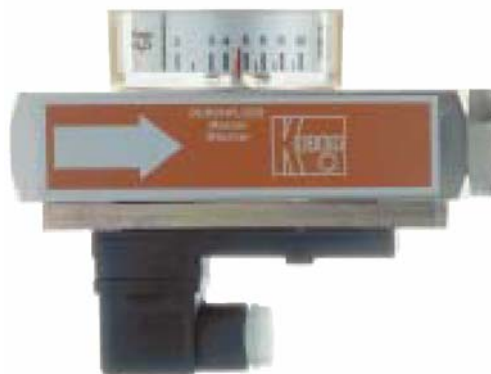


**Operating Instruction  
for  
Flow Meter / Monitor**

**Model: SMO-...  
SMW-...**



## 1. Contents

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## **2. Note**

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Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.

The instruction manuals on our website [www.kobold.com](http://www.kobold.com) are always for currently manufactured version of our products. Due to technical changes, the instruction manuals available online may not always correspond to the product version you have purchased. If you need an instruction manual that corresponds to the purchased product version, you can request it from us free of charge by email ([info.de@kobold.com](mailto:info.de@kobold.com)) in PDF format, specifying the relevant invoice number and serial number. If you wish, the operating instructions can also be sent to you by post in paper form against an applicable postage fee.

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

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

### **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**

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Instruments are inspected 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:**

#### **The standard delivery includes:**

- Flow Meter / Monitor, model SMW-, SMO-

## 4. Regulation Use

---

Any use of the Flow Meter / Monitor, which exceeds the manufacturer's specifications, may invalidate its warranty. Therefore, any resulting damage is not the responsibility of the manufacturer. The user assumes all risk for such usage.

The Flow Meter / Monitor, model: SMW/SMO, is used for measuring and monitoring liquid flow. Only clean, low viscosity and homogeneous media may be measured, which do not affect the materials used in the instrument casing. Large measuring errors will occur when using high viscosity media. Large dirt particles may lead to blocking of the float and therefore large measurement and signal errors. Ferritic particles that deposit on the float body (with internal magnet) may also lead to a similar effect. Therefore, we recommend a magnet filter.

The instruments are provided as follows:

### **Flow measurement**

The actual flow may be read locally off the instrument indication, which is mounted at the side of the housing. The scale shows the flow rate directly in litres per minute of water.

### **Limit Value Contacts (not for model SMW-2.. and SMO-2..)**

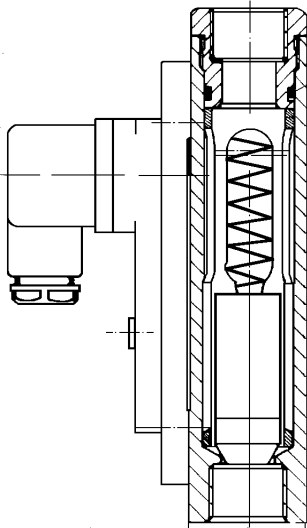
For the monitoring of the flow rate, the instruments may be fitted with one or two adjustable limit value contacts (reed contacts).

### **Contact versions:**

- N/O contact (standard)
- Changeover contact (standard)
- N/O (cCSAus)
- Changeover (cCSAus)

The contact is adjustable over the entire measuring range. Hysteresis should however be taken into account.

## 5. Operating Principle



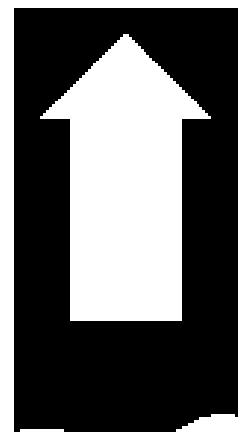
The Flow Meters / Monitors, model: SMW, SMO, are based on the principle of the well-known float type Flow Meters, however without making use of conventional measuring pipe that extends conically upwards. These patented instruments are provided instead with a cylindrical guide-tube with conical slots along the periphery. A float is found in this tube which, by means of the flow of the medium, is raised in the tube against a force of a spring. Each float position corresponds to a certain flow which can be read off by means of an indicator, external to the medium.

Permanent magnets are inserted in the float which activates reed switches mounted outside of the flow throughput. The activation of the contact is carried out by means of magnetic field, i.e. the contact is hermetically separated from the flowing medium.

## 6. Mechanical Connection

### Before installation:

- Please ascertain that the allowable maximum operating pressure and operating temperature of the instruments are not exceeded
- The instrument should be installed in a vertical (model SMO-...) or horizontal (model SMW-...) position in the piping. The flow direction is according to the arrow direction - from top to bottom (model SMO-...), or left to right / right to left (model SMW-...).
- Remove all transport locks and ascertain that no packing material is left within the instrument.
- Sealing of the connection threads should be carried out with Teflon tape or similar.
- Do not install the instrument within an induction field.
- If possible, check whether the connection joints/pipe link is fully sealed, immediately after mechanical installation (see 8. Commissioning).

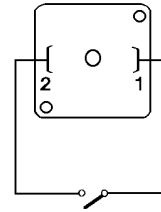


## 7. Electrical Connection

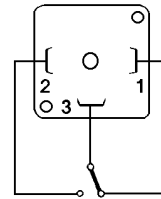
### 7.1. with Plug Connection (not for SMO-2..and SMW-2)

- Ensure that the power is disconnected while connections are made.
- Loosen the holding screw on the plug cap and remove the cap from the plug.
- Connect the power cable to the plug cap in accordance with the connection diagram below.
- If the contact has as yet not been adjusted, this should be carried out at this stage (see 8. Commissioning).
- Push the plug over contact foot and secure it with the holding screw.

N/O contact



Changeover contact

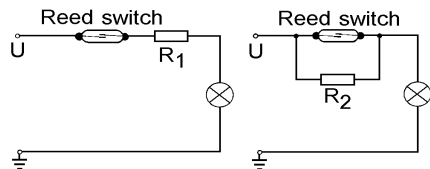


**Attention! The given electrical values of the reed contacts shall not be exceeded even for short periods of time. For higher switching values, we recommend contact protection relays or other contact protection measures.**

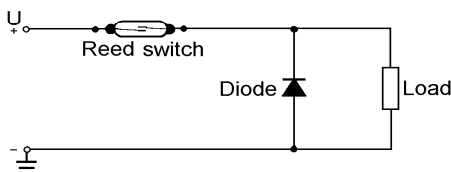
- After connection of the required external equipment to the limit contacts and adjustment of the desired switching points, all the connection work is finished.
- The unit may now be set in operation.

### 7.2. Examples for Contact Protection Measures

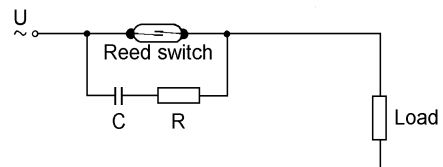
For capacitive and inductive loads (long wires and relays/switch) we recommend the following protective circuit:



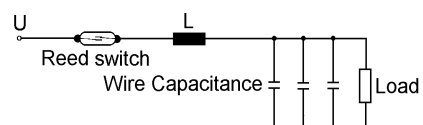
Lamp load with parallel or series resistance to the switch.



Protection with an idle diode for d.c. current and inductive load.



Protection with an RC circuit for a.c. current and inductive load.



Protection against high discharge from condensers and loadcapacitances.

## 8. Commissioning

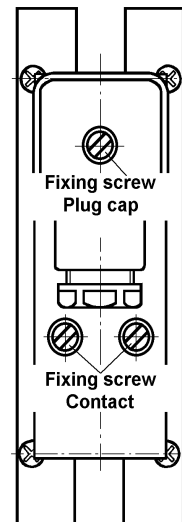
With reference to employment of these instruments in machines, according to the guidelines 89/392/EWG, commissioning is prohibited unless it is established that the machine complies with the respective guidelines.

### Adjustment of limit values (Model SMO-3... and SMW-3... with display and contact)

- Loosen both the safety screws on contact-foot with the help of a screw driver.
- Push the switch-housing downwards.
- Remove the plug-cap from contact-foot, after loosening the safety screws.
- Connect on pin 1 + 2 (changeover contact PIN 2 + 3) a suitable conductivity testing device.



**Attention! Sudden opening of inflow can lead to pressure peaks, which overstep the operational pressure many times. Water hammer! This can cause the breakage of measuring glass.**



#### Case 1: with installed unit

Open the inlet pipe. Let the medium flow through it slowly, till the pointer display shows the flow volume of desired switching point.

#### Case 2: with not installed unit

Lift up the float with a suitable tool, till the pointer display shows flow volume of desired switching point.

- The reed contact is now closed (electrical conductivity).
- Push the switch-housing upwards, till the reed contact just opens (No electrical conduction). The contact is now set for falling flow. If the contact is to be adjusted for the rising flow, the contact must be repositioned based on hysteresis, i.e. 3-5 mm downwards.
- In this position tighten the safety screws. Replace the plug cap. The unit is now ready for operation.
- With correct adjustment of limit-switch, bistable operation is achieved, that means on surpassing the adjusted limit value the contact closes, and when falling below the adjusted limit value, the contact open.

## Adjustment of limit value (model SMO-1..., SMW-1...)

- Loosen the safety screws on contact-foot.
- Set the adjustment notch on contact-foot at the desired value on the scale mounted on the housing.
- In this position, tighten the safety screws.

## Hysteresis

Hysteresis indicates the difference between switch-on and switch-off points of contacts. Through factory set coordination of magnet and contact force (AW-number) a float upstroke (hysteresis) of approx. 3-5 mm is achieved. At the same time, it is ensured that the contact operates in a bistable manner.

## Measuring range transgressions



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**Attention! Pulsating flow currents should be avoided. Overstepping of measuring range continuously by pulsating flow currents and subsequently resulting impacts on float's limit pin may lead to increased wear and tear as well as damage to the unit. In such cases, please consult your supplier.**

---

With continuous flow, if the measuring range is substantially over-ranged, an increase in pressure loss is noticed.  
(Permissible max. operational pressure must not be exceeded)

## 9. Maintenance

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For measured media without contamination, the instrument is almost maintenance-free. Where contamination or calcium or other deposits are found on the internal parts, the instrument should be cleaned regularly.

The instrument may be dismantled from the piping with the help of a suitable spanner. The internal parts are accessible for cleaning after removing the upper connection joint.

The internal parts may be cleaned with a suitable brush. After cleaning, the instrument should be reassembled in the correct order.

We recommend changing the O-rings of the connection joints after cleaning.



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**Attention! Make sure before beginning the maintenance that the supply wires are de-energized.**

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## 10. Technical Information

Housing/Connections/Float:	SMx-x1...:Brass, Ms 58 SMx-x2...:St. Steel,1.4301
Slotted nozzle:	SMx-x1...:Brass, Ms 58 SMx-x1...:St. Steel, 1.3955
Sealings:	SMx-x1...:NBR SMx-x2...:FPM
Max. temperature:	100 °C
Max. operating pressure:	SMx-x1...:250 bar SMx-x2...:350 bar
Mounting position	SMW: horizontal SMO: vertical, flow from top
Accuracy:	± 5 % of f.s.
Reproducibility	1 %

### **Contacts: for SMW-1..., SMW-3..., SMO-1 and SMO-3...**

Electrical connection: Plug DIN EN 175301-803

#### Electrical switching specifications:

N/O contact (standard) max. 250 V<sub>AC/DC</sub> / 1,5 A / 100 W / 100 VA

Changeover contact (standard) max. 250 V<sub>AC/DC</sub> / 1A / 30 W / 60 VA

N/O contact and

changeover contact (cCSAus) 230 V<sub>DC</sub> / 0,26 A / 60 W,  
60 V<sub>DC</sub> / 1 A / 60 W,  
max. 240 V<sub>AC</sub> / 0,42 A / 100 W,  
100 V<sub>AC</sub> / 1 A / 100 W

Protection: IP 65 (electrical contact)  
IP 54 (side indication)

#### Average electrical switch contact life (MTTF):

At max. electrical load	10 <sup>5</sup> switching cycles
At half electrical load (<10% max. load)	5*10 <sup>7</sup> switching cycles
At low electrical load (<10V/<1mA)	10 <sup>8</sup> switching cycles

## 11. Order Codes

### Flow switches with 1 contact, flow from top model: SMO-1...

(Example: SMO-1101H R0 R08)

Measuring range l/min. water	Pressure loss $\Delta P$ (bar)	Brass	Stainless steel	Contact	Connection	
					..R08 = G 1/4 ..R15 = G 1/2	..N08 = 1/4 NPT ..N15 = 1/2 NPT
0.2...3	0.2	SMO-1101H...	SMO-1201H..	...R0... = 1 N/O contact	..R08 = G 1/4 ..R15 = G 1/2	..N08 = 1/4 NPT ..N15 = 1/2 NPT
1...4.5	0.2	SMO-1103H...	SMO-1203H...	...U0... = 1 Changeover contact		
1...7.5	0.3	SMO-1105H...	SMO-1205H...	...C0... = 1 N/O contact (cCSAus)	..R15 = G 1/2	..N15 = 1/2 NPT
1...14	0.4	SMO-1107H...	SMO-1207H...	...D0... = 1 Changeover contact (cCSAus)		
2...18	0.2	SMO-1109H...	SMO-1209H...	...RR... = 2 N/O contact	..R15 = G 1/2	..N15 = 1/2 NPT
7...25	0.4	SMO-1111H...	SMO-1211H...	...UU... = 2 Changeover contact		
10...60	0.7	SMO-1113H...	SMO-1213H...	...CC... = 2 N/O contact (cCSAus)	..R20 = G 3/4 ..R25 = G 1	..N20 = 3/4 NPT
10...80	0.5	SMO-1115H...	SMO-1215H...	...DD... = 2 changeover contact (cCSAus)		
10...120	0.5	SMO-1117H...	SMO-1217H...			

### Flow meter, flow from top model: SMO-2...

(Example: SMO-2107H 00R08)

Measuring range l/min. water	Pressure Loss $\Delta P$ (bar)	Brass	Stainless steel	Contact	Connection	
					..R08 = G 1/4 ..R15 = G 1/2	..N08 = 1/4 NPT ..N15 = 1/2 NPT
0.2...3	0.2	SMO-2101H...	SMO-2201H..	...00... = without contact	..R08 = G 1/4 ..R15 = G 1/2	..N08 = 1/4 NPT ..N15 = 1/2 NPT
1...4.5	0.2	SMO-2103H...	SMO-2203H...			
1...7.5	0.3	SMO-2105H...	SMO-2205H...		..R15 = G 1/2	..N15 = 1/2 NPT
1...14	0.4	SMO-2107H...	SMO-2207H...			
2...18	0.2	SMO-2109H...	SMO-2209H...		..R20 = G 3/4 ..R25 = G 1	..N20 = 3/4 NPT ..N25 = 1 NPT
7...25	0.4	SMO-2111H...	SMO-2211H...			
10...60	0.7	SMO-2113H...	SMO-2213H...			
10...80	0.5	SMO-2115H...	SMO-2215H...			
10...120	0.5	SMO-2117H...	SMO-2217H...			

### Flow meters and switches with 1 contact, flow from top model: SMO-3...

(Example: SMO-3101H R0 R08)

Measuring range l/min. water	Pressure loss $\Delta P$ (bar)	Brass	Stainless Steel	Contact	Connection	
					..R08 = G 1/4 ..R15 = G 1/2	..N08 = 1/4 NPT ..N15 = 1/2 NPT
0.2...3	0.2	SMO-3101H...	SMO-3201H..	...R0... = 1 N/O contact	..R08 = G 1/4 ..R15 = G 1/2	..N08 = 1/4 NPT ..N15 = 1/2 NPT
1...4.5	0.2	SMO-3103H...	SMO-3203H...	...U0... = 1 Changeover contact		
1...7.5	0.3	SMO-3105H...	SMO-3205H...	...C0... = 1 N/O contact (cCSAus)	..R15 = G 1/2	..N15 = 1/2 NPT
1...14	0.4	SMO-3107H...	SMO-3207H...	...D0... = 1 Changeover contact (cCSAus)		
2...18	0.2	SMO-3109H...	SMO-3209H...	...RR... = 2 N/O contact	..R15 = G 1/2	..N15 = 1/2 NPT
7...25	0.4	SMO-3111H...	SMO-3211H...	...UU... = 2 Changeover contact		
10...60	0.7	SMO-3113H...	SMO-3213H...	...CC... = 2 N/O contact (cCSAus)	..R20 = G 3/4 ..R25 = G 1	..N20 = 3/4 NPT ..N25 = 1 NPT
10...80	0.5	SMO-3115H...	SMO-3215H...	...DD... = 2 changeover contact (cCSAus)		
10...120	0.5	SMO-3117H...	SMO-3217H...			

## Flow switches with 1 contact, horizontal flow model: SMW-1...

(Example: SMW-1101H LR0 R08)

Measuring range l/min. water	Pressure loss $\Delta P$ (bar)	Brass	Stainless Steel	Direction of flow	Contact	Connection	
0.5...3.5	0.2	SMW-1101H...	SMW-1201H...	..L = from left ..R = from right	...R0...= 1 N/O contact ...U0...= 1 Changeover contact ...C0...= 1 N/O contact (cCSAus) ...D0...= 1 Changeover contact (cCSAus) ...RR...= 2 N/O contact ...UU...= 2 Changeover contact ...CC...= 2 N/O contact (cCSAus) ...DD...= 2 changeover contact (cCSAus)	..R08= G 1/4 ..R15= G 1/2	..N08= 1/4 NPT ..N15= 1/2 NPT
2...9	0.4	SMW-1103H...	SMW-1203H...				
2.5...15	0.5	SMW-1105H...	SMW-1205H...				
3.5...24	0.3	SMW-1107H...	SMW-1207H...				
10...60	0.7	SMW-1109H...	SMW-1209H...			..R15= G 1/2	..N15= 1/2 NPT
5...90	0.6	SMW-1111H...	SMW-1211H...			..R20= G 3/4	..N20= 3/4 NPT
10...120	0.6	SMW-1113H...	SMW-1213H...			..R25= G 1	..N25= 1 NPT

## Flow meter, horizontal flow model: SMW-2...

(Example: SMW-2101H L00 R08)

Measuring range l/min. water	Pressure loss $\Delta P$ (bar)	Brass	Stainless Steel	Direction of flow	Contact	Connection	
0.5...3.5	0.2	SMW-2101H...	SMW-2201H...	..L = from left ..R = from right	...00...= without contact	..R08= G 1/4 ..R15= G 1/2	..N08= 1/4 NPT ..N15= 1/2 NPT
2...9	0.4	SMW-2103H...	SMW-2203H...				
2.5...15	0.5	SMW-2105H...	SMW-2205H...				
3.5...24	0.3	SMW-2107H...	SMW-2207H...			..R15= G 1/2	..N15= 1/2 NPT
10...60	0.7	SMW-2109H...	SMW-2209H...			..R20= G 3/4	..N20= 3/4 NPT
5...90	0.6	SMW-2111H...	SMW-2211H...			..R25= G 1	..N25= 1 NPT
10...120	0.6	SMW-2113H...	SMW-2213H...				

## Flow meters and switches with 1 contact, horizontal flow model: SMW-3...

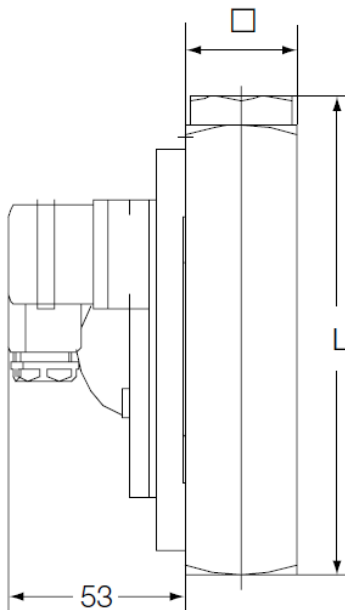
(Example: SMW-3101H RR0 R08)

Measuring range l/min. water	Pressure loss $\Delta P$ (bar)	Brass	Stainless Steel	Direction of flow	Contact	Connection	
0.5...3.5	0.2	SMW-3101H...	SMW-3201H...	..L = from left ..R = from right	...R0...= 1 N/O contact ...U0...= 1 Changeover contact ...C0...= 1 N/O contact (cCSAus) ...D0...= 1 Changeover contact (cCSAus) ...RR...= 2 N/O contact ...UU...= 2 Changeover contact ...CC...= 2 N/O contact (cCSAus) ...DD...= 2 changeover contact (cCSAus)	..R08= G 1/4 ..R15= G 1/2	..N08= 1/4 NPT ..N15= 1/2 NPT
2...9	0.4	SMW-3103H...	SMW-3203H...				
2.5...15	0.5	SMW-3105H...	SMW-3205H...				
3.5...24	0.3	SMW-3107H...	SMW-3207H...			..R15= G 1/2	..N15= 1/2 NPT
10...60	0.7	SMW-3109H...	SMW-3209H...			..R20= G 3/4	..N20= 3/4 NPT
5...90	0.6	SMW-3111H...	SMW-3211H...			..R25= G 1	..N25= 1 NPT
10...120	0.6	SMW-3113H...	SMW-3213H...				

## 12. Dimensions

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Model	4-side (mm)	Thread G	L (mm)	Weight (kg)
SMx-..01	30x30	1/4 (1/2)	132 (136)	1
SMx-..03	30x30	1/4 (1/2)	132 (136)	1
SMx-..05	30x30	1/4 (1/2)	132 (136)	1
SMx-..07	30x30	1/4 (1/2)	132 (136)	1
SMO-..09	30x30	1/4 (1/2)	132 (136)	1
SMW-..09	30x30	1/2	150	1
SMO-..11	30x30	1/4 (1/2)	156 (150)	1.7
SMW-..11	40x40	3/4 (1)	156 (150)	1.7
SMO-..13	30x30	1/2	150	1
SMW-..13	40x40	3/4 (1)	156 (150)	1.7
SMO-..15	40x40	3/4(1)	156 (150)	1.7
SMO-..17	40x40	3/4 (1)	156 (150)	1.7



## **13. Recommended Parts**

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Only the parts of the instruments and the materials are listed. Depending on the instrument model, these parts are available in different sizes. (When ordering please mention the instrument type.)

- |                                       |                                    |
|---------------------------------------|------------------------------------|
| 1.1) Float (Brass)                    | 5.1) N/O Contact (standard)        |
| 1.2) Float (Stainless Steel)          | 5.2) Changeover Contact (standard) |
| 2.1) Slotted nozzle (Brass)           | 5.4) N/O Contact (cCSAus)          |
| 2.2) Slotted nozzle (Stainless Steel) | 5.5) Changeover Contact (cCSAus)   |
| 3.1) Spring (Stainless Steel)         |                                    |
| 4.1) O-ring set (NBR)                 |                                    |
| 4.2) O-ring set (FPM)                 |                                    |

## 14. Disposal

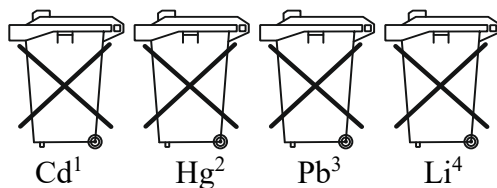
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### Note!

- Avoid environmental damage caused by media-contaminated parts
- Dispose of the device and packaging in an environmentally friendly manner
- Comply with applicable national and international disposal regulations and environmental regulations.

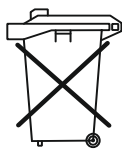
### Batteries

Batteries containing pollutants are marked with a sign consisting of a crossed-out garbage can and the chemical symbol (Cd, Hg, Li or Pb) of the heavy metal that is decisive for the classification as containing pollutants:



1. „Cd" stands for cadmium
2. „Hg" stands for mercury
3. „Pb" stands for lead
4. „Li" stands for lithium

### Electrical and electronic equipment



## **15. EU Declaration of Conformance (SMO/SMW)**

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

**Flow Meter / Monitor**      **Model: SMO-..., SMW-...**

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

**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)

**EN 60079-0:2014**      Explosive atmospheres - Part 0: Equipment - General requirements

**EN 60079-18:2010**      Explosive atmospheres - Part 18: Equipment protection by encapsulation "m"

**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:

**2014/35/EU**      Low Voltage Directive  
**2011/65/EU**      **RoHS** (category 9)  
**2015/863/EU**      Delegated Directive (RoHS III)

Hofheim, 1 June 2021



H. Volz  
General Manager



M. Wenzel  
Proxy Holder

## 16. UK Declaration of Conformity (SMO/SMW)

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

**Flow Meter / Monitor      Model: SMO-..., SMW-...**

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

**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. 2016/1101**

**Electrical Equipment (Safety) Regulations 2016**

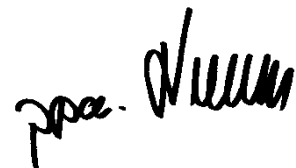
**S.I. 2012/3032**

The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

Hofheim, 1 June 2021



H. Volz  
General Manager



M. Wenzel  
Proxy Holder