



**Operating Instruction
for
Turbine-wheel Flow Meter**

Model: DRS



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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 3 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 a frequency divider, analogue 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

- Direction of flow must match the direction of arrow (position independent).
- 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.

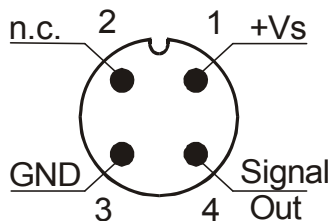


Attention! A false level on plug connections may cause destruction of unit's electronics.

7.2. Evaluation electronics

Frequency output without Pt100

Plug connection(..F3000; ..F3200; ..F3400; ..F3900)



Plug connection (..F5000; ..F5200; ..F5400; ..F5900; ..K0000)

brown: + V_s
 blue: GND
 Black: Signal

...S000

white: + V_s
 green: Signal
 brown: GND

...S00P

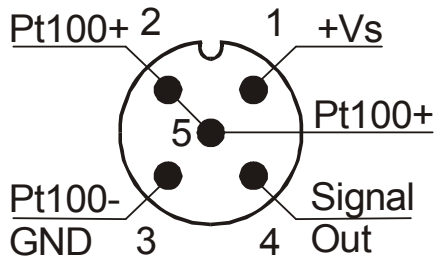
brown: + V_s
 black: Signal
 green-yellow: GND/PT100-1
 yellow: PT100-2

7.3. Evaluation electronics:

Frequency output and analogue output with Pt100 (DRS-..P)

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

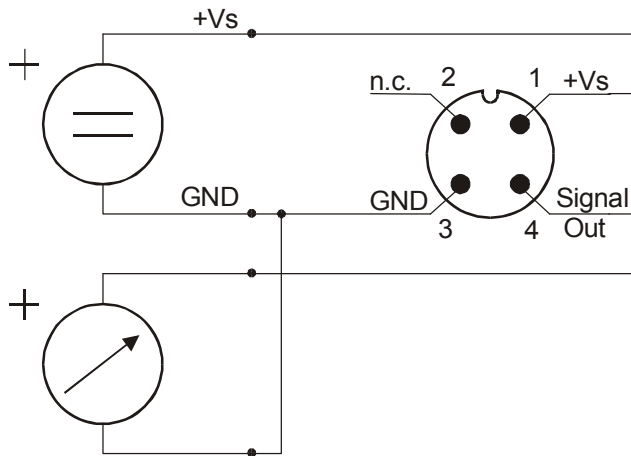
Cable connection (..F500P;
..F520P, ..F540P, F590P)



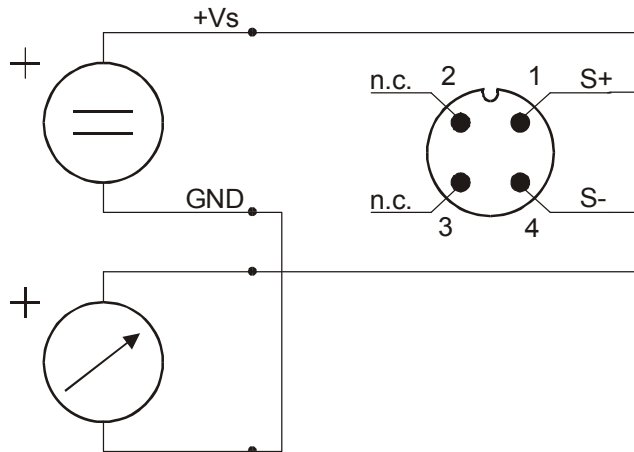
brown: +Vs
blue: GND / Pt100
black: Signal
white: PT100 2-wire
grey: PT100 3-wire

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

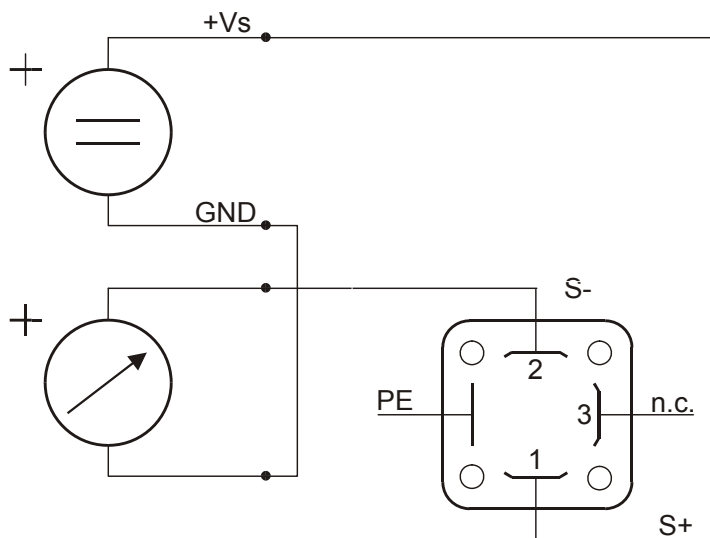
3-conductor (..L303, ..L343)



2-conductor (..L342)



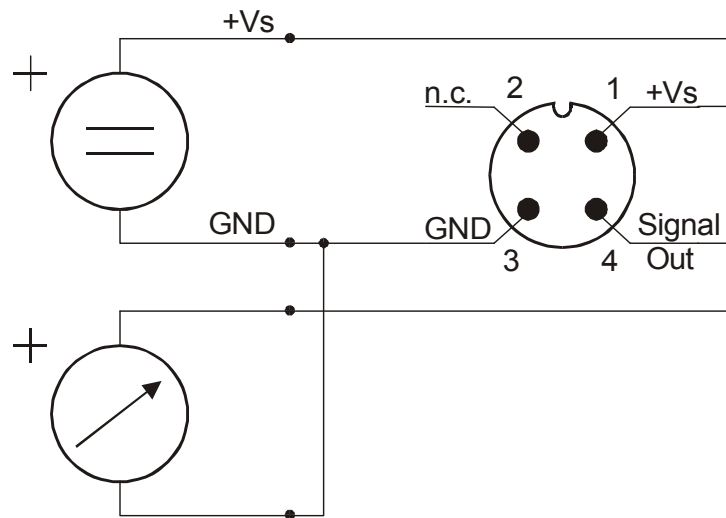
2-conductor, DIN-plug (DRS-...L442)



**7.5. Compact electronics:
(..C30R, ..C30M, ..C34P, ..C34N)**

Please see
Operating Instruction Manual for compact electronics with frequency output

7.6. Evaluation electronics: Pointer display (..Z300, ..Z340)



Caution! In case current output is not needed, PIN 4 (Signal OUT) is to be permanently connected with Ground (GND) (short circuit jumper).

8. Commissioning

8.1. Frequency output

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

8.2. Analogue output

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

8.3. Pointer display (..Z300, ..Z340)

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

8.4. 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 guaranty 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, 3-wire

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, 3-wire

DRS-...L...

Supply: 24 V_{DC} ± 20%
Output: 0(4)-20 mA, 3-wire or 2-wire
Max. load: 500 Ω
Option: Pt 100 (3-wire only)

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
Analogue 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

DRS-...Z...

Pointer indicator with analogue output
Housing: aluminum
Display: moving-coil instrument, 240 ° display
Power supply: 24 V_{DC} ±20%
Output: 0-20 mA or 4-20 mA, 3-wire
Max. load: 250 Ω
Electrical connection: plug connector M12x1

11. Order Codes

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

Material sensor housing	Model	Connection	Evaluating electronics	Option
			Frequency output F300 = Plug connector M12x1, PNP F320 = Plug connector M12x1, PNP, divider 1:2 F340 = Plug connector M12x1, PNP, divider 1:4 F390 = Plug connector M12x1, PNP, divider 1... ¹ /128 F500 = 2 m PVC cable, PNP Analogue output L303 = Plug connector M12x1, 0 - 20 mA, 3-wire L342 = Plug connector M12x1, 4 - 20 mA, 2-wire L343 = Plug connector M12x1, 4 - 20 mA, 3-wire L442 = Plug connector DIN 43 650, 4 - 20 mA, 2-wire	
Brass	DRS-9150	14 = G 1/2 female thread		0 = without P = Pt 100 ²⁾ Y = Special model
Stainless steel	DRS-9250	G4 = G 1/2 female/male thread		
Plastic (Noryl)	DRS-9350	G5 = G 3/4 male thread	Compact electronics¹⁾ C30M = LED display, 2 x NPN switching output, Plug connector M12x1 C30R = LED display, 2 x NPN switching output, Plug connector M12x1 C34N = LED display, 4 - 20 mA, 1 NPN switching output, Plug connector M12x1 C34P = LED display, 4 - 20 mA, 1 PNP switching output, Plug connector M12x1	
		N5 = 3/4 NPT male thread	Pointer indication, 240^{*1)} Z300 = Pointer indication, 0 - 20 mA, Plug con. M12x1 Z340 = Pointer indication, 4 - 20 mA, Plug con. M12x1	

¹⁾ Please specify flow direction in writing.

²⁾ for PNP frequency output and 3-wire analogue output only

Plug-on display

For model DRS-...L442 (with 4-20 mA output and DIN plug connector)

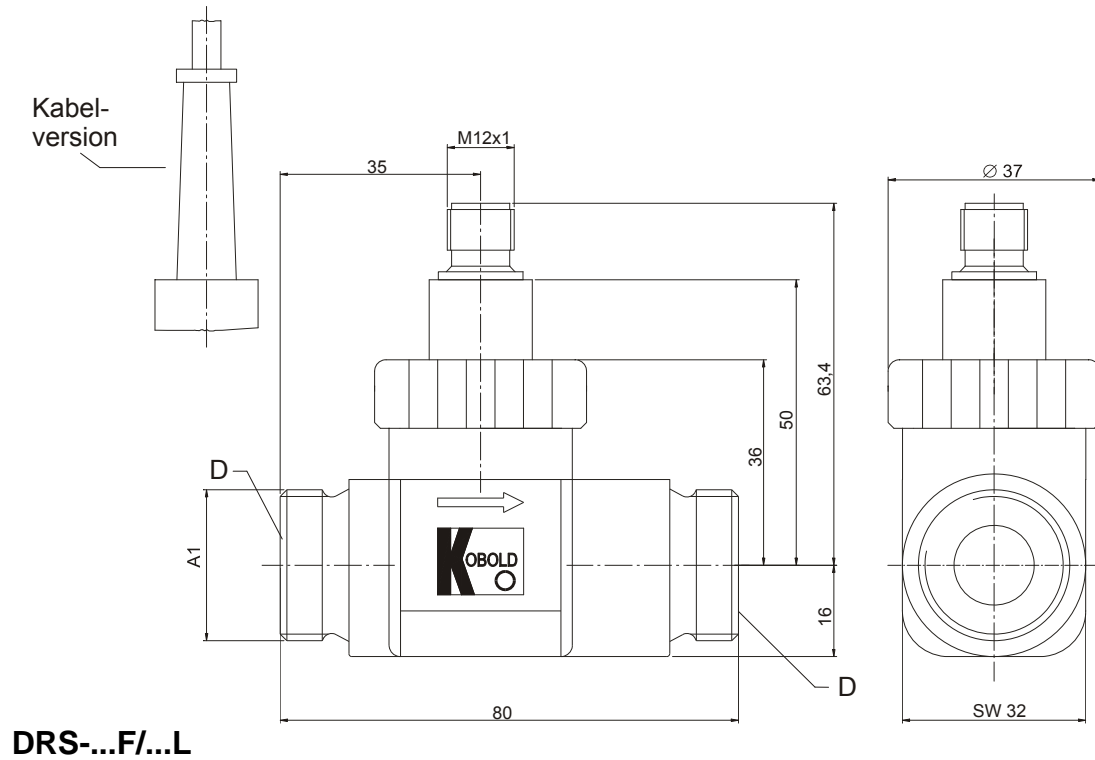
Description	Order number
4-digit LED, connector DIN 43650, 2-wire, supply through analogue output	AUF-1000
as above however with additional open collector output	AUF-1001

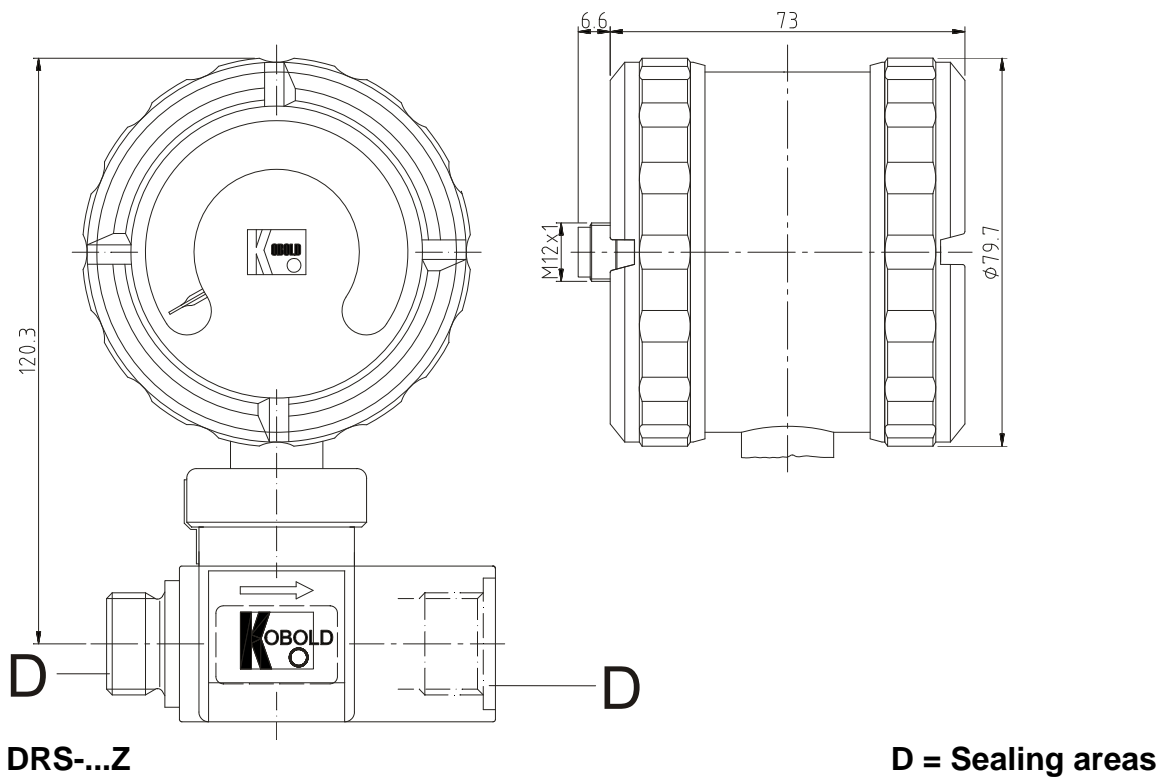
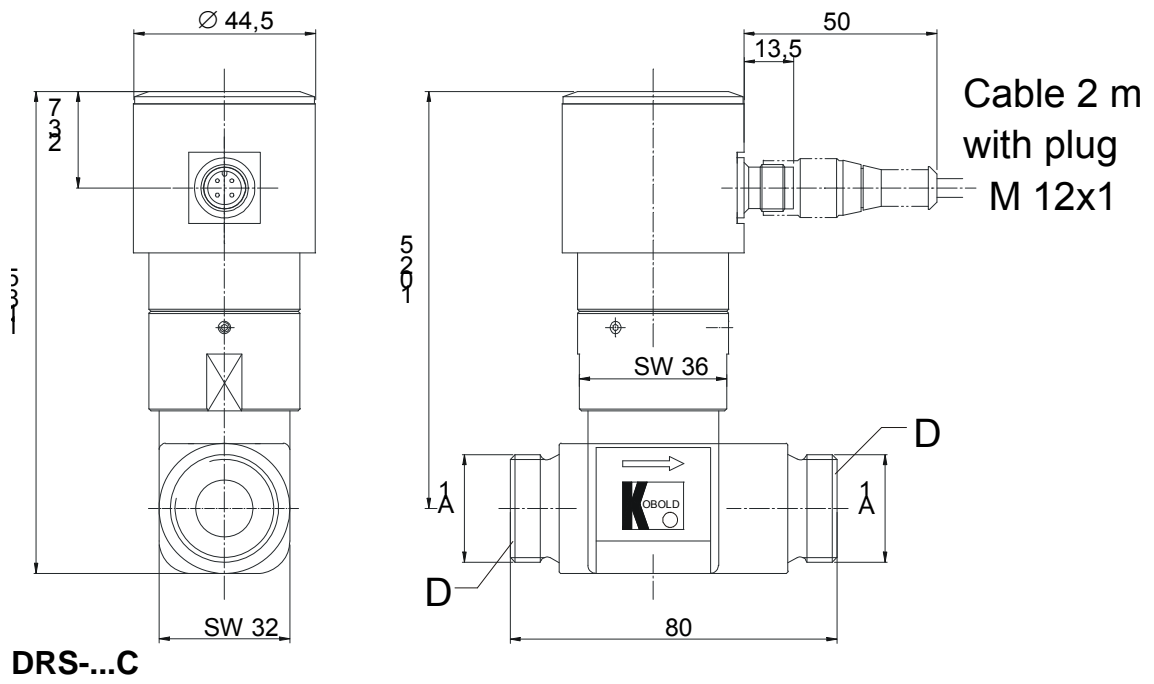
Order details OEM version example: DRS-0350 I4 K0000)

Material sensor housing	Model	Connection	Evaluating electronics
Brass	DRS-0150	I4 = G 1/2 female thread	Frequency output K0000 = 1.5 m PVC cable, NPN, OEM without CE S000 = 1.5 m Silicone cable, NPN, OEM without CE S00P = 1.5 m Silicone cable, NPN, PT100, OEM without CE (Version S00x not available for DRS-0350)
Stainless steel	DRS-0250	G4 = G 1/2 female/male thread	
Plastic (Noryl)	DRS-0350	G5 = G 3/4 male thread N5 = 3/4 NPT male thread	

12. Dimensions

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





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 61000-6-2:2011

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

EN 61010-1:2011

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)

Also the following EC guidelines are fulfilled:

2004/108/EC

EMC Directive

2011/65/EU

RoHS (category 9) industrial monitoring and control instruments, compliant, no CE-marking for the transitional period until 2017

Category II, Table 8, pipe, Group 1 dangerous fluids

Module D, mark CE0098

notified body: Germanischer Lloyd Germany



H. Peters
General Manager



M. Wenzel
Proxy Holder

Hofheim, 07. Apr. 2016