
FLOW
2025
PROFI MESS GMBH
FLOW METERS

SP-04

Digital Flowmeter/Switch with Way-Deflection-System

Features

/ 4. . .20 mA or 0. . .10 V DC output

/ Optional RS 232 interface

/ Totalizer

/ 2 separately adjustable switching contacts

/ Soil-resistant

/ For pipes up to DN600

/ LCD display for flow & total volume

/ Operating range 1:10

Description:

Profimess' measuring device SP-04 is a flow transmitter with a digital display of the current flow, analogue output, totalizer, voltage output and two adjustable switching relays with display of the setpoints for monitoring the flow rate. An RS 232C interface is optionally available. The flowing medium moves a baffle plate mounted to a pendulum and thus generates the measured displacement. The spring-loaded pendulum alters its position depending on the flow. The position of a magnet fixed to the pendulum is recorded by a Hall sensor located outside the measuring chamber and transmitted to the microchip-controlled electronics where it is processed. This 2-chamber system ensures that no fluid can penetrate the electronics housing even if the device is defective.

Application:

The SP-04 series of flowmeters and -switches is used for detection of thin-bodied media in nominal diameter ranges up to DN600. Particularly in the range of DN50 upwards the extremely cost-effective price-performance ratio is perceptible. Measurement by means of a baffle plate is independent of the conductivity of the medium due to which also glycol, oils and other hydrocarbons can be captured without problems. The SP-04 can be adapted to a large number of processes thanks to different material combinations.

Technical Specifications:

max. Pressure /	SP-04.GW and SP-04.AU 25 bar SP-04.FL 16 bar
max. Media temp. /	-20. . .+100°C (others on request)
Accuracy /	± 2% of full scale value
Totalizer /	with EEPROM-memory
Display /	LCD DOT-Matrix-module 2 x 8 digits (illuminated)
Flow direction /	any

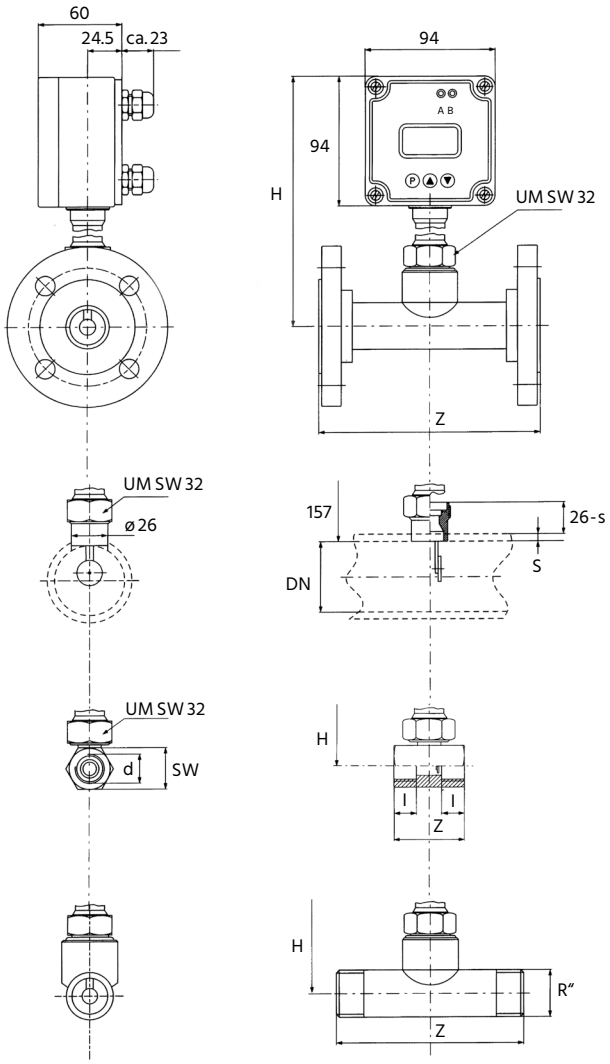
Electrical Specifications:

Contacts /	relay, 230 V, 1 A
Supply voltage /	24 VDC ± 10%, 200 mA max.
Protection class /	IP65
Analogue output /	4. . .20mA, load 500Ω; 0. . .10 VDC

Versions:

SP-04.GW...	with T-piece and pipe thread connection from R 3/8" to R 2"
SP-04.FL...	with T-piece and DIN flange from DN 10 to DN 50
Material combination A:	housing made of brass T-piece made of brass pendulum system, st. steel 1.4310 flange made of steel
Material combination B:	housing made of stainless steel 1.4571 T-piece made of stainless steel 1.4571 pendulum system, st. steel 1.4310 flange made of st. steel 1.4571
Material combination C:	T-piece made of PVC pendulum system, st. steel 1.4310 flange made of PVC
SP-04.AU...	IP65
Material combination A:	housing made of brass pendulum system, st. steel 1.4310 welding props made of steel
Material combination B:	housing made of stainless steel 1.4571 pendulum system, st. steel 1.4310 bellow made of stainless steel 1.4571 welding props made of st. steel 1.4571

Dimensions in mm:



Ordering Codes:

Order number	**SP-04.**	**GW25.**	**A.**	**2.**	**10-100**

SP-04 Baffle Disc Flowmeter

Process connection /
GW... = with thread (DN 10 to DN 50 only)
FL.... = with flange (DN 10 to DN 50 only)
AU... = with welding props (from DN 65 to DN 600)

Material combination /
A = brass / stainless steel / steel
B = fully stainless steel
C = PVC / stainless steel (not for SP-04.AU)

Switching output /
2 = 2 relays (230 V / 1A)

Operating range /
xxxx-xxxx = min. - max. flow (see table operating ranges)

Additional details /
· media density and viscosity (if different from water)
· operating pressure and temperature · **mounting position and direction of flow**

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Measuring Ranges:

Processconnection: SP.04.GW..., SP.04FL...

ND	Flow (l/min) min.	max.	Flow ratio
3/8"	1,5	25	1:10
1/2"	1,5	45	1:10
3/4"	5	100	1:10
1"	6	150	1:10
1 1/4"	10	250	1:10
1 1/2"	20	400	1:10
2"	50	600	1:10

Values are applicable for water, 20°C.
Within the specified limits, all operating ranges can be implemented, provided that the ratio max. to min. 1 : 10 is not exceeded.

Processconnection: SP-04.AU...

ND	Flow (m^3/h) min.	max.	Flow ratio
DN 65	4,8	60	1:10
DN 80	7,2	90	1:10
DN 100	12	144	1:10
DN 125	18	255	1:10
DN 150	24	330	1:10
DN 200	42	600	1:10
DN 250	72	900	1:10
DN 300	100	1200	1:10
DN 350	150	1800	1:10
DN 400	180	2400	1:10
DN 500	300	3600	1:10
DN 600	420	4500	1:10

Dimensions:

SP-04.GW...

Diameter		Mounting length Z in mm and (thread type)	
		Material A	Material B
3/8"	DN 10	50 (F)	50 (F)
1/2"	DN 15	50 (F)	50 (F)
3/4"	DN 20	50 (F)	50 (F)
1"	DN 25	50 (F)	135 (M)
1 1/4"	DN 32	50 (F)	170 (M)
1 1/2"	DN 40	50 (F)	170 (M)
2"	DN 50	170 (M)	170 (M)

SP-04.FL...

Diameter		Mounting length Z in mm	Mounting height H in mm	
			Material A	Material B
3/8"	DN 10	155 ± 2	157	157
1/2"	DN 15	155 ± 2	157	157
3/4"	DN 20	155 ± 2	157	157
1"	DN 25	155 ± 2	162	178
1 1/4"	DN 32	190 ± 2	167	178
1 1/2"	DN 40	190 ± 2	171	178
2"	DN 50	190 ± 2	179	188

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FL-01

Diaphragm Flow Meter

Description:

The FL-01's body contains a thin, elastic diaphragm, made of stainless steel, which covers the entire flow cross-section. It is bent through the flowing liquid, until it touches a bow-shaped stopper. The magnetic field of a plastic-encapsulated magnet, sitting right on the diaphragm, is detected by an external sensor. The optional available measuring-transducer, installed on the outside of the housing, owns a back-lit, well-readable LCD-Display, which shows measured values and parameters in a clear and easy to understand way. The FL-01 has either a 0. . .10 VDC- or 4. . .20 mA-output-signal and two switching outputs which can be used as PNP- or NPN-transistor-outputs, if needed. The device can be controlled and programmed with a magnet ring. By turning the ring left or right, parameters, such as hysteresis or switching points, can easily be changed.
A further option, the electronic unit can be ordered as a counter, with external reset, antivalent switching-outputs and current-value display, or, as a current-value display with analogue output, volume-pulse-output and counter.

Features

/ Analogue output
/ 2 switching outputs
/ Well-readable, back-lit display
/ Changeable dimensions
/ For industrial applications
/ Small and compact in size
/ Easy installation

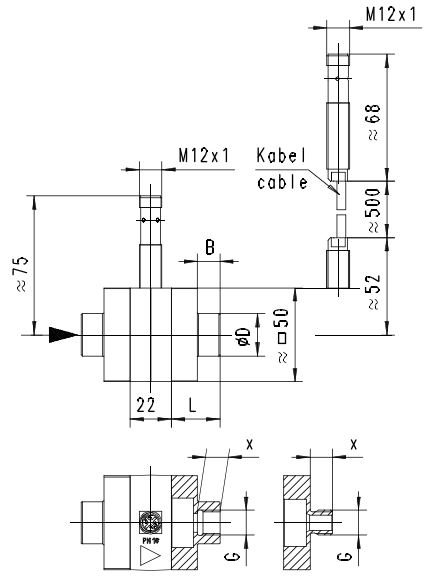
Application:

The new developed measuring-system of the FL-01 offers, by the fact, that it manages without any bearing a very good reproducibility and is practically free of hysteresis. In addition, the response time of the measurement is extremely small, due to the small mass of the spring diaphragm and the nearly complete coverage of the flow cross section. Therefore the instruments allows the detection of even the smallest starting values and a large measuring range of up to 1:100. Compared to some other principles of flow measurement, e.g. the calorimetric or the impeller system, the dynamics of the entire flow cross-section are detected in the FL-01 and not just a supposedly representative point in the center or at the edge of the flow profile. Straight inlet and outlet sections have a considerably less influence on the measurement result. The FL-01 connectors on the input and output sides are flanged to the measuring system at the factory, so if the device needs to be serviced, the connecting screws can be removed easily from the flange and the measuring-unit removed, without removing the connectors from the pipe. This flowmeter is a universally applicable, robust instrument, which is used in the entire industry. The excellent price-performance ratio and its multitude of technical advantages make it economically viable at many measuring points to replace old technologies, such as impeller or turbine flowmeters, with the FL-01.

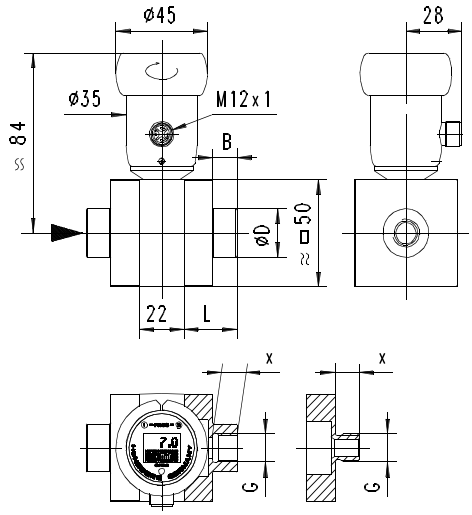
Technical Specifications:

Pressure resistance /	plastic: PN 16 metal: PN 100
Pressure drop /	max. 0.5 bar at scale-end
max. Mediatemp. /	0. . .+70 °C with opt. high-temp. 0. . .150 °C
max. Ambient-temp. /	0. . .+70 °C
Storage temp. /	-20. . .+80 °C
Sensor /	flow-dependent diaphragm
Pipe diameter /	DN 8. . .25
Connection Type /	female thread G¼ to G1, optional male thread or tube, NPT-thread and customer specific connectors on request
Switching range /	1. . .100 l/min (water)
Measuring range (water) /	1. . .100 l/min; small-volume-range 0.4. . .6 l/min on request
Measurement uncertainty /	Standard range: ±3 % from measured value, at least 0.25 l/min Small-volume-range: ±3 % from measured range, at least 0.1 l/min
Display /	graphic LCD-Display extended temperature range -20. . .+70°C, 32 x 16 pixels, back-lit, shows value and dimension, LED-signal blinking + message
Materials, wetted /	
Body:	PPS, brass nickel-coated CW614N or stainless steel 1.4404
Connections:	POM, brass nickel-coated CW614N or stainless steel 1.4404
Seals:	FKM
Diaphragm:	stainless steel 1.4031k
Magnetic holder:	PPS
Glue:	epoxy
Materials, not wetted /	
Sensorpipe:	brass nickel coated CW614N
Flange screws:	stainless steel or steel
with Display /	
Body:	stainless steel 1.4305
Glas:	hardened mineral glass
Magnet:	samarium-cobalt
Ring:	POM

Dimensions w/o Display:



Dimensions with Display:



Range:

Pipe diameter	Switching range (l/min H_2O)
DN 8. . .25	0.4. . .6.0
DN 8. . .25	1.0. . .15.0
DN 10. . .25	1.0. . .25.0
DN 15. . .25	1.0. . .50.0
DN 20. . .25	1.0. . .80.0
DN 25	1.0. . .100.0

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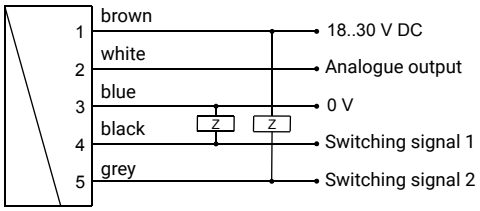
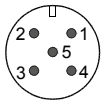
Elect. Connection:



Connection examples: PNP NPN



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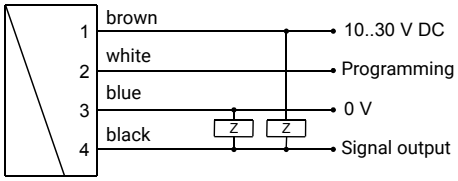
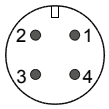


Connection examples: PNP NPN



Electrical Specifications:

Power supply /	10. . .30 VDC; 18. . .30 V DC with display: 15. . .30 V DC
Current output /	4. . .20 mA (0. . .20 mA on request max. 500 Ohm (only with display)
Voltage output /	0. . .10 V (2. . .10 V on request) current output max. 20 mA
Switching output /	transistor output „Push-Pull“ I_{out} = 100 mA max.
Frequency output /	output frequency in relation to the range, standard 500 pulse/l (corresponds to 833,3 Hz at 100 l/min) 5000 pulse/l (corresponds to 500 Hz at 6 l/min) (other frequencys on request)
Pulse output /	transistor output „Push-Pull“ I_{out} = 100 mA max. pulse-width 50 ms pulse/quantity, please specify when ordering
Power consumption /	< 1 W (for unloaded outputs)
Connection /	for round connectors M12x1, 4-pin
Protection class /	IP 67 (IP 68 with oil filling)
Conformity /	CE

Ordering Codes:

Order number	**FL-01.**	**1.**	**3.**	**1.**	**1.**	**08.**	**2.**	**3.**	**2.**	**1**

FL-01 Diaphragm Flow Meter

Housing material /
1 = PPS
2 = brass, nickel plated(CW614N)
3 = stainless steel

Process connection material /
1 = POM
2 = brass nickel plated (CW614N)
3 = stainless steel

Seal material /
1 = FKM
2 = EPDM
3 = NBR

Process connection thread /
1 = female
2 = male
3 = hose fitting

Nominal diameter / (see table)
08 = ¼“
10 = 3/8“
15 = ½“
20 = ¾“
25 = 1“

Measuring range /
1 = 0.4. . .6 l/min (on request)
2 = 1.0. . .15 l/min
3 = 1.0. . .25 l/min
4 = 1.0. . .50 l/min
5 = 1.0. . .80 l/min
6 = 1.0. . .100 l/min

Output configuration /
1 = switching output pushpull (PNP and PNP)
2 = power output 4. . .20 mA
3 = current output 0. . .10 V
4 = frequency output (500 pulse/l)
5 = pulse output (please specify pulse/volume)
6 = digital on-site display with 2 transistor switching-outputs, display and analogue output 4. . .20 mA
7 = digital on-site display with 2 transistor switching-outputs, display and analogue output 0. . .10 V

Options /
1 = none
2 = with backflow resistance
3 = high-temperatures up to 150°C [1]
4 = counter with external reset, antivalent switching-outputs and current-value display[2]
5 = current-value display with analogue output, volume-pulse-output and sum-counter[2]

Accessories /
0 = none
1 = counter plug M12x1, 4-pol.

[1] only with metal housing (with 300 mm cable separation)
[2] only with digital on-site indication

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FL-10

Flow Rate Indicator

Features

/ For liquid media

/ For media viscosities up to 600 cSt

/ Pressure up to 200 bar max.

/ Mechanical flow indication

/ Weatherproof enclosure box (IP65)

/ May be installed in any position

/ Size range from 1/4“ to 8“

/ Adjustable under operating conditions

/ ATEX approved Explosion-proof models avaible

Description:

A spring loaded stainless steel flap inside the FL-10 is rotated around a symmetrical axis due to the upcoming flow and opens therefore a variable aperture. This rotation moves the mechanically coupled pointer on the clearly visible flow scale of the FL-10 proportional to the flow. The rotary motion can be used for mechanical display only, for switching a microswitch when the adjusted setpoint is reached or even to put out a 4. . 20 mA analogue output. The FL-10 can easily be used within potentially explosive atmospheres thanks to its ATEX approvals for the switching unit and the output module. The unique construction of the FL-10 allows an installation in any mounting position.

Application:

The FL-10 side flow indicators with flap are among the most robust flowmeters on the market. In theory, the user can completely disassemble and reassemble the device on site without any functional restriction. The devices are durable, accurate, and versatile. There are many material combinations for a variety of liquid media and sizes from DN10 to DN200, as well as pressure levels up to 200 bar. Larger variants can be supplied for intermediate flange mounting (sandwich) on request. Various options for the electrical outputs of the indicators predestine the FL-10 series against many other sight flow indicators and offers the customer a perfect industrial product.

Technical Specification:

Materials /	
AL /	aluminum
B /	bronze
CI /	cast iron
CIK /	cast iron nickel plated
S /	carbon
SS /	stainless steel
PTFE /	PTFE (only up to 4" and 7 bar max.)
PVC /	PVC (only up to 4" and 7 bar max.)
Seal material /	
S1 /	NBR (-40. . .+110 °C)
S2 /	EPDM (-40. . .+150 °C)
S3 /	FKM (-20. . .+200 °C)
S4 /	PTFE (-100. . .+250 °C)
S5 /	Perlast (-15. . .+330 °C)
max. Pressure /	
LP	20 bar
MP	50 bar
HP	200 bar (CI, CIK, S & SS only)
max. Media temperature /	-100. . .+330 °C (depending on the material and seal material)
Mounting position	any position

Electrical Specification:

Switch /	
3EE /	SPDT 3 wire
Switching load:	15 A @ 125/250 or 480 VAC 0,5 A @ 125 VDC / 0,25 A - 250 VDC
3EEG /	SPDT 3 wire with gold contacts
Switching load:	on request
3EE (ATEX zone 2 / zone 3) /	SPDT micro switch (ATEX zone 2 / zone 3)
Switching load:	on request
6EE (ATEX zone 2) /	DPDT (ATEX zone 2)
Switching load:	2 micro switch, switching in parallel 10 A @ 125 or 250 VAC 0,3 A @ 125 VDC / 0,15 - 250VDC
AIR /	pneumatic switch
Switching load:	on request
POT /	potentiometer (specify rating)
Switching load:	on request
Analog out put /	
OUT /	4. . .20 mA out put
Supply:	on request
Rate totaliser /	
TOT /	digital rate totaliser
TOTX /	digital rate totaliser (ATEX)

Measuring ranges:

Process connection	Full scale values FML l/min	FMM m^3 / h	FMG U.S. Gallons / min	FMB imp. Gallons / min
Size small				
1/4" - 1"	4 - 70	0,24 - 4,2	1,0 - 18,5	0,88 - 15,4
Size middle				
3/4" - 2"	40 - 500	2,4 - 30	10,6 - 132	8,8 - 110
2 1/2"	50 - 800	3 - 48	13,2 - 211	11 - 176
Size large				
3"	120 - 1500	7,2 - 90	32 - 400	26,4 - 330
4"	120 - 2000	7,2 - 120	32 - 530	26,4 - 440
6"	120 - 3500	7,2 - 210	32 - 925	26,4 - 770
8"	120 - 5000	7,2 - 300	32 - 1325	26,4 - 1100

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Odering Codes:

Oder number	FL-10.	FML.	K.	B.	LP.	ME.	[20.]	2.	F10.	S1.	L

FL-10 Flow Rate Indicator

Series and flow rate /

FMC = up to 5 l/min (low flow)
FML = up to 5000 l/min
FMB = up to 1100 imp. Gallons / min
FMG = up to 1325 U.S. Gallons / min
FMM = up to 300 m^3/h

Size and ranges /

K = 1/4" to 1", ranges: 0...4 l/min bis 0...70 l/min
M = 3/4 to 2 1/2", ranges: 0...4 l/min bis 0...500 l/min
G = 3" to 8", ranges: 0...250 l/min bis 0---5000 l/min

Material /

AL = aluminum
B = bronze
CI = cast iron
CIK = cast iron nickel plated
S = carbon
SS = stainless steel
PTFE = PTFE (only up to 4" and 7 bar max.)
PVC = PVC (only up to 4" and 7 bar max.)

Pressure limit /

LP = max. 20 bar
MP = max. 50 bar
HP = max. 200 bar (only CI, CIK, S & SS)

Output signals /

ME = mechanical display only
3EE = micro switch
3EEG = micro switch with gold contacts
3EE(A2) = micro switch, ATEX zone 2
3EE(A1) = micro switch, ATEX zone 1
6EE(A2) = DPDT, ATEX zone 1
AIR = pneumatic switch
POT = potentiometer (spezify rating)
OUT = 4. . .20 mA output
TOT = digital totaliser
TOTX = digital totaliser (ATEX)

Media viscosity /

1. . .600 = please specify viscosity of media in cSt [mm^2/s]

Process connection size /

2 = 1/4" (only size K)
4 = 1/2" (only size K)
6 = 3/4" (only size K and M)
8 = 1" (only size K and M)
10 = 1 1/4" (only size M)
12 = 1 1/2" (only size M)
16 = 2" (only size M)
20 = 2 1/2" (only size M)
24 = 3" (only size G)
32 = 4" (only size G)
48 = 6" (only size G)
64 = 8" (only size G)

Process connection /

BSP = standard thread BSP (only connection size 1/4" up to 21/2")
NPT = standard thread NPT (only connection size 1/4" up to 21/2")

F10 = flange DIN2632-5 PN10
F16 = flange DIN2632-5 PN16
F25 = flange DIN2632-5 PN25
F40 = flange DIN2632-5 PN40

F150 = flange ANSI B16.5 150 lbs.
F300 = flange ANSI B16.5 300 lbs.
F600 = flange ANSI B16.5 600 lbs.

Seal material /

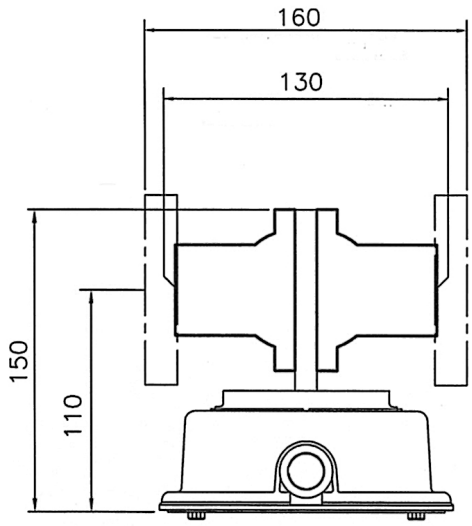
S1 = NBR (-40. . .+110 °C)
S2 = EPDM (-40. . .+150 °C)
S3 = FKM (-20. . .+200 °C)
S4 = PTFE (-100. . .+250 °C)
S5 = Perlast (-15. . .+330 °C)

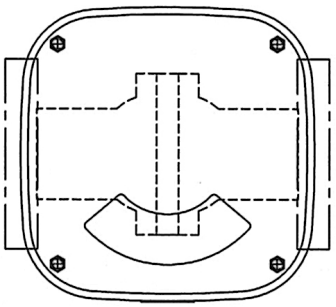
Flow directions /

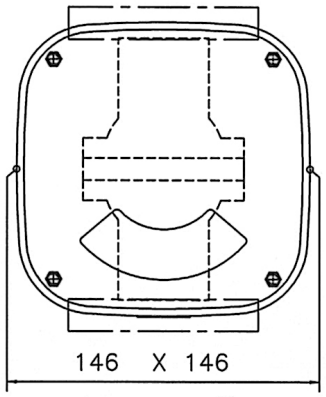
L = from left to right
R = from right to left
U = from bottom to top
O = from top to bottom

Dimensions FL-10 in mm:

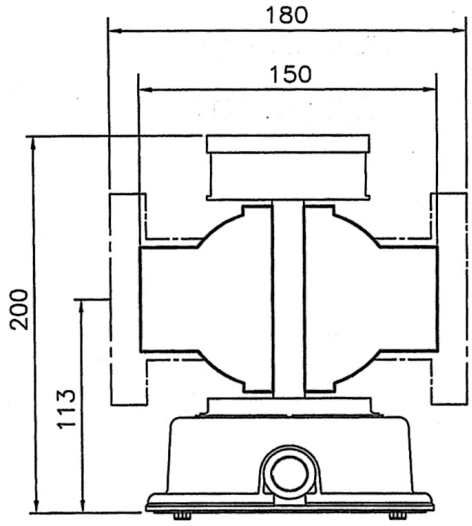
Size small (K)

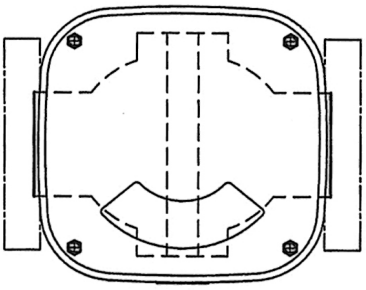


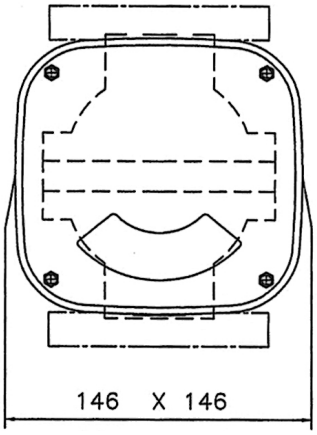




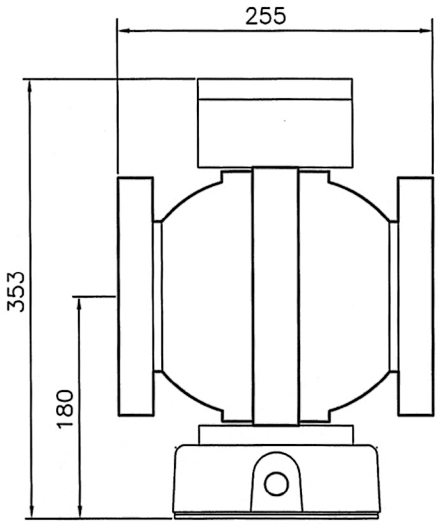
Size middle (M)

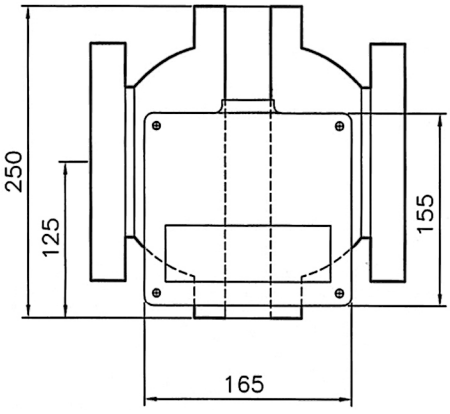


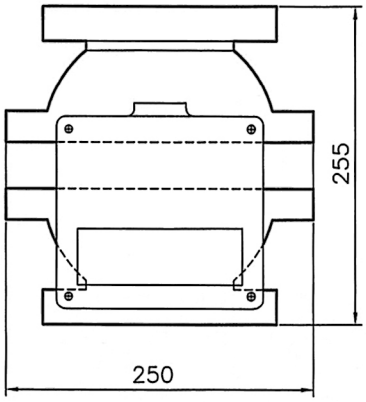




Size large (G)







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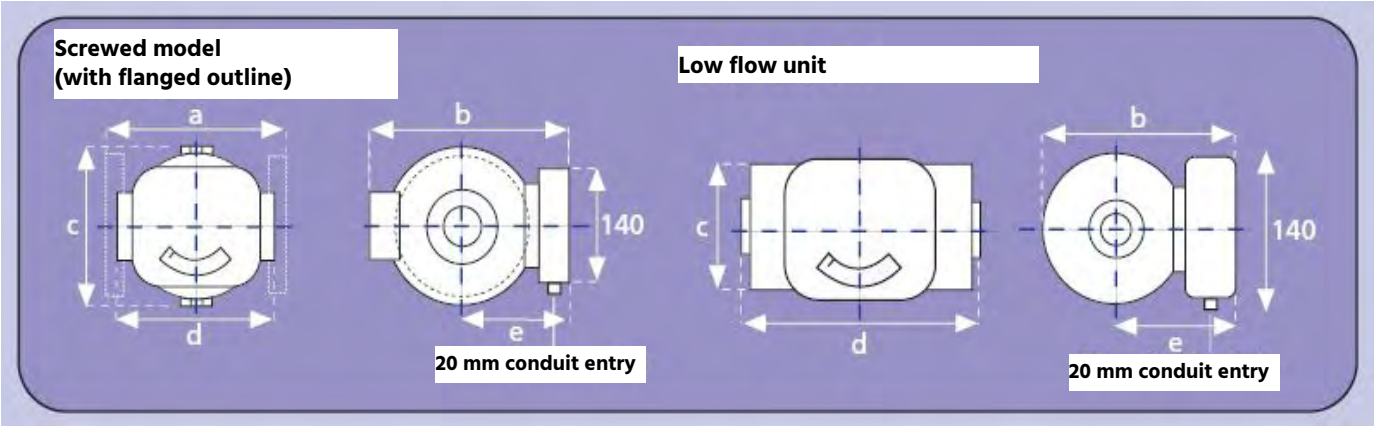
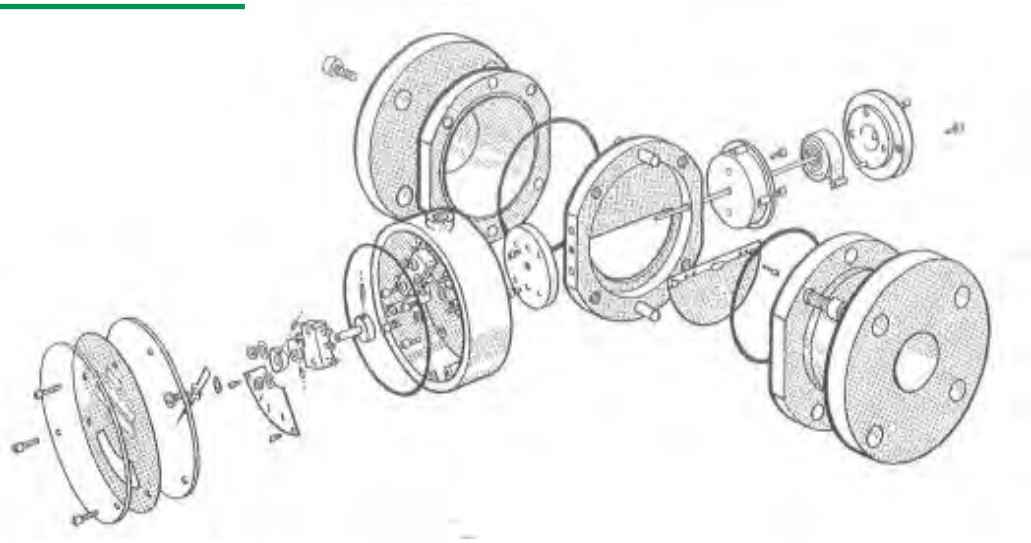
Dimensions and Weight:



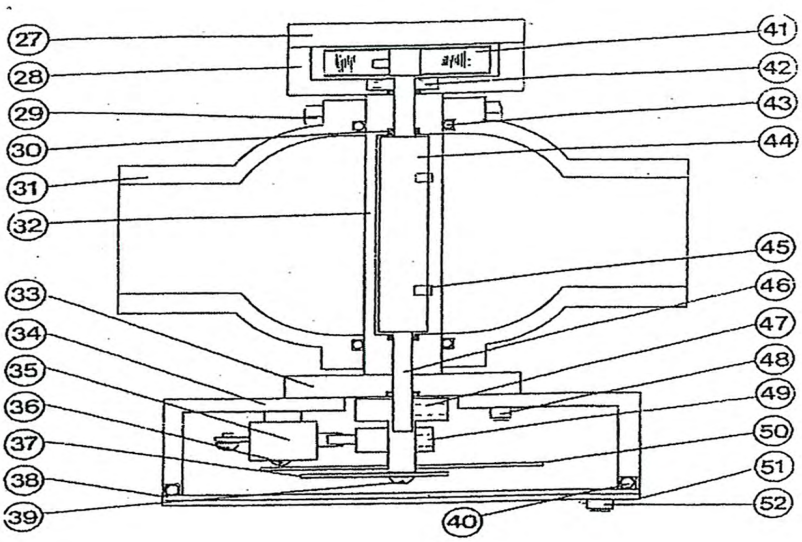
Pipe size	Overall dimension (mm)					Approximate Weight (kg)				
	a	b	c	d	e	AL	B	CI	S-SS	PVC
1/4" - 1"	n/a	155	100	188	110	3	8	-	8	3
1/4" - 1"	160	150	80	130	110	1	2	2	2	1
3/4 - 2"	180	200	120	150	115	3	7	7	7	3
2 1/2"	180	200	120	230*	115	5	10	10	10	4
3"	255	320	250	305*	160	20	54	50	54	15
4"	255	320	250	305*	160	23	60	56	60	17
6"	460	500	370	510*	280	60	200	175	200	n/a
8"	485	500	370	585*	280	68	225	200	225	n/a

***** obtained by mating flanges

Spares Data:



Item No.	Description
27.	Spring cover
28.	Spring housing
29.	Stud & nuts
30.	O-Ring (S1, S2, S3, S4)
31.	Bowl screwed/flanged AL, B, CI, CIK, S, SS, PVC
32.	Centre housing AL, B, CI, CIK, S, SS, PVC
33.	Mounting disc
34.	Enclosure Box
35.	Switch
36.	Screw
37.	Pointer
38.	Window
39.	Screw
40.	(a) Rear O-Ring (b) Front O-Ring
41.	Spring
42.	Bearing
43.	O-Ring (S1, S2, S3, S4)
44.	Valve plate
45.	Grub screw
46.	Spindle
47.	Indicator dial
48.	Screw
49.	Cam
50.	Dial plate
51.	Face plate
52.	Screw



Spares Kit

Item	Qty
30.	2 St
35.	1 St
36.	2 St
38.	1 St
40.	1 St
43.	2 St
52.	3 St

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SM-06N

Variable Area Flowmeter made of Acrylic

Description:

SM-06 variable area flowmeters operate according to the variable area principle in which the measuring element such as a stainless steel ball can move in a conical flow tube in vertical direction. When the medium being measured begins to flow from bottom to top, the float, too, moves to top until a dynamic equilibrium of forces freezes it at a certain height. The position that the float reaches in this manner is proportional to the volume flow. The scale value that can be read at the center of the measuring ball, therefore, corresponds to the flow rate. If the excrescent volume of flow needs to be regulated, the SM-06 provides optionally a regulating valve to easily allow flow volume control.

Features

/ Local indication without auxiliary power supply
/ Excellent readability
/ Compact design
/ Scales for water and air
/ Process connection of brass or stainless steel
/ Optional with regulating valve
/ Accuracy class 3.0 or 5.0

Application:

Variable area flowmeters made of acrylic are a cost-effective alternative to glass-made devices. Especially users in the fields of:

- Machine construction
- Medical engineering
- Pharmaceutical industry
- Chemical industry and in
- Research & Development

Where flow indicators are used in large numbers for simple applications and maximum accuracy is not a decisive factor, stand to benefit from this. An important aspect while assembling these devices is that the flow must always be from bottom to top and the medium is free from abrasive solid particles which, otherwise, may cause scratches inside the plastic tube and render it opaque.

Technical Specifications:

Media / compatible gases and liquids

Process connection / 1/8"-IG NPT. Version 2: W80 and W81 GPM water have 1/4" NPT back-connections or 3/8" NPT end-connections. These versions aren't available with brass valves.

Mounting position / vertical

Weight /
Version 1: 110. . .140g
Version 2: 200. . .250g

max. Pressure /

without valve: 6.9 bar at 65°C
10 bar at 38°C

with valve: 6.9 bar at 48°C

Accuracy /
Version 1: 5% FS
Version 2: 3% FS

Wetted materials /

Housing: acrylic

O-ring: Buna-N (fluororubber on request)

Connections: depending on the valve, brass or stainless steel

Floating cone: depending on the range: st. steel, black glass, aluminium, monel K

Ordering Codes:

Order number	SM-06N.	1.	[][][].	A.	1

SM-06N Acrylic-Flow Meter

Version /
1 = 101.6 mm
2 = 165.1 mm

Operating Range /
[][][] = see table, depending on version

Valve /
0 = no valve (standard)
A = brass valve
B = stainless steel valve

Options /
9 = custom scale on request
1 = valve with PTFE seal
2 = wetted parts completely in st. steel
3 = fluororubber with O-rings

Meas. Ranges Version 1:

Measuring range SCFH air	Code
0.1. . .1	L10
0.2. . .2	L11
0.6. . .5	L12
1. . .10	L13
2. . .20	L14
4. . .30	L15
5. . .50	L16
10. . .100	L17
20. . .200	L18

Measuring range CC / min water	Code
6. . .50	W30
10. . .100	W31
20. . .200	W32

Measuring range LPM air	Code
0.06. . .0.5	L20
0.15. . .1	L21
0.6. . .5	L22
1. . .10	L23
3. . .25	L24
6. . .50	L25
10. . .100	L26

Measuring range GPH water	Code
0.6. . .5	W40
2. . .10	W41
3. . .20	W42
8. . .40	W43

Meas. Ranges Version 2:

Measuring range SCFH air	Code
0.3. . .3	L50
1. . .10	L51
2. . .20	L52
4. . .40	L53
10. . .100	L54
10. . .150	L55
20. . .200	L56

Measuring range SCFM air	Code
0,3. . .3	L57

Measuring range GPH water	Code
0.5. . .12	W70
1. . .20	W71
6. . .40	W72
6. . .60	W73

Measuring range LPM air	Code
0.2. . .4	L60
1. . .10	L61
1. . .20	L62
3. . .30	L63
4. . .40	L64

Measuring range GPM water	Code
0.2. . .2	W80*
0.5. . .5	W81*

* not possible with brass valve or 1/4" NPT back-connection!

Measuring range CC / min water	Code
2. . .30	W99

Measuring range CC / min air	Code
100. . .1000	L99

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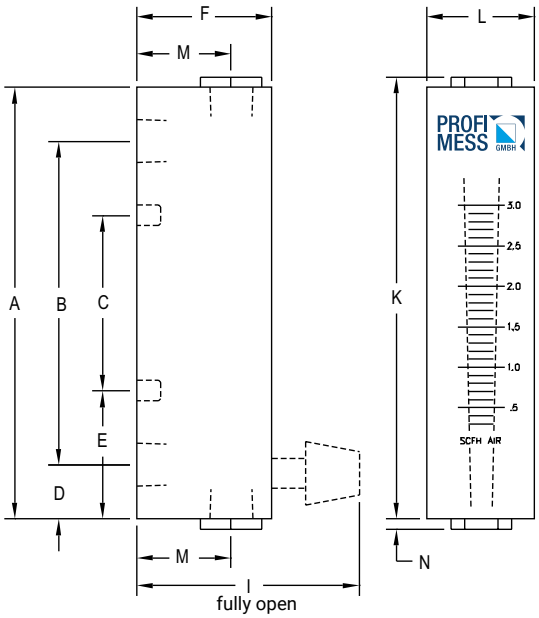
Dimensions in mm:



Length	Version 1	Version 2
A	101.6	165.1
B	76.2	139.7
C	41.28	88.9
D	12.7	12.7
E	30.16	38.1
F	31.75	31.75
I	52.39	52.39
K	104.0	169.9
L	25.40	34.93
M	22.23	22.23
N	2.381	2.381

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SM-10

Variable Area Flowmeter with Sight Glass for Small Flow Volumes

Features

/ Indication without power supply

/ For fluids and gases

/ Brass or stainless steel

/ With built-in needle valve

/ Alarm output on request

/ Accuracy class 1.0, 2.5 or 4.0

Description:

The SM-10 series of flowmeters operates according to the proven variable area principle. The flowing medium moves the float in a conical measuring tube in the opposite direction of gravitational force. The height of the float is a measure for the flow and it can be read from a non-abrasive and burnt-in scale. Optionally, inductive contacts fixed on the sight glass can be used for obtaining limit values. As a standard, all devices are equipped with a needle valve for precise regulation of flow.

Application:

The SM-10 series of variable area flowmeters is primarily intended for controlling and monitoring low-viscosity fluid or gaseous media. For standard conditions, scales for water or air are predefined and enable a quick and simple dimensioning of the devices. For other media or different process conditions specially customized scales are available.

Versions:

SM-10 Variable area Flowmeter with sight glas

SM-10.1: Design size 1, height: 111 mm, accuracy class 4.0

SM-10.2: Design size 2, height: 146 mm, accuracy class 2.5

SM-10.3: Design size 3, height: 196 mm, accuracy class 2.5

SM-10.4: Design size 4, height: 346 mm, accuracy class 1.0

Ordering Codes:

Order-no.	SM-10.	2.	1.	1.	1.	L01.	1.	1.	0

SM-10 Variable area Flow-meter with sight glass

Version /
1 = design size 1, accuracy class 4.0
2 = design size 2, accuracy class 2.5
3 = design size 3, accuracy class 2.5
4 = design size 4, accuracy class 1.0

Process connection /
1 = G 1/4"-female rear side
2 = NPT 1/4" rear side

Material /
1 = brass
2 = stainless steel

Gasket material /
1 = PTFE / FPM (standard)
2 = PTFE / FFKM

Operating range /
L01 - L22 = as per table „Operating ranges air"
W01 - W18 = as per table „Operating ranges water"
99 = special operating range

Valve /
0 = none
1 = valve at the inlet (standard)
2 = valve at the outlet (no backstroke ball)

Limit contacts /
0 = none
1 = 1 contact - Type A
2 = 2 contacts - Type A
3 = 1 contact - Type B
4 = 2 contacts - Type B

Options (multiple specs possible) /
0 = none
1 = switching panel assembly

/ Special type connections like hose spouts, SWAGELOK, ERMETO or others on request. For operating the limit contacts isolating circuit amplifiers KFA to SR2-Ex1.W for 1 contact or KFA to SR2-Ex2.W for 2 contacts are required. Technical specifications and prices on request.

Electrical Specifications:

Terminal connection /	connection box M16 x 1,5
Clamping range /	3 to 7 mm
Contact version /	2-wire
contact type A:	for ring diameter 10 mm
contact type B:	for ring diameter 15 mm
Contact function /	bistable
NAMUR /	yes
Nominal voltage U_0 /	8 VDC
Current consumption /	1 mA passage ↓ (1)
Current consumption /	3 mA passage ↑ (1)

(1) For devices with the valve at the top (at the outlet), the function is inverted!

Technical Specifications:

Measuring principle /	variable area measuring principle
Measurement /	
primary:	float position
secondary:	operating and standard volumetric flow
Inflow, outflow lines /	none
max. Pressure /	10 bar
max. Media temperature /	
without contact:	-5. . .+100°C
with contact:	-5. . .+65°C
max. Ambient temp. /	
without contact:	-20. . .+100°C
with contact:	-20. . .+65°C
Accuracy /	SM-10.1: Class 4.0 SM-10.2: Class 2.5 SM-10.3: Class 2.5 SM-10.4: Class 1.0
Materials /	
Top/bottom fitting:	CrNi steel 1.4404 / 316 L or brass nickel-plated (Hastelloy ® optional)
Measuring tube:	borosilicate glass
Float (ball shape):	CrNi steel 1.4404 / 316 L (glass, POM, titanium, Hastelloy® C4 optional)
Float (cone shape):	CrNi steel 1.4404 / 316 L, alu, (PP)
Valve:	CrNi steel 1.4571 / 316 Ti
Valve spindle:	CrNi steel 1.4404 / 316 L
Gaskets:	PTFE / FPM (PTFE / FFKM optional)
Protective cover:	polycarbonate

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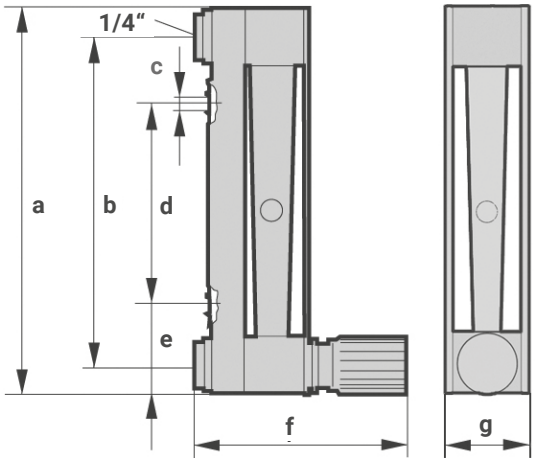
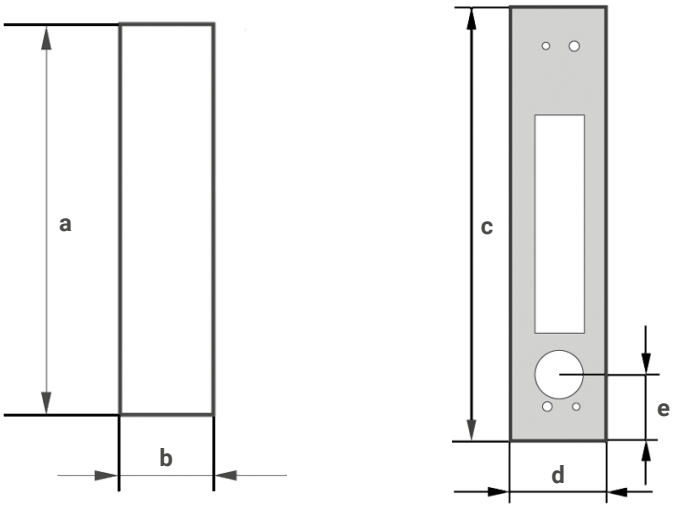
Dimensions in mm:



Version	a	b ± 0,25	c	d	e	f ca.	g	weight (kg)
SM-10.1	111	90	4.3	45	33	82	28	0.4
SM-10.2	146	125	4.3	80	33	82	28	0.5
SM-10.3	196	175	4.3	130	33	82	28	0.6
SM-10.4	346	325	4.3	280	33	82	28	0.7

Dimensions of control-panel cutout and faceplate:



Version	a	b	c	d	e
SM-10.1	128	32	145	40	27.5
SM-10.2	163	32	180	40	27.5
SM-10.3	213	32	230	40	27.5
SM-10.4	363	32	380	40	27.5

Operating ranges Water and Contact option:

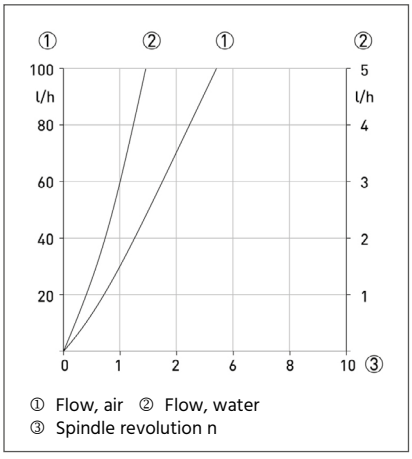
Operating range no.	Operating range l/h water	SM-10.1	Contact option	SM-10.2	Contact option	SM-10.3	Contact option	SM-10.4	Contact option
W01	0,04. . .0,4	-	-	-	-	-	-	$x^{2\,(1)}$	-
W02	0,063. . .0,63	-	-	-	-	-	-	x^2	-
W03	0,1. . .1	-	-	-	-	-	-	x^2	-
W04	0,16. . .1,6	-	-	-	-	-	-	x^2	A
W05	0,25. . .2,5	x	A	x	A	-	-	x^2	A
W06	0,4. . .4	-	-	-	-	-	-	x^2	A
W07	0,5. . .5	x	B	x	B	x	B	-	-
W08	0,63. . .6,3	-	-	-	-	-	-	x^2	A
W09	1. . .10	-	-	-	-	-	-	x^2	A
W10	1,2. . .12	x	B	x	B	x	B	-	-
W11	1,6. . .16	-	-	-	-	-	-	x^2	B
W12	2,5. . .25	x	B	x	B	x	B	x^2	B
W13	4. . .40	x	B	x	B	x	B	x^2	-
W14	6. . .60	x	B	x	B	x	B	-	-
W15	6,3. . .63	-	-	-	-	-	-	x^2	-
W16	10. . .100	x	B (min.)	x	B (min.)	x	B (min.)	x^2	-
W17	12. . .120	x	-	x	B (min.)	-	-	-	-
W18	16. . .160	x	-	x	B (min.)	-	-	-	-

x = available – = not available (1) = reduced accuray: 2.5 %
Contacts: The contact version is determined by the operating range.
(min.) = contact can be used as Min.-Contact only.

Float form: X =  X^1 =  X^2 = 

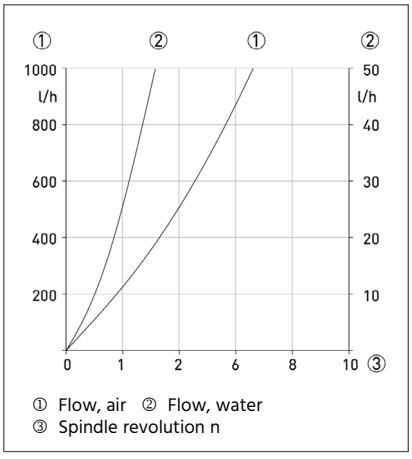
Valve characteristics:

Spindle Ø 1.0 mm



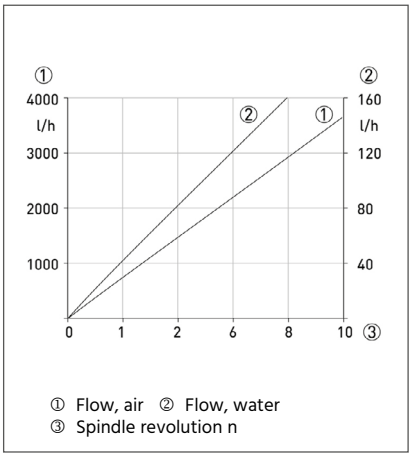
① Flow, air ② Flow, water
③ Spindle revolution n

Spindle Ø 2.5 mm



① Flow, air ② Flow, water
③ Spindle revolution n

Spindle Ø 4.5 mm



① Flow, air ② Flow, water
③ Spindle revolution n

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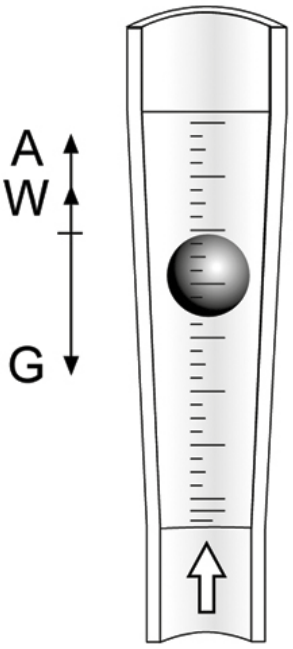
Operating ranges Air and Contact option:

Operating range no.	Operating range Nl/h air, 20°C, 1,2 bar abs.	SM-10.1	Contact option	SM-10.2	Contact option	SM-10.3	Contact option	SM-10.4	Contact option
L01	0,5. . .5	x[1]	A	x[1]	A	-	-	-	-
L02	0,8. . .8	x[1]	A	x[1]	A	-	-	-	-
L03	1,6. . .16	x	A	x	A	x[1]	A	x[2]	-
L04	2,5. . .25	-	-	-	-	-	-	x[2]	-
L05	4. . .40	x	A	x	A	x	A	x[2]	-
L06	6. . .60	x	A	x	A	x	B	x[2]	A
L07	9. . .90	-	-	-	-	-	-	x[2]	A
L08	10. . .100	x	B	x	B	x	B	-	-
L09	14. . .140	-	-	-	-	-	-	x[2]	A
L10	20. . .200	-	-	-	-	-	-	x[2]	A
L11	25. . .250	x	B	x	B	x	B	-	-
L12	30. . .300	-	-	-	-	-	-	x[2]	A
L13	50. . .500	x	B	x	B	x	B	x[2]	B
L14	80. . .800	x	B	x	B	x	B	x[2]	B
L15	100. . .1000	-	-	x	B	-	-	-	-
L16	120. . .1200	x	B (min.)	-	-	-	-	x[2]	-
L17	180. . .1800	-	-	x	B	-	-	-	-
L18	200. . .2000	-	-	-	-	-	-	x[2]	-
L19	240. . .2400	-	-	x	B	-	-	-	-
L20	300. . .3000	-	-	x	B (min.)	-	-	x[2]	-
L21	400. . .4000	-	-	x	B (min.)	-	-	-	-
L22	500. . .5000	-	-	x	B (min.)	-	-	-	-



Operating principle:

The flowmeter operates on the float measuring principle. The float adjusts itself so that the buoyancy force A, acting on it, the form drag W and its weight G are in balance:

G = A + W.

The height of the float is read on the scale of the measuring glass and indicates the flow rate. The top edge of the float marks the reading line for flow values.

Valve spindle	max. Flowrate		Valve characteristic value
	Water (20°C)	Air (20°C, 1.013 bar)	Cv
Ø [mm]	**[l/h]**	**[Nl/h]**	**[m³/h]**
1.0	5	100	0.018
2.5	50	1000	0.150
4.5	160	4300	0.480

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SM-12N

Conical Glass Flowmeter as per the Variable Area Principle

Features

/ For fluids and gases

/ Wide range of measuring

/ Easy to read scale

/ Low pressure drop

/ Turnable splinter shield

/ Optional limit switch

Description:

A float made of plastic or metal gets lifted by a fluid flowing vertically through a conical glass tube and set into rotation. Its upward movement stops at a point where the gravitational and dynamic forces become equal against each other. The body's position in the cone, therefore, depends of the flow with the result that the volume of flow can be read from the scale engraved on the sight glass.

Application:

Six different sight glass geometries and four different float materials allow a wide range of measuring with the SM-12N for all types of fluids and gases which are compatible with material being used. This data sheet provides an overview of possibilities for water and air at atmospheric state. Please ask us for different media, pressures or temperatures. The SM-12N series of variable area flowmeters is deployed wherever a volume of flow needs to be displayed without electrical means. Specially manufactured floats produce a negligible pressure drop. Often the advantage is that the characteristics of the material being measured can be assessed visually through the glass tube.

Technical Specifications:

Materials /

Process conn.:	AISI 316L - st. steel 1.4404
Housing:	AISI 304 - st. steel 1.4301
Nut:	AISI 316 - st. steel 1.4401 (or galvanized steel)
Stoppers:	PFA (tube L6, L7) PVDF, AISI 316L (tube P0-P4)
Measuring cone:	Borosilicate glass
Float: (see table 1+2)	Titan, PVDF (tube L6, L7) PTFE, PVDF (FDA conform), AISI 316Ti (1.4571) (tube P0-P4)
Sealing:	NBR (standard) FKM, EPDM (on request)

Pressure /

Measuring tube:	L6; L7	P0; P1	P2	P4
P_{max} [bar]:	16	10	8	6

Temperature /	-25. . .+100°C
Mounting length /	375 mm (thread, clamp), 425 mm (flange)
Weight /	1.7. . .7.1 kg (see Table 4)
Mounting position /	vertical, flow from bottom
Operating ranges /	0,002 l/h to 10 m^3/h water (20°C) 0,1 l/h to 160 m^3/h air (20°C, 1 bar abs.)
Range /	10:1 for P measuring tubes 20:1 for L measuring tubes
Accuracy / **(as per VDI 3513)**	Class 2.5 for tube L613-L623 Class 1.6 for tube L624-L747 Class 1.6 for tube P051-P471

Electrical Specifications:

Limit contact /	REED, bistable (potential-free)
Voltage /	230 V max.
Switching current /	2 A max.
Switching load /	40 VA or 40 W
Temperature /	-10. . .+70°C
Protection class /	IP65
Self-capacity /	0 nF
Self-inductivity /	0 mH
Connecting cable /	LIYY 2 x 0,34 mm^2, 1 m long
Housing /	Polystyrene
Weight /	35 g

Versions:

Operating range code: To determine the operating range code, the desired operating range is ascertained in the relevant tables (Table 1 for water and fluids; Table 2 for air and gases) and the code is determined according to the measuring tube, the float and the other listed criteria. For example, the code [P]-[0]-[51]-[SS]-[0]-[3]-[N] indicates the operating range of 10 to 100 l/h water, a float in stainless steel 1.4571 without preparation for a limit contact, this means, without magnets in the float.

Process connection: G female thread, NPT female thread, EN and ASME flanges in stainless steel are available as variants for the connection. The table 3 (Model specification) provides information as to which measuring tube can be fitted with which connection.

Valve: A number of device variants can be equipped with a regulating valve. Optionally, the valve can be made of brass or stainless steel. Depending on the version, the valve can be mounted at the inlet or outlet. The table 3 (Model specification) provides information as to which measuring tube can be combined with which valve. The valves are connected to the flowmeter on site.

Limit contact: All type P measuring tubes can be equipped with REED contacts which require a magnetic float (the operating range code takes this into regard). Optionally, MIN contacts (normally closed) or MAX contacts (normally open) are available.

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Table 1: Water/Fluids

Flow table		Operating range code (measuring tube and float combination)						
Water / Fluids 20°C		Measuring Tube			Float			
		-x	x	xx	-xx	x	x	x
max. Flow [l/h]	pressure drop *) [mbar]	Length Code	Diameter Code	Meas. tube conus Code	Material Code	Diameter Code	Flow ID Code	Insertion Code
0.025	1	L	6	13	TT	A 1)	L	N
0.04	1	L	6	14				
0.63	2	L	6	17				
0.1	2	L	6	21				
0.16	3	L	6	22				
0.25	4	L	6	23				
0.4	1	L	6	24	TT; PD	B	L	
0.63	1	L	6	27				
1	2	L	6	31				
1.6	3	L	6	32				
2.5	4	L	6	33				
4	2	L	7	34		C	L	
6.3	2	L	7	37				
10	3	L	7	41				
16	4	L	7	42				
25	5	L	7	43				
40	5	L	7	44		D	L	
63	10	L	7	47				
63	10	P	0	51	PD	0	2	M
100	16	P	0	52				
100	16	P	0	51	SS		3	M 2); N
160	24	P	0	52				
160	15	P	1	53	PD	1	2	M
250	16	P	1	54				
400	18	P	1	57				
630	26	P	1	61				
250	15	P	1	53	SS		3	M 2); N
400	16	P	1	54				
630	18	P	1	57				
1000	26	P	1	61				
1000	11	P	2	62	PD	2	2	M
1600	13	P	2	63				
1600	26	P	2	62	SS		3	M 2); N
2500	30	P	2	63				
2500	16	P	4	64	PD	4	2	M
4000	18	P	4	67				
6300	21	P	4	71				
4000	40	P	4	64	SS		3	M 2); N
6300	44	P	4	67				
10000	53	P	4	71				

Operating range Code		[ ]-	[ ]-	[ ]-	[ ]-	[ ]-	[ ]-	[ ]-
Tube length (Type)	300 mm	L						
	300 mm	P						
Tube diameter	10. . .81 mm		X					
Tube cone				XX				
Float material	st. Steel				SS			
	Titanium				TT			
	PTFE				PF			
	PVDF				PD			
Float Ø	1.6. . .54 mm					X		
Flow ID	for Fluids						L	
	for Water						2	
	for Water						3	
Float insertion	w/o Magnet							N
	with Magnet							M 2)

*) The specified pressure drop is merely a standard value and may be different depending on the diameter used.
1) Max. viscosity 2 mPas*s
2) For option limit switch

Table 2: Air/Gas

Flow table		Operating range code (measuring tube and float combination)						
Air / Gas 20°C, 1 bar abs.		Measuring Tube			Float			
		-x	x	xx	-xx	x	x	x
max. Flow [l/h]	pressure drop *) [mbar]	Length Code	Diameter Code	Meas. tube conus Code	Material Code	Diameter Code	Flow ID Code	Insertion Code
1.9	1	L	6	13	TT	A	G	N
3	1	L	6	14				
4.4	2	L	6	17				
6.5	2	L	6	21				
10	3	L	6	22				
14	4	L	6	23				
23	2	L	6	24	PD; TT	B	G	
33	2	L	6	27				
50	2	L	6	31				
70	3	L	6	32				
100	4	L	6	33				
180	3	L	7	34		C	G	
250	3	L	7	37				
400	3	L	7	41				
630	4	L	7	42				
1000	5	L	7	43				
1600	5	L	7	44		D	G	
2400	10	L	7	47				
1600	4	P	0	51	PF	0	6	
2500	6	P	0	52				
2400	8	P	0	51	PD	0	7	M 1)
3800	11	P	0	52				
6000	6	P	1	53	PD	1	7	M 1)
9300	7	P	1	54				
14500	8	P	1	57				
23000	10	P	1	61				
400	5	P	1	53	PF	1	6	N
6300	5	P	1	54				
10000	6	P	1	57				
16000	8	P	1	61				
35000	11	P	2	62	PD	2	7	M 1)
55000	13	P	2	63				
25000	8	P	2	62	PF	2	6	N
40000	10	P	2	63				
88000	29	P	4	64	PD	4	7	M 1)
140000	32	P	4	67				
220000	34	P	4	71				
63000	13	P	4	64	PF	4	6	N
100000	14	P	4	67				
160000	17	P	4	71				

Operating range Code		[ ]-	[ ]-	[ ]-	[ ]-	[ ]-	[ ]-	[ ]-
Tube length (Type)	300 mm	L						
	300 mm	P						
Tueb diameter	10. . .81 mm		X					
Tueb cone				XX				
Float material	Titanium				TT			
	PTFE				PF			
	PVDF				PD			
Float diameter Ø	1.6. . .54 mm					X		
Flow ID	for Gas						G	
	for Air						6	
	for Air						7	
Float insertion	w/o Magnet							N
	with Magnet							M 1)

*) The specified pressure drop is merely a standard value and may be different depending on the diameter used.
1) For option limit switch

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Ordering Codes:

Order number	SM-12N.	[]-[]-[]-[]-[]-[]-[].	1.	1.	1.	0.	0.	0

SM-12N Variable Area Flowmeter with Conical Glass

Operating range code from Table 1 or Table 2:

Process connection /
1 = female thread G (Code G0)
2 = female thread NPT (Code T0)
3 = flange EN-1092 B1 PN40 (Code D4)
4 = flange ASME B16.5 150 lbs (Code A1)
5 = on request: Clamp ISO 2852 (Code S4)

Process connection material /
1 = AISI 316L - stainless steel 1.4404 (Code SS)

Armature material /
1 = AISI 304 - stainless steel1.4301 (Code SS)

Valve /
0 = without valve (Code NNN)
1 = with valve, brass housing (Code VM) (1)
2 = with valve, stainless steel housing 1.4571 (Code VA) (1)

Limit contact /
0 = without contact
1 = MIN contact (NC, opening when the float reachs the setpoint) (2)
2 = MAX contact (NO, closing when the float reachs the setpoint) (2)

Options (multiple specifications possible) /
0 = none
1 = with isolated switching amplifier for limit contact 24 VDC
2 = with isolated switching amplifier for limit contact 230 VAC
3 = oil and grease free for applications with oxygen
4 = with flow table for conversion

(1) The valves are connected to the flowmeter on site (not for FDA). Other restrictions see table 3 (model specification).
(2) Only for tube P0 to P4 and float insertion code M (with magnet)

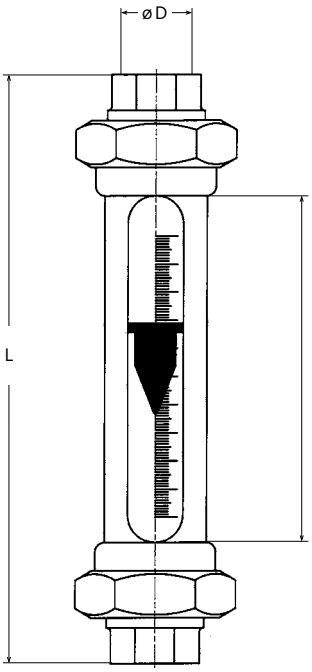
Table 3: Model specification

SM-12N without valve	Process connection				Connection material	Armature material	Valve	Measuring tube (length + diameter)
	Female thread		Flange					
	G	NPT	EN 1092-2 B1 PN40	ASME B16.5 150 lbs				
Diameter	Code	Code	Code	Code	Code	Code	Code	Code
1/2“	G0	T0	D4	A1	SS	SS	NNN	L6; L7; P0; P1
3/4“	G0	T0	-	-	SS	SS	NNN	L6; L7; P0; P1
1“	G0	T0	D4	A1	SS	SS	NNN	L6; L7; P0; P1; P2
1 1/2“	G0	T0	D4	A1	SS	SS	NNN	P2; P4
2“	-	-	D4	A1	SS	SS	NNN	P2; P4
2“	G0	T0	-	-	SS	SS	NNN	P4
2 1/2“	G0	T0	-	-	SS	SS	NNN	P4

SM-12N with valve	Process connection				Connection material	Armature material	Valve	Measuring tube (length + diameter)
	Female thread		Flange					
	G	NPT	EN 1092-2 B1 PN40	ASME B16.5 150 lbs				
Diameter	Code	Code	Code	Code	Code	Code	Code	Code
1/2“	G0	-	-	-	SS	SS	VM / VA	L6; L7; P0
1“	G0	-	-	-	SS	SS	VM / VA	P1
1 1/2“	G0	-	-	-	SS	SS	VM / VA	P2

Table 4: Installation lengths and weights

Conn. diameter	Process connection	Measuring tube	Length L [mm]	Weight [kg]
DN 15 (1/2“)	Female thread	L6; L7; P0; P1	375	1.7
	Clamp		375	1.9
	Flange		425	2.5
DN 20 (3/4“)	Female thread		375	1.7
DN 25 (1“)	Female thread	L6; L7; P0; P1	375	1.7
		P2		2.6
	Clamp	L6; L7; P0; P1		2.0
		P2		2.8
	Flange	L6; L7; P0; P1	425	3.3
		P2		3.9
DN 40 (1 1/2“)	Female thread	P2	375	2.6
		P4		7.1
	Flange	P2	425	5.2
		P4		8.7
DN 50 (2“)	Female thread	P4	375	7.1
	Flange	P2	425	6.6
		P4		11.1
DN 65 (2 1/2“)	Female thread	P4	375	7.1



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SM-15

Plastic Flowmeters as per the Variable Area Principle

Description:

The SM-15 series of flowmeters operates according to the proven variable area principle. The float gets lifted by the flowing medium and indicates the flow with its upper edge on the scale attached to the device. If floats with integrated magnets are used, optionally, alarm contacts or a measuring transmitter can be attached to the device. All devices possess a male thread on the measuring tube and are additionally equipped with standard PVC adhesive sleeves. As an option, also female threaded fittings made of PVC, PP, brass or stainless steel can be supplied.

Application:

Due to a wide variety of materials and easily interchangeable measurement scales, the SM-15 series plastic flowmeters can be deployed for most of media including hostile media. The main areas of application are water treatment, effluent technology, chemical and food-processing industries and many others.

Features

/ For every industrial application
/ For fluid and gaseous media
/ Simple and robust design with high operational safety
/ PVC, PA, PSU and PVDF versions
/ Low pressure drop
/ Easy to assemble
/ High resolution scale
/ Optional alarm contacts and analogue output

Technical Specifications:

Materials /

Measuring tube:	**PVC-U;** transparent **Polyamide;** transparent, with heavily reduced humidity absorption **Polysulfon;** transparent **PVDF;** opaque (yellowish-white)
Float:	PVDF, optional PVDF with integrated magnet (>1% lead of the REACH candidate list)
Seals:	EPDM, optional FPM
Tube connections:	PVC, optional PP, brass, st. steel

max. Pressure /

PVC:	10 bar at +20°C, 1 bar at +60°C
Polyamide:	10 bar at +30°C, 1 bar at +75°C
Polysulphone:	10 bar at +40°C, 1 bar at +100°C
PVDF:	10 bar at +40°C, 1 bar at +110°C

max. Temperature without joints at 1 bar /

PVC:	+60°C
Polyamide:	+75°C
Polysulphone:	+100°C
PVDF:	+110°C

max. Temperature with joints made of /

PVC:	+60°C
PP:	as per temperature parameters for the relevant measuring tube, but max. +80°C
Brass, st. steel:	as per temperature parameters for the relevant measuring tube

Mounting position /	vertical, flow from bottom to top
Assembly /	with moderation line 5-7 x DN before and after the device
Accuracy /	Cl. 4 as per VDI/VDE 3513, Bl. 2

Accessories /

Limit value switch:	bistable contacts, NO-contact or NC-contact function
Analogue output:	Measuring device with integrated measuring transmitter, 4. . .20 mA

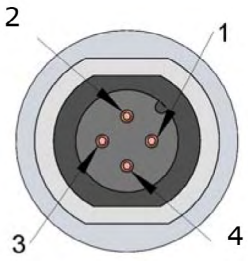
Attention: Limit contacts or measuring transmitters operate only in combination with a float with integrated magnet.

Meas. transmitter (optional):

Version /	reed chain
Housing material /	ABS
Assembly /	adjustable to dove-tail rail of the measuring tube
Supply voltage /	18. . .30 VDC
Analogue output signal /	4. . .20 mA, 2-wire (output can be calibrated/ set)
Electrical connection /	plug connection M12, 4-pole, with counter-plug angular 90°
Measuring length /	114 mm
Resolution /	3.5 mm
max. Operating temp. /	0. . .+70°C
max. Ambient temp. /	-20. . .+70°C
max. Ambient pressure /	atmospheric 0.8. . .1.1 bar
max. rel. Humidity /	20. . .85%
CE marking /	DIN EN 61326-1, DIN EN 55022/B
Protection class /	IP 65 (with plug)

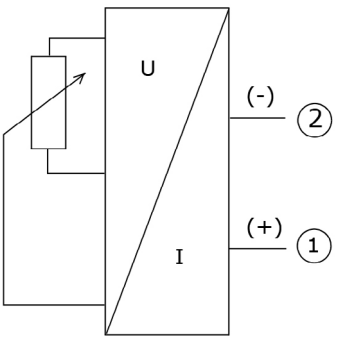
The optionally available measuring transmitter for the flowmeter SM-15 is clipped to the dove-tail rail mounted on the measuring tube. The unit comprises a reed chain, the respective evaluation and implementation. Thanks to the 2-wire technology voltage supply and output signal do not run separated from each other. The exact magnet field sensors of the receiver capture the height of the magnetic float and covert its position continually into a 4. . .20 mA output signal. This signal can be directly further processed.

M12 Plug



1. Signal (+)
2. Signal (-)
3. n.c.
4. n.c.

Wiring diagram



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Indicator Dimensions:

For the media water (in l/h) and air (in Nm^3/h) at relative operating pressures of 0, 1, 2 and 3 bar, standard scales are available.
For other media such as air at higher operating pressure, HCL (30%), NaOH (30%) and, for the units m^3/h, l/sec., l/min, USGPM or IGPM, special type scales can be supplied on request.

These supplementary special type scales can be attached later easily and reliably on the flowmeter. There is no need of any modifications to the measuring device.

For other media and/or operational conditions, special type scale can be offered on request.

For this, the following data is required:

- Medium
- Operating pressure
- Operating temperature
- Operating density
- Operating viscosity

Limit contacts (optional):

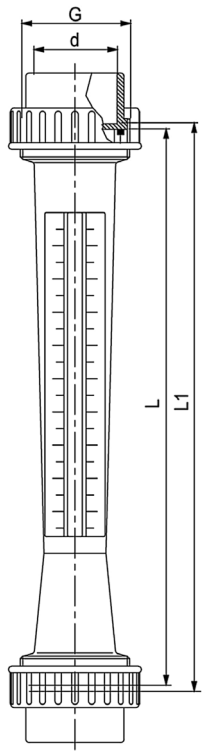
Version /	bistable reed contacts.
Contact function /	NO-contact or NC-contact for rising flow
Assembly /	adjustable to dove-tail rail of the measuring tube
Switching load /	max. 230 VAC, max. 0.5 A, max. 10 VA
Operating temp. /	0. . .+55°C
Hysteresis /	10 mm
Connection layout /	2-wire, irrespective of polarity

Operating Ranges (Table 1):

Measuring tube	Operating range					
		Water (l/h)	Air at +20°C (Nm^3/h) not for PVC measuring tubes			
			0 bar rel.	1 bar rel.	2 bar rel.	3 bar rel.
1	101	3. . .24	0.2. . .1	0.2. . .1.3	0.25. . .1.6	0.3. . .1.75
	102	5. . .60	0.2. . .2.5	0.4. . .3.2	0.2. . .3.8	0.3. . .4.4
	103	10. . .100	0.5. . .3.6	0.6. . .5	0.8. . .6	0.8. . .7
	104	25. . .250	0.5. . .9	1. . .13	1. . .16	1.5. . .18
2	201	5. . .50	0.4. . .2.8	0.4. . .3.2	0.5. . .4	0.5. . .4.5
	202	15. . .150	0.8. . .6.25	1. . .9	1. . .11	1.5. . .12
	203	25. . .250	0.9. . .9.5	1.5. . .13	2. . .17	2. . .20
	204	40. . .400	2. . .15	2. . .21	3. . .26	3. . .30
3	301	15. . .150	0.5. . .5.5	1. . .8.5	1. . .11	1. . .10.5
	302	40. . .400	2. . .14	2. . .20	3. . .26	4. . .30
	303	60. . .600	2.5. . .22	4. . .31	4. . .38	5. . .45
	304	100. . .1000	4. . .34	5. . .45	6. . .58	7.5. . .67.5
4	401	25. . .250	1. . .8	1.5. . .12	1.5. . .16	1.5. . .17
	402	40. . .400	2. . .14	2. . .20	3. . .26	3. . .30
	403	100. . .1000	4. . .34	4. . .46	5. . .55	6. . .66
	404	150. . .1500	5. . .50	6. . .70	7.5. . .90	7.5. . .100
6	603	60. . .600	2. . .21	3. . .30	4. . .36	4. . .40
	604	100. . .1000	3. . .34	5. . .50	5. . .60	5. . .70
	605	150. . .1500	5. . .50	5. . .70	7. . .85	8. . .100
	606	250. . .2500	7. . .80	10. . .110	10. . .140	15. . .160
	606a	200. . .2000	8. . .70	10. . .100	10. . .120	12. . .135
	606b	300. . .3000	10. . .100	14. . .125	20. . .160	20. . .190
	607	400. . .4000	14. . .125	20. . .170	15. . .220	20. . .250
	608	600. . .6000	20. . .200	30. . .280	30. . .380	40. . .400
	609	1000. . .10000	30. . .320	40. . .440	50. . .540	60. . .620
	610	1500. . .15000	50. . .500	80. . .800	80. . .800	102. . .880
	611	2500. . .25000	80. . .800	140. . .1240	140. . .1240	166. . .1400
	612	10000. . .50000	300. . .1600	600. . .2500	600. . .2500	700. . .2900

Types of connection (Table 2):

Measuring Tube



Measuring Tube (L in mm)	Pressure drop mbar Water / Air at 20°C	Range	AG (R)	Connecting joints					Conn. No.
				PVC-ad. sleeve standard (mm)	Female thread (G) PVC	PP	MS	VA	
					Material-No.				
			0	1	2	3	5	6	
1 **(165)**	3.3 / 4.8	101 102 103 104	3/4"	d: 16 DN: 10 L1: 171	3/8"	3/8"	3/8"	3/8"	**01**
2 **(170)**	2.5 / 4.3	201 202 203 204	1"	d: 20 DN: 15 L1: 176	1/2"	1/2"	1/2"	1/2"	**02**
3 **(185)**	6.1 / 8.3	301 302 303 304	1 1/4"	d: 25 DN: 20 L1: 191	3/4"	3/4"	3/4"	3/4"	**03**
4 **(200)**	6.1 / 8.3	401 402 403 404	1 1/2"	d: 32 DN: 25 L1: 206	1"	1"	1"	1"	**04**
6 **(350)**	12.3 / 15.9	603 604	1 1/2"	d: 32 DN: 25 L1: 356	1"	1"	1"	1"	**09**
	12.3 / 15.9	605 606	2"	d: 40 DN: 32 L1: 356	1 1/4"	1 1/4"	1 1/4"	1 1/4"	**10**
	12.3 / 15.9	606a 606b	2 1/4"	d: 50 DN: 40 L1: 356	1 1/2"	1 1/2"	1 1/2"	1 1/2"	**10b**
	22.2 / 27.1	607 608 609	2 3/4"	d: 63 DN: 50 L1: 356	2"	2"	2"	2"	**11**
	33.7 / 40	610 611 612	3 1/2"	d: 75 DN: 65 L1: 356	2 1/2"	2 1/2"	2 1/2"	2 1/2"	**12**

Other dimensions L and L1 for PVDF measuring tube

The connection code comprises Material and Connection No.

Example: PCV female thread G1 for measuring tube 6:
Material No. 2, Connection No. 09 · Connection code 209

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Ordering Codes:

Order number	SM-15.	2.	1.	202.	102.	1.	11

SM-15 Plastic Flowmeter

Material version (measuring tube) /
1 = PVC-U (only with scales for water)
2 = Polyamid
3 = Polysulfon
4 = PVDF

Scale /
1 = water
2 = air (0 bar rel.)
3 = air (1 bar rel.)
4 = air (2 bar rel.)
5 = air (3 bar rel.)
9 = Special scale type

Operating range /
101. . .612 = as per Table 1

Process connection /
as per Table 2

Float /
1 = PVDF (standard)
3 = PVDF with integrated magnet
(when using limit contacts or analogue output only)

Options /
00 = none
11 = 1 limit contact (NC-contact)
21 = 2 limit contacts (NC-contact)
12 = 1 limit contact (NO-contact)
22 = 2 limit contacts (NO-contact)
60 = measuring transmitter, 4. . .20 mA

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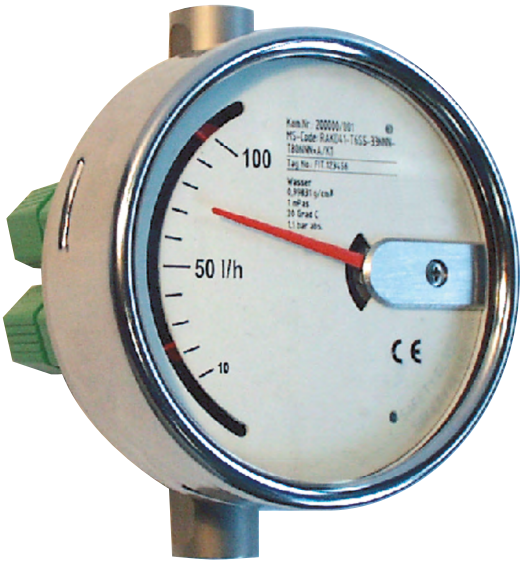
SM-20

Variable Area Flowmeter for Small Flow Volumes in Compact Design



Features

/ For fluids and gases

/ Operating pressures up to 400 bar

/ Operating temperatures up to 250°C

/ Scales for all operational conditions individually designed

/ Local display, MIN. MAX. contacts or analogue output

/ Measuring tube fully st. steel 1.4571

/ Optionally available with valve

Description:

The SM-20 series of flowmeters operates according to the proven variable area principle. The conical float is introduced into a cylindrical measuring tube. The flowing medium moves the float in the direction of flow. The movement of the float is magnetically transferred to a display unit situated outside the measuring tube. The display unit is provided with a scale that is designed to match the operational conditions. Additionally, it can also be equipped with contacts or an analogue output.

Application:

The SM-20 series of variable area flowmeters is intended for measuring and monitoring low-viscosity fluid or gaseous media, for example, in cooling systems for welding machines, laser and pipe installations, pump monitoring, compressors and so on. Due to the fact that for all wetted parts high quality stainless steel 1.4571 has been used, the device is excellently suited for even hostile media.

Technical Specifications:

Materials / wetted parts made of stainless steel 1.4571
housing made of 1.4301

max. Pressure / PN 100 (standard), PN 10, 40, as per ordering codes (higher pressures up to 400 bar on request)

max. Temperature /

- local display: -25. . .+250°C (+150°C with valve)
- with contacts: -25. . .+135°C
- with analogue output: -25. . .+ 65°C (lower temperatures on request)

Protection class / IP 66/67

Accuracy / ± 4% of operating range value

Options / Ex-approval, pulse output

Contact /

- Type: inductive (as per DIN EN 60947-5-6) SC2-NO
- Nominal voltage: 8 VDC
- Output signal: ≤ 1 mA or ≥ 3 mA
- Hysteresis: < 0.5mm

Analogue output /

- Supply: 14. . .30 VDC
- Output: 4. . .20 mA
- Load resistance: (U-14V) / 20 mA, 500Ω max.
- El. connection: quick connect QUICKON
- Pulse output: available on request
- Ex-Version: available on request

Ranges:

No. of operating range	Water 20°C - l/h	Air 20°C. 1.013 bar abs. Nl/h	Pressure drop mbar
1 (W/A)	0.1. . .1	4. . .40	6
2 (W/A)	0.16. . .1.6	6. . .60	6
3 (W/A)	0.25. . .2.5	10. . .100	6
4 (W/A)	0.4. . .4	15. . .150	6
5 (W/A)	0.6. . .6	20. . .200	6
6 (W/A)	1. . .10	32.5. . .325	8
7 (W/A)	1.6. . .16	50. . .500	8
8 (W/A)	2.5. . .25	80. . .800	8
9 (W/A)	4. . .40	140. . .1400	11
10 (W/A)	6. . .60	200. . .2000	11
11 (W/A)	10. . .100	325. . .3250	11
12 (W/A)	16. . .160	500. . .5000	13
13 (W/A)	25. . .250	800. . .8000	13

Attention: For versions without valve, operating ranges 12 and 13 come with connection joints 3/8" (Code 42...)

Ordering Codes:

Order number	SM-20.	41G4.	4W.	0.	1.	0

SM-20 Variable Area Flowmeter

Process connection /

41G4 =G 1/4 female, PN40
41G6 =G 1/4 female, PN100
41T4 = 1/4"NPT-female, PN40
41T6 = 1/4"NPT-female, PN100
53C4 = cutting ring joint 6 mm, PN40
53C6 = cutting ring joint 6 mm, PN100
53P1 = hose spout 6 mm, PN10
54C4 = cutting ring joint 8 mm, PN40
54C6 = cutting ring joint 8 mm, PN100
54P1 = hose spout 8 mm, PN10
55C4 = cutting ring joint 10 mm, PN40
55C6 = cutting ring joint 10 mm, PN100
56C4 = cutting ring joint 12 mm, PN40
56C6 = cutting ring joint 12 mm, PN100
01D4 = flanges DN15 PN40
02D4 = flanges DN25 PN40
01A1 = flanges ANSI 1/2", 150 lbs RF (only operating ranges 12 and 13 without valve)
02A1 = flanges ANSI 1", 150 lbs RF (only operating ranges 12 and 13 without valve)
01A2 = flanges ANSI 1/2", 300 lbs RF (only operating ranges 12 and 13 without valve)
02A2 = flanges ANSI 1", 300 lbs RF (only operating ranges 12 and 13 without valve)

Operating range, air (A) or water (W) /

1. . .13 = as per table, for example 4W (0.4. . .4 l/h water)
99 = special operating range

Valve /

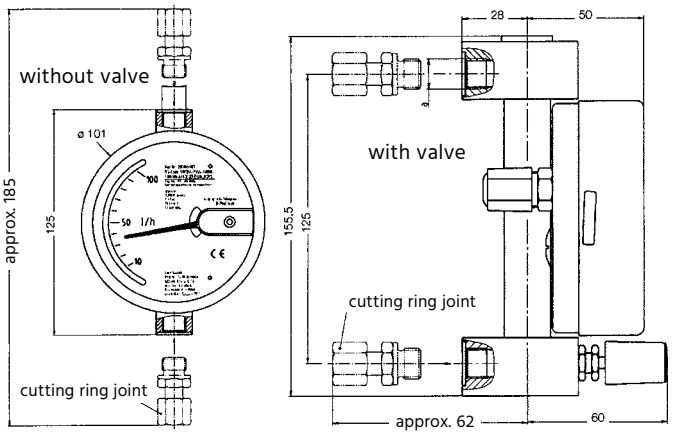
0 = none
1 = valve at inlet, valve seat silver
2 = valve at inlet, valve seat PCTFE
3 = valve at outlet, valve seat silver
4 = valve at outlet, valve seat PCTFE

Display unit /

1 = local indicator
2 = local indicator, 1 MIN contact
3 = local indicator, 1 MAX contact
4 = local indicator, 1 MIN, 1 MAX contact
5 = local indicator, analogue output 4. . .20 mA

Options /

0 = none
9 = please specify in detailed text



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SM-25

Variable Area Flowmeter with Flange Connection, Irrespective of Viscosity

Features

/ For fluids and gases

/ Operating pressures PN16, PN40, PN63, PN100 as standard, higher pressures up to 700 bar on request

/ Operating temperatures up to +370°C

/ Scales for all operational conditions, individually designed

/ Local display, MIN. MAX. contacts or analogue output

/ Measuring tube fully st. steel 1.4404

/ Optionally with PTFE lining

Description:

The SM-25 series of flowmeters operates according to the proven variable area principle. The float is introduced into a conical measuring tube where the medium's viscosity has nearly no effect on the float's movement. The flowing medium moves the float in the direction of flow. The movement of the float is magnetically transferred to a display unit situated outside the measuring tube. The display unit is provided with a scale that is designed to match the operational conditions. Additionally, it can also be equipped with contacts or an analogue output.

Application:

The SM-25 series of variable area flowmeters is intended for measuring and monitoring fluid or gaseous media of any type. Due to the fact that for all wetted parts high quality stainless steel 1.4404 has been used, the device is excellently suited for hostile media as well as for use in the food-processing industry (by using Tri-Clamp or milk tube joints).

How to order:

1. **Choose a version**
2. **Select the desired process connections from the Table „Process connections“**
3. **Select the operating range as per the Tables „Operating ranges“**
4. **Select the display component and the desired output signals**
5. **Determine the required options**

1. Versions

Depending on the medium the SM-25 series of flowmeters is available in fully stainless steel 1.4404 (SM-25.1) or with PTFE lining versions for all wetted parts (SM-25.2).

Other materials such as Monel, Hastelloy, tantalum are available on request (SM-25.9).

Technical specifications:

Measurable media /	fluids, steam and gases
Operating ranges /	see tables 3a and 3b
Ratio of op. range /	10 : 1
Accuracy /	
SM-25.1:	Class 1.6 (DN15 - DN100)
SM-25.1:	Class 2.5 (DN125 - DN150)
SM-25.2:	Class 2.5 (DN15 - DN100)
Process connection /	siehe Tabelle „Prozessanschlüsse“
max. Pressure /	see Table „Process connections“ (op. pressures up to 700 bar on request)
Operating temperature /	
SM-25.1:	-180. . .370°C
SM-25.2:	-80. . .130°C (Note max. operating temperatures of display unit and possible options)
Materials /	
SM-25.1:	all wetted parts are st. steel 1.4404, (AISI 316 L)
SM-25.2:	all wetted parts are st. steel 1.4404, (AISI 316 L) with PTFE coating
Mounting position /	vertical
Direction of flow /	from bottom
Mounting length /	see Table „Process connections“
Straight inlet /	
DN 15-65:	none
DN 80-100:	min. 5D
Protection class /	IP 66 with stainless steel housing IP 66 with aluminium housing IP 66/67 NEMA 4, 4x, 6 (not available for Ex d housings)

Ordering Codes:

Order no.	SM-25.	1.	121.	1.	321.	1.	0.	104

SM-25 Variable area flowmeter

Version /
1 = st. steel version
2 = wetted parts PTFE-coated

Process connection /
101. . .678 = process conn. as per Table 2
999 = special connection (please specify in detailed text)

Media /
1 = water / fluids
2 = air / gas
3 = steam (please specify operating conditions)

Operating range /
101. . .666 = operating range as per Table 3
999 = special range (please specify in detailed text)

Housing design /
0. . .2 = housing material as per Table 4a

Contact components /
0. . .5 = contacts as per Table 4b

Analogue output and Supply voltage /
1. No:
0. . .3 = analogue output as per Table 4c

2.-3. No:
00. . .13 = supply voltage as per Table 4d

Please specify optional specifications in detailed text /

Ordering details /

1. **Model number as per Ordering codes**
2. a. Name of the medium
   b. Temperature
   c. Pressure
   d. Viscosity
   e. Density
3. **For gases:** point of reference
4. **Options:**
   a. Model number as per list of options
   b. Customer-specific instructions

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2. Process Connections

DN	Process connection	Measuring-tube No.	Connection Code No.	Mount-length L (mm)
15 (½″)	Flange DN15 PN40 B1	1	101	250
	Flange ANSI ½″ 150 lbs.	1	102	250
	Flange ANSI ½″ 300 lbs.	1	103	250
	G ½″ female PN40	1	104	295
	½″ NPT female PN40	1	105	295
	Flange DN15 PN100 B2	2	206	250
	R ½″ female PN25	2	209	295
	½″ NPT female PN25	2	210	295
20 (¾″)	Flange DN20 PN40 B1	1	111	250
	Flange ANSI ¾″ 150 lbs.	1	112	250
	Flange ANSI ¾″ 300 lbs.	1	113	250
	R ¾″ female PN25	1	114	295
	¾″ NPT female PN25	1	115	295
	Flange ANSI ¾″, 150 lbs.	2	217	250
	Flange ANSI ¾″, 300 lbs.	2	218	250
	G ¾″ female PN40	2	219	295
	¾″ NPT female PN40	2	220	295
25 (1″)	Flange DN25 PN40 B1	1	121	250
	Flange ANSI 1″ 150 lbs.	1	122	250
	Flange ANSI 1″ 300 lbs.	1	123	250
	Thread socket DN25 PN40 (male) as per DIN 11851	1	126	275
	Tri-Clamp DN25 / 1	1	127	250
	Flange DN25 PN40 B1	2	228	250
	Flange ANSI 1″ 150 lbs.	2	229	250
	Flange ANSI 1″ 300 lbs.	2	230	250
	Thread socket DN25 PN40 (male) as per DIN 11851	2	233	275
	Tri-Clamp DN25 / 1″	2	234	250
	Flange DN25 PN40 B1	3	335	250
	Flange ANSI 1″, 150 lbs.	3	336	250
	Flange ANSI 1″, 300 lbs.	3	337	250
	R 1″ female PN16	3	338	310
	1″ NPT female PN16	3	339	310
32 (1 ¼″)	Flange DN32 PN40 B1	1	140	250
	Tri-Clamp DN32	1	141	250
	Flange DN32 PN40 B1	2	242	250
	Flange ANSI 1 ¼″ 150 lbs.	2	243	250
	Flange ANSI 1 ¼″ 300 lbs.	2	244	250
	Tri-Clamp DN32	2	245	250
	Flange ANSI 1 ¼″, 150 lbs.	3	347	250
	Flange ANSI 1 ¼″, 300 lbs.	3	348	250
	G 1 ¼″ female PN40	3	349	310
	1 ¼″ NPT female PN40	3	350	310

DN	Process connection	Measuring-tube No.	Connection Code No.	Mount-length L (mm)
40 (1 ½″)	Tri-Clamp DN40 / 1 ½″	1	151	250
	Tri-Clamp DN40 / 1 ½″	2	252	250
	Flange DN40 PN40 B1	3	353	250
	Flange ANSI 1 ½″, 150 lbs.	3	354	250
	Flange ANSI 1 ½″ 300 lbs.	3	355	250
50 (2″)	Flange DN50 PN40 B1	3	356	250
	Flange ANSI 2″ 150 lbs.	3	357	250
	Flange ANSI 2″ 300 lbs.	3	358	250
	Thread socket DN50 PN25 (male) as per DIN 11851	3	359	275
	Tri-Clamp DN50 / 2″	3	360	250
	Flange DN50 PN40 B1	4	461	250
	Flange ANSI 2″ 150 lbs.	4	462	250
	Flange ANSI 2″ 300 lbs.	4	463	250
	R 2″ female PN10	4	464	325
	2″ NPT female PN10	4	465	325
65 (2 ½″)	Thread socket DN65 PN25 (male) as per DIN 11851	4	466	275
	G 2 ½″ female PN40	4	467	325
	2 ½″ NPT female PN40	4	468	325
80 (3″)	Thread socket DN80 PN25 (male) as per DIN 11851	4	469	275
	Tri-Clamp DN65 / 3″	4	470	300
	Flange DN80 PN40 B1	5	571	250
	Flange ANSI 3″, 150 lbs.	5	572	250
	Flange ANSI 3″, 300 lbs.	5	573	260
	Flange DN100 PN16 B1	5	571a	
100 (4″)	Thread socket DN100 PN25 (male) as per DIN 11851	5	574	300
	Tri-Clamp DN100 / 4″	5	575	250
	Flange DN100 PN16 B1	6	676	250
	Flange DN100 PN40 B1	6	677	250
	Flange ANSI 4″, 150 lbs.	6	678	250
	Flange ANSI 4″, 300 lbs.	6	679	270

3. Operating ranges

a) SM-25.1 - Stainless Steel Version

		Water / Fluids (20°C)					Air / Gas (20°C, 1 bar abs.)			
Measuring tube Nr.	Operating range code	Operating range (m^3/h)	Meas. cone Nr.	Float Nr.	Pressure drop (mbar)	max. Viscosity (mPas)	Meas. cone (m^3/h)	Meas. cone Nr.	Float Nr.	Pressure drop (mbar)
1	101	**0.0025. . .0.025**	43	S0	40	10	**0.075. . .0.75**	43	S0	45
	102	**0.004. . .0.04**	44	S0	40	80	**0.12. . .1.2**	44	S0	45
	103	**0.0063. . .0.063**	47	S0	40	80	**0.18. . .1.8**	47	S0	45
	104	**0.01. . .0.1**	51	S0	40	80	**0.3. . .3**	51	S0	45
2	206	0.01. . .0.13	53	L1	12	50	**0.55. . .5.5**	53	M1	21
	207	**0.016. . .0.16**	53	M1	15	100	-	-	-	-
	208	0.022. . .0.22	54	L1	12	50	**0.65. . .6.5**	54	L1	13
	209	**0.025. . .0.25**	53	S1	40	100	0.9. . .9	54	M1	21
	210	0.032. . .0.32	57	L1	12	50	**1. . .10**	57	L1	13
	211	**0.04. . .0.4**	54	S1	40	50	1.4. . .14	57	M1	21
	212	0.05. . .0.5	61	L1	12	50	**1.6. . .16**	61	L1	13
	213	**0.063. . .0.63**	57	S1	40	50	2.2. . .22	61	M1	21
	214	-	-	-	-	-	**2.5. . .25**	62	L1	13
	214a	0.08. . .0.8	62	L1	12	50	-	-	-	-
	215	**0.1. . .1**	61	S1	40	100	3.4. . .34	62	M1	21
	216	0.1. . .1	62	M1	15	100	**5. . .50**	62	S1	45
	217	**0.16. . .1.6**	62	S1	40	100	-	-	-	-
	218	**0.22. . .2.2**	62	V1	45	50	-	-	-	-
3	319	0.13. . .1.3	63	L2	17	50	**4. . .40**	63	L2	19
	320	0.21. . .2.1	64	L2	17	50	5. . .50	63	M2	23
	321	**0.25. . .2.5**	63	S2	42	30	**6. . .60**	64	L2	19
	322	0.25. . .2.5	64	M2	17	10	**8.5. . .85**	64	M2	23
	323	**0.4. . .4**	64	S2	42	10	**12. . .120**	64	S2	47
	324	**0.6. . .6**	64	V2	43	50	-	-	-	-
4	425	0.32. . .3.2	67	L5	13	50	**10. . .100**	67	L5	16
	426	0.5. . .5	71	L5	13	50	13. . .130	67	M5	25
	427	**0.63. . .6.3**	67	S5	47	30	**16. . .160**	71	L5	16
	428	0.85. . .8.5	72	L5	13	30	**20. . .200**	71	M5	25
	429	**1. . .10**	71	S5	47	5	-	-	-	-
	430	-	-	-	-	-	25. . .250	72	L5	16
	431	1.6. . .16	72	S5	47	5	34. . .340	72	M5	25
	432	**2.5. . .25**	72	V5	63	5	50. . .500	72	S5	54
5	533	**2.5. . .25**	73	V8	60	10	**55. . .550**	73	L8	30
	534	**4. . .40**	74	V8	60	10	-	-	-	-
	535	**6.3. . .63**	77	V8	60	10	**85. . .850**	74	L8	30
	536	-	-	-	-	-	-	-	-	-
	537	-	-	-	-	-	140. . .1400	77	L8	30
6	638	**10. . .100**	81	11	70	10	-	-	-	-
6	639	**13. . .130**	82	11	70	10	-	-	-	-

Bold operating ranges are preferred.

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b) SM-25.2 - Wetted parts with PTFE-lining

		Water / Fluids (20°C)					Air / Gas (20°C, 1 bar abs.)			
Measuring tube Nr.	Operating range code	Operating range (m^3/h)	Meas. cone Nr.	Float Nr.	Pressure drop (mbar)	max. Viscosity (mPas)	Meas. cone (m^3/h)	Meas. cone Nr.	Float Nr.	Pressure drop (mbar)
2	250	0.01. . .0.1	51	A1	16	50	0.35. . .3.5	51	A1	20
	251	0.016. . .0.16	52	A1	16	50	0.5. . .5	52	A1	20
	252	0.025. . .0.25	53	A1	16	50	0.85. . .8.5	53	A1	20
	253	0.04. . .0.4	54	A1	16	50	1.3. . .13	54	A1	20
	254	0.063. . .0.63	57	A1	16	50	2. . .20	57	A1	20
	255	0.1. . .1	61	V1	18	50	3.4. . .34	61	V1	22
3	356	0.16. . .1.6	62	A2	20	30	5. . .50	62	A2	25
	357	0.25. . .2.5	63	A2	20	10	8.5. . .85	63	A2	25
	358	0.4. . .4	63	V2	22	50	-	-	-	-
4	459	0.4. . .4	64	A5	20	30	13. . .130	64	A5	25
	460	0.63. . .6.3	67	A5	20	30	20. . .200	67	A5	25
	461	1. . .10	71	A5	20	05	35. . .350	71	A5	25
	462	1.6. . .16	71	V5	22	10	-	-	-	-
5	563	1.6. . .16	72	V8	25	10	50. . .500	72	V8	27
	564	2.5. . .25	73	V8	25	10	85. . .850	73	V8	27
	565	4. . .40	74	V8	25	10	-	-	-	-
6	666	6.3. . .63	77	10	30	10	-	-	-	-

4. Display Unit

Basically, the display unit consists of a stainless steel or aluminium housing with an indicator magnetically coupled to the float. The scale may be designed for units of flow or in percentage. In the display unit, measuring transmitter and contact components can be mounted.

4a. Housing designs

Material	Code No.
st. steel 1.4301	0
Aluminium, coated yellow	2

4b. Contact components

Type of Contact	Code No.
none	0
1 min.-contact	1
1 max.-contact	2
1 min.-contact + 1 max.-contact	3
2 min.-contact	4
2 max.-contact	5

4c. Analogue outputs

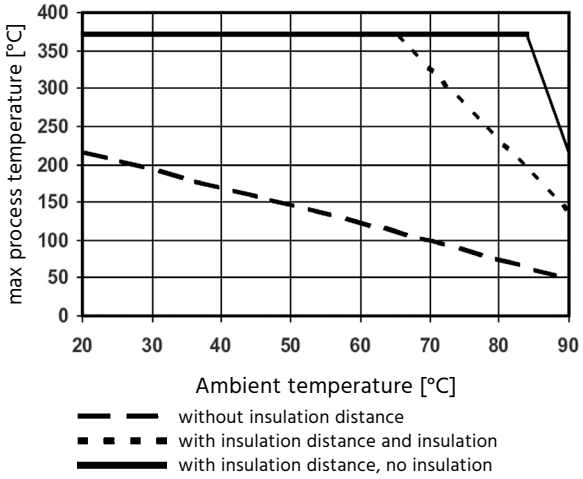
Type	Code No.
none	0
electrical measuring transmitter	1
electrical measuring transmitter (Ex)	2

4d. Supply voltage and output signal

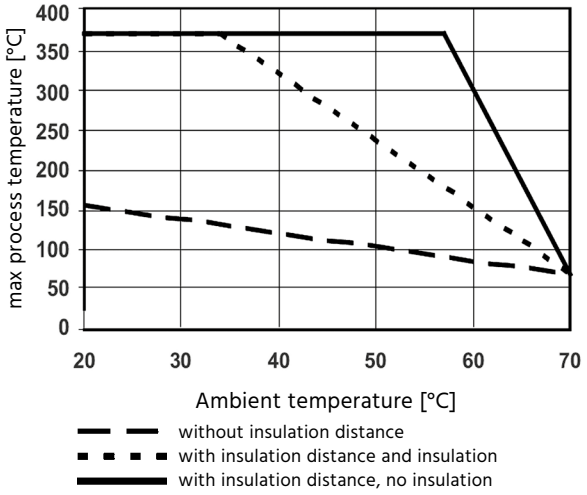
Type of Contact	Code No.
none	00
115 VAC, 0. . .20 mA, 4-wire	01
115 VAC, 4. . .20 mA, 4-wire	02
230 VAC, 0. . .20 mA, 4-wire	03
230 VAC, 4. . .20 mA, 4-wire	04
24 VDC, 0. . .20 mA, 3-wire	07
24 VDC, 4. . .20 mA, 2-wire	08
24 VDC, 4. . .20 mA, 3-wire	09

Temperature curves:
for metal versions, standard and Ex-i

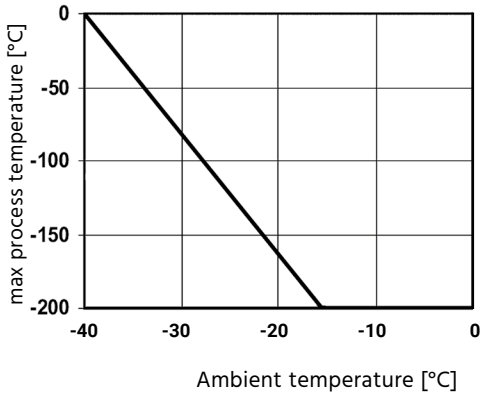
SM-25 – only with indicator



SM-25 – with limit switches
– with electronic transmitter



SM-25 – with limit switches
– with electronic transmitter



Technical Spec. (Display):

Indicator mechanical /

Media temp.:	-25. . .+110°C (for higher or lower operating temperatures from -80. . .+370°C order option „Insulation distance“)

Contacts /

Type:	inductive proximity switch SC3.5-NO as per DIN EN 60947-5-6 (NAMUR)
Media temp.:	-25. . .+120°C at T_{amb} = +60°C (outside this temperature range order option ‘Insulation distance”)
Nominal voltage:	8 VDC
Output signal:	≤ 1 mA or ≥ 3mA
Explosion prot.:	Ex ia IIC T6
Recomm. acc.:	isolated switch amplifier Type SE01 (see under ”Options”)

Electrical measuring transmitter /

Output signal:	0. . .20 mA, 4. . .20 mA
Display:	LCD, 8-digit (programmable for display of units of flow or as non-reversible total volume counter)
Auxiliary power:	see Table 4d
max. Load:	4-wire: ≤ 500 Ohm 2/3-wire: ≤ (U-14,0 V) / 20 mA, max. 500 Ω
Op. temperature:	-25. . .+70°C (outside this temperature range order option ‘Insulation distance”)
El. connection:	M16 x 1,5 or ½“ NPT

Intrinsically safe Electrical measuring transmitter /

Technical specifications like standard version, except:

Output signal:	4. . .20 mA
Op. temperature:	-25. . .+70°C (outside this temperature range order option ‘Insulation distance”)
Ex-protection:	Ex ia IIC T6 Gb acc. to Ex certificate
Recomm. acc.:	feeding device Type SE11 (see under ”Options”)
Pulse output:	on request

The temperature graphs are reference values for size DN100. They may be influenced negative by trapped heat, external heat sources or radiated heat and influenced positive for smaller sizes. Insulation means rock wool between tube aud indicator. Units with electronic transmitter can show the temperature of the internal transmitter on the display. Units with PTFE lining are usable up to 130°C. For units with exlosion proof certification the temperature limits according the certificate of conformity must be regarded. The minimum ambient temperature for indicators is -25°C (lower temperatures on request).

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5. Options:

5a. Insulation distance (SM-25.A):
For media temperatures outside the values specified under Technical specifications, an insulation distance of 95 mm is created between the measuring tube and display unit. With this the temperature resistance can be increased up to values as specified for the measuring tube.

5b. Attenuation (SM-25.D):
It is recommended to provide attenuation of the float for gas applications under the following conditions:

Float type	Operating pressure ≥
SM-25.D.1:	L 1 bar
SM-25.D.2:	M 5 bar
SM-25.D.3:	S 10 bar

(for SM-25.1 only (stainless steel)

5c. Heating:
Heating elements (steam cover) are meant for maintaining a certain media temperature in the measuring tube. Heating elements with 3 different process connections are available:

SM-25.H.1:	DIN-flange DN15 PN40
SM-25.H.2:	DIN-flange DN25 PN40
SM-25.H.3:	NPT 1/4" female thread

(see also Table 1, „Process connections")

5d. Oil and grease-free (SM-25.F):
For applications with oxygen the devices free of oil and grease can be supplied.

5e. Tests and certifications
on request

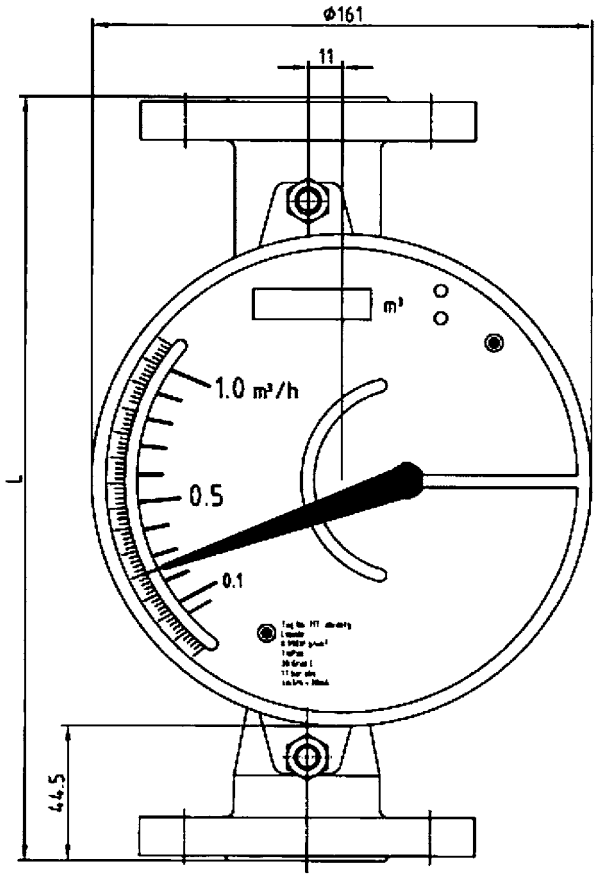
5f. Measuring point labels,
customer-specific scale labeling:
Please specify exact text for labels.

5g. Isolated switching amplifier (Type SE-01):
Version:
as per DIN EN 50227 (NAMUR)
Supply voltage output:
SE-21.1: 230VAC/DC, 1 channel, 1 change-over contact
SE-21.2: 230 VAC/DC, 2 chan., 2 change-over contact
SE-21.3: 24 VDC, 1 channel, 1 change-over contact
SE-21.4: 24 VDC, 2 channel, 2 change-over contact
Switching load:
max. 250 VAC, max. 2A
Control power circuit
intrinsically safe [EEx ia] IIC

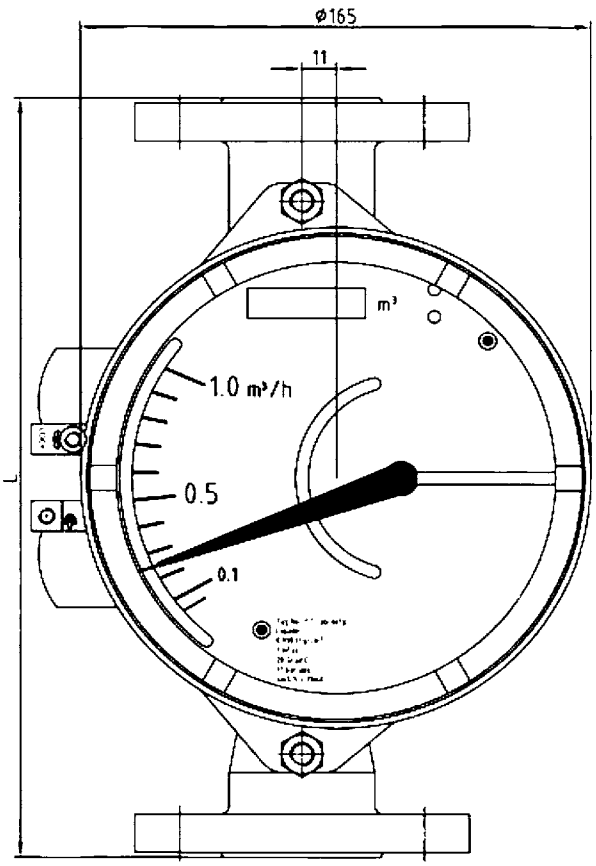
5h. Transm. power supply for intrinsically safe operation (Type SE-11):
Output:
0/4. . .20 mA, with galvanic
separation of inlet and outlet
Supply voltage:
SE-11.1: 230 VAC
SE-11.2: 24 VAC/DC
max. load:
750 Ohm
Control power circuit:
intrinsically safe [EEx ia] IIC

Dimensions in mm:

SM-25 – Housing Type 0 (st. steel)



SM-25 – Housing Type 2 (aluminium)



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SM-30

Variable Area Flowmeters for very low flow rates

Features

/ Indication without power supply

/ For fluids and gases

/ Stainless steel

/ High resistance to pressure and temperature

/ Compact design, no inlet and outlet sections

/ Optional: limit switch

Description:

The SM-30 flow meter works according to the proven float principle. The flowing medium moves from bottom to top to lift the float against gravity in a conical metal tube. The height of the float is a measure of the flow and can be read off directly.

Application:

Variable area flowmeters of the SM-30 series are mainly used to measure liquid and gaseous media. Due to their robust design, they are particularly suitable for difficult operating or environmental conditions.
The devices are particularly suitable for measuring small amounts of:
- Process or carrier gases
- Nitrogen, CO2 or other industrial gases
- Flushing media for measuring systems
- Air or water
- Chemicals and additives
- Lubricants, coolants and anti-corrosion agents

Technical Specification:

Measuring principle /	variable area measuring principle
Measurement /	
primary:	float position
secondary:	operating and standard volume flow, mass flow
Operating conditions	
max. Pressure /	130 bar
max. Test pressure PT /	202 bar
max. Media temperature /	
Standard version:	up to +150°C
HT version:	up to +200°C
Measurement accuracy /	
Max. permissible error :	3.0% of full scale range 4.0% of measured value according to VDI/VDE 3513-2 (q_G = 50%)
Measurement repeatability /	0,5%
Materials /	
Top/bottom fitting, cone:	stainless steel 1.4404 / 316 L
Lock srew:	stainless steel 1.4404 / 316 L
Float, standard:	stainless steel 1.4404 / 316 L or titanium
Dosing unit:	stainless steel 1.4571 / 316 Ti
Valve spindle:	stainless steel 1.4404 / 316 L
Gasket of lock srew:	PTFE
Gasket of dosing unit:	FPM/PTFE, PTFE, FFKM other on request
Housing:	die-cast aluminium with powder coating
Process connections /	
Standard:	1/4“ NPT female
Option:	G1/4“, Ermeto, Serto, Gyrolok, Swagelok, flanges, other on request

Elektrical Specification:

Electrical connection data for indicator

Cable gland /	M16 x 1,5
Terminal connection /	1,5 mm^2
Clamping range /	4,5. . .10 mm
Connection cable /	Ø 6,3 mm
Cable length /	approx. 1,7 m (other on request)

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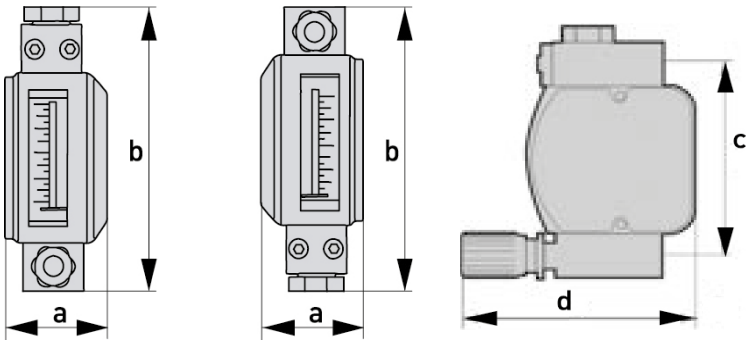
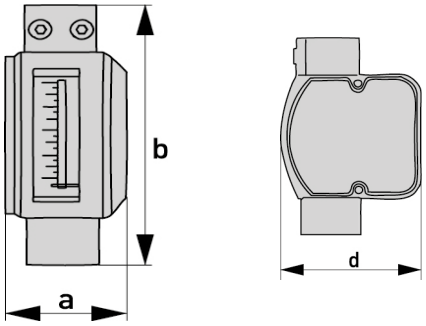
Dimensions in mm:

SM-30 with valve top/bottom and rear process connection

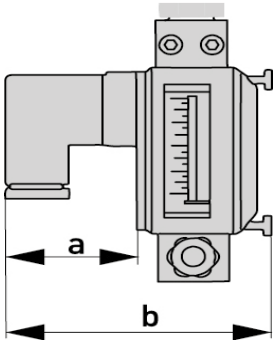


SM-30 without valve and vertical process connection

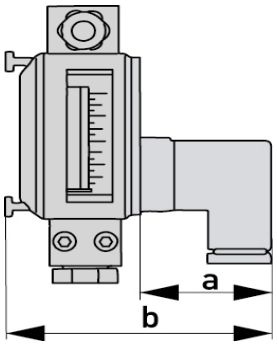


Version	a	b	c	d	Weight (kg)
SM-30 with valve	42	118	90	100	0,7
SM-30 without valve	42	110	-	75	0,6

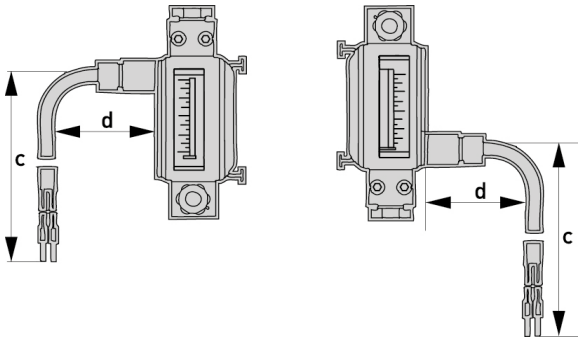
Version with limit switch with connector SM-30 with bottom valve / without valve



Version with limit switch with connector SM-30 with top valve



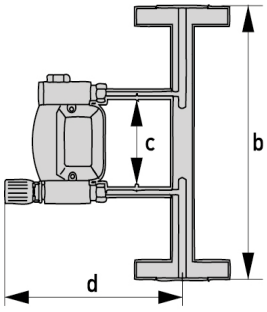
Version with limit switch with cable end SM-30 with bottom valve / without valve



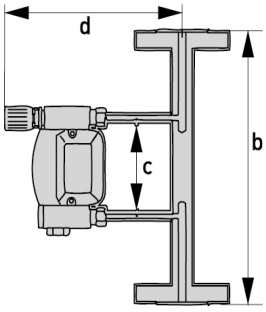
Version	a	b	c	d	Weight (kg)
SM-30 with valve	46	90	1500	50	0,7
SM-30 without valve	46	90	1500	50	0,6

Version with flange adapter

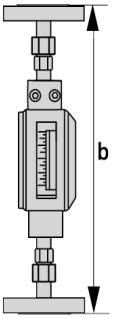
SM-30 with bottom valve



SM-30 with top valve



SM-30 without valve



Version	a	b	c	d
SM-30 with valve	-	250	90	195
SM-30 without valve	-	250	-	-

Extra weight for flange adapter dependent on pressure rating of flange: approx. 1,5. . .9 kg.

Ordering Codes:

Order-no.	SM-30.	2.	1.	1.	1.	L01.	1

SM-30
Variable Area Flowmeter

Version /
1 = without valve , vertical process connection
2 = with bottom valve, rear process connection
3 = with top valve, rear process connection
4 = with top valve, vertical flange connection
5 = with bottom valve, vertical flange connection

Contact /
1 = without
2 = with plug
3 = with cable end

Process connection /
1 = (standard) 1/4 NPT
2 = G1/4
3 = Ermeto
4 = Serto
5 = Gyrolok
6 = Swagelok
7 = flange adapter
8 = other process connections on request

Gasket material of the dosing unit /
1 = FPM/PTFE
2 = PTFE
3 = FFKM

Measuring range/
Water [l/h]
W01 = 0,15. . .1,5
W02 = 0,3. . .3
W03 = 0,5. . .5
W04 = 0,7. . .7
W05 = 1. . .10
W06 = 1,6. . .16
W07 = 2,5. . .25
W08 = 4. . .40
W09 = 6. . .60
W10 = 8. . .80
W11 = 10. . .100
Air [Nl/h]
L01 = 1,6. . .16
L02 = 2,5. . .25
L03 = 5. . .50
L04 = 7. . .70
L05 = 10. . .100
L06 = 15. . .150
L07 = 25. . .250
L08 = 40. . .400
L09 = 55. . .550
L10 = 80. . .800
L11 = 125. . .1250
L09 = 200. . .2000
L10 = 250. . .2500
L11 = 340. . .3400

Valve spindle /
1 = 1 mm (Measuring range: W01-W04 / L01-L06)
2 = 2,5 mm (Measuring range: W05-W10 / L07-L11)
3 = 4,5 mm (Measuring range: W11-W13 / L12-L15)

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DT-03

Calorimetric Flow Sensor in Compact Design with Optional Analogue Output

Features

/ No moving parts

/ Optionally with temperature output

/ Switch or transmitter

/ Mounting in T pieces of 3/8“ to 2“

/ Wetted stainless steel

Description:

The sensor system of the DT-03 series flow sensor is based on the calorimetric principle. A heated measuring resistance is mounted into a stainless steel sleeve in such a manner that the fluid carries the heat proportional to the inflow velocity. The heat output that must be fed to the sensor in order to maintain the resistance temperature constant is, therefore, a measure for the volume of flow. A second PT100 measuring resistance is located inside the sleeve within the flow to measure the temperature of the media. This will rule out temperature changes in the streaming fluid being interpreted erroneously as change of flow. The electronic components in the DT-03 receive information from the sensor about the flow and the temperature and convert them into a PNP or NPN switching output, a 0. . .10 V DC or 4. . .20 mA analogue output or an impulse output. At the 4-pole output plug of the DT-03 an analogue output and a switching output (on request as impulse output) are tapped that can be freely assigned ex factory to the parameters of volume and temperature.

Application:

The flow sensors of the DT-03 series are the logical consequence of Profimess‘ proven DT-01 and DT-02. Due to the new method of outputting flow and temperature also as analogue or impulse output and combining both the parameters, the application spectrum of the calorimetric technology has experienced a vast expansion in the technology of fluid measurement. The DT-03 sensors are used wherever flow and temperature of fluid media need to be tapped in narrow spaces and wherever it would be advantageous, due to the type of fluid, to use entirely stainless steel switches for the wetted parts without any moving components. In order to ensure maximum error sensitivity of the sensor, the DT-03 should be mounted for direction of flow from bottom to top as this will facilitate optimum ventilation even in extremely low flow speeds.

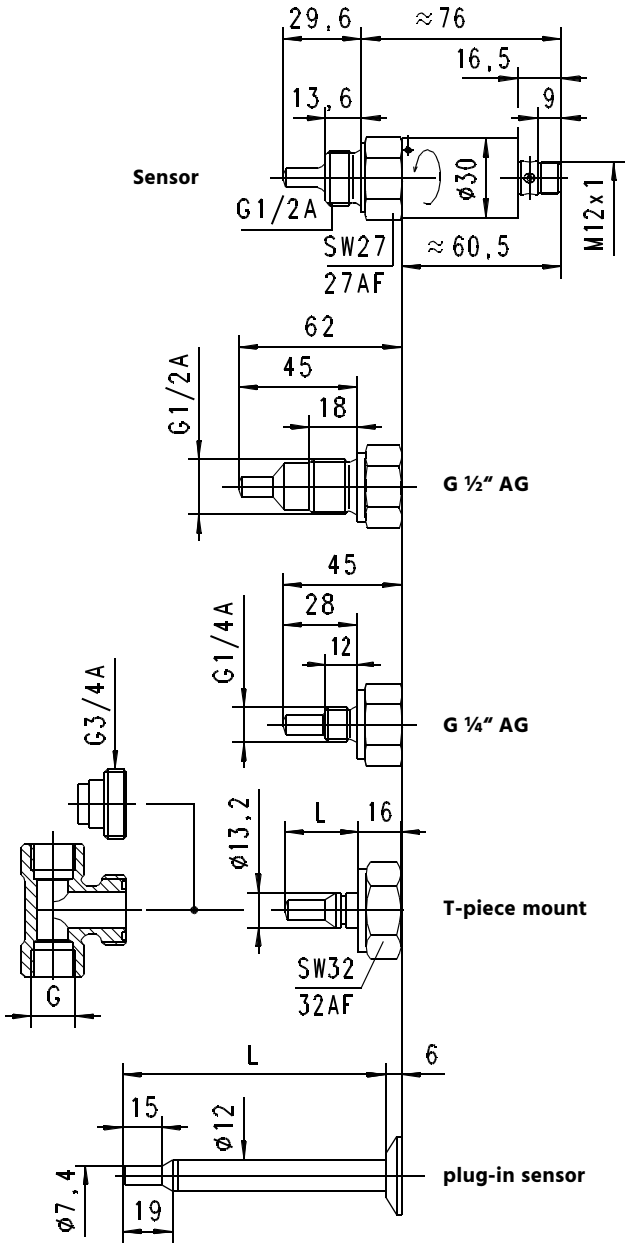
Technical Specifications:

Operating range velocity /	water 2. . .150 cm/s or 3. . .300 cm/s, oil on request
Accuracy /	± 10% set point value (tested on water with 10xD in inflow and outflow in rising tube)
Reproducibility /	± 1%
Switching hysteresis /	flow 4% set point, temp. approx. 2°C
Temperature gradient /	max. 4°C/s or rather 4 Kelvin/s
Op. range temp. /	0. . .70°C, 0. . .120°C with gooseneck
Storage temperature /	-20. . .+80°C
Materials /	wetted st. steel 1.4571, others 1.4305
Operating pressure /	max. 100 bar, 200 bar on request (if necessary, consider pressure level of T-piece)
Operating temp. /	0. . .70°C (electronics)
Weight /	approx. 200 g (standard version)
Assembly /	staved cross points to inflow
Programming the setpoints /	by means of magnet supplied along, the magnet is brought between 0.5 and 2 seconds to the marking on the label. The excrescent measuring value is stored as limit value, the LED changes to O.K. status. Longer or shorter magnetizing times than 0.5 or 2 seconds are ineffective (protection against external magnetic fields)

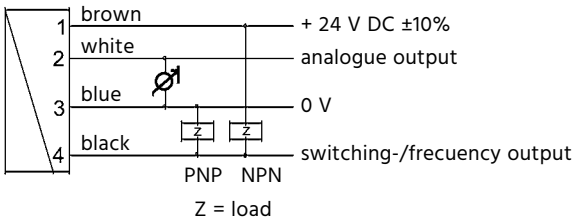
Electrical Specifications:

Power supply /	24 VDC ± 10%
Power consumption /	max. 100 mA
Connection /	round pin connector M12 x 1, 4-pole
Switching output /	Transistor output Push Pull, line short circuit and reverse polarity protected
Switching current /	max. 100 mA
As frequency output /	max. 2000 Hz
Analogue output /	4. . .20 mA max. load 500 Ohm or 0. . .10 VDC
Display /	yellow LED (ON = o.k., OFF = Alarm)
Setting /	through magnet
Protection class /	IP67

Dimensions in mm:



Electrical Connection:



Please use shielded cable, signal lines < 30m and power supply lines < 10m.

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Ordering Codes:

Order number	DT-03.	1.	1.	1.	1.	1.	3.	2.	2.	5

DT-03 Calorimetric Flowmeters and Switch

Connection size /
1 = G¼"-male
2 = G½"-male
3 = attachable sensor Ø 12 mm
4 = T-piece connector Ø 13,2 mm

Wetted material /
1 = stainless steel 1.4571

Sensor length /
0 = T-piece assembly (please specify nominal diameter of 3/8" to 2" and material in detailed text)
1 = 28 mm (G¼")
2 = 29.6 mm (G½")
3 = 45 mm (G½")
4 = plug-in sensor 50 mm
5 = plug-in sensor 70 mm
6 = plug-in sensor 100 mm
7 = plug-in sensor 150 mm
8 = plug-in sensor 200 mm

Analogue output /
0 = no analogue output
1 = current 4. . .20 mA
2 = voltage 0. . .10 VDC

Assignment for analogue output /
0 = no analogue output
1 = flow
2 = temperature

Switching output /
0 = no switching output
3 = PushPull (PNP and NPN)

Assignment for switching output /
0 = no switching output
1 = flow
2 = temperature

Switching signal /
0 = no switching output
1 = MIN switch
2 = MAX switch
3 = Frequency output

Options (multiple naming such as 3/5/6 possible) /
1 = special operating range for flow (max. 3 m/s)
2 = special operating range for temperature (max. 120°C, standard 70°C, min. -20°C, st. 0°C)
3 = Switch on delay from Alarm to O.K.
4 = Switch off delay from O.K. to Alarm
5 = Power-On-Delay (delay after switching on until the switching output becomes active)
6 = inverted switching output
7 = special hysteresis (standard 4% of full scale value)
8 = counter plug, M12x1, 4-pole

Please specify operating range full scale value, output frequency for impulse output and the setpoint in detailed text.

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SM-00

Impeller Flowmeter for Small Volumes of Fluid

Description:

The SM-00 is a universally applicable flowmeter for small to medium volumes of thin fluid. A rotor mounted on one side on a bearing pin is made to rotate by a flow obliquely directed through a nozzle where the rotor's blades are equipped with magnets. A Hall effect sensor mounted externally on the flow housing emits a small voltage impulse every time when one of the magnets passes by its front side. The electronics of the SM-00 are capable of receiving these impulses and translating them into an NPN Open-Collector rectangular signal that will be made available to the plug output.

Features

/ Arnite, Larton® G/40 or PVDF

/ Up to 100°C

/ Up to 20 bar

/ Wide choice of operating range

/ Excellent media resistance

Application:

The SM-00 is the ideal device especially for tapping small volumes of flow of chemically hostile fluids. The available material combinations are Arnite, Larton® G/40 and PVDF which can be deployed in many areas of the chemical industry. With its range of up to 100°C and 20 bar, for a plastic device the limits in regard to pressure and temperature are very outstretched and the Open-Collector signal in NPN form can be evaluated by any common control device. The available connection threads are G1/4" female thread as well as G1/2" male thread where the user has the option to place both the inlet and the outlet of flow on a single side of the SM-00 or, to have, preferably, one connection on the right side and another on the left side of the flowmeter.

The unique impeller bearing of the SM-00 ensures a long life for the SM-00. As against many other devices available in the market, the rotor is not mounted on both sides but it practically „floats" during operation over a one-sided bearing pin. Thus, the design of the device ensures durability and, consequently, maximum possible rotational speed of the impeller.

Technical Specifications:

Material /

SM-00.1:	Housing made of PBT 35%GF (Arnite) bearing pin made of stainless steel 1.4305 (1.4571 optional) O-Ring made of silicon (Viton or EPDM optional) rotor made of PVDF magnets made of ceramic Sr Fe O
SM-00.2:	Housing made of PPS 40%GF (Larton® G/40) bearing pin made of stainless steel 1.4305 (1.4571 optional) O-Ring made of silicon (Viton or EPDM optional) rotor made of PVDF magnets made of ceramic Sr Fe O
SM-00.3.1:	Housing made of PVDF Bearing pin made of st. steel 1.4305 (1.4571 or PCTFE (nozzle PTFE) optional) O-Ring made of Viton (EPDM optional) Rotor made of PVDF Magnets made of ceramic Sr Fe O
SM-00.3.(2. . .3):	Housing made of PVDF Bearing pin made of PCTFE O-Ring made of Viton (EPDM optional) Rotor made of PVDF magnets made of ceramic Sr Fe O (not wetted)
Flow volume /	depends on the version and nozzle, see Tables 1 and 2
Accuracy /	± 2% of MV
Reproducibility /	< ± 0.25%
Temperature range /	
SM-00.1:	-10. . .+65°C
SM-00.2:	-10. . .+100°C
SM-00.3:	-10. . .+100°C
Pressure /	max. 20 bar at 20°C
Mounting position /	horizontal pos. recommended
Nozzle sizes /	see Tables 1 and 2
Process connection /	G1/4" female on one side or G1/4"male on both sides (left/right), or G1/2"male on both sides (for large operating ranges only)

Electrical Specifications:

Supply voltage /	4,5. . .24 VDC
Power consumption /	5. . .13 mA
Output /	rectangular impulse NPN open collector
Signal load /	20 mA max.
Current leakage /	10 µA max.
El. connection /	3Pin -AMP 2.8 x 0.8 mm (counter-plug available as accessory)
Duty Cycle /	50% ± 5%

Ordering Codes:

Order number	**SM-00.**	**1.**	**1.**	**1.**	**0**

SM-00 Impeller Flowmeter for Small Volumes

Material version /
1 = Arnite with bearing pin in stainless steel 1.4305, O-Ring in silicon and turbine in PVDF
2 = Larton® G/40 with bearing pin in stainless steel 1.4305, O-Ring in silicon and turbine in PVDF
3 = PVDF with bearing pin in stainless steel 1.4305 (PCTFE for thread on both sides), O-Ring in Viton and turbine in PVDF

Connections /
1 = 2 x G1/4" female on one side (not nozzle sizes 10 mm and 3 - 4 - 5.6 mm for PVDF)
2 = 2 x G1/4"male on both sides (not nozzle sizes 3.3 and 10 mm)
3 = 2 x G1/2"male on both sides (nozzle size 10 only)

Nozzle size /
1 = 1.0 mm
2 = 1.2 mm
3 = 1.5 mm
4 = 2.0 mm
5 = 2.5 mm
6 = 3.0 mm (both sides in G1/4" male thread only)
7 = 3.3 mm (both sides in G1/4" female thread only)
8 = 4.0 mm (both sides in G1/4" male thread only)
9 = 5.6 mm (both sides in G1/4" male thread only)
10= 10 mm (in G1/2" male thread only)

Optionen /
0 = none
1 = O-Ring in Viton instead of silicon for versions in Arnite and Larton® G/40
2 = O-Ring in EPDM instead of silicon for versions in Arnite and Larton® G/40
3 = O-Ring in EPDM instead of Viton for versions in PVDF
4 = Bearing pin in st. steel 1.4571 instead of 1.4305 for versions in Arnite and Larton® G/40
5 = Bearing pin in st. steel 1.4571 instead of 1.4305 for versions in PVDF with one-sided thread
6 = Bearing pin in PCTFE instead of st. steel 1.4305 for versions in PVDF with one-sided thread

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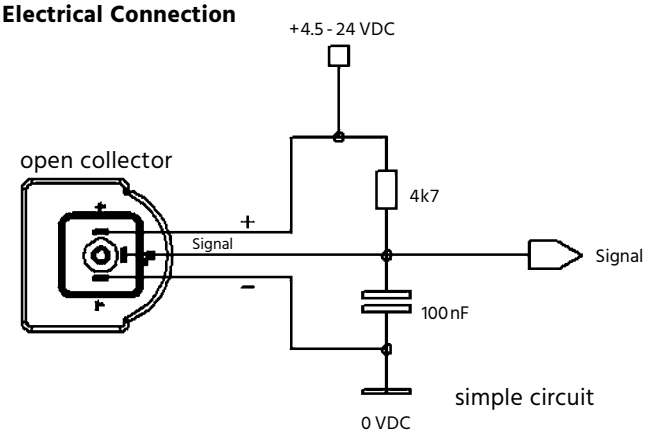
Versions:

Material version: The basic body of the SM-00 can be made of materials such as Arnite, Larton® G/40 or PVDF where the Arnite and Larton versions are intended for standard applications while the PVDF version has been developed for applications in the chemical industry.

Connections: The available thread connections are G1/4“ female thread and G1/2“ male thread which allow the user to decide placing both the flow inlet and outlet on the same side of the SM-00 or, preferably, one connection on the right side and another on the left side of the flowmeter. The possible operating ranges vary with different versions as detailed in the Tables 1 and 2.

Nozzle size: The nozzle at the inlet of the SM-00 enables an oblique direction flow within the body of the SM-00 and is largely responsible for the dynamic functioning of the flowmeter and, therefore, for the length and position of the linear operating range. The relationship between the nozzle size and operating range is detailed in the Tables 1 and 2. The operating ranges given in these tables indicate the linear range of the relevant version. The specified pressure drop occurs when the full scale value of the measuring range is reached.

Electrical Connection



Options: The bearing pin in the Arnite and Larton® G/40 versions of the SM-00 is made of stainless steel 1.4305 as a standard and the sealing ring is made of silicon. If the medium in question has special requirements in regard to the material, the bearing pin can be also supplied in stainless steel 1.4571 and the O-Ring in Viton or EPDM. The PDVF version of the SM-00 is used, especially when the requirements of strength on the flowmeter are very high. In the case of the variant with
thread connection, the bearing pin is made of stainless steel 1.4305 on the one side and, in those with thread connections on both sides it is made of PCTFE. Optionally, the stainless steel pin in the one-sided version can also be replaced by a PCTFE pin. In this „chemical“ version, the impeller magnets are fully infused and hence not wetted.

All given values are average and have been measured for water at room-temperature and horizontal position.
The actual values differ, depending on the application, by an accuracy of ± 2% of MV.

Table of operating ranges SM-00.1/2

Nozzle size	Version Arnite or Larton® G/40, connections G 1/4"-female one-sided			Version Arnite or Larton® G/40, connections G 1/4"-male both-sided			Version Arnite or Larton® G/40, connections G 1/2"-male both-sided		
[mm]	Flow [l/min]	Impulse rate [Imp./l]	Pressure drop for FSV [bar]	Flow [l/min]	Impulse rate [Imp./l]	Pressure drop for FSV [bar]	Flow [l/min]	Impulse rate [Imp./l]	Pressure drop for FSV [bar]
1.0	0.0274. . .0.5867	2223	1.0	0.0410. . .0.5670	2063	1.0			
1.2	0.0315. . .0.7777	1787	1.0	0.0505. . .0.8225	1700	1.0			
1.5	0.0417. . .1.3434	1386	1.0	0.0427. . .1.2504	1314	1.0			
2.0	0.1109. . .2.3268	1013	1.0	0.0911. . .2.4055	988	1.0			
2.5	0.0673. . .2.7421	754	0.6	0.1503. . .3.7478	760	1.0			
3.0	0.137. . .4.88	572	1.0	0.1022. . .5.6310	565	1.0			
3.3	0.1396. . .5.3606	509	1.0						
4.0	0.111. . .7.26	382	1.0	0.1235. . .8.3893	381	0.8			
5.6	0.180. . .8.30	256	0.9	0.3088. . .9.2647	236	0.45			
10.0							3.00. . .26.69	65	0.32

Table of operating ranges SM-00.3

Nozzle size	Version PVDF with bearing pin in 1.4305, connections G 1/4"-female one-sided			Version PVDF with bearing pin in PCTFE, connections G 1/4"-female one-sided			Version PVDF, connections G 1/4"-male both-sided		
[mm]	Flow [l/min]	Impulse rate [Imp./l]	Pressure drop for FSV [bar]	Flow [l/min]	Impulse rate [Imp./l]	Pressure drop for FSV [bar]	Flow [l/min]	Impulse rate [Imp./l]	Pressure drop for FSV [bar]
1.0	0.0419. . .0.5899	2277	1.0	0.0551. . .0.4789	4962	1.0	0.0440. . .0.5498	4366	1.0
1.2	0.0343. . .0.8014	1834	1.0	0.0480. . .0.8273	3752	1.0	0.0532. . .0.8447	3485	1.0
1.5	0.0523. . .1.2731	1447	1.0	0.0784. . .1.1325	3020	1.0	0.0668. . .0.9314	2827	0.55
2.0	0.0692. . .2.3482	1010	1.0	0.1087. . .2.2155	2078	1.0	0.1170. . .2.2198	2049	1.0
2.5	0.0664. . .3.7142	739	1.0	0.0741. . .2.7640	1443	0.66	0.1147. . .2.7205	1544	0.64
3.0							0.1048. . .2.8494	1109	0.41
3.3	0.7173. . .6.0997	555	1.0	0.2571. . .5.0044	1033	1.0			
4.0							0.2098. . .9.2712	793	1.0
5.6							1.7820. . .10.7990	511	0.49

Nozzle size	Version PVDF, connections G 1/2"-male both-sided		
[mm]	Flow [l/min]	Impulse rate [Imp./l]	Pressure drop for FSV [bar]
10.0	3. . .26.69	130	0.32

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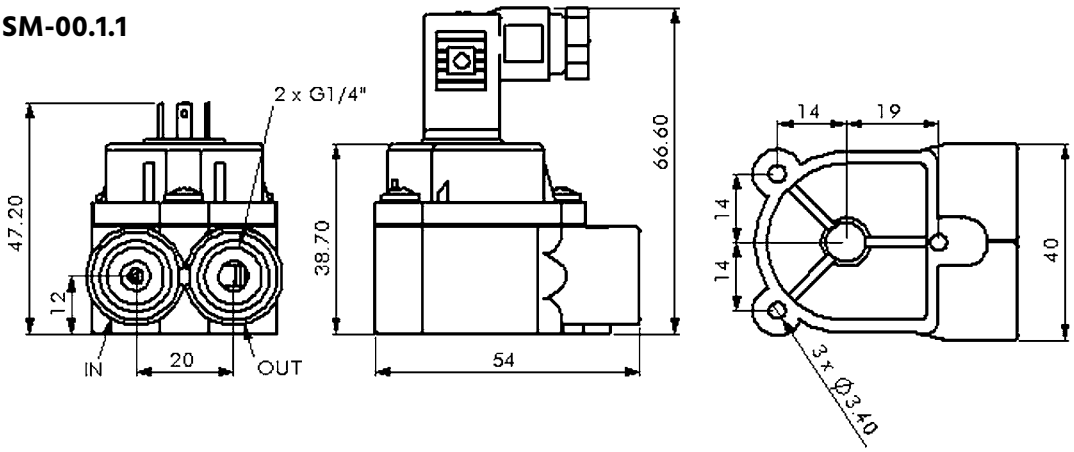
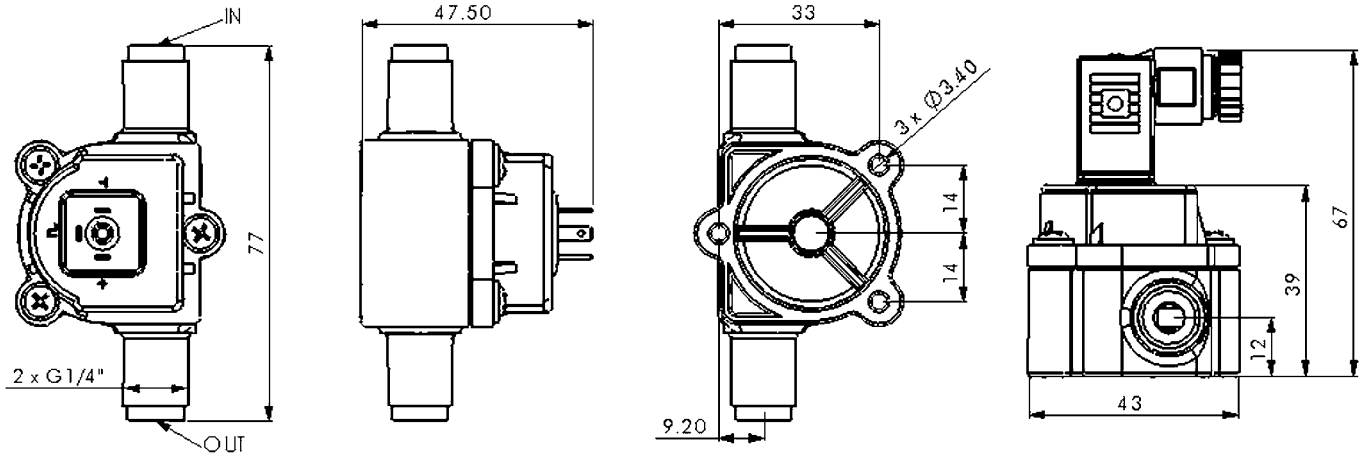
Dimensions in mm:

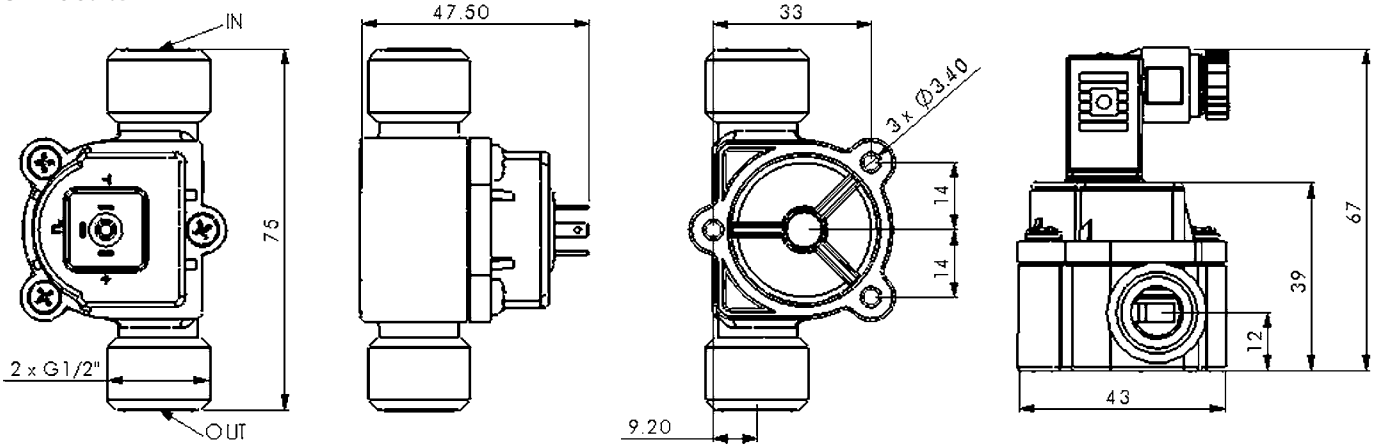
SM-00.1.1



SM-00.1.2



SM-00.1.3



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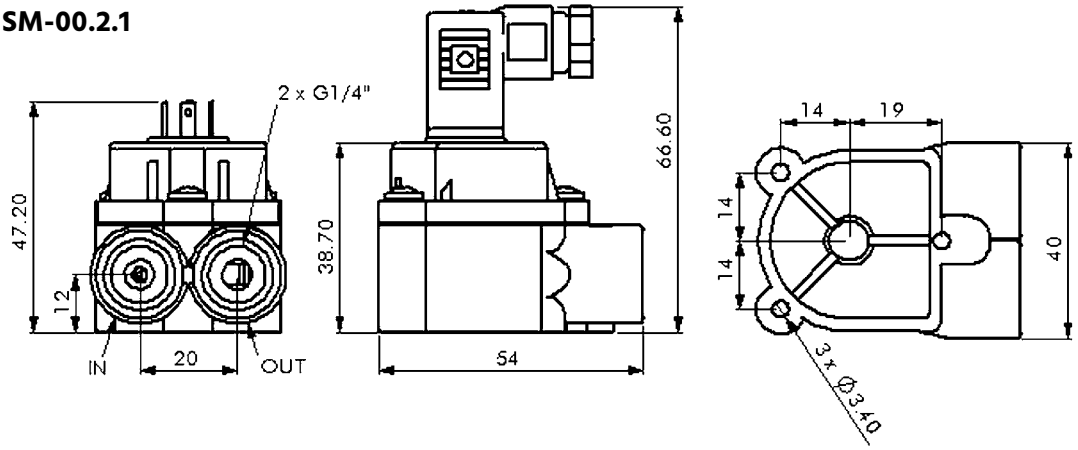
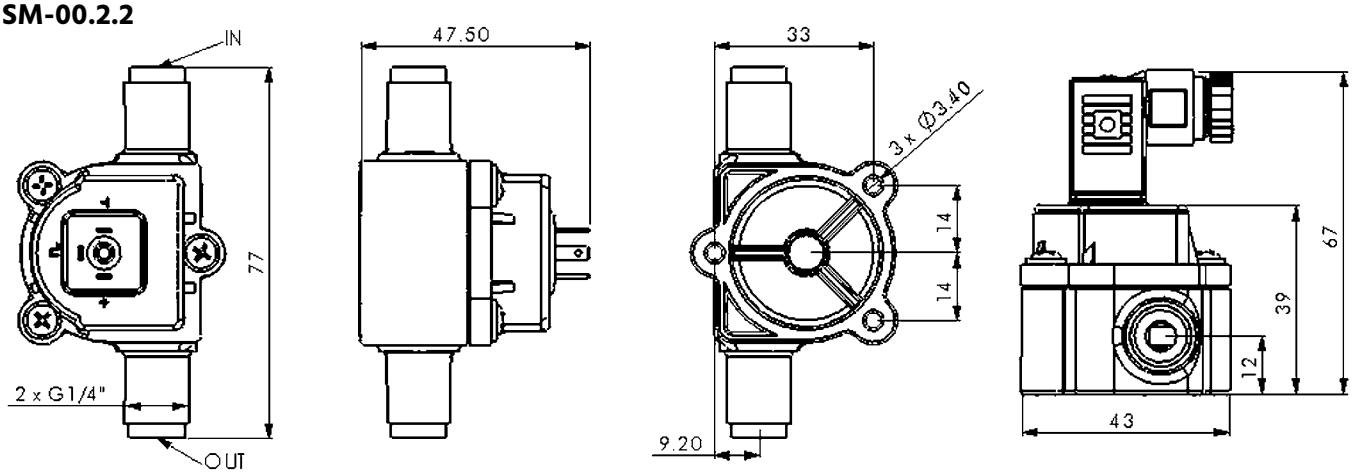
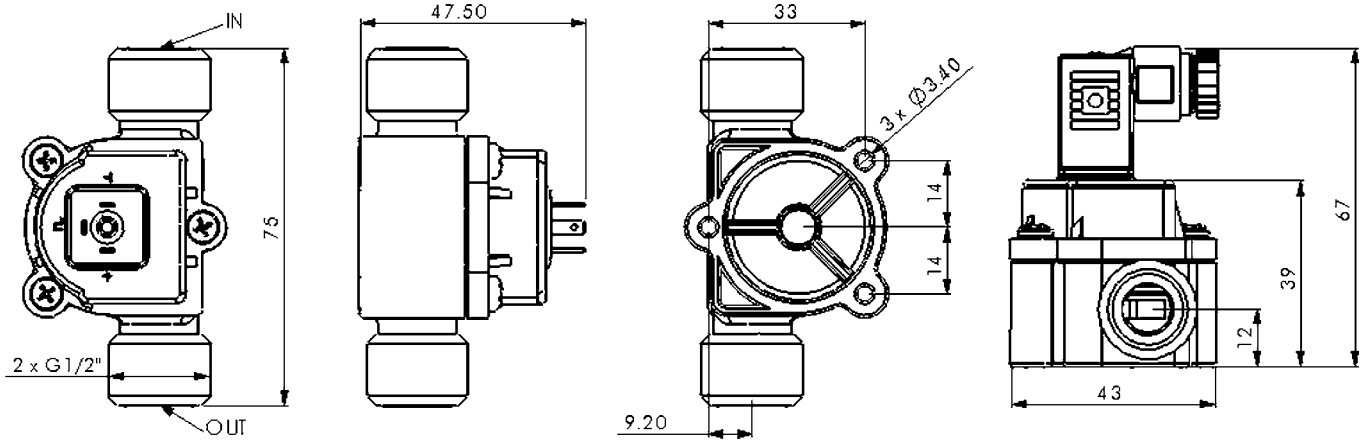


SM-00.2.2



SM-00.2.3



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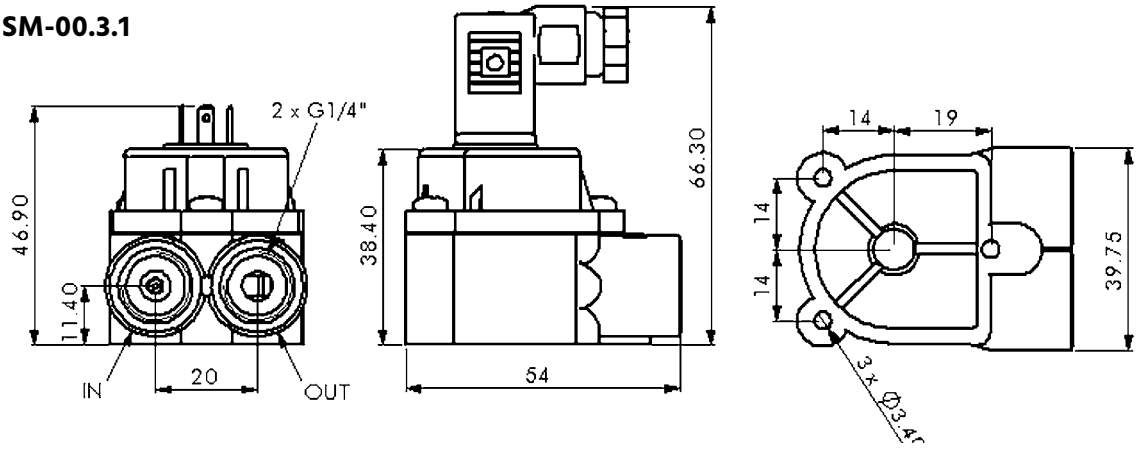
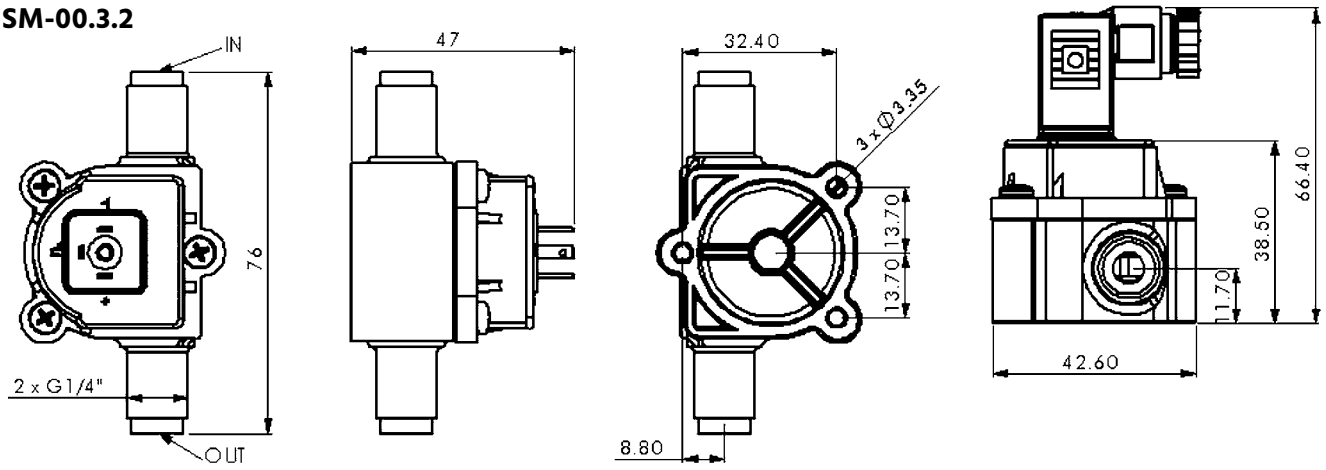
SM-00.3.1



SM-00.3.2



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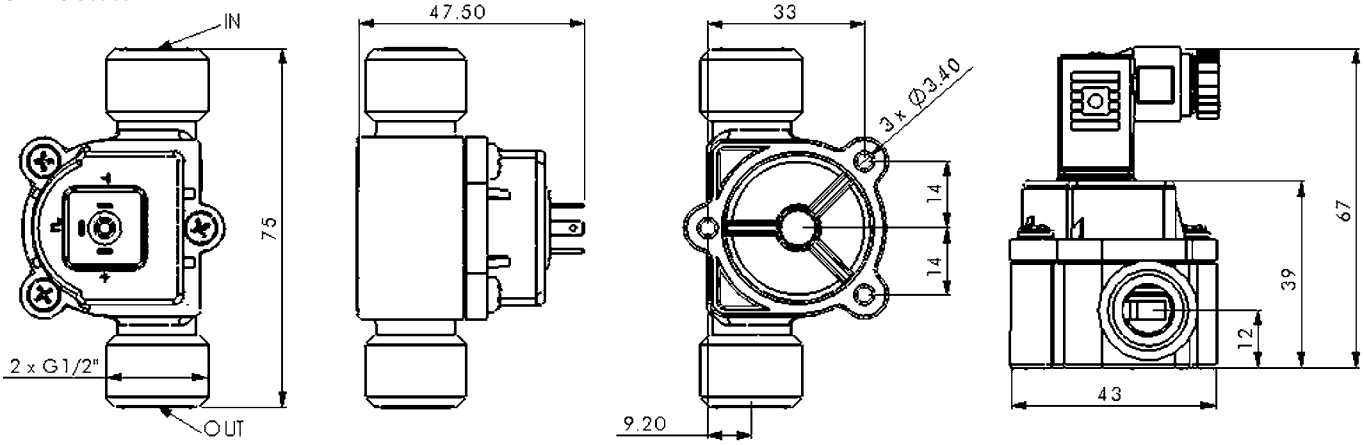

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SM-04

Impeller Flowmeter, Switch and Indicator in Modular Design

Features

/ Robust and compact flow sensor
/ Variety of materials
/ Location-independent
/ Operating range ratios up to 40:1
/ No inflow outflow lines required
/ Different measuring transmitters can be mounted directly or are available for DIN rail mounting

Description:

The SM-04 series of impeller flowmeters consists of a sensor and an optionally available measuring transmitter. The sensor has an impeller that is fitted in a housing made of PPS, brass or stainless steel. The impeller is set into rotation by the streaming medium. Depending on the material version, this rotational movement is tapped by an inductive, optical or Hall sensor-system and output as a frequency signal which is proportional to the flow. For the evaluation of the signal, different types of measuring transmitters are available which can amplify, convert or display the impulse signal from the sensor.

Application:

Due to their modular design, the SM-04 series of impeller flowmeters represents a versatile measuring and monitoring system for all low-viscosity fluids that do not corrode the materials being used.

Technical Specs - Sensor:

max. Pressure /

SM-04.1:	16 bar
SM-04.3/4:	100 bar

max. Temperature /

SM-04.1:	0. . .+60°C
SM-04.3/4:	0. . .+100°C

Accuracy / ± 3 % of MV

Reproducibility / ± 1 % of FSV

Electrical Specs - Sensor:

Supply voltage /

PNP/NPN:	10. . .30 V DC
NAMUR:	7. . .12 V DC

Power consumption /

Inductive:	10 mA
NAMUR:	7 mA
Hall Sensor:	30 mA

Output current max. /

Inductive:	200 mA
NAMUR:	7 mA
Hall Sensor:	100 mA

Output circuit / PNP, NPN or NAMUR

Short-circuit proof / yes

Polarity-reversal proof / yes

El. connection / 2 m cable or plug connection

Protection class / IP 67

Electrical Specs - Display:

Supply voltage / 18. . .30 VDC

Power consumption / < 1 W

Output signal / 0/4. . .20 mA max. load 500 Ω (or 0/2. . .10 VDC, min. 1 Ω on request)

Switching outputs / 2 x transistor outputs „Push-Pull“safe against short-circuit and pole-reversal) max. I_{out} = 100 mA

Hysteresis / adjustable, direction of hysteresis depends on MIN and MAX

Technical Specs - Display:

Display / graphical LCD-display 32x16 pixels, backlight, indicates measuring value and unit

LED-indicator / flashes simultaneously with displayed message

Media temp. /

SM-04.1:	0. . .+60°C
SM-04.3/4:	0. . .+70°C (0. . .+100°C with optional gooseneck)

El. connection / for round plug connector M12x1, 5-pole

Protection class / IP 67 (IP 68 when oil-filled)

Materials /

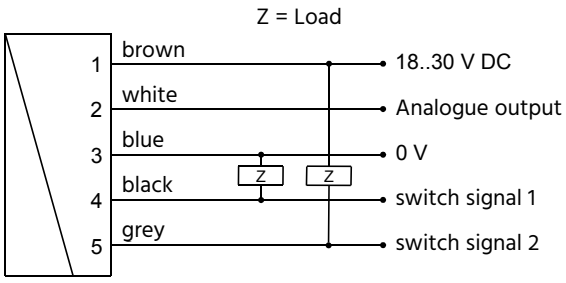
Clamps:	stainless steel (1.4301)
Housing:	stainless steel (1.4305)
Adapter:	CW614N nickel-plated
Glas:	mineralglas hardened
Magnet:	samarium-cobalt
Ring:	POM

El. Specs - Analogue Output:

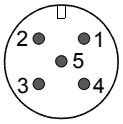
Output current / 4. . .20 mA at 10. . .30 VDC

Output voltage / 0. . .10 V at 15. . .30 VDC max. 20 mA

El. Connection Sensor:



Connection example: PNP NPN Optional: NAMUR



Plug connection M12x1

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Wetted Parts - Sensor:

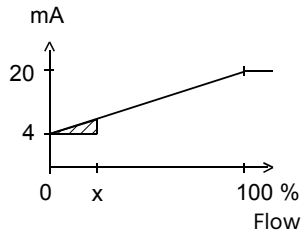
Type	SM-04.1	SM-04.3	SM-04.4
Housing	PPS (Fortron 1140L4)	brass (CW614N nickel-plated)	stainlees steel (1.4305)
Cover	PPS (Fortron 1140L4) (opt. PPS)	brass (CW614N nickel-plated)	stainlees steel (1.4305)
Connection	PVDF (opt. stainless steel (1.4305) or CW614N nickel-plated)	brass (CW614N nickel-plated)	stainlees steel (1.4305)
Rotor	PVDF with 10 clamps (opt. 2 or 5 clamps)	PVDF with 5 magnets, glued with epoxy resin (opt. 2 magnets)	PVDF with 5 magnets, glued with epoxy resin (opt. 2 magnets)
Clamps	stainless steel (1.4310) (opt. titanium or Hastelloy ®)	-	-
Bearing	Iglidur X	Iglidur X	Iglidur X
Axis	ceramic (Zr02-TZP)	Keramik ($Zr0_2$-TZP)	Keramik ($Zr0_2$-TZP)
Sealing	FKM (opt. EPDM or NBR)	FKM (opt. EPDM, NBR or Kemraz)	FKM (opt. EPDM, NBR or Kemraz)

Materials for not wetted parts:
PVC-cable, st. steel (1.4305, 1.4301) and CW614N nickel-plated

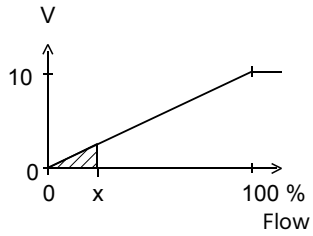
Signal characteristics curve:

Value x = Beginning of the specific range
= not specified

Current output



Voltage output



Other characteristics on request

Ordering Codes:

Order no.	**SM-04.**	**1.**	**2.**	**1.**	**4.**	**1.**	**1.**	**0**

SM-04 Flow Sensor with Impeller

Version /
1 = with PPS housing, inductive pickup
3 = with brass housing, Hall sensor
4 = with stainless steel housing, Hall sensor

Size of housing /
1 = 50 x 50 mm, for 3/8" tube
2 = 70 x 70 mm, for 1" tube

Process connection /
1 = female thread G
2 = male thread G
3 = hose spout
9 = other connection, please specify in detailed text

Operating ranges /(applicable for water 25°C):
SM-04.x.1 only:
1 = 0.1. . .1.5 l/min (0.1. . .0.5 l/min linearized)
2 = 0.2. . .10 l/min (0.2. . .2 l/min linearized)
3 = 0.4. . .12 l/min (0.4. . .2 l/min linearized)
SM-04.x.2 only:
4 = 2. . .30 l/min (2. . .3 l/min linearized)
5 = 3. . .60 l/min (3. . .5 l/min linearized)
6 = 4. . .100 l/min (4. . .6 l/min linearized)

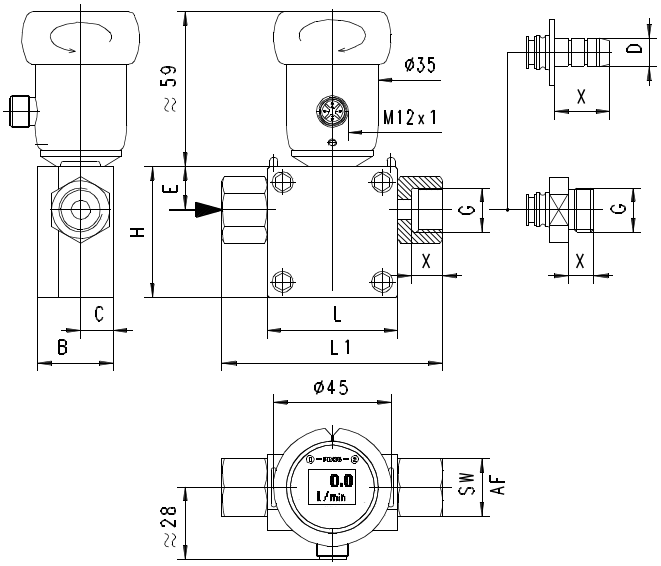
Electrical connection /
1 = 2 m cable (standard)
2 = plug connection M12x1

Output circuit /
1 = PNP impulses
2 = NPN impulses
3 = NAMUR (SM-04.1 only)
4 = mounted frequency receiver with a setpoint
5 = mounted frequency receiver with power output 4. . .20 mA, 3-wire
5a = mounted frequency receiver with voltage output 0. . .10V
6 = digital mounted transmitter with 2 transistor switching outputs, display and analogue output 4. . .20mA, 3-wire (0. . .10 VDC on request)

Options /
0 = none
1 = with transparent cover PSU (SM-04.1 only)

Dimensions Sensor:

Connection	DN	H/L	L1	B	C	E	X	SW
G 3/8" female	10	50	84	29	12.5	16.5	12	22
G 3/8" male	10	50	84	29	12.5	16.5	14	22
G 1" female	25	70	110	53	23.0	27.5	18	38
G 1" male	25	70	122	53	23.0	27.5	18	38
hose nozzle Ø 11	10	50	96	29	12.5	16.5	21	-
hose nozzle Ø 30	25	70	176	53	23.0	27.5	45	-



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SD-04

Impeller Flowmeter with Dosing or Switching Electronics

Features

/ Nominal diameters DN06 to DN50

/ Pressure-proof up to 16 bar

/ DC- or AC power supply

/ Variety of materials

/ Flanges and connections for food-processing applications

/ Available as NAMUR transmitter for ATEX zone 0 or 20 on request

Description:

An impeller made of PVDF is set into motion by a flowing medium. It generates through completely compound-filled magnets an impulse signal in the transmitter electronics proportional to the flow. Depending on the version the measuring transmitter, this signal is converted into different functions. In the simplest version, the complete unit is battery powered and displays the current flow rate and additionally two reset-table counters. The next level has a 4. . .20 mA signal and a pulse output, which is designed as a transistoroutput, and, in addition, two resettable totalizers that can be used as the main and day counters. Naturally, also the current flow rate can be displayed and furthermore two addi-tional relay outputs are available, if switchpoints are necessary. The full version of SD-04 includes a dosing device with 2 totalizers, 2 relays and 3 dosing modes. The dosing volume can be set through a keypad, binary inputs or pulse-modulated through a PLC. The dosing device is capable of determining the K factor of other flow sensors by means of „Teach-in“ or, in the same way, to enhance (litre-wise) the accuracy of the inbuilt own sensor. Moreover, for testing the system a flow can be simulated in a „dry“ run, thereby meeting the highest requirements of modern dosing technology. The sensor and electronics are connected to each other through a simple bayonet lock; therefore, the electronics are easily interchangeable. Pick-up sensors and transmitter variants can be interchanged in any manner.

Application:

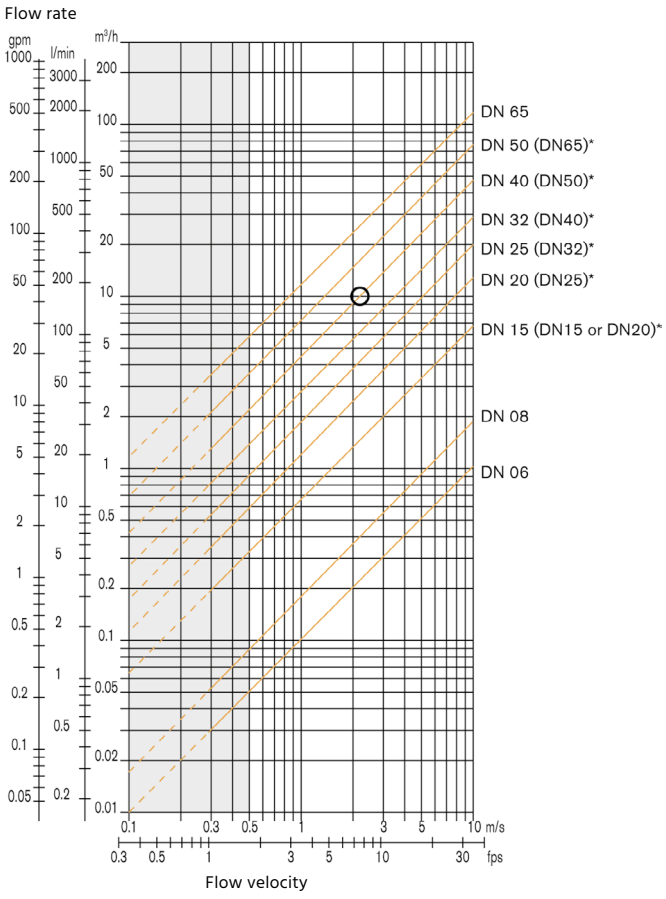
Thanks to the variety of materials and connectivity in the flow pick-up sensor in the SD-04, the user has immense possibilities of application. Polypropylenes, PVDF and PVC offer a choice of synthetic materials that are resistant to nearly all hostile media and, materials such as brass and stainless steel logically supplement the choice favoring metals. All com-monly used thread variants, DIN and ANSI flanges in stainless steel and Tri-Clamp supports and welded ends are available as connectors and thus enable coupling the SD-04 to nearly any process. The nominal diameter ranges from DN06 to DN50 and covers, therefore, a wide range of flows.

Technical Specifications:

Nominal diameter /	DN06 to DN50
Operating range /	0.5. . .1200 l/min
Flow velocity /	0,3. . .10 m/s (hall transducer version) 0,5. . .10 m/s (batterie version - coil transducer)
Accuracy /	
Teach-In:	± 1% of measured value
Standard K-Factor:	+ 2.5% of measured value (at 10 m/s)
Linearity /	± 0.5% of F.S. (at 10 m/s)
Repeatability /	± 0.4% MW
Viscosity & Pollution /	clean, neutral or aggressive fluids max. 300 cSt / 1% max. (particle size: 0.5 mm max.)
Media temperature /	
PVC:	0. . .+50°C
PP:	0. . .+80°C
PVDF, brass, st. steel:	-15. . .+100°C (high temperature on request)
Operating and storage temperature of sensor housing /	
PVC:	-15. . .+60°C
PP:	-15. . .+80°C
VA, Ms, PVDF:	-15. . .+100°C
Rel. humidity /	≤ 80%, non-condensed
max. Pressure Fitting /	
Plastic:	10 bar up to 20°C (see P-T diagram)
Metal:	16 bar (40 bar on request)
Materials Fitting /	
Seal:	FKM (EPDM)
Housing:	PVC, PP, PVDF, brass ($CuZn_{39}Pb_2$) stainless steel (316L - 1.4404)
Screws:	stainless steel (316L - 1.4404)
Impeller:	PVDF (PP or stainless steel on request)
Axis and bearing:	ceramics (Al_2O_3)
Materials Electronics /	
Housing, cover, lid, nut:	PC
Front film:	polyester
Screws:	stainless steel
Cable, plug or glands:	PA
Wetted parts /	fitting, impeller, axis, bearing and seal
Display /	15 x 60 mm, 8-digit LCD, alpha-numeric, 15 segments, 9 mm high
Norm /	2014/68/EU
Certificate /	EN-ISO 10204 DIN 4762 DIN 4768 ISO/4287/1

Impeller sensors ensure reliable operation in the range of 0.3 to 10 m/s flow velocity which means that their accuracy of 0.5% from one end of the range plus 2.5% of the measured volume is available for a range of 1:33.
In dosing technology, especially the SD-04 has hardly any match, considering its variety in respect to volume specifi-cations, resistance to different media and, not the least, its excellent price to performance ratio.

Nominal Diameter Options:



--- not recommended
* choose a pipe size DN40 [or DN50 for any * marked fitting] for the following fittings with process connector:
External Thread SMS 1145
Weld-on end SMS 3008, BS4825-1/ASME BPE/DIN 11866 Line C or DIN 11850 Line 2/DIN 11866 Line A/DIN EN 10357 Line A
Clamp SMS 3017, BS 4825-3/ASME BPE or DIN 32676 Line A

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Electrical Specifications:

Dosing unit /

Supply voltage:	12. . .36 VDC ± 10%, filtered and controlled, SELV circuit with non-dangerous energy-level, or 115 / 230 VAC 50/60 Hz
Cable:	50 m max., shielded, 1.5 mm² max.
Cable gland:	M20 x 1.5 or plug EN 175301-803
Reverse polarity protection DC:	yes
Current consumption:	≤ 100 mA at 12 VDC - with relay ≤ 50 mA at 36 VDC - with relay ≤ 55 mA at 115/230 VAC - with relay (without consumption of digital input and pulse output)
4 digital inputs:	switching threshold Von: 5 to 36 VDC switching threshold Voff: 2 VDC max. input impedance: 9.4 kΩ galvanic insulation, protected against polarity reversals and voltage spikes functions selections of dosing volume and Start/Stop actuation

Transistor output / 2x NPN or PNP, potential free;

default for output 1: pulse output

default for output 2: batch state

configurable and parameterizable 0.6-2200 Hz, 5-36 VDC, 100 mA max. line drop 2.7 VDC at 100 mA

duty cycle:
> 0.45 if 0.6 < frequency < 300 Hz
> 0.4 if 300 < frequency < 1500 Hz
< 0.4 if 1500 < frequency < 2200 Hz
galvanic insulation, protected against overvoltage, polarity reversals and short circuits

Relay output / 2 relays (currentless open), parameterizable

Switching load:	230 VAC, 3 A, or 40 VDC, 3 A (ohmic load) max. switching capacity 750 VA (ohmic load)

Protection class / IP65

EMC / EN 61000-6-2, EN 61000-6-3

Security / EN 61010-1

Vibration / EN 60068-2-6

Shock / EN 60068-2-27

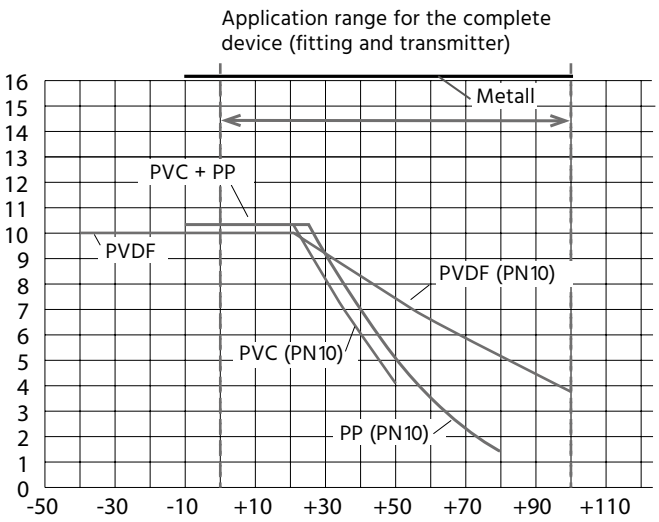
Approvals / CE; UL-Recognised for US & Canada

Flow transmitter /

Supply voltage:	12. . .36 VDC ± 10%, filtered and controlled, SELV circuit with non-dangerous energy-level, or 115 / 230 VAC 50/60 Hz
Cable:	50 m max., shielded, 1.5 mm² max.
Cable gland:	M20 x 1.5 or plug EN 175301-803
Reverse polarity protection DC:	yes
Current consumption:	≤ 70 mA at 12 VDC - with relay ≤ 25 mA at 12 VDC - without relay
Output signal:	4. . .20 mA, 3-wire - with relay 4. . .20 mA, 2-wire - without relay
Load:	max. 50 Ω at 12 VDC max. 600 Ω at 24 VDC max. 800 Ω at 115 / 230 VAC max. 900 Ω at 30 VDC
Pulse output:	polarized, potential free, 5 to 36 VDC, 100 mA, protected, line drop at 100 mA: 2.5 VDC
Relay:	2 relays freely configurable, 3 A, 230 VAC or 3A, 40 VDC
Protection class:	IP65
EMC:	EN 61000-6-2, EN 61000-6-3
Security:	EN 61010-1
Vibration:	EN 60068-2-6
Shock:	EN 60068-2-27

Battery power / batteries 4 x 1.5 VDC AA
lifespan min. 4 years at 20°C

P-T Diagram:



Ordering Codes:

Order number	SD-04.	2.	2.	2.	2.	0

SD-04 Flowmeter with Dosing or Switching Electronics

Sensor housing material /

1 = polypropylene with weld-on ends
1a = polypropylene with swivel nut and weld-on bushings
2 = PVDF with weld-on ends
2a = PVDF with swivel nut and weld-on bushings
2b = PVDF with male thread as per ISO 10931
3 = PVC with adhesive ends DIN 8063
3a = PVC with swivel nut and adhesive bushings DIN 8063
3b = PVC with BSPP-male thread DIN 8063
4 = brass with BSPP-female thread
4a = brass with BSPT-female thread
5 = brass with BSPP-male thread
5a = brass with BSPT-male thread
6 = brass with NPT-female thread
6a = brass with NPT-male thread
7 = stainless steel with BSPP-female thread
7a = stainless steel with BSPT-female thread
8 = stainless steel with BSPP-male thread
8a = stainless steel with BSPT-male thread
9 = stainless steel with NPT-female thread
9a = stainless steel with NPT-male thread
10 = stainless steel with welding studs EN ISO 1127 ISO 4200
11 = stainless steel with Tri-Clamp EN ISO 1127 ISO 4200
12 = stainless steel with flanges as per EN 1092-1
13 = stainless steel with flanges as per ANSI B16-5-1988

Nominal diameter /

0 = 06 mm
0a = 08 mm
1 = 15 mm
2 = 20 mm
3 = 25 mm
4 = 32 mm
5 = 40 mm
6 = 50 mm

Transmitter /

0 = battery operated measuring device, without outputs, with display for current flow and 2 resettable counters
1 = measuring device with 4 to 20 mA and pulse output (PNP and NPN), 2 totalizers and interchangeable flow display
2 = measuring device with 4 to 20 mA and pulse output (NPN and PNP), 2 additional relays, 2 totalizers and interchangeable flow display
5 = dosing device with 2 totalizers, dosing flow display and 2 relays

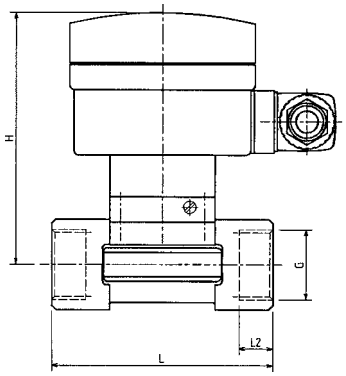
Supply voltage /

0 = battery 2 x 9 VDC (transmitter version 0 only)
1 = 12. . .36 VDC
2 = 115. . .230 VAC

Options /

0 = none
1 = measuring transmitter separately for panel-mounting
2 = measuring transmitter separately for wall-mounting

Dimensions MS and SS:



Brass and st. steel housing with f-thread G

ND [mm]	Thread	L [mm]	L2 [mm]	H [mm]
15	G ½"	84	16.00	139
20	G ¾"	94	17.00	137
25	G 1"	104	23.50	137
32	G 1 ¼"	119	23.50	140
40	G 1 ½"	129	23.50	144
50	G 2"	148.5	27.50	151

Brass and st. steel housing with NPT-f

ND [mm]	Thread	L [mm]	L2 [mm]	H [mm]
15	NPT ½"	84	17.00	139
20	NPT ¾"	94	18.30	137
25	NPT 1"	104	18.00	137
32	NPT 1 ¼"	119	21.00	140
40	NPT 1 ½"	129	20.00	144
50	NPT 2"	148.5	24.00	151

Brass and st. steel housing with BSPT-f

ND [mm]	Thread	L [mm]	L2 [mm]	H [mm]
15	Rc ½"	84	15.00	139
20	Rc ¾"	94	16.30	137
25	Rc 1"	104	18.00	137
32	Rc 1 ¼"	119	21.00	140
40	Rc 1 ½"	129	19.00	144
50	Rc 2"	148.5	24.00	151

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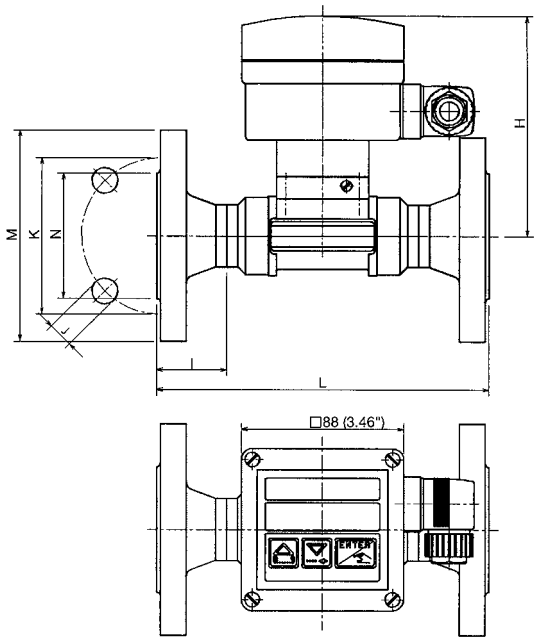
Dimensions MS and SS:

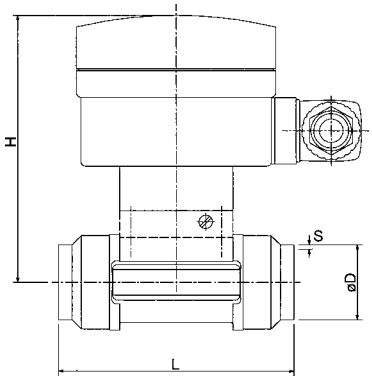


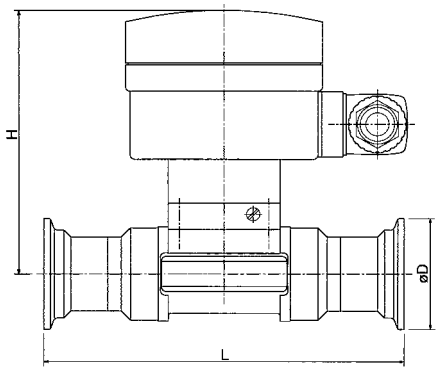
St. steel housing with flange as per EN 1092-1

ND [mm]	I [mm]	J amount x Ø	K [mm]	M [mm]	N [mm]	L [mm]	H [mm]
15	23.5	4 x 14 mm	65	95	45	130	139
20	28.5	4 x 14 mm	75	105	58	150	137
25	28.5	4 x 14 mm	85	115	68	160	137
32	31	4 x 18 mm	100	140	78	180	140
40	36	4 x 18 mm	110	150	88	200	144
50	41	4 x 18 mm	125	165	102	230	151

St. steel housing with flange as per ANSI B16-5

ND [mm]	I [mm]	J amount x Ø	K [mm]	M [mm]	N [mm]	L [mm]	H [mm]
15	23.5	4 x 15.8 mm	60.3	89.0	34.9	130	139
20	28.5	4 x 15.8 mm	69.8	99.0	42.9	150	137
25	28.5	4 x 15.8 mm	79.4	108.0	50.8	160	137
32	31	4 x 15.8 mm	88.9	117.0	63.5	180	140
40	36	4 x 15.8 mm	98.4	127.0	73.0	200	144
50	41	4 x 19.0 mm	120.6	152.0	92.1	230	151





Stainless steel housing with welding studs as per EN ISO 1127 ISO 400

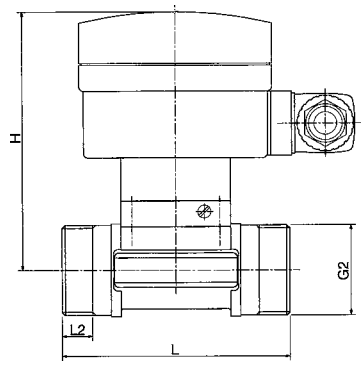
ND [mm]	D [mm]	L [mm]	S [mm]	H [mm]
08 DIN 11850	13	90	1.5	134
15	21.3	84	1.6	139
20	26.9	94	1.6	137
25	33.7	104	2.0	137
32	42.4	119	2.0	140
40	48.3	129	2.0	144
50	60.3	148.5	2.6	151

Stainless steel housing with Tri-Clamp connector as per EN ISO 1127/ISO 400

ND [mm]	D [mm]	L [mm]	H [mm]
08 DIN 32676	34.00	125	134
15	34.00	130	139
20	50.50	150	137
25	50.50	160	137
32	50.50	180	140
40	64.00	200	144
50	77.50	230	151

Other connections on request.

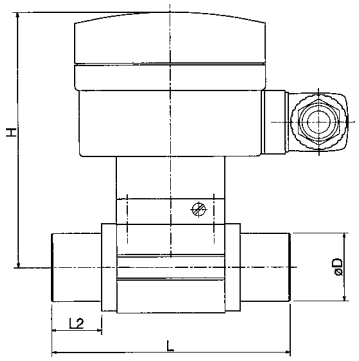
Dimensions MS and SS:



PVC, PVDF, Brass and stainless steel housing with male thread

PVC only available for DN6 and DN8, PVDF only available for DN8

ND [mm]	Thread	L [mm]	L2 [mm]	H [mm]
06	G ½"	90	14.00	134
08	G. NPT. R ½"	90	14.00	134
15	G ¾"	84	11.50	139
20	G 1"	94	13.50	137
25	G 1 ¼"	104	14.00	137
32	G 1 ½"	119	18.00	140
40	M 55 x 2	129	19.00	144
50	M64 x 2	148.5	20.00	151

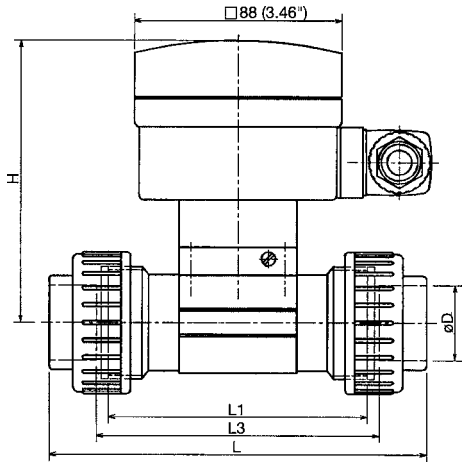


PP- and PVDF housing with weld-on ends ISO 10931 DIN 16962

ND [mm]	D [mm]	L [mm]	L2 [mm]	H [mm]
15	20	85	14	139
20	25	92	16	137
25	32	95	18	137
32	40	100	20	140
40	50	106	23	144
50	63	110	27	151

PVC housing with adhesive ends DIN 8063

ND [mm]	D [mm]	L [mm]	L2 [mm]	H [mm]
15	20	90	16.50	139
20	25	100	20.00	137
25	32	110	23.00	137
32	40	110	27.50	140
40	50	120	30.00	144
50	63	130	37.00	151



PVC housing with swivel nut and adhesion bushings; PP and PVDF housing with swivel nut and weld-on bushings

ND [mm]	D [mm]	L [mm]	L1 [mm]	L3 [mm]	H [mm]
08 [PVC only]	12	122	90	92	134
15	20	128	90	96	139
20	25	144	100	106	137
25	32	160	110	116	137
32	40	168	110	116	140
40	50	188	120	127	144
50	63	212	130	136	151

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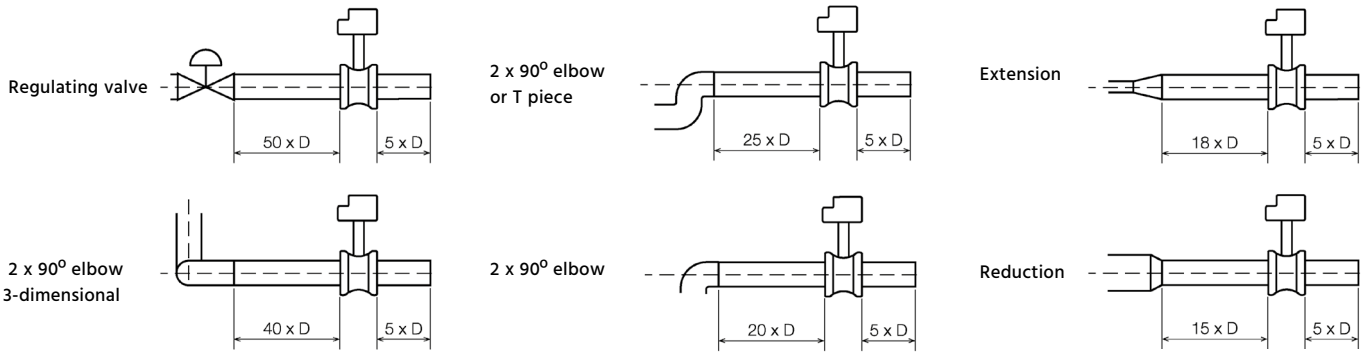
Inlet and Outlet sections:



Nominal Diameter	DN06-1/4"	DN06 - ½"	DN08 - ½"	DN15	DN20	DN25	DN32	DN40	DN50
brass fitting									
BSPP female thread	o	o	o	x	x	x	x	x	x
NPT female thread	o	o	o	x	x	x	x	x	x
BSPT female thread ISO7	o	o	o	x	x	x	x	x	x
BSPP male thread	x	x	x	x	x	x	x	x	x
NPT male thread	o	o	x	o	o	o	o	o	o
BSPT male thread ISO7	o	o	x	o	o	o	o	o	o
stainless steel fitting									
BSPP female thread	o	o	o	x	x	x	x	x	x
NPT female thread	o	o	o	x	x	x	x	x	x
BSPT female thread ISO7	o	o	o	x	x	x	x	x	x
BSPP male thread	x	x	x	x	x	x	x	x	x
NPT male thread	o	o	x	o	o	o	o	o	o
BSPT male thread ISO7	o	o	x	o	o	o	o	o	o
weld-on ends ENISO1127 / ISO4200	o	o	x[1)]	x	x	x	x	x	x
Tri-clamp for pipe ISO1127 / ISO4200	o	o	o	x	x	x	x	x	x
flange EN 1092-1	o	o	o	x	x	x	x	x	x
flange ANSI B16-5-1988	o	o	o	x	x	x	x	x	x
PVC fitting									
bushing DIN 8063	o	o	x	x	x	x	x	x	x
socket DIN 8063	o	o	o	x	x	x	x	x	x
BSPP mal thread	o	x	x	o	o	o	o	o	o
PP fitting									
bushing DIN 16962	o	o	o	x	x	x	x	x	x
socket DIN DIN 16962	o	o	o	x	x	x	x	x	x
PVDF fitting									
bushing ISO 10931	o	o	o	x	x	x	x	x	x
socket ISO 10931	o	o	o	x	x	x	x	x	x
male thread ISO 10931	o	o	x	o	o	o	o	o	o

1) with EPDM gasket o = not available, * = available in this combination

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SD-05

Plastic Impeller Flowmeter

Features

/ DN25 to DN50

/ 5 to 1000 l/min in four operating ranges

/ Wetted parts out of PP, ECTFE, ceramic and Viton

/ 4 to 20 mA or pulse output

/ Optionally with switching contacts

/ Intended for operating pressures up to 10 bar

Description:

The SD-05 impeller flowmeter measures thin fluids according to the impeller wheel principle. An impeller wheel made of ECTFE that holds moulded magnetic pins on its five vanes projects into a polypropylene fitting. Since less flow velocity is present at the edge of the pipe than in the centre a torque causes the rotor to rotate proportionally to the flow on the axis made of ceramic. An externally mounted electronic element records the rotating speed of the impeller by means of a Hall effect sensor that emits a voltage impulse whenever a magnet crosses it and, through an amplifier, produces an NPN impulse signal at the PINs of connector. In the version with 2-wire output the impulse signal is readily converted internally into a power signal. In contrast to this, in the case of the 3-wire version, as also in a variant with impulse output and two additional threshold value relays, an SD-05 equipped with a “normal” impulse output can be easily converted into a flowmeter with 3-wire power output or one with a Push-Pull impulse output and threshold value relay by replacing the mating plug.

Application:

The most significant characteristic of flowmeters in the SD-05 series is that the materials used are plastics and, therefore, even the most hostile fluids do not pose any problems. This device offers particularly a dependable solution for deploying it in fully desalinated water where metallic components are often ruled out. The measuring range of all the four available nominal diameters of SD-05 scales at 1:50 which means that minimum 5 and maximum 1000 litres per minute can be recorded. By virtue of its design the SD-05 causes only a negligible pressure drop within the piping system and is, therefore, a cost-effective alternative for measuring low-viscous fluids.

Electrical Specifications:

Pulse output (SD-05.xx.x.x.IM) /

Function:	NPN-open-collector
Supply voltage:	4.5. . .24 VDC
Current:	max. 15 mA at 24 VDC
El. connection:	plug connector as per EN 175301-803A (cubical-shaped)
Protection class:	IP65

Analogue output 2-wire (SD-05.xx.x.x.A2) /

Supply voltage:	15. . .24 VDC
Current:	4. . .20 mA, 2-wire
Damping:	factory adjustable in steps of one second
El. connection:	plug connector as per EN 175301-803A (cubical-shaped)
Protection class:	IP65
Ambient temp. at the plug:	max. +55°C

Analogue output 3-wire (SD-05.xx.x.x.A3) /

Supply voltage:	15. . .24 VDC
Current:	10. . .40 mA
Damping:	factory adjustable in steps of one second
El. connection:	plug connector as per EN 175301-803A (cubical-shaped)
Protection class:	IP65
Ambient temp. at plug connector:	max. +55°C
Mounting:	The electronic modul is easily plugged between the plug connector and the mating plug of the SD-05 and transforms the pulse output into an analogue output. The correllation between analogue output and operating range is adjusted with a REED switch at the plug connector. This electronic modul can be field upgraded at any time.

Pulse output Push-Pull and two additional treshold value relays (SD-05.xx.x.x.FK) /

Supply voltage:	4.5. . .24 VDC
Current:	10. . .220 mA
Outputs:	1 x complementary final stage (11 mA, 24 VDC), 2 x semiconductor relays (0.1 A/24 VDC)
Damping:	factory adjustable in steps of one second
El. connection:	plug connector as per EN 175301-803A (cubical-shaped) with one meter cable
Protection class:	IP65
Ambient temp. at plug connector:	max. +55°C
Mounting:	The electronic module can be easily connected between the plug connector and the mating plug of the SD-05, transforming the pulse output into a push-pull pulse signal (suitable for PNP and NPN inputs). It also sets two limit switches on the semiconductor relay available. The measuring and limits are set via a REED switch on the connector. This model can be retrofitted on existing installations.

Technical Specifications:

Measuring principle /	rotating vane
Sensing system /	Hall effect, non-contacting
Operating ranges /	5. . .250 l/min, DN25 10. . .400 l/min, DN32 15. . .600 l/min, DN40 20. . .1000 l/min, DN50 at 0.15. . .10 m/s and 42 Hz per m/s
Accuracy /	± 3% on calibrated range
Repeatability /	< 1% on calibrated range
Operating pressure /	10 bar max. (at +22°C)
Burst pressure /	>15 bar (at +22°C)
Operating temperature /	0. . .+80°C
Viscosity range /	0.5. . .20 cSt
Housing material /	Polypropylene
Rotor /	5 blade rotor from ECTFE with encapsulated magnets
Axis/Bearing /	ceramic Al_2O_3
O-Ring /	FKM (optionally EPDM)

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El. Connection:

	SD-05. xx.x.x.IM	SD-05. xx.x.x.A2	SD-05. xx.x.x.A3	SD-05. xx.x.x.FK
Supply +	PIN 1	PIN 1	PIN 1	white
Signal	PIN 2	PIN 2	PIN 2	green
Load	PIN 3		PIN 3	brown
Relays 1-A				yellow
Relays 1-B				grey
Relays 2-A				pink
Relays 2-B				blue

Ordering Codes:

Order number	**SD-05.**	**25.**	**G.**	**VI.**	**A3.**	**0**

SD-05 Plastic Impeller Flowmeter

Size and Operating range /
25 = DN25 for 5. . .250 l/min
32 = DN32 for 10. . .400 l/min
40 = DN40 for 15. . .600 l/min
50 = DN50 for 20. . .1000 l/min

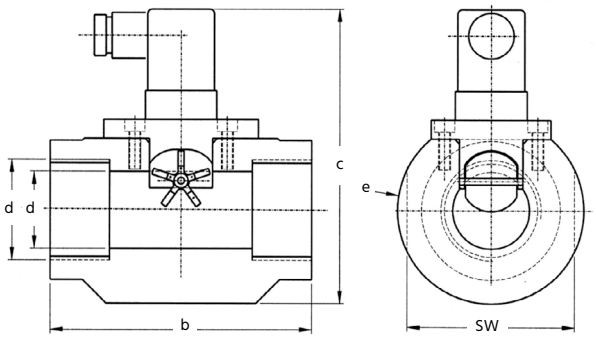
Process connection /
G = G-female thread, parallel
N = NPT-female thread, conical

Gasket /
VI = Viton
EP = EPDM

Output signal /
IM = pulse signal NPN open collector, 3-wire
A2 = analogue signal, 4 to 20 mA, 2-wire
A3 = analogue signal, 4 to 20 mA, 3-wire
FK = pulse signal Push-Pull and two setpoints (semiconductor relays)

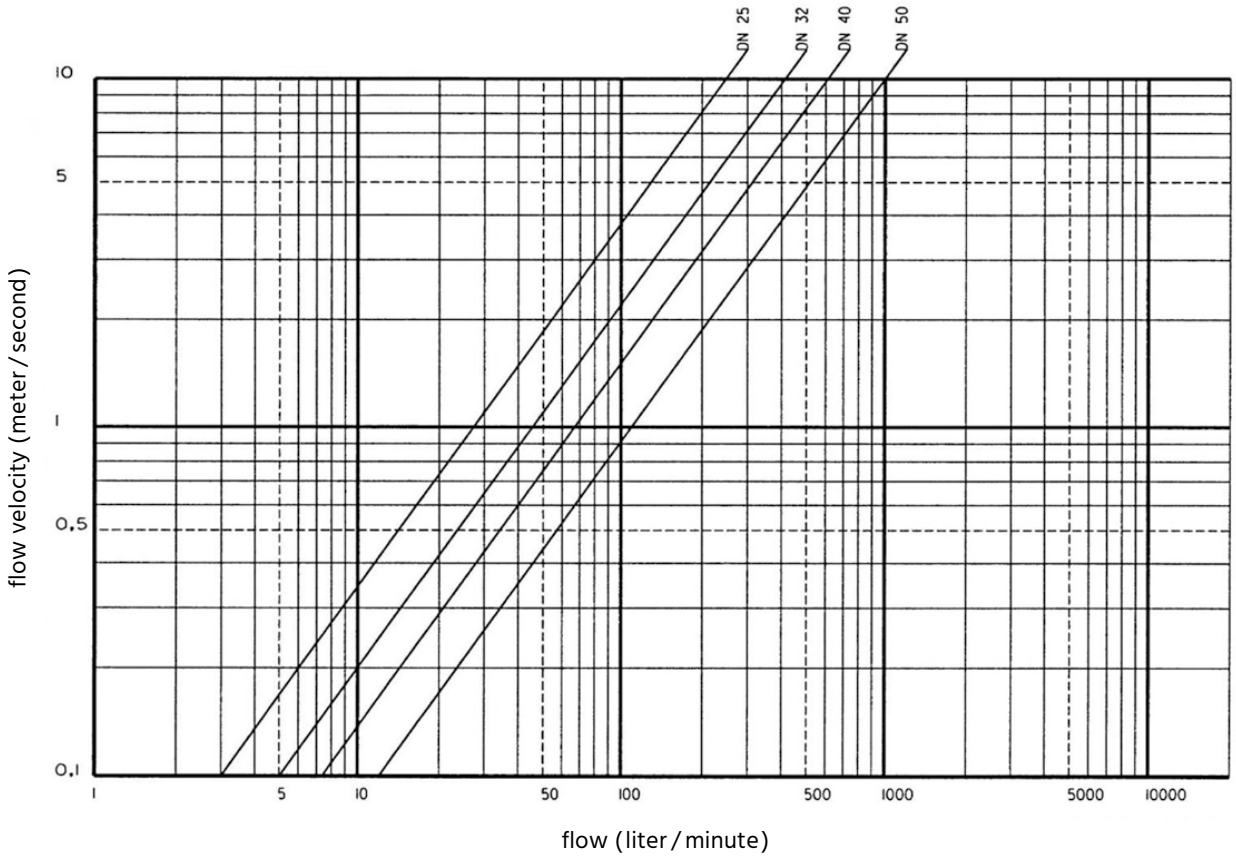
Options /
0 = none
1 = special issue, please specify in detailed text

Dimensions:



Diameter a	b [mm]	c [mm]	d [mm]	e [mm]	SW [mm]
DN25 / G1"	110	119	25	74	70
DN32 / G1 ¼"	110	123	32	78	70
DN40 / G1 ½"	120	125	40	80	75
DN50 / G2"	125	135	50	89	75

Impulse characteristic curve:



Calculation formula for the frequency determination of the flowmeter:

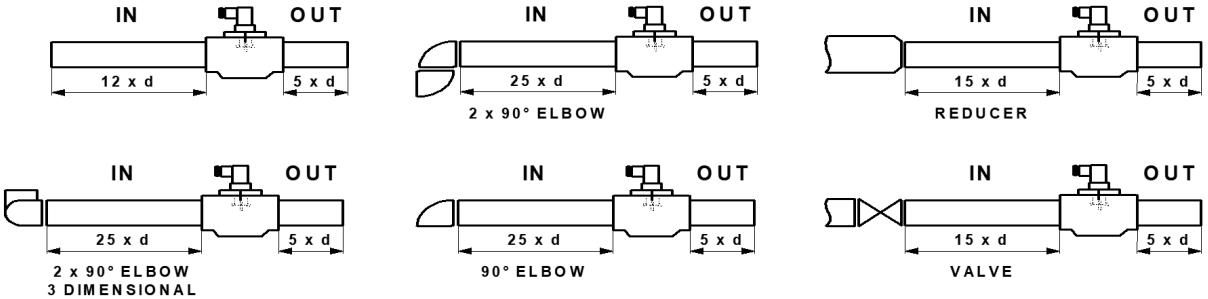
Frequency [Hz] = 42 x Flow [m/sec]

Example for Frequency determination:

500l/min at DN 50 › Frequency = 42 x 4.9 [m/sec] = 205.8 Hz

Installation Instructions:

Different types of piping and flow obstacles such as fittings, fittings, dirt traps, etc. cause different sized interference profiles whose smoothing is determined in line (pipe) lengths according to DIN 1952. In order to ensure optimum function, the installation should be made according to DIN 1952 as far as possible.



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SM-08

Miniature Turbine Flowmeter for Fluid Media

Features

/ High accuracy of measurement and resolution

/ Low deviation in mass-production

/ Plastic, brass or st. steel designs

/ Pressure-proof up to 300 bar

/ High temperature resistance

/ Convenient dim. for assembly

/ Affordable low-cost alternative

Description:

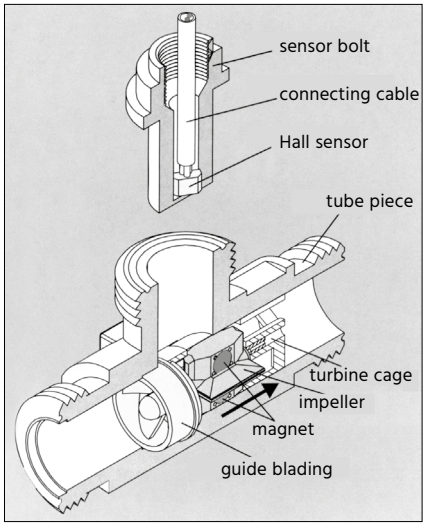
The SM-08 series of flowmeters operates according to the principle of a turbine wheel. In this the fluid flows into the turbine body and gets deflected by the guide blades at an angle of 90°. The resulting tangential flow sets a rotor into a rotation that is proportional to the flow. Depending on the device version, this rotational movement is converted into an output frequency by means of an inductive proximity sensor or a Hall sensor. A main feature of the turbine flowmeter SM-08 is that the deviation in mass-production is very low compared to other similar designs. Consequently, individual tuning for each turbine to match the particular downstream electronic unit becomes unnecessary; the SM-08 is thus ideally suited for use in series applications.

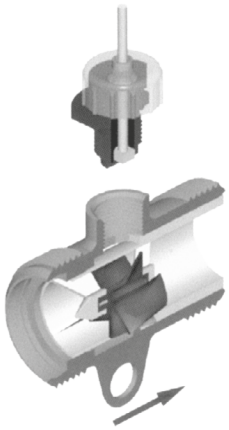
Application:

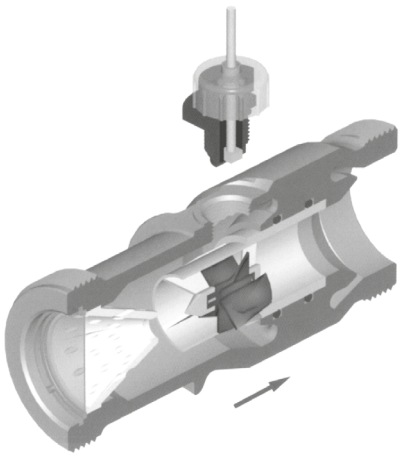
Due to their compact design, wide range of measurement and highly accurate measuring, the SM-08 series of turbine flowmeters is suitable for applications in the following areas:

- Cooling water measurement
- Medical engineering
- Plastics industry
- Solar installations
- Machine tools
- Photo laboratories
- Tapping and dosing installations
- Cooling and heating applications
- Heat volume logging
- and many more...

Measuring principle & Dimensions:







SM-08.15:
Op. range 2. . .20 (2. . .40) l/min
Axial turbine flowmeter
with guide blades

The fluid flowing into the flowmeter gets divided by the guide blades into four partial jets which strike the rotor from four directions and set it into rotation. Due to the uniform load on the bearing from four sides, the forces become largely neutralized and the wear is reduced to a minimum. In addition, extremely hard bearing material such as sapphire and carbide metal ensure extraordinary long life span.

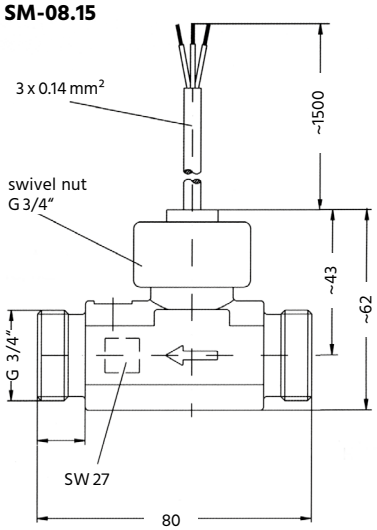
SM-08.25:
Op. range 4. . .80 (4. . .160) l/min
Axial turbine flowmeter

The fluid streaming into the flowmeter sets the turbine wheel into rotation. Due to the high-quality sapphire bearing and low RPM, the turbine has an extraordinarily long life span. The rotor RPM is converted into an electrical pulse signal (frequency).

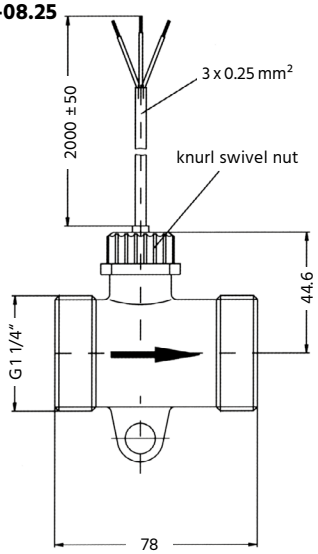
SM-08.40:
Op. range 0.4. . .25 m³/h
Axial turbine flowmeter
with partial stream evaluation

In the center of the brass-made turbine body a plastic turbine system is situated. An annular gap is designed around the turbine system. Part of the fluid stream sets the turbine into rotation while the other part of the stream is allowed to pass through the annular gap without obstruction. The rotor RPM is then converted into an electrical pulse signal (frequency). Due to high-quality sapphire bearing and low RPM, the turbine has an extraordinarily long life span.

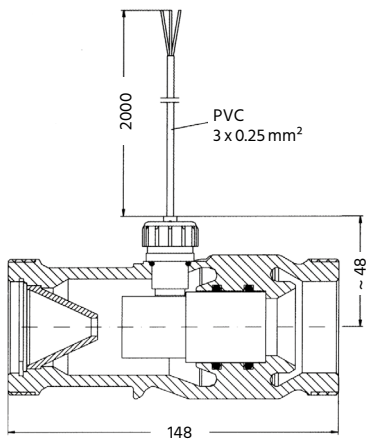
SM-08.15



SM-08.25



SM-08.40



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Materials SM-08.15:

	SM-08.15.V.K.H	SM-08.15.V.M.H	SM-08.15.V.K.I	SM-08.15.V.M.I	SM-08.15.V.M.P	SM-08.15.V.V.P
Pipe section	PPE+PS Noryl 30% fibre-reinforced	brass	PPE+PS Noryl 30% fibre-reinforced	brass	brass	st. steel 1.4571
Sensor housing	PPE+PS Noryl 30% fibre-reinforced		PPE+PS Noryl 30% fibre-reinforced		brass	st. steel 1.4571
Union nut	PA 66		PA 66		brass	without
Turbine cage & rotor	PEI ULTEM		PEI ULTEM		PEEK Victrex™	
O-Ring / seal	NBR		NBR		FKM	
Bearing system / shaft	Shaft Arcap AP1D with hard metal pins in sapphire bearings					
Bearing support	Arcap AP1D					
Rotor assembly	Hard ferrite magnet		st. steel pins		Hard ferrite magnet	
Temp. sensor (opt.)	brass or stainless steel 1.4571		brass or st. steel 1.4571		brass	brass or 1.4571
Sieve filter (optional)	POM / st. steel		POM / st. steel			

Ordering Codes:

Order number	**SM-08.15.**	**V.**	**K.**	**H.**	**N.**	**P.**	**2.**	**x.**	**VE**

SM-08 Axial Turbine Flowmeter with Guide Blades

Operating range /
V = 2. . .40 l/min - continuous flow max. 20 l/min

Material /
K = housing made of PPO Noryl (available for version „I" and „H")
M = housing made of brass (available for version „I", „H" and „P")
V = housing made of stainless steel (available for version „H" and „P")

Version /
H = with Hall sensor
I = with inductive pick-up
P = with Hall sensor up to 300 bar, 150°C

Output signal /
P = PNP (available for version „I" only)
N = NPN (available for version „I", „H" and „P")

Electrical connection /
O = none (with Option T only)
P = 1.5 m PVC cable (high-temperature version with silicon cable)
S = plug connection M12x1, 4-Pin (available for version „I" and „H")

Additional temperature sensor (not for Version P) /
0 = none
1 = PT-100 in brass sleeve
2 = PT-100 in stainless steel sleeve
3 = PT-1000 in brass sleeve
4 = PT-1000 in stainless steel sleeve

Process connection /
A = G 3/4"-male (standard)
I = G 3/4"-female (for high-pressure version in stainless steel only)
x = Connection adapter as per Table „Connection adapter"

Options /
H = with integrated sieve filter, mesh size 0.5 mm ($T_{max.}$ 60°C) (available for version „I" and „H")
Ax = with mounted measuring transmitter 4. . .20 mA (a) (x = operating ranges full scale value 5, 10, 20 or 40 l/min)
VE = with mounted switching output (a)
VEP = with mounted switching output and additional impulse output (a) (5-Pin plug required)
T = prepared for mounted evaluator electronics TD-325 (must be ordered separately)

(a) Available for version „H" and „P" (with Hall sensor).

Tech. Specs SM-08.15:

max. Pressure /
SM-08.15.x.x.H: 10 bar
SM-08.15.x.x.I: 10 bar
SM-08.15.x.x.P: 300 bar

max. Temperature /
SM-08.15.x.x.H: 85°C
SM-08.15.x.x.I: 85°C
SM-08.15.x.x.P: 150°C (only for water)

Accuracy /
SM-08.15.x.x.H: ±0.8 l/min
SM-08.15.x.x.P: ±0.8 l/min at 2. . .20 l/min
SM-08.15.x.x.I: ±0.2 l/min

Repeatability /
SM-08.15.x.x.H: ±0.1 l/min
SM-08.15.x.x.P: ±0.1 l/min
SM-08.15.x.x.I: ±0.05 l/min

Supply /
SM-08.15.x.x.H: 4.5. . .24 VDC
SM-08.15.x.x.P: 4.5. . .24 VDC
SM-08.15.x.x.I: 10. . .30 VDC

Output signal /
SM-08.15.x.x.H: rectangular impulses, 855 ppl (1.2 ml/Puls) NPN Open Collector, max. 10mA
SM-08.15.x.x.P: rectangular impulses, 915 ppl (1.1 ml/Puls) NPN Open Collector, max. 10mA
SM-08.15.x.x.I: rectangular impulses, 1795 ppl (0.6 ml/Puls) NPN or PNP Open Collector. max. 50mA

Cable sheat /
SM-08.15.x.x.H: PVC ($T_{max.}$ 70°C)
SM-08.15.x.x.I: PVC ($T_{max.}$ 70°C)
SM-08.15.x.x.P: silicone ($T_{max.}$ 150°C)

max. Particle size: 0.5 mm
Start-up: from 0.3 l/min
Protection class: IP54

SM-08.25:

Materials SM-08.25:

	SM-08.25.S.M.H	SM-08.25.S.K.H	SM-08.25.S.M.P	SM-08.25.S.V.P
Pipe section	brass, CW724R	PP	brass, CW724R	st. steel 1.4571
Turbine cage	PS-ST Xarec® 20% fibre-reinforced			
Rotor	PS-ST Xarec® 20% fibre-reinforced			
Rotor assembly	Hard ferrite magnete			
Axis	st. steel 1.4539			
Bearing	Sapphire / PA			
Housing for Hall sensor	PPE + PS Noryl™ 30% fibre-reinforced		brass, CW602N / CW614N	st. steel 1.4571
O-Ring	EPDM			
Sieve filter (optional) **associated O-Ring**	st. steel 1.4301 EPDM		st. steel 1.4301 EPDM	
Spacer		PP		

Ordering Codes:

Order number	**SM-08.25.**	**S.**	**K.**	**H.**	**P.**	**2.**	**x.**	**VE**

SM-08 Axial-Turbine flowmeter

Operating range /
S = 4. . .160 l/min - with continuous flow max. 80 l/min

Material /
K = housing made of PP (available for version „H")
M = housing made of brass (available for version „H" and „P")
V = housing made of stainless steel (available for version „P")

Version /
I = with inductive pick-up
H = with Hall sensor
P = with Hall sensor up to 50 bar, 85°C

Electrical connection /
O = none (with option T only)
P = 2 m PVC cable, Tmax. 75°C (available for version „H" only)
S = plug connection M12x1, 4-Pin (available for version „P" only)

Additional temperature sensor /
0 = none
5 = PT-100, 3-wire for SM-08.25.M/V see Table „Connection adapter"

Process connection /
A = G1 1/4"-male
x = connection adapter as per Table „Connection adapter"

Options /
H = with flat filter 0.63 mm, stainless steel, including O-Ring made of EPDM
Ax = with mounted measuring transmitter 4. . .20mA
(x = operating range full scale value 60, 100 or 160 l/min)
VE = with mounted switching output (a)
VEP = with mounted switching output and additional impulse output (a)
T = prepared for mounted evaluator electronics TD-325 (a) (must be ordered separately)

(a) Available for version „H" and „P" (with Hall sensor).

Tech. Specs SM-08.25:

max. Pressure /
SM-08.25.x.x.H: 10 bar
SM-08.25.x.x.P: 50 bar

max. Temperature /
SM-08.25.x.K.H: 80°C at 2 bar, 60°C at 5 bar, 30°C at 10 bar
SM-08.25.x.M.H: 85°C
SM-08.25.x.M.P: 85°C
SM-08.25.x.V.P: 85°C

Accuracy / ± 5% of measured value (up to 5 l/min 7% of measured value)

Repeatability / ± 0.5%

Supply /
SM-08.25.x.x.H: 10. . .30 VDC (optional 4.5. . .26.5 VDC)
SM-08.25.x.x.P: 6.5. . .24 VDC

Output signal /
SM-08.25.x.x.H: rectangular impulses, 65 ppl (15 ml/pulse) NPN Open Collector, max. 19 mA
SM-08.25.x.x.P: rectangular impulses, 65 ppl (15 ml/pulse) NPN Open Collector, max. 19 mA

max. Particle size: < 0.63 mm
Protection class: IP54
Start-up: ab 1 l/min

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SM-08.40:

Materials SM-08.40:

	SM-08.40.S.M.H	SM-08.40.S.M.P
Pipe section	brass, CW724R	
Turbine cage	PS-ST Xarec® 20% fibre-reinforced	
Rotor	PS-ST Xarec® 20% fibre-reinforced	
Rotor assembly	Hard ferrite magnets	
Axis	st. steel 1.4539	
Bearing	Sapphire / PA	
Housing for Hall sensor	PPE + PS Noryl™ 30% fibre-reinforced	brass, CW602N / CW614N
O-Ring	EPDM	
Flow guiding cone	POM	
Sieve filter	st. steel 1.4301	
Retaining ring	st. steel 1.4122	

Ordering Codes:

Order number	**SM-08.40.**	**S.**	**M.**	**H.**	**P.**	**5.**	**x.**	**VE**

SM-08 Axial Turbine Flowmeter with Partial Stream Evaluation

Operating range /
S = 0.4. . .25 m³/h

Material /
M = housing made of brass

Version /
H = with Hall sensor
P = with Hall sensor up to 50 bar

Electrical connection /
O = none (with Option T only)
P = 2 m PVC cable (available for version „H" only)
S = plug connector M12 x 1, 4-Pin (available for version „P" only)

Additional temperature sensor /
0 = none
5 = PT-100, 3-wire see Table „Connection adapter"

Process connection /
A = G 2"-male
x = connection adapter as per Table „Connection adapter"

Options:
Ax = with mounted measuring transmitter 4. . .20 mA
(x = operating range full scale value 150, 250 or 400 l/min)
VE = with mounted switching output (a)
VEP = with mounted switching output and additional impulse output (a)
T = prepared for mounted evaluator electronics TD-325 (a) (must be ordered separately)

(a) Available for version „H" and „P" (with Hall sensor).

Tech. Specs SM-08.40:

max. Pressure /
SM-08.40.x.x.H: 10 bar
SM-08.40.x.x.P: 50 bar

max. Temperature /
SM-08.40.x.x.H: 85°C
SM-08.40.x.x.P: 85°C

Accuracy / ± 7% of the measured value between 0.4. . .3 m³/h
±5 % of the measured value between 3. . .25 m³/h

Repeatability / ± 0.5%

Supply /
SM-08.40.x.x.H: 10. . .30 VDC (optional 4.5. . .26.5 VDC)
SM-08.40.x.x.P: 6.5. . .24 VDC

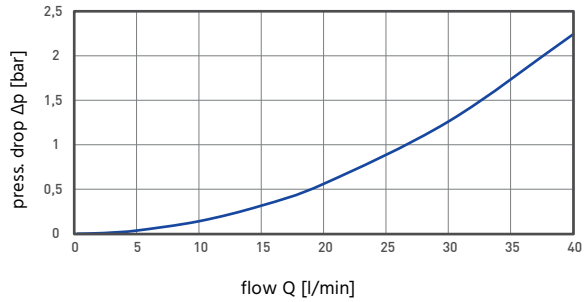
Output signal /
SM-08.40.x.x.H: rectangular imp., 26.6 ppl (37.6 ml/pulse) NPN Open Collector, max. 19 mA
SM-08.40.x.x.P: rectangular imp., 26.6 ppl (37.6 ml/pulse) NPN Open Collector, max. 19 mA

max. Particle size: < 0.63 mm

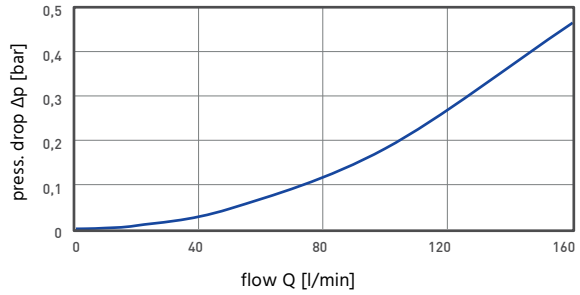
Filter: flat filter 0.63 mm, included
Protection class: IP54
Start-up: from 0.28 m³/h

Pressure drop:

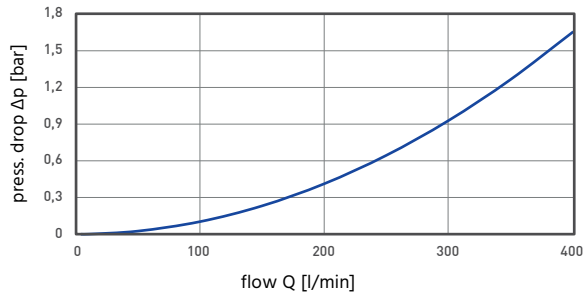
SM-08.15



SM-08.25

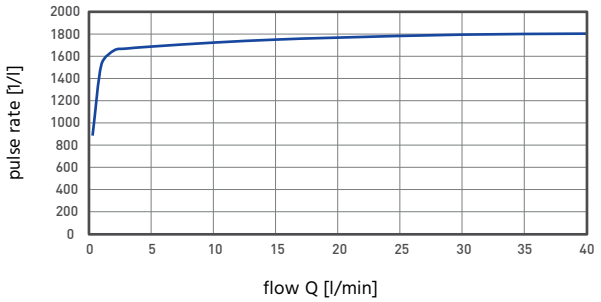


SM-08.40

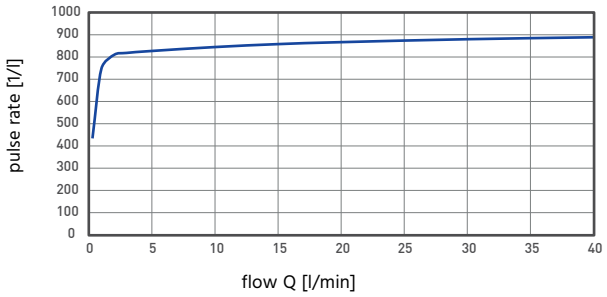


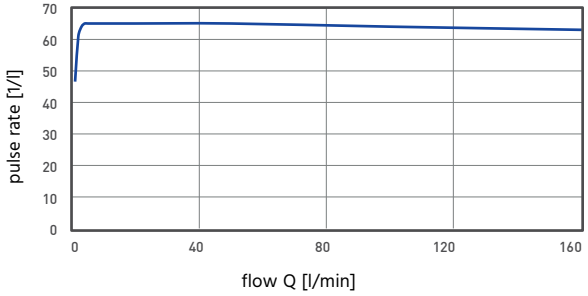
Pulse rates:

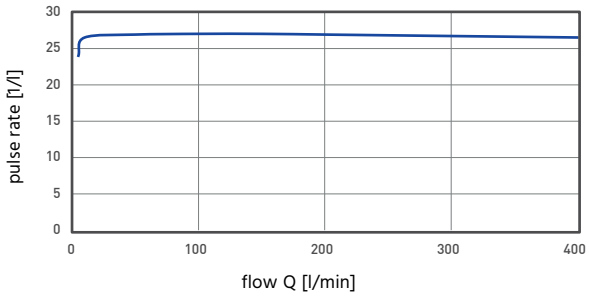
SM-08.15, inductive



SM-08.15, Hall Sensor







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Connection Adapter incl. Sealing:

Connection Adapter – SM-08.15:

Type	Description	fits to:	$T_{max.}$ / $P_{max.}$
A15ST10K	hose spout, PA 6.6, d = 10 mm	SM-08.15	20°C at 10 bar, 60°C at 2.5 bar
A15ST12K	hose spout, PP, d = 12 mm	SM-08.15	20°C at 10 bar, 60°C at 2.5 bar
A15ST15K	hose spout, PP, d = 15 mm	SM-08.15	20°C at 10 bar, 60°C at 2.5 bar
A15ST19K	hose spout, HDPE, d = 19 mm	SM-08.15	20°C at 10 bar, 60°C at 2.5 bar
A15STW13K	hose spout, HDPE, angled, d = 13 mm	SM-08.15	60°C, PN10
A15STW13M	hose spout, brass d = 13 mm	SM-08.15	80°C, PN10
A15KM22K	adhesive sleeve, PVC, d = 22 mm, for pipes with outer diam. 16mm	SM-08.15	20°C at 10 bar, 60°C at 2.5 bar
A15SN20K	welded socket, PP, d = 20 mm	SM-08.15	20°C at 10 bar, 60°C at 2.5 bar
A15VA10M	joint, brass, G 3/8" male	SM-08.15	110°C, PN16
A15VA15M	joint, brass, G 1/2" male	SM-08.15	110°C, PN16
A15VI10M	joint, brass, Ni plated, G 3/8" female	SM-08.15	110°C, PN16
A15VI15M	joint, brass, G 1/2"	SM-08.15	110°C, PN16
A15KL18M	compression fitting, brass, for copper pipe d = 18 mm	SM-08.15	110°C, PN16
A15KL22M	compression fitting, brass, for copper pipe d = 22 mm	SM-08.15	110°C, PN16
A15LA15M	solder connection, brass, for copper pipe d = 15 mm	SM-08.15	90°C, PN16
A15LA18M	solder connection, brass, for copper pipe d = 18 mm	SM-08.15	90°C, PN16

Connection Adapter – SM-08.40:

Type	Description	fits to:	$T_{max.}$ / $P_{max.}$
A40VA40M-PT-100	joint, brass, with PT-100 in brass sleeve, G1 1/2" male	SM-08.40	85°C, PN16
A40VA40M	joint, brass, R1 1/2"male	SM-08.40	85°C, PN16
A40VA50M	joint, brass, G2" male	SM-08.40	85°C, PN16
A40LA42M	solder connection, brass, for copper pipe d = 42 mm	SM-08.40	85°C, PN16

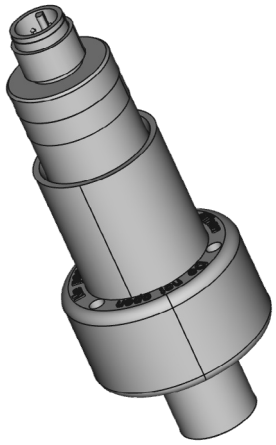
Connection Adapter – SM-08.25:

Type	Description	fits to:	$T_{max.}$ / $P_{max.}$
A25ST25K	hose spout, PP, d = 25 mm	SM-08.25	20°C at 10 bar, 60°C at 2.5 bar
A25ST30K	hose spout, PP, d = 30 mm	SM-08.25	20°C at 10 bar, 60°C at 2.5 bar
A25ST32K	hose spout, PP, d = 32 mm	SM-08.25	20°C at 10 bar, 60°C at 2.5 bar
A25SM25K	welded sleeve, PP, outer diameter. 25 mm	SM-08.25	20°C at 10 bar, 60°C at 2.5 bar
A25KM25K	adhesive sleeve, PVC, outer diameter. 25 mm	SM-08.25	20°C at 10 bar, 60°C at 2.5 bar
A25VA25M-PT-100	joint, brass, with PT-100 in brass sleeve, G1" male	SM-08.25	85°C, Centelen
A25VA25M	joint, Ms, R1" male	SM-08.25	85°C, Centelen
A25VA32M	joint, brass, R1 1/4" male	SM-08.25	85°C, Centelen
A25LA28M	solder connection, for copper pipe d = 28 mm	SM-08.25	85°C, PN 16, Centelen
A25VA25V	joint, VA, R1" male	SM-08.25	85°C, Centelen

Accessory – SM-08:

Type	Description
SM-08.Z.L3	connecting cord for turbine-flow-sensors with tipped coupling M12 x 1, 4-Pin, shielded, L = 3 m $T_{max.}$ = 70°C
SM-08.Z.L5	as above, however L = 5 m
SM-08.Z.L10	as above, however L = 10 m
SM-08.Z.S	coupling box M12 x 1, 4-Pin, for self-customization

Limit Value Emitter (optional) SM-08. . .VE(P)



Description: The SM-08 can be transformed into a flowswitch with the help of an optional limit value emitter. The turbine delivers a flow-proportional frequency signal to a microprocessor. This monitors the set minimum flow and activates the alarm contact without potential, if the flow falls short. Even a likely blockage in the turbine is reliably identified and signaled. Besides the switching output (contact), optionally, an impulse signal is available, so in addition to the safe monitoring, a continuous or temporary flow measurement can also be performed.

Areas of application: Monitoring of cooling circuits in high-end equipment such as laser installations, HF generators etc.

Switch position	Setpoint in l/min					
	SM-08.15		SM-08.25		SM-08.40	
	rising	falling	rising	falling	rising	falling
0	1	0.5	5	3	10	7
1	1.5	1	7	5	13	10
2	2	1.5	8	6	19	15
3	2.5	2	10	8	24	20
4	3	2.5	12	10	30	25
5	3.5	3	14	12	35	30
6	4	3.5	17	15	40	35
7	5	4.5	20	18	47	40
8	6	5.5	22	20	58	50
9	8	7.5	27	25	75	65
A	10	9.5	33	30	90	80
B	12	11.5	38	35	115	100
C	16	15.5	44	40	150	130
D	20	19.5	55	50	190	160
E	25	24.5	75	70	230	200
F	30	29.5	105	100	310	275

The specified setpoints refer to water, 20°C. Customer-specific setpoint tables can be implemented for above 25 devices.

Technical Specifications:

Setpoint range / see „Setpoint table“

Accuracy of switching if used with /

SM-08.15: 0.5. . .29.5 l/min
± 2% of Setpoint + x

SM-08.25: 3. . .100 l/min
± 4% of Setpoint + x

SM-08.40: 7. . .275 l/min
± 6% of Setpoint + x
x = accuracy of turbine flow sensor

Setpoint adjustment / 16 different Setpoints, usable by means of 16-digit rotary switch

Switching hysteresis /

SM-08.15: 0.5 l/min

SM-08.25: 2. . .5 l/min

SM-08.40: 3. . .35 l/min

Output /

Switching output: electrically insulated contact, opens in the case of lack of flow, max. contact rating 125 VAC/DC, 100 mA

Pulse- and switching output: switching output against power supply max. contact rating 100 mA
Pulse output: flow-proportional frequency signal, NPN, max. 100 mA

Display: 2 LED – yellow: flow OK, red: alarm

Electr. connection: 4-Pin plug, M12 x 1

Supply voltage: 12. . .24 VDC, max. 25mA

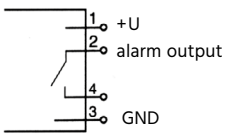
max. Media temp.: 80°C

Protection class: IP54 with closed sleeve and connected socket

Housing: PA transparent

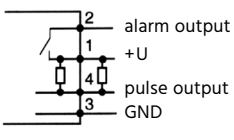
Electrical Connection:

Switching output only



or

Switching output and Pulse output



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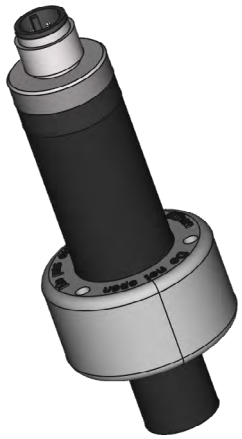
Measuring Transmitter (optional) SM-08. . .Ax



All SM-08 series of turbine flowmeters can be equipped with an integrated F/I measuring transmitter. With this they transmit an analogue signal output of 4. . ..20mA instead of the im-pulse output.

Technical Specifications:

Ouput /	4. . .20mA, power limiting at ~26mA
Scaling /	as per Ordering codes SM-08.15, SM-08.25, SM-08.40. other scaling on request
Supply voltage /	18. . .30VDC
max. Power /	30 mA
max. Load /	250 Ohm to GND
El. connection /	4-Pin plug, M12 x 1
max. Media temp. /	80°C
Residual ripple /	0.2 mA_{ss} over the entire range
Type /	3-wire, galvanically not separated
Casing material /	PA
Protection class /	IP54

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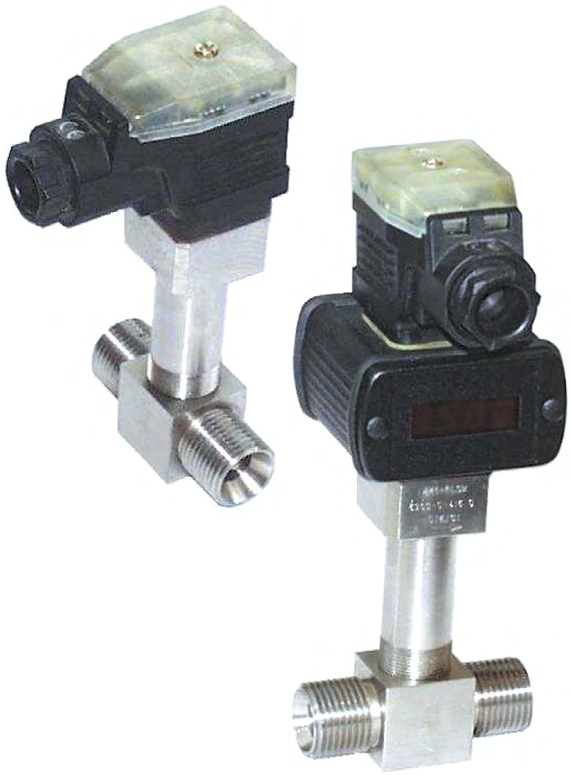


SM-11N

Stainless Steel Turbine Flowmeter

Features

/ Accuracy at ± 0.5% of measured value

/ Operating ranges up to 550 m3/h

/ Suitable for plug-in display SD-01

/ Up to 400 bar

/ Carbide metal or PTFE bearings

/ Flange or tube connection

Description:

The turbine wheel of the flow meter SM-11N is positioned concentrically on both sides and it rotates inside the housing proportionally to the mean flow velocity. An inductive Pick-Up screw-mounted on the housing wall deflects the turbine wheel's rotational movement and outputs a sinus-shaped power signal to the amplifier below the plug connector which in turn generates a square-shaped impulse signal in the PNP 3-wire circuit. Optionally, the bearings for the SM-11N can be made of PTFE or carbide metal, while all other wetted parts are made of stainless steel. This allows the SM-11N to conveniently measure a wide range of low viscosity fluids.

Application:

The turbine flow meter SM-11N is used if flow volumes of low viscosity fluids need to be measured highly accurately. The permissible temperature range up to 120°C and pressure levels up to 400 bar make the device capable of handling a wide range of applications covering the entire industry. Depending on the process, the user can opt for a tube or flange connector. At the output of SM-11N a PNP transistor impulse signal is available which is compatible with most downstream evaluation devices and, if required, can be easily converted into a 4. . .20 mA or 0. . .10 V DC analogue output. Moreover, the Profimess plug-in display SD-01, can be mounted directly between the plug and the cable box of the SM-11N and does not require additional power supply, offering an excellent way to visualize the measured value.

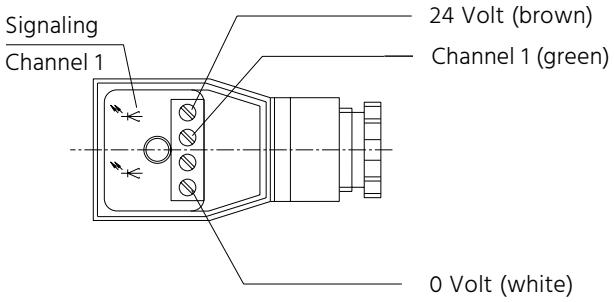
Technical Specifications:

Accuracy /	see table „Bearing types“
Mounting position /	horizontal ±5°
Housing material /	stainless steel 1.4541
Flange material /	steel 1.0566 or stainless steel 1.4541
Bearing material /	PTFE or carbide metal
Pressure /	see table for connector types
Media temperature /	-20°C to +120°C for steel flange connection -30°C to +120°C for stainless steel flange connection or tube connection
Ambient temp. /	-20°C to +60°C for steel flange connection -30°C to +60°C for stainless steel flange connection or tube connection
Required inlet section /	10 x pipe diameter to achieve the specified accuracy
Required outlet section /	5 x pipe diameter to achieve the specified accuracy

Electrical Specifications:

No. of measuring channels /	1
Operating voltage /	Ub = 12. . .30 VDC
Output signal /	voltage impulses PNP
Impulse amplitude /	$U_A \geq 0{,}8\ U_B$
Impulse form /	square
Duty cycle (Channel) /	1:1 ± 15 %
Power requirement /	max. 0.6 W
Output power /	max. 0.3 W short-circuit protected
Protection class /	IP65 DIN40050
Options /	ATEX approval for EX Zone 1, intrinsically safe

Electrical connection /

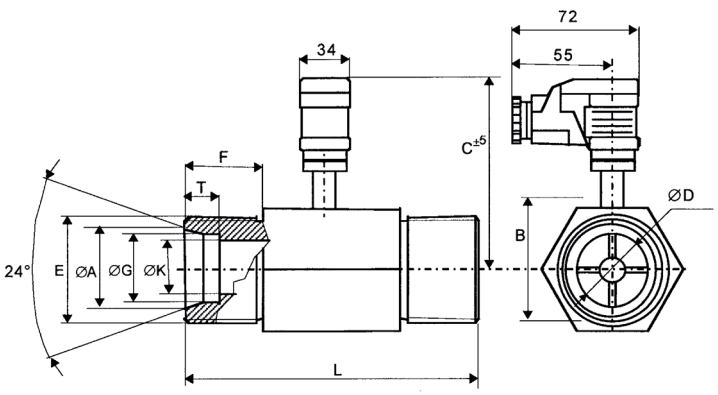


Bearing types:

Type	ND	Carbide metal		PTFE	
		Flow in l/min	Accuracy	Flow in l/min	Accuracy
SM-11N.1	6	0.92. . .4.58	± 1% of m.v.	0.92. . .4.58	± 1% of m.v.
SM-11N.2	6	1.83. . .9.17	± 1% of m.v.	1.83. . .9.17	± 1% of m.v.
SM-11N.3	12	3.67. . .18.3	± 1% of m.v.	3.67. . .18.3	± 1% of m.v.
SM-11N.4	15	7.33. . .36.7	± 0.5% v. MW.	7.33. . .36.7	± 0.5% of m.v.
SM-11N.5	15	13.3. . .66.7	± 0.5% v. MW.	13.3. . .66.7	± 0.5% of m.v.
SM-11N.6	18	26.6. . .133	± 0.5% v. MW.	13.3. . .133	± 0.5% of m.v.
SM-11N.7	25	53.4. . .267	± 0.5% v. MW.	26,7. . .267	± 0.5% of m.v.
SM-11N.8	37	113. . .567	± 0.5% v. MW.	56,7. . .567	± 0.5% of m.v.
SM-11N.9	50	227. . .1133	± 0.5% v. MW.	113. . .1133	± 0.5% of m.v.
SM-11N.10	75	450. . .2250	± 0.5% v. MW.	225. . .2250	± 0.5% of m.v.
SM-11N.11	100	900. . .4500	± 0.4% v. MW.	720. . .4500	± 0.4% of m.v.
SM-11N.12	150	1833. . .9167	± 0.4% v. MW.	1464. . .9167	± 0.4% of m.v.
SM-11N.13	200	3667 - 18333	± 0.4% v. MW.	2933 - 18333	± 0.4% of m.v.
SM-11N.14	250	6333 - 31667	± 0.4% v. MW.	5067 - 31667	± 0.4% of m.v.
SM-11N.15	300	9000 - 45000	± 0.4% v. MW.	7200 - 45000	± 0.4% of m.v.
SM-11N.16	400	13333 - 66667	± 0.4% v. MW.	10667 - 66667	± 0.4% of m.v.

Dimensions tube-connection:

Type	Ø D [mm]	Ø A [mm]	B [mm]	C [mm]	L [mm]	E [mm]	F [mm]	Ø G [mm]	Ø K [mm]	Ø T [mm]
SM-11N.1	6	14.3	25	82	58	M20 x 1.5	12	12	8	7.5
SM-11N.2	6	14.3	25	82	58	M20 x 1.5	12	12	8	7.5
SM-11N.3	12	18.3	36	86	76	M24 x 1.5	14	16	12	8.5
SM-11N.4	15	22.9	41	87	76	M30 x 2	16	20	15	10.5
SM-11N.5	15	22.9	41	87	76	M30 x 2	16	20	15	10.5
SM-11N.6	18	27.9	48	89	130	M36 x 2	18	25	19	12
SM-11N.7	25	38	48	92	155	M52 x 2	16	35	27	10.5



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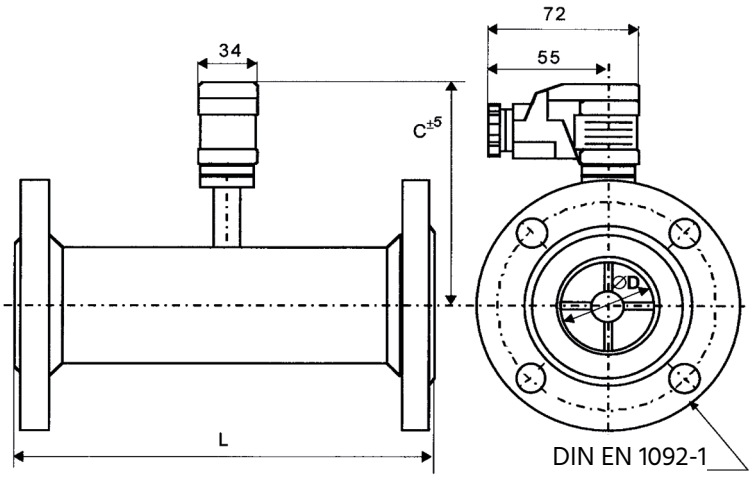
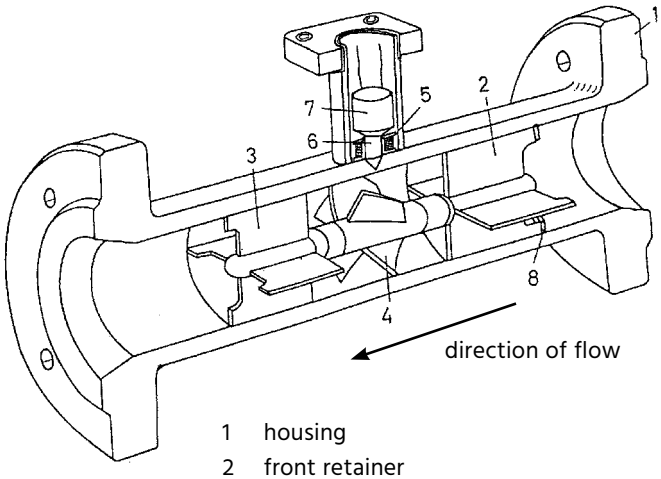
Dim. flange-connection:

Type	Ø D [mm]	L [mm]	C [mm]	Connecting flange
SM-11N.1	6	114	95	DN10
SM-11N.2	6	114	95	DN10
SM-11N.3	12	127	102	DN15
SM-11N.4	15	127	115	DN15
SM-11N.5	15	127	115	DN15
SM-11N.6	18	141	115	DN20
SM-11N.7	25	153.5	126	DN25
SM-11N.8	37	179	126	DN40
SM-11N.9	50	198	132	DN50
SM-11N.10	75	228	140	DN80
SM-11N.11	100	355	154	DN100
SM-11N.12	150	368	180	DN150
SM-11N.13	200	458	236	DN200
SM-11N.14	250	458	265	DN250
SM-11N.15	300	458	290	DN300
SM-11N.16	400	610	345	DN400





1 housing
2 front retainer
3 rear retainer
4 turbine wheel
5 signal emitter coil
6 iron core
7 magnet
8 clamp ring

Connection types:

Type	ND	Available pressure levels in bar	
		Tube connection	flange
SM-11N.1	6	320	40/160/250/320/400
SM-11N.2	6	320	40/160/250/320/400
SM-11N.3	12	320	40/160/250/320/400
SM-11N.4	15	320	40/160/250/320/400
SM-11N.5	15	320	40/160/250/320/400
SM-11N.6	18	320	40
SM-11N.7	25	320	40/160/250/320/400
SM-11N.8	37		40/160/250/320/400
SM-11N.9	50		40/64/100/160/250/320/400
SM-11N.10	75		10/40/64/100/160/250/320/400
SM-11N.11	100		10/40/64/100/160/250
SM-11N.12	150		10/40/64/100/160
SM-11N.13	200		10/16/25/40/64
SM-11N.14	250		10/16/25/40/64
SM-11N.15	300		10/16/25/40/64
SM-11N.16	400		10/16/25/40/64

Ordering Codes:

Order number	SM-11N.	1.	2.	1.	4.

SM-11N Stainless Steel Turbine Flowmeter

Operating range end/

1 = 0,275 m^3/h
2 = 0,55 m^3/h
3 = 1,1 m^3/h
4 = 2,2 m^3/h
5 = 4 m^3/h
6 = 8 m^3/h
7 = 16 m^3/h
8 = 34 m^3/h
9 = 68 m^3/h
10 = 135 m^3/h
11 = 270 m^3/h
12 = 550 m^3/h
13 = 1100 m^3/h
14 = 1900 m^3/h
15 = 2700 m^3/h
16 = 4000 m^3/h

Bearing material /

1 = carbide metal
2 = PTFE

Process connection /

1 = tube connection
2 = stainless steel flange connection
3 = steel flange connection

Pressure levels /

1 = 10 bar
2 = 40 bar
3 = 64 bar
4 = 100 bar
5 = 160 bar
6 = 250 bar
7 = 320 bar
8 = 400 bar

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SM-16

Turbine Flowmeter for Fluid Media without Auxiliary Power Supply

Features

/ Counter and/or flowmeter versions
/ Local 6-digit LCD display
/ Battery-operated, replaceable
/ Aluminium, nylon or st. steel versions
/ Operating ranges up to 1135 l/min
/ Convenient dimensions for assembly
/ ATEX II 1G Ex ia IIC T6

Description:

The SM-16 series of turbine flowmeters consists of an interchangeable turbine which is built into a flow housing made of nylon, aluminium or stainless steel and a local evaluator and display electronic unit. This functions as a total and a partial volume counter and as a flowmeter. The turbine wheel is set into rotation by the streaming medium. The ferrites embedded into the turbine blades are scanned through an inductive pick-up system. The sequence of impulses generated thus is proportional to the flow and is displayed by means of a microprocessor controlled electronic unit.

Application:

Due to the interchangeable battery the devices do not depend on external power supply and, therefore, they can be deployed without extensive cabling wherever flow volumes need to be accurately measured or counted locally. The integrated microprocessor allows on-the-spot calibration with the result that accuracy is increased or the device can be adjusted, apart from water, for even highly viscous media.

Technical Specifications:

Medium / low-viscosity (higher viscosities with on-the-spot calibration)

Process connection / 1/2" ISO female thread
(only operating range 14)
3/4" ISO female thread
(only operating range 11, 12, 16)
1" ISO female thread
(only operating range 15)
1 1/2" ISO female thread
(only operating range 17)
2" ISO female thread
(only operating range 13, 18)

max. Temperature / -18. . .+60 °C

max. Pressure /

- Al-housing: 20 bar
- Nylon-housing: 10 bar
- St. steel-housing: 100 bar - A high pressure version up to 200 bar for the st. steel housing is available on request.

Supply / 2x lithium battery, approx. lbattery life: 5 years

Display / LCD, 6-digit automatic On and Off switching

Accuracy / **only applies to low-viscosity liquids:**

- Range 11: bis ± 5% ***
- Range 12,13,14: ± 1.5%
- Range 15,16: ± 1.0%
- Range 17,18: ± 0.75%
(± 1.0% possible with on-site calibration)

*** Accuracy can vary up to ± 5% depending on installation and fluid type. Field calibration is recommended for best accuracy.

Protection class / IP 44

Dimensions in mm:

Nylon- and Aluminium housing		Operating ranges
102 x 63 x 51 mm	1"	11, 12
152 x 114 x 76 mm	2"	13
St. Steel housing		
107 x 46 x 51 mm	1/2"	14
109 x 51 x 51 mm	3/4"	15
114 x 56 x 51 mm	1"	16
135 x 71 x 68 mm	1 1/2"	17
160 x 81 x 84 mm	2"	18

Ordering Codes:

Order number	SM-16.	Q9.	A.	11.	0

SM-16 Turbine Flowmeter

Version /
Q9 = counter for total and partial volume and flowmeter

Material /
A = aluminium housing
N = nylon housing
E = stainless steel housing

Operating range (nylon and aluminium housing) /
11 = 1 . . . 11 l/min
12 = 11 . . . 190 l/min
13 = 104 . . . 1135 l/min (only aluminium housing)

Operating range (stainless steel housing) /
14 = 3.8. . .37.9 l/min
15 = 7.6 . . . 75.7 l/min
16 = 18.9 . . . 190 l/min
17 = 38.0 . . . 380 l/min
18 = 76.0 . . . 760 l/min

Special issues /
0 = none
1 = please specify in detailed text
2 = ATEX approval, ATEX II 1G Ex ia IIC T6 Ta = -40. . .+60°C; IP65

Special Versions /

For the operating range 10. . .100 l/min, a low-cost version of the SM-16 for petrol, diesel and kerosene in aluminium or another version for water in nylon that operates with accuracy of 5 % and up to 20 bar for aluminium housing, 10 bar for nylon housing pressure is available (without ATEX approval). The max. operation temperature is from -10. . .+54°C. These versions function purely as flow counters.

Ordering Codes for this Version:
SM-16.Q9.A.99V (diesel)
SM-16.Q9.N.99V (water)

Electronic /

Counter for total volume (not resettable) and partial volume counter (resettable) and current value meter. Field calibration on EEPROM possible.

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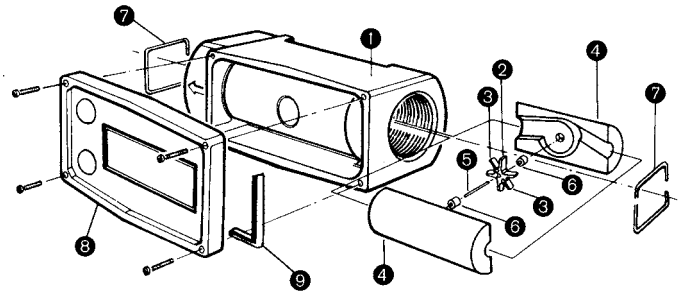
Materials:

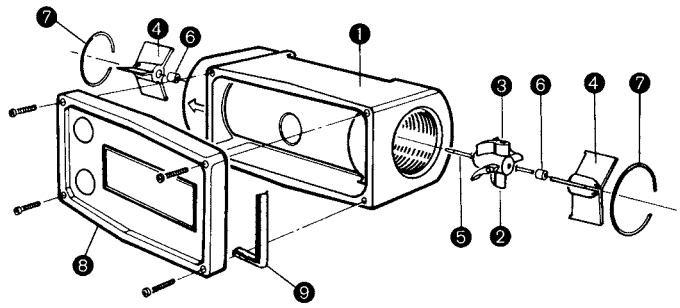
	Nr.	Al-Version	Nylon version	St. steel version
Housing	1	aluminium	nylon	st. steel
Turbine	2	nylon	nylon	PVDF
Rotor mounting	3	ferrit	ferrit	ferrit
Retainer	4	nylon	nylon	PVDF
Axis	5	tungsten-carbide	tungsten-carbide	tungsten-carbide
Bearing	6	ceramic	ceramic	ceramic
Lantern ring	7	st. steel	st. steel	st. steel
Ellectronics housing	8	nylon	nylon	nylon
Sealing	9	rubber	rubber	rubber

Layout:

1. . .11 l/min.



11. . .190 l/min. and 114. . .1135 l/min.



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PF-222

Portable Ultrasonic Liquid Flowmeter according to Transit-Time Difference Method

Features

/ Measurement through the pipe

/ Non-contacting

/ Easy to install

/ For pipes up to 1000 mm

/ Operating temp. up to 135°C

/ Reynoldsnumber correction

/ Cost effective

/ Ideally suited for difficult media

Description:

The portable ultrasonic liquid flow meters of the PF series measure the flow in a closed pipe according to the cross correlation method without the need for any mechanical parts to be inserted through the pipe wall. Two ultrasonic transducers are mounted to the pipe with a fastening rail. In the course of commissioning, individual data of the measuring point, like for example the medium, pipe material, pipe diameter, wall thickness etc., is entered into the transmitter. The ideal seperation distance of the two transducers is then calculated by the transmitter in response to the entered data concerning the pipe and fluid characteristics.In the measuring mode the transducers work alternating as emitter and receiver. The transit time of the ultrasound between the transducers is measured once in flow direction and once against the flow direction. Because the ultrasound transmitted in the same direction as the liquid flows is faster than against it, a time difference which is directly proportional to the flow velocity of the liquid and independent of the individual features of the fluid results. The PF-222 is capable to transmit the recorded flow data as analog output or pulse output and also in alphanumeric text on the built-in LCD backlit graphic display as flow rate or velocity together with totalized values. The internal battery of the PF-222 allows up to 14 hours of operating time, depending on the output utilisation and backlight usage. The PF-222 is delivered either with transducers A for pipe sizes 13 mm to 115 mm or with transducers B for pipe sizes 50 mm to 1000 mm.

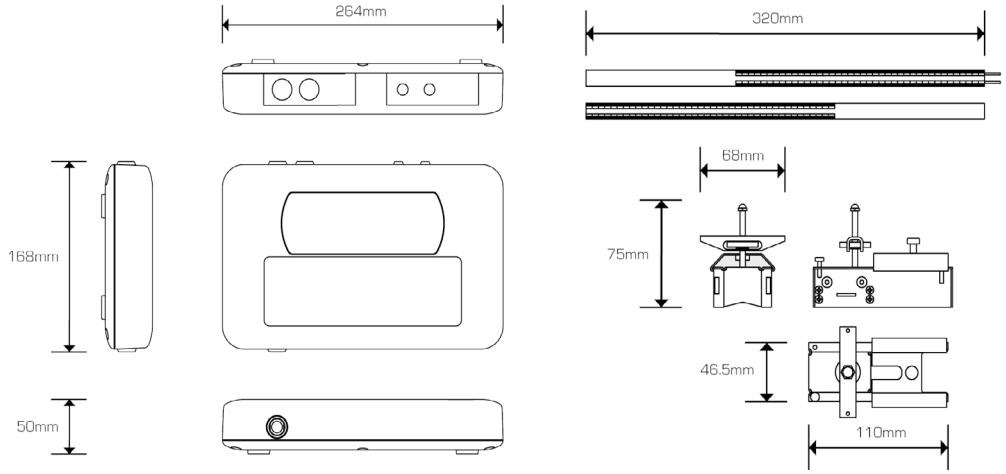
NEW: The PF-222 can now be operated with both sensor pairs A/B.

Application:

- Building services
- Pump verification
- Leak detection
- Fuel oil measurement
- Filter sizing and inspection
- Ultrapure water
- Hydraulik system testing
- Heavy fuel oil
- Balancing systems

and much more...

Dimensions in mm:



Technical Specifications:

Equipment

PF-222.A / evaluation unit with backlit graphic display

0/4. . .20 mA-output

language options:
German, English, French, Spanish

transducers A or
pipe outer diameter 13. . .115 mm
temperature range -20. . .+135°C

extra strong IP67 carrying case from
PP foam inlay and double walls, cable,
instruction manual, ancillary equipment

transducer guide rails with all mounting hardware

test piece for confirmation of correct system operation

The version PF-222.B contains the following:

transducers B for pipe outer diameter 50. . .1000 mm
temperature range -20. . .+135°C

instead of the transducers A. The rest of the equipment is identical.

The PF-222.A/B version contains both pairs of sensors, the rest of the version is identical.

Flow range / 0.1. . .20 m/s, bi-directional

Accuracy / ± 0.5% up to ± 2% of measuring value
for flow velocities > 0.2 m/s
and pipe inner diameters > 75 mm

± 3% of measuring value for
flow velocities > 0.2 m/s
and pipe inner diameters 13-75 mm

Electrical Specifications:

Outputs / 3 x Pulse Output: Pulse or Frequency.
Opto Isolated MOSFET relay.
4. . .20mA flow proportional output,
optically isolated 1500 volts 620 ohms
maximum load.
Frequency max. 200 Hz
Pulse > 100 V AC/DC, 150 mA

Display / 64 x 240 Pixel

Exposition / continuous display of battery status, signal strength and flow information (counter and flow)

Keypad / 16 keys

Supply voltage / rechargeable battery or line voltage

Battery capacity / 14 hours, 2,5 charge time

Line voltage / 110. . .240 VAC, 50 Hz ± 10%

Approval / CE

Ordering Codes:

Order number	**PF-222.**	**A**

PF-222 Portable Ultrasonic Liquid Flowmeter according to Transit Time Difference Method

Transducers /

A = with transducers A for pipe diameters 13. . .115 mm
B = with transducers B for pipe diameters 50. . .1000 mm
A/B = with transducers A/B

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PF-333

Portable Ultrasonic Liquid Flowmeter according to Transit Time Difference Method

Description:

The portable ultrasonic liquid flow meters of the PF series measure the flow in a closed pipe according to the transit-time difference method without the need for any mechanical parts to be inserted through the pipe wall. Two ultrasonic transducers are mounted to the pipe with a fastening rail. In the course of commissioning, individual data of the measuring point, like for example the medium, pipe material, pipe diameter, wall thickness etc. is entered into the transmitter. The ideal seperation distance of the two transducers is then calculated by the transmitter in response to the entered data concerning the pipe and fluid characteristics. In the measuring mode the transducers work alternating as emitter and receiver. The transit time of the ultrasound between the transducers is measured once in flow direction and once against the flow direction. Because the ultrasound transmitted in the same direction as the liquid flow is faster than against it, a time difference which is directly proportional to the flow velocity of the liquid and independent of the individual features of the fluid results. The PF-333 is capable to transmit the recorded flow data as analog output or pulse output and also in alphanumeric text or graph on the built-in LCD backlit graphic display as flow rate or velocity together with totalized values. The internal battery of the PF-333 allows up to 14 hours of operating time depending on the output utilisation and backlight usage. The internal logger can store up to 100.000k data points. By use of the provided Windows® based software the logged data can be output directly to a PC using the RS232/USB interface or stored in the instrument`s non-volatile memory for downloading at a later time.

Features

/NEW: Optional as heat meter

/ Measurement through the pipe

/ Non-contacting

/ Easy to install

/ For pipes up to 5000 mm

/ Operating temp. up to 200°C

/ Reynoldsnumber correction

/ Cost effective

/ Ideally suited for difficult media

Application:

- Building services
- Pump verification
- Leak detection
- Fuel oil measurement
- Filter sizing and inspection
- Ultrapure water
- Hydraulik system testing
- Heavy fuel oil
- Balancing systems

and much more...

Technical Specifications:

Equipment

PF-333.A/B/D / evaluation unit with backlit graphic display

RS232 and USB (both on board)

language options:
German, English, French, Spanish

transducers A for
pipe outer diameter 13. . .115 mm
temperature range -20. . .+135°C (-20. . .+200°C)

transducers B for
pipe outer diameter 50. . .2000 mm
temperature range -20. . .+135°C (-20. . .+200°C)

transducers D for
pipe outer diameter 1500. . .5000 mm
temperature range -20. . .+135°C

extra strong IP67 carrying case from
PP foam inlay and double walls, cable,
instruction manual, ancillary equipment

transducer guide rails with all mounting hardware

test piece for confirmation of correct system operation

WINDOWS® based software package which works with 2000/ XP/ Vista/ Windows 7 operating systems

Flow range / 0.1. . .20 m/s, bi-directional

Data logger / 100.000k memory points, up to 12 recording blocks with different names, data is displayed either as graph or as text in graphic display in Real Time or from the memory and can be transmitted to a WINDOWS®-based PC via RS232 or USB interface.

Accuracy / ± 0,5% up to ± 2% of measuring value
for flow velocities > 0,2 m/s
and pipe inner diameters > 75 mm
± 3% of measuring value for
flow velocities > 0,2 m/s
and pipe inner diameters < 75 mm

Option:

Heat meter / Measurement Technique: Ultrasonic, cross-correlation transit time method for flow measurement and PT100 Class B 4 wire for temperature measurement.

Heat measurement: The Heat/Energy calculation is designed to comply with EN1434 section 6.

Temperature sensors: Clamp-on PT100 Class B 4 wire, range 0. . .200°C (32. . .392°F), resolution 0.1°C (0.18°F). Minimum delta T is 0.3°C

Electrical Specifications:

Outputs / 3 x Pulse Output: Pulse or Frequency. Opto Isolated MOSFET relay. 4-20mA flow proportional output, optically isolated 1500 volts 620 ohms maximum load.
Frequency max. 200 Hz
Pulse > 100 V AC/DC, 150 mA

Display / 64 x 240 Pixel

Exposition / continuous display of battery status, signal strength and flow information (counter and flow)

Keypad / 16 keys

Supply voltage / rechargeable battery or line voltage

Battery capacity / 14 hours, 2,5 hours charge time

Line voltage / 110. . .240 VAC, 50 Hz ± 10%

Approval / CE

Ordering Codes:

Order number	**PF-333.**	**A**

PF-333 Portable Ultrasonic Liquid Flowmeter according to Transit Time Difference Method

Transducers /

A = with transducers A for pipe diameters 13. . .115 mm
AH = high temperature version A for -20. . .+200°C
B = with transducers B for pipe diameters 50. . .2000 mm
BH = high temperature version B for -20. . .+200°C
D = with transducers D for pipe diameters 1500. . .5000 mm
AB = with both types
ABH = high temperature version A and B for -20. . .+200°C

Option /

0 = none
HM = heat meter

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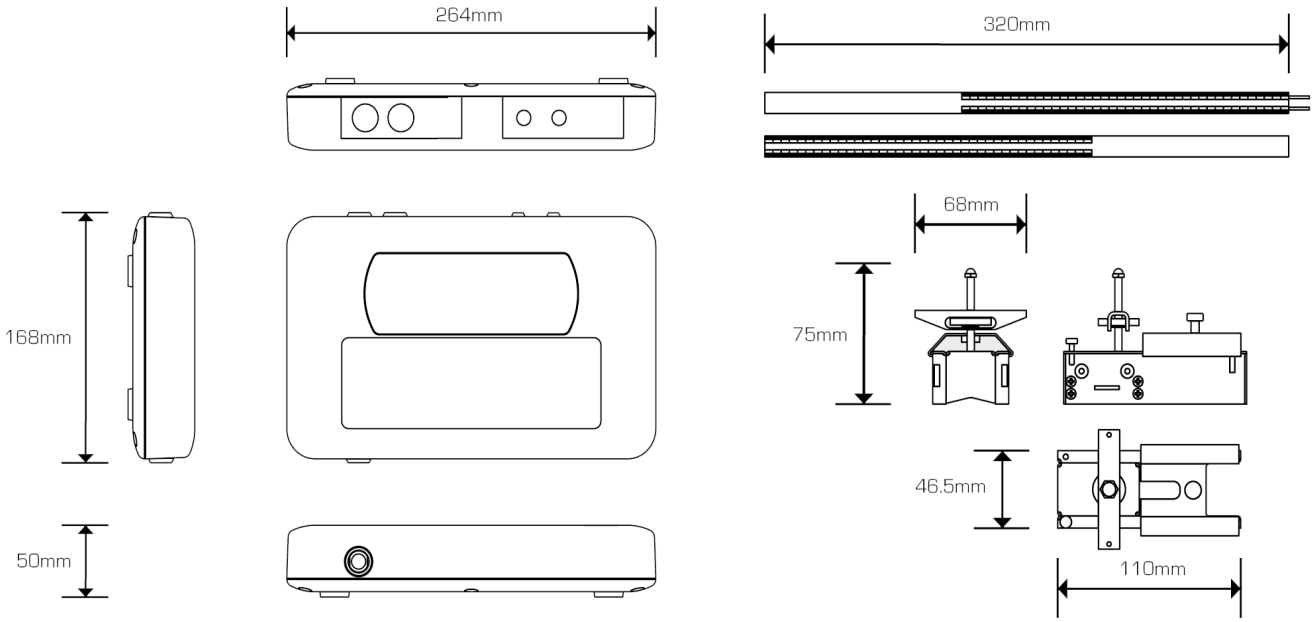
Dimensions in mm:



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PF-D550

Portable Doppler Flow Meter for Dirty or Aerated Liquids

Features

/ Measurement through the pipe
/ Easy calibration
/ No pressure drop
/ Ideal for problem liquids
/ For pipes ½“ to 180“ ID
/ Operating temp. up to 120°C
/ 300,000 point data logger
/ 4. . .20 mA output (AC powered)
/ 10-Digit totalizer
/ AC/DC operation
/ Built-in rechargeable battery

Description:

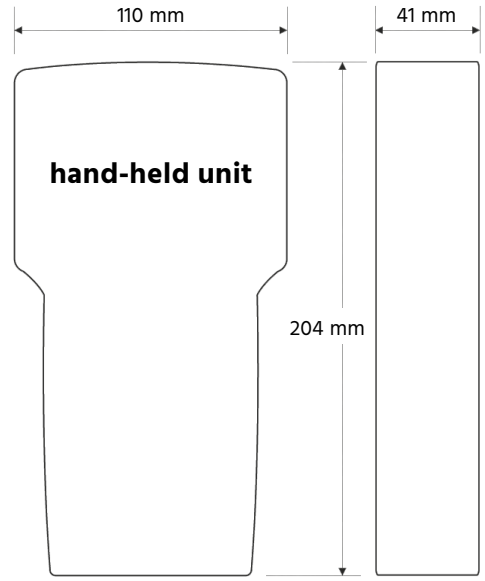
The PF-D550 ultrasonic sensor injects high frequency sound through the pipe wall and into the flowing liquid. Gas bubbles or solids suspended in the liquid reflect the ultrasonic signal back to the sensor. When this sound is reflected from moving bubbles or particles it is returned to the sensor at an altered frequency. This frequency shift is called the Doppler effect. The PF-D550 continuously measures the change from it's transmitted frequency to the received frequency to accurately calculate flow.

Application:

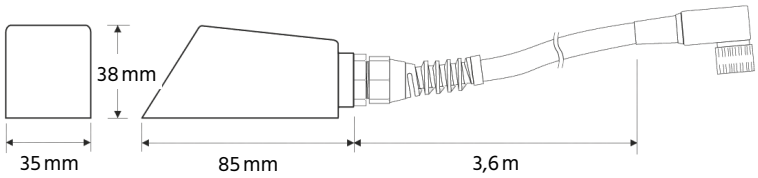
The PF-D550 works best with difficult liquids in applications that would damage regular flow meters. Because the sensor is mounted on the outside of the pipe, there is no contact with the moving fluid. The ultrasonic sensor straps onto the outside of pipes 12.5 mm (½“) ID or larger and measures flow in common pipe materials: PVC, carbon steel, stainless steel, cast iron, fiberglass and lined pipes... any pipe that conducts ultra-sound. Doppler signals cannot be transmitted through pipe walls which contain air pockets (materials like concrete and wood), or loose insertion liners (with an air gap between the liner and pipe wall). Because the sensor is so easy to install you can test any application and pipe material in a few minutes.

Recommended for: Sewage, Treated Wastewater, Aerated Water, Sludge and Slurries, Chemicals and Solvents, Viscous Liquids, Abrasives, Food Products, Pulp Stock, Acids and Caustics.

Dimensions in mm:



Sensor



Technical Specifications

Flow rate /	± 0.075. . .12.2 m/s
Accuracy /	± 2 % of full scale, requires solids or bubbles minimum size of 100 microns, minimum concentration 75 ppm
Repeatability /	± 0.25 %
Linearity /	± 0.5 %
Sensitivity /	adjustable damping and cut-off
max. Temperature /	-23. . .+60°C (hand-held unit)
Outputs /	4. . .20 mA analogue output and USB
min. Ø-Pipe /	12.5 mm inner diameter 15.0 mm outer diameter
max. Ø-Pipe /	4500 mm inner diameter
max. Temperature sensor /	-40. . .+120 °C
Frequency /	640 kHz
Housing material /	st. steel
Sensor cable /	3.6 m shielded cable
Mounting kit /	stainless steel pipe clamp, silicone coupling compound (150 gr.)
Data logger /	300.000 points with time and date

Electrical Specifications:

Output /	4. . .20 mA (500 Ω) when AC-powered
Display /	4-digit white, backlit matrix
Exposition /	flow rate, totalizer, operating mode and calibration menu
Power supply /	built-in battery (NiMH) /supply voltage
Supply voltage /	100. . .240 VAC, 50. . .60 Hz
Battery capacity /	up to 18 hours continuous operation

Ordering Codes:

Order number	**PF-D550.**	**A**
PF-D550 Portable Doppler Flow Meter		

Version /
0 = basic version
1 = basic version with 15 m (50 ft) sensor cable extension, shielded

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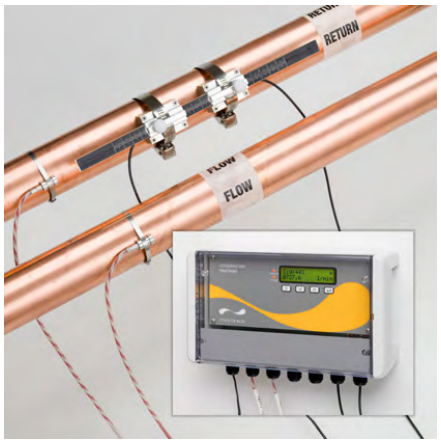

U-1000

Ultrasonic Flow Meter based on Transit Time Difference Method for permanent Installation

Features

/ NEW: wall mounted display
/ Measurement through the pipe
/ Easy calibration
/ For steel-, plastic- or copperpipes
/ For 22 (25) mm to 115 mm OD
or 125 mm to 180 (225) mm OD
/ Operating temperatures up to 85°C
at wall mounted display up to 135°C
/ LCD display with backlights
/ Integrated pulse or frequency output
/ 4 to 20 mA output (optional)
/ Modbus (optional)
/ Supply 12 to 24V AC/DC (external)

Description:

The U-1000 is a clamp-on, ultrasonic flowmeter that uses a multiple slope transit time algorithm to provide accurate flow measurements. An ultrasonic beam of a given frequency is generated by applying a repetitive voltage pulse to the transducer crystals. This transmission goes first from the Downstream transducer to the Upstream transducer. The transmission is then made in the reverse direction, being sent from the Upstream transducer to the Downstream transducer. The speed, at which the ultrasound is transmitted through the liquid, is accelerated slightly by the velocity of the liquid through the pipe. The subsequent time difference is directly proportional to the liquid flow velocity. Having measured the flow velocity and knowing the pipe cross-sectional area, the volumetric flow can be easily calculated.
The U-1000 is scheduled for fixed installation, easy to install and requires the minimum of information to be entered by the user. The instrument displays the required seperation after the pipe internal diameter and material are entered. Both the electronics and guide rail housings form an integral unit that is attached to the pipe using the supplied jubilee clips. Power to the unit is provided by an external 12 - 24V AC/DC power supply. The U-1000 is intended to operate on steel, copper and plastic pipes with maximum 180 (225) mm OD. Compact, rugged and reliable, the U-1000 has been designed to provide sustained performance in industrial environments.

Application:

Flow-metering and monitoring as:
Hot water meter, heat meter, chilled water meter, drinking-water meter, ultrapure water meter and for process water

Version:

U-1000 Ultrasonic Flow Meter

/ Measurement of the flow velocity and flow rate
/ Recommended for hot water < 85°C, chilled water, portable water and demineralised water
/ Configurable pipe size between 22. . .115 mm or 125. . .180 mm outer diameter
/ Pipe materials: steel, plastic and copper
/ Simplified guide rail & sensor assembly
/ Clamp-on sensor
/ LCD display with backlight
/ Display: 2 line x 16 characters
/ Key pad: 4 key tactile feedback membrane keypad
/ Password controlled menu structure
/ Menu language: english
/ Selectable units: m/s, ft/s, l/s, l/min, gal/s, gal/min, USgal/s, USgal/min, m^3/min, m^3/h, litres, m3, gals, USgals
/ Integrated pulse- or frequency output and optional 4. . .20 mA output or Modbus

U-1000 Ultrasonic Flow Meter with wall mounted display

/ Measurement of the flow velocity and flow rate
/ Temperature range: 0. . .135°C
/ Configurable pipe size between 25. . .115 mm or 125. . .225 mm outer diameter
/ Pipe materials: steel, plastic and copper
/ Simplified guide rail & sensor assembly
/ Clamp-on sensor
/ LCD display with backlight
/ Display: 2 line x 16 characters
/ Key pad: 4 key tactile feedback membrane keypad
/ Password controlled menu structure
/ Menu language: english
/ Selectable units: m/s, ft/s, l/s, l/min, gal/s, gal/min, USgal/s, USgal/min, m^3/min, m^3/h, litres, m3, gals, USgals
/ Integrated pulse- or frequency output and optional 4. . .20 mA output or Modbus

Technical Specifications:

Measuring technique /	transit time
Measurement channels /	1
Timing resolution /	± 50 / sec.
Turn-down ratio /	100 : 1
Flow velocity range /	0.1. . .10 m/s
Pipe ranges Ø /	22. . .115 mm outer diameter 125. . .180 mm outer diameter
Pipe ranges Ø / Wall mounted display	25 . .115 mm outer diameter 125. . .225 mm outer diameter
Media /	clean water with < 3 % particle volume-content
Accuracy /	± 3 % of measured value for flow rate > 0.3 m/s
Repeatability /	± 0.15 % of measured value
max. Temperature /	
Media temperature:	0. . .+85°C 0. . .+135°C (wall mounted display)
Operating temperature:	0. . .+50°C (electronic)
Storage temperature:	-10. . .+60°C
Humidity /	90 % RH at 50°C max.

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Electrical Specifications:

Power supply /	12. . .24V ±10% AC/DC
Power consumption /	max. 7 watt
Elect. connection /	cable, 5 m x 6 core, for power input and data output
Output 1 /	Pulse or frequency, default values depending on pipe diameter
Pulse width:	default value 50 ms (choose from 3. . .99 ms)
Pulse repetition rate:	up to 166 pulses/sec (depending on pulse width)
Frequency mode:	max. 200 Hz for flow rate
Output 2 /	current (optional) for flow rate
Output:	4. . .20 mA
Resolution:	0.1 % of scale
max. Load:	620 Ω
Protection class /	IP 54 (casing) IP 68 (wall mounted display)
Modbus /	
Format	RTU
Baudrate	1200, 2400, 4800, 9600, 19200, 38400
Data-Parity-StopBits	8-none-2, 8-none-1, 8-odd-2, 8-even-1
Standards:	PI-MBUS-300 Rev. J
Physical connection:	RS485

Ordering Codes:

Order Number	**U-1000.**	**1.**	**1.**

U-1000 Ultrasonic Flow Meter

Version /

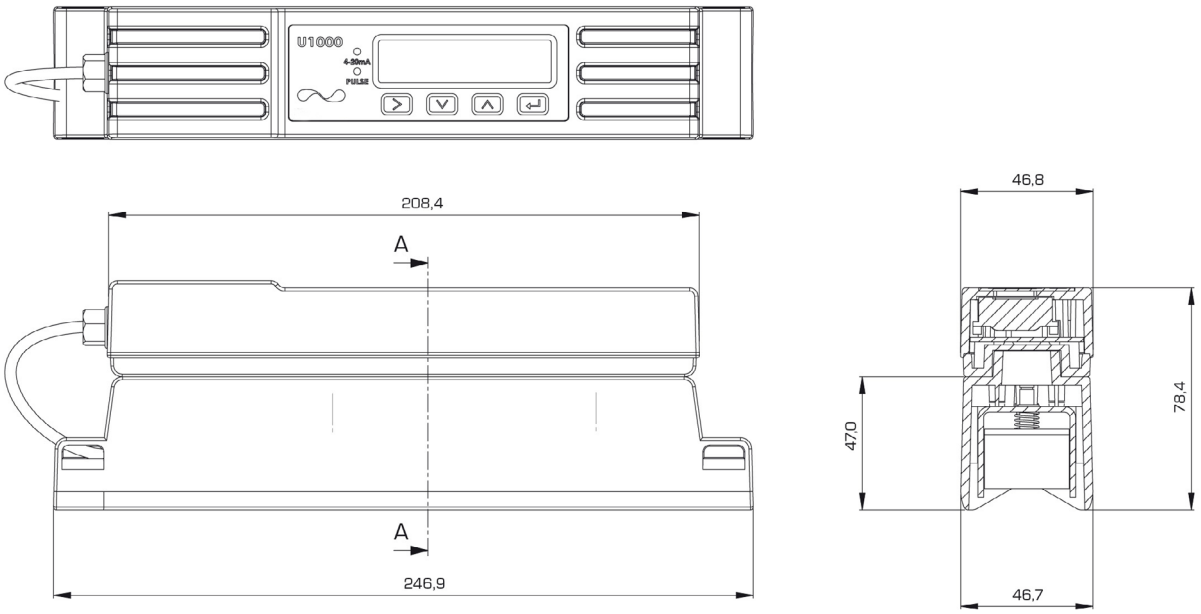
1 = with pulse output
2 = with pulse and 4. . .20 mA output
3 = with pulse and Modbus
4 = with pulse and M-bus
5 = with wall mounted display (For nominal sizes see technical data)

Nominal diameter /

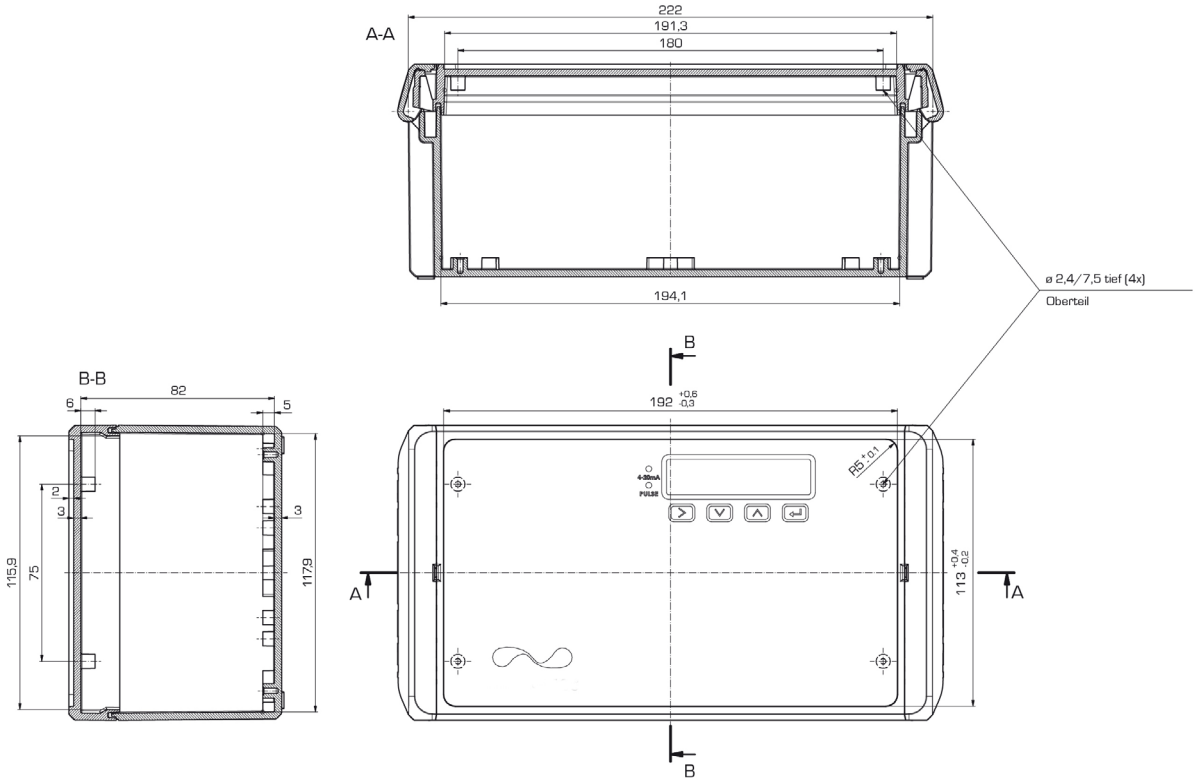
1 = 22. . .115 mm outer diameter
2 = 125. . .180 mm outer diameter

Dimensions in mm:

U-1000 for pipe mounting:



U-1000.5 Elektronic for wall mounting:



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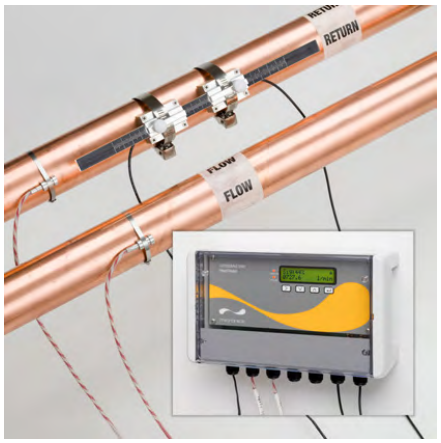

U-1000 HM

Fixed Ultrasonic Heat/ Energy Meter with Modbus Communication

Features

/ NEW: wall mounted display
/ Heat- and Energy-measuring
/ Easy installation
/ For pipes with 22(25) - 115 mm OD
or 125 - 180(225) mm OD
/ Water temperature up to 85 °C
at wall mounted display up to 135°C
/ Modbus compatible
/ Single values and sums
/ Mbus (optional)

Description:

The U-1000 HM is a clamp-on thermo-, heat- and energy meter based on ultrasound which is installed on the outside of a pipeline without any complications. The device measures the flow and return temperatures via PT100 sensors and the flow rate with ultrasound. An ultrasonic beam of a given frequency is generated by applying a repetitive voltage pulse to the transducer crystals. This transmission goes first from the Downstream transducer to the Upstream transducer. The transmission is then made in the reverse direction, being sent from the Upstream transducer to the Downstream transducer. The speed, at which the ultrasound is transmitted through the liquid, is accelerated slightly by the velocity of the liquid through the pipe. The subsequent time difference is directly proportional to the liquid flow velocity. Having measured the flow velocity and knowing the pipe cross-sectional area, the volumetric flow can be easily calculated. The temperature sensors measure the heat difference at the inlet and the outlet point. Together with the flow rate, the U-1000 HM then calculates the corresponding amount of heat. The values can be output individually or summed. In addition, there is a Modbus compatibility so that the device can also be used as a component an an aM & T or BEM system. The U-1000 HM is designed like the U-1000 for fixed installations. It is easy to install and requires a minimum of information that must be entered by the user. The device requires 12-24V AC/DC from an external source. The U-1000 HM is designed to work on steel, copper and plastic pipes with an outside diameter up to 180(225) mm.

Application:

Heat-metering and monitoring as:
Warm water meter, heat meter, chilled water meter, drinking-water meter, ultrapure water meter and for process water.

Electrical Specifications:

Power supply /	12 V. . .24 V ± 10 % AC/DC at 7 watt
Protection class /	IP54 IP68 (Wall mounted display)
In-/Output-cable /	5 m x 6-core for power in and pulse out

Technical Specifications:

Measuring principle /	Transit time method & PT-100
Flow /	0.1. . .10 m/s
Watertemp. range /	0. . .85 °C 0. . .135 °C (Wall mounted display)
Measuring range dynamic /	100 : 1
Pipesize Ø /	22 . .115 mm OD 125. . .180 mm OD
Pipesize Ø / Wall mounted display	25 . .115 mm OD 125. . .225 mm OD
Media /	Coldwater (with glycol), warmwater
Accuracy /	± 3 % des Messwertes bei Strömungsgeschwindigkeiten > 0.3 m/s
Temperature sensors /	PT-100, clamp-on, class B, 4 cables, range 0. . .85 °C, resolution 0.1°C
Output /	Pulse or frequency, energy (kWh or BTU) or volume flow. The pulse output can also be configured as a loss of flow or low flow alarm for standalone meter or modbus communication applications.
Communication /	Modbus RTU slave, RS485 serial link hardware layer. Energy, power, temperature and flow. Optional with Mbus

Ordering Codes:

Order Number	**U-1000.HM**	**1.**	**1.**

U-1000 HM Heatflowmeter

Version /
1 = with pulse output
2 = with pulse and Modbus
3 = with pulse and Mbus
4 = with wall mounted display (For nominal sizes see technical data)

Nominal diameter /
1 = 22. . .115 mm outer diameter
2 = 125. . .180 mm outer diameter

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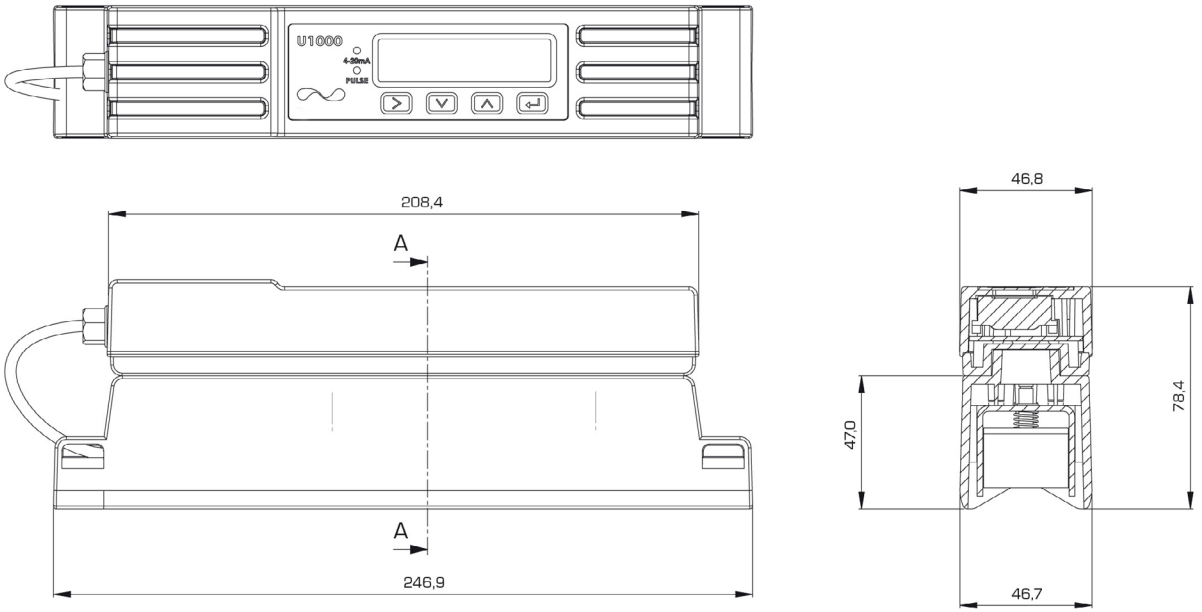
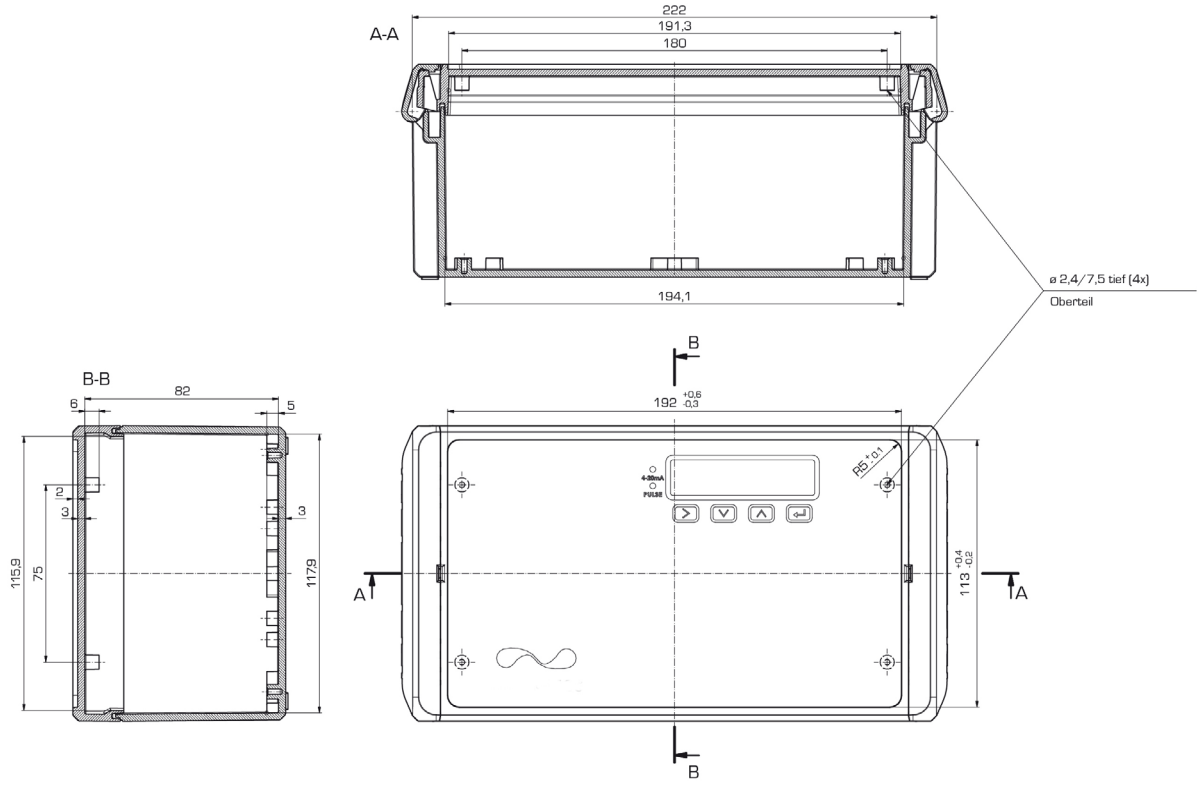
Dimensions in mm:

U-1000 for pipe mounting:



U-1000.4 Elektronic for wall mounting:



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SI-00

Miniature-
Electromagnetic Flowmeter

Features

/ Wetted parts out of st. steel 1.4404, PEEK and FKM

/ Displays flow bidirectionally

/ Op. range 0. . .600 l/min in 5 sizes

/ Additional temperature measurement from -20. . .+80°C

/ Minimum conductivity 20 µS/cm

/ Viscosity up to 70 mm²/s at 40°C

/ Two output channels for 4. . .20 mA or 0. . .10 VDC, pulse or alarm

/ Including totalizer and batching function

/ Operating pressure up to 16 bar

Description:

The measuring principle of the magnetic flow meter is based on Faraday`s law. The flow of a conductible liquid within a magnetic field causes an electrical voltage, which is proportional to the velocity of the flow. A measuring pipe out of the very rugged plastic material PEEK is installed in the stainless steel fitting of the SI-00. This construction is suitable to isolate the liquid from the metallic fitting to make the induced measuring voltage useable. Magnetic coils located on the outside generate a magnetic field inside the measuring pipe and small stainless steel electrods measure the voltage, which is then amplified and processed by the powerful electronic of the SI-00.

Application:

The electromagnetic flowmeter SI-00 combines the advantage of the electromagnetic measuring principle and an ultramodern amplifier electronic to a device of the latest generation. There are no wishes left regarding easy operation and versatility of the measuring value processing. The device detects and processes the medium temperature, the actual flow and the fluid consumption. Setpoints, as well as analogue and pulse signals in different combinations are provided by the SI-00 at two output connections. The setpoints can be programmed as N.O./N.C. or window function always with adjustable hysteresis. In case of activated start-up delay the setpoints work at the normal operating condition within the programmed period of time as soon as the flow reaches 0,5% of the full scale value after switch on, to ensure that no alarm occures if the flow value is under the threshold just because of the starting condition of the plant or machine.
The analogue output can be used as 4. . .20 mA- or 0. . .10 VDC-signal and can be assigned to the temperature or to the flowrate. Zero and span are free adjustable, but the minimum measuring span has to be 20% of the full scale value. The consumption is added or subtracted (depending on the flow direction) by the SI-00 and displayed. The positive flow direction is marked with an arrow on the unit. The outputs of the SI-00 always refer to the positive direction.

The counter is reset either through external pulse, through programmable automatic reset time from one hour to eight weeks or manually by the touch of a button. One of the outputs of the SI-00 can be used to realize a batching process. In this operating mode the switching output of the SI-00 is activated to control e.g. a solenoid valve after the preset amount has passed through the flowmeter. In case of not reaching the preset amount the user can choose either to wait for further flow or to reset the counter automatically.

Electrical Specifications:

Supply voltage /	18. . .32 VDC acc. to EN50178, SELV, PELV
Current rating /	SI-00.08: 200 mA SI-00.15: 2 x 200 mA SI-00.20: 2 x 200 mA SI-00.25: 2 x 200 mA SI-00.50a: 2 x 250 mA SI-00.50b: 2 x 250 mA
Short-circuit protection /	pulsed
Reverse polarity protection /	yes
Overload protection /	yes
Voltage drop /	< 2 V
Current consumption /	SI-00.08: < 80 mA SI-00.15: 95 mA;(24 V) SI-00.20: 95 mA;(24 V) SI-00.25: 95 mA;(24 V) SI-00.50a: < 150 mA SI-00.50b: < 150 mA
Power-on delay /	5 s
Analogue output /	4. . .20 mA or 0. . .10 VDC, scaleable
Load for analogue output /	max. 500 Ω for 4. . .20 mA, min. 2000 Ω for 0. . .10 VDC
Pulse output /	flow rate meter
Pulse value /	SI-00.08: 0,001. . .3 l SI-00.15: 0,00001. . .30 000 m^3 SI-00.20: 0,00001. . .50 000 m^3 SI-00.25: 0,00001. . .100 000 m^3 SI-00.50a: 0,0001. . .300 x 10^3 m^3 SI-00.50b: 0,0001. . .600 x 10^3 m^3
Pulse length / (not adjustable)	SI-00.08: 0,008. . .2 s SI-00.15: 0.01. . .2 s SI-00.20: 0.005. . .2 s SI-00.25: 0.0025. . .2 s SI-00.50a: 0.016. . .2 s SI-00.50b: 0.008. . .2 s

Programming options /	
SI-00.08 /15 /20 /25:	Flow monitoring; volume counter; preselection counter; temperature monitoring; hysteresis / window function; start-up delay; output logic; current / voltage / pulse output; N.O./ N.C.; display can be deactivated; display unit;
SI-00.50a/ 50b:	Flow monitoring; volume counter; preselection counter; temperature monitoring; hysteresis / window function; start-up delay; output logic; current / voltage / pulse output; N.O./ N.C.; display can be deactivated; display unit; empty tube detection;
Protection class /	IP 65 / IP 67
Insulation resist. /	>100 MΩ (500 VDC)
EMC /	DIN EN 60947-5-9
Electrical connection /	M12 connector; gold-plated contacts
Display /	
Measuring unit:	6 LED green (l/min, m^3/h, l, m^3, 103, °C)
Switching status:	2 LED yellow
Measured values:	4-digit alphanumeric display
Programming:	4-digit alphanumeric display

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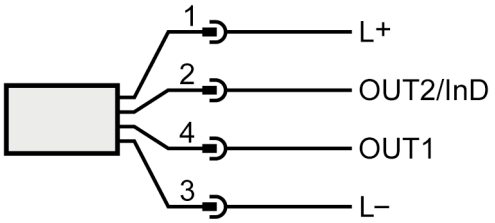
Wiring:



Plug connection /

OUT1 (SI-00.08 /15 /20 /25) /

4 selection options:

- switching output flow-detector
- pulse output flow
- switching output preset counter
- IO-Link

OUT1 (SI-00.50a / 50b) /

6 selection options:

- switching output empty pipe detection
- switching output flow-detector
- frequency output flow-detector
- pulse output flow
- switching output preset counter
- IO-Link

OUT2 / InD (SI-00.08 /15 /20 /25) /

5 selection options:

- switching output flow-detector
- switching output temperature-detector
- analogue output flow
- analogue output temperature
- input for an external reset signal

OUT2 / InD (SI-00.50a /50b) /

6 selection options:

- switching output empty pipe detection
- switching output flow-detector
- switching output temperature-detector
- analogue output flow
- analogue output temperature
- Input for an external reset signal

Technical Specifications:

Application /	conductive liquids, fluid group 2 (DGRL) conductivity from 20 µS/cm upwards and viscosity up to 70 mm^2/s at 40°C
Pressure drop /	max. 16 bar (max. 10 bar for SI-00.08)
Medium temp. /	-10. . .+70°C (0. . .+60°C for SI-00.08)
Ambient temp. /	-10. . .+60°C
Storage temp. /	-25. . .+80°C
Shock resistance /	DIN IEC 68-2-27: 20 g (11 ms)
Vibration resistance /	DIN IEC 68-2-6: 5 g (10. . .2000 Hz)
Housing material /	
SI-00.08 /15 /20 /25:	1.4404 (st. steel / 316L); PBT-GF20; PC; FKM; TPE
SI-00.50a /50b:	1.4404 (st. steel / 316L); 1.4571 (st. steel / 316Ti); PEI; FKM; PBT-GF20; TPE-U
Wetted parts /	
SI-00.08 /15 /20 /25:	V4A (1.4404), Viton (FKM), PEEK (Polyether-Etherketon)
SI-00.50a /50b:	V4A (1.4404), V4A (1.4571), FKM, PEEK (Polyether-Etherketon), Centellen

Ordering Codes:

Order number	**SI-00.**	**08.**	**0.**	**1**

SI-00 Miniature-Electromagnetic Flowmeter

Process connection and operating range /

08 = G1/4"-male for 0.005. . .3 l/min
15 = G1/2"-male for 0.1. . .25 l/min
20 = G3/4"-male for 0.2. . .50 l/min
25 = G1"-male for 0.2. . .100 l/min
50a = G2"-male for 5. . .300 l/min
50b = G2"-male for 5. . .600 l/min

Process connection, adapter /

0 = none
2 = incl. 2 pieces adapter R1/2"-male stainless steel 1.4571 incl. gaskets for SI-00.15

Options /

0 = no option
1 = counter plug 4-pole for M12

Setting range:

Setpoint /	
SI-00.08:	0.02. . .3 l/min
SI-00.15:	0.25. . .25 l/min
SI-00.20:	0.5. . .50 l/min
SI-00.25:	0.7. . .100 l/min
SI-00.50a:	6.5. . .300 l/min
SI-00.50b:	8.0. . .600 l/min
Resetpoint /	
SI-00.08:	0.005. . .2.984 l/min
SI-00.15:	0.1. . .24.9 l/min
SI-00.20:	0.2. . .49.8 l/min
SI-00.25:	0.2. . .99.5 l/min
SI-00.50a:	5. . .298.5 l/min
SI-00.50b:	5. . .597.0 l/min
Analogue start point /	
SI-00.08:	0. . .2.4 l/min
SI-00.15:	0. . .20 l/min
SI-00.20:	0. . .40 l/min
SI-00.25:	0. . .80 l/min
SI-00.50a:	0. . .240 l/min
SI-00.50b:	0. . .480 l/min
Analogue end point /	
SI-00.08:	0.6. . .3 l/min
SI-00.15:	5. . .25 l/min
SI-00.20:	10. . .50 l/min
SI-00.25:	20. . .100 l/min
SI-00.50a:	60. . .300 l/min
SI-00.50b:	120. . .600 l/min
in steps of /	
SI-00.08:	0.001 l/min
SI-00.15:	0.02 l/min
SI-00.20:	0.1 l/min
SI-00.25:	0.1 l/min
SI-00.50a:	0.5 l/min
SI-00.50b:	0.5 l/min

Damping /	0. . .5 sec, adjustable
Start-up delay /	0. . .50 sec, adjustable
Response time /	
SI-00.08:	< 0.15 s by damping 0 s
SI-00.15:	< 0.15 s by damping 0 s
SI-00.20:	< 0.15 s by damping 0 s
SI-00.25:	< 0.15 s by damping 0 s
SI-00.50a:	< 0.35 s by damping 0 s
SI-00.50b:	< 0.35 s by damping 0 s
Process connection /	
SI-00.08:	G1/4“-male
SI-00.15:	G1/2“-AG (available with adapter G3/4“ or R1/2“)
SI-00.20:	G3/4“-male
SI-00.25:	G1“-male
SI-00.50a:	G2“-male
SI-00.50b:	G2“-male
Accuracy /	
SI-00.08:	± (2% MW + 0.5% ME)
SI-00.15:	± (0.8% MW + 0.5% ME)
SI-00.20:	± (0.8% MW + 0.5% ME)
SI-00.25:	± (0.8% MW + 0.5% ME)
SI-00.50a:	± (0.8% MW + 0.5% ME)
SI-00.50b:	± (0.8% MW + 0.5% ME)
Repeatability /	± 0.2% ME

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Flow Measurement:

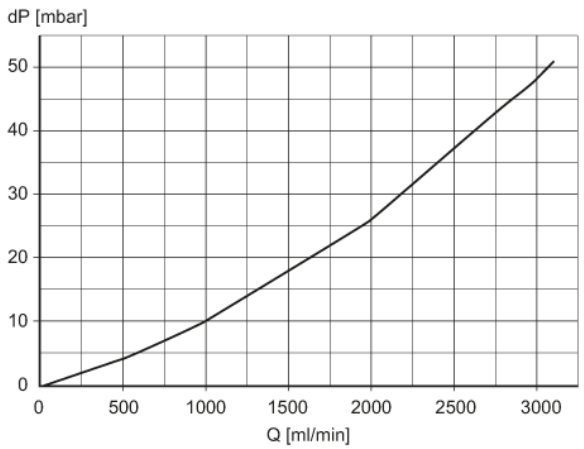
Display range /	
SI-00.08:	-1.999. . .3.6 l/min
SI-00.15:	-30. . .+30 l/min
SI-00.20:	-60. . .+60 l/min
SI-00.25:	-120. . .+120 l/min
SI-00.50a:	-360. . .+360 l/min
SI-00.50b:	-720. . .+720 l/min
Measuring range /	
SI-00.08:	0.005. . .3 l/min
SI-00.15:	0.1. . .25 l/min
SI-00.20:	0.2. . .50 l/min
SI-00.25:	0.2. . .100 l/min
SI-00.50a:	5. . .300 l/min
SI-00.50b:	5. . .600 l/min
Resolution /	
SI-00.08:	0.001 l/min
SI-00.15:	0.02 l/min
SI-00.20:	0.1 l/min
SI-00.25:	0.1 l/min
SI-00.50a:	0.5 l/min
SI-00.50b:	0.5 l/min

Temperature Measurement:

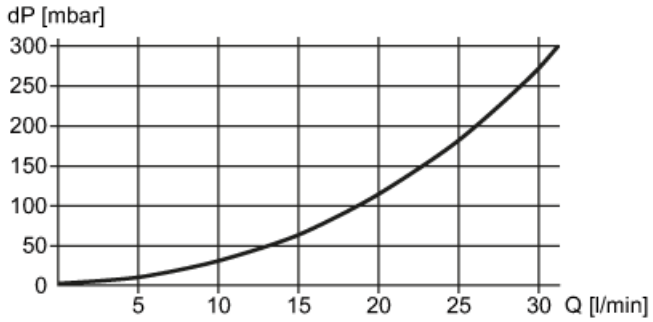
Temperature range /	-20. . .+80°C
Setpoint temp. /	-19.2. . .+80°C
Resetpoint temp. /	-19.6. . .+79.6°C
Analogue start point:	-20. . .+60°C
Analogue end point:	0. . .+80°C
in steps of:	0.2°C
Response time temp. /	
SI-00.08:	T09 = 40 s (Q > 1 l/min)
SI-00.15:	T09 = 20 s (Q > 1 l/min)
SI-00.20:	T09 = 20 s (Q > 5 l/min)
SI-00.25:	T09 = 20 s (Q > 5 l/min)
SI-00.50a:	T09 = 3 s (Q > 15 l/min)
SI-00.50b:	T09 = 3 s (Q > 15 l/min)
Accuracy temp. /	
SI-00.08:	± 1.5; 25°C (Q > 0.5 l/min)
SI-00.15:	± 2.5; 25°C (Q > 1 l/min)
SI-00.20:	± 2.5; 25°C (Q > 5 l/min)
SI-00.25:	± 2.5; 25°C (Q > 5 l/min)
SI-00.50a:	± 1.0; 25°C (Q > 15 l/min)
SI-00.50b:	± 1.0; 25°C (Q > 15 l/min)

Pressure drop curves:

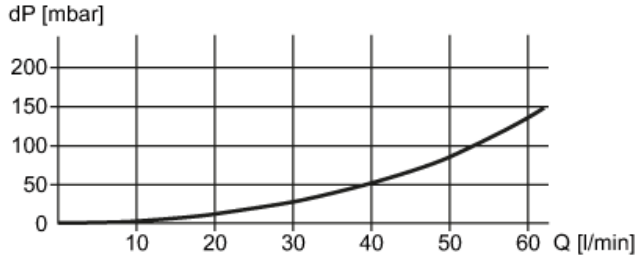
SI-00.08 /



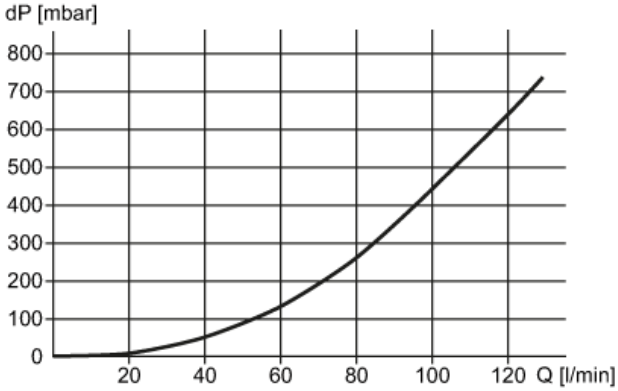
SI-00.15 /



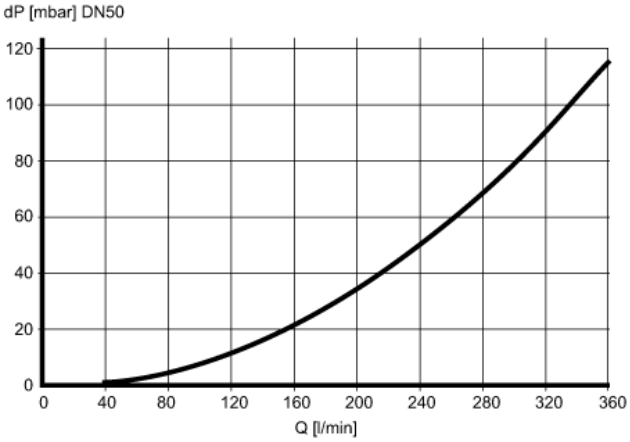
SI-00.20 /



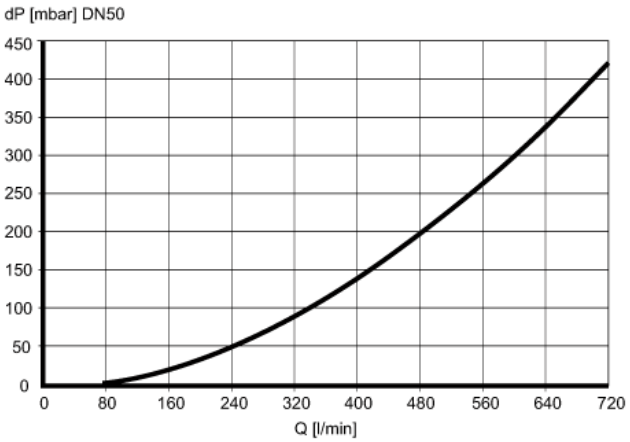
SI-00.25 /



SI-00.50a /



SI-00.50b /



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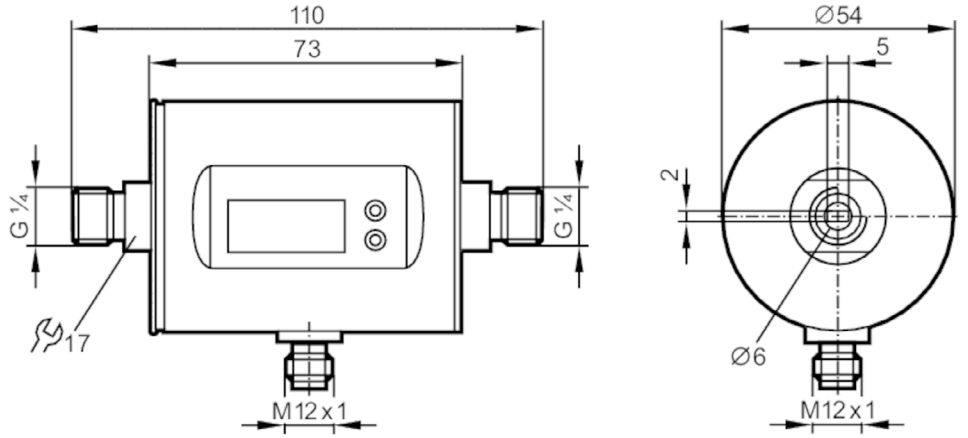
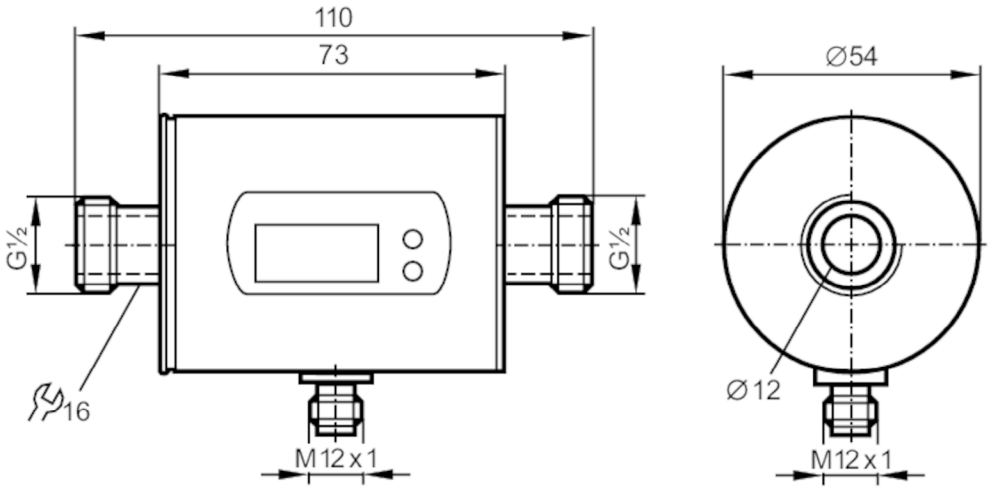
Dimensions in mm:

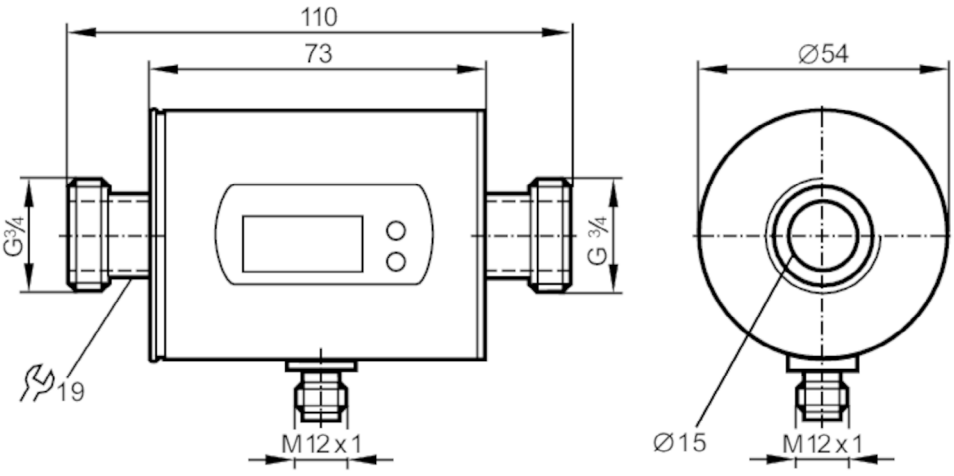
SI-00.08 /



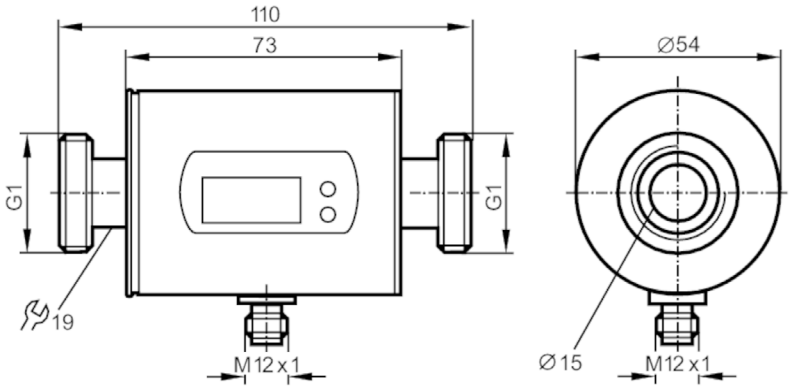
SI-00.15 /



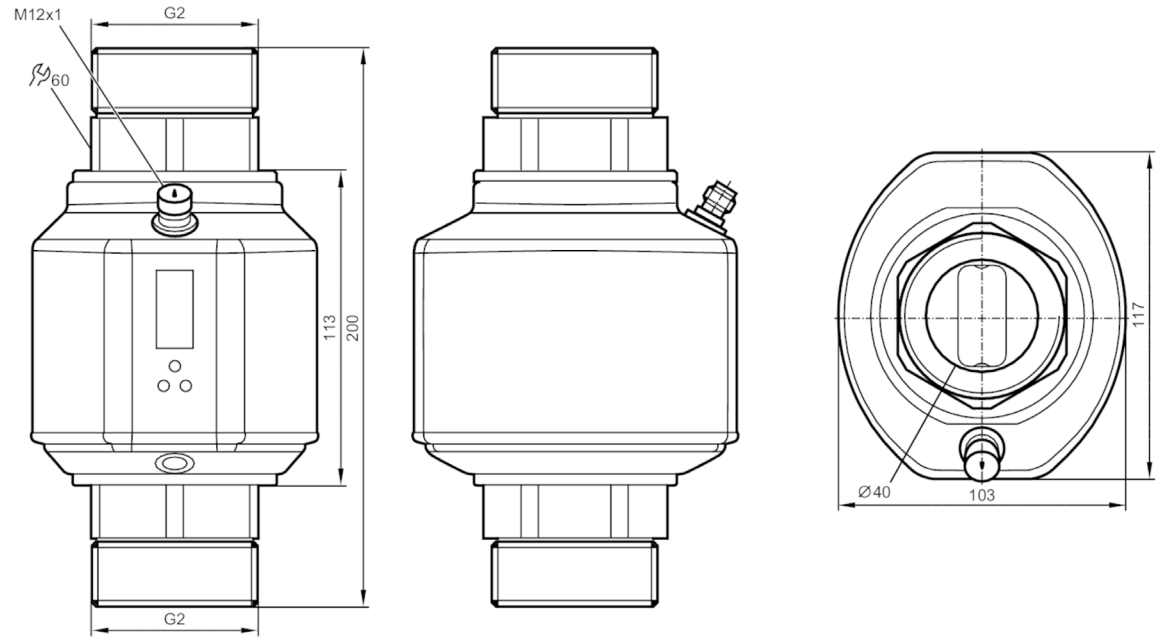
SI-00.20 /



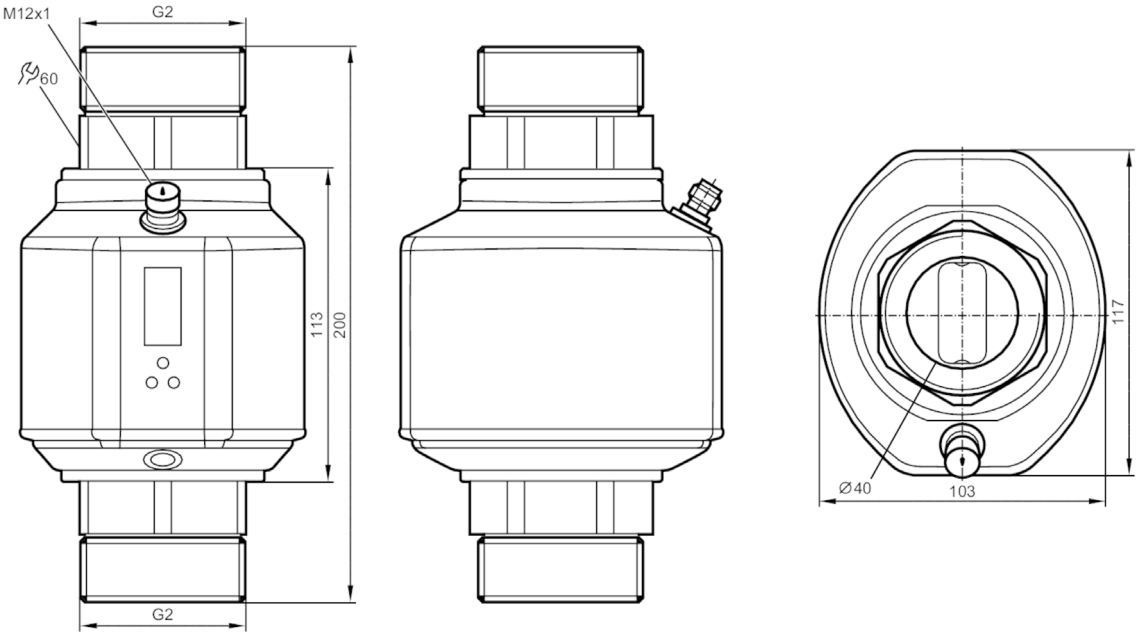
SI-00.25 /



SI-00.50a /



SI-00.50b /



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SI-01

Electromagnetic Flowmeter for Water Applications

Features

/ Cost-effective

/ Separate or compact measuring transmitter

/ NBR or EPDM lining

/ DN25 to DN1200

/ DIN or ANSI flange

Description:

The SI-01 series of electromagnetic flowmeters is always a combination of measuring pick-up SI-01 and measuring transmitter MU-5000 which can be either directly mounted on the pick-up or separately mounted on the wall by means of a fixing metal plate. The measuring pick-up consists of a magnetically non-conductive measuring tube with plastic lining, magnetic coils fastened diametrically on the tube and at least two electrodes which are inserted through the tube's wall and establish contact with the measuring medium. As current passes through the magnetic coils, a clocked magnetic field is generated which penetrates the magnetically non-conductive measuring tube and induces in the electrically conductive medium a voltage proportional to the flow velocity. The electrodes inside the tube tap this voltage and pass it on to the measuring transmitter MU-5000. Now the transmitter generates a current signal in the range of 4. . .20 mA which is linearly connected to the mean velocity of flow. The measuring pick-up has a SENSORPROM memory module in which its individual data is stored. The result is that nearly every measuring pick-up of the SI-01 series can be operate along with every MU-5000 measuring transmitter without the need for prior parameterization.

Application:

Electromagnetic flowmeters are suited for measuring nearly all electrically conductive fluids, pulp and slurry that have a conductivity of at least 5 micro-Siemens. Temperature, pressure, density and viscosity are of no consequence for the method of measurement so long as the measurement is performed within the velocity range of 0.25. . .10 m/s and the permissible material specifications do not fall short or are not exceeded. The main applications for the SI-01 series are found in the following areas, Water removal, Water treatment, Water distribution, Effluent treatment, Industrial water applications and Filtration installations. For applications that necessitate higher temperatures or pressure, more hostile media or other nominal diameter ranges, the high-quality measuring pick-up of the SI-02 offers a reliable solution.

Technical Specifications:

Measuring principle /	electromagnetic induction
Exciter frequency /	1.56 Hz. . .12,5 Hz depending on ND
Conductivity of medium /	at least 5 µS/cm (micro Siemens)
Operating range /	0.25. . .10 m/s for the specified accuracy, below and above this greater deviations
Accuracy /	± 0.4% ±1mm/s
Ambient temp. /	-40. . .+70°C -20. . .+60°C for directly mounted measuring transmitter
Media temperature /	-10. . .+70°C
Operating pressure /	DN 15. . .40 0.01. . .40 bar abs. DN 50. . .300 0.03. . .20 bar abs. DN 350. . .1200 0.01. . .16 bar abs. (note pressure level of the flange)
Lining /	NBR or EPDM
Materials /	
Flange and housing:	carbon steel, with corrosion-resistant two-component epoxy coat. (min. 150 µm)
Electrodes:	Hastelloy C
Grounding:	Hastelloy C
Process connection /	**DIN EN 1092-1:** PN 10 (145 psi): DN 200. . .300 (8“. . .12“) without nubbin PN 10 (145 psi): DN 350. . .1200 (14“. . .48“) with nubbin (Type 01 SORF) PN 16 (232 psi): DN 50. . .300 (2“. . .12“) w/o nubbin (DN ≤600 Typ 01; > 600 Typ 11) PN 16 (232 psi): DN 350. . .1200 (14“. . .48“) with nubbin PN 40 (580 psi): DN 15. . .40 (½“. . .1½“) without nubbin **ANSI B16.5:** Class 150: ½“. . .12“ without nubbin; 14“. . .24“ with nubbin **AWWA C-207:** Class D: 28“. . .48“, without nubbin **AS4087:** PN 16 (232 psi) DN 15. . .DN 300 (2“. . .12“) without nubbin DN 350. . .DN 1200 (14“. . .48“) with nubbin

Electrical Spec. Transmitter:

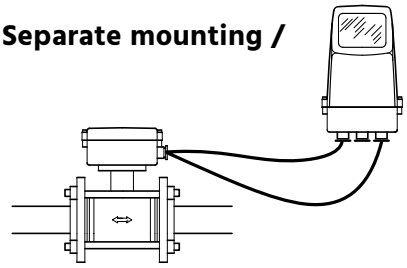
Cable insertion /	M20 x 1.5 or 1/2“-NPT
Protection class /	IP67 (IP68 on request)
EMC /	2014/30/EU

(see also Measuring transmitter MU-5000)

Measuring transmitter /

In principle, the SI-01 is suited for operations with a directly mounted measuring transmitter or for separate mounting. The MU-5000 measuring transmitter can be used universally (see data sheet MU-5000), hence it can be mounted directly on the measurement pick-up or positioned away from it by means of a wall fixture. If the SI-01 is required as a spare, since the MU-5000 measuring transmitter is already available, only the measurement pick-up can be ordered without the measuring transmitter.

Separate mounting /



Ordering Codes:

Order no.	**SI-01.**	**[0][0][1][5].**	**3.**	**2.**	**1.**	**2**

SI-01 Electromagnetic Flowmeter for Water

Nominal diameter DN15 to DN1200 /
[ ][ ][ ][ ] e.g. 0040 for DN40

Flange version and pressure level /
1 = DIN, PN10 for nominal diameters DN200. . .DN1200
2 = DIN, PN16 for nominal diameters DN50. . .DN1200
3 = DIN, PN40 for nominal diameters DN15 to DN40
4 = ANSI B16.5 Class 150 for nominal diameters 1“ to 24“
5 = AWWA C207 Class D for nominal diameters 28“ to 48“
6 = AS4087, for nominal diameters DN15. . .1200

Lining /
1 = NBR
2 = EPDM

Measuring transmitter /
0 = none
1 = with MU-5000, accuracy ±0.4% ±1mm/s

Cable gland /
2 = M 20x1.5 (not for ANSI flanges)
3 = 1/2“-NPT (for ANSI flanges only)

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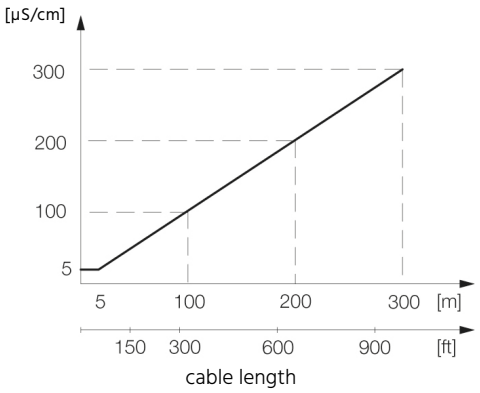
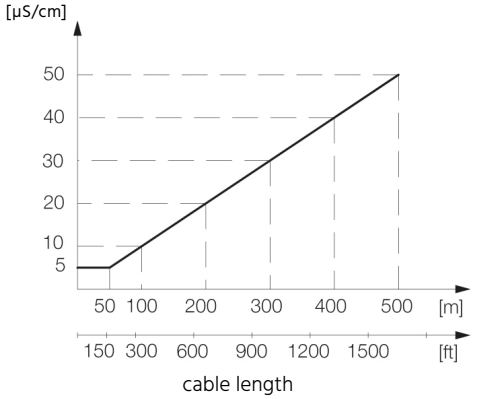
Dimensions SI-01:

Dimensions		A		D		L	
[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
15	½	177	7.0	77	3.0	200	7.9
25	1	187	7.4	96	3.8	200	7.9
40	1 ½	202	8.0	127	5.0	200	7.9
50	2	188	7.4	76	3.0	200	7.9
65	2 ½	194	7.6	89	3.5	200	7.9
80	3	200	7.9	102	4.0	200	7.9
100	4	207	8.1	114	4.5	250	9.8
125	5	217	8.5	140	5.5	250	9.8
150	6	232	9.1	168	6.6	300	11.8
200	8	257	10.1	219	8.6	350	13.8
250	10	284	11.2	273	10.8	450	17.7
300	12	310	12.2	324	12.8	500	19.7
350	14	382	15.0	451	17.8	550	21.7
400	16	407	16.0	502	19.8	600	23.6
450	18	438	17.2	563	22.2	600	23.6
500	20	463	18.2	614	24.2	600	23.6
600	24	514	20.2	715	28.2	600	23.6
700	28	564	22.2	816	32.1	700	27.6
750	30	591	23.3	869	34.2	750	29.5
800	32	616	24.3	927	36.5	800	31.5
900	36	663	26.1	1032	40.6	900	35.4
1000	40	714	28.1	1136	44.7	1000	39.4
	42	714	28.1	1136	44.7	1000	39.4
	44	765	30.1	1238	48.7	1100	43.3
1200	48	820	32.3	1348	53.1	1200	47.2

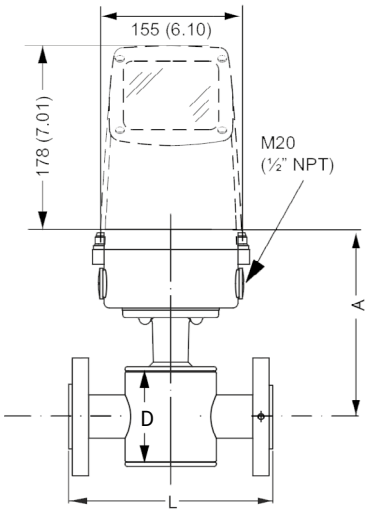
Connector length standard cable:



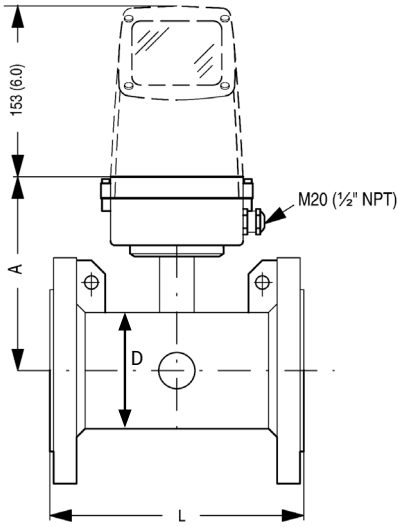
Connector length special cable:



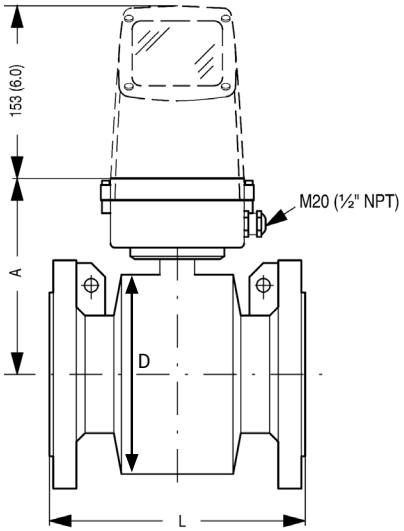
DN 15. . .40



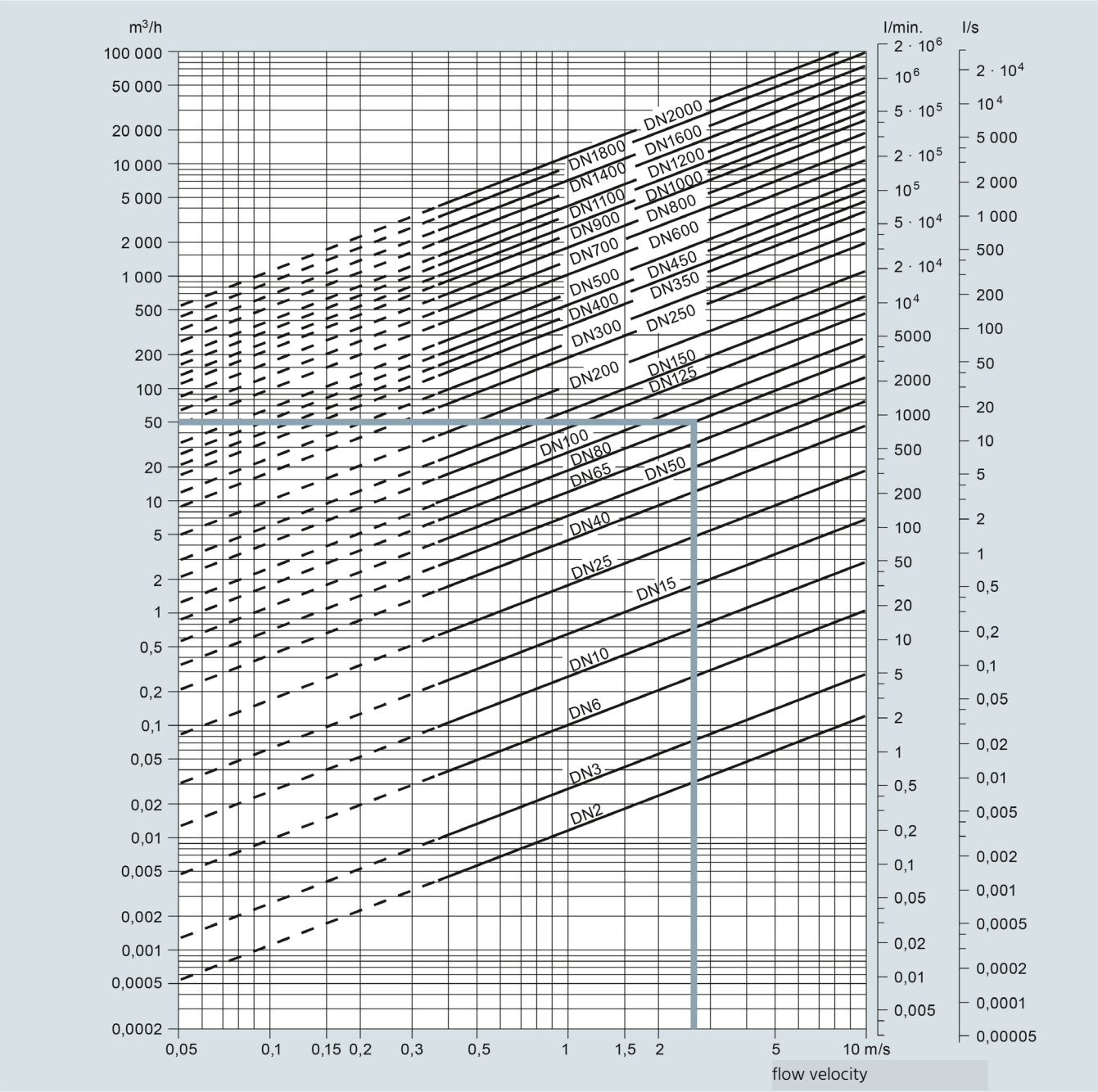
DN 50. . .300



DN 350. . .1200



Flow-Nomogram SI-01 / SI-02:



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SI-02

Electromagnetic Flowmeter for General Applications

Features

/ Universally applicable

/ Separate or compact measuring transmitter

/ Variety of lining material

/ DN15 to DN2000

/ DIN- or ANSI flanges

/ High-temperature version

/ Pressure level up to PN100

Description:

The SI-02 series of electromagnetic flowmeters is always a combination of measuring pick-up and measuring transmitter MU-5000 which can be either directly mounted on the pick-up or separately mounted on the wall by means of a fixing metal plate. The measuring pick-up consists of a magnetically non-conductive measuring tube with plastic lining, magnetic coils fastened diametrically on the tube and at least two electrodes which are inserted through the tube's wall and establish contact with the measuring medium. As current passes through the magnetic coils, a clocked magnetic field is generated which penetrates the magnetically non-conductive measuring tube and induces in the electrically conductive medium a voltage proportional to the flow velocity. The electrodes inside the tube tap this voltage and pass it on to the measuring transmitter MU-5000. Now the transmitter generates a current signal in the range of 0(4). . .20mA which is linearly connected to the mean velocity of flow. The measuring pick-up has a SENSORPROM memory module in which its individual data is stored. The result is that nearly every measuring pick-up of the SI-02 series can be operate along with every MU-5000 measuring transmitter without the need for prior parameterization.

Application:

Electromagnetic flowmeters are suited for measuring nearly all electrically conductive fluids, pulp and slurry that have a conductivity of at least 5 micro-Siemens. Temperature, pressure, density and viscosity are of no consequence for the method of measurement so long as the measurement is performed within the velocity range of 0.25. . .10 m/s and the permissible material specifications do not fall short or are not exceeded. Applications for the SI-02 series are found in a wide range of industrial segments since the material combinations ensure resistance to nearly all media in respect of different electrodes and lining materials.

Technical Specifications:

Measuring principle / electromagnetic induction

Exciter frequency / 12.5/15 Hz for DN15. . .DN65
6.25/7.5 Hz for DN80. . .DN150
3.125/3.75 Hz for DN200. . .DN1200
1.5625/1.875 Hz for DN1400. . .DN2000

Conductivity / at least 5 µS/cm (mikro Siemens)

Operating range / 0.25. . .10 m/s at specified accuracy, below and above this greater deviations

Accuracy / ± 0.4% ± 1mm/s (optional ± 0.2% ± 1mm/s)

Ambient temp. / -40. . .+100°C standard
-20. . .+60°C for directly mounted measuring transmitter

Media temperature / 0. . .+70°C for Neopren lining
-10. . .+70°C for EPDM lining
-40. . .+70°C for Linatex (rubber) lining
(for temperatures below -20°C stainless steel flanges must be used)
0. . .+95°C for Ebonite lining
-20. . .+100°C for standard PTFE lining
-20. . .+180°C for high-temp. PTFE lining
Attention: For stainless steel flanges note the pressure-temperature curve!

Operating pressure / 0.01 to 100 bar abs. for Neopren lining

0.01 to 40 bar abs. for EPDM lining

0.01 to 40 bar abs. for Linatex lining

0.01 to 100 bar abs. for Ebonite lining

0.3 to 50 bar abs. for standard PTFE lining **(DN15 to DN300 only)**

0.3 to 40 bar abs. for standard PTFE lining **(DN350 to DN600 only)**

0.6 to 50 bar abs.for high-temp. PTFE lining **(DN15 to DN300 only)**

Testing pressure / 1,5 x PN (where applicable)

Vibration-proof / 18. . .1000 Hz random in x, y, z, directions for 2 hours as per EN 60068-2-36, Sensor 3.17 grms

Lining / Neoprene, EPDM, Linatex, Ebonit, PTFE or PTFE for high temperature

Materials /

Flange and housing: **Standard:** carbon steel with anti-corrosive 2-component coating (min 150 micrometer)

Option 1: flanges made of st. steel AISI 304 (1.4301), housing carbon steel

Option 2 (on request): flanges and housing made of st. steel AISI 316L (1.4404), polished

Measuring tube: AISI 304 (stainless steel 1.4301) (if flanges and housing are from AISI 316 L, the measuring tube is also from 316 L)

Electrodes: AISI 316 Ti (1.4571)
Option: Hastelloy C-276, Platin/Iridium, Titan, Tantal

Grounding electrodes: similar to measuring electrodes excepting for PTFE lining or electrode material Platinum and Tantalum as well PN100 (use grounding rings)

Process connection / **DIN flanges**
DN15. . .DN2000:

PN40 at DN15. . .DN600
PN16 at DN65. . .DN2000
PN10 at DN200. . .DN2000
PN6 at DN65. . .DN2000
(Options see Ordering codes)

ANSI flanges B16.5
for nominal diameters 1/2". . .24"

pressure level 150 lbs. or 300 lbs.

AWWA flanges C-207
for nominal diameters 28" to 78"

Class D (10 bar)

Weight / see drawings

Ordering Codes:

Order no.	SI-02.	[0][0][1][5].	4.	1.	1.	1.	1.	2

SI-02 Electromagn.Flowmeter for Gen. Applications

Nominal diameter DN15. . .DN2000 /
[ ][ ][ ][ ] e.g. 0040 for DN40

Flange design and pressure level /
0 = as per EN 1092-1 (DIN flange)
PN6 for nominal diameters DN65 to DN2000
1 = as per EN 1092-1 (DIN flange)
PN10 for nominal diameters DN200 to DN2000
2 = as per EN 1092-1 (DIN flange)
PN16 for nominal diameters DN65 to DN2000**
3 = as per EN 1092-1 (DIN flange)
PN25 for nominal diameters DN200 to DN600
4 = as per EN 1092-1 (DIN flange)
PN40 for nominal diameters DN15 to DN600
5 = as per EN 1092-1 (DIN flange)
PN63 for nominal diameters DN50 to DN300, not for PTFE lining
6 = as per EN 1092-1 (DIN flange)
PN100 for nominal diameters DN25 to DN300, not for PTFE lining
7 = as per ANSI B16.5 Class 150
for nominal diameters 1/2" to 24"
8 = as per ANSI B16.5 Class 300
for nominal diameters 1/2" to 24"
9 = as per AWWA C207 Class D
for nominal diameters 28" to 78"

Flange material /
1 = flanges made of plain carbon steel ASTM A 105
2 = flanges made of stainless steel AISI 304 (1.4301)
3 = flanges and sensor made of stainless steel AISI 316L (1.4404), polished (on request)

Electrode material / ***
1 = AISI 316Ti (stainless steel 1.4571)
2 = Hastelloy C276 (2.4819)
3 = Platinum (no grounding electrodes) (DN ≤ 300/12")*
4 = Titanium (DN ≤ 600/24")
5 = Tantalum (no grounding electrodes) (DN ≤ 600/24")*

Lining /
1 = Neopren for media temperatures 0. . .+70°C, 0.01. . .100 bar
2 = EPDM for media temperatures -10. . .+70°C, 0.01. . .40 bar
3 = Linatex for media temperatures -40. . .+70°C, 0.01. . .40 bar
4 = Ebonite for media temperatures 0. . .+95°C, 0.01. . .100 bar
5 = PTFE for media temperatures -20. . .+100°C, 0.3. . .40 bar, DN15. . .DN600 only (max. 50 bar below DN300)
6 = PTFE for media temperatures -20. . .+180°C, 0.6. . .50 bar, DN15. . .DN300 only

Measuring transmitter /
0 = none
1 = with MU-5000, accuracy ± 0.4% ± 1 mm/s

Cable gland /
2 = M20 x 1.5 (not for ANSI flanges)
3 = 1/2"-NPT (for ANSI flanges only)

* not for Ebonite lining
** PN16, non PED (DN700 to DN1200) (pending)
*** Grounding electrodes not for PTFE liner or pressure PN100

Electrical Spec. Transmitter:

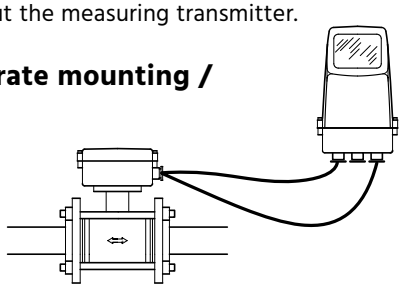
Cable insertion /	M20 x 1.5 or 1/2"-NPT
Protection class /	IP67 (IP68 on request)
EMC /	2014/30/EU

(see also Measuring transmitter MU-5000)

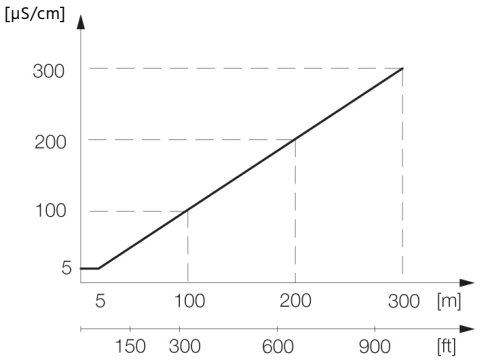
Measuring transmitter /

In principle, the SI-02 is suited for operations with a directly mounted measuring transmitter or for separate mounting. The MU-5000 measuring transmitter can be used universally (see data sheet MU-5000), hence it can be mounted directly on the measurement pick-up or positioned away from it by means of a wall fixture. If the SI-02 is required as a spare, since the MU-5000 measuring transmitter is already available, only the measurement pick-up can be ordered without the measuring transmitter.

Separate mounting /

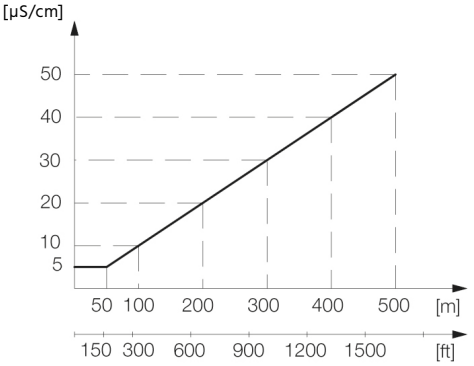


Connector length standard cable:



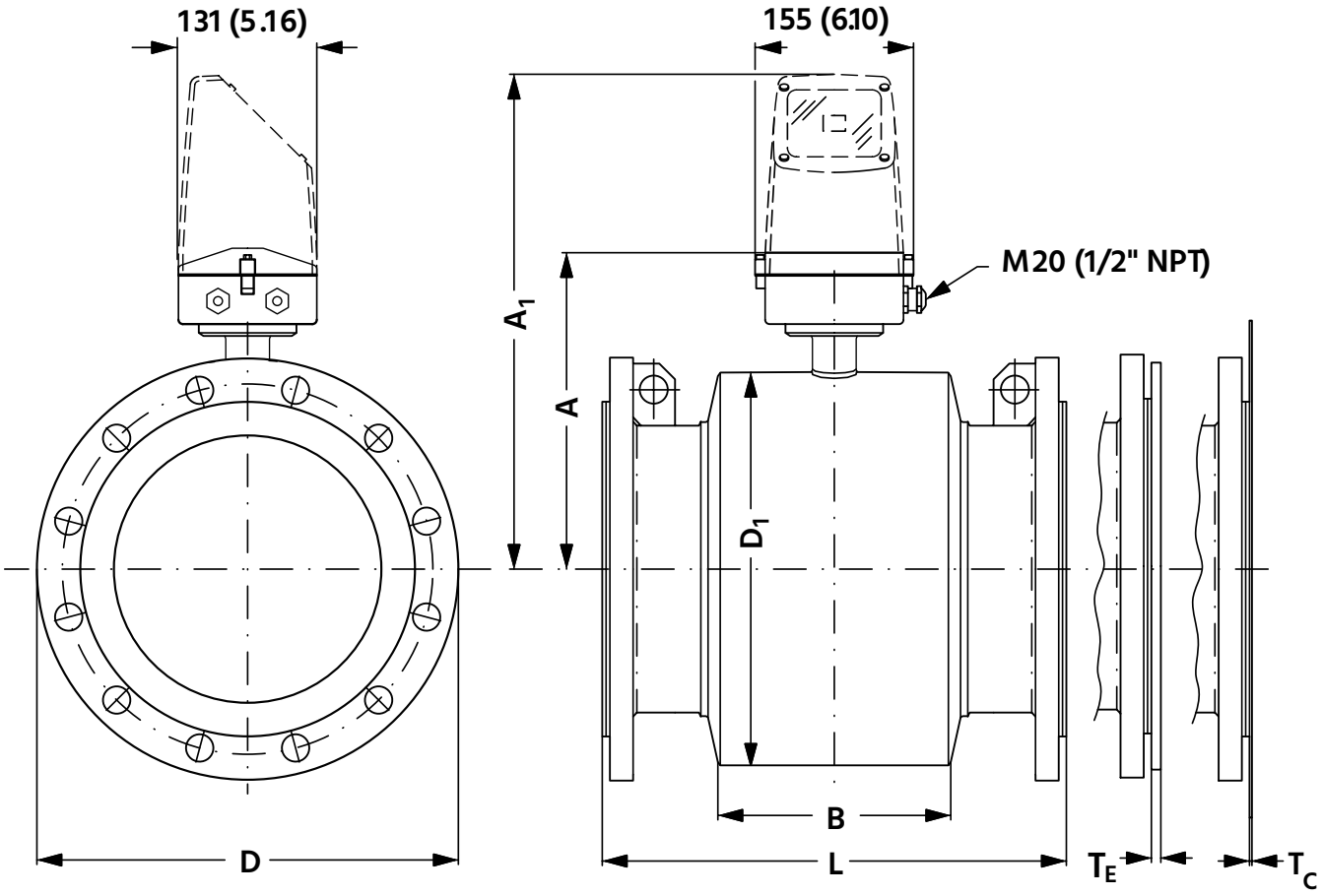
cable length

Connector length special cable:



cable length

Dimensions SI-02:



Dimensions SI-02:

DN	A[1)]	A[1]	B	D[1]	L[2)]								T_C[3)]	T_E[3)]	Weight[4)]
					EN1092-1-201					ANSI 16.5		AWWA C-207 Class D			
					PN6. 10. 16	PN25	PN40	PN64	PN100	Class 150	Class 300				
[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
15	187	341	59	104	-	-	200	-	-	200	200	-	-	6	4
25	187	341	59	104	-	-	200	-	260	200	200	-	1.2	6	5
40	197	351	82	124	-	-	200	-	280	200	200	-	1.2	6	8
50	205	359	72	139	-	-	200	276	300	200	200	-	1.2	6	9
65	212	366	72	154	200	-	200	320	350	200	272	-	1.2	6	11
80	222	376	72	174	200	-	272*	323	340	272*	272*	-	1.2	6	12
100	242	396	85	214	250	-	250	380	400	250	310	-	1.2	6	16
125	255	409	85	239	250	-	250	420	450	250	335	-	1.2	6	19
150	276	430	85	282	300	-	300	415	450	300	300	-	1.2	6	27
200	304	458	137	338	350	350	350	480	530	350	350	-	1.2	8	40
250	332	486	157	393	450	450	450	550	620	450	450	-	1.2	8	60
300	357	511	157	444	500	500	500	600	680	500	500	-	1.6	8	80
350	362	516	270	451	550	550	550	-	-	550	550	-	1.6	8	110
400	387	541	270	502	600	600	600	-	-	600	600	-	1.6	10	125
450	418	572	310	563	600	600	600	-	-	600	640	-	1.6	10	175
500	443	597	350	614	600	625	680	-	-	600	730	-	1.6	10	200
600	494	648	320	715	600	750	800	-	-	600	860	-	1.6	10	287
700	544	698	450	816	700	-	-	-	-	-	-	700	2.0	-	330
750	571	725	556	869	-	-	-	-	-	-	-	750	2.0	-	360
800	606	760	560	927	800	-	-	-	-	-	-	800	2.0	-	450
900	653	807	630	1032	900	-	-	-	-	-	-	900	2.0	-	530
1000	704	858	670	1136	1000	-	-	-	-	-	-	1000	2.0	-	660
1100	755	904	770	1238	-	-	-	-	-	-	-	1100	2.0	-	1140
1200	810	964	792	1348	1200	-	-	-	-	-	-	1200	2.0	-	1180
1400	925	1079	1000	1675	1400	-	-	-	-	-	-	1400	2.0	-	1600
1500	972	1126	1020	1672	1500	-	-	-	-	-	-	1500	3.0	-	2460
1600	1025	1179	1130	1915	1600	-	-	-	-	-	-	1600	3.0	-	2525
1800	1123	1277	1250	1974	1800	-	-	-	-	-	-	1800	3.0	-	2930
2000	1223	1377	1375	2174	2000	-	-	-	-	-	-	2000	3.0	-	3665

1) 14.5mm shorter for AISI terminal boxes (Ex- and high-temperature version)

2) When using earth rings the flange thickness must be added to mounting length

3) TC = earth ring Type C,
TE = earth ring Type E
(included for PTFE measuring transmitter in high-temperature version and pre-mounted)

4) Weights are approximate values (for PN16) and applicable without measuring transmitter

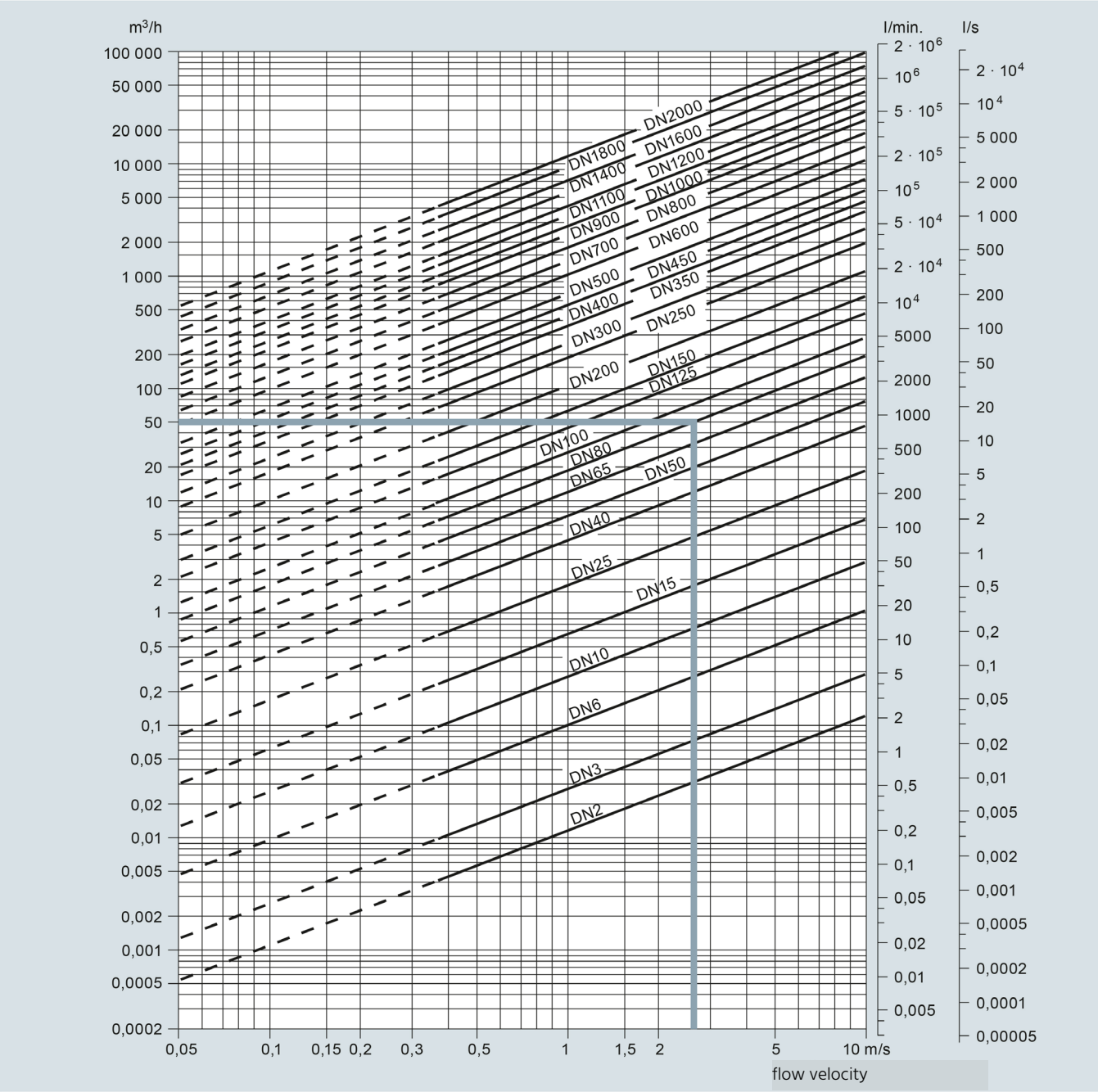
5) PN35 = 272 mm (not according to ISO 13359)

D = flange diameter see flange tables

\- not available

* Size is out to ISO 13359

Flow-Nomogramm SI-01 / SI-02:



MU-5000

Measuring Transmitter for Electromagnetic Flowmeters SI-01 and SI-02

Features

/ Easy to assemble

/ Separate or compact

/ Easy commissioning and maintenance

/ Optimal dynamics

/ Self-diagnostics

/ IP67

Description:

The MU-5000 is a high-performance measuring transmitter based on a micro-processor with built-in alphanumeric multi-language display. The MU-5000 is always a part of SI-01 or SI-02 series of measurement pick-up. It supplies power to its magnetic coils and evaluates the signal transmitted by the electrodes. On the output side, the device has a power output of a 0(4) to 20 mA signal as well as an active and a passive impulse output. All outputs can be adjusted in unidirectional (positive flow direction only) as well as bidirectional (forward and backward) way and, a parameterizable limit value can be evaluated with an additional relay. A programmable time-constant acts on the display and output signals. Moreover, the measuring transmitter has a digital input with which the internal counter can be set to zero or the output signal can be controlled or fixed. The measurement pick-ups of the SI-01 or SI-02 series possess a SENSORPROM memory module in which their individual data is stored. The result is that every measurement pick-up of the SI series can operate along with every MU-5000 measuring transmitter without the need for prior parameterizing. After connecting the MU-5000 to a measurement pick-up the specific data is read into the MU-5000 and it begins to function immediately. The standard accuracy of the MU-5000 is ±0.4% ±1 mm/s of the measured value. In combination with the SI-02, however, the system can also be supplied optionally with calibration set to ±0.2% ±1 mm/s.

Electrical Specifications:

Supply voltage /

AC/DC-Version: 11. . .30 VDC or 11. . .24 VAC

AC-Version: 115. . .230 VAC +10%-15% (50. . .60 Hz)

Power consum. /

AC/DC-Version: 9 VA at 24 VAC
(I_N = 380 mA, I_{ST} = 8A (30 ms))
or
11 W at 12 VDC
(I_N = 920 mA, I_{ST} = 4A (250 ms))

AC-Version: 17 VA at 230 VAC

Cable insertion / M20 x 1.5 at DIN-flanges or 1/2"-NPT at ANSI (AWWA)-flanges

Protection class /

Compact version: IP67

19"-slider: IP20

EMC-Function / IEC/EN 61326-1 (any environment)
IEC/EN 61326-2-5

Digital input / 11. . .30 VDC, activation time 50 ms,
current for 11 VDC I = 2,5 mA,
current for 30 VDC I = 7 mA
Ri = 4,4 kΩ

Digital output /

Frequency: 0. . .10 kHz, 50% scan ratio (uni-/bidirectional)

Time-constant: 0.1. . .30 s, adjustable

Impulse (active): 24 VDC, 30 mA,
1 kΩ ≤ Ri ≤ 10 kΩ, short-circuit-proof

Impulse (passive): 3. . .30 VDC, max. 110 mA,
200 Ω ≤ Ri ≤ 10 kΩ

Time-constant: 0.1. . .30 s, adjustable

Relay output /

Time-constant: change-over realy,
as the current output

Load: 42 VAC at max. 2 A,
24 VDC at max. 1 A

Power output /

Output signal: 0. . .20 mA or 4. . .20 mA

Load: < 800 Ohm

Time-constant: 0.1. . .30 s adjustable

Galv. Isolation / All inputs and outputs are galvanic isolated.

Display and Keypad /

Counter: two 8-digit counter for
forward, backward and net flow

Display: back-lit alphanumeric text, 3x20 characters for display of flow rate, counter values, settings and errors, display of backward flow by minus symbol.

Time-constant: time-constant as current output time-constant

Technical Specifications:

Measuring principle / magnetic-inductive with clocked constant field

Empty tube / empty tube identification (special cable required for separate mounting)

Zero point setting / automatic

Creep vol. suppression / 0. . .9.9% of max. flow

Exciter frequency / depend on sensor size

Electrode input impedance / > 1 x 10^{14} Ohm

Accuracy / ±0,4% ±1 mm/s (optional ±0,2% ±1 mm/s)

Ambient temperature during operation / -20. . .+60°C with display
-20. . .+60°C without display

Storage temperature / -40. . .+70°C

Materials /

Compact version: fiberglass reinforced polyamide (on request stainless steel AISI 316)

19"-slider: standard 19" slider (aluminium/steel) as per DIN 41494 width 21 TE, height 3 HE

Vibration-proof /

Compact version: 18. . .1000 Hz any, 3.17 g effectively, sinusoidal in all directions as per DIN IEC 68-2-36

19"-slider: 1. . .800 Hz, 1 g, sinusoidal in all directions as per DIN IEC 68-2-36

Weight /

Compact version: 0.75 kg

19"-slider: 0.8 kg

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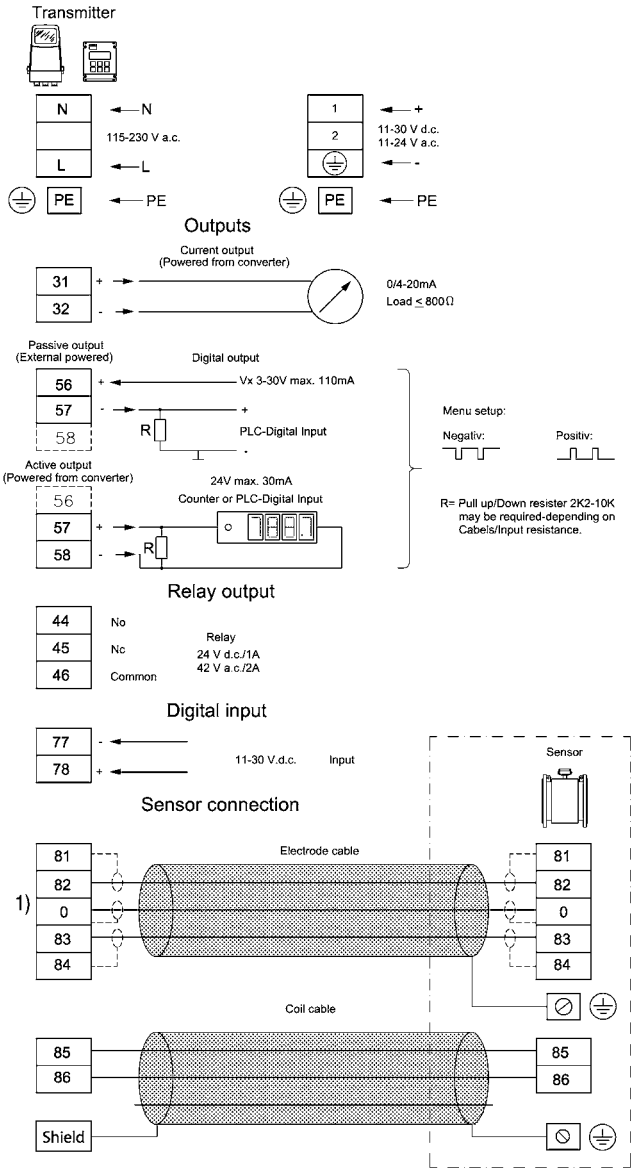
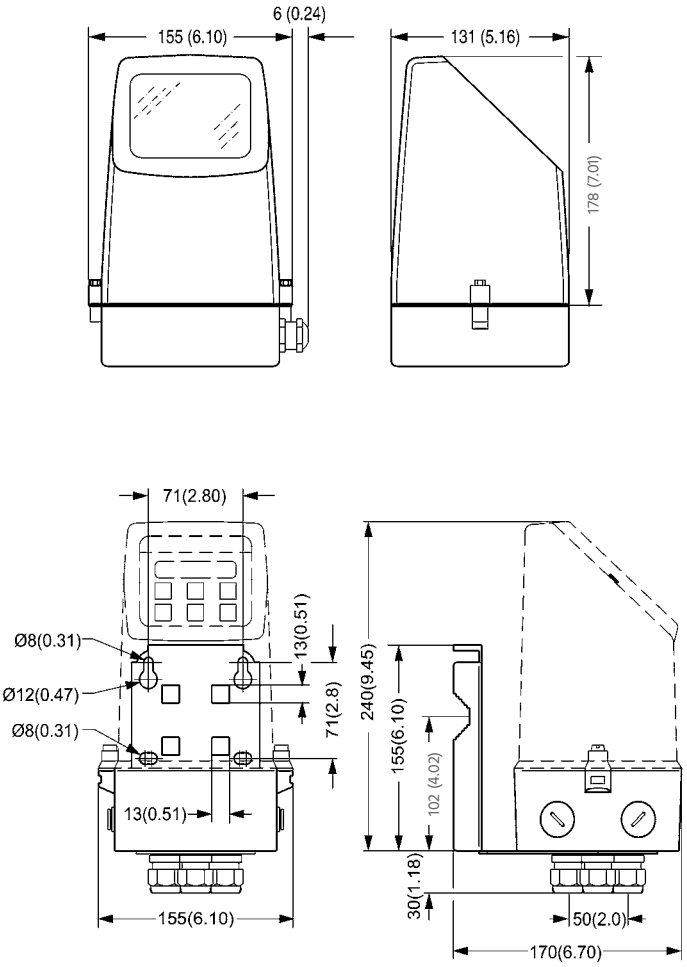
Power supply:



1) Note
Special cable with individual wire shields (shown as dotted lines) are only required when using empty pipe function or long cables

Dimensions in mm (inch):



Ordering Codes:

Order number	MU-5000.	1.	1.	1

MU-5000 Measuring Transmitter for Electromagnetic Flowmeters SI-01 and SI-02

Display /
0 = without display
1 = with display

Assembly /
1 = for direct mounting on the measurement pick-up
2 = with wall-mounting unit for assembly separate from measurement pick-up
3 = measuring transmitter for mounting on the 19" component assembly carrier (HART protocol not possible)

Supply voltage /
1 = 11. . .30 VDC and 11. . .24 VAC
2 = 115/230 VAC 50/60 Hz
3 = 115/230 VAC 50/60 Hz with HART protocol for versions with display only

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VO-01

Low-Volume Oval Gear Flowmeter

Description:

The VO-01 low volume oval gear flowmeter measures fluids in the viscosity range of 5 to 200 cSt according to the principle of positive displacement. Two interlocked oval gear-wheels made of PEEK rotate inside the measuring chamber as a result of the flow and, effectively, defined volumes are channelled through the VO-01 proportional to the rotating speed. An externally mounted electronic element records the rotating speed of the oval gear-wheel pair by means of a non-contacting Hall effect sensor that emits a voltage impulse whenever a magnet crosses it and, through an amplifier, produces a rectangular impulse signal at the PINs of the plug connector. In the version with 2-wire output the impulse signal is readily converted internally into a power signal. In contrast to this, in the case of the 3-wire version, as also in a variant with impulse output and two additional threshold value relays, a VO-01 equipped with a "normal" impulse output can be easily converted into a flowmeter with 3-wire power output or one with a Push-Pull impulse output and threshold value relays by replacing the mating plug.

Features

/ Plastic or stainless steel housing

/ Measuring range from 8 l/h

/ Cost-effective

/ 4. . .20 mA or pulse output

/ Optionally with switching contacts

/ Intended for fluid viscosities from 5 to 200 cSt

Application:

Oval gear flowmeters of VO-01 series offer a cost-effective solution when low volume flows in the range of low to medium viscosities need to be measured and monitored. For the housing, the materials used can be polypropylene, ECTFE and stainless steel; however, the oval gear-wheels are always made of PEEK. Therefore, it is possible to design a device in a way that only plastics come into contact with the flow medium. The result is that the range of application of the VO-01 is extended to measuring even hostile fluids which, otherwise, are corrosive on metals. Typical applications for the VO-01 are, for example:

· monitoring lubrication points
· measuring consumption of fuel or lubricants
· manufacturing of paints and dyes
· processing of solvents.

Ordering Codes:

Order number	VO-01.	PP.	40.	EP.	ST.	IM.	0

VO-01 Oval Gear Flowmeter

Design /
PP = housing Polypropylen, oval gear-wheels PEEK
EC = housing ECTFE, oval gear-wheels PEEK
VA = housing st. steel, oval gear-wheels from PEEK

Operating range /
40 = 8. . .40 l/h
80 = 14. . .80 l/h

Gasket /
VI = Viton
KR = Kalrez
EP = EPDM

Electrical Connection /
ST = cubical plug EN 175301-803A
KA = 3 m cable connection

Output signal /
IM = pulses out of complementary final stage (suitable for NPN or PNP inputs)
A2 = analogue output 4. . .20 mA, 2-wire (with plug connection only)
A3 = analogue output 4. . .20 mA, 3-wire (with plug connection only)
FK = pulse output Push-Pull and two setpoints (semiconductor relays)

Options /
0 = none
AK = axis from ceramic instead of zirconium oxide
NPT= process connection 1/4"-NPT-female instead of G1/4"-female

Technical Specifications:

Operating principle /	positive displacement
Sensing system /	Hall-effect, non-contacting
Operating ranges / (start-up)	(2)8. . .40 l/h or (5)14. . .80 l/h
Accuracy /	± 2.5% full scale value
Repeatability /	< ± 0.8% full scale value
Flow direction /	in direction of arrow
Mounting position /	any (best result vertically with arrow to the bottom)
Straight inlet and outlet /	not necessary
Process connection /	2 x G1/4"-female
Operating pressure /	
PP-housing:	10 bar max.
ECTFE-housing:	10 bar max.
SS-housing:	20 bar max. (higher on request)
Burst pressure /	
PP-housing:	>18 bar
ECTFE-housing:	>18 bar
SS-housing:	>35 bar (higher on request)
Operating temp. /	0. . .80°C
Viscosity range /	5. . .200 cSt
Housing material /	Polypropylen, ECTFE or stainless steel 1.4571
Oval gear-wheels /	PEEK
Axis /	ZrO_2 (zirconium oxide), optionally ceramic Al_2O_3
Bearings /	PEEK
Magnets /	encapsulated in PEEK
O-ring /	Viton (optionally EPDM or Kalrez)

Dimensions in mm:

Range	Width	Height	Depth	Imp. per Litre*	Process connection
8. . .40 l/h	54	45	44	6000	2 x G 1/4"-female
14. . .80 l/h	54	45	44	3400	2 x G 1/4"-female

*The pulse-litre-correlation of each VO-01 is individually evaluated before shipment and can be read on the type label of each unit. A difference to the values above is possible.

Electrical Connection:

	VO-01.xx.xx.xx.xx.IM	VO-01.xx.xx.xx.xx.A2	VO-01.xx.xx.xx.xx.A3	VO-01.xx.xx.xx.xx.FK
Supply +	PIN 1	PIN 1	PIN 1	white
Signal	PIN 2	PIN 2	PIN 2	green
Ground	PIN 3		PIN 3	brown
Relay 1-A				yellow
Relay 1-B				grey
Relay 2-A				pink
Relay 2-B				blue

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Electrical Specifications:

Pulse output (VO-01.xx.xx.xx.xx.IM) /

Function:	complementary final stage (suitable for PNP- or NPN-inputs)
Supply voltage:	+4.5. . .+24 VDC
Current:	max. 11 mA at 24 VDC
El. connection:	plug connector as per EN 175301-803A (cubical-shaped) or round cable LiYY 3 x 1.4 mm^2, length 3 m
Protection:	IP65

Analogue output 2-wire (VO-01.xx.xx.xx.xx.A2) /

Supply voltage:	+15. . .+24 VDC
Current:	4. . .20 mA, 2-wire
Damping:	factory adjustable in steps of 1 sec.
El. connection:	plug connector as per EN 175301-803A (cubical-shaped)
Protection:	IP65
Ambient temp. at plug connector:	max. 55°C

Analogue output 3-wire (VO-01.xx.xx.xx.xx.A3) /

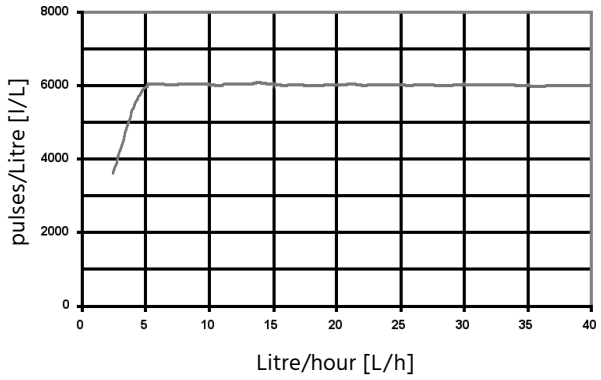
Supply voltage:	+15. . .+24 VDC
Current:	10. . .40 mA
Damping:	factory adjustable in steps of one sec.
El. connection:	plug connector as per EN 175301-803A (cubical-shaped)
Protection:	IP65
Ambient temp. at plug connector:	max. 55°C
Mounting:	The electronic modul is easily plugged between the plug connector and the mating plug of the SD-05 and transforms the pulse output into an analogue output. The correllation between analogue output and operating range is adjusted with a REED switch at the plug connector. This electronic modul can be field upgraded at any time.

Pulse output Push-Pull and two additional threshold value relays (VO-01.xx.xx.xx.xx.FK) /

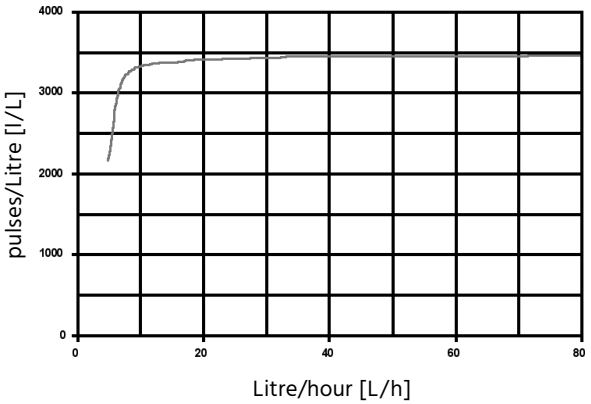
Supply voltage:	+4.5. . .+24 VDC
Current:	10. . .220 mA
Damping:	factory adjustable in steps of one second
Outputs:	1 x complementary final stage (11 mA, 24 VDC), 2 x semiconductor relays (0.1 A / 24 VDC)
El. connection:	plug connector as per EN 175301-803A (cubical-shaped) with one meter factory connected cable
Protection:	IP65
Ambient temp. at plug connector:	max. 55°C
Mounting:	The electronic modul is easily plugged between the plug connector and the mating plug of the SD-05 and transforms the pulse output into Push-Pull output (suitable for PNP and NPN inputs). Additionally two alarm outputs are provided. The correllation between analogue output and operating range and the setpoints are adjusted with a REED switch at the plug connector. This electronic modul can be field upgraded at any time.

Pulses per Litre:

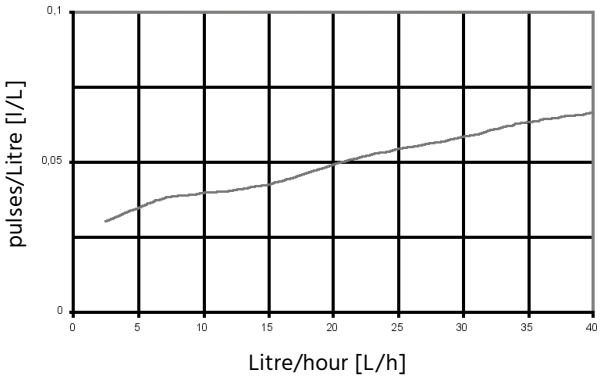
Range 8. . .40 l/h

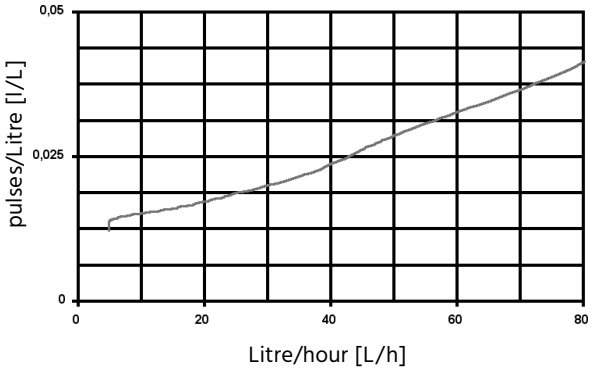


Range 14. . .80 l/h



Pressure Drop:





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VO-02

Miniature
Oval Gear Flowmeter

Features

/ Aluminium or st. steel

/ Small build

/ For ranges from 0,001 l/min

/ Up to 80 bar

/ From 0,5 mPas

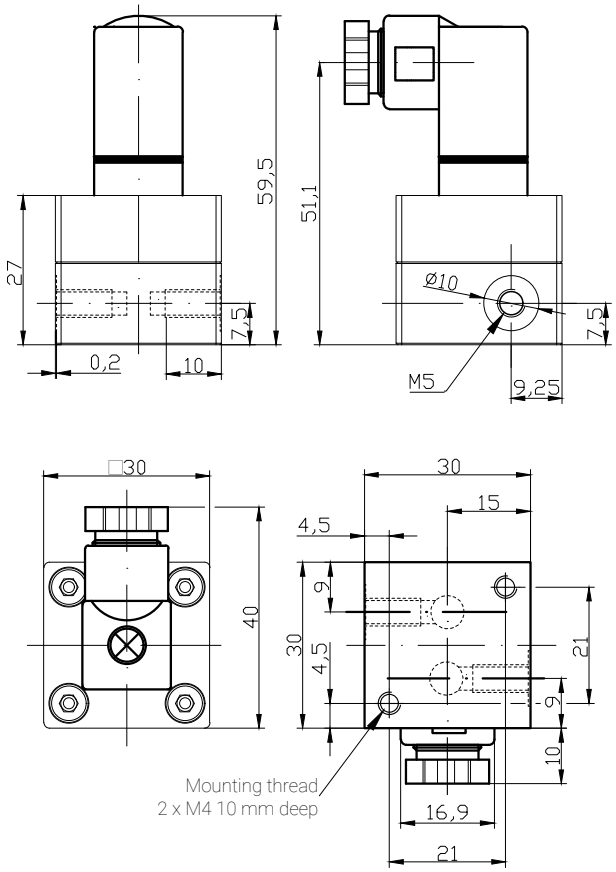
Description:

In addition to our proven oval gear flowmeters series VO-01, the new series VO-02 has been designed for tiny ranges (from 0,001 l/min). These meters are very precise and can measure the smallest amounts of fluid. These instruments are using the volume-measuring principle, where the media running through the housing sets gears into motion. Within those gears are magnets, which trigger a Hall-sensor. The sensor then sends out squarewaves, whose frequency is proportional to the flowing media. Whether the meter is used for low or highly viscose media, the volume of the tooth space remains the same, so the meters can be used either way. The VO-02 has a standard PNP impulse output, while the housing is available in either aluminium or stainless steel.

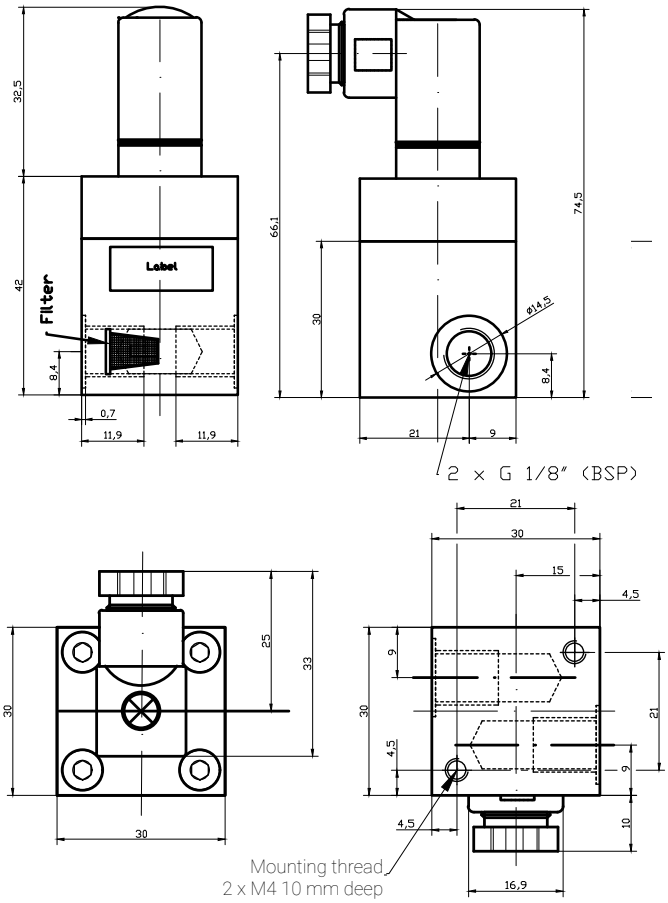
Application:

The VO-02 are perfectly designed for measuring the flow of oils. For example mineral- and plant-oils, plant based fuels, diesel and a variety of lubricants.

Flow range up to 0,3 l/min:



Flow range up to 1,75 l/min:



	VO-02.1.1	VO-02.2.1
Material	aluminium	stainless steel
Flow range	0.001. . .0.3 l/min for v > 3 mPas	0.001. . .0.3 l/min for v > 5 mPas
Output signal	PNP	PNP
Impulses / litre	14.000 imp/l (v > 3 mPas)	7.000 imp/l (v > 5 mPas)
Pressure range	-0.8 . . . 30 bar (20°C)	-0.8 . . . 30 bar (20°C)
Burst pressure	50 bar	50 bar
Connection	2 x M5 female	2 x M5 female
Material/rotor/O-ring	Alu-elox. / PPS / FPM 75.5	SS 316L / PPS / FPM 75.5
Pivot/bearing	SS 316 L / 1.4435	SS 316 L / 1.4435
Weight	70 g	165 g
Viscosity	from 0.7 mPas	from 0.7 mPas
max. Mediatemp.	-20. . .+100°C	-20. . .+110°C
Accuracy	± 1% at v > 3 mPas	± 1% at v > 5 mPas
Repeatability	± 0.5% (for constant service conditions)	± 0.5% (for constant service conditions)
Mounting position	any	any
Supply	5. . .24 VDC	5. . .24 VDC
max. Current	25 mA	15 mA

VO-02.1.2	VO-02.2.2
aluminium	stainless steel
0.005. . .1.75 l/min for v > 5 mPas	0.005. . .1.75 l/min
PNP	PNP
3.600 imp/l (20°C)	3.600 imp/l (v > 3 mPas)
-0.8 . . . 30 bar (20°C)	-0.8 . . . 30 bar (20°C)
50 bar	50 bar
2 x G 1/8" female	2 x G 1/8" female
Alu-elox. / PPS / FPM 75.5	1.4404 / PPS / FPM 75.5
SS 316 L / PTFE	1.4404 / PPS / PTFE
80 g	80 g
from 0.5 mPas	from 0.5 mPas
-20. . .+100°C	-20. . .+110°C
± 1% at v > 3 mPas	± 1% from 5 mPas
± 0.5% (for constant service conditions)	± 0.5% (for constant service conditions)
any	any
5. . .24 VDC	5. . .24 VDC
15 mA	25 mA

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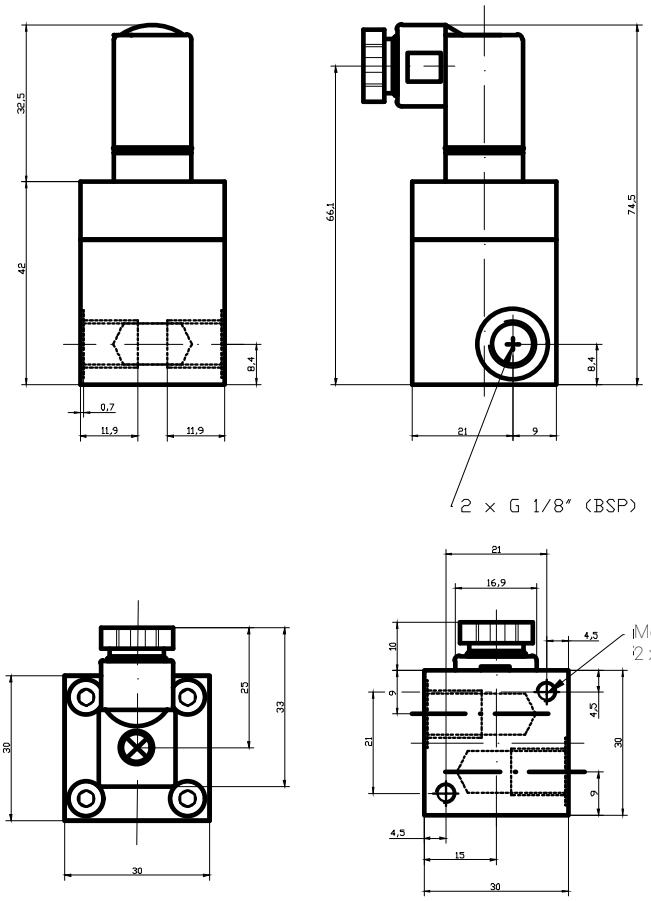
Flow range up to 5,0 l/min:

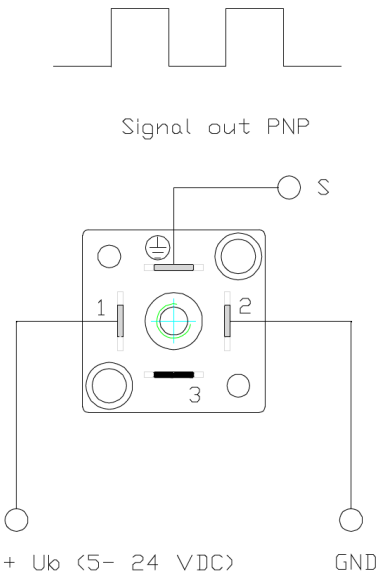


	VO-02.1.3	VO-02.2.3
Material	aluminium	stainless steel
Flow range	0.07. . .5.0 l/min for v = 5 mPas	0.07. . .5.0 l/min for v = 3 mPas
Output signal	PNP	PNP
Impulses / litre	1.800 imp/l (v > 3 mPas)	900 imp/l
Pressure range	-0.8 . . . 30 bar (20°C)	-0.8. . .60 bar (20°C)
Burst pressure	50 bar	80 bar
Connection	2 x G 1/8" female	2 x G 1/8" female
Material/rotor/O-ring	Alu. elox. / PPS / FKM	1.4435 / PPS / FKM
Pivot/bearing	SS 316 L / PPS, PTFE	1.4435
Weight	110 g	110 g
Viscosity	from 0.5 mPas	from 0.7 mPas
max. Mediatemp.	-40. . .+90°C	-20. . .+110°C
Accuracy	± 1% at v ≥ 5 mPas	± 1% at v ≥ 5 mPas
Repeatability	± 0.5% (for constant service conditions)	± 0.5% (for constant service conditions)
Mounting position	any	any
Supply	5. . .24 VDC	5. . .24 VDC
max. Current	15 mA	15 mA

Electrical Connection:

Pin arrangement /

Pin 1: 4.5. . .24VDC
Pin 2: GND (0V)
Mass-Pin: Signal



Ordering Codes:

Order number	**VO-02.**	**1.**	**2**

VO-02 Miniature Oval Gear Flowmeter

Material /
1 = aluminium
2 = stainless steel

Measuring range /
1 = 0.001. . .0.3 l/min and 7000 imp/l
2 = 0.005. . .1.75 l/min and 3600 imp/l
3 = 0.07. . .5 l/min and 1800 imp/l

For use with clean liquids only.
It is essential to ensure that the medium is filtered (approx. 5 µm). Metal/magnetic filtering is also ideal.
Never drive the device with compressed air !
Check the resistance of the used materials !

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SD-01

Plug-In Display for Gear-Wheel Sensors

Description:

The SD-01 series is a universally applicable on-the-spot display for all gear-wheel volume sensors of Profimess GmbH provided with the plug connection as per DIN43650. The display is simply inserted between the plug and plug socket of the volume meter. Optionally, the display unit can display the flow as the current value or the accumulated volume as the sum. In the basic version, the SD-01 transmits the rectangular signal from the gear-wheel volume sensor without modifying it. In the next extended level, the device is equipped with a F/I converter which translates the rectangular signal in into a freely parametrizable 0(4) to 20mA signal. Another method is to equip the display unit with two relay contacts which can be used for monitoring MIN/MAX parameters of a flow volume or to implement a simple dosing function. All necessary settings for the SD-01 are stored in an EEPROM and are preserved even in the event of a power failure. If previously supplied gear-wheel volume sensors need to be upgraded with the SD-01, the user can remove just the plug PCB of the sensor and mount the display unit without much effort.

Features

/ Display and F/I converter

/ Capable to simple dosing

/ No additional auxiliary power supply

/ Upgrade for sensors already supplied

Application:

In practice, use of impulse emitting volume sensors is widely popular. Often the user wishes, on the one hand, to process the measured value within his guide system but, on the other hand, also make it available on-the-spot so as to optically monitor maintenance work or regulating operations. Also, many controls are capable of processing only analogue inputs but not impulse signals or, for this purpose, an expensive impulse input card must be added. The SD-01 plug-in display offers an ideal and cost-effective solution to this problem. This version with the display of the accumulated volume and two relay contacts is moreover capable of dosing through the connected volume sensor by connecting one of the relay outputs to a magnetic valve and by utilizing the second as the START/STOP input. This feature turns the volume sensor/SD-01 unit into a practical dosing system.

Electrical Specifications:

Supply voltage /	10. . .19 VDC or 18. . .28 VDC
Power consumption /	120 mA max.
Display /	7-segment LED, 7.62 mm, red
Range /	0,000. . .9999 with floating point, overflow >9999 display 9999
Keypad /	two keys behind the front aperture
Protection class /	IP65
El. connection /	angled connector DIN43650 (4-pole), polarity-reversal-proof

Impulse output (incremental signal) /

Impulse amplitude:	approx. 0,8x Supply voltage, depends on load
Impulse form in symmetrical output signal:	rectangle, scan ratio for each channel 1:1, ± 15%
Impulse displacement between two channels:	90°, ± 30°
Output rating per channel:	0,3 W max., short-circuit-proof

Analogue output (Option) /

Output:	0(4). . .20 mA, short-circuit-proof
Load:	≤ 250 Ohm at 18. . .28 VDC supply ≤ 50 Ohm at 10 VDC supply
Resolution:	10 Bit

Relay outputs /

Load:	24 VDC, 1 A max.

Ordering Codes:

Order number	**SD-01.**	**2.**	**1.**	**1**

SD-01 Plug-In Display

Output signal /
1 = rectangular signals
2 = analogue output 0(4). . .20 mA
3 = 2 relay contacts 24 V DC 1 A

Supply Voltage /
1 = 24 VDC
2 = 12 VDC

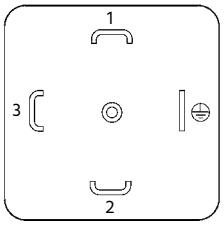
Display /
1 = current flow value
2 = volume (sum of flow), not for SD-01.1

Technical Specifications:

Operating temp. /	0. . .60°C
Storage temp. /	-25. . .+85°C
Housing /	aluminium
Dimensions /	height w/o plug approx. 35 mm, width approx. 60 mm, depth approx. 60 mm
Weight /	approx. 0,12 kg

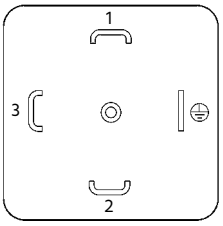
Electrical Connection:

Version: SD-01.1



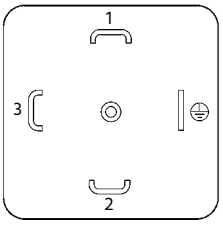
PIN 1 = 12/24 VDC
PIN 2 = GND
PIN 3 = channel 1
PIN ⏚ = channel 2

Version: SD-01.2



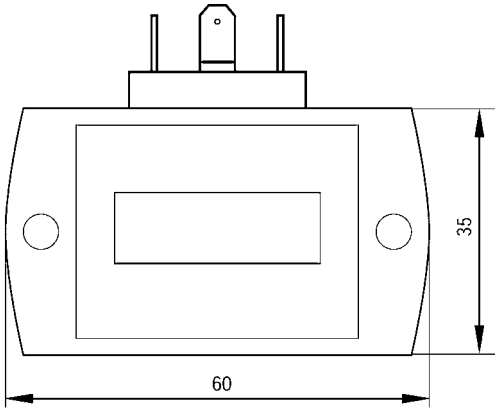
PIN 1 = 12/24 VDC
PIN 2 = GND
PIN 3 = 0/4-20 mA
PIN ⏚ = –

Version: SD-01.3



PIN 1 = 12/24 VDC
PIN 2 = GND
PIN 3 = relay 1
PIN ⏚ = relay 2

Dimensions in mm:



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VM-04

High-Precision Gear-Wheel Volume Sensor for Viscous Fluids

Features

/ For viscosities above 1 cSt

/ Excellent price to performance ratio

/ Cast or st. steel versions available

/ Accuracy better than 0.3% of MV

/ High resolution

/ Pressure-proof up to 400 bar

/ Convenient dim. for assembly

Description:

The VM-04 series of the flowmeters measuring sensor consists of a pair of toothed wheels which is driven by the flow of fluid according to the working principle of a gear-wheel pump. The bearing for the measuring sensor is designed as a radial or axial sliding contact bearing. The gear-wheel movement is scanned by means of two magneto-resistive sensors which are phase displaced by 90° and hermetically separated from the measuring chamber. The two-channel scanning enables a higher resolution of measurement and detection of direction of flow by means of suitable electronic devices. Optionally, all devices can be supplied with an explosion-proof design with separate switching amplifier. The gear-wheel flowmeter VM-04 is outstanding due to its low resistance to flow and especially low sound level.

Application:

Due to their excellent accuracy of measurement along with high resolution, these devices are especially suited for use in test beds for measuring small and least volumes of flow. Some of the areas of deployment are:

- Measurement of consumption
- Controlling filling operations
- Dosing oils and chemicals
- Measurement of flow for paints and varnishes
- Ratio regulation for polyol and isocyanate

Versions and Ranges:

Sealing material	Series	FKM	EPDM	FEP	FFKM
Ambient temperature		-15. . .+80°C	-30. . .+80°C	-30. . .+80°C	-15. . .+80°C
Medium temperature for standard version	1,2,6,7,8	-15. . .+120°C	-30. . .+120°C	-30. . .+120°C	-15. . .+120°C
	3,4,5	-15. . .+80°C	-30. . .+80°C	-30. . .+80°C	-15. . .+80°C
Medium temperature for high temperature version	1,2,6,7,8	-15. . .+150°C	-30. . .+150°C	-30. . .+150°C	-15. . .+150°C
	3,4,5	on request	on request	on request	on request
Medium temperature for high temp. PLUS version	1,2,6,7,8	-15. . .+150°C	not available	-30. . .+220°C*	-15. . .+220°C*
	3,4,5	not available	not available	not available	not available
Medium temperature for EX-Version	1,2,6,7,8	-15. . .+80°C	-30. . .+80°C	-30. . .+80°C	-15. . .+80°C
	3,4,5	-15. . .+80°C	-30. . .+80°C	-30. . .+80°C	-15. . .+80°C

*max. 200°C for VM-04.2

Technical Specifications:

Viscosity range / 1. . .1,000,000 mm^2/s

Pressure drop / depending on viscosity and usage rate of the device, max. permissible pressure drop 16 bar

Materials /

Series 1-4 and 7: Housing EN-G75-400-15, measuring element 1.7139

Series 5, 6 and 8: Housing st. steel 1.4404 meas. element st. steel 1.4462

Electronics /

Standard: 2 sensors, phase displaced for detection of direction

Ex-Version: with separate switching amplifier

Supply voltage / 12. . .30 VDC, polarity-reversal-proof

Output signal / rectangular impulses, PNP (NPN on request), ≥ 0,8 U_B , scan ratio 1:1 (± 15%)

Protection class / IP 65 DIN 40050

Power consumption / 0.9 $W_{max.}$

Impulse offset between channels / 90° ± 30°

Output rating/channel / 0.3 $W_{max.}$ short circuit protected

Ordering Codes:

Order number	VM-04.	3.	1.	F.	PS.	3.	S.	0

VM-04 Gear Volume Sensor

Operating ranges /
2. . .16 = as per table 3

Series /
1. . .8 = as per table 2

Sealing /
F = Viton
E = EPDM
P = FEP, Viton core with PTFE mantle
K = FFKM

Connection type /
PS = with assembly plate, connection sideways
PU = with assembly plate, connection at bottom
R = without assembly plate, connection sideways (Series 5, 6 and 8 only)

Process connection /
2 = G 1/8"-female (operating range 2 only)*
3 = G 3/8"-female (operating ranges 3 and 4 only)
4 = G 1/2"-female (operating ranges 5 and 6 only)
6 = G 1"-female (operating ranges 7 and 8 only)
8 = G 1 1/2"-female (operating range 9 only)
9 = SAE flange 1 1/2-female (operating range 12-16 only)

Elektronics version /
S = standard
H = high-temperature version (Series 1, 2, 6, 7 and 8 only)
H+ = high-temperature-Plus version, with seperate amplifier (series 1, 2, 6, 7 and 8 only)
X = intrinsically safe with separate switching amplifier (EEx ia IIC)

Options /
0 = none
1 = please specify in detailed text

* for operating range 2 with connecting plate the thread size is G 3/8"-female

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Versions (Table 1):

Depending on the application and media, the VM-04 is available in 8 different series:

Series	Material	min. Viscosity (mm^2/s)	Accuracy (% of MV)	Media properties		Particle size	Connection
				Viscosity	Lubrication		
1	EN-G75-400-15	20	± 0.3	low	well	20 µm max.	Plate mounting
2	EN-G75-400-15	50	± 0.5	middle	well	30 µm max.	Plate mounting
3	EN-G75-400-15	100	± 1.0	high	well	50 µm max.	Plate mounting
4	EN-G75-400-15	100	± 0.5	middle	low	30 µm max.	Plate mounting
5	st. steel 1.4404	100	± 0.5	middle	low	30 µm max.	Plate mounting or direct thread
6	st. steel 1.4404	20	± 0.3	low	well	20 µm max.	Plate mounting or direct thread
7	EN-G75-400-15	20	± 1	low	bad	20 µm max.	Plate mounting
8	st. steel 1.4404	20	± 1	low	bad	20 µm max.	Plate mounting or direct thread

Application Examples (Table 2):

Series	Application example	Media	Bearing	Bearing tolerance
1	flow measurement and counting	lubrication oils	ball bearing	small
2	filling	gear oils	ball bearing	expanded
3	consumption measurement	offset paint	bronze sliding bearing	big
4	ratio regulation	Polyol + Isocyanat	carbidemetal sliding bearing	expanded
5	dosing	clear varnish	carbidemetal sliding bearing	expanded
6	flow measurement	solvents	ball bearing made of st. steel	small
7/8		solvents	hybrid bearing	small

Ranges in l/min (Tab. 3):

Startup	Type	Series						
l/min		1	2	3	4	5	6	7/8
0.001	VM-04.2	0.008. . .2	-	-	-	0.02. . .2*	0.008. . .2	0.008. . .2
0.004	VM-04.3	0.02. . .4	-	-	-	-	0.02. . .4	0.02. . .4
0.008	VM-04.4a	0.04. . .8	-	-	0.04. . .8	-	0.04. . .8	0.04. . .8
0.01	VM-04.4	0.16. . .16	0.16. . .16	-	0.16. . .16	0.16. . .16	0.16. . .16	0.16. . .16
0.01	VM-04.5	0.2. . .40	-	-	0.2. . .30	0.2. . .30	-	-
0.02	VM-04.6	0.4. . .80	0.4. . .80	0.6. . .40	0.3. . .60	0.3. . .60	0.4. . .80	0.4. . .80
0.03	VM-04.7	0.6. . .160	0.6. . .160	-	0.6. . .100	0.6. . .100	0.6. . .160	-
0.04	VM-04.8	1. . .250	1. . .250	1.2. . .80	1. . .160	1. . .160	1. . .250	-
0.1	VM-04.12	2. . .600	-	-	-	-	-	-
0.2	VM-04.16	3. . .700	-	-	-	-	-	-

*Accuracy ± 3%; linear Accuracy ± 1.5%

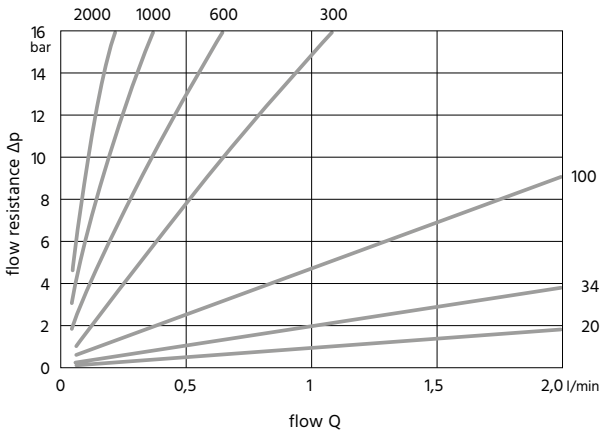
Parameters (Tab. 4):

Type	max. Pressure	Pressure Peaks	SPL in dB(A)	Resolution pulses/l
VM-04.2	400 bar	480 bar	< 60	40,000
VM-04.3	400 bar	480 bar	< 60	25,000
VM-04.4a	400 bar	480 bar	< 60	10000
VM-04.4	400 bar	480 bar	< 60	4,081.63
VM-04.5	400 bar	480 bar	< 70	2,500
VM-04.6	400 bar	480 bar	< 70	965.25
VM-04.7	315 bar	350 bar	< 70	333.33
VM-04.8	315 bar	350 bar	< 72	191.5
VM-04.12	400 bar	480 bar	< 80	83.33
VM-04.16	400 bar	480 bar	< 80	62.50

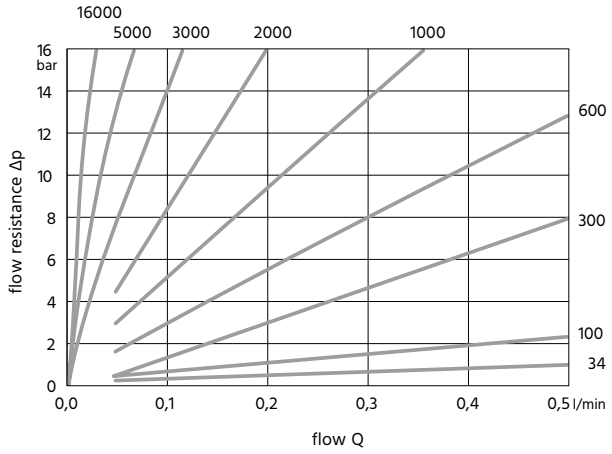
Flow resistance VM-04:

Series 1, 2, 6, 7, 8 – Parameter: Viscosity (mm^2/s)

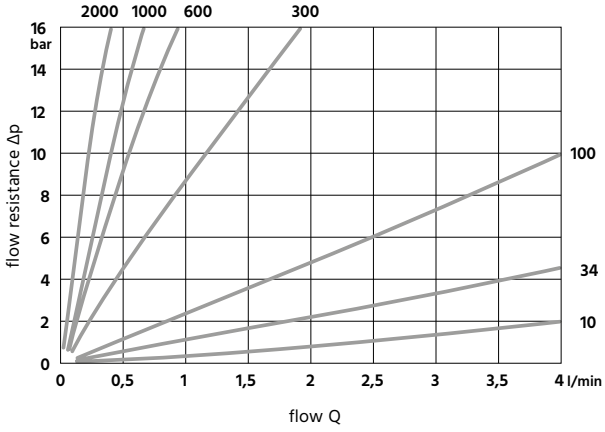
Operating range 2



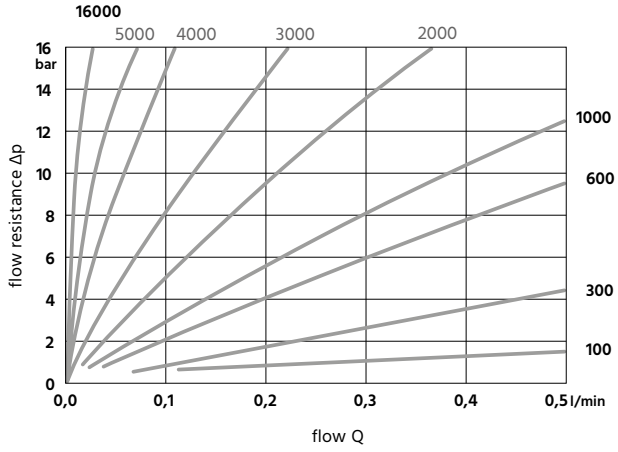
Operating range 2 (Ausschnitt)



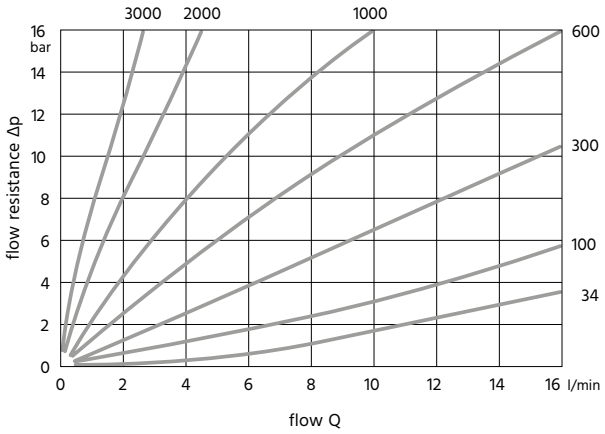
Operating range 3



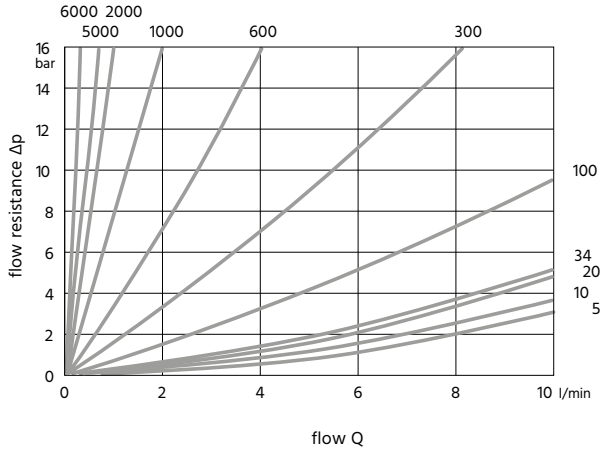
Operating range 3 (Ausschnitt)



Operating range 4



Operating range 4a



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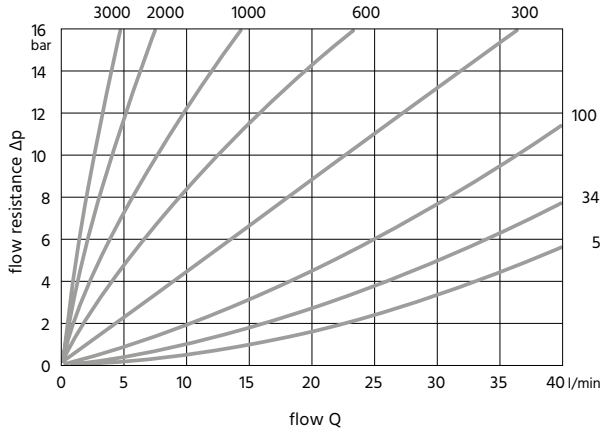
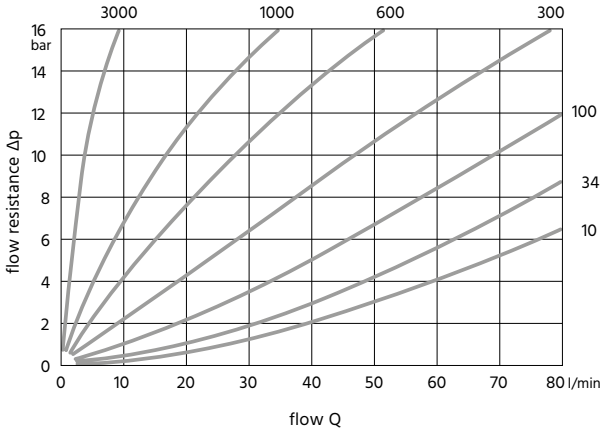
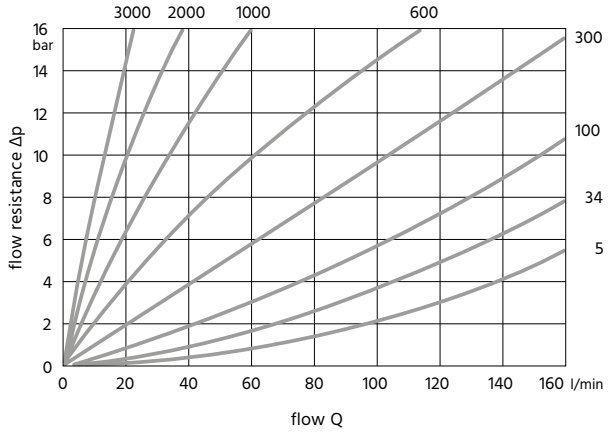
Operating range 5



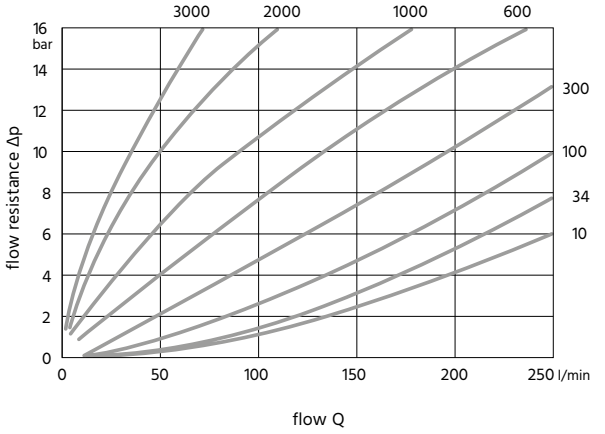
Operating range 6



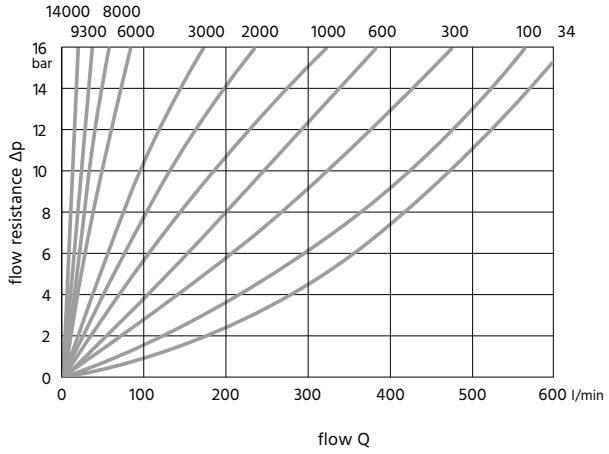
Operating range 7



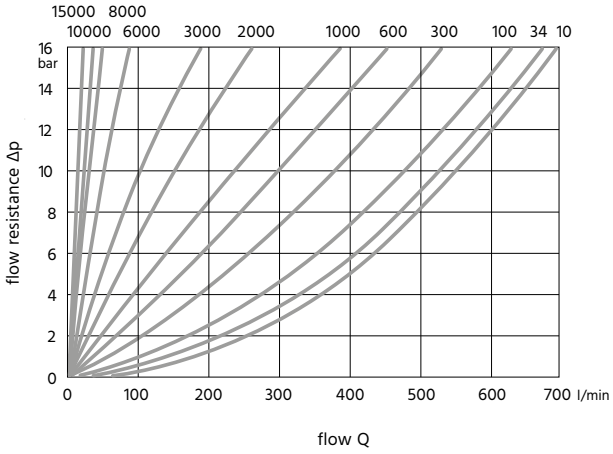
Operating range 8



Operating range 12



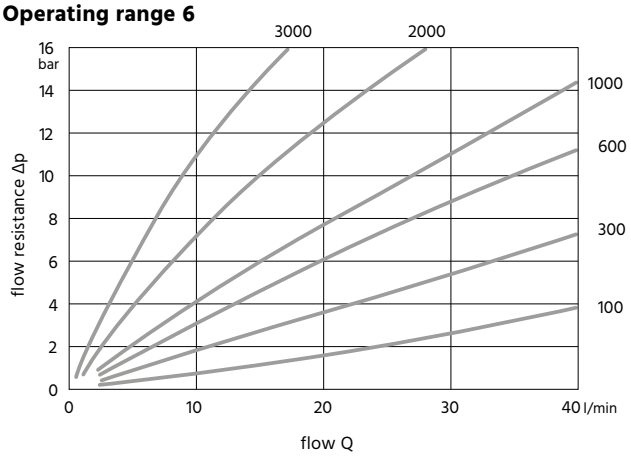
Operating range 16



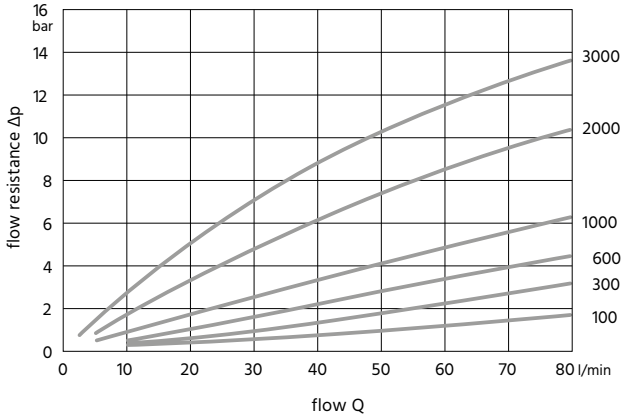
Flow resistance VM-04:

Series 3 – Parameter: Viscosity (mm²/s)

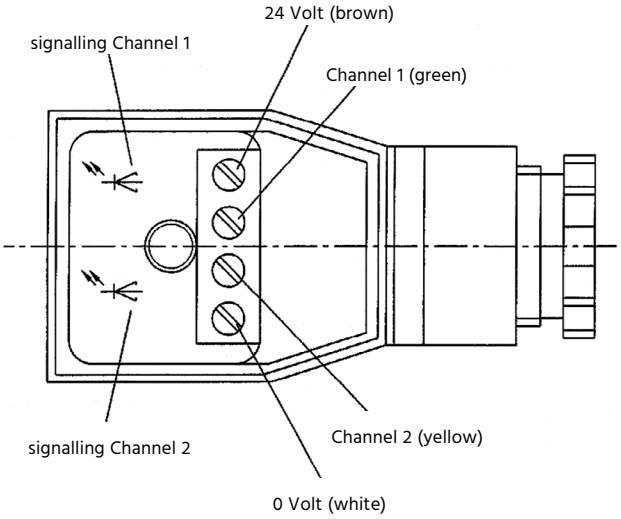
Operating range 6



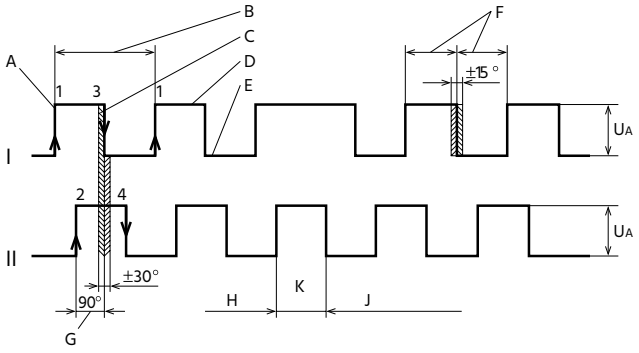
Operating range 8



Electric Cable Connection VM-04:



Signal Pattern VM-04:



Channel I

A rising flank

B one impulse (corresponds to the throughput of a geometrical tooth-volume Vgz)

C falling flank

D switch on phase

D switch off phase

F scan ratio 1:1 ± 15%

Channel II

G channel displacement

H flow direction 1

K reversal of direction of rotation

H flow direction 2

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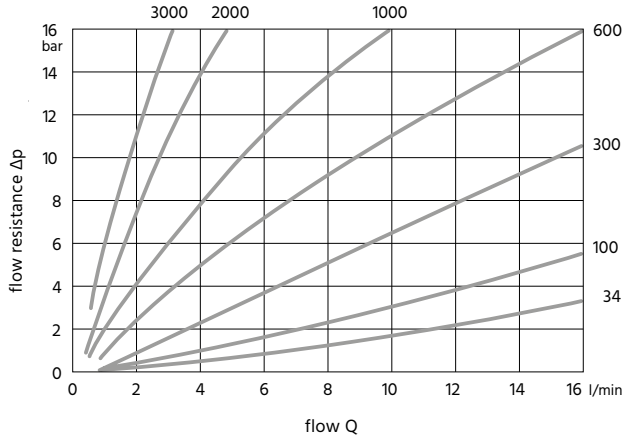
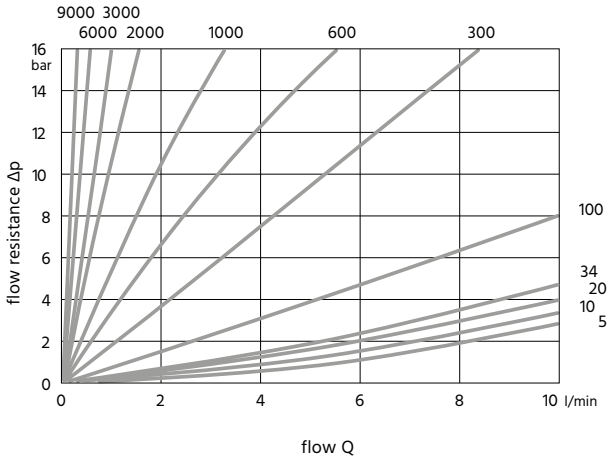
Flow resistance VM-04:

Series 4, 5 – Parameter: Viscosity (mm²/s)

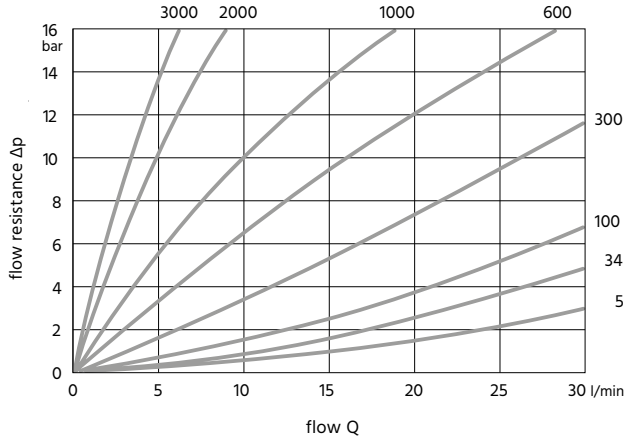
Operating range 4



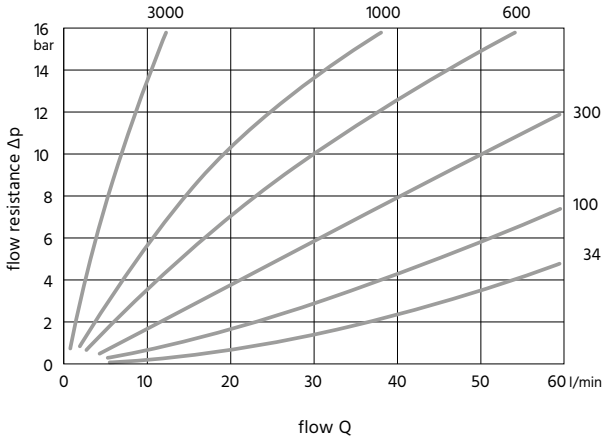
Operating range 4a



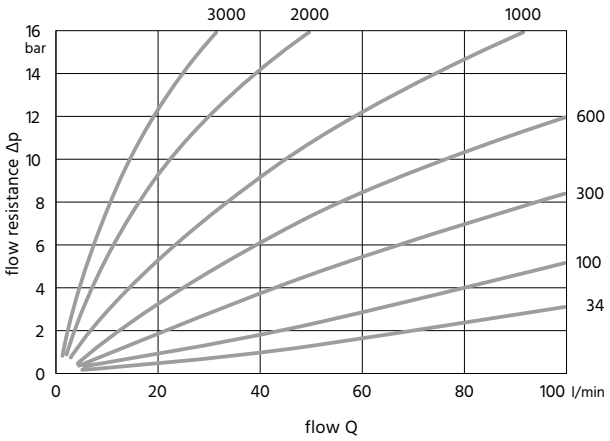
Operating range 5



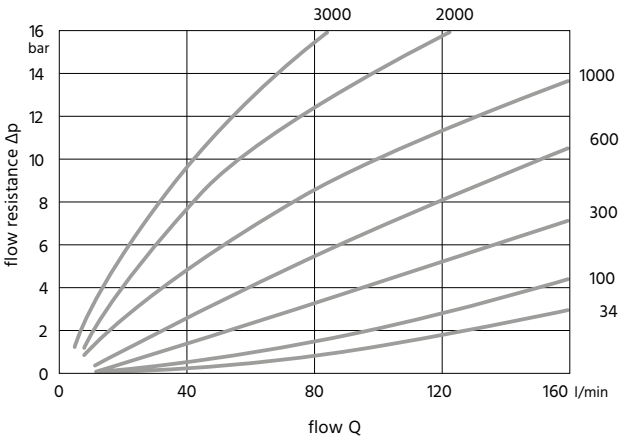
Operating range 6



Operating range 7



Operating range 8



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VS-02

Screw Spindle Flowmeter for Viscous Fluids

Features

/ Viscosity independent up to 40k cSt

/ Light and compact design

/ Bi-directional operation

/ Switching-, analogue- or pulse outputs

/ Cost-effective

/ Ranges up to 3800 l/min

/ Applicable up to 350 bar

/ Media temperature up to +150°C

Description:

The screw spindle flowmeter series VS-02 is developed for metering lubricating and viscous fluids in accordance with volumetric principle employing two cycloid steel spindles with a screw-shaped profile to rotate as the medium passes the flow chamber. The spindles form a geometric precise defined measuring chamber, through which accurately measured fluid is forwarded which is then detected by the Hall sensor outside the flow chamber. The output of the basic version VS-02.2 is pulse signal which may be connected to serve back-end PNP or NPN inputs, it supplies a square wave signal. With further options electronic housings can be screwed on the flowmeter body. These different electronics amplify the signal and deliver current or voltage outputs and/or drive the LCD-display.The electronic sensors are replaceable during active operation since the sensors never have contact to the medium.

Application:

Typical applications for the screw spindle flowmeter series VS-02 are cost-effective measurements of large volume flow of viscous fluids up to 3800 l/min. The flowmeters are also applicable for aqueous fluids like soap, paste or emulsions, and specially for oil, which show no abrasive behavior and which are compatible to the used materials of the flowmeter. Because of the volumetric principle of the VS-02 almost no viscosity depended error occurs up to 40 000 cSt. The units can be operated according to their corresponding versions up to 350 bar and +150°C.

Technical Specifications:

Operating ranges /

VS-02.1:	1.4. . .140 l/min
VS-02.2:	3.5. . .350 l/min
VS-02.3:	5.5. . .550 l/min
VS-02.4:	8.0. . .800 l/min
VS-02.5:	10. . .1000 l/min
VS-02.6:	15. . .1500 l/min
VS-02.7:	25. . .2500 l/min

max. Flow /

VS-02.1:	200 l/min
VS-02.2:	500 l/min
VS-02.3:	800 l/min
VS-02.4:	1200 l/min
VS-02.5:	1600 l/min
VS-02.6:	2200 l/min
VS-02.7:	3800 l/min

Accuracy / 1% of measured value (for 20 cSt 1% to 100% of nominal operating range, see also diagram „Accuracy“)

Repeatability / ± 0.25%

max. Pressure / connection material aluminium
› without steel SAE-flange 160 bar
› with SAE-flange 350 bar
connection material steel
› with or without steel SAE-flange 350 bar

max. Media-temp. / -25. . .+80°C, (+150°C possible with separated pick-up)

Materials /

body:	aluminium 6082 anodised
connection material:	aluminium 6082 anodised or steel
main screw:	steel 35SMnPb10 Uni 4838-80
subsidiary screw:	GHISA GJL-250 EN1561
ball bearing:	steel
screws:	steel, galvanised
positioning dowel:	steel
gaskets:	NBR (FKM on request)
SAE connection:	ASTM A216WCB

/ other materials are available on request.

Applicable fluids / oils and other none-hostile, self-lubricating liquids (a 30 µm mesh filter should be used)

Electrical Specifications:

Supply voltage / 10. . .30 VDC

Connection / round plug M12x1, 4-pol.; 5-pol. with display

Protection class / IP67

Conformity / CE

VS-02.x.x.x.1 (1 switching point) /

Power consumption:	< 1 W (without load)
Switching output:	transistor output „push-pull“ (short-circuit proved and polarity reversal protected) I_{out} = 100 mA max

VS-02.x.x.x.2 (pulse output „push-pull“) /

Current consumption:	approx. 20 mA (without load)
Signal output:	transistor output „push-pull“ (short-circuit proved and polarity reversal protected) I_{out} = 100 mA max

VS-02.x.x.x.3 (analogue output 0. . .10 VDC) /

Power consumption:	< 1 W (without load)
Analogue output:	0. . .10 VDC (short-circuit proved and polarity reversal protected)
Output current:	max. 20 mA

VS-02.x.x.x.4 (analogue output 4. . .20 mA, 3-wire) /

Power consumption:	< 1 W (without load)
Analogue output:	4. . .20 mA (short-circuit proved and polarity reversal protected)

VS-02.x.x.x.5 (display with analogue + switching output) /

Supply voltage:	18. . .30 VDC
Power consumption:	< 1 W
Analogue output:	4. . .20 mA / load max. 500 Ω or 0. . .10 VDC / load min. 1 kΩ
Setpoints S1 + S2:	transistor output „push-pull“ (short-circuit proved and polarity reversal protected) I_{out} = 100 mA max
Hysteresis:	adjustable, position of the hysteresis depends on minimum or maximum
Display:	backlit graphical LCD-display 32 x 16 pixels, background illumination, displays value and unit, flashing LED signal lamp with simultaneous message
Operating temperature:	-20°C. . .+70°C
Connection:	round plug M12x1, 5-pol.
Protection class:	IP67 (IP 68 for oil)
Conformity:	CE

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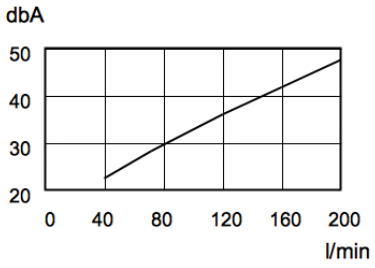
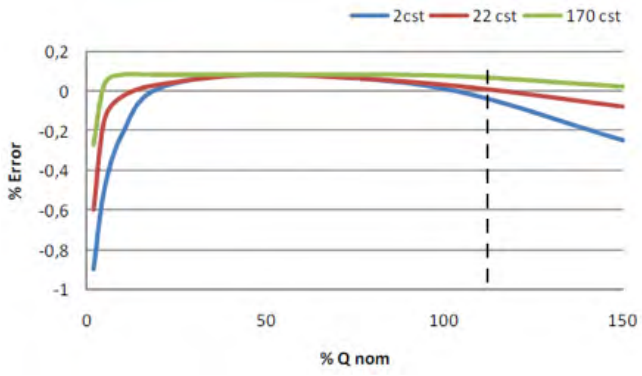
Selection table:

Type	Operating range 1. . .100% Q_{nom}	Volume / pulse	Pulse / litre	Output frequency at Q_{nom}	Output frequency at Q_{max}	Q_{max} (recomm.)	Body with aluminium connections	Body with steel connections	SAE-flanges (weight per pair)
	l/min	cm^3		Hz	Hz	l/min	kg	kg	kg
VS-02.1	1.4. . .140	13.10	76.340	178.1	254.5	200	3.44	4.76	5.76
VS-02.2	3.5. . .350	29.00	34.480	201.1	287.4	500	6.35	8.50	9.55
VS-02.3	5.5. . .550	48.58	20.590	188.7	274.5	800	10.50	13.60	15.10
VS-02.4	8.0. . .800	72.00	13.890	185.2	277.8	1200	14.20	18.50	18.80
VS-02.5	10.0. . .1000	103.63	9.650	160.6	257.3	1600	20.70	27.70	30.30
VS-02.6	15.0. . .1500	133.00	7.519	188.0	275.7	2200	25.00	33.20	34.60
VS-02.7	25.0. . .2500	238.82	4.187	174.5	265.2	3800	42.70	56.10	60.70

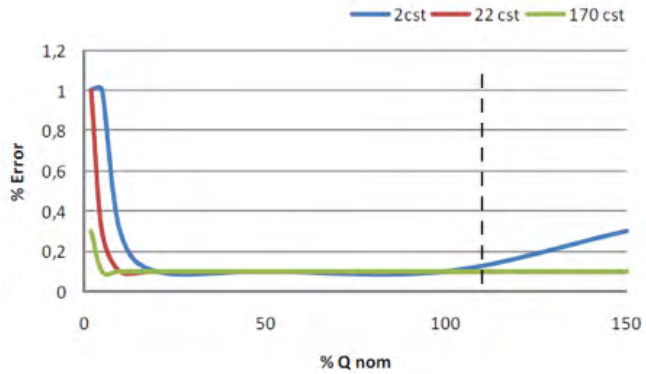
Sound level:



Linearity:



Accuracy:



Ordering Codes:

Order number **VS-02. 1. 2. 1. 4. 0**

VS-02 Screw Spindle Flowmeter for Viscous Fluids

Size and operating range /
1 = 1" up to 140 (200) l/min
2 = 1 1/4" up to 350 (500) l/min
3 = 1 1/2" up to 550 (800) l/min
4 = 1 1/2" up to 800 (1200) l/min
5 = 2" up to 1000 (1600) l/min
6 = 2" up to 1500 (2200) l/min
7 = 2 1/2" up to 2500 (3800) l/min

Process connection /
1 = female thread BSP
2 = steel SAE-flange* with female thread G

Connection material /
1 = aluminium, anodised
2 = steel

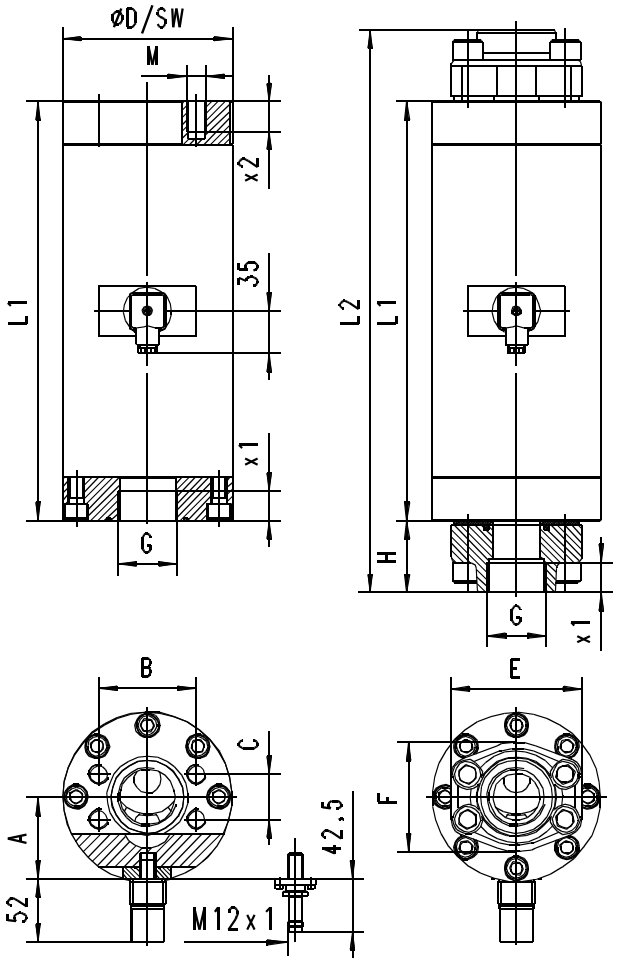
Output signal /
1 = screwed-in frequency pick-up with one Push-Pull switching output (Min or Max)
2 = pulse output Push-Pull
3 = screwed-in frequency pick-up with analog output 0 to 10 VDC
4 = screwed-in frequency pick-up with analog output 4 to 20 mA, 3-wire
5a = digital display unit with 2 transistor switching outputs, graphic display and 4 to 20 mA
5b = digital display unit with 2 transistor switching outputs, graphic display and 0 to 10 VDC-output

Options /
0 = none
HT = high-temperature up to +150°C

* The use of steel SAE flanges enables the sensor to be installed and removed more easily and increases the stability to pressure. In conjunction with connection material aluminum 6082 anodised only.

Dimensions in mm:

Female Thread **SAE-flange**



G	DN. . .range	L1	Ø D	SW	A	M	x2	B	C	L2	H	E	F
G 1	025. . .0140	220	88	78	49,0	12	20	57,1	27,8	324	52	80	69
G 1 ¼	032. . .0350	285	103	-	55,0	14	22	66,7	31,6	381	48	94	77
G 1 ½	040. . .0550	332	122	-	58,8	16	24	79,4	36,5	448	58	106	89
G 1 ½	040. . .0800	340	138	-	66,5	16	24	79,4	36,5	456	58	106	89
G 2	050. . .1000	396	155	-	71,0	20	35	96,8	44,4	544	74	135	116
G 2	050. . .1500	405	168	-	77,3	20	35	96,8	44,4	553	74	135	116
G 2 ½	065. . .2500	475	203	-	86,0	24	42	123,8	58,7	633	79	166	150

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VZ-01

Oil Counter for Light to Heavy Fuel Oil

Features

/ Mounting on pressure or suction side

/ Space-saving and flexible mounting

/ Temperature-independent

/ Viscosity-independent

Description:

The VZ-01 series of volume counters are rotary piston meters that function without auxiliary electrical power. A hollow slitted cylinder is situated in a cylindrical housing. Due to the guide slot, the cylinder makes oscillating movements as soon as the measuring chamber is flooded with the medium. The piston movement is transmitted magnetically to a totalizing roller counter which totalizes the volume of flow over a certain period. If necessary, the counter can be equipped with a remote value emitter designed as a reed or inductive contact which will transmit an electrical impulse for each defined volume.

Application:

Rotary piston meters are used wherever flow of oil or liquid fuel needs to be tapped in a simple but highly accurate method without depending on auxiliary electrical power. Some of the typical examples are in its deployment in the bunker piping in ships or as measurement of consumption in the forerun and return in diesel engines. Using the VZ-01 even simple dosing processes can be controlled where even hostile media can be measured by using special type of materials (Teflon or stainless steel pistons, stainless steel chamber). A major advantage of the volume counters is that the outcome of measurement does not depend on temperature and viscosity. This represents a plus point in some applications as against float devices or measuring turbines.

Technical Specifications:

Counter /	roller counter in litres
Process connection /	flange- or thread connection
Flow range /	0.5 up to 30000 l/h
Permissible media /	heating fuel (extra-light, light, medium and heavy), Naphta, Bunker C, gasoil and other lubricating media
Options /	display in US-gallons (1 gallon corresponds to 3.785 litres) outpaired units for differential measurement of fuel consumption approvals as per GL, LR and DNV

Electrical Specifications:

Switching element /	RE, RV = Reed-tubes with protective gas contact IN = inductive slit initiator as per IEC 60947-5-6
Switching voltage /	RE, RV = max. 48 V DC/AC protection class III (SELV) IN = 5 to 15 VDC
Switching current /	RE, RV = max. 50 mA (Ri = 47 Ω / 0.5 W) IN = > 3 mA bei 8 VDC / 1 kΩ
Standby current /	RE, RV = open contact IN = < 1 mA at 8 VDC / 1 kΩ
Switching load /	RE, RV = max. 2 W
Switching time /	RE = 40% to 60% (impulse value 1.0 and 0.1 l/Imp.) 30 to 70% (impulse value 0.00125 and 0.00311 l/Imp.) RV = 50% ± 10% IN = 50% ± 10%
Ambient temperature /	RE = -10°C to +60°C RV = -10°C to +70°C IN = -10°C to +70°C
Protection class /	RE = IP50 (IEC 60529) RV = IP65 (IEC 60529) IN = IP65 (IEC 60529)
Electrical connection /	RE = on plug connector with cable ø 3.5 mm to ø 5 mm RV = fixed cable 3 m length (2 x 0.14 mm²) IN = plug for cable (2 x 0.35 mm²)

Electrical Specifications of display with two selectable pulse- and analogue outputs FA:

Display /	8-character LCD with identification of the parameter, height of numbers 8 mm, flow rate (meter load) using bar indicator
Display values /	total volume, resettable volume, flow rate
Ambient temperature /	-25°C. . .+70°C
Power supply /	24 VDC (6. . .30 VDC)
Data preservation /	by non-volatile memory (EEPROM)
Protection class /	IP66 (IEC 60529)
Output versions /	**Version 1:** 1 potential free digital output (Rel. 1), adjustable and 1 passive analogue output 4. . .20 mA **Version 2:** 2 potential free digital outputs (Rel.1 + Rel. 2) each adjustable
Analogue output /	
Power supply:	6. . .30 VDC
Load RL:	max. (U-5) V / 0.0215 A [Ω]
Resolution:	16 Bit
Error:	max. ± 0.2 mA
Update interval:	< 1 s
Digital output /	
Update intervall:	< 1 s
max. Voltage:	48 V DC/AC
max. Current:	50 mA
ON - resistance:	≤ 100 Ω
OFF - resistance:	≥ 10 M Ω
Insulation voltage:	> 100 V DC/AC
max. Output frequency:	200 Hz

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Versions:

VZ-01 Oil Counter

max. Temperature: In case of oil counters belonging to the sizes 04M, 04 and 08 the media temperature must not exceed 60°C. And in case of sizes 15 to 50 the maximum media temperature is 130°C. Optionally, a high-temperature version up to 180°C is available.

Process connection: The VZ-01 of sizes 04M, 04 and 08 have only thread connections as per the table „Sizes" (on the following page). The sizes 15 to 40 offer a choice between thread or flange connections.

Nominal pressure: The nominal pressure for thread connections is PN 16 while for flange connections either PN 25 or PN 40 can be selected.

Impulse emitter: See table „Sizes" on the following page.

The electronic display FA is a top-mounted unit, that provides two selectable outputs, either as one adjustable pulse- and one additional 4 to 20 mA-analogue output or as two adjustable pulse outputs. The displayed values are total volume, resettable volume and flow rate.

Ordering codes:

Order number	VZ-01.	04.	2.	1.	2.	0

VZ-01 Oil Counter

Size /
04M = 04M (only without impulse emitter)
04 = 04
08 = 08
15 = 15
20 = 20
25 = 25
40 = 40
50 = 50

maximum Temperature in °C /
1 = 60°C only for Sizes 04M, 04 and 08
2 = 130°C only for Sizes 15 to 50
3 = 180°C only for Sizes 15 to 50

Process connection /
1 = thread
2 = flange

Nominal pressure for flanges /
0 = thread connection PN16
1 = PN 25
2 = PN 40 (for 180°C only)

Impulse emitter /
0 = none
1 = RE (only for Sizes: 04, 08 see table)
2 = RV (only for Sizes: 15. . .50 see table)
3 = IN (only for Sizes: 15. . .50 see table)
4 = FA-electronic display with 2 selectable pulse- and analogue outputs

Table of sizes:

Typ:	Einh.	VZ-01.04M	VZ-01.04	VZ-01.08	VZ-01.15	VZ-01.20	VZ-01.25	VZ-01.40	VZ-01.50
Diameter	Zoll	0.125	0.125	0.25	0.5	0.75	1	1.5	2
DN		4	4	8	15	20	25	40	50
Thread size		1/8"-f	1/8"-f	1/4"-f	3/4"-m	1"-m	1 1/4"-m	2"-m	-
PN thread	bar	25	25	25	16	16	16	16	-
PN on the flange	bar	-	-	-	25/40	25/40	25/40	25/40	25/40
max. Temperature	°C	60	60	60	130/180	130/180	130/180	130/180	130/180
max. Flow	l/h	40	80	200	600	1500	3000	9000	30000
Continuous flow	l/h	25	50	135	400	1000	2000	6000	20000
min. Flow	l/h	0.5	1	4	20	40	75	225	750
Start-up at approx.	l/h	0.3	0.4	1.6	4	12	30	90	300
Measuring error limit	± 1% of measured value (max. Deviation: VZO 4 Q_{min} 0.5: 0.5 l/h. . .2 l/h = +1 % / -2 % VZO 4: 1 l/h. . .2 l/h = +1 % / -2 %)								
Repeatability	± 0,2%								
Least readable volume	l	0.001	0.001	0.01	0.01	0.1	0.1	0.1	1
Registering ability	m^3	100	100	1000	1000	10.000	10.000	10.000	100.000
Registering duration	h	4000	2000	7400	2500	10.000	5000	1667	5000
Mesh width for safety filter	mm	0.125	0.125	0.15	0.4	0.4	0.4	0.8	0.8
Mesh width for strainer [1]	mm	0.08	0.08	0.1	0.25	0.4	0.4	0.6	0.6
Measuring chamber volume	ccm	5	5	12.5	12	36	100	330	1200
Housing surface		-	-	-	red, Ral 3013	red, Ral 3013	red, Ral 3013	red, Ral 3013	red, Ral 3013
Weight without joints	kg	0.65	0.65	0.75	-	-	-	-	-
Weight with thread	kg	-	-	-	2.2	2.5	4.2	17.3	-
Weight with flange PN 25	kg	-	-	-	3.8	4.5	7.5	20.3	41
Weight with flange PN 40	kg	-	-	-	4.4	5.5	7.8	20.5	42
Impulse emitter REED									
RE 1	l/Imp	-	-	1	-	-	-	-	-
RE 0.1	l/Imp	-	0.1	-	-	-	-	-	-
RE 0.01	l/Imp	-	-	-	-	-	-	-	-
RE 0.00125	l/Imp	-	0.00125	-	-	-	-	-	-
RE 0.00311	l/Imp	-	-	0.00311	-	-	-	-	-
IN inductive DIN 19234	l/Imp	-	-	-	0.01	0.01	0.1	0.1	1
RV RE	l/Imp	-	-	-	0.1	1	1	1	10
RV RE	l/Imp	-	-	-	1	-	-	10	100
Imp.frq. RE 0,00125 Q_{max}	Hz	-	17.777	-	-	-	-	-	-
Q_{min}	Hz	-	0.222	-	-	-	-	-	-
Imp.frq. RE 0,00311 Q_{max}	Hz	-	-	17.864	-	-	-	-	-
Q_{min}	Hz	-	-	0.357	-	-	-	-	-

[1] Recommended mesh width for optional strainer

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Table of Dimensions:

Size	Length	Width (incl. Imp.)	Height	Connec-tions	Height at 130 °C w/o emitter	Height at 130 °C with RV	Height at 130 °C with IN	Height at 180 °C w/o emitter	Height at 180 °C with RV	Height at 180 °C with IN
VZ-01.04M	68	68	79	bottom						
VZ-01.04	68	68 (89)	79	bottom						
VZ-01.08	68	68 (89)	79	bottom						
VZ-01.15	165	105		sideways	106	130	185	147	171	225
VZ-01.20	165	105		sideways	115	139	194	156	180	234
VZ-01.25	190	130		sideways	142	166	221	183	207	261
VZ-01.40	300	210		sideways	235	259	273	235	259	313
VZ-01.50	350	280		sideways	291	315	329	291	315	369

Materials Oil Counter:

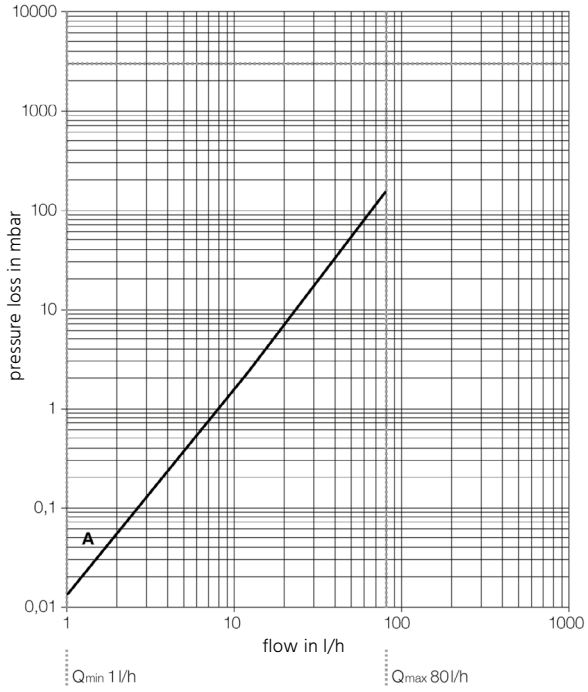
Part	Material	PN 4	PN 8	PN 15	PN 20	PN 25	PN 40	PN 50
Housing / Measuring unit	brass	x	x					
Housing with threaded ends	cast brass			x	x	x		
	spheroidal graphite iron GJS 40							x
Housing with flanges	spheroidal graphite iron GJS 40			x	x	x	x	x
Measuring chamber								
- PN 16 / 25	cast brass			x	x	x	x	
	alu-bronze							x
- PN 40	stainless steel			x	x	x	x	x
Seals	NBR butadiene-acrylnitril	x						
	FPM fluorelastomer	o	x	x	x	x	x	x
Rotary piston	aluminium anodized	x	x	x	x	x	x	x
Ancillaries	plastic			x	x	x	x	x
Cover of meter	plastic	x	x					

x = possible configuration o = on request

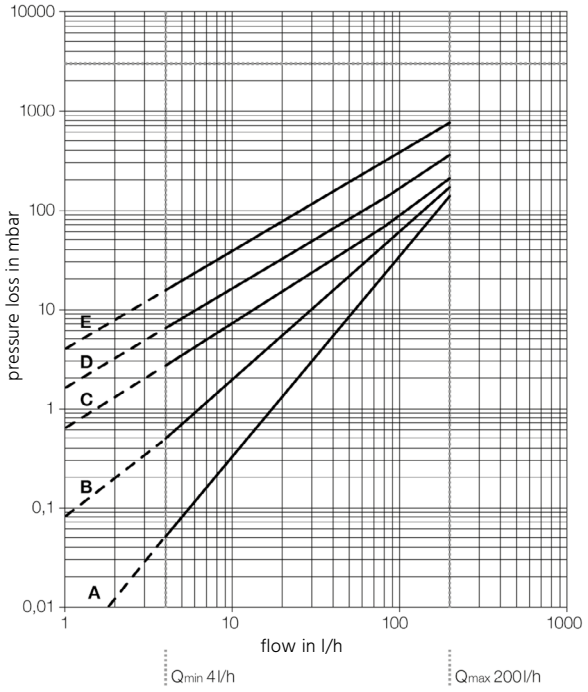
Pressure drop- / Viscosity-curves:

Kinematic viscosity /	Stokes, Centi-Stokes, mm^2/s	St, cSt, mm^2/s
Dynamic viscosity /	Pascal seconds, milli-pascal seconds Poise, Centipoise (obsolete)	Pas, mPa.s P, cP

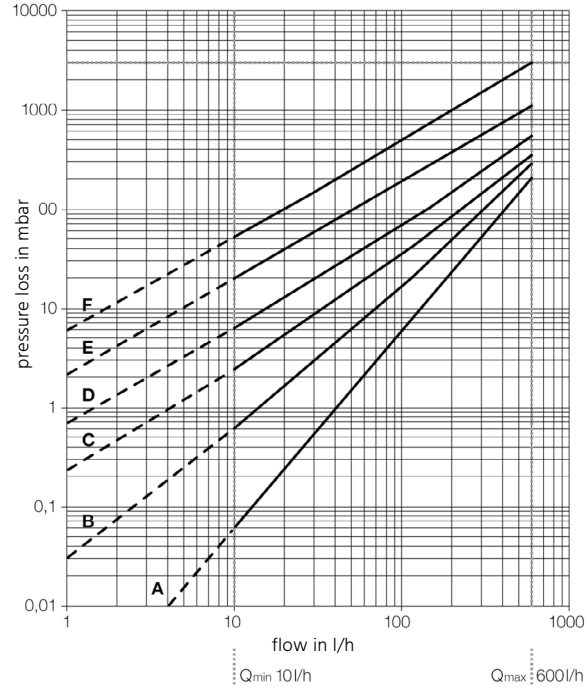
VZ-01.04



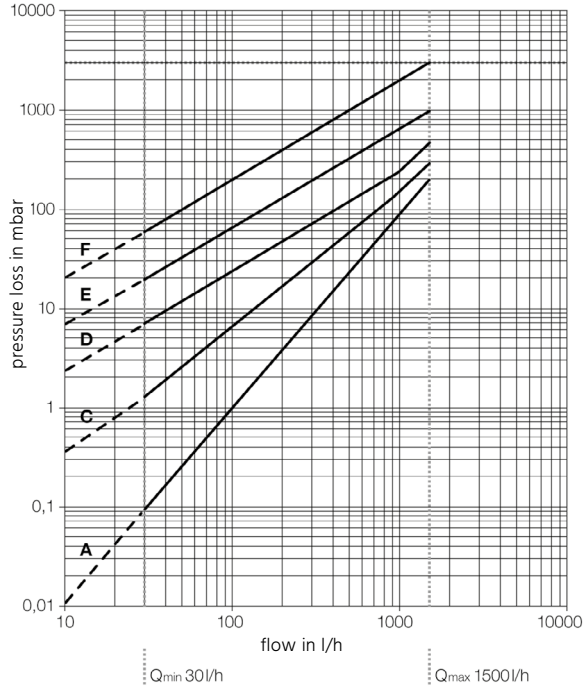
VZ-01.08



VZ-01.15



VZ-01.20



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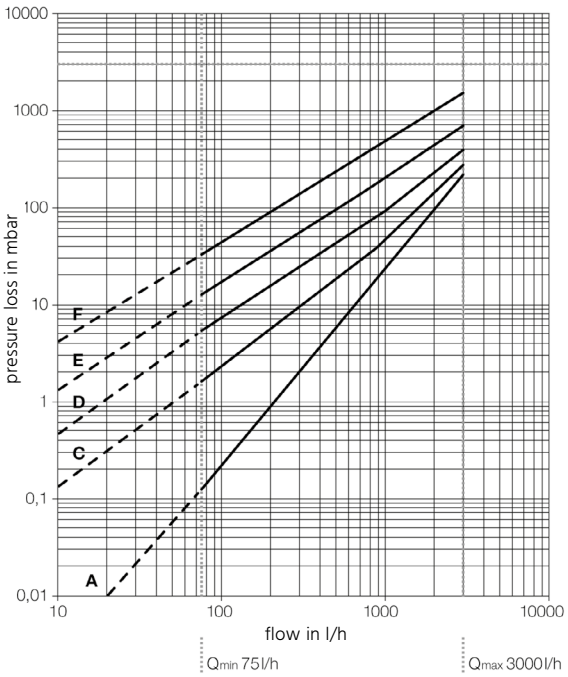
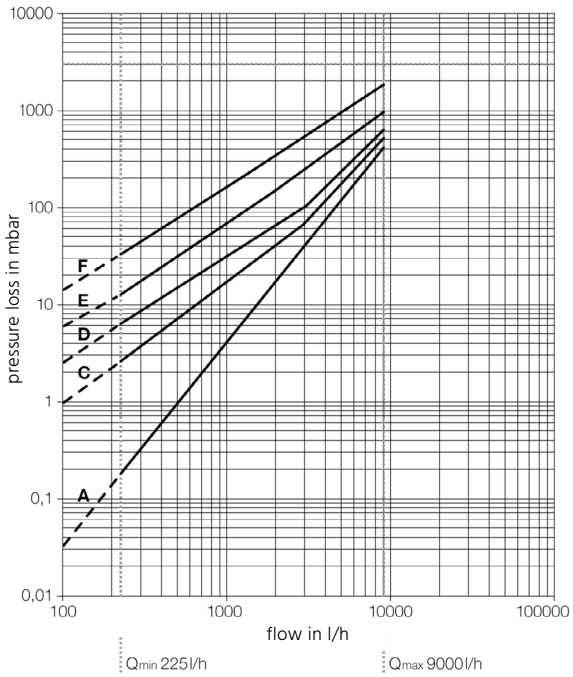
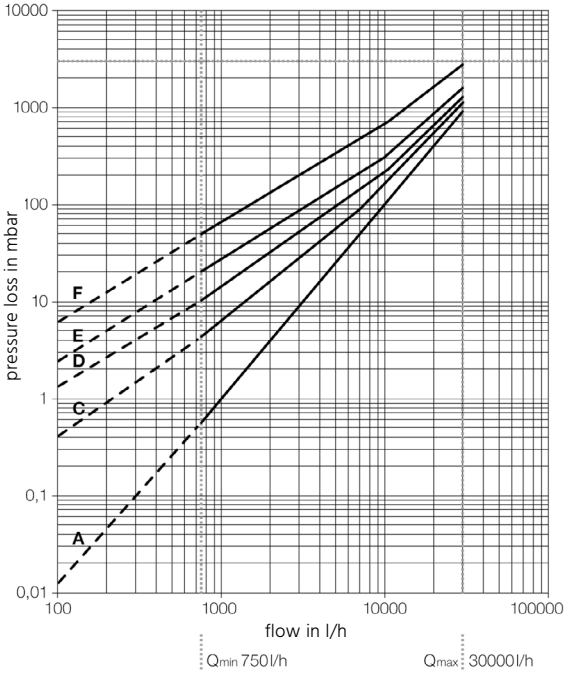
VZ-01.25



VZ-01.40



VZ-01.50



Conversion / cSt x density = mPa.s

Englergrade °E in mPa.s:
based on comparison table only

Saybold units in mPa.s:
based on comparison table only

Redwood units in mPa.s:
based on comparison table only

Rule of thumb / 1 cSt –> 1 mm2/s –> 1 mPa.s

Viscositylines for VZ-01.04 and VZ-01.08

A = 5 mPa.s	B = 50 mPa.s
C = 100 mPa.s	D = 200 mPa.s
E = 500 mPa.s	

Viscositylines for VZ-01.15 to VZ-01.50

A = 5 mPa.s	B = 25 mPa.s
C = 50 mPa.s	D = 100 mPa.s
E = 200 mPa.s	F = 500 mPa.s

If the pressure drop is above 1 bar, we recommend using the next greater nominal diameter for the counter. Maximum permissible pressure drop = 3 bar.

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GM-10N

Battery powered thermal Mass Flowmeter for Gases

Features

/ Standard AA battery powered

/ Touchscreen with password protection

/ Flow units changeable

/ Totalizer

/ High accuracy and dynamic

/ Extremely quick response time

/ No inflow and outflow lines required

/ Real gas calibration

/ Optional multigas

/ Optional 24 VDC supply

/ Optional regulating valve

/ Optional switching contacts

Description:

The GM-10N with its integrated touchscreen, offers thanks to autonomous operation with standard AA batteries and its insensitivity to pressure surges a highly accurate alternative to variable area flowmeters. The device has a CMOS flow sensor that enables a quick response speed due to its extremely small dimensions, while ensuring excellent accuracy. An all-metal body made of aluminium or stainless steel is equipped in its interior with a flow rectifier and subsequent resistance that divides the volume flow of gases into a defined main and an auxiliary flow. The auxiliary flow is guided through a measuring chamber in which the approximately 1 mm sensor is directly located. The sensor gets cooled by the mass flow of gas in such manner that its heat loss is proportional to the number of gas molecules flowing along regardless of their packing density. Consequently, the mass flow can be ascertained in a wide area without compensating for pressure and temperature. This principle of measurement is unique as against conventional methods like the variable area principle because no inflow and outflow lines are required. In its basic version, the GM-10N displays the standard and the total volume flow as a numerical value on its touchscreen. In addition to the numerical values, the standard volume flow is also shown graphically by a bar graph. The GM-10N can be supplied in its extended levels with additional precision regulating valve and / or adjustable switching contacts.

Application:

The GM-10N series of thermal gas mass flowmeters has been developed to replace on a longterm basis the variable area flowmeter that enjoyed a fine track-record for years for small gas flows. In contrast to this measurement system, it offers obvious advantages like higher accuracy and insensitive to pressure and temperature changes and it can be deployed even without auxiliary power supply. The device is suited for a number of various gases and covers the volume flow range up to 450 Nl/min air. Considering these advantages, the GM-10N can be used in different areas of the industry like, for example, gas supply systems, semi-conductor productions, welding technology, machine construction, supply

of compressed air, fuel cells, fermenters, chemical engineering, laboratories, ovens, burners, medical engineering, analyzing devices, laser technology, surface coating and so on. In the laboratory applications especially, the GM-10N is often deployed along with its optionally available integrated manual regulating valve since it permits adjustment of very low gas volume flows and maintenance of constant levels.

Alarm functions: In the version with contacts, the GM-10N provides three configurable alarms with 5 different selectable triggers (e.g. min. alarm, max. alarm, windows alarm, overflow alarm and totalizer alarm).

Options: Alternative sealing materials, external 24 VDC power supply instead of battery-operation, a housing for switch panel mounting, separately deliverable calibration protocols and a multigas calibration (e.g. one measuring device can be used for up to 3 different gases or gas mixtures) are available as options at additional charges.

Versions:

GM-10N Battery powered, thermal Mass Flowmeter for Gases

Normally, the GM-10N works as a battery-powered thermal mass flowmeter displaying the standard and the total volume flow as a numerical value on its touchscreen. In addition to the numerical values, the standard volume flow is also shown graphically by a bar graph. In the next extended level, a manual regulating valve is added to the device to accurately regulate the volume flow. Optionally, the GM-10N can be supplied with electrical switching contacts with or without a regulating valve. However, in this case an external 24 VDC power supply is necessary since the battery capacity is insufficient for operating the switching outputs.

Measuring tube material: The measuring tube can be made of anodized aluminium or electropolished stainless steel depending on the media. However, the CMOS sensor is wetted and deployment of the GM-10N is therefore limited to measuring and regulating non-hostile gases. The sealing material used is FKM, optionally it can be supplied in EPDM.

Accuracy and span: There are two versions of accuracies available. The more affordable standard variant measures at an accuracy of ± 2% of full scale value (ranges > 200 Nl/min ± 3% of full scale) and has a measuring span of 1:50.
The more accurate version has an accuracy of ± 1% of full scale and a measuring span of 1:100 (for units with process connection G 1/4“ and measuring ranges up to 50 Nl/min with real gas calibration only).

Medium: As measuring media all non-hostile and dry gases can be considered. Gases that are not listed in the ordering codes but comply with these requirements can be ordered
as special medium. All devices are supplied ex-factory in real gas calibration.

Flow units: It can be choosen between a large number of standardized and normalized flow units of the Imperial, US customary and SI measuring systems (with user adjustable reference conditions). The units are selectable from the integrated menu both for the actual and the totalized flow.

Ordering Codes:

Order number	GM-10N.	1.	2.	1/	N.	[].	T1

GM-10N Battery powered, thermal Mass Flowmeter for Gases

Version /
1 = flowmeter
2a = flowmeter with regulating valve
2b = flowmeter with regulating valve (flanged)
3 = flowmeter with switching contacts
4a = flowmeter with regulating valve and switching contacts
4b = flowmeter with regulating valve (flanged) and switching contacts

Measuring tube material /
1 = aluminium anodized
2 = stainless steel electropolished

Options (multiple selection such as 1/2/5 possible) /
0 = none
1 = seals EPDM instead of FKM
2 = external supply 24 VDC instead of battery for GM-10N.1/2
4 = switch panel mounting
5 = calibration protocol
6 = multigas (up to 3)

Medium /
L = air
N = nitrogen (N2)
O = oxygen (O2)
AR = argon (Ar)
HE = helium (He)
C = carbon dioxide (CO2)
P = propane (C3H8)
H = hydrogen (H2)
M = methane (CH4)
99 = please specify special type medium in detailed text

End value for measuring range /
[][][] = Please specify. Possible values from 0. . .50 Nml/min to 450 Nl/min (air). From 60 Nl/min on, the gas-connector is G ½“ female

Accuracy and span /
T1 = ± 1% of full scale (up to 50 Nl/min); span 1:100
T2 = ± 2% of full scale (> 200 Nl/min ± 3% of full scale); span 1:50

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Technical Specifications:

Media /	dry, non-hostile gases (see also list in ordering codes)
Accuracy & Dynamics /	
Type T1:	± 1% of full scale; dynamics 1:100 (for units with process connection G 1/4“ and measuring ranges up to 50 Nl/min with real gas calibration only)
Type T2:	± 2% of full scale; dynamics 1:50 (ranges > 200 Nl/min ± 3% of full scale)
Reaction time /	max. 300 msec (depending on filter configuration)
Response /	from 500 ms (depending on the application)
Repeatability /	± 0,5% of measured value
Longterm stability /	< 1% of measured value / year
Operating pressure /	0,2. . .11 bar abs.
Temperature /	0. . .50°C
Materials /	
Measuring tube:	aluminium anodized or stainless steel electropolished
Sensor:	silicon, silicon oxide and glass
Valve:	brass nickel-plated or stainless st.
Seals /	FKM, optional EPDM (FDA)
Pressure sensitivity /	< 0,2%/ bar of reading (typical N2)
Temperature sensitivity /	< 0,025% FS measuring range type / °C
Warm-up time /	< 1 sec. for full accuracy
Gas connection /	G¼"-female up to 60 Nl/min above this G½"-female (for air)
Inflow line /	not required
Mounting position /	up to 5 bar any, above this horizontal
Testing pressure /	16 bar abs.
Leakage rate /	<1 x 10-6 mbar l/s He
Display /	touchscreen 128 x 64 px backlighted with external power supply only (Micro-USB or 24 VDC)
Display units /	
Flow:	g/sec, g/min, g/h, kg/sec, kg/min, lb/sec, lb/min, lb/h, mln/min, mln/h, ln/sec, ln/min, nlpm, ln/h, m^3n/h mls/min, mls/h, sccs, sccm, ls/sec, ls/min, slpm, ls/h, scfm, scfh, m^3s/h, l/s, l/min, l/h, cc/sec, cc/min, cc/hr
Totalizer:	g, kg, lb, ln, mln, m3n, ls, mls, m^3s, scc, sf, scf, l, cc
Totalizer /	2 (1 x resettable, 1 x non-resettable)

Electrical Specifications:

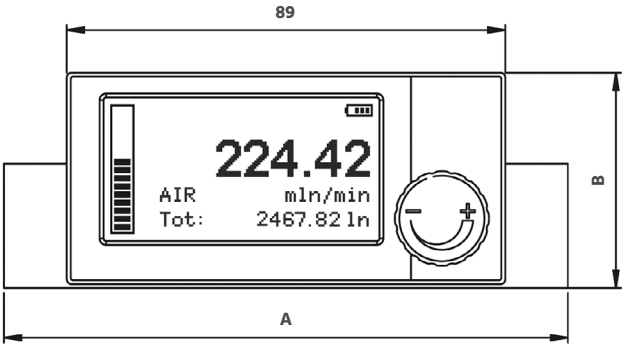
Supply voltage /	
GM-10N.1/2:	standard AA battery (lifetime in months depending on operation, approx. 56 h of continuous operation) or Micro-USB power supply (DIN 62684) Option: external supply +12 to 30 VDC (current consumption max. 100 mA)
GM-10N.3/4:	12. . .30 VDC (max. 200 mA) or Micro-USB (DIN 62684)
Connection cable /	for external power supply: 2 m with loose ends (special lengths on request)
Protection class /	IP 50
EMC /	EN 61326-1
Limit switch /	
Quantity:	3, freely adjustable
Function:	normally closed (NC), normally open (NO), hysteresis and auto / manual reset
Trigger:	min. alarm, max. alarm, windows alarm, overflow alarm and totalizer alarm

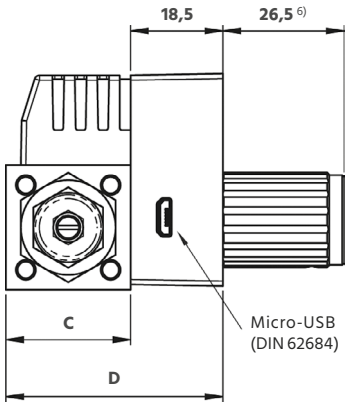
Possible Configurations:

Selection	GM-10N.1	GM-10N.2	GM-10N.3	GM-10N.4
Touchscreen	x	x	x	x
Totalizer (resettable)	x	x	x	x
Totalizer (not resettable)	x	x	x	
Multigas (max. 3 gases)		- optional -		
Regulating valve		x		x
Alarm functions			x	x

Selection	GM-10N.1	GM-10N.2	GM-10N.3	GM-10N.4
Battery supply	x	x		
24 VDC supply	- optional -		x	x
Micro-USB supply	x	x		

Dimensions in mm:





6) only with valve (GM-10N.2a/b and GM-10N.4a/b)

Operating range end ≤ 60 Nl/min (air)	Process-connection	A [mm]	B [mm]	C [mm]	D [mm]
GM-10N.1	G 1/4" IG	114	44	25	44
GM-10N.2a/b					
GM-10N.3					
GM-10N.4a/b					

Operating range end ≤ 60 Nl/min (air)	Process-connection	A [mm]	B [mm]	C [mm]	D [mm]
GM-10N.1	G 1/2" IG	160	54	35	54
GM-10N.3					
GM-10N.2a/b		207			
GM-10N.4a/b					

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GR-02

Thermal Mass Flowmeter and Controler for Gases

Features

/ Insensitive to pressure and temp.

/ Short response times

/ Highly accurate and dynamic

/ Low pressure drop

/ Serial interface

Description:

The GR-02 series of mass flowmeter for gases has a CMOS flow sensor that is capable of measuring at very high accuracy according to the thermal principle that applies to gas flow. The measurement pick-up is located directly within the gas flow and detects the quantum of heat that the passing gas molecules carry off a heating element. With its significantly small dimensions and direct contact to the medium, the GR-02 is capable of measuring at extremely fast speeds of response time. The measuring tube can be delivered in aluminium or stainless steel where the measuring chamber is always made of plastic. This limits its use to non-hostile gases or gaseous mixtures with only low hostile content. A major advantage of the thermal measuring principle is that the volume flow can be measured and put out under standard conditions, largely independent of the process pressure and the gas temperature. Selectively, the GR-02 can be supplied as a mere flowmeter with analogue output signal or as flowmeter and controller with integrated regulating valve. In the version with valve, the flow of gas volume is regulated proportionally to an analogue input signal while this unit can also be seen as a „constant gas source“. The parameters of the PI-controller, the operating range settings, selection of media and many other features can be verified and modified through suitable Windows software over the serial RS-485 interface.

Application:

The GR-02 series represents the new generation of thermal mass flowmeters for gases. The extremely cost-effective CMOS technology combines a dependable accuracy of up to ±0.3% of the full scale value + ±0.5% of measured value, fast response times and excellent dynamics to a flowmeter and controller that offers maximum operational convenience. Considering the advantages like modular construction of the measuring system, its assembly in any position and the convenience of cleaning the measuring pick-up without elaborate recalibration, the GR-02 can be deployed in various applications

Electrical Specifications:

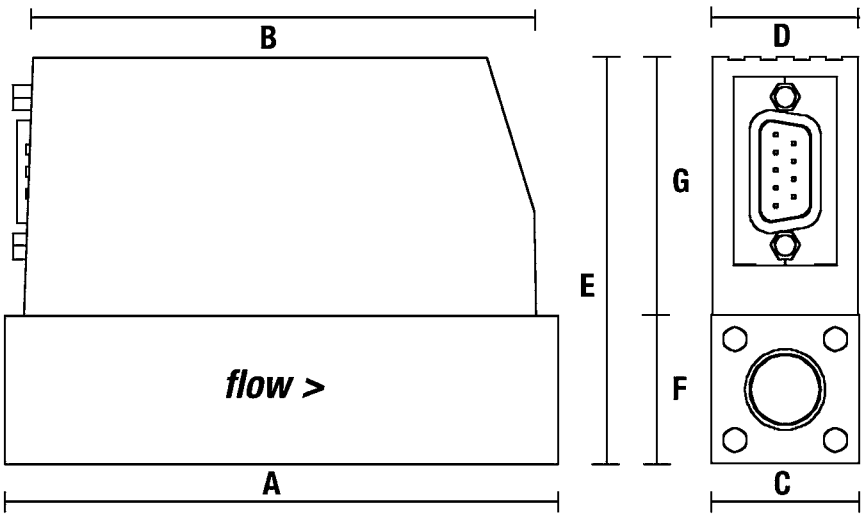
Supply voltage /	24 VDC (18-30 VDC) (15 VDC on request)
Power consumption /	meter max. 100 mA controller max. 250 mA
Electr. connection /	D-Sub plug 9-pole
Output signals analogue /	4. . .20 mA, 0. . .10 VDC, 0. . .5 VDC, 1. . .5 VDC, 2. . .10 VDC or 0. . .20 mA
Output signals digital /	RS-485; Modbus RTU (Slave); Lab View-VI´s available; optional: Profibus DP-V0, DP-V1
Set point value input for regulator /	4. . .20 mA, 0. . .10 VDC, 0. . .5 VDC, 1. . .5 VDC, 2. . .10 VDC or 0. . .20 mA
Starting time /	<1 sec.
EMC /	EN 61326-1
Protection class /	IP 50
Software /	- Reading of actual values for flow and temperature. - Specification of set point values - Entering regulator parameters - Changing gases - Optional recording of measuring data through logging function

Technical Specifications:

Measuring medium /	dry, non-hostile gases (see also listing in the Ordering codes)
Accuracy /	
GR-02.x.1:	± 1.0 % of full scale value
GR-02.x.2:	± 0.3 % of full scale value + ± 0.5% of full measured value
Pressure sensitivity /	< 0.2 % per bar (typically N2)
Repeatability /	± 0.2 % of full scale value
Dynamics /	
GR-02.x.1:	1:50
GR-02.x.2:	1:100
Response time /	80 ms; controller 500 ms
In- and outflow lines /	none
Pressure /	0.2. . .11 bar a (controller max. 8 bar)
Temperature /	0. . .50°C
Temp.-sensitivity /	< 0.025% per °C
Materials /	aluminium anodized, optional stainless steel electropolished
Seals /	Viton, EPDM, optional FFKM
Mounting position /	any (above 5 bar horizontal)
Gas connection /	G 1/4“-female up to 60 Nl/min, above G 1/2“-female
Testing pressure /	16 bar a
Longterm stability /	< 1% measured value / year
Leakage rate /	< 1x 10^{-6} mbar l/s He

Dimensions in mm:

Sizes	A	B	C	D	E	F	G
GR-02.1, 1/4“	94	87	25	25	69	25	44
GR-02.1, 1/2“	145	87	35	25	79	35	44
GR-02.2, 1/4“	124	117	25	25	69	25	44
GR-02.2, 1/2“	170	117	35	25	79	35	44



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Versions:

GR-02 Thermal Mass Flowmeter & Controller

The GR-02 is supplied as a mere flowmeter or as a flow controller with integrated regulating valve. The meter estimates the current volume flow and transmits it in the form of an analogue signal at the output. The controller functions like a „constant gas source". The device measures the volume flow as the actual value and transmits it as analogue output. At the same time, the set point value is fed to the input of the GR-02 in the form of another analogue signal. The electronics estimate the difference in the regulation and adjust the integrated valve by means of an interface-programmable PI controller.

Accuracy and span: There are two versions of accuracies available. The more affordable standard variant measures at an accuracy of ±1.0% of full scale value and has a measuring span of 1:50. The more accurate version has an accuracy of ±0.3% of full scale value + ±0.5% of measured value at a span of 1:100.

Basic body and seals: The measuring tube of the GR-02 is made of aluminium or stainless steel. The CMOS sensor is however, always made of plastic and constantly wetted. The standard sealing material is Viton; optionally also EPDM is available.

Output signals: The signal pattern over which the measured volume flow can be tapped at the output of the GR-02, is either 4. . .20 mA, 0. . .20 mA, 0. . .5 VDC, 1. . .5 VDC, 0. . .10 VDC or 2. . .10 VDC.

Set point value signal for controlling function: If the GR-02 is designed as a flowmeter and controller, the set point value of the flow must be set as an analogue signal. This is either 4. . .20 mA, 0. . .20 mA, 0. . .5 VDC, 1. . .5 VDC, 0. . .10 VDC or 2. . .10 VDC. The mere flowmeter version of the GR-02 has no set point value input.

Pressure ratios in regulating function: The integrated regulating valve of the GR-02.2 as a flowmeter and controller must be set for inlet and outlet pressure. For this reason, both these values must be specified as absolute pressure in [bar].

Medium: As measuring media all non-hostile, dry gases can be considered. Gases that are not listed in the Ordering codes but comply with the requirements can be ordered as special type medium. All devices are supplied ex factory with real gas calibration.

Operating range: There are various operating ranges from 0-25 Nml/min up to 0-450 Nl/min available. Customer-specific full scale values are available on request.

Ordering Codes:

Order no.	GR-02.	1.	2.	1.	1.	1.	P.	[]

GR-02 Thermal Mass Flowmeter & Controler for Gases

Version /
1 = flowmeter
2 = flowmeter & controler

Accuracy & span /
1 = ± 1.0% full scale value, span 1:50 (standard)
2 = ± 0.3% full scale value + ± 0.5% of measured value, span 1:100

Basic body and seals /
1 = aluminium with Viton (standard I)
2 = aluminium with EPDM
3 = stainless steel with Viton (standard II)
4 = stainless steel with EPDM

Output signals /
1 = current 4. . .20 mA
2 = current 0. . .20 mA
3 = voltage 0. . .5 VDC
4 = voltage 1. . .5 VDC
5 = voltage 0. . .10 VDC
6 = voltage 2. . .10 VDC

Set point value input signal for controlling function /
0 = no set point value input for meter only (GR-02.1)
1 = current 4. . .20 mA
2 = current 0. . .20 mA
3 = voltage 0. . .5 VDC
4 = voltage 1. . .5 VDC
5 = voltage 0. . .10 VDC
6 = voltage 2. . .10 VDC

Medium /
L = air
N = nitrogen
O = oxygen
HE = helium
AR = argon
C = carbon dioxide
P = propane (80Nl/min max.)
B = butane
H = hydrogen
M = methane
7 = please specify special type medium in detailed text

End value for measuring range /
[][][] = Please specify. Possible values from 0. . .50 Nml/min to 450 Nl/min (air). From 60 Nl/min on, the gas-connector is G ½" female

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GS-01N

Compressed Air Counter with Switching- and Analogue-Output

Description:

The GS-01N series compressed air counter is a thermal mass flow-meter for gases according to the principle of hot-wire anemometer that is equipped with an electronic unit that has been developed specifically for applications in the field of industrial compressed air. A calorimetric measuring unit consisting of a heated and a temperature measuring resistor form the sensor component of the GS-01N. A volume of compressed air passing through the measuring tube carries off the heat from the heated resistor that is proportional to the velocity. The resulting electrical change of the heated resistor is evaluated by means of the measuring bridge and the effect of media temperature is compensated by the measuring resistance. The extremely user-friendly designed electronic unit has two outputs which can be adjusted optionally as a PNP transistor output for incorporating a limit value switch or an impulse output or as an analogue output for transmitting a 4. . .20 mA signal (for flow, temperature or pressure). Thus, the possible combinations of outputs for the GS-01N are:

- / **2 x NO-contacts / NC-contacts**, adjustable with regard to position and hysteresis of the setpoint or as Window function
- / **1 x NO-contact / NC-contact** and an additional analogue output (scalable) or
- / **1 x NO-contact / NC-contact** and an additional impulse output (programmable).

The rotatable 4-digit digital display on the GS-01N displays either the accumulated sum of the compressed air flow (consumption of compressed air) in Nm^3 or the current value of the flow in Nm^3/min or in Nm^3/h optically. The maximum value that can be displayed is 4000 * $10^3 m^3$ where at such high values a yellow LED indicates that the displayed 4-digit value must be multiplied by the factor 1000. On pressing a button, the device can display the current media temperature and the accumulated sum after the last counter reset. Using a programming device, the display can be adjusted to let it remain switched off in RUN mode. An automatic Reset function of the totalizer can be programmed to different time intervals. In addition, the GS-01N has a minimum and a maximum memory that can store the lowest and the highest value measured until its next resetting.

Features

/ New:
Temperature monitoring and
pressure monitoring included
/ Analogue or pulse output
/ Display of current value or total
/ Can be used as preselection counter
/ Independent of pressure and temp.
/ Max. and min. value memory
/ Low pressure drop
/ Additonal temperature monitoring

Application:

Today, consumption of compressed air in machines and equipment is a cost factor that cannot be ignored at all. Due to this fact the consuming industry increasingly demands measuring devices which, on the one hand, help satisfactorily monitor consumption of compressed air and, on the other hand, do not cause additional pressure drop within the system which in turn would further escalate costs. The new compressed air counter GS-01N is our answer to this problem. It enables visual check of current consumption on a clearly readable display and, it can display the volume of compressed air consumed up to a point like a „water clock for air“ and store the value. Two programmable switching contacts trigger an alarm in the event of exceeding or falling short of a defined volume flow and, optionally, they can be programmed using window technology. It means that a defined range is considered as „good“ and, on escaping this Window alarm is sounded. Optionally, the user may avoid one of the switching outputs and, instead, opt for an impulse or analogue output or program the switching output as the preselection counter. The fact that the GS-01N is a mass flowmeter based on the thermal principle also underlines the advantages of measuring volume flow largely regardless of pressure and media temperature and implies a pressure drop in the range of only few millibars.

The accuracy of ±3% of measured value + ±0.3% of full scale value and the option of operating range up to 700 Nm^3/h round off a device that pays off within the shortest span of time, not the least, due to its excellent price to performance ratio.
The integrated temperature measurement enables temperature-sensitive processes, such as drying processes, to be monitored and the production quality to be ensured. The compressed air meter thus contributes to increasing process reliability.

Versions:

GS-01N Compressed Air Counter with Switching- and Analogue-Output

The GS-01N can be supplied in 5 versions with different nominal diameters and volume flow ranges measurable by them. The available connection sizes are:
G¼“, R½“, R1“, R1 ½“ and R2“. The tapping ranges are in the same sequence 0 - 18 Nm^3/h, 0 - 90 Nm^3/h, 0 - 270 Nm^3/h, 0 - 492 Nm^3/h and 0 - 840 Nm^3/h. The sizes G¼“ and R½“ are also available for argon. CO_2 and nitrogen.

Ordering Codes:

Order number	GS-01N.	1.	1.	1

GS-01N Compressed Air Counter with Switching- and Analogue-Output

Size /
0 = operating range 0.04 to 15 Nm^3/h, connections in G1/4“-female
1 = operating range 0.2 to 75 Nm^3/h, connections in R1/2“-male
2 = operating range 0.7 to 225 Nm^3/h, connections in R1“-male
3 = operating range 1.3 (1.5) to 410 Nm^3/h, conn. in R1 1/2“-male
4 = operating range 2.3 (3) to 700 Nm^3/h, connections in R2“-male

Medium /
0 = compressed air (all sizes)
1 = argon, CO_2, N_2 switchable (only GS-01N.0, GSN-01.1 and GS-01N.2)

Option /
0 = no option
1 = counter plug 4-pole series 713

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Technical Specifications:

Measuring/setting range for compressed air and gases (Ar, CO2, N2)

Values in Nm³/h	GS-01N.0.0/1	GS-01N.1.0/1	GS-01N.2.0/1	GS-01N.3.0	GS-01N.4.0
Display-range	0. . .18	0. . .90	0 . .270	0. . .492	0. . .840
Operating-range	0,05. . .15	0,25. . .75	0,8. . .225	1,4. . .410	2,5. . .700
Setpoint	0,13. . .14,99	0,65. . .74,97	1,9. . .224,9	3,6. . .409,8	5,9. . .699,7
Reset point	0,06. . .14,92	0,28. . .74,6	0,8. . .223,8	1,6. . .407,8	2,5 . .696,3
Analogue startpoint	0. . .12	0. . .60	0. . .180	0. . .327,9	0. . .560
Analogue endpoint	3. . .15	15. . .75	45. . .225	82,1. . .410	140. . .700
In steps of...	0,01	0,01	0,1	0,1	0,1
Process connection	G ¼"-IG	R ½"-AG	R 1"-AG	R 1 ½"-AG	R 2"-AG

Measuring, display and setting ranges refer to the standard volume flow according to DIN ISO 2533.

Volumetric flow quantity monitoring

Values in Nm³/h	GS-01N.0.0/1	GS-01N.1.0/1	GS-01N.2.0/1	GS-01N.3.0	GS-01N.4.0
Pulse value (m³)	0,001. . .10000000	0,001. . .10000000	0,001. . .10000000	0,001. . .10000000	0,001. . .10000000
In steps of... (m³)	0,0001	0,0001	0,0001	0,0001	0,0001
Pulse length (s)	0,01. . .2	0,002. . . 2	0,007. . .2	0,004. . .2	0,002. . .2

Media /	compressed air, process gas
Air quality (ISO 8573-1) at medium temperature 23°C /	class 141 (measuring errors value A) class 344 (measuring errors value B)
Measuring errors /	
Air quality A:	± (2% MW + 0,5% MEW)
Air quality B:	± (6% MW + 0,6% MEW)
Argon/ CO_2 / N_2:	± (6% MW + 0,6% MEW)
Temperature coefficient /	± 0,07 % MW 1/K
Repeatability /	± (0,4 % MW + 0,1 % MEW)
Response time /	< 0,1 s (dAP = 0 s)
Damping for the switching output /	0. . .5 s
Measuring dynamics /	1:300
Pressure rating /	16 bar
Min. bursting pressure /	64 bar

Medium temperature /	-10. . .60°C
Ambient temperature /	0. . .60°C
Storage temperature /	-20. . .+85°C
Max. rel. humidity /	90%
Vibration proof /	5 g (DIN EN 68000-2-6, 55-2000 Hz)
Housing materials /	
GS-01N.x.x.x:/	PBT+PC-GF30; PPS GF40; stainless steel (1.4301 / 304); stainless steel (1.4305 / 303); steel (1.5523) galvanised; 2.0401 (brass / CW614N); FKM
Sensor materials /	
GS-01N.x.x.x:/	stainless steel (1.4301 / 304); stainless steel (1.4305 / 303); FKM; ceramics glass passivated; PPS GF40; Al2O3 (ceramics); acrylate

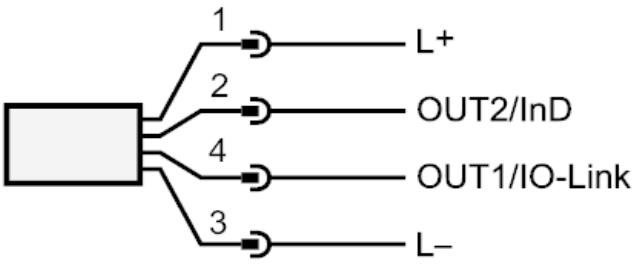
Electrical Spezification:

Supply voltage /	18. . .30 VDC (to EN 50178 SELV/PELV)
Protection class /	IP65, IP67
Current /	< 80 mA
Polarity reversal protection /	yes
Inputs / outputs	
Number:	2 digital outputs, 1 analog output
Inputs:	counter reset
Outputs /	
Output signal:	switching signal; analogue signal; pulse signal; IO-Link; (configurable)
Electrical version:	PNP/NPN
Output function:	normally open / normally closed; (parameterisable)
Max. voltage drop:	2,5 V
Power consumption:	150 mA; (per output)
Analogue current output:	4. . .20 mA (scalable)
Max. load:	500 Ω
Pulse output:	consumed quantity meter
Short-circuit protection /	yes; pulsed
Overload protection:	yes
Electrical connection /	connector: M12
Display /	
Colour display:	1,44“, 128 x 128 pixels 2 x LED, yellow

Pressure monitoring	
Measuring range /	-1. . .16 bar
Display range /	-1. . .20 bar
Resolution /	0,05 bar
Set point /	-0,92. . .16 bar
Reset point /	-1. . .15,92 bar
Analogue start point /	-1. . .12,8 bar
Analogue end point /	2,2. . .16 bar
In steps of /	0,01 bar
Response time /	0,05 s
Repeatability /	± 0,2% of the final value
Characteristics deviation /	< ± 0,5% of the final value, (BFSL = Best Fit Straight Line)

Temperature monitoring	
Measuring range /	-10. . .60°C
Display range /	-24. . .74°C
Resolution /	0,2°C
Set point /	-9,7. . .60°C
Reset point /	-10. . .59,7°C
Analogue start point /	-10. . .46°C
Analogue end point /	4. . .60°C
In steps of /	0,1°C
Accuracy /	± 0,5 K (medium flow in the limit area of the flow measurement range)
Dynamik T05 - T09 /	T09 = 0,5 s

Connection diagram:



OUT1/I0-LINK /	**OUT2/InD**
switching output flow	switching output flow
switching output temperature	switching output temperature
switching output pressure	switching output pressure
pulse output quantity meter	analogue output flow
signal output preset counter	analogue output temperature
	analogue output pressure
	signal output preset counter
	pulse output quantity meter
	input counter reset

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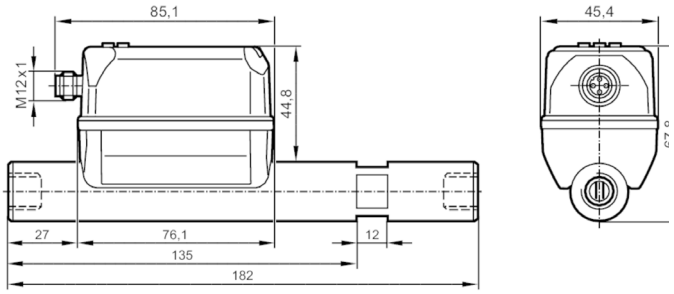
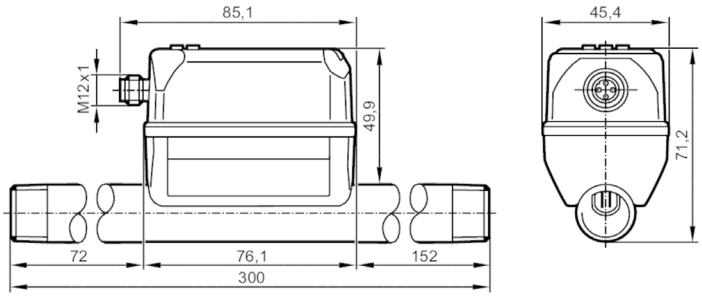
Dimensions in mm:

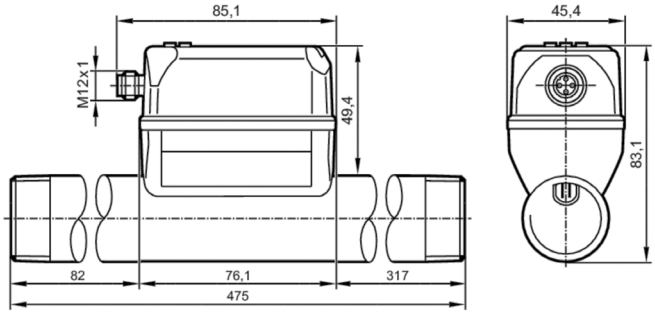
GS-01N.0



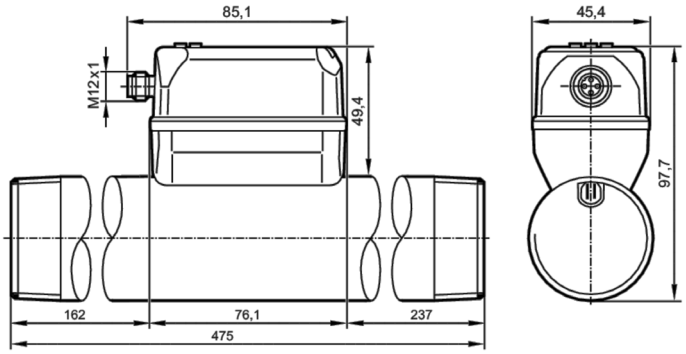
GS-01N.1



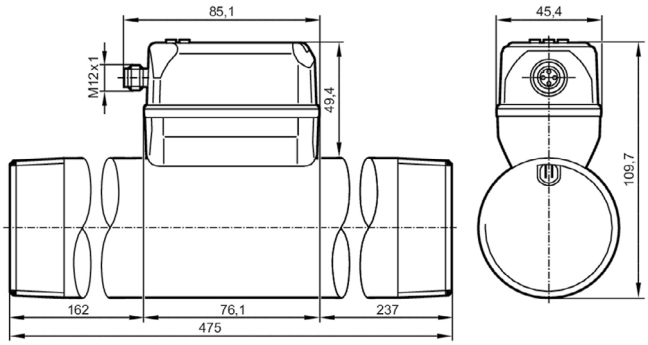
GS-01N.2



GS-01N.3



GS-01N.4



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GM-50

Air Velocity Transmitter

Features

/ Operating ranges up to 75 m/s (15000 ft/min) in 8 levels

/ Optional LED display

/ 6 different mounting lengths

/ 4. . .20 mA output

/ Digital filter

Description:

The GM-50 series of air velocity transmitter is the ideal instrument for measuring air velocities in large pipes and ducts. The device uses a mass flow sensor that allows accurate measurement at different flow velocities and temperatures. The rate of cooling in a heated measuring resistance is estimated which is directly proportional to the velocity of flow streaming along. At the output of the GM-50 the measured value can be tapped in the form of a 4 to 20 mA signal selectively in 3- or 4-wire system. In addition, the device has an optionally available LED display on which the measured value is displayed digitally, and an adjustable filter that attenuates the output with the time element of 0.5 to 15 seconds. The result is that a possible turbulent, restive flow does not lead to strong fluctuations in the output and the display. Since the GM-50 as a mass flowmeter always refers its measured values to air pressure and, in this respect, it is calibrated at factory to a standard status, it is possible to recalibrate the sensor to another pressure within the framework of parameterization.

Application:

The flow velocity of air or emission flow is often measured in the air-conditioning, ventilation and building technologies. Modern sensor elements of the GM-50 enable accurate and convenient measurement regardless of the air temperature at an enormously large span of operating range. Outmoded measuring instruments such as apertures, dynamic pressure probes or tubes can be conveniently replaced by the GM-50 with its principle of thermal mass flow measurement. In the course of commissioning, the user has a choice of eight different operating ranges between 0. . .1.25 and 0. . .75 m/s respectively 0. . .250 and 0. . .15000 ft/min, can customize to existing air pressure and adapt the 4. . .20 mA value of the output to his evaluator electronics. All settings for the device are performed through two keys and a potentiometer extremely easily.

Technical Specifications:

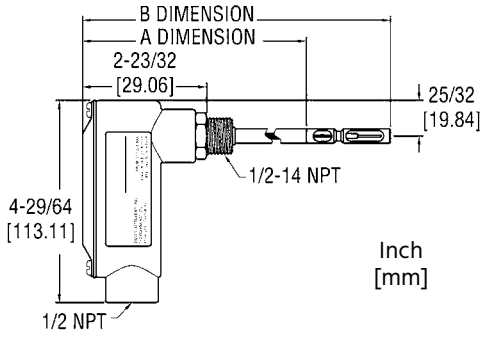
Media /	clean air and compatible, non-flammable gases
Operating range in m/s /	0. . .1,25; 0. . .2.5; 0. . .5; 0. . .10; 0. . .15; 0. . .25; 0. . .50; 0. . .75
Op. range in ft/min /	0. . .250; 0. . .500; 0. . .1000; 0. . .2000; 0. . .3000; 0. . .5000; 0. . .10000; 0. . .15000
Accuracy /	3% FS in the temp. range 0. . .+50°C 4% FS in the temp. range -40. . .0°C and +50. . .+100°C
Reaction time /	1.5 seconds to 95% of final value (outlet filter on minimum value)
Operating temp. /	-40. . .+100°C
Ambient temp. /	0. . .+60°C
Pressure /	6.89 bar max.
Mounting position /	independent
Humidity /	non-condensing
Process connection /	1/2"-NPT-male
Weight /	357.2 g (377g with Display)

Electrical Specifications:

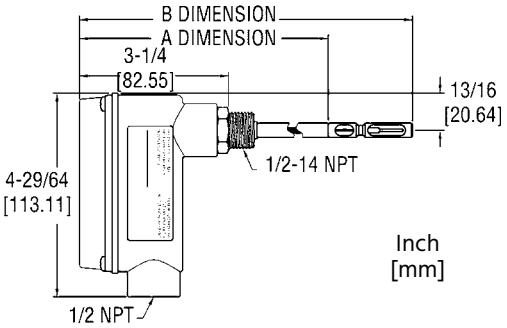
Supply voltage /	12. . .35 VDC or 10. . .16 VAC 1.5 A rating required due to initial power surge drawn by transmitter
Power consumption /	300 mA max.
Output /	4. . .20 mA, in 3- or 4-wire system
Output filer /	0.5. . .15 seconds, adjustable
Load /	600 Ohm max.
El. connection /	screw clamps
Protective switch /	IP66 (no display unit) IP23 (with display unit)
Display /	
Design:	4 1/2-digit 1/2" red LED
Resolution:	0.01 m/s

Dimensions in inch [mm]:

GM-50.0



GM-50.1



Ordering Codes:

Order number	**GM-50.**	**1.**	**1**

GM-50 Air Velocity Transmitter

Digital display /
0 = no display
1 = with digital display

Mounting length /
1 = 152,4 mm (6")
2 = 304,8 mm (12")
3 = 457,2 mm (18")
4 = 609,6 mm (24")
5 = 762,0 mm (30") - (only on request)
6 = 914,0 mm (36") - (only on request)

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