# Turbine Wheel Flow Meter / Monitor

for liquids

measuring • monitoring • analysing

## DRS



Model:
DRS-...C3

- Measuring range: 2 - 40 l/min water
- Measuring accuracy: ± 1.5 % of full scale
- $p_{max}$: 200 bar; $t_{max}$: 80 °C (optional 150 °C)
- Viscosity range: low viscous
- Connection:
  G ½ female / male thread,
  G ¾ male / male thread
  ¾" NPT male / male thread
- Material:
  PPO / PEI / brass / stainless steel
- Output:
  pulses, 0 - 20, 4 - 20 mA,
  Switching output NPN



Model:
DRS-...0
DRS-...F5...



U-PACE

IO-Link

Model: POD
(optional
electronics)

S4

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## Application

KOBOLD model DRS flow meters are used for measuring and monitoring liquids. Due to its compact construction the mini turbine is suitable for use with machines with minimum available space.



## Application Examples

Washing machines, vehicles, farm equipment, developing machines in the photographic and printed-circuit board industries.

## Working Principle

The flow meter operates on the turbine wheel principle. The liquid first flows through a laminar flow element to eliminate turbulence and to route the flow stream to the turbine wheel. The turbine wheel then starts to rotate. This rotary motion is sensed non-contacting by magnets embedded in the turbine wheel and converted to a frequency signal. The frequency is proportional to the flow velocity.

Frequency divider, analogue output or compact electronics with LED display and limit contacts are available as options. An integrated temperature sensor for simultaneous measuring of flow rate and temperature are available as an additional option. The vane is sapphire-supported: this ensures a high degree of linearity and long service life.











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## Model Summary

- **DRS-0...K000, DRS-0...S000**
  OEM version (without CE mark)
  direct output from Hall-sensor signal
  for DRS-K000 no optional temperature sensor available
  DRS-0...S000 up to 150 °C medium temperature
- **DRS-...F300**
  Pulse output
- **DRS-...F390**
  Pulse output with adapted frequency
  Factor 0.25...2
- **DRS-...L...**
  Analogue output 0(4)-20 mA / 3-wire
- **DRS-...C30...**
  With compact electronics, 3-digit LED display,
  limit contacts, no optional temperature sensor available
- **DRS-...C34...**
  With compact electronics
  3-digit LED display, limit contact, analogue output
  no optional temperature sensor available

## Technical Details

| | |
|---|---|
| Measuring range: | 2 - 40 l/min water |
| Sensor pulse output: | 384 Hz at 40 l/min<br>metal sensor (DRS-150; DRS-250)<br>352 Hz at 40 l/min<br>plastic sensor (DRS-350) |
| Max. operating pressure: | 200 bar (DRS-150; DRS-250)<br>16 bar (DRS-350) |
| Temperature: | -20 ... +80 °C (medium)<br>-20 ... +100 °C (bearing)<br>-20 ... +150 °C (medium with DRS-...S) |
| Measuring accuracy: | ±1,5% of full scale<br>±5% vom ME<br>(DRS-…K0000 / DRS-…S0000) |
| Linearity: | ±0,5% of full scale |
| Repeatability: | ±0,1% of full scale |
| Electrical connection: | plug connector M12x1<br>1,5 m cable (DRS-0 only)<br>2 m cable (DRS-...F5 only)<br>1,5 m silicone cable (DRS-...S) |
| Protection: | IP 65 (plug connector), IP 66 (cable) |

**Weight (sensor and electronics)**

| | |
|---|---|
| Sensor: | approx. 80 g (DRS-...350)<br>approx. 550 g (DRS-...150;<br>DRS-...250) |
| Electronics: | approx. 60 g (DRS-...K..; DRS-...F..;<br>DRS-...L3...)<br>approx. 100 g (DRS-...L442)<br>approx. 450 g (DRS-...Z...)<br>approx. 650 g (DRS-...C...) |

## Electrical Data

**DRS-0...K0000, DRS-...S000**

| | |
|---|---|
| Supply: | 5 ... 24 $V_{DC}$ |
| Output pulse: | rectangular pulse signal,<br>open collector NPN, max. 10 mA |

**DRS-...F300; DRS-...F500**

| | |
|---|---|
| Supply: | 12-28 $V_{DC}$ |
| Power consumption: | 10 mA |
| Pulse output: | PNP, open collector, max. 20 mA |
| Option: | Pt 100, 3-wire |

**DRS-...F390**

| | |
|---|---|
| Supply: | 24 $V_{DC}$ ± 20 % |
| Power consumption: | 15 mA |
| Pulse output: | PNP, open collector, max. 20 mA |
| Factor: | 1...1/128 set at the factory |
| Option: | Pt 100, 2-wire |
| Response time: | $t_{90}$ = 25 s (DRS-91.../-92...)<br>$t_{90}$ = 100 s (DRS-93...) |

**DRS-...L...**

| | |
|---|---|
| Supply: | 24 $V_{DC}$ ± 20 % |
| Output: | 0(4)-20 mA, 3-wire or 2-wire |
| Max. load: | 500 Ω |
| Option: | Pt 100 (2-wire) |
| Response time: | $t_{90}$ = 25 s (DRS-91.../-92...)<br>$t_{90}$ = 100 s (DRS-93...) |

**DRS-...C30...**

| | |
|---|---|
| Compact electronics | |
| Display: | 3-digit LED |
| Switching outputs: | 2 semiconductor PNP or NPN,<br>set at the factory |
| Contact operation: | N/C / N/O contact frequency<br>programmable |
| Setting: | with 2 buttons |
| Supply: | 24 $V_{DC}$ ±20%, 3-wire |
| Electrical connection: | plug connector M12x1 |

**DRS-...C34...**

| | |
|---|---|
| Compact electronics | |
| Display: | 3-digit LED |
| Analogue output: | (0)4...20 mA adjustable |
| Switching outputs: | 1 semiconductor PNP or NPN,<br>set at the factory |
| Contact operation: | N/C / N/O contact / frequency<br>programmable |
| Setting: | with 2 buttons |
| Supply: | 24 $V_{DC}$ ±20%, 3-wire |
| Power consumption: | approx. 100 mA |
| Electrical connection: | plug connector M12x1 |

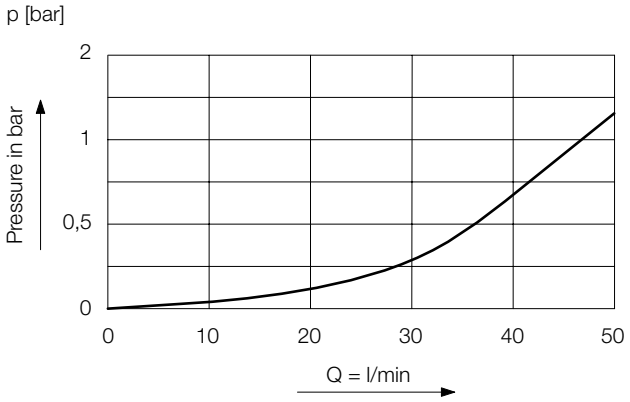


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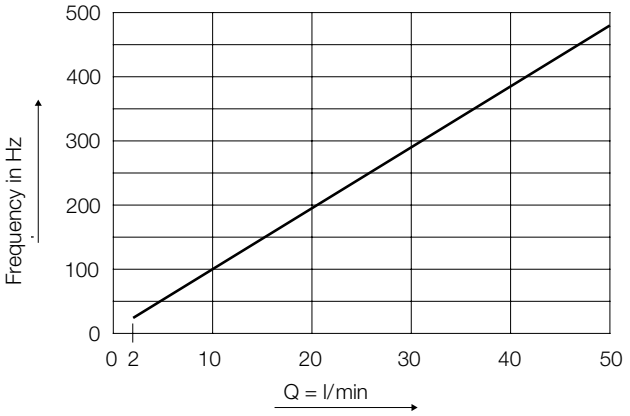
## Materials

| | |
|---|---|
| Housing: | PPO,<br>brass or stainless steel 1.4301 |
| Turbine: | PEI |
| Magnets: | ceramic |
| Axle: | hard metal |
| Bearing: | sapphire |
| Seal: | NBR (others on request)<br>FKM (DRS-0...S000) |

## Pressure loss



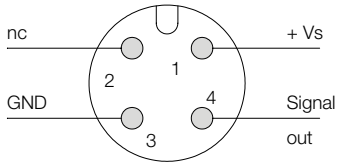

## Frequency diagram (DRS-*150, DRS-*250)




## Electrical Connection

### DRS-...F., DRS-...L3... (3-wire without Pt 100)

**Plug**

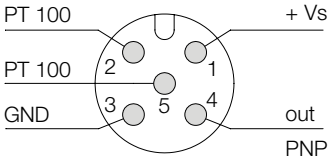



**Cable**

| | |
|---|---|
| brown: | +Vs |
| blue: | GND |
| black: | Signal |

### DRS-...F., DRS-...L3... (3-wire with Pt 100)

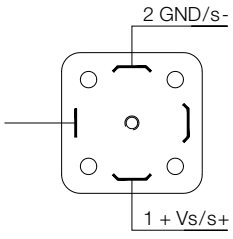
**Plug**



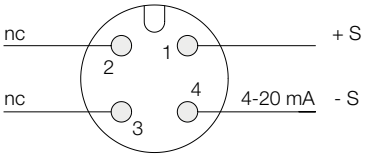

**Cable**

| | |
|---|---|
| brown: | +Vs |
| blue: | GND |
| black: | signal |
| white: | Pt 100 2-wire |
| grey: | Pt 100 2-wire |

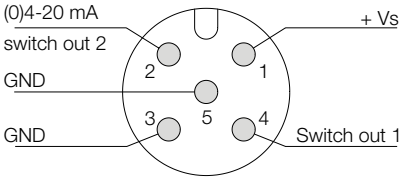
### DRS-...L442...




### DRS-...L342 (2-wire)




### DRS-...C3...






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**Order Details** (example: **DRS-9350 I4 L303 0**)

| Material sensor housing | Model | Connection | Evaluating electronics | Option |
|---|---|---|---|---|
| Brass | **DRS-9150** | **I4** = G ½ female thread<br>**G4** = G ½ female/ male thread<br>**N5** = ¾" NPT male thread<br>**G5** = G ¾ male thread | **Frequency output**<br>**F300** = plug connector M12x1, PNP<br>**F320** = plug connector M12x1, PNP, divider 1:2<br>**F340** = plug connector M12x1, PNP, divider 1:4<br>**F390** = plug connector M12x1, PNP, divider 1...$^{1}/_{128}$ adjusted<br>**F500** = 2 m PVC cable, PNP<br>**Analogue output**<br>**L303** = plug connector M12x1, 0-20 mA, 3-wire<br>**L342** = plug connector M12x1, 4-20 mA, 2-wire<br>**L343** = plug connector M12x1, 4-20 mA, 3-wire<br>**L442** = plug connector DIN 43 650, 4-20 mA, 2-wire<br>**Compact electronics**[1]<br>**C30M** = LED display, 2 x NPN switching output, plug connector M12x1<br>**C30R** = LED display, 2 x PNP switching output, plug connector M12x1<br>**C34N** = LED display, 4-20 mA, 1 NPN switching output, plug connector M12x1<br>**C34P** = LED display, 4-20 mA, 1 PNP switching output, plug connector M12x1 | **0** = without<br>**P** = Pt 100[2]<br>**Y** = special model |
| Stainless steel | **DRS-9250** | | | |
| Plastic (PPO) | **DRS-9350** | | | |

[1] Please specify flow direction in writing.
[2] For option F3/F5 and L3x3 only, brass or stainless steel version

**Plug-on Display**
for model DRS-...L442 (with 4-20 mA output and DIN plug connector)

| Description | Order number |
|---|---|
| 4-digit LED, connector DIN 43650, 2-wire, supply through analogue output | **AUF-1000** |
| as above however with additional open collector output | **AUF-1001** |



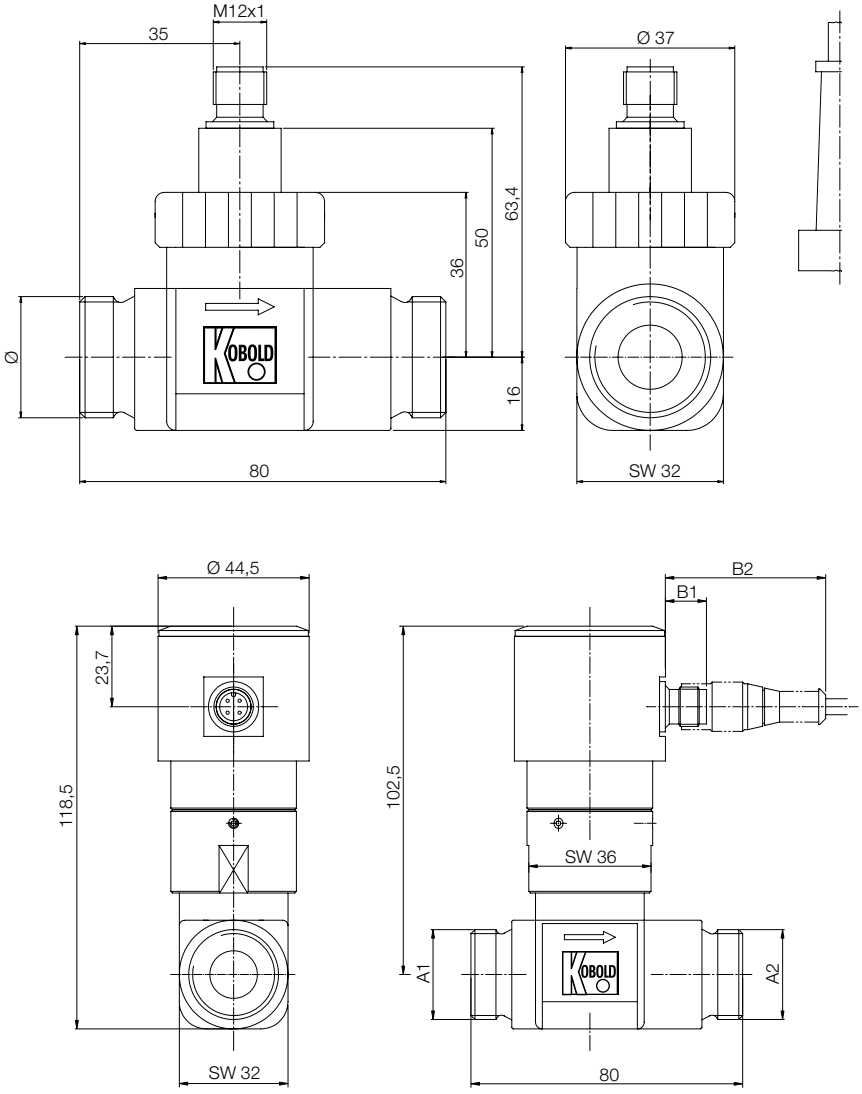
**Order Details OEM Version** (example: **DRS-0350 I4 K0000**)

| Material sensor housing | Model | Connection | Evaluating electronics |
|---|---|---|---|
| Brass | **DRS-0150** | **I4** = G ½ female thread<br>**G4** = G ½ female/male thread<br>**N5** = ¾" NPT male thread<br>**G5** = G ¾ male thread | **Frequency output**<br>**K0000** = 1.5 m PUR cable, black, NPN, OEM without CE<br>**S0000** = 1.5 m silicone cable, NPN, OEM without CE, max. 150 °C (not for DRS-0350)<br>**S000P** = 1.5 m silicone cable, NPN, OEM without CE, Pt 100, max. 150 °C (not for DRS-0350) |
| Stainless steel | **DRS-0250** | | |
| Plastic (PPO) | **DRS-0350** | | |



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**Dimensions** [mm]






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