

General Specifications

Model RAKD Small Metal ROTAMETER

GS 01R01B30-00E-E

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.

A float is guided concentrically in a conic metal tube.

The position of this float is magnetically transmitted to the indicator.

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, IECEx, FM, NEPSI, PESO, EAC, INMETRO, KOSHA
- Ex for non- electrical RAKD: ATEX, EAC
- FMEDA report available for SIL application

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Fig. 1a Indicator RAKD with tube without valve



Fig. 1b Tube RAKD with valve

STANDARD SPECIFICATIONS

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

RoHS Directive 2011/65/EU:

RoHS conform according to EN 50581

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 (wetted)	: • acc. EN 1092-1 DN15 and DN25 PN40; • acc. ASME B 16.5 1/2" and 1" 150 lbs, 300 lbs • Stainless steel AISI 316Ti - gasket PTFE
Process pressure	: depends on process connection; see model code
Viscosity limit	: 6 mPas
Process temperature	: without valve -25 °C – 250 °C with valve -25 °C – 150 °C See also fig. 6. Lower temperatures on request.
Measurement accuracy	: acc. Directive VDI/VDE 3513 sheet 2 ($q_e=50$ %) 4 %
Installation	
• Installation position	: vertical
• Flow direction	: upwards
• Face to face length	: 125 mm (with flange 250 mm)
Weight	: see table 14

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 – +110 °C

ELECTRONIC TRANSMITTER

(Indicator/Code -E)

Temperature range

: -25 °C – +65 °C

Transportation and storage condition

: -40 °C – +70 °C

Process-/ Ambient temperature

The dependency of the process temperature from the ambient temperature is shown in fig.6.

Power supply : 14 – 30 V DC

Load resistance : (U - 14 V) / 20 mA, max. 500 Ω

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.. $Q_{max} = 1$ m³/h \rightarrow

1 Puls = 0.0001 m³ = 0.1 l

Electromagnetic compatibility (EMC)

- EN 61326-1: Class A, Table 2
- EN 61326-2-3

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

M12 (option /A29, /A30)

Cable diameter : 4 – 6 mm

Maximum cross section of core

: $\varnothing 0.34 - 0.75$ mm²

LIMIT SWITCHES IN STANDARD VERSION

(option /K1 – /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 – /K8)

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

Nominal voltage : 8 V 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 – /K8):

Type : Quickon
M12 (option /A29, /A30)

Cable diameter : 4 – 6 mm

Maximum cross section of core
: $\varnothing 0.34 - 0.75$ mm²

POWER SUPPLY FOR LIMIT SWITCHES (Option /W0□□)

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 ± 10 %, 45-65 Hz
• 115 V AC ± 10 %, 45-65 Hz
• 24 V DC ± 25 %

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

Switching capacity
: max. 250 V AC, max. 2 A

Note:

If Fail-Safe limit switch option /K6 or /K7 is ordered, for power supply option /W2E or /W4E must be selected.

If Fail-Safe limit switch option /K8 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

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 – +80 °C

Materials:

Table 5

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

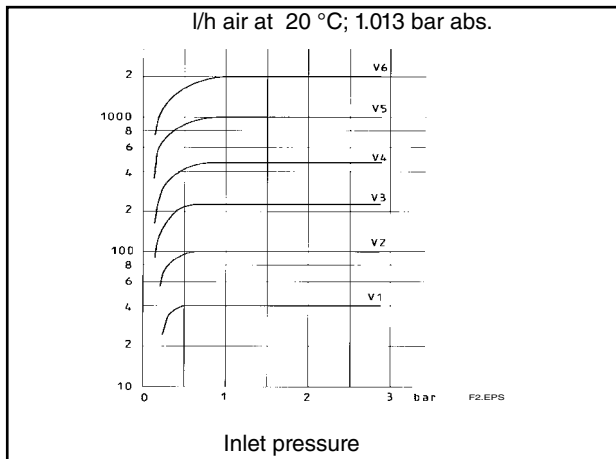


Fig. 2 Diagram controller characteristic

FOLLOWING IEC 61508

RAKD with local indicator and standard or fail safe limit switches (RAKD□□-□□SS-□□□□□□-T□□NNN/K1 – K8): Suitable for application in safety functions up to and including SIL1.

RAKD with valve and controller with local indicator and standard or fail safe limit switches (RAKD□□-□□SS-□□V□□-T□□NNN/R□/K1 – K8): Suitable for application in safety functions up to and including SIL1. Details see FMEDA report.

FOLLOWING ISO 13849-1

Safety Metrics available for:
 RAKD with local indicator and standard or fail safe limit switches (RAKD□□-□□SS-□□□□□□-T□□NNN/K1 – K8)
 RAKD with valve and controller with local indicator and standard or fail safe limit switches (RAKD□□-□□SS-□□V□□-T□□NNN/R□/K1 – K8)
 Details see FMEDA report.

METROLOGICAL REGULATION IN CIS AND EAC COUNTRIES

Russia, Kazakhstan, Uzbekistan, Belorussia and Turkmenistan are members of CIS. RAKD has “Pattern Approval Certificate of Measuring Instruments” and is registered as a measuring instrument in Russia, Kazakhstan, Uzbekistan, Belorussia and Turkmenistan. Option /QR2 is for Kazakhstan. Option /QR3 is for Uzbekistan. For the Ukraine the test certificate of Rota Yokogawa is sufficient. Therefore no special option exists. Russia, Kazakhstan and Belorussia are covered by EAC. For export to CIS and EAC 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; 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

Configuration	Max. ambient temperature	Max. process temperature	Temperature class
Transmitter 4 – 20 mA / 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 ATEX certificates from Pepperl & Fuchs:

- PTB 99 ATEX 2219X (SC2-NO) for /K1 – /K3
- PTB 00 ATEX 2049X (SJ2-SN) for /K6 – /K8

RAKD with ATEX- certification “intrinsic safe ic” (option /KS3)

Output signal:

4 – 20 mA / Pulse output / Limit switches

Explosion proof:

Ex ic IIC T6...T4 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

Configuration	Max. ambient temperature	Max. process temperature	Temperature class
Transmitter 4 – 20 mA / 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
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 – /K3
- IECEx PTB 11.0092X (SJ2-SN) for /K6 – /K8

RAKD with IECEx- certification “intrinsic safe ic” (option /ES3)

Output signal:

4 – 20 mA / Pulse output / Limit switches

Explosion proof:

Ex ic IIC T6...T4 Gc

Entity parameter:

see table 8

Temperature specification:

see table 9

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

Certificate:

GYJ15.1065

Output signal:

4 – 20 mA / Pulse output / Limit switches

Explosion proof:

Ex ia IIC T5/T6

Max. Tamb.:

65 °C

Limit switches:

option /K1 – /K8

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

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.

RAKD with EAC- certification “intrinsic safe” (Russia, Belorussia, Kazakhstan) (option /GS1)

Certificate:

RU C-DE.ГБ08.B.01183

Output signal:

4 – 20 mA / Pulse output / Limit switches

Explosion proof:

0ExialICT6 X

Entity parameter:

Table 12

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

Temperature specification:

Table 13

Configura-tion	Max. ambient temperature	Max. process temperature	Temperature class
Indicator “E” + limit switches type “2”	65 °C	65 °C	T6
	50 °C	80 °C	
	45 °C	100 °C	T5
	38 °C	135 °C	T4
Indicator “T” with limit switches 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		
Indicator “T” with limit switches 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		

RAKD with INMETRO- certification “intrinsic safe” (Brazil) (option /US1)

Certificate:

DEKRA 15.0005 X

Data same as IECEx type with option /ES1.

Intrinsically safe RAKD with Taiwan Safety Mark:

Registration Document:

ML041200703XN3

Option /ES1 must be selected.

Same data as IECEx-certified type (/ES1)

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

Intrinsically safe and dust proof limit switches with ATEX-certification (only for indicator T with option /K1 – /K8) (option /KS2)

Certificate:

- PTB 99 ATEX 2219X (SC2-NO)
- PTB 00 ATEX 2049X (SJ 2-S.N)

Explosion proof:

Ex ia IIC T6...T1 Gb, II 2G
Ex ia IIIC T135 °C Da, II 1D
Ex ib IIIC T135 °C Db, II 2D

Entity parameter:

see certificate of conformity

Intrinsically safe / non incendive limit switches with FM- certification (USA) (only for indicator T with option /K1 – /K8) (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

ATEX registrated RAKD not electrical type (option /KC1)

Archive no.:

IBExU 137/15_E1

Explosion proof:

II 2GD IIC TX

Max. surface temperature:

TX: corresponding process temperature

Ambient temperature:

-25 °C – 80 °C

Max. process temperature:

without valve: 250 °C
with valve: 150 °C

RAKD with EAC- certification for not electrical type (option /GC1)

Certificate:

RU C-DE.ГБ08.B.01183

Explosion proof:

II Gb IIC T* X
III Db IIIC T* °C X

Max. surface temperature:

T* : corresponding process temperature

Ambient temperature :

-25 °C – 80 °C

Max. process temperature:

without valve: 250 °C
with valve: 150 °C

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: PTB00ATEX 2018
IECEX: PTB06.0089
FM: 3007835, Control Drawing 02 02 00 111
CSA: 1067708, Control Drawing 02 02 00 112
EAC: RU C-DE.ГБ05.B.00213

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 : P333188/1
KOSHA : 2009-BO-0157
NEPSI : GYJ12.1079
EAC : RU C-П.ГБ05.B.00718
- KFA6-SR2-Ex*-W: ATEX : PTB 00 ATEX 2081
CSA : 1029981 (LR 36087-19)
FM : ID 3011578
IECEX : PTB11.0031
PESO : P333188/1
KOSHA : 2009-BO-0157
NEPSI : GYJ12.1079
EAC : RU C-П.ГБ05.B.00718
- KHA6-SH-Ex1: ATEX : PTB 00 ATEX 2043
EAC : RU C-П.ГБ05.B.00718
- KFD2-SR2-Ex*-W: ATEX : PTB 00 ATEX 2080
CSA : 1029981 (LR 36087-19)
FM : ID 3011578
IECEX : PTB11.0034
PESO : P333188/2
KOSHA : 2009-BO-0157
NEPSI : GYJ12.1081
EAC : RU C-П.ГБ05.B.00718
- KFD2-SH-Ex1: ATEX : PTB 00 ATEX 2042
EAC : RU C-П.ГБ05.B.00718

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 %, 45-65 Hz
- 115 V AC ± 10 %, 45-65 Hz
- 24 V DC ± 25 %

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

Switching capacity : max. 250 V AC, max. 2 A

INSTALLATION

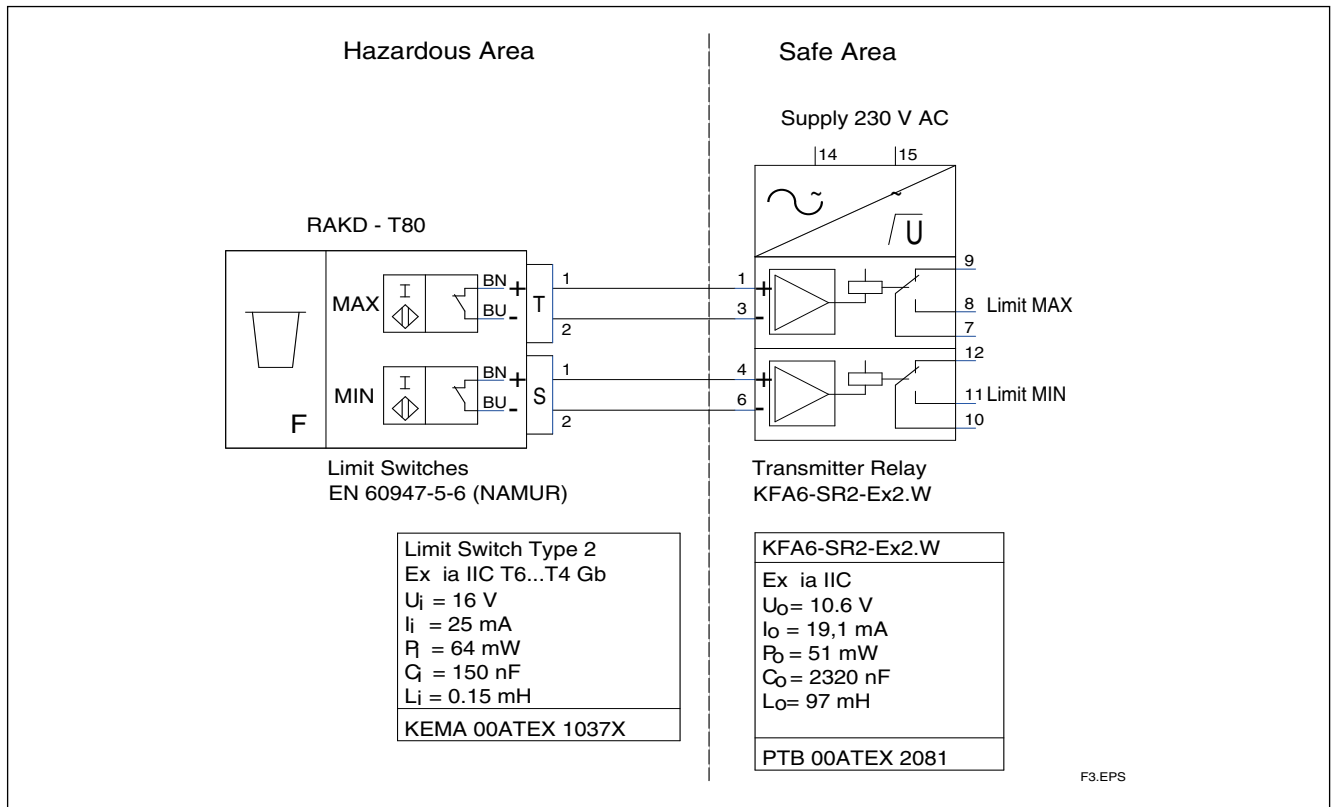


Fig. 3 ATEX- version of RAKD with 2 limit switches in combination with transmitter relay

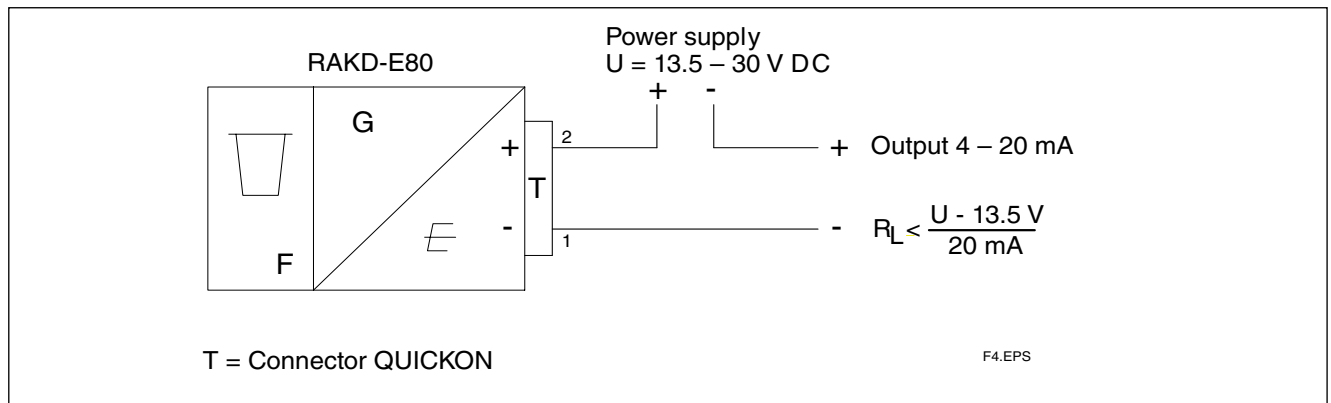


Fig. 4 RAKD with electronic transmitter

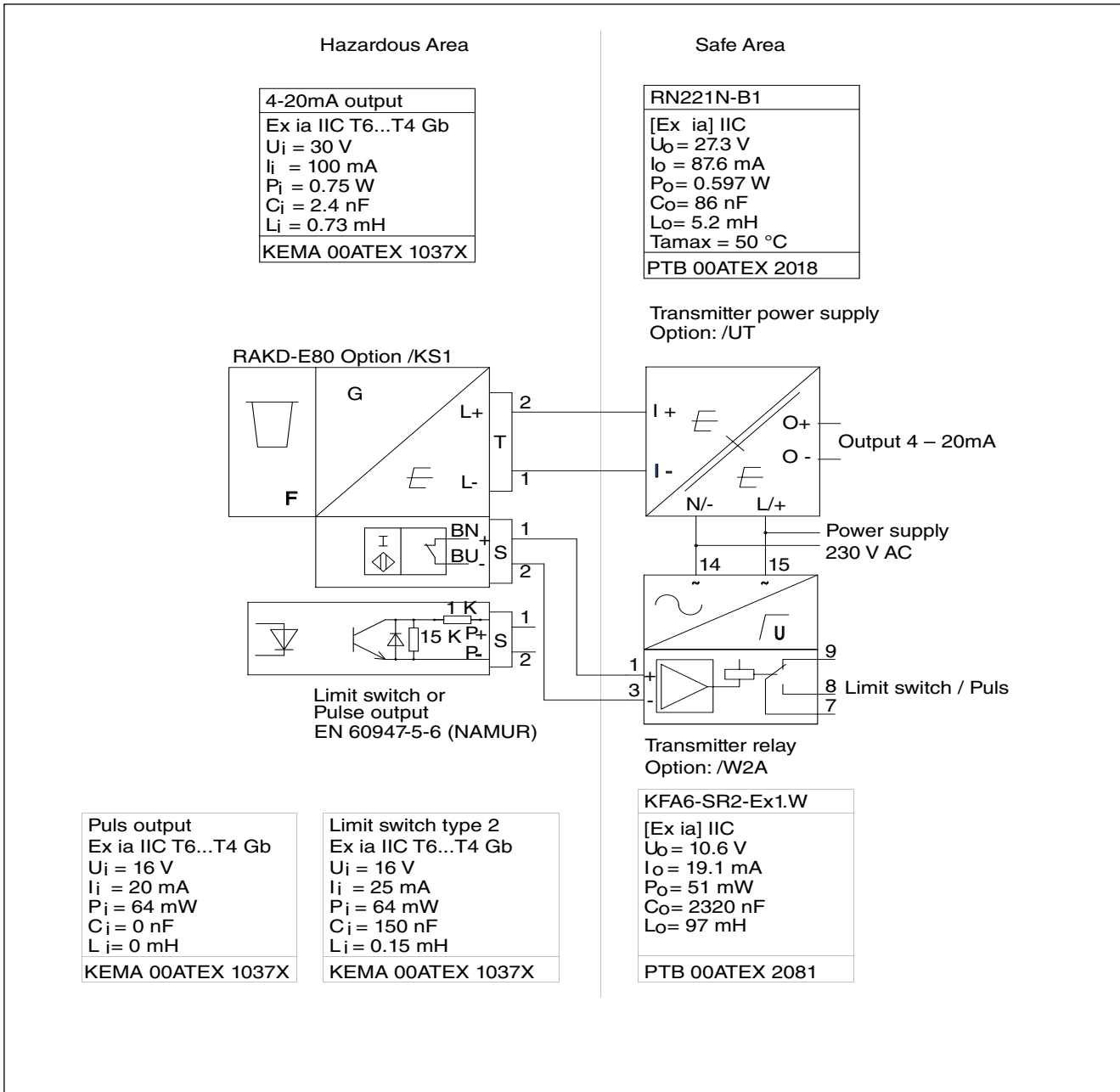


Fig. 5 ATEX- version of RAKD with electronic transmitter with power supply and limit switch or pulse output in combination with transmitter relay

TEMPERATURE SPECIFICATION

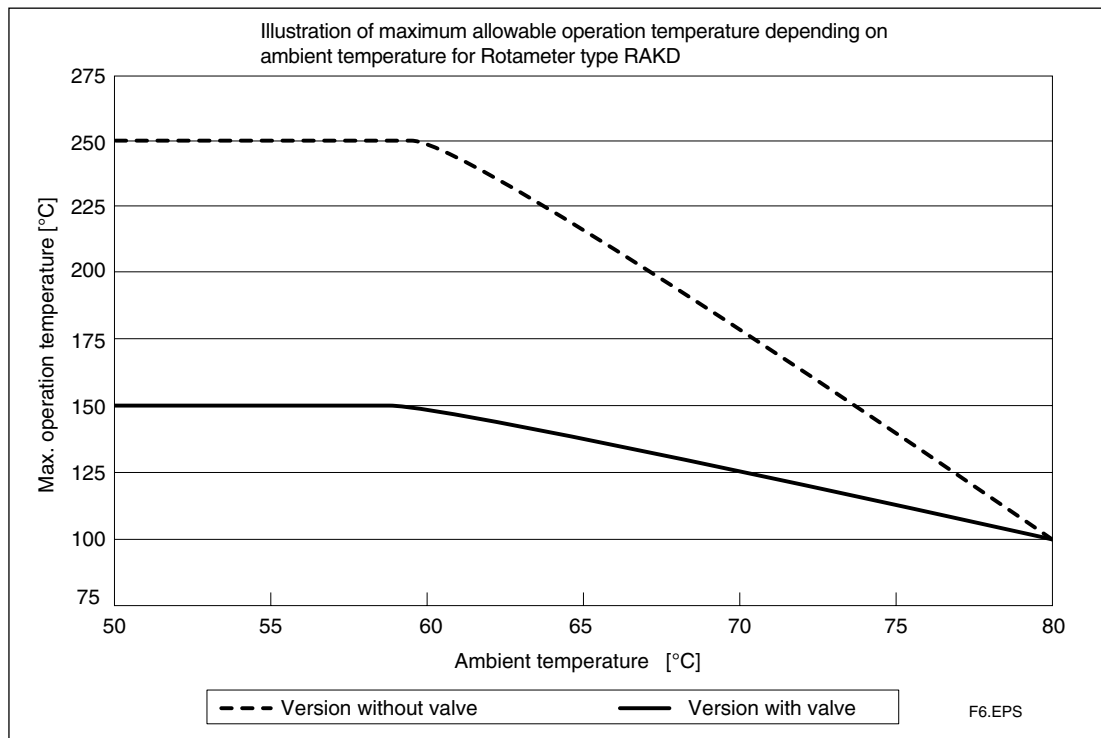


Fig. 6

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 considered.

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 considered.

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 considered.

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	without controller	without controller
2. Version	with valve	without valve	without 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	160 – 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 11	Page 12	Page 13	Page 14

Ordering instructions

Standard:

a: Model, suffix and option code

b: Flow conditions

c: Temperature

d: Pressure

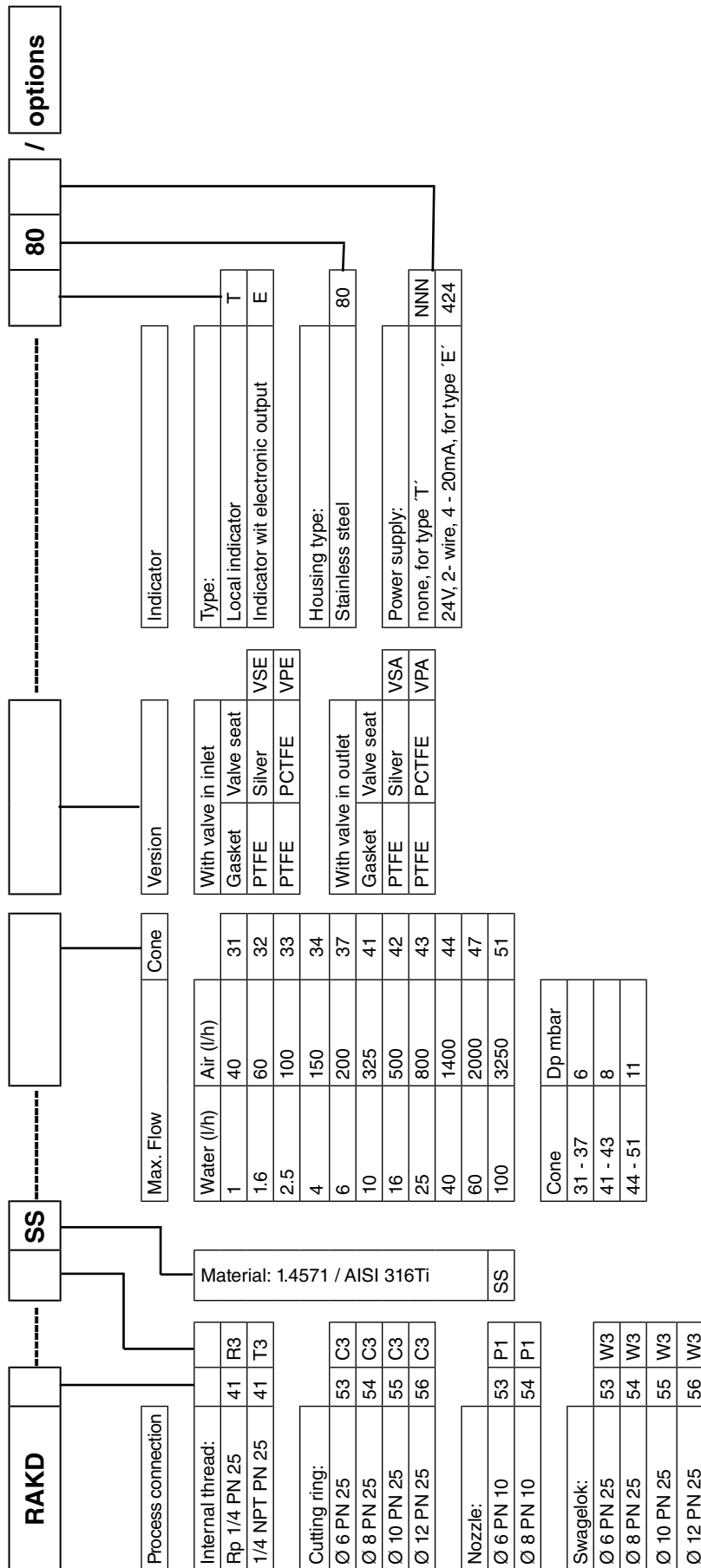
e: Viscosity (see viscosity limit)

f: Density

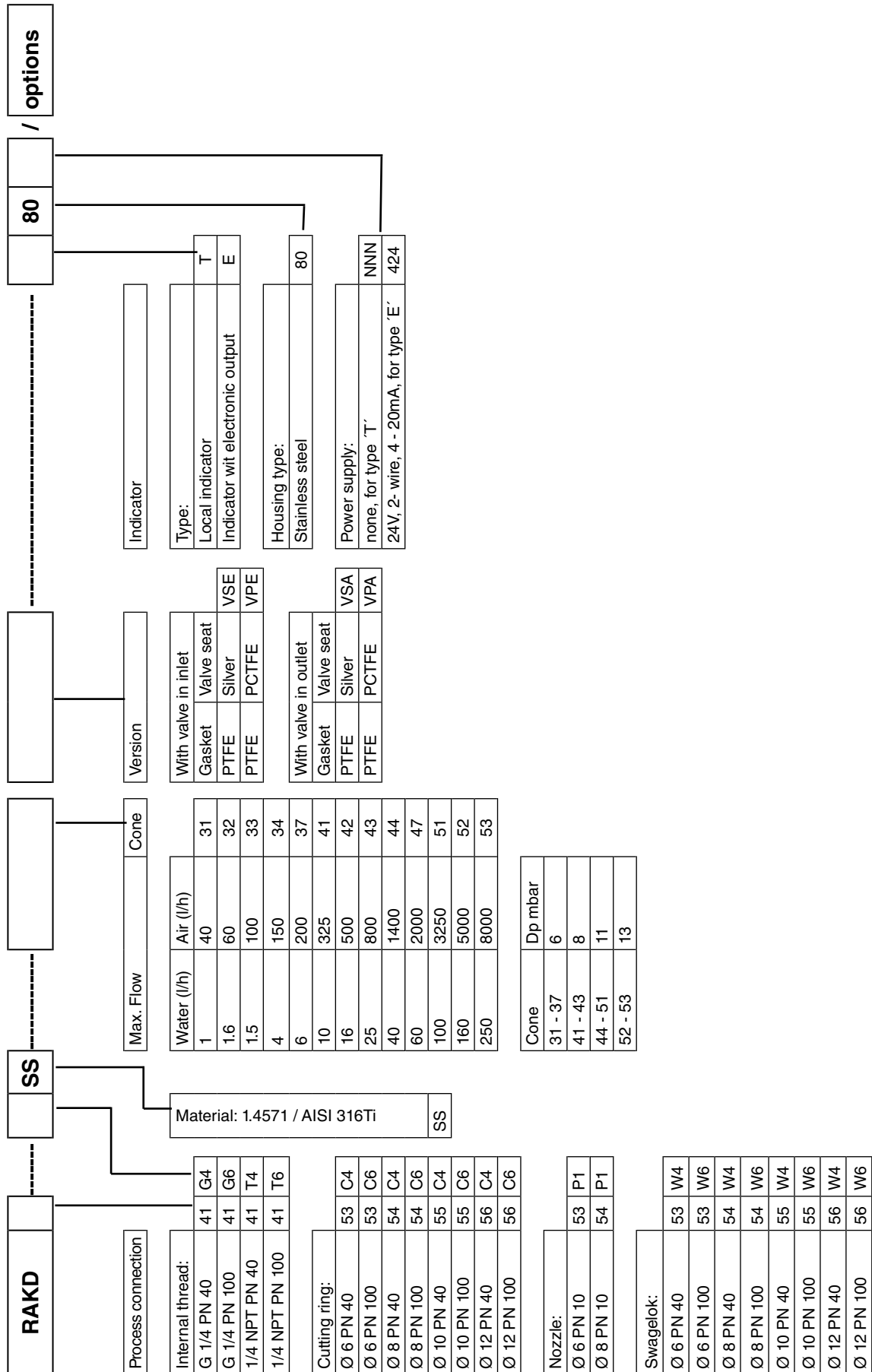
For gases: cross reference of the scale

Option/Bx: customer specification notes

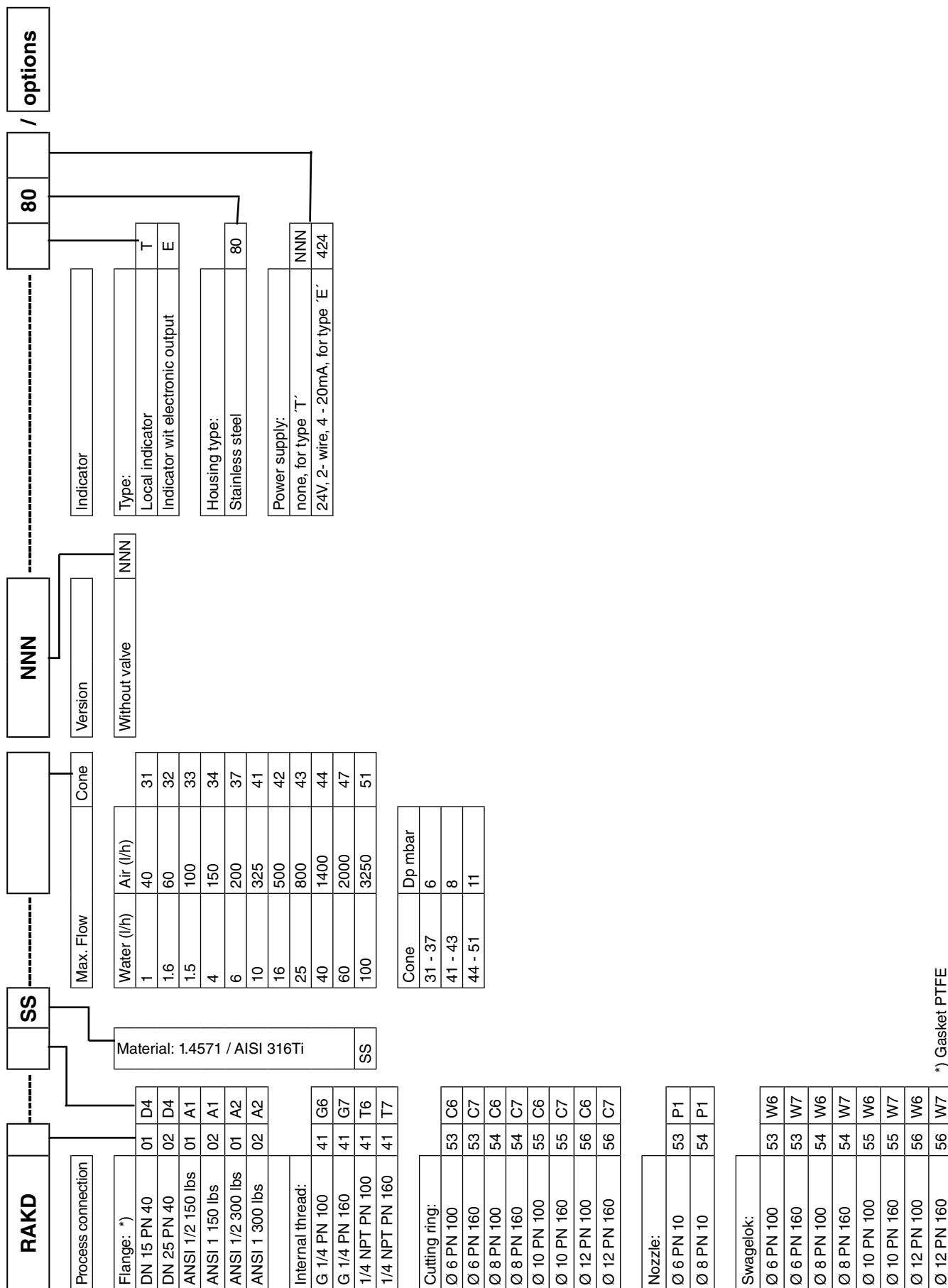
RAKD with valve and controller (option /R1 and /R3) 1.0 – 100 l/h water / 40 – 3250 l/h air



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

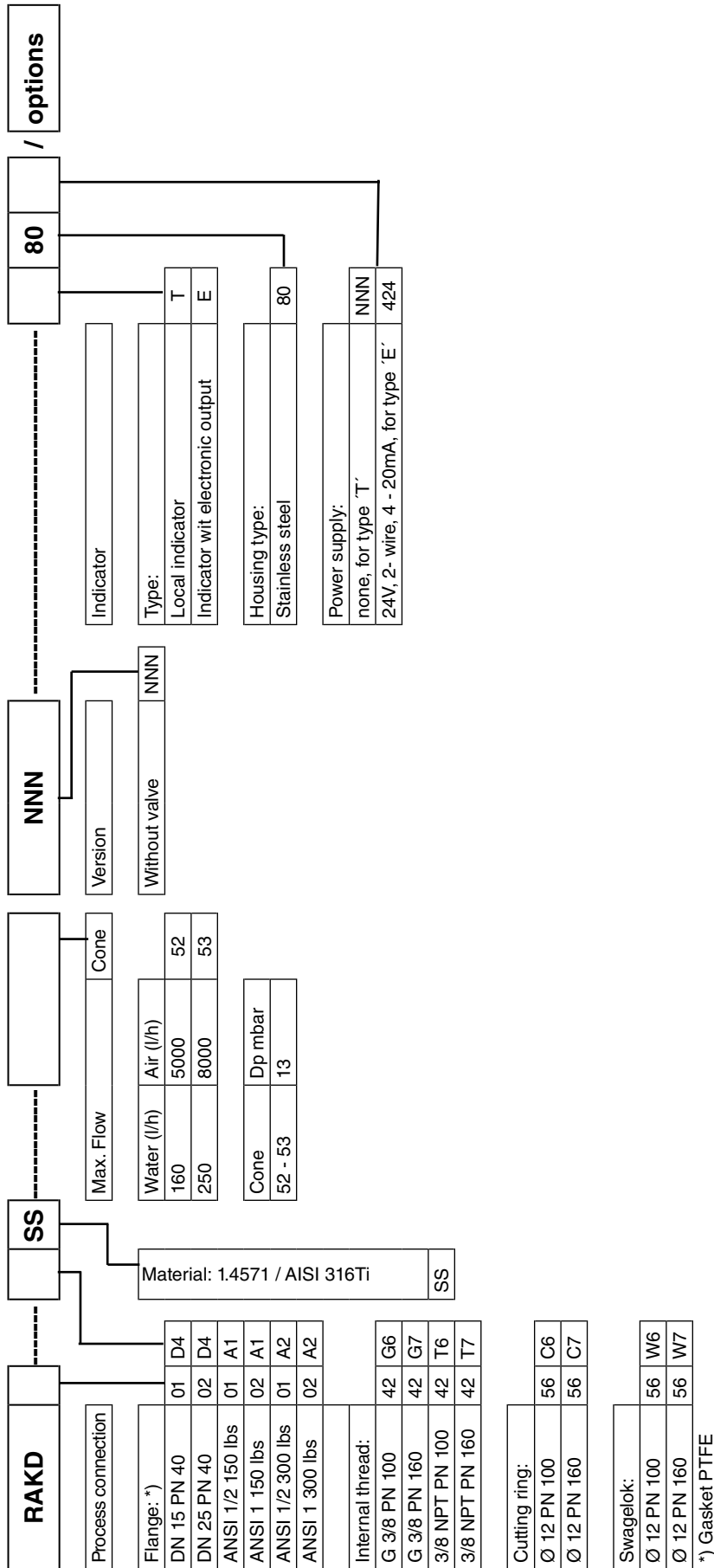


RAKD without valve 1.0 – 100 l/h water / 40 – 3250 l/h air



*) 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
	/A29	M12- connector acc. IEC 61076-2-101	Only for indicator E or T with limit switches
	/A30	M12- connector with plug connector acc. IEC 61076-2-101	Only for indicator E or T with limit switches
Marking	/B1	Tag plate (SS) fixed by wire and customer specified tag number on scale	Plate 12 x 40 mm; max. 45 digits
	/B4	Neutral version	Not with Ex-proof type
	/B8	Customer provided marking on label	
	/B10	Percent scale	
	/BG	With customer specified tag number on scale	Max. 45 digits
	/BD	Dual Scale	Adjustment only possible for 1 fluid
Limit switches	/K1	MIN- contact	Only for indicator T
	/K2	MAX- contact	
	/K3	MIN-MAX- contact, MIN-MIN- contact, MAX-MAX- contact	
	/K6	MIN- contact "Fail safe" version	Only for indicator T
	/K7	MAX- contact "Fail safe" version	
	/K8	MIN-MAX- contact "Fail safe" version	
Pulse output	/CP	Pulse output, acc. EN 60947-5-6 (NAMUR)	Only for indicator E; not with limit switches
Hazardous area approvals	/KS1	ATEX intrinsically safe „ia“	Not for indicator T without limit switches
	/KS2	ATEX gas and dust proof limit switches, category 2G 1D	Only for indicator T with limit switches
	/KS3	ATEX intrinsically safe „ic“	Not for indicator T without limit switches
	/ES1	IECEX intrinsically safe „ia“	Not for indicator T without limit switches
	/ES3	IECEX intrinsically safe „ic“	
	/FS1	FM intrinsically safe / non incedive limit switches (USA)	For indicator T only with limit switches
	/NS1	NEPSI approval (China)	Not for indicator T without limit switches; only with /CN
	/GS1	EAC intrinsically safe „ia“	Not for indicator T without limit switches; only with /VE
	/US1	INMETRO intrinsically safe „ia“	Not for indicator T without limit switches
	/KC1	ATEX non- electrical type	Only for indicator T without limit switches
	/GC1	EAC non- electrical type	Only for indicator T without limit switches
Test and certificates	/H1	Oil + fat free for wetted surfaces	Not for /R1 and /R3
	/PP	Pressure test report measuring system	
	/P2	Certificate of Compliance with the order acc. to EN 10204: 2004- 2.1	
	/P3	As /P2 +Test report acc. to EN 10204: 2004- 2.2	
	/P6	Material certificate acc. to EN 10204: 2004- 3.1	Only for tube, connection heads, screw sealing plug
	/PM1	PAMI test (1 test point : metering tube)	Only for models without valve
/PM4	PAMI test (4 test points : metering tube, connection heads, sealing plug)	Only for models with valve	
/PM5	PAMI test (5 test points : metering tube, connection pieces, slip on flanges)	Only for models with process connection D4, A1, A2	
Gost approval	/QR2	Primary Calibration and Test Confirmation valid in Kazakhstan	See page 4 only with /VE
	/QR3	Primary Calibration and Test Confirmation valid in Uzbekistan	See page 4
Controller	/R1	Pre pressure controller 1.4571 (only with valve in inlet; for gas with variable pre pressure and liquids with variable pre and back pressure)	Only for process connection R3, T3, C3, W3, P1; only with valve
	/R3	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
Delivery to Korea	/KC	With KC-mark for Korea	Not with /VE or /CN
Eurasian Conformity	/VE	With EAC- mark	Not with /KC or /CN
Delivery to China	/CN	For delivery to China	Not with /VE or /KC
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	KFA5-SR2-Ex1.W / 115 V AC, 1 channel	Only for limit switches /K1, /K2, /K3 or /CP
	/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 or /CP
	/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, /K7
	/W2F	2x KHA6-SH-Ex1 / 115/230 V AC, 1 channel, Fail Safe	Only for limit switches /K8
	/W4A	KFD2-SR2-Ex1.W / 24 V DC, 1 channel	Only for limit switches /K1, /K2, /K3 or /CP
	/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 /K6, /K7
	/W4F	2x KFD2-SH-Ex1 / 24 V DC, 1 channel, Fail Safe	Only for limit switches /K8
Instruction manuals	/IE n	Quantity of instruction manuals in English	n = 1 to 9 selectable *)
	/ID n	Quantity of instruction manuals in German	n = 1 to 9 selectable *)
Special order	/Z	Special design, must be specified separately. If /Z is selected, several Suffix of Model-Suffix Code can be changed to Z.	

*) 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.

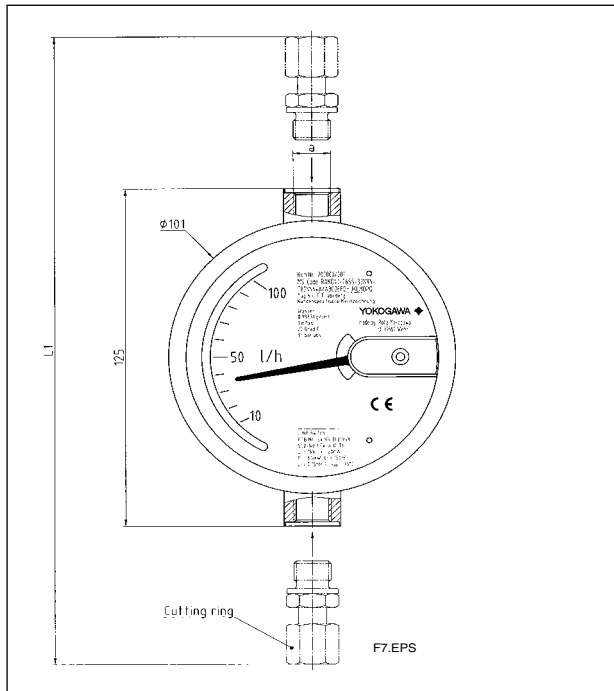


Fig. 7 Version without valve

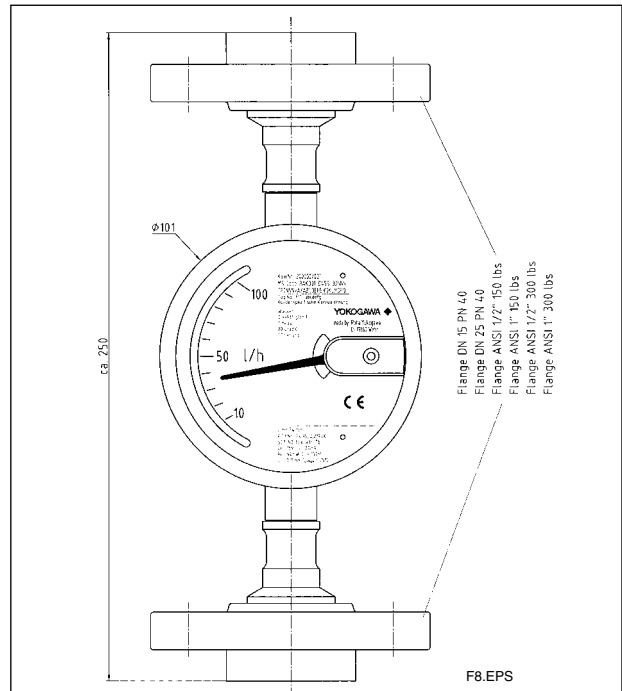


Fig. 8 Version with flange connection

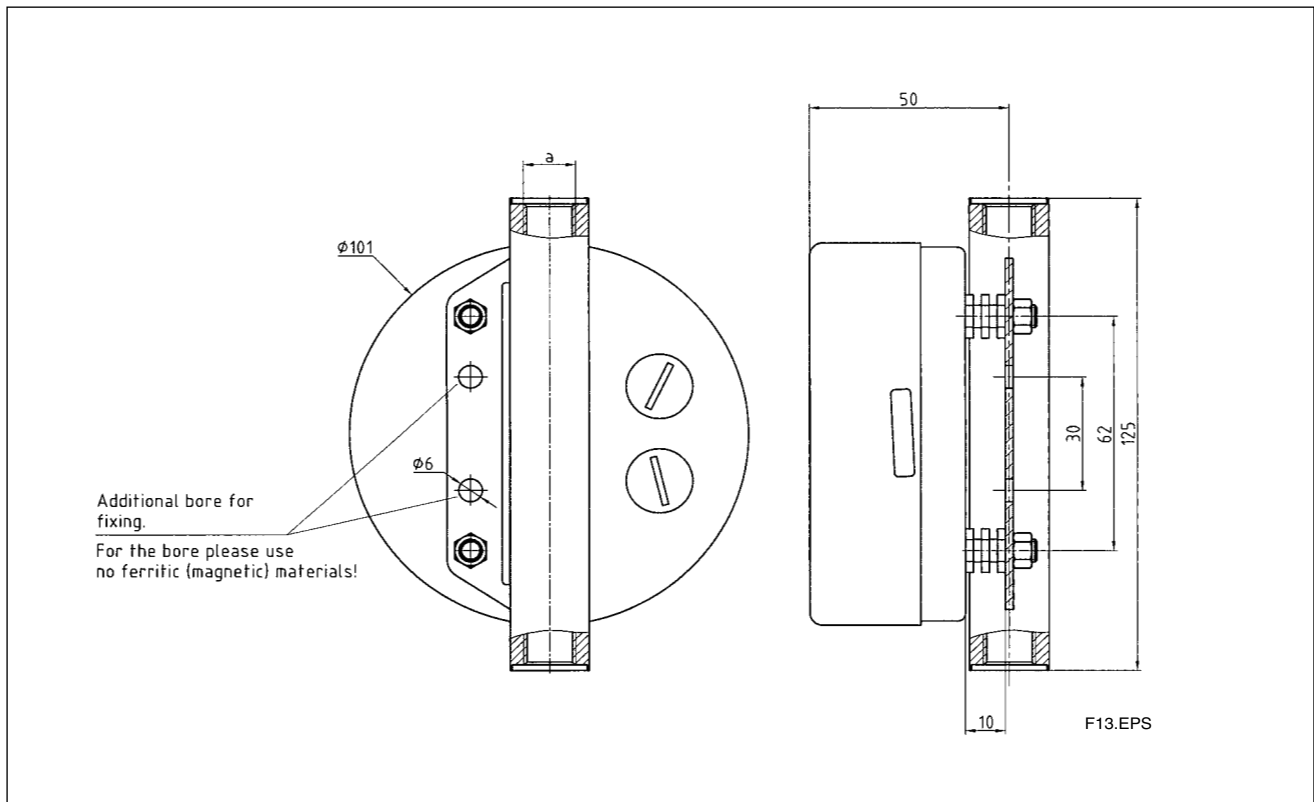


Fig. 9 Back view with mounting

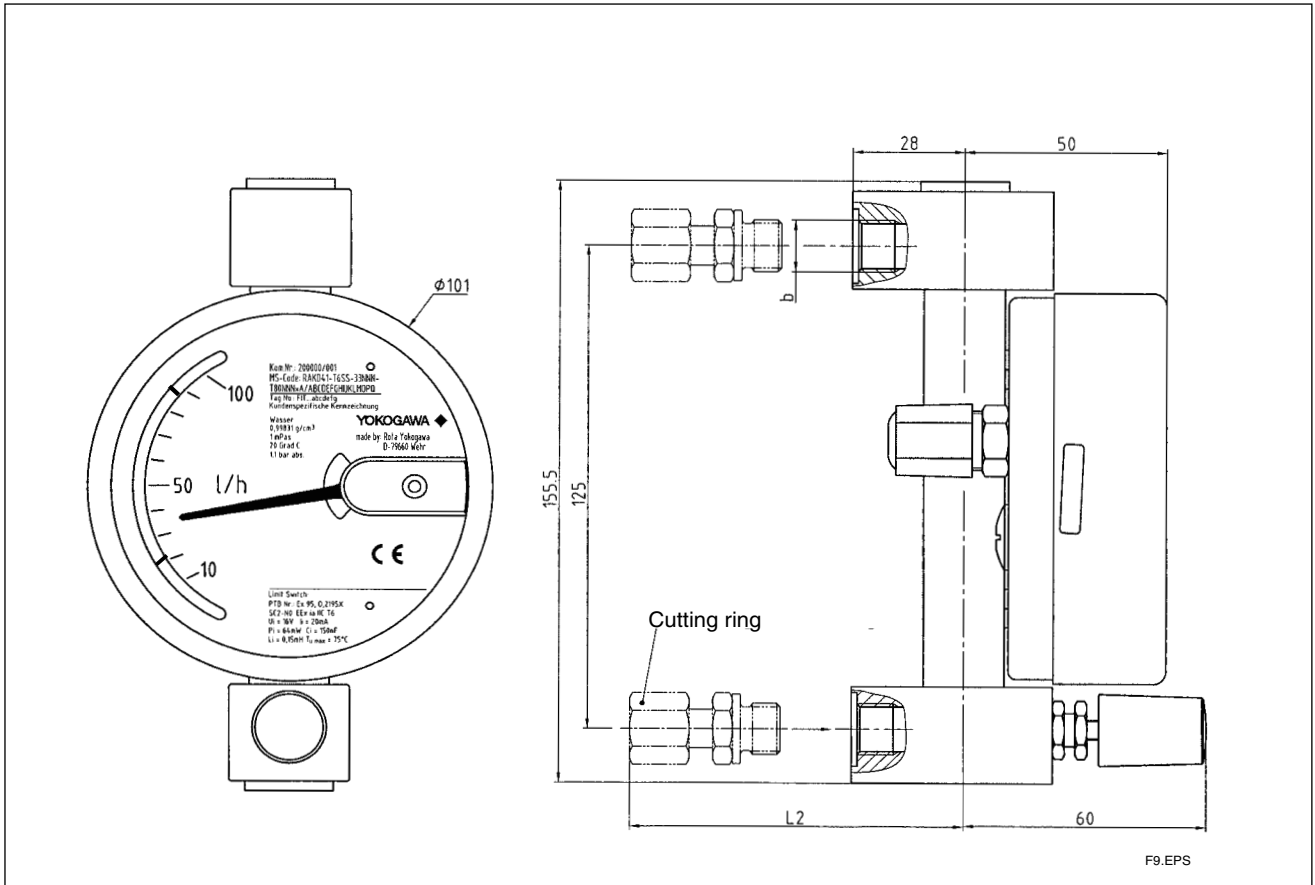


Fig. 10 Version with inlet valve

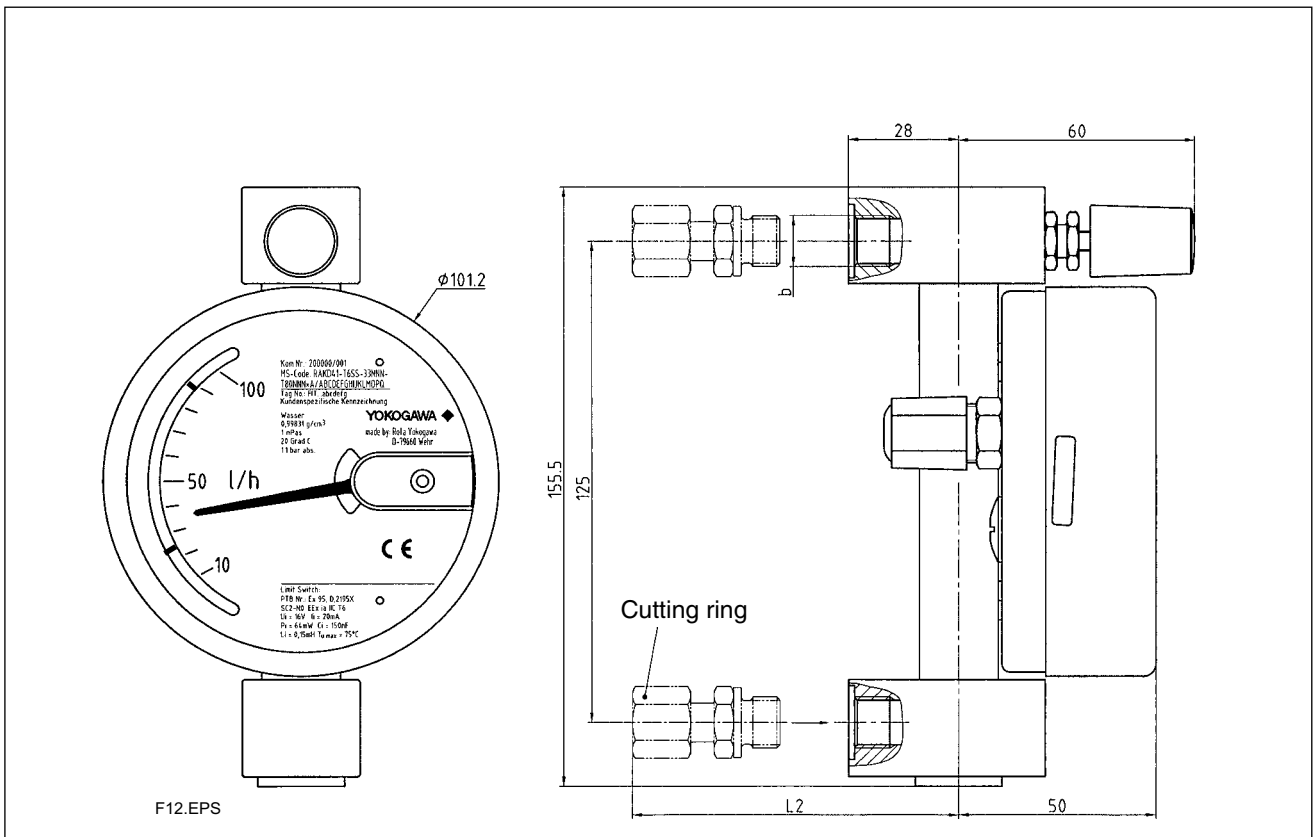


Fig. 11 Version with outlet valve

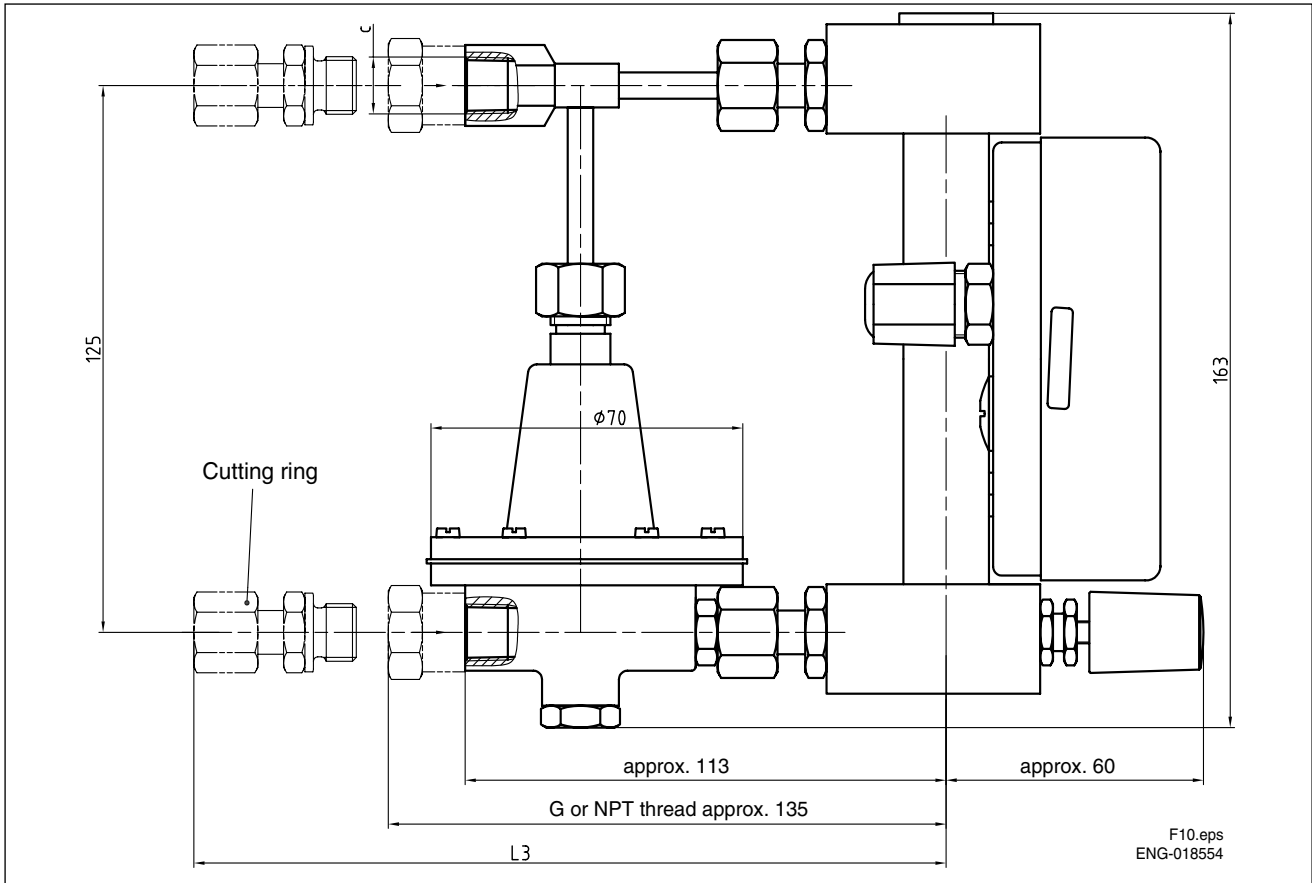


Fig. 12 Version with inlet valve and inlet controller

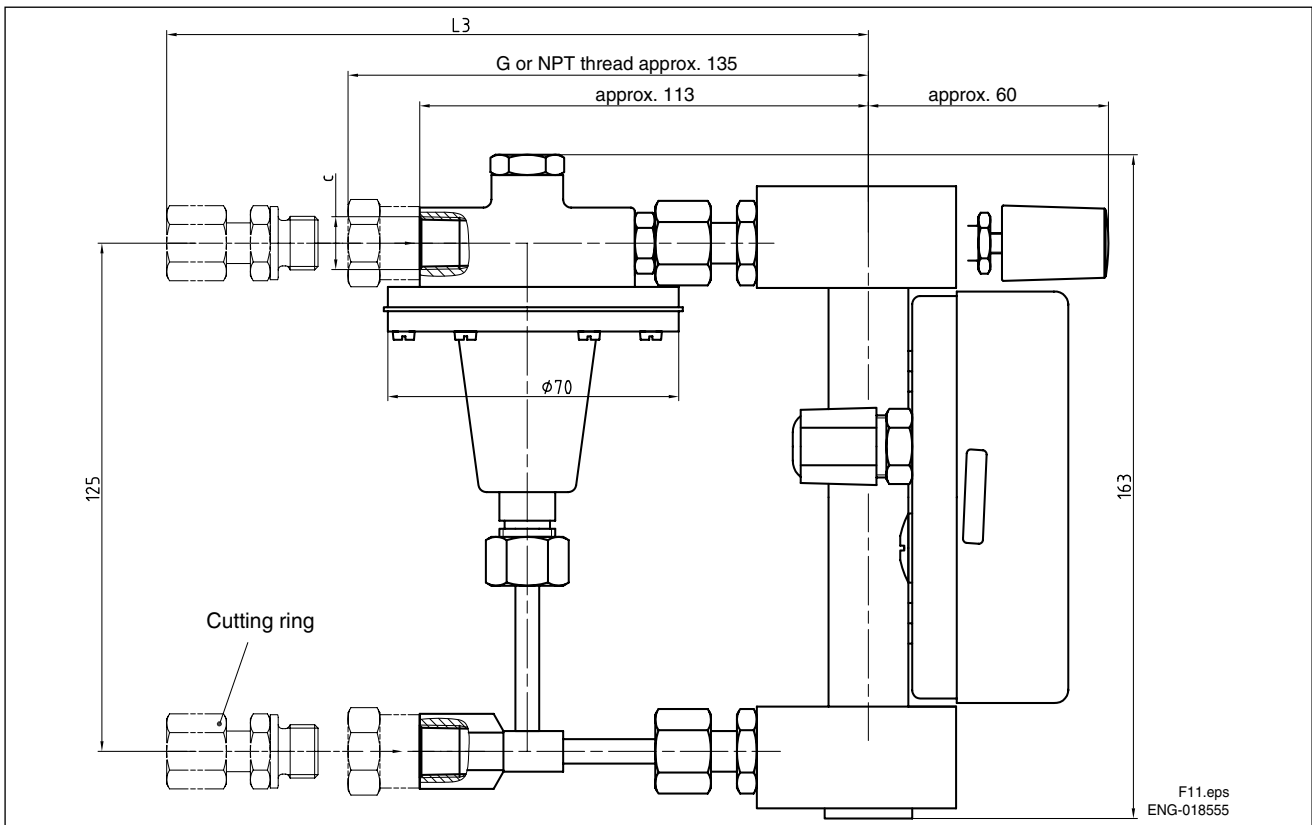


Fig. 13 Version with outlet valve and back pressure controller

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. 600 g	approx. 1000 g	approx. 1800 g

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 0 mT.



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