



User's Guide

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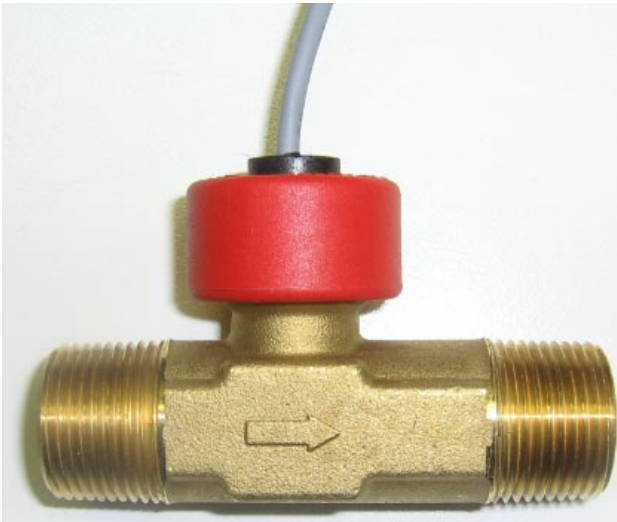
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FTB 371

Turbine Flow Sensor



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The information contained in this document is believed to be correct, but OMEGA accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, human applications.

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1. Function

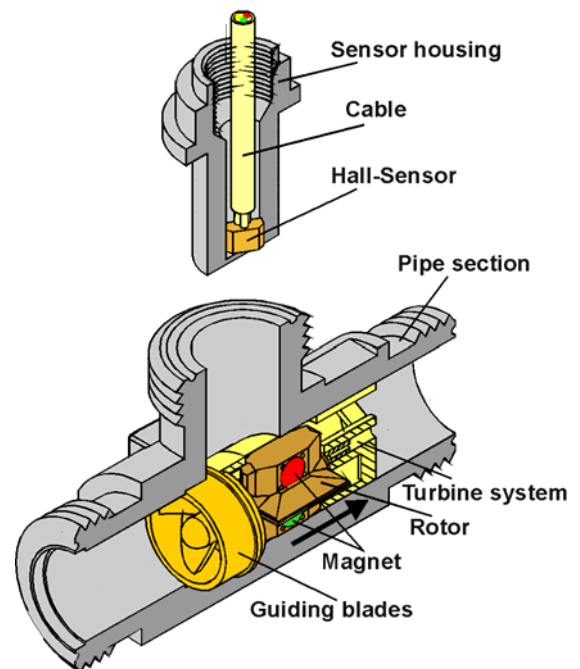
The turbine flow sensor of the series FTB 370 is a transducer for volume flow recognition or for fluid dosing use. It has an almost unlimited application through its exceptionally compact design, its very wide measurement range and its convincing measurement accuracy.

The liquid flowing into the meter is divided by the guiding blades in four split beams. These hit the rotor from four directions and put it in motion. The uniform loading of bearing from four sides causes the forces to cancel themselves out for the most part and wear is reduced to a minimum.

The extremely hard bearing materials, sapphire and hard metal, ensure in addition an extraordinary life expectancy. The rotor speed is transmitted to an electrical pulse signal (frequency):

- The FTB 371 is equipped with rotors which are fitted with magnets. A Hall effect sensor recognizes the rotation of the rotor.

In this case, a frequency signal proportional to flow (square wave) is available.



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 measurement of fluids – never use the instrument for gas measurements.
- Check before installation, whether the material of the turbine flow sensor is suitable for the medium to be monitored (see Materials Table, Chapter 7)!
- 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 in - and outlet tubes must be observed (see Chap. 3: Requirements to 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 0.02 inch. 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 series FTB 371 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 in opposite direction to the flow (see Chap. 7).
- A possible blowing out of the instrument must take place only in opposite direction to the flow.
- We recommend to use only shielded connection cables. Connect the shield on one side (the wire ends) on ground.
- **Attention:**
The upper union nut of the instrument is sealed and must not be opened. When you loosen the union nut, the fixation of the turbine system is disturbed and it will be damaged.
- 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.

If you should have any problems or questions, please contact your local supplier or directly:



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.

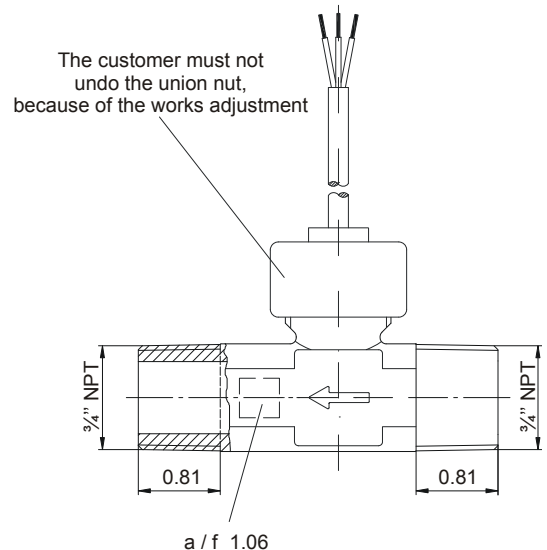
- Before installing the turbine flow sensor flush the pipe carefully. You avoid a blocking of the turbine caused by particles from the pipe installation.
- The installation position of the flow control instruments is unreserved. If it is installed into vertical pipes, the flow direction is preferably upwards. You must avoid a free outlet.
- The arrow which is placed on the flow sensor (➔) shows the only permitted flow direction.
- A straight tube in front of the flow sensor must be retained, min 10 x ID, i.e. 5,91 inch. Behind the flow sensor, a straight outlet tube of 5 x ID, i.e. 2.95 inch, must be kept. The internal diameter of the in- and outlet tubes must correspond with the internal diameter of the flow control instrument = 0.591 inch. 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 monitored should preferably contain as few solid particles as possible. Present particles must not exceed a diameter of 0.02 inch. If necessary, install a filter!
- The materials of the series FTB 370 are not suitable for monitoring oils. The strength of the used plastic parts would be considerably reduced.
- **Attention:**
The upper union nut of the instrument is sealed and must not be opened. When you loosen the union nut, the fixation of the turbine system is disturbed and it will be damaged.

4. Installation in piping

- Now you can install the turbine in the piping system which was prepared according to chapter 3.
- The pipe section has a 3/4" NPT thread connection male.
- Make sure that the correspondent part has a 3/4" NPT thread connection female.

Notice:

- Counterhold! When tightening the correspondent part use only the wrench flat (a / f 1.06") of the turbine.
- If you seal the male thread, take care that no fibrous sealing compounds get into the turbine (hemp or Teflon strip).



5. Electrical connection

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

Electrical connection with 4-pin-plug M12x1

Screw on 4-pin-plug M12x1 to sleeve and tighten plug with a starting torque of max. 0.74 ft lb.

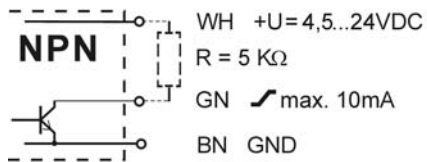
5.1. Turbine flow sensor with pulse output

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-switching. The connected electronic instrument should have a loading resistance (pull-up or pull-down resistor) of 5 kΩ in the inlet.

Schematic representation

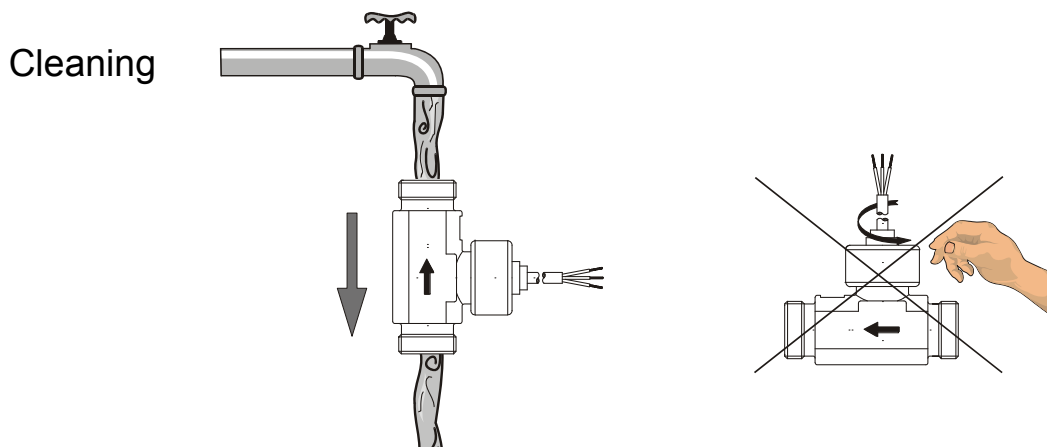
A connection is made with three leads, the supply voltage must be connected between +U and GND (earth), the output signal can be tapped between \surd and GND. The color assignment of the supply cables or the pin allocation of the plug can be taken from the sketch on the type plate.

FTB 371 connecting cable

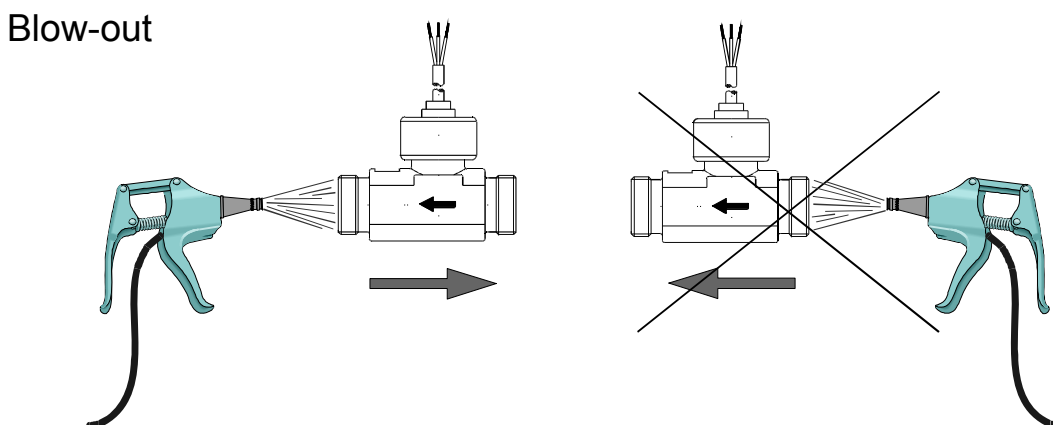


6. Cleaning

- To remove dirt from the flow sensor, you should flush it with water always in opposite direction to the flow.
- **Attention:**
 The union nut of the instrument is sealed and must not be opened. When you loosen the union nut, the fixation of the turbine system is disturbed and it will be damaged. A repair in the factory becomes necessary!



- **Warning:**
 A possible blowing-out the instrument with compressed air must only be carried out in opposite direction to the flow.



7. Shut-down and disposal

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

8. Materials table

Materials	
Type	FTB 371
Pipe section	Brass, CuZn36Pb2As
Turbine system	PEI Ultem
Rotor assembly	Hard ferrite magnet
Bearing system / shaft	shaft Arcap AP1D with hard metal pins in sapphire bearing
Union nut	PA GF 30
Sensor housing	PPO Noryl GFN3
O-ring	NBR
Integrated temperature sensor (option)	Brass or stainless steel 316 SS
Strainer (option)	POM / stainless steel

9. Technical data

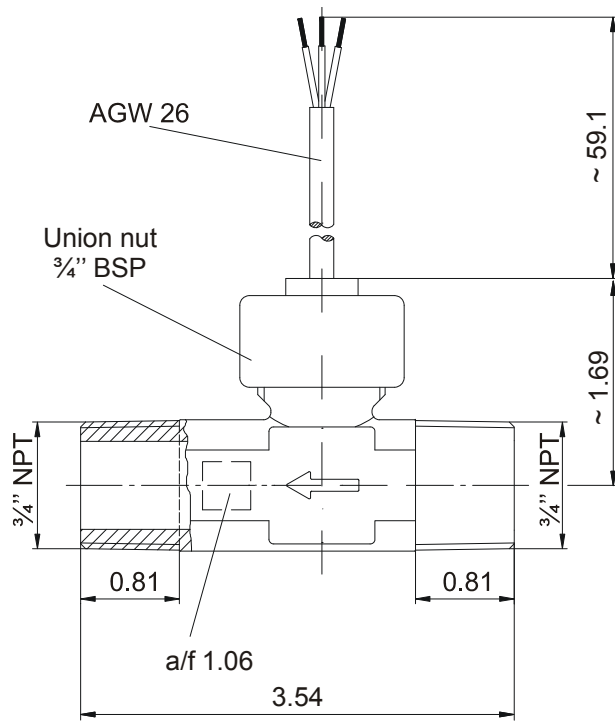
There are special customer designs that may differ from the standard data listed in these instructions – always consider the specifications noted on the type plate.

Turbine flow sensor with pulse output

Type	FTB 371
Material, pipe section	Brass
Nominal diameter	½"
Measurement range	0.52 ... 10.4 GPM with special "bearings for low flow rates" (order code 40) with continuous flow max. 5.2 GPM
Accuracy	+/-1 % of range
Reproducibility	+/-0.2 %
Start of output signal	< 0.08 GPM
Sensor	Hall sensor
Output signal	
- Pulse rate / K-factor	3237 pulses / gal
- Resolution	3.16 fl.dr. / pulse
- Signal shape	Square wave signal
- Signal current	NPN open collector max. 10 mA
Pull-up-resistance	5 kΩ (recommendation)
Supply voltage	4.5...24 V DC
Electrical connection	5 ft PVC cable, screened (Tmax = 158 °F) or 4-pin-plug M12x1
Protection class	IP 54
Max. medium temperature	185 °F
Nominal pressure	145 psi
Max. particle size in the medium	< 0.02"
Process connection	¾" NPT male

The stated values refer to operation with water at 68 °F. Monitoring of fluids with higher viscosities is possible with the effect of deviations from mentioned values.

10. Dimensions



WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. **BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS).** The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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