



Oval Wheel Flowmeters

for clean water based mediums and
corrosive chemicals



measuring
•
monitoring
•
analysing

DOC



- Measuring range:
15 ... 500 l/h ... 3 ... 80 l/min
- Viscosity range: 0...1000 cP
- Accuracy: $\pm 0.5\%$... $\pm 1\%$ of reading
- Material: PPS
- p_{\max} : 10 bar; t_{\max} : 80 °C
- Pulse output



S4

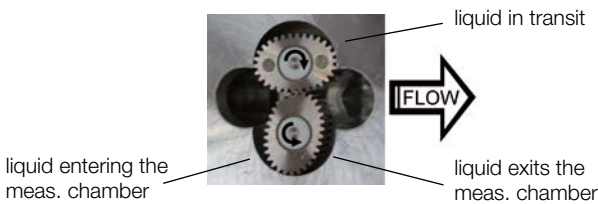
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KOBOLD Messring GmbH
Nordring 22-24
D-65719 Hofheim/Ts.
Head Office:
+49(0)6192 299-0
+49(0)6192 23398
info.de@kobold.com
www.kobold.com

Principle of Operation

The Oval Wheel meters are positive displacement flowmeters where the passage of liquid causes two oval gears to rotate within a precision measuring chamber and with each rotation a fixed volume of liquid passes through the meter. Magnets embedded within the gears initiate a high resolution pulse train output. The pulse output can be wired directly to process control and monitoring equipment or can be used as an input to instruments supplied with or fitted directly onto the meter. The flowmeter is available as a blind transmitter with pulse output capable of interfacing to most monitoring and control instrumentation or the meter can be fitted with reed switch.



This technology allows precise flow measurement and dispensing of most clean liquids regardless of their conductivity, with other liquid characteristics having no or minimal effect on meter performance. This metering technology does not require flow profile conditioning or straightline runs as required with alternative flow technologies making the installation relatively compact and low cost.

Positive displacement flowmeters are an inexpensive means to accurately meter high viscosity clean liquids as high as one thousand centipoises however, the appropriate meter must be sized so that the pressure drop across the primary measuring elements (oval rotor), does not exceed the maximum capability of either.

Areas of Application

For all clean liquids like:

- Non-aromatic/non-halogenated chemicals
- Additives
- Water based liquids
- Diesel exhaust fluid (DEF or AdBlue)
- Most fuel
- Fuel and lubricating oils

Technical Details

Material

Body:	PPS
Oval wheels:	PPS
Axes (shafts):	Hastelloy® C
Cap:	PPS
O-rings:	FFKM (DOC-515) FEP-O-seal/PTFE encapsulated (DOC-520)
Accuracy:	± 1% of reading (DOC-515) ± 0.5% of reading (DOC-520)
Repeatability:	typ. ±0.03%
Protection:	IP67
Medium temp.:	-40 °C ... +80 °C (-40 °F ... +176 °F)
Max. ambient temp.:	+80 °C
Max. pressure:	5 bar (DOC-515) 10 bar (DOC-520)
Electrical connection:	DOC-515: 1 m PVC cable DOC-520: cable entry M20x1.5

Recommended Filter

DOC-515:	<75 µm micron (200 mesh)
DOC-520:	<250 µm micron (60 mesh)

Pulse Output

Reed switch pulse output (... R0)

The reed switch output is a 2-wire normally open SPST voltage free contact ideal for installations without power.

Note: When using the reed switch output the liquid temperature must not change at a rate greater than 10 °C per minute.

Hall sensor pulse output (... H0)

In the electronic option H0, a Hall Effect sensor is combined with a reed switch output. The electrical connection is provided in 3-wire version. The output is actively switched either to +Vs or to ground. The external supply voltage is 4.5 ... 24 V_{DC}. A pull up resistor is required. The high signal is approximately equal to the supply voltage +Vs and the low signal is approximately 0 V. The electrical load may optionally be connected to the supply voltage or to GND.



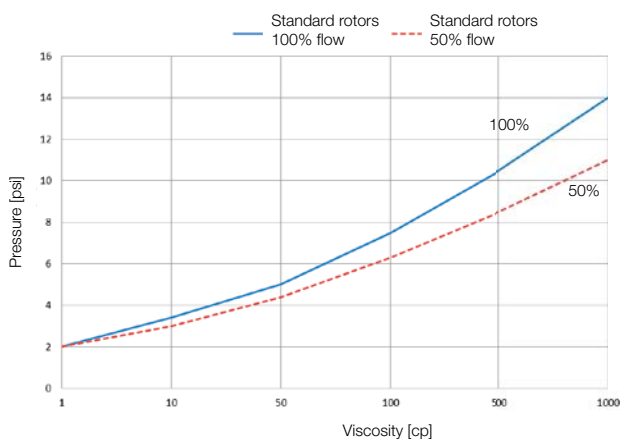
DOC-515 and DOC-520

Output signals	Standard pulse meter		2x digital (square wave)
Reed switch ¹⁾ (mechanical sensor)	Current	max.	500 mA
	Voltage	max.	30V _{DC}
	Contact rating	max. ²⁾	10 W
Hall effect ¹⁾ (electronic sensor)	Maximum current		7.5 mA
	Operating voltage		4.5 V ... 24 V _{DC}
	Transistor type		Open-Collector NPN

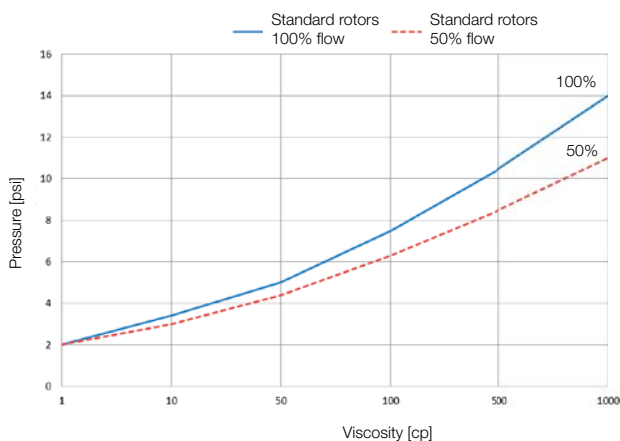
¹⁾ Voltage and current specifications apply per sensor (not combined)

²⁾ Contact rating maximum is 10 W. Neither current nor voltage maximums should be exceeded in achieving this

Pressure Drop for DOC-515...



Pressure Drop for DOC-520...



The curves above represent the pressure drop for standard oval rotors at various viscosities.

Output Pulse Resolution

Model	Measuring range	Pulse/litre
DOC-515	below 5 cp: 25-500 l/h	400
	5 ... 1000 cp: 15-500 l/h	
DOC-520	below 5 cp: 8-70 l/min	52
	5 ... 1000 cp: 3-80 l/min	



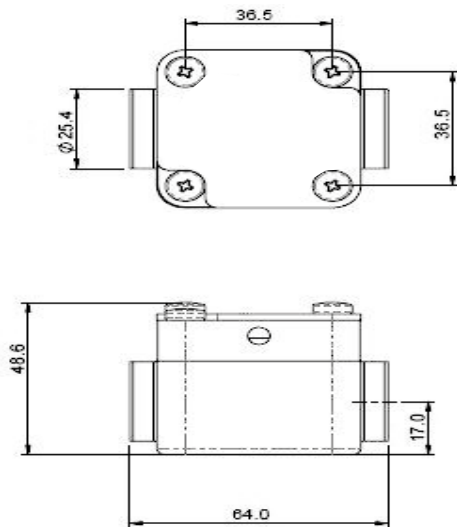
Order Details (Example: **DOC 5 15 H R2 H0 0**)

Model	Material	Range	Mech. connection	Electronic	Options
DOC-	5 = PPS	15H = 15-500 l/h	R2 = ¼ BSP N2 = ¼" NPT	H0 = Hall sensor/reed switch pulse output R0* = Reed switch pulse output	0 = without Y = special option
		20H = 3-80 l/min	R6 = 1 BSP N6 = 1" NPT		

* Should be chosen when using DOC intrinsically safe circuits as "simple apparatus"

Dimensions [mm]

DOC-515



DOC-520

