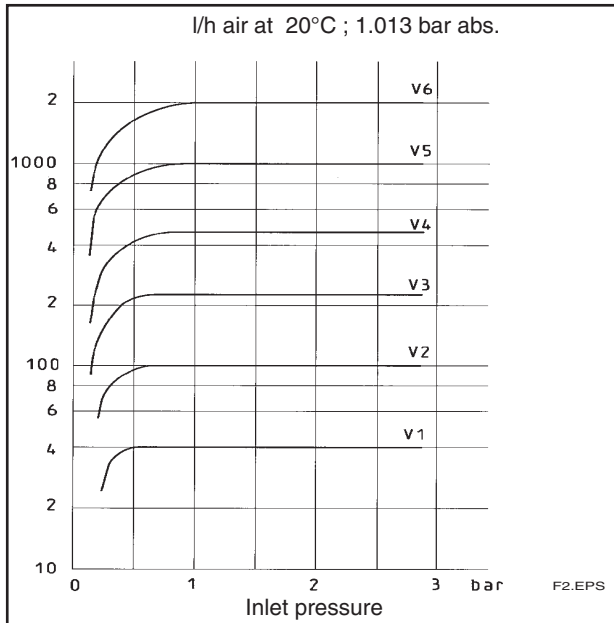


Fig. 2 Diagram controller characteristic

COMPLIANCE WITH IEC 61508

RAKD with local indicator and standard or fail safe limit switches (RAKD□□-□□SS-□□□□□□-□□□□□□/NNN/K1...K10):
Suitable for application in safety functions up to and including SIL2.

RAKD with valve and controller with local indicator and standard or fail safe limit switches (RAKD□□-□□SS-□□V□□□-□□□□□□/NNN/R□/K1...K10):
Suitable for application in safety functions up to and including SIL1.

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.

**HAZARDOUS AREA SPECIFICATIONS
RAKD with ATEX- certification “intrinsic safe”
(option /KS1)**

Certificate :

KEMA 00ATEX 1037X

Output signal :

4–20 mA

Explosion proof :

Ex ia IIC T6; group II ; category 2G

Entity parameter :

Table 6

| | Analog output | Pulse output | Limit switch type 2 /K1-/K3 | Limit switch type 3 /K1-/K3 | Limit switch type 2 /K6-/K8 | Limit switch type 3 /K6-/K8 |
|---------|---------------|--------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Ui [V] | 30 | 16 | 16 | 16 | 16 | 16 |
| Ii [mA] | 100 | 20 | 25 | 52 | 25 | 52 |
| Pi [mW] | 750 | 64 | 64 | 169 | 64 | 169 |
| Li [mH] | 0.73 | 0 | 0.15 | 0.15 | 0.1 | 0.1 |
| Ci [nF] | 2.4 | 0 | 150 | 150 | 30 | 30 |

Temperature specification :

Table 7

| Configura-tion | Max. ambient temperature | Max. process temperature | Temperature class |
|----------------------------|--------------------------|--------------------------|-------------------|
| Transmitter 4-20mA / Pulse | 65°C | 65°C | T6 |
| | 50°C | 80°C | |
| | 45°C | 100°C | T5 |
| | 38°C | 135°C | T4 |
| Limit switch(es) type 2 | 65°C | 65°C | T6 |
| | 80°C | 80°C | T5 |
| | 59°C | 100°C | |
| | 100°C | 100°C | T4 |
| Limit switch(es) type 3 | 73°C | 135°C | T4 |
| | 24°C | 65°C | |
| | 37°C | 80°C | |
| | 34°C | 100°C | |
| | 57°C | 80°C | |
| | 54°C | 100°C | |
| 48°C | 135°C | | |

For the configuration where a transmitter is combined with limit switches, the temperature class is determined by the most restrictive combinations of maximum ambient temperature and maximum process temperature.

Description of limit switch type 2 and 3 see ATEX certificates from Pepperl & Fuchs:

- PTB 99 ATEX 2219X (SC2-NO) for /K1 to /K3
- PTB 00 ATEX 2049X (SJ2-S.N) for /K6 to /K10

RAKD “non incensive” (option /KN1)

Type “n” (non incensive) acc. EN 60079-15.

Explosion proof :

Ex nL IIC T6 protection „nL”; group II ; category 3G

Dust proof :

Ex II 3D; group II ; category 3D
Max. surface temperature : 80°C

Entity parameter :

see table 6

Temperature specification :

see table 7

RAKD with NEPSI- certification "intrinsic safe" (China) (option /NS1) :

Certificate :

GYJ05153

Output signal :

4–20 mA

Explosion proof :

Ex ia IIC T6

Max. Tamb. :

65°C

Limit switches :

option /K1 to /K8,

see certificates GYJ06542X and GYJ06543X

Entity parameter :

Table 8

| | Analog output | Pulse output | Limit switch type 2 /K1-/K3 | Limit switch type 3 /K1-/K3 | Limit switch type 2 /K6-/K8 | Limit switch type 3 /K6-/K8 |
|---------|---------------|--------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Ui [V] | 30 | 16 | 20 | 20 | 16 | 16 |
| Ii [mA] | 100 | 20 | 25 | 52 | 25 | 52 |
| Pi [mW] | 750 | 64 | 64 | 169 | 64 | 169 |
| Li [mH] | 0.73 | 0 | 0.15 | 0.15 | 0.1 | 0.1 |
| Ci [nF] | 2.4 | 0 | 150 | 150 | 30 | 30 |

Temperature specification :

Table 9

| Max. ambient temperature | Max. process temperature | Temperature class |
|--------------------------|--------------------------|-------------------|
| 65°C | 65°C | T6 |
| 50°C | 80°C | T6 |
| 45°C | 95°C | T5 |

Description of limit switch type 2 and 3 see ATEX certificates from Pepperl & Fuchs:

- PTB 99 ATEX 2219X (SC2-NO) for /K1 to /K3
- PTB 00 ATEX 2049X (SJ2-S.N) for /K6 to /K10

RAKD with CCOE- certification (India)

Option /KS1 must be selected. CCOE- certificate is available at your Yokogawa Sales Office.

Intrinsically safe and dust proof limit switches with ATEX-certification (only for indicator T with option /K1 ... /K10) (option /KS2) :

Certificate :

- PTB 99 ATEX 2219X (SC2-NO)
- PTB 00 ATEX 2049X (SJ 2-S.N)
- ZELM 03 ATEX 0128X (for dust proof)

Explosion proof :

EEx ia IIC T6, group II category 2G

Dust proof:

Ex iaD 20 T 108 °C, group II category 1D
Max. surface temperature : T108°C

Entity parameter :

see certificate of conformity

Intrinsically safe limit switches with SAA-certification (Australia) (only for indicator T with option /K1 ... /K10) (option /SS1) :

Certificate :

AUS Ex 02.3838X

Explosion proof :

Ex ia IIC T1 ... T6

Entity parameter :

see certificate of conformity

Intrinsically safe / non incandive limit switches with FM- certification (USA) (only for indicator T with option /K1 ... /K10) (option /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) (only for indicator T with option /K1 ... /K3) (option /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.

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

Type :

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

Certificate :

PTB 00 ATEX 2018

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. 5

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)
SAA: AUS Ex 3631X
- KFA6-SR2-Ex*-W: ATEX: PTB 00 ATEX 2081
CSA: 1029981 (LR 36087-19)
SAA: AUS Ex 3631X
- KHA6-SH-Ex1: ATEX: PTB 00 ATEX 2043
- KFD2-SR2-Ex*-W: ATEX: PTB 00 ATEX 2080
CSA: 1029981 (LR 36087-19)
SAA: AUS Ex 2244X
NEPSI:GYJ071116
- KFD2-SH-Ex1: ATEX: PTB 00 ATEX 2042
NEPSI:GYJ04443

Control circuit (ATEX):

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

Entity parameter:

see fig. 5 (ATEX) and certificate

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. 250V AC, max. 2 A

INSTALLATION

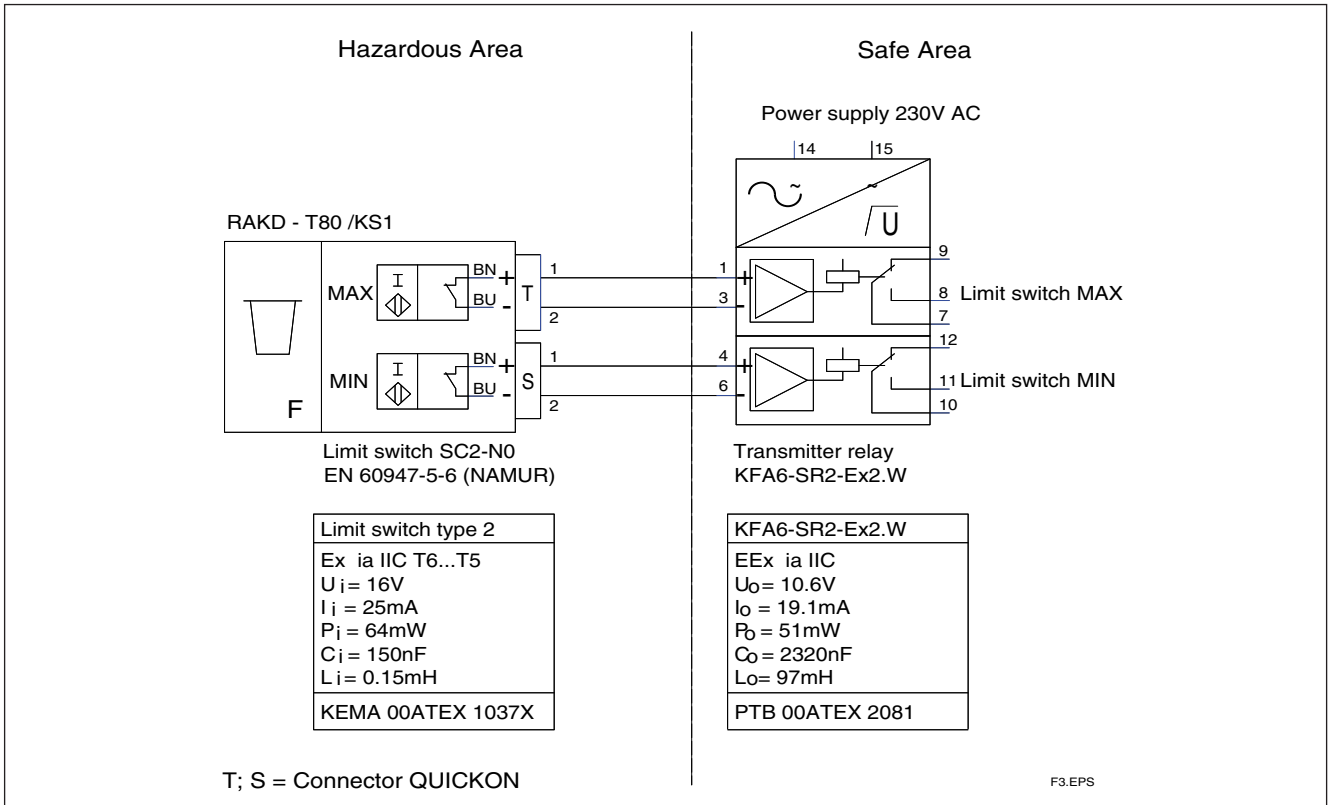


Fig. 3 ATEX- version of RAKD with 2 limit switches in combination with transmitter relay

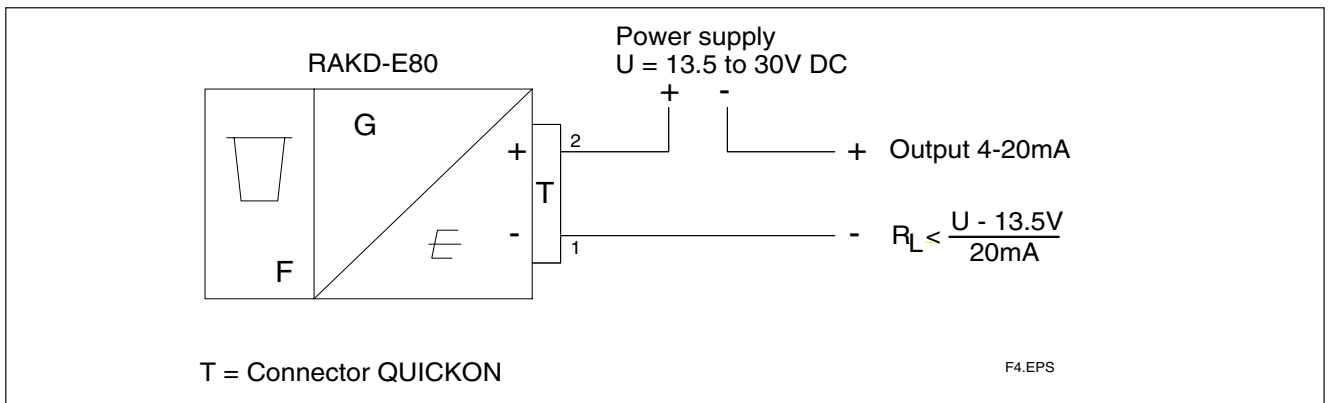


Fig. 4 RAKD with electronic transmitter

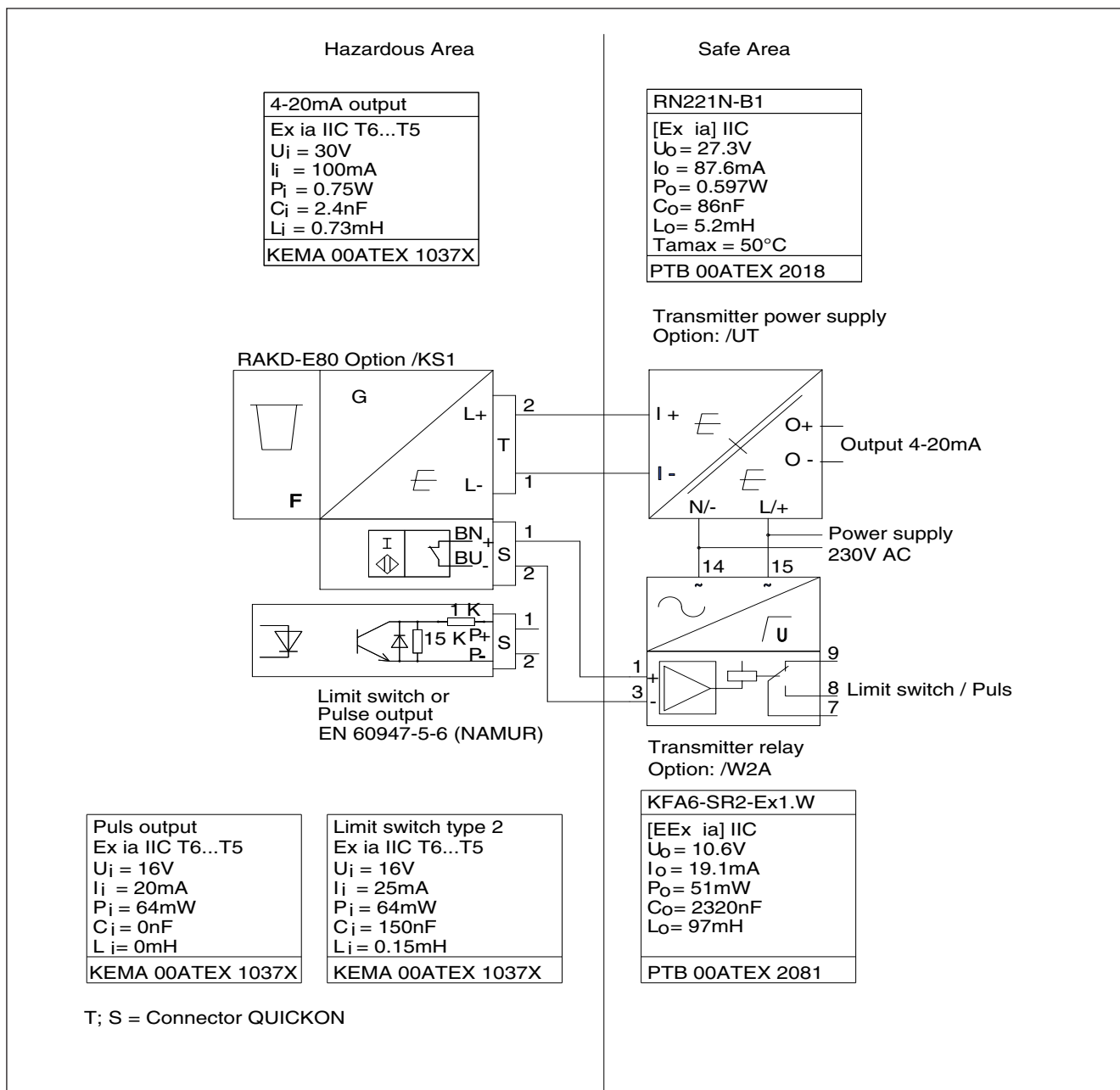


Fig. 5 ATEX- version of RAKD with electronic transmitter with power supply and limit switch or pulse output in combination with transmitter relay

TEMPERATURE SPECIFICATION

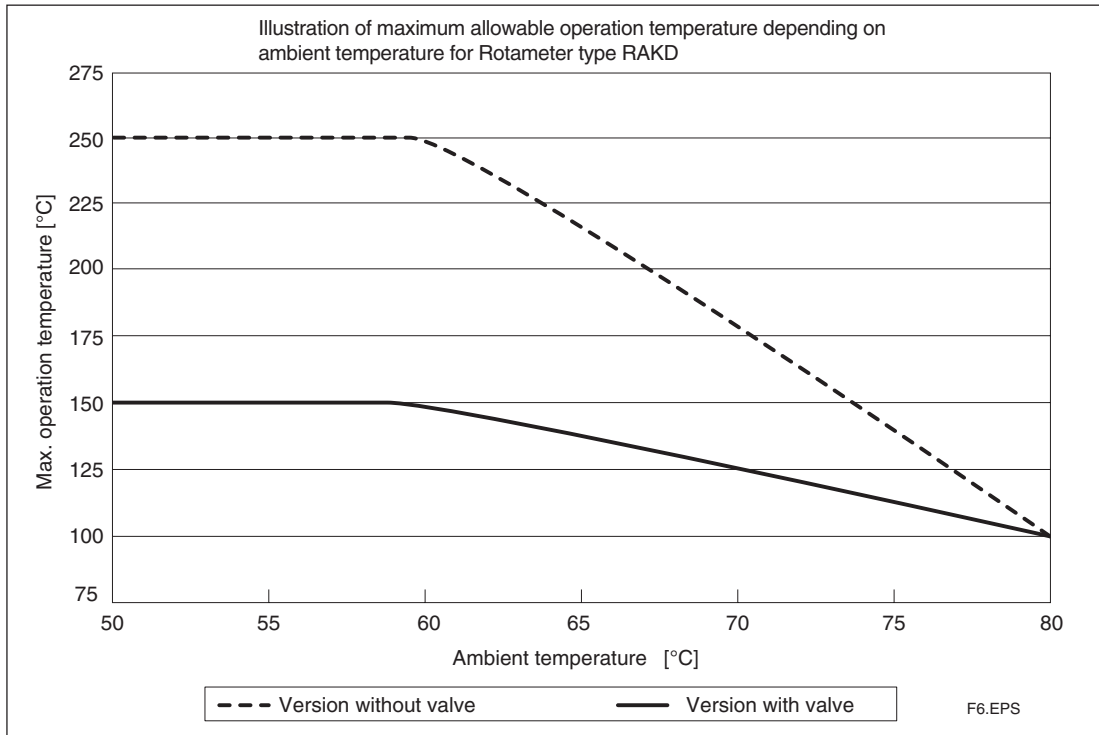


Fig. 6

For option /KS1 or /KN1 (Ex-i-versions ATEX) the maximum values for ambient and process temperature according to the respective temperature class mentioned in fig. 5 and table 7 must be regarded.

For option /NS1 (Ex-i-version NEPSI) the maximum values for ambient and process temperature according to the respective temperature class mentioned in table 9 must be regarded.

The minimum ambient temperature is -25°C. Lower temperatures on request.

MODEL AND OPTION SPECIFICATIONS

| Please make your decision in this order: | | | | |
|---|---|---|---|---|
| 1. Option controller | with controller | without controller | with controller | without controller |
| 2. Version | with valve | without valve | with valve | without valve |
| 3. Max. Flow | 1.0 - 100 l/h water 40 - 3250 l/h air 31 - 51 | 1.0 - 250 l/h water 40 - 8000 l/h air 31 - 53 | 1.0 - 100 l/h water 40 - 3250 l/h air 31 - 51 | 1.0 - 250 l/h water 5000 - 8000 l/h air 52 - 53 |
| Cone | | | | |
| 4. Process connection | Inner thread Cutting ring Cutting ring (Swagelok) Nozzle | Inner thread Cutting ring Cutting ring (Swagelok) Nozzle | Inner thread Cutting ring Cutting ring (Swagelok) Nozzle Flange | Inner thread Cutting ring Cutting ring (Swagelok) Flange |
| Specify the model code according the mentioned page | Page 9 | Page 10 | Page 11 | Page 12 |

Ordering instructions

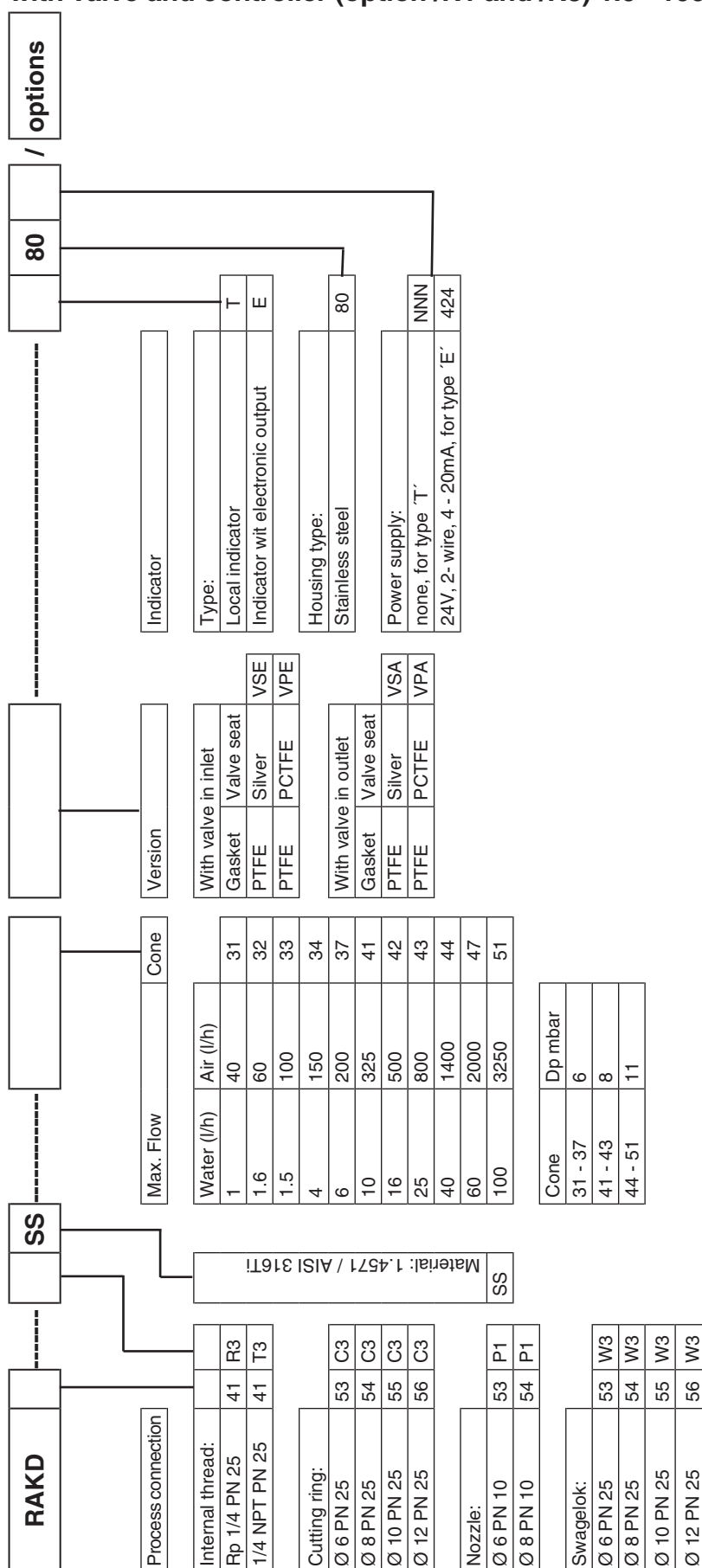
Standard:

- a: Model, suffix and option code
- b: Flow conditions
- c: Temperature
- d: Pressure
- e: Viscosity
- f: Density

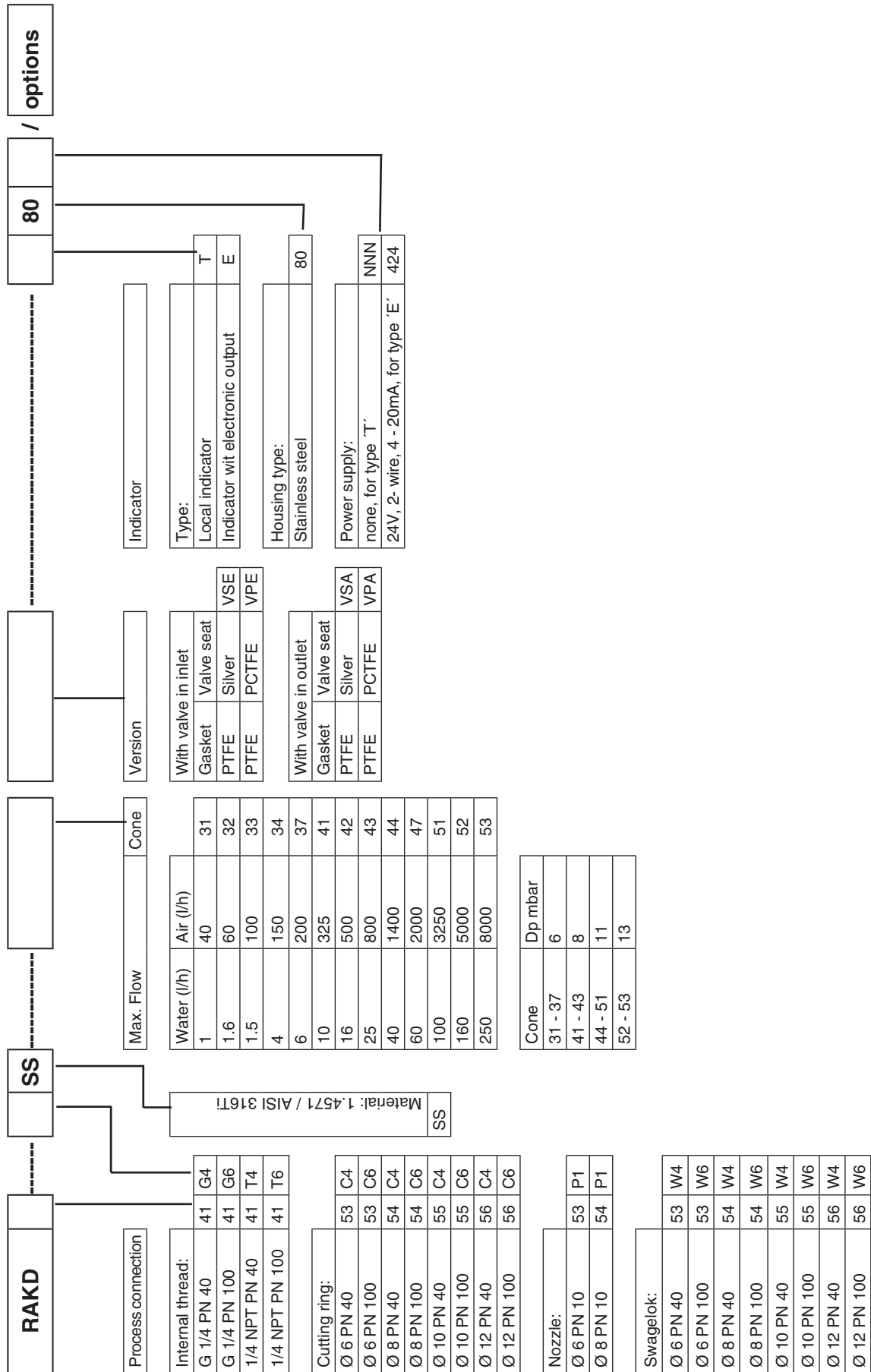
For gases: cross reference of the scale

Option/Bx: customer specification notes

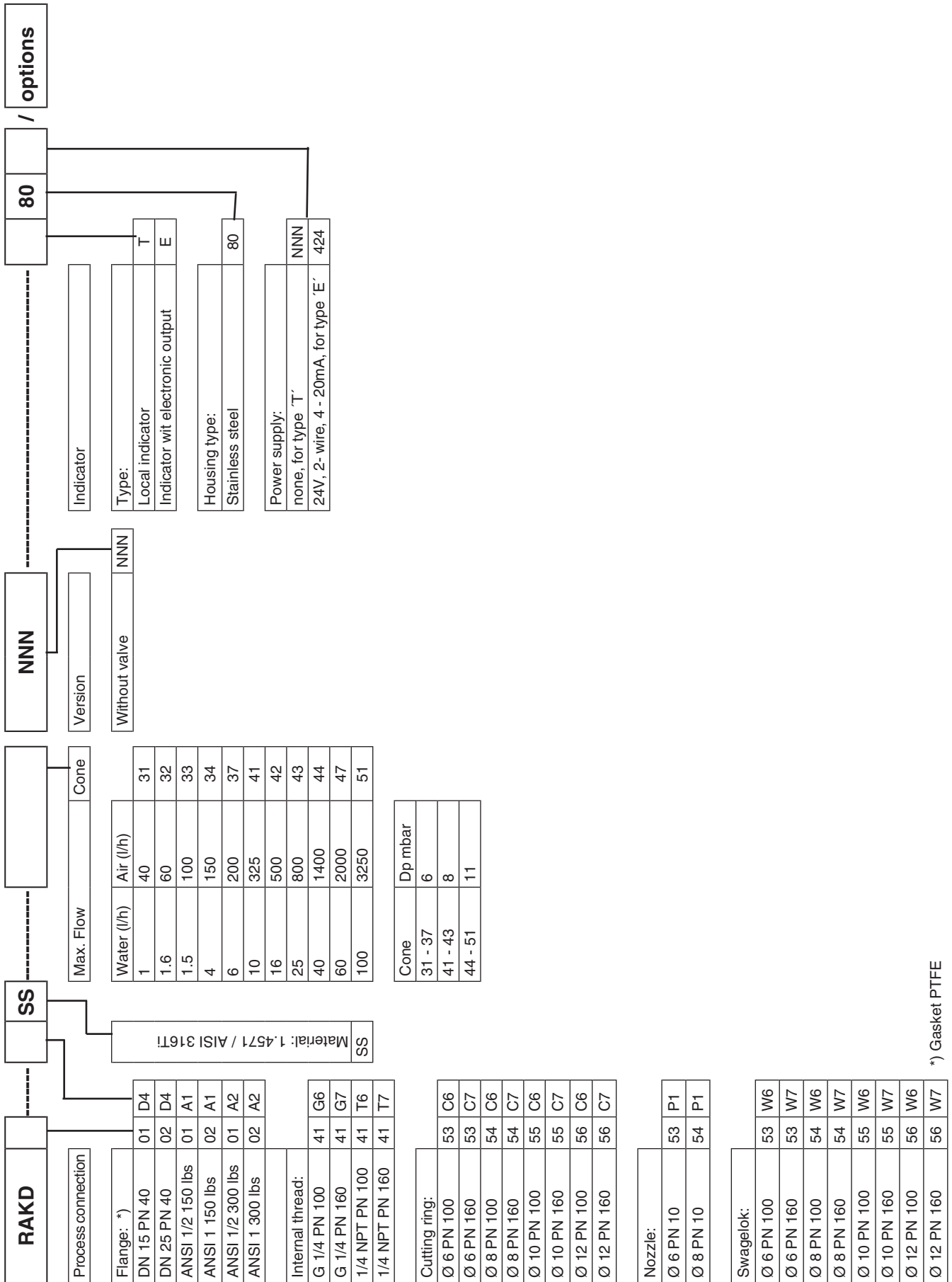
RAKD with valve and controller (option /R1 and /R3) 1.0 - 100 l/h water / 40 - 3250 l/h air



RAKD with valve 1.0 - 250 l/h water / 40 - 8000 l/h air

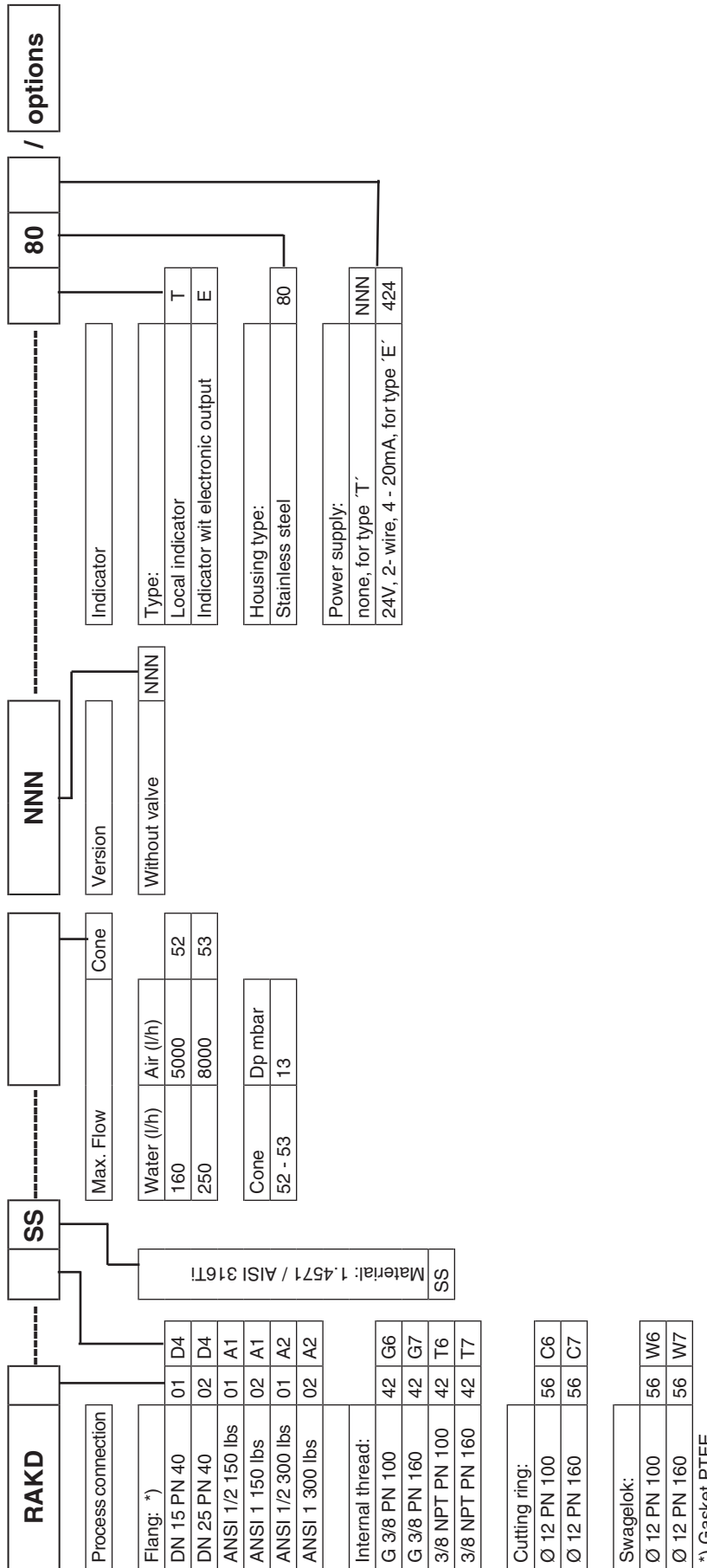


RAKD without valve 1.0 - 100 l/h water / 40 - 3250 l/h air



*) Gasket PTFE

RAKD without valve 160 - 250 l/h water / 5000 - 8000 l/h air



OPTIONS

| Options | Option code | Description | Restriction |
|---|--|--|---|
| Indicator | /A12 | US- engineering units | Only for indicator E |
| Marking | /B1 /B4 /B8 /B10 /BG /BD | Tag plate (SS) fixed by wire and marking on scale Neutral version Customer provided marking on label Percent scale Customer specific notes on scale Dual Scale | Plate 12 x 40 mm; max. 45 digits Not with option /P6; not with Ex-proof type Max. 45 digits Adjustment only possible for 1 fluid |
| 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 | Only for indicator T Only for indicator T Only for indicator T Only for indicator T |
| Pulse output | /CP | Pulse output, acc. EN 60947-5-6 (NAMUR) | Only for indicator E; not with limit switches |
| Hazardous area approvals | /KS1 /KS2 /KN1 /FS1 /CS1 /SS1 /NS1 | ATEX intrinsically safe „ia“ ATEX gas and dust proof limit switches, category 2G 1D ATEX category 3G „nL“ / 3D FM intrinsic safe / non incendive approval for limit switches (USA) CSA intrinsic safe approval for limit switches (Canada) SAA approval for limit switches (Australia) NEPSI approval (China) | Not for indicator T without limit switches Only for indicator T with limit switches Not for indicator T without limit switch Only for indicator T with limit switches Only for indicator T with limit switches; limit switches only /K1, /K2, /K3, only in combination with power supply /WxA or /WxB Only for indicator T with limit switches Not for indicator T without limit switches |
| Test and certificates | /H1 /PP /P2 /P3 /P6 /PM1 /PM4 /PM5 | Oil + fat free for wetted surfaces Pressure test report measuring system Certificate of Compliance with the order acc. to EN 10204: 2004- 2.1 As /P2 +Test report acc. to EN 10204: 2004- 2.2 Material certificate acc. to EN 10204: 2004- 3.1 PAMI test (1 test point : metering tube) PAMI test (4 test points : metering tube, connection heads, sealing plug) PAMI test (5 test points : metering tube, connection pieces, slip on flanges) | Not for /R1 and /R3 Only for tube, connection heads, screw sealing plug Only for models with valve Only for models with process connection D4, A1, A2 |
| Gost approval | /QR1 /QR2 /QR3 | GOST certificate for Russia GOST certificate for Kazakhstan GOST certificate for Uzbekistan | |
| Controller | /R1 /R3 | Pre pressure controller 1.4571 (only with valve in inlet; for gas with variable pre pressure and liquids with variable pre and back pressure) Back pressure controller 1.4571 (only with valve in outlet; for gas with variable back pressure) | Only for process connection R3, T3, C3, W3, P1; only with valve Only for process connection R3, T3, C3, W3, P1; only with valve |
| Power supply for electronic transmitter | /UT | RN221N-B1, 20 ... 250V DC/AC, Ex i | Only for indicator E |
| Power supply for limit switches (transmitter relay) | /W1A /W1B /W2A /W2B /W2E /W2F /W4A /W4B /W4E /W4F | KFA5-SR2-Ex1.W / 115 V AC, 1 channel KFA5-SR2-Ex2.W / 115 V AC, 2 channel KFA6-SR2-Ex1.W / 230 V AC, 1 channel KFA6-SR2-Ex2.W / 230 V AC, 2 channel KHA6-SH-Ex1 / 115/230 V AC, 1 channel, Fail Safe 2x KHA6-SH-Ex1 / 115/230 V AC, 1 channel, Fail Safe KFD2-SR2-Ex1.W / 24 V DC, 1 channel KFD2-SR2-Ex2.W / 24 V DC, 2 channel KFD2-SH-Ex1 / 24 V DC, 1 channel, Fail Safe 2x KFD2-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 /K1, /K2, /K3 Only for limit switches /K1, /K2, /K3 Only for limit switches /K6, /K7 Only for limit switches /K8, /K9, /K10 Only for limit switches /K1, /K2, /K3 Only for limit switches /K1, /K2, /K3 Only for limit switches /K1, /K2, /K3 Only for limit switches /K6, /K7 Only for limit switches /K8, /K9, /K10 |
| Instruction manuals | /IEn /IDn /IFn | 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. |

DIMENSIONS

Note : The dimensions a ; b ; c ; L1 ; L2 ; L3 are listed in table 10 and 11.

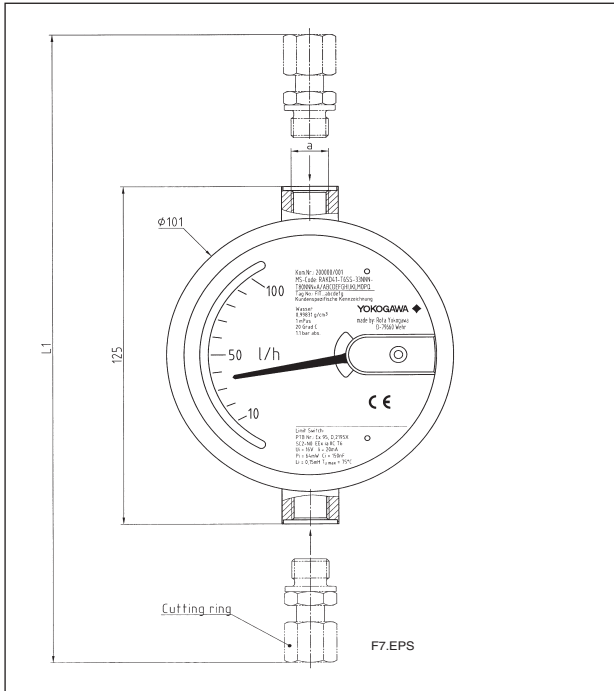


Fig. 7 Version without valve

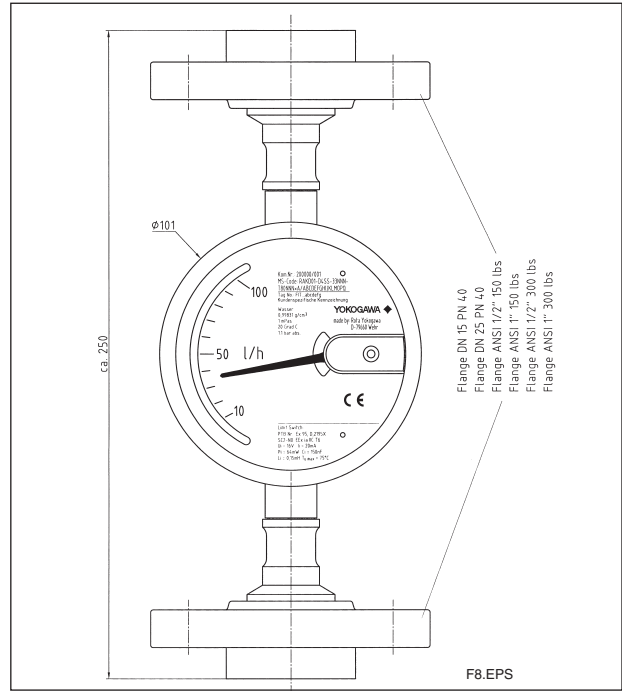


Fig. 8 Version with flange connection

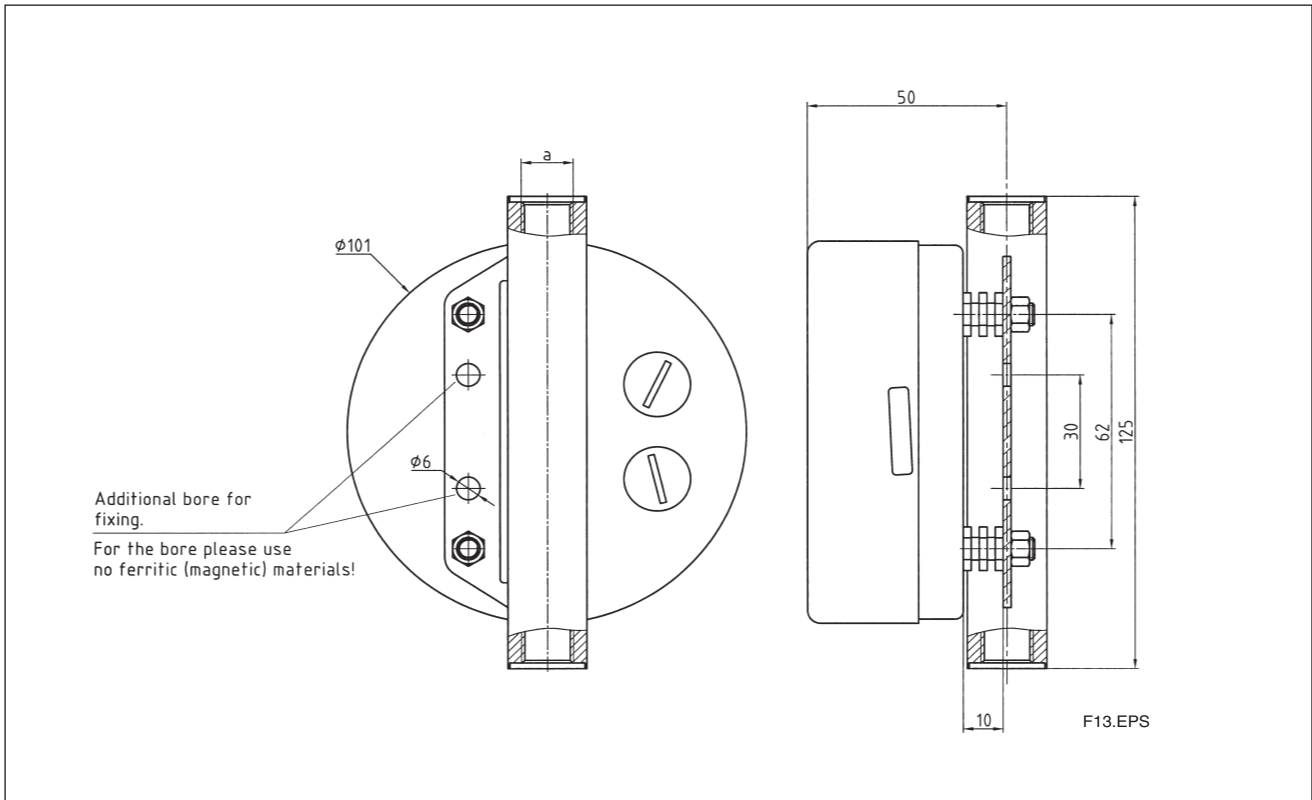


Fig. 9 Back view with mounting

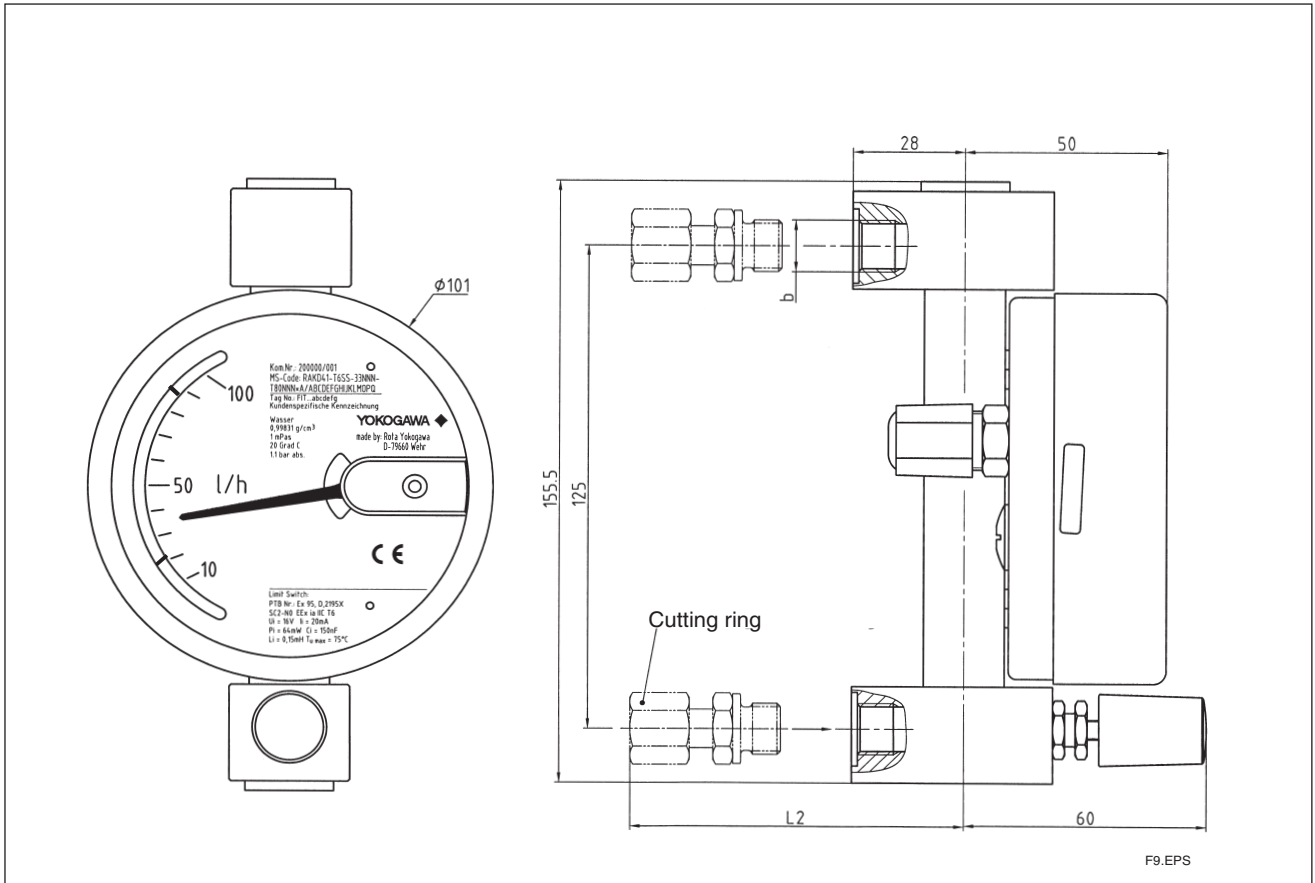


Fig. 10 Version with inlet valve

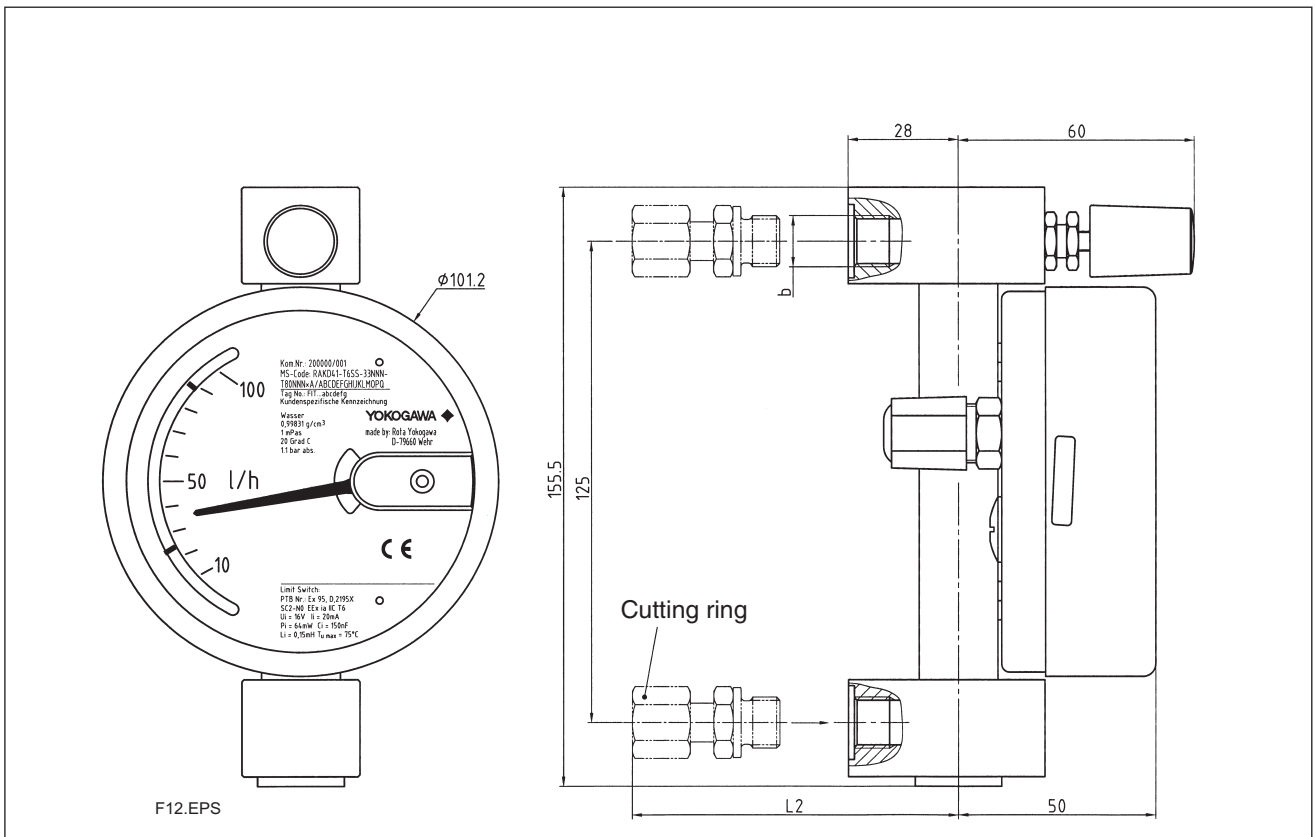


Fig. 11 Version with outlet valve

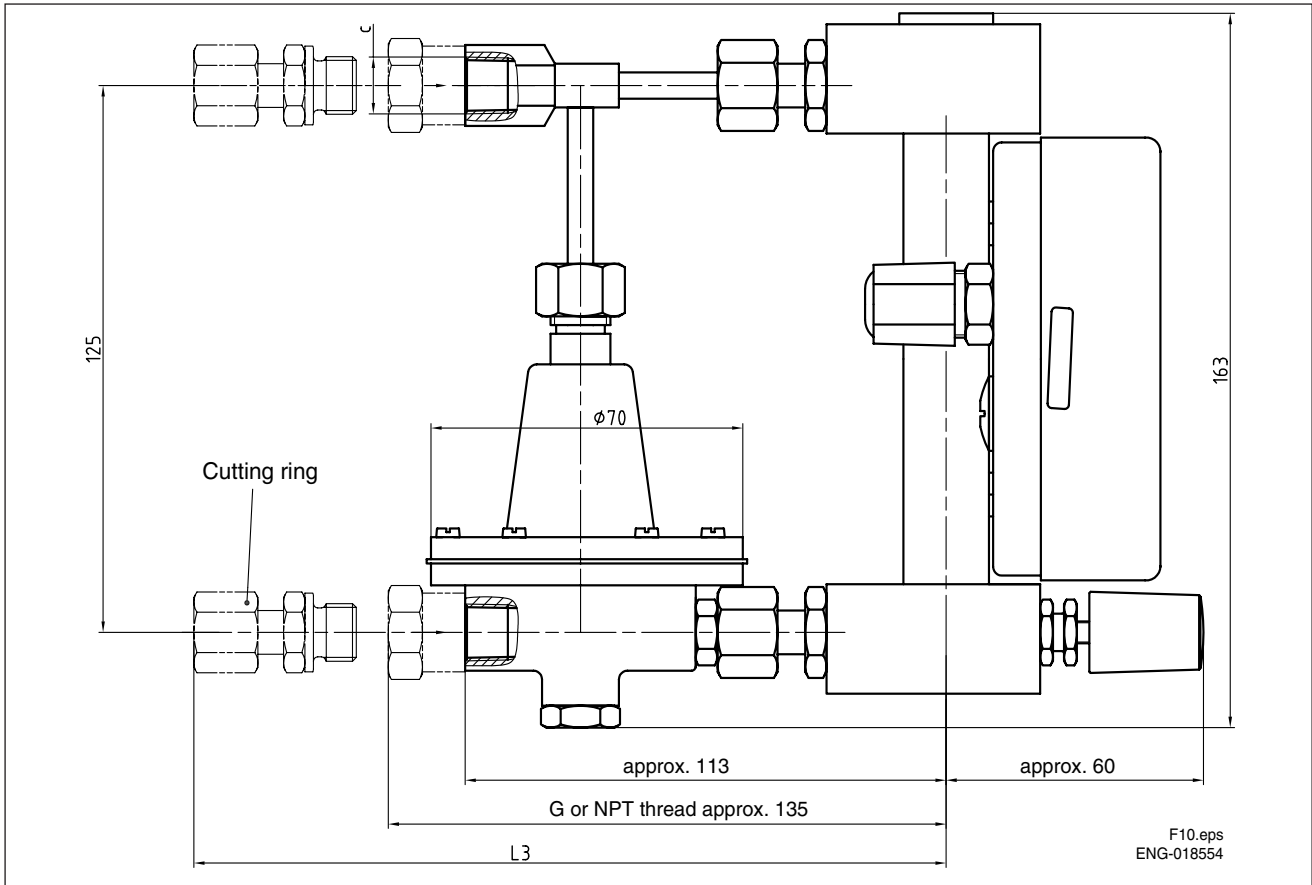


Fig. 12 Version with inlet valve and inlet controller

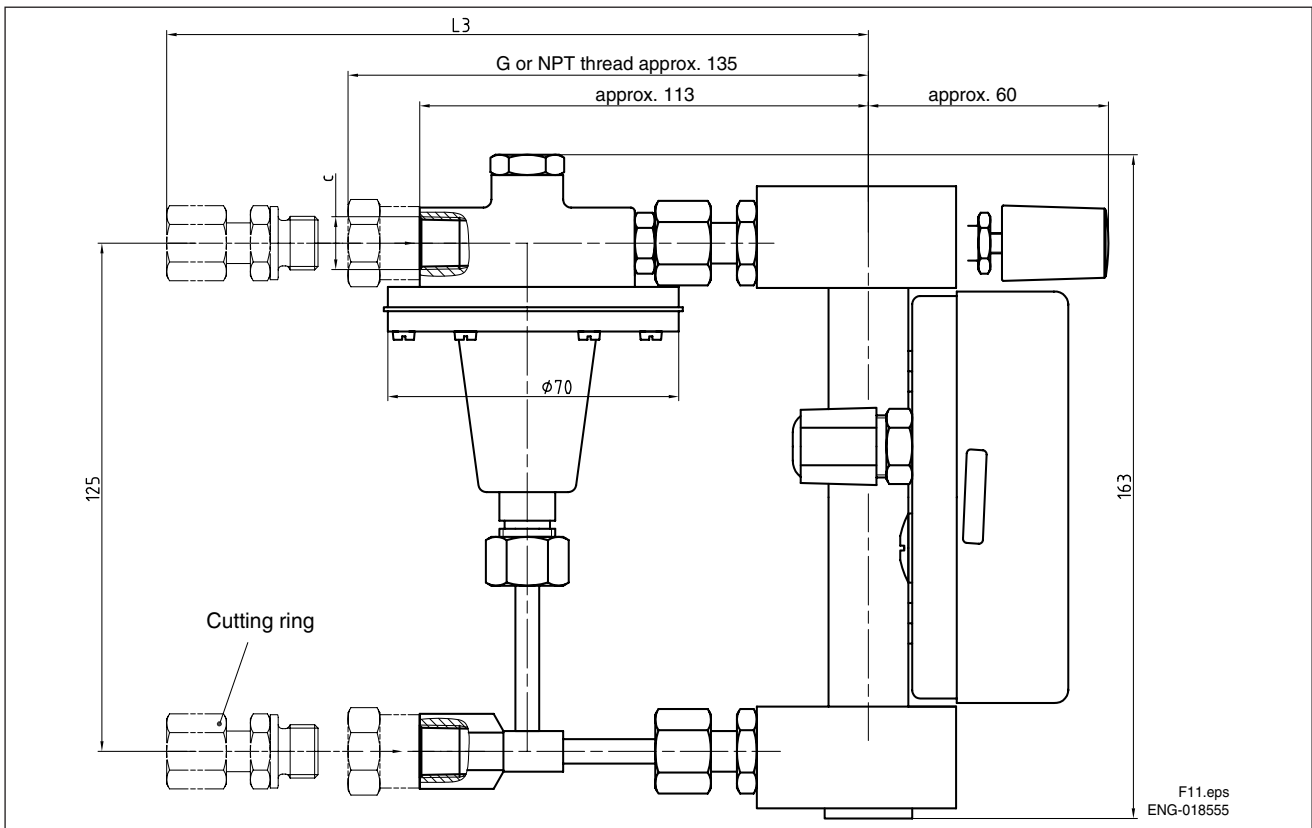


Fig. 13 Version with outlet valve and back pressure controller

CONNECTION TYPES

Table 10

| Size | a | | b | c |
|--------|---------------|---------------|---------------|---------------|
| | Cone 31-51 | Cone 52-53 | Cone 31-53 | Cone 31-51 |
| Thread | G 1/4 | G 3/8 | G 1/4 | G 1/4 |
| | 1/4 NPT | 3/8 NPT | 1/4 NPT | 1/4 NPT |

INSTALLATION LENGTHS DEPENDING ON CONNECTION TYPE AND SIZE

Table 11

| | | L1 | | L2 | L3 |
|--------------------|-------|------------|------------|------------|------------|
| Process connection | Size | Cone 31-51 | Cone 52-53 | Cone 31-53 | Cone 31-51 |
| Cutting ring | 6 mm | 178 mm | ----- | 54.5 mm | 164 mm |
| | 8 mm | 172 mm | ----- | 51.5 mm | 161 mm |
| | 10 mm | 174 mm | ----- | 52.5 mm | 162 mm |
| | 12 mm | 174 mm | 177 mm | 52.5 mm | 162 mm |
| Nozzle | 6 mm | 182 mm | ----- | 56.5 mm | 166 mm |
| | 8 mm | 182 mm | ----- | 56.5 mm | 166 mm |

WEIGHTS

Table 12

| | without valve | with valve | with controller |
|--------|---------------|---------------|-----------------|
| Weight | approx. 600g | approx. 1000g | approx. 1800g |

PLANNING HINTS

- The real working pressure has to be less than the specified pressure limit of the Rotameter.
- Make sure that the wetted material is resistant to the medium.
- Ambient and operation temperature has to be less than the specified maximum value.
- 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 a parallel design of several Rotameters take care that the distance between the tube middle axes is not less than 120 mm. The distance to other ferric materials should not be less than 60 mm.
- The strength of external magnetic fields close by the Rotameter should be approximately 0mT.

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