European Cooperation in
Legal Metrology (WELMEC)
e. V. Bundesallee 100 38116
Braunschweig Germany

WELMEC Guide 13.1

Measuring Instruments Directive 2014/32/EU

Common application for utility meters

(water meters and thermal energy meters)

Version 2025

WELMEC

WELMEC is a cooperation between the legal metrology authorities of the Member States of the European Union and EFTA.

This document is one of a number of Guides published by WELMEC to provide guidance to manufacturers of measuring instruments and to Notified Bodies responsible for conformity assessment of their products.

The Guides are purely advisory and do not themselves impose any restrictions or additional technical requirements beyond those contained in relevant EU Directives.

Alternative approaches may be acceptable, but the guidance provided in this document represents the considered view of WELMEC as to the best practice to be followed

Published by:
WELMEC Secretariat

E-mail: secretary@welmec.org
Website: www.welmec.org

Contents

1 Foreword

This document is intended to provide guidance to all those concerned with the application of Measuring Instruments Directive 2014/32/EU (MID) on utility meters (water meters and thermal energy meters).

This document provides a record of the continuing work of WELMEC Working Group 13 in the area of the common application of the Directive itself.

This document is one of a number of Guides published by WELMEC to provide guidance to manufacturers of measuring instruments and to Notified Bodies responsible for conformity assessment of their products. The Guides are purely advisory and do not themselves impose any restrictions or additional technical requirements beyond those contained in relevant E Directives. Alternative approaches may be acceptable, but the guidance provided in this document represents the considered view of WELMEC as to the best practice to be followed.

This document refers to and explains some of the requirements of the recommendation OIML R-49:2024. When relevant part of recommendation OIML R 49 is mentioned in this guide, it means that the version OIML R 49:2024 applies. Moreover, it may be understood to apply also to relevant part of European Standard ISO 4064: 2024, because both specifications are the same with respect to their content.

Regarding thermal energy meters, this document refers to EN 1434. When relevant parts of EN 1434 are mentioned in this guide, it means that the version EN 1434:2022 applies.

1.1 Overview

The list of decisions concerning common application of the Directive is following:

Scope and exclusions of the Directive

Clause No.	Issue
2.1.1	Maximum size of a meter assessable under MID
2.1.2	Scope of MID concerning “additional/ associated functions” of measuring instruments

Interpretation of the essential requirements in respect to utility meters for water meters - Annex III (MI 001) and thermal energy meters - Annex VI (MI 004).

Clause No.	Issue
2.2.1	Acceptance criteria for accuracy measurements during market surveillance and conformity assessment
2.2.2	Explanation of the term “supplier” regarding MID, Annex I, Introduction
2.2.3	Indication of results
2.2.4	Indication of low flows

Interpretation of the special requirements on water meters - Annex III (MI 001)

Clause No.	Issue
2.3.1	Clean water
2.3.2	Connection interface of axial or coaxial cartridge water meters and its CE marking
2.3.3	Interpretation of requirements for conformity assessment of water meters according to OIML R 49

Interpretation of the special requirements on thermal energy meters - Annex VI (MI 004)

Clause No.	Issue
2.4.1	Application of thermal energy meters in systems for cooling (additional function)
2.4.2	Bifunctional thermal energy meters

2.4.3	Other special requirements

Sub-assemblies

Clause No.	Issue
2.5	Combining sub-assemblies of the thermal energy meters during putting into use

Evaluation of conformity assessment procedures

Clause No.	Issue
2.6.1	Adjustment of meters in order to avoid an exploitation of MPE
2.6.2	Metrological surveillance

Miscellaneous

Clause No.	Issue
2.7.1	MPEs applicable to a repaired meter that was originally conformity assessed according to MID
2.7.2	Determination of “period of time estimated by the manufacturer” in respect to the meter durability (MID, Annex 1, clause 5) and consequences for manufacturer following from this statement
2.7.3	Documentation of seals used for security measures

Protection against reset of meters, checking of meters placed on the market

Clause No.	Issue
2.8.1	Resetting of registers
2.8.2	Additional tools/equipment

Meter families in respect to conformity assessment

Clause No.	Issue
2.9.1	Definition of a family of meters

2 Decisions

2.1 Scope and exclusions of the Directive

2.1.1 Maximum size of a meter possible to be assessed under MID

There is no limit on size of the water meter/thermal energy meter that can be assessed under MID.

Reason:
There are no limits concerning the size stated in the MID. It is the choice of the manufacturer which meter sizes are in the scope of an assessment.

2.1.2 Scope of MID concerning “additional/ associated functions” of measuring instruments

Functions of the water meter/thermal energy meter which are not specified in the instrument specific Annex shall be considered as “additional/associated functions” (see also clauses 2.3 and 2.4). They shall be examined in order to ensure that they do not affect the conformity of the measuring instrument to the essential requirements of MID.

The “additional/associated functions” including the concerned hardware and software respectively shall be examined in respect to the appropriate clauses of Annex I of MID, in particular the clauses 7.1, 7.6, 8.1, 10.2 and 10.5. The EU-type examination certificate or EU design examination certificate shall include a list of the “additional/associated functions” with a clear description of the functions and the additional information that these functions do not influence the metrological characteristics of the measuring instrument and essential requirements.

Note: The guideline shall be applied to “additional /associated functions besides the measuring function” referred to as “additional /associated functions” in this guideline.

2.2 Interpretation of the essential requirements in respect to water meters - Annex III (MI 001) and thermal energy meters - Annex VI (MI 004)

2.2.1 Acceptance criteria for accuracy measurements during market surveillance and conformity assessment

In order to obtain reliable results, the traceability and the Best Measurement Capability (BMC) of the test equipment used during market surveillance and conformity assessments shall be known. The Best Measurement Capability is the uncertainty (k=2) of the measurand without the uncertainty contribution of the measuring instrument under the test.

a) Market surveillance applications

It is recommended that the following equation is fulfilled:

$$\text{BMC} < 1/3\ \text{MPE}$$

Meters (or sub-assemblies) can be declared to be non-conforming if at any point of the operating range of the measuring instrument, the average $\bar{e}$ (average of repetitions for one measuring value) of the observed errors exceeds the sum of MPE and U:

$$\bar{e} > \text{MPE} + U$$

where U is the uncertainty (the coverage factor k=2) of the measurement result.

b) Conformity assessment applications

If nothing else is stated in harmonised standards or normative documents, the following approach applies:

- **Conformity assessment according module B or module H1**

  For test equipment, it is recommended that the following equation is fulfilled:

  $$\text{BMC} < 1/5\ \text{MPE}.$$

  The observed errors e during a meter test meet the requirements if, for all repetitions the following equation is fulfilled:

  $$e < \text{MPE}$$

It is always preferable to use test equipment with a BMC < 1/5 MPE. However, if it is technically or economically impractical to reach an uncertainty of $1/5^{th}$ of the MPE, a “reduced MPE = (6/5 x MPE - U) may be used. This exception is only valid in case of mutual agreement of the manufacturer and the test authority. Use of this exception shall be fully documented.

Additionally, the standard deviation of three measurements at the same flow rate shall not exceed one-third of the MPEs.

- **Conformity assessment according module D and module F**
  For test equipment, it is recommended that the following equation is fulfilled:

  for water meters: BMC < 1/3 MPE
  for thermal energy meters and its subassemblies: BMC < 1/5 MPE

  The observed errors e during a meter test meet the requirements if, for all repetitions the following equation is fulfilled:

  $$e < MPE$$

Note on the evaluation of test results:
The minimum measuring time or the minimum number of pulses taken into account during an accuracy test of a meter shall be specified by the manufacturer in testing instructions. The results of repeatability tests in respect to Annex 1 clause 3 of MID shall be inside the MPE.

2.2.2 Explanation of the term “supplier” regarding MID, Annex I, Introduction

In Annex 1 the term supplier is used in the definition of ‘utility’. In this context the term “supplier” means an entity which supplies, heat or water to the end users. Where heat or water is resold, the reseller takes on the responsibility of the supplier.

2.2.3 Indication of results

Related to: MID, Annex 1, clause 10.5

10.5. *Whether or not a measuring instrument intended for utility measurement purposes can be remotely read it shall in any case be fitted with a metrological controlled display accessible without tools to the consumer. The reading of this display is the measurement result that serves as the basis for the price to pay.*

If a meter is designed to count the quantities defined in Annex III (MI 001) and Annex VI (MI 004) in different registers, the meter shall be able to display the total quantities of each register on the display by means of the user interface (see WELMEC guide 7.2, for instance buttons on the measuring instrument) as well as the currently active rate register. It is possible to show the results on different displays, periodically or on request via user interface.

If a meter is designed to count the quantities consumed in time intervals, the display shall show the results on request via user interface (see WELMEC guide 7.2, for instance buttons on the measuring instrument). In addition to the value itself, the corresponding date and time shall be identifiable. The memorised values shall be available over a reasonable period time in order to check of the bill.

Reasons:
- The price to pay for a measured quantity may depend mainly on the rates (price/quantity).
- In order to control the consumption behaviour individually the end user needs the information, as to which rate is currently active.

– If only the total quantity supplied is displayed on the metrological controlled display, then distribution of the quantities in different rate registers will not be obtainable for checking. Using the example of a bifunctional thermal energy meter (see 2.4.2), there shall be at least a register for the accumulated heat energy and a register for accumulated cooling energy. These registers and its registered values shall be displayable on the display.

2.2.4 Indication of flows outside measuring range

Related to: MID, Annex 1, clause 7, suitability

7.2. A measuring instrument shall be suitable for its intended use taking account of the practical working conditions and shall not require unreasonable demands of the user in order to obtain a correct measurement result.

A meter shall allow to check whether there is also a registration outside the measuring range or not.

It is up to the manufacturer to declare how this functionality is implemented.

An acceptable solution is for the meter to display a special sign. In the case where the display is switched off (for saving energy) this sign may also be switched off.

A further acceptable solution for checking the registration outside the measuring range is that the design includes a sufficiently low value of the last digit of the display, or a special indication mode.

2.3 Interpretation of the special requirements on water meters - Annex III (MI 001)

2.3.1 Clean water

Related to: MID, Annex III, water meters (MI 001), Scope

Clean water is potable water which may contain solid additives (particles) or additives in solution only.

2.3.2 Connection interface of axial or coaxial cartridge water meters and its CE marking

A connection interface is not a sub-assembly of a meter in the sense of MID. It shall be considered as part of the installation piping, provided that it is described in the OIML R 49 and that the meter is assessed to fulfil the requirements of the Directive with one or more of the types of the defined connection interfaces. Axial and co-axial cartridge meters and the standardised connection interfaces shall be clearly marked for their intended combined fit for the use under MID requirements.

The manufacturer has to specify which connection interface is used on the application for the conformity assessment. Connection interface and cartridge meter have to carry the identical externally visible identification mark. Furthermore, it is not allowed to use any adaptor devices, to make it possible to mount a meter into a connection interface of a type where it is not intentionally designed for and approved for. This information must be part of the installation instructions.

The CE and M marking has to be applied to the measuring instrument only.

The above mentioned does not apply to concentric meters as defined in OIML R 49.

Reason:

According to MID, article 4 (2), sub-assemblies have to be mentioned in the instrument specific annexes. This is the reason for not considering the connection interface as a sub-assembly in view of the Directive.
It is the current experience of experts, that the metrological performance of a meter may be influenced if the meter is not used with the prescribed connection interface. In accordance with article 8 of the Directive the measuring instrument is to be put into use together with a connection interface of a type accepted under the conformity assessment of the cartridge meter. Attention should be given to the prohibition of use of adaptors in practice.

2.3.3 Interpretation of requirements for conformity assessment of water meters according to OIML R 49

a) **Related to:** Orientations of water meters for testing

If a meter is marked “V”, the connecting pipework shall be mounted with the flow axis vertical, with flow direction from bottom to top and at least one meter shall be mounted with the flow axis vertical, with flow direction from top to bottom in line with OIML R 49-2, clause **7.4.2.2.7.5.**

If a meter is marked “H”, the connecting pipework shall be mounted with the flow axis in the horizontal plane and at least one meter shall be mounted with the flow axis horizontal. The indicating device shall be positioned on top.
If a meter is not marked “H” or “V”, then at least one meter shall be mounted and tested as previously described for a “V” marking. Additionally, at least one meter:

- shall be mounted with the flow axis at an intermediate angle to the vertical and horizontal
- shall be mounted with the flow axis horizontal and with the indicating device oriented upwards, sideways and downwards.

If there is no indicating device anymore (remote display), an additional marking sign for „this way up“ is  .

a) **Related to:** selection of samples concerning performance tests No.3 - No.9 and No. 14 (Table 7) according to OIML R 49-2.

It is not required to submit the same meter sample for tests No.3 - No.9 and No. 14 (Table 7) according to OIML R 49-2.

Reason:
The performance tests No.3 - No.9 and No. 14 (Table 7) according to OIML R 49-2 are not technically or metrological interdependent.
However always in advance of performing these above tests, test no. 2 (Error of indication) shall be performed.

b) **Related to:** temperature classes according to OIML R 49-2

The meter temperature class T30/70 specified in OIML R 49-2, Table 1 is not covered by MID.

Reason:
According to MID, Annex III, clause 2 *„The values for the temperature range shall fulfil the following conditions: 0,1 °C to at least 30 °C, or 30 °C to at least 90 °C. The meter may be designed to operate over both ranges.”*

c) **Related to:** water meters intended to be used in specific installation/operated positions

Other installation/operated positions of the water meter beside the main positions: horizontal (H), vertical (V) and any position (not marked H or V) according to OIML R 49-2 are allowed under the condition that the operated position is clearly and understandably marked on the water meter. Such operated position shall be clear described in the EU-type examination certificate or EU design examination certificate and in the documentation referred to in certificate which accompany a measuring instrument.

Reason:
The operated positions as are defined in OIML R 49-2 are not strictly prescribed in MID. According to MID, Annex III, clause 8.1 "*The meter shall be able to be installed to operate in any position unless clearly marked otherwise."*

d) Related to: testing the water meters with different DN sizes within the family of water meters according to OIML R 49-2.

Rules for type evaluation of a family of water meters are stated in OIML R 49-2, Annex D. Below an explanatory table is given for visual interpretation of the rules, where the horizontal lines represent the size of the family, and the vertical columns indicate which test is applicable per meter size.

		Tests per meter size						
		Size 1 (smallest)	Size 2	Size 3	Size 4	Size 5	Intermediate sizes (sizes >5)	Largest size (sizes >5)
Family size	1 size	OIML R49-2 Table 6 tests excl. 7.11[a]	N/A	N/A	N/A	N/A	N/A	N/A
	2 sizes		7.3 & 7.4	N/A	N/A	N/A	N/A	N/A
	3 sizes		No tests[b]	OIML R49-2 Table 6 tests[c] excl. 7.11	N/A	N/A	N/A	N/A
	4 sizes		No tests[b]		7.4[d]	N/A	N/A	N/A
	5 sizes		No tests[b]		No tests[b]	7.3 & 7.4[c]	N/A	N/A
	>5 sizes		No tests[b]		No tests[b]	7.3 & 7.4[c]	No test[b]	7.4[d]

[a] Durability test (7.11) to be done on size with highest wear or size 1 (smallest) for meters without moving parts.

[b] Only if Q3 of the size is less than twice the Q3 of a size tested for 7.4, otherwise tested for 7.4.

[c] An other size may be selected for these tests, ensuring that the Q3 of a size which is not tested shall be within 2x Q3 of a size tested for 7.4.

[d] Size tested for 7.4 if practical or required when Q3 is larger than 2x Q3 of size tested for 7.4.

2.4 Interpretation of the special requirements on thermal energy meters - Annex VI (MI 004)

2.4.1 Application of thermal energy meters in systems for cooling (additional function)

The Directive 2014/32/EU does not regulate the thermal energy meters for cooling applications. The thermal energy meters for cooling applications are regulated by the national legislation of the member states.

The tests and conditions of the tests for cooling applications are defined in the relevant standard EN 1434. Thermal energy conveying liquids for cooling systems or systems working at low temperatures can be mixtures of water and other liquids (mostly on basis of ethylene or propylene glycol, etc.). These liquids exhibit different thermodynamic parameters compared to water:

- usually increased kinematic viscosity (especially at lower temperatures), influencing the flow meter through Reynolds-dependency,
- decreased specific heat capacity, resulting in differences regarding the heat coefficient programmed in the calculation unit,
- increased density, resulting in differences regarding the heat coefficient programmed in the calculation unit,
- altered heat conduction, which may affect temperature measurements.

Thus, all sub-assemblies of a thermal energy meter are affected by uncertainties of the liquid's thermodynamic parameters. Therefore, special care shall be taken:

- for the definition of the values of specific heat capacity, density and viscosity based on traceable measurements,
- regarding the necessary calibration processes of flow meters

to prevent measurement deviations well above the MPE of thermal energy meters.

Note: Metering thermal energy with other liquids than water as well as respective test descriptions and requirements on utilization, are defined and referenced in EN 1434:2022.

2.4.2 Bifunctional thermal energy meters

Bifunctional thermal energy meters are equipped with automatic switching between the heating and cooling function of the thermal energy meter resulting in the accumulation of thermal energy in separated registers for cooling and heating. It is based on the optional switching temperature Θ_{hc} (e.g. 25 °C) and temperature difference threshold $\Delta\Theta_{hc}$ (e.g. 0,1 K) for energy accumulation, as defined in standard EN 1434-1:2022. Tests for the switching over from heating to cooling register and reversed shall be performed during conformity assessment according to the tests defined in standard EN 1434-4:2022.

2.4.3 Other special requirements

Concerning clauses 2.2.3 "Indication of results", 2.8.1 "Resetting of registers", 2.8.2 "Additional tools/equipment" of this document and utilization of thermal energy meters in smart metering, remote reading, data transmission, etc., following points should be taken in account as additional intelligent functionalities of the thermal energy meters:

- interval metering and tariff values
- thermal power (in defined time interval)
- internal time of meter (real time clock)
- suitable legal relevant software
- reliable communication ability of the meter

Specifications are given in standard EN 1434 and WELMEC Guide 7.2 and WELMEC Guide 11.2.

2.5 Sub-assemblies

2.5.1 Combining sub-assemblies of the thermal energy meters during putting into use

The national legislation has to provide regulations concerning the responsibility for a correct combination of sub-assemblies of the thermal energy meters (flow sensor, temperature sensor pair and calculator or a combination thereof) during putting into use. This includes the responsibilities concerning the correct programming of parameters e.g. pulse factors. All information shall be easily available in the documentation for sub-assemblies to set up the

combination correctly. The notified body has to ensure that during the conformity assessment the documentation is complete and comprehensive.

Before CE-marking, the manufacturer has to set the parameters in such a way, that the sub-assembly works with default parameters.

The EU type examination certificate (TEC) or EU design examination certificate and documentation referred to in certificate which accompany a measuring instrument shall specify detailed information necessary to ensure correct functioning of the combined instrument when built and installed according to this information.

The sealing of the connection of the subassemblies shall be ensured by the person legally designated for installing the meter.

Reason:
According to MID, article 5 sub-assemblies can have separate EU type examination certificates.
According to MID, article 18, clause 5 the manufacturer shall indicate the conditions for compatibility with interfaces and sub-assemblies.

2.6 Evaluation of conformity assessment procedures

2.6.1 Adjustment of meters in order to avoid an exploitation of MPE or systematically favour any party

Related to:
Annex III, water meters (MI 001)
Annex VI, thermal energy meters (MI 004)

The Annex III, water meters (MI 001) and Annex VI, thermal energy meters (MI 004) includes a following requirement which restrict the MPE additionally in order to avoid an undue biasing of meters during the production: *“The meter shall not exploit the MPEs or systematically favour any party”.*

This requirement (further called as Adjustment Rule, abbreviation AR) shall be applied during the production process, where the adjustment of a meter takes place or during the final tests of the meter. The manufacturer is responsible for the correct adjustment of the meter and shall establish appropriate measures in his quality system to follow the adjustment rules or implement other means during production process.

The adjustment shall lead to meter errors curves which are as close as possible near to zero level, taking into account the technical opportunities of a meter/or sub-assembly design.

The manufacturer´s quality system of the production process (Module D, H1) shall describe how a duly adjustment of the meter is implemented. If a manufacturer applies module F he shall inform the responsible notified body about the applied methods of the adjustment.

In order to allow a check of the correct application of the AR by the Notified Body, the manufacturer shall file the results of the relevant tests over an appropriate time.

Concerning the adjustment of the meter following rules shall be applied:

a) For water meters:

- All meters must be designed and adjusted as close as possible to the zero error limits.
- Water meters and flow sensors (that means a part of water meter) with abilities for adjustment of the error curves, where the errors are aligned into the same sign (+/-) within

the complete measuring range, shall only pass the verification if all errors do not exceed a half of the MPE. In cases where no adjustment is possible, special measures have to be included into the manufacturer´s quality system of the production process.

Note: Measures mean e.g. to detect the batch of statistics coming from test results of water meters which shall show at Q_3 or Q_2 that the maximum of the error distribution is below half of the permitted errors."

b) For thermal energy meters (flow sensors):

- Each individual meter with electronic abilities for adjustment of their error curves, where errors are aligned into same sign (+/-) in the complete measuring range, shall only pass the verification assessment if any of the errors does not exceed half of MPE. Mechanical meters (e.g. Woltman Turbine Meters) with no abilities by electronic adjustment shall be produced as close as possible to zero error.
- In a case of statistical method, it is not permitted to select special meters from produced batch. A batch is a deliverable of the same type and range. WELMEC guide 8.10 provides information about the acceptable size of a batch (lot size).

2.6.2 Metrological surveillance

The metrological surveillance of water meters and thermal energy meters in respect to the AR may be based on statistical methods applied on a sufficient number of meters.
Taking into account the typical values of uncertainties of the test rigs used by the manufacturer and surveillance authorities the uncertainties may be not negligible in respect to the MPE. The uncertainty of the used test rig shall be taken into account as described in this document, clause 2.2.1 a).

2.7 Miscellaneous

2.7.1 MPEs applicable to a repaired meter that was originally conformity assessed according to MID

If a measuring instrument was repaired before putting into use, the MPEs stated in the corresponding specific annex shall apply.
For measuring instruments that are in-service the national regulations apply.

Reason:
MID is applicable to measuring instruments being made available on the market and/or put into use for the measuring tasks.

2.7.2 Testing by cold water for hot water meters:

A testing of hot water meters may also be carried out with cold water at a temperature of 20 °C +- 10 °C below the error limits of accuracy class 2, cold water. Details of any eventual metrological tests for proof of testability in this form must be clarified with the notified body during the certification. The certificate shall include such an information.

2.7.3 Testing by cold water for thermal energy meters:

Testing of flow sensors during verification may also be carried out with cold water at a temperature of 20 °C +/- 10 °C, in accordance with the respective procedures laid down in the certificate during type approval as clarified with the notified body. During type approval, a statistical method shall

be used to determine the influence of liquid temperature on the flow meter. The measurement results shall be within the MPE at cold water and hot water measurements.

2.7.4 New SW download and validation:

If water meter has possibility of separation of SW, non relevant part of SW can be changed without changing certificate.
If water meter does not have separation of SW and all SW is under one sealing, then the new SW has to be assessed and revision of the certificate has to be issued for the new SW version SW and CRC.
Updating of SW must be checked by authorized body, resp. by help of manufacturer, but based on national rules, only.

2.7.5 Minimal thread size for water meters:

The minimal thread size for water meters is G ¾“.

2.7.6 Interchangeable metrological module and adaptor devices:

No adaptors are allowed.

2.7.7 Testing of water meters with valves

Following tests are required for certification of water meters with valves included in the meter body:

a) Tests to be performed with fully opened valves: all relevant tests
b) Tests to be performed also with valves partially closed (if the valves are designed to be operated in these positions):
    - OIML R49-2 chapter 7.4
    - if the meter is intended to measure reverse flow - OIML R49-2 chapter 7.8
    - if the valve allow only discrete positions all should be tested, if the valve has continuous scale at least 3 intermediate positions covering the full range of the valve should be tested

The family of meters can have variants with or without valves. If the family of meters have these variants, OIML R49-2 chapter 7.3, 7.4, 7.9, 7.10 and also 7.8 (if the meter is intended to measure reverse flow) should be done on all variants. ~~Protection against reset of meters, checking of meters placed on the market.~~

2.7.8 Resetting of registers

Related to: MID, Annex I, clause 8.5:
“For utility measuring instruments the display of the total quantity supplied or the displays from which the total quantity supplied can be derived, whole or partial reference to which is the basis for payment, shall not be able to be reset during use.”

If tariff registers are used for billing purposes, they have to be treated as legally relevant parameters. The registers need to be protected against changes and resetting in the same way as legally relevant parameters (see WELMEC 7.2 requirement P5 and P7). For different tariff registers a software seal is allowed, as described in P7.

The overall cumulative register need~~s~~ to be protected by means of a hardware seal.

If no overall cumulative register is available, the displays from which the total quantity supplied can be derived (all tariff registers) need to be protected also by means of a hardware seal.

The reset is just allowed if the meter is out of the field installation.
The reset should take place by certified and authorized laboratories only.
A procedure for reset of calculator (procedure, tools description, number of adjustments, etc.) should be clearly described by manufacturer in line with OIML R49-1; clause 6.8.2.1 and WELMEC 7.2 - clause 11.2.3 (I1-6).

Reasons:
Lots of utility meters have more than one tariff register. One of the simplest version is a meter with a day and a night tariff register. The day or night tariff register may be reset under a software seal in the case a total (overall cumulative) register is available which is protected by means of a hardware seal.

2.8 Meter families in respect to conformity assessment

The aim of definition of meter families is to reduce the necessary tests and documents to a minimum in respect to conformity assessment.

The manufacturer should make suggestions for grouping measuring instruments to a family. The Notified Body assesses the suggestion and can accept, refuse or modify the manufacturer´s proposal.

2.8.1 Definition of a family of meters

a) Water meters

The criteria to be applied in deciding whether a group of water meters can be considered to be from the same family for conformity assessment procedures are given in Annex D, Annex D, OIML R 49-2.

The water meters within a family may have different display device versions as long as it is demonstrated by design argumentations or tests that they have the same influence on the metrological performances.

b) Thermal energy meters or sub-assemblies

A family of thermal energy meters is a group of meters of different sizes having a family similarity in the principles of operation, construction and materials (EN 1434-1:2022, cl. 3.13).

Other criteria to be applied in deciding whether a group of thermal energy meters can be considered to be from the same family for conformity assessment procedures are following:

- the same manufacturer
- the same measuring principle
- the same accuracy class
- roughly the same ratios q_s/q_p and q_p/q_i
- roughly the same $\Delta\theta$ range
- the same temperature pairs
- the same electronic devices for each meter size
- geometric similarity of the wetted parts with scalable measures thereof
- a similar construction and component assembly
- the same materials for those components that are critical to the metrological performance of the meter

– the same rated operating conditions

The thermal energy meters within a family may have different display device versions as long as it is demonstrated by design argumentations or tests that they have the same influence on the metrological performances.