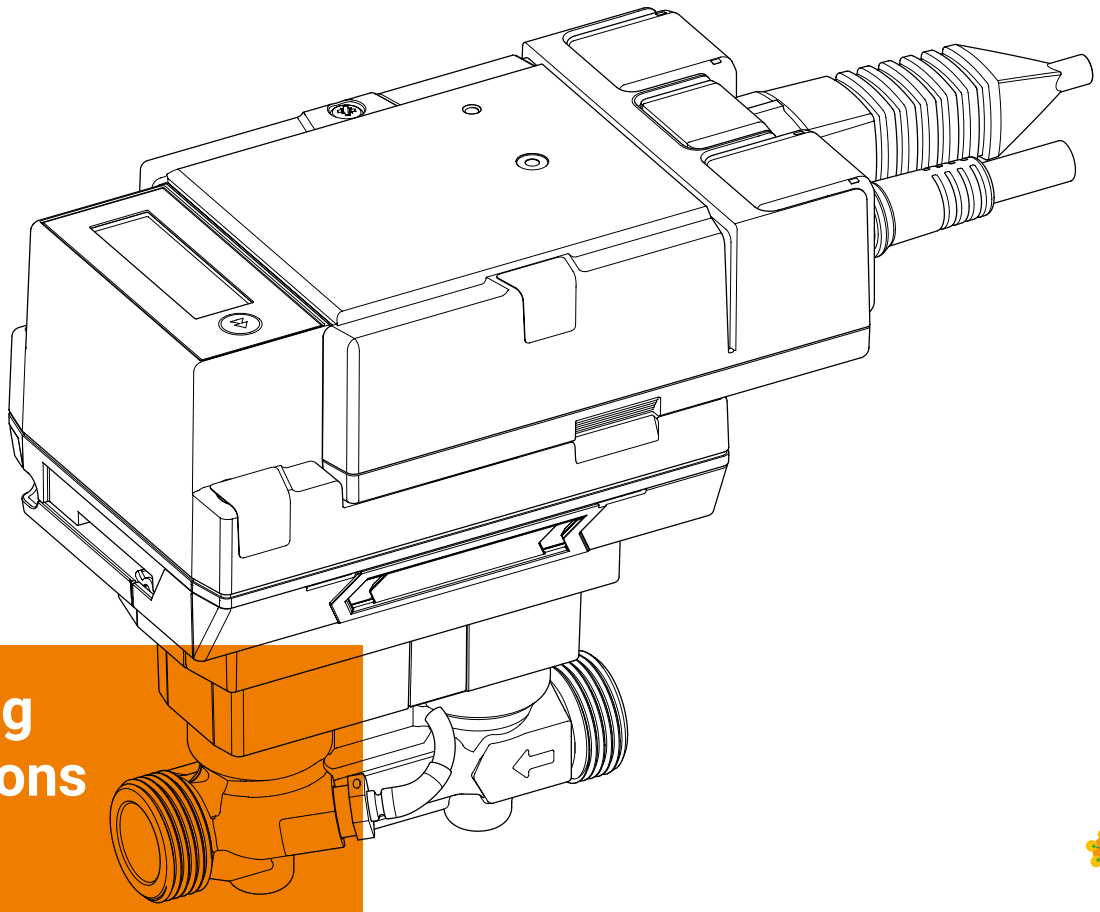


Operating instructions

Thermal Energy Meters 22PEM-1U..

MID 2014/32/EU

EN 1434

Edition 2021-09/B

BELIMO

Table of contents

BELIMO

Notes

General information

Use and function

The thermal energy meter records the thermal energy in closed heating, cooling systems or heating/cooling systems.

Approval

The thermal energy meter meets the requirements of EN 1434 and has type approval according to the European Measuring Instruments Directive 2014/32/EU (MI-004). The thermal energy meter is approved as a heat meter. In certain European counties, based on local regulations, the thermal energy meter is not approved for use as a cooling meter. In these countries, it is not legally compliant to use the thermal energy meter as a cooling meter in legal transactions. But it is possible to use the thermal energy meter as a cooling meter for "internal use" at any time.

Scope of delivery

- Thermal energy meter
- Two security seals consecutively numbered (once) with attached wire approx. 40 cm
- Insulation shell
- Silicone grommet
- Installation instructions

Water quality requirements

The measuring stability of the counters is only given if the water quality meets the conditions of AGFW recommendation FW-510 and VDI 2035.

Energy meter installation

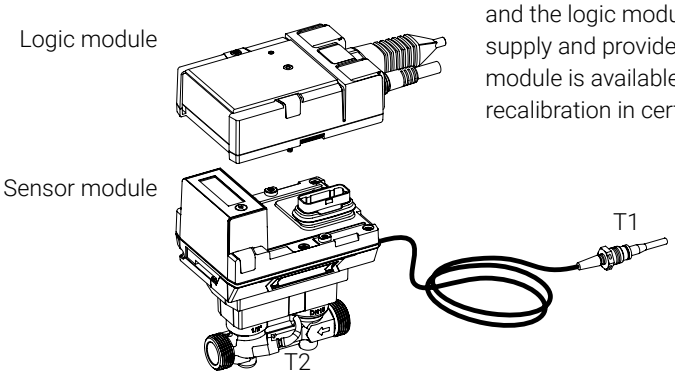
Before commissioning and installing the thermal energy meter, the operating manual should be carefully studied to prevent errors during installation and commissioning.

The operating instructions are valid for the following thermal energy meters

Product type from Belimo	DN	DN (")	G (")	Nominal flow qp (m^3/h)
22PEM-1UC	15	1/2	3/4	1.5
22PEM-1UD	20	3/4	1	2.5
22PEM-1UE	25	1	1 1/4	3.5
22PEM-1UF	32	1 1/4	1 1/2	6
22PEM-1UG	40	1 1/2	2	10
22PEM-1UH	50	2	2 1/2	15

Structure of the thermal energy meter

The thermal energy meter consists of a sensor module with connected temperature sensors, which houses the calculator unit and measuring system, and the logic module, which connects the thermal energy meter to the power supply and provides the bus and NFC communication interface. The sensor module is available as a spare part and must be replaced periodically for recalibration in certain countries according to national regulations.



Belimo Assistant App

For successful commissioning of the thermal energy meter, it is necessary to set system-specific parameters using the Belimo Assistant App. Communication from the smartphone to the thermal energy meter takes place via NFC (Near Field Communication). The settings made in the process are finally shown on the display of the thermal energy meter for inspection (see chapter "Activation of the thermal energy meter").

NFC connection

The NFC logo on the thermal energy meter indicates that the device can be operated with the Belimo Assistant App.

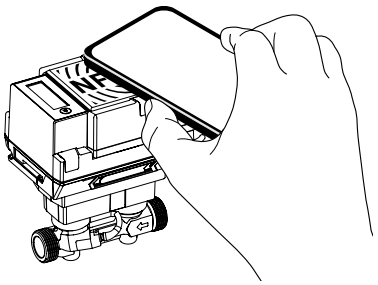
Requirement:
- NFC or Bluetooth-enabled smartphone
- Belimo Assistant App (Google Play and Apple App Store)

NFC: position the NFC-enabled smartphone on the thermal energy meter so that both NFC antennas of the smartphone and thermal energy meter are on top of each other.

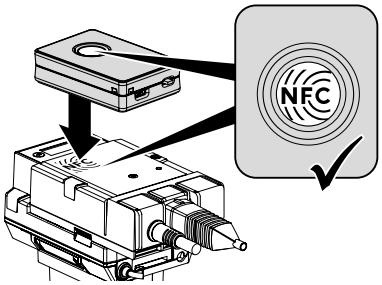
Bluetooth: connect the Bluetooth-enabled smartphone to the thermal energy meter via Bluetooth NFC converter ZIP-BT-NFC.

Technical data and operating manual can be found on the ZIP-BT-NFC data sheet.

NFC



Bluetooth



Calibration Certificate

A calibration certificate is available in the Belimo Cloud for each thermal energy meter. If required, this can be downloaded as a PDF with the Belimo Assistant App or via the Belimo Cloud frontend.

Selecting the physical address

In order for the thermal energy meter to operate successfully with bus communication, the device must be assigned a physical address. The address is programmed using the Belimo Assistant App.

Legal notice

Authorisation

The thermal energy meter has left the factory in perfect condition. All installation work may only be carried out by a trained and authorised specialist.

MID-conformity and guarantee

The factory seals of the thermal energy meter must not be changed, damaged or removed - otherwise the guarantee and MID conformity of the device are void.

Application for cooling measurement

The thermal energy meter can optionally display the accumulated heat quantity and the accumulated cooling quantity. In doing so, the national regulations regarding the measurement of cooling quantities must be observed. In certain European counties, based on local regulations, the thermal energy meter is not approved for use as a cooling meter. In these countries, it is not legally compliant to use the thermal energy meter as a cooling meter in legal transactions. But it is possible to use the thermal energy meter as a cooling meter for "internal use" at any time.

Data Protection

Please consider the principles of data security and data privacy when using the device. This applies in particular if the device is used in residential buildings. For this purpose, the initial password for remote access (webserver) needs to be changed when configuring the device. Moreover, physical access to the device should be restricted so that only authorized persons may access the device. Alternatively, the device offers the option to permanently disable access through the NFC interface.

Installation notes

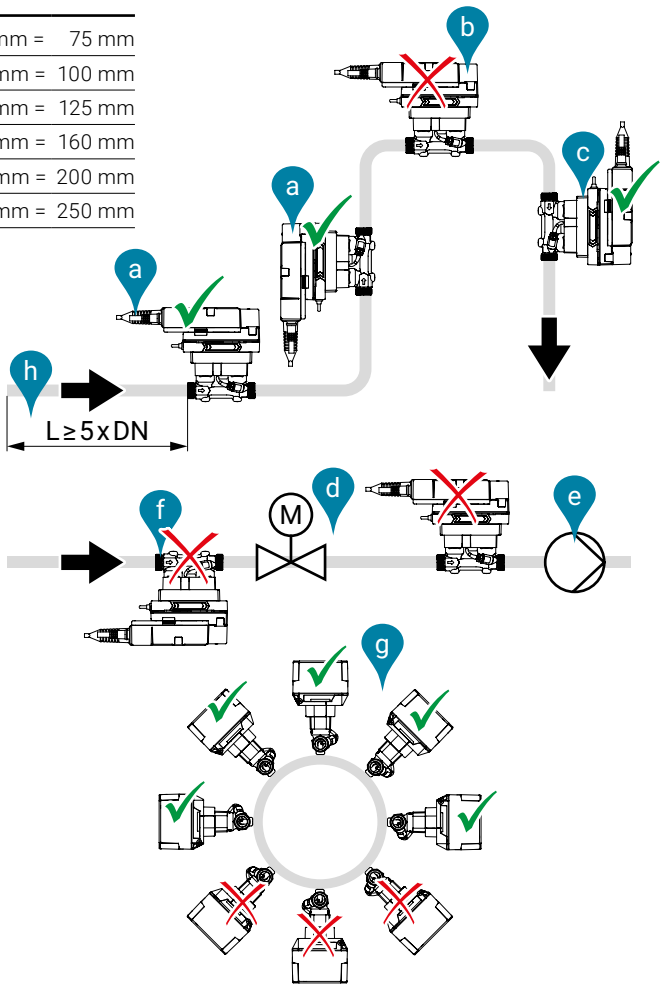
Installation position

a) Recommended installation position
b) Prohibited installation position due to the risk of air accumulation
c) Acceptable installation position in closed systems
d) Installation directly downstream from valves is prohibited.
Exception: If it is an isolation valve without constriction and is 100% open.
e) Installation on the suction side of a pump is prohibited.
f) The thermal energy meter must not be installed upside down.
g) Upright to horizontal installation is permitted, but suspended installation is prohibited.

Inlet section

h) In order to achieve the specified measuring accuracy, it is recommended to provide a straight flow-calming section or inflow section in the direction of flow upstream from the thermal energy meter. This must be at least 5 x DN and have the same nominal size (DN) as the thermal energy meter.

DN	L min.
15	5 x 15 mm = 75 mm
20	5 x 20 mm = 100 mm
25	5 x 25 mm = 125 mm
32	5 x 32 mm = 160 mm
40	5 x 40 mm = 200 mm
50	5 x 50 mm = 250 mm



Flow direction

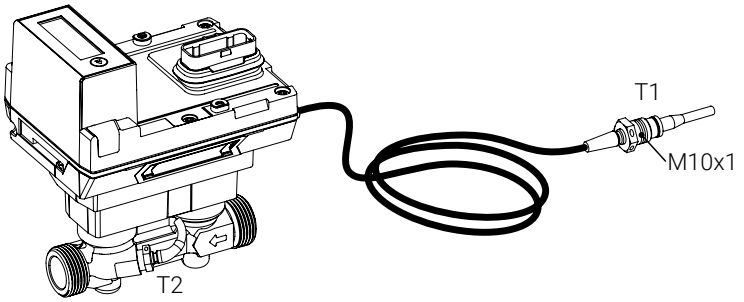
The direction of flow indicated by an arrow on the logic module and flow measuring pipe must be complied with, otherwise the flow will be measured incorrectly.

Preventing cavitation

To prevent cavitation, the system pressure at the output of the thermal energy meter must be at least 1 bar at qs (maximum flow) and temperatures up to 90°C. At a temperature of 120°C the system pressure at the output of the thermal energy meter must be at least 2.5 bar.

Installation of temperature sensor T1

For new installations, direct installation of temperature sensor T1 is preferred. National regulations must be observed when using (stock) thermowells.



The connecting cable of temperature sensor T1 should not be laid along hot pipes or wound around them, as the wire resistance and its temperature dependency affect the measurement result of temperature sensors in two-wire technology.

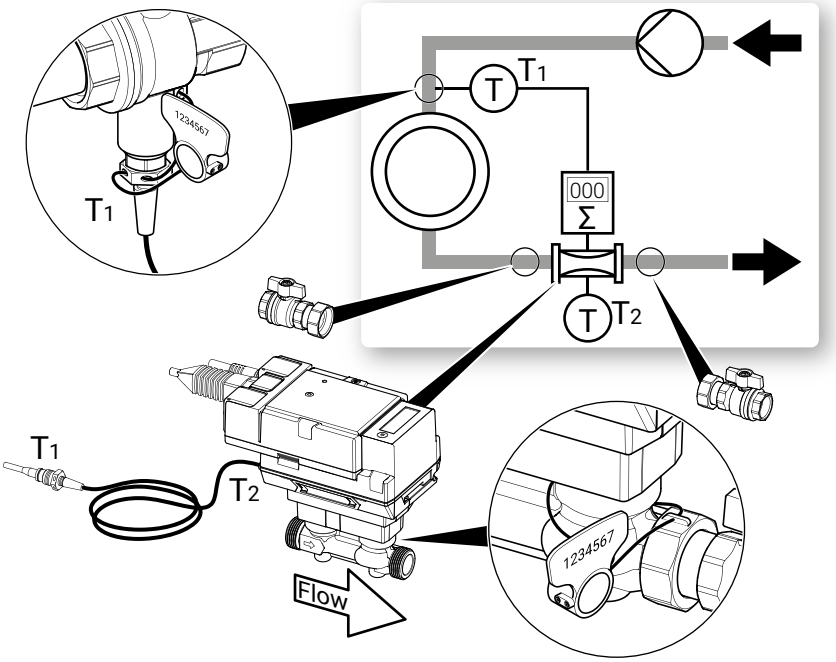
Installation in the return (default)

Assignment and configuration
The Belimo Assistant App must be used to inform the thermal energy meter that it is located in the return (see chapter "Activation of the thermal energy meter").

Picture 1 shows the principle. The thermal energy meter is located in the return of the consumer. Temperature sensor T2 installed directly in the sensor module records the return temperature. The external temperature sensor T1 can be installed in the temperature measurement ball valve, which is located in the supply, via the brass screw connection with M10x1 thread, which surrounds the sensor. During installation of the sensor in the temperature measurement ball valve, ensure that the flat seal surrounding the sensor is clean and has a proper fit. The brass screw connection of the sensor is tightened slightly (6...10 Nm) with an open-end wrench.

After checking the installation, temperature sensor T1 installed in the temperature measurement ball valve is fitted with a security seal (protection against manipulation). The security seal is included in the scope of delivery.

When installing the thermal energy meter, the direction of flow must be considered. The direction of flow is indicated by the arrows on the flow body (on both sides) and on the logic module. The thermal energy meter is installed between two isolation valves. After installation, one of the isolation valves along with the flow body is fitted with a security seal (protection against manipulation). The security seal is included in the scope of delivery. Temperature sensors T1 and T2 are permanently connected to the thermal energy meter. The cable length must not be changed. If the sensor module is replaced, both temperature sensors T1 and T2 are also replaced.



Picture 1

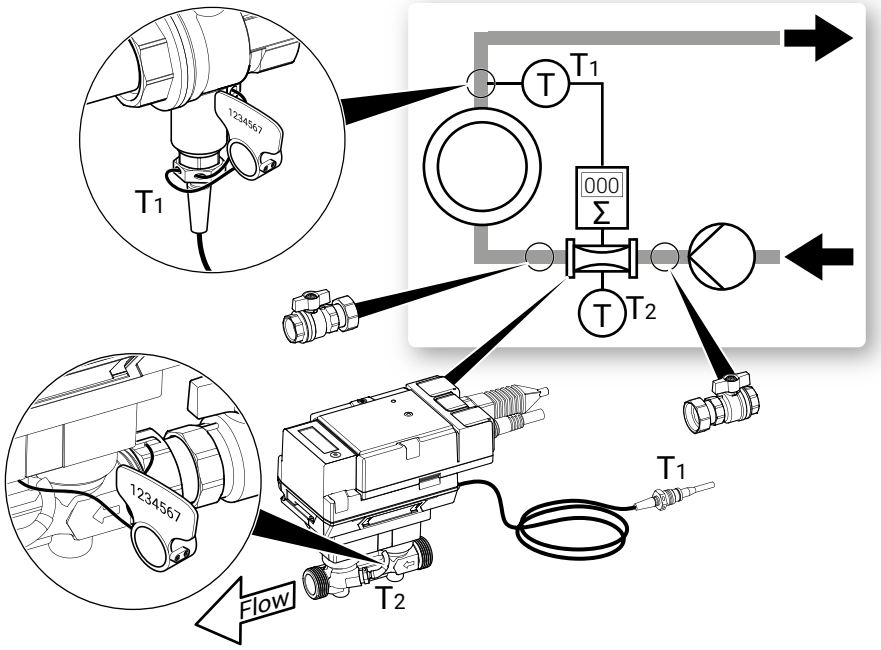
Installation in the supply (alternative)

Assignment and configuration
The Belimo Assistant App must be used to inform the thermal energy meter that it is located in the supply (see chapter "Activation the thermal energy meter").

Picture 2 shows the principle (alternative). The thermal energy meter is located in the supply. Temperature sensor T2 installed directly in the sensor module records the supply temperature. The external temperature sensor T1 can be installed in the temperature measurement ball valve, which is located in the return, via the brass screw connection with M10x1 thread, which surrounds the sensor. During installation of the sensor in the temperature measurement ball valve, ensure that the flat seal surrounding the sensor is clean and has a proper fit. The brass screw connection of the sensor is tightened slightly (6...10 Nm) with an open-end wrench.

After checking the installation, temperature sensor T1 installed in the temperature measurement ball valve is fitted with a security seal (protection against manipulation). The security seal is included in the scope of delivery.

When installing the thermal energy meter, the direction of flow must be considered. The direction of flow is indicated by the arrows on the flow body (on both sides) and on the logic module. The thermal energy meter is installed between two isolation valves. After installation, one of the isolation valves along with the flow body is fitted with a security seal (protection against manipulation). The security seal is included in the scope of delivery. Temperature sensors T1 and T2 are permanently connected to the thermal energy meter. The cable length must not be changed. If the sensor module is replaced, both temperature sensors T1 and T2 are also replaced.



Picture 2

Supply voltage

Supply with AC/DC 24 V

The supply voltage of the thermal energy meter is 24 Volt AC or DC.

Supply via PoE

Alternatively, supply can be supplied via the Ethernet socket using PoE (Power over Ethernet with standard IEEE 802.3af). Activation of the PoE-supply DC 24 V for supplying the external active sensor (see also the chapter "Wiring diagrams") is carried out via the Belimo Assistant App (regardless of whether communication takes place via Ethernet). If the thermal energy meter is supplied with voltage via PoE, DC 24 V (max. 8W) is available at wires 1 + 2 for supplying external devices (e.g. actuator or active sensor).

Caution: PoE may only be enabled if an external device is connected to wires 1 + 2 or if wires 1 + 2 are insulated!

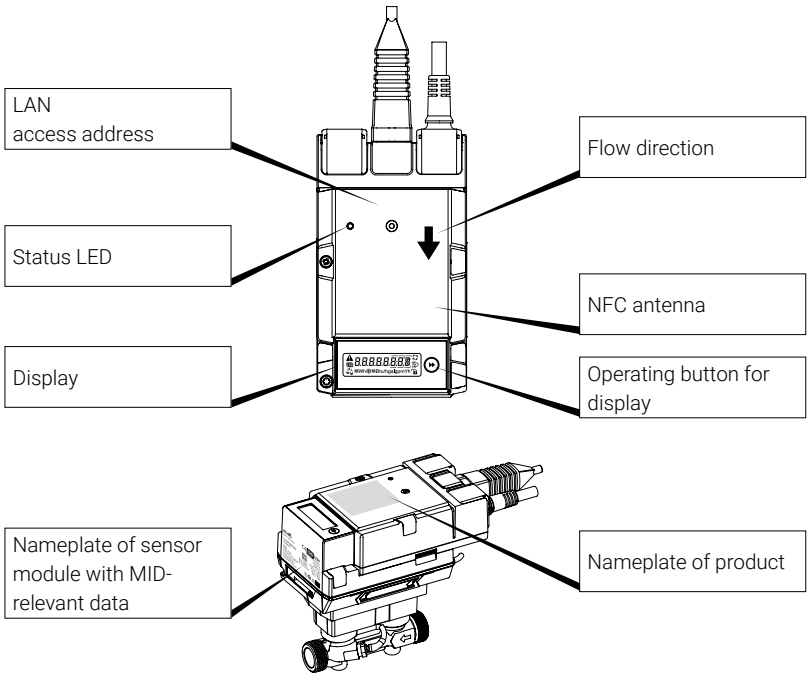
Battery operation

In the event of a voltage interruption, the thermal energy meter can no longer be accessed via communication. However, the thermal energy meter continues to operate supported by a battery and internally stores the cumulative counter readings (energy and volume). The battery is capable of providing power to the energy meter for 14 months. While the thermal energy meter is running on the battery, the values can only be read out via the display.

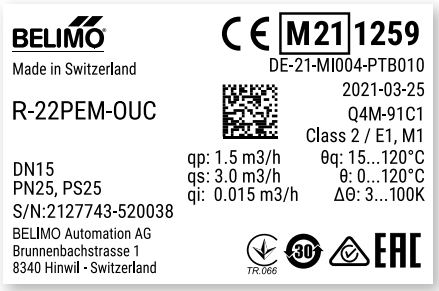
Operating controls and indicators

Status LED display

LED	Status
Lights up continuously	Device starts
Flashing	Device in operation
Off	No voltage



Nameplate of sensor module with MID-relevant data
(Example DN 15)

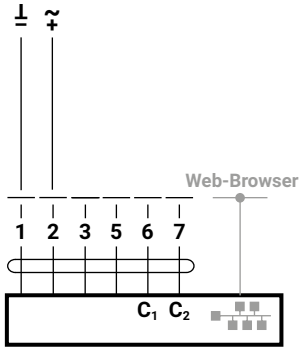


Wiring diagrams

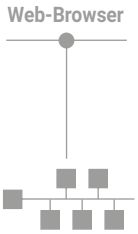
Notes

- Supply with isolating transformer
- The wiring of the line for BACnet MS/TP and Modbus RTU must be carried out according to the relevant RS485 guidelines.
- Modbus/BACnet: power supply and communication are not galvanically separated. Connect earth signal for devices with one another.
- Sensor interface: a sensor can optionally be connected to the thermal energy meter. This can be a passive resistance sensor (Pt1000, Ni1000 or NTC), an active sensor (e.g. with a DC 0...10 V output) or a switching contact. As a result, the analogue signal of the sensor can be easily digitised with the thermal energy meter and transferred to the corresponding bus system.
- Analogue output: an analogue output is available at the thermal energy meter. This can be selected as DC 0…10 V, DC 0.5…10 V or DC 2…10 V. For example, the flow or the temperature of temperature sensor T1/T2 can be output as an analogue value.
- IP protection: IP protection is only guaranteed if either the Ethernet connector socket is protected with the cover cap or a connected Ethernet cable is protected with the enclosed silicone grommet.
  The clamp that fastens the silicone grommet must be tightened to a torque of 0.3 Nm.
- Equipotential bonding: equipotential bonding must be installed on the flow body, if this is not already done via the pipeline.

Connection assignment



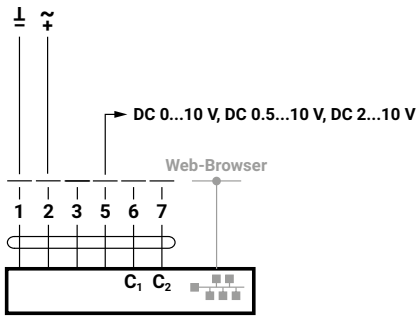
Wire colours:
1 = black, GND
2 = red, AC/DC 24 V
3 = white, sensor
5 = orange, MP, DC 0…10 V
6 = pink, C1 = D− = A
7 = grey, C2 = D+ = B



Connection RJ45
- PoE
- BACnet IP
- Modbus TCP
- TCP/IP
- Belimo Cloud
- Web server

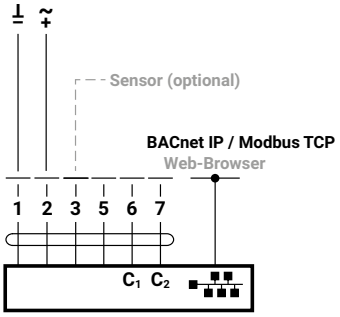
Note: the connection to the Belimo Cloud is permanently available. Activation takes place via web server or Belimo Assistant App.

Analogue output connection

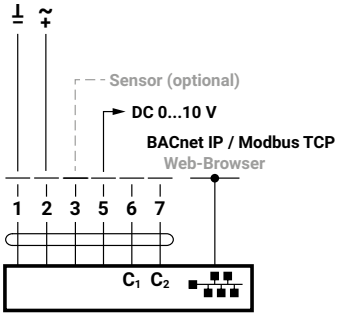


Connections BACnet, Modbus, MP-Bus

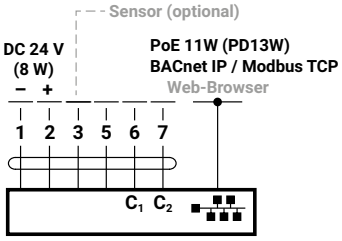
BACnet IP or Modbus TCP



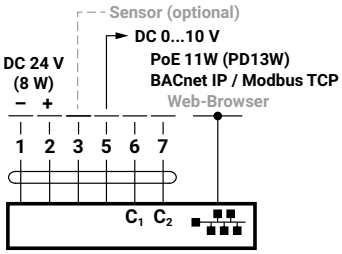
BACnet IP or Modbus TCP with analogue output



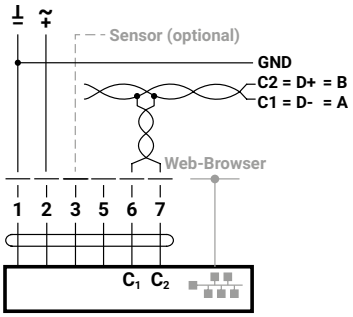
PoE with BACnet IP or Modbus TCP



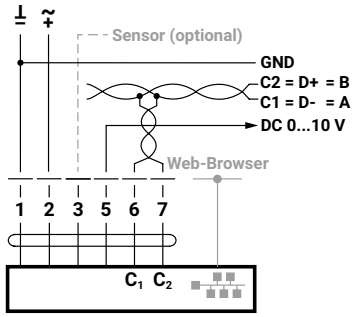
PoE with BACnet IP or Modbus TCP with analogue output



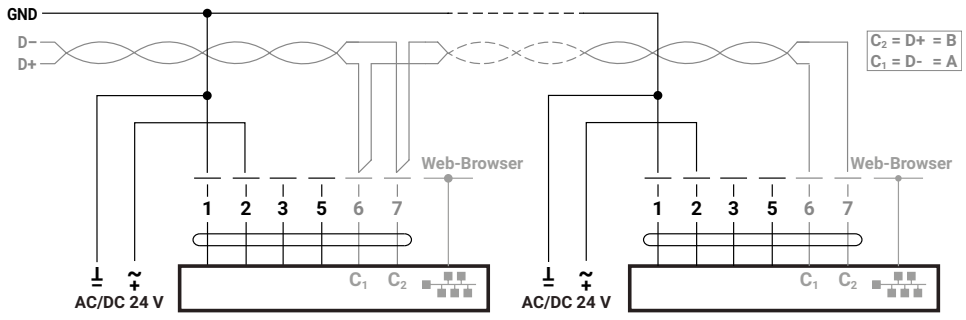
BACnet MS/TP or Modbus RTU



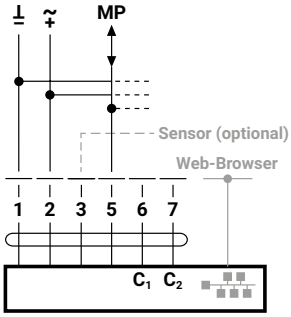
BACnet MS/TP or Modbus RTU with analogue output



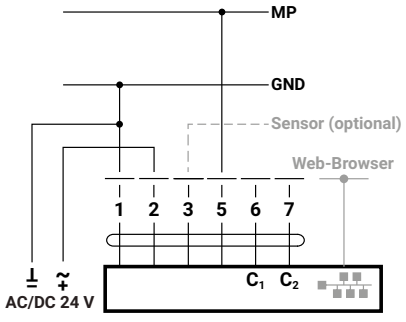
Wiring BACnet MS/TP or Modbus RTU (daisy chain)



MP-Bus, supply via 3-wire

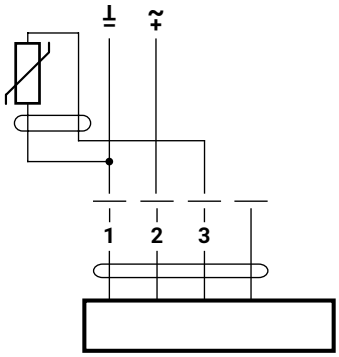


MP-Bus via 2-wire local power supply

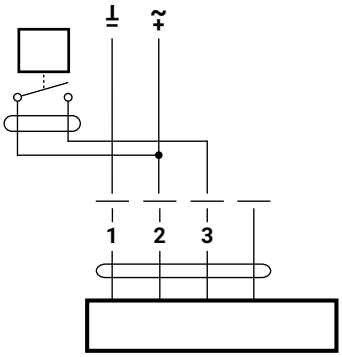


Sensor connections (optional)

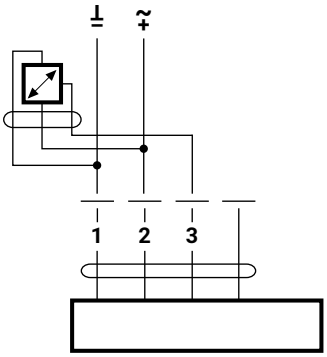
Passive sensor connection



Switch connection

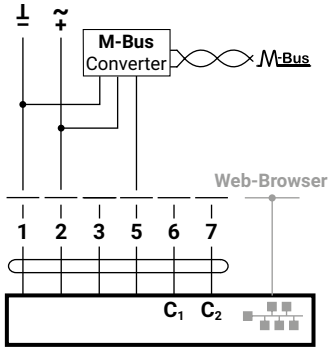


Active sensor connection



Connection to M-Bus

M-Bus via M-Bus converter



Activation of the thermal energy meter

Display symbols

Symbol	Meaning
	Flow is signalled
	Energy meter is installed in the supply
	Energy meter is installed in the return
	Energy meter already activated
	Energy meter not yet activated
	Cooling quantity is displayed
	Error present Note: details can be queried in the diagnostic loop
	Diagnostic loop is active
	Findings check mode active

Notes on activation

To successfully commission the thermal energy meter, it is necessary to set system-specific parameters using the Belimo Assistant App. Communication from the smartphone to the thermal energy meter takes place via NFC (Near Field Communication). The settings made are then shown on the display of the thermal energy meter for verification and must be confirmed by pressing a button on the device to activate it. Once activated, the thermal energy meter will begin to accumulate the measured energy. The correct configuration of the thermal energy meter is a prerequisite for correct functioning.

The parameters can be set **once** and cannot be changed after activation.

Important:

- Activation is carried out only once and is irreversible, i.e. it is important to be attentive and mindful during activation. If activated incorrectly, the device will measure incorrectly and must be removed and replaced at the user's own expense.
- Whoever carries out commissioning is obliged to check all relevant parameters.
- A Belimo Cloud account is required for activation. Registration for a Belimo Cloud account can be completed at www.cloud.belimo.com.
  In addition, a credential is required, which can be obtained by completing an online learning module. The online learning module is available on a special website at www.belimo.ch/tem-activation.

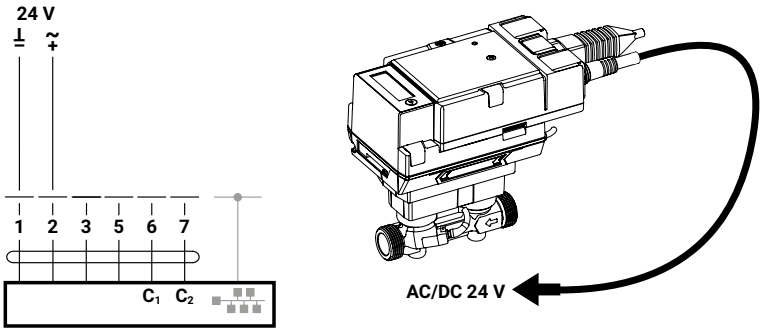
The following chapter describes how to activate the thermal energy meter using the Belimo Assistant App.

Notes on smartphones with Bluetooth

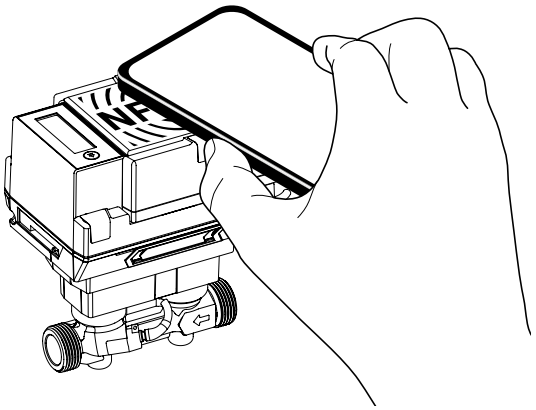
Bluetooth-enabled smartphones can be connected to the thermal energy meter via "Bluetooth-NFC converter" ZIP-BT-NFC (see chapter "NFC connection" in the "General notes").

Procedure for activation

1. Step
Connect the thermal energy meter to AC or DC 24 Volt or PoE (Power over Ethernet).

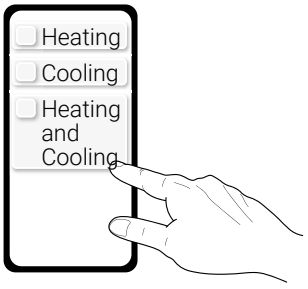


2. Step
Scan the thermal energy meter via NFC and read out data. The activation process can now be started via the overview page.
Initial situation:
– Status ok
– Energy meter not activated



3. Step
– Log in with Belimo ID…

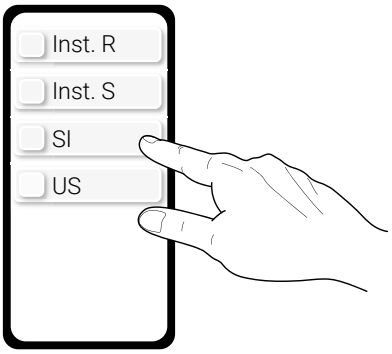
4. Step
Select the application according to system design
a) Heating
b) Cooling
c) Heating and cooling



The thermal energy meter is not approved as a cooling meter (cooling application). Therefore, it is not legally compliant to use the thermal energy meter in legal trade as a cooling meter (cooling application). Use as a cooling meter (cooling application) within the company is possible at any time.

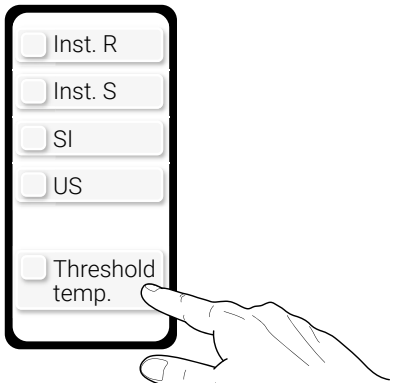
5. Step
Select parameters for the corresponding application

Heating



- Choice of installation in return (R) or in supply (S)
- The system of units must be selected (SI = International System of Units, US = US System of Units)

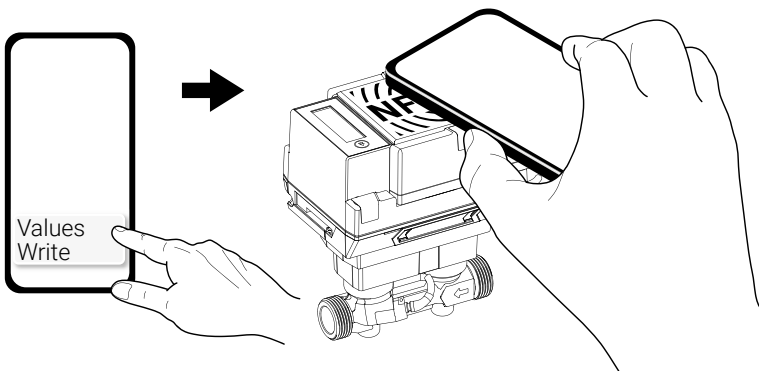
Cooling
Heating / cooling



- Choice of installation in return (R) or in supply (S)
- The system of units must be selected (SI = International System of Units, US = US System of Units)
- Advanced setting: the threshold temperature can be set as an option (threshold temp.).

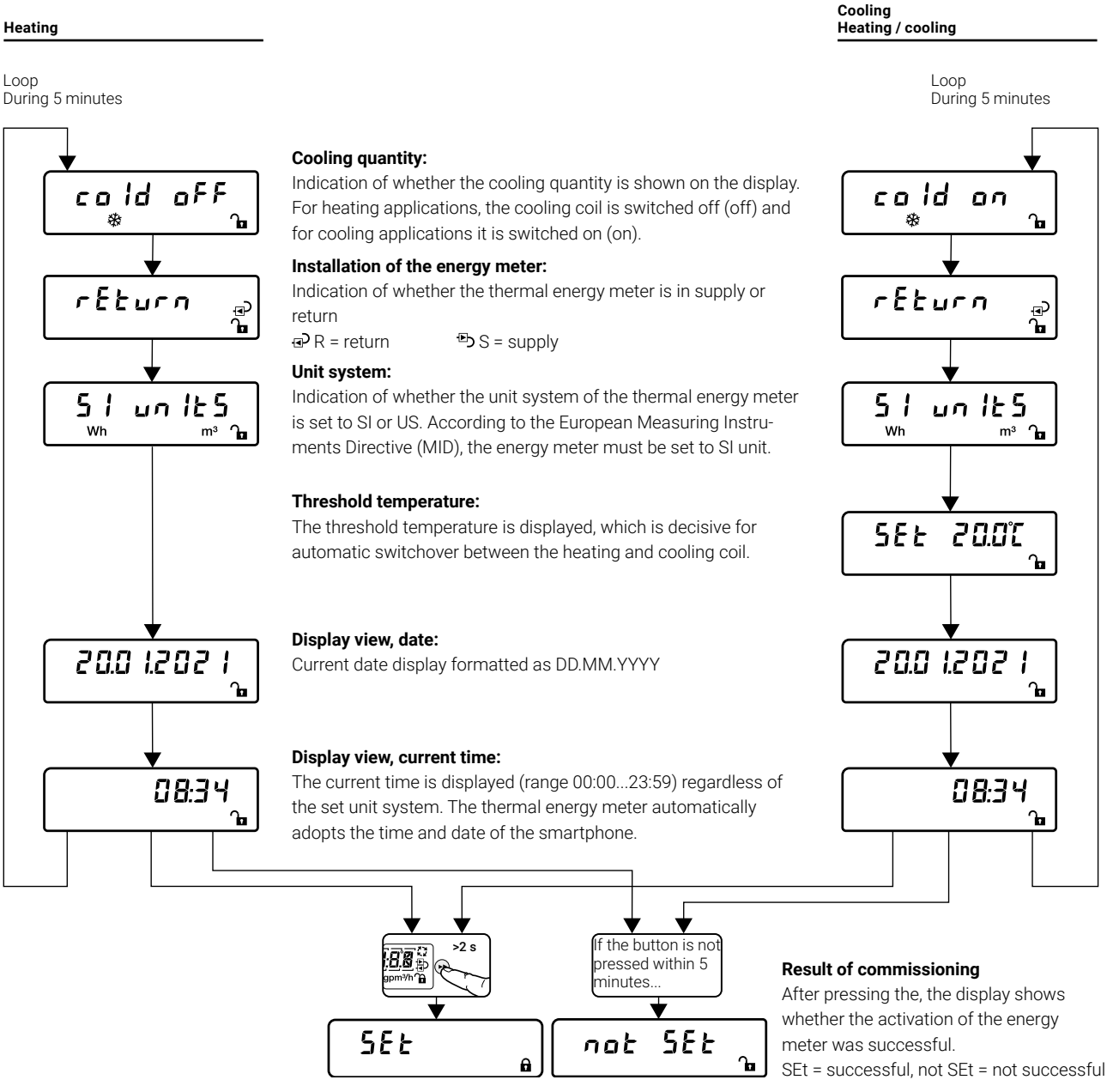
Note on threshold temperature: the threshold temperature is the temperature that is decisive for automatic switching between the heating and cooling coils. The factory setting is 20°C. The value should only be changed if a very high supply temperature is selected for a cooling application. National regulations on how to set the threshold temperature may apply. According to standard EN 1434, the threshold temperature should be 3°C above the highest supply temperature in cooling mode and 3°C below the lowest supply temperature in heating mode.

6. Step
Transfer values to the thermal energy meter via NFC

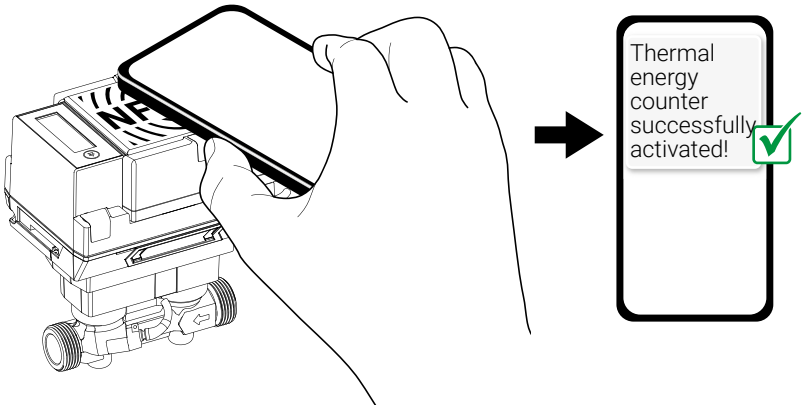


7. Step

The parameters selected in step 5 are now visible on the smartphone. At the same time, the "commissioning loop" is initiated on the display of the thermal energy meter. The display views are automatically changed in ascending order with an interval of 2.5 s. Once the last display view is reached, the first one is displayed again. **Whoever carries out commissioning is obliged to check all relevant parameters.** If all parameters are correct, they must be confirmed by pressing the display button on the thermal energy meter (>2 s) within 5 minutes. Note: if the key is not pressed, the app will display the message "Values not written". In this case, activation must be restarted. After a time-out of 5 minutes, the "commissioning loop" is terminated and the commissioning process aborted.



8. Step
Scan thermal energy meter via NFC:
– Message appears: thermal energy meter successfully activated!



Commissioning protocol

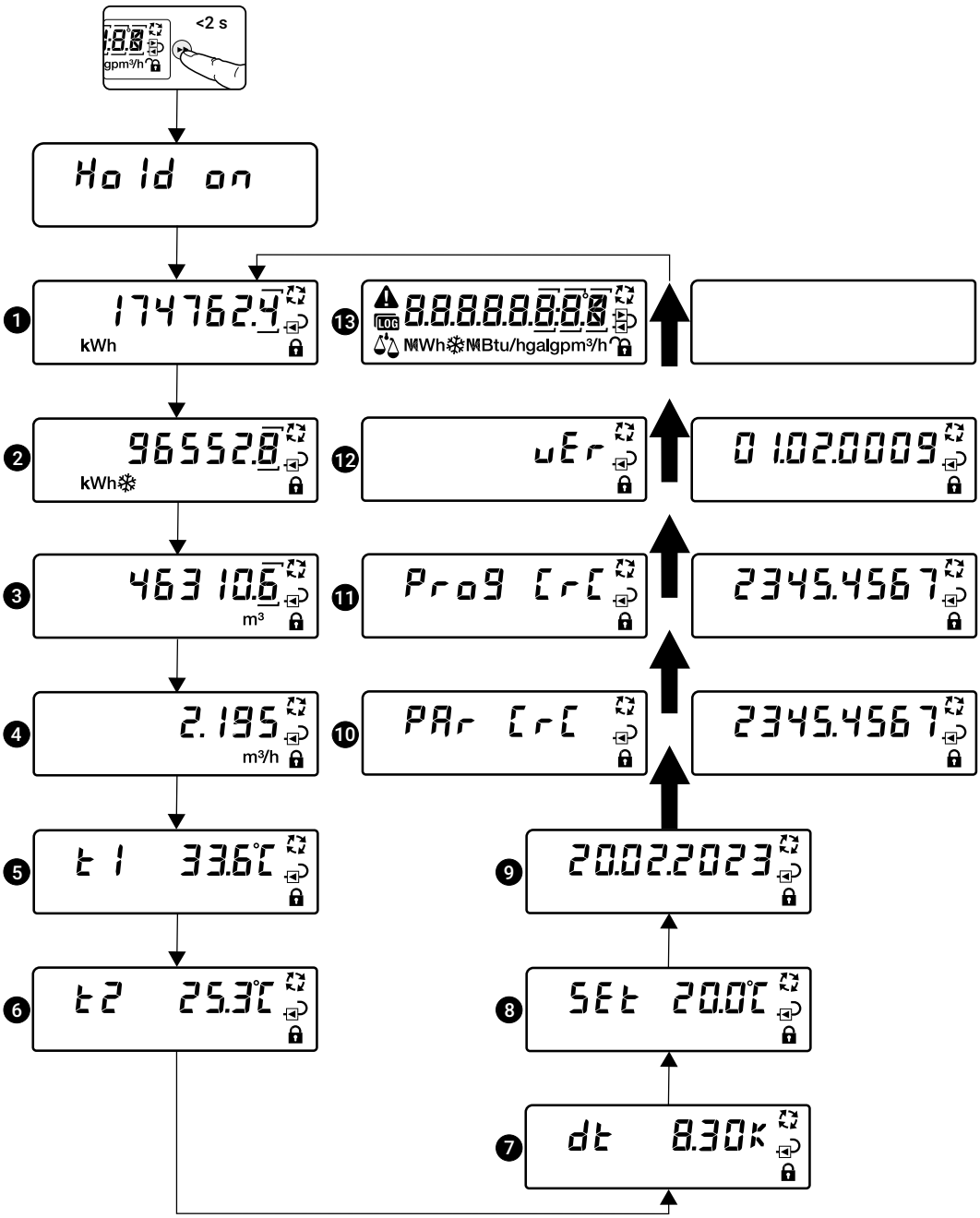
To prevent installation errors, it is recommended to have an installation and commissioning certificate issued when the thermal energy meter is reassembled or replaced. Documenting all measuring point data, counter data, the installation situation and the operating states ensures that the correct installation and the function of the thermal energy meter is reliably verified. As a result, the legal certainty of subsequent auxiliary cost statements can be additionally substantiated and tenant objections can be invalidated.
The commissioning protocol of the thermal energy meter is based on the submission of the technical guideline K9 of the German Physikalisch-Technische Bundesanstalt (PTB). After commissioning the thermal energy meter, the commissioning report is saved on device owner's Belimo Cloud account.

Display loops

User loop

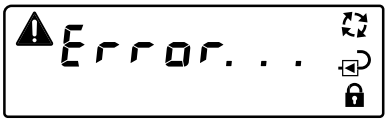
The "user loop" is started by activating the dark LCD display by briefly pressing (<2 s) the display button. It may take a moment for display view 1 to appear. During this time, "Hold on" is displayed. The view can be changed in ascending order by briefly pressing the display button. When the last entry in the table is reached, the first entry is displayed again.

The "user loop" is exited after a timeout of 30 s. The timeout is restarted each time the display button is pressed. After a timeout the display is switched off.



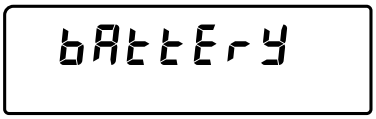
Description of the display views
"User loop"

If there are error messages, the adjacent display appears. The errors are displayed in ascending order (... = error code 00…99). In the other display views 1…11 of the user loop, a warning triangle is displayed. If there are no errors, this display does not appear.



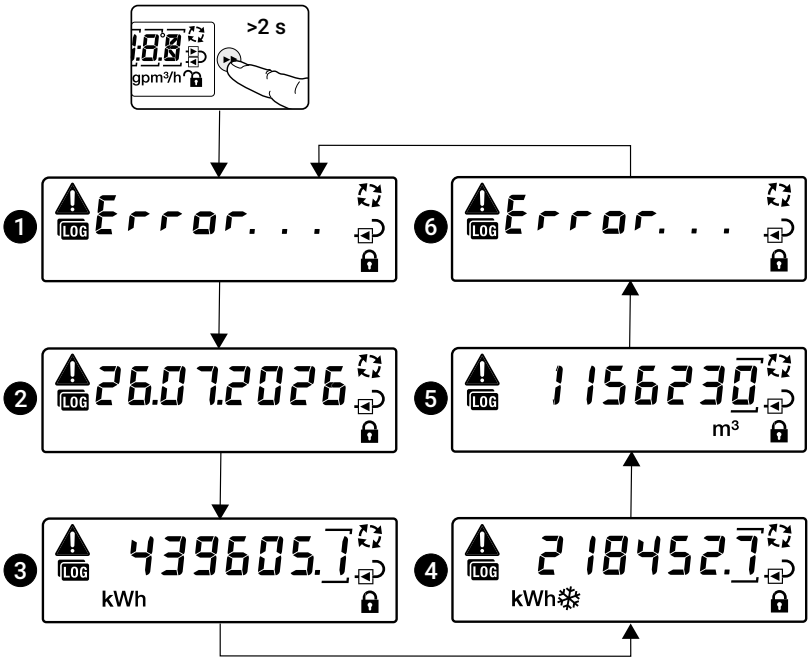
1	**Accumulated heat quantity**	The current accumulated heat quantity is displayed. If there is a permanent error (error codes 1...16), the last permanently stored accumulated heat quantity is displayed.
2	**Accumulated cooling quantity**	The current accumulated cooling quantity is displayed. If there is a permanent error (error codes 1...16), the last permanently stored accumulated cooling quantity is displayed. This display does not appear for pure heating applications.
3	**Accumulated volume**	The current accumulated volume is displayed. If there is a permanent error (error codes 1...16), the last permanently stored accumulated volume is displayed.
4	**Current volumetric flow**	The current volumetric flow is displayed.
5	**Current temperature of external temperature sensor T1**	The current temperature of the external temperature sensor is displayed.
6	**Current temperature of the temperature sensor T2 integrated in the thermal energy meter**	The current temperature of the temperature sensor integrated in the thermal energy meter is displayed.
7	**Temperature difference**	The current differential temperature between the supply and return temperature is displayed.
8	**Threshold temperature**	The threshold temperature is displayed, which is decisive for the automatic switchover between the heat and cooling coil.
9	**Date**	Current date display formatted as DD.MM.YYYY
10	**CRC type-specific parameter**	For display purposes, the two display views are alternately displayed at 1-s intervals. The CRC code is used to indicate that the factory settings have not been changed.
11	**CRC program code**	For display purposes, the two display views are alternately displayed at 1-s intervals. The CRC code is used to indicate that the program code has not been changed.
12	**Software version**	For display purposes, the two display views are alternately displayed at 1-s intervals.
13	**LCD test**	The LCD display is being tested. In 1-s intervals, all characters are displayed and then deleted again. During this process, you can check that all characters and symbols are shown on the display.

To save the battery, the LCD display is deactivated when the battery voltage is critical. In this case, the adjacent display appears. The measuring operation continues nevertheless. To reactivate the display, the thermal energy meter must be supplied with external voltage.



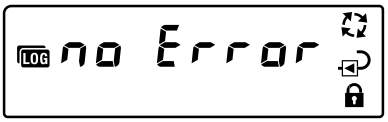
Diagnostic loop

The "diagnostic loop" is started from the "user loop" by pressing the display key (>2 s) and indicated by the LOG symbol. You can switch from the "user loop" to the "diagnostic loop" and back by pressing and holding the display key (>2 s). The display view can be changed in ascending order by briefly pressing the display key. After the last display is reached, the first display is shown again. The "diagnostic loop" is exited after a time-out of 30 s. The time-out is restarted each time the display button is pressed. After a timeout the display is switched off.



Description of display views "Diagnostic loop"

If no messages are pending, the following display appears:



1	**Error number (... = error code 00...99)**	The error with the lowest error number is displayed (permanent errors have lower error numbers).
2	**Date**	Date of the last permanently stored counter readings is displayed.
3	**Accumulated heat quantity**	The last permanently stored accumulated heat quantity is displayed.
4	**Accumulated cooling quantity**	The last permanently stored accumulated cooling quantity is displayed. Is only displayed if the cooling quantities are activated.
5	**Accumulated volume**	The last permanently stored volume is displayed.
6	**Other errors (... = error code 00...99)**	If available, additional error codes are displayed.

Error codes

Permanent errors

Error code	Meaning
Err 01	Temperature sensor T2 (temperature sensor integrated in the sensor module) is short-circuited, and this has been detected in several successive measurements (only released after legal commissioning of the device)
Err 02	Temperature sensor T2 (temperature sensor integrated in the sensor module) is interrupted, and this has been detected in several successive measurements (only released after legal commissioning of the device)
Err 03	Temperature sensor T1 (external temperature sensor) is short-circuited, and this has been detected in several successive measurements (only released after legal commissioning of the device)
Err 04	Temperature sensor T1 (external temperature sensor) is interrupted, and this has been detected in several successive measurements (only released after legal commissioning of the device)
Err 05	Permanent communication error with non-volatile memory (SPI)
Err 06	Program code integrity check failed
Err 07	Parameter integrity check failed
Err 08	Power failure after completion of commissioning requiring calibration (only for MID devices)
Err 09	The data format in the non-volatile memory does not match the data format in the sensor uC software
Err 10	Integrity check of data in non-volatile memory failed
Err 11	An error counter has reached the maximum value
Err 12	
Err 13	
Err 14	
Err 15	
Err 16	

Temporary errors

Error code	Meaning
Err 17	
Err 18	The ultrasonic path is interrupted (air bubbles in the system, connection to ultrasonic transducers interrupted)
Err 19	Ultrasonic time of flight out of range
Err 20	Automatic gain controller out of range (problem with the ultrasonic transducer or wrong fluid)
Err 21	
Err 22	Volume accumulation failed
Err 23	Heat/cold accumulation failed
Err 24	The raw resistance measurement of temperature sensor T1 (external temperature sensor) or temperature sensor T2 (temperature sensor integrated in the sensor module) is invalid
Err 25	Calculation error
Err 26	Temperature sensor T2 (temperature sensor integrated in the sensor module) is short circuited
Err 27	Temperature sensor T2 (temperature sensor integrated in the sensor module) is interrupted
Err 28	Temperature sensor T1 (external temperature sensor) is short circuited
Err 29	Temperature sensor T1 (external temperature sensor) is interrupted
Err 30	Flow in reverse direction (backflow) detected
Err 31	Flow above the upper limit value
Err 32	Invalid flow

Sealing and lead sealing

Factory-applied seals

The following seals are applied at the factory.

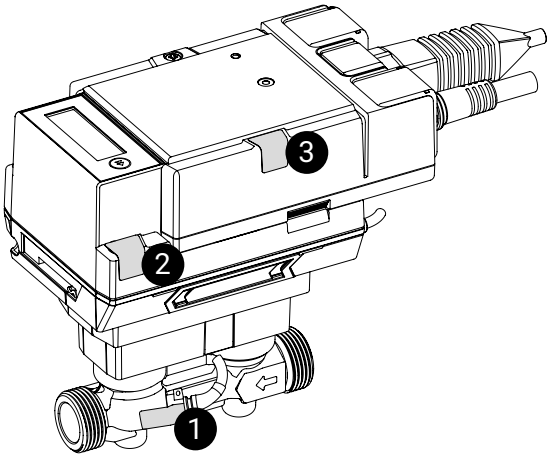
Seal 1
Seal (1) visualises manipulations of the internal temperature sensor T2.

Seal 2
Seal (2) visualises manipulations of the sensor module (calculator unit).

Seal 3
Seal (3) visualises manipulations of the logic module.

Note:
If the sensor module is purchased as a spare part, a seal (3) is included. The authorised person who replaces the sensor module must reapply the seal (3) after work has been carried out.

The factory seals (1) and (2) of the thermal energy meter must not be changed, damaged or removed - otherwise the guarantee and MID conformity of the device are void.

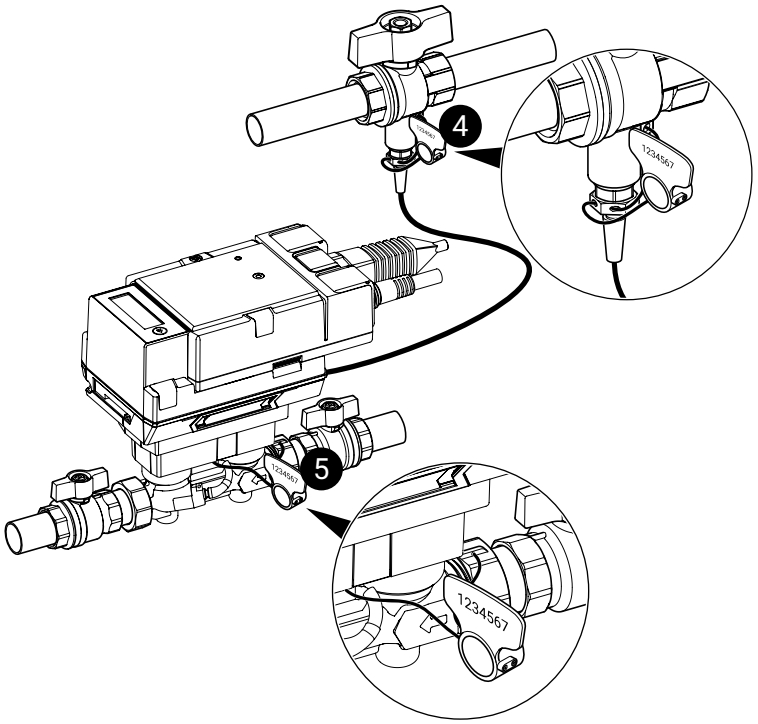


Lead sealing on the system

After the thermal energy meter has been installed and commissioned, it must be fitted with security seals by an authorised person (security seals in the scope of delivery) and the seals attached at the factory must be checked to ensure they are intact.

Security seal 4
Security seal (4) visualises manipulations of the external temperature measuring point (sealing of the temperature measuring ball valve).

Security seal 5
Security seal (5) visualises manipulations of the measured section of the thermal energy meter (seal between isolation valve and flow body).

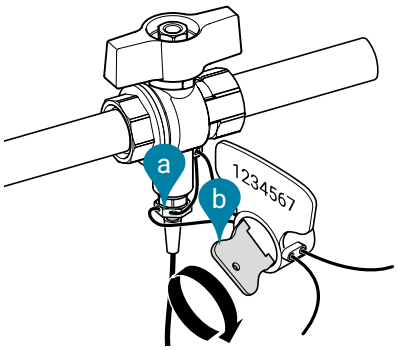


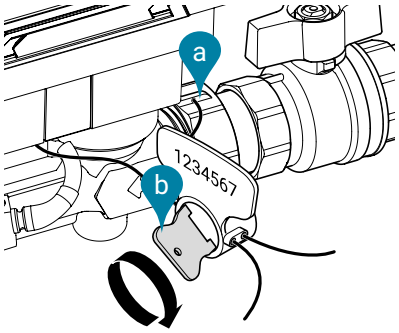
Properly affixing security seals

Rotary seal 4
Sealing of the temperature measurement ball valve

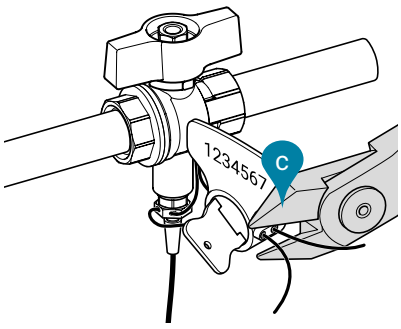
Rotary seal 5
Sealing between isolation valve and flow body

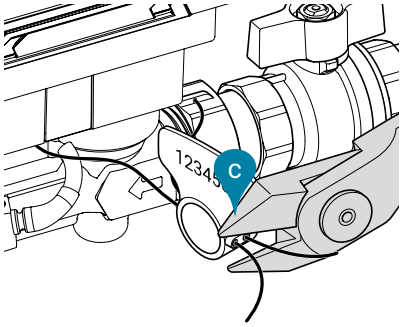
a) Thread the seal wire through all the openings provided for this purpose in the temperature measurement point and the security seal
b) Turn the handle of the security seal clockwise until the seal is flush with the surface and secured



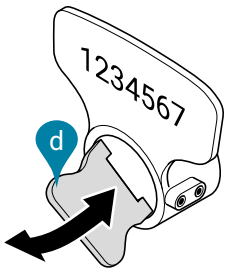


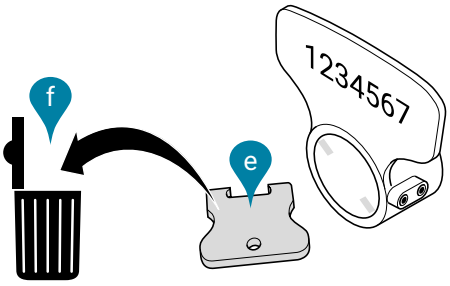
c) Cut seal wires with side cutter directly on the security seal



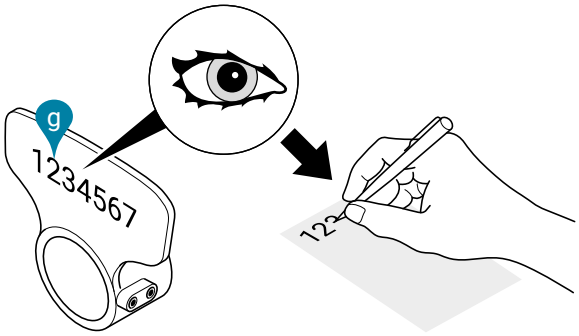


d) Move the handle of the security seal back and forth until it falls off
e) Handle of the security seal drops off, security seal is secured
f) Dispose of the handle of the security seal





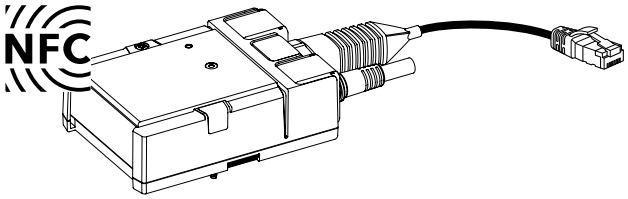
g) Record the consecutive and unique 7-digit number of security seals (4) and (5) and transfer the number to the commissioning report



Exchanging the sensor module

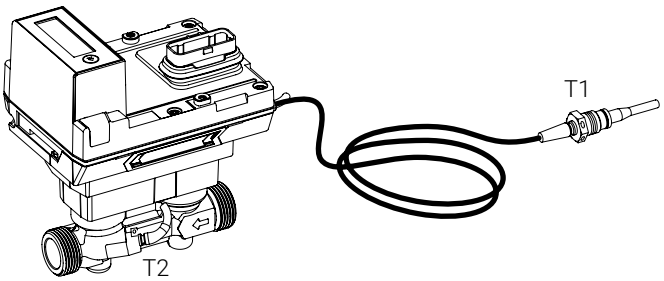
Logic module of the thermal energy meter

The thermal energy meter is supplied with voltage via the logic module. The bus and NFC communication interface is also available on the logic module. If the sensor module is disconnected from the logic module for replacement, the connecting cables can remain connected to the logic module and the system.



Sensor module of the thermal energy meter

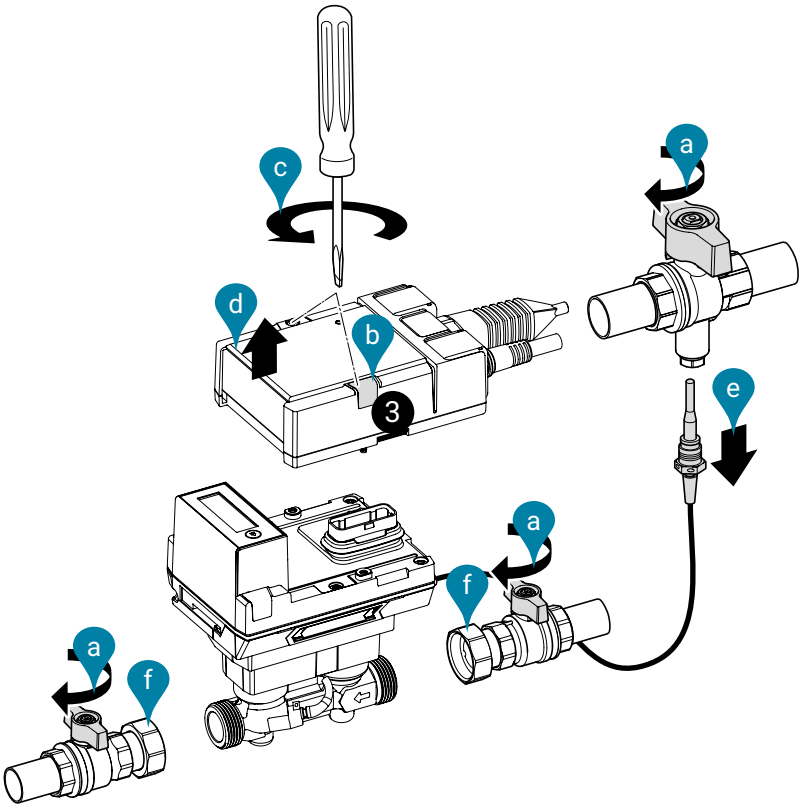
The sensor module contains the integrated temperature sensor T2 and the external temperature sensor T1 is connected via a cable. If the sensor module is replaced, both temperature sensors T1 and T2 must also be replaced. The sensor module also houses the calculator unit and the ultrasonic flow measurement system.



In certain countries, the sensor module must be replaced periodically for recalibration and is therefore available as a spare part. Relevant national regulations must be observed.
After expiry of the national recalibration period, the use of the thermal energy meter is no longer legally compliant.

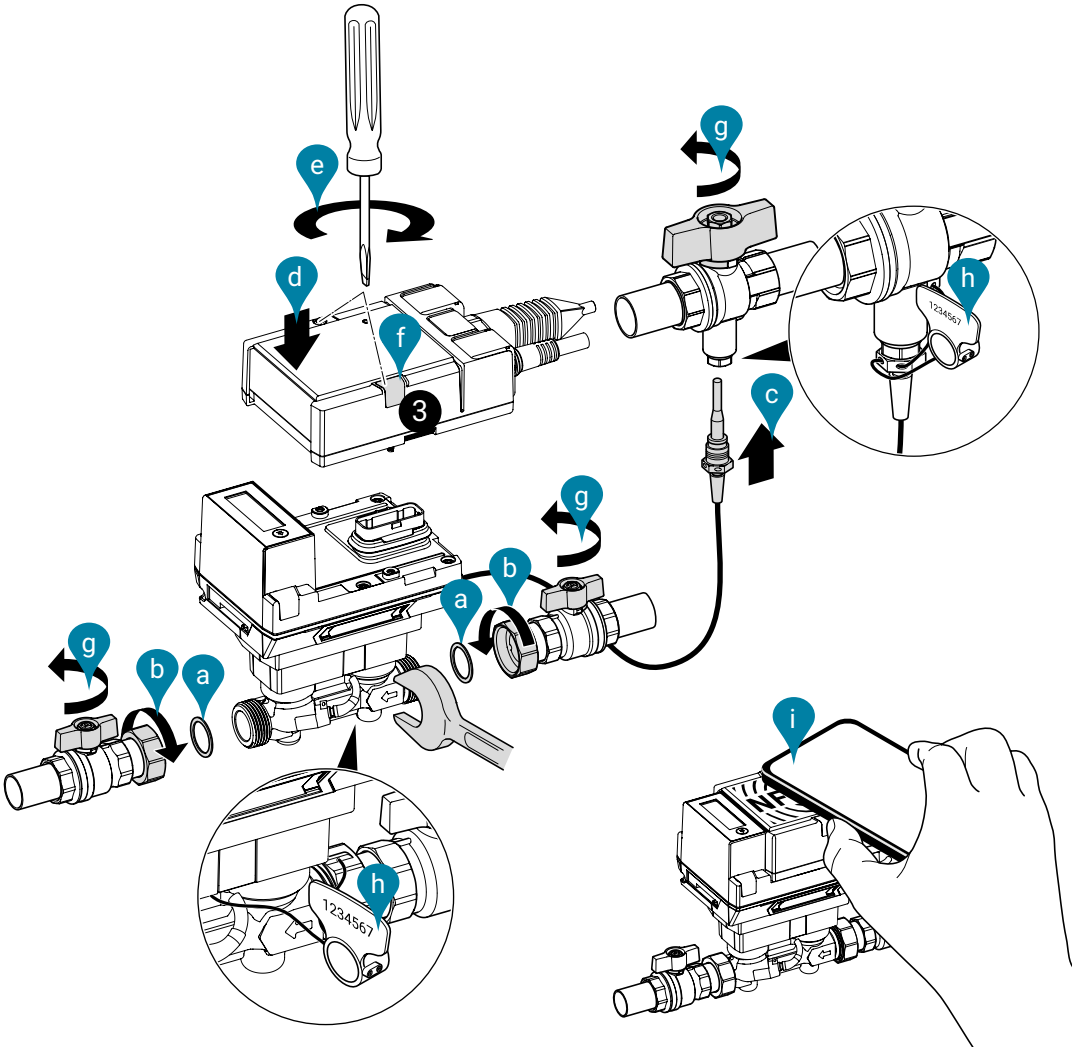
Separate the logic module and sensor module

a) Remove security seals and close the temperature measurement ball valve and the isolation valves
b) Remove seal (3)
c) Loosen the screws of the logic module
d) Separate the logic module and sensor module
e) Loosen brass screw connection of temperature sensor T1 and pull out sensor
f) Loosen the screw connections on the sensor module and remove the sensor module



Join the logic module and sensor module

a) Place sealings (a) between the connections of the thermal energy meter and the isolation valves
b) Tighten the union nuts (b) clockwise while holding them tight with the open-end wrench attached to the flow body of the thermal energy meter. **Attention!** When tightening the union nuts, do not hold against the plastic housing of the thermal energy meter, instead use the wrench size on the metal flow body to apply the open-end wrench.
c) Insert temperature sensor T1 into the temperature measurement ball valve, check whether the flat seal is correctly positioned and tighten the brass screw connection (6...10 Nm)
d) Connect the logic module onto sensor module
e) Tighten the screws of the logic module with a torque of 1.8 Nm
f) Apply seal (3)
g) Open temperature measurement ball valve and isolation valves
h) Attach security seals
i) Activate thermal energy meter

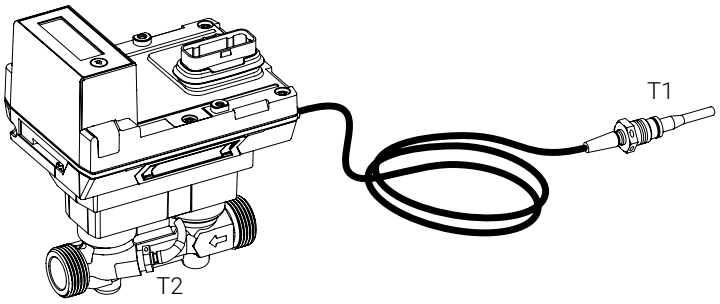


Sensor module as a spare part

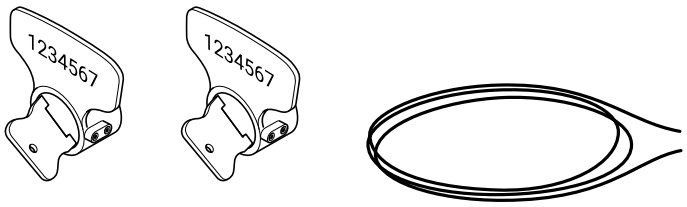
Product type from Belimo	DN	DN (")	G (")
R-22PEM-0UC	15	1/2	3/4
R-22PEM-0UD	20	3/4	1
R-22PEM-0UE	25	1	1 1/4
R-22PEM-0UF	32	1 1/4	1 1/2
R-22PEM-0UG	40	1 1/2	2
R-22PEM-0UH	50	2	2 1/2

Comprising:

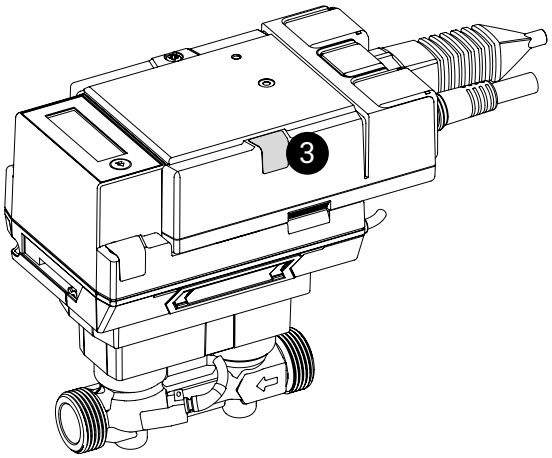
– Sensor module including the built-in temperature sensor T2 and the external temperature sensor T1



– 2 security seals consecutively numbered (once) with attached wire approx. 40 cm



– 1 seal (seal 3)

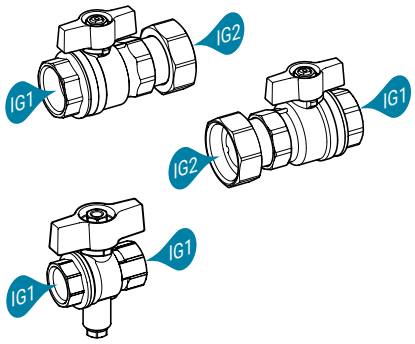


Accessories

Optional accessories

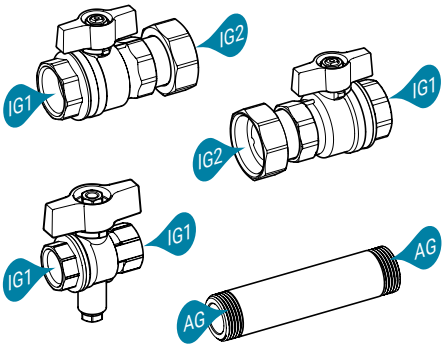
MID accessory sets optionally with or without adaptor consisting of:
- 2 x isolation valves with internal thread and union nut (installation of thermal energy meters)
- 1 x temperature measurement ball valve, can be sealed with sensor connection piece (sensor installation directly immersed)

MID accessory set without adaptor



Energy counter (DN)	Internal thread 1 (IG1) Isolation valve (Rp)	Internal thread 2 (IG2) Isolation valve (G)	Product type from Belimo
15	½"	¾"	EXT-EF-15A
20	¾"	1"	EXT-EF-20A
25	1"	1 ¼"	EXT-EF-25A
32	1 ¼"	1 ½"	EXT-EF-32A
40	1 ½"	2"	EXT-EF-40A
50	2"	2 ½"	EXT-EF-50A

MID accessory set with adaptor



Energy counter (DN)	Internal thread 1 (IG1) Isolation valve (Rp)	Internal thread 2 (IG2) Isolation valve (G)	Adaptor (AG) External thread (G)	Adaptor length (mm)	Product type from Belimo
15	½"	¾"	¾"	110	EXT-EF-15B
20	¾"	1"	1"	130	EXT-EF-20B
25	1"	1 ¼"	1 ¼"	135	EXT-EF-25B
32	1 ¼"	1 ½"	1 ½"	140	EXT-EF-32B
40	1 ½"	2"	2"	145	EXT-EF-40B
50	2"	2 ½"	2 ½"	145	EXT-EF-50B

	Product type from Belimo	For DN
Insulation shell		
For thermal insulation of the thermal energy meter	A-22PEM-A01	15, 20, 25
	A-22PEM-A02	32, 40, 50
Rotary seals		
2 pieces consecutively numbered (once) with attached wire	A-22PEM-A03	
Silicone grommet with clamp	A-22PEM-A04	
Converter for M-Bus	G-22PEM-A01	
Bluetooth-NFC converter	ZIP-BT-NFC	

All inclusive.

Belimo as a global market leader develops innovative solutions for the controlling of heating, ventilation and air-conditioning systems. Actuators, valves and sensors represent our core business.

Always focusing on customer added value, we deliver more than only products. We offer you the complete product range for the regulation and control of HVAC systems from a single source. At the same time, we rely on tested Swiss quality with a five-year warranty. Our world-wide representatives in over 80 countries guarantee short delivery times and comprehensive support through the entire product life. Belimo does indeed include everything.

The "small" Belimo devices have a big impact on comfort, energy efficiency, safety, installation and maintenance.

In short: Small devices, big impact.

- 5-year warranty
- On-site around the globe
- Complete product range
- Tested quality
- Short delivery times
- Comprehensive support

EN – 2021-09/B – Subject to technical modifications

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