

# 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  $\mu$ 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, IECEx, FM, CSA, NEPSI, PESO
- 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

<b>Materials of wetted parts</b>	: Stainless steel AISI 316Ti (1.4571) other materials on request
<b>Fluids to be measured</b>	: Liquid or gas
<b>Measuring range</b>	: see flow table
<b>Measuring range ratio</b>	: 10:1
<b>Process connections</b>	:
- 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
<b>Process pressure</b>	: depends on process connection; see model code
<b>Process temperature</b>	: without valve -25°C to 250°C with valve -25°C to 150°C See also fig. 6. Lower temperatures on request.
<b>Measurement accuracy</b>	: acc. Directive VDI/VDE 3513 sheet 2 ( $q_G=50\%$ ) 4%
<b>Installation</b>	:
- Installation position	: vertical
- Flow direction	: upwards
- Face to face length	: 125 mm (with flange 250 mm)
<b>Weight</b>	: see table 14

### LOCAL INDICATOR

(Indicator/Code -T)

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

### ELECTRONIC TRANSMITTER

(Indicator/Code -E)

<b>Temperature range</b>	: -25°C to +65°C
<b>Transportation and storage condition</b>	: -40°C to +70°C
<b>Process-/ Ambient temperature :</b>	
The dependency of the process temperature from the ambient temperature is shown in fig.6.	
<b>Power supply</b>	: 14 ... 30 V DC
<b>Load resistance</b>	: (U - 14V) / 20 mA, max. 500 Ω
<b>Analog output</b>	: 4-20 mA
Linearity	: ≤ ± 0.25% f.s.
Hysteresis	: ≤ ± 0.15% f.s.
Repeatability	: ≤ ± 0.16% f.s.
<b>Influence of power supply</b>	
	: ≤ ± 0.1% f.s.
<b>Temp. coefficient of analog output</b>	
	: ≤ ± 0.5% / 10 K f.s.
<b>AC-part of analog output</b>	
	: ≤ ± 0.15% f.s.
<b>Long time stability</b>	: ≤ ± 0.2% / year
<b>Maximum output current</b>	
	: 21.5 mA
<b>Output current in case of failure</b>	
	: ≤ 3.6 mA (NAMUR NE 43)
<b>Response time (99%)</b>	
	: approx. 1 s
<b>Pulse output (Option /CP)</b>	
	: 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.. $Q_{max} = 1 \text{ m}^3/\text{h} \rightarrow$ $1 \text{ Puls} = 0.0001 \text{ m}^3 = 0.1$
<b>Electromagnetic compatibility (EMC)</b>	
- EN 61326-1: 2006, Class A, Table 2	
EN 61326-2-3 : 2006	

### POWER SUPPLY FOR ELECTRONIC TRANSMITTER (Option /UT)

<b>Type :</b>	Power supply with galvanically separated input and output - RN221N-B1, HART- compatible
<b>Supply voltage :</b>	20 ... 250 V DC / AC 50/60 Hz
<b>Maximum load :</b>	700 Ω
<b>Output signal :</b>	4 - 20 mA

### ELECTRICAL CONNECTION (Indicator/Code -E) :

<b>Type</b>	: Quickon
<b>Cable diameter</b>	: 4 – 6 mm
<b>Maximum cross section of core</b>	: Ø 0.34 to 0.75 mm <sup>2</sup>

**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** :  $\leq 1 \text{ mA}$  or  $\geq 3 \text{ mA}$

**Hysteresis** :  $< 0.5 \text{ mm}$

**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** :  $\leq 1 \text{ mA}$  or  $\geq 3 \text{ mA}$

**Hysteresis** :  $< 0.5 \text{ mm}$

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

- pointer movement :  $\approx 0.8 \text{ mm}$

- float movement :  $\approx 0.8 \text{ mm}$

**Minimum distance between 2 contacts**

:  $\approx 8 \text{ mm}$

**ELECTRICAL CONNECTION (option /K1 to /K10) :**

**Type** : Quickon

**Cable diameter** : 4 – 6 mm

**Maximum cross section of core**

:  $\varnothing 0.34$  to  $0.75 \text{ mm}^2$

**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

l/h air at 20°C ; 1.013 bar abs.

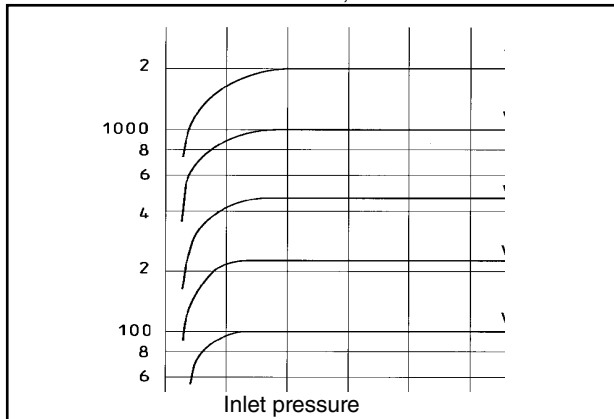


Fig. 2 Diagram controller characteristic

**COMPLIANCE WITH IEC 61508**

**RAKD with local indicator and standard or fail safe limit switches (RAKD-□□-□□SS-□□□□□□-□□□□□□/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□□□-□□□□□□/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.

**METROLOGICAL REGULATION IN CIS (GOST)**

RAKD 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 RAKD, option /QR[.]

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

For export to CIS countries please contact your Yokogawa representative.

**HAZARDOUS AREA SPECIFICATIONS**

**RAKD with ATEX- certification "intrinsic safe ia" (option /KS1)**

**Certificate :**

KEMA 00ATEX 1037X

**Output signal :**

4-20 mA / Pulse output / Limit switches

**Explosion proof :**

Ex ia IIC T6 ... T4 Gb

**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	T4
	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 ATEX- certification “intrinsic safe ic”****(option /KS3)****Output signal :**

4–20 mA / Pulse output / Limit switches

**Explosion proof :**

Ex ic IIC T6; Gc group II ; category 3G

**Entity parameter :**

see table 6

**Temperature specification :**

see table 7

**RAKD with IECEx- certification “intrinsic safe”****(option /ES1)****Certificate :**

IECEx DEK 12.0003X

**Output signal :**

4–20 mA / Pulse output / Limit switches

**Explosion proof :**

Ex ia IIC T6 ... T4 Gb

**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	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 9

Configura-tion	Max. ambient temperature	Max. process tem-perature	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
	73°C	135°C	
Limit switch(es) type 3	24°C	65°C	T6
	37°C	80°C	T5
	34°C	100°C	
	57°C	80°C	T4
	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 IECEx certificates from Pepperl & Fuchs:

- IECEx PTB 11.0091X ( SC2-NO) for /K1 to /K3
- IECEx PTB 11.0092X (SJ2-S.N) for /K6 to /K10

**RAKD with IECEx- certification “intrinsic safe ic”****(option /ES3)****Output signal :**

4–20 mA / Pulse output / Limit switches

**Explosion proof :**

Ex ic IIC T6; Gc group II ; category 3G

**Entity parameter :**

see table 8

**Temperature specification :**

see table 9

**RAKD with NEPSI- certification “intrinsic safe”****(China) (option /NS1) :****Certificate :**

GYJ101552

**Output signal :**

4–20 mA

**Explosion proof :**

Ex ia IIC T5/T6

**Max. Tamb. :**

65°C

**Limit switches :**

option /K1 to /K8, see certificates GYJ11.1505X

**Entity parameter :**

Table 10

	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 11

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 PESO- certification (India)**

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

**RAKD with KOSHA- certification (Korea)**

Option /ES1 must be selected.

Same data as for IECEx certification.

**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 / non incendive 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 :**

- ATEX: PTB 00 ATEX 2018
- IECEX: PTB06.0089
- 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. 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) |
|                   | FM    | : ID 3011578            |
|                   | IECEX | : PTB11.0031            |
|                   | PESO  |                         |
|                   | KOSHA | : 2009-BO-0157          |
| - KFA6-SR2-Ex*-W: | ATEX  | : PTB 00 ATEX 2081      |
|                   | CSA   | : 1029981 (LR 36087-19) |
|                   | FM    | : ID 3011578            |
|                   | IECEX | : PTB11.0031            |
|                   | PESO  |                         |
|                   | KOSHA | : 2009-BO-0157          |
| - KHA6-SH-Ex1:    | ATEX  | : PTB 00 ATEX 2043      |
| - KFD2-SR2-Ex*-W: | ATEX  | : PTB 00 ATEX 2080      |
|                   | CSA   | : 1029981 (LR 36087-19) |
|                   | FM    | : ID 3011578            |
|                   | IECEX | : PTB11.0034            |
|                   | PESO  |                         |
|                   | KOSHA | : 2009-BO-0157          |
|                   | NEPSI | : GYJ12.1081            |
| - KFD2-SH-Ex1:    | ATEX  | : PTB 00 ATEX 2042      |
|                   | NEPSI | : GYJ091350             |

**Control circuit (ATEX):** [Ex 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

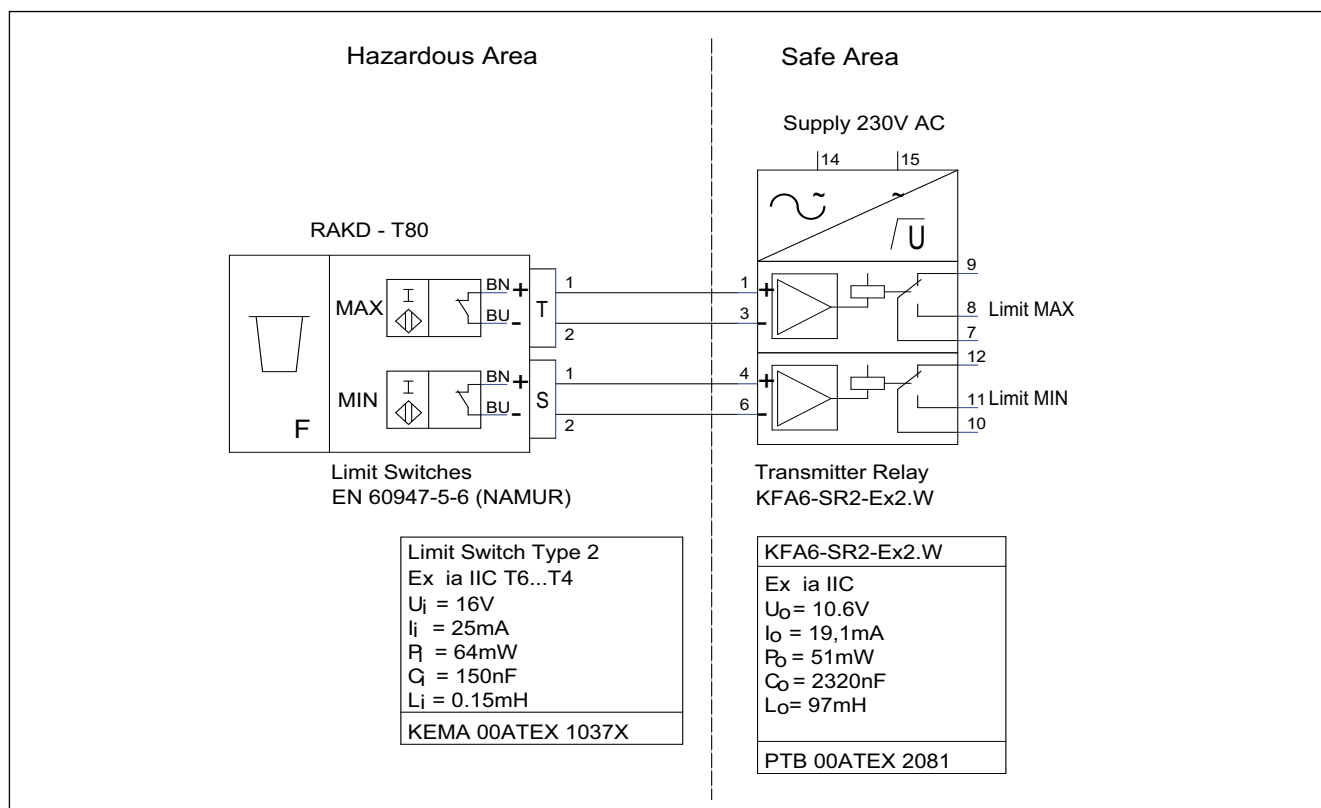


Fig. 3 ATEX- version of RAKD with 2 limit switches in combination with transmitter relay

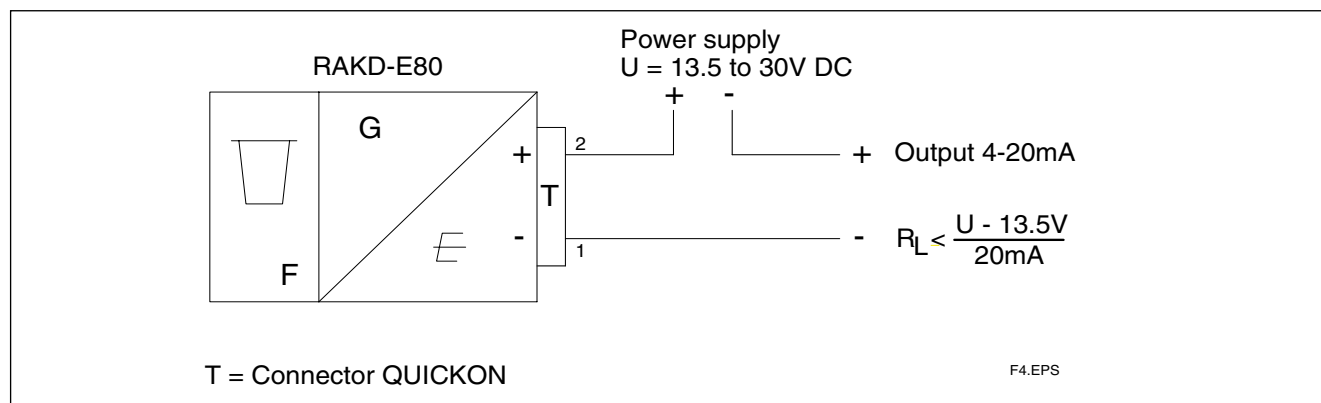


Fig. 4 RAKD with electronic transmitter

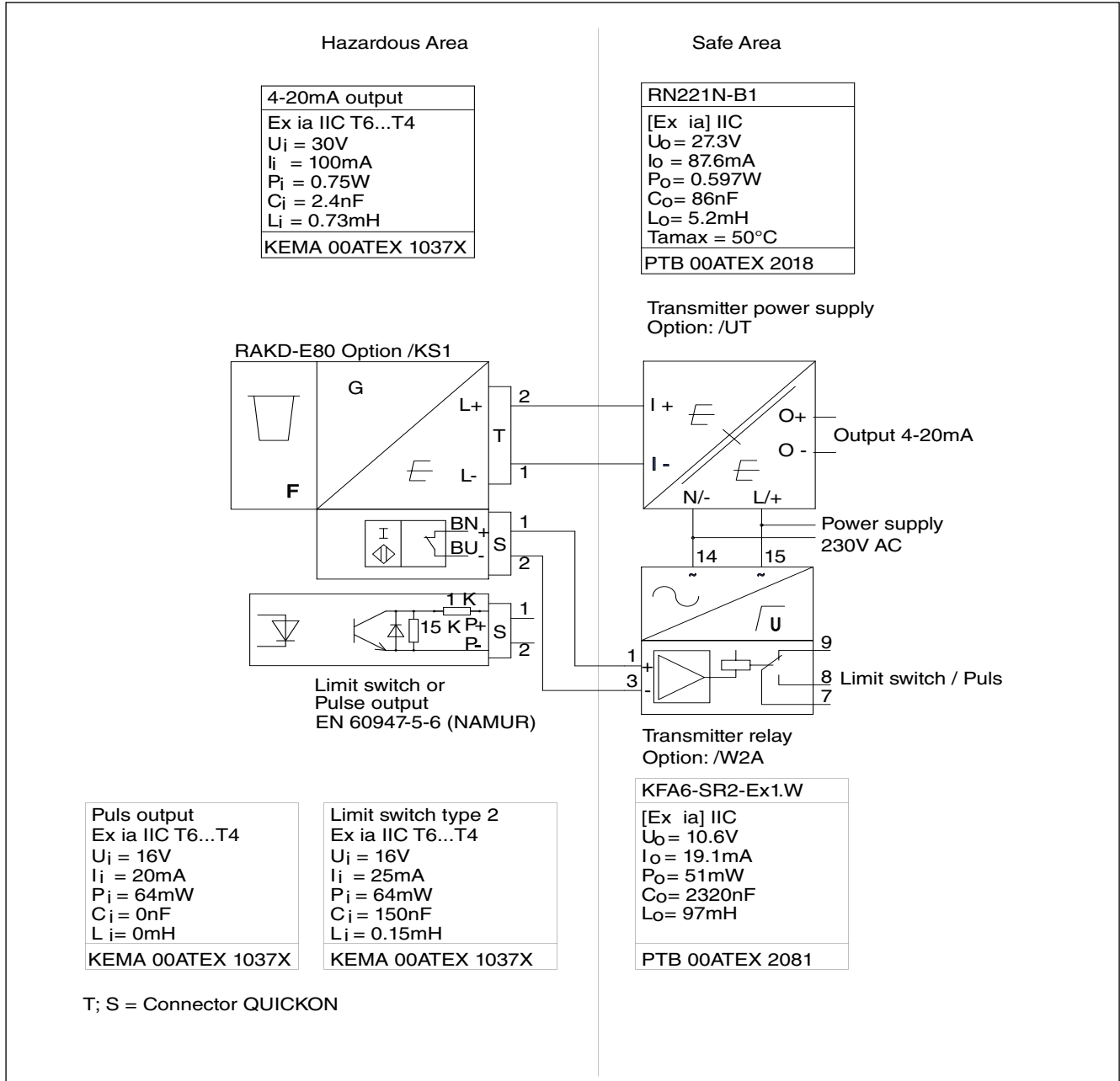


Fig. 5 ATEX- version of RAKD with electronic transmitter with power supply and limit switch or pulse output in combination with transmitter relay



## TEMPERATURE SPECIFICATION

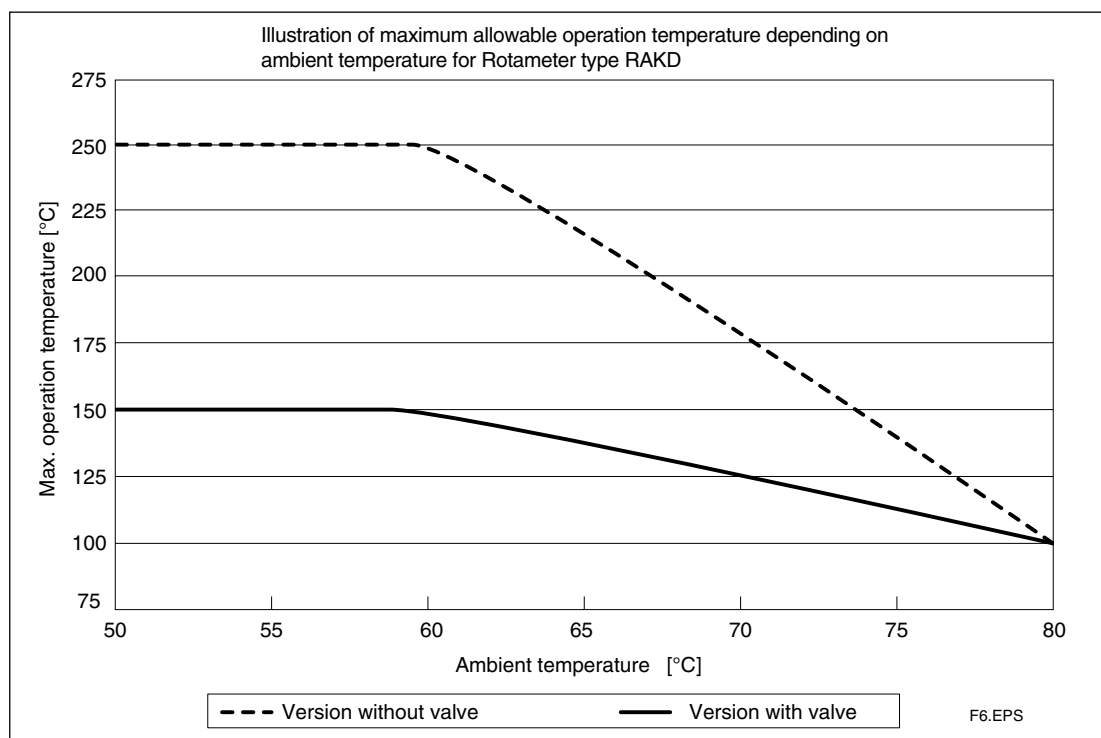


Fig. 6

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 /ES1 (Ex-i-versions IECEx) the maximum values for ambient and process temperature according to the respective temperature class mentioned table 9 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 11 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	1.0 - 250 l/h water 40 - 8000 l/h air	1.0 - 100 l/h water 40 - 3250 l/h air	1.0 - 250 l/h water 5000 - 8000 l/h air
Cone	31 - 51	31 - 53	31 - 51	52 - 53
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 10	Page 11	Page 12	Page 13

### Ordering instructions

Standard:

a: Model, suffix and option code

b: Flow conditions

c: Temperature

d: Pressure

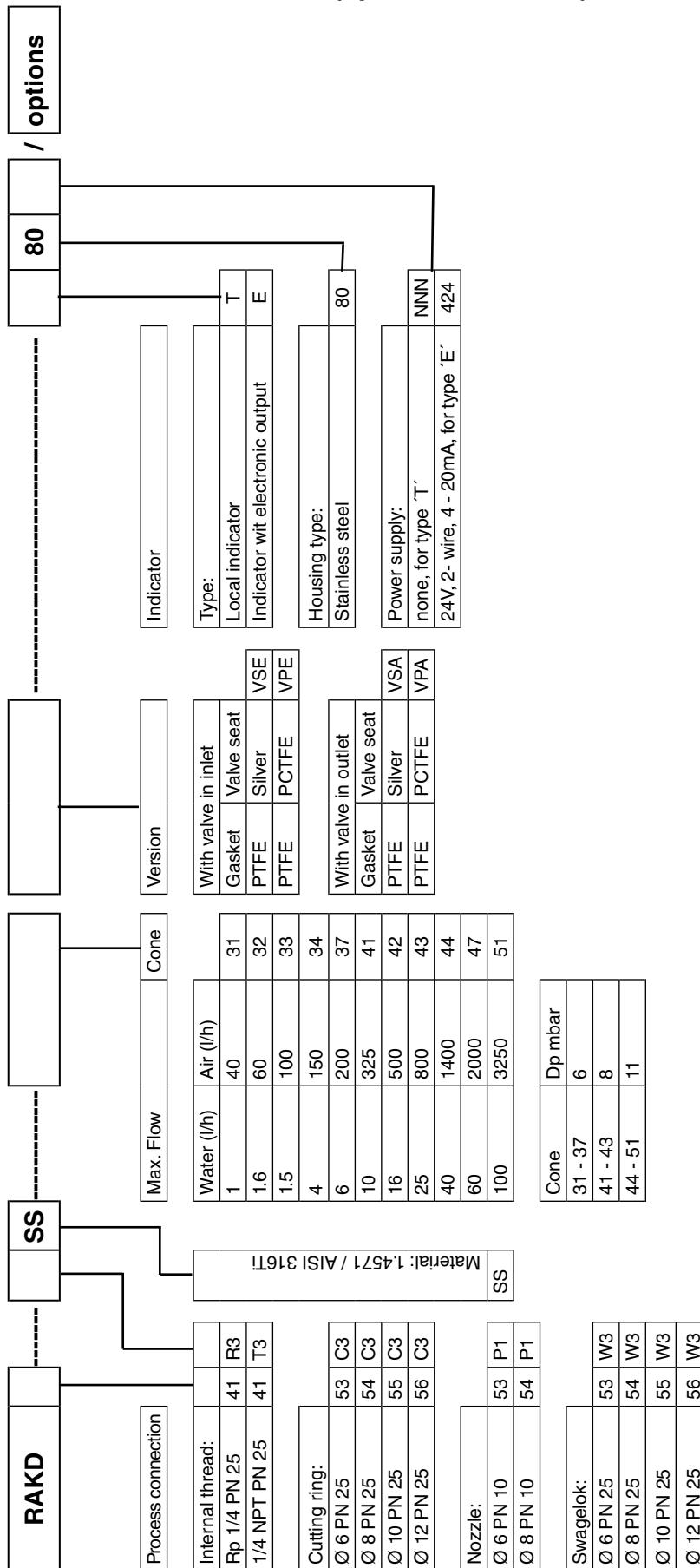
e: Viscosity

f: Density

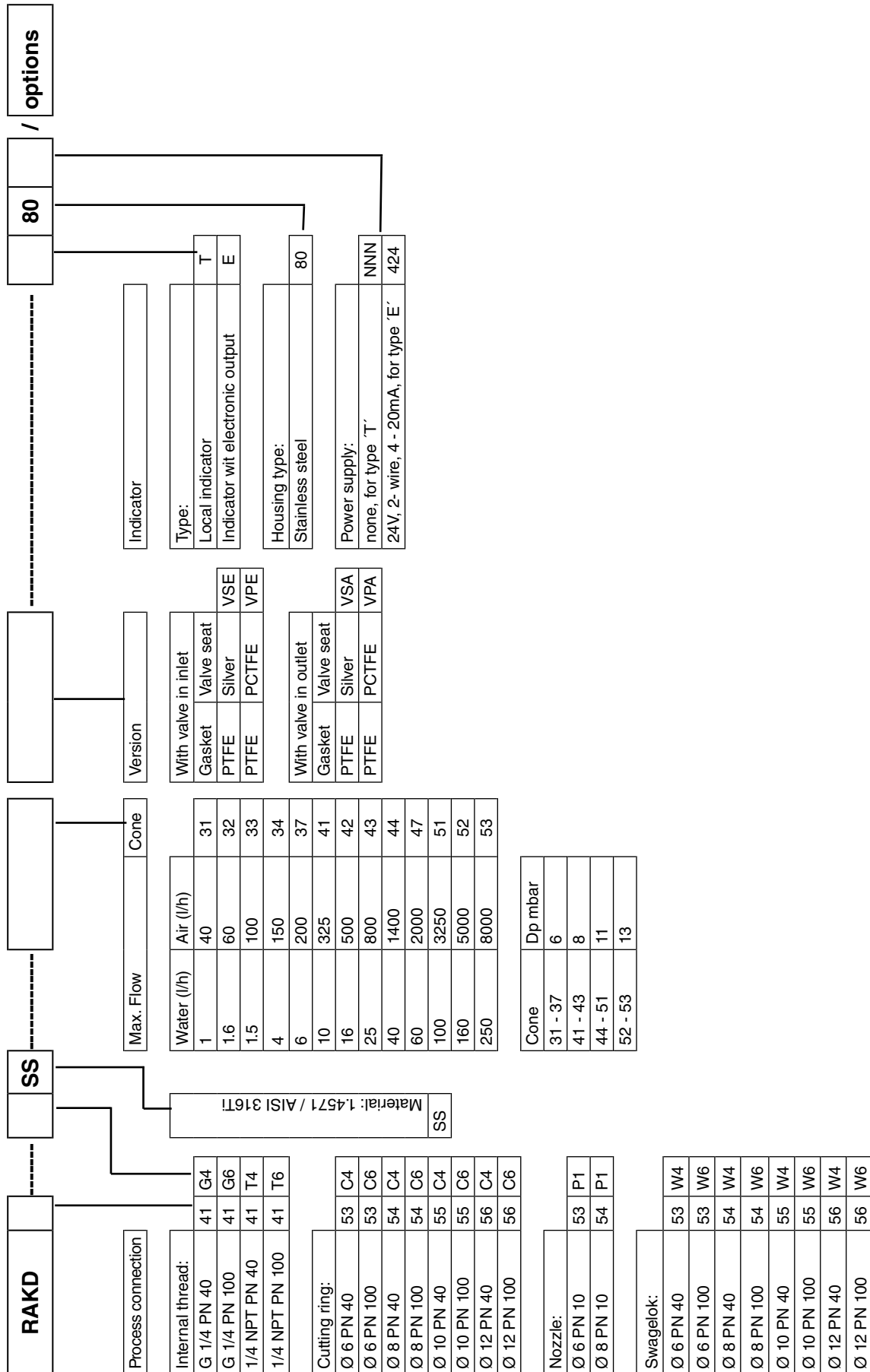
For gases: cross reference of the scale

Option/Bx: customer specification notes

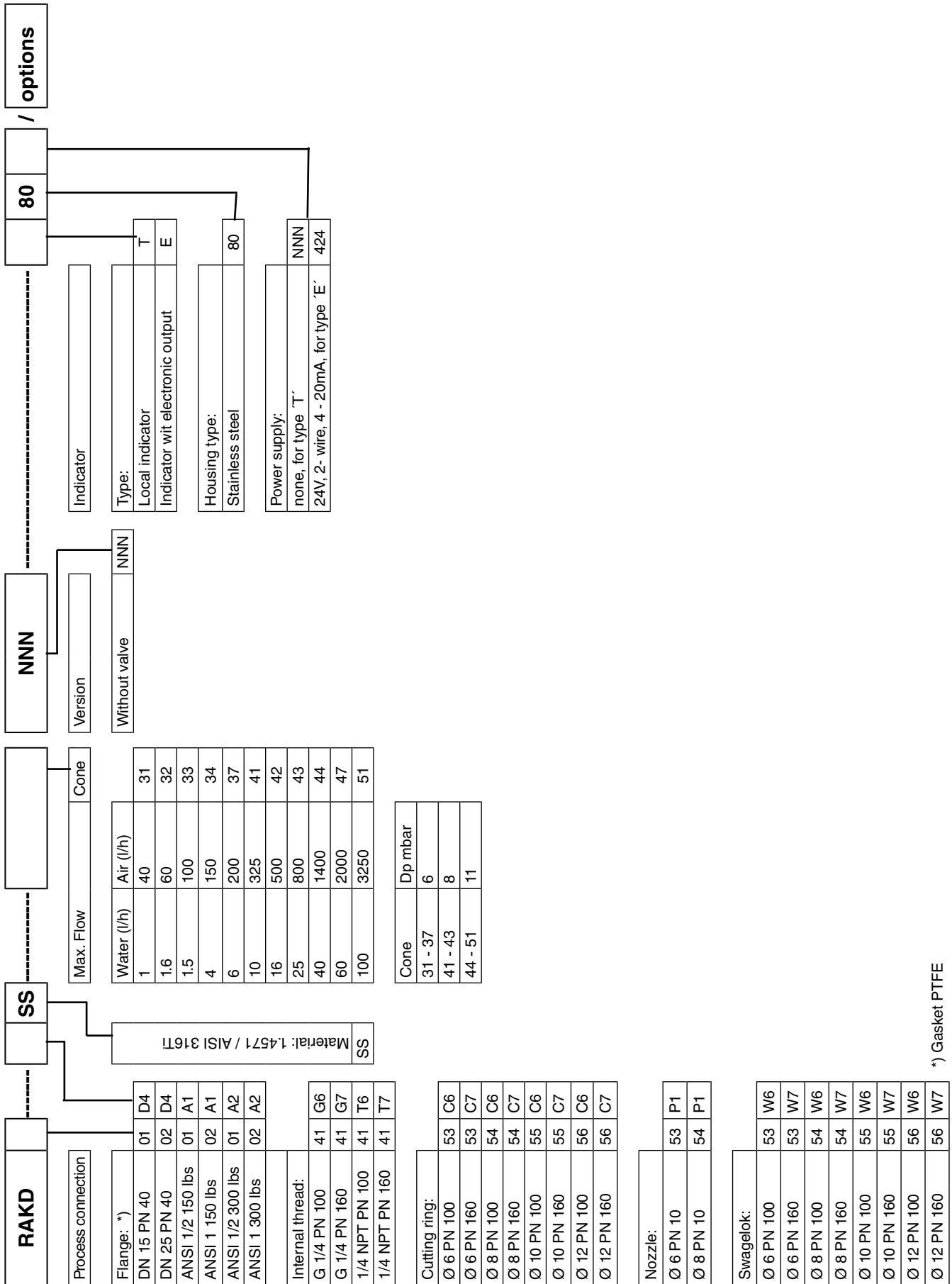
**RAKD with valve and controller (option /R1 and /R3) 1.0 - 100 l/h water / 40 - 3250 l/h air**



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

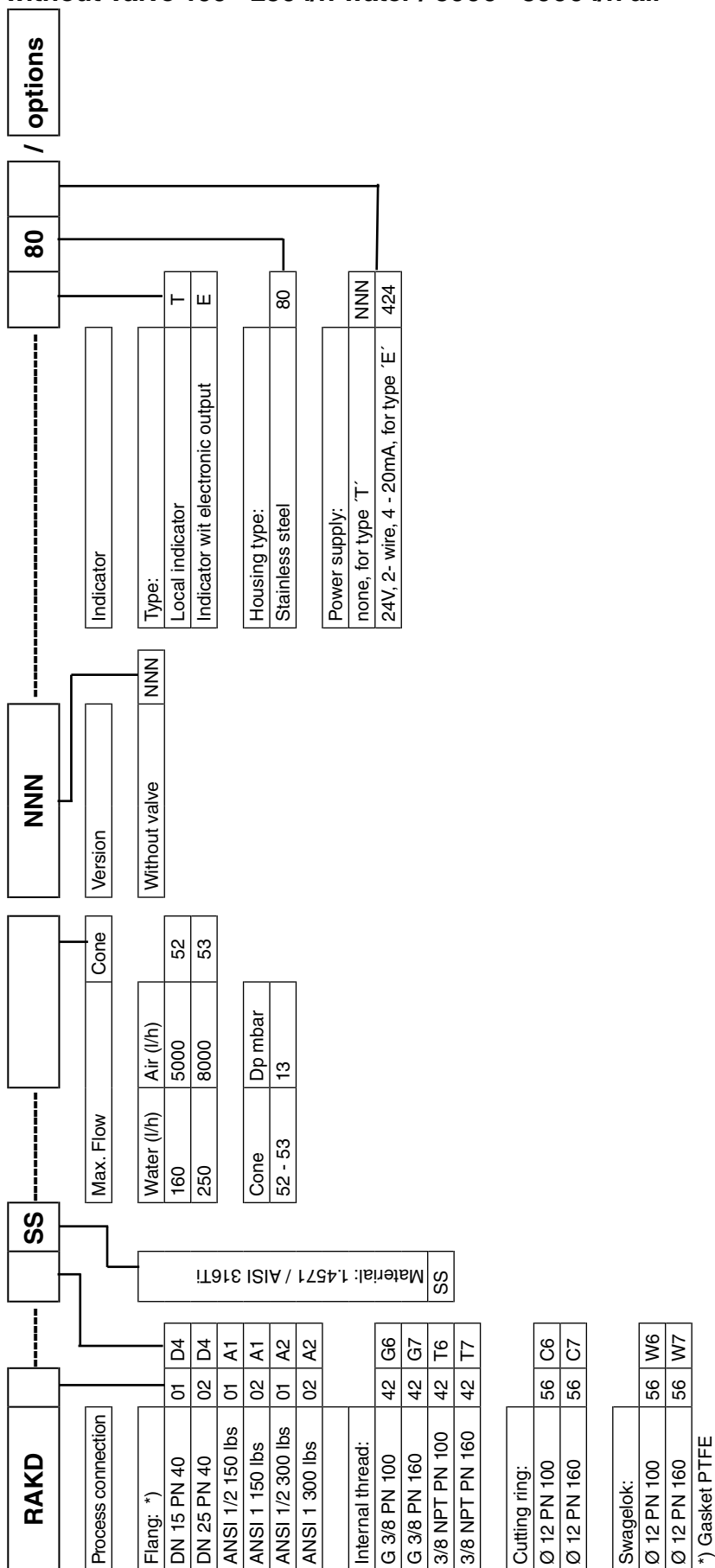


**RAKD without valve 1.0 - 100 l/h water / 40 - 3250 l/h air**



\*) Gasket PTFE

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



## OPTIONS

Options	Option code	Description	Restriction
Indicator	/A12 /A29 /A30	US- engineering units M12- connector acc. IEC 61076-2-101 (in preparation) M12- connector with plug connector acc. IEC 61076-2-101 (in preparation)	Only for indicator E Only for indicator E or T with limit switches Only for indicator E or T with limit switches
Marking	/B1  /B4 /B8 /B10 /BG /BD	Tag plate (SS) fixed by wire and customer specified tag number on scale Neutral version Customer provided marking on label Percent scale With customer specified tag number on scale Dual Scale	Plate 12 x 40 mm; max. 45 digits  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 /KS3 /KN1 /ES1 /ES3 /FS1 /CS1  /NS1	ATEX intrinsically safe „ia“ ATEX gas and dust proof limit switches, category 2G 1D ATEX intrinsically safe „ic“ ATEX category 3G „nL“ / 3D IECEX intrinsically safe „ia“ IECEX intrinsically safe „ic“ FM intrinsically safe / non incendive limit switches (USA) CSA intrinsically safe / non incendive limit switches (Canada)  NEPSI approval (China)	Not for indicator T without limit switches Only for indicator T with limit switches Not for indicator T without limit switches Not for indicator T without limit switches Not for indicator T without limit switches  For indicator T only with limit switches For indicator T only with limit switches; limit switches only /K1, /K2, /K3, only in combination with power supply /WxA or /WxB 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	Primary Calibration and Test Confirmation valid in Russia Primary Calibration and Test Confirmation valid in Kazakhstan Primary Calibration and Test Confirmation valid in Uzbekistan	See page 4 See page 4 See page 4
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
Delivery to Korea	/KC	With KC-mark for Korea	
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 or /CP Only for limit switches /K1, /K2, /K3 Only for limit switches /K1, /K2, /K3 or /CP 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 or /CP Only for limit switches /K1, /K2, /K3 Only for limit switches /K6, /K7 Only for limit switches /K8, /K9, /K10
Instruction manuals	/IE <sub>n</sub> /ID <sub>n</sub> /IF <sub>n</sub>	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 *)
Special order	/Z	Special design must be specification on extra sheet	

\*) if no instruction manual is selected, only a DVD with instruction manuals is shipped with the flowmeter

## DIMENSIONS

Note : The dimensions a ; b ; c ; L1 ; L2 ; L3 are listed in table 12 and 13.

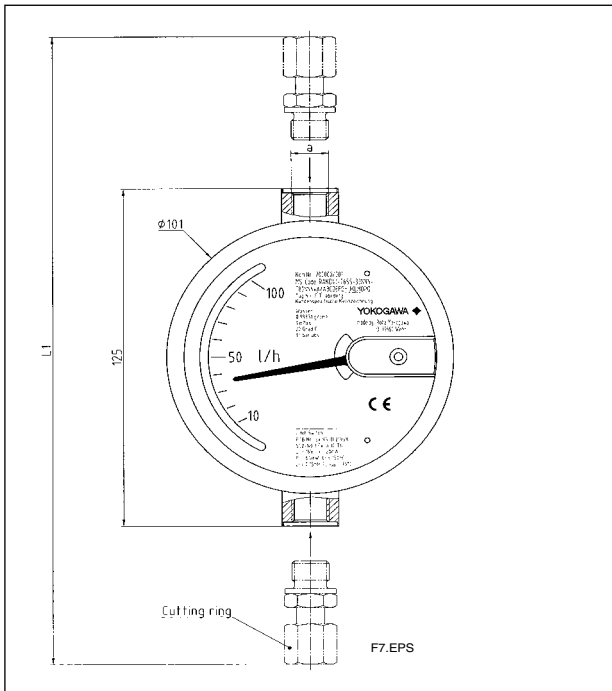


Fig. 7 Version without valve

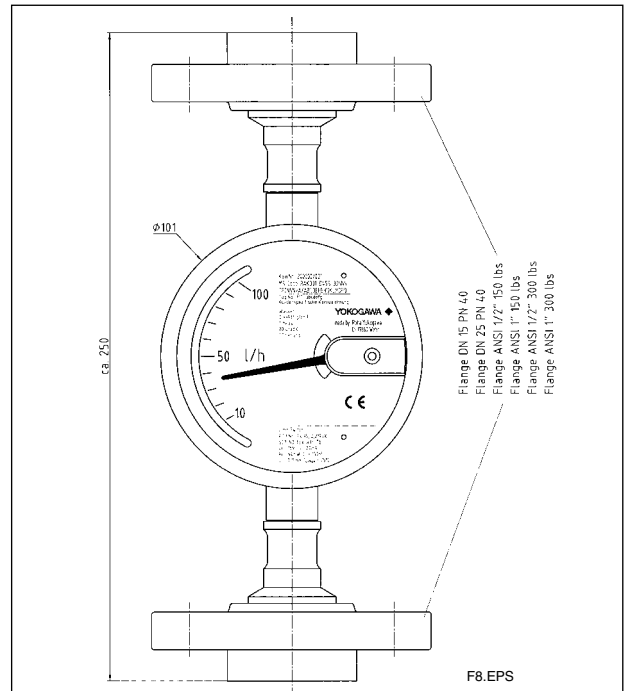


Fig. 8 Version with flange connection

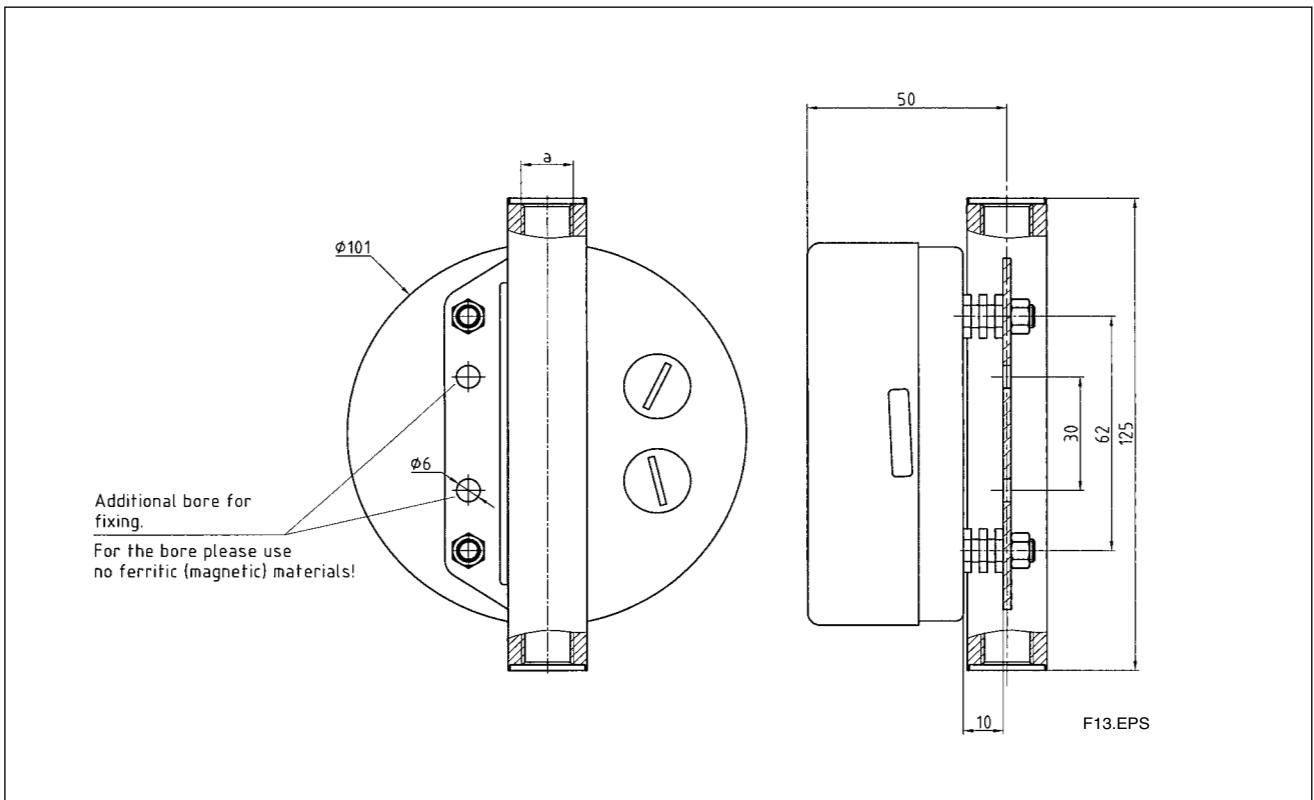


Fig. 9 Back view with mounting

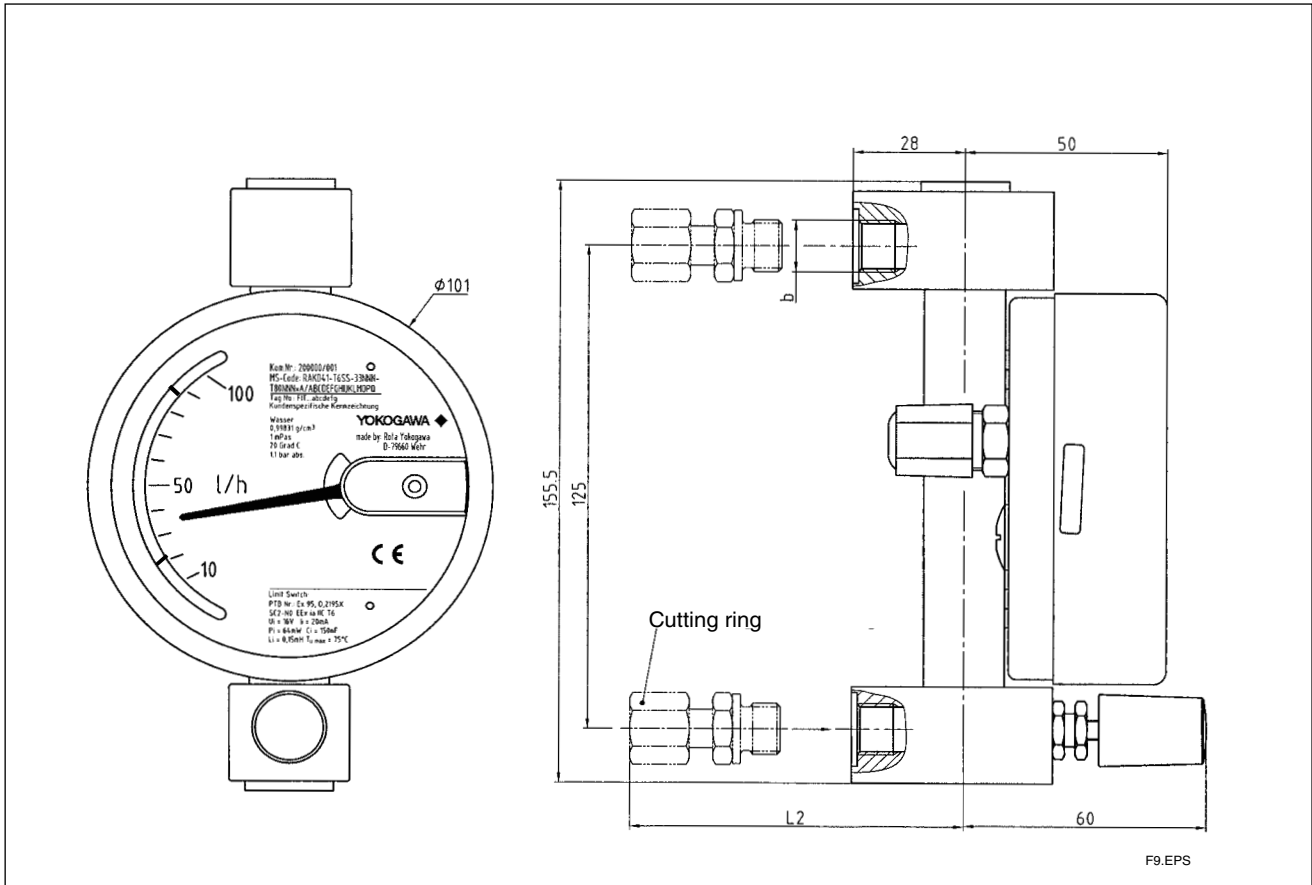


Fig. 10 Version with inlet valve

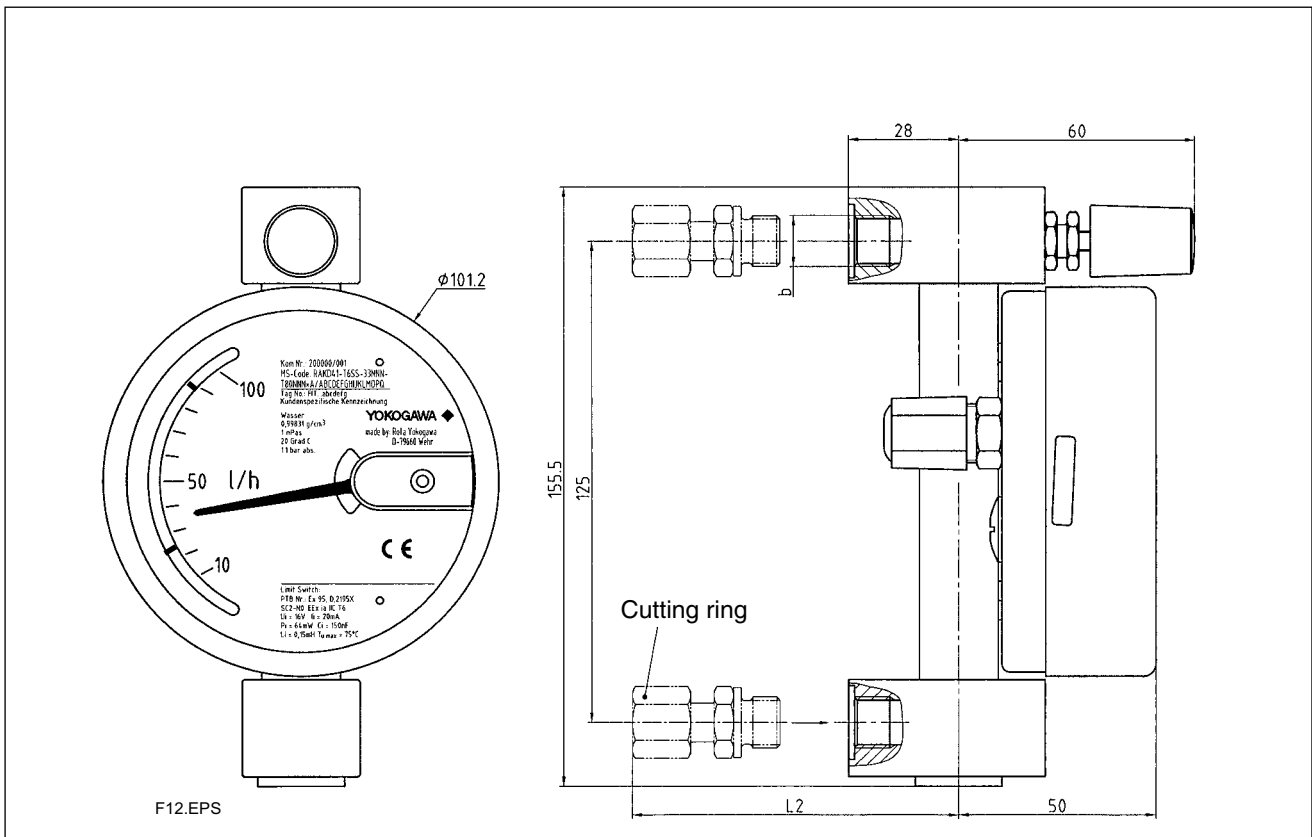


Fig. 11 Version with outlet valve



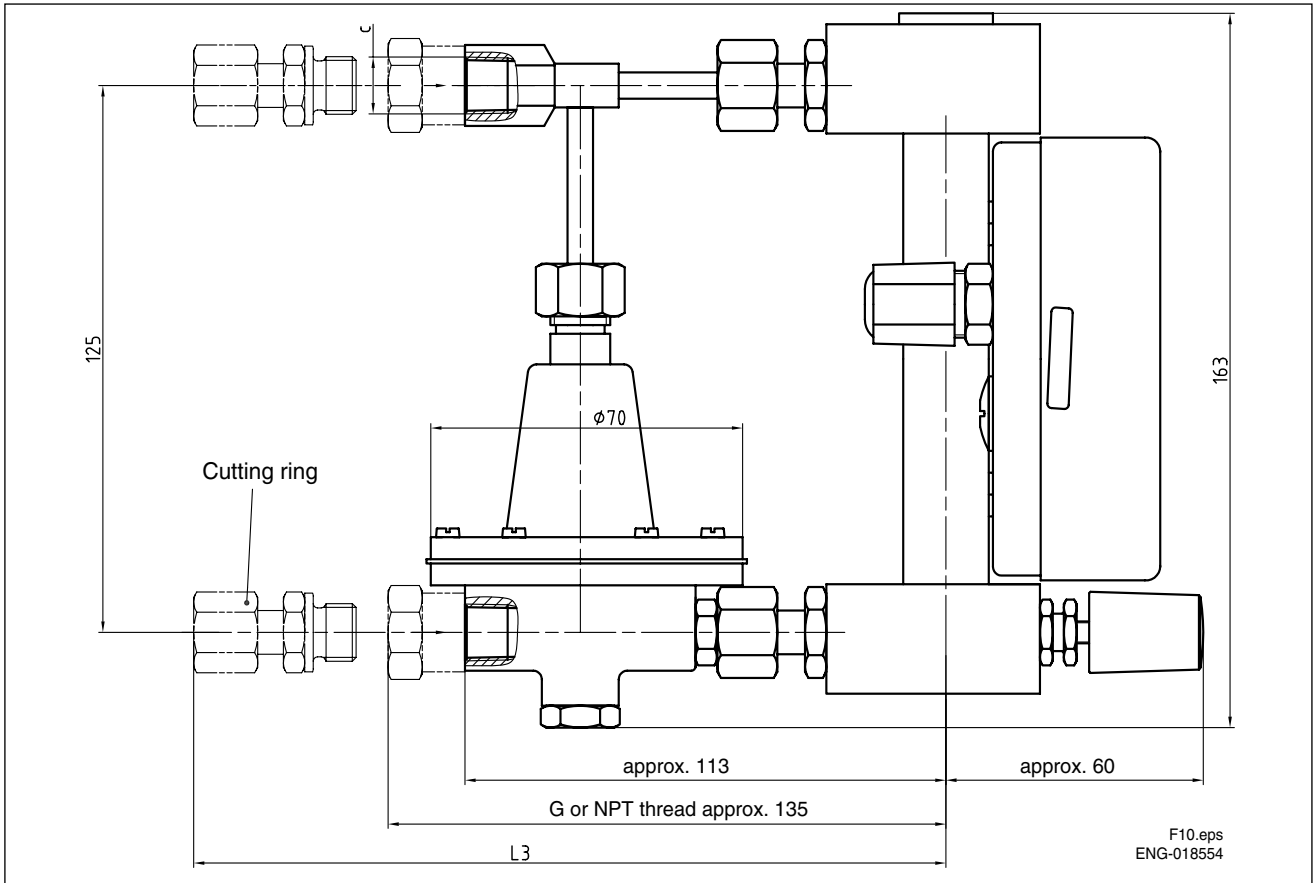


Fig. 12 Version with inlet valve and inlet controller

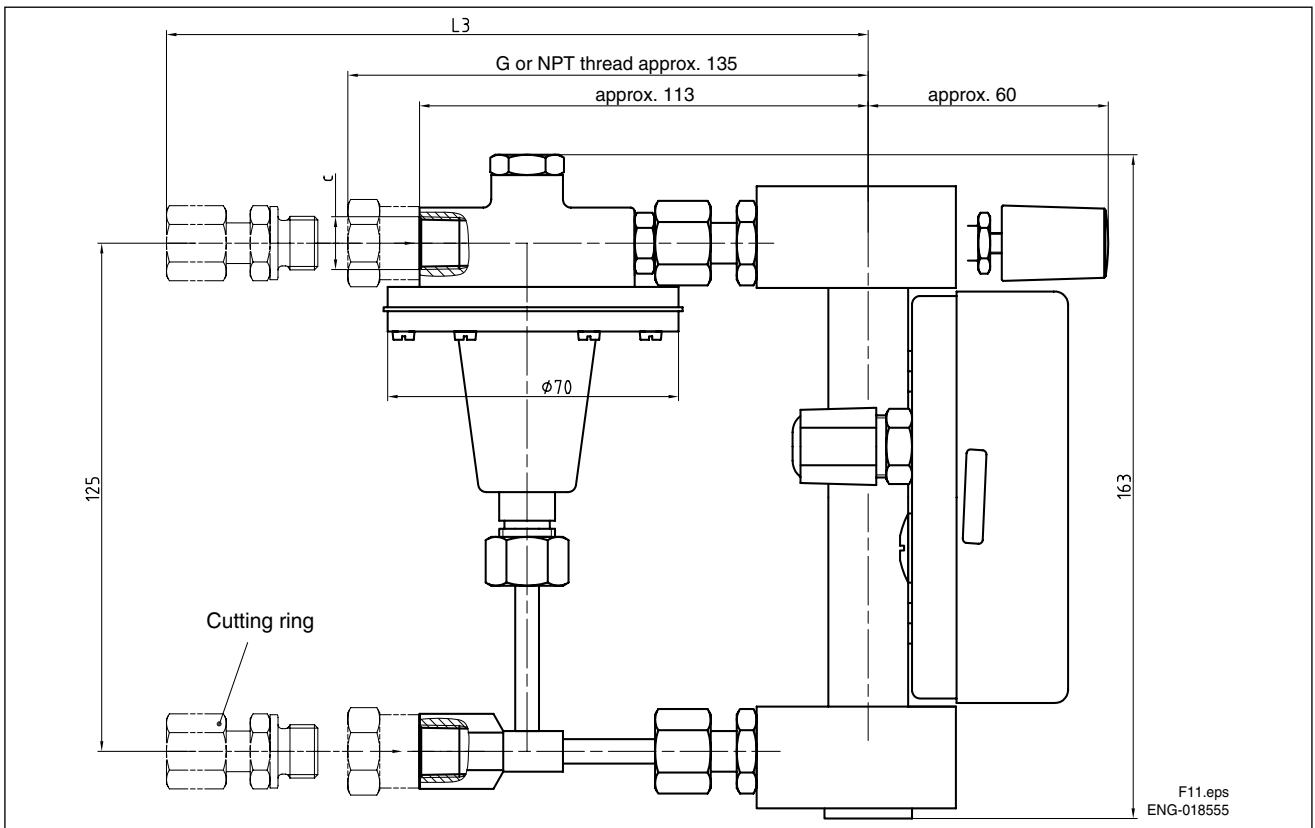


Fig. 13 Version with outlet valve and back pressure controller

## CONNECTION TYPES

Table 12

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 13

		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 14

	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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