Zertifiziertes QM-System
DIN EN ISO 9001
Zertifikat-Nr. 01017

# Turbine Wheel Flow Meter/ Monitor

for low viscous liquids

measuring • monitoring • analysing

## DOT

- Measuring range:
  0.11 - 1.1 m³/h … 270 - 2 700 m³/h water
  (higher on request)
- Viscosity range: low viscous
- Linearity: ±0.5 % of reading
- $p_{max}$: 250 bar; $t_{max}$: 120 °C
- Connection:
  G ½ … G 2 male, ½" NPT … 2" NPT male,
  DIN flanges DN 15 … DN 300 (larger on request),
  ANSI flanges ½"... 12" (larger on request)
- Material: stainless steel, carbon steel
- Output: LCD display, 4…20 mA,
  batching, totalising

S4

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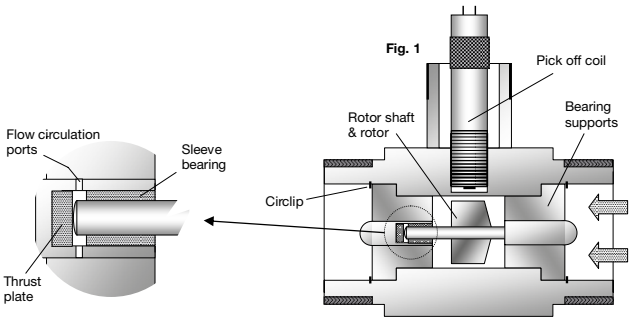
## Description

The turbine flow meter model DOT consists of a helically shaped turbine rotor supported in two tungsten carbide bearings, the rotor being solid ferritic stainless steel of a grade compatible with the metered liquid, all contained within a housing of non-magnetic stainless steel.

A pick off coil having a permanent magnet core is mounted in the housing adjacent to the rotor blade tips such that a magnetic circuit is set up via the rotor blades (Fig.1).

Rotation of the rotor varies the reluctance of this magnetic circuit and the flux changes induce a small voltage in the coil, the frequency of which is directly proportional to the rotor speed and therefore proportional to the volumetric flow rate.

The effects of increasing viscosity reduce the linear flow range and shifts the k-factor. Further, the effect of viscosity depends on the frequency (RPM of rotors). Therefore, smaller the meter, higher is the effect of viscosity on the linearity curve.




## Design

The DOT is a highly accurate, reliable and robust turbine meter used to measure the flow of clean low viscosity liquids.

Stainless steel construction with tungsten carbide bearings provides long life with a wide range of aggressive and non-lubricating liquids in petrochemical and general industrial applications.

The meter is supplied fitted with integral instruments. These may include e.g. Z1 dual totaliser, Z3 rate counter or Z2 dosing unit.

The electronics are identical to the series ZOK. ATEX certification is not available. For further information please see the operation manual of ZOK.

## Applications

- Chemical and allied products
- Pharmaceuticals
- Deionised water
- Fuel additives
- Petrochemicals
- Plastics and hydraulics
- Water conditioning
- other low viscous fluids

## Technical Details

| | |
|---|---|
| Sizes: | 15 mm ... 300 mm (½" ... 12" ANSI, DN 15 ... DN 300), bigger on request (see model no. designation for information on available sizes) |
| Linearity at 1cP: | ± 0.5 % of reading, (± 0.2% when utilising the linearisation feature of electronic type Z3) |
| Repeatability: | ± 0.02 ... 0.05 % under steady flow conditions |
| Max. pressure: | threaded connections: 250 bar<br>flange connections: corresponding to flange specifications |
| Medium temperature: | -20 ... +120 °C<br>(ambient temperature max. +80 °C) |
| Pressure drop: | approximately 0.28 bar at maximum flow (SG = 1.0, Vis. = 1 mm²/s) |
| Supply voltage: | see electronics |
| Electronic features: | see comparison table |
| Flanges: | according to DIN 2501 or ASME B16.5 (optional) |

## Materials

| | |
|---|---|
| Housing: | stainless steel 1.4401 (316 SS) |
| Flanges: | stainless steel 1.4401 (316 SS)<br>or carbon steel A106 |
| Rotor: | SS 430 (up to DOT-xx15),<br>SS ANC 21 (Duplex stainless steel, for bigger sizes) |
| Bearing support: | stainless steel 1.4401 (316 SS) |
| Bearings: | tungsten carbide<br>(shaft, bush, thrust plate) |

## Output

| | |
|---|---|
| Standard: | 2-wire reluctance type pick-off coil (40 mV P/P at minimum flowrate), polarity insensitive, 20 m max. transmission distance<br>see relevant electronics datasheet ZOK |
| Protection: | IP 66/67 (with integrated electronic ZOK)<br>IP 54 (with option »FOS«) |

## Recommended filters

| | |
|---|---|
| Sizes up to DN 50: | 0.3 mm (300 microns or 60 mesh) |
| Sizes from DN 80: | 0.5 mm (500 microns or 100 mesh) |



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**Electronic with LCD Display** (For details see ZOK data sheet)

| Model | ..Z1 | ..Z2 | ..Z3 |
|---|---|---|---|
| Function | dual totaliser | dosing unit | rate / counter |
| **Power supply** | | | |
| Battery-powered (outputs inactive) | yes | no | yes |
| External (also for backlighting) | 8 - 24 $V_{DC}$ | 12 - 24 $V_{DC}$ | 8 - 24 $V_{DC}$ |
| **LCD display** | | | |
| Selectable units | yes | yes | yes |
| Decimal point | yes | yes | yes |
| Accumulative total | yes | yes | yes |
| Resettable total | yes | yes | yes |
| Linearisation | no | no | yes |
| Rate display | yes | yes | yes |
| Backlighting | yes | yes | yes |
| **Outputs** | | | |
| 4-20 mA | no | no | yes |
| Flow rate<br>Alarm min./max. | no | no | NPN/PNP/PP |
| Batch end & control | no | yes | no |
| Pulse outputs | no | no | PP |
| 2 x SPDT relays* | no | yes | option |
| **Installation** | | | |
| IP 65 | yes | yes | yes |
| Cable entries (not included in delivery) | M20x1.5 / ½" NPT | M20x1.5 / ½" NPT | M20x1.5 / ½" NPT |
| Medium temperature | -20...+120 °C | -20...+120 °C | -20...+120 °C |
| Ambient temperature | -20 ... +80 °C | | |
| Housing material | PA6 GF35 UL94 HB/VO / PC UL94 V-2 | | |
| ATEX approval | no | no | no |

* Replaces solid state outputs

**Order Details threaded version** (Example: **DOT-13 15H G5 Z3 M 0**)

| Housing/connection material | Range | Mechanical connection* | Electronics/ cable entry/plug | Flow direction | Special options |
|---|---|---|---|---|---|
| **DOT-13** = (st. steel/ st. steel) | **05H** = 0.11 - 1.1 m³/h | **G4** = ½" male | **F0S**** = only frequency output, MS (military style) connector for 120 °C max.<br>**Z1M** = electronic ZOK-Z1, M20x1,5<br>**Z2M** = electronic ZOK-Z2, M20x1,5<br>**Z3M** = electronic ZOK-Z1, M20x1,5<br>**Z1N** = electronic ZOK-Z1, ½" NPT<br>**Z2N** = electronic ZOK-Z2, ½" NPT<br>**Z3N** = electronic ZOK-Z3, ½" NPT | **0** = all directions (only frequency output)<br>**B** = from bottom to top, indication right<br>**M** = from bottom to top, indication left<br>**L** = from left to right, indication on top<br>**R** = from right to left, indication on top | **0** = none<br>**Y** = specified in clear text |
| | **10H** = 0.22 - 2.2 m³/h<br>**15H** = 0.4 - 4.0 m³/h<br>**20H** = 0.8 - 8 m³/h | **G5** = ¾" male | | | |
| | **25H** = 1.6 - 16 m³/h | **G6** = 1" male | | | |
| | **30H** = 3.4 - 34 m³/h | **G8** = 1 ½" male | | | |
| | **35H** = 6.8 - 68 m³/h | **G9** = 2" male | | | |
| | **XXH** = special option | **XX** = special option | **XX** = special option | | |

* Replace DOT-xxxxGx… into DOT-xxxxNx… for NPT connection
** In preparation

**Order Details flanged version** (Example: **DOT-13 50H FE Z3 M 0**)

| Housing/connection material | Range | Mechanical connection* | Electronics/ cable entry/plug | Flow direction | Special options |
|---|---|---|---|---|---|
| **DOT-12** = (st. steel/ carbon steel)<br>**DOT-13** = (st. steel/ st. steel) | **05H** = 0.11-1.1 m³/h | **F4** = DN 15, PN 16 | **F0S**** = only frequency output, MS (military style) connector for 120 °C max.<br>**Z1M** = electronic ZOK-Z1, M20x1,5<br>**Z2M** = electronic ZOK-Z2, M20x1,5<br>**Z3M** = electronic ZOK-Z1, M20x1,5<br>**Z1N** = electronic ZOK-Z1, ½" NPT<br>**Z2N** = electronic ZOK-Z2, ½" NPT<br>**Z3N** = electronic ZOK-Z3, ½" NPT | **0** = all directions (only frequency output)<br>**B** = from bottom to top, indication right<br>**M** = from bottom to top, indication left<br>**L** = from left to right, indication on top<br>**R** = from right to left, indication on top | **0** = none<br>**Y** = specified in clear text |
| | **10H** = 0.22 - 2.2 m³/h<br>**15H** = 0.4 - 4.0 m³/h<br>**20H** = 0.8 - 8 m³/h | **F5** = DN 20, PN 16 | | | |
| | **25H** = 1.6 - 16 m³/h | **F6** = DN 25, PN 16 | | | |
| | **30H** = 3.4 - 34 m³/h | **F8** = DN 40, PN 16 | | | |
| | **35H** = 6.8 - 68 m³/h | **F9** = DN 50, PN 16 | | | |
| | **40H** = 13.5 - 135 m³/h | **FB** = DN 80, PN 16 | | | |
| | **45H** = 27 - 270 m³/h | **FC** = DN 100, PN 16 | | | |
| | **50H** = 55 - 550 m³/h | **FE** = DN 150, PN 16 | | | |
| | **XXH** = special option | **XX** = special option | **XX** = special option | | |

* Change DOT-xxxxFx… into DOT-xxxxHx… for PN25
Change DOT-xxxxFx… into DOT-xxxxAx… for ANSI 150 RF connection or into DOT-xxxxBx… for ANSI 300 RF
** In preparation



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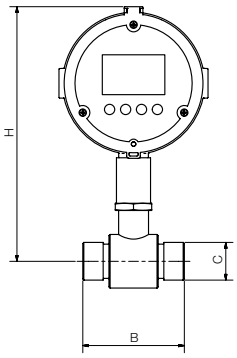
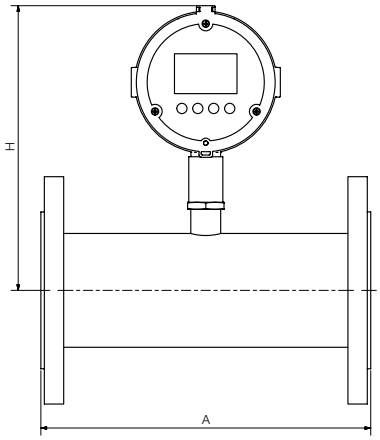
## **Dimensions** [mm]

### Threaded



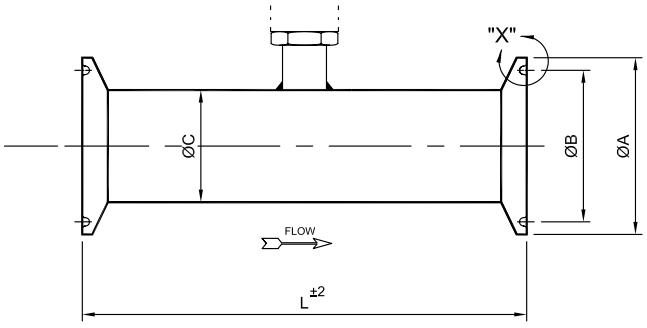

| Flow [m³/h] | C (Thread) | B | H |
|---|---|---|---|
| 0.11-1.1 | ½" | 64 | 222 |
| 0.22-2.2 | ¾" | 65 | 222 |
| 0.4-4 | ¾" | 65 | 222 |
| 0.8-8 | ¾" | 83 | 223 |
| 1.6-16 | 1" | 88 | 226 |
| 3.4-34 | 1½" | 114 | 233 |
| 6.8-68 | 2" | 132 | 237 |

### Flanged




| Flow [m³/h] | A | H |
|---|---|---|
| 0.11-1.1 | 127 | 219 |
| 0.22-2.2 | 127 | 219 |
| 0.4-4 | 127 | 219 |
| 0.8-8 | 140 | 222 |
| 1.6-16 | 152 | 228 |
| 3.4-34 | 178 | 231 |
| 6.8-68 | 197 | 237 |
| 13.5-135 | 254 | 249 |
| 27-270 | 356 | 268 |
| 55-550 | 368 | 298 |

### Clamp ferrule (acc. to DIN 32676)




| Model | ±0.1 ØA | ±0.1 ØB | ±0.025 ØC | ±0.1 F | ±2 L |
|---|---|---|---|---|---|
| **DOT-1305** | 50.5 | 43.5 | 31.7 | 2.85 | 127 |
| **DOT-1310** | 50.5 | 43.5 | 31.7 | 2.85 | 127 |
| **DOT-1315** | 50.5 | 43.5 | 31.7 | 2.85 | 127 |
| **DOT-1320** | 50.5 | 43.5 | 35.0 | 2.85 | 140 |
| **DOT-1325** | 50.5 | 43.5 | 38.1 | 2.85 | 152 |
| **DOT-1330** | 50.5 | 43.5 | 57.2 | 2.85 | 178 |
| **DOT-1335** | 64.0 | 56.3 | 69.5 | 2.85 | 197 |

### Detail »X«