HORN TECALEMIT

Operating manual

Counter

FMOG 100 ne, FMOG 150 ne

Translation of the original operating manual
GB

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.

Copyright

Service Hotline **+49 1805 900 301**
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service@tecalemit.de

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Content

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.

2. General Information

2.1 Description / Appropriate use

The FMOG 100 ne / FMOG 150 ne is a non-calibratable flow rate meter for streaming liquids according to the measurement principle of an oval wheel counter. It is suitable for the employment as stationary counter. The impulse sensor enables employment in a fluid management system.

⚠ **The FMOG 100 ne / FMOG 150 ne may not be operated with inflammable and potentially explosive liquids with a flash point below 55°C (Hazard Classes AI, AII and B). Fluids with a flash point above 55°C (Hazard Class A III) may not be transported, if these are heated beyond their flash point.**

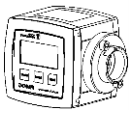
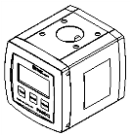
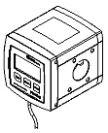
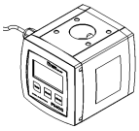
! **The temperature range of the transported liquid may not undercut or exceed respectively -10 °C to +40°C.**

The oval wheel counter FMOG 100 ne / FMOG 150 ne consists of a measurement chamber with an oval wheel pair and a cover. There are variants with which the cover contains evaluation electronics as well as indicator and a keyboard. The variant without the display has a pulse output for external evaluation electronics The oval wheels are equipped respectively with a magnet pair which transfer to the evaluation electronics the counter pulses with volume flow to magnet contact switches in an offset pattern.

2.2 Product version

The counters which have no pulse output, are each provided with a blanking plug at this point.

One of the following variants is to be selected depending on the individual case:

Designation / Article No.	Description				
	Illustration	With display	Connection horizontal	Connection vertical	With pulse output
FMOG 100 ne US027176600				x	x
FMOG 100 ne US027176601		x	x		
FMOG 100 ne US027176602		x		x	
FMOG 100 ne US027176603		x	x		x
FMOG 100 ne US027176604		x		x	x
FMOG 100 ne US027176605		x	x		x
FMOG 150 ne 027177600				x	x
FMOG 150 ne 027177601		x	x		
FMOG 150 ne 027177602		x		x	
FMOG 150 ne 027177603		x	x		x
FMOG 150 ne 027177604		x		x	x
FMOG 150 ne 027177605		x	x		x

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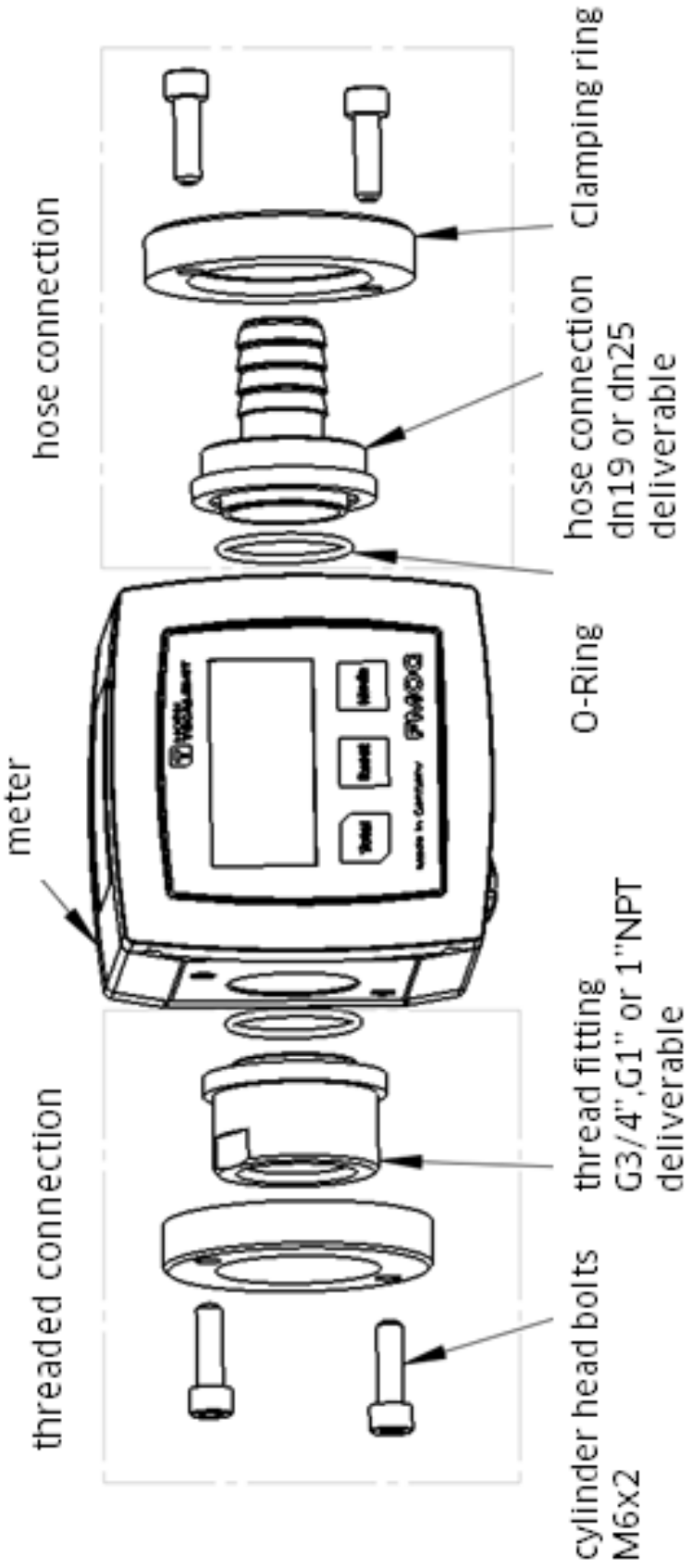
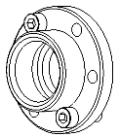
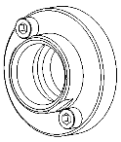
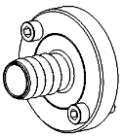
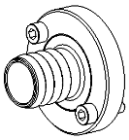
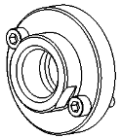
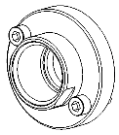
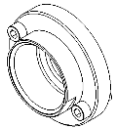
2.3 Installation

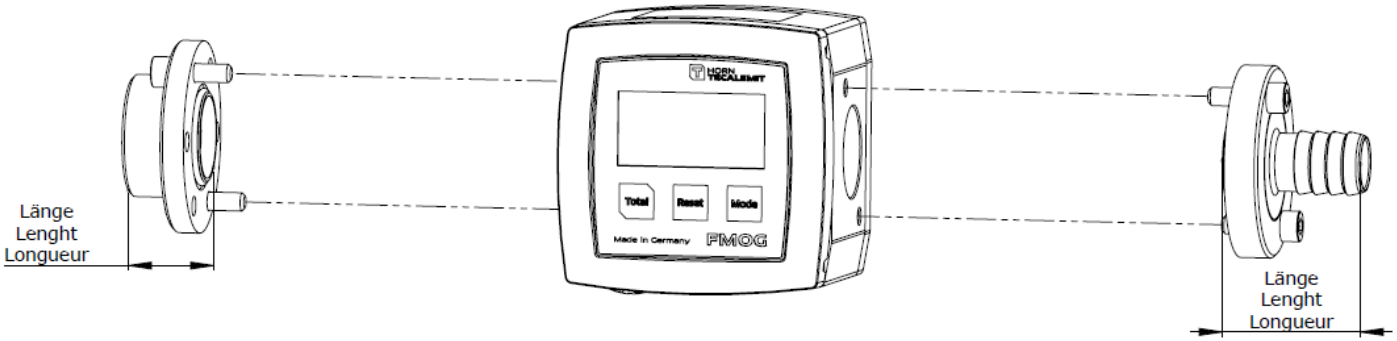
2.3.1 **Connection possibilities**

One of the following variants is to be selected depending on the individual case:



Designation / Article No.			Description		
	Compatibility		With fixed flange	With rotatable clamping collar	Illustration
	FMOG 100	FMOG 150			
Connecting kit G1" flange 027176610	x	x	x		
Connecting kit G1" 027176611	x	x		x	
Connecting kit DN19 027176612	x	x		x	
Connecting kit DN25 027176613	x	x		x	
Connecting kit G3/4" 027176614	x	x		x	
Connecting kit 1"NPT 027176615	x	x		x	
Connecting kit G1-1/4“ flange 027177610		x	x		
Connecting kit G1-1/4“ 027177611		x		x	
Connecting kit NPT1-1/4“ flange US027177610		x	x		
Connecting kit NPT 1-1/4“ US027177611		x		x	

All connecting kits contain each an O-ring Ø28x2 and two cylinder head bolts M6x20 DIN 912.



Anschluss am Ausgang (Ø63xLänge)
Connection output (Ø63xlenght)
Branchement à l'entrée (Ø63xLongueur)

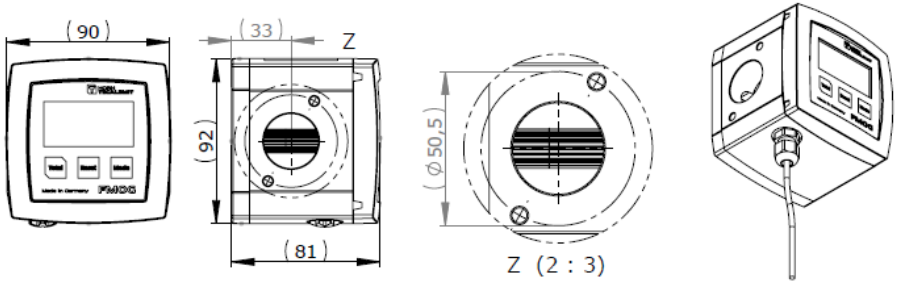
Abb. *Copy Fig.*	Bezeichnung *Marking Désignation*	Länge *Lenght Longueur*	Art. Nr.: *Art. No.: Art. No.:*	Anzahl *Number Nombre*
	Anschlussset G1" Flansch *Connection kit G1" flange* *Kit de branchement G1" Bridge*	25	027176610	
	Anschlussset G1" *Connection kit G1"* *Kit de branchement G1"*	26	027176611	
	Anschlussset DN19 *Connection kit DN19* *Kit de branchement DN19*	45	027176612	
	Anschlussset DN25 *Connection kit DN25* *Kit de branchement DN25*	45	027176613	
	Anschlussset G3/4" *Connection kit G3/4"* *Kit de branchement G3/4"*	26	027176614	
	Anschlussset 1"NPT *Connection kit 1"NPT* *Kit de branchement 1"NPT*	28	027176615	

Zählervariante (90x92x81)
Counter type (90x92x81)
Variante de compteur (90x92x81)

Abb. *Copy Fig.*	Bezeichnung *Marking Désignation*	Art. Nr.: *Art. No.: Art. No.:*	Anzahl *Number Nombre*
	FMOG-100 ne Impulsgeber (ohne Display) *FMOG-100 ne impulse counter (without display)* *FMOG-100 ne Générateur d'impulsions (sans Affichage)*	027176600	
	FMOG-100 ne horizontal *FMOG-100 ne horizontal* *FMOG-100 ne horizontal*	027176601	
	FMOG-100 ne vertikal *FMOG-100 ne vertical* *FMOG-100 ne vertical*	027176602	
	FMOG-100 ne horizontal mit Impulsausgang *FMOG-100 ne horizontal with impulse output* *FMOG-100 ne horizontal avec impulsions sortie*	027176603	
	FMOG-100 ne vertikal mit Impulsausgang *FMOG-100 ne vertical with impulse output* *FMOG-100 ne vertical avec impulsions sortie*	027176604	
	FMOG-100 ne horizontal Impulsgeber Set *FMOG-100 ne horizontal Pulser kit* *FMOG-100 ne horizontal Générateur d'impulsions kit*	027176605	

Anschluss am Ausgang (Ø63xLänge)
Connection output (Ø63xlenght)
Branchement à la sortie (Ø63xLongueur)

Abb. *Copy Fig.*	Bezeichnung *Marking Désignation*	Länge *Lenght Longueur*	Art. Nr.: *Art. No.: Art. No.:*	Anzahl *Number Nombre*
	Anschlussset G1" Flansch *Connection kit G1" flange* *Kit de branchement G1" Bridge*	25	027176610	
	Anschlussset G1" *Connection kit G1"* *Kit de branchement G1"*	26	027176611	
	Anschlussset DN19 *Connection kit DN19* *Kit de branchement DN19*	45	027176612	
	Anschlussset DN25 *Connection kit DN25* *Kit de branchement DN25*	45	027176613	
	Anschlussset G3/4" *Connection kit G3/4"* *Kit de branchement G3/4"*	26	027176614	
	Anschlussset 1"NPT *Connection kit 1"NPT* *Kit de branchement 1"NPT*	28	027176615	



Zust.	Änderung	Datum	Name

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HORN TECALEMIT
HORN GMBH & CO. KG
D-24937 FLENSBURG

	Datum	Name
Bearb.	12.06.12	B.Dohrmund
Gepr.	17.07.12	O.Holste
Freig.	17.07.12	O.Holste

○ AV	○ WE	○ SCHL
○ M 1	○ M 2	○ M 3
○ Dreherei	○ E-MONT	

-

Massblatt FMOG 100 ne

Dimension sheet FMOG 100 ne

MB-1667001-B

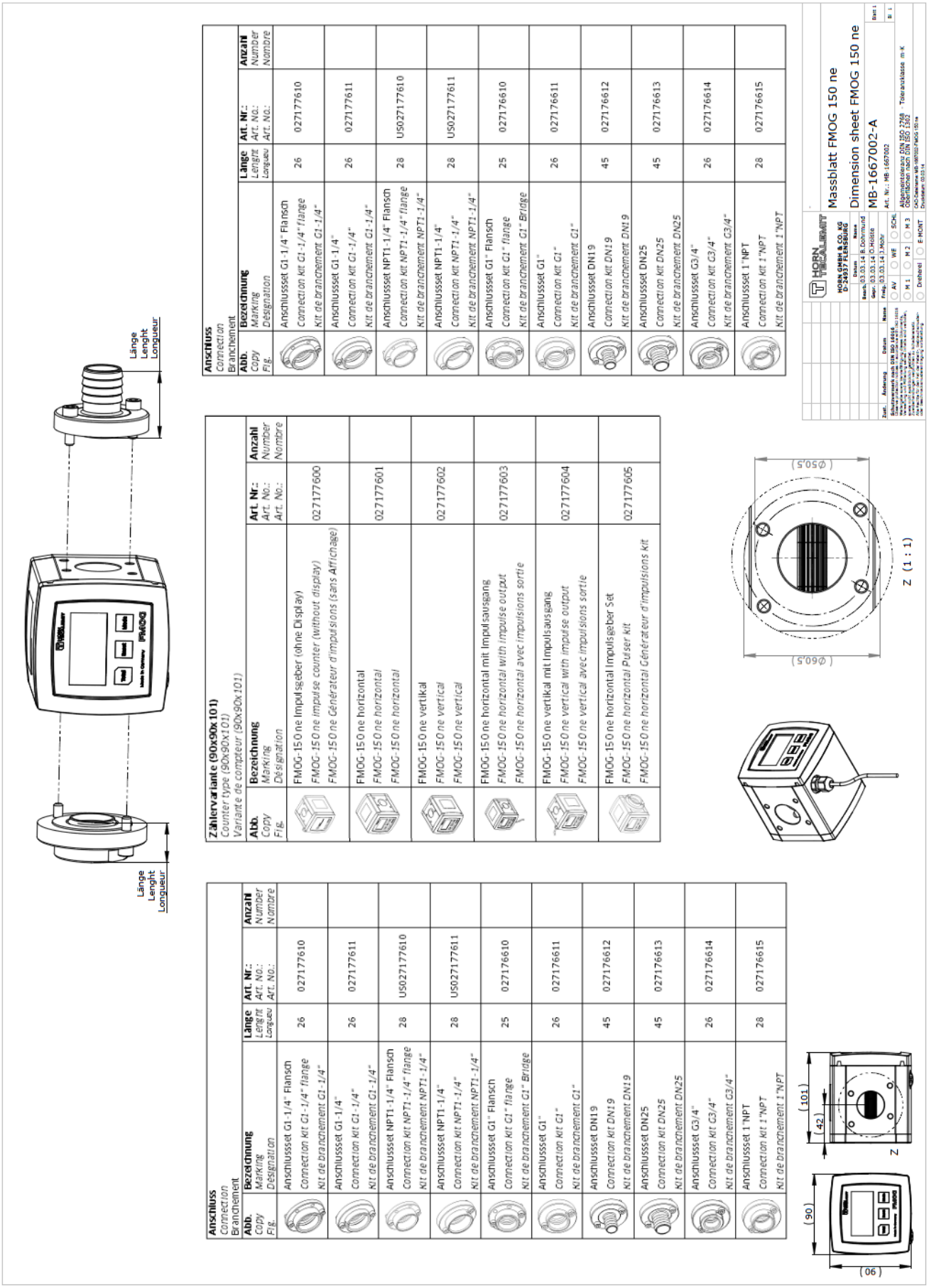
Blatt 1
Bl 1

Art. Nr.: MB-1667001

Allgemeintoleranz DIN ISO 2768 - Toleranzklasse m-K
Oberflächen nach DIN ISO 1302

CAD-Dateiname: MB-1667001-FMOG 100 ne
Druckdatum: 03.03.14

2.5 Dimensions sheet FMOG 150 ne



2.6 Installation Instructions

Before installation and commissioning the equipment is to be checked for completeness and damage.

The provisions of the [German) Operating Safety Ordinance are to be observed.

⚠ **Incomplete or damaged equipment may not be taken into service!**

With the installation, attention must be paid that the counter and the counter casing are not distorted. A clamping force which, for example, can occur with installation between two pipes, can lead to a malfunction or also to a defect of the counter.

3. Operating range

	FMOG 100 ne	FMOG 150 ne
Casing	Aluminium	
Viscosity range	20 - 2000 mPas	
Volume flow Q for low viscosity liquids (e.g. diesel fuel)	10 - 100 l /min	15 – 150 l/min
Volume flow for high viscosity liquids (e.g. motor oil)	3 - 30 l/min	5 – 50 l/min
max. Operating pressure p max.	15 bar	
Threaded / flange connection	See Chapter "2.3.1"	
Measuring accuracy	+/- 1%	
After calibration	+/- 0.5%	
Dimensions	90 x 90 x 81 (w x h x d)	90 x 90 x 101 (w x h x d)
Weight	ca. 1.1 kg	ca. 1.45 kg
Permitted operating temperature	-10°C to +50°C	
Permitted storage temperature	-20°C to +70°C	
Type of protection	IP 67	
Battery*	Lithium battery	

3.1 Elements of the FMOG 100 ne with display

3.1.1 Display

Evaluation electronics with five figure LC display for volume indication with 16 mm high characters and indication of the unit of measure litres (optional US gall., UK gall.) and indication of low battery capacity.

The smallest increment of the measured value is 0.01 litres. The smallest increment of the non-resettable totalisator is 1 litre.

3.1.2 Keypad

Membrane keypad with three keys: "Total“, "Reset“ and "Mode“.

3.1.3 Battery

Lithium battery (Type CR ½ AA, 3.6 V, 1200 mAh) with a minimum service life of approx. 10 years (depending on temperature) for a flow quantity of 1,000,000 liters during this period of time.
The battery can be replaced by opening the housing, and is available under the article number 814938001. Cumulative and calibration values are retained when the battery is replaced.

3.1.4 Logging of measured values

Recording of the measurement chamber pulse signals.

Error-redundant storage and readout of units of measure and calibration factor.

3.1.5 Pulse output (optional)

Under the option "pulse output", the counters with a pulse output have a dual channel pulse output with 2 x 50 single pulses/unit of measurement. The pulses are 90° ± 60° out of phase. The counter can be operated using an external voltage source of 5 VDC - 24 VDC.

3.1.6 Terminal layout

Terminal	Colour
Vcc (5VDC – 24 VDC)	Yellow
Pulse output A	Green
Pulse output B	White
Earth	Brown

Characteristics of the pulse outputs: Open collector, VCemax = 30V, Icmax = 50 mA, not short-circuit-proof against Vcc.

3.2 Pulse output of the FMOG 100 ne without display

3.2.1 Cover and measured value logging

Reed contacts are plugged in the cover instead of evaluation electronics and display. These, together with external electronics, create pulses with the flow of a medium through the measurement chamber.. The evaluation and calibration of the pulses takes place in the external electronics (e.g. Horn HDM eco).

For the FMOG 100 ne, approx. 53.95 pulses are generated per liter and for the FMOG 150 ne, approx. 35.43 pulses per liter.

3.2.1 Terminal layout

Terminal	Colour
Pulse output	White
Earth	Brown

Following parameters of the external electronics must be observed:

- Switch voltage at the reed contact maximum 5.2 V
- Length of the connection cable max. 5"5 metres
- Input capacity max. 10 nF

4. Operating instruction*

4.1 Delivery status

Following delivery, the counter is furnished ex-factory with the unit "litre" and the calibration factor "1.000". With pretested counters the calibration factor is already adjusted ex works, otherwise this can also be carried out subsequently. The counter is ready to measure deliveries, without further intervention.

4.2 nitial state, flow measurement

In the initial state the measured volume since the last resetting is indicated on the LC display. The indication takes place with the three pre-decimal and two post-decimal places; the smallest increment is 0.01 litre. The unit of measure "Litre" (optional US gallon, UK gallon) is shown in the lower line.

4.3 Restoring key "Reset"

After pressing the "Reset" key the program status is shown for as long as the key is pressed. After releasing the key a test of all segments and the resetting of the volume counter are carried out one after the other. In the case that while pulse signals are input (volume flow) then the indicator test is interrupted and there is a change into initial state.

4.4 Totalisator key "Total"

After pressing the "Reset" key the program status is shown for as long as the key is pressed. Five digit or even higher values can be fully displayed by pressing the "Total" key for ca. 3 seconds. With this, the five digit value runs through the four digit indicator. Display is rounded down in litres (optional US galls, UK galls). In the case that while pulse signals are input (volume flow) then the indication of the totalisator status is interrupted and there is a change into initial state.

4.5 Indication of the calibration factor key "Total" + "Reset"

If with pressed "Total" key (indication of the totalisator status) the "Reset" key is also pressed, the calibration factor set is indicated for as long as both keys are pressed. The calibration factor can lie in the range 0.5 to 1.5.

In the case that while pulse signals are input (volume flow) then the indication of the calibration factor is interrupted and there is a change into initial state.

5. Error monitoring*

5.1 Indication of the battery symbol in the initial state

The installed 3.6 V lithium battery, Type CR ½ AA, is designed for a minimum service life of ca. 10 years with a throughflow quantity of 1,000,000 litres in this period. If in the initial state the battery symbol is indicated then the battery capacity is exhausted and the battery must be exchanged within half a year. The time details, under extreme conditions such as high throughflow quantities or extremely low temperatures, can reduce.

The battery is exchangeable without tools following opening of the casing. Cumulative and calibration values are retained with exchange.

5.2 Indication of five dashes "-----"

If the counter sets its function and only five horizontal dashes can be seen in the indicator then there is an error in the evaluation electronics, the counter must be exchanged.

6. Programming of the counter*

6.1 General

The unit (litre, US gall., UK gall.) and the calibration factor (0.500 - 1.500) can be set and stored error redundant.

The calibration is carried out, via the respective keys, on the display. With the exception of the counter Art. No.: 027176600, whose calibration takes place using the higher control.

In order to determine a new calibration factor, a delivery into a calibrated container or via reference counter must first be carried out. The new calibration factor is calculated as follows:

$$Factor_{new} = Factor_{old} \times \frac{Volume_{delivered}}{Volume_{indicated}}$$

Example:

A 20 litre measuring vessel is filled, the counter indicates 19 litres only. The old calibration factor is 1.040.

The new calibration factor is calculated as:

$$1.040 \times \frac{20}{19} = 1.090 \text{ (rounded down)}$$

Please note: While the counter is in the programming mode no volume pulses are counted. In the case that more than five minutes elapse when no key is pressed in the programming mode, the counter switches back automatically into the initial state.

6.2 Switching into the programming mode

In order to get into the programming mode the "Mode" key is to pressed for ca. 5 secs. In the LC display all segments blink in a rapid rhythm (ca. 3 Hz).

6.3 Setting of the unit of measure

After releasing the "Mode" key the set unit of measure appears in the indicator. Through renewed multiple pressing of the "Total" key the unit of measure changes between "Litre", "US gall." and "UK gall.". The unit of measure set is adopted by renewed pressing of the "Mode" key. Please note: In the case that the unit of measure has been changed, then the volume indicator and totalisator are reset.

6.4 Setting of the calibration factor

After pressing the "Mode" key the set calibration factor appears in the indicator. By pressing the "Total" key the calibration factor is incremented in steps of 0.010; by pressing the "Reset" key it is correspondingly decremented.

The calibration set is adopted by pressing of the "Mode" key.

6.5 Resetting of all settings (first initialisation)

If during setting of unit of measure or calibration factor the "Total" and "Reset" keys are pressed at the same time and held, all values of the counter are deleted and a first initialisation is carried out.

The following values are installed:

Unit of measure:	litre
Calibration factor:	1.000
Delivery quantity:	0 litre
Totalisator:	0 litre

6.6 End of the programming mode

In order to end the programming mode the "Mode" key is to be pressed again after setting the calibration factor. The counter switches back into the initial state. In the case that more than five minutes elapse when no key is pressed in the programming mode, the counter switches back automatically into the initial state.

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.

8. Declaration of Conformity

Konformitätserklärung
Declaration of Conformity

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

Typ: *Type:*	**FMOG-100 ne, FMOG-150 ne** ***FMOG-100 ne, FMOG-150 ne***
Bezeichnung: *Designation:*	**Durchflussmesser** ***Flow meter***
Artikel-Nr.: *Item No.:*	**916670001, 916670002, 916670003, 916670004, 916670005, 916670006, 916670007, 916670008, 916670009, 916670010**

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: Jörg Mohr
EC official agent for documentation:

Horn GmbH & Co. KG
Munketoft 42
24937 Flensburg

27.02.2014
Datum
Date

.....
i.V. Dipl.-Ing. Jörg Mohr
Entwicklungsleiter / *Engineering Manager*

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