



Operating Instructions for Turbine Wheel Flow Meter

Model: TUV



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2. Note

Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.

The instruction manuals on our website www.kobold.com are always for currently manufactured version of our products. Due to technical changes, the instruction manuals available online may not always correspond to the product version you have purchased. If you need an instruction manual that corresponds to the purchased product version, you can request it from us free of charge by email (info.de@kobold.com) in PDF format, specifying the relevant invoice number and serial number. If you wish, the operating instructions can also be sent to you by post in paper form against an applicable postage fee.

Operating instructions, data sheet, approvals and further information via the QR code on the device or via www.kobold.com

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EC-machine guidelines.

as per PED 2014/68/EU

In acc. with Article 4 Paragraph (3), "Sound Engineering Practice", of the PED 2014/68/EU no CE mark.

Diagram 8, Pipe, Group 1 dangerous fluids

3. Regulation Use

Any use of the TUV which exceeds the manufacturer's specification may invalidate its warranty. Therefore, any resulting damage is not the responsibility of the manufacturer. The user assumes all risk for such usage.

4. Operating Principle

4.1 General

The medium (to be measured) rushes into the turbine flow sensor in axial direction and sets the turbine wheel into rotation. The pick-up grasps the speed of the turbine wheel and generates an output signal which is alternating voltage with a specific frequency (impulses per litre) with reference to the instantaneous rate of flow. Thus, the generated frequency is proportional to the rate of flow of medium at any given point in time. After amplification and signal-conversion, the voltage is made available for pulse evaluation. The K-factor (Calibration factor) of turbine wheel flow sensor is printed as an exact measure of pulse-rate. To ascertain the K-factor, we calibrate our flow sensors ourselves. In doing so, we make allowance for operational viscosities and customer's specifications.

4.2 Evaluation

Our Calibration protocol includes the following (and other) data for unit evaluation:

- Max. Measurement-error with respect to the instantaneous value
- Max./min. Frequency with corresponding flow-rates
- K-factors, at different flow rates within the measurement range
- Intermediate K-factor as average value for the complete measuring range. The intermediate factor serves the purpose of evaluation for strongly fluctuating flow-volumes

While this data is made available, you can fine-tune your units. The following equation is used:

$$Q_{\text{Lit}} = \frac{F \times 60}{K}$$

Q= Flow in Litre per Minute

K= K-factor of flow sensor (pulses per Litre)

F= generated pulse frequency in Hz

5. Instrument Inspection

Instruments are inspected before shipping and sent out in perfect condition. Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:

The standard delivery includes:

- Turbine Wheel Flow Meter model: TUV

6. Mechanical Connection

6.1 Preparation

- Ensure that piping is free of debris before installation of the turbine, as hardened debris or other impurities may clog or jam the turbine wheel.
- For all turbines, we recommend the following filter sizes.

DN (Turbine)	Filter size
3 to 9 mm	100 Micron
9 to 50 mm	300 Micron
50 to 300 mm	500 Micron

6.2 Installation

- **The installation should be carried out in straight pipe runs**, preferably in the vertical position. However, the turbine may be mounted in every mounting position with proper calibration. Note that the K-factor could change slightly in the horizontal position, because the calibration of turbines (under DN 50) is carried out in vertical position. If the mounting position of the turbine is to be horizontal, it has to be specified when ordering.

Straight run distances from elbows, T-pieces, valves, pumps, etc. are critical for proper operation. Inlet and outlet pipe straight run distances should be as follows:

Inlet straight run: 10 x DN

Outlet straight run: 5 x DN

- **Pipe Connections**

The diameter of connecting pipe and turbine must be the same. Because of the variations in high-pressure pipe joints, the inner diameter of connecting pipes should be smaller than the nominal diameter of the turbine.

- **Reducing the pipe to connect the meter**

Please use only the cone versions with an angle of 22° to 30° and ensure that the gaskets do not block the free-flow area of cross section of the pipe.

6.3 Noise sources

- **Vortices and other flow-disturbances** in immediate vicinity of turbine falsify the results of measurements. Moreover, the turbine may be damaged in the extreme case. You may avoid such impairments by installing separate laminar flow elements (Length 2.5 x DN of turbine) on both ends of turbine.
- **Voltage: Noise Generation and Magnetic field Disturbances** near the turbine can disturb the pick-up. In particular, on the remote version, the pick-up may act as an antenna.
- **Strong Vibrations of Pipelines** may possibly impose microphonic effect on the pick-up. The transmission of vibrations may be restricted through proper mounting of the pick-up, so that there is no metallic contact between pick-up tip and pick-up bore-ends (inside turbine housing). Flexible hose connections should be used at the inlet and outlet.
- **Air inside in the Pipelines** falsifies the results of measurements. The pipelines must always be filled with liquid, because turbine-flow sensor is an indirect volume-measuring unit and thus registers only the total volume flowing through, independent of, whether the liquid is pure or a mixture of liquid and gas.
- **Cavities** (above all, with the measurement of random-flow gases)
A steady minimal output counter pressure restricts cavity development:

2x Pressure-loss of turbine /Transducer
+ vaporisation pressure of the liquids
= minimal output counter pressure

7. Electrical Connection

7.1 Installation of Pick-up and Amplifier

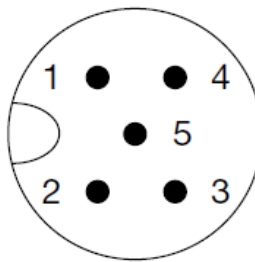
- Screw-in the pick-up gently.
- Loosen the pick-up about a $\frac{1}{4}$ turn.
- Counter-nut should be tightened securely.
By this procedure, a metallic contact between the pick-up tip and pick-up bore-end in the turbine housing is ruled out.
- Please use only shielded cable, preferably, a mesh-screen or braided type.

7.2 Wiring of Standard Pick-up model EHV

(Short circuit proof, reverse polarity protected)
M12 connector (5-pole, male, A-coded)

Pin

- 1 +U_b / Loop+ (24 V)
- 2 n. c.
- 3 GND / Loop-
- 4 Digital output
- 5 n. c.



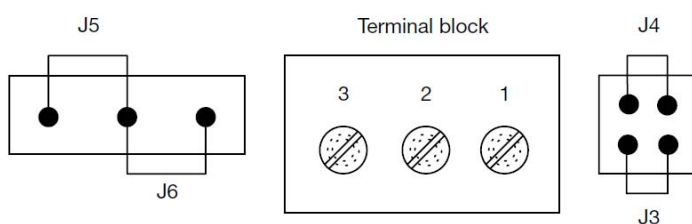
Push-Pull

		min.	max.	
	R_{Last}	10 k Ω		
	I_{Last}		15 mA	$V_{outlow} = 1800 \Omega \times I_{Last}$
	U_{Last}		28 V	$V_{outhigh} = +U_b - 0,5 V - (1800 \Omega \times I_{Last})$
	+U _b	11,5 V	28 V	

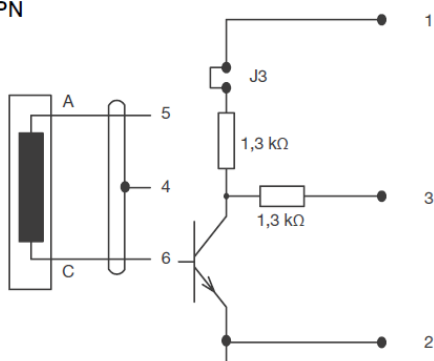
7.3 Setting the Output Mode Electronics model IFV

In the electronics model IFV the type of output can be selected freely. By inserting or removing the 2 jumpers, the output mode is defined.

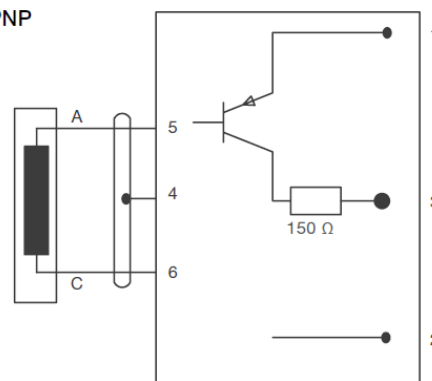
Output mode	Jumper J3	Jumper J4	Jumper J5	Jumper J6
Two-wire passive DIN 19234 NAMUR	Remove	Insert	Remove	Remove
Three-wire active NPN	Insert	Remove	Remove	Insert
Three-wire active PNP (PLC)	Insert	Remove	Insert	Remove
Three-wire passive NPN/Open Collector	Remove	Remove	Remove	Insert



Connections
NPN



PNP



Terminal Assignment

- 1 = +U_B
- 2 = 0 V / GND
- 3 = output signal
- 4 = 0 V / GND / shield
- 5 = signal IF-coil
- 6 = signal IF-coil

8. Commissioning

To avoid pressure shock, the flow medium should be introduced slowly into the unit.



Warning! Pressure shocks from solenoid valves, ball valves or similar may lead to breakage of the instrument (water hammer). In the operating condition, it must be checked that the instrument housing is continuously filled with the flow medium.

Attention! Large air bubbles in the measuring chamber may lead to measurement errors as well as destruction of the bearings.

9. Maintenance

Turbine wheel flow meters (standard version) are generally maintenance-free devices, provided the instructions are followed as detailed in this manual. We recommend a calibration check-up after 8000 service-hours.

The following spare parts are available:

- **Pick-up**
- **Amplifier**
- **1 Turbine wheel with axle**
The turbine wheel is supported axially between two flow straighteners. The ends of the turbine's axle rest in two bearings located in the flow straighteners and against thrust bearings, which absorb the axial push.
- **2 rectifiers with axial counter bearing**
The rectifiers are fixed with the help of supporting clamps between a distance-ring (Ermeto- turbines) or an inflow cone (flange-turbines) and a support in the housing pipe.

10. Technical Information

Operating instructions, data sheet, approvals and further information via the QR code on the device or via www.kobold.com

11. Order Codes

Operating instructions, data sheet, approvals and further information via the QR code on the device or via www.kobold.com

12. Dimensions

Operating instructions, data sheet, approvals and further information via the QR code on the device or via www.kobold.com

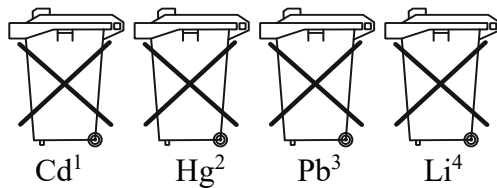
13. Disposal

Note!

- Avoid environmental damage caused by media-contaminated parts
- Dispose of the device and packaging in an environmentally friendly manner
- Comply with applicable national and international disposal regulations and environmental regulations.

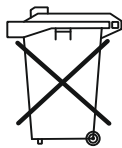
Batteries

Batteries containing pollutants are marked with a sign consisting of a crossed-out garbage can and the chemical symbol (Cd, Hg, Li or Pb) of the heavy metal that is decisive for the classification as containing pollutants:



1. „Cd" stands for cadmium
2. „Hg" stands for mercury
3. „Pb" stands for lead
4. „Li" stands for lithium

Electrical and electronic equipment



14. EU Declaration of Conformance

We, KOBOLD Messring GmbH, Nordring 22-24, 65719 Hofheim, Germany, declare under our sole responsibility that the product:

Turbine Wheel Flow Meter

model: TUV

to which this declaration relates is in conformity with the following EU directives stated below:

2014/30/EU

EMC Directive

2011/65/EU

RoHS (category 9)

2015/863/EU

Delegated Directive (RoHS III)

Also, the following standards are fulfilled:

EN 61000-6-2:2005

Electromagnetic compatibility (EMC) - Part 6-2:
Generic standards - Immunity for industrial environments

EN 61000-6-4:2007+A1

Electromagnetic compatibility (EMC) - Part 6-4:
Generic standards - Emission standard for industrial environments

EN 61010-1:2015

Safety requirements for electrical equipment for
measurement, control, and laboratory use - Part 1: General requirements

Hofheim, 25 Sept 2023



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