



# 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.

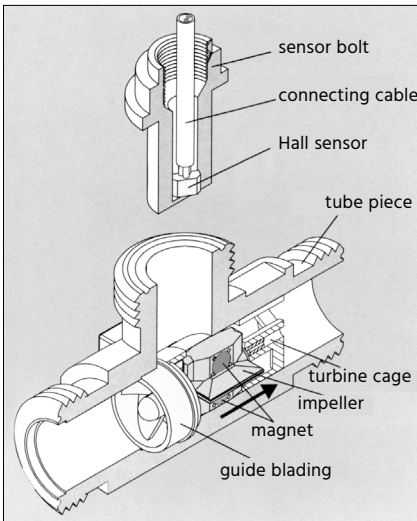
## Application:

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...

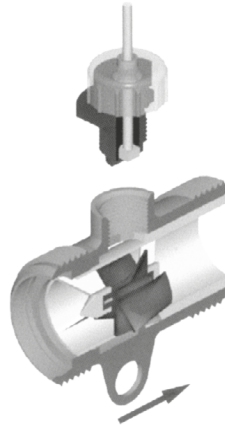


# Measuring principle & Dimensions:



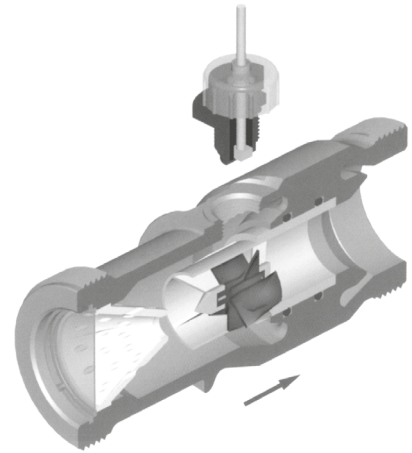
**SM-08.15:**  
**Op. range 2 . . 20 (2 . . 40) l/min**  
**Axial turbine flowmeter**  
**with guide blades**

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.



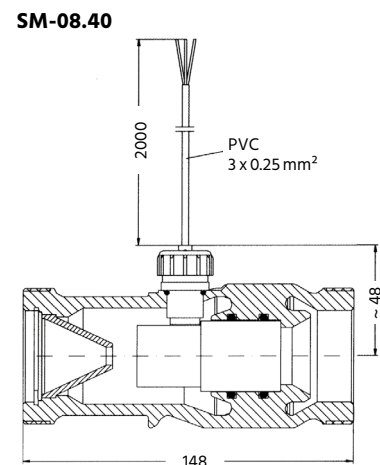
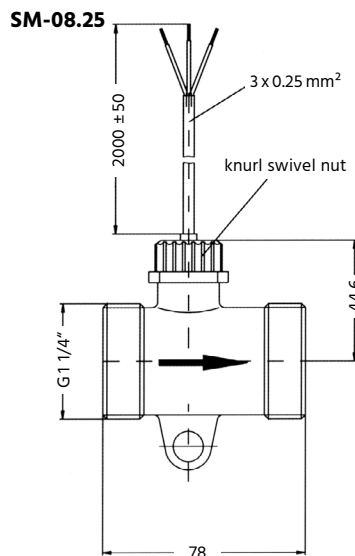
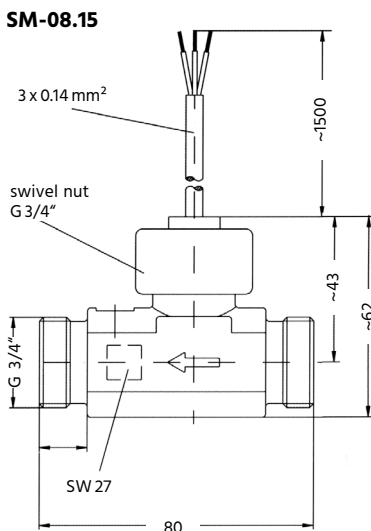
**SM-08.25:**  
**Op. range 4 . . 80 (4 . . 160) l/min**  
**Axial turbine flowmeter**

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.





**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
<b>Pipe section</b>	PPE+PS Noryl 30% fibre-reinforced	brass	PPE+PS Noryl 30% fibre-reinforced	brass	brass	st. steel 1.4571
<b>Sensor housing</b>	PPE+PS Noryl 30% fibre-reinforced		PPE+PS Noryl 30% fibre-reinforced		brass	st. steel 1.4571
<b>Union nut</b>	PA 66		PA 66		brass	without
<b>Turbine cage &amp; rotor</b>	PEI ULTEM		PEI ULTEM		PEEK Victrex™	
<b>O-Ring / seal</b>	NBR		NBR		FKM	
<b>Bearing system / shaft</b>	Shaft Arcap AP1D with hard metal pins in sapphire bearings					
<b>Bearing support</b>	Arcap AP1D					
<b>Rotor assembly</b>	Hard ferrite magnet		st. steel pins		Hard ferrite magnet	
<b>Temp. sensor (opt.)</b>	brass or stainless steel 1.4571		brass or st. steel 1.4571		brass	brass or 1.4571
<b>Sieve filter (optional)</b>	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<sub>max</sub> 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<sub>max</sub> 70°C)
- SM-08.15.x.x.I: PVC (T<sub>max</sub> 70°C)
- SM-08.15.x.x.P: silicone (T<sub>max</sub> 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:

<b>Order number</b>	<b>SM-08.25.</b>	<b>S.</b>	<b>K.</b>	<b>H.</b>	<b>P.</b>	<b>2.</b>	<b>x.</b>	<b>VE</b>
<b>SM-08 Axial-Turbine flowmeter</b>								
<b>Operating range /</b> S = 4...160 l/min - with continuous flow max. 80 l/min								
<b>Material /</b> 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“)								
<b>Version /</b> I = with inductive pick-up H = with Hall sensor P = with Hall sensor up to 50 bar, 85°C								
<b>Electrical connection /</b> 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)								
<b>Additional temperature sensor /</b> 0 = none 5 = PT-100, 3-wire for SM-08.25.M/V see Table „Connection adapter“								
<b>Process connection /</b> A = G1 1/4"-male x = connection adapter as per Table „Connection adapter“								
<b>Options /</b> 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:

<b>max. Pressure /</b>	
SM-08.25.x.x.H:	10 bar
SM-08.25.x.x.P:	50 bar
<b>max. Temperature /</b>	
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
<b>Accuracy /</b>	± 5% of measured value (up to 5 l/min 7% of measured value)
<b>Repeatability /</b>	± 0.5%
<b>Supply /</b>	
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
<b>Output signal /</b>	
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
<b>max. Particle size:</b>	< 0.63 mm
<b>Protection class:</b>	IP54
<b>Start-up:</b>	ab 1 l/min

# 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
<b>SM-08 Axial Turbine Flowmeter with Partial Stream Evaluation</b>								
<b>Operating range /</b> S = 0.4 . . 25 m³/h								
<b>Material /</b> M = housing made of brass								
<b>Version /</b> H = with Hall sensor P = with Hall sensor up to 50 bar								
<b>Electrical connection /</b> 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)								
<b>Additional temperature sensor /</b> 0 = none 5 = PT-100, 3-wire see Table „Connection adapter“								
<b>Process connection /</b> A = G 2"-male x = connection adapter as per Table „Connection adapter“								
<b>Options:</b> 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:

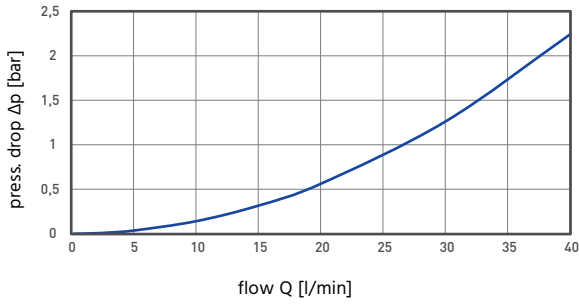
<b>max. Pressure /</b>	
SM-08.40.x.x.H:	10 bar
SM-08.40.x.x.P:	50 bar
<b>max. Temperature /</b>	
SM-08.40.x.x.H:	85°C
SM-08.40.x.x.P:	85°C
<b>Accuracy /</b>	± 7% of the measured value between 0.4 . . 3 m³/h ±5 % of the measured value between 3 . . 25 m³/h
<b>Repeatability /</b>	± 0.5%
<b>Supply /</b>	
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
<b>Output signal /</b>	
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
<b>max. Particle size:</b>	< 0.63 mm
<b>Filter:</b>	flat filter 0.63 mm, included
<b>Protection class:</b>	IP54
<b>Start-up:</b>	from 0.28 m³/h



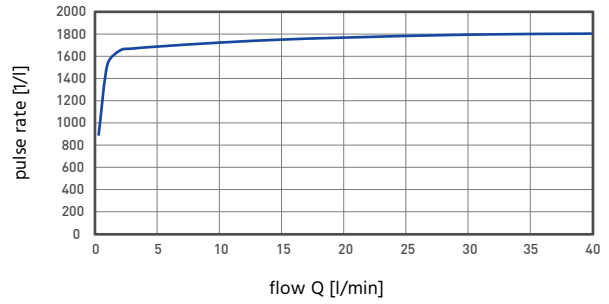
## Pressure drop:

## Pulse rates:

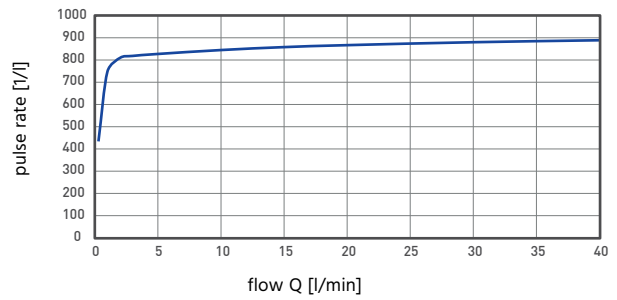
### SM-08.15



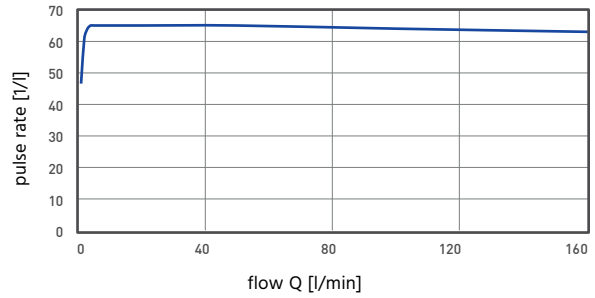
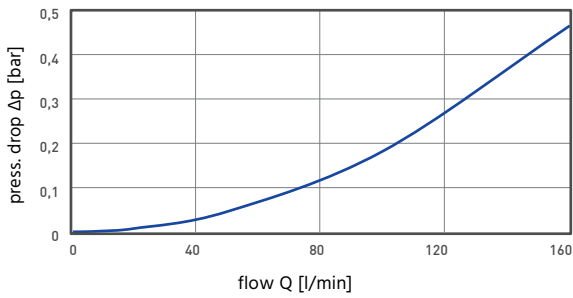
### SM-08.15, inductive



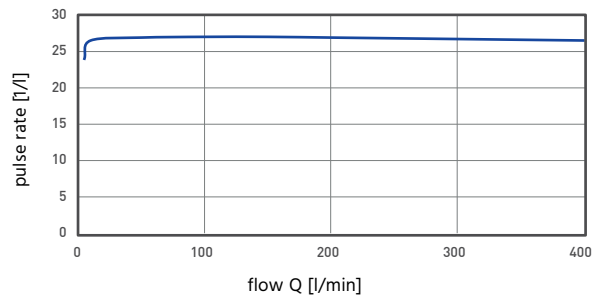
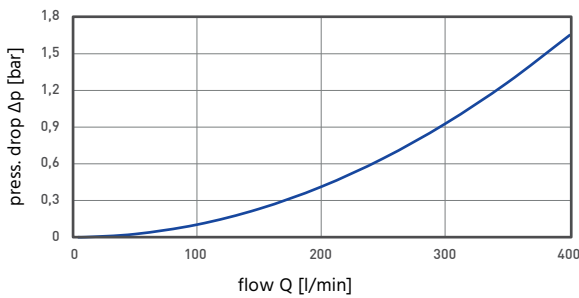
### SM-08.15, Hall Sensor



### SM-08.25



### SM-08.40



## Connection Adapter incl. Sealing:

### Connection Adapter – SM-08.15:

Type	Description	fits to:	T <sub>max.</sub> / P <sub>max.</sub>
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 <sub>max.</sub> / P <sub>max.</sub>
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:

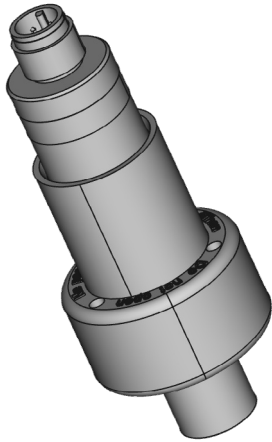
Type	Description	fits to:	T <sub>max.</sub> / P <sub>max.</sub>
A25ST25K	hose spout, PP, d = 25 mm	SM-08.25	20°C at 10 bar, 60°C at 2.5 bar
A25ST30K	hose spout, PP, d = 30 mm	SM-08.25	20°C at 10 bar, 60°C at 2.5 bar
A25ST32K	hose spout, PP, d = 32 mm	SM-08.25	20°C at 10 bar, 60°C at 2.5 bar
A25SM25K	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 <sub>max.</sub> = 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.

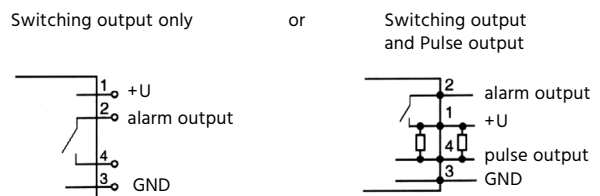
Switch position	Setpoint in l/min					
	SM-08.15		SM-08.25		SM-08.40	
	rising	falling	rising	falling	rising	falling
0	1	0.5	5	3	10	7
1	1.5	1	7	5	13	10
2	2	1.5	8	6	19	15
3	2.5	2	10	8	24	20
4	3	2.5	12	10	30	25
5	3.5	3	14	12	35	30
6	4	3.5	17	15	40	35
7	5	4.5	20	18	47	40
8	6	5.5	22	20	58	50
9	8	7.5	27	25	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:

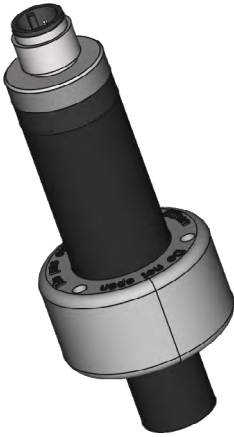
- Setpoint range /** see „Setpoint table“
- Accuracy of switching if used with /**
  - SM-08.15: 0.5 . .29.5 l/min  
± 2% of Setpoint + x
  - SM-08.25: 3 . .100 l/min  
± 4% of Setpoint + x
  - SM-08.40: 7 . .275 l/min  
± 6% of Setpoint + x  
x = accuracy of turbine flow sensor
- Setpoint adjustment /** 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:





## 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:

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

