



## Design and application

The function of the SGM is based on the variable area float principle. In all cases where a dependable device is required for indicating instantaneous values and monitoring the flow in pipelines, the SGM is the obvious choice as a reliable device for measuring the flow of liquids and gases. Since the vertical position of the float is transmitted magnetically to a dial gauge, the SGM, as opposed to standard type variable area flow meters with a glass tube, is also suitable for measuring the flow of opaque media. Each device is individually calibrated to meet customer specifics and fitted with a medium specific scale.

For process control, the flow meter can be equipped with a limit value switch and/or measuring transmitter with electrical analog output.

Our technical documents provide a detailed explanation of the function and measuring principle of VA flow meters.

## SGM



- **all-metal device, indication via magnetic coupling**
- **high resistance to pressure and temperature**
- **DN 15 to DN 100**
- **low pressure loss**
- **optionally**
  - **limit value switches**
  - **analog output 4 ... 20 mA**
  - **explosion-proof design**
  - **PTFE liner**
  - **horizontal installation**





**SGM**

Variable area flow meters

## Type series

Version	Description
SGM	all-metal device
SGM-EM	with electrical signal output
SGM-EMZ	with electrical signal output and totalizer
SGM-IK1	with one inductive switch (SC3,5-N0-Y)
SGM-IK2	with two inductive switches (SC3,5-N0-Y)
SGM-IKS1	with one electronic switch (SB3,5-E2)
SGM-IKS2	with two electronic switches (SB3,5-E2)
SGM-IK1-EM	with one inductive switch and with electrical signal output
SGM-IK1-EMZ	with one inductive switch and with electrical signal output and totalizer
SGM-IK2-EM	with two inductive switches and with electrical signal output
SGM-IK2-EMZ	with two inductive switches and with electrical signal output and totalizer
SGM-IKS1-EM	with one electronic switch and with electrical signal output
SGM-IKS1-EMZ	with one electronic switch and with electrical signal output and totalizer
SGM-IKS2-EM	with two electronic switches and with electrical signal output
SGM-IKS2-EMZ	with two electronic switches and with electrical signal output and totalizer
Optionally	Version/Description
SGM EEx	all-metal device, explosion-proof design
SGM-EM EEx	with electrical signal output, explosion-proof design
SGM-IK1 EEx	with one inductive switch, explosion-proof design
SGM-IK2 EEx	with two inductive switches, explosion-proof design explosion-proof design
SGM-IK1-EM EEx	with one inductive switch and with electrical signal output, explosion-proof design
SGM-IK2-EM EEx	with two inductive switches and with electrical signal output, explosion-proof design

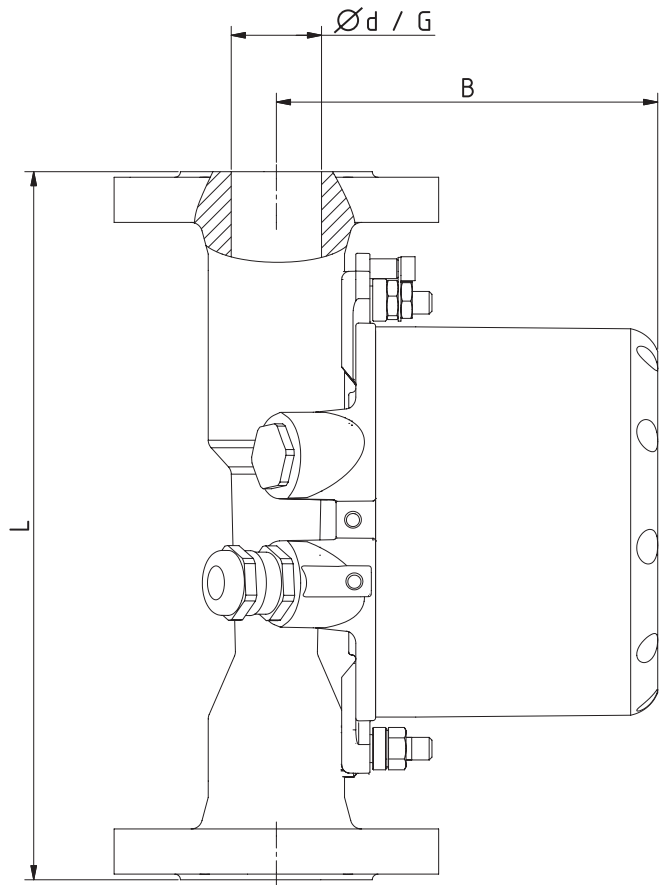
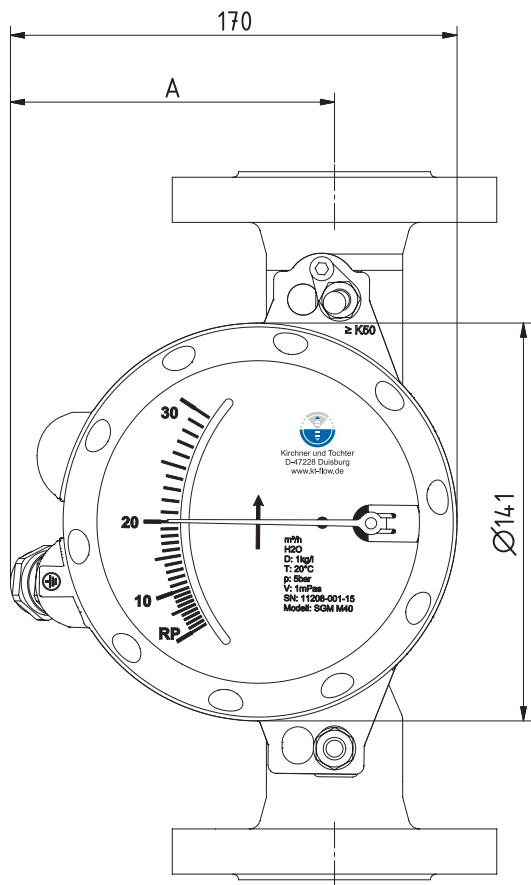
## Technical data

Measurement accuracy	
Standard (VA/C4)	1,6 acc. to VDI/VDE 3513 pt. 2
alternative (PTFE/ceramics)	2,5 acc. to VDI/VDE 3513 pt. 2
Indicator part	
Scale	in phy. units, e.g. l/h, m <sup>3</sup> /h
Scale length	90 mm
Standard range	1:10
Degree of Protection	IP 67, NEMA 4X
Permissible working pressure	
DN 15, DN 25, DN 50	PN 40
DN 80, DN 100	PN 16
Connections	
Flange connection	acc. EN-1092-1, optionally: ANSI B 16.5, JIS B 2220
Screw connection	optionally: DIN 11851, DIN EN ISO 228

## Materials and media temperature

Version	Measuring tube/float	Media-temperature	Amb. temp.
SGM/VA	stainless steel 1.4404	-70 ... +300 °C	-40 ... +120 °C
SGM/C4	Hastelloy C4 2.4610	-70 ... +300 °C	-40 ... +120 °C
SGM/PTFE	PTFE <sup>1)</sup> /PTFE	-70 ... + 70 °C	-40 ... + 70 °C
SGM/PTFE/K	PTFE <sup>1)</sup> /ceramics	-70 ... +150 °C	-40 ... + 70 °C
SGM/TFM/K	TFM <sup>1)</sup> /ceramics	-70 ... +250 °C	-40 ... +120 °C
Indicator part			
Scale case	aluminium, painted		
Pointer	aluminium, painted		
Scale	aluminium, coated		
Pane	float glass		

<sup>1)</sup> measuring tube of stainless steel (1.4404) with liner



## Dimensions and weights

(Design: Stainless steel with flange connection)

DN	PN	Dimensions [mm]				d	Weight [kg]	
		L	A	B	Stainless steel		Ceramics/PTFE	
15	40	250	104	114	20	3,5	3,5	
25	40	250	104	127	32	5	5	
50	40	250	117	139	65	8,2	10	
80	16	250	117	155	89	12,2	13	
100 <sup>1)</sup>	16	250	117	164	114	14	15	

1) PTFE lining only

Overall length for devices with internal thread to DIN EN ISO 228: 300 mm, to ANSI B 16.5 (3"/300 lbs and higher): 300 mm  
other connections on request

(Design: Stainless steel with internal thread)

DN	G	Dimensions [mm]				d	Weight [kg]
		L	A	B			
15	G ½	300	104	114	20	3,5	
15	½" NPT	300	104	114	20	3,5	
15	¾" NPT	300	104	114	20	3,5	
15	G 1	300	104	114	20	3,5	
25	G 1	300	104	127	32	5	
25	1" NPT	300	104	127	32	5	

other connections on request



**SGM**

Variable area flow meters

**Measuring ranges** (stainless steel design)

Size	Stainless steel float				Air at STP <sup>1)</sup>	Pressure loss [mbar]		
	Water			Pressure loss [mbar]				
15 bzw. ½"	2,5	-	25	l/h	26	65 - 650	l/h	21
	4	-	40	l/h	26	100 - 100	l/h	21
	6,3	-	63	l/h	26	150 - 1500	l/h	21
	10	-	100	l/h	26	220 - 2200	l/h	21
	16	-	160	l/h	26	360 - 3600	l/h	21
	25	-	250	l/h	26	550 - 5500	l/h	21
	40	-	400	l/h	28	1 - 10	m³/h	21
	63	-	630	l/h	32	1,4 - 14	m³/h	22
	70	-	700	l/h	38	1,8 - 18	m³/h	38
	100	-	1000	l/h	50	2,8 - 28	m³/h	50
160	-	1600	l/h	85	5 - 50	m³/h	85	
25 bzw. 1"	63	-	630	l/h	32	1,4 - 14	m³/h	24
	100	-	1000	l/h	33	2,3 - 23	m³/h	24
	160	-	1600	l/h	34	3,5 - 35	m³/h	25
	250	-	2500	l/h	38	5 - 50	m³/h	26
	400	-	4000	l/h	45	9,5 - 95	m³/h	30
	630	-	6300	l/h	103 <sup>2)</sup>	11 - 110	m³/h	78
50 bzw. 2"	630	-	6300	l/h	74	8 - 80	m³/h	13
	1	-	10	m³/h	77	11 - 110	m³/h	13
	1,6	-	16	m³/h	84	15 - 150	m³/h	13
	2,5	-	25	m³/h	104	23 - 230	m³/h	60
						35 - 350	m³/h	69
						70 - 700	m³/h	104
80 bzw. 3"	2,5	-	25	m³/h	68	35 - 350	m³/h	16
	4	-	40	m³/h	89	40 - 400	m³/h	16
	6,4	-	64	m³/h	125	100 - 1000	m³/h	95
						180 - 1800	m³/h	125
100 bzw. 4"	6,3	-	63	m³/h	120			
	10	-	100	m³/h	220			

Float damping system recommended for devices used for gas flow measurement!

<sup>1)</sup> at STP (0 °C and 1013 mbar abs.)

<sup>2)</sup> 300 mbar with damping

## Measuring range (PTFE design)

Size	PTFE float				Air at STP <sup>1)</sup>	Pressure loss [mbar]		
	Water			Pressure loss [mbar]				
15 bzw. ½"	2,5	-	25 l/h	65	70	-	700 l/h	65
	4	-	40 l/h	66	110	-	1100 l/h	66
	6,3	-	63 l/h	66	180	-	1800 l/h	66
	10	-	100 l/h	68	280	-	2800 l/h	68
	16	-	160 l/h	72	480	-	4800 l/h	72
	25	-	250 l/h	86	700	-	7000 l/h	86
	40	-	400 l/h	111	1000	-	10000 l/h	111
25 bzw. 1"	63	-	630 l/h	70	1,6	-	16 m³/h	70
	100	-	1000 l/h	80	3	-	30 m³/h	80
	160	-	1600 l/h	108	4,5	-	45 m³/h	108
	250	-	2500 l/h	158	7	-	70 m³/h	158
	400	-	4000 l/h	290	12	-	120 m³/h	194
50 bzw. 2"	400	-	4000 l/h	81	11	-	110 m³/h	81
	630	-	6300 l/h	110	18	-	180 m³/h	110
	1	-	10 m³/h	170	25	-	250 m³/h	170
80 bzw. 3"	1,6	-	16 m³/h	81				
	2,5	-	25 m³/h	95				
100 bzw. 4"	4	-	40 m³/h	100				

Float damping system recommended for devices used for gas flow measurement!

1) at STP (0 °C and 1013 mbar abs.)

## Measuring range (Ceramics design)

Size	Ceramics float				Air at STP <sup>1)</sup>	Pressure loss [mbar]		
	Water			Pressure loss [mbar]				
15 bzw. ½"	3	-	30 l/h	62				
	5	-	50 l/h	64	180	-	1800 l/h	64
	7	-	70 l/h	66	240	-	2400 l/h	66
	13	-	130 l/h	68	400	-	4000 l/h	68
	20	-	200 l/h	70	650	-	6500 l/h	70
	25	-	250 l/h	72	900	-	9000 l/h	72
25 bzw. 1"	50	-	500 l/h	55	1,8	-	18 m³/h	55
	70	-	700 l/h	60	2,2	-	22 m³/h	60
	110	-	1100 l/h	70	3	-	30 m³/h	70
	160	-	1600 l/h	82	5	-	50 m³/h	82
	250	-	2500 l/h	100	7,5	-	75 m³/h	100
50 bzw. 2"	450	-	4500 l/h	70	14	-	140 m³/h	70
	630	-	6300 l/h	80	20	-	200 m³/h	80
	1,1	-	11 m³/h	110	35	-	350 m³/h	110
80 bzw. 3"	1,6	-	16 m³/h	70				
	2,5	-	25 m³/h	85				
100 bzw. 4"								

Float damping system recommended for devices used for gas flow measurement!

1) at STP (0 °C and 1013 mbar abs.)

**SGM**

Variable area flow meters

## IK / IKS Limit value switch

A module with up to two limit switches can be installed into the indicator part. You can choose between a 2-wire (IK) and a 3-wire (IKS) type. The switching point is adjusted by the setting pointer. The position of the setting pointer is displayed on the scale. The switch is triggered, by the vane of the main pointer that dips in the slot-type initiator, when the limit value is over- or undershot (hysteresis-free).

### Switch types

SC3,5-N0-Y	2-wire technology (NAMUR)
SB3,5-E2	3-wire technology (non Ex)

2-wire SC3,5-N0-Y	
Switching element function	NAMUR NC (normally closed)
Nominal voltage $U_0$	8 V
Current consumption:	
Pointer vane not sensed	$\geq 3$ mA
Pointer vane sensed	$\leq 1$ mA
Ambient temperature	-25 ... +100 °C
EMV according to	NE 21
SIL according to	IEC 61508
Approval certificate	PTB 99 ATEX 2219X only with isolation switching amplifier
3-wire SB3,5-E2	
Switching element function	PNP NO (normally open)
Nominal voltage $U_0$	10 ... 30 V DC
Current consumption:	
Pointer vane not sensed	$\leq 0,3$ V DC
Pointer vane sensed	$U_b - 3$ V DC
Ambient temperature	-25 ... +70 °C
Continuous current	max. 100 mA
No-load current $I_0$	$\leq 15$ mA
EMV according to	EN 60947-5-2

degree of protection (EN 60529/IEC 529) IP 67

## EM Electrical measurement transmitter

The electrical transmitter EM and provides an output signal of 4 ... 20 mA proportional to the instantaneous flow rate in 2-wire connection. Due to the well-thought-out construction, EM and IK / IKS can be operated in one indicator part at the same time. If provided with an intrinsically safe power supply, the transmitter can also be used in a potentially explosive areas. Product data and measuring range are easily retrieved with the help of HART®-communication.

Power supply	12 ... 30 V DC (HART® min. 18 V DC)
Current consumption	4 ... 20 mA for 0 ... 100 % of measured value
NAMUR failure signal	> 21 mA
Reproducibility	< 0,1 % of FS
Linearity error	< 0,1 %
Influence of supply power	< 0,1 %
Ext. resistance dependence	< 0,1 %
Temperature effect	< 10 $\mu$ A/K
Max. load impedance	0 (250*) ... 800 $\Omega$
Individual certificate	PTB 00 ATEX 2063

\* With HART®-communication, this value is the minimum value  
For use in potentially explosive areas: built-in equipment may only be connected to separate intrinsically safe circuits.

## EMZ electrical transmitter with totalizer

The EMZ flow totalizer in 2-wire technology is used in combination with the electrical current output EM. SGM flow meters with EMZ have a different housing with the same installation length. 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 RL	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>	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



**SGM**

Variable area flow meters

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### **Safety note**

Operate the devices only up to the specified permissible working pressure and operating temperature.  
Avoid excessive pressure surges.

### **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 liquid product used in his process. The manufacturer shall not be liable for any damage arising from incorrect or improper use of the devices.

### **Conformity with EU Directives**

The SGM variable area flow meter meets all requirements of EU Directives applicable to the product.

- EMC-Directive (2014/30/EU)
- ATEX (2014/34/EU)
- PED (2014/68/EU)

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.