TECALEMIT

Operating manual

Meter

FMT 3

Item-No.:
399120200, 399120201

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.

Copyright

Service Hotline **+49 1805 900 301**
Repair service **+49 1805 900 302**
(0,14 €/Min: on the German landline network, Mobile telephone max. 0,42 €/Min.)

service@tecalemit.de

Document-No.: 399120270GB-A
Translation of: 399120270DE-A
As of: September 28, 2022

Table of contents

1 Safety instructions

This device was manufactured taking into account the relevant laws and directives for ensuring security as well as the protection of the environment and health. Despite this, its use may result in hazards for persons and material assets. Hence, it is essential that the instructions in this manual are complied with.

Warning notices and symbols

In this operating manual, the following symbols are used to point out especially important information:

Specific details on the economic use of the device.

Specific details and/or instructions for damage prevention.

Details and/or instructions for preventing injury to persons or extensive material damages

Intended use

Use the device only when it is in perfect working condition and only for its intended purpose while observing all safety precautions and risks. In particular, all malfunctions that could pose a safety hazard are to be corrected immediately.
The device and its components are intended for use exclusively with the liquids listed and only for the purpose described. Any other use or additional manner of usage is not intended.

Organizational measures

This operating manual is to be kept within easy reach at the place of operation. The nameplate and the warning labels on the device must be observed and kept completely legible at all times.

Qualified personnel

The personnel for installation, commissioning, operation, and maintenance of the device must possess the relevant and adequate qualifications for these tasks. The operator must ensure that the contents of this manual are fully understood and implemented by the personnel.

Maintenance and repairs

Do not make any changes, extensions and/or modifications to the device without the manufacturer's permission. Replacement parts must conform to the technical specifications defined by the manufacturer. For original parts, this conformity is always guaranteed.

Hazardous substances

In exceptional cases, the components of this device may contain hazardous substances. In accordance with the requirements of the European REACH regulation, we provide current information on this on our homepage, in the download section.
Observe all safety regulations for the respective product when handling oils, greases, fuels and other chemical substances!

Hydraulics

Only personnel with special knowledge of and experience in hydraulics are allowed to perform work of any type on hydraulic equipment. Depressurize the device before performing any work on it. All pressure-bearing components are to be inspected regularly for leaks and damage.

Electrical energy

Work on electrical equipment is only to be performed by qualified electricians. De-energize the machine and system components before performing any work on the device.
The insulation on all live parts is to be inspected regularly for damage.

Water protection

The device has been constructed for use with water contaminants. It is to be operated such that bodies of water cannot be polluted by it. All applicable regulations at the place of operation are to be complied with!

2 Technical description

2.1 Description

The FMT 3 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 FMT 3 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 3 turbine meter consists of a measurement tube with a turbine and an electronic housing which contains the evaluation electronics, display, and keypad. The turbine is equipped with a magnet which transfers the measurement pulses to a reed switch on the evaluation electronics when a medium flows through it.
The FMT 3 has a non-resettable total volume memory and 8 resettable partial volume memory slots which allow e.g. the fuel consumption of individual vehicles to be monitored.

Permissible fluids: diesel, fuel oil, water, radiator antifreeze (concentrated or diluted), other fluids on request

2.2 Product versions

Art. no.	Type	Material*
399120200	FMT 3 Al	Aluminium, POM, Stainless Steel
399120201	FMT 3 Al Pulser	Aluminium, POM, Stainless Steel

* Material of measurement chamber, measurement chamber lid, and of turbine

2.3 Technical data

Volume flow range	5 – 120 l/min	Nominal width	1“ external thread
Viscosity range	0.8 – 40 mPa s	Protection category	IP 65
Operating pressure (max.)	10 bar	Burst pressure (min.)	20 bar
Accuracy, uncalibrated*	± 2%	Dimensions approx.	85x 123 x 52 mm
Accuracy, calibrated*	± 1%	Weight approx.	0.24 kg
Repeat accuracy	± 0.5 %	Operating temperature range:	-25°C – +50°C
Battery	2 x AAA 1.5V Alkali Manganese Dioxide ZnMnO2	Storage temperature range:	-25°C – +70°C

* Test assembly: Medium water/diesel, settling section of 0.2 m before and after meter

2.4 Display

LCD display with
- Four-digit volume display with digits measuring 17 mm in height for current dispensation
- Seven-digit display with digits measuring 6 mm in height for totalizers
- Display in liter units (optional: GAL, PTS, QTS) and flow rate (l/min)
- Low battery alert on display.

The minimum digital step of the measured value is 0.01 liters and that of the non-resettable totalizers 1 liter

2.5 Keypad

Front membrane with three keys: "Reset", "Mode", and "Light".

2.6 Battery

Two 1.5 V batteries (AAA) with a minimum service life of approx. 5 years for a flow quantity of 1,000,000 liters during this period without use of the illumination. If the illumination is used, the service life decreases with frequency of use.
The battery can be replaced after opening the housing (see chapter 6.2). Volume and calibration values remain stored in the device after a battery change.

2.7 Pulse out

In the product version "pulse output", the FMT 3 has a single-channel pulse output for connecting a tank data recording system (signal type: open drain, short-circuit-proof).

Please note the following technical data in addition to those specified in Chapter2.3:

Umax:	30 V	Imax:	100 mA
Cable assignment:			
Pulse output, open drain	White	Cable length:	5 m
GND (ground)	Brown		

The pulse valence depends on the unit of measurement selected; see the following table:

Unit of measurement	Display	Pulse valence
Liter	L	25 pul. / L
US Gallons / Imperial Gallons	GAL	100 pul. / GAL
US Quarts / Imperial Quarts	QTS	25 pul. / QTS
US Pints / Imperial Pints	PTS	12.5 pul. / PTS

2.8 Accessories

According to the application, these accessories can be ordered:

	Item no.
Attachement kit FMT 3 universal DN19	**253591996**
Attachement kit FMT 3 to Hornet 50/80	**253591998**
Attachement kit FMT 3 to Hornet W85H	**253591999**

3 Assembly instructions

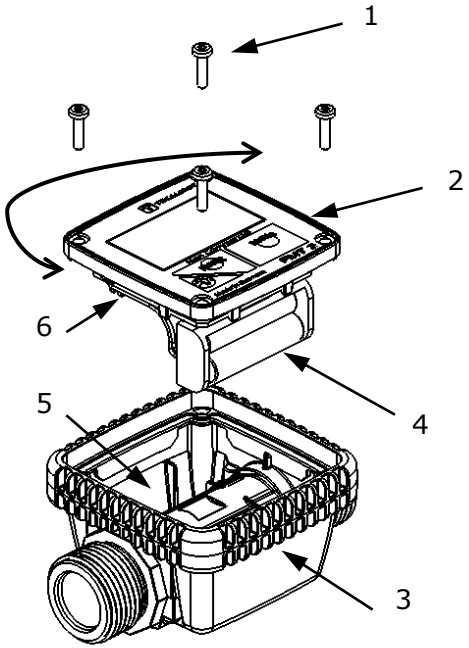
3.1 Installation in pipes

The FMT 3 possesses G1" external threads on both sides which allow it to be installed in any pipe. When doing so, please ensure that the meter is not under mechanical stress due to tension/pressure or bending. To avoid this, an elastic equalizing element is to be used, and the lines are to be supported in a suitable manner. In order to prevent damage, the tightening torque at the G1" external threads are not to exceed 30 Nm.
The flow direction can be chosen freely.
We recommend the use of front-side flat seals or O-rings at the ends of the screw threads for sealing purposes.
After being screwed into the pipe, the electronic housing can be rotated freely around the measurement tube. This allows the display to be brought into a position that is comfortable for the user.

The pressure surges that occur in the pipe are not to exceed the nominal pressure.

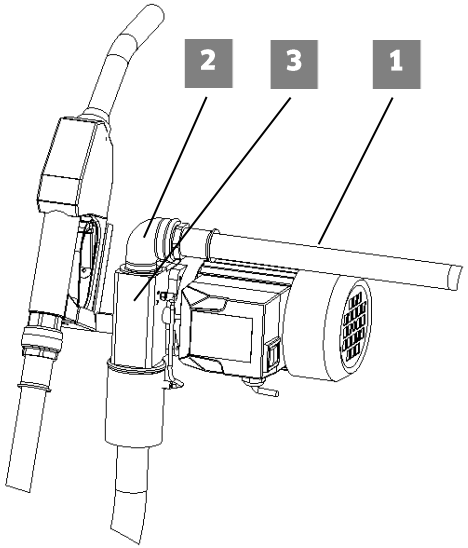
3.2 Rotating the display (only versions without pulse out)

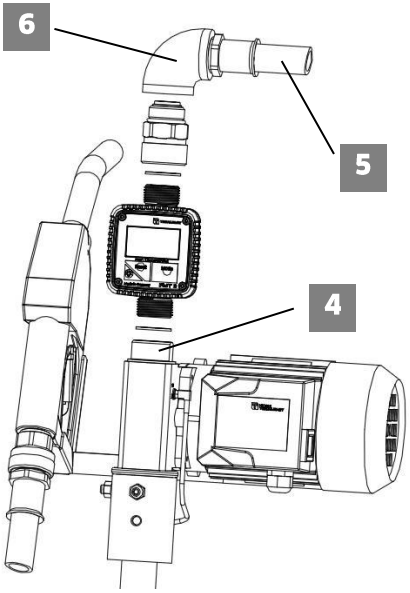
The display of the FMT 3 [1] can be mounted both vertically as well as horizontally in order to allow the meter to be read off comfortably. To turn the display, the four screws [2] on the top side are loosened and the display is pulled upwards. The display can now be replaced in any desired orientation. The rubber shock protector [3] is not to be rotated along with the display. The battery housing [4] may need to be placed on the other side [5] of the meter housing to prevent the battery housing and battery connector [6] from colliding. The battery cable needs to be laid such that it is not pinched between the reed switch and the housing.



3.3 Instructions for retrofitting FMT 3 to HORNET 50 II, 80, 120

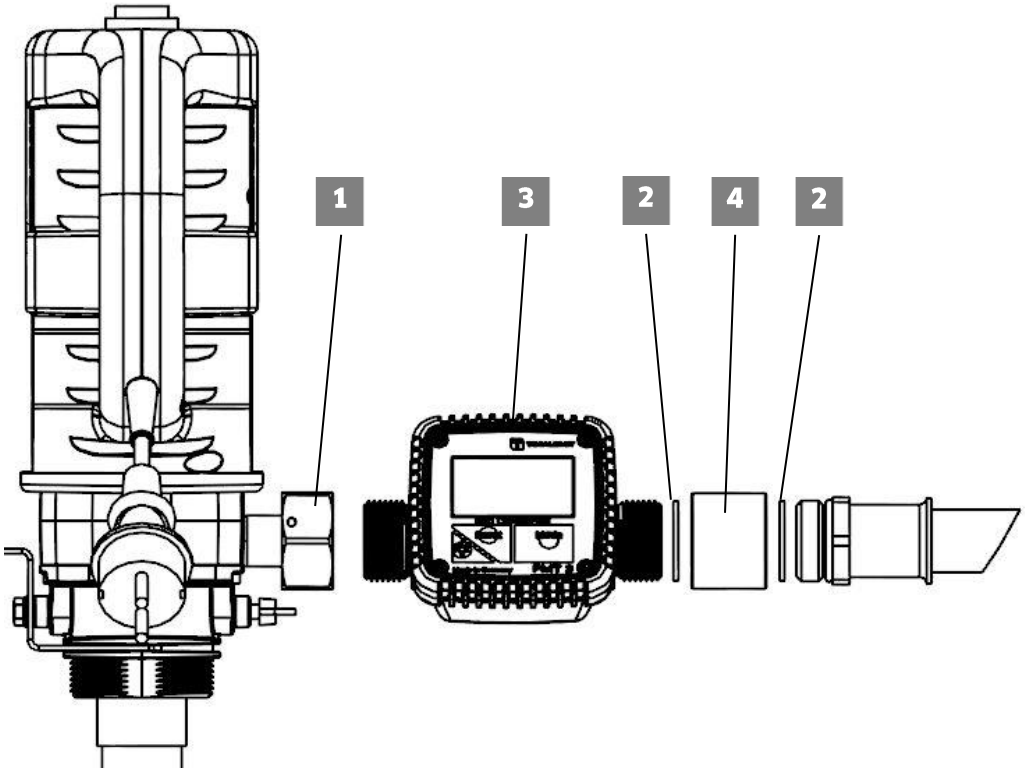
- Before installation, check all components to ensure that all packaging materials have been completely removed.
- Remove dispensation hose (1) from 90° elbow (2).
- Unscrew G1" elbow (2) from the pump (3) (warm it up at the ends, e.g. with a heat gun)
- Insert the two provided sealing rings all the way into the screw threads of the extension piece and the swivel joint (4).
- Screw the provided extension piece (4) to the meter.
- Screw the meter with extension piece into the pump, simultaneously sealing the joint with pipe thread sealant or teflon tape. You do not have to pay attention to the direction of flow, as the FMT 3 can be used with both flow directions.
- Screw the swivel joint to the meter, which in turn is screwed to the provided G1" elbow (6).
- Attach dispensation hose (5) to elbow (6).
- After assembly, check all connections for leaks.

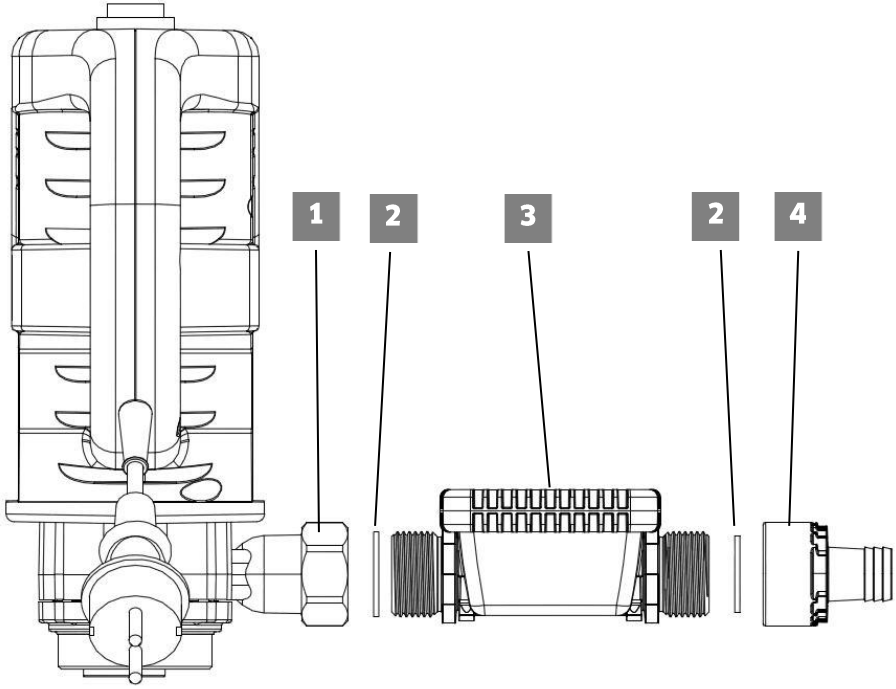

2
3
1


6
5
4

3.4 Instructions for installing FMT 3 on HORNET W 85 H

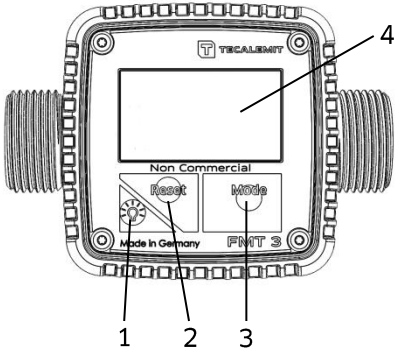
- Before installation, check all components to ensure that all packaging materials have been completely removed.
- Insert sealing rings (2) into adapter coupling (4) on both sides.
- Screw adapter coupling (4) with sealing rings (2) onto the meter (3) and screw tightly in place. You do not have to pay attention to the direction of flow, as the FMT 3 can be used with both flow directions.
- Place O-ring on pressure port and lubricate. Lightly insert meter (3) onto pressure port where the cap nut (1) is. Now screw the cap nut (1) onto the meter (3) and screw tightly in place. When doing so, ensure that the smaller of the two diameters on the meter connects to the pressure port in order to correctly secure the O-ring in place.
- After assembly, check all connections for leaks.


1
3
2
4
2


1
2
3
2
4

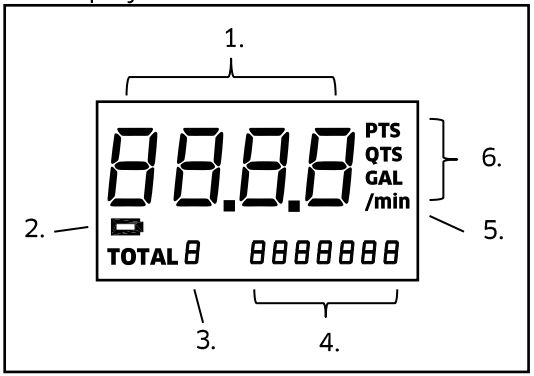
4 Operating the FMT 3

The FMT 3 is operated using three keys: "Reset" (2), "Mode" (3), and "Light" (1). Information is shown on the LCD display (4) with a permanently visible display.
Upon delivery, the meter is factory-configured with the unit "liters" and the calibration factor "1.000". The accuracy of the display can be increased through calibration, and the unit of measurement can also be changed (see chapter 5). After installation, the meter is ready to measure dispensations without requiring further configuration.



4.1 Description of display

The display is divided into various areas



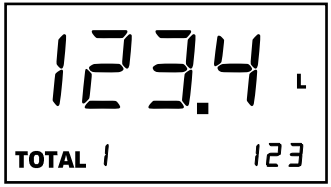
1. Four-digit partial volume display with floating point, values range from 0.00 to 9999
2. Battery symbol
3. Indicates partial volume totalizer (TOTAL 1 – TOTAL 8) or total volume totalizer (TOTAL)
4. Seven-digit totalizer display, values range from 0 to 9999999
5. Volume flow display
6. Volume unit display

4.2 Dispensation mode

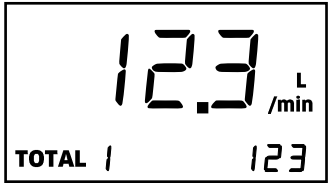
For daily use, the FMT 3 is set to **Dispensation mode**.

4.2.1 Dispensation active

During a dispensation, both the partial volume display as well as the selected totalizer will be continually updated. The total volume totalizer will always be updated in the background even if it is not shown on the display.



The following key combinations are possible during dispensation:
"Light" key: The display illumination is turned on for 15 seconds.
"Mode" key: The current flow rate is shown in the partial volume display for as long as the "Mode" key is held down.

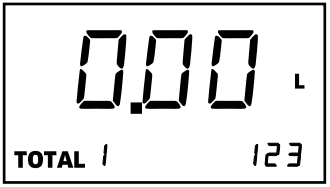


4.2.2 No active dispensation

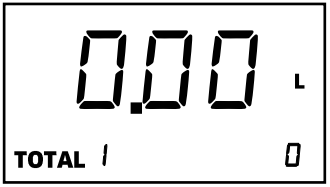
The partial volume for the last dispensation as well as the current value for the selected totalizer are shown on the display. The following key combinations are possible:

"Light" key: The display illumination is turned on for 15 seconds.

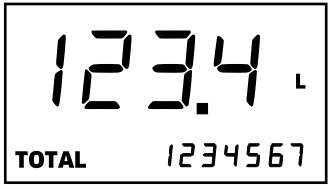
"Reset" key: Pressing this key for a short time resets the partial volume display.



Holding it down for a longer time resets the active partial volume totalizer. The total volume totalizer cannot be reset.



"Mode" key: Pressing this key for a short time toggles between partial volume totalizers (TOTAL 1 – TOTAL 8) and the total volume totalizer (TOTAL) shown.



Holding down the "Mode" key for a longer time until the program version is shown (e.g. "P1.33") switches the device to **Programming mode** (see chapter 5).

5 Programming the meter

The device allows the unit of measurement (liters, US gallons, US quarts, US pints, imperial gallons, imperial quarts, imperial pints) to be selected, the basic selection of the medium characteristic curve (watery media, thin mineral oils) to be performed, as well as a calibration to be performed to optimize measurement accuracy.

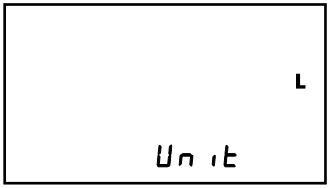
5.1 Switching to programming mode

Hold down the "Mode" key until the program version is shown (e.g. "P1.33" to switch to **Programming mode**.

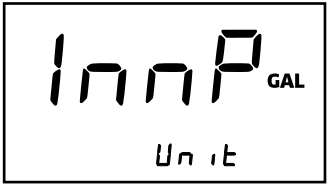
Once the key is released, a display test is carried out. Subsequently, multiple settings can be configured in succession, beginning with the **selection of the unit of measurement for volume**. In programming mode, the display will blink. If no key is pressed for more than 60 seconds, the device will cancel programming mode and return to **dispensation mode**.

5.2 Setting the unit of measurement

The configured unit of measurement is shown and can be changed if necessary. If the unit is changed, the partial volume shown as well as all totalizers will automatically be converted.



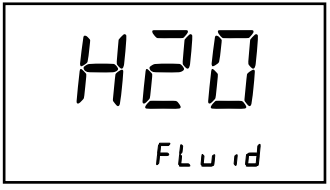
"Reset" key: Toggles between the units liters (L), US gallons (US GAL), US quarts (US QTS), US pints (US PTS), imperial gallons (IMP GAL), imperial quarts (IMP QTS) and imperial pints (IMP PTS).



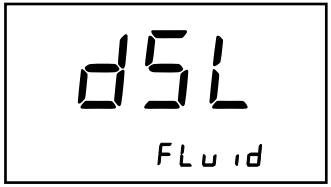
"Mode" key: Confirms the volume unit shown and switches to **Fluid selection**.

5.3 Setting the medium conveyed

The FMT 3 meter is configured with two optimized characteristic curves for watery media such as water or AdBlue, as well as for thin mineral oils such as diesel or fuel oil at 20 °C. One of these two characteristic curves can be chosen.



"Reset" key: Switches between the characteristic curves for watery media (H2O) and for thin mineral oils (dSL).

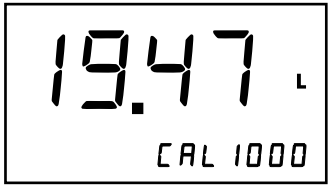


"Mode" key: Confirms the fluid shown and switches to **Calibration**.

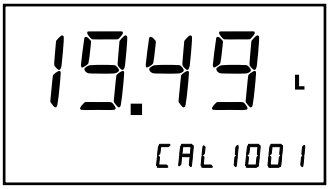
5.4 Setting the calibration factor

5.4.1 Calibration

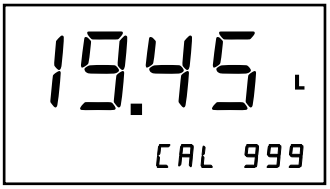
The selected characteristic curve of the FMT 3 can be subjected to an additional calibration to compensate for special operating conditions, such as unusual media temperatures or borderline flow values.
Shown on the partial volume display are the measured quantity for the last dispensation, as well as the calibration factor in the lower line (factory default 1000, configurable values 500–1500).



"Reset" key: Increases calibration factor by 1; increases the dispensation value shown by 1/1000. Hold the key to increase the setting speed.



"Light" key: Decreases calibration factor by 1; decreases the dispensation value shown by 1/1000. Hold the key to increase the setting speed.

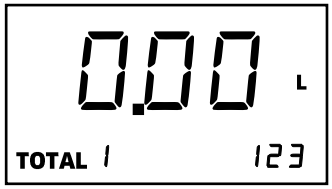


"Mode" key: Confirms the calibration factor shown and switches back to **Dispensation mode**.

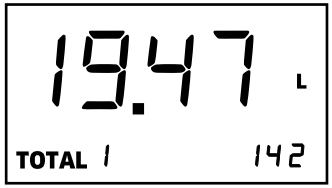
5.4.2 Calibration with measuring vessel

One easy way to perform a calibration is by performing a comparison using a sufficiently large and precise measuring vessel. Proceed as follows:

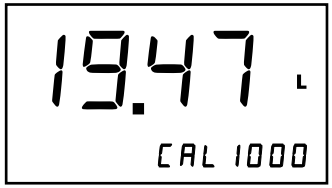
1. Meter is in dispensation mode, partial volume counter has been deleted



2. The dispensation is carried out at a flow speed that is as constant as possible until the measuring vessel is filled to the defined volume.

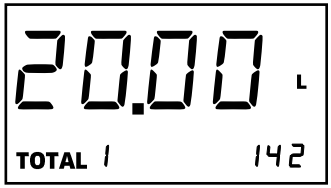


3. Switch to programming mode, sub-menu "Calibration" (skip Volume unit and Fluid menus with the "Mode" key).



4. Adjust the calibration factor until the quantity displayed corresponds to the quantity dispensed into the measuring vessel.

5. Save the new calibration factor and return to **Dispensation mode**.



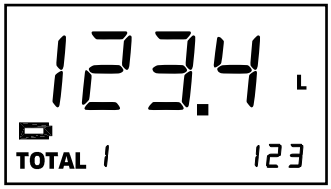
6 Maintenance

6.1 Cleaning the meter

In the case of dirt or stains on the exterior of the device, clean it carefully using a damp cloth and mild cleaning agent. Do not use any aggressive (e.g. abrasive, chlorine-containing) cleaning agents or solvents. The screen of the display may turn milky upon contact with solvents.

6.2 Changing the battery

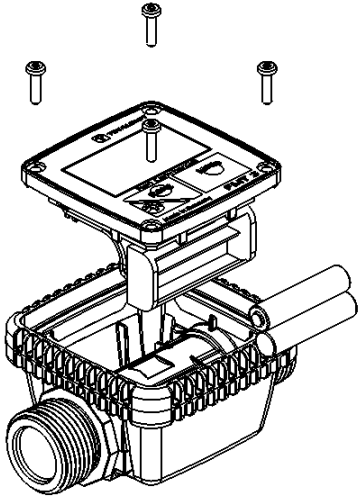
When the battery symbol appears on the display, it is recommended that the batteries of the FMT 3 be changed as soon as possible. It will be possible to continue using the meter, but the display illumination will not work.



If all that appears on the display is a blinking battery symbol, it will be necessary to change the batteries before the meter can be used again.

All displayed and saved values are retained during a battery change.

To change the battery, remove the front cover by loosening the four screws on the top and pulling the cover upwards. Now remove the battery housing from the device housing and replace the batteries with normal store-bought batteries (1.5 V, type AAA). The device is then closed back up in reverse order. When doing so, ensure that the rubber shock protector is in the correct orientation. The battery cable needs to be laid such that it is not pinched between the reed switch and the housing.



7 Error messages– What do I do when...

... the battery symbol appears on the display?

Change the batteries (see chapter 6.2).

... nothing appears on the display?

Ensure that the batteries have been placed in the correct orientation and the battery cable has been connected to the control circuit board.
Check if the batteries have sufficient charge. Replace batteries if necessary (see chapter 6.2).

... the value on the display does not change, or only moves very slowly?

Free the turbine in the measurement tube of foreign objects.

... the display shows too much or too little?

Check that the permissible flow rate and media specifications are complied with.
Calibrate the meter (see chapter 5.4).

... the illumination no longer works?

Change the batteries (see chapter 6.2).

8 Disposal

Upon being decommissioned, the device is to be completely emptied and the fluid(s) disposed of properly. Upon being taken out of service permanently, the device is to be dismantled by specialist personnel and disposed of properly:

- Dispose of used metal parts at a recycling facility for metal.
- Bring plastic parts to a recycling center.
- Bring electrical scrap to a recycling center.
  Batteries which are not permanently sealed, glued shut, or installed must first be removed and disposed of separately.

☛ **Observe all legal regulations concerning water protection.**

8.1 Disposal of batteries

Batteries are not to be disposed of as unsorted municipal waste.

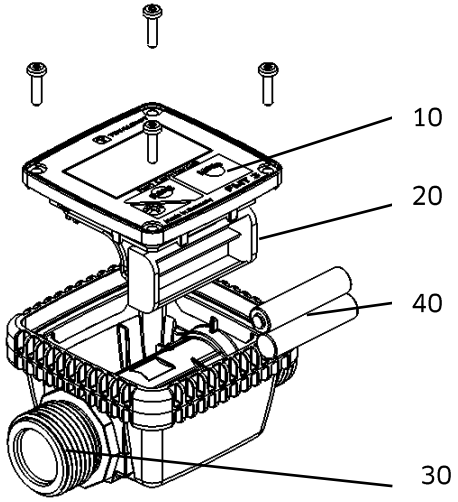
Batteries can be returned free of charge via a suitable collection point or at the dispatch warehouse. End users are legally obliged to return used batteries. Batteries containing hazardous substances are marked with the chemical symbol of the heavy metal that causes them to be classified as hazardous waste:

"Cd" stands for cadmium "Pb" stands for lead "Hg" stands for mercury

Lithium batteries and -battery packs must be fully discharged before being brought to a return point. Otherwise, precautions against short circuits must be taken, e.g. by insulating the terminals with adhesive tape.

9 Spare parts

Item	Art. no.	Description
10	817050001	Cover incl. electronics (without pulse out)
	817050004	Cover incl. electronics (with pulse out)
20	517050011	Battery housing
30	817050002	Measurement chamber (without electronic housing)
40	450600750	Battery, 1.5V, type AAA (2x required)



Tecalemit GmbH & Co. KG
Munketoft 42
24937 Flensburg
Germany

T +49 461-8696-0
F +49 461-8696-66

www.tecalemit.de
info@tecalemit.de