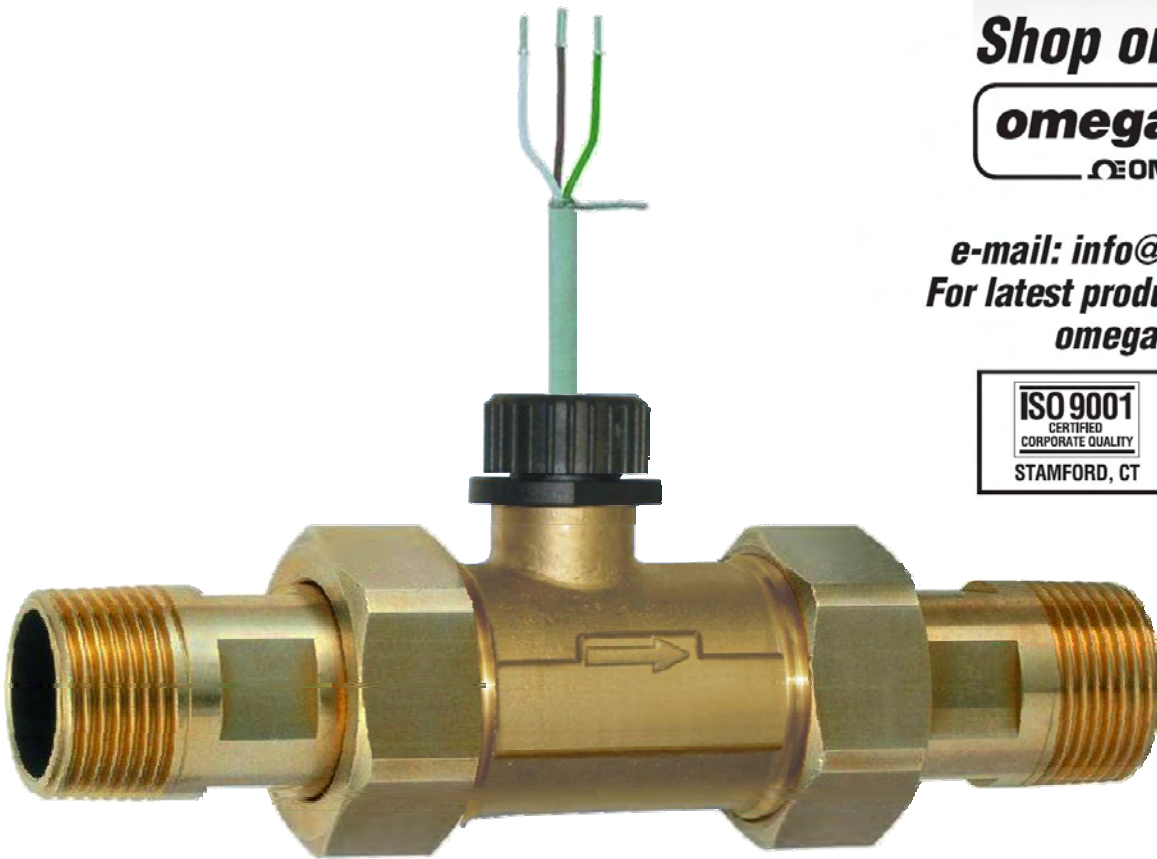


# User's Guide



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**FTB 372**

**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.

<b>Table of contents</b>	<b>page</b>
1 Function.....	4
2 Safety instructions.....	5
3 Important notes to installation and operation.....	6
4 Installation in piping.....	6
5 Electrical connection.....	7
6 Replacement of turbine insert.....	7
7 Cleaning.....	8
8 Shut-down and disposal.....	8
9 Materials Table.....	9
10 Technical Data.....	9
10.1 Hall sensor VTH output signal characteristics.....	10
11 Dimensions.....	10

## 1 Function

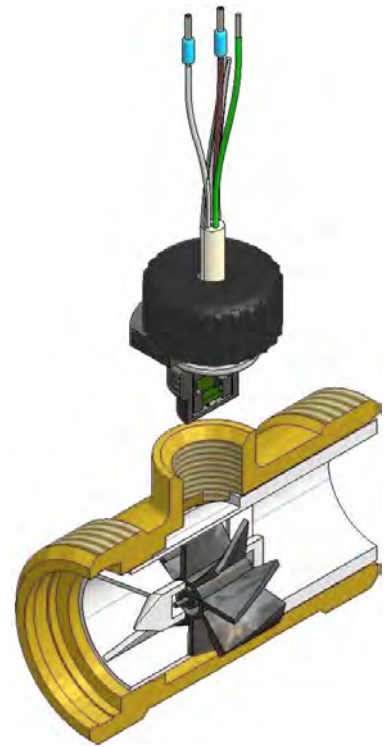
The turbine flow sensor of the series turbine is a transducer for flow rate and total flow measurement. It has an almost unlimited application through its exceptionally compact design, its very wide measurement range and its convincing measurement accuracy.

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):

- FTB 372 is equipped with magnets on the rotor. A Hall-Effect sensor detects the rotation of the rotor.

In this 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 0.025 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 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).
- ❖ Suitable measures should be taken to prevent the medium from freezing.
- ❖ 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 sensor housing (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.

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



### 3 Important notes to installation and operation

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

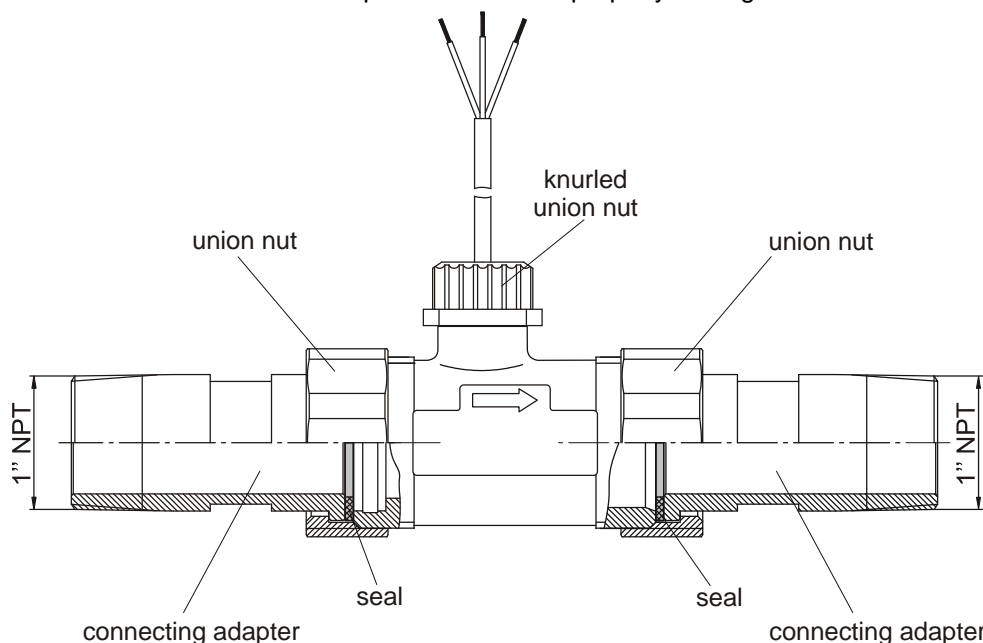
- Before installing the turbine flow sensor flush the pipe carefully. You avoid a blocking of the turbine caused by particles from the pipe installation.
- The installation position of the flow sensor is unreserved. If it is installed into vertical pipes, the flow direction is preferably from below upward. You must avoid a free outlet.
- The arrow which is placed on the flow sensor (→) shows the only permitted flow direction.
- A straight tube in front (upstream) of the flow sensor must be retained, min 10 x DN, i.e. 9.84 inch. Behind the flow sensor (downstream), a straight outlet tube of 5 x DN, i.e. 4.92 inch, must be kept. The internal diameter of the in- and outlet tubes must correspond with the internal diameter of the flow sensor = 0.984 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 measured should preferably contain as few solid particles as possible. Present particles must not exceed a diameter of 0.025 inch. 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 sensor housing (Hall-Effect-Sensor or inductive proximity switch) is sealed and must not be opened.

### 4 Installation in piping

- Now you can install the FTB 372 in the piping system which was prepared according to chapter 3.
- The connecting adapter has an 1" NPT thread connection male. Make sure that the correspondent part has an 1" NPT thread connection female

#### Installation of flow sensor made of brass 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.



## 5 Electrical connection

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

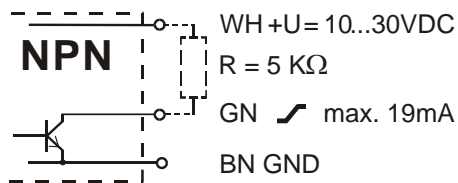
### Turbine flow sensor with pulse output

The output signal of FTB 372 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 k $\Omega$  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  $\mathcal{L}$  and GND. The colour assignment of the supply cables can be taken from the sketch on the type plate.

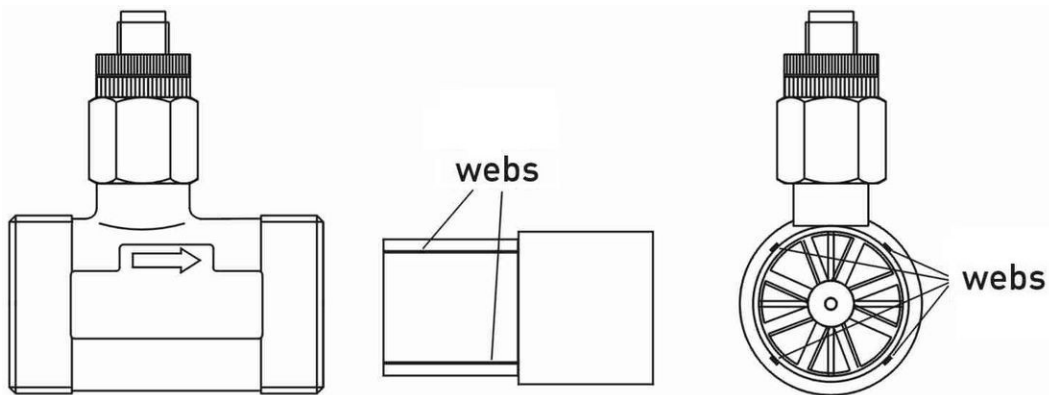
### connecting cable



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

## 6 Replacement of turbine insert

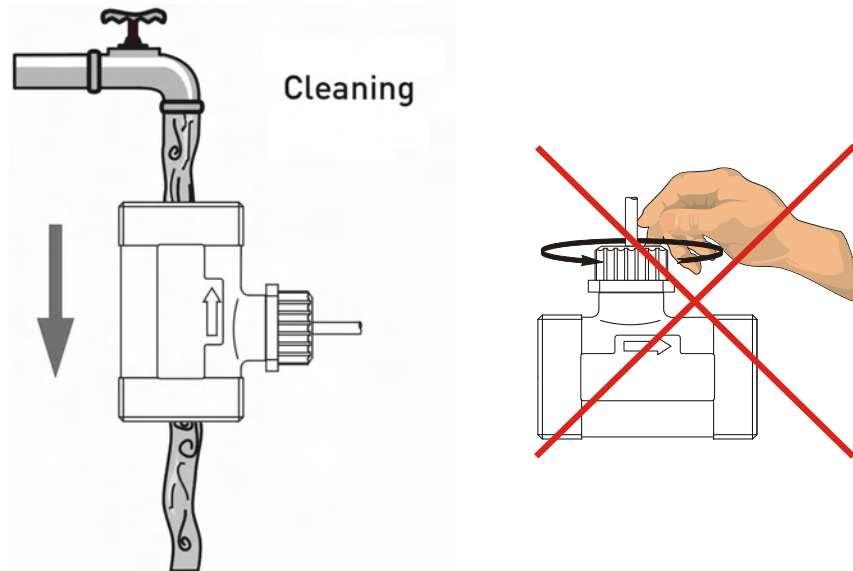
- Dismount the flow sensor. The sensor housing (Hall-Effect-Sensor) is sealed and must not be opened.
- Press the turbine insert out of the tube piece in flow direction using a flat tool.  
The insert fits very tight in the tube piece. You should not use your fingers and never use a pointed tool to press it out of the tube.



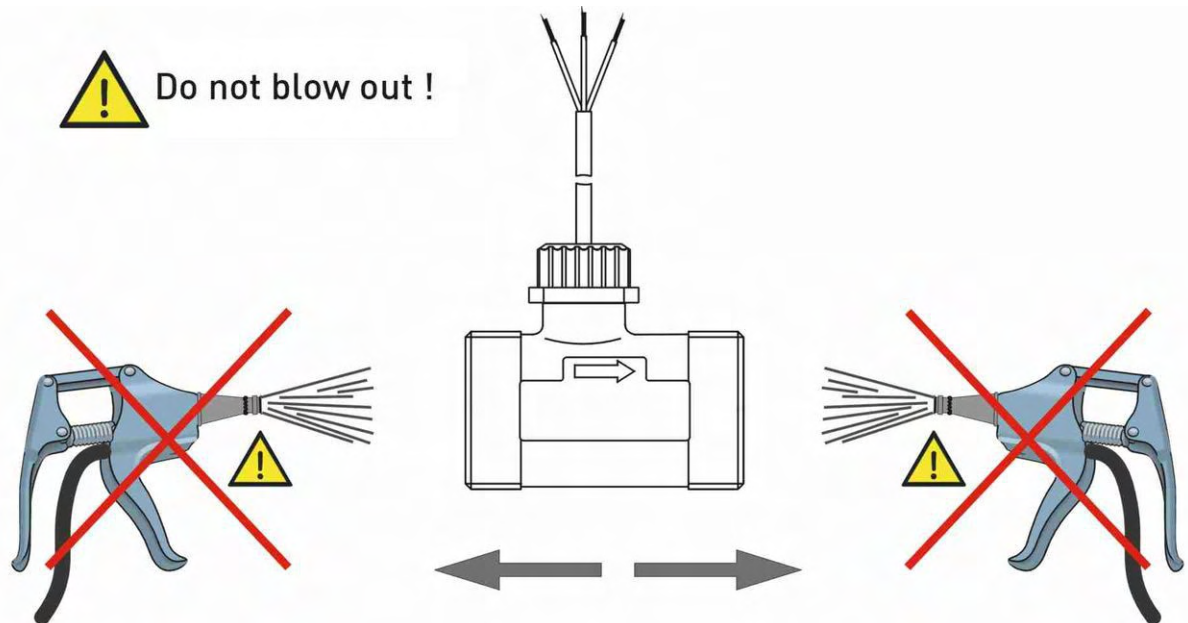
- The turbine insert consists of two cylinders of different diameters which must never be dismantled.
- Push the new insert with the small diameter to the front into the pipe section against the flow direction. Turn the insert in such a way that the webs are not directly beneath the Hall sensor or the 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 FTB 372 in the piping. Make sure that the provided seals fit properly.

## 7 Cleaning

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



- **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 FTB 372 unit is made of different materials (see technical data). Don't dispose the FTB 372 unit together with household waste. The official rules of your area have to be observed at disposing of the FTB 372 unit.



## 9 Materials Table

Type	FTB 372
Pipe section	Brass CW602N
Turbine cage	PPO Noryl GFN1630V
Rotor	PPO Noryl GFN1520V
Rotor assembly	Hard ferrite magnets
Shaft	Stainless steel 904L
Bearing	Sapphire / PA
Sensor housing	PPO Noryl GFN1630V
O-ring	EPDM
Strainer (optional) associated O-ring	Stainless steel 304 EPDM

## 10 Technical Data

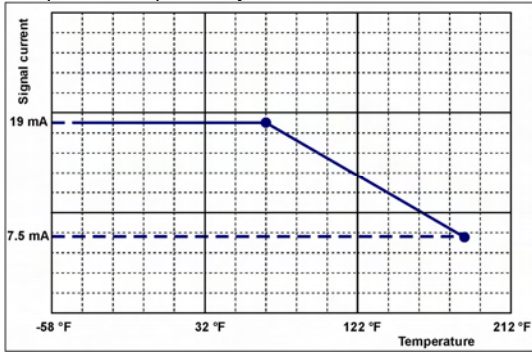
There are special customer designs that may differ from the standard data listed in these instructions always consider the specifications noted on the type plate.

### Turbine flow sensor with pulse output

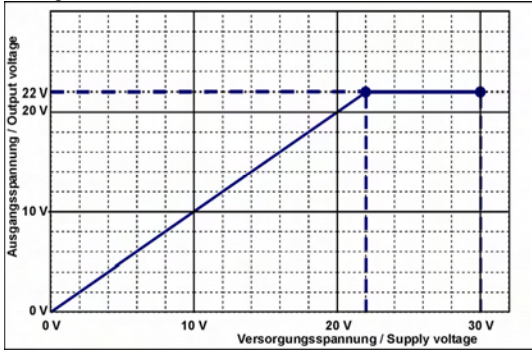
Type	FTB 372
Material pipe section	Brass
Nominal diameter	1"
Measurement range	1.1 ...42.2 GPM, continuous operation max. 21.1 GPM
Accuracy	±7 % of reading (≤ 1.32 GPM) ±5 % of reading (> 1.32 GPM)
Repeatability	±0,5 %
Signal output from	< 0.26 GPM
Sensor	Hall-sensor
Output signal - Pulse rate / K-factor - Resolution - Signal shape  - Signal current	246 pulses / gal 0.0034 gal. / pulse Square wave signal NPN open collector  max. 7.5...19 mA (see Sect.10.1)
Pull-up-resistor	5 KΩ (recommendation)
Supply voltage	10...30 V <sub>DC</sub>
Electrical connection	6.6 ft PVC cable, screened (T <sub>max</sub> = 167 °F) or 4-pin-plug M12x1
Degree of protection (EN 60529)	IP 54
max. medium temperature	185 °F
min. medium temperature	32 °F not freezing
Ambient temperature	32...167 °F
Nominal pressure	145 psi
Particle size in the medium	< 0.025"
Process connection	1" NPT male

**10.1 Hall sensor VTH output signal characteristics**

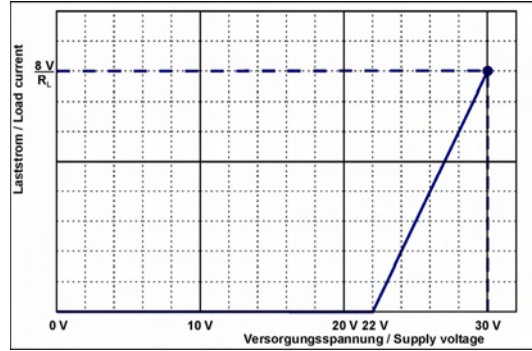
Temperature dependency



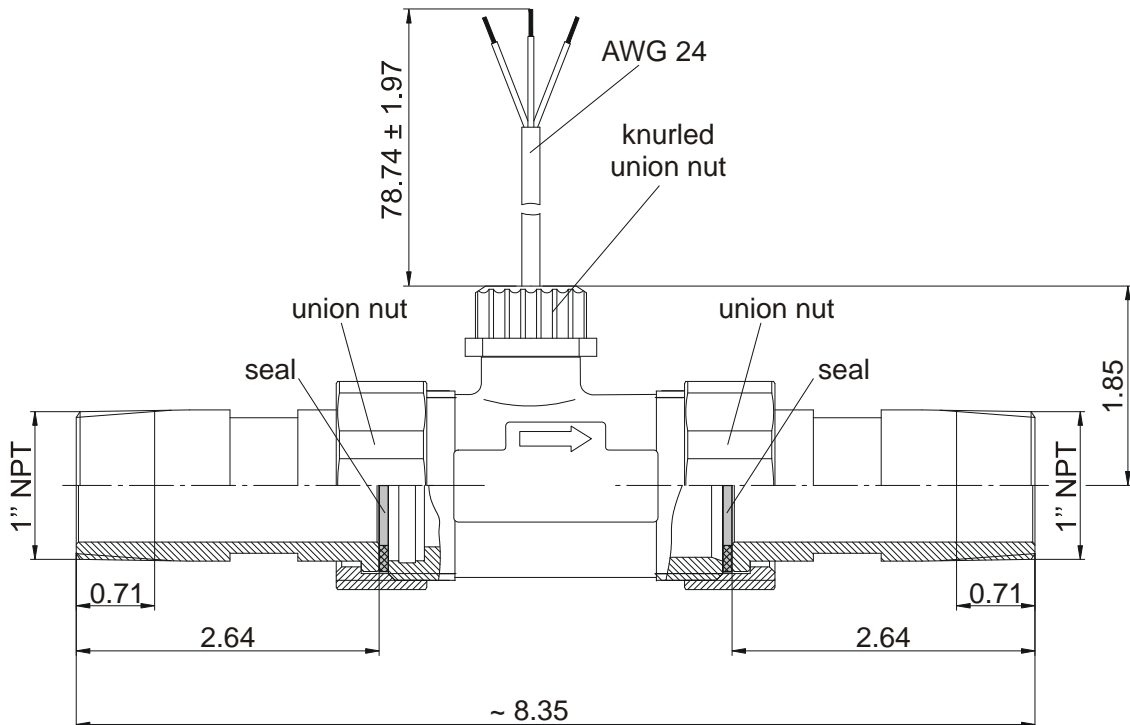
Closed output transistor:  
Voltage limitation



Load current



**11 Dimensions**



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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,
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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
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