

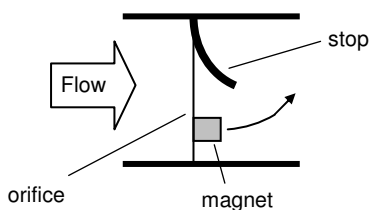
Flow meter TS-FM



- * short response time
- * high overload security
- * measurement range 1:80
- * low pressure loss
- * compact dimensions

GENERAL CHARACTERISTICS

A thin springy orifice that covers the entire flow cross-section is displaced by the flow of the liquid and is pushed to a curved stop.



A plastic encapsulated magnet is mounted on the orifice. Its magnetic field is moved by deflection of the orifice. The change of the field is detected by a sensor outside the flow cross-section.



Bendable stainless steel orifice
with plastic encapsulated magnet

The integrated electronics put out analogue standard signals (20 mA, 10 V), switching or frequency signals. Intelligent electronics of the Flex or omni series may be used alternatively.

Since the orifice is only bent without rotary bearing, there are almost no friction effects. The movement is therefore nearly free of hysteresis and the measurement respectively the switching value is highly reproducible.

The low mass of the orifice leads to a short response time. The nearly complete coverage of the flow cross-section in the rest position results in a high initial sensitivity. At smallest flow rates the orifice is inevitably deflected. The evaluation of the entire flow cross-section allows unproblematic pipeline routing. Minimum inlet or outlet distances are not necessary.

Due to the form of the stop and the spring properties the orifice withstands even strong water impacts without damage. The small number of wetted parts guarantees low pollution tendency and reliable operation.

At the inlet and outlet flanged ports are used which are available in various sizes and materials.

By removing the four screws of the flange in case of service the measuring unit is easily removable while the ports remain in the pipeline.

MOUNTING

The operation of the sensor is possible in every orientation. The lowest pollution tendency, however, is where the orifice swings from the bottom up.

If possible the installation should take place either with flow from bottom to top or horizontally.

In the latter case, for the low flow version (maximum of 6 l/min, see options) the sensor should point downwards, for all other versions to the top.

Factory adjustment is done with flow in horizontal direction.

It is important to ensure that the sensor is installed in the direction of the flow arrow. The orifice is very robust, despite its low mass, although it should not be creased or compressed by force during assembly or disassembly.

The housing screws go through the whole housing and must be completely removed for replacement of the sensor body. Thereafter the body can be pulled out as usual with a flange part without having to loosen the threads.

PROGRAMMING

As a standard only for versions with switching output:

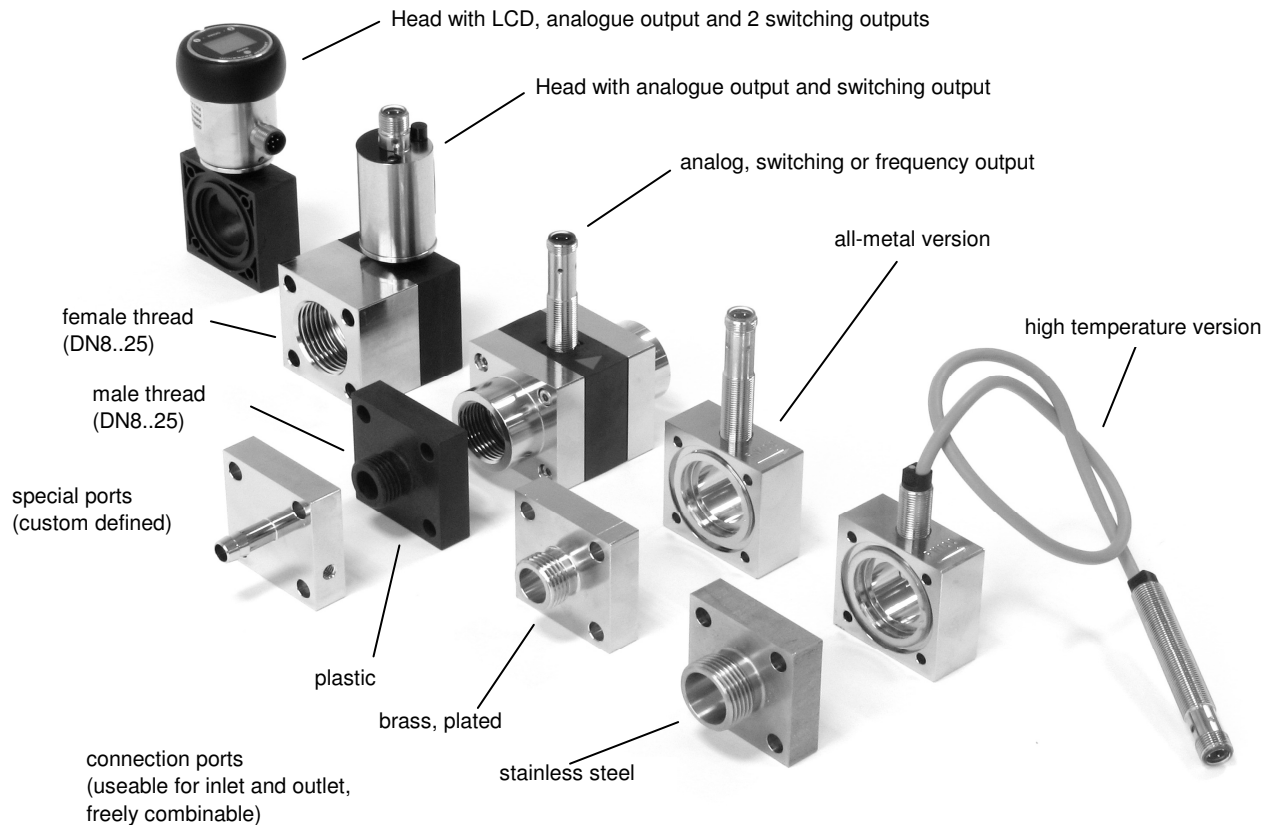
- set desired flow in the system
- Apply pulse of a duration between 0.5 to 2 sec. to pin 2 respectively the white wire of the cable (e.g. by connection to power supply or pulse from PLC)
- > actual flow value will become trip value of the switch

Immediately after the programming the sensor activates the alarm. The alarm is terminated when the flow is changed to a value above the trip value plus hysteresis for a minimum switch or below the trip value minus hysteresis for a maximum switch.

After successful programming pin 2 (or the white wire) must be connected to 0 V.

The change of many parameters of all sensor types is possible using the optional configurator interface ECI-1 (see corresponding data sheet).

OPTIONS



The TS-FM system is easily customizable to various requirements by a number of options:

All-metal version

The standard version has a plastic body with a pressure rating of 16 bar. As an option, a metal body (brass, plated) is available with a pressure rating of 100 bar. The higher operating pressure requires a combination with metal fittings. Measurements and switch settings are possible in the range of 1.. 80 l / min.

High temperature version

Equipping the all-metal version with sensors in high temperature design allows operation at medium temperatures up to 150 °C. In this case the primary sensor element is attached directly to the body of the measurement unit, while the evaluation system is mounted separately via a heat-resistant cable with a length of appr. 50 cm. Available output signals are analogue standard signals (4..20 mA, 0..10 V), switching signals (push-pull) or a frequency output. Smart electronic systems of the *omni* and *Flex* series can be connected to these signals as remote versions.

Note: An operation of the plastic body with more than 70 °C is also possible. It should be noted that thereby the pressure rating is decreased. For further information please contact the sales department of TIVAL Sensors!

Reverse flow protection

At flow in forward direction the orifice sets to a curved stop and will not be damaged at flow values even much higher as the desired measurement range or by water impacts. At flow or reverse water impacts in reverse direction the orifice sets to a plastic ring and closes the cross-section nearly completely. This causes a pressure that can destroy the orifice. In applications where those conditions may occur (e.g. with elastic hose behind the instrument) the option "reverse flow protection" is recommended. Here the plastic ring is substituted by a second curved stop for the other direction, thus giving the orifice the overload and water impact proofness as in the forward direction. Measurements or switch value setting are not possible for the reverse direction.

The option "reverse flow protection" is obligatory for all-metal versions of the body.

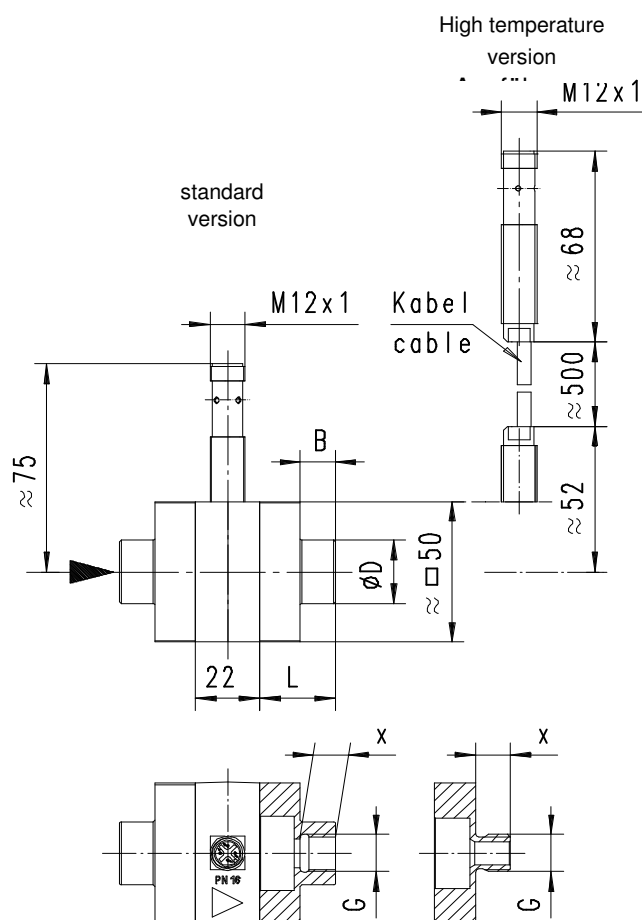
Low flow measurements

For measurement ranges up to 6 l/min the sensitivity of the measurement system can be increased, making possible measurements below 1 l/min beginning at 0.4 l/min. For this option the sensor is mounted at the opposite side of the body. It's not available for metal versions of the body.

TECHNICAL DATA

measurement ranges	1..80 l/min (water) for standard ranges see nomenclature, special ranges adjustable on request, low flow range 0.4 .. 6 l/min available as option
accuracy	standard ranges: ± 3 % MV or 0.25 l/min low flow range: ± 3 % MW or 0.1 l/min (higher value is valid)
pressure loss	max. 0.5 bar at top of range
pressure rating	plastic version: 16 bar (70 °C) all-metal version: 100 bar
medium temperature	0..70 °C with high temperature option 0..150 °C
ambient temperature	0..70 °C
storage temperature	-20..80 °C
supply voltage	10..30 VDC for voltage output 10 V: 15..30 VDC
connection	locking plug M12x1, 4-pole
outputs	all outputs are short-circuit proof and reverse voltage protected current output: 4..20 mA (0..20 mA on request) voltage output: 0..10 V (2..10 V on request) output current max. 20 mA switching output: push-pull output output current max. 200 mA minimum control (maximum control on request) hysteresis 2 % (others on request) frequency output: push-pull output output current max. 200 mA output frequency depending on range, standard 500 pulses/l (equivalent to 666,7 Hz at 80 l/min) low flow range: 5000 pulses/l (equivalent to 500 Hz at 6 l/min) (other frequencies on request)
protection class	IP67
CE-conformity	yes
materials	<p>medium contact</p> plastic body: PPS metal body: brass plated (s.s. 1.4305 on request) ports: POM or brass plated (s.s. 1.4305 on request) sealings: FKM (Viton) (others on request) orifice: stainless steel 1.4031k magnet holder: PPS glue: epoxy resin <p>no medium contact</p> sensor housing: brass plated glue: epoxy resin flange screws: stainless steel

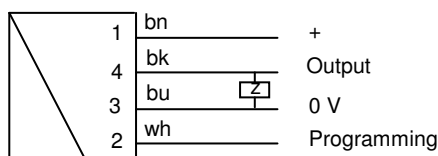
DIMENSIONS



DN	G	L mm	B mm	X mm	ØD mm	Weight* kg
08	1/4	26	12	12	33	0,60
10	3/8	26	12	12	33	0,60
15	1/2	28	14	14	37	0,60
20	3/4	30	16	16	42	0,65
25	1	30	0	18	-	0,70

* = weight for plastic housing with metal connectors

TERMINAL ASSIGNMENT



Before carrying out the electrical installation, make sure that the supply voltage corresponds to the data provided!

The switching outputs can be connected as NPN or PNP without any hardware or software settings (push-pull-driver).

It is recommended to use shielded cable < 30 m, supply lines < 10 m