



Operating manual

Meter FMOGne

Item-No.: 253400000, 253400010, 253400020, 253400030,
027176201, 027176301, 027176401, 027176501

Translation of the original
operating manual

Important!

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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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.

Warning notices and symbols

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.

Appropriate use



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.

Organisational measures



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.

Qualified personnel



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.

Waters protection



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.

Hydraulics



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!

Maintenance and service



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.

Electric power



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. Technical description

2.1 Description

The FMOG is a volume meter for flowing fluids working on the principle of an oval gear meter. The product is suitable to be used as a stationary counter, or a hand flow meter. The pulse generator allows use in a fluid management system.



The FMOG must not be operated with combustible and explosive liquids with a flashpoint below 55°C . Liquids with a flashpoint above 55°C must not be used, if they are heated above their flash point. Operation of the FMOG in explosion-endangered areas is not permitted. This would constitute a risk of explosion!



The temperature of the liquid to be pumped must be in the range -10°C to 50°C.

The oval gear meter FMOG consists of a measuring chamber with a pair of oval gears, and a lid which contains the evaluation electronic as well as the display and the keypad. The oval gears are each equipped with a pair of magnets which transmit the counted pulses to transposed Reed switches on the evaluation electronic.

2.2 Product versions

According to the area of use, one of the following types is to be selected:

Designation/ Item No.	Description
FMOG ne LV 253 400 000	Flow Meter for aqueous media ($\eta < 20$ mPa s), inlet on top or down
FMOG ne Imp. LV 253 400 010	With pulse exit for aqueous media ($\eta < 20$ mPa s), inlet on top or down
FMOG ne LV 253 400 020	Flow Meter for aqueous media ($\eta < 20$ mPa s), inlet on the right or left
FMOG ne Imp. LV 253 400 030	With pulse exit for aqueous media ($\eta < 20$ mPa s), inlet on the right or left
FMOG ne HV 027 176 201	With pulse exit for lubricating oil and similar media ($\eta > 20$ mPa s), inlet on right or left
FMOG ne HV 027 176 301	With pulse exit for lubricating oil and similar media ($\eta > 20$ mPa s), inlet on top or down
FMOG ne HV 027 176 401	Flow Meter for lubricating oil and similar media ($\eta > 20$ mPa s), inlet on right or left
FMOG ne HV 027 176 501	Flow Meter for lubricating oil and similar media ($\eta > 20$ mPa s), inlet on top or down

2.3 Operation domain

	Low Viscosity (LV)	High Viscosity (HV)
housing	PEEK	Aluminium
Viscosity range	1 - 20 mPa s	20 - 2000 mPa s
Smallest volume flow Q min	2 l /min	1 l /min
Largest volume flow Q max	30 l /min	15 l / min
Max. operation pressure p max	4 bar	10 bar
Thread connection	G 1" exit	G ½" inlet
Accuracy after calibration	+/- 1% +/- 0,5%	+/- 1% +/- 0,5%
Dimensions	90x135*x60 (wxhxl) *flow direction	90x90*x60 (wxhxl) *flow direction
Weight	approx. 0,5 kg	approx. 0,5 kg
Operation temperature	-10°C to +50°C	-10°C to +50°C
Storage temperature	-20°C to +70°C	-20°C to +70°C
Protection class	IP 65	IP 65
Battery	Lithium battery	Lithium battery

2.4 Elements of the FMOG

2.4.1 Display

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.

2.4.1 Keyboard

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

2.4.2 Battery

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.

2.4.3 Measured value recording

Recording of the double pulse signal of the sensing chamber.

Error redundant saving and selection of measuring unit and calibration factor.

2.4.4 Double pulse exit (optional)

In the option „double pulse exit“, the counter is equipped with a dual-channel double pulse exit with 2 x 100 pulses / measuring unit. The pulses are phase-deferred by $90^\circ \pm 60^\circ$. The counter can be operated with an external voltage source of 5 VDC-24 VDC. Data of the pulse exits: open collector, $U_{CEmax} = 30\text{ V}$, $I_{Cmax} = 50\text{ mA}$

Pin assignment:

Connection	Colour
V_{dc} (5 VDC - 24 VDC)	Yellow
Pulse exit A	Green
Pulse exit B	White
Gnd (Mass)	Brown

3. Operating manual

3.1 Delivery state

In the basic state the LC display shows the measured volume since the last reset. The display shows two pre-decimal and three decimal places, the smallest digit step is 0,01 litres. In the lower line, the measuring unit „litre“(optional US-Gal, UK-Gal) is displayed. During the measurement, the keys are locked.

3.2 Basic state, volume measuring

In the ground state on the LCD screen displays the measured volume since the last reset. The display shows three primary and two decimal places. The smallest increment of volume is 0.01 liters. In the bottom line, the unit "liter" (optional U.S. Gal, UK Gal) is displayed.

3.3 „Reset“ key

After pressing the key „Reset“ the programme state is displayed as long as the key remains pressed. After releasing the key, all segments are tested successively, and the resetting of the volume counter is executed. Should pulse signals incur at the same time (volume flow), the display test is interrupted and the counter changes back to the basic state.

3.4 Totalizer key - „Total“

After pressing the key „Total“, the totalizer state is displayed as long as the key remains pressed. The display is in rounded litres. Should pulse signals incur at the same time (volume flow), the display of the totalizer is interrupted, and the counter changes back to the basic state.

3.5 „Reset“ Display of the calibration factor – keys „Total“ + „Reset“

By additionally pressing the key „reset“ while holding down the key „total“ (display of the totalizer status), the set calibration factor will be shown for as long as the keys remain pressed. The calibration factor can be between 0.500 and 1.500.

Should pulse signals incur at the same time (volume flow), the display of the calibration factor is interrupted, and the counter changes back to the basic state.

4. Error Control

4.1 Display of the battery symbol in the basic state

The built-in 3,6V lithium battery, type CR ½ AA is designed for a minimum durability of approx. 10 years at a flow amount of 1.000.000 litres during that time span. Should the battery symbol be displayed in the basic state, the battery capacity is exhausted and the battery should be replaced within the next 6 months. The average life time can decrease in case of extreme terms, such as high flow volume or low temperatures! The battery can be replaced after opening the casing. Totals and calibration values remain saved during the replacement.(See 6.)

4.2 Display of five lines „-----“

Should the counter stop functioning and the display only show five horizontal lines, then an error has occurred in the evaluation electronic, and the counter has to be exchanged.

5. Programming the meter

5.1 General

The measuring unit (litre, US-Gal, UK-Gal) and the calibration factor (0.500 – 1.500) can be set and saved.

In order to determine the new calibration factor, it is necessary to dispense into a sufficiently accurate container or over a reference counter. The new calibration factor is calculated as follows:

$$\text{Factor}_{\text{new}} = \text{Factor}_{\text{old}} \times \frac{\text{Volume}_{\text{dispensed}}}{\text{Volume}_{\text{displayed}}}$$

Example: a 2-litre measuring receptacle is filled, the counter only reads 1,90 litres. The old calibration factor is 1,040.

The new calibration factor is calculated as:

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

Attention: no volume pulses will be counted while the counter is in programming mode. If no key is pressed for longer than five minutes while in the programming mode, the counter will automatically switch back into the basic state.

5.2 Switching to the programming mode

To enter the programming mode, press the key „Mode“ for approximately 5 seconds. All segments will now blink fast (ca. 3 Hz.) on the LC display.

5.3 Setting the measuring unit

By pressing the key „Reset“, the display will show the set measuring unit. By repeatedly pressing the key „reset“, the measuring unit will change between „Litre“, „US-Gal“ and „UK-Gal“. The set unit will be adopted by pressing „Mode“. Attention: should the measuring unit be modified, the amount indicator and totalizer will be reset!

5.4 Setting the calibration factor

After actuating the key „Mode“, the display will show the set calibration factor. By pressing the key „Total“, the calibration factor is increased by steps of 0.010, by pressing the key „Reset“, it is decreased by the same steps. The set calibration factor is adopted by pressing the key „Mode“.

5.5 Resetting all settings (first initialization)

By pressing and holding the key „Total“ (setting the calibration factor) and the key „Reset“ simultaneously, all values of the counter are deleted and a first initialization carried out.

Following values are initialized:

Measuring unit:	Litres
Calibration factor:	1.000
Dispensing amount:	0,00 litres
Totalizer:	0 litres

5.6 Ending the programming mode

To end the programming mode, press the „mode“ key once again after setting the calibration factor. The counter switches back into the basic state. If no key has been pressed for longer than five minutes while in programming mode, then the counter will switch back to the basic state automatically.

6. Exchanging the battery

1. Unscrew the venting screw (*fig. 1*)
(in the case of versions with pulse output, loosen the cable gland)
2. Unscrew the four M5 Allen screws on the underside of the device (*fig. 2*)
3. Pull off the cover cap with the electronic measuring system.

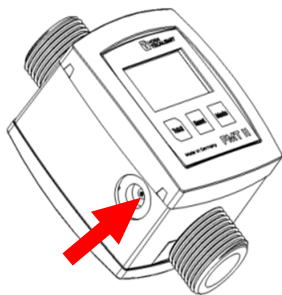


Figure 1

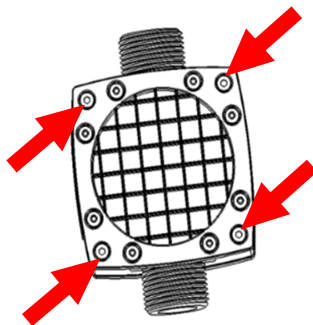


Figure 2

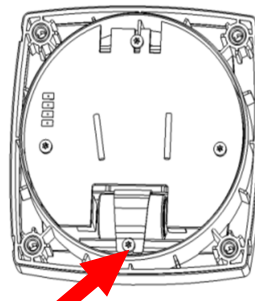


Figure 3

4. Unscrew the battery fixing screw (*fig. 3*)
5. Remove the battery.
6. Insert the new battery. **Use only a 3.6V 1/2 AA lithium battery.**
Ensure that the polarity is correct (+- pole is marked on the PCB)!
7. Flip down the tab and screw in the fixing screw.
8. Exchange the O-ring on the electronic measuring system. Two O-rings are supplied, but only one is fitted: - O-ring 82x2 for FMOG, FMT II POM, FMT II PP
- O-ring 81x1,5 for FMT II PVDF
9. Fit the electronic measuring system and screw it on tight.
10. Insert the venting screw (tighten the cable gland in the case of versions with pulse output).

7. Disposal

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

The equipment is to be disposed of properly when taken permanently out of service:



- 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.

9. Notes

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