



## Turbine Wheel Flowmeter / Monitor

for low viscous liquids



measuring  
•  
monitoring  
•  
analysing

DOT



- Measuring range:  
0.11 - 1.1 m<sup>3</sup>/h ... 270 - 2700 m<sup>3</sup>/h water  
(higher on request)
- Viscosity range: low viscous
- Linearity: ±0.5 % of reading
- p<sub>max</sub>: 250 bar; t<sub>max</sub>: 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:  
pulse output, LC display, 4 ... 20 mA,  
batching, totalising



S4

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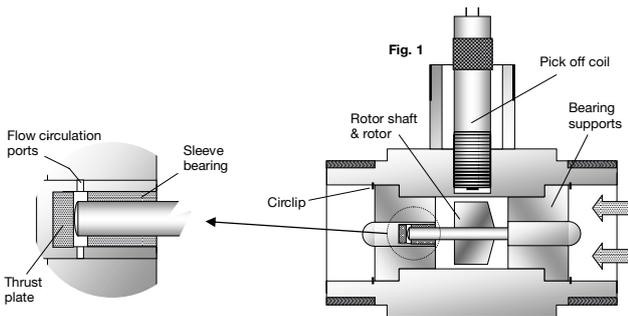
### Description

The turbine flowmeter 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 basic meter is available with a pre-amplified square wave output. These meters have MS (military style) plug/socket for the pulse output connection.

Alternatively the meter is supplied fitted with integral instruments. These may include e.g. dual totaliser, rate counter Z3/ZE/ZB or dosing unit.

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

### 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  
flange connections: corresponding to flange specifications
- Medium temperature: -20 ... +120 °C (ambient temperature max. +80 °C)
- Pressure drop: approximately 0.28 bar at maximum flow (SG = 1.0, Vis. = 1 mm<sup>2</sup>/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) or carbon steel A106
- Rotor: SS 430 (up to DOT-xx15), SS ANC 21 (Duplex stainless steel, for bigger sizes)
- Bearing support: stainless steel 1.4401 (316 SS)
- Bearings: tungsten carbide (shaft, bush, thrust plate)



**Output**

Pre-amplifier: Inductive sensor in option »F4S« is a turbine wheel sensor with integrated pre-amplifier. Specially designed for turbine flowmeters, the sensor provides amplified output on 3 wire.

Transmission distance: max. 500 m

Housing: stainless steel

Connector: MS acc. to MIL-DTL-5015 including mating plug with 3 x soldering pins

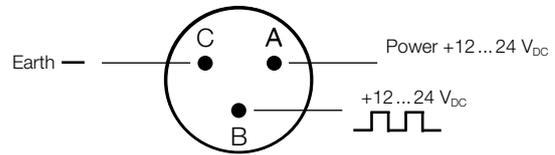
Power supply: 12-24 V<sub>DC</sub>

Pulse output: NPN, max. 25 mA

Others: see relevant electronics datasheets ZOK/ZOE

Protection: IP55 (with option »F4S«)  
IP66/67 (with integrated electronic ZOK/ZOE)

**Wire diagram**



**Recommended filters**

Sizes up to DN50: 0.3mm (300 microns or 60 mesh)

Sizes from DN80: 0.5mm (500 microns or 100 mesh)

**Electronic with LCD Display**

Model	..Z1	..Z2	..Z3	..ZE	..ZB
Function	dual totaliser	dosing unit	rate/counter		
<b>Power supply</b>					
Battery-powered (outputs inactive)	yes	no	yes		
External (also for backlighting)	5-28 V <sub>DC</sub>	12-28 V <sub>DC</sub>	5-28 V <sub>DC</sub>	9-28 V <sub>DC</sub>	-
<b>LCD display</b>					
Selectable units	yes	yes	yes	yes	yes
Decimal point	yes	yes	yes	yes	yes
Accumulative total	yes	yes	yes	yes	yes
Resettable total	yes	yes	yes	yes	yes
Linearisation	yes	no	yes	yes	yes
Rate display	yes	yes	yes	yes	yes
Backlighting	yes	yes	yes	yes	no
<b>Outputs</b>					
4-20 mA	no	no	yes	no	no
Flow rate alarm min./max.	no	no	NPN/PNP/PP	no	no
Batch end & control	no	yes	no	no	no
Pulse outputs	no	no	PP	PP	no
2 x SPDT relays <sup>1)</sup>	no	yes	option	no	no

<sup>1)</sup> Replaces solid state outputs, for details see data sheet ZOK



Turbine Wheel Flowmeter/Monitor Model DOT

Order Details threaded version (Example: DOT-13 15H G5 Z3M B)

Housing/ connection material	Range	Mechanical connection*	Electronics/ cable entry/plug	Flow direction
DOT-13 = (st. steel/ st. steel)	05H = 0.11 - 1.1 m³/h	G4 = ½" male	F4S = only pulse output preamplified/ MS (military style) connector for max. 120 °C	<b>0</b> = all directions (only pulse output) <b>B</b> = from bottom to top, indication right <b>M</b> = from bottom to top, indication left <b>L</b> = from left to right, indication on top <b>R</b> = from right to left, indication on top
	10H = 0.22 - 2.2 m³/h 15H = 0.4 - 4.0 m³/h 20H = 0.8 - 8 m³/h	G5 = ¾" male	Z1M = electronic ZOK-Z1/M20 x 1.5 Z2M = electronic ZOK-Z2/M20 x 1.5 Z3M = electronic ZOK-Z3/M20 x 1.5	
	25H = 1.6 - 16 m³/h	G6 = 1" male	ZEM = electronic ZOE with external supply/with battery/M20 x 1.5 ZBM = electronic ZOE without external supply/M20 x 1.5	
	30H = 3.4 - 34 m³/h	G8 = 1 ½" male	Z1N = electronic ZOK-Z1/½" NPT Z2N = electronic ZOK-Z2/½" NPT Z3N = electronic ZOK-Z3/½" NPT	
	35H = 6.8 - 68 m³/h	G9 = 2" male	ZEN = electronic ZOE with external supply/½" NPT ZBN = electronic ZOE without external supply/with battery/½" NPT	
	XXH = special option	XX = special option	XX = special option	

\* Replace DOT-xxxxGx... into DOT-xxxxNx... for NPT connection

Order Details flanged version (Example: DOT-13 50H FE Z3M B)

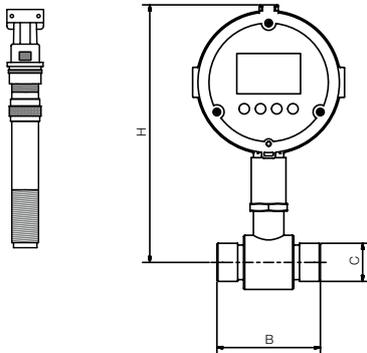
Housing/ connection material	Range	Mechanical connection*	Electronics/ cable entry/plug	Flow direction
DOT-12 = (st. steel/ carbon steel) DOT-13 = (st. steel/ st. steel)	05H = 0.11 - 1.1 m³/h	F4 = DN15, PN 16	F4S = only pulse output preamplified/MS (military style) connector for max. 120 °C	<b>0</b> = all directions (only pulse output) <b>B</b> = from bottom to top, indication right <b>M</b> = from bottom to top, indication left <b>L</b> = from left to right, indication on top <b>R</b> = from right to left, indication on top
	10H = 0.22 - 2.2 m³/h 15H = 0.4 - 4.0 m³/h 20H = 0.8 - 8 m³/h	F5 = DN20, PN 16	Z1M = electronic ZOK-Z1/M20 x 1.5 Z2M = electronic ZOK-Z2/M20 x 1.5 Z3M = electronic ZOK-Z3/M20 x 1.5	
	25H = 1.6 - 16 m³/h	F6 = DN25, PN 16	ZEM = electronic ZOE with external supply/M20 x 1.5 ZBM = electronic ZOE without external supply/with battery/M20 x 1.5	
	30H = 3.4 - 34 m³/h	F8 = DN40, PN 16	Z1N = electronic ZOK-Z1/½" NPT Z2N = electronic ZOK-Z2/½" NPT Z3N = electronic ZOK-Z3/½" NPT	
	35H = 6.8 - 68 m³/h	F9 = DN50, PN 16	ZEN = electronic ZOE with external supply/½" NPT ZBN = electronic ZOE without external supply/with battery/½" NPT	
	40H = 13.5 - 135 m³/h	FB = DN80, PN 16		
	45H = 27 - 270 m³/h	FC = DN100, PN 16		
	50H = 55 - 550 m³/h	FE = DN150, 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

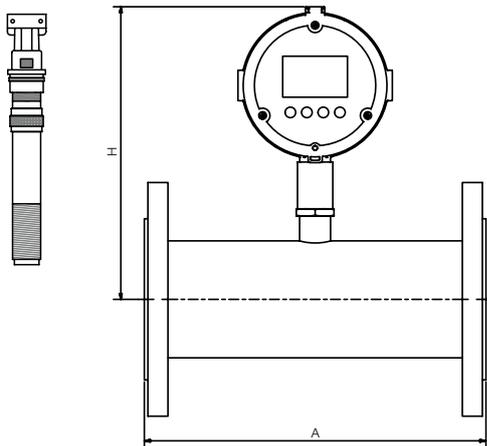
**Dimensions** [ $\pm 2$  mm]

**Threaded**



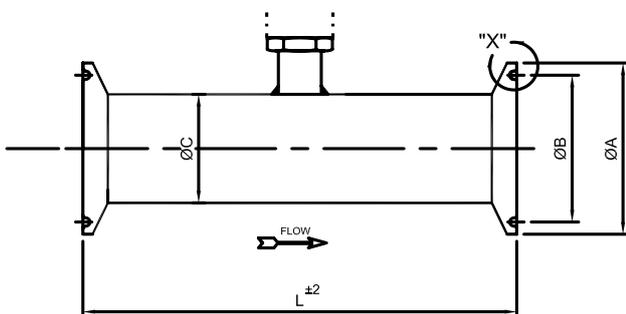
Flow [m <sup>3</sup> /h]	C (Thread)	B	H (with pulse output)	H (with ZOK/ZOE electronics)
0.11-1.1	1/2"	64	150	222
0.22-2.2	3/4"	65	152	222
0.4-4	3/4"	65	152	222
0.8-8	3/4"	83	154	223
1.6-16	1"	89	158	226
3.4-34	1 1/2"	114	164	233
6.8-68	2"	133	169	237

**Flanged**



Flow [m <sup>3</sup> /h]	A	H (with pulse output)	H (with ZOK/ZOE electronics)
0.11-1.1	127	150	219
0.22-2.2	127	152	219
0.4-4	127	152	219
0.8-8	140	154	222
1.6-16	152	158	228
3.4-34	178	164	231
6.8-68	197	169	237
13.5-135	254	178	249
27-270	356	197	268
55-550	368	222	298

**Clamp ferrule (Tri-Clamp®) (according to DIN 32676)**



Model	$\pm 0.1$ ØA	$\pm 0.1$ ØB	$\pm 0.025$ ØC	$\pm 0.1$ F	$\pm 2$ 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«**

