



## Design and applications

The measuring device operates largely independent of viscosity and is suitable for indicating the flow rate of water, acids, alkaline solutions and gases. Every device is calibrated to customer requirement and fitted with a product-specific scale. The 50 mm thick ring features a half-round plate that is fastened to a rotating spring-loaded spindle. The angle between flap and ring changes according to the rate of flow, and a breakaway-proof magnetic coupling transfers the movement to an external pointer. For process control purposes, the measuring device can be equipped with limit value switches or a measuring transducer with electrical analog output.

The standard indicator is housed in a round stainless steel casing with bayonet lock and can optionally be equipped with limit value switches. The casing of the indicator part with integrated 4 ... 20 mA output is constructed of die-cast aluminium.

**KFS**



- **suitable for H<sub>2</sub>O, acids, alkaline solutions and gases**
- **spring-loaded flap**
- **horizontal or vertical direction of flow**
- **largely independent of viscosity**
- **wide range of materials**
- **optionally**
  - **limit value switches**
  - **analog output 4 ... 20 mA**
  - **totalizer with LC-Display**
  - **explosion-proof design**





# KFS

## Flap-type flow meters

### Type series

KFS	local mechanical indicator
KFS-IK1	with one inductive limit value switch
KFS-IK2	with two inductive limit value switches
KFS-IKS1	with one electronic limit value switch
KFS-IKS2	with two electronic limit value switches
KFS-RK1	with one reed limit value switch
KFS-RK2	with two reed limit value switches
KFS-EM	with 4 ... 20 mA output
KFS-EM-IK1	with 4 ... 20 mA output and one inductive limit value switch
KFS-EM-IK2	with 4 ... 20 mA output and two inductive limit value switches
KFS-EMZ	with totalizer and LC-Display
KFS-M40	local mechanical indicator M40
KFS-M40-IK1	M40-indicator with one inductive limit value switch
KFS-M40-IK2	M40-indicator with two inductive limit value switches
KFS-M40 Ex	local mechanical indicator M40, explosion-proof design
KFS Ex	local mechanical indicator, explosion-proof design
KFS-IK1 Ex	with one inductive limit value switch, explosion-proof design
KFS-IK2 Ex	with two inductive limit value switches, explosion-proof design
KFS-EM Ex	with 4 ... 20 mA output, explosion-proof design
KFS-EM-IK1 Ex	with 4 ... 20 mA output and one inductive limit value switch, explosion-proof design
KFS-EM-IK2 Ex	with 4 ... 20 mA output and two inductive limit value switches, explosion-proof design
KFS-EMZ Ex	EM with totalizer and LC-Display, explosion-proof design

ATEX Explosion-proof version (KFS ... Ex)

Standard: Type of protection intrinsic safety (ia)

Alternative: Type of protection flameproof enclosure (d)

### Technical Data

Measuring accuracy	5 % FS
Scale	in physical units, e.g.: l/h, m <sup>3</sup> /h
Measuring range	min. 1:10
Degree of protection, indicator part	IP66 (IP67 for KFS-EM)
Corrosion protection for steel version	epoxy paint, kiln-dried, traffic blue (RAL 5017), satin finished
Corrosion class	C2
Mounting length	50 mm (standard) 60 mm (PVC/PP/PVDF & DN 250 - 300)
Connections	mounting between flanges acc. to DIN EN 1092-1, PN 6/10/16/25/40
optionally	mounting between flanges acc. ASME B16.5, JIS B 2220, others on request

### Materials

Material, ring	Wetted internal parts	Wetted gasket <sup>2)</sup>	DN
S355	1.4571	Sil 4400	25 - 600
1.4571	1.4571	Sil 8800	25 - 600
PVC	1.4571 <sup>1)</sup>	EPDM	25 - 300
PP	1.4571 <sup>1)</sup>	EPDM	25 - 300
PVDF	1.4571 <sup>1)</sup>	FKM	25 - 300
Indicator	KFS	KFS-EM	
scale casing	stainless steel 1.4301	aluminium painted	
pointer	aluminium painted	aluminium painted	
scale	aluminium coated	aluminium coated	
screen	PC, optionally glass	float glass	

<sup>1)</sup> optionally Hastelloy C4

<sup>2)</sup> others on request

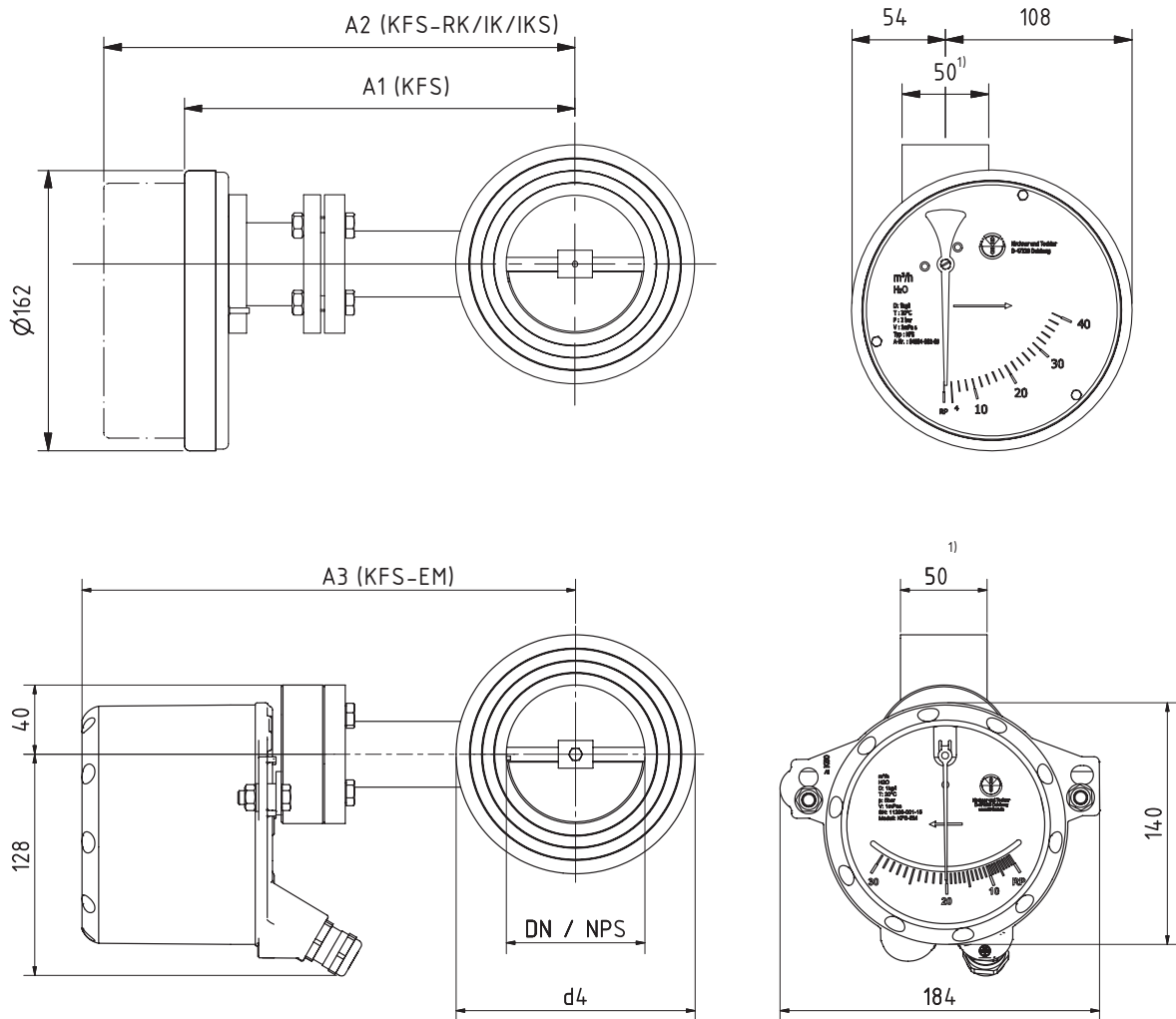
Rubber coating on request

Material	DN [mm]	Max. media temperature [°C]	Pressure resistance [bar] <sup>2)</sup>
S355/1.4571	25 - 600	-70 - 200 <sup>1)</sup>	6/10 (16/25/40)
		-20 - 70	
PVC	25 - 80	0 - 20	10
	100 - 300	0 - 20	6
	25 - 300	0 - 40	6
PP	25 - 80	0 - 20	10
	100 - 300	0 - 20	6
	25 - 300	0 - 80	1,5
PVDF	25 - 80	-40 - 20	10
	100 - 300	-40 - 20	6
	25 - 300	-40 - 140	2

The process liquid must not freeze.

<sup>1)</sup> KFS Ex, KFS-IK1 Ex and KFS-IK2 Ex: Where insulation measures have been carried out to pipeline and measuring part, -70 ... +200 °C are also possible.

<sup>2)</sup> optionally: PN 16, 25 or 40



## Dimensions

DN	d <sub>4</sub>	Weight [kg]		ASME flange connection		KFS		KFS-RK/IK/IKS		KFS-EM/EMZ	
		Steel	PVC <sup>1)</sup>	NPS	d <sub>4</sub>	A1 <sup>2)</sup>	A1 <sup>2)</sup> (ASME)	A2 <sup>2)</sup>	A2 <sup>2)</sup> (ASME)	A3 <sup>2)</sup>	A3 <sup>2)</sup> (ASME)
25	68	3,8	2,0	1"	51	202	199	249	246	242	242
32	78	3,8	2,0	1 1/4"	64	206	204	253	251	245	247
40	88	3,8	2,0	1 1/2"	73	206	206	253	253	251	249
50	102	3,9	2,1	2"	92	211	212	258	259	256	255
65	122	5,0	2,3	2 1/2"	105	219	217	266	264	262	260
80	138	5,6	2,5	3"	127	226	225	273	272	269	268
100	158	6,4	2,7	4"	157	236	237	283	284	279	280
125	188	8,0	2,8	5"	186	249	250	296	297	292	293
150	212	8,8	3,3	6"	216	261	263	308	310	304	306
200	268	11,4	3,7	8"	270	286	287	333	334	329	330
250	320	13,0	4,5	10"	324	311	313	358	360	354	356
300	370	22,0	4,9	12"	381	336	338	383	385	379	381
350	430	29,3	-	-	-	376	-	423	-	404	-
400	482	31,5	-	-	-	401	-	448	-	429	-
500	585	39,0	-	-	-	451	-	498	-	494	-
600	685	45,5	-	-	-	501	-	548	-	544	-

all dimensions in mm except NPS

<sup>1)</sup> Devices made of PVC / PP / PVDF with nominal diameter DN 250-300 have a installation length of 60 mm.

<sup>2)</sup> PVC/PP/PVDF versions differ minimally from the standard.



## Measuring ranges H<sub>2</sub>O

DN	Standard measuring ranges [m <sup>3</sup> /h] H <sub>2</sub> O at 20 °C					
25	0,5 - 7	1 - 12				
32	0,5 - 8	1,8 - 18	3 - 30			
40	0,6 - 6	1 - 10	2 - 20	3 - 30	5 - 50	
50	0,8 - 8	2 - 20	3 - 35	5 - 50	7 - 70	
65	2 - 20	4 - 40	6 - 60	9 - 90	11 - 110	
80	2 - 20	4 - 40	6 - 60	10 - 100	12 - 120	20 - 200
100	4 - 40	8 - 80	12 - 120	16 - 160	20 - 200	25 - 250
125	5 - 55	8 - 80	12 - 120	14 - 140	20 - 200	35 - 350
150	6 - 60	10 - 100	14 - 140	18 - 180	22 - 220	35 - 350
200	5 - 50	9 - 90	12 - 120	15 - 150	20 - 200	25 - 250
250	18 - 180	25 - 250	30 - 300	40 - 400		
300	15 - 170	20 - 220	25 - 250	30 - 300	50 - 500	
DN	Special measuring ranges [m <sup>3</sup> /h] H <sub>2</sub> O at 20 °C					
200	40 - 400	60 - 600				
250	50 - 500	60 - 600				
300	60 - 650	90 - 900				
350	50 - 500	70 - 700	90 - 900	100 - 1000		
400	60 - 600	75 - 750	110 - 1100	400 - 1850		
500	70 - 700	100 - 1000	135 - 1350	200 - 1600		
600	80 - 800	125 - 1250	165 - 1650			

intermediate measuring ranges possible

The measuring ranges for the series KFS-EM/EMZ differ slightly from the above values.  
More detailed information and measuring ranges for other media and operating conditions are available on request.

## Measuring ranges air

DN	Standard measuring ranges [m <sup>3</sup> /h] air at STP <sup>1)</sup>	
	minimum range	maximum range
25	15 - 150	30 - 300
32	15 - 150	30 - 300
40	15 - 150	40 - 400
50	18 - 180	75 - 750
65	18 - 180	80 - 800
80	20 - 200	100 - 1000
100	25 - 250	220 - 2200
125	25 - 250	260 - 2600
150	30 - 300	300 - 3000
200	40 - 400	300 - 3000
250	100 - 1000	400 - 4000
300	150 - 1500	500 - 5000

1) at STP: at standard conditions (0 °C and 1013 mbar abs.)

intermediate measuring ranges possible

The measuring ranges for the series KFS-EM/EMZ differ slightly from the above values.  
More detailed information and measuring ranges for other media and operating conditions are available on request.

## Limit value switches

In order to realize a local display with a monitoring function, the flowmeter can be equipped with limit value switches.

## Reed switches RK1 and RK2

The KFS flow meter can optionally be equipped with a limit value switch RK for flow monitoring and control purposes. The limit value switch is adjustable over the full measuring range.

RK1	Version with one switch
RK2	Version with two switches
Switch	Reed switch, floating
Switching function	NC or NO
Switching performance	bistable
Proof voltage	max. 140 V AC/200 V DC
Switching voltage	50 V AC/75 V DC
Current switched	max. 0,25 A
Switch rating	max. 5 VA/3 W
Ambient temperature	-25 ... +105 °C

## Inductive switch IK1 and IK2

Limit value switch with inductive slot initiator, optionally explosion-proof design

The pointer in the indicator activates a built-in inductive switch by means of a metal vane.

The switching point is adjustable over the full measuring range. A maximum of two IK switches can be built into one KFS. The switching point is indicated on the flow meter scale by a pointer.

Switch data	
Function	Inductive slot initiator acc. to NAMUR, two-wire
Switching function	NC or NO
Slot width	2,0 mm
Hysteresis	1,0 % v. E ... 10 % v.E
Repeat accuracy	≤ 2,0 %
Temperature drift	≤ ± 10 %
Ambient temperature	-25 ... +70° C
Voltage	nom. 8,2 V DC
Switching frequency	≤ 2,5 kHz
Switching performance	bistable
Nominal Voltage	8 V DC via isolation switching amplifier KFA
Power consumption	
Active area uncovered	≥ 2,1 mA
Active area covered	≤ 1,2 mA
Ambient temperature	-25 ... +70 °C
Polarity reversal protection	yes
Certification to	KEMA 02 ATEX 1090 X
Inner inductance (L <sub>i</sub> ) / capacitance (C <sub>i</sub> )	266 µH/41 nF * Values for pre-assembled cables up to 10 m
Switch marking	ⒺII 1G Ex ia IIC T4...T6 Ga (max. U <sub>i</sub> = 20 V DC, I <sub>i</sub> = 60 mA, P <sub>i</sub> = 130 mW)

## Inductive switch with slot initiator for PLCs IKS1 and IKS2

The pointer of the flow meter activates the inductive switch that is built into the indicator casing by means of a metal vane. The limit value switch is adjustable over the full measuring range. A maximum of two IKS switches can be built into one KFS. The switching point is indicated on the meter scale by a pointer.

The IKS version is particularly suitable for the direct connection to PLCs.

IKS1	version with one switch
IKS2	version with two switches
Switch	inductive slot initiator
Switching function	NC or NO
Switching performance	bistable
Supply voltage	24 V DC
Current switched I <sub>A</sub>	≤ 100 mA
Open-circuit power consumption	≤ 10 mA
Ambient temperature	-25 ... +70° C
Explosion protection	no
Voltage drop (at I <sub>max</sub> )	≤ 1,2 V



## Electrical measuring transducer EM

The electrical measuring transducer generates a current of 4 ... 20 mA in two-wire technology that is proportional to the instantaneous flow rate. The transducer is factory-calibrated on the basis of the flow measuring range. The calibration values, used for linearization of the measuring transducer, are stored in a memory chip. A protective extra-low voltage (PELV) with galvanic isolation to VDE 0100 Part 410 is required as power supply. All instruments connected to the measuring circuit (indicators, recorders) are connected in series, and together may not exceed the maximum external resistance. The EM features reverse voltage protection.

Power supply	24 V DC
Measuring signal	4 ... 20 mA for 0 - 100 % flow value > 20,8 mA for alarm status
Supply power influence	< 0,1 %
Ext. resistance dependence	< 0,1 %
Temperature influence	< 5 µA/K
max. external resistance / load impedance	0 (250') ... 800 Ω
Ambient temperature	-25 ... +60 °C
Certification to	TÜV 15 ATEX 7805 X
Inner inductance (L <sub>i</sub> ) / capacitance (C <sub>i</sub> )	~0 µH/10 nF
Switch marking	ⓈII 2G Ex ia IIC T6...T1 Gb (max. U <sub>i</sub> = 30 V, I <sub>i</sub> = 130 mA, P <sub>i</sub> = 1 W)

\*With HART™-communication, these are minimum values.

## EMZ electrical transmitter with totalizer

The EMZ flow totalizer in 2-wire technology is used in combination with the electrical current output EM. An LCD display indicates the total flow value and can be switched over to indicate the instantaneous flow rate in 0 ... 100 %. The EMZ has two galvanically isolated binary outputs which can be configured as a switching output or pulse output. The pulse output supplies each displayed counter increment an adjustable number of pulses. If the voltage drops, an automatic backup takes place. If an indicator with totalizing function is to be used in potentially explosive areas, it must be connected to an intrinsically safe circuit.

Two binary outputs	galvanically isolated, passive	
Connection types	NAMUR (EN 60947-5-6) or Transistor output (passive, open collector)	
<b>Switch output Transistor</b>		
Power supply	nominal 24 V DC, max. 30 V DC	
Load R <sub>L</sub>	250 ... 1000 Ω	
Continuous current	max. 100 mA	
P <sub>max</sub>	500 mW	
<b>Switch output NAMUR <sup>1)</sup></b>		
U <sub>o</sub>	8,2 V DC	
R <sub>i</sub> <sup>1)</sup>	1000 Ω	
Signal current	> 3 mA, switching value reached	< 1 mA, switching value not reached
<b>Pulse output</b>		
T <sub>on</sub>	configurable from 50 ... 500 ms	
T <sub>off</sub>	depending on flow rate	
f <sub>max</sub>	10 Hz	
Pulse value	configurable in flow units e.g. 5 pulses per m <sup>3</sup>	
Ambient temperature	-40 ... +70 °C	

<sup>1)</sup> switching amplifier with U<sub>o</sub> = 8,2 V DC and R<sub>i</sub> = 1000 Ω

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## **Explosion protection according to Directive 2014/34/EU: ATEX**

The following versions are also available in the type-tested explosion-proof variant for Zone 1 and 2 of device categories 2 and 3, atmosphere G, in compliance with Directive 2014/34/EU:

KFS Ex: mechanical local indicator

KFS-IK1 Ex: with one inductive limit value switch \*

KFS-IK2 Ex: with two inductive limit value switches \*

KFS-EM Ex: with 4 ... 20 mA output \*

KFS-EMZ Ex: with totalizer \*

\* Connection to intrinsically safe circuits only



# KFS

Flap-type flow meters

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## Low Voltage Directive

Above 50 V AC/75 V DC, electrical components are subjected to the EU Low Voltage Directive (LVD). The user is required to verify their use accordingly.

## Proper use

The user is responsible for assessing the suitability of the flow meters for his case of application, for use as prescribed and for material compatibility regarding the fluid product used in his process.

The manufacturer shall not be liable for any damage arising from incorrect or improper use of the devices.

Pressure surges can cause device damage and should therefore be generally avoided. The limit values given in the data sheet should be observed.

The equipment from **Kirchner und Tochter** has been tested in compliance with applicable CE-regulations of the European Community. The respective declaration of conformity is available on request. Subject to change without notice. The current valid version of our documents can be found at [www.kt-flow.de](http://www.kt-flow.de)

The **Kirchner und Tochter** QM-System is certified in accordance with DIN EN ISO 9001:2015. The quality is systematically adapted to the continuously increasing demands.