Ultrasonic heating and cooling meter
T550 (UH50…)

Residential, district heating, local heating plant

Landis
|Gyr$^+$

manage energy better

ULTRAHEAT$^®$T550 (UH50…)
ULTRACOLD$^®$T550 (UH50…)
Flow sensor T550 (UH50…)

Technical description

32 16 101 001 h
Date: 23.08.2018
Landis+Gyr GmbH

Outstanding features

Meter for measurement of flow and energy in a heat or cold circuit with water using the ultrasonic principle.

Important properties are:

- Non-wearing due to non-moving parts

- Measuring range of 1:100 according to EN1434:2014, 1:1.000 total range

- Power measurement with maximum values, tariffs selectable

- Data logger for system monitoring

- 60 monthly values

- Logbook

- Battery or mains operated

- Optical interface according to EN 62056-21:2003

- Big range of communication modules for remote readout and system integration

- 2 module slots for using 2 communication modules coincidental

- Also operable as a flow meter, cooling or combined heat/cold meter

- Self-diagnosis

Contents

1 General notes

> **Note:** In the following text, the term meter refers to heating meter, cooling meter and flow meter, unless they are otherwise differentiated.

The meter is used as a meter for heating or cooling consumption measurement in systems with water.

The meter consists of a volume measurement, two temperature sensors and an electronic unit that calculates the energy consumption from the volume and temperature difference. The meter combines modern microcomputer technology with innovative ultrasonic measurement technology for which no mechanically moving parts are necessary.

This technology is thus wear-free, robust and largely maintenance-free. High precision and long-term stability guarantee precise and accounts of charges.

Other available documentations

- Operating instructions T550 (UH50...)
- Installation instructions T550 (UH50...)
- Respective module operating and installation instruction
- Illustrated catalogue

Additional informations are available on request.

2   Safety information

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

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

⚠ 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 on the basis of any expressly granted guarantees.

⚠ Requirements for circulating water (CEN/TR 16911: 2016).

⚠ The meter is only suitable for circulating water in heating systems.

⚠ The meter is not suitable for drinking water.

⚠ Do not lift the meter by the electronic unit.

⚠ Be aware of sharp points on the thread, flange and measuring tube.

⚠ Only personnel, trained in the installation and operation of meters in heating and cooling systems, may install and remove the meter.

⚠ Only install or remove the meter when the pipes are pressure-less.

⚠ After installing the meter, check the leak-tightness of the system.

⚠ Guarantee and calibration validity will lapse if the calibration relevant security seal is broken.

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

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

⚠ The meter 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 meter 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. The relevant national, legal regulations must be observed as the appliance must be disposed of via the channels provided for this purpose. The local and currently valid legislation must be observed.

⚠ The meter contains lithium batteries. Do not dispose of the meter 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 meter does not have any lightning protection. Ensure lightning protection via the in-house installation.

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

3   Technical data

General

Measuring accuracy	Class 2 or 3 (EN 1434)
Environment class	A (EN 1434) for indoor installation
Mechanical class	M1 *)
Electromagnetic class	E1 *)

*) according to 2014/32/EU 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
Temperature range	0 ... 150°C (up to 45 mm overall length) 0 ... 180°C (from 100 mm overall length)

Volume measurement unit

Protection class	IP 54 / IP 65 / IP 68 according to EN 60529 According to EN 60529
Mounting place	Hot side / cold side
Installation position	Any
Flow straightening	None
Measuring range	1:100
Temperature range	5 … 130°C National type approvals may be different.
Recommended...	
...heating application	10 … 130°C
...cooling application	5 … 50°C
Maximum overload	2,8 × qp
Nominal pressure	PN16 (PS16), PN25 (PS25)

Nominal flowrate q_p	Overall length	Connection	Maximum flowrate q_s	Minimum flowrate q_i	Response threshold (variable)	Pressure loss at q_p	Kv flowrate at Δp 1 bar	Kv flowrate at Δp 100 mbar	Weight
m^3/h	mm	G/DN	m^3/h	l/h	l/h	mbar	m^3/h	m^3/h	kg
0.6	110	G $^3/_4$	1.2	6	2.4	150	1.5	0.5	1
0.6	190	G1	1.2	6	2.4	150	1.5	0.5	1.5
0.6	190	DN20	1.2	6	2.4	150	1.5	0.5	3
1.5	110	G $^3/_4$	3	15	6	150	3.9	1.2	1
1.5	130	G1	3	15	6	160	3.8	1.2	1.5
1.5	190	G1	3	15	6	160	3.8	1.2	1.5
1.5	190	DN20	3	15	6	160	3.8	1.2	3
2.5	130	G1	5	25	10	200	5.6	1.8	1.5
2.5	190	G1	5	25	10	210	5.3	1.7	1.5
2.5	190	DN20	5	25	10	210	5.3	1.7	3
3.5	260	G 1 $^1/_4$	7	35	14	60	14	4.5	3
3.5	260	DN25	7	35	14	60	14	4.5	5
6	150	G 1 $^1/_4$	12	60	24	240	12	3.9	3
6	260	G 1 $^1/_4$	12	60	24	180	14	4.5	3
6	260	DN25	12	60	24	180	14	4.5	5
10	200	G2	20	100	40	130	28	8.8	2.6
10	300	G2	20	100	40	110	30	9.5	4
10	300	DN40	20	100	40	130	28	8.8	7
15	200	DN50	30	150	60	95	49	15.4	5
15	270	DN50	30	150	60	110	45	14.3	8
25	300	DN65	50	250	100	105	77	24.4	11
40	300	DN80	80	400	160	160	100	31.6	13
60	360	DN100	120	600	240	115	177	56.0	22
150	500	DN150	300	1500	600	120	433	136.9	50*)

*) Measurement insert 4 kg

Tolerance of pressure lost: +/- 5%

Small meters (qp 0.6 – 2.5 m³/h)
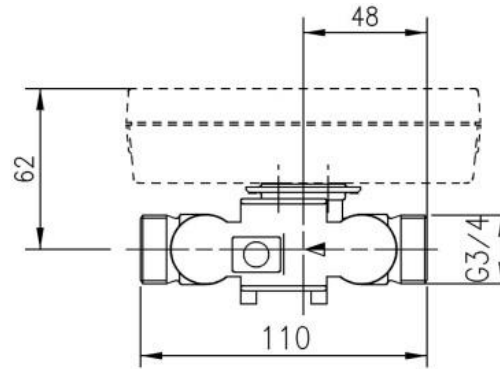
Fig. 1: Overview dimensions overall length 110 mm (thread)
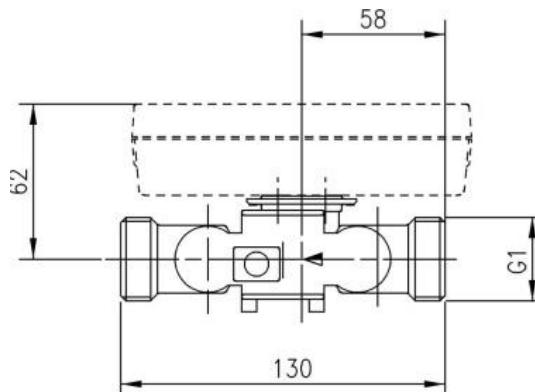
Fig. 2: Overview dimensions overall length 130 mm (thread)
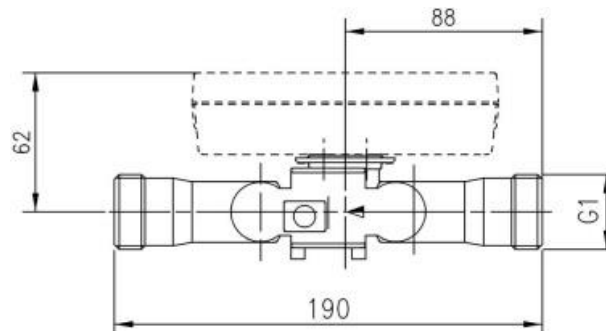
Fig. 3: Overview dimensions overall length 190 mm (thread)

Order-No.	qp	PN	a	b	c
	m³/h	bar	mm	mm	mm
UH50-x03	0.6	16	130	G1	58
UH50-x04	0.6	25	130	G1	58
UH50-x05	0.6	16	110	G ¾	48
UH50-x06	0.6	25	110	G ¾	48
UH50-x07	0.6	16	190	G1	88
UH50-x09	0.6	25	190	G1	88
UH50-x21	1.5	16	110	G ¾	48
UH50-x22	1.5	25	110	G ¾	48
UH50-x23	1.5	16	190	G 1	88
UH50-x25	1.5	25	190	G1	88
UH50-x26	1.5	16	130	G1	58
UH50-x27	1.5	25	130	G1	58
UH50-x36	2.5	16	130	G1	58
UH50-x37	2.5	25	130	G1	58
UH50-x38	2.5	16	190	G1	95
UH50-x40	2.5	25	190	G1	95
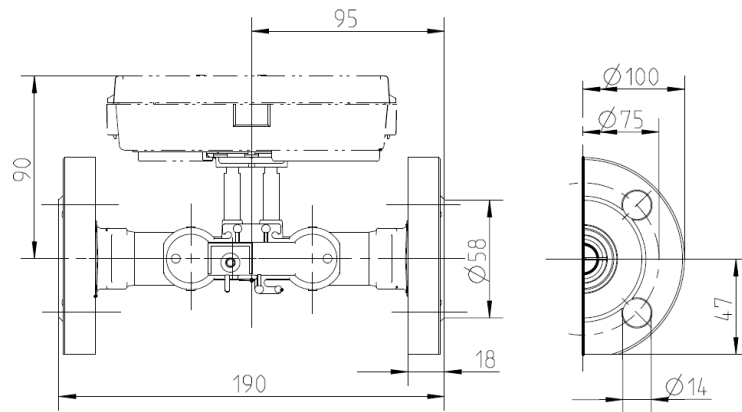
Fig: Overview dimensions overall length 190 mm (flange)

Order-No.	qp	PN	Overall length	Connection
	m³/h	bar	mm	
UH50-x08	0.6	25	190	DN20
UH50-x24	1.5	25	190	DN20
UH50-x39	2.5	25	190	DN20

Large meters with thread

Alternative mounting option
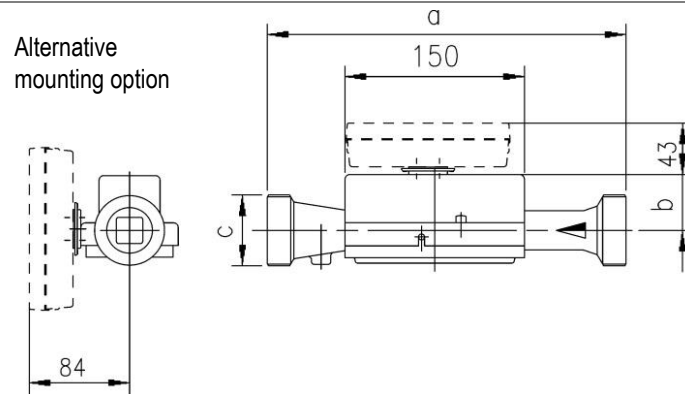
Fig. 5: Overview dimensions of large meters with thread

Order-No.	qp	PN	a	b	c
	m³/h	bar	mm	mm	
UH50-x45	3.5	16	260	59	G 1¼ B
UH50-x47	3.5	25	260	59	G 1¼ B
UH50-x50	6	16	260	59	G 1¼ B
UH50-x60	10	16	300	59	G 2 B
UH50-x63	10	16	200	59	G 2 B
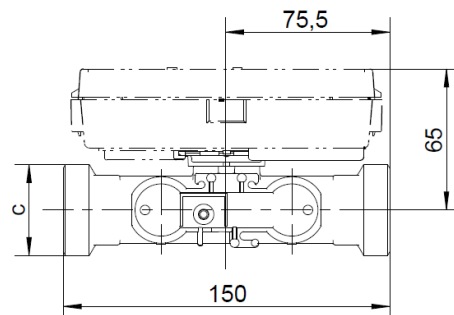
Fig. 6: Overview dimensions of large meters qp 6 with tread (short face-to-face length)

Order-No.	qp m³/h	PN bar	c
	m³/h	bar	
UH50-x55	6	16	G 1¼ B

Large meters with flange
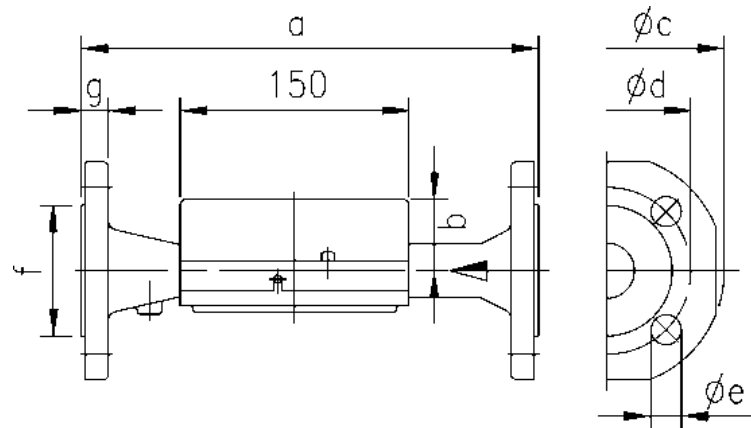
Fig. 7: Overview dimensions of large meters with flange

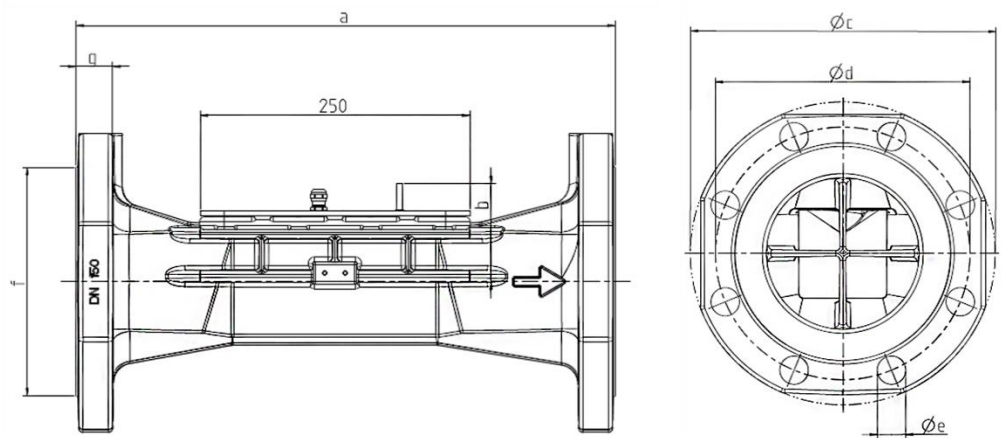| Order-No.	qp m³/h	PN bar	DN	a mm	b mm	Øc mm	Ød mm	Øe mm	No. of holes	f mm	g mm
UH50-x46	3.5	25	25	260	59	112	85	14	4	60	19
UH50-x52	6	25	25	260	59	112	85	14	4	60	19
UH50-x61	10	25	40	300	59	140	110	18	4	90	19
UH50-x65	15	25	50	270	59	155	125	18	4	102	20
UH50-x69	15	25	50	200	59	155	125	18	4	102	20
UH50-x70	25	25	65	300	52	185	145	18	8	122	22
UH50-x74	40	25	80	300	56	200	160	18	8	138	24
UH50-x82	60	16	100	360	68	235	180	18	8	158	24
UH50-x83	60	25	100	360	68	235	190	22	8	158	24

Large meter qp 150

Fig. 8: Overview all dimensions of large meter qp 150

Order-No.	qp m³/h	PN bar	DN	a mm	b mm	Øc mm	Ød mm	Øe mm	No. of holes	f mm	g mm
UH50-xA1	150	16	150	500	91	300	240	23	8	211	31
UH50-xA2	150	25	150	500	91	300	250	28	8	211	31

4 Installation

To install the meter proceed as follows:

- Determine the place of installation in line with the inscription on the meter.

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

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

- Observe the dimensions of the meter and check whether there is sufficient space available.
- Rinse the system thoroughly before installing the meter.
- Fit the meter vertically or horizontally between two slide valves so that the arrow on the housing and the flow direction match. Also observe the installation situations and the following examples of installation.
- Fit the temperature sensors in the same circuit as the meter. Observe the admixtures.
- Seal the temperature sensors and the fittings to protect against manipulation.
- Loosen the elastic band or the cable tie, provided for the transport, from the volume measurement unit. In operation, the temperature sensor and the control cable should not depend directly on the volume measurement unit.
- If you install the meter for cooling metering, follow the appropriate notes.

Installation Notes

Inlet or outlet sections are not necessary. If you install the meter in the common return of two circuits, determine a place of installation with a minimum distance of 10 × DN from the T-piece. This distance ensures a good thorough mixing of the different water temperatures. You can install the temperature sensors in T-pieces, ball valves, directly immersed or in pockets depending on the version. The temperature sensor ends must reach to at least the middle of the pipe cross section.

> **Note:** During installation it must be ensured that no water can enter the electronic unit during operation.

Examples of installation
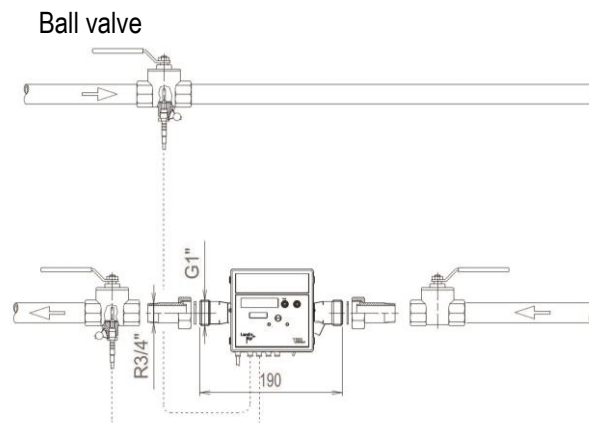
Fig. 9: Installation with a ball valve (recommended up to and including qp 6)

Welding sleeve with pockets
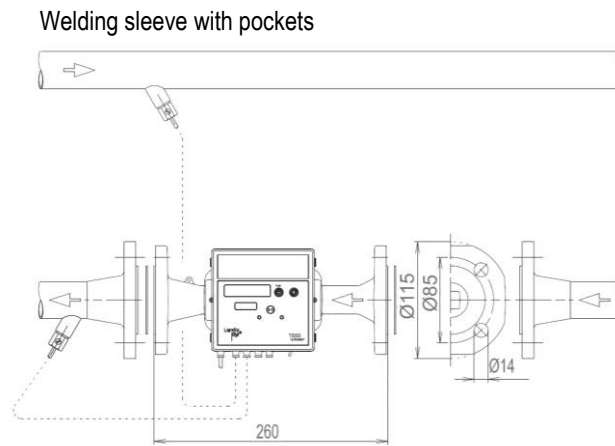
Fig. 10: Installation with pockets (recommended greater than or equal to qp 10)
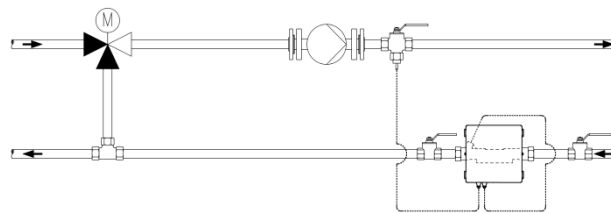
Fig. 11: Installation for circulation with admixing; placement of temperature sensors
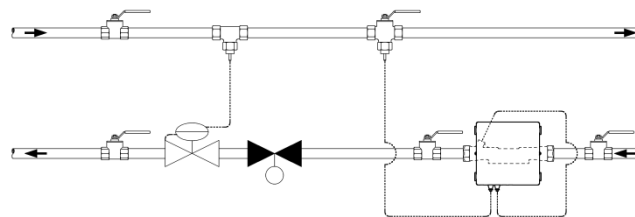
Fig. 12: Installation for circulation with throttling configuration for example (flow sensor in flow direction upstream control valve / differential pressure regulating valve)

Installation notes for sensor adapter set (temperature sensor directly immersed)

A mounting set is included for meters with 5.2 × 45 mm temperature sensors. It allows for mounting the temperature sensors directly immersed into an insert or a ball valve for example.

1. Install with the O-ring at the point of installation with the fit-up aid/pen provided.
2. Place both halves of the plastic bolting round the 3 notches of the temperature sensor.
3. Press the bolting together and screw the bolting hand tight into the point of installation until it comes to a stop (tightening torque 3 … 5 Nm).
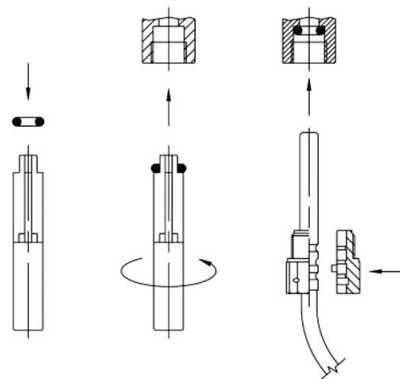
Fig. 13: Mounting adapter set

4.1 Installation for cooling metering

When installing as a cooling meter it is essential that the black cover on the measuring tube is pointed to the side or down-wards in order to avoid problems with condensation. Fit the immersion sleeves so that the temperature sensor is positioned vertically downwards or horizontally.

Fit the electronic unit separate to the volume measurement tube, e.g. on the wall. Make a loop downwards in order to prevent condensation running along the connected lines into the electronic unit.

Transducer cover
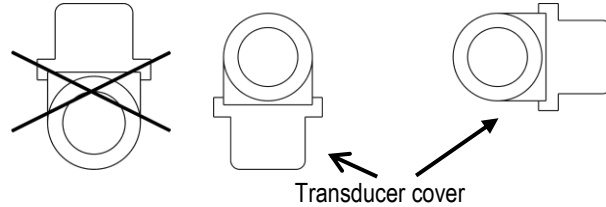
Fig. 14: Recommended installation position for cooling metering

4.2 Installation of qp 150

Note: Use flange bolts with a length of at least 100 mm to install the flanged body in the pipeline.

As an assembly aid 2 M10 threads are mounted on the flange. The threads allow for the use of stainless steel eye bolts, for example, for a lifting device.

Note: The measurement insert in the flanged body should be positioned on the top. This allows a simple exchange of the measurement insert.

5 Dimension of electronic unit
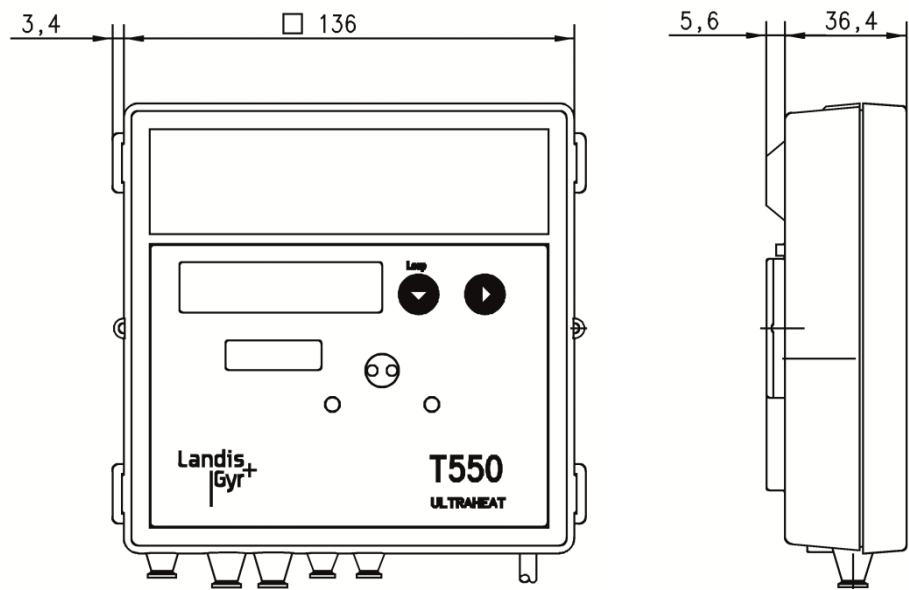
Fig. 15: Dimensions of electronic unit
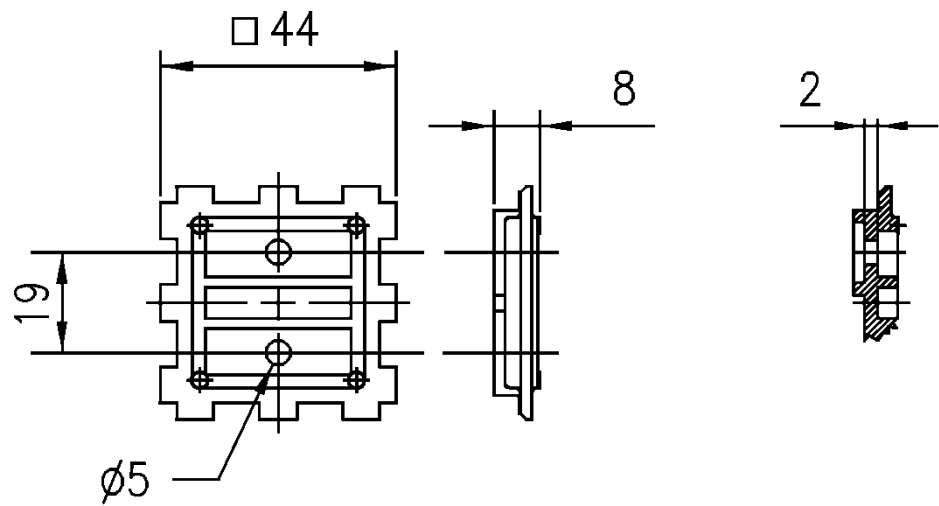
Fig. 16: Plan view and cross section of adapter plate

6 Operating elements
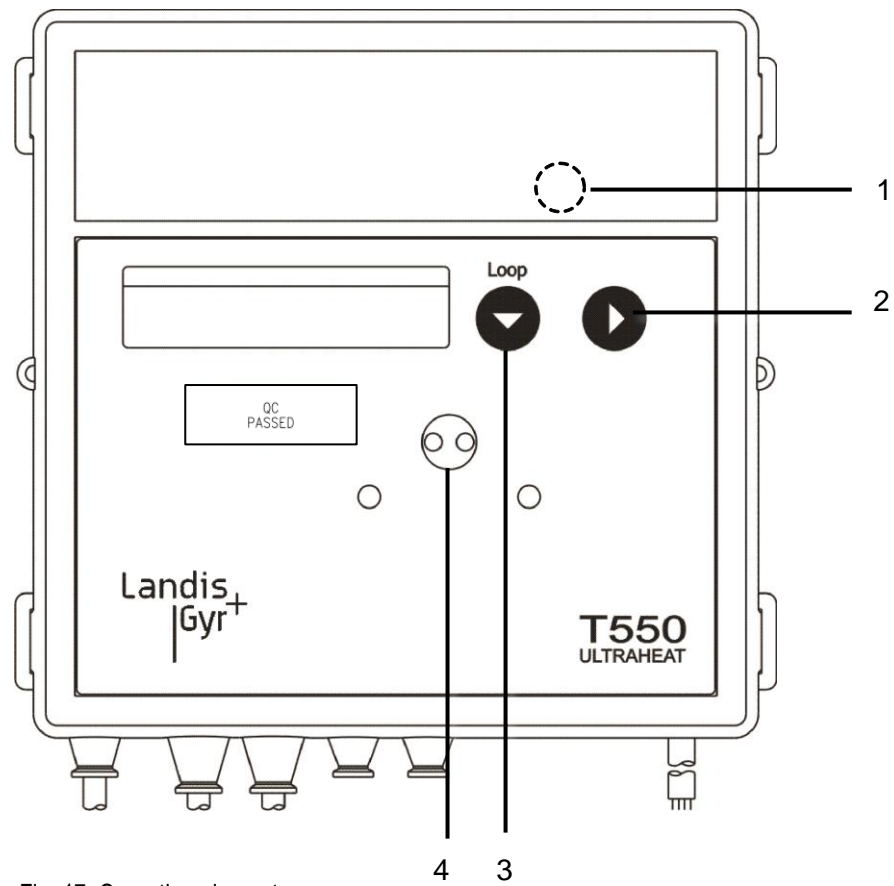
Fig. 17: Operating elements

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 Displaying current meter status

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

> **Note:** In order 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.
>
> **Note:** Both display range and data displayed can differ from the description depending on the appliance parameterization. Certain button functions can also be blocked.

Display values (LOOPs)

`L OOP      0`	User loop
`L OOP      1`	Service loop 1
`L OOP      2`	Service loop 2
…	...
`L OOP      0`	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:

`..      1234567 k₊W h`	Energy accumulated with tariff status
`T '  1234567 k W h`	Tariff register 1 (optional)
`1234567 m³`	Volume accumulated
`8.8.8.8.8.8.8. k W h`	Segment test
`L OOP      0`	Head of the loop
`F  - - - - - - -`	In case of error: message with error code

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:

Display	Description
L OOP 1	Head of the loop
1,234 m³/h	Current flow
90,4 kW	Current power
TV 91,6 °C	*TV* current temperature hot side,
TR 56,2 °C	*TR* current temperature cold side; in 2-sec. cycles
Bd 1234 h	Operating time
Pd 1234 h	Operating time with flow
Fd 123 h	Missing time
K 12345678	Property number, 8-digit
D 10,05,06	Date
SD 31,05,--	Yearly set day (DD.MM)
1234567 kWh	Energy: previous year on set day
12345,67 m³	Volume: previous year on set day
FW1 5-00	Firmware version

Service loop 2 „LOOP 2"

Service loop 2 displays the measurement period for establishing the maximum.

The LCD displays the following values one after the other:

Display	Description
L OOP 2	Head of the loop
MP 60 min	Measurement period for establishing the maximum

Service loop 3 („LOOP 3")

Service loop 3 displays the monthly values.

| `L OOP    3` | Head of the loop |

…   …

| `0 07,11  M` | Set day for July 2011 |

The LCD displays the following values one after the other:

`123456,7 k W h`	Energy on the set day
`T ' 123456 7 k W h`	Tariff register 1 on the set day
`12345,67    m³`	Volume on the set day
`Ma    3,899   m³/h`	Max. flow on the set day, in 2-sec. cycles with date stamp
`St  13,06,11`	
`Ma    288,9 k W`	Max. power on the set day, in 2-sec. cycles with date stamp
`St  13,06,11`	
`MV    98,8 ℃`	
`St  13,06,11`	Max. temperatures on the set day, in 2-sec. cycles with date stamp *MV for hot side or MR for cold side*
`MR    87,7 ℃`	
`St  13,06,11`	
`Fd    123  h`	Missing time count on the set day

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

Note: If the number of months to be read out is changed with the service software, this will have an impact on the number of retrievable months in the LCD.

Service loop 4 („LOOP 4")

Service loop 4 displays appliance parameters.

The LCD displays the following values one after the other:

Display	Description
`LOOP    4`	Head of the loop
`T2    0,000  m³/h` `'     0,000  m³/h`	Current tariff, in 2-sec. cycles with threshold value 1
`FP   2,00  SEC`	Measurement interval flow
`TP   30   SEC`	Measurement interval temperature
`Modul 1    M3`	Module 1: M-Bus module
`AP 1    127`	M-Bus primary address 1
`A 12345678`	M-Bus secondary address 8-digit
`Modul 2-1 CE` `Modul 2-2 CV`	Module 2: Pulse module; channel 1 = energy, channel 2 = volume; in 2-sec. cycles
`PO1  125,00Wh/I`	Value for energy pulses *)
`PO2 0,0250  L/I`	Value for volume pulses *)
`PO3     2mS`	Pulse duration in in ms *)

*) for "fast pulse"

6.2   Previous year's values

The meter saves the following values on the yearly set day
- Energy (meter status)
- Volume (meter status)
- Tariff register (meter status)
- Missing time (meter status)
- Flow measurement time (meter status)

and the maxima with date stamp for
- Flow
- Power
- Temperature difference
- Temperature hot side
- Temperature cold side

6.3   Monthly values

The meter stores the following values for 60 months on the monthly set day
- Energy (meter status)
- Volume (meter status)
- Tariff register (meter status)
- Missing time (meter status)
- Flow measurement time (meter status)

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 and the 20 mA-interface.

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

7   Resolution of the display
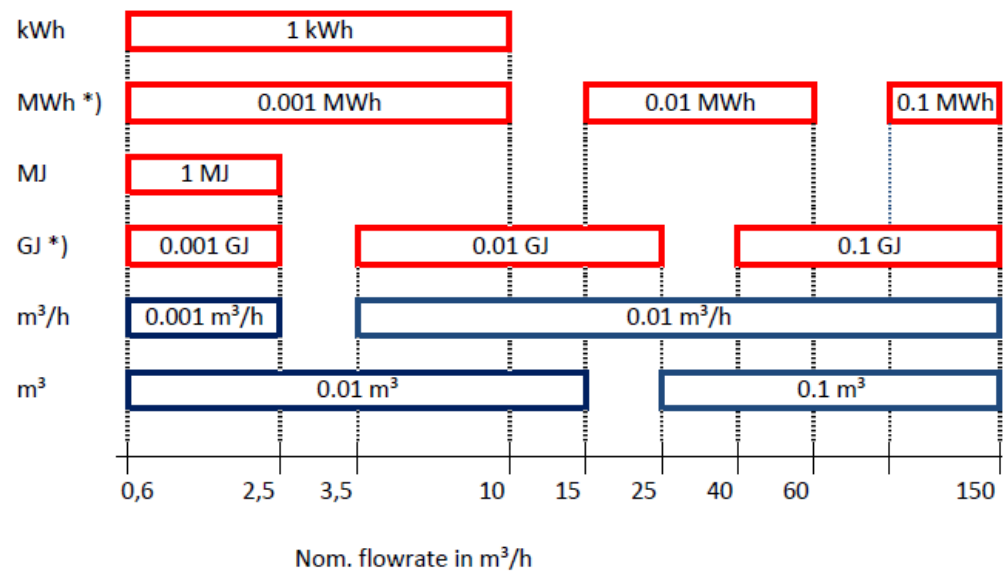
*) Places after decimal point "blinking", "static" or "suppressed"

> **Note:** The number of places after the decimal point of a value is based on the chosen measurement path and the chosen dimension.

8 Power supply

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

> **Options:**
> - 6 years battery
> - 11 years battery
> - 16 years battery
> - Power supply 230 V AC [*)]
> - Power supply 110 V AC [*)]
> - Power supply 24 V ACDC

*) From 2018 replaced by a wide-range power supply 100 - 240V

Automatic power supply detection

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

Power supply requirements

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

> **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	-20…+60 °C
Back-up time during power failure (power reserve)	> 20 minutes

24°V°safety extra-low voltage

Voltage	12...36 V AC or 12..42 V DC
Frequency	50 / 60 Hz or DC
Galvanic isolation	1000 V DC
Power consumption	maximal 0.8 VA
Terminals for connecting cable	2 x 1.5 mm² about, Ø 5.0...6.0 mm

110 V or 230 V alternating voltage

Voltage	85…121 V AC or 196…253 V AC
Type	Safety class II
Frequency	50 / 60 Hz
Line voltage fluctuations	maximal 10% of the nom. voltage
Overvoltage category II per EN60010	2500 V pulse voltage
Power consumption	maximal 0.8 VA
Relative humidity	less than 93 % for T < 50°C
Fuse protection	6 A MCB

100 - 240 V alternating voltage *)

Voltage	100…240 V AC (±10%)
Type	Safety class II
Frequency	50 / 60 Hz
Line voltage fluctuations	maximal 10% of the nom. voltage
Overvoltage II per EN60010	2500 V pulse voltage
Power consumption	maximal 2.5 W
Relative humidity	5…90 % T < 55°C, without condensation
Fuse protection	6 A MCB

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

9 Communication

Electronic unit interfaces

The meter 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
- CL module
- M-Bus module G2
- M-Bus module G4
- M-Bus module G4 MI with 2 pulse inputs
- Analog module
- Radio module 868 MHz
- GPRS module

These modules do not have an effect on 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
	MB MI	M-Bus module
	CL	CL module
	RF	Radio module
	GPRS	GPRS module
	LoRa	LoRaWAN module

Step 1 Slot for module #2 **is** equipped with...

Slot for module #1 **can** be equipped with.. (Step 2)

	AM (5)	Pulse module "standard"	Pulse module "fast" *)	MB	MB G4	CL	GPRS	RF 868 MHz	LoRa
AM	yes	yes	yes	yes (4)	yes	yes	no	yes	yes
Pulse module **) "standard"	yes	yes (3)	yes (2)	yes (4)	yes	yes	yes	yes	yes
MB	yes	yes	yes	yes (4)	yes	yes (1)	yes	yes	yes
MB G4	yes	yes	yes	yes	yes	yes (1)	yes	yes	yes
MB MI	yes	yes	yes	yes	yes	yes (1)	no	yes	yes
CL	yes	yes	yes	yes (1)	yes (1)	no	yes	yes	yes

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) For M-bus with fast read out, the CL read-out can take up to 40 s
(2) Pulse length of the fast pulses min. 5 ms
(3) The first and second channel can be parameterized individually!
(4) The secondary address for both modules can only be changed via module No. 1!
(5) The analog module is not possible in module slot 2, when the meter has a power supply module 110 V / 230 V!

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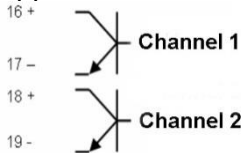
2-pole or 4-pole terminals are used for connection of the external cables to the modules.

- 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

9.1   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.

Labeling	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):	

A special version WZU-P2L of the pulse module is available with an Opto-Mos output.

Advantages	low voltage drop and reverse polarity protected (bipolar)
Connection	

9.2   CL module

With the CL module it is possible to read out the meter by wire e.g. on the doorstep through a point-to-point connection.

Display in LCD	CL (Current Loop)
Classification	acc. to EN 62056-21 Mode B
Type	passive current loop
Baud rate	2400 Baud, fix
Isolation	galvanic
Polarity	yes
Voltage	30 V max.
Current	30 mA max.
Voltage drop	< 2 V at 20 mA
Interface description	TKB 3436

9.3   M-Bus module G4

The M-Bus module enables the meter to communicate with an M-Bus center in order to transmit measured values.

Standard	EN 1434-3; EN 13757-2, -3
Protocol	EN 60870-5
Electrical isolation	
from the meter	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

9.4   M-Bus module MI with 2 pulse inputs

The M-Bus module enables the meter to communicate with an M-Bus center in order 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 the meter	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	
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	yes, must be correct, if transmitter is of type "open collector"
Electrical isolation	from the meter: 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

9.5 Analog module

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

Power supply range	12 … 30 V AC
	12 … 42 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, 2kOhm 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

9.6 Radio module 868 MHz (Wireless M-Bus)

> **Note:** For meter of the type T550 firmware ≥ 5.17.
> For meter of the type T550 firmware ≥ 5.23 new functions are availed (C1 mode, OMS 4.1.2 with security profile B).

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 or C1 and 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	868.95 MHz (868.90 MHz up to 869.00 MHz)
Transmission power (ERP)	min. 3.16 mW (5 dBm) up to max. 25 mW (13.9 dBm)
Receive frequency	868.30 MHz (868.00 MHz up to 869.60 MHz)
Range *)	
Free field	up to 400 m
Inside buildings	e.g. horizontally 30 m
Power supply	
via meter **)	Battery type D mobile radio (16 seconds) battery for 11 years; stationary radio (15 minutes) battery for 16 years
via power supply	110/230/24 V
Standard	EN13757-2/ -4

[1]   Open Metering System
[2]   Dutch Smart Metering Requirements
*) 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.

9.7   Radio module 868 MHz LoRaWAN (CMi4110)

Note: For T550 with firmware ≥ 5.15.

Note: The module is displayed as "MB G4" on the LCD. For details see also Quick Manual and User Manual.

Note: Can be ordered as an accessory with internal or external antenna.

The LoRaWAN module sends meter data via LoRaWAN network [1] to an applikations 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.

Frequency	868 MHz
Transmission power (ERP)	25 mW (14 dBm)
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)

Long Range Wide Area Network (**LoRaWAN**) is a low-power wireless network protocol. The LoRaWAN specification is defined by LoRa Alliance is freely available and uses a special modulation technique.

*)   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.

9.8   GPRS module

The GPRS module is used for data acquisition over a mobile network[*]), using open standard protocols[**]) in push mode (as Email, HTTP, FTP, SMS) or pull mode as transparent M-Bus (GSM, TCP). The integration into billing systems happens via selectable report templates.

The module is configured by SMS messages. A firmware update is possible at any time ("Over the Air").

The module includes an integrated M-Bus Master, which allows to read out up to 8 additional M-Bus Meter (so-called slaves). The meter data can be stored and send at configurable intervals. In addition, "ad hoc" readings are possible.

Connection M-Bus	Screw terminal 0.25 to 1.5 mm²
Power supply	via power supply (meter)
Nominal voltage	100-240 V AC
Voltage range	-20 % to +15 % of nominal voltage
Frequency	50/60 Hz
Power consumption (Max)	< 2.5 VA
Power consumption (Nom)	< 1 VA
Installation/overvoltage	CAT 2
GPRS Class	12
Band	850/9000/1800/1900 MHz
Operating temperature range	-30 to +55°C
Storage temperature range	-40 to +85°C
Operating humidity max.	80% RH
Pollution	Grade 2
Operating altitude	0-2000 m
Indoor use only	Yes
LED Indication	green, yellow, red
M-Bus standard	13757
M-Bus Baud rate	300 and 2400 Bit/sec
Transparent M-Bus	Listening server on TCP and GSM data
Maximum connected M-Bus slaves	8
Maximum cable length	1000 m
Real Time Clock Backup	3 days
Real Time Clock Accuracy	< 2 sec/day
Data storage (Data logger function)	1.3 MByte

[*]) SIM card is required.

**) Communication protocols
- E-Mail using SMTP with authentication mode HELO, EHLO
- FTP passive mode with authentication and remote directory change
- HTTP POST and GET
- GSM data Transparent M-Bus @ 300 and 2400 baud and GSM data console
- TCP Transparent M-Bus @ 300 and 2400 baud and TCP console
- SMS for configuration
- Internet time synchronization using NTP or Daytime protocol

10 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.
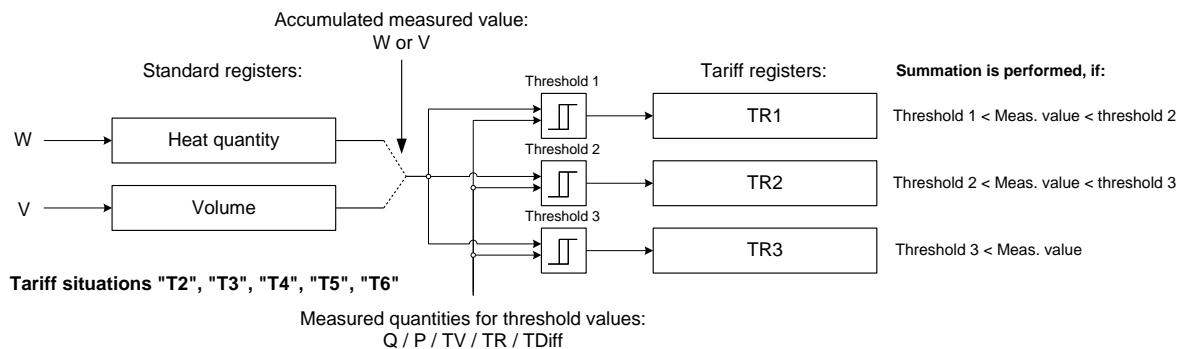
Summation in the relevant tariff register is only performed if the relevant threshold is exceeded.

- 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).

Heating/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).
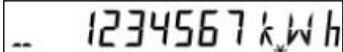
- Above return threshold: T1 is summated
- Below return threshold: T2 is summated
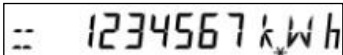
Display of the tariff situation on the LCD
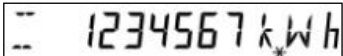
The current tariff status is shown in the user loop "LOOP 0" together with the quantity of energy or the volume.
No tariff status is shown for tariffs T7 and T8.
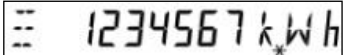
For tariffs T2, T3, T4, T5, T6, T10, T11 and T12
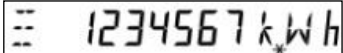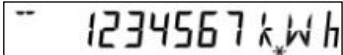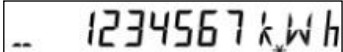
`1234567 kWh`	no tariff register active
`1234567 kWh`	tariff register 1 active
`1234567 kWh`	tariff register 2 active
`1234567 kWh`	tariff register 3 active

For tariffs T9 (heating/cooling meter)

`1234567 kWh`	no tariff register active
`1234567 kWh`	tariff register 1 active
`1234567 kWh`	tariff register 2 active

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

T2	0,000	m³/h
'	0,000	m³/h

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

T7	0	°C

for T7

T8	0	°C

for T8

T9c	18	°C
T9h	45	°C

for T9;
in 2-sec. cycles

T 10	- - - - -

01	00,00	0
02	12,00	1

for T10;
switching times in 2-sec. cycles

T 11	- - - - -

for T11

T 12	50	°C

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

T '	1234567	kWh

tariff register 1

T ''	1234567	kWh

tariff register 2

T '''	1234567	kWh

tariff register 3 (not for T12)

DH	1234567	kWh

for tariff T7

RH	1234567	kWh

for tariff T8

HE	1234567	kWh
Co	1234567	kWh

for tariff T9

11   Error messages

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

Error code	Error	Service guidelines
FL neG	Incorrect flow direction	Check flow or installation direction; correct if necessary
if necessary in exchange with:		
DIFF nEG	Negative temperature difference	Check installation point of the temperature sensors; exchange if necessary
if necessary in exchange with:		
F0	No flow can be measured	Air in the measurement unit/pipe; bleed air from line (delivery condition)
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 meter
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 meter
F8	Errors F1, F2, F3, F5 or F6 for longer than 8 hours, recognition of attempts to manipulate. No further measurements are carried out.	Measure dependent on error code. Error message F8 must be reset by service department.
F9	Fault in the electronics	Exchange the meter

Note: Reset the message F8 in the parameterization mode manually or with the service software. All other error messages are deleted automatically once the error has been rectified.

12   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
1	F0 = Air in measuring tube
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
7	F8 = Temperature sensor error > 8 hours
8	F9 = ASIC error
9	Above max. temperature in the volume measuring unit
10	Below min. temperature in the volume measuring unit
11	Max. flowrate qs was exceeded
12	Soiling pre-warning
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.

13   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	Timebase	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

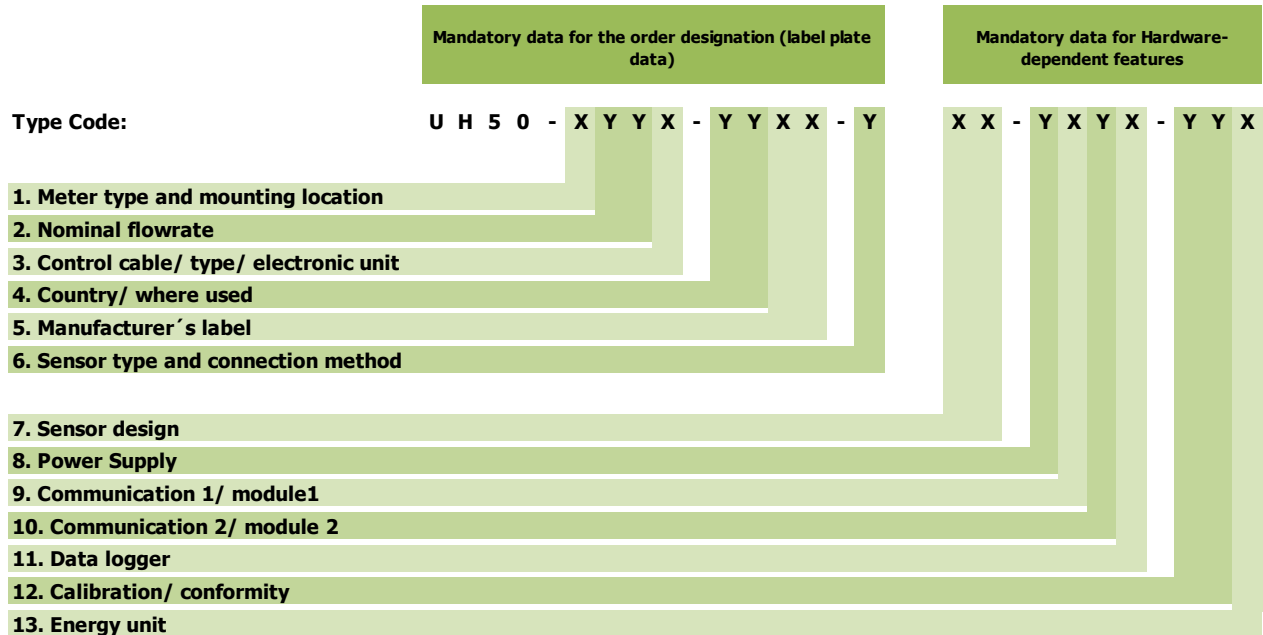*) depending on parameter setting: hours or days

14   Additional options

Options:

- Version with data logger

- Heating meter for mounting place hot side

- Operable as flow meter

- Cooling meter 6/12 °C

- Combined heat/cold meter

- Length of the control cable between measurement tube and electronic unit up to 5 m

- Electronic unit for connecting temperature sensors in four wire technique

15   Order codes (type number key)

Mandatory data for the order designation (label plate data)	Mandatory data for Hardware-dependent features

Type Code: **U H 5 0 - X Y Y X - Y Y X X - Y   X X - Y X Y X - Y Y X**

1. Meter type and mounting location
2. Nominal flowrate
3. Control cable/ type/ electronic unit
4. Country/ where used
5. Manufacturer´s label
6. Sensor type and connection method

7. Sensor design
8. Power Supply
9. Communication 1/ module1
10. Communication 2/ module 2
11. Data logger
12. Calibration/ conformity
13. Energy unit

Order codes for label plate data	
1. Type of meter and mounting location	**Code**
Heating meter for two wire temperature measurement, mounting place cold side	A
Heating meter for two wire temperature measurement, mounting place hot side	B
Combined heat/cold meter for two wire temperature measurement, mounting place cold side (only in connection with temperature sensor Pt500)	C
Flow sensor	D
Cooling meter for two wire temperature measurement, mounting place hot side (only in connection with temperature sensor Pt500)	G
Cooling meter for two wire temperature measurement, mounting place cold side	H
Heating meter for four wire temperature measurement, mounting place cold side	L
Heating meter for four wire temperature measurement, mounting place hot side	M
Combined heat/cold meter for four wire temperature measurement, mounting place cold side (only in connection with temperature sensor Pt500)	N
Cooling meter for four wire temperature measurement, mounting place hot side (only in connection with temperature sensor Pt500	T
Cooling meter for four wire temperature measurement, mounting place cold side	U
2. Nominal flowrate	**Code**
Nominal flowrate 0.6 m³/h, length 130 mm, nominal pressure PN16, connection G 1 B	03
Nominal flowrate 0.6 m³/h, length 130 mm, nominal pressure PN25, connection G 1 B	04
Nominal flowrate 0.6 m³/h, length 110 mm, nominal pressure PN16, connection G ¾ B	05
Nominal flowrate 0.6 m³/h, length 110 mm, nominal pressure PN25, connection G ¾ B	06
Nominal flowrate 0.6 m³/h, length 190 mm, nominal pressure PN16, connection G 1 B	07
Nominal flowrate 0.6 m³/h, length 190 mm, nominal pressure PN25, connection flanged DN 20	08
Nominal flowrate 0.6 m³/h, length 190mm, nominal pressure PN25, connection G 1 B	09

Nominal flowrate 1.5 m³/h, length 110 mm, nominal pressure PN16, connection G ¾ B	21
Nominal flowrate 1.5 m³/h, length 110 mm, nominal pressure PN25, connection G ¾ B	22
Nominal flowrate 1.5 m³/h, length 190 mm, nominal pressure PN16, connection G 1 B	23
Nominal flowrate 1.5 m³/h, length 190 mm, nominal pressure PN25, connection flanged DN 20	24
Nominal flowrate 1.5 m³/h, length 190 mm, nominal pressure PN25, connection G 1 B	25
Nominal flowrate 1.5 m³/h, length 130 mm, nominal pressure PN16, connection G 1	26
Nominal flowrate 1.5 m³/h, length 130 mm, nominal pressure PN25, connection G 1	27
Nominal flowrate 2.5 m³/h, length 130 mm, nominal pressure PN16, connection G 1 B	36
Nominal flowrate 2.5 m³/h, length 130 mm, nominal pressure PN25, connection G 1 B	37
Nominal flowrate 2.5 m³/h, length 190 mm, nominal pressure PN16, connection G 1 B	38
Nominal flowrate 2.5 m³/h, length 190 mm, nominal pressure PN25, connection flanged DN 20	39
Nominal flowrate 2.5 m³/h, length 190 mm, nominal pressure PN25, connection G 1 B	40
Nominal flowrate 3.5 m³/h, length 260 mm, nominal pressure PN16, connection G 1¼ B	45
Nominal flowrate 3.5 m³/h, length 260 mm, nominal pressure PN25, connection flanged DN 25	46
Nominal flowrate 3.5 m³/h, length 260 mm, nominal pressure PN25, connection G 1¼ B	47
Nominal flowrate 6.0 m³/h, length 260 mm, nominal pressure PN16, connection G 1¼ B	50
Nominal flowrate 6.0 m³/h, length 260 mm, nominal pressure PN25, connection flanged DN 25	52
Nominal flowrate 6,0 m³/h, length 150 mm, nominal pressure PN16, connection G 1 ¼ B	55
Nominal flowrate 10 m³/h, length 300 mm, nominal pressure PN16, connection G 2 B	60
Nominal flowrate 10 m³/h, length 300 mm, nominal pressure PN25, connection flanged DN 40	61
Nominal flowrate 10 m³/h, length 200 mm, nominal pressure PN16, connection G 2 B	63
Nominal flowrate 15 m³/h, length 270 mm, nominal pressure PN25, connection flanged DN 50	65

	Code
Nominal flowrate 15 m³/h, length 200 mm, nominal pressure PN25, connection flanged DN 50	69
Nominal flowrate 25 m³/h, length 300 mm, nominal pressure PN25, connection flanged DN 65	70
Nominal flowrate 40 m³/h, length 300 mm, nominal pressure PN25, connection flanged DN 80	74
Nominal flowrate 60 m³/h, length 360 mm, nominal pressure PN16, connection flanged DN 100	82
Nominal flowrate 60 m³/h, length 360 mm, nominal pressure PN25, connection flanged DN 100	83
Nominal flowrate 150 m³/h, length 500 mm, nominal pressure PN16, connection DN 150	A1
Nominal flowrate 150 m³/h, length 500 mm, nominal pressure PN25, connection DN 150	A2
Measurement insert: Nominal flowrate 150 m³/h, length 500 mm, nominal pressure PN16, connection DN 150	A3
Measurement insert: Nominal flowrate 150 m³/h, length 500 mm, nominal pressure PN25, connection DN 150	A4

3. Control cable / type / electronic unit	Code
Compact version (until 90°C, with 0.3 m control cable)	A
Split version with 1.5 m control cable	C
Split version with 3.0 m control cable	D
Split version with 5.0 m control cable	E
Compact version (until 90°C, with 0.3 m control cable), control cable removable	M
Split version with 1.5 m control cable, control cable removable	P
Split version with 3.0 m control cable, control cable removable	Q
Split version with 5.0 m control cable, control cable removable	R

4. County / where used	Code
Dial plate for Middle East (English)	AE
Dial plate for Austria (German)	AT
Dial plate for Austria (German)	AU
Dial plate for Bosnia-Herzegovina (Croatian)	BA
Dial plate for Belgium (French/Flemish)	BE
Dial plate for Bulgaria (Bulgarian)	BG
Dial plate for Belarus (Russian)	BY
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 for Denmark (Danish)	DK
Dial plate for Estonia (Estonian)	EE
Dial plate English neutral	EN
Dial plate for Spain (Spanish)	ES
Dial plate for Finland (Finnish)	FI
Dial plate for France (French)	FR
Dial plate for Great Britain (English)	GB
Dial plate for Greece (English)	GR
Dial plate for Croatia (Croatian)	HR
Dial plate for Hungary (Hungarian)	HU
Dial plate for Iceland (Icelandic)	IS
Dial plate for Italy (Italian)	IT
Dial plate for Japan (Japanese)	JP
Dial plate for Luxembourg (German/French)	LU
Dial plate for Moldova (Romanian)	MD
Dial plate for Montenegro (Serbian)	ME
Dial plate for Macedonia (Macedonian)	MK
Dial plate for Mongolia (Mongolian)	MN
Dial plate for The Netherlands (Dutch)	NL
Dial plate for Norway (Norwegian)	NO
Dial plate for Poland (Polish)	PL
Dial plate for Romania (Romanian)	RO
Dial plate for Serbia (Serbian)	RS
Dial plate for Russia (Russian)	RU
Dial plate for Sweden (Swedish)	SE
Dial plate for Slovak Republic (Slovakian)	SK
Dial plate for Southern Tyrol (German)	I2
Dial plate for Ukraine (Ukrainian)	UA

5. Manufacturer's label	Code
Logo Landis+Gyr	00
Other labels on request	xx

6. Sensor type and method of connection	Code
Flow sensor (without temperature sensors)	0
Sensor Pt100, removable, not mounted in the tube	A
Sensor Pt100, removable, mounted in the tube	B
Sensor Pt100, removable, mounting in the tube as an option	C
Sensor Pt500, removable, not mounted in the tube	E
Sensor Pt500, removable, mounted in the tube	F
Sensor Pt500, removable, mounting in the tube as an option	G
Sensor Pt500, not removable, not mounted in the tube	N
Sensor Pt500, not removable, mounted in the tube	P
Sensor Pt500, not removable, mounting in the tube as an option	R

Hardware-dependent features	
7. Sensor type	**Code**
Without temperature sensors	00
Type DS, 25 bar/150°C/ M10x1 / length 27.5 mm, cable length 1.5 m	0B
Type DS, 25 bar/150°C/ M10x1 / length 27.5 mm, cable length 2.5 m	0C
Type DS, 25 bar/150°C/ M10x1 / length 38 mm, cable length 1.5 m (only Pt500)	0D
Type DS, 25 bar/150°C/ M10x1 / length 38 mm, cable length 2.5 m (only Pt500)	0E
Type PS, 16 bar/150°C/ Ø5,2x45mm, cable length 1.5 m	0H
Type PS, 16 bar/150°C/ Ø5,2x45mm, cable length 5 m	0J
Type PL, 25 bar/180°C/ Ø6x100mm, cable length 2 m	0M
Type PL, 25 bar/180°C/ Ø6x100mm, cable length 5 m (only Pt500)	0N
Type PL, 25 bar/180°C/ Ø6x150mm, cable length 2 m	0P
Type PL, 25 bar/180°C/ Ø6x150mm, cable length 5 m (only Pt500)	0Q

8. Power supply	Code
Without power supply	0
Standard battery for 6 years (2xAA cells)	A
Battery for 6 years for all applications (D-cell)	B
Battery for 11 years (C-cell)	C
Battery for 11 years (D-cell)	E
Battery for 16 years (D-cell)	F
Power supply 24 V AC/DC with plug	M
Power supply 230 V AC with 1.5 m cable	N
Power supply 230 V AC with 5 m cable	P
Power supply 110 V AC with 1.5 m cable	R
Power supply 110 V AC with 5 m cable	S
Power supply 110 V AC with 10 m cable	T
Power supply 230 V with 3 m cable for high-current applications	V
Power supply 24 V AC/DC with connecting terminals for high-current applications	W

9. Communication module 1	Code
No module	0
Analog module	A
M-Bus module G4	B

CL module	C
M-Bus module 30s	D
M-Bus module G4	M
M-Bus module G4-MI with 2 pulse inputs	N
Pulse module with OptoMOS	L
Pulse module standard	P
10. Communication module 2	**Code**
No module	0
Analog module	A
M-Bus module G4	B
CL module	C
M-Bus module 30 s	D
Radio module 868 MHz *)	E
Radio module 868 MHz with external antenna*)	F
GPRS module	H
GPRS module (with SIM card)	J
Pulse module with OptoMOS	L
M-Bus module G4	M
Pulse module standard	P
Radio module 868 MHz; OMS 4.1.2; T1, C1; security profile A, B *)	Q
Radio module 868 MHz with external antenna; OMS 4.1.2; T1, C1; security profile A, B *)	W
11. Data logger	**Code**
Without data logger	0
Data logger with 8 channels	8
12. Calibration / conformity	**Code**
Certified acc. to national regulations	CL
Compliant to MID class 2	M2
Compliant to MID class 3	M3
Compliant with CEN 1434, class 2	T2
Compliant with CEN 1434, class 3	T3
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; as of qp 150 with 1 decimal place)	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
Display: kWh (until qp 10), flashing	G
Display: MWh with 3 decimal places (as of qp 15 with 2 decimal places), flashing	H
Display: GJ with 3 decimal places (as of qp 6 with 2 decimal places), flashing	K
Only for flow sensor: Display: m³ with 2 decimal places (as of qp 25 with 1 decimal place)	V
Further features	
Measurement dynamics	**Code**
Dynamic range 1:100	C
Other ranges on request	

*) Additional ordering information needed (see page 45; 46)

16 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:
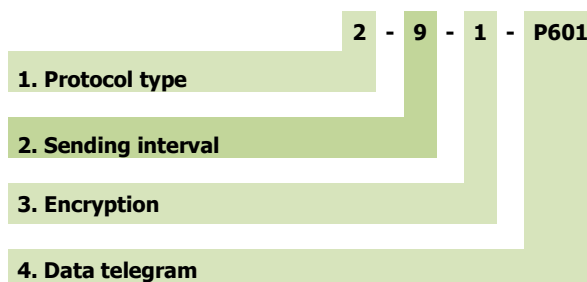UH50-XYY0-Y 00-YX**E**X-YYX
UH50-XYY0-Y 00-YX**F**X-YYX

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 8.

Ordering example:

Order example OMS

| | 2 | - | 9 | - | 1 | - | P601 |

1. Protocol type
2. Sending interval
3. Encryption
4. Data telegram

UH50-XYY0-Y 00-YX**E**X-YYX **+ 2-9-1-P601**

E = Radio module 868 MHz (wireless M-Bus)

2 = OMS v2.0, radio mode T1

0 = Sending interval 12 seconds (mobile radio)

1 = Security profile A (encryption mode 5), AES-128 Bit; for example to connect to receivers who not support so 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 - http://oms-group.org.

Defines requirements in addition to standard EN13757-4.

17 Additional ordering information on radio module 868 MHz (wireless M-Bus EN13757-4, OMS v4.1.2)

For OMS v4.1.2 (BSI), radio mode T1, security profile B (encryption mode 7) or radio mode C1

Necessary additional ordering information:
Wireless M-Bus module 868 MHz with integrated / external antenna

UH50-XYY0-Y   00-YX**Q**X-YYX
UH50-XYY0-Y   00-YX**W**X-YYX

Description	OMS
1. Protocol type	**Code**
OMS 4.1.2 / wireless M-Bus T1 (BSI) *	7
OMS 4.1.2 / wireless M-Bus C1	8
2. Sending interval	**Code**
Sending interval of 15 minutes	0
Sending interval of 16 seconds	5
3. Encryption	**Code**
None	0
Security profile A (encryption mode 5), AES 128	2
Security profile B for BSI (encryption mode 7), AES 128	3
4. Data telegram	**Code**
Telegram radio standard	P600
Telegram mobile radio	P601
5. Age of data	**Code**
None	0
With **	1

More data telegrams on request.

Please find the information about lifetime of battery in chapter 8.

[*] only with encryption: code = 3

[**] In Germany, this option must be activated when connected to a Smart Meter Gateway.

The radio module retrieves data from the T550 calculator in a time grid of 15 minutes. The transmission interval has a different, parameterizable time grid. The "age of data" indicates the time difference between the transmission and the fetching of the data.

Ordering examples:
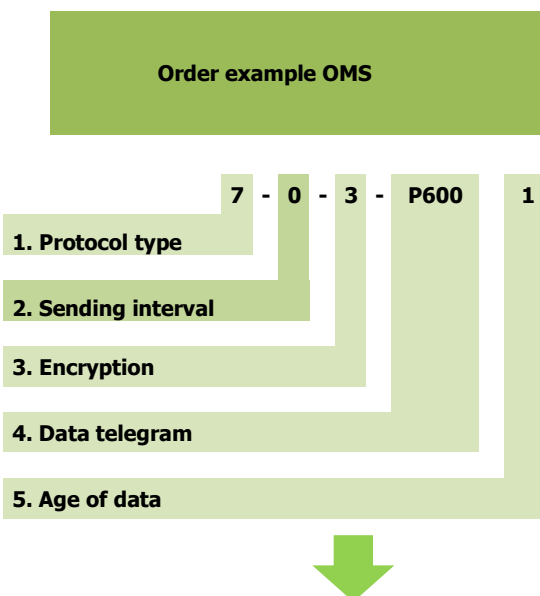
UH50-XYY0-Y   00-YX**Q**X-YYX **+ 7-0-3-P600-1**

Q =   Radio module 868 MHz with integrated antenna (wireless M-Bus) **OMS v4.1.2**

7 =   OMS v4.1.2, radio mode T1

0 =   Sending interval of 15 minutes (stationary radio)

3 =   Security profile B for BSI (encryption mode 7), AES 128; for example for connection to a Smart Meter Gateway

P600 = Telegram radio standard

1 =   With "age of data"
- Current energy
- Current volume
- Current flow
- Current power
- Current temperatures hot and cold side
- Errors (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 - http://oms-group.org.

Defines requirements in addition to standard EN13757-4.

18   Pressure loss

Nominal flowrate qp	Overall length	Connection	Pressure loss at qp	Kv-Factor at Δp 1 bar	Graph in diagram
m³/h	mm		mbar	m³/h	
0,6	110, 190	G ³/₄, G 1, DN20	150	1,5	A
1,5	130, 190	G 1, DN20	160	3,8	B
1,5	110	G ³/₄	150	3,9	C
2,5	190	G 1, DN20	210	5,3	D
2,5	130	G 1	200	5,6	E
3,5	260	G 1¹/₄, DN25	55	15	G
6	150	G 1¹/₄	190	14	F
6	260	G 1¹/₄, DN25	140	16	H
10	200, 300	G 2, DN40	130	28	I
10	300	G 2	110	30	J
15	270	DN50	110	45	K
15	200	DN50	95	49	L
25	300	DN65	105	77	M
40	300	DN80	160	100	N
60	360	DN100	115	177	O
150	500	DN150	120	433	P

The indicated pressure loss of a flow sensor is at the nominal flowrate qp.
Using the Kv-Factor, which defines the flow rate at a pressure loss of 1 bar, the pressure loss at any given flow rate can be calculated:
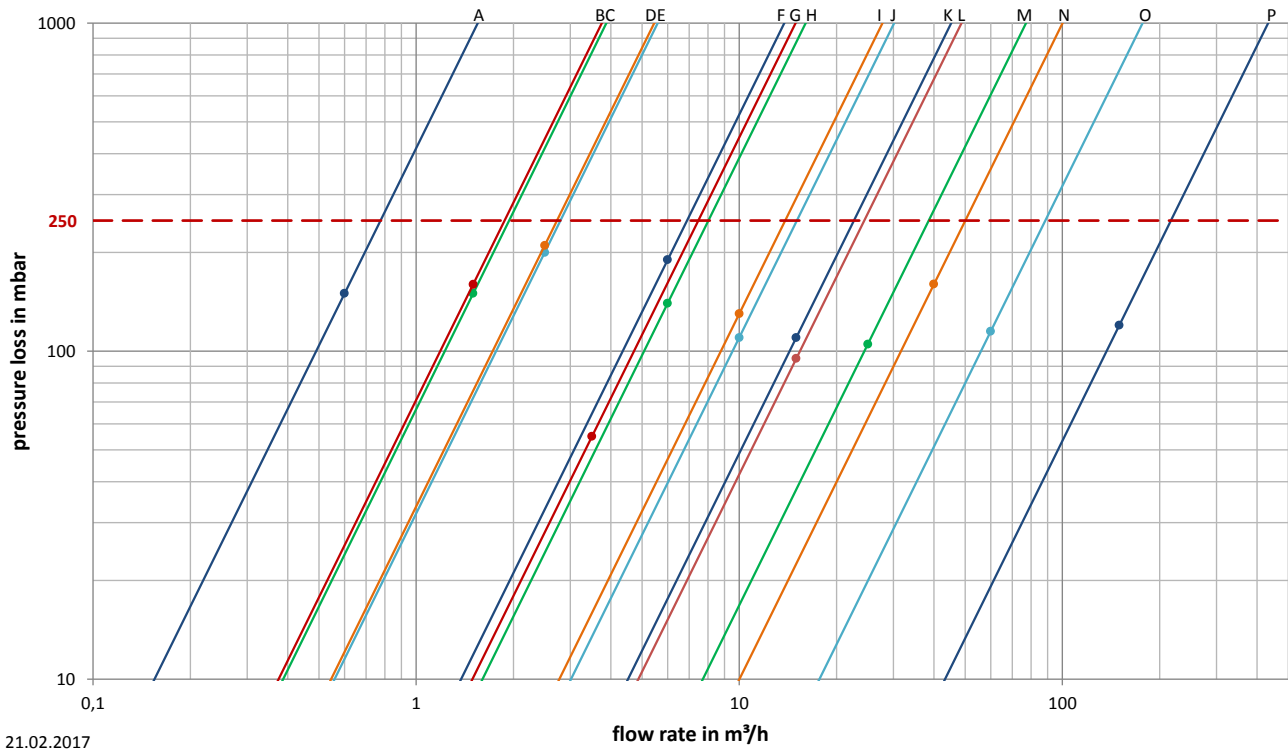
$$\Delta p = 1 bar \times \left(\frac{Q}{K_v}\right)^2$$

$\Delta p = pressure\ loss\ in\ bar$

$Q = flowrate\ in\ m^3/h$

$K_v = K_v - Factor\ at\ \Delta p = 1\ bar$

Alternatively, the value can be taken from the diagram.

21.02.2017