

THERMAL FLOW SENSOR TFS-35

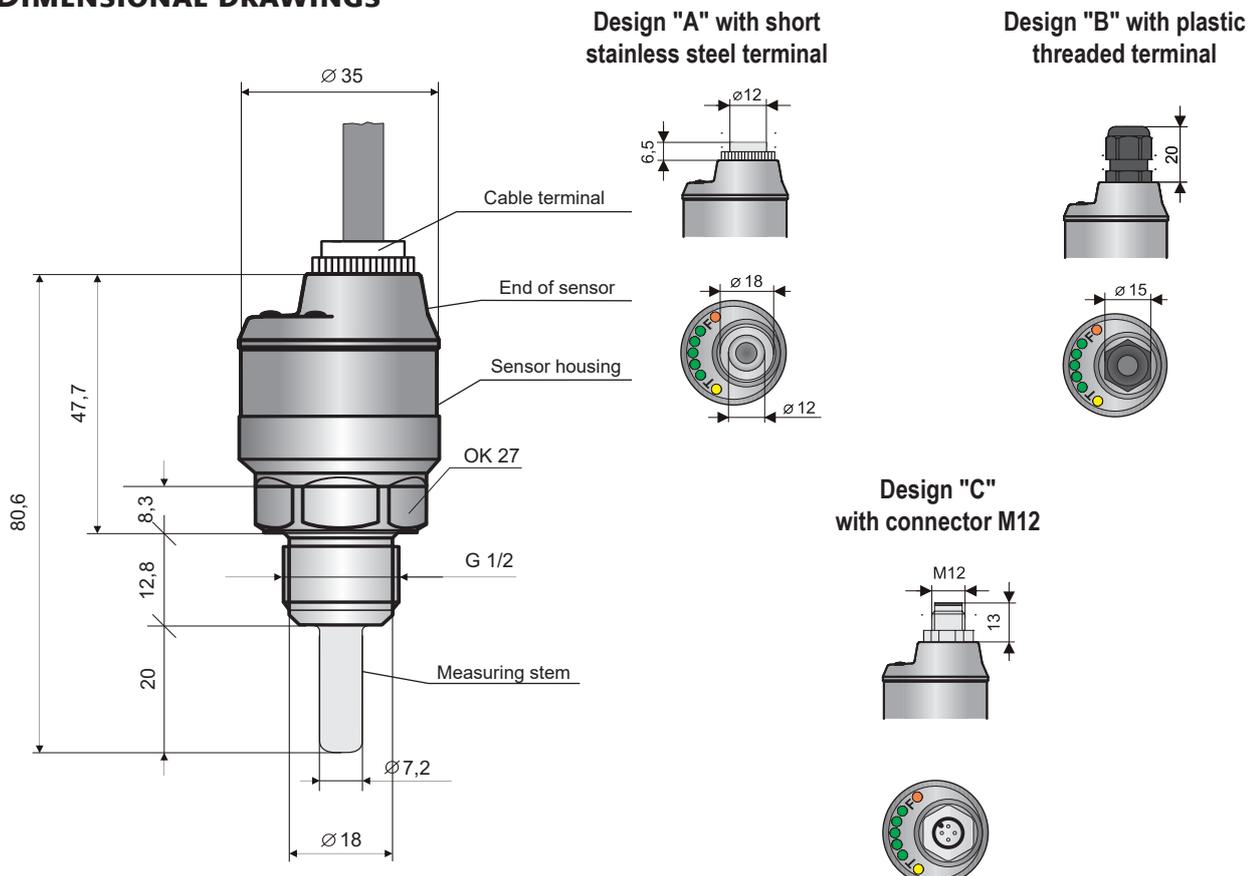
For sensing limit flow rates of fluid media and for monitoring their temperature.

- These sensors are intended for installation in pipes, in which the actual monitoring of the flow rate and temperature occurs
- Flow rate measurement is shown in a bar graph by five green LED diodes and in the same graduation it is possible to select the limit for output switching (unswitching)
- Optical indication of the flow rate and temperature status via two LEDs
- Settings made by magnetic pen
- Stainless steel case

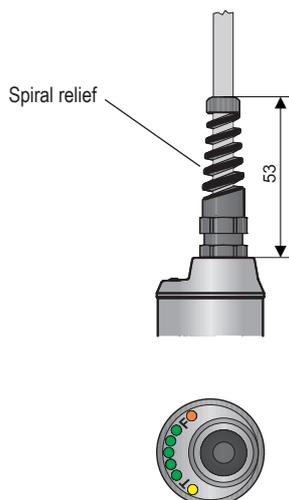


Thermal flow sensor - TFS-35 is a compact measuring device intended for industrial use for sensing limit flow rates of fluid media and for monitoring their temperature when installed in the pipe. The sensor may be installed in plastic and metal pipes. Suitable for monitoring filling, cooling or lubricating media and their temperatures. Flow rate is indicated by means of a bar graph (5 green LEDs). Output (flow rate and temperature) switching indicator by means of LED (orange and yellow). Simple configuration using a magnetic pen. Sensor is made in a stainless steel design. Quick and simple installation thanks to simple construction.

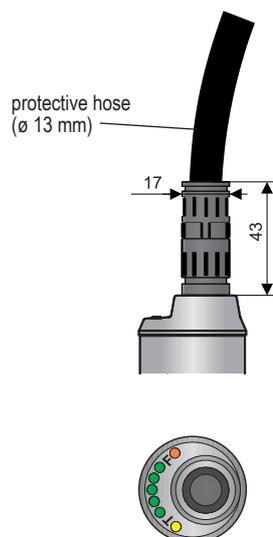
DIMENSIONAL DRAWINGS



Design "V" with plastic terminal with spiral relief – in case of increased mechanical strain on the cable



Variant "H" with terminal for protected hoses - for use in outdoor environments or in areas with increased moisture.



BASIC TECHNICAL DATA

Work environment (ČSN EN 60079-10-1)		no explosive hazard area
Supply voltage		12 ... 34 V DC
Power consumption	for power voltage	12 V DC 15 V DC 18 V DC 24 V DC
		max. 100 mA DC max. 80 mA DC max. 70 mA DC max. 60 mA DC
	Output	PNP PNP
	flow rate temperatures	
Maximum switching current		300 mA
Maximum residual voltage in ON state		1.5 V
Temperature output - switching points		15°C; 30°C; 45°C; 60°C; 75°C;
Flow rate range		1 to 150 cm/s (for water)
Temperature gradient		< 250 K/min
Isolating capacity (housing - inputs) / dielectric strength		4 nF / 500 V AC
Protection		IP67 (design C) IP68 (design A, B, V, H)
Ambient working temperature range (ta)		-20 ... +80°C

BASIC TECHNICAL DATA

Power cord	PVC 4x0.5 mm ²
Heat up time after start	10s
Response time	2 to 15s
Pressure strength	10 MPa (100 bar) over full temperature range
Weight of sensor (without cable)	150g

USED MATERIALS

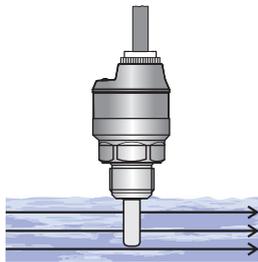
part of the sensor	type	standard material
Housing	all	stainless steel W.Nr. 1.4404 (AISI 316L)
End of sensor	all	stainless steel W.Nr. 1.4301 (AISI 304)
Cable terminal	TFS-35 _ _ _ _ _ -A-L_ _	stainless steel W.Nr. 1.4571 / NBR
	TFS-35 _ _ _ _ _ -B-L_ _	plastic PA / NBR
	TFS-35 _ _ _ _ _ -V-L_ _	plastic PA / NBR
	TFS-35 _ _ _ _ _ -H-L_ _	plastic PA / NBR
Connector M12	TFS-35 _ _ _ _ _ -C-L_ _	nickel-plated brass /

PROCESS CONNECTION

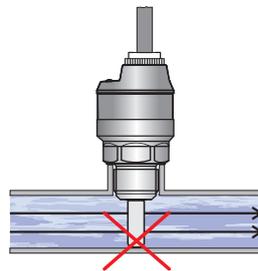
name	dimensions	marking
pipe thread	G 1/2"	G 1/2

INSTALLATION INSTRUCTIONS

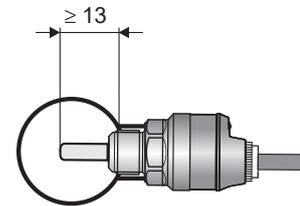
The sensor must be installed with the sensor stem completely flooded.



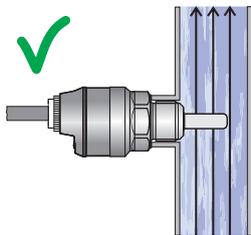
The tip of the sensor stem must not be touching the pipe wall.



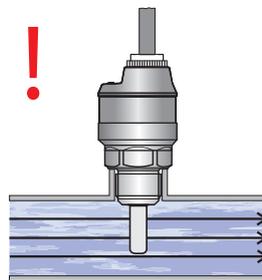
The sensor must be located in such a way that the tip of the sensor stem is at least 13 mm away from the pipe wall.



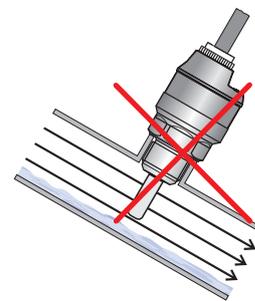
The recommended installation location is in the rising parts of the pipe system.



The sensor is installed on a horizontal pipe from above when the pipe is completely flooded.



Installation is not recommended in parts of the pipe system that may become aerated (highest parts of the pipe system, horizontal areas with open ends).

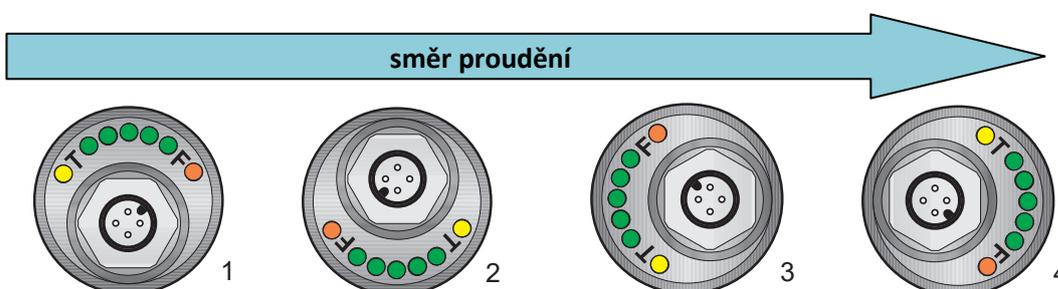


When measuring very low flow rates in water pipe systems, where there is a risk of dirt accumulating on the stem of the sensor, it is recommended to install it from the side of the pipe.

Disruptive elements cause the media to swirl, which reduces measuring accuracy. For this reason, the sensor installation location is selected so that there are calming direct pipe segments before and after the sensor. A direct segment of length 5...10 DN is recommended before the sensor and a direct segment of length 3...5 DN behind it. Disruptive elements are understood to mean bends, elbows, valves, reductions, other sensors, etc.

The sensor is screwed into a threaded sleeve in the pipe. For tightening, a 27 mm open end wrench must be used. The tightening torque must be selected respecting the used seal and the working overpressure in the pipe system.

Positions relative to the flow direction:



The sensitivity of the sensor depends on its position relative to the flow direction. Optimal positions are no. 1 and no. 2. In these positions, the signal from the sensor is not dependent on the flow direction and sensitivity corresponds to factory settings. The lighting up of individual LED diodes on the bar graph is practically linear relative to the flow rate.

In position 3, the sensor is more sensitive to small flow rates, the ability to differentiate large flow rates is limited.

In position no. 4, the sensor is able to detect larger flow rates well, the sensitivity to small flow rates is limited.

ELECTRICAL CONNECTION.

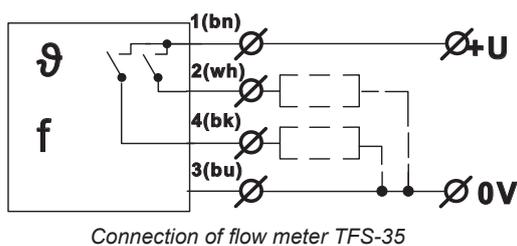


Electrical connection can only be made in a voltage-free state!

A sensor with PNP type of outputs can be loaded only by resistive or inductive loads. The positive pole of the supply voltage (+U) is connected to the brown wire *BN* or *pin connector no.1*, the negative pole (0V) is connected to the blue wire *BU* or *pin connector no.3*. Flow rate load on the black wire *BK* or *pin connector no.4* and temperature load on the white wire *WH* or *pin connector no.2*. The capacitive loads and low resistance loads (e.g.bulb) are evaluated by the sensor as a short circuit. Wiring diagrams are provided in the figures below.

Flowmeter TFS-35 with a type A, B, V or H cable terminal, is connected to the assessment units permanently by a connection cable, see. Dimensional drawings.

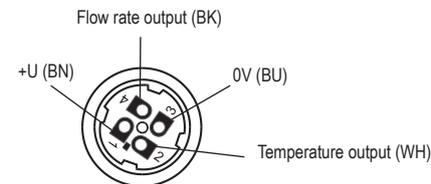
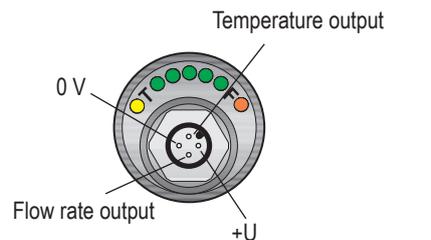
The TFS-35 flow meter with connection method type C (see Dimensional drawings) is connected to the assessment units by means of a connector socket with a pressed-in cable, or by means of a detachable connector socket without a cable (e.g. ELWIKA), see accessories. In this case the cable is connected to the inside pins of the socket according to the figure below. The recommended diameter of this cable when using ELWIKA connectors is 4 to 6 mm (the recommended wire cross-sectional area is 0.5 to 0.75 mm²).



Connection of flow meter TFS-35

Cable wire colours:

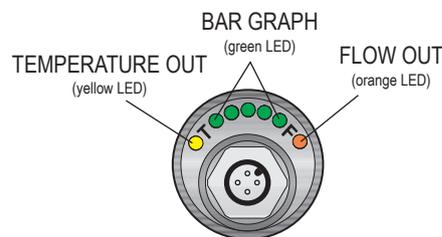
- BN – brown
- WH– white
- BK – black
- BU – blue



Inside view of the connector socket (variant "C")

SETTINGS

Settings are performed by placing the magnetic pen on to the sensitive spot marked "T" or "F" located between the LEDs. In this way, the minimum and maximum flow rate, flow rate switching point, temperature switching point, switching modes (O, C) are set or the factory setting are restored. An incorrect setting is indicated by the green LEDs gradually turning on and off, going from the centre to the edges. Information on settings of the sensor is provided in the user's manual.



OPERATING SIGNALS

signal	colour	function
"FLOW OUT"	orange	<p>Flow rate output status indicator permanently lit - output is switched not lit - output is unswitched</p> <p>Maximum flow rate setting light with gradual lighting of green LEDs - maximum flow rate is being set 3 flashes - confirmation that settings are saved</p>
"BAR GRAPH" (5 LEDs)	green	<p>Flow rate indicator gradual lighting up of LEDs from left to right- depending on the flow rate range settings incorrect setting - gradual turning on and off, going from the centre to the edges</p> <p>Flow rate / temperature switching point settings one LED is permanently lit - when this point is reached, the flow rate / temperature output is switched / unswitched</p>
"TEMPERATURE OUT"	yellow	<p>Temperature output status indicator permanently lit - output is switched not lit - output is unswitched</p> <p>Minimum flow rate setting light with gradual lighting of green LEDs - maximum flow rate is being set 3 flashes - confirmation that settings are saved</p>

