

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

Contents	
Features	page 1
Standard Specification	page 2
Controller (/R1, /R3)	page 4
Compliance with IEC 61508	page 4
Compliance with ISO 13849	page 4
Hazardous Area Specifications	page 4
Installation	page 6
Temperature Specification	page 8
Model and option specifications	page 8
Dimensions	page 14
Connection Types	page 17
Installation Lengths depending on Connection Types and Size	page 17
Weights	page 17
Planning Hints	page 17

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.. $Q_{max} = 1$ m³/h $\rightarrow$

1 Puls = 0.0001 m³ = 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 mm²

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

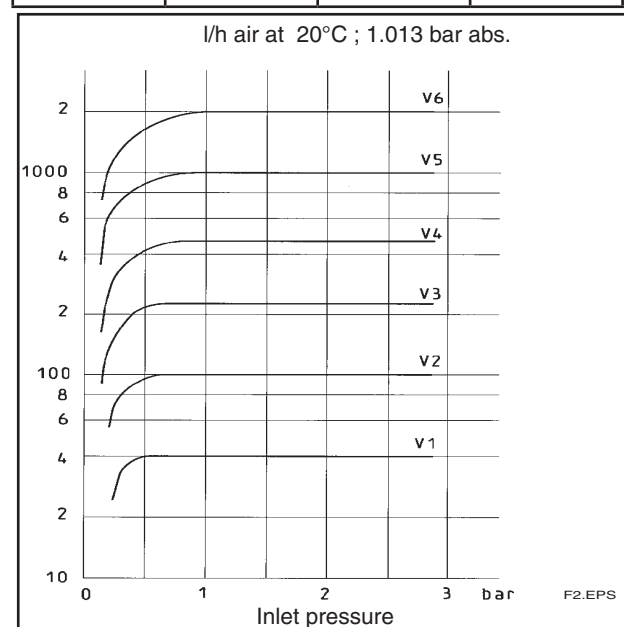


Fig. 2 Diagram controller characteristic

COMPLIANCE WITH IEC 61508

RAKD with local indicator and standard or fail safe limit switches (RAKD□□-□□SS-□□□□□-T□□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□□-T□□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
	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 to /K3

- PTB 00 ATEX 2049X (SJ2-S.N) for /K6 to /K10

RAKD “non incendive” (option /KN1)

Type “n” (non incendive) 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 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 :

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:

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

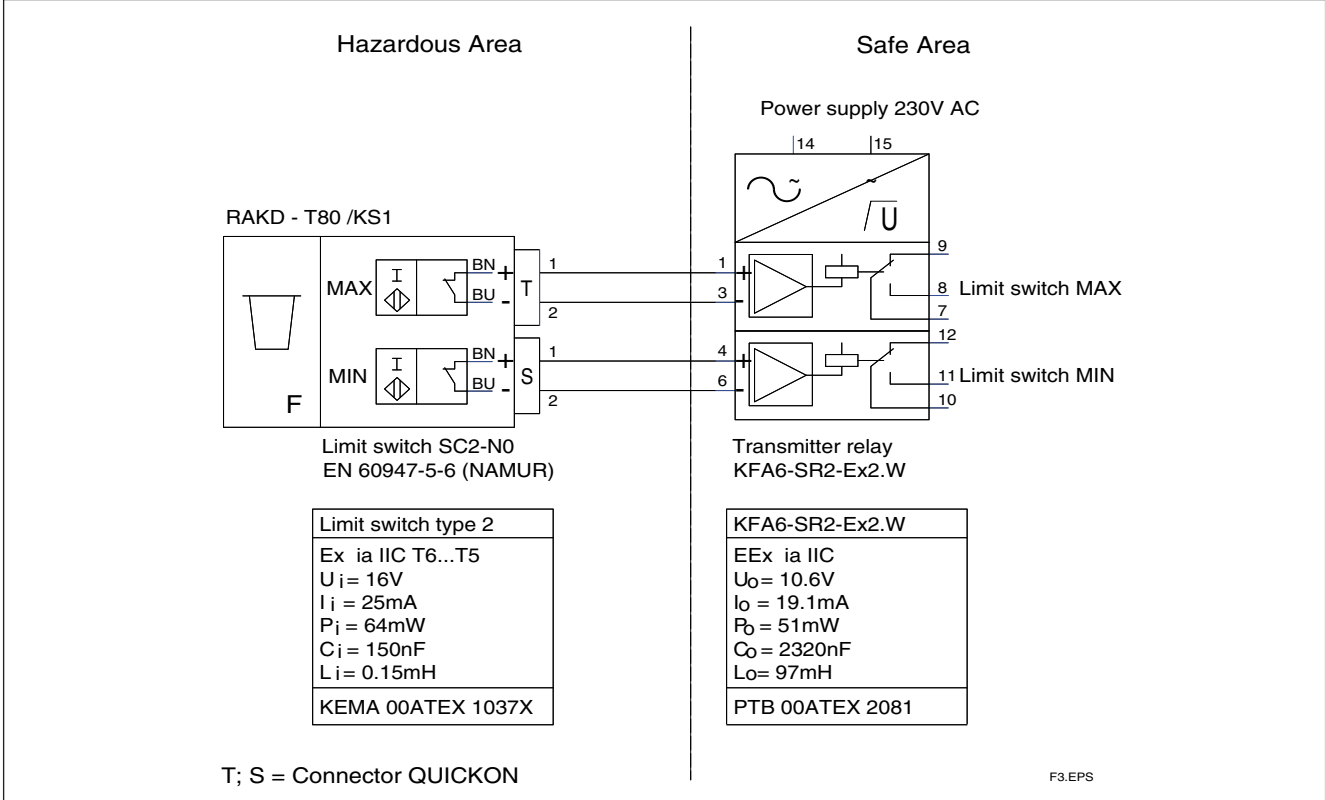


Fig. 3 ATEX- version of RAKD with 2 limit switches in combination with transmitter relay

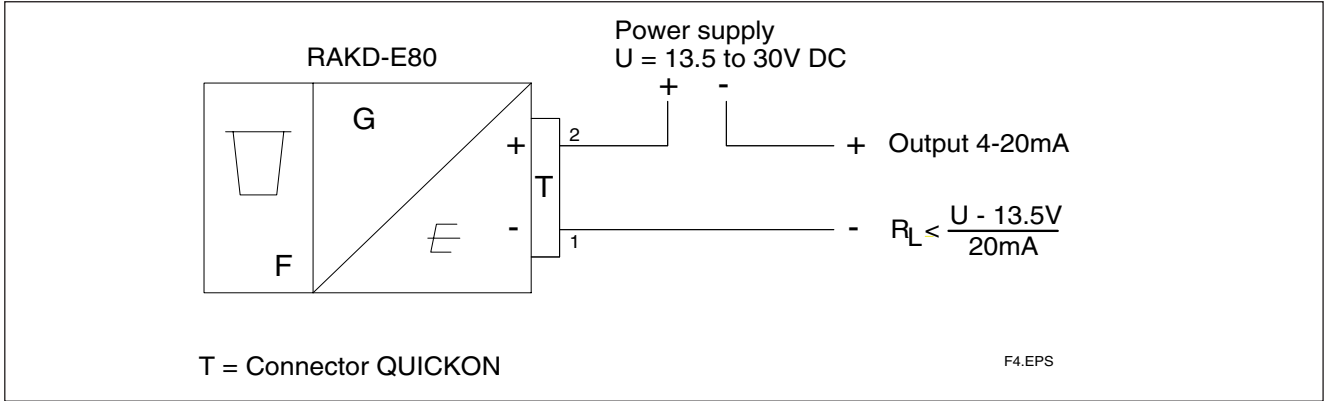


Fig. 4 RAKD with electronic transmitter

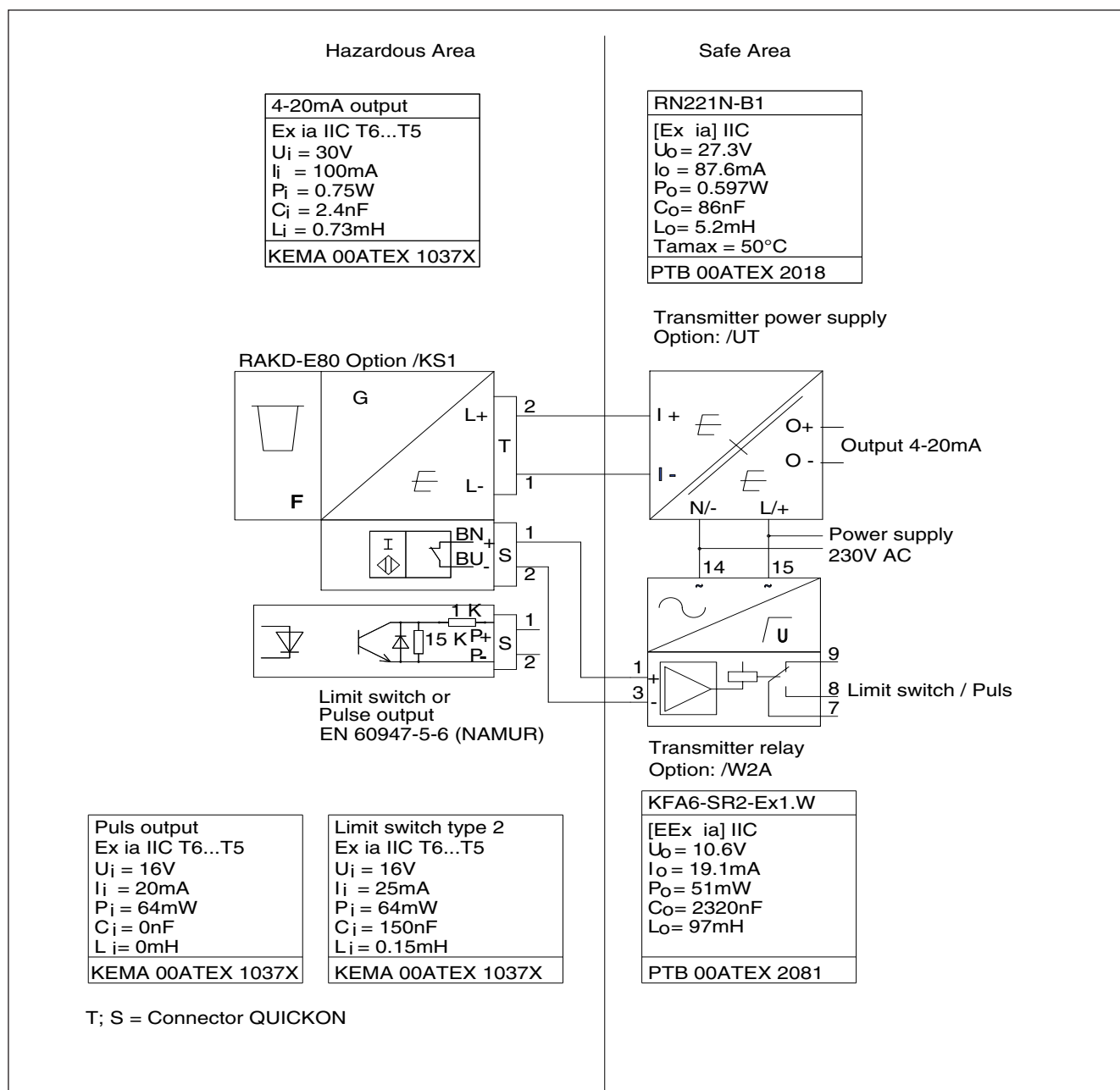


Fig. 5 ATEX- version of RAKD with electronic transmitter with power supply and limit switch or pulse output in combination with transmitter relay

TEMPERATURE SPECIFICATION

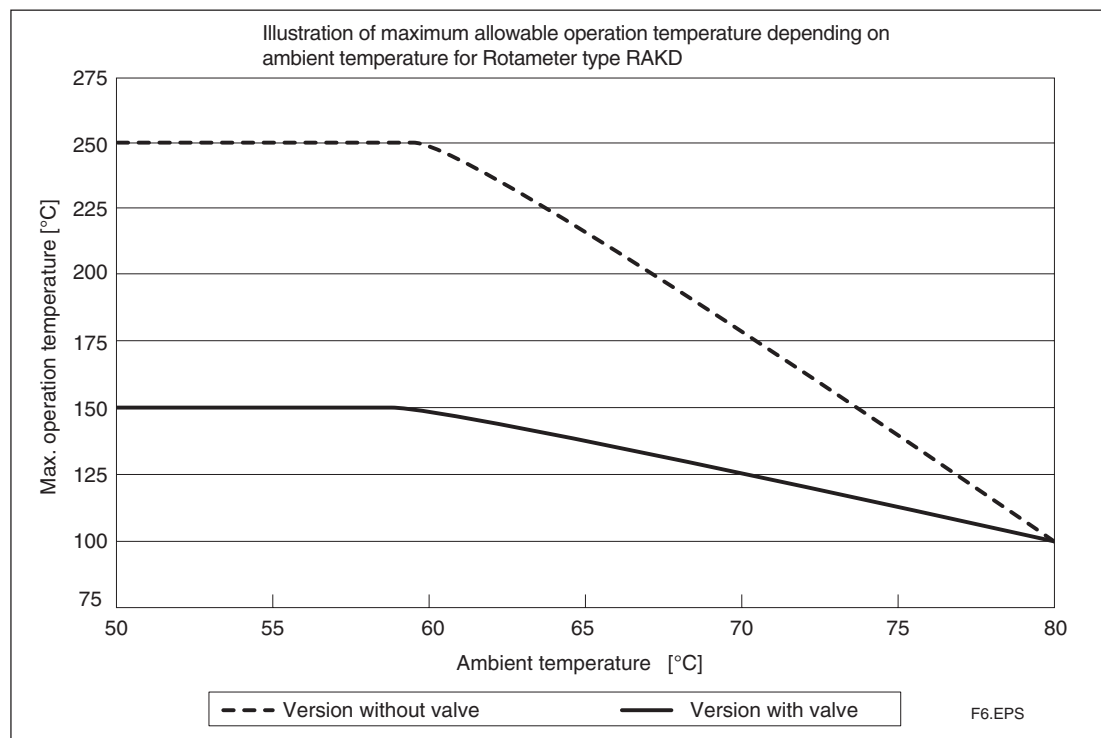


Fig. 6

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

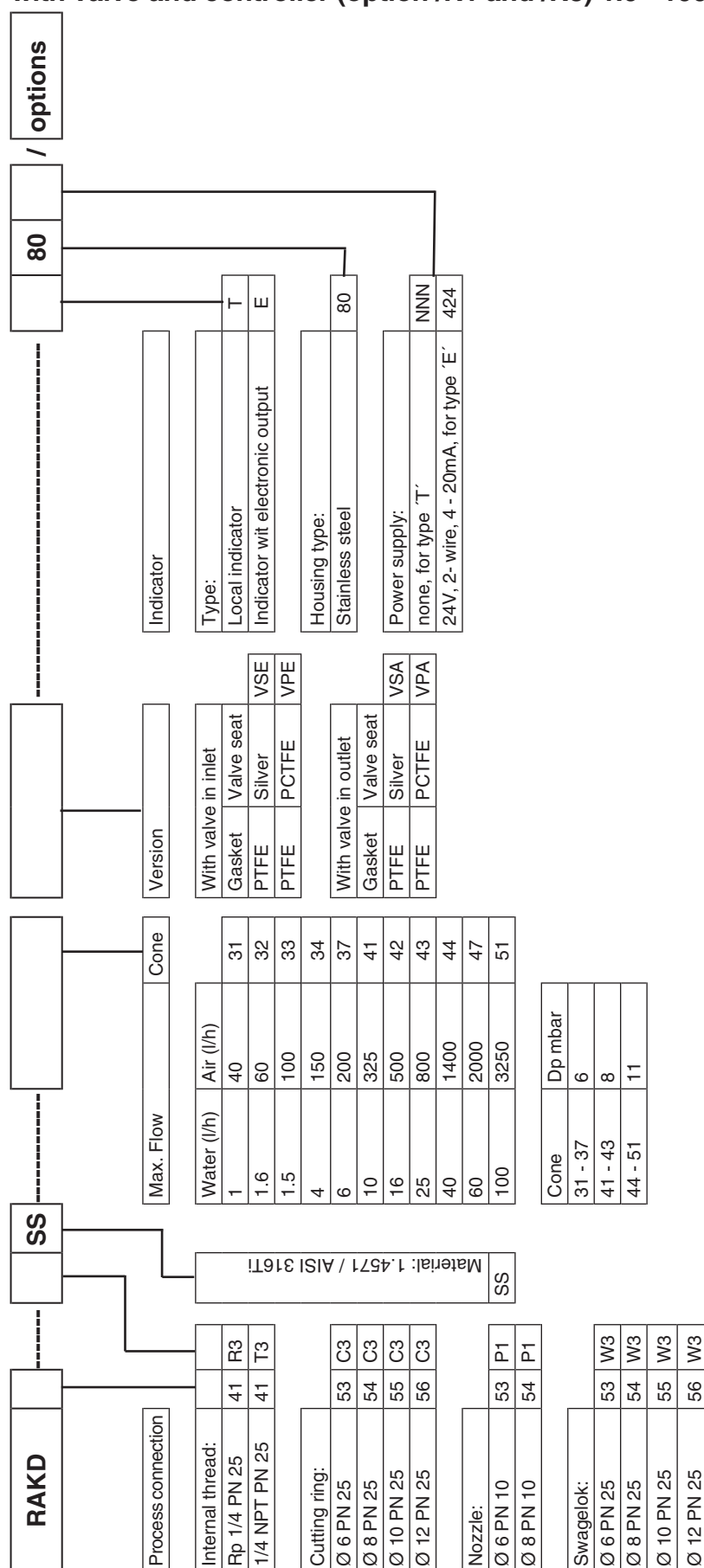
Standard:

- 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

SS

80

options

Process connection

Internal thread:

G 1/4 PN 40	41	G4
G 1/4 PN 100	41	G6
1/4 NPT PN 40	41	T4
1/4 NPT PN 100	41	T6

Cutting ring:

Ø 6 PN 40	53	C4
Ø 6 PN 100	53	C6
Ø 8 PN 40	54	C4
Ø 8 PN 100	54	C6
Ø 10 PN 40	55	C4
Ø 10 PN 100	55	C6
Ø 12 PN 40	56	C4
Ø 12 PN 100	56	C6

Nozzle:

Ø 6 PN 10	53	P1
Ø 8 PN 10	54	P1

Swagelok:

Ø 6 PN 40	53	W4
Ø 6 PN 100	53	W6
Ø 8 PN 40	54	W4
Ø 8 PN 100	54	W6
Ø 10 PN 40	55	W4
Ø 10 PN 100	55	W6
Ø 12 PN 40	56	W4
Ø 12 PN 100	56	W6

Max. Flow

Water (l/h)

Air (l/h)

1	40	31
1.6	60	32
1.5	100	33
4	150	34
6	200	37
10	325	41
16	500	42
25	800	43
40	1400	44
60	2000	47
100	3250	51
160	5000	52
250	8000	53

Version

With valve in inlet

Gasket	Valve seat
PTFE	Silver
PTFE	PCTFE

With valve in outlet

Gasket	Valve seat
PTFE	Silver
PTFE	PCTFE

VSA

VPA

Indicator

Type:

Local indicator	T
Indicator wit electronic output	E

Housing type:

Stainless steel	80
-----------------	----

Power supply:

none, for type 'T'	NNN
24V, 2- wire, 4 - 20mA, for type 'E'	424

Material: 1.4571 / AISI 316Ti

SS

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

RAKD		SS		Max. Flow		Cone		NNN		80		options	
Process connection		Material: 1.4571 / AISI 316Ti		Water (l/h)		Air (l/h)		Version		Indicator			
Flange: *)				1		40		Without valve		Type:			
DN 15 PN 40		01 D4		1.6		60		NNN		Local indicator		T	
DN 25 PN 40		02 D4		1.5		100				Indicator wit electronic output		E	
ANSI 1/2 150 lbs		01 A1		4		150				Housing type:		80	
ANSI 1 150 lbs		02 A1		6		200				Stainless steel			
ANSI 1/2 300 lbs		01 A2		10		325				Power supply:		NNN	
ANSI 1 300 lbs		02 A2		16		500				none, for type 'T'		424	
				25		800				24V, 2-wire, 4 - 20mA, for type 'E'			
Internal thread:				40		1400							
G 1/4 PN 100		41 G6		60		2000							
G 1/4 PN 160		41 G7		100		3250							
1/4 NPT PN 100		41 T6											
1/4 NPT PN 160		41 T7											
Cutting ring:				Cone		Dp mbar							
Ø 6 PN 100		53 C6		31 - 37		6							
Ø 6 PN 160		53 C7		41 - 43		8							
Ø 8 PN 100		54 C6		44 - 51		11							
Ø 8 PN 160		54 C7											
Ø 10 PN 100		55 C6											
Ø 10 PN 160		55 C7											
Ø 12 PN 100		56 C6											
Ø 12 PN 160		56 C7											
Nozzle:													
Ø 6 PN 10		53 P1											
Ø 8 PN 10		54 P1											
Swagelok:													
Ø 6 PN 100		53 W6											
Ø 6 PN 160		53 W7											
Ø 8 PN 100		54 W6											
Ø 8 PN 160		54 W7											
Ø 10 PN 100		55 W6											
Ø 10 PN 160		55 W7											
Ø 12 PN 100		56 W6											
Ø 12 PN 160		56 W7											

*) Gasket PTFE

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

RAKD

Process connection

Flang: *)

DN 15 PN 40

01

D4

DN 25 PN 40

02

D4

ANSI 1/2 150 lbs

01

A1

ANSI 1 150 lbs

02

A1

ANSI 1/2 300 lbs

01

A2

ANSI 1 300 lbs

02

A2

Internal thread:

G 3/8 PN 100

42

G6

G 3/8 PN 160

42

G7

3/8 NPT PN 100

42

T6

3/8 NPT PN 160

42

T7

Cutting ring:

Ø 12 PN 100

56

C6

Ø 12 PN 160

56

C7

Swagelok:

Ø 12 PN 100

56

W6

Ø 12 PN 160

56

W7

*) Gasket PTFE

SS

Material: 1.4571 / AISI 316Ti

SS

Max. Flow

Water (l/h)

Air (l/h)

160

5000

250

8000

Cone

Dp mbar

52 - 53

13

Version

Without valve

NNN

NNN

Indicator

Type:

Local indicator

T

Indicator wit electronic output

E

Housing type:

Stainless steel

80

Power supply:

none, for type 'T'

NNN

24V, 2- wire, 4 - 20mA, for type 'E'

424

80

options

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 /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.

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

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



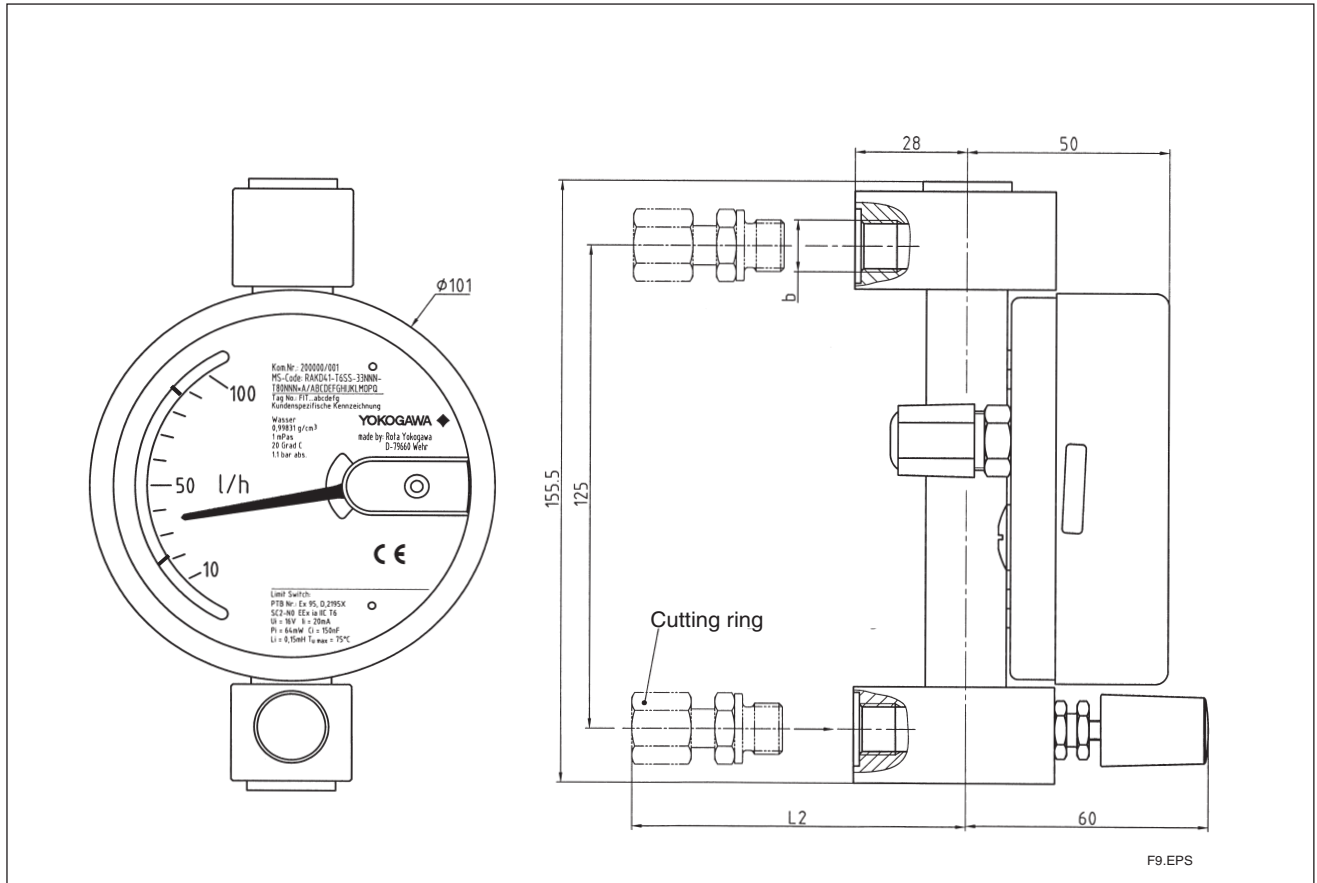


Fig. 10 Version with inlet valve

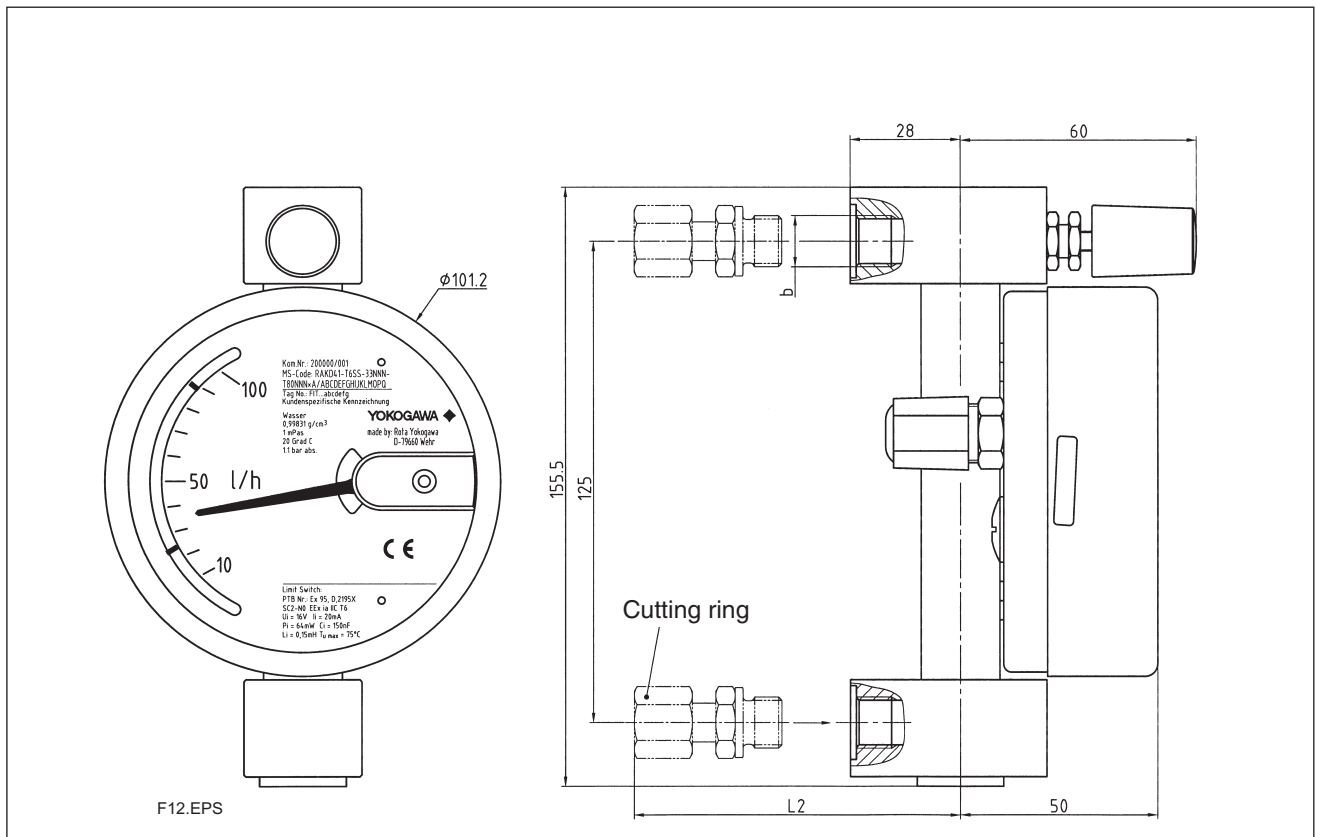


Fig. 11 Version with outlet valve

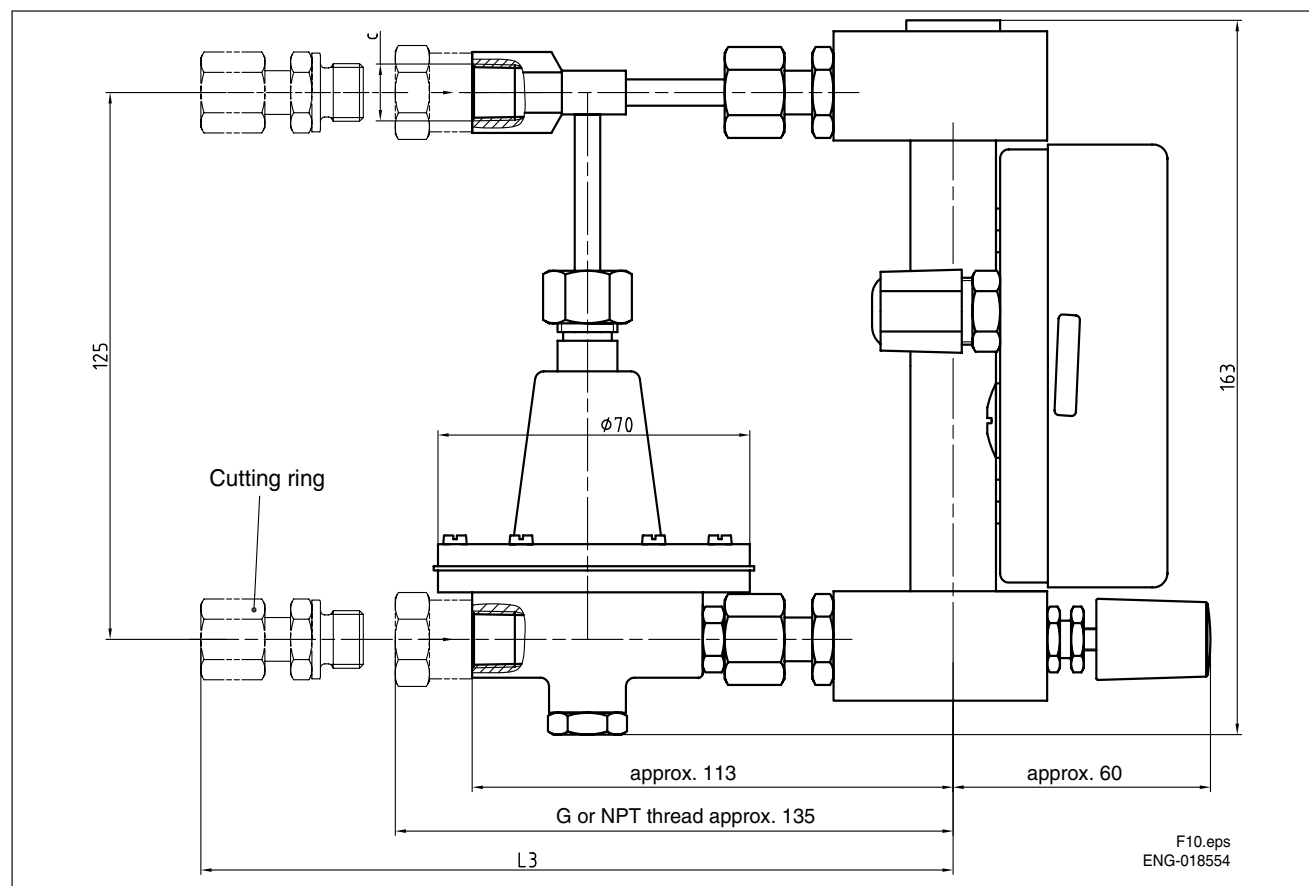


Fig. 12 Version with inlet valve and inlet controller

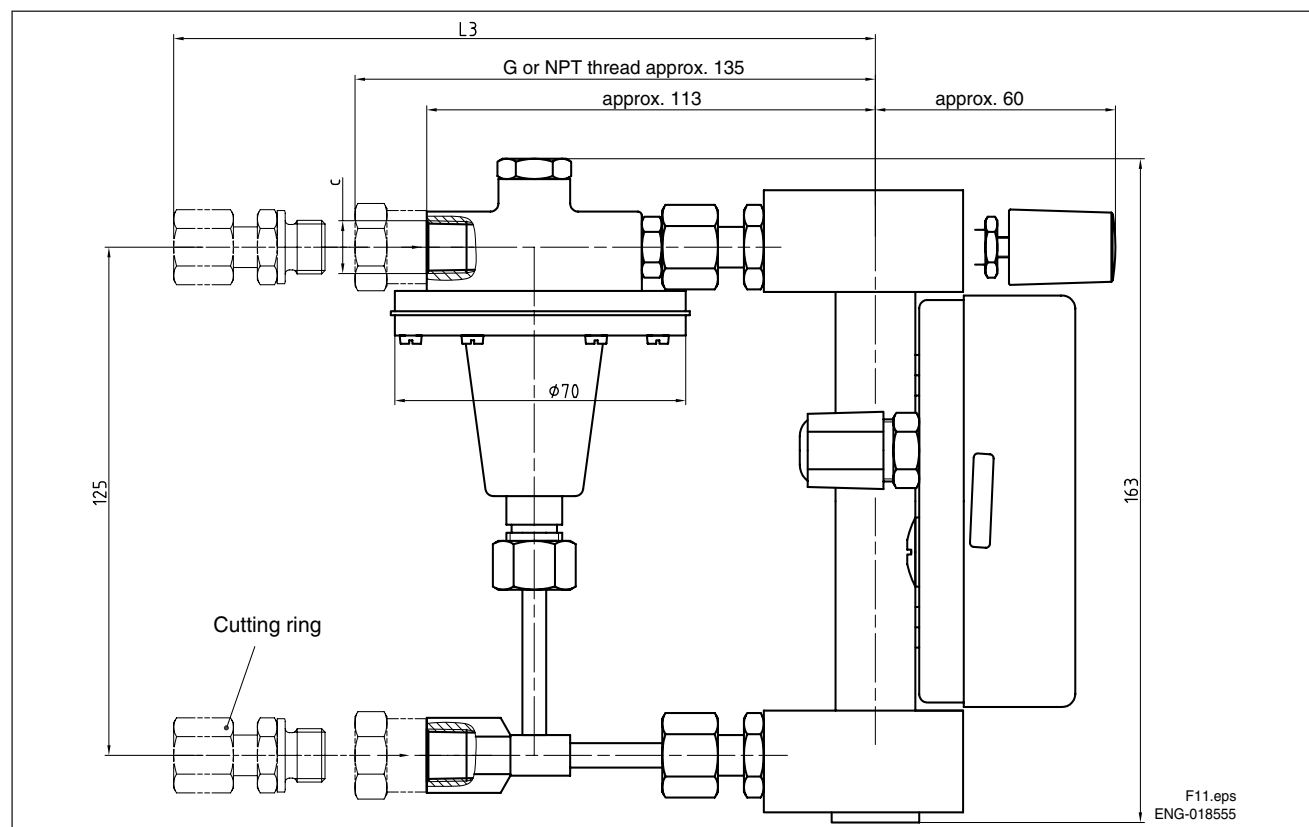


Fig. 13 Version with outlet valve and back pressure controller

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.

YOKOGAWA ELECTRIC CORPORATION World Headquarters 9-32, Nakacho 2-chome, Musashino-shi Tokyo 180-8750 Japan www.yokogawa.com YOKOGAWA CORPORATION OF AMERICA 2 Dart Road Newnan GA 30265 USA www.yokogawa.com/us YOKOGAWA EUROPE B.V. Euroweg 2 3825 HD AMERSFOORT The Netherlands www.yokogawa.com/eu	YOKOGAWA ELECTRIC ASIA Pte. LTD. 5 Bedok South Road Singapore 469270 www.yokogawa.com/sg YOKOGAWA CHINA CO. LTD. 3F Tower D Cartelo Crocodile Building No.568 West Tianshan Road Changing District Shanghai, China www.yokogawa.com/cn YOKOGAWA MIDDLE EAST B.S.C.(c) P.O. Box 10070, Manama Building 577, Road 2516, Busaiteen 225 Muharraq, Bahrain www.yokogawa.com/bh	Yokogawa has an extensive sales and distribution network. Please refer to the European website (www.yokogawa.com/eu) to contact your nearest representative.  YOKOGAWA ◆
--	---	---