

Installation Instruction

Axial Turbine Flow Sensor Series Turbotron VTH 25 / VTI 25 / VTM 25

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1 Function of Turbotron

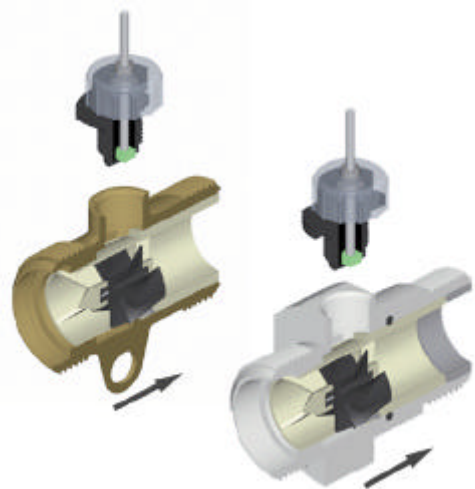
The turbine flow sensor of the series Turbotron is a transducer for flow rate and total flow measurement. It has an almost unlimited application through its exceptionally compact design, its very wide measurement range and its convincing measurement accuracy.

The liquid flowing through the flow sensor makes the turbine wheel to rotate. Based on high-quality sapphire bearings and low rotational speed, the turbine assures an exceptionally long life expectancy.

The rotor speed is transmitted to an electrical pulse signal (frequency):

- VTH and VTM are equipped with magnets on the rotor. A Hall-Effect sensor detects the rotation of the rotor.
- VTI has stainless steel pins in the rotor. An inductive proximity switch detects the rotation of the rotor.

In both cases, a flow-proportional frequency signal (square wave signal) is provided.



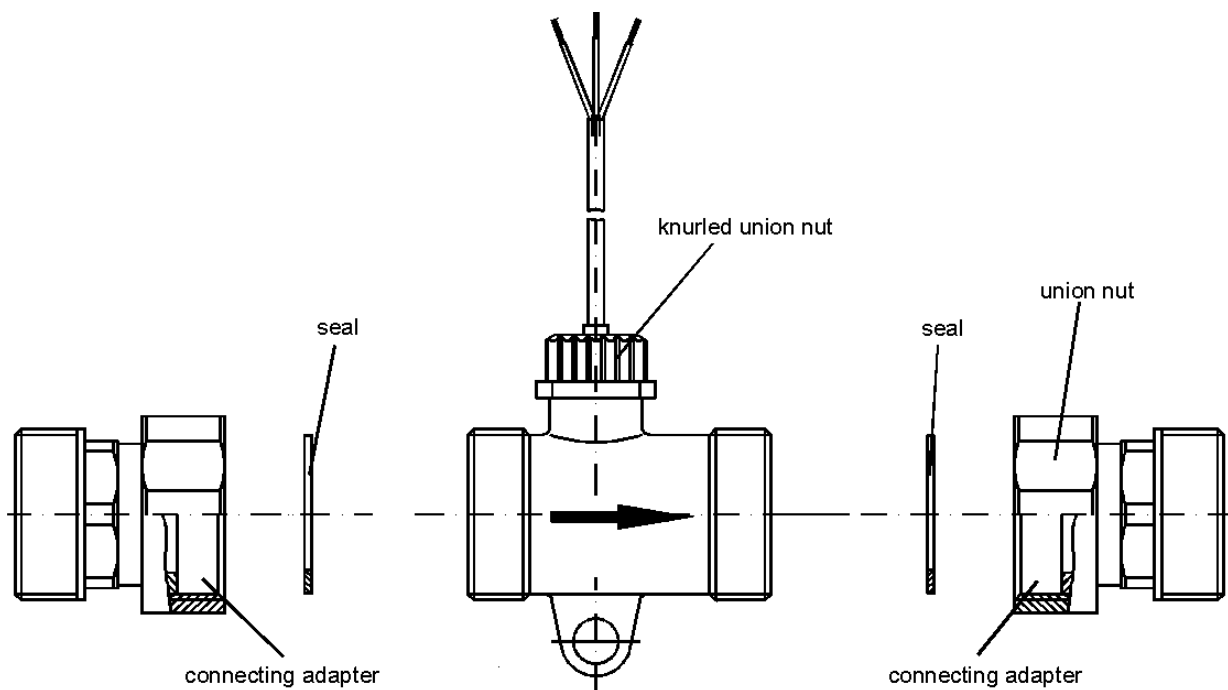
2 Safety instructions

- Before you install the product, please read the relevant chapters of the installation instruction carefully.
- The turbine flow sensor is only suitable for measuring liquid flows, on no account for measuring gas flows.
- Check before installation, whether the material of the turbine flow sensor is suitable for the medium to be monitored (see Materials Table, Chapter 9)!
- You can fit the turbine flow control instrument in any position. If it is installed into vertical pipes, the flow direction is preferably upwards. You must avoid a free outlet.
- The arrow which is placed on the flow sensor (➔) shows the only permitted flow direction.
- For precise measurement, the length of the straight in - and outlet tubes must be observed (see Chap. 3: Requirements on Installation and Operation)
- The internal diameter of the in - and outlet tube must correspond with the internal diameter of the flow sensor.
- The flow medium to be monitored should preferably contain as few solid particles as possible. Present particles must not exceed a diameter of 0.63 mm. If necessary, install a filter!
- Avoid absolutely the formation of gas bubbles or cavitation in the medium by taking proper measures.
- The material of the instrument is **not suitable** for monitoring oils. The strength of the used plastic parts would be considerably reduced.
- In order to clean the flow sensor of contaminations, flush the unit with water reverse to the flow direction (see Chap. 7).
- The instrument must not be blown out with compressed air. The turbine can be damaged.
- We recommend to use only screened connection cables. Connect the shield on one side (the wire ends) on ground.
- **Attention:**
The pick-off (Hall-Effect-Sensor or inductive proximity switch) is sealed and must not be opened.
- There are special customer designs that may differ from the standard data listed in these instructions – always consider the specifications noted on the type plate.

3 Important notes and requirements to installation and operation

Observe the following instructions in order to achieve highest-possible measurement accuracy and specified output signal.

- Before installing the turbine flow sensor flush the pipe carefully. You avoid a blocking of the turbine caused by particles from the pipe installation.
- The installation position of the flow sensor is unreserved. If it is installed into vertical pipes, the flow direction is preferably from below upward. You must avoid a free outlet.
- The arrow which is placed on the flow sensor (\rightarrow) shows the only permitted flow direction.
- A straight tube in front (upstream) of the flow sensor must be retained, min $10 \times \text{DN}$, i.e. 25 cm. Behind the flow sensor (downstream), a straight outlet tube of $5 \times \text{DN}$, i.e. 12.5 cm, must be kept. The internal diameter of the in- and outlet tubes must correspond with the internal diameter of the flow sensor = 25 mm. Before and behind the stabilization tubes, the line may be contracted or enlarged. In practice these instructions often can not be observed. Then the pulse rate and the measurement accuracy can be affected.
- The flow medium to be measured should preferably contain as few solid particles as possible. Present particles must not exceed a diameter of 0.63 mm. If necessary, install a filter!
- The materials of the instrument are not suitable for monitoring oils. The strength of the used plastic parts would be considerably reduced.
- **Attention:**
The pick-off (Hall-Effect-Sensor or inductive proximity switch) is sealed and must not be opened.



4 Installation in piping

- Now you can install the Turbotron in the piping system which was prepared according to chapter 3.

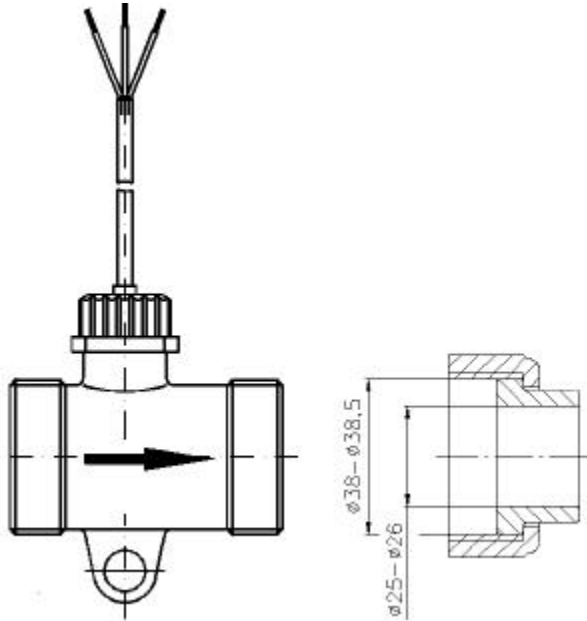
4.1 Installation of flow sensor made of brass or stainless steel using connecting adaptors (recommended kind of installation)

- At first screw-in the connecting adaptors into the tube. Use only a suitable compound for sealing. Take care that no fibrous sealing compounds get into the turbine (hemp or Teflon strip).
- Now install the turbine. Make sure that the provided seals fit properly and tighten the union nuts.

4.2 Installation of flow sensor made of brass or stainless steel without connecting adaptors

The turbine system fits into the Turbotron casing and is correctly positioned by the two connecting adaptors. If you do not want to use connecting adaptors, you must observe the following instructions:

- Your piping system must have a collar at the outlet side of the Turbotron which prevents slipping of the turbine insert. Recommended dimensions are:
Internal diameter: 25-26 mm
External diameter: 38-38,5 mm



- When installing the Turbotron, make sure that the seals fit properly.

4.3 Installation of flow sensor made of plastics using hose nozzles

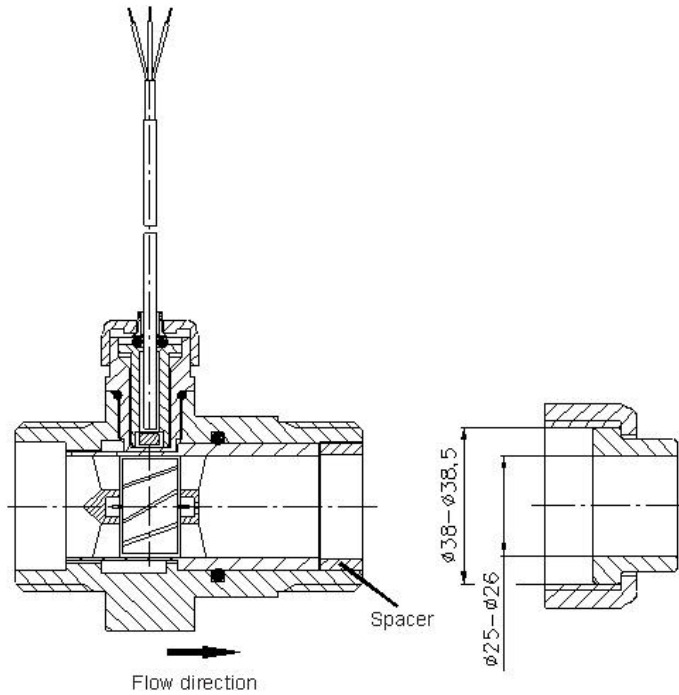
- In the outlet of the Turbotron, there is a spacer. Remove it before installation of the hose barb.
- Push the hose barb with a rotational movement into the Turbotron casing. Make sure that the O-ring is not displaced and tighten the union nut.
- Put the hose barb into the piping and fix it with suitable means, e.g. with hose band clips.

4.4 Installation of flow sensor made of plastics using gluing or welding adaptors

- Glue or weld at first the connecting adaptors to the piping.
- Now install the turbine. Make sure that the provided seals fit properly and tighten the union nuts.

4.5 Installation of flow sensor made of plastics without fittings

- Install the Turbotron without removing the spacer from the outlet.
- Your piping system must have a collar at the outlet side of the Turbotron which prevents slipping of the turbine insert. Recommended dimensions are:
Internal diameter: 25-26 mm
External diameter: 38 mm



- When installing the Turbotron, make sure that the seals fit properly.


5 Electrical connection

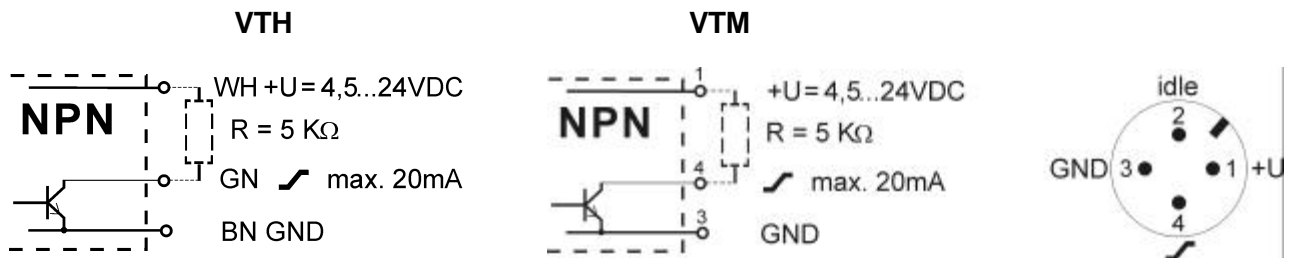
Attention: We recommend to use only screened connection cables. Connect the shield on one side (the wire ends) on ground.

5.1 Turbine flow sensor with pulse output

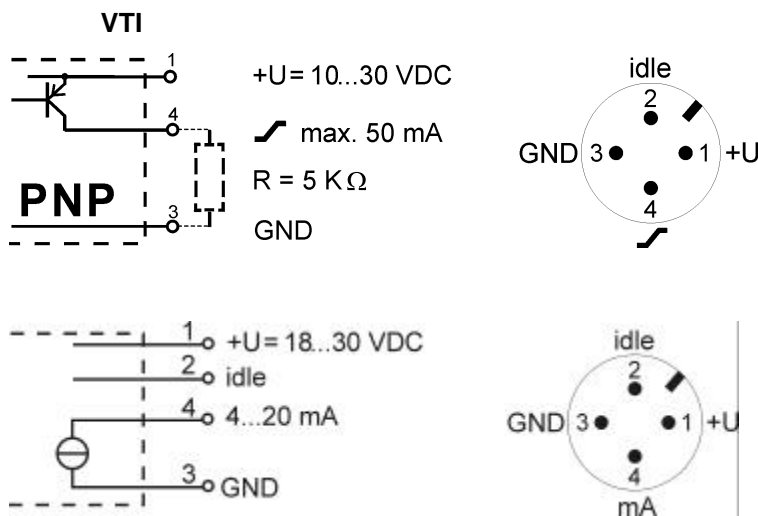
The output signal of Turbotron is a flow-proportional frequency signal. The shape of the signal is a square wave and its amplitude corresponds approximately with the supply voltage. It is an open collector signal, NPN- or PNP-switching. The connected electronic instrument should have a loading resistance (pull-up or pull-down resistor) of 5 kΩ in the inlet.

Schematic representation

A connection is made with three leads, the supply voltage must be connected between +U and GND (ground), the output signal can be tapped between  and GND. The color assignment of the supply cables can be taken from the sketch on the type plate.

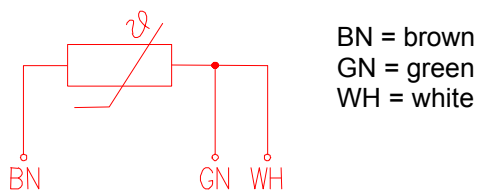


BN = brown, GN = green,
WH = white, R = resistor



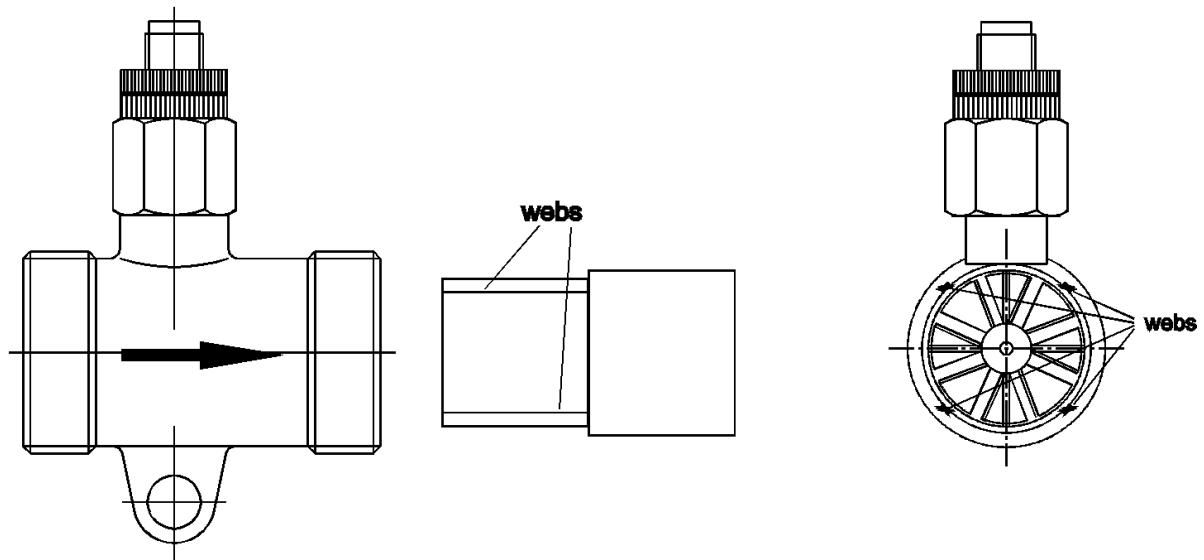
5.2 Turbine flow transmitter with analog output, version AI

5.3 Integrated temperature sensor Pt 100/3-wire or Pt 1000/3-wire (option)



6 Replacement of turbine insert

- Dismount the flow sensor. The pick-off (Hall-Effect-Sensor or inductive proximity switch) is sealed and must not be opened.
- Press the turbine insert out of the tube piece in flow direction using a flat tool. The insert fits very tight in the tube piece. You should not use your fingers and never use a pointed tool to press it out of the tube.
- The turbine insert consists of two cylinders of different diameters which must never be dismantled.

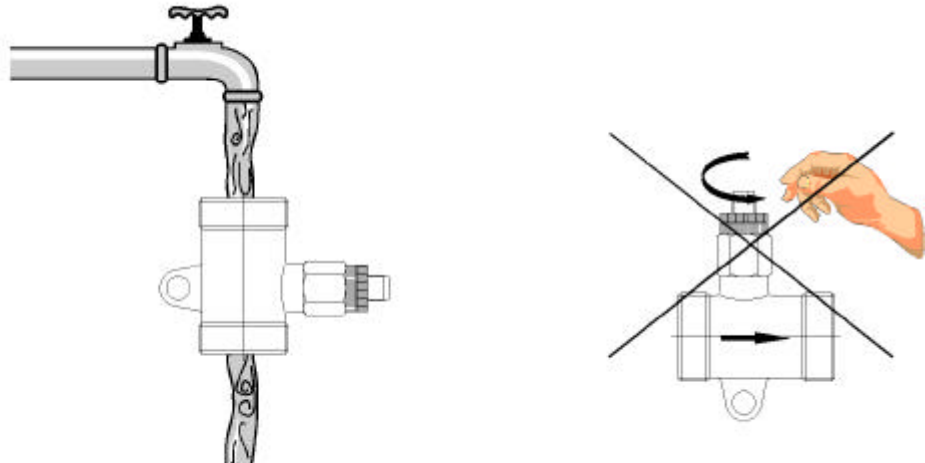


- Push the new insert with the small diameter to the front into the pipe section against the flow direction. Turn the insert in such a way that the webs are not directly beneath the Hall sensor or the proximity switch. Press the insert into the pipe section up to the stop. The position will be correct, if the face of the inserts is flush with the pipe section (applies only for metallic version). Plastic version: push the insert up to the stop, now do the same with the spacer. The spacer must be flush with the tube piece.
- Reinstall the Turbotron in the piping. Make sure that the provided seals fit properly.

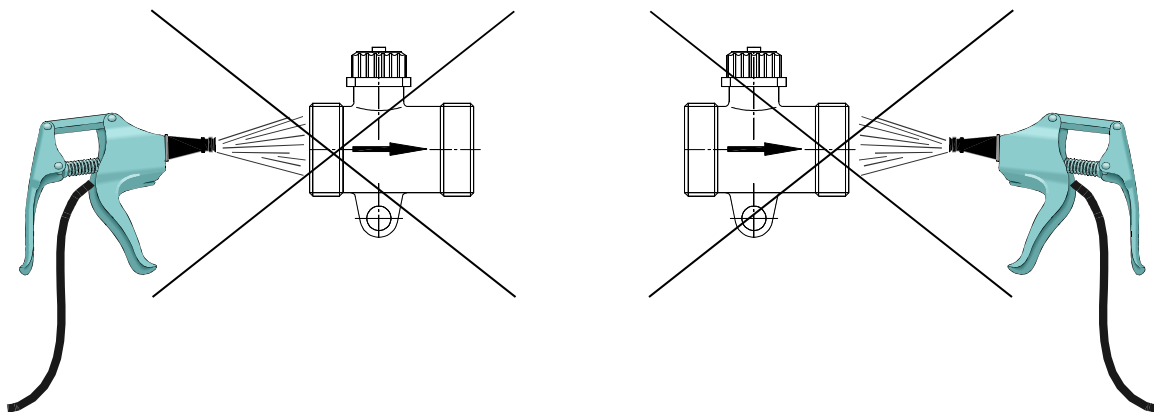
7 Cleaning of Turbotron

- To remove dirt from the flow sensor, you should flush it with water reverse to the flow direction.
- **Attention:**
The pick-off (Hall-Effect-Sensor or inductive proximity switch) is sealed and must not be opened.

Reinigung / Cleaning



- **Warning:**
You must not blow-out the instrument with compressed air. The turbine bearings can be damaged.



8 Shut-down and disposal

- Remove the electrical connection and carry out the flow sensor.
- The Turbotron unit is made of different materials (see technical data). Don't dispose the Turbotron unit together with household waste. The official rules of your area have to be observed at disposing of the Turbotron unit.

9 Materials Table

Materials						
Type	VTH 25 MS-180	VTH 25 K6-180	VTM 25 MS-180	VTM 25 VA-180	VTI 25 MS-180	VTI 25 K6-180
Pipe section	Brass, DZR CuZn36Pb2As CW602N	PP	Brass, DZR CuZn36Pb2As CW602N	Stainless steel 1.4571	Brass, DZR CuZn36Pb2As CW602N	PP
Turbine cage	PPO Noryl GFN 3V 960					
Rotor	PPO Noryl GFN 2V 73701					
Rotor assembly	Permanent magnets, Recona 28 nickel plated				Stainless steel 1.4305	
Shaft	Stainless steel 1.4436					
Bearing	Sapphire / PA					
Pick-off	PPO Noryl GFN 1630 V		Brass, DZR CuZn36Pb2As CW602N	Stainless steel 1.4571	POM Delrin 100 P	
O-ring	72 NBR 872					
Filtering screen (option) matching O- ring	Stainless steel 1.4301 70 EPDM 281	---	Stainless steel 1.4301 70 EPDM 281			---
Housing transducer (version AI)	PA					
Spacer	---	PP	---	---	---	PP

10 Technical Data

10.1 Turbine flow sensor with pulse output**

Type	VTH		VTM		VTI	
	Brass	Plastics	Brass	Stainless steel	Brass	Plastics
Pick-off	Hall sensor				Inductive proximity switch	
Nominal diameter	DN 25					
Measurement range	(1) 4...160 l/min, continuous operation max. 80 l/min					
Start of signal output	< 1 l/min					
Measurement accuracy	+/- 3% of reading					
Reproducibility	+/- 0.5%					
Output signal - Signal shape	Square signal NPN open collector				Square signal PNP open collector	
- Pulse rate / K-factor	65 pulses / liter				65 pulses / liter	
- Resolution	15,4 ml / pulse				15,4 ml / pulse	
- Frequency range	(1,08) 4,33...173,3 Hz				(1,08) 4,33...173,3 Hz	
- Amplitude	~ applied power supply				~ applied power supply	
- Signal current	max. 20 mA				max. 50 mA	
Pull-up-resistance	5 K Ω (recommendation)					
Supply voltage	10 ... 30 VDC					
Electrical connection	2 m PVC cable, screened (T _{max} = 75°C)		4-pin plug M12x1			
Protection class	IP 54					
Max. medium temperature	85 °C	80 °C (2 bar) 60 °C (5 bar) 30°C (10 bar)	85 °C		60 °C	60 °C (5 bar) 30°C (10 bar)
Nominal pressure	PN10		PN50		PN10	
Max. size of foreign particles	< 0.63 mm					
Process connection	1¼" BSP male*	1¼" BSP male	1¼" BSP male*			1¼" BSP male

* additional fitting required

**There are special customer designs that may differ from the standard data listed in these instructions always consider the specifications noted on the type plate.

10.2 Turbine flow transmitter with analog output, version AI**

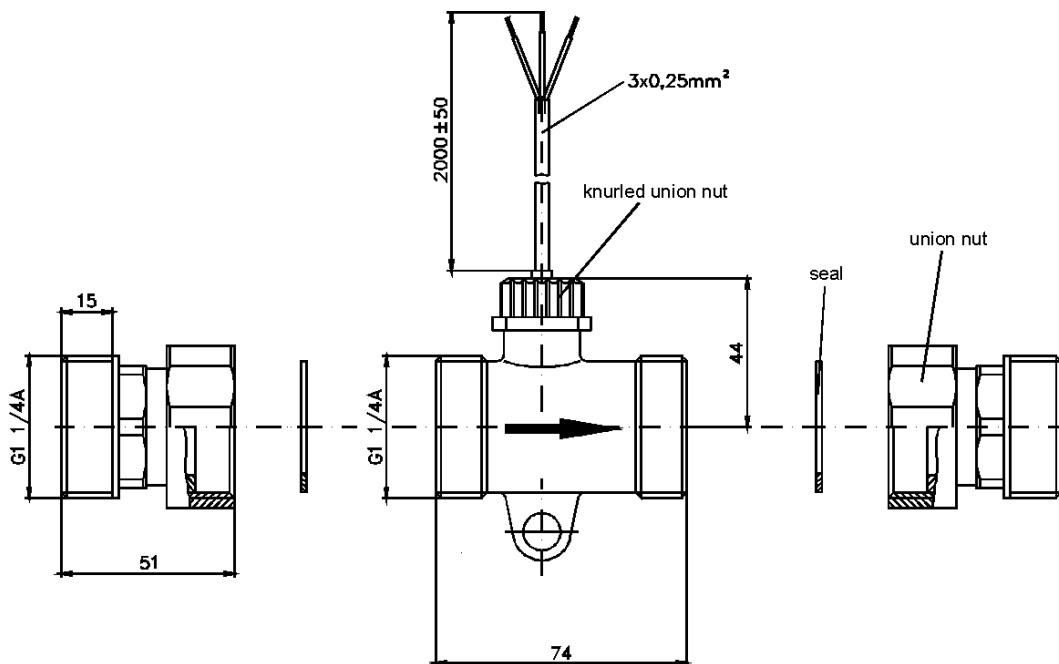
Type	VTH		VTM		VTI	
	Brass	Plastics	Brass	Stainless steel	Brass	Plastics
Pick-off	Hall sensor				Inductive proximity switch	
Nominal diameter	DN 25					
Measurement range (scaling see type plate)	4...20 mA corresponding to		0...60 l/min, 0...100 l/min 0...160 l/min			
	(continuous operation max. 80 l/min)					
Start of signal output	< 1 l/min					
Output signal	4...20 mA					
Current limit	approx. 26 mA					
Max. current consumption	30 mA					
Max. resistance	250 Ω against GND					
Residual ripple	0,2 mA _{SS} over the entire range					
Type	3 wire, galvanically not separated, common GND of power supply and output signal					
Power supply	18...30 VDC					
Electrical connection	4-pin plug M12x1					
Protection class	IP 54					
Max. medium temperature	85 °C	80 °C (2 bar) 60 °C (5 bar) 30°C (10 bar)	85 °C		60 °C	60 °C (5 bar) 30°C (10 bar)
Nominal pressure	PN10		PN50		PN10	
Max. size of foreign particles	< 0.63 mm					
Process connection	1¼" BSP male*	1¼" BSP male	1¼" BSP male*			1¼" BSP male

* additional fitting required

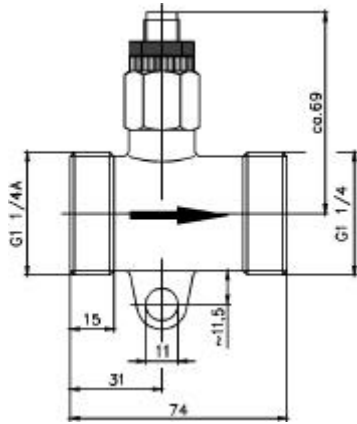
**There are special customer designs that may differ from the standard data listed in these instructions always consider the specifications noted on the type plate.

11 Dimensions (selection)

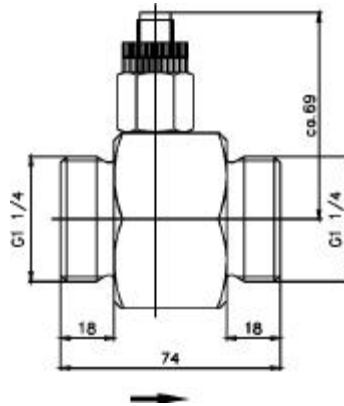
VTH 25 MS-180 with connecting adaptor



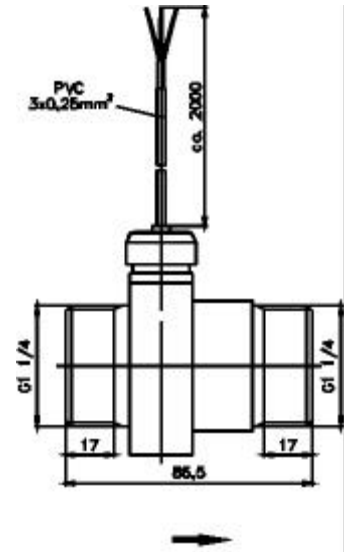
VTM 25 MS-180



VTM 25 VA-180



VTH 25 K6-180



Turbine flow transmitter, version AI

