



Operating manual

# Meter

## FMT II

Item-No.: 253590000, 253590001, 253590003, 253590004, 253590006, 253590007, 253590008, 253590009, 253590010, 253590011, 253590012, 253590013, 253590020, 253590030, 253590031, 253590032, 253590033, 253590034, 253590035, 253590036, 253590037, 253590060, 253590061, 253590062, 253590063, 253590064, 253590065, 253590066, 253590067, 253590300.

Translation of the  
original operating manual

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## **Important!**

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**The operating manual is always to be read before commissioning the equipment. No warranty claim will be granted for faults and damage to the equipment arising from insufficient knowledge of the operating manual.**

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Document-No.:      44 1494 101-G  
As of:                03.03.2014

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## 1. Safety instructions

The device is a state of the art piece of equipment and has been constructed according to recognised safety specifications. It is nevertheless possible that use of the device will present hazards to the operator or to third parties, or may damage the device or other property. It is therefore essential to act in accordance with these safety instructions, and in particular with those sections identified as warnings.

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### Warning notices and symbols

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In the operating manual, the following signs are used for highlighting important information.



**Special information for economical use of the equipment.**



**Special information or "dos and don'ts" for damage prevention.**



**Information or "dos and don'ts" for the prevention of damage to persons or equipment.**

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### Appropriate use

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The device may only be used if it is in perfect condition, and then only for its intended purpose, in compliance with all safety regulations, with an awareness of the potential risks, and according to the operating manual. Any faults that may impair the safety must be rectified immediately.



The device and its components are only to be used for handling the liquids listed and the purpose described. Using the machine for any other purpose would constitute inappropriate use. The manufacturer is not responsible for any loss arising as a result of this, the risk for this is borne only by the operating company.

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### Organisational measures

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This operating manual should always be kept readily available at the site of operation! Each person concerned with the assembly, commissioning, maintenance and operation of the equipment must have read and understood the entire operating manual. It is essential that the type plate and the warning notices attached to the device are observed, and are maintained in a fully readable condition.

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### Qualified personnel

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The operating, maintenance and assembly personnel must be appropriately qualified for their work. The areas of responsibility, competences and supervision of the personnel must be precisely regulated by the operating company. If the personnel do not have the required knowledge, they must be trained and instructed. The operating company must also ensure that the contents of the operating manual are properly understood by the personnel.

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### Waters protection

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The device has been designed to handle water hazardous substances. The regulations on the operating place (e.g. Water Resources Act WHG, = ordinance on installations for handling of substances hazardous to water VAWS) must be adhered to.

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## Hydraulics

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Only persons with special knowledge and experience with hydraulic systems may carry out work on hydraulic parts and equipment. All lines, hoses and screw joints should regularly be checked for leaks and visible external damage. Any damage must be rectified immediately. Any oil spurting out can cause injuries and fire.

The relevant safety regulations for the product must be followed when handling oils, greases or other chemical substances!

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## Maintenance and Service

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According to the regulations of the water resources law only authorized services may work on devices for flammable and/or water endangering substances. During such works, appropriate tools are to be used (avoid sparking). Before any kind of work on the device, all fuel lines are to be completely emptied and aerated.

Do not make any changes. Modifications or additions to the device which may affect the safety cannot be carried out without consent of the manufacturer. Exclusively genuine spare parts made by the manufacturer may be used.

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## Electric power

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Work on the electrical equipment may only be carried out by a qualified electrician or by trained persons under the guidance and supervision of a qualified electrician according to electro-technical guidelines. Machine or system components, on which inspection, maintenance or repair work is to be carried out must be de-energised. Product description

## 2. Description

### 2.1 Technical description

The FMT II is a flow meter for flowing liquids based on the measuring principle of a turbine wheel meter. It can be used as a fixed meter or as a manual flow meter. The optional pulse generator allows it to be used in a fluid management system.



**The FMT II is not to be operated with flammable and potentially explosive liquids with a flash point < 55 °C. Liquids with a flash point above 55°C may not be used with the unit if they are heated beyond their flash point.**

The FMT II turbine wheel meter consists of a measurement chamber with a turbine wheel and a cover containing the evaluation electronic system as well as display and keyboard. The turbine wheel has a magnet pair which in the case of volume flow transfers the meter pulses to a reed switch on the evaluation electronic system.

### 2.2 Product variants

Art. no.	Type	Material*	Intake
253590000	FMT II add-on kit for Hornet 40	POM	above
253590001	FMT II add-on kit for Hornet 50/80	POM	left
253590003	FMT II, custom-built	POM	above
253590004	FMT II add-on kit for Hornet 50/80	POM	below
253590006	FMT II	POM	below
253590007	FMT II with pulse output	POM	left
253590008	FMT II with pulse output	POM	right
253590009	FMT II	POM	above
253590010	FMT II	POM	left
253590011	FMT II	POM	right
253590012	FMT II with pulse output	POM	below
253590013	FMT II with pulse output	POM	above
253590020	FMT II add-on kit for Hornet W85 H	POM	left
253590030	FMT II	PP	below
253590031	FMT II	PP	above
253590032	FMT II	PP	left
253590033	FMT II	PP	right
253590034	FMT II with pulse output	PP	below
253590035	FMT II with pulse output	PP	above
253590036	FMT II with pulse output	PP	left
253590037	FMT II with pulse output	PP	right
253590060	FMT II	PVDF	below
253590061	FMT II	PVDF	above
253590062	FMT II	PVDF	left
253590063	FMT II	PVDF	right
253590064	FMT II with pulse output	PVDF	below
253590065	FMT II with pulse output	PVDF	above
253590066	FMT II with pulse output	PVDF	left
253590067	FMT II with pulse output	PVDF	right
253590300	FMT II, custom-built	POM	below

\*Material of the measuring chamber, measuring chamber lid and the turbine

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## 2.3 Technical data

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Volume flow range	5 – 90 l/min	Nominal width	1" external threat
Viscosity range	0,8 – 40 mPa s	Protection category	IP 65
Operating pressure	4 bar	Pulser output:	optional, 25 Imp/l
Accuracy uncalibrated*	± 2%	Dimensions approx.	90 x 130 x 61 mm
Accuracy calibrated*	± 1%	Weight approx.	0,3 kg
Repeat accuracy	± 0,5 %	Temperature range	Operation: -10 °C - +50°C Storage: -20°C - +70°C
Battery	Li-MO, Type CR ½ AA, 3,6 V 1200 mAh, exchangeable		

\* Test assembly: Medium water, settling section of 0.2 m before and behind meter

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## 2.4 Display

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LC display with five-digit volume indicator with 16 mm high digits and display of the litre measurement unit (optional US-Gal, UK-Gal) and low battery capacity display. The minimum digital step of the measured value is 0.01 litre and that of the non-resettable totalisers 1 litre.

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## 2.5 Keyboard

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Membrane keyboard with 3 keys: „Total“, „Reset“ and „Mode“.

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## 2.6 Battery

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Lithium battery (Type CR ½ AA, 3.6V, 1200 mAh) with a minimum operating life of approx. 10 years given a 1,000,000 litre flow rate during this period. The battery can be replaced once the housing is opened. Cumulative and calibration values are not affected by replacement.

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## 2.7 Acquisition of values

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Logging the measurement chamber pulse signal.  
Fault-redundant storage and read-out of measurement unit and calibrating factor.

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## 2.8 Pulse output (optional)

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In the "Pulse output" option, the meter has a single-channel pulse output with 25 pulses/measurement unit. The meter can be operated on external 5VDC - 24VDC. Pulse output characteristics: Open collector, VC<sub>max</sub> = 30 V, Ic<sub>max</sub> = 50 mA

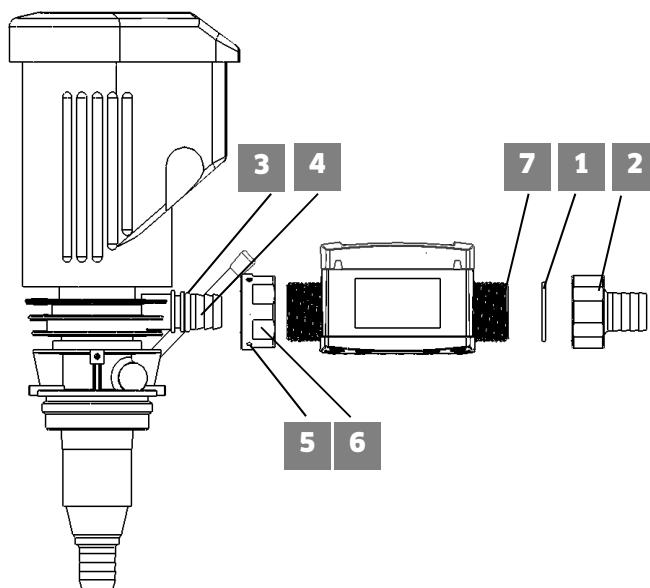
Pin configuration:

Connection	Colour
Vcc (5VDC - 24 VDC)	yellow
Pulse output	green
Gnd (Mass)	brown

### 3. Assembly

#### 3.1 Assembly instructions for FMT II at HORNET 40

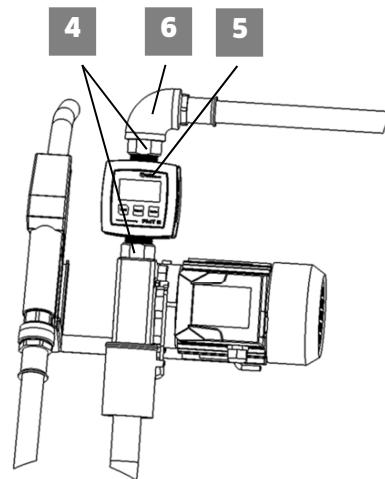
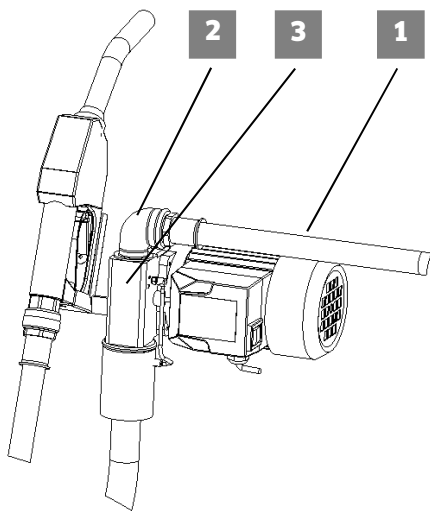
- Before fitting check all parts for any packaging material residue.
- Place the O-ring (3) on the first groove of the hose grommet (4) of the pump and lubricate it.
- Lightly screw the stud screws M4x8 (5) into the pump adapter (6).
- Position the pump adapter (6) on the hose grommet of the pump and continue screwing in the stud screws (5), so that the pump adapter enters the groove. Do not tighten at this stage.
- Screw the counter onto the pump adapter (6) (hold the pump adapter and turn the counter). Please ensure that the arrow on the counter points away from the pump.
- Once the meter has reached the limit stop, you can align the meter together with the pump adapter and tighten the stud screws (5) with the socket spanner provided.
- Push the seal ring (1) into the thread of the hose grommet (2) as far as it will go.
- Insert the hose grommet (2) into the discharge hose, position it on the outgoing thread G1" (7) of the meter and tighten it.
- The connections are to be checked for leaks after the installation.





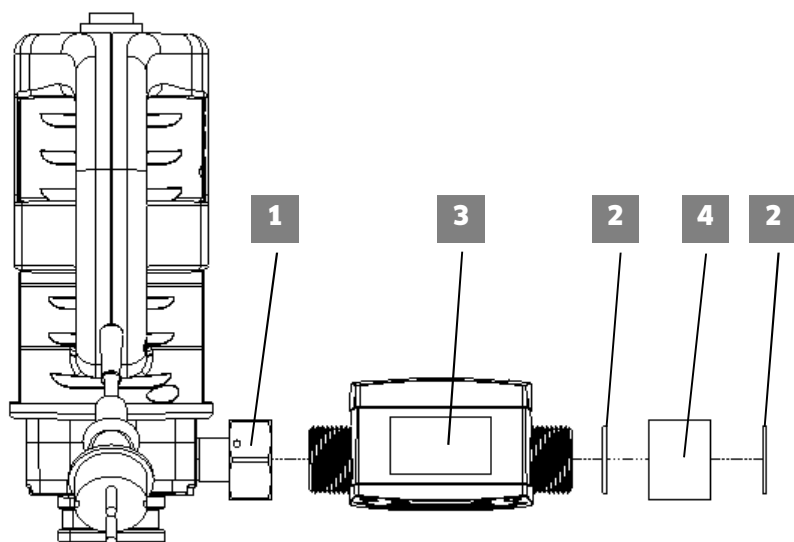
### 3.2 Assembly instruction for subsequent mounting of FMT II at Hornet 50 II, 80, 120

- Before fitting check all parts for any packaging material residue.
- Remove the discharge hose (1) from the 90° angle piece (2).
- Unscrew the G1" angle piece (2) from the pump (3) (heat the ends, e.g. with a hot-air gun)
- Push the two seal rings provided into the extension threads (4) as far as they will go.
- Screw the extensions provided (4) to the meter.
- Screw the meter into the pump and align it in the required position. The arrow on the bottom of the meter must point in the direction of the flow.
- Screw the second extension onto the meter, attach the angle piece provided G1" (6) and align it in the correct position.
- Attach the discharge hose to the angle piece.
- The connections are to be checked for leaks after the installation.



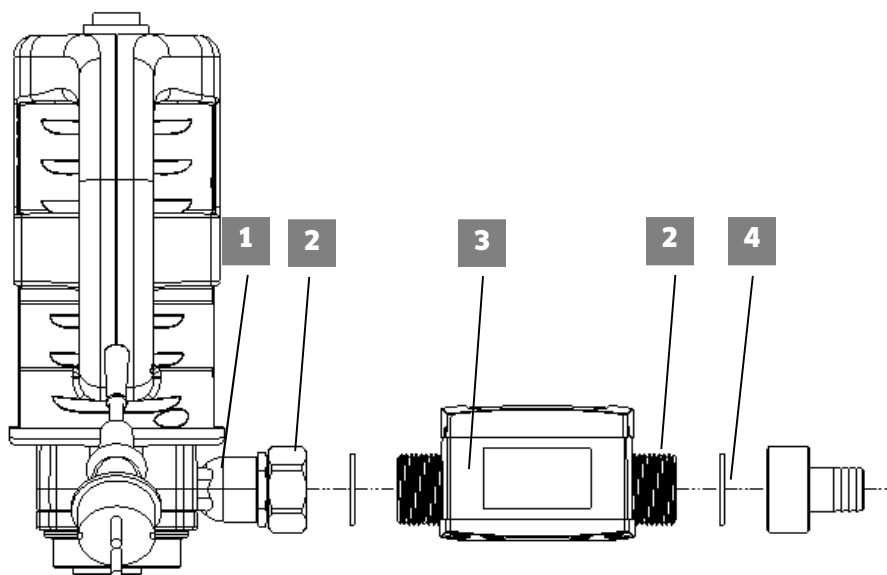
### 3.3 Assembly instructions for FMT II on HORNET W 85 H

- Before fitting check all parts for any packaging material residue.
- Insert sealing rings (2) into the adaptor sleeve (4) on both sides.
- Screw the adaptor sleeve (4) with the sealing



### 3.4 Assembly instructions for FMT II on HORNET W 85 H INOX

- Before fitting check all parts for any packaging material residue.
- Insert a sealing ring (2) into the adaptor on the pressure side (1).
- Insert a sealing ring (2) into the hose mandrel (4).
- Screw the hose mandrel (4) with the sealing ring (2) onto the meter (3) and tighten it firmly. Ensure when doing this that the arrow on the meter (3) points toward the hose mandrel (4). The arrow can be seen on the side of the meter (3) or on the name plate of the meter (3). Pay attention to the direction of flow!
- Screw the meter (3) into the adaptor on the pressure side (1). Ensure when doing this that the adaptor on the pressure side (1) is not rotated. The rotation of the adaptor on the pressure side (1) can be prevented with the aid of a 36 AF spanner.
- The connections are to be checked for leaks after the installation.



## 4. Meter programming

The measurement unit (litre, US-Gal, UK-Gal) and the calibrating factor (0.500 - 1.500) can be set and stored in a fault-redundant manner.

! No volume pulses are counted when the meter is in the programming mode. When no key is pressed for over 5 minutes in the programming mode, the meter automatically returns to the basic state.

### 4.1 Changing over into the programming mode

To get into the programming mode, the "Mode" key is to be pressed for 5 seconds. Then all segments rapidly flash (approx. 3 Hz) on the LC display.

### 4.2 Setting the measurement unit

After releasing the "Mode" key, the measurement unit set appears in the display. Renewed pressing of the „Total“ key results in the measurement unit switching between „Litre“, „US-Gal“ and „UK-Gal“. Renewed pressing of the "Mode" key and the set measurement unit is taken on.

! Any change to the measurement unit causes the volume indicator and totaliser to be reset.

### 4.3 Setting the calibrating factor

After pressing the "Mode" key, the calibrating factor set appears in the display. Pressing the "Total" key results in the calibrating factor being counted up in 0.010 steps and pressing the „Reset“ key in it being counted down accordingly. Press the "Mode" key and the set calibrating factor is taken on.

Before a new calibrating factor can be established, a delivery must be made into a satisfactorily accurate vessel or undertaken by means of a reference meter. The new calibrating factor is calculated as follows:

$$\text{Factor}_{\text{new}} = \text{Factor}_{\text{existing}} \times \frac{\text{Volume}_{\text{delivered}}}{\text{Volume}_{\text{shown}}}$$

Example: A 2 litre measurement vessel is filled; the meter only indicates 1.90 litres. The existing calibrating factor is 1.040.

The new calibrating factor is calculated to:

$$1,040 \times \frac{2,00}{1,90} = 1,090 \text{ (rounded)}$$

### 4.4 Resetting all settings (initialisation)

The effect of pressing and holding the "Total" and "Reset" keys at the same time when setting the measurement unit or calibrating factor is to delete all the meter values and carry out an initialisation.

Following values are initialised:

Measurement unit:	Litre
Calibrating factor:	1.000
Delivery quantity:	0, 00 litres
Totaliser:	0 litres

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## **4.5 Ending the programming mode**

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To end the programming mode, the "Mode" key is again to be pressed after setting the calibrating factor. The meter then reverts to the basic state. When no key is pressed for over 5 minutes in the programming mode, the meter automatically returns to the basic state.

## **5. Operation**

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### **5.1 Delivery state**

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On delivery the meter is provided with the factory "litre" measurement unit and the "1,000" calibrating factor. Pre-tested meters have a calibrating factor already factory-adjusted. Alternatively this adjustment can be undertaken at a later date. The meter as it is can meter deliveries.

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### **5.2 Basic state, flow measurement**

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In the basic state the LC display indicates the metered volume since the last reset. The display has three digits before the decimal point and two after; 0.01 litre is the minimum digital step. The "litre" measurement unit (optional US-Gal, UK-Gal) is shown on the lower line.

The keys are blocked when metering takes place.

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### **5.3 Reset - "Reset" key**

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On pressing the "Reset" key, the programme status is shown for as long as the key remains pressed. On releasing the key, all the segments are tested one after the other followed by volume meter resetting. Should pulse signals proceed (volume flow) during the above, then the display test is interrupted and changed to the basic state.

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### **5.4 Totaliser - Key „Total“**

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On pressing the "Total" key, the totaliser status is shown for as long as the key remains pressed. The display is rounded in litres (optional US-Gal, UK-Gal). Should pulse signals proceed (volume flow) during the display, then the totaliser status display is interrupted and changed to the basic state.

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### **5.5 Calibrating factor display - Keys „Total“ + „Reset“**

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When the "Reset" key is pressed in addition to the pressed "Total" key (totaliser status display), the set calibrating factor is displayed for as long as the two keys are pressed. The calibrating factor can be between 0.500 and 1.500.

Should pulse signals proceed (volume flow) during the display, then the calibrating factor display is interrupted and changed to the basic state.

## 6. Fault monitoring

### 6.1 Battery symbol display in the basic state

The built-in 3.6 V lithium battery, type CR ½ AA, is designed for a minimum operating life of approx. 10 years given a 1,000,000 litre flow rate during this period. The appearance of the battery symbol in the basic state indicates that the battery capacity is exhausted and that the battery must be replaced within the next 6 months. The times may be reduced given extreme operating conditions such as a high flow rate or very low temperatures!

The battery can be replaced once the housing is opened. Cumulative and calibration values are not affected by replacement.

### 6.2 Display of five dashes „-----“

The fact of the meter stopping operations and the appearance of five horizontal dashes in the display points to a fault in the evaluation electronics. As a result, the meter must be replaced.

## 7. Disposal

The device is to be emptied completely and the liquids properly disposed of in case it is taken out of service.

In case the device is put out of service permanently then it has to be disposed of properly:



- Return old metal for recycling.
- Return plastic parts for recycling.
- Return electronic waste for recycling.



**The water legal regulations are to be followed.**

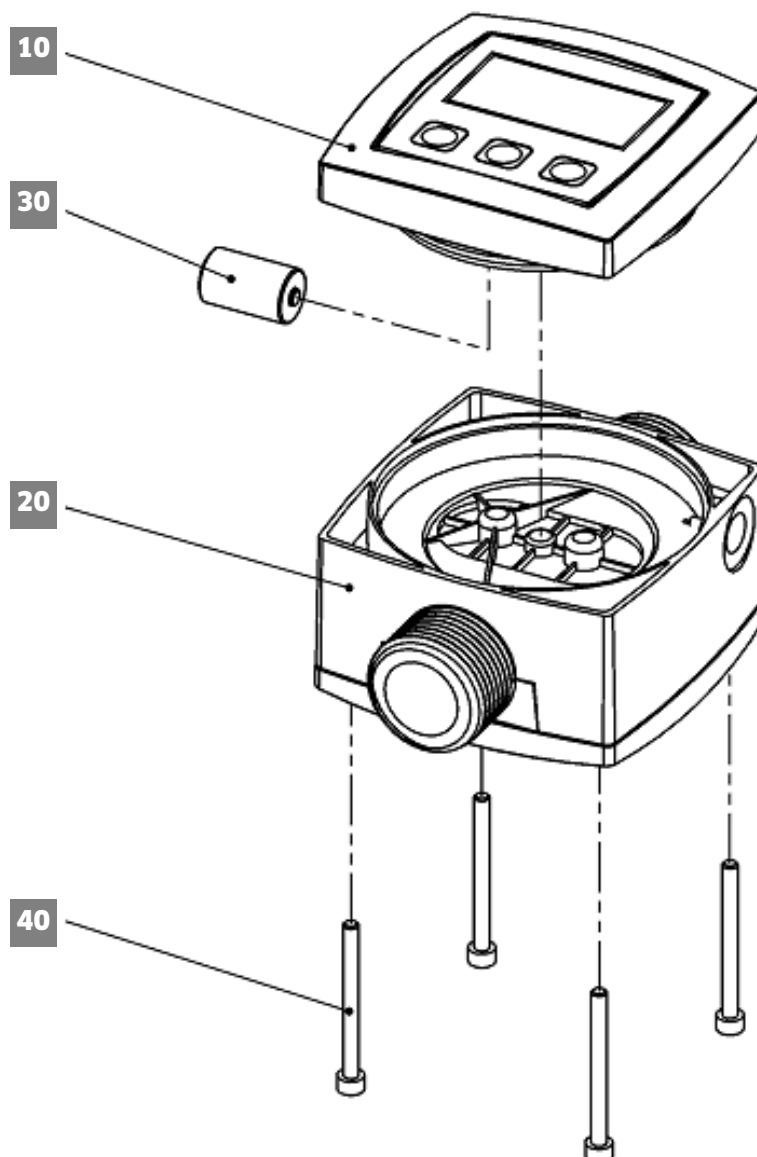
### 7.1 Return of batteries

Batteries must not be disposed of with the domestic waste. Batteries can be returned free of charge via a suitable collecting point or to the dispatch stores. Consumers are legally obliged to return used batteries.

Batteries that contain harmful substances are marked with a crossed out dustbin (see above) and the chemical symbol (Cd, Hg or Pb) of the heavy metal that is decisive for the classification as containing harmful substances:

1. “Cd” stands for cadmium.
2. “Pb” stands for lead.
3. “Hg” stands for mercury.

## 8. Spare part drawing



Item	Description	POM version	
		horizontal flow	vertical flow
10	Cover, complete + battery	814948001	814948002
	Cover, complete + battery + pulse cable	814948010	814948011
20	Measuring chamber, complete + type plate	814948003	
	Measuring chamber, complete + type plate + pulse cable outlet	814940012	
30	Battery	814938001	
40	Four cheese-head screw DIN 912 - M4 x 45, A2	814948009	

## 9. Declaration of Conformity



### Konformitätserklärung Declaration of Conformity

Hiermit erklären wir, dass die Bauart  
*We herewith declare that the construction type*

Typ: <i>Type:</i>	<b>FMT II</b>
Bezeichnung: <i>Designation:</i>	<b>Durchflussmesser Flow meter</b>
Artikel-Nr.: <i>Item No.:</i>	<b>914940004, 914940005, 914940006, 914940007, 914940008, 914940009, 914940010, 914940011, 914940012, 914940013, 914940014, 914940015, 914940016, 914940017, 914940018, 914940019</b>

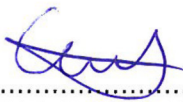
in der von uns gelieferten Ausführung folgenden einschlägigen Bestimmungen  
entspricht:  
*in the form as delivered by us complies with the following applicable regulations:*

- EMV-Richtlinie 2004/108/EG  
*Electromagnetic compatibility 2004/108/EC*

EG-Dokumentationsbevollmächtigter: <i>EC official agent for documentation:</i>	Jörg Mohr	Horn GmbH & Co. KG Munketoft 42 24937 Flensburg
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20.12.2010

Datum  
*Date*

  
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