Operating Instruction

for

Turbine-wheel Flow Meter

Model: DRS

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

Model:
DRS-...C3

1. Contents

Manufactured and sold by:

KOBOLD Instruments Inc
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2. Note

Please read and take note of these operating instructions before unpacking and putting the unit in operation and follow the instructions precisely as described herein.
The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and with the prevailing regulation applying to procedural safety and the prevention of accidents.

When used in machines, the measuring unit should be used only then when the machines fulfil the EC-machine guide lines.

PED 2014/68/EU
In acc. with Article 4 Paragraph (3), "Sound Engineering Practice", of the PED 2014/68/EU no CE mark.
Table 8, Pipe, Group 1 dangerous fluids

3. Instrument Inspection

These devices are checked before shipping and sent out in perfect condition. Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service/forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:
- Turbine-Wheel Flow Meter: Model DRS
- Operating Instructions

4. Regulation Use

The DRS is to be installed only in the specified applications. Any use of the DRS sensor which exceeds the manufacturer’s specifications may invalidate the warranty and any resulting damage is not the responsibility of the manufacturer. The user assumes all risk for such usage. The application specifications include the installation, start-up and service requirements specified by the manufacturer.

5. Operating Principle

The DRS flow meter operates on the turbine wheel principle. The liquid first flows through a laminar flow element that eliminates turbulence and routes the flow stream into 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. Various outputs, such as frequency divider, analog output or compact electronics with LED display with limit contacts are available as options. An integrated temperature sensor for simultaneous measuring of flow rate and temperature is also available as an additional option. The rotating vane is sapphire-supported: this ensures a high degree of linearity and long service life.

6. Mechanical Connection

6.1. Operational conditions check-up:

- Flow volume
- max. operational pressure
- max. operational temperature

Attention! Exceeding prescribed ranges may cause damage to ball-bearings and considerable measurement errors may result.

6.2. Mounting

- Installation can be in horizontal and vertical pipes (flow direction from bottom to top). Flow in the direction of the arrow.
- Pressure and tensile loading is to be avoided on the connection threads. Inlet and outlet piping should be secured at least 50 mm away mechanically from the connections.
- Check the sealing of the connections.
- The use of flat sealings is to be preferred. The sealing surfaces are shown in section 11 - “Dimensions“

7. Electrical Connection

7.1. General

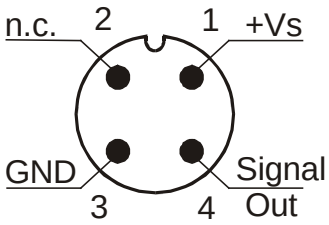
Attention! Ensure that the power ratings of your supply system are in agreement with the power ratings of the flow meter.

- Please ensure that the electric supply lines are not active.
- Wire the connection cable/plug with the supply line according to the following connection diagram.
- We recommend a cross-sectional area of 0.25 mm² for the supply line.

Attention! A false level on plug connections may cause destruction of unit's electronics.

7.2. Evaluation electronics
Frequency output without Pt100

Plug connection(..F300; ..F320; ..F340; ..F390)



Plug connection (..F500; ..F520; ..F540; ..F590; ..K000)

brown:	+ V_S
blue:	GND
Black:	Signal

...S0000

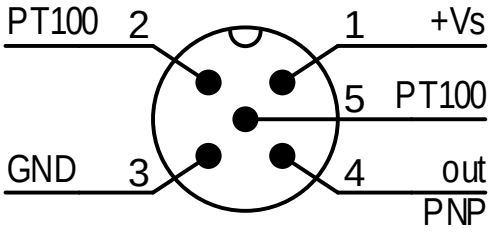
white:	+ Vs
green:	Signal
brown:	GND

...S000P

brown:	+ Vs
black:	Signal
green-yellow:	GND/PT100-1
yellow:	PT100-2

7.3. Evaluation electronics: Frequency output and Analog output with Pt100 (DRS-..P)

Plug connection (..F300P; ..F320P, ..F340P, ..F390P, ..L303P; ..L343P)

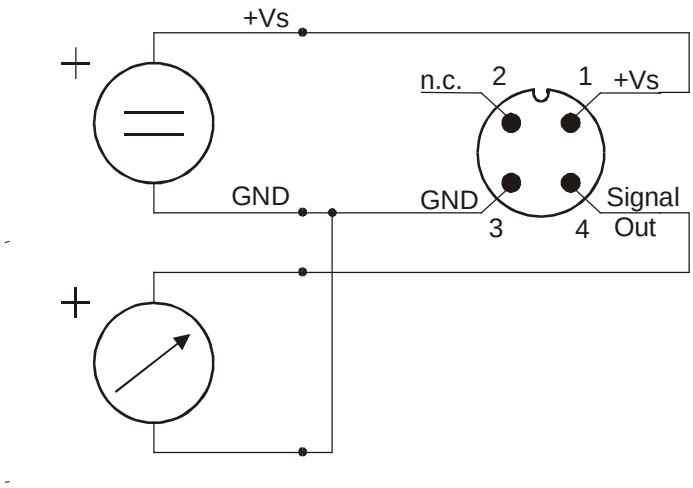


Cable connection (..F500P; ..F520P, ..F540P, F590P)

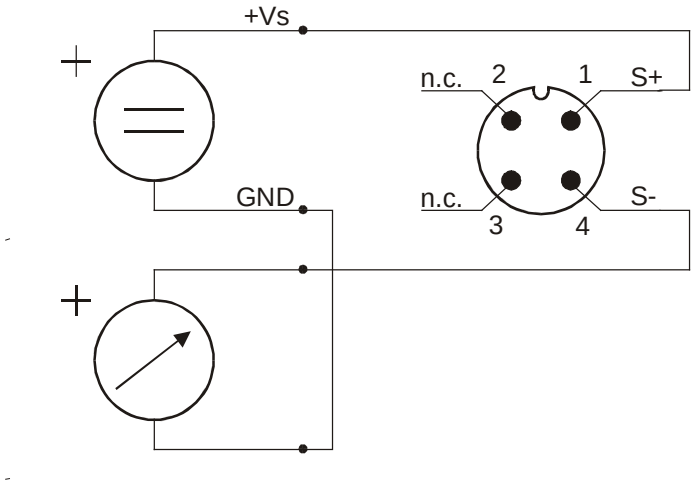
brown: +Vs
blue: GND
black: Signal
white: PT100 2-wire
grey: PT100 2-wire

7.4. Evaluation electronics: Analog output (..L..)

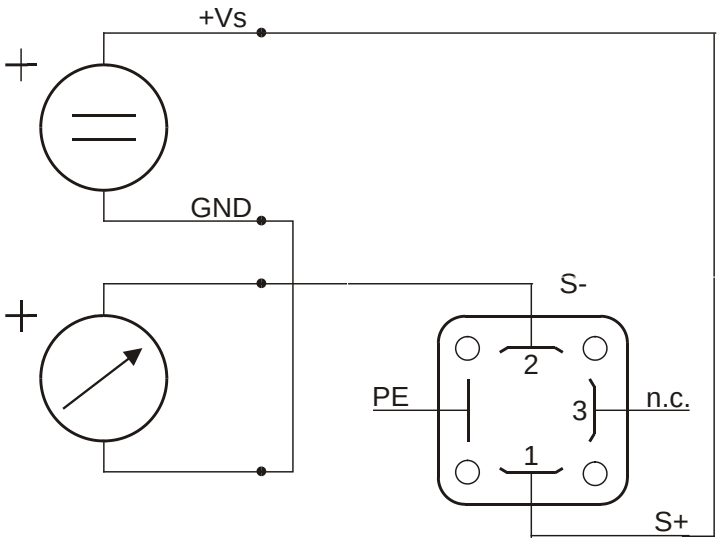
3-conductor (..L303, ..L343)



2-conductor (..L342)

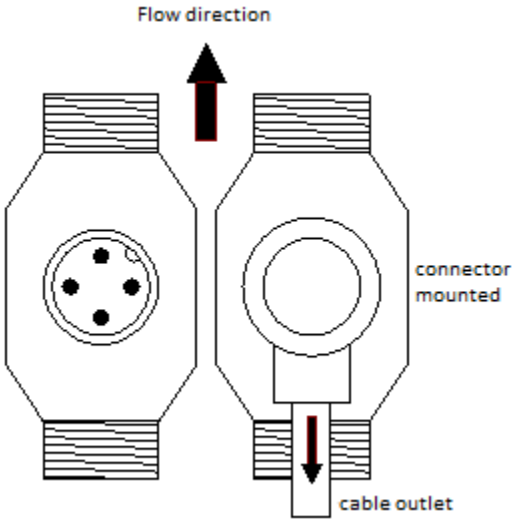


2-conductor, DIN-plug (DRS-...L442)



7.5. Cable outlet with M12x1 angle plug electronic options F3x and L3x

When using a pre-assembled M12x1 connection cable with angled plug, the cable outlet is always aligned opposite to the flow direction.



7.6. Compact electronics: (..C30R, ..C30M, ..C34P, ..C34N)

Please see
Operating Instruction Manual for compact electronics with frequency output

8. Commissioning

8.1. Frequency output

The measuring units are pre-adjusted and ready for operation after electrical connection.

8.2. Analog output

The measuring units are pre-adjusted and ready for operation after electrical connection.

8.3. Compact electronics

Please see
Operating Instruction Manual for compact electronics with frequency output

9. Maintenance

As long as the medium to be measured is not polluted, the measuring unit is maintenance-free. In order to avoid problems, we recommend installation of a filter, such as magnet filter, Model MFR.
Should cleaning be deemed necessary, the sensor must be uninstalled and rinsed thoroughly in clean water.
Work on electronics may only be carried out by the supplier, so that the product guarantee remains valid.

10. Technical information

10.1. Sensor data

Measuring range:	2-40 L/min water
Sensor pulse output:	384 Hz at 40 L/min Metal Sensor (DRS-...150; DRS-...250) 352 Hz at 40 L/min plastic sensor (DRS-...350)
Max. operating pressure:	200 bar (DRS-...150; DRS-...250) 16 bar (DRS- ...350)
Temperature:	-20 to +80 °C (medium, standard), -20...+150 °C (medium, -S00x), -20 to +100 °C (storage)
Measuring accuracy:	±1.5% of f.s. ±5 % of f.s. (DRS-0)
Linearity:	±0.5 % of f.s.
Repeatability:	±0.1 % of f.s.
Electrical connection:	plug connector M12x1 1.5 m cable (DRS-0 only) 2 m cable (DRS-...F5 only)
Protection:	IP 65 (plug connector), IP 66 (cable)

Weight (sensor and electronics)

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

10.2. Evaluation electronics

DRS-0...K000 / DRS-0...S00x

Supply:	5...28 V_{DC}
Output pulse:	rectangular pulse signal, 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, 2-wire
Response time (Pt100):	t_{90} = 100 s

DRS-...F390

Supply:	24 V_{DC} ± 20 %
Power consumption:	15 mA
Pulse output:	PNP, open collector, max. 20 mA
Frequency divider:	1...1/128, factory setting
Option:	Pt 100, 2-wire
Response time (Pt100):	t_{90} = 25 s (DRS-91…/-92…) 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 (Pt100):	t_{90} = 25 s (DRS-91…/-92…) t_{90} = 100 s (DRS-93…)

DRS-...C30...

Compact electronics	
Display:	3-digit LED
Switching outputs:	2 semiconductor PNP or NPN, factory set
Contact operation:	N/C / N/O contact frequency programmable
Setting:	with 2 buttons
Supply:	24 V_{DC} ±20%, 3-wire
Power consumption	approx. 100 mA
Electrical connection:	plug connector M12x1

DRS-...C34...

Compact electronics	
Display:	3-digit LED
Analog output:	(0)4...20 mA adjustable, max. 500 Ω
Switching outputs:	1 semiconductor PNP or NPN, factory set
Contact operation:	N/C / N/O contact frequency programmable
Setting:	with 2 buttons
Supply:	24 V_{DC} ±20%, 3-wire
Power consumption:	approx. 100 mA mA
Electrical connection:	plug connector M12x1

11. Order Codes

Order Details for Standard Versions (Example: **DRS-9180 N5 F300**)

Body Materials	Model Number	Mechanical Connection	Output / Electronics	Options
Brass	**DRS-9180..**	**..N4..** = 1/2" NPT Female **..N5..** = 3/4" NPT Male **..I4..** = G 1/2 Female **..G4..** = G 1/2 Male/Female **..G5..** = G 3/4 Male	**..F300** = PNP Frequency Output, Micro-DC Plug **..F500** = PNP Frequency Output, 6 Ft. PVC Cable **..L342** = 4-20 mA, 2-wire, Micro-DC Plug **..L343** = 4-20 mA, 3-wire, Micro-DC Plug **..L442** = 4-20 mA, 2-wire DIN 43650 Plug **..C30R**[1] = Compact Electronics 2 PNP Switch **..C34P**[1] = Compact Electronics, 4-20 mA + 1 PNP Switch	**..P** = Pt-100, 3-wire RTD (only for output options F300, F500 or L343)
Stainless Steel	**DRS-9280..**	**..N5..** = 3/4" NPT Male **..G4..** = G 1/2 Male/Female **..G5..** = G 3/4 Male		
PPO Plastic	**DRS-9380..**	**..N5..** = 3/4" NPT Male **..G4..** = G 1/2 Male/Female **..G5..** = G 3/4 Male		
Accessories: **807.037** = Mating 4 PIN Micro-DC Connector with 6 ft. Cable for Output Types F300, F500, L342, & L343 **807.007** = Mating 5 PIN Micro-DC Connector with 6 ft. Cable for Output Types C34P & C30R				

[1] Please specify flow direction in writing

Order Details: Plug-on Display (Model DRS-..L442)

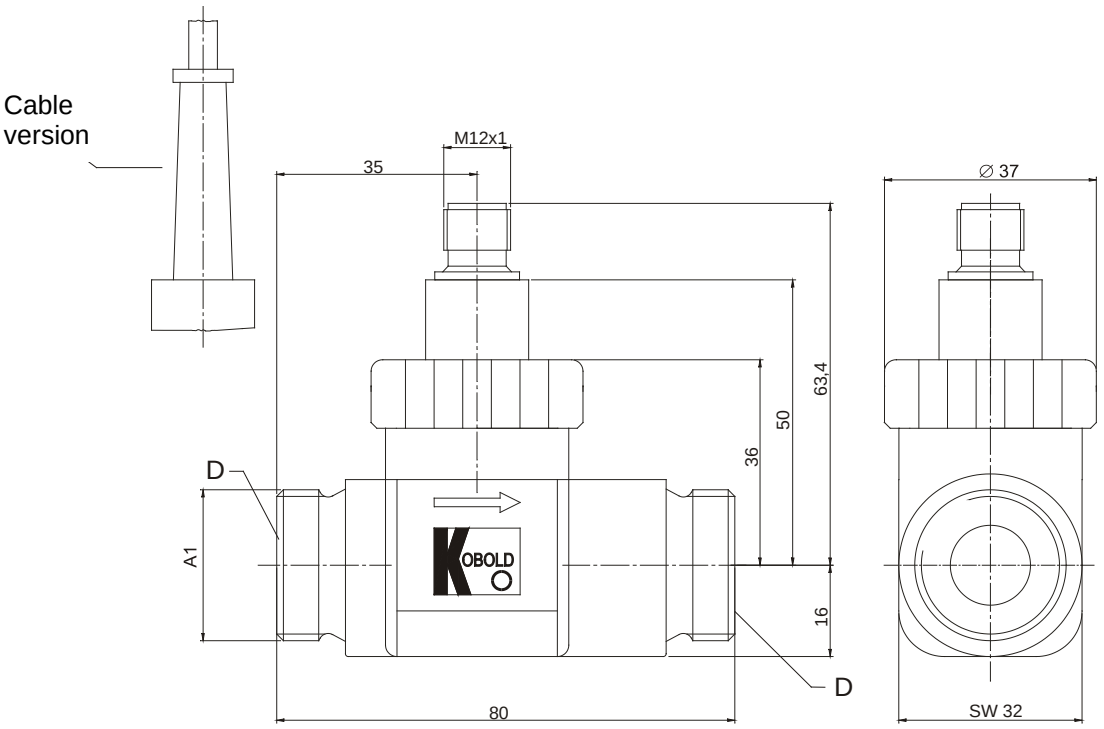
Description	Model Number
4 Digit LED DIN 43 650 Connector 2-Wire Supply Through Analog Output	**AUF-1000**
Same Specs as Above with Additional Open Collector Output	**AUF-1001**

Order Details for OEM Versions (Example: **DRS-0380 N5 K0000**)

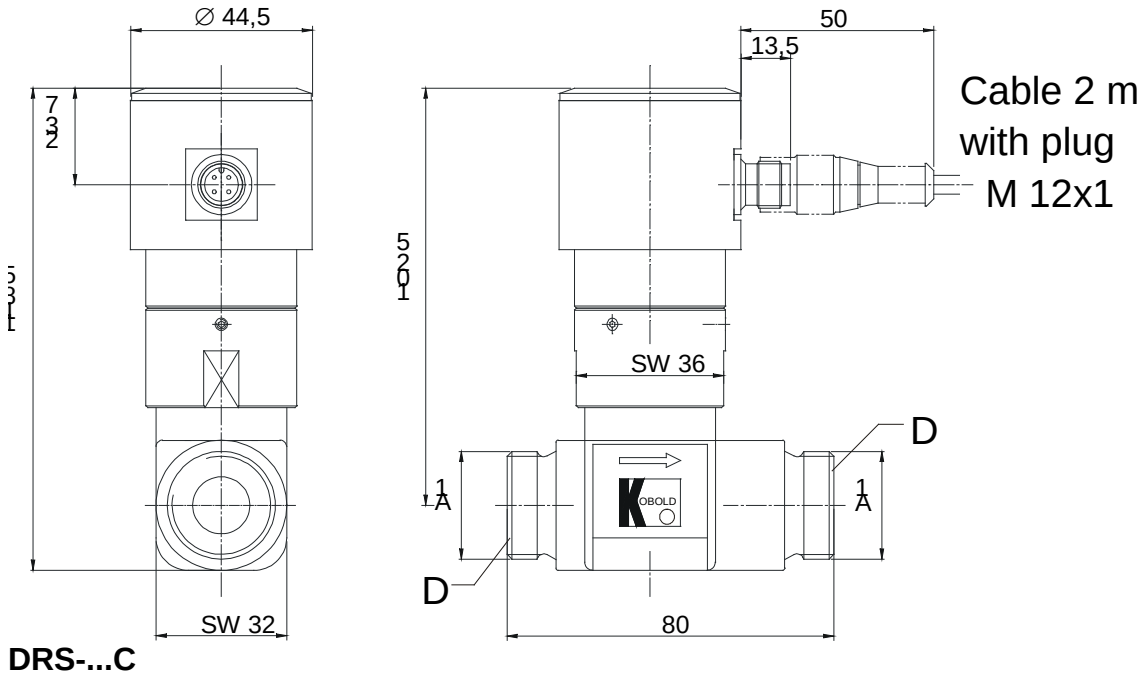
Body Materials	Model Number	Mechanical Connection	Output Type
Brass	**DRS-0180..**	**..N5..** = 3/4" NPT Male **..G4..** = G 1/2 Male/ Female **..G5..** = G 3/4 Male	**..K0000** = NPN Frequency Output, 5 ft. PUR Cable, Black, without CE **..S0000** = 1.5 m Silicone Cable, NPN, OEM without CE, Max 300 °F (not for DRS-0380) **..S000P** = 1.5 m Silicone Cable, NPN, OEM without CE, Pt 100, Max 300 °F (not for DRS-0380)
Stainless Steel	**DRS-0280..**		
PPO Plastic	**DRS-0380..**		

12. Dimensions

Connection threads: female/female; male/male and female/male with the same outer dimensions.



DRS-...F/...L



DRS-...C

D = Sealing areas

13. EU Declaration of Conformance

We, KOBOLD-Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Turbine-wheel Flow Meter Model: DRS

to which this declaration relates is in conformity with the standards noted below:

EN 61000-6-4:2011
Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

EN 61000-6-2:2005
Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments

EN 61010-1:2020
Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements

EN 60529:2014
Degrees of protection provided by enclosures (IP Code)

EN IEC 63000:2018
Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Also, the following EC guidelines are fulfilled:

2014/30/EU	**EMC Directive**
2011/65/EU	**RoHS** (category 9)
2015/863/EU	Delegated Directive (RoHS III)

Hofheim, 24 May 2021

H. Volz
General Manager

M. Wenzel
Proxy Holder

14. UK Declaration of Conformity

We, KOBOLD Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Turbine-wheel Flow Meter **model: DRS -...**

to which this declaration relates is in conformity with the standards noted below:

BS EN 61000-6-4:2007+A1:2011
Electromagnetic compatibility (EMC). Generic standards. Emission standard for industrial environments

BS EN 61000-6-2:2005
Electromagnetic compatibility (EMC). Generic standards. Immunity for industrial environments

BS EN 61010-1:2010+A1:2019
Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements

BS EN 60529:1992+A2:2013
Degrees of protection provided by enclosures (IP Code)

BS EN IEC 63000:2018
Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.

Also, the following UK guidelines are fulfilled:

S.I. 2016/1091	**Electromagnetic Compatibility Regulations 2016**
S.I. 2012/3032	The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

Hofheim, 24 May 2021

H. Volz
General Manager

M. Wenzel
Proxy Holder