OPERATING INSTRUCTIONS AND SAFETY NOTES

Manual Flow Meter



FMT Swiss AG

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FMT Swiss AG

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Operating instructions translation

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We reserve the right to make design and product modifications, which serve to improve the product.

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1. Introduction

1.1. Preface

Please carefully read these operating instructions and observe in particular all safety notes!

Our staff will be pleased to provide support if you have any questions about the product.

Yours sincerely, FMT Swiss AG

1.2. Obligations of the personnel

Before they start to work, all persons who are entrusted with work with manual flow meter, are obliged:

- to follow all applicable regulations on occupational safety and accident prevention.
- to read and to comply with all safety instructions and warning notes contained in these operating instructions.

Please observe the following instructions in the interest of all concerned:

- Refrain from any unsafe working methods!
- Adhere to all hazard and warning notes contained in this manual!
- In addition to this documentation, keep to all generally accepted safety rules, legal provisions as well as all other binding rules regarding occupational safety, accident prevention and environmental protection!
- Wear appropriate protective clothing in accordance with the work to be done!
- Perform only work for which you have been sufficiently trained and instructed!
- Only genuine spare parts as well as original tools and auxiliaries of the manufacturer are allowed to be used in order to ensure the functional safety and maintain the warranty coverage.

1.3. Symbols in this manual

1.3.1. Structure of the warning notes

The warning notes have the following structure:



SIGNAL WORD

Type and source of the hazard

- Consquences of non-compliance with the notes.
- Measures to avoid that risk.

Depending on the danger level, different signal words are used:

Signal word	Danger level	Consequences of non-compliance
DANGER	Imminent threat of danger	Death or serious bodily injury
WARNING	Possible threat of danger	Death or serious bodily injury
CAUTION	Possibly dangerous situation	Minor bodily injury
ATTENTION	Possibly dangerous situation	Damage to material property



NOTE

Indicates further information or tips which facilitate work.

1.3.2. Hazard symbols

Symbol	Meaning
	General hazard symbol. The warning note marked in this way contains supplementary information on the type of hazard.
	This symbol warns of dangerous electrical voltages.
	This symbol warns of a hazardous explosive atmosphere.

1.3.3. General symbols

Symbol	Meaning
■	A small black square indicates the work you have to perform.
–	The dash denotes lists.
⇨	The arrow identifies cross-references. If cross-references to other chapters are required within the text, the expression is shortened for reasons of clarity. Example: ⇨ Chapter 2 Safety notes. This means: please refer to chapter 2 for the safety notes.

2. Safety notes

Various dangers may occur if the manual flow meter is improperly handled during installation, commissioning and daily operation.



WARNING

Risk of injury and damage to material property because of improper handling!

- Hold the manual at the disposal of the operating staff at the usage site of the unit.
- Country-specific safety measures and accident prevention regulations must be observed.

2.1. Authorized personnel

Only qualified and authorized persons are allowed to operate and to work on the oval gear meter.

Persons are qualified if they are, due to their training, experience, instruction and knowledge of the relevant standards, able to assess assigned tasks and to identify potentially hazardous situations.

These persons must have been authorized by the person responsible for the safety of the unit and must be able to identify and to avoid potential dangers.

All persons charged with installation, operation, maintenance and repair work, must have read and understood this operation manual.

A copy of this operating manual must be stored permanently and ready at hand at the place of usage of the unit.

2.2. Intended conditions of use

The manual flow meter was designed and constructed for the precise measurement and registration of volumes of various media such as engine oils SAE 5 to 50 / gear oils SAE 80 to 240 (Item No. 19 698; 19698 950; 19698 95), antifreeze agents and radiator fluids (Item No. 19 700).

The manual flow meter is intended for integration at the end of a discharge hose, e. g. a hose reel. The user is liable for any damage resulting from non-intended use. The manual flow meter is only suitable for use with flame retardant fluids.

2.3. Reasonably foreseeable misuse

Any departure from the usage stipulations (other media, use of force) or user modifications (changes, use of non-original parts) can be dangerous and are considered as non-intended usage.

The use in the food industry is forbidden.

The manual flow meter must not be used in explosion risk areas.

Use only genuine replacement parts for repairs, because otherwise the warranty will be invalidated.



DANGER

Risk of injury and material damage from explosive vapours.

- Never pump explosive fluids such as gasoline or other fluids with similar flashpoints.

3. Risks involved in handling the manual flow meter and the fluids to be used

Improper use of engine and gear oils, antifreeze agents and radiator fluids may constitute a risk to humans and to the environment. Provide adequate ventilation and avoid splashing in the working area.

Do not allow leaking fluids to enter drains or ground water. Local and country regulations relating to domestic water supply must be obeyed.



DANGER

Use of engine and gear oils.

- Engine and gear oils may cause lung damage if swallowed.



WARNING

Risk of slips and falls because of leaks.

- In case of an excessive leakage, the manual flow meter must be immediately stopped and the source of the leakage must be repaired.



CAUTION

- Avoid skin and eye contact.
- In case of contact with the eyes, rinse the eyes with plenty of drinking water and consult a physician.
- Use appropriate equipment such as protective gloves and goggles.
- Keep the material data safety sheet at hand and adhere to it.

NOTE

- Particular mention must be given to all local water protection regulations, especially with regard to filling installations, which must be constructed, built, maintained and operated in such a way, that any risk of water pollution and/or any other environmental damage is excluded.
- The operator of such an installation is responsible for continuously monitoring the compliance with the above stated requirements at the place of installation.

4. Design and functional description

The manual flow meter is a liquid counter with an electronic register and a digital display.

The medium flowing through the meter sets two oval gear wheels in rotation, whereby a Hall sensor transmits pulses to the electronic register. By means of a calculation factor, these pulses are converted into the actual flow volume which appears on the display.

The factor has been pre-set at the factory using an average that has turned out to be useful in normal operation. However, this factor can be easily adapted to specific requirements by the user.

The volume flow can be started and stopped by means of the manually actuated valve built in upstream of the meter. The anti-drop coupler behind the meter immediately stops the flowing fluid and prevents any dripping.

The user needs only two membrane key switches for operation: RESET and TOTAL (total volume).

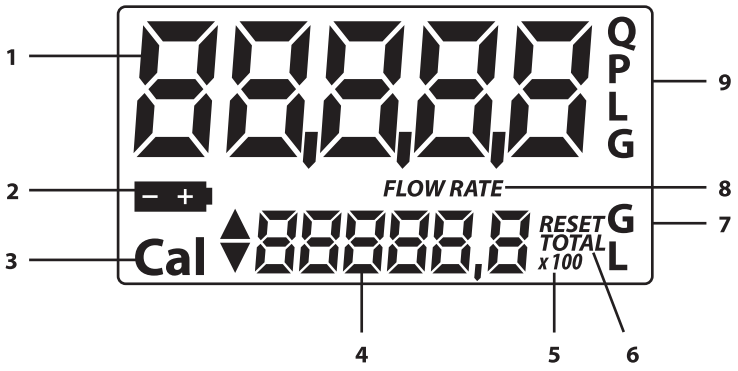
The electronic component is shockproof and sealed against the entry of oil. It meets the RFI and EMI shock test conditions.



The electronic components and LCD display sit at the top of the oval gear meter, well insulated against the wet measuring chamber. There is a cover to protect them against the working environment.

4.1. LCD display

The meter's LCD display is equipped with two numeric registers and different types of display modes showing information to the user only when it is actually needed with the operation / function going on at the moment.



Key:

1. Register of partial volume (5 digits with floating decimal: 0.000+99999) showing the amount of liquid that has been delivered since the RESET button was last pressed.
2. Battery charge.
3. Display of the calibration mode.
4. Register of total volume (6 digits with floating decimal 0.0-999999x10/x100) showing two different kinds of total volumes:
   4.1 Non-resettable total volume (TOTAL).
   4.2 Resettable total volume (RESET TOTAL).
5. Total volume multiplication factor (x10/x100).
6. Type of total volume display (TOTAL/RESET TOTAL).
7. Units for total volume; L = litres; GAL = gallons.
8. Flow rate display.
9. Display of measuring unit for partial volumes:
   QTS = quarters; PTS = pints; L = litres; GAL = gallons.

4.2. User controls

There are two push buttons on the meter (RESET and TOTAL), each controlling two main functions (pressed individually) and various auxiliary sub-functions (pressed simultaneously).

Main functions:

- RESET button: Resetting the partial volume register and the (resettable) total volume register RESET TOTAL.
- TOTAL button: Calling up the calibration mode. When pressed together, the two buttons call up the configuration mode where you select the unit of measurement.

4.3. Measuring chamber

The measuring chamber is located in the centre of the meter.

There is a oval gear in the measuring chamber, set in rotation by the flow of liquid. Each revolution will generate an electrical pulse that is processed by the microprocessor on the control circuit board.

The microprocessor uses a calibration factor (i.e. a ‚weighting' assigned to each pulse) to convert the pulses generated by the gears' revolutions into an intelligible value representing the volume of liquid that has passed through. It is then displayed in the unit pre-set before in the corresponding registers of the LCD display for partial and total volumes, respectively.

All of our oval gear meters leave the factory with a default calibration factor = 1000 called „FACTORY K FACTOR". There is a possibility to calibrate the meter in order to adapt that factor to the physical properties of different liquids.

There is always a possibility to return to the manufacturer's default setting.

4.4. Battery compartment

The meter is powered by two 1.5 V standard batteries (N1).

The battery compartment is inside the body. Remove the screw plug (⇨ chapter 15.1, pos. 4) to replace the batteries.

5. Technical data

Manual flow meter	**19 698** **19698 950** **19698 951**	**19 700**
Version	non calibratable	
Mechanical measuring components	oval gears	
Flow volume (l/min)	0 – 30	1 – 35
Typical fluids	engine oils SAE 5 to 50 gear oils SAE 80 to 240	radiator fluids antifreeze agents
Nominal pressure (bar)	70	
Operating pressure min. (bar)	0,30	0,35
Temperature range (°C)	-10 / +50	
Viscosity (mPa s)	8 – 5000	
Measuring tolerance (%)	± 0,5 %	
Repeat accuracy	± 0,3 %	
Display	digital, three digits before and two digits behind the decimal point	
Digit height (mm)	8	
Resolution (l)	0,002	
Impulses (pulses/l)	46	
Measuring unit	quarters (QTS), pints (PTS), litres (L), gallons (GAL)	
Batteries	LR 1_1,5 V	
Battery lifetime	approx. 2 years in case of an operating time of 0.5 hours a day (20 °C)	
Connection thread	G ½" f	
Material housing	die-cast aluminium	
Weight (kg)	1,92 / 1,68 / 1,65	1,92

Tab. 5-1 Technical data, manual flow meter

6. Assembly

The manual flow meter is supplied with assembly included.

According to the version, accessories may be or must be mounted.

NOTE

- Ensure cleanliness during installation and an exact connection and accurate sealing.

7. Installation

The inlet and outlet of the manual flow meter are aligned in a straight axis and are equipped with a G 1/2“ thread. The meter may be installed in any given position, as a fixed unit in a pipeline and/or as a mobile unit on a spigot.

The manual flow meter does not have a pre-defined flow direction. Both ends may alternatively serve as inlet or outlet, as needed. However, it is absolutely important that the side that is used as inlet (where the pipeline arrives) is equipped with a filter with suitable performance characteristics. Solid particles getting into the measuring chamber might clog up the ovar gear.

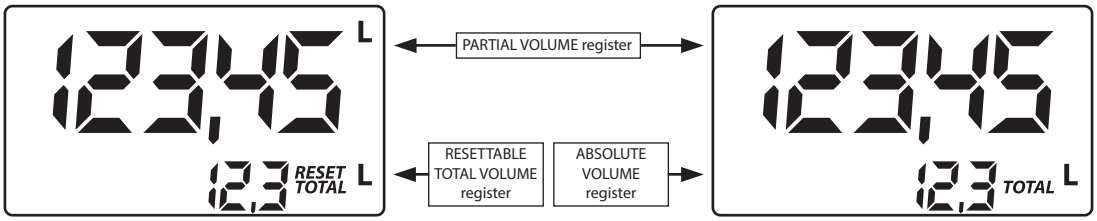
8. Routine operation

The manual flow meter is supplied ready for use.

Even after periods of prolonged storage, it will be ready for operation without any lengthy preparations.

The only action that may be necessary from time to time during normal operation is to reset the registers of partial and/or resettable total volumes.

To accomplish that, call up the two displays for normal operation. The first normal operation display contains the partial volume and resettable total volume (RESET TOTAL). The other display shows the partial volume and the non-resettable (absolute) TOTAL volume. The LCD automatically switches between resettable and absolute total in a given period of time. This has been set at the factory and cannot be influenced by the user.



The register of the absolute total (TOTAL) cannot be reset by the user. It will continue counting during the entire lifetime of the meter. The resettable and non-resettable registers of total volumes (RESET TOTAL and TOTAL) share the same ‚window‘ and the same digits of the LCD display. For that reason, the two numbers cannot be viewed at the same time but are always shown alternately in the display.

The oval gear meter has been programmed so that the one or the other total is visible at certain moments / in certain modes during operation:

- The absolute total volume (TOTAL) is visible in standby mode.
- The resettable total (RESET TOTAL) is visible at the following times / in the following modes:
  - For a short moment (several seconds) after resetting the (resettable) partial volume.
  - During fluid delivery.

A few seconds after fluid delivery, this short time span expires and the meter switches to standby mode. The display of the bottom register shows the absolute total volume.

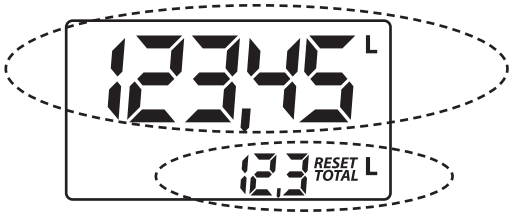
NOTE

For the display of total volumes, there are 6 digits available, plus two icons x10/x100. The increments are activated in the following sequence:

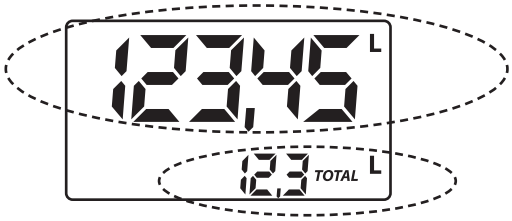
0,0 ---> 99999,9 ---> 999999 ---> 100000 x10 ---> 999999 x10 ---> 100000 x100 ---> 999999 x100

8.1. Output of fluid during standard operation (Normal Mode)

During standard output of liquid, the meter will count and at the same time display the volume having gone through the device so far, and the resettable total (RESET TOTAL).



Accidental pressing of the RESET or TOTAL button does not have any effect in this state.



A few seconds after fluid delivery, the display of the lower register will change from resettable total to absolute total: The word RESET above the word TOTAL will disappear, and the value of the resettable total will be replaced by the absolute total.

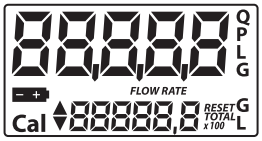
We call this state (or mode) „standby". It will persist as long as the user does not carry out any more actions on the meter.

8.1.1 Resetting partial volumes

For resetting the partial volume register: Press the RESET button while the meter is in standby, i.e. when you see the word TOTAL in the display.



When you press RESET, the display will first switch on all the segments, one after the other, and then switch them all off again.



When the reset is complete, the display will first show the partial volume having been reset and then RESET TOTAL.



After a couple of seconds, RESET TOTAL will be replaced by the NON-resettable total amount TOTAL.



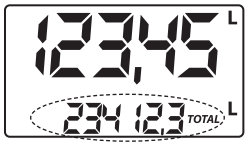
8.1.2. Resetting the resettable total volume (RESET TOTAL)

You can reset the resettable total only if you have reset the register of the partial volumes before. To reset the resettable total: press RESET for several seconds. The display will show the words RESET TOTAL (see fig.):



You must carry out the following steps (in this order):

1. Wait until the display is back to default standby mode (i.e. showing only TOTAL).
2. Press RESET shortly.
3. The meter will now start resetting the partial volume register.
4. While the display shows RESET TOTAL, shortly press RESET.
5. The display will show all the segments again. Only then follows the phase where all segments are switched off. Finally, there will be a display showing the total that has been reset (RESET TOTAL).







8.2. Fluid delivery with display of current flow rate (Flow Rate Mode)

It is possible to output a liquid and have the following displays available at the same time:

- Partial volumes having been output.
- Current flow rate (Flow Rate) in [unit of partial volume per min.], as shown below.

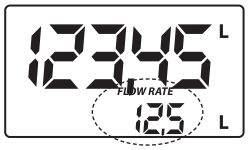
This is how you get into this mode:

- Wait until the meter is in default standby mode (i.e. the display shows only the total volume).
- Press TOTAL shortly.
- Start output operation.

The display of the current flow rate will be updated every 0.7 secs. For that reason the display may ‚flutter' somewhat with low flow rates. However, the higher the flow rate, the more stable the display will be.

NOTE

The current flow rate will be shown in the unit set for the partial volume register. That means if partial and total volume have been set to different units (as shown in the example below) you must bear in mind that the flow rate shown is in the unit set for partial volumes. In the example shown, the flow rate is in L./min.



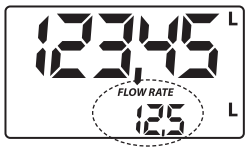
The word L next to the flow rate refers to the register of the (resettable and NON-resettable) total volumes which will be displayed again as soon as you leave the ‚current flow rate' display mode. In order to go back to the default standby mode, press the TOTAL button again. Accidental pressing of the RESET or TOTAL button does not have any effect in this state.

NOTE

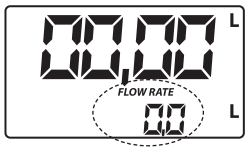
RESET TOTAL and absolute total (TOTAL) are not shown in this mode. However, the values nevertheless go up. You can check after fluid discharge. Wait for the default standby mode and press TOTAL shortly.

8.2.1. Resetting partial volumes

In order to reset the partial volume register, you must first complete the output of liquid. Wait until the display shows a flow rate of 0.0 (see fig.) and then press RESET shortly.



The effect is different from what you would have if you press Reset in default standby mode. There is no phase where all the segments are first switched on and then off again. Instead, the register will display the reset partial volume immediately.



9. Calibration

9.1. Definition

Calibration factor or „K FACTOR“:

This is the multiplication factor the system ascribes to the electronic pulses it receives in order to convert them into a plain unit of measurement.

- FACTORY K FACTOR: Calibration (default) factor pre-set at the factory.
  Factory K Factor = 1000.

This calibration factor ensures maximum precision under the following operating conditions:

Fluid	Oils	Antifreeze agents / radiator fluids
Flow rate	0-30 l/min	1-35 l/min

You can always return to the original Factory K Factor even after you have changed the value. The procedure is simple.

- USER K FACTOR: This is the calibration factor the user has set to adapt the meter to specific requirements (i.e. the user has carried out a calibration procedure).

9.2. Why calibrate?

The manual flow meter is delivered with a setting made by the manufacturer. In most operating conditions, this setting will ensure a precise measurement.

If a calibration is necessary, it should be conducted under the operating conditions in which the meter is used, such as in the following extreme conditions:

- Fluids having a viscosity close to the admissible limits (e.g. antifreeze with low viscosity, high-viscosity oils for gearboxes).
- Extreme flow rates (i.e. close to upper or lower limits).

9.3. Calibration mode

The manual flow meter offers the possibility to carry out a quick and precise electronic calibration by changing the calibration factor (K FACTOR).

There are two calibration procedures you may choose from:
- Calibration during simulated operation (requiring actual output of liquid to be carried out).
- Direct calibration (simply changing the calibration factor).

By briefly pressing the TOTAL button > FLOW RATE screen, and subsequently pressing the RESET and TOTAL buttons for a longer time, the calibration process can be called up for the following reasons:
- To display the valid calibration factor.
- To reset the calibration factor pre-set at the factory (FACTORY K FACTOR) after calibration by the user.
- To change the calibration factor using one of the two available calibration procedures.

During calibration, the registers on the LCD display - that normally show partial and total volumes of liquid output – will take on new meanings.

During calibration, the meter cannot carry out normal output operation.

During calibration, the count of the absolute total volume of liquid having been output (non-resettable total) will not increase.

NOTE

The manual flow meter is equipped with a non-volatile memory which ensures that the saved calibration and total discharge amount data are retained over an extended period, even without power supply. After battery replacement, a new calibration is not necessary.

9.3.1. Displaying the valid calibration factor – resetting the factory calibration factor (if necessary)

By briefly pressing the TOTAL button > FLOW RATE screen, and subsequently pressing the RESET and TOTAL buttons for a longer time, the calibration process can be called up for the following reasons:

Two situations are possible:

a) User never changed the calibration factor and/or user restored the factory calibration factor after changing it: the display will show the following:

The word FACT (short for FACTORY) indicates that the valid calibration factor is the factor pre-set at the factory.



b) If calibrations have been made by the user, the calibration value currently used is indicated (in our example 0,998).

The word USER indicates that the calibration factor currently used was entered by the user.

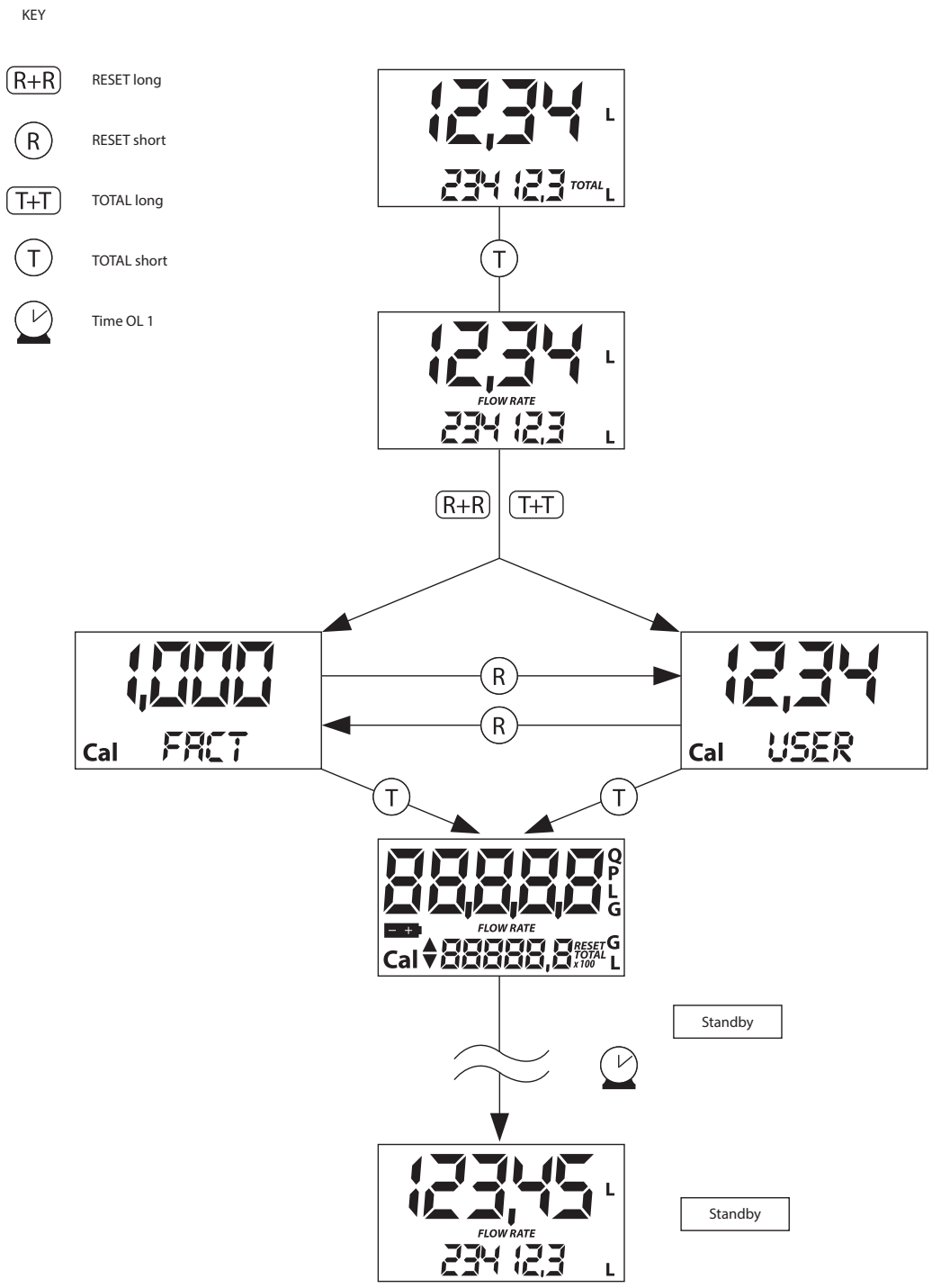


The flow chart below shows the schematics of the display modes the LCD display may go through.

In this mode, the user may press RESET and thus change from the USER to the FACTORY FACTOR.

In order to confirm your choice, shortly press TOTAL while the display shows either USER or FACT.

After re-start, the meter will use the new calibration factor you just confirmed.



NOTE

When you confirm restoration of the Factory K Factor, the old user factor will be deleted from memory.

9.3.2. Calibration during simulated operation

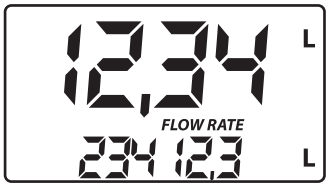
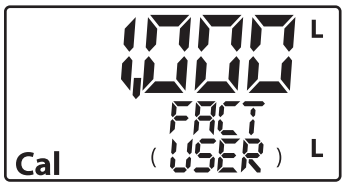
This procedure is basically a simulated output of liquid into a calibration vessel under actual operating conditions (flow rate, viscosity etc.). The procedure must be carried out with utmost care.

NOTE

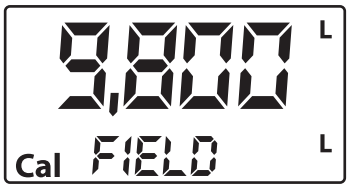
Absolutely bear in mind the following points in order to guarantee proper calibration:

- Have your equipment properly vented before calibration.
- Use a calibrated vessel holding at least 5 litres with a precise full mark.
- For calibration, tap a certain amount of test liquid with a constant flow rate, exactly as you would do in normal operation. Continue until the vessel is full.
- Do not decrease the flow rate when you approach the full mark. Instead, turn the spigot on and off and fill the vessel in small batches, but make sure the flow rate remains unchanged.
- When you are finished be sure to wait a few minutes and let air bubbles escape that may still be in the calibration vessel. Otherwise there is a danger you get a wrong value because the level in the vessel may still go down.
- Be sure to carry out the following procedure correctly.

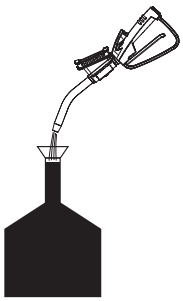
9.3.3. Meter calibration during simulated operation

	Operation	Display configuration
1	NONE Meter is in default standby mode, not counting.	
2	SHORT PRESS OF THE TOTAL BUTTON The meter changes to the FLOW RATE screen.	
3	LONG PRESS OF THE RESET AND TOTAL BUTTONS Meter switches to calibration mode, displaying TOTAL. Display no longer shows total volume, but instead the valid calibration factor. FACT and USER indicate whether valid calibration factor is FACTORY K FACTOR or USER K FACTOR.	
4	PRESS RESET SEVERAL SECS Meter shows TOTAL display and the resettable total register displays zeroes. Meter is now ready for simulated operation calibration.	

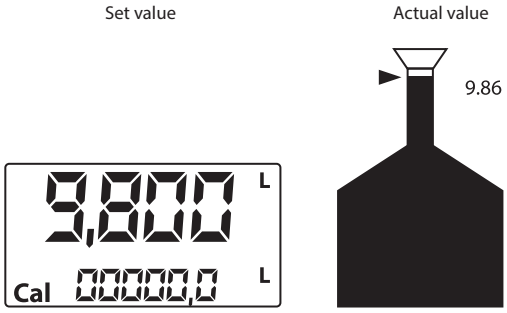
5 FILL LIQUID INTO CAL VESSEL



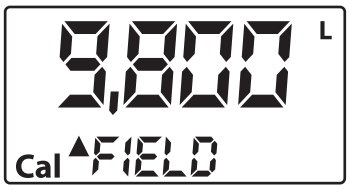
Start simulated operation, but do not press any buttons yet.



Simulated operation may be interrupted and continued as necessary. Continue filling the vessel until full mark is reached. It is not necessary to top out at any specific value.



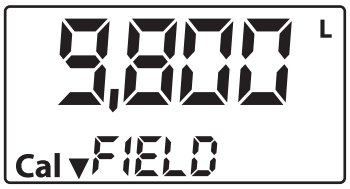
6 PRESS RESET SHORTLY



This is how the meter ‚knows' that sim op for calibration is complete. Make sure cal vessel has really been filled up to full mark before you do this.

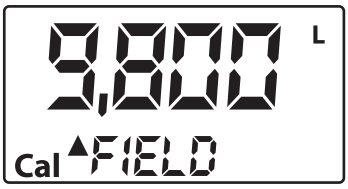
For calibration you must correct the count indicated by the partial volume register (ex.: 9,800), entering the actual value, i.e. the volume of the cal vessel. An arrow at the bottom left of the display (pointing up or down) indicates the direction in which USER K FACTOR is changed. Increase or decrease when actions 6 or 7 are carried out.

7 PRESS RESET SHORTLY



Direction of arrow flips. This may be repeated as often as necessary.

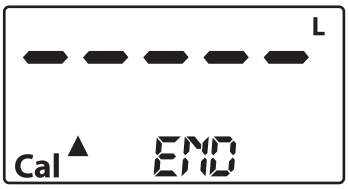
8 PRESS TOTAL SHORTLY / SEVERAL SECS



Value indicated will change as indicated by arrow:

- One increment per each time TOTAL is pressed.
- Continuous if the TOTAL button is held down, the first 5 increments slow, then fast.
- If you overshoot, go back to point 6 and repeat (6).

9 LONG PRESS OF THE RESET BUTTON



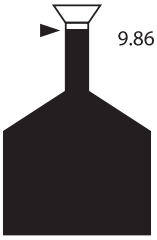
This is how the meter ‚knows' that calibration is now complete.

Before you press the button, be absolutely sure the display shows the correct value (volume of vessel).

Set value



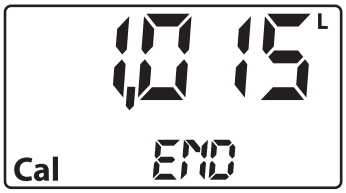
Actual value



The meter will now calculate the new USER K FACTOR: This may take a couple of seconds depending on the complexity of the correction. The arrow will disappear during this phase, but the word TOTAL will remain unchanged.

If you carry out this action right after point 5 the new USER K FACTOR will be equal to the FACTORY K FACTOR. It will be ignored, therefore.

10 NO OPERATION



After completion of the calculation the new USER K FACTOR will be displayed a few seconds. Next, the meter will re-start. Finally, the meter will be back in default standby mode.

PLEASE NOTE: From now on, the new value set will be used as the new valid K Factor and will remain even after replacement of batteries!

11 NO OPERATION



The meter stores the new K Factor for operation and is now ready for operation using the newly set USER K FACTOR.

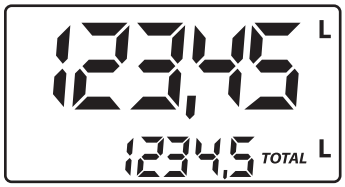
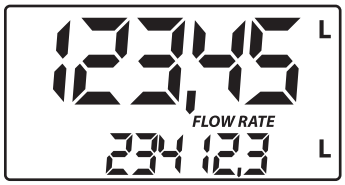
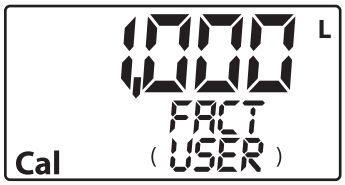
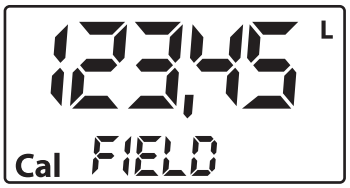
9.3.4. Changing the K FACTOR directly

This procedure is helpful for the correction of a mean error that may occur as a result of many output operations. In the event you observe a mean percentage error during normal meter operation you may carry out a correction by changing the valid User K Factor by that percentage. In order to calculate the correction of the USER K FACTOR, proceed as follows:

$$\textbf{New calibration factor = old calibration factor x } \frac{\textbf{100-E\%}}{\textbf{100}}$$

Example:	
Observed mean percentage error E %	-0,9 %
Current K Factor	1.000
New USER K FACTOR	1.000 x {[100-(-0,9)]÷100}= 1.000 x [(100+0,9)÷100]= 1.009

If the meter displays less than the actual amount of liquid output (negative error), the new K Factor must be greater than the old one (see example). The opposite is true if the value indicated is greater than the actual amount (positive error).

	Operation	Display configuration
1	NO Meter is in default standby mode, not counting.	
2	SHORT PRESS OF THE TOTAL BUTTON The meter changes to the FLOW RATE screen.	
3	LONG PRESS OF THE RESET AND TOTAL BUTTONS The meter changes to the calibration mode, the word TOTAL is displayed, and the calibration factor used is displayed instead of the total volume. The messages FACT and USER indicate which one of the two factors (manufacturer or user) is currently being used.	
4	LONG PRESS OF THE RESET BUTTON The meter shows TOTAL display and the resettable total register displays zeroes. The meter is now ready for simulated operation calibration.	

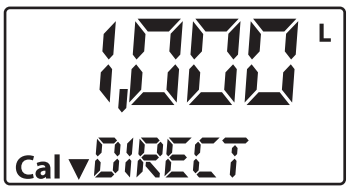
5 LONG PRESS OF THE RESET BUTTON

Changing valid K Factor directly: The word DIRECT is displayed, together with the calibration factor currently in use. An arrow at the bottom left of the display (pointing up or down) indicates the direction in which the displayed value is changed. Increase or decrease when actions 5 or 6 are carried out.



6 PRESS RESET SHORTLY

Direction of arrow flips. This may be repeated as often as necessary in order to set the correct direction.



7 SHORT / LONG PRESS OF THE TOTAL BUTTON

Value indicated will change as indicated by arrow:

- One increment per each time TOTAL is pressed.
- Continuously if TOTAL is held down. Display will ‚roll' more quickly if button is held permanently.

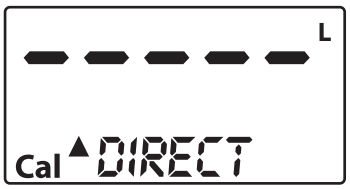
If you overshoot, go back to point 5 and repeat.



8 LONG PRESS OF THE RESET BUTTON

This is how the meter ‚knows' that calibration is now complete.

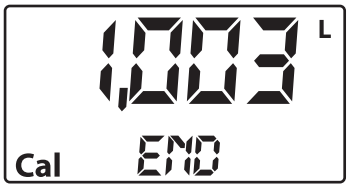
Before you press this button, be absolutely sure the value indicated is the value you wanted to set.



9 NO OPERATION

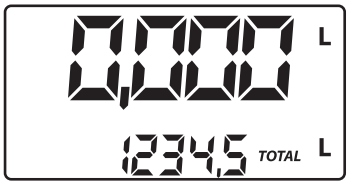
After the following calculation the new USER K FACTOR will be displayed a few secs. Next, the meter will re-start. Finally, the meter will be back in default standby mode.

PLEASE NOTE: From now on, the new value set will be used as the new valid K Factor and will remain even after replacement of batteries!



10 NO OPERATION

The meter stores the new K Factor for operation and is now ready for actual operation using the newly set USER K FACTOR.



10. Configuration of the meter

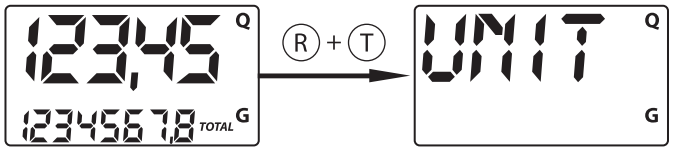
The manual flow meter features a menu allowing the user to choose the main measuring unit: quarters (QTS), pints (PTS), litres (L), gallons (GAL).

Combining partial-volume and total-volume units is possible as shown in the following table:

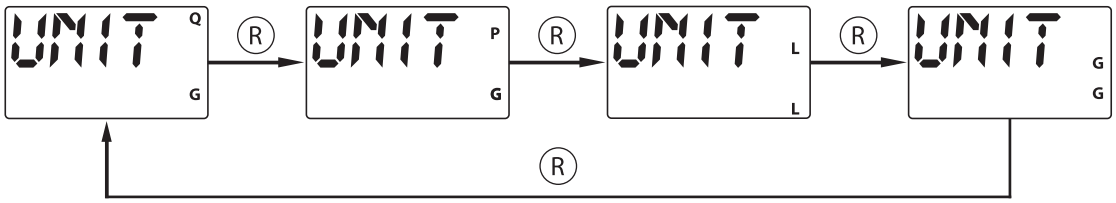
Combination No.	Unit register of partial amounts	Unit register of total amounts
1	litres (L)	litres (L)
2	gallons (GAL)	gallons (GAL)
3	quarters (QTS)	gallons (GAL)
4	Pints (PTS)	gallons (GAL)

This is how you select any of the combinations proposed:

Wait until the meter is in default standby mode. Simultaneously press TOTAL and RESET until the display shows the word „UNIT“ displaying the valid unit being used at present (in our example: litres/litres).



Every time you (shortly) press RESET, one of the other combinations of units will be displayed one after the other (see figs.):



Press TOTAL for several seconds to store the new combination. The meter will re- start and is then ready for operation using the newly selected combination of units.

NOTE

The registers of the resettable and absolute total amounts are automatically set to the new measuring units.

When the measuring unit is modified, a new calibration is NOT required.

11. Maintenance

In general, the manual flow meter requires only very little maintenance.

Due to the operator responsibilities the following components must be regularly checked to avoid the risk of environmental or equipment damage or personal injury:

- The meter housing must be regularly checked for damages.
- The batteries must be replaced when they are discharged (chapter 11.1 - Replacing the batteries)
- Cleaning the measuring chamber (chapter 11.2 Cleaning the measuring chamber). This may become necessary because of particularities of the delivered fluids.
- The strainer, pos. 43 (fig. 15-1), must be cleaned from time to time, depending on the soiling.

11.1. Replacing the batteries

The meter is supplied complete with two 1.5 V alkaline batteries (1N).

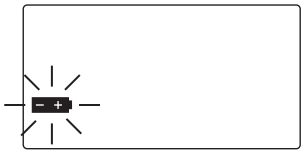
The meter has a two-step low battery indicator:

1) As soon as the batteries dip below the first charge level the battery icon in the display will light up.

   The meter will continue to operate correctly, but the user is informed that the batteries should be exchanged as soon as possible.



2) If the batteries are not exchanged, the battery will sooner or later reach the second alarm level. Normal operation is no longer possible. At this state, the battery icon will flash, being the only thing that is still visible in the display.



NOTE

- Do not throw batteries in the dustbin. Be sure to know and respect local regulations concerning proper disposal.

Proceed as follows (items correspond to spare parts list):

- Press RESET in order to update total volume.
- Unscrew the battery cover (82 353).
- Remove the old batteries.
- Insert new batteries. Observe + and - icons on batteries and cap.
- Replace battery cap properly and screw down tightly.

The meter will go on automatically and revert to default standby mode. Routine operation may now be continued. The values of the resettable and non-resettable totals and partial volume will be the same as before.

Neither will the calibration (K) factor change in the case of power failures and/or exchange of batteries. It is not necessary to re-calibrate the meter after exchange of batteries.

11.2. Cleaning the measuring chamber

The measuring chamber of the manual flow meter can only be cleaned when the meter has been disconnected from the line or the nozzle. The inlet and outlet must be fully accessible.



ATTENTION

- Never blow compressed air into the meter, since the resulting high speed of rotation can cause damage to the oval gears!



NOTE

- Always make sure that ALL the fluid has been removed from the device before you start cleaning it.

If there are any foreign objects in the meter, they can be removed with a pointed object, such as a small screwdriver, or needle nose pliers.

After removing larger objects, a suitable fluid can be used to rinse out smaller foreign particles.

Be careful not to damage the body of the device and the plastic parts.

12. Troubleshooting

Malfunction	Cause	Solution
LCD display: No display	▸ Loose battery contacts	▸ Check batteries for good contact
Accuracy of measurements is insufficient	▸ K FACTOR wrong ▸ Meter operates below admissible min. flow rate	▸ Check K FACTOR, ⇨ see chapter 8.3. ▸ Increase flow rate to acceptable level
Reduced flow rate, or no flow at all	▸ Oval gear blocked	▸ Clean measuring chamber
Display flashing „Err 1“	▸ Data stored in electronic memory are damaged	▸ irreparable
Short display of „Err 2“	▸ Limited error reading data (usually when replacing the batteries)	▸ Control circuit board automatically switches off and on to restore proper operation

13. Repair / Service

The manual flow meter was developed and produced according to the highest quality standards.

If a problem should occur despite all quality measures taken, please get in touch with our service contact partners:

FMT Swiss AG
Tel +49 9462 17-246
Fax +49 9462 1063
service@fmtag.ch

14. Disposal

The operating company is responsible for the proper disposal of the manual flow meter.

Hereby, the industry-specific and local regulations must be observed when disposing of the various materials.

Only qualified personnel is authorized to disassemble and dispose of the manual flow meter.

15. EC Declaration of Conformity

CE

Manufacturer:

FMT Swiss AG

Fluid Management Technologies Swiss AG

Gewerbestraße 6

6330 Cham / Switzerland

Declares under his sole responsibility that the machine:

Model type	**Manual flow meter, digital**
	19 698, 19 698 950, 19 698 951 **19 700**
Function	Measurement and registration of volumes of various media such as engine oils SAE 5 to 50 / gear oils SAE 80 to 240 (Item No. 19 698; 19698 950; 19698 95), antifreeze agents and radiator fluids (Item No. 19 700).
Complies with all relevant provisions of the following Directive:	
EC Directives	2014/30/EU EMC Directive
Applicable standards	DIN VDE 0843 T1

Authorized representative for the compilation of the technical documentation:

Name: Matthias Fischer
Adress: Fluid Management Technologies Swiss AG
Gewerbestraße 6
6330 Cham / Switzerland
Tel.: +49 09462/ 17 - 0

FMT Swiss AG
Cham, 10.04.2019

Dipl.-Ing. Rudolf Schlenker

(Managing Director)

16. Exploded view, manual flow meter

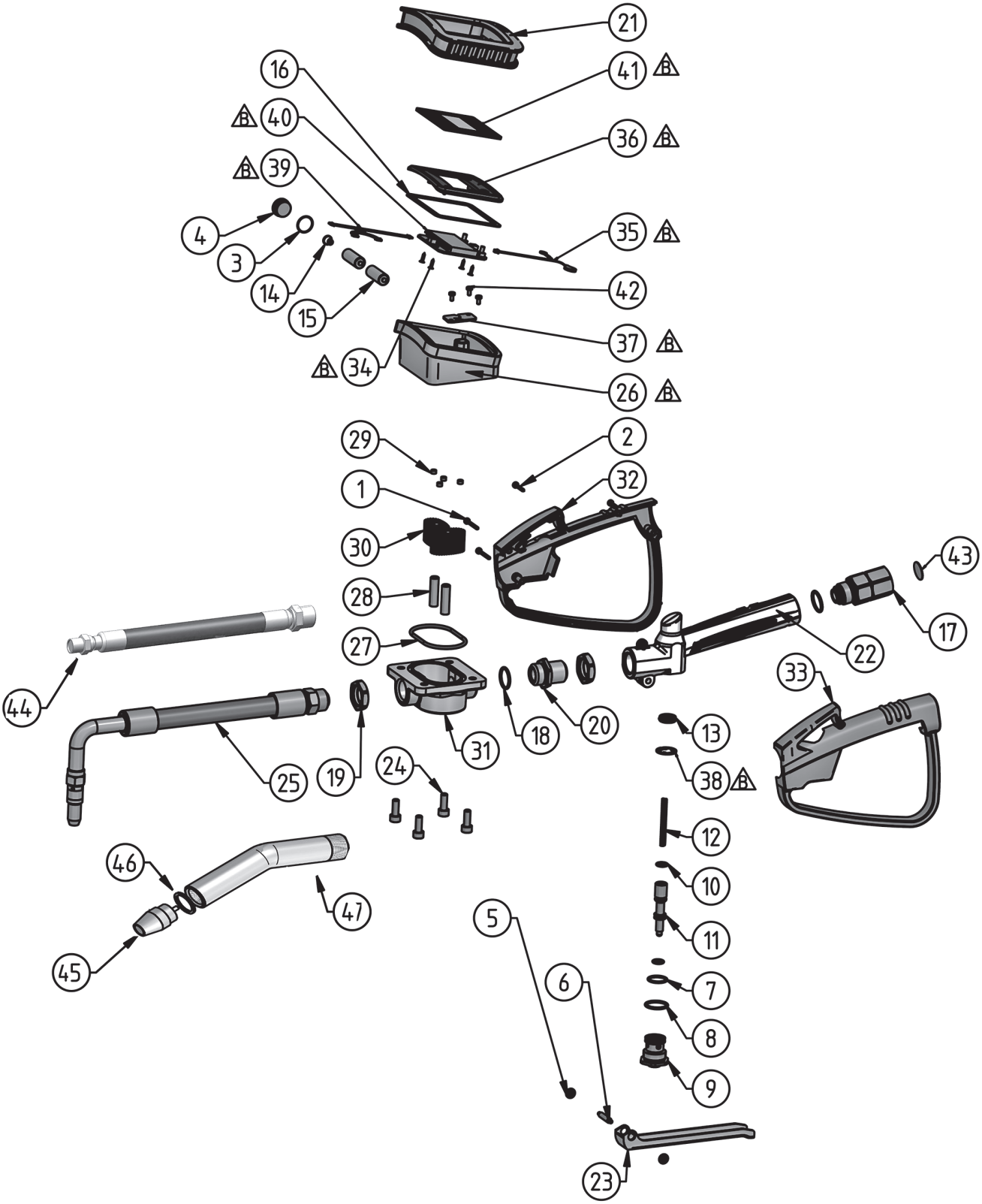


Fig. 15-1: Exploded view, manual flow meter

Item	Quantity	Designation	Item No.
1	2	Tapping screw 2,9x25	88 421
2	2	Tapping screw 2,9x19	88 425
3	1	O-ring NBR 70-15x1	00 725
4	1	Screw plug	88 414
5	2	Lock washer	88 248
6	1	Axle	88 415
7	1	O-ring FKM 80-16x1,8	88 427
8	1	O-ring FPM 80-19x2	88 428
9	1	Valve body	88 409
10	2	O-ring FPM 80-8x1,8	01 547
11	1	Valve bolt	88 410
12	1	Compression spring 1x4x60	88 426
13	1	Rod seal	88 430
14	1	Compresion spring, conical	03 181
15	2	Battery LR1	88 431
16	1	Adhesive seal	88 435
17	1	Swivel joint	19 616
18	2	O-ring FKM 80-18x2	00 723
19	2	Lock nut SW27-G 1/2“	88 413
20	1	Adapter	88 412
21	1	Rubber protective cap	88 411
22	1	Handle rod	88 403
23	1	Hand lever	88 404
24	4	Cylinder screw M6x16	88 419
25	1	Discharge spout 90°	19 746
26	1	Housing, upper part	88 402
27	1	O-ring FPM 80-56x3	88 429
28	2	Bearing bolt	88 406
29	4	Disc magnet	88 416
30	2	Oval gear	88 405
31	1	Housing, lower part	88 401
32	1	Handle shell, L. H.	88 440
33	1	Handle shell, R. H.	88 441
34	4	Tapping screw 2,2x9,5	88 422
35	1	Battery connection cable	91 268
36	1	Carrier board	89 686
37	1	Hall sensor-carrier board	87 391
38	1	Locking ring 20x1	03 264
39	1	Connection cable	88 727
40	1	Board	88 725
41	1	Protective display film FMT	82 397
42	3	Self-tapping screws	91 295
43	1	Filter strainer	88 436
44	1	Discharge hose, straight	19 745
45	1	Anti-drop coupler	19 747
46	1	Copper disk	02 296
47	1	Discharge tube, angled	19 741

Tab. 15-1: Overview of the individual parts of fig. 15-1

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