

# Device Manual

## Chapter 3.1-U ultego III smart



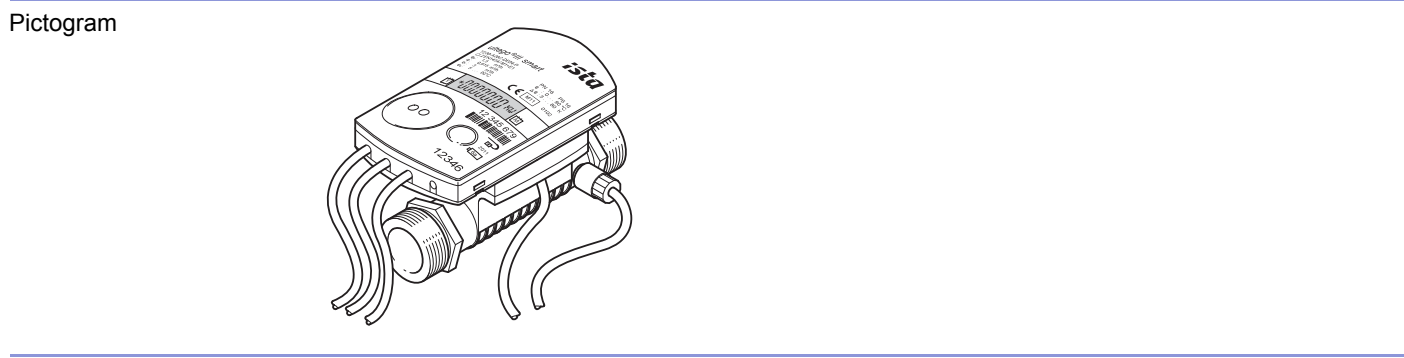
G.83.0171 - Release 8.1.0 CH 2014  
ista International GmbH - Grugaplatz 2 - 45131 Essen  
<http://www.ista.com>

<b>1</b>	<b>Equipment data</b>	<b>3</b>
1.1	General information	3
1.2	Device display	4
1.3	Technical data	10
1.3.1	Technical data, arithmetic logic unit	10
1.3.2	Technical data, flow sensor	11
1.3.3	Technical data, temperature sensor	13
1.3.4	Technical data, M-bus interface (optional, preassembled)	13
1.4	Main and connecting dimensions	14
1.5	Approval	14
<b>2</b>	<b>Part numbers</b>	<b>15</b>
<b>3</b>	<b>Safety information</b>	<b>16</b>
<b>4</b>	<b>Notes</b>	<b>17</b>
4.1	Application / function	17
4.2	Transport / return logistics	17
<b>5</b>	<b>Notes on installation</b>	<b>18</b>
5.1	General information	18
5.2	Notes on installation location and position	18
5.3	Notes on installing the temperature sensor	19
5.4	Notes on installing the arithmetic-logic unit	19
<b>6</b>	<b>Installation</b>	<b>20</b>
6.1	Performing installation	20
6.2	Wall-mounted calculator (o) (optional)	21
<b>7</b>	<b>Commissioning</b>	<b>22</b>
<b>8</b>	<b>Replacement</b>	<b>23</b>
<b>9</b>	<b>Readout</b>	<b>24</b>
<b>10</b>	<b>Disposal</b>	<b>25</b>

# **i** 1 Device data

## 1.1 General information

Equipment group	Kompaktzähler
Product name	ultego III smart



**Functional description** This meter is a measuring instrument for physically correct acquisition of energy consumption. The device consists of a high-tech plastic flow sensor, two permanently connected temperature sensors and a calculator calculating the energy consumption from volume and temperature delta. The volume acquisition works on the principle of wear-free ultrasonic measuring without mechanically moved parts. The metered flow is calculated with utmost precision by the comparison of the downstream and upstream ultrasonic signal runtimes and allowing for temperature dependence. The long-life battery has been dimensioned for the whole service life of the meter (see type plate). The meter cannot be opened without destroying the security stamp.

- Components**
- Flow sensor
  - Microprocessor calculator
  - Temperature sensors for flow and return

- Options / add-ons**
- Version for installation in the flow
  - Version as a cold meter
  - Optional M-bus interface

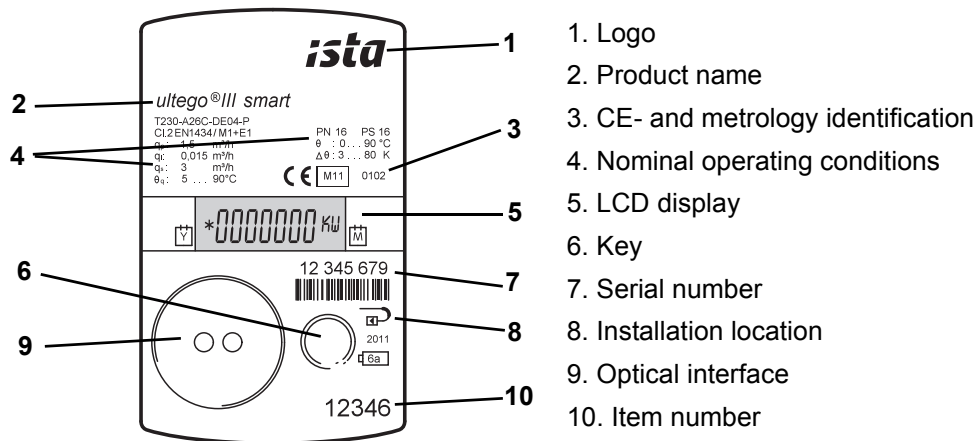
- Available installation lengths and connection dimensions**
- $q_p$  0.6: 110 mm (3/4 in.)
  - $q_p$  1.5: 110 mm (3/4 in.), 130 mm (1 in.)
  - $q_p$  2.5: 130 mm (1 in.)

**Packaging** Single package (1 pc. per carton)

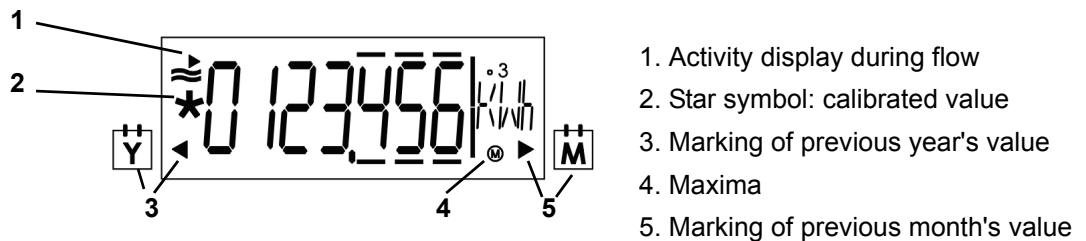
- Delivery scope**
- ultego III smart
  - 3 EPDM seals
  - Installation instructions

## 1.2 Device display

Front view



Display



The arrow symbols indicate the output of a stored previous year's/month's value. A calibrated value (e.g. energy quantity) is indicated by a star symbol. Press the button briefly (< 2 s) to run through the current loop line by line. The first line is displayed again after the last line.

Press the button for a long time (> 3 s) to call up the first line of the next highest loop. The first loop is displayed again after the last loop. After 30 seconds' inactivity in the user loop (loop 0) the display returns to the standard display (e.g. energy quantity). After 30 minutes' inactivity in the other loops the display automatically returns to the standard display.



### NOTICE

- ▶ Depending on the device configuration, both the scope of the display and the displayed data can differ from the description. Furthermore, certain key functions might be blocked.

User loop

Display	Meaning
	Energy quantity
	Volume
	Segment test
	Error message with error code in the event of a fault

Instantaneous values

Display	Meaning
	Current flow
	Current thermal output
	Current flow and return temperature at 2 s intervals
	Temperature difference
	Operating time with flow
	Off time
	Time with flow

Display	Meaning
LOOP 2	
0102.12 <sup>M</sup>	Storage day
1234567 kWh	Energy quantity and volume on the reference date
1234567 m <sup>3</sup>	
Fd 123 h	Off time on the reference date
3899 m <sup>3</sup> /h	Max. flow on reference date alternating at 2s intervals with date stamp
1701.12	
1000 kW	Max. output alternating at 2 s intervals with date stamp
1702.12	
810 °C	Max. flow temperature alternating at 2 s intervals with date stamp
1701.12	
660 °C	Max. return temperature alternating at 2 s intervals with date stamp
1701.12	

Nur für den internen Gebrauch — For internal use only — Uniquement pour utilisation interne

Nur für den internen Gebrauch — For internal use only — Uniquement pour utilisation interne

General / communication

Display	Meaning
LOOP 3	
1234567 G	Device number, 7-digit
Mbus	Optional interface
127 <sup>A</sup>	Primary address (M-Bus only)
0000000 <sup>A</sup>	Secondary address, 7-digit (M-Bus only)
0101--	Annual reference date
01--:--M1	Monthly reference date
1 7-13 FW	Firmware version
CrC99F2	CRC code, part subject to official calibration



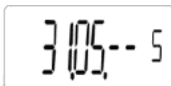
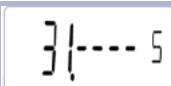
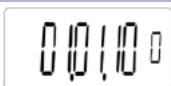



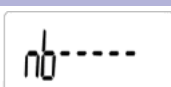
Miscellaneous

Display	Meaning
LOOP 4	
0802.12 D	Date
1759.12 T	Time
---- C	Code input for test/param operation

Once the code entry is displayed on the LCD, an input template will open upon continuous LCD keystroke (first dash is flashing). The parameterisation mode is entered by inputting the meter date (DDMM).



A scroll-down menu appears, which switches to the next menu item every 1.5s. As soon as the required function is displayed, press the button to accept the function. Keep the button pressed to adjust the value. Press the button briefly to accept the flashing set value. The next low-order digit flashes, which in turn can be set by keeping the button pressed and accepted by pressing the button briefly. The asterisk (\*) symbol is output briefly as the end acknowledgement of a display line.

Display	Meaning
	Reset the maxima
	Off time reset
	Entry of the annual reference date (day and month) *)
	Entry of the monthly reference date (day) *)
	Entry of the date (day, month, year)
	Entry of the time (hour, minute, second)
	Entry of the owner number, 7-digit numerical
	Entry of the M-Bus primary address (0 ... 255) *)
	Return to normal operation

\*) The user has to take care to enter useful values only. There is no plausibility check so that 'wrong' values will also be accepted (month > 12, etc.)

The loop can be run through once again in case of false entries. The parameterisation mode is exited and normal operation started when the 'nb-----' menu option is enabled in the scroll-down menu (short LCD key actuation) or otherwise after 10 minutes automatically.

Nur für den internen Gebrauch — For internal use only — Uniquement pour utilisation interne

## Error codes and IDs

The heat meter is continuously performing self-diagnostics and thus indicates various installation or device errors:

- **Error code: *FL nEG***
    - Error: Wrong direction of flow
    - Action: Check / correct the mounting direction
  - **Error code: *DIFF nEG***
    - Error: Negative temperature delta
    - Action: Check / replace sensors place of installation
  - **Error code: *F0***
    - Error: flow not measurable
    - Action: Air in measuring part/line, bleed line (as-delivered condition)
  - **Error code: *F1***
    - Error: Interruption in the flow sensor
    - Action: Replace meter
  - **Error code: *F2***
    - Error: Interruption in the return sensor
    - Action: Replace meter
  - **Error code: *F3***
    - Error: Temperature evaluation electronics defective
    - Action: Replace meter
  - **Error code: *F4***
    - Error: Battery empty
    - Action: Replace meter
  - **Error code: *F5***
    - Error: Short in the flow sensor
    - Action: Replace meter
  - **Error code: *F6***
    - Error: Short in the return sensor
    - Action: Replace meter
  - **Error code: *F7***
    - Error: Disturbance of the internal memory operation
    - Action: Replace meter
  - **Error code: *F8***
    - Error: Errors F1, F2 or F3 or F5, F6 pending since more than 8 hours, detection of attempted frauds by manipulation. Measurements are no longer conducted.
    - Action: Service has to reset the error message F8.
  - **Error code: *F9***
    - Error: Faults in the electronics
    - Action: Inform service
-

## 1.3 Technical data

Ambient class	A (according to EN 1434) for indoor installation
Mechanical class	M1 acc. to 2004/22/EG (Measurement Instruments Directive)
Electromagnetic class	E1 acc. to 2004/22/EG (Measurement Instruments Directive)
Storage temperature	-20 °C to 60 °C
Max. altitude	2000 m above sea level
Ambient humidity	< 93 % RH at 25 °C, non-condensing

### 1.3.1 Technical data of the calculator

Ambient temperature	+5 °C - +55 °C
Temperature range	0 °C - 180 °C
Temperature difference	3 K - 80 K
Response threshold for $\Delta t$	0.2 K
Measuring grid flow	4 s
Measuring grid temperature	Adaptive <ul style="list-style-type: none"> <li>▪ Standard: 60 s</li> <li>▪ During rapid rise of the flow (<math>\geq 30\%</math>): 4 s</li> </ul>
Heat coefficient	Floating compensated
t-measurement error without temperature sensor (EN 1434)	$(0,5 + \Delta\theta_{\min}/\Delta\theta)$ %, max. 1.5 % at $\Delta\theta = 3$ K
Power supply	Battery for 11 years
Protection class	IP54 acc. to EN 60529 i.e.: <ul style="list-style-type: none"> <li>▪ Protection against foreign objects: Protects against damaging amount of dust.</li> <li>▪ Protects against contact: complete protection against contact.</li> <li>▪ Protection against water: Protection against splash water on all sides.</li> </ul>
Interfaces	<ul style="list-style-type: none"> <li>▪ Optical interface to EN 62056-21</li> <li>▪ Optional M-Bus to EN 1434-3</li> </ul>
Cable length	1,5 m

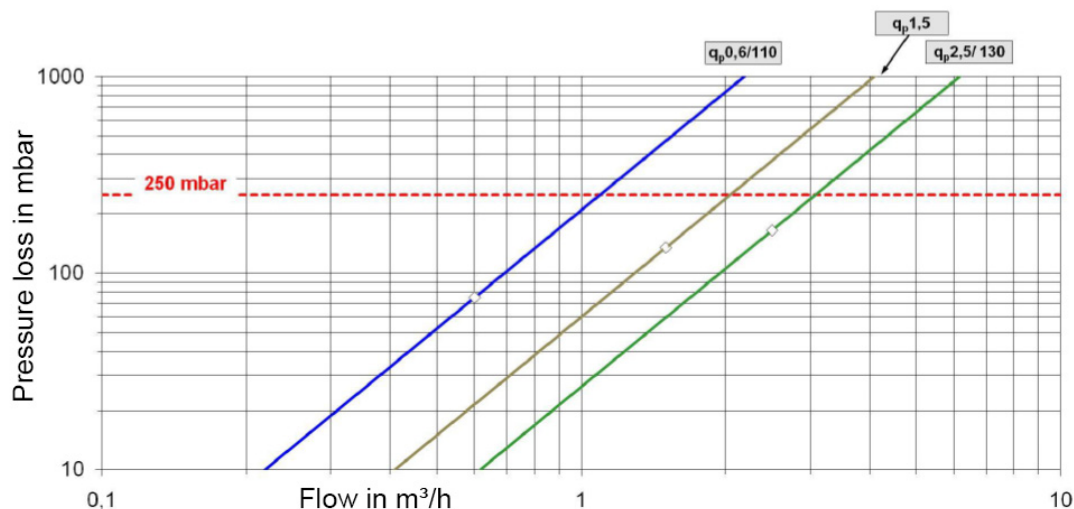
Recorded data On every monthly reporting date, the calculator stores the following values for 24 months:

- Thermal energy (meter reading)
- Volume (meter reading)
- Off-hours meter (meter reading)
- Max. flow with date and time
- Max. performance with date and time
- Max. flow and return temperature with date and time

### 1.3.2 Technical data of the flow sensor

Nominal flow	$q_p = 0.6 \text{ m}^3/\text{h}$	$q_p = 1.5 \text{ m}^3/\text{h}$	$q_p = 2.5 \text{ m}^3/\text{h}$
Threshold limit	1.2 l/h	3 l/h	5 l/h
Pressure loss $\Delta p$ at $q_p$			
Overall length 110 mm	75 mbar	135 mbar	---
Overall length 130 mm	---	135 mbar	165 mbar

Pressure loss graph



Tolerance with pressure loss +/- 5 %

Flow at $\Delta p = 1 \text{ bar}$	$K_V = 2.2 \text{ m}^3/\text{h}$	$K_V = 4.1 \text{ m}^3/\text{h}$	$K_V = 6.2 \text{ m}^3/\text{h}$
------------------------------------	----------------------------------	----------------------------------	----------------------------------

$q_p / q_i$	100
-------------	-----

Maximum flow	$q_s = 2 \times q_p$
--------------	----------------------

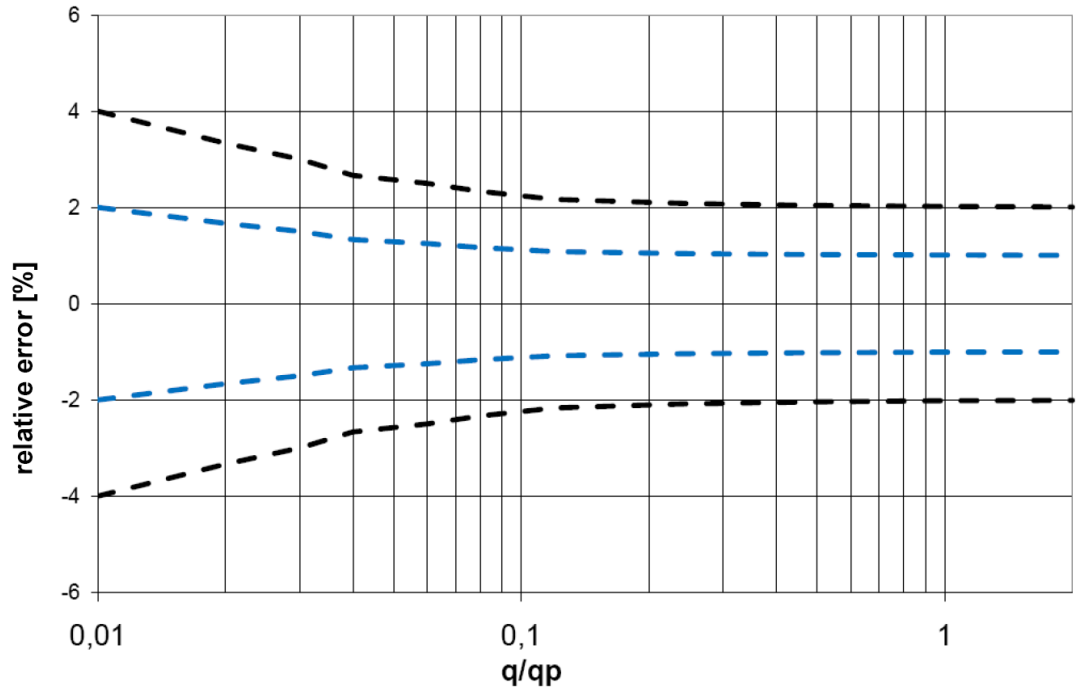
Metrological class	1:100, $q_p$ 1.5 with face-to-face length 110 mm, also available in 1:125
--------------------	---

Temperature range 5 °C - 90 °C (nat. approvals can deviate from this)

Nominal pressure PN 16

Installation position Horizontal / vertical

Measuring accuracy Class 2 or 3 according to EN 1434



Caption:   
 - - - typical for ultego III smart  
 - - - EN 1434 class 2

Protection class IP 65 to EN 60529  
 i.e.

- Protection against contaminant: dust tight.
- Protection against contact: protected against acces with a conductor.
- Protection against water: protection against water jets from any direction.

- Available installation lengths and connection dimensions
- q<sub>p</sub> 0.6: 110 mm (3/4 in.)
  - q<sub>p</sub> 1.5: 110 mm (3/4 in.), 130 mm (1 in.)
  - q<sub>p</sub> 2.5: 130 mm (1 in.)

Nur für den internen Gebrauch — For internal use only — Uniquement pour utilisation interne

### 1.3.3 Technical Data Temperature Sensor

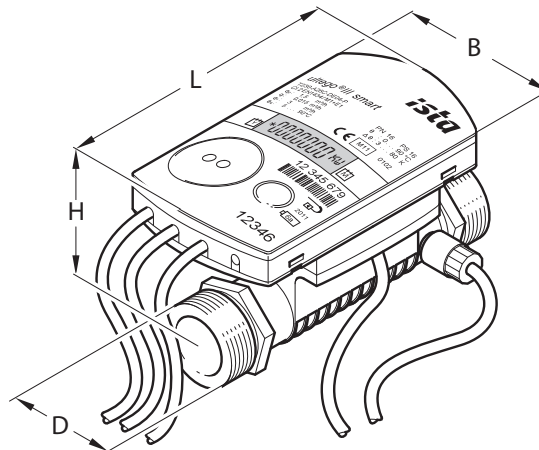
Type	PT500 according to EN 60751
Connection	2-wire technology
Cable length	1.5 m (optional 5 m)
Temperature range	0 °C - 95 °C
Version	Rod sensor, 5,0 mm x 45 mm dia.

### 1.3.4 Technical data mbus interface (optional, pre-assembled)

Fulfilled standards	<ul style="list-style-type: none"><li>• EN 1434-3</li><li>• EN 13757-2 / -3</li></ul>
Voltage	50 V maximum
Current consumption	1 M-bus load (1.5 mA)
Addressing	Primary or secondary
Transfer rate	2400 Baud
Selection frequency	> 1 / min.
Cable length	1,5 m

## 1.4 Main and connection dimensions

### Dimensions



Nominal flow	Pipe connection	Height of construction (H)	Length of construction (L)	max. depth (T)
qp 0,6	G 3/4	57,7 mm	110 mm	70 mm
qp 1,5	G 3/4	57,7 mm	110 mm	70 mm
qp 1,5	G 1	60,3 mm	130 mm	70 mm
qp 2.5	G 1	60,3 mm	130 mm	70 mm


## 1.5 Approval

Approval owner	Landis+Gyr GmbH, Humboldtstr. 64, D 90459 Nürnberg
Notified body	PTB Braunschweig and Berlin, Germany; ID number 0102
Directives met	<ul style="list-style-type: none"> <li>• <b>2004/22/EC</b> Measuring Instruments Directive*</li> <li>• <b>2004/108/EC</b> Electromagnetic compatibility of electric and electronic devices</li> <li>• <b>1999/5/EC</b> Directive on Radio and Telecommunications Terminal Equipment (R&amp;TTE)</li> <li>• <b>2002/95/EC</b> Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS)</li> </ul> <p>*) PTB TR K 7.2 applies alternatively for cold meters in Germany.</p>
Notified body	PTB Braunschweig and Berlin, Germany; ID number 0102
EC Design Certificate of Conformity	DE-11-MI004-PTB003
Certification of recognition of the quality management system	DE-11-AQ-PTB006MID
Type approval as cold meter	German type approval with the registration mark 22.72/11.01








Nur für den internen Gebrauch — For internal use only — Uniquement pour utilisation interne

## **i** 2 Item numbers

### Devices

77630	ultego III smart 0.6,110,3/4",1.5m,	
77631	ultego III smart 1.5,110,3/4",1.5m,	
77632	ultego III smart 2.5,130,1",1.5m,	
77633	ultego III smart 0.6,110,3/4",1.5m,Mbus	
77634	ultego III smart 1.5,110,3/4",1.5m,Mbus	
77635	ultego III smart 2.5,130,1",1.5m,Mbus	
77639	ultego III smart 1.5,130,1",1.5m TR	
77640	ultego III smart 1.5,130,1",Mbus TR	
77641	ultego III smart 0.6,110 3/4",1.5m ,GJ	
77642	ultego III smart 0.6,110,3/4" GJ, flow	
77643	ultego III smart 1.5,110,3/4",1.5m FR	
77644	ultego III smart 1.5,110,3/4" flow FR	
77647	ultego III smart 0.6,110 3/4",1.5m UAE	
77648	ultego III smart 1.5,110 3/4",1.5m UAE	
77649	ultego III smart 2.5,130 1",1.5m UAE	
77651	ultego III smart 0.6,110 3/4" Mbus UAE	
77652	ultego III smart 1.5,110 3/4" Mbus UAE	
77653	ultego III smart 2.5,130 1" Mbus UAE	

### Accessories

15001	Seal wire	
15006	Seal wire, coil a 100 m	
15012	Self-lock seal large series	
15531	Sealing bracket 3/4"for thread 1/2"	
15532	Sealing bracket 1"for thread 1/2" 3/4"	
77595	ultego III smart wall adapter	
77650	Hinged bolt, T sensor ultego III smart	



### 3 Safety information



#### **WARNING!**

##### *Explosion risk*

- ▶ Do not heat the battery above 80 °C.
- ▶ Do not throw the battery into fire.
- ▶ Do not expose the battery to water.
- ▶ Do not short-circuit the battery.
- ▶ Do not open or damage the battery.
- ▶ Do not charge the battery.
- ▶ Do not weld or solder the battery

**i**

## **4 Notes**

### **4.1 Application / Function**

- The ultego III smart is exclusively intended to be used with circuit water in heating systems. Do not use with drinking water.
- The requirements on circulating water of the German Heat and Power Association (AGFW) must be followed.
- Flash protection cannot be guaranteed. This must be secured via the domestic installation.



### **4.2 Transport / reverse logistics**

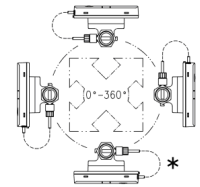
- You may only transport the ultego III smart in its original packaging.
- Protect the meter from knocks and vibrations.

5.1 General

- The unit may only be mounted by authorized expert personell!
- The devices may only be installed and deinstalled in depressurized systems.
- After installation, perform a leak test (cold flush).
- Only use the meter under operating conditions, otherwise risks can occur and the warranty expires.
- Breaking the security stamp voids both the warranty and conformity or calibration.
- Only clean the ultego III smart with a soft, damp cloth.
- In no case carry out any welding, soldering or drilling work in the vicinity of the meter.
- The meter should remain in the original packaging until all connection, insulation and rinsing work has been done.
- Prior to installing the ultego III smart, rinse the system thoroughly.
- Avoid any cavitation in the whole measurement range using overpressure, i.e. minimum 1 bar up to  $q_p$  and approx. 2 bar at overload  $q_s$  (applies for approx. 80 °C).
- The ultego III smart must be installed strainless into the pipelines.
- Only use the rubber EPDM seals included in the shipment!
- The meter is made of robust and very resistant material. During installation, care must nonetheless be taken to ensure that the maximum range of the tightening torque of 10–25 Nm (for 3/4" meter thread) and 20–50 Nm (for 1" meter thread) is not exceeded, otherwise the meter could be damaged! In the case of flush pipe joints it is sufficient to turn the union nut through 120 ... 180° (3/4") or 90 ... 120° (1") from the point of contact of the gasket with the union nut.
- A meter equipped with the 'M-Bus' option is delivered with a two-core connection cable that can be extended (fit junction box).

5.2 Notes on installation location and position

- If several meters are installed in a unit, make sure that the installation conditions are the same for all meters.
- Select the mounting location such that the connecting lines of the flow sensor and the temperature sensor cables will not be routed close to power and high-frequency lines or electromagnetic interference sources (min. distance: 50 cm).
- Always install the meter in accordance with the installation situation (standard: return flow) printed on the dial. Symbol for return flow installation:  Symbol for flow installation: 
- If the ultego III smart is installed in the joint return flow of two heating circuits, e.g. heating and hot water, the installation location must be sufficiently far, i.e. at least 10 DN from the T-piece, so that the different temperatures can mix properly.
- It is recommended not to install the meter at the suction side of a pump. A minimum distance of 10 DN should be kept on the delivery side.
- The meter can be installed in any position, for example, horizontally or vertically. To avoid any air buildup and operational disturbances, the meter should not be mounted to the uppermost region of a line (recommendation: vertical fitting position).
- \*This position is not allowed for cold meters and cases in which moisture can penetrate into the calculator due to condensation (e.g. during summer break).



Nur für den internen Gebrauch — For internal use only — Uniquement pour utilisation interne

### 5.3 Notes on installing the temperature sensor

---

- Heed national regulations which may possibly deviate from this instruction when installing the temperature sensors in immersion sleeves.
- The following applies in Germany for MID-conform devices: for new installations in pipelines smaller/equal DN 25, short-sensors may only be installed directly immersed!
- Temperature sensor: the cables may not be divided, shortened or extended.
- The sensors must be installed in the same heating circuit as the flow sensor (observe blending).
- The ends of the temperature sensors must reach at least up to the middle of the pipe cross-section.
- When being used for cold metering, the temperature sensors should be installed into the pipe from below.
- Temperature sensors and screw fittings have to be sealed to prevent manipulation.

### 5.4 Installation notices for the calculator

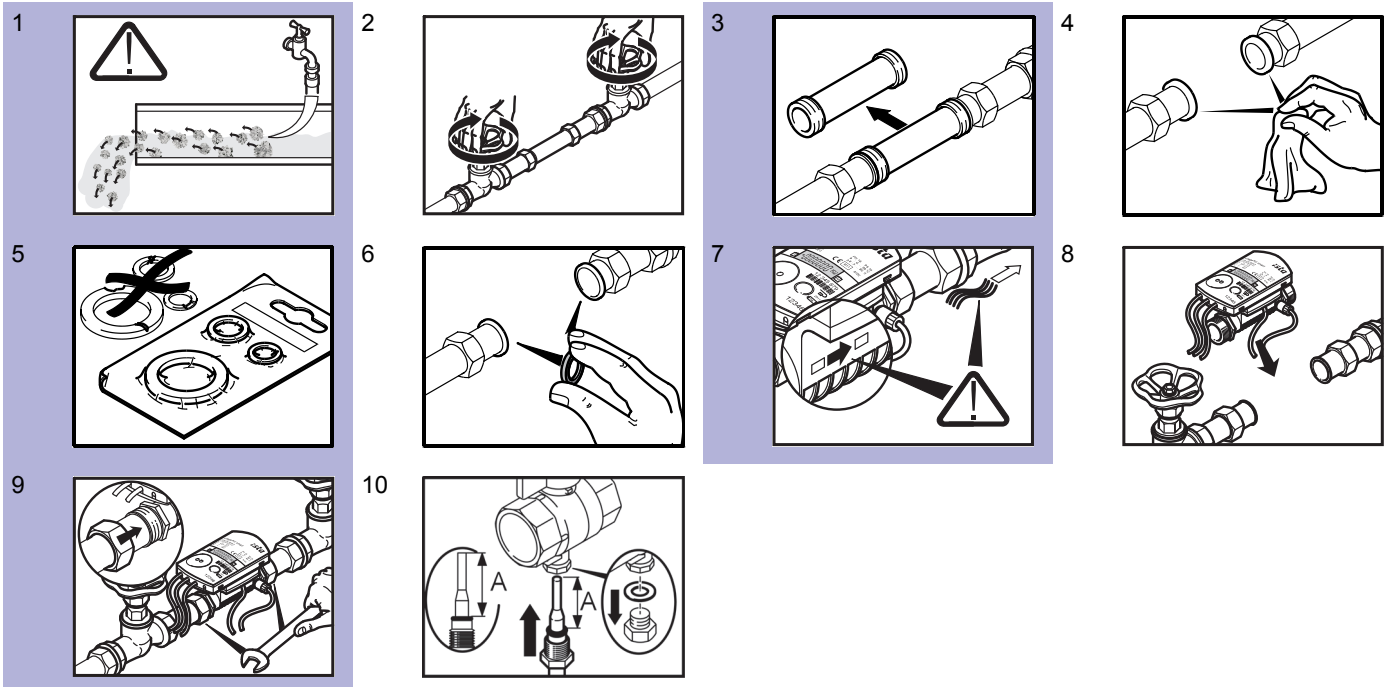
---

- Avoid direct solar radiation.
- For water temperatures below 10 °C the calculator must be mounted on the wall. At the same time it is necessary to ensure that condensed water cannot run along the connected pipes and into the calculator.



## 6 Installation

### 6.1 Performing the installation

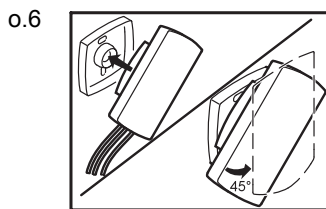
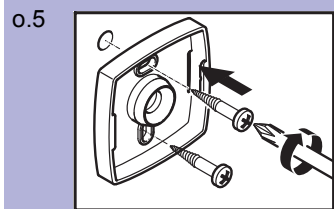
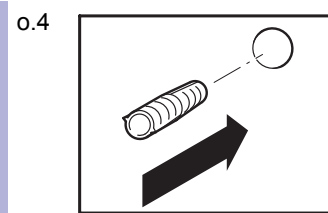
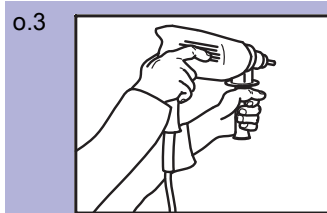
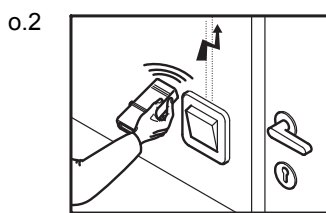
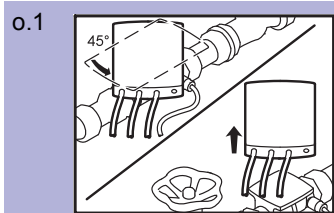


1. Flush pipeline according to DIN/EN. Observe the country specific regulations!
2. Close the shut-off devices in front and behind the installation site.
3. Remove the fitting piece.
4. Clean sealing surfaces.
5. Only insert a new profile sealing.
6. Insert new seal.
7. Note the direction of flow and compare with the arrow on the meter.
8. Mount meter.
9. Tighten all connection elements.
10. Install temperature sensors, depending on version, into tees, ball valves or immersion sleeves.

Nur für den internen Gebrauch — For internal use only — Uniquement pour utilisation interne

## 6.2 Wall-mounted calculator (o) (optional)

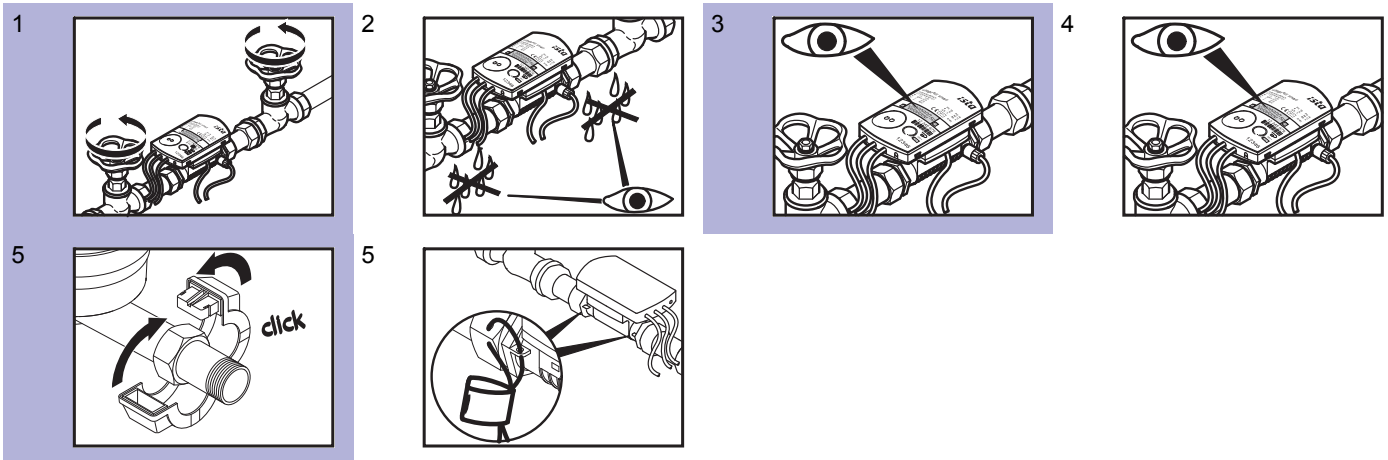
Nur für den internen Gebrauch — For internal use only — Uniquement pour utilisation interne



1. Turn the calculator through 45° and pull it off the flow sensor.
2. Prior to drilling, check that there are no electricity cables, gas or water pipes below the surface at the installation site.
3. Drill two holes at 35 mm apart using a 6 mm drill bit. Use the mounting plate (not included) as a template.
4. Insert dowels.
5. Attach the mounting plate to the wall (not part of the delivery scope).
6. Place the calculator onto the mounting plate at an angle of 45° and rotate it.



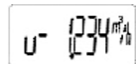
## 7 Commissioning



1. Open the shut-off valves in front and behind the installation site.
2. Check the heating system for impermeability and ventilate it thoroughly.
3. Message F0 disappears after 10 s at the latest. Then check the measured "Temperatures" and "Flow" values for plausibility.

### NOTICE

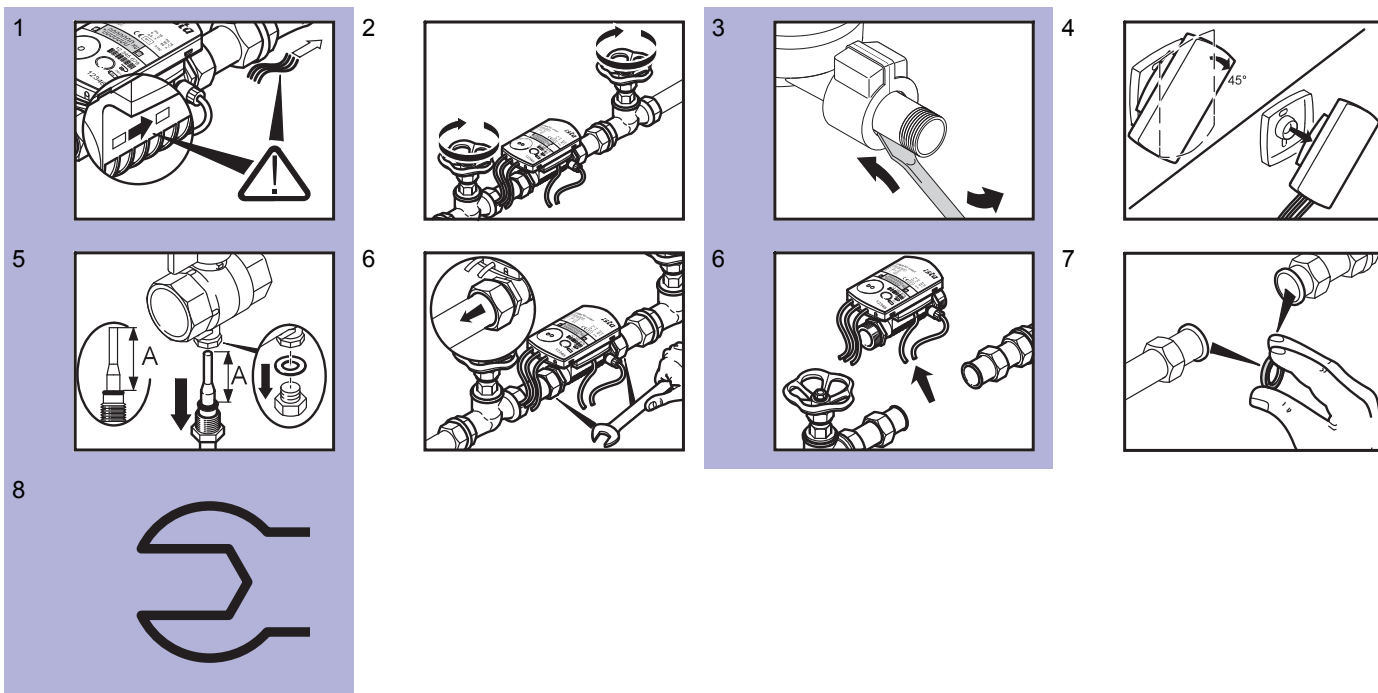
- ▶ If the measured value is below the response threshold, a 'u' is displayed as the leading digit in the flow, output and temperature display.



4. Remove air from the system until the flow indication is stable.
5. Attach the seals to the screw fittings and the sensors.



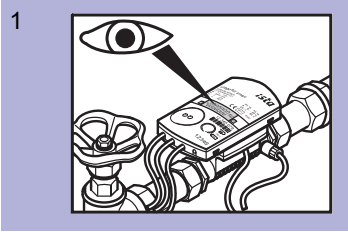
## 8 Exchange



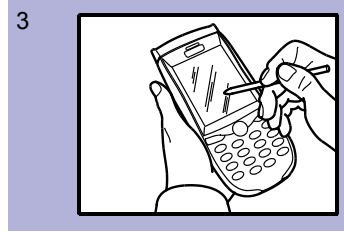
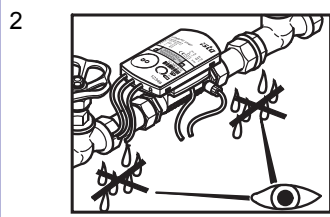
1. Note the direction of flow and compare with the arrow on the meter.
2. Close the shut-off devices in front and behind the installation site.
3. Remove the seals.
4. Detach the calculator from the wall, if applicable.
5. Remove the temperature sensor from the tee, ball valve or immersion sleeve.
6. Dismount meter.
7. Remove seals.
8. For more see installation from point 4 onward.



## 9 Reading



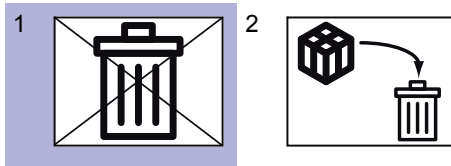
1. Check the serial number / check the year of certification.
2. Check for function and leakage.



3. Note meter reading of meter.



## 10 Disposal



1. Do not dispose of the old device in the household waste.
2. Send obsolete devices to the main warehouse via outlet.

They will ensure proper disposal.