



Paddle Type Flow Meter

TSK

Technical Data Sheet



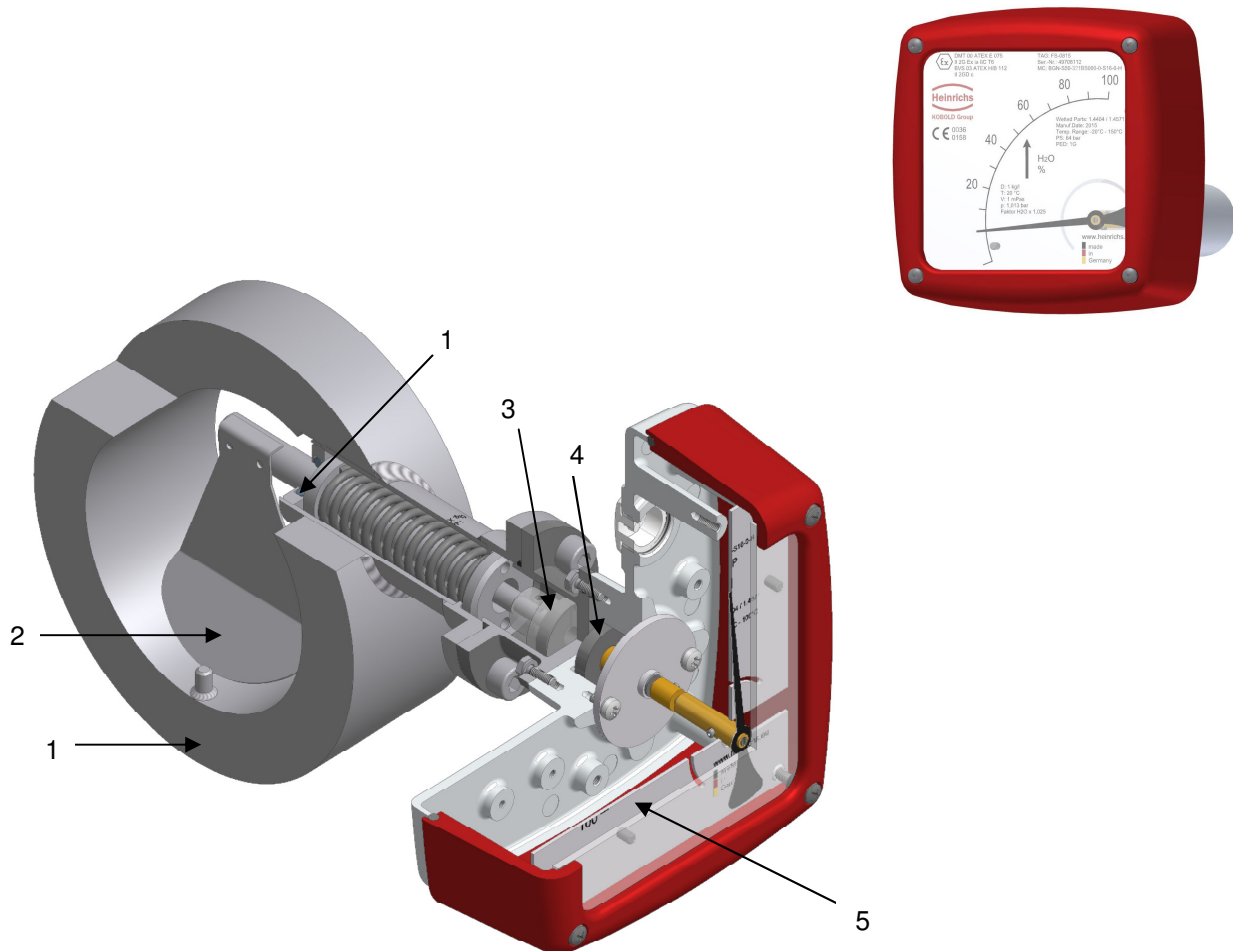
- Flow measurement and monitoring of liquids and gases
- Horizontal and vertical mounting
- Extremely robust layout
- Linear characteristic due to optimized paddle design
- Outstanding clear meter reading through 90° arranged scale
- Electrical transmitter with HART®, PROFIBUS-PA® or Fieldbus Foundation®
- Suitable for the installation in safety related applications acc. to SIL



Measuring Principle

If a medium flows with sufficient velocity through the horizontally or vertically arranged **measuring chamber (1)** of the TSK fitting, the **paddle (2)** will swivel around the axle until the force of the medium and the opposing force of the paddle surface plus the spring tension establish equilibrium. The angular position or the position of equilibrium of the **paddle (2)** in the **measuring chamber (1)** is the measure for the flow. The encapsulated ring-type **permanent magnet (3)** at the end of the paddle axis then transmits this position via a **coupled magnet system (4)** to the **scale (5)** and the optional electronic evaluators. This happens safely and without packing glands.

The flow rates shown on the scale only apply to the calibrated medium or to a medium with the same physical characteristics.



Application

The paddle type flow meter TSK is suitable for flow measurement of liquid and gaseous fluids in pipes.

The special advantage of the meter is that it can be used for all mounting and flow directions. Furthermore it is extremely robust and well suited for rough environmental conditions.

The meter shows the actual flow rate in volume or mass per unit in time.

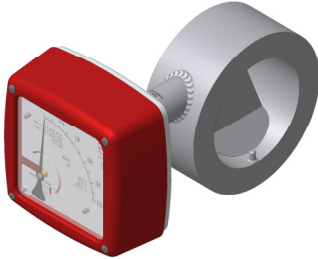
Applications: flow measurement, monitoring, adjusting and control of liquid and gaseous products. The meter's design makes it ideal for processes under difficult and adverse operating conditions. The instruments are available with additional electrical equipment for process monitoring and control.

- Large variety of wetted materials
- Very safe magneto-resistive signal transmission
- Applicable for very high process temperatures up to 300 °C



Versions / Instrument Models

Aluminum Indicator



Optimized aluminum indicator.
Large and well arranged scale with 90° angle for optimal reading.
Rounded edges and rims ensure a smooth draining of liquids after wet contact. A special anodization and paint finish makes the indicator housing also suitable for outdoor use.

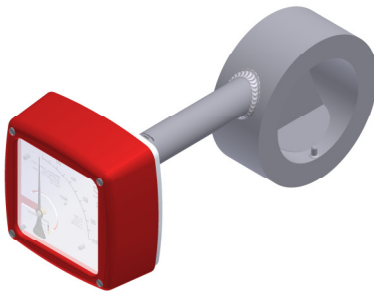
Process connection: wafer style

Stainless steel Indicator



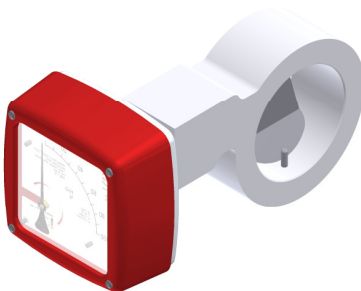
Stainless steel indicator
with IP 67/68 protection for extreme applications.
Large and well arranged scale with 90° angle for optimal reading.
Round design ensures a smooth draining of liquids after wet contact. Salty and rough environments e.g. off-shore applications do not show any problem.

High temperature version for up to 350 °C with displaced indicator



Displaced indicator for process temperatures up to 300 °C.
For very high or very low process temperatures the indicator will be displaced from the measuring pipe.
The use of limit switches or transmitters are without limitations.

Instrument lining / Special materials



PTFE or PPH lining for highest chemical resistance.
Wetted parts made of Hastelloy or Monel.
The unique design enables the usage of chemically high resistant materials for rough industrial environment and highly corrosive processes such as e.g. acid and lye.



Technical Data:

Fitting

Werkstoffe:	(TSK-S) (TSK-C) (TSK-H) (TSK-H) (TSK-J) (TSK-P)	1.4404 (316 L) / 1.4571 (316 TI), Hastelloy C22 / C4, PTFE , PPH from DN80 carbon steel / st.st. Hastelloy C-22 / C4 Polypropylen PPH / st.st. Polypropylen PPH/ Hastelloy C-22 PTFE / Hastelloy C22/C4 other materials on request
Process connection:		Wafer acc. EN 1092, ASME B16.5, DIN2512, Special connections on request
Nominal pressure:	(TSK-S/C/H) (TSK-K/J/P)	PN 40, ASME Cl150 / 300 (Standard) PN 16, ASME Cl150 (Standard) higher pressure rating on request
Process temperature:	(TSK-S/C/H) (TSK-K/J) (TSK-P)	-40 °C ... +300 °C 0 °C ... +80 °C -20 °C ... +125 °C
Ambient temperature:		-40 °C +80 °C (w/o electrical equipment) -40 °C +65°/70 °C (c/w limit switches / transmitter ES)
Protection:		IP 65 / IP 67 (EN60529)

Indicator

		Aluminum IP 65 st.st. IP 67
Switching output		max. 2 inductive limit switches max. 2 inductive limit switches (safety technology) max.2 SPDT micro switches

Electrical transmitter:

		ES c/w HART-protocol ES c/w HART-protocol and 2 NAMUR-contact ES c/w HART-protocol and 1 NAMUR-contact / 1 pulse output ES c/w Profibus-PA® ES c/w HART-Protocol und totalizer module ES c/w Foundation FIELDBUS®
Power supply:		14 - 30 VDC (reverse polarity protected)
Output signals:		passive, galvanically seperated
Analog output:		4-20 mA
Binary output 1 and 2:		$U_i=30\text{ V}$, $I_i=20\text{ mA}$, $P_i=100\text{ mW}$
Binary input:		totalizer reset (only for ES c/w totalizer module)
Ambient temperature:		-40 °C +70 °C
Protection:		IP 20 (EN60529)

Accuracy

	Liquid / Gas:	2,5% FS ± 0,2% additional error for transmitter ES
Repeatability		± 0,5 %



Messbereiche

Size DN / Inch	Range code	Measuring range for water 1000 kg/m ³ , 20 °C		Pressure loss (mbar)
25*	A1	0,5 – 3,5	m ³ /h	
40* / 1 1/2"	B1	1,5 – 6	m ³ /h	
	B2	1,5 – 10	m ³ /h	
	B3	3 – 15	m ³ /h	
50 / 2"	C1	1,5 – 10	m ³ /h	120
	C2	3 – 30	m ³ /h	50
65 / 2 1/2"	D1	1,5 – 14	m ³ /h	40
	D2	4 – 30	m ³ /h	60
	D3	6 – 50	m ³ /h	60
80 / 3"	E1	4 – 24	m ³ /h	40
	E2	10 – 60	m ³ /h	60
100 / 4"	F1	6 – 40	m ³ /h	40
	F2	8 – 80	m ³ /h	60
125 / 5"	G1	10 – 60	m ³ /h	40
	G2	20 – 120	m ³ /h	60
150 / 6"	H1	15 – 100	m ³ /h	35
	H2	30 – 200	m ³ /h	55
200 / 8"	J1	25 – 160	m ³ /h	35
	J2	50 – 275	m ³ /h	45
	J3	60 – 400	m ³ /h	55
250 / 10"	K1	50 – 300	m ³ /h	30
	K2	75 – 400	m ³ /h	40
	K3	80 – 500	m ³ /h	40
300 / 12"	L1	80 – 400	m ³ /h	30
	L2	100 – 600	m ³ /h	40
350 / 14"	M1	120 – 700	m ³ /h	30
	M2	150 – 1000	m ³ /h	40
400 / 16"	N1	150 – 800	m ³ /h	30
	N2	200 – 1300	m ³ /h	40
500 / 20"	P1	200 – 1300	m ³ /h	40
	P2	200 – 1500	m ³ /h	40

* Full scale bei solid encapsulation 15% reduced

Reference conditions: acc. IEC 770:
Water @ 20 °C

Calibration for oil up to 320 cSt on request

Certification and Approvals

Hazardous area approvals:

DMT 00 ATEX E 075 / PTB 99 ATEX 2219 / ZELM 03 ATEX 0128

Protection class: w/o electrical equipment
c/w limit switches
c/w electrical transmitter ES

II 2GD
 II 2G Ex ia IIC T6 / II 1D Ex iaD 20 T108
 II 2G Ex ia IIC T6

Explosion Directive

94/9/EG, Explosion Protection Directive 94/9/EC

EN 13463-1 Non-electrical equipment for potentially explosive atmospheres

EN 60079-0 General requirements

EN 60079-11 Intrinsic safety „i“

EN 60079-27 Fieldbus intrinsically safe concept FISCO

Electro magnetic compatibility:

EMC Directive 2004/108/EC

EN 61000-6-2:2011 immunity industrial environment

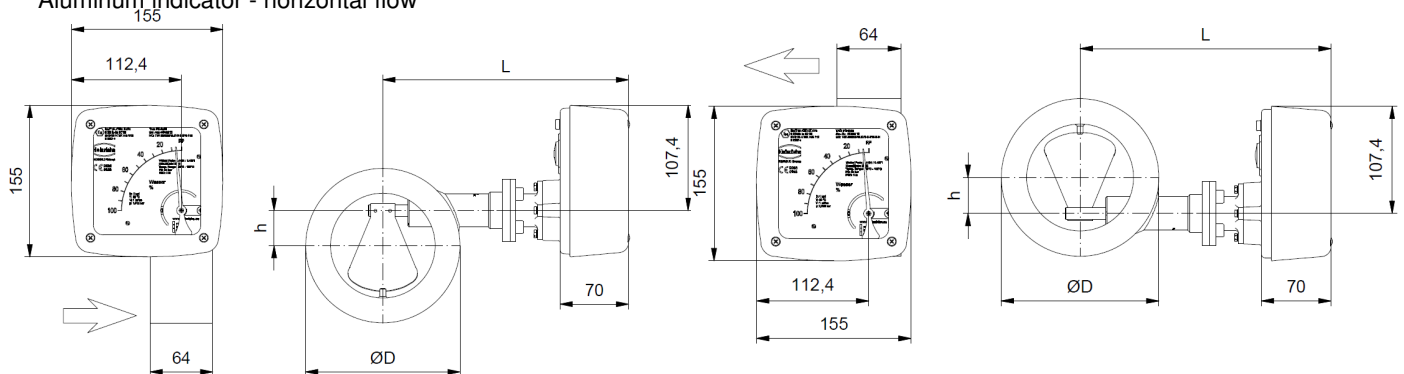
EN 61000-6-3:2011 emission residential, commercial

EN 55011:2011 Group 1 Class B , ISM ratio-frequency equipment

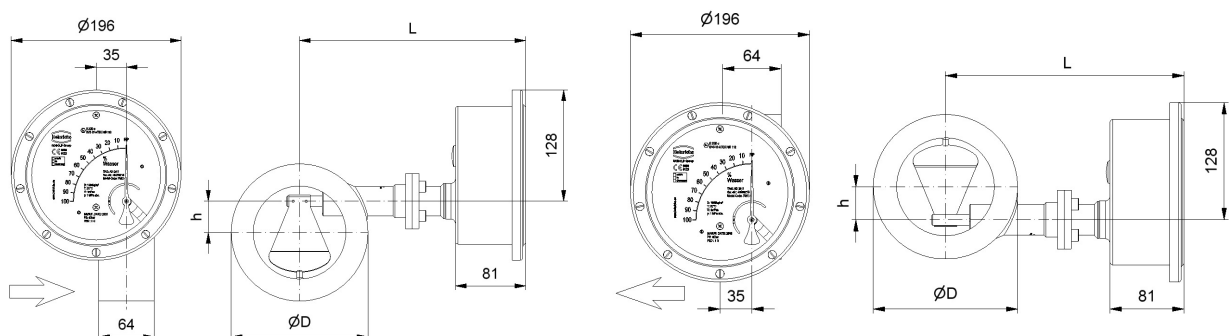
EN61326-1:2013 EMC requirements

Dimensions

Aluminum indicator - horizontal flow

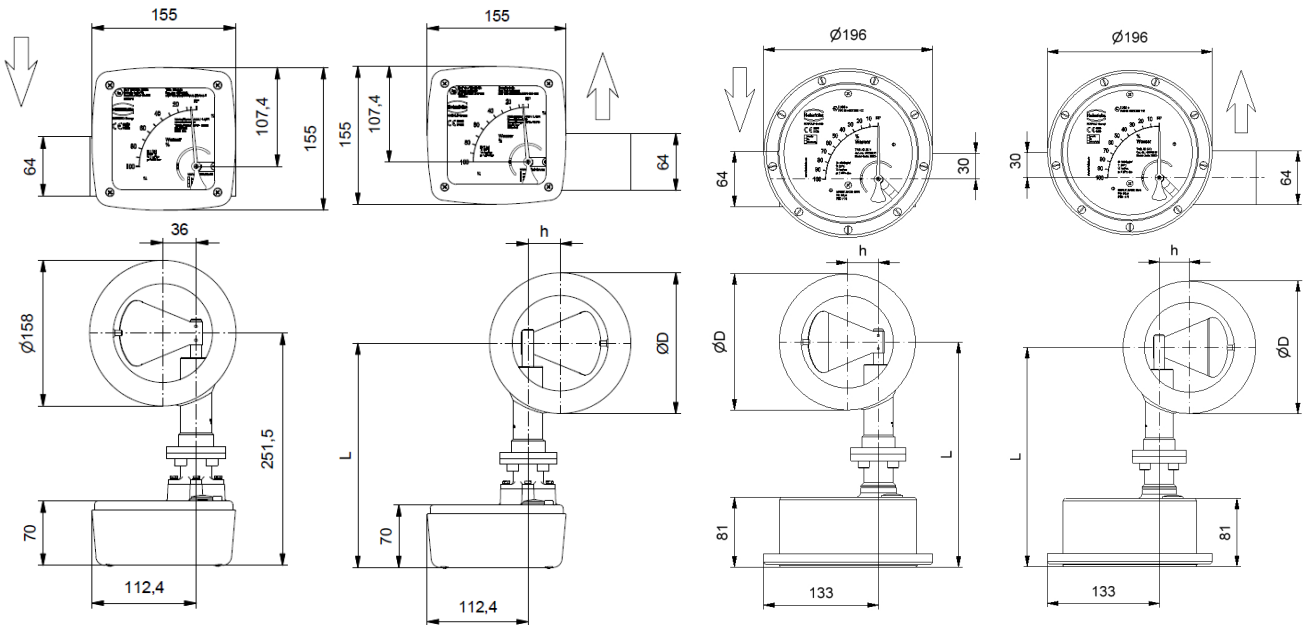


Stainless steel indicator - horizontal flow





Vertical flow



Further informations on TSK flow meters can be found in the device description or installation manual

Model Code

Model code	Description				
	TSK				
		Wetted Parts		Pressure rating	Process temperature
	S	Fitting: st.st.	Built in parts: st.st.	40 bar	-40° up to +300°C
	H	Fitting: Hastelloy C-22	Built in parts: Hastelloy C-22	40 bar	-40° up to +300°C
	K	Fitting: PP	Built in parts: st.st.	16 bar	0° up to +80°C
	J	Fitting: PP	Built in parts: Hastelloy C-22	16 bar	0° up to +80°C
	P	Fitting: PTFE	Built in parts: Hastelloy C-22	16 bar	-20° up to +125°C
		Process connection			
DN25/	309B	DN25 PN40 Form B1 DIN EN 1092-1			
1"	203R	1" Class 150 RF ASME B16.5-2003			
	223R	1" Class 300 RF ASME B16.5-2003			
	309D	DN25 PN40 Form D DIN EN 1092-1			
	203J	1" Class 150 RTJ ASME B16.5-2003			
	223J	1" Class 300 RTJ ASME B16.5-2003			
DN40/	317B	DN40 PN40 Form B1 DIN EN 1092-1			
1 1/2"	205R	1 1/2" Class 150 RF ASME B16.5-2003			
	225R	1 1/2" Class 300 RF ASME B16.5-2003			
	317D	DN40 PN40 Form D DIN EN 1092-1			
	205J	1 1/2" Class 150 RTJ ASME B16.5-2003			
	225J	1 1/2" Class 300 RTJ ASME B16.5-2003			
DN50/	321B	DN50 PN40 Form B1 DIN EN 1092-1			
2"	206R	2" Class 150 RF ASME B16.5-2003			
	226R	2" Class 300 RF ASME B16.5-2003			
	321D	DN50 PN40 Form D DIN EN 1092-1			
	206J	2" Class 150 RTJ ASME B16.5-2003			
	226J	2" Class 300 RTJ ASME B16.5-2003			
DN65/	326B	DN65 PN40 Form B1 DIN EN 1092-1			
2 1/2"	207R	2 1/2" Class 150 RF ASME B16.5-2003			
	227R	2 1/2" Class 300 RF ASME B16.5-2003			
	326D	DN65 PN40 Form D DIN EN 1092-1			
	207J	2 1/2" Class 150 RTJ ASME B16.5-2003			
	227J	2 1/2" Class 300 RTJ ASME B16.5-2003			
DN80/	331B	DN80 PN40 Form B1 DIN EN 1092-1			
3"	208R	3" Class 150 RF ASME B16.5-2003			
	228R	3" Class 300 RF ASME B16.5-2003			
	331D	DN80 PN40 Form D DIN EN 1092-1			



	208J	3" Class 150 RTJ ASME B16.5-2003			
	228J	3" Class 300 RTJ ASME B16.5-2003			
DN100/	335B	DN100 PN16 Form B1 DIN EN 1092-1			
4"	210R	4" Class 150 RF ASME B16.5-2003			
	230R	4" Class 300 RF ASME B16.5-2003			
	335D	DN100 PN16 Form D DIN EN 1092-1			
	210J	4" Class 150 RTJ ASME B16.5-2003			
	230J	4" Class 300 RTJ ASME B16.5-2003			
DN150/	345B	DN150 PN16 Form B1 DIN EN 1092-1			
6"	212R	6" Class 150 RF ASME B16.5-2003			
	232R	6" Class 300 RF ASME B16.5-2003			
	345D	DN150 PN16 Form D DIN EN 1092-1			
	212J	6" Class 150 RTJ ASME B16.5-2003			
	232J	6" Class 300 RTJ ASME B16.5-2003			
DN200/	350B	DN200 PN16 Form B1 DIN EN 1092-1			
8"	213R	8" Class 150 RF ASME B16.5-2003			
	350D	DN200 PN16 Form D DIN EN 1092-1			
	213J	8" Class 150 RTJ ASME B16.5-2003			
DN250/	355B	DN250 PN10 Form B1 DIN EN 1092-1			
10"	214R	10" Class 150 RF ASME B16.5-2003			
	355D	DN250 PN10 Form D DIN EN 1092-1			
	214J	10" Class 150 RTJ ASME B16.5-2003			
DN300/	362B	DN300 PN10 Form B1 DIN EN 1092-1			
12"	215R	12" Class 150 RF ASME B16.5-2003			
	362D	DN300 PN10 Form D DIN EN 1092-1			
	215J	12" Class 150 RTJ ASME B16.5-2003			
DN350/	369B	DN350 PN10 Form B1 DIN EN 1092-1			
14"	216R	14" Class 150 RF ASME B16.5-2003			
	369D	DN350 PN10 Form D DIN EN 1092-1			
	216R	14" Class 150 RTJ ASME B16.5-2003			
DN400/	375B	'DN400 PN10 Form B1 DIN EN 1092-1			
16"	217R	16" Class 150 RF ASME B16.5-2003			
	375D	'DN400 PN10 Form D DIN EN 1092-1			
	217J	16" Class 150 RTJ ASME B16.5-2003			
DN500/	380B	DN500 PN10 Form B1 DIN EN 1092-1			
18"	219R	20" Class 150 RF ASME B16.5-2003			
	380D	DN500 PN10 Form D DIN EN 1092-1			
	219J	20" Class 150 RTJ ASME B16.5-2003			
		Measuring range			
	xxx	Acc. To measuring range table			
		Flow direction			
	U	Bottom to top			
	O	Top to bottom			
	L	Left to right			
	R	Right to left			
		Temperature class		Model	
	6	max. 80°C	Contains: enclosure of magnet PVDF	K, J	
	5	max. 100°C	Contains: enclosure of magnet PVDF		
	4	max. 135°C	Contains: display forward advanced, enclosure of magnet PVDF		
	3	max. 200°C	Contains: display forward advanced, stainless steel enclosure of magnet		
	2	max. 300°C	Contains: display forward advanced, stainless steel enclosure of magnet, spring Inconel, stainless steel sealing		
		Sealing		Process temperature	
	V	Viton		max. 150°C	
	F	FEP		max. 200°C	
	S	Stainless steel		max. 300°C	
		Protection against particle-penetration into transmission chamber		Process temperature	
	0	without			
	1	with (Viton)		max. 150°C	
	2	with (FEP)		max. 200°C	
	-				
		Certificate			
	0	without			
	1	Certificate of compliance with the order, 2.1			
	2	Test report, 2.2			
	B	Inspection certificate 3.1 with material certificate (DIN EN 10204:2004)			
	C	Inspection certificate 3.2 with material certificate (DIN EN 10204:2004)			
	N	NACE Material certificate			
	-				
		Indicating part			



	S	Standard indicator housing (aluminum)			
	E	Stainless steel indicating housing IP67			
	T	Standard indicating housing (aluminum) with pressure compensation			
		Product scale			
	1	%-Scale (Water)			
	2	Measuring range-Scale (Water)			
	F	Double-scale (acc. customer preference)			
	4	%-Scale (Media)			
	5	Measuring range-Scale (Media)			
	7	Oil scale	measuring ranges on request		
		Electrical output			Ambient temperature
	0	without			-40° to +80°C
	1	1 x inductive switch, Type SJ 3,5 N			-40° to +65°C SIL1 ¹⁰⁾
	2	2 x inductive switch, Type SJ 3,5 N			-40° to +65°C SIL1 ¹⁰⁾
	3	1 x inductive switch, Type SJ 3,5 SN (safety design)			-40° to +65°C SIL1 ¹⁰⁾
	4	2 x inductive switch, Type SJ 3,5 SN (safety design)			-40° to +65°C SIL1 ¹⁰⁾
	6	Transmitter ES with HART-protocol, 4-20 mA, EEx ia			-40° to +70°C SIL1 ¹⁰⁾
	7	Transmitter ES with HART-protocol, 4-20 mA, EEx ia / 2x NAMUR-switch			-40° to +70°C SIL1 ¹⁰⁾
	8	Transmitter ES with HART-protocol, 4-20 mA, EEx ia / 1x NAMUR-switch, 1x pulse output			-40° to +70°C SIL1 ¹⁰⁾
	9	Transmitter ES with Profibus PA, EEx ia			-40° to +70°C
	C	1 x micro switch			-40° to +65°C
	D	2 x micro switch			-40° to +65°C
	E	1 x inductive switch, Type SB 3,5-E2, three wire			-40° to +65°C
	F	2 x inductive switch, Type SB 3,5-E2, three wire			-40° to +65°C
	G	Proximity switch NCB2-12GM40-ZO			-25° to +70°C
	H	2 x inductive switch, Type SJ 3,5 N, separate adjustable			-40° to +65°C
	I	Transmitter ES with HART-protocol and counter module			-40° to +70°C
	K	Transmitter ES Fieldbus Foundation			-40° to +70°C
	X	special model			
	-				
		Accessory			
	0	without			
	X	with (separate specification necessary)			
	-				
		Design			
	H	Heinrichs			
	K	Kobold			

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