



Flap Flow Meter for liquids



measuring
•
monitoring
•
analysing

TSK



- Range:
0.5 - 3.5 ... 200 - 1500 m³/h
- Accuracy: ±2.5 of full scale
- p_{max}: PN 40, t_{max}: -40 ... +300 °C
- Connection: wafer flange
DN 25 ... 500
- Material: stainless steel,
Hastelloy® C, PTFE
- Option: limit contacts,
analogue output with HART® or
Profibus-PA®, counter



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Description

The Kobold flap flow meter type TSK is suitable for flow measurement of liquid products in pipes. The special advantage is that it can be used for all directions of flow. It shows the current flow rate in volume or mass per unit in time. The meter's design makes it ideal for processes under difficult and adverse operating conditions. The devices are available with additional electrical equipment for process monitoring and control.

Function

If a medium flows with sufficient velocity through the horizontally or vertically mounted TSK fitting, the paddle 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 in the measuring compartment is the measure for the flow. The encapsulated ring-type permanent magnet at the end of the paddle axis transmits this position to the scale and the optional electronic evaluators through the magnet tracking indicator system. 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.

Additional Advantages

- A large spectrum of wetted materials and linings
- Magneto-resistive signal transmission
- Special design for high temperature applications

Applications

- Control of cooling- and flushing processes
- Chemical industry
- Water- and waste-water technology
- Power-plants
- Machinery-building

Technical Details

Sensor

Materials:	1.4404 (316 L) / 1.4571 (316 Ti) (TSK-S) Hastelloy® C-22 (TSK-H) PTFE / Hastelloy® C-22 (TSK-P) other materials on request
Process connection:	sandwich acc. EN 1092, ASME B16.5, DIN2512, special connections on request

Nominal pressure:	PN 40, ASME C1150 / 300 (standard) (TSK-S/H) PN 16, ASME C1150 (standard) (TSK-P) higher pressure rates optional
Process temperature:	-40 °C ... +300 °C (TSK-S/H) -20 °C ... +100 °C (TSK-P)
Ambient temperature:	-25 °C ... +80 °C
Accuracy:	liquid: ± 2.5% of full scale ± 0.2% with transmitter (ES)
Repeatability:	± 0.5%
Certification	
Explosion protection:	HMT21-4151X (Conformity statement) Ex marking (Armature): II 2G Ex h IIC T2...T6 Gb II 2D Ex h IIC T85°C/T300°C Db
CE-Marking:	Pressure Equipment Directive 2014/68/EU
Display	
Materials:	aluminium (stove-enameled) stainless steel (as option)
Electrical outputs:	inductive switch max. 2 micro changeover switches (Reed switch U_{max} : 175 V _{DC} , I_{max} : 0.25 A, p_{max} : 5 W) others on request
Ambient temperature:	-40 ... +80 °C without electrical accessories -40 ... +70 °C with ES transmitter -25 °C ... +70 °C / +80 °C with limit switches (For SJ3,5N and SJ3,5SN up to +80 °C, all other switches up to +70 °C)
Protection:	IP 65 (aluminium housing) IP 65, IP 66, IP 67 (stainless steel housing)
Transmitter	
	● ES with HART®-protocol ● ES with HART®-protocol and 2 NAMUR-switches ● ES with Profibus-PA® ● ES with HART®-protocol and counter module
Power supply:	14 -30 V _{DC}
Outputs:	passive, galvanically isolated
Analogue:	4-20 mA
Binary 1 and 2:	U_i = 30 V, I_i = 20 mA, P_i = 100 mW
Input Binary:	Counter reset (only for ES with counter module)
Ambient temperature:	-40 °C ... +70 °C
Protection:	IP 20
Certification	
Explosion protection:	DMT 00 ATEX E 075
Type of protection:	II 2G Ex ia IIC T6 Gb
CE-Marking:	ATEX (IECEx) Directive 2014/34/EU

Order Details (Example: **TSK-S 309B A1 U 5 V 00 S 1 0 0K**)

Model	Process connection 3... = flange form B1 DIN EN 1092-1 2... = flange RF ASME B16.5-2003	Range m³/h water	Flow direction	Temperature class	Seal
TSK-S = armature stain- less steel, built-in parts stainless steel TSK-H = armature and built-in parts Hastelloy® C-22 TSK-P ³⁾ = armature PTFE, built-in parts Hastelloy® C-22	309B = DN25 PN40	A1 = 0,5 - 3,5	U = from the bottom to the top O = from the top to the bottom L = from the left to the right R = from the right to the left	5 = max. 100 °C, magnet encapsulation PVDF 4 ¹⁾ = max. 135 °C, magnet encapsulation PVDF, forward advanced display 3 ¹⁾ = max. 200 °C, magnet encapsulation stainless steel, forward advanced display 2 ¹⁾ = max. 300 °C, magnet encapsulation stainless steel, forward advanced display	V = FPM (max. 150 °C) F = FEP (max. 200 °C) S = stainless steel (max. 300 °C)
	309D = DN25 PN40 form D				
	317B = DN40 PN40	B1 = 1,5 - 6 B2 = 1,5 - 10 B3 = 3 - 15			
	205R = 1 ½" Class 150				
	225R = 1 ½" Class 300	C1 = 1,5 - 10 C2 = 3 - 30			
	321B = DN50 PN40				
	206R = 2" Class 150				
	226R = 2" Class 300	D1 = 1,5 - 14 D2 = 4 - 30 D3 = 6 - 50			
	326B = DN65 PN40				
	207R = 2 ½" Class 150				
	227R = 2 ½" Class 300	E1 = 4 - 24 E2 = 10 - 60			
	331B = DN80 PN40				
	208R = 3" Class 150				
	228R = 3" Class 300	F1 = 6 - 40 F2 = 8 - 80			
	335B = DN100 PN16				
	210R = 4" Class 150				
	230R = 4" Class 300	G1 = 10 - 60 G2 = 20 - 120			
	340B = DN125 PN16				
	211R = 5" Class 150				
	231R = 5" Class 300	H1 = 15 - 100 H2 = 30 - 200			
	345B = DN150 PN16				
	212R = 6" Class 150				
	232R = 6" Class 300	J1 = 25 - 160 J2 = 50 - 275 J3 = 60 - 400			
	350B = DN200 PN16				
	213R = 8" Class 150				
	355B = DN250 PN10	K1 = 50 - 300 K2 = 75 - 400 K3 = 80 - 500			
	214R = 10" Class 150				
	362B = DN300 PN10	L1 = 80 - 400 L2 = 100 - 600			
	215R = 12" Class 150				
	369B = DN350 PN10	M1 = 120 - 700 M2 = 150 - 1000			
	216R = 14" Class 150				
	375B = DN400 PN10	N1 = 150 - 800 N2 = 200 - 1300			
	217R = 16" Class 150				
	380B = DN500 PN10	P1 = 200 - 1300 P2 = 200 - 1500			
	219R = 20" Class 150				

³⁾ TSK-P t_{max} 125 °C



Order Details (Example: **TSK-S 309B A1 U 5 V 00 S 1 0 0K**) (cont'd)

Special seal	Certificate	Display	Scale	Electrical outputs	Accessories
0 = without 1²⁾ = FPM, (max. +150°C) 2²⁾ = FEP, (max. +200°C)	0 = without 1 = certificate of compliance with the order 2.1 2 = test report 2.2 B = inspection certificate 3.1 C = inspection certificate 3.2	S⁵⁾ = standard (aluminium) E⁵⁾ = stainless steel display T⁵⁾ = standard (aluminium) with pressure compensation	1 = % scale (water) 2 = range scale (water) F = double scale (acc. customer preference) 4 = % scale (media) 5 = range scale (Media)	0 = without 1 = 1 x inductive switch, Type SJ 3,5 N 2 = 2 x inductive switch, Type SJ 3,5 N 3⁶⁾7¹²⁾ = 1 x inductive switch, Type SJ 3,5 SN (safety design) 4⁶⁾7¹²⁾ = 2 x inductive switch, Type SJ 3,5 SN (safety design) 6⁷⁾12) = Transmitter ES with HART® protocol, 4-20 mA, Exia 7⁷⁾12) = Transmitter ES with HART® protocol, 4-20 mA, Exia / 2x NAMUR-switch 8⁷⁾12) = Transmitter ES with HART® protocol, 4-20 mA, Exia / 1x NAMUR-switch, 1x pulse output 9 = Transmitter ES with Profibus-PA®, Exia L = 1 x reed contact - changeover switch M = 2 x reed contact - changeover switch E = 1 x inductive switch, Type SB 3,5-E2, three wire F = 2 x inductive switch, Type SB 3,5-E2, three wire G = 1 x inductive switch, Type NCB2-12GM40-Z0 I⁹⁾14) = Transmitter ES with HART® protocol and counter module K = Transmitter ES with Foundation Fieldbus®	0K = without SK¹³⁾ = SIL Conformity assessment by EXIDA XK = Special

²⁾ Recommended for particle containing fluid

⁵⁾ The thread in the base is suitable for cable glands with thread M20 x 1,5, other threads on request. Select cable glands from accessories list.

⁶⁾ SIL 1 - IEC 61508-2:2010 conformity examined by EXIDA

⁷⁾ SIL 1 - IEC 61508-2:2000 conformity examined by EXIDA

⁸⁾ SIL 2 - IEC 61508-2:2000 conformity examined by EXIDA

⁹⁾ Stainless steel display housing is not compatible with counter module.

¹¹⁾ Not for PTFE armature

¹²⁾ SIL conformity only with "Accessories" option "S"

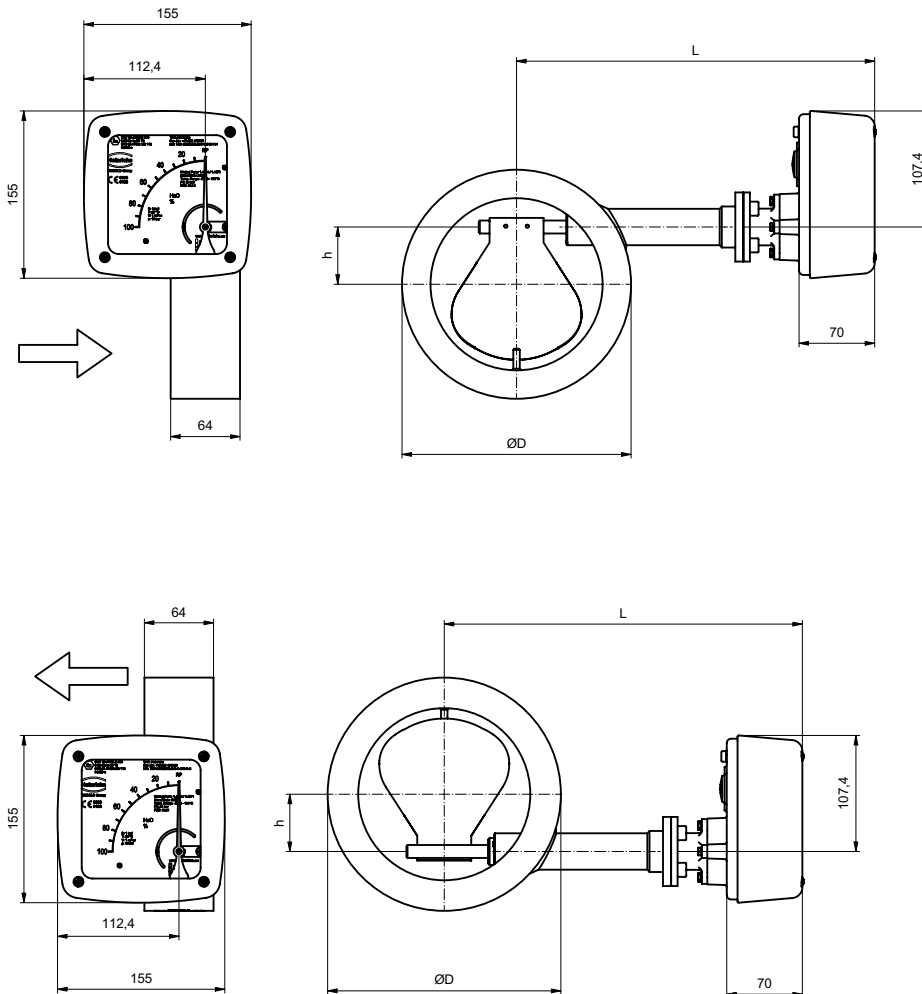
¹³⁾ Only in combination with "electrical output" for options "3", "4", "6", "7", "8"

¹⁴⁾ Only for the flow direction from bottom to top.

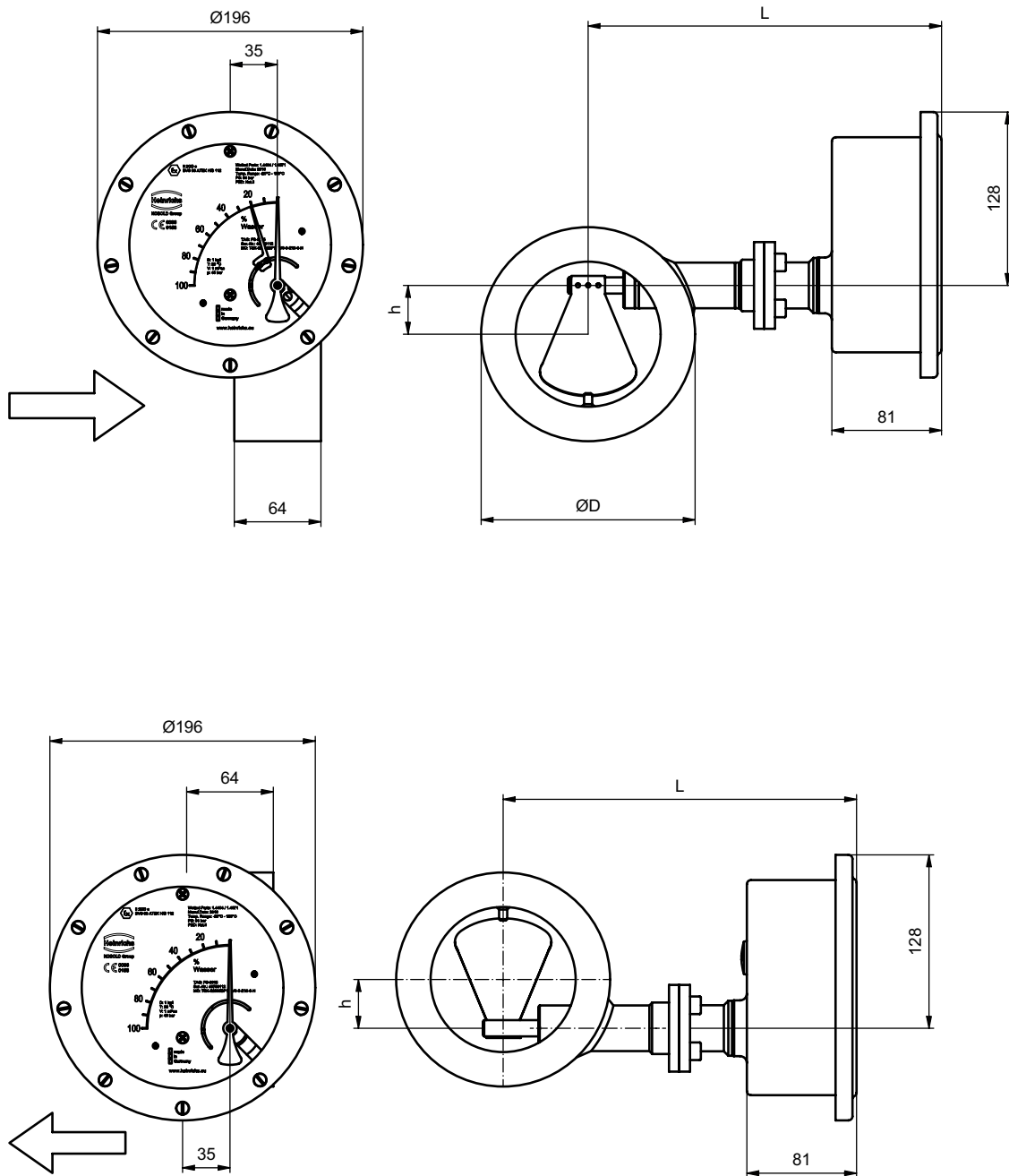
Dimensions

Size		Nominal pressure (standard)		L [mm]		D [mm]		h [mm]
DIN/EN	ASME	PN	class	Display aluminium	Display stainless steel	DIN-/EN-flange	ASME-flange	
50	2"	40	300	272	261	102	92,1	17
65	2 ½"	40	300	272	261	122	102	21 (ASME = 17)
80	3"	40	300	272	261	138	127	31
100	4"	16	150	272	261	158	158	36
125	5"	16	150	352	341	186	186	45
150	6"	16	150	352	341	212	212	53
200	8"	16	150	352	341	268	268	80
250	10"	16	150	352	341	320	320	90
300	12"	10	150	372	361	370	381	100
350	14"	10	150	442	431	430	413	100
400	16"	10	150	452	441	482	470	130
500	20"	10	150	492	481	585	585	130

Design with standard display for horizontal flow



Design with stainless steel display for horizontal flow





Design for vertical flow

