Calculator T550 (UC50…)
Residential, district heating, local heating plant

ULTRAHEAT®T550 (UC50…)
ULTRACOLD®T550 (UC50…)

Technical description

32 19 101 001 d
Datum: 18.12.2023
Landis+Gyr GmbH

Outstanding features

- Also operable as combined heat / cooling meter calculator
- Mounting place of flow sensor: hot or cold side possible
- Big range of communication modules for remote readout and system integration
- 2 module slots for using 2 communication modules coincidental
- Optical interface according to EN 62056-21:2003
- Power measurement with maximum values, tariffs selectable
- Data logger for system monitoring
- 60 monthly values
- Logbook
- Battery or mains operated
- Self-diagnostics
- Available for order as cooling meter calculator with German national approval
- Available for order with one-time adjustable pulse value and mounting place of the flow sensor
- Available for order for liquid mixtures (e. g. glycol / water)

Contents

1 General notes

Note: In the following text, the term calculator refers to both heat meter calculator and cooling meter calculator, unless they are otherwise differentiated.

The calculator is used as a calculator for heating or cooling consumption measurement in systems with water.
The calculator forms the volume from the pulses of the flow sensor. The temperatures of the hot and cold sides are determined using platinum resistors. The volume of water and the temperature difference between hot and cold side are then calculated and the product is summated.
The result is that the quantity of thermal energy consumed is displayed in the units kWh / MWh or MJ / GJ.

Other available documentations

- Operating instructions T550 (UC50…)
- Installation instructions T550 (UC50…)
- Respective module operating and installation instruction
- Illustrated catalogue

Additional information is available on request.

2 Safety Information

The calculator may only be used in building service engineering systems and only for the applications described.

The local regulations (installation etc.) must be adhered to.

Adhere to the operating conditions according to the dial plate during use. Non-adherence can cause hazards and the guarantee will lapse.

The operating conditions according to the type plate must be complied with during use. Non-compliance can result in hazardous situations and the expiry of all claims arising from liability for defects as well as liability based on any expressly granted guarantees.

Only clean the calculator from outside with a soft, lightly wet cloth. Do not use any spirit or cleaning solvent.

The 110 V / 230 V connections may only be made by an electrician.

The calculator may only be powered up once the installation has been completed. Otherwise, there is a danger of electronic shock on the terminals.
A defective or obviously damaged appliance must be disconnected from the power supply immediately and replaced.

As far as disposal is concerned, the calculator is a waste electronic appliance in the sense of European Directive 2012/19/EU (WEEE) and it must not be disposed of as domestic waste.

- Dispose of the meter through the channels provided for this purpose.
- Respect the local and currently valid legislation.
- Dispose of used batteries at the collection points provided for them.

The calculator may contain lithium batteries. Do not dispose of the calculator and the batteries with domestic waste. Observe the local stipulations and laws on disposal.

You can return the lithium batteries to the manufacturer for appropriate disposal following use. When shipping please observe legal regulations, in particular, those governing the labelling and packaging of hazardous goods.

Do not open the batteries. Do not bring batteries into contact with water or expose to temperatures above 80 °C.

The calculator does not have any lightning protection. Ensure lightning protection via the in-house installation.

Only fit one compartment for the power supply. Do not remove the red locking hatch.

3 Technical Data

General	
Environment class	A (EN 1434) for indoor installation
Mechanical class	M1 *)
Electromagnetic class	E1 *)
*) according to 2004/22/EC Directive on Measuring Instruments	
Ambient humidity	<93 % rel. humidity at 25 °C, without condensation
Max. height	2000 m above sea level
Storage temperature	-20 … 60 °C
Electronic unit	
Ambient temperature	5 … 55 °C
Housing protection rating	IP 54 according to EN 60529
Safety class	
Line 110 / 230 V AC	II according to EN 61558
Line 24 V ACDC	III according to EN 61558
Operation threshold f. ΔT	0.2 K
Temperature difference ΔT	3 K … 120 K
Temperature measurement range	0 ... 180 °C
LCD	7 digit
Optical interface	Standard, EN 62056-21
Communication	Optional, e.g. M-Bus
Separability	Always, optional cable length
Temperature sensor	
Type	Pt 500 or Pt 100 according to EN 60751
Pulse input	
Pulse input	IB / IC according to EN1434
Pulse length	min. 10 ms
Pulse frequency	max. 50 Hz
Pulse wire length	max. 20 m (recommended)
Power supply	
Type of power supply	Battery for 6, 11 or 16 years / 110°/°230°V°AC. 24 V AC/DC
Battery type	2 x AA-Cell Lithium metal battery 1 x C-cell Lithium metal battery 1 x D-cell Lithium metal battery, depending on configuration
Lithium content	AA-cell: 0.65g per battery C-cell: 2.5g D-cell: 5g
Number of batteries	1-2. depending on configuration

4 Installation

Note: The **mounting place** and the **pulse value** of flow sensors with pulse output must correspond to the values set in the calculator (see LOOP 2).

Service loop 2 “LOOP 2“
Service loop 2 displays the installation details.

LOOP 2	Head of the loop
POS cold	Mounting place of the flow sensor: cold side or
POS hot	Mounting place of the flow sensor: hot side
PI000 1,000 L/I	Pulse value

Note: At a **heat meter calculator** or combined heat / cold meter calculator the mounting place of the flow sensor cold side is equivalent to return. The mounting place of the flow sensor hot side is equivalent to flow.

Note: At a **cooling meter calculator** the mounting place of the flow sensor hot side is equivalent to the return. The mounting place of the flow sensor cold side is equivalent to flow.

Attention: Calculators with one-time adjustable pulse value and adaptable mounting place are marked by the following symbol:

Attention: At calculators with one-time adjustable pulse value, the pulse value must be adjusted during commissioning in accordance with the flow sensor and the mounting place must be checked!

If the pulse value has not been set, the calculator does not cumulate energy and volume.

The mounting place can be adapted and is fully locked by entering the pulse value.

Examples of installation

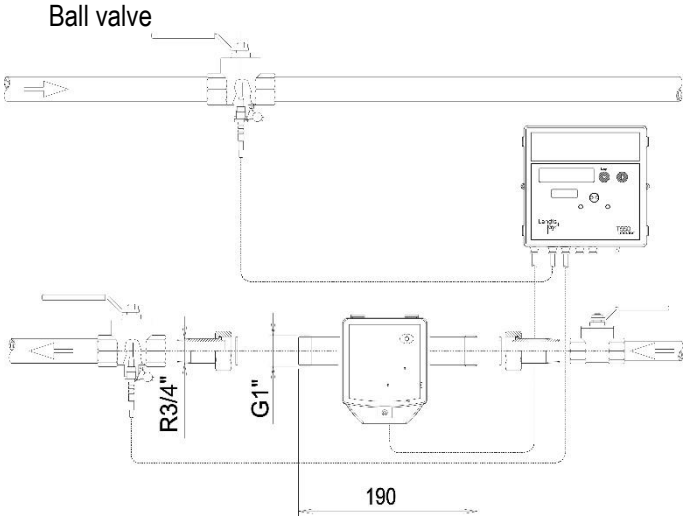


Fig. 1: Installation with a ball valve (recommended up to and including DN25)

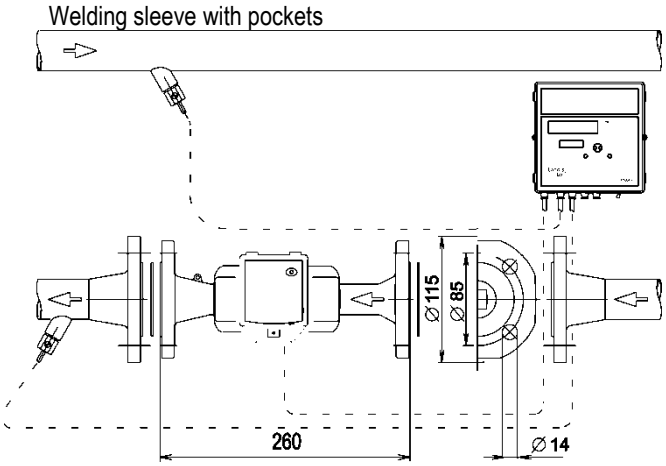


Fig. 2: Installation with pockets (recommended greater than or equal to DN32)

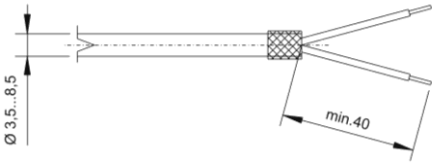
4.1 Temperature sensors

Note: The temperature sensor type PT 100 / 500 must correspond to the information on the dial plate.

Note: If detachable temperature sensors are used, they must have their own calibration or certification of conformity and must be mounted in the same circuit as the flow sensor.

Note: The maximum cable length of the temperature sensors is 10 m. Extension is not permitted.

- Press the 4 side lugs of the housing cover inwards and remove the cover.
- Guide the wire of the temperature sensor from the outside through the 2nd sleeve from the left and the return sensor through the 3rd sleeve from the left.
- Strip both wires as in figure 3.



wire end ferrules

Fig. 3

- Connect the cores in line with the inscription printed on the meter.
  The 2-wire connection occurs on terminal 5/6 and 7/8.
  This also applies to a connection of 2-wire temperature sensors on a 4-wire connection terminal.

Note: Do not connect the shielding braid on the calculator side.

- Insert the temperature sensors into the pockets, ball-valves or T-pieces.
  The end of the temperature sensors must reach at least to the center of the pipe cross-section.
- Seal the temperature sensors to protect against manipulation.
- Put the housing cover in position and press it gently until all the lugs click into place audibly.

4.2 Connection of flow sensor

Note: The flow sensor must be installed at the same circuit as the temperature sensors.

Note: When a polarity dependent pulse transmitter is used, take care of the correct orientation.

- Connect the negative reference potential (-) or GND on the right spring-type terminal.
- Connect the positive reference potential (+) on the left spring-type terminal.
- If the line has a shielding braid, push the shielding braid covering over the counter covering of the cable.
- For stain relief, fix the line on the outer sheath by a clamp.

Note: The shielding braid must not be connected to T550 (UC50…) when the flow sensor has its own ground connection.

Note: The cage clamp terminals can be used for cable cross-section of 0.5 … 1.5 mm² (solid or stranded). In order to preserve the IP protection class of the housing, the outside diameter of the cable sheath shall be 3.7 … 4.4 mm.

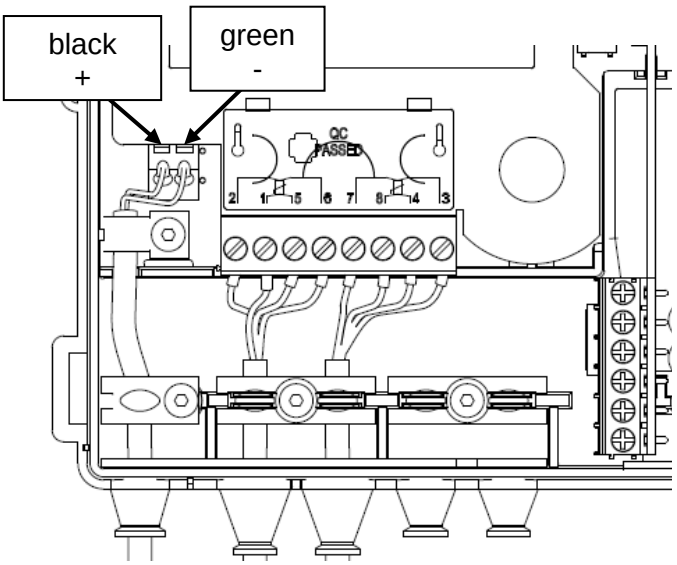


Fig. 4

5 Dimension of electronic unit

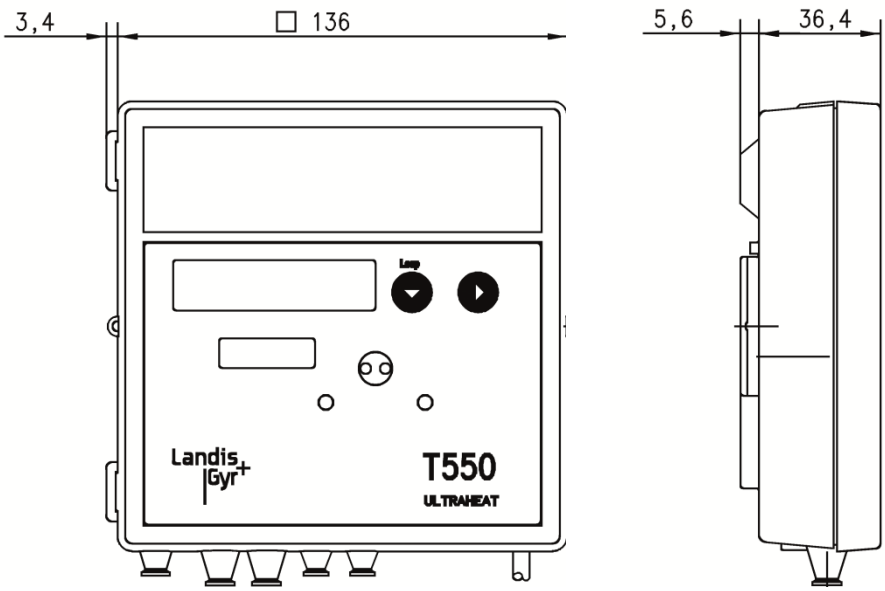


Fig. 5: Dimensions of electronic unit

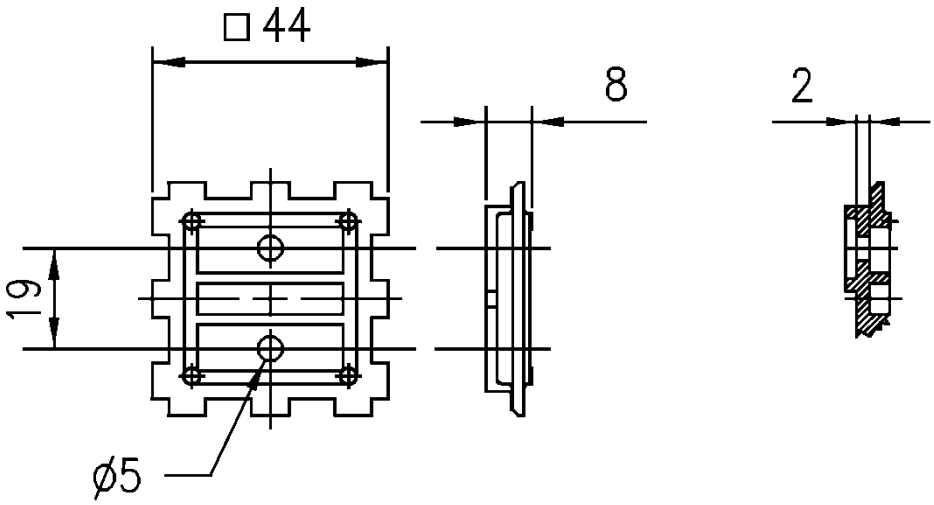


Fig. 6: Plan view and cross section of adapter plate

6 Operating elements

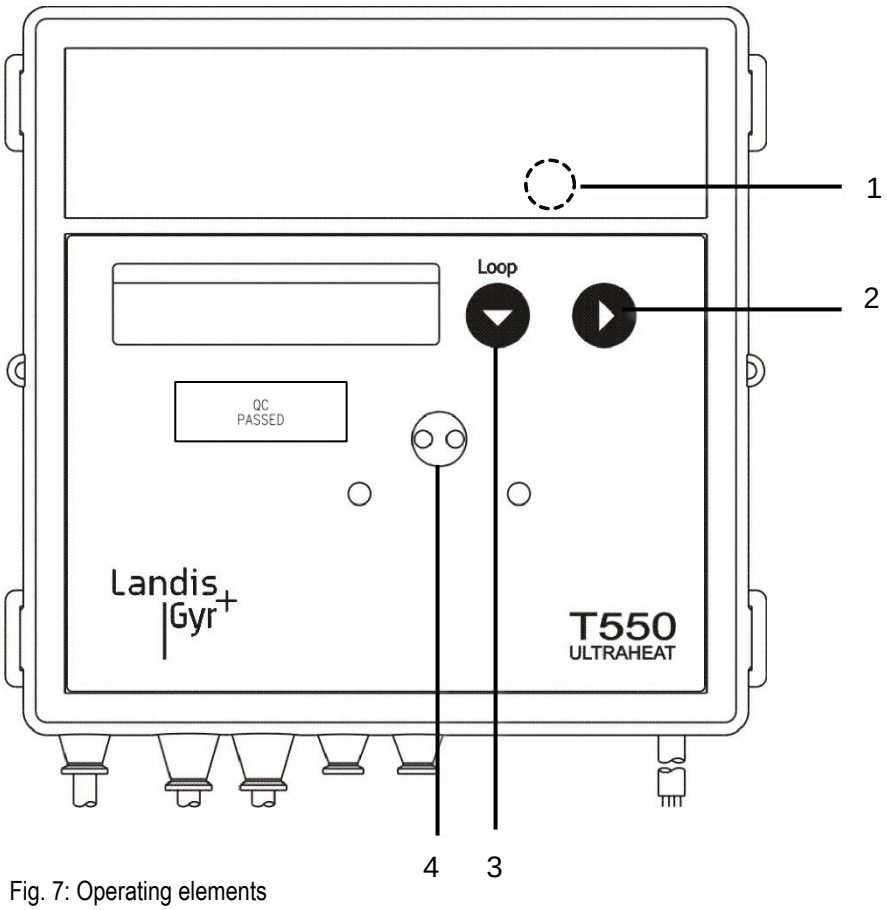


Fig. 7: Operating elements

No.	Name	Description	Note
1	Service button	To call up the parameterization operation of the meter.	Accessible after removing the cover.
2	Button 2	Switches to the next display value within a loop.	
3	Button 1	Switches to the next loop.	
4	Optical interface	Permits data communication via a computer with the necessary service software.	

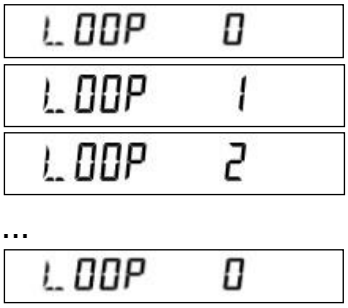
6.1 LCD

The calculator displays the current meter status in kWh, MWh, MJ or GJ.

Note: To prevent reading errors, the decimal places of the values displayed are marked with a frame.

Note: Calibrated values can be recognized by an additionally displayed star symbol.

Display values “LOOPs”

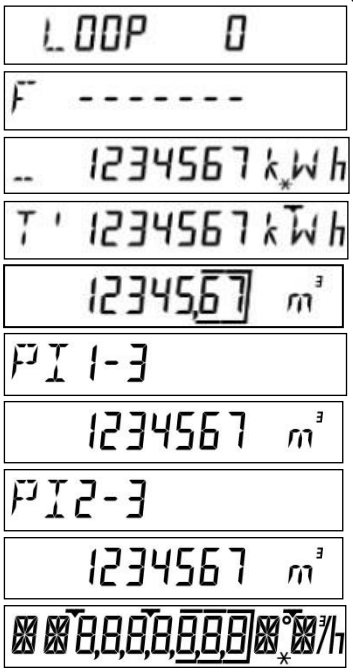


User loop
Service loop 1
Service loop 2
...
User loop

After the last loop is displayed, the user loop “LOOP 0” comes up again.

User loop “LOOP 0“

The LCD shows the following values one after the other:

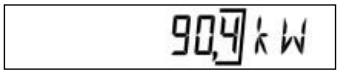
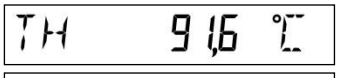
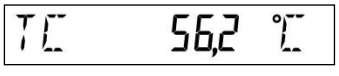
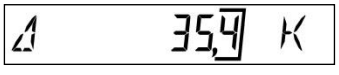
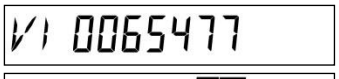
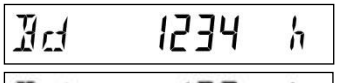
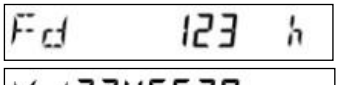
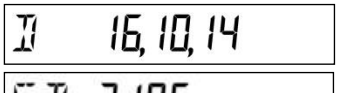
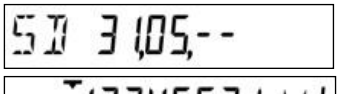
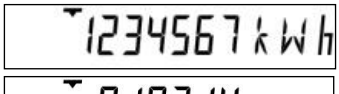
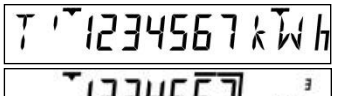
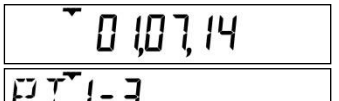
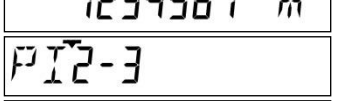
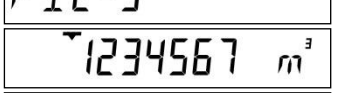


Head of the loop
In case of error: message with error code
Energy accumulated with tariff status
Tariff register 1,2,3 [1])
Volume accumulated
Volume pulse input 1 [2])
at 2-sec. cycles with current volume
Volume pulse input 2 [2])
at 2-sec. cycles with current volume
Segment test

Service loop 1 “LOOP 1“

Service loop 1 displays the details of the current measurement.

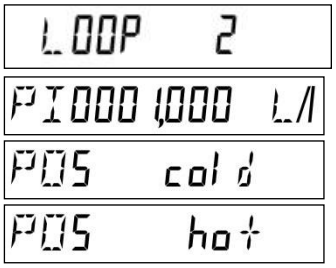
The LCD shows the following values one after the other:

	Head of the loop
	Current flow
	Current power
	Current temperature “hot“, “cold“ at 2-sec. cycles
	
	Temperature difference
	Volume pulse
	Volume at energy calculation
	Operating time
	Missing time
	Property number, M-Bus secondary address
	Date
	Yearly set day (DD.MM)
	Energy: previous year on set day at 2-sec. cycles with date
	
	Tariff register 1,2,3: previous year on set day [1])
	Volume: previous year on set day at 2-sec. cycles with date
	
	Volume pulse input 1 [2]) at 2-sec. cycles with volume previous year
	
	Volume pulse input 2 [2]) at 2-sec. cycles with volume previous year
	
	Firmware version
	CRC Code

Service loop 2 “LOOP 2“

Service loop 2 displays the installation details.

The LCD shows the following values one after the other:



Head of the loop

Pulse value

Mounting place of the flow cold side or hot side

Note: At a **heat meter calculator** or combined heat / cold meter calculator the mounting place of the flow sensor cold side is equivalent to return. The mounting place of the flow sensor hot side is equivalent to flow.

Note: At a **cooling meter calculator** the mounting place of the flow sensor hot side is equivalent to the return. The mounting place of the flow sensor cold side is equivalent to flow.

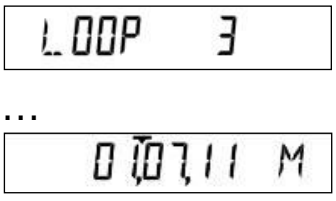
Service loop 3 “LOOP 3“

Service loop 3 displays the monthly values.

- To display the monthly values, press button 2.

The set day of the current month is displayed.

- To select the desired month, press button 1.

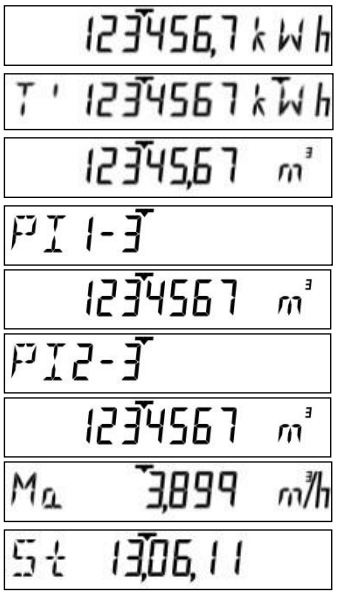


Head of the loop

… …

Set day for July 2011

The LCD displays the following values one after the other:



Energy on set day

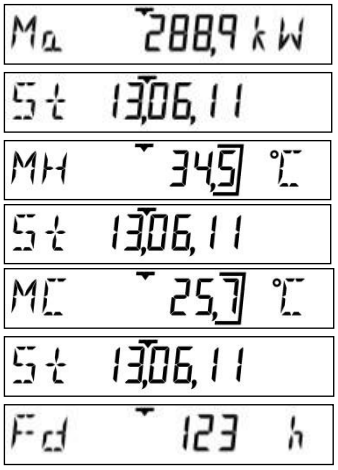
Tariff 1,2,3 on set day (visible when Tariff is activated)

Volume on set day

Volume pulse input 1at 2-sec. cycles with volume on set day (visible when module with pulse input is plugged in)

Volume pulse input 2 at 2-sec. cycles with volume on set day (visible when module with pulse input is plugged in)

Max. flow at period, at 2-sec. cycles with date stamp



Max. power at period,
at 2-sec. cycles with date stamp

Max. temperatures „warm“ in the period,
at 2-sec. cycles with date stamp

Max. temperatures „cold“ in the period,
at 2-sec. cycles with date stamp

Missing time count on set day

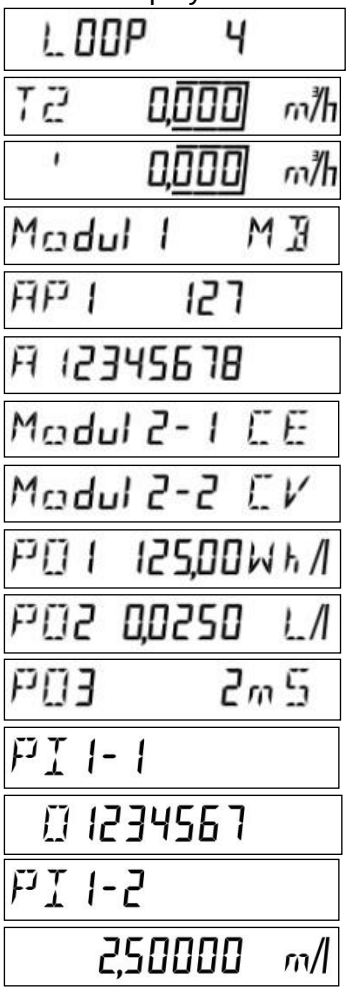
After the last display the previously selected set day is displayed once again.

- To select the next set day, press button 1.

Service loop 4 “LOOP 4“

Service loop 4 displays appliance parameters.

The LCD displays the following values one after the other:



Head of the loop

Current tariff 1,2,3 [1])
in 2-sec. cycles with threshold value 1

Module 1: M-Bus module

M-Bus primary address 1

M-Bus secondary address 8-digit

Module 2: pulse module;
Channel 1 = energy, Channel 2 = volume;
in 2-sec. cycles

Value for energy pulses (for “fast” pulses)

Value for volume pulses (for “fast” pulses)

Pulse duration in ms (for “fast” pulses)

Parameter pulse input 1 in 2-sec. cycles with calculator number (visible when module with pulse input is plugged in)

Parameter pulse input 2 in 2-sec. cycles with pulse value (visible when module with pulse input is plugged in)

6.2 Previous year's values

The meter saves the following values on the yearly set day

- Energy (meter value)
- Volume (meter value)
- Tariff register (meter value)
- Missing time (meter value)

and the maxima with date stamp for

- Flow
- Power
- Temperature difference
- Temperature hot side
- Temperature cold side

6.3 Monthly values

The calculator saves the following values for 60 months on the monthly set day.

- Energy (meter value)
- Volume (meter value)
- Tariff register (meter value)
- Missing time (meter value)

and the maxima with date stamp for

- Flow
- Power
- Temperature difference
- Temperature hot side
- Temperature cold side

The monthly values can be read via the optical interface.

Note: Central European Time (CET) applies as the standard time. During summertime the storage takes place at the corresponding times.

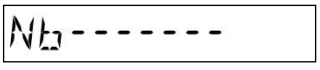
7 Parameterization of pulse value and mounting place of flow sensor

Attention: Calculators with one-time adjustable pulse value and adaptable mounting place being characterized by:

The pulse value must be set in the para menu before the first use. The right mounting place of the flow sensor must be checked. As long as the pulse value hasn't yet been entered, the mounting place can be adapted.

Pulse value

Mounting place of the flow sensor (here: cold side)



Return to normal mode (manual)

Both entries will be adopted with the return in the normal operation and subsequently cannot be changed anymore!
LCD display will adopt automatically.

8 Display / priority rating

Note: A permanent flow higher than 800 m³/h can cause faulty flow peaks.

The view is limited to up to 7 entries. At pulse parameterization, the display will adapt automatically.

The display resolution can be selected from the following:

Pulse [l/p]	Energy [MWh]	Energy [GJ]	Volume [m³]	Flow [m³/h]	Power [kW]
1	0000.001	0000.001	00000.01	000.001	00000.1
2.5	0000.001	00000.01	00000.01	000.001	00000.1
10	00000.01	00000.01	000000.1	000.001	00000.1
25	00000.01	000000.1	000000.1	000.001	00000.1
100	000000.1	000000.1	0000001	0000.01	000001
250	000000.1	0000001	0000001	0000.01	000001
1.000	000000.1	0000001	0000001	0000.01	000001
2.500	000000.1	0000001	0000001	0000.01	000001

Note: Calculators up to 2.5 l/p can be parameterized to kWh. Calculators up to 1 l/p can be parameterized to MJ.

The pulse values are restricted by following connecting conditions:

Pulse [l/p]	Max. power [MW]	Max. flow [m³/h]
1	3.3	24
2.5	3.3	24
10	33	240
25	33	240
100	330	2400
250	330	2400
1.000	330	2400
2.500	330	2400

9 Power supply

The calculator can be supplied with power via a battery supply module as preferred. Battery and power supply are replaceable at any time.

Options:

- 6 years battery
- 11 years battery
- 16 years battery
- Power supply 110 / 230 V AC
- Power supply 24 V ACDC

Automatic power supply detection

The power supply detects whether a line voltage is applied. This signal is routed to the calculator. That enables the device to detect automatically whether it is being powered from a battery or power supply.

Requirements (for measuring timebase Q = 4 s and time base T = 30 s)	**6 years**	**11 years**	**16 years**	**Power supply** (230 / 110 V AC; 24 V ACDC)
Standard pulses, M-Bus read out (max. each 15 min.)**, CL-Module**	2x AA	C	D	yes
Radio module 868 MHz (mobile radio; 16 sec. transmission interval)	D	D	--	yes
Radio module 868 MHz (stationary radio; 15 min. transmission interval)	D	D	D	yes
M-Bus fast read out (max. each 4 sec.)**, fast pulses, analog module**	D	--	--	yes
Fast measurement raster (for measuring timebase Q = 4 s and time base T = 4 s)	D	--	--	yes
Radio module LoRa 868 MHz *) in EcoMode **) limitation see instructions module	D	D*)	D*)	yes**)
Radio module NB-IoT G2 Band 3, 8, 20 ***) and extra battery for NB-IoT (WZU-NB-IoT-BAT)	C***)			yes
BACnet / Modbus module reading interval < 10 min.	D			yes

Note: The lifetime of battery depends on the type of battery and on the requirements.

Note: Only batteries approved by the manufacturer may be installed.

Power supply modules

General	
Pollution degree	per EN 61010 (no or only dry, non-conductive soiling)
Ambient temperature	+5° ... +55 °C
Storage temperature	-25 … 70 °C
Relative humidity	5...90 % non-condensing T < 55°C
24 V safety extra-low voltage	
Voltage	12...35 V AC or 12…50 V DC
Frequency	50 / 60 Hz or DC
Galvanic isolation	Yes
Power consumption	maximal 2.5 VA
Terminals for connecting cable	2 x 1.0 mm² about, Ø 5.0...6.0 mm
Hold-up time with power failure (power reserve)	Approx. 30 minutes
110 - 240 V alternating voltage	
Voltage	100…240 V AC (±10%)
Type	Safety class II
Frequency	50 / 60 Hz
Line voltage fluctuations	max. 10 % of the nom. voltage
Overvoltage category II per EN60010	2500 V impulse voltage
Power consumption	Max. 2.5 VA
Fuse protection	6 A circuit breaker
Hold-up time with power failure (power reserve)	Approx. 4 hours

*) Has two outputs. One supplies the meter, the other an optionally plugged GPRS or NB-IoT module.

Note: For the 24 V ACDC version, only use cables with a diameter of 5.0 ... 6.0 mm.

Note: The 110 V or. 230 V power supply must be marked near the meter with a 6 A overcurrent protection device with disconnection function in accordance with the applicable safety standards.

- marked,
- be protected from tampering and
- be easily accessible in case of emergency.

If the neutral conductor in the building is cannot be clearly identified and safely grounded (e.g. IT supply systems), an all-pole disconnecting device must be used.

10 Communication

Electronic unit interfaces

The calculator is equipped with an optical interface in accordance with EN 62056-21:2002 as standard.
You can additionally use the remote reading with up to 2 of the following communication modules:

- Pulse module
- M-Bus module G4
- M-Bus module G4 MI with 2 pulse inputs
- Analog module
- Radio module 868 MHz
- BACnet module
- Modbus module
- LoRaWAN module
- NB-IoT module

These modules do not influence the measurement. You can retrofit the modules at any time without damaging the security seal.

Note: You will find the technical details and data on communication modules in their respective documentation.

Permissible combinations of modules

AM	Analog module
MB	M-Bus module
MB G4	M-Bus module
RF	Radio module
LoRa	LoRaWAN module
BACnet	BACnet module
Modbus	Modbus module
NB-IoT	NB-IoT module
GPRS	GPRS module

Step 2: Slot for module #1 **can** be equipped with..	Step 1: Slot for module #2 **is** equipped with...								
	AM (3)	Pulse module „Standard“	Pulse module „fast“ *)	MB G4	MB G4	CL	RF 868 MHz	LoRa	NB-IoT
AM	yes	yes	yes	yes	yes	no	yes	yes	no
Pulse module **) "standard"	yes	yes (2)	yes (1)	yes	yes	yes	yes	yes	yes
MB G4	yes	yes	yes	yes	yes	yes	yes	yes	yes
MB MI	yes	yes	yes	yes	no	no	yes	yes	no
Modbus	no	no	no	yes (4)	no	no	no	no	no
BACnet	no	no	no	yes	no	no	no	no	no

Restrictions:

*) only 1 module with fast pulses is possible;
only permissible on slot 2;
min. pulse duration:
- 2 ms, if pulse module 1 not fitted
- 5 ms, if pulse module 1 fitted

**) Subsequent mounting of a further pulse module in module slot 1 can result in changed output values for module 2!

(1) Pulse length of the fast pulses min. 5 ms

(2) First and second channel can be parametrized individually

(3) The analog module is not possible in module slot 2, when the meter has a power supply module 110 V / 230 V!

(4) Query interval < 10 min requires D-cell (6 years) or power supply

Terminals

2-pole or 4-pole terminals are used for connection of the external cables to the modules.

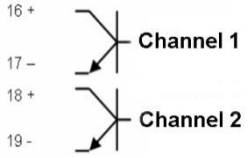
- Outer diameter of the cable 4 … 6 mm
- Connection capacity
  - rigid or flexible 0.2 … 2.5 mm²
  - flexible with wire end ferrule 0.25 … 1.5 mm²
  - conductor sizes 26 … 14 AWG
- Multiple conductor connector (2 conductors with the same cross-section)

  - rigid or flexible, 0.2 … 0.75 mm²
  - flexible with wire end ferrule without plastic sleeve, 0.25 … 0.34 mm²
  - flexible with TWIN wire end ferrule with plastic sleeve, 0.5 … 0.75 mm²
- Strip-back length 5 mm
- Recommended screwdriver:
  - 0.6 × 3.5 mm
- Tightening torque: 0.4 Nm

10.1 Pulse module

The pulse module permits the output of pulses that can be derived from the quantity of heat, the volume, tariff register 1, tariff register 2 or the mistake status. Two channels are available whose functions can be parameterized with the service software.

Output takes the form of standard pulses or “fast pulses”. The pulse duration is identical for channel 1 and channel 2.

Labelling	pulse module
Display in LCD	**CE**, **C2**, **CV**, **CT** or **RI**
Type	open collector
Voltage	max. 30 V
Current	max. 30 mA
Dielectric strength	500 V_{eff} against ground
Classification	OB (per EN 1434-2)
Voltage drop	approx. 1.3 V at 20 mA
Classification	OC (per EN 1434-2)
Voltage drop	approx. 0.3 V at 0.1 mA
Output connection (WZU-P2):	

10.2 M-Bus module G4

The M-Bus module is used for the communication of the calculator with an M-Bus center for the transmission of the measured values.

Standard	EN 1434-3; EN 13757-2, -3
Protocol	EN 60870-5
Electrical isolation	
from calculator	yes
from the pulse inputs	no
Connection	
Strip-back length	5 mm
Connection capacity	
rigid or flexible	0.25 ... 0.75 mm²
flexible with wire end ferrule	0.25 ... 0.75 mm²
Polarity	any
Voltage	50 V DC maximal
Current consumption	1 M-Bus load (1.5 mA)
Addressing	primary or secondary
Baud rate	300, 1200, 2400, 4800 or 9600 baud
Interface description	see TKB3448

10.3 M-Bus module MI with 2 pulse inputs

The M-Bus module enables the meter to communicate with an M-Bus center to transmit measured values. In addition to a possible voltage supply from the M-bus connection, the “MI” module is equipped with a battery. This powers the module processor and the pulse input if no M-bus voltage is applied.

M-Bus	
Standard	EN 1434-3; EN 13757-2, -3
Protocol	EN 60870-5
Electrical isolation	
from calculator	yes
from the pulse inputs	no
Connection	
strip-back length	5 mm
Connection capacity	
rigid or flexible	0.25 ... 0.75 mm²
flexible with wire end ferrule	0.25 ... 0.75 mm²
Polarity	any
Voltage	50 V DC max.
Current consumption	1 M-Bus load (1.5 mA)
Addressing	primary or secondary
Baud rate	300, 1200, 2400, 4800 or 9600 baud
Interface description	see TKB3448
Pulse input	
Number of pulse inputs	2 pulse inputs per “MI” module
Life of the module battery	5 years of operation + 1 year storage duration; if the M-bus voltage is applied for at least 90% of the operating time, the battery life increased to 10 years
Standard for pulse inputs	Class IB per EN 1434-2
Frequency	max. 10 Hz
Pulse duration (low)	≥ 50 ms
No-pulse duration (high)	≥ 50 ms
Pulse value	0.01 liters/pulse, in steps of 10 000.00 liters/pulse, in steps of 0.01 liters/pulse
Display and output	in m^3, 7-digit; acc. to parameter setting with or without 1 decimal place
Polarity	must be observed if transmitter is of type “open collector”
Electrical isolation	
from calculator	yes
from the M-bus inputs	no
Output voltage	approx. 3.3 V
Internal resistance	approx. 1 MΩ
Source current	approx. 3 µA
Pulse input closed (low)	Switching threshold low < 0.2 V Resistance < 50 kΩ
Pulse input open (high)	Switching threshold high: unconnected collector Resistance ≥ 6 MΩ
Connection	Strip-back length 5 mm

Connection capacity	
rigid or flexible	0.25 ... 0.75 mm²
flexible with wire end ferrule	0.25 ... 0.75 mm²
Permissible cable length	max. 10 m

10.4 Analog module

The analog module converts the measured value from the meter to an analog signal.

Power supply range	12 … 30 V AC
Power supply protection	
< 24V	200 mA, slow blow
≥ 24V	100 mA, slow blow
Max. current consumption	170 mA @ 12 Volt
Power consumption	max. 2 Watt
Max. output load	300 Ohm for current output, 2 kOhm for voltage output (outputs are short circuit proof)
Accuracy	≤ ±1% of parameterized max. value
Max. length of connections	100 m
Outer diameter of connections	up to 1.5 mm²

10.5 Radio module 868 MHz (wireless M-Bus)

The radio module 868 MHz enables the meter to communicate with a center (receiver) using 868 MHz radio frequency. The module supports OMS[1)] – compliant data transmission with radio mode T1 with or without encryption (see chapter 16, 17).

A data transmission to an OMS radio concentrator (Smart Meter Gateway) or the L+G mobile radio readout system Q4 is possible.

Frequency with T1	868.95 MHz (868.90 MHz up to 869.00 MHz)
Frequency with C1	868,95 MHz (min. 868,928 MHz bis max. 868,972 MHz)
Transmission power (ERP)	min. 3.16 mW (5 dBm) up to max. 25 mW (13.9 dBm)
Antenna	Internal or external (from our accessories, with SMA connector)
Range*)	
free field	up to 400 m
inside buildings	e.g. horizontally 30 m
Power supply	
via calculator **)	Battery type D mobile radio (30 seconds) battery for 11 years stationary radio (15 minutes) battery for 16 years
via power supply	110 / 230 / 24 V
Standard	EN13757-2/ -4

*) Depending on the structure of the building can deviate significantly

**) If the battery of the meter is of any other type, it must be replaced by a battery of type D. This battery life time is valid for the standard data telegrams (P600, P601) and T550 with standard measuring interval for flow and temperature.

10.6 Radio module 868 MHz LoRaWAN (WZU-LR; WZU-LR-EXT)

Note: The module is displayed as “MB G4”.

The LoRaWAN module sends meter data via LoRaWAN network [1)] to an applications Server. The end customer also has access to the application server. The meter data is sent immediately after the start. The module can be parameterized with the mobile APP “LoRaWAN MCM” from Elvaco. Registration and access to the module keys is possible via the OTC Web Service of Elvaco.

Frequency	868 MHz
Transmission power (ERP)	25 mW (14 dBm)
Antenna	Internal or external (from our accessories, with SMA connector)
Range*)	
free field	10 km
inside buildings	100 m
Power supply	
via calculator **)	Battery type D Transmission interval 60 minutes battery for 11 years Transmission interval 160 minutes battery for 16 years
via power supply	110/230/24 V (not with Elvaco 24V)
Standard	LoRaWAN Version 1.0 (Class A bi-directional)

*) Depending on the structure of the building can deviate significantly.

**) If the battery of the meter is of any other type, it must be replaced by a battery of type D. This battery life time is valid for the standard data telegrams (P600, P601) and T550 with standard measuring interval for flow and temperature.

10.7 Funk-Modul NB-IoT (WZU-NB-IoT-G2)

Note: The module is displayed as “MB G4”.

The NB-IoT module sends meter data via NB-IoT mobile radio network [1)] to an applications Server to which the end customer also has access to. Meter data is sent immediately after the start. The module can be parameterized with the mobile “Elvaco OTC APP” from Elvaco. Registration and access to the module keys is possible via the OTC Web Service of Elvaco.

Band (Frequency)	3 (1800 MHz), 8 (900MHz), 20 (800MHz)
SIM card format	„4FF” (Nano-SIM)
Transmission power (ERP)	max. 200 mW (23 dBm)
Antenna	for external antennas with MCX plug from our accessories
Range*)	
free field	10 km
Inside buildings	100 m
Trasmission interval	Max. every 5 minutes
Power supply	
via power supply	WZU-ACDC24-50 (with 2 outputs); WZU-AC110/230-xx (with 2 outputs)

… Battery for NB-IoT with holder **)	WZU-NB-IoT-BAT transmission interval daily (hourly profile of the day before) 7 years lifetime (with ECL0)
Standard	3GPP release 14 (NB2)

*) Depending on the structure of the building can deviate significantly.
**) The meter requires an additional battery type C cell (WZU-BC+GUM) in the left compartment.

10.8 BACnet Modul (WZU-485E-BAC)

The BACnet communication module WZU-485E-BAC is a add-on module for the calculator T550 (UC50…).
The module is suitable and preconfigured for data transmission according to the BACnet MS/TP (RS485) protocol.

General information	
Communication protocol	BACnet MS/TP (RS485) nach ASHRAE 135 und ISO 16484-5
Supported BACnet services	BACnet Application Specific Controller (B-ASC) BACnet Master Mode
BACnet address range	1 – 127
Trasmission rate	9600 / 19200 / 38400 / 76800 bps
Communication address	M-Bus primary address des T550 (Loop 4:)
Data refreshing	Stand-by: 60 min In operation: after every data request, max. every 10s
Default settings	
Transmission rate	38400 bps
Communication address (T550)	0 (meter default – must be changed)
RS485 information	
HW network connection	RS485: A+, B-, GND Communication signal inputs (A, B) are protected against short-term (pulse) overload
Bus termination RS485	Use external resistor (120 Ohm)
Power supply	
Alternating current	permissible range: AC 16...28 V
Direct current	permissible range: DC 10...32 V
Consumption	<50mA (typically <20 mA bei 24 V)
Recommended fuse	100 mA slow
Galvanic isolation	
From the meter	yes
From RS485 network	no

10.9 Modbus Modul (WZU-485E-MOD)

The Modbus communication module WZU-485E-MOD is an add-on module for the calculator T550 (UC50...).
The module is suitable and preconfigured for data transmission according to the Modbus-RTU protocol on RS485..

General information	
Communication protocol	Modbus RTU
Modbus address range	1 – 247
Transmission rate	2400 / 4800 / 9600 / 19200 bps
Communication address	M-Bus primary address des T550 (Loop 4: )
Data refreshing	Stand-by: 60 min In operation: after every data request, max. every 10s
Parity	even / odd / none
Number of stop-bits	1
Default settings	
Transmission rate	9600 bps
Modbus parity	even
Communication address	0 (meter default; must be changed)
RS485 Informationen	
HW network connection	RS485: A+, B-, GND Communication signal inputs (A, B) are protected against short-term (pulse) overload.
Bus termination RS485	Use external resistor (120 Ohm)
Power Supply	
Alternating current	permissible range: AC 16...28 V
Direct current	permissible range: DC 10...32 V
Consumption	<50mA (typical <20 mA bei 24 V)
Recommended fuse	100 mA slow
Galvanic isolation	
from the calculator	yes
from RS485 network	no

11 Tariff control (optional)

Note: The tariffs can only be parameterized using the service software.

Note: The summation of quantity of energy and volume in the standard registers is performed independently of the tariff situation.

The following options are available for tariff control:

Threshold value tariff (Tariffs T2, T3, T4, T5, T6)

The threshold value tariff can be derived from

- the flowrate (tariff T2),
- the power (tariff T3),
- the temperature cold side (tariff T4),
- the temperature warm side (tariff T5) or
- the temperature difference (tariff T6).

The total heat quantity and the total volume are always summed. But the heat quantity or the volume can also be acquired dependently from threshold value in up to 3 tariff register.

Each tariff threshold is assigned its own tariff register.

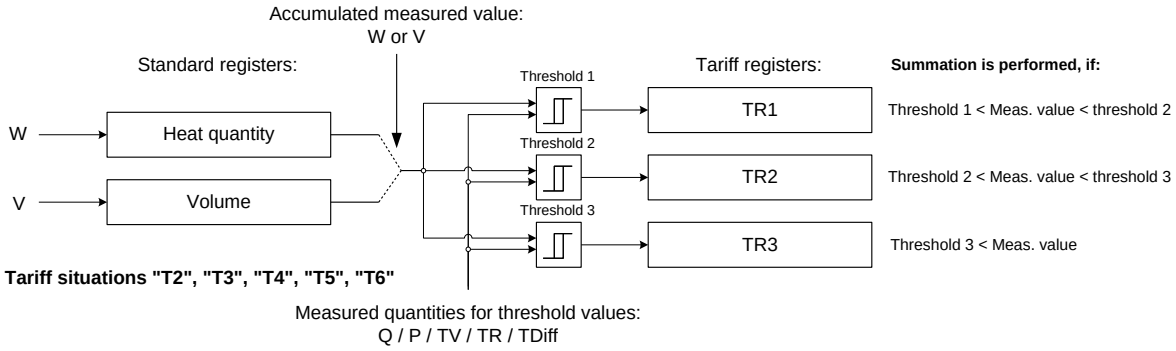


Fig. 8

Summation in the relevant tariff register is only performed if the relevant threshold is exceeded.

- Threshold 1 exceeded: Summation in tariff register 1
- Thresholds 1 and 2 exceeded: Summation in tariff register 2
- Thresholds 1, 2 and 3 exceeded: Summation in tariff register 3

Supplied quantity of energy (tariff T7)

In tariff register 1, a quantity of energy is summated that is calculated from the temperature warm side (instead of from the temperature difference).

Returned quantity of energy (tariff T8)

In tariff register 1, a quantity of energy is summated that is calculated from the temperature cold side (instead of from the temperature difference).

Heat / cooling meter (tariff T9)

In tariff register 1, the measured quantity of cold; in tariff register 2, the measured quantity of heat is summated. In both cases a threshold can be defined via the temperature hot side (“cold threshold”, “heat threshold”).

- Temperature above “heat threshold” and temperature difference > +0.2 K → quantity of heat is acquired
- Temperature below “cold threshold” and temperature difference < -0.2 K → quantity of cold is acquired

Tariff control via timer switch (tariff T10)

For tariff control, one switch-off time and one switch-on time per day can be defined. At the switch-on time, summation of the quantity of energy or volume is started in tariff register 1; at the switch-off time, it is ended.

Tariff control via M-Bus (tariff T11)

In tariff registers 1, 2 and 3, either the quantity of energy or the volume can be summated. With the relevant M-bus command, one of the 3 tariffs can be activated, or all tariffs can be deactivated.

Surcharge quantity tariff by means of return temperature (tariff T12)

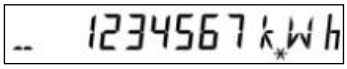
The quantity of energy is summated depending on the temperature cold side in tariff registers 1 or 2.
The summated quantity of energy is calculated from the difference of the temperature cold side from the defined return temperature threshold (instead of from the temperature difference).

- Above return threshold: T1 is summated
- Below return threshold: T2 is summated

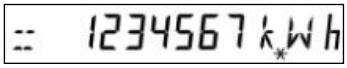
Display of the tariff situation on the LCD

The current tariff status is shown in the user loop “LOOP 0” together with the quantity of energy or the volume.
No tariff status is shown for tariffs T7 and T8.

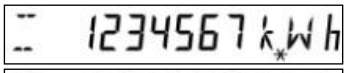
For tariffs T2, T3, T4, T5, T6, T10, T11 and T12



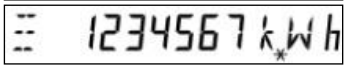
no tariff register active



tariff register 1 active

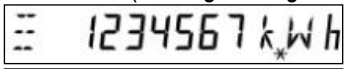


tariff register 2 active



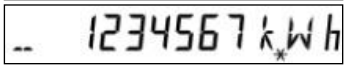
tariff register 3 active

For tariffs T9 (heating/cooling meter)



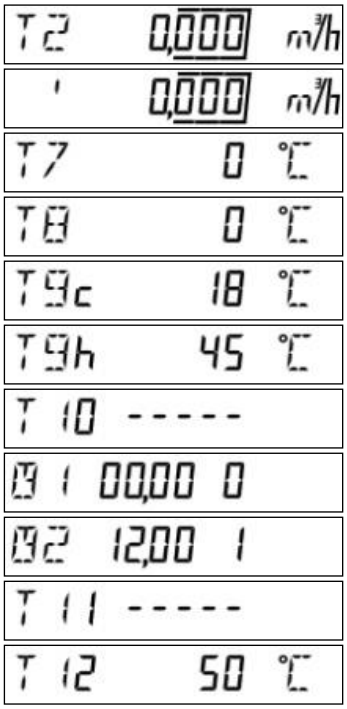
no tariff register active

tariff register 1 active



tariff register 2 active

The type of tariff and the associated parameters are displayed in service loop “LOOP 4”.



for T2, T3, T4, T5, T6
in 2-sec. cycles with threshold value 1/2/3

for T7

for T8

for T9;
in 2sec. cycles

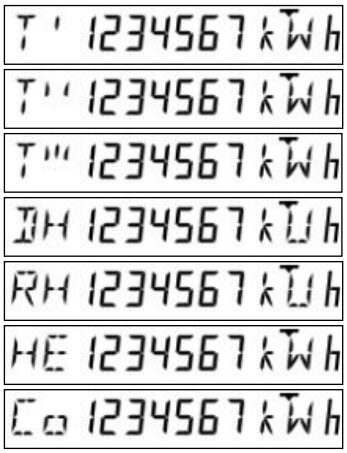
for T10;
switching times in 2-sec. cycles

for T11

for T12

The contents of the tariff registers are displayed in the user loop after the quantity of energy.

For tariffs T2, T3, T4, T5, T6, T10, T11 and T12



tariff register 1

tariff register 2

tariff register 3 (not for T12)

for tariff T7

for tariff T8

for tariff T9

12 Error messages

The calculator continuously runs a self-diagnosis and can thus recognize and display various installation or meter error messages.

Error code	Error	Service guidelines
DIFF nEG	Negative temperature difference	Check installation point of the temperature sensors; exchange if necessary
if necessary in exchange with:		
F1	Interruption in the hot side temperature sensor	Check hot side temperature sensors; replace if necessary
F2	Interruption in the cold side temperature sensor	Check cold side temperature sensors; replace if necessary
F3	Electronics for temperature evaluation defective	Exchange the calculator
F4	Problem with the power supply; Battery flat;	Check connection; Change battery
F5	Short-circuit hot side temperature sensor	Check hot side temperature sensors; replace if necessary
F6	Short-circuit cold side temperature sensor	Check cold side temperature sensors; replace if necessary
F7	Fault in internal memory holding	Exchange the calculator
F9	Fault in the electronics	Exchange the calculator

Note: All error messages are deleted automatically once the error has been rectified.

13 Log functions

In the internal logbook, metrologically relevant events (errors, states, actions) are stored in chronological order with their time of occurrence. The events acquired are predefined. The data of the logbook cannot be deleted.

Each event is stored in a separate 4-level shift register; the overflows are transferred to a 25-level circulating buffer. Therefore, at least the last 4 times can be traced for each event.

In a monthly register, the error states are stored for the current month and for the past 18 months (without time stamp).

Ser. No.	Description
2	F1 = Interruption temperature sensor hot side
3	F2 = Interruption temperature sensor cold side
4	F3 = Error temperature electronics
5	F5 = Short-circuit temperature sensor hot side
6	F6 = Short-circuit temperature sensor cold side
8	F9 = ASIC error
13	Line voltage off
14	CRC error occurred
15	Adjustment values parameterized
16	F7-(EEPROM) pre-warning
17	Reset made
18	Date / time parameterized
19	Yearly set day parameterized
20	Monthly set das parameterized
21	Master reset performed
22	All times deleted
23	Missing time deleted
24	Maxima deleted

Note: Read-out is performed via the optical interface with the service software.

14 Data logger (optional)

The data logger permits the archiving of data that the user can select from a predefined set of values. The data logger contains four archives whose 8 channels can be assigned. The data can be assigned to any of the channels.

Archive	Time base	Storage depth	Averaging time for maximum*)
Hourly archive	1 hour	45 days	1 hour
Daily archive	1 day	65 days	1 hour
Monthly archive	1 month	15 months	1 hour
Yearly archive	1 year	15 years	1 hour / 24 hours

*) For a shorter measuring period than 1 hour, the largest value from the maximum values calculated within one hour applies.

Note: Parameterization and read-out are performed with the service software.

Note: Data transmission is in a manufacturer-specific format.

	Value set for data to be recorded
Meter readings at the end of the period for...	Quantity of energy Tariff register 1, 2, 3 Volume Operating duration*) Fault duration*) Pulse input 1 Pulse input 2
Instantaneous values at the end of the period for...	Power Flowrate Temperature hot side Temperature cold side Temperature difference Error display
Maximum for...	Power Flowrate Temperature hot side Temperature cold side Temperature difference

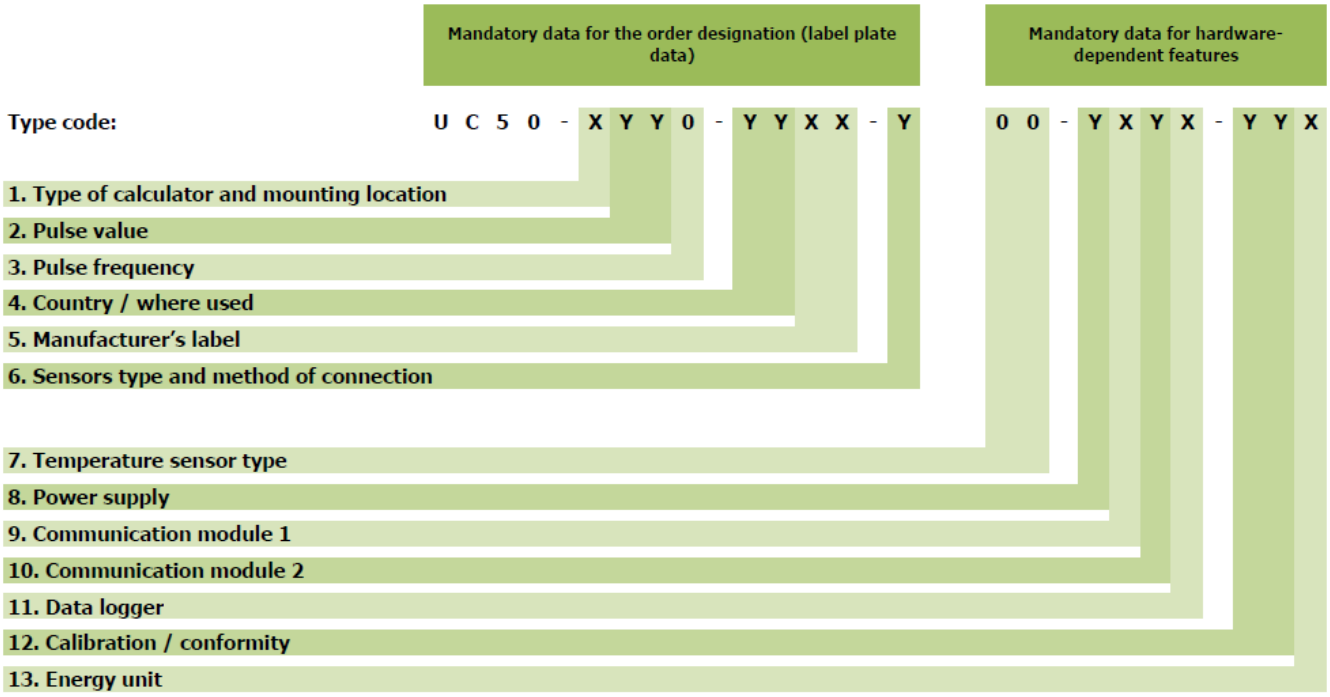
*) depending on parameter setting: hours or days

15 Additional options

Options:

- Version with data logger
- Available for order as cooling meter calculator with German national approval
- Combined heat / cooling meter calculator
- Available for order for liquid mixtures (e. g. glycol / water)
- Available for order with one-time adjustable pulse value and mounting place of the flow sensor

16 Order codes (type number key)



Order codes for label plate data	
1. Type of calculator and mounting location	**Code**
Flow sensor	D
Calculator for heat measurement, four-wire technology, mounting place of flow sensor cold side (flow)	L
Calculator for heat measurement, four-wire technology, mounting place of flow sensor hot side (flow)	M
Calculator (combined) heat/cooling measurement, four-wire technology, mounting place of flow sensor cold side (return), only in combination with temperature sensors Pt 500	N
Calculator cooling measurement, four-wire technology, mounting place of flow sensor hot side (return)	T
Calculator for cooling measurement, four-wire technology, mounting place of flow sensor cold side (flow)	U
Calculator for heat measurement, medium glycol, four-wire technology, mounting place of flow sensor cold side (return) [1]	5
Calculator for heat measurement, medium glycol, four-wire technology, mounting place of flow sensor hot side (flow) [1]	6
Calculator for cooling measurement, medium glycol, four-wire technology, mounting place of flow sensor hot side (return)[1]	7
Calculator for cooling measurement, medium glycol, four-wire technology, mounting place of flow sensor cold side (flow) [1]	8
Calculator (combined) for heat/cooling measurement, medium glycol, four-wire technology, mounting place of flow sensor cold side (return) [1]	9
2. Pulse value	**Code**
One-time adjustable pulse value	00
Pulse value1 l/pulse	01
Pulse value 2.5 l/pulse	02
Pulse value 10 l/pulse	03
Pulse value 25 l/pulse	04
Pulse value 100 l/pulse	05
Pulse value 250 l/pulse	06
Pulse value 1000 l/pulse	07
Pulse value 2500 l/pulse	08
3. Pulse frequency	**Code**
Maximal pulse frequency 50 Hz	0
4. Country / where used	**Code**
Dial plate for Middle East (English)	AE
Dial plate for Austria (German)	AT
Dial plate for Switzerland (German/French)	CH
Dial plate for China (Chinese)	CN
Dial plate for Czech Republic (Czech)	CZ
Dial plate for Germany (German)	DE
Dial plate English neutral	EN
Dial plate for Great Britain (English)	GB
Dial plate for The Netherlands (Dutch)	NL
Dial plate for Norway (Norwegian)	NO
Dial plate for Poland (Polish)	PL
Dial plate for Sweden (Swedish)	SE
Dial plate for Slovak Republic (Slovakian)	SK
5. Manufacturer's label	**Code**
Logo Landis+Gyr	00
Other labels on request	xx
6. Sensors type and method of connection	**Code**
Flow sensor (without temperature sensors)	0
Sensor Pt100, removable	A
Sensor Pt500, removable	E
Hardware dependent features	
7. Temperature sensor type	**Code**
Without temperature sensors	00
8. Power supply	**Code**
Without power supply	0
Standard battery for 6 years (2xAA cells)	A
Battery for 6 years for all applications (D cells)	B
Battery for 11 years (C cells)	C
Battery for 11 years (D cells)	E
Battery for 16 years (D cells)	F

Power supply 24 V AC/DC with plugs	M
Power supply 230 V AC with 1.5 m cable	N
Power supply 230 V AC with 5 m cable	P
9. Communication module in slot 1	**Code**
No module in slot 1	0
Analog module	A
M-Bus module G4	B
M-Bus module G4-MI with 2 pulse inputs	N
Pulse module standard	P
10. Communication module in slot 2	**Code**
No module in slot 2	0
Analog module	A
M-Bus module G4	B
Radio module 868 MHz *)	E
Radio module 868 MHz with external antenna *)	F
Pulse module standard	P
11. Data logger	**Code**
Without data logger	0
Data logger with 8 channels	8
12. Calibration / conformity	**Code**
Compliant acc. to national regulations	CL
Compliant to MID, class 2	M2
Compliant with CEN 1434, class 2	T2
Compliant acc. to national regulations	TL
13. Energy unit	**Code**
Display: kWh (until qp 10)	A
Display: MWh with 3 decimal places (as of qp 15 with 2 decimal places)	B
Display: MJ (until qp 2.5)	C
Display: GJ with 3 decimal places (as of qp 3.5 with 2 decimal places; as of qp 40 with 1 decimal place)	D
Only for flow sensor: Display: m³ with 2 decimal places (as of qp 25 with 1 decimal place)	V

*) Additional ordering information needed (see page 40)

[1]) Additional ordering information needed (see page 41)

17 Additional ordering information on radio module 868 MHz (wireless M-Bus EN13757-4, OMS v2.0)

For OMS v2.0, radio mode T1, security profile A (encryption mode 5)

Necessary additional ordering information:

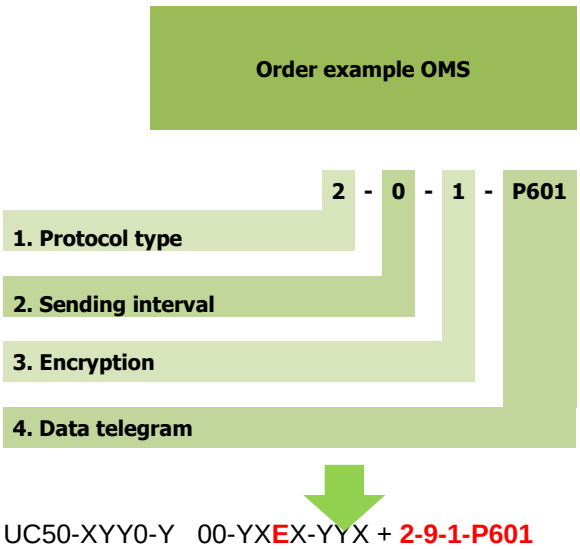
Wireless M-Bus module 868 MHz with integrated / external antenna:
UC50-XYY0-Y 00-YX**E**X-YYX
UC50-XYY0-Y 00-YX**F**X-YYX

Description	OMS
1. Protocol type	**Code**
OMS 2.0 / wireless M-Bus	2
2. Sending interval	**Code**
Sending interval 15 minutes	0
Sending interval 1 minutes	3
Sending interval 16 seconds	5
Sending interval 20 seconds	8
Sending interval 12 seconds	9
3. Encryption	**Code**
None	0
AES-128 Bit	1
4. Data telegram	**Code**
Telegram radio standard	P600
Telegram mobile radio	P601
Telegram mobile radio with tariffs	P602

More data telegrams on request.

Please find the information about lifetime of battery in chapter 9.

Ordering examples:



UC50-XYY0-Y 00-YX**E**X-YYX + **2-9-1-P601**

E = Radio module 868 MHz internal antenna (wireless M-Bus) **OMS v2.0**
2 = OMS v2.0, radio mode T1
9 = Sending interval 12 seconds (mobile radio)
1 = Security profile A (encryption mode 5), AES-128 Bit; for example, to connect to receivers who do not support such high encryption
P601 = Telegram mobile radio

- Current energy
- Current volume
- Energy on monthly set day
- Volume on monthly set day
- Monthly set day
- Energy at yearly set day
- Yearly set day
- Error (manufacturer specific)
- Current time stamp (type I)

OMS:

Open Metering System Specification: Industry standard of a community of interest of companies and associations. It develops open and vendor independent specifications for communication interfaces and basic requirements for meters -

Defines requirements in addition to standard EN13757-4.

18 Additional ordering information for glycol

T550 (UC50…) can be used as a calculator (acc. EN1434, not calibrated) for determination of heat / cold flow volume of liquid mixtures (e.g. glycol/water). An adjustment can be performed with the service software.

Available medium	Order code: ME_UC50_GLY =	Continuation:	
Tyfocor ® LS	= 01	Glythermin P 44 ® 50%	= 23
Tyfocor ® 30%	= 02	Ethylene Glycol 30%	= 24
Tyfocor ® 40%	= 03	Ethylene Glycol 40%	= 25
Tyfocor ® 50%	= 04	Ethylene Glycol 50%	= 26
Tyfocor L ® 30%	= 05	1.2 Propylene Glycol 30%	= 27
Tyfocor L ® 40%	= 06	1.2 Propylene Glycol 40%	= 28
Tyfocor L ® 50%	= 07	1.2 Propylene Glycol 50%	= 29
Antifrogen N ® 30%	= 08	Fernox HP-5c 20%	= 31
Antifrogen N ® 40%	= 09	Fernox HP-5c 30%	= 32
Antifrogen N ® 50%	= 10	Antifrogen N ® 20%	= 33
Antifrogen L ® 30%	= 11	1.2 Propylene Glycol 20%	= 34
Antifrogen L ® 40%	= 12	Dowcal 100 ® 30%	= 35
Antifrogen L ® 50%	= 13	Dowcal 100 ® 40%	= 36
Antifrogen SOL ®	= 14	Dowcal 100 ® 50%	= 37
Dowcal 10 ® 30%	= 15	Ethanol 20%	= 38
Dowcal 10 ® 40%	= 16	Ethanol 30%	= 39
Dowcal 10 ® 50%	= 17	Ethanol 40%	= 40
Dowcal 20 ® 30%	= 18	Ethanol 50%	= 41
Dowcal 20 ® 40%	= 19	Dowcal 100 ® 35%	= 42
Dowcal 20 ® 50%	= 20	Ethylene Glycol 25%	= 43
Glythermin P 44 ® 30%	= 21	Ethylene Glycol 20%	= 44
Glythermin P 44 ® 40%	= 22		

Example for ordering:

UC50-**5**YY0-Y 00-YXYX-T2X + **ME_UC50_GLY = 01**

5 = Calculator for heat measurement (medium glycol) for mounting place of flow sensor cold side (return)

01 = Tyfocor ® LS

19 Additional order information for LoRaWAN-Modul

If a configuration different from the factory setting (*) is required.
More details about the function in the Elvaco User Manual module CMi4110!

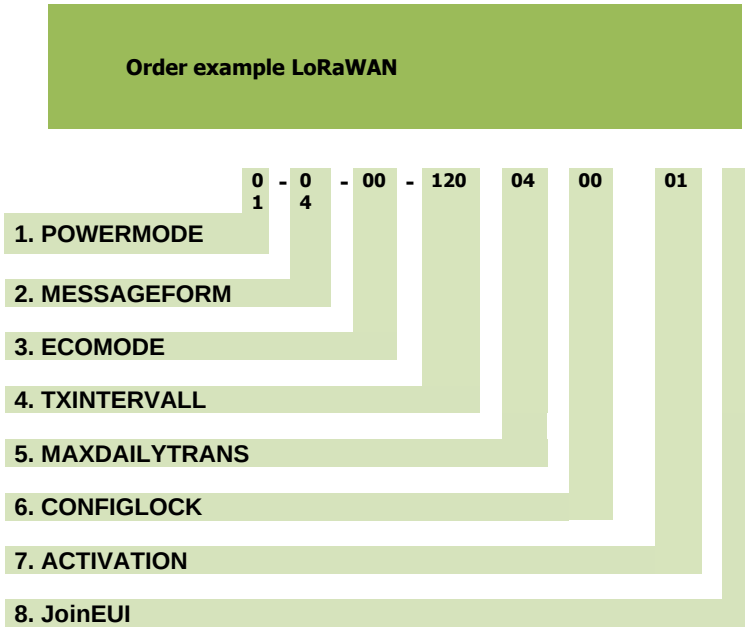
Necessary additional information on the order with LoRaWAN module int. / ext. antenna

UC50-XYY0-Y 00-YX4X-YYX
UC50-XYY0-Y 00-YX5X-YYX

Description	LoRa
1. POWERMODE	**Code**
Not active (radio off) *	00
Active (radio on)	01
2. MESSAGEFORM (Telegram content)	**Code**
Standard *	00
Compact	01
JSON	02
Scheduled – daily redundant	03
Scheduled – extended	04
Scheduled – extended + (Tariff)	05
Compact Tariff	06
3. ECOMODE	**Code**
Ecomode (power saving) off	00
Ecomode (power saving) on *	01
4. TXINTERVALL	
Transmission interval in minutes	
(Input: 15* .. 1440)	
5. MAXDAILYTRANS	**Code**
Limit how many times per day maximum is sent.	
Input: 1, 2, 3, 4, 6, 8, 9, 12, 24, 48, 96*times per day	
6. CONFIGLOCK (Configuration lock)	**Code**
Locked	00
Unlocked*	01
7. Activation (Connection type)	
ABP	00
OTAA *	01
8.JoinEUI (ID des Join Servers)	
0000000000000000 *	
16-digit number (hexadecimal)	

Battery life 6 years: ECOMODE off
Battery life 11 years: ECOMODE on
Battery life 16 years: ECOMODE on and MAXDAILYTRANS 1 to 9
For more details on battery life, see Chap.8.

Order example:



UC50-XYY0-Y 00-YX4X-YYX + **01-04-00-120-04-00-01-70B3D57ED000B375**

01 = Active (radio on)

04 = Message format “Scheduled – extended”

00= Ecomode (power saving) off
120 = Transmission interval 120 minutes
04 = Send max. 4 times per day

00 = Module locked, only for registered user (in the OTC web service of Elvaco company)

01 = OTAA

70B3D57ED000B375 – Beispiel ID Join Server

LoRaWAN:
The LoRa Alliance® is an open, non-profit association with the mission to support and promote the global adoption of the LoRaWAN® standard, the leading LPWAN

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