# Turbine Wheel Flowmeter
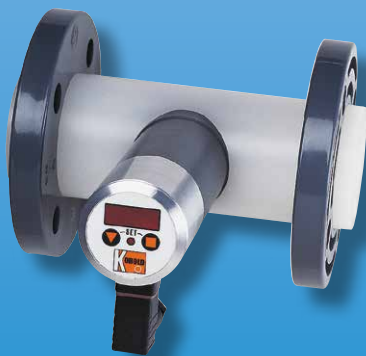## Plastic Model for Liquids

**KOBOLD**

## TUR

TUR with Transmitter

TUR with ADI-1 Electronics

TUR with Compact Electronics

- Measuring Ranges:
  5.3...88 GPM or
  11...440 GPM (Water)

- Measuring Accuracy:
  ±1% of Full Scale

- $p_{max}$: 145 PSIG; $t_{max}$: 158 °F

- Process Connection:
  2" or 4" 150lb ANSI Flanges

- Body Material: PVC or PVDF

- Output: Pulse Frequency, 4-20 mA,
  or 0-10V, LED Display, Switching
  Outputs, Batching, or Totalizers

## Description

TUR turbine wheel flowmeters are used for measurement and control of water and compatible, water-based medias. Engineered from chemically resistant materials, they are compatible with many acidic, basic, and aggressive water-based medias commonly found throughout the industrial process industry.

The TUR is comprised of the following:

### Body

Material: PVC or PVDF
Connection: 150# ANSI Flange 2" or 4" PVC

### Pulse Frequency Pickup

PNP (24 $V_{DC}$, $I_{max}$ 400 mA)
NPN (24 $V_{DC}$, $I_{max}$ 400 mA)

### Transmitter (Optional)

Outputs: 4-20 mA, or 0-10 V
Supply: 24 $V_{DC}$, or 115 $V_{AC}$

### Display/Transmitter (Optional)

Outputs: 4-20 mA or 0-10 V
PNP/NPN Switches, 2 SPDT Relays
Supply: 24 $V_{DC}$, 18-30 $V_{AC}$/10-40 $V_{DC}$ or 100-240 $V_{AC/DC}$

## Principle of Operation

The body is comprised of a thick-walled plastic pipe with (1) a rotatable PVC flange secured at each end. Bearing cross bars (2) which ensure steady flow, are fitted into both the inlet and outlet. A turbine wheel (3), with steel slugs cast-in at each end, rotates as a result of the media flow. The metal slugs are protected against corrosion as they do not come into contact with the media. The sapphire bearings (4a) are fitted in the bearing cross bars. The bearing axle, made of highly chemically-resistant tungsten-carbide, is cast into the turbine wheel. The rotation of the turbine wheel is picked up by a top-mounted pulse generator (5) without seals and is mechanically non-interacting, and transferred to the evaluating electronics as pulses. The evaluating electronics convert the pulse signal into a flow rate display, limit contacts and/or analog output.
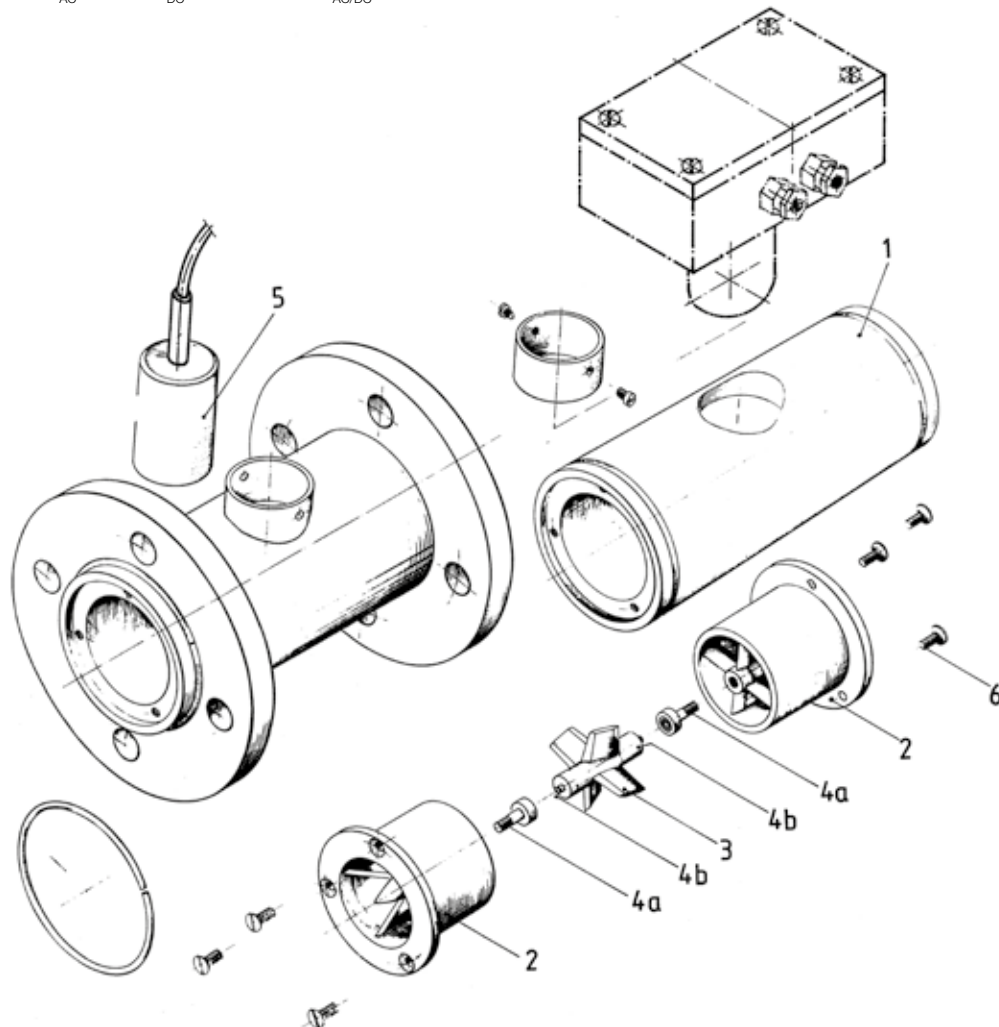
## Technical Details

| | |
|---|---|
| **Measuring Accuracy:** | ±1% of Full Scale |
| **Media:** | Water and Compatible, Water-Based Solutions |
| **Max. Media Temperature:** | PVC Version: 140 °F (60 °C) PVDF Version: 158 °F (70 °C) |
| **Max. Pressure:** | 145 PSIG |
| **Pressure Drop:** | Approx. 1.5 PSIG at Max. Flow |
| **Protection Type:** | IP 65 |

### Materials

| Component | PVC Model | PVDF Model |
|---|---|---|
| (1) Fitting | PVC | PVDF |
| (2) Bearing Cross Bars | PVC | PVDF |
| (3) Turbine Wheel | PVC | PVDF |
| (4a) Bearing Bush | Sapphire | Sapphire |
| (4b) Bearing Axle | Sapphire | Sapphire |
| (6) Bolts | Polyamide | PVDF |
| (7) Flange | PVC | PVC |

## Electronics

- **Frequency Output**

| | |
|---|---|
| **Power Supply:** | 24 $V_{DC}$ ± 20% |
| **Idle Current:** | 15 mA (nominal) |
| **Pulse Output:** | PNP or NPN, Max. 400 mA |
| **Electrical Conn:** | 6.5' (2 m) PVC Cable |

- **Transmitter**

| | |
|---|---|
| **Power Supply:** | 115 $V_{AC}$, 24 $V_{DC}$ |
| **Output:** | 4-20 mA or 0-10 $V_{DC}$ 4-wire |
| **Max. Load:** | 500 Ω |
| **Electrical Conn:** | Connection Box with Cable Gland |

- **Compact Electronics**

| | |
|---|---|
| **Display:** | 3-Segment LED Rate |
| **Analog Output:** | 4... 20 mA Adjustable, Max. Load: 500 Ω |
| **Switching Outputs:** | 1 or 2 PNP or NPN Semiconductor |
| **Contact Operation:** | N/C N/O Programmable |
| **Programming:** | via 2 Buttons |
| **Power Supply:** | 24 $V_{DC}$ ±20%, 3-wire, Approx. 100 mA |
| **Electrical Conn:** | Plug Connector M12x1 |

## Totalizing Electronic

| | |
|---|---|
| **Display:** | LCD, 2 x 8 Digits, Illuminated Rate, Total and Grand Total, Units Selectable |
| **Analog Output:** | 4-20 mA Adjustable |
| **Load:** | Max. 500 Ω |
| **Switching Output:** | Relay (2x), Max. 30 V/2 A, 60 VA |
| **Settings:** | Via 4 Buttons |
| **Functions:** | Reset, MIN/MAX Memory, Flow Rate, Total and Grand Total, Language |
| **Power Supply:** | 24 $V_{DC}$ ±20 %, 3-wire |
| **Power Consumption:** | Approx. 170 mA |
| **Electrical Connection:** | Cable Connection or M12x1 Plug |

## Batching Electronic

| | |
|---|---|
| **Display:** | LCD, 2 x 8 Digits, Illuminated Batching, Total and Grand Total, Units Selectable |
| **Analog Output:** | 4-20 mA, Adjustable |
| **Load:** | Max. 500 Ω |
| **Switching Output:** | Relay (2x), Max. 30 V / 2 A, 60 VA |
| **Settings:** | Via 4 Buttons |
| **Functions:** | Batching (Relay S2), Start, Stop, Reset, Fine Batching, Correction Amount, Flow Switch, Total Quantity, Language |
| **Power Supply:** | 24 $V_{DC}$ ±20 %, 3-wire |
| **Power Consumption:** | Approx. 170 mA |
| **Electrical Connection:** | Cable Connection or M12 Plug |

- **ADI-1 Electronics***

| | |
|---|---|
| **Display:** | Bar Graph and 5-Digit LED Display |
| **Analog Output:** | 4...20 mA, 0-10 $V_{DC}$ |
| **Switching Outputs:** | Relay/SPDT (Changeover) Contact, Max. 250 $V_{AC}$/5 A Resistive Load, Max. 30 $V_{DC}$ / 5 A |
| **Setting:** | Via 4 Buttons |
| **Power Supply:** | 100 ... 240 $V_{AC}$ ± 10 % or 18 ... 30 $V_{AC}$ /10 ... 40 $V_{DC}$ |
| **Electrical Conn:** | Pluggable Terminal Block via Cable Gland |

*For more technical details on the ADI-1 electronic indicator, please see datasheet ADI-1.*

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**Order Details:** (Example: **TUR-3 0 50 N**)

| Model | Output | Body Material | Connection/ Measuring Range | Electronics |
|---|---|---|---|---|
| | **..3..** = Blind Pulse | **..0..** = PVC <br> **..1..** = PVDF | **..50..** = 2" 150lb ANSI Flange 5.3...88 GPM <br><br> **..10..** = 4" 150lb ANSI Flange 11...440 GPM | **..N** = NPN, 24 $V_{DC}$, 3-wire <br> **..P** = PNP, 24 $V_{DC}$, 3-wire |
| **TUR-** | **..4..** = Blind Analog or Evaluating Display Electronic | **..0..** = PVC <br> **..1..** = PVDF | **..50..** = 2" 150lb ANSI Flange 5.3...88 GPM <br><br> **..10..** = 4" 150lb ANSI Flange 11...440 GPM | **Blind Transmitter** <br> **..M140** = 115 $V_{AC}$, 4-20 mA, 4-wire <br> **..M110** = 115 $V_{AC}$, 0-10 $V_{DC}$, 4-wire <br> **..M340** = 24 $V_{DC}$, 4-20 mA, 4-wire <br> **..M310** = 24 $V_{DC}$, 0-10 $V_{DC}$, 4-wire <br><br> **Compact Electronics\*** <br> **..C30R** = 2x Open Collector, PNP <br> **..C30M** = 2x Open Collector <br> **..C34P** = 4-20 mA, 1x Open Collector, PNP <br> **..C34N** = 4-20 mA, 1x Open Collector NPN <br><br> **Totalizer Electronics\*** <br> **..E34R** = 24 $V_{DC}$, 4-20 mA <br> **..E31R** = 24 $V_{DC}$, 0-10 V <br> **..E04R** = 90-250 $V_{AC}$, 4-20 mA <br> **..E01R** = 90-250 $V_{AC}$, 0-10 V <br><br> **Batching Electronics\*** <br> **..G34R** = 24 $V_{DC}$, 4-20 mA <br> **..G31R** = 24 $V_{DC}$, 0-10 <br> **..G04R** = 90-250 $V_{AC}$, 4-20 m <br> **..G01R** = 90-250 $V_{AC}$, 0-10 V <br><br><br> **ADI-1 Electronics\*** <br> **..K002** = 100-240 $V_{AC/DC}$, 2 SPDT Relay Contacts <br> **..K042** = 100-240 $V_{AC/DC}$, 4-20 mA, 0-10 $V_{DC}$, 2x SPDT Relay <br> **..K302** = 18-30 $V_{AC}$, 10-40 $V_{DC}$, 2 SPDT Relay Contacts <br> **..K342** = 18-30 $V_{AC}$, 10-40 $V_{DC}$, 4-20 mA, 0-10 $V_{DC}$, 2x SPDT Relay |

\* Please specify flow direction in writing

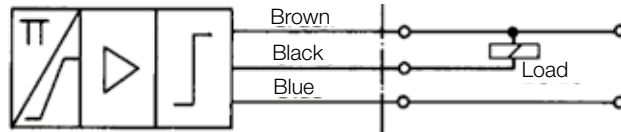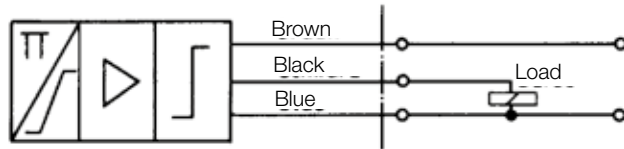**TUR-3... with Frequency Output**

**TUR-4... with Integrated Converter**
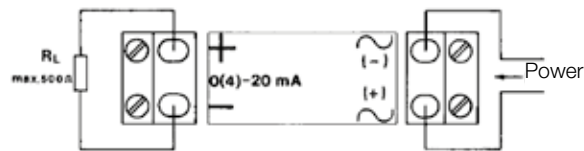
### Electrical Connection Diagrams

**NPN TUR-3...N**

Brown
Black
Blue
Load

**PNP TUR-3...P**

Brown
Black
Blue
Load

**Transmitter TUR-4...M...**

$R_L$ max. 500 Ω

0(4)-20 mA

Power

**TUR-4...C...**

(0)4-20 mA
Switch out 2
GND
GND

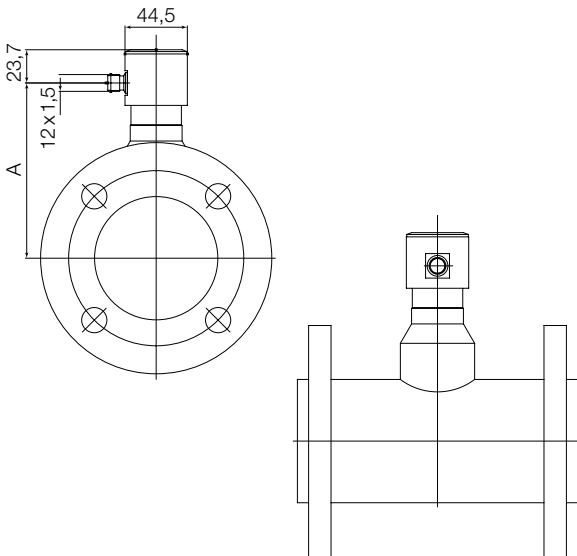+ Vs
Switch out 1

2  1
5
3  4

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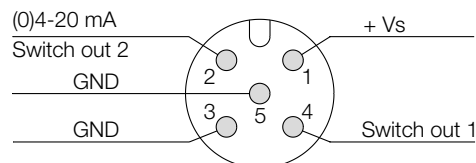
**TUR with Blind Transmitters**
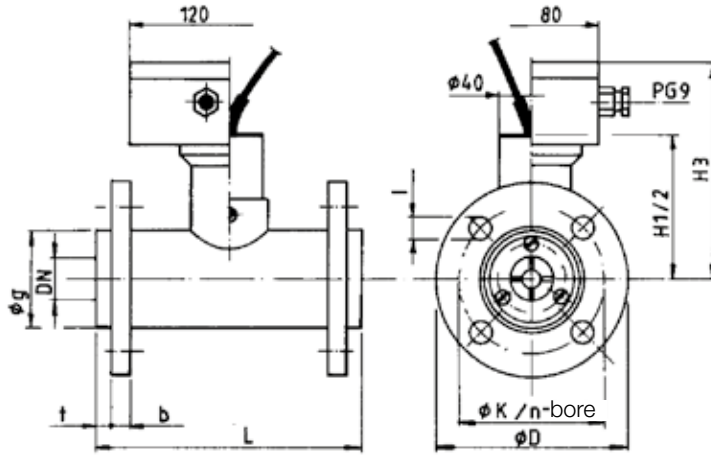


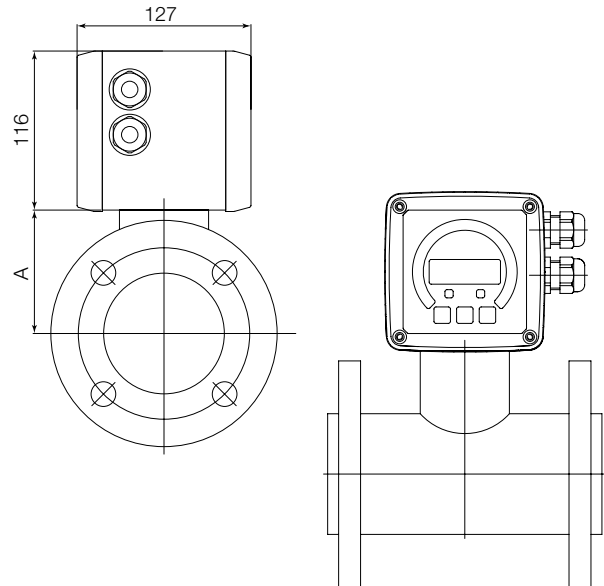| Flange Size | b | D | g | H2* | H3 | K | L | n | l | t |
|---|---|---|---|---|---|---|---|---|---|---|
| 2" | 20 | 165 | 88 | 100 | 140 | 125 | 200 | 4x | 18 | 11 |
| 4" | 22 | 220 | 145 | 125 | 165 | 180 | 250 | 8x | 18 | 11 |

* with NPN- or PNP sensor

**Dimensions** (mm)

**TUR with Compact Electronics**



| Model | Dimension A |
|---|---|
| TUR-..50 | 125 |
| TUR-..10 | 150 |

**TUR with ADI-1, Gxxx, Exxx or Electronics**



| Model | Dimension A |
|---|---|
| TUR-..50 | 90 |
| TUR-..10 | 115 |

**Dimensions** (mm)