



EN Installation and Operating Instructions

i Use / Function

The battery-operated sonsonic 3 calculator is a component of a combination thermal energy meter in accordance with EN 1434. It receives signals from connected flow sensors and temperature sensors, and calculates the energy transferred from these.

It is authorised for measuring circuit water in accordance AGFW (FW 510) in heating systems. It is not authorised for use for billing purposes in systems with glycol admixtures.

Variants:

- T1: 1 pulse = 1 l
- T25: 1 pulse = 25 l
- T250: 1 pulse = 250 l
- TX: Pulse value of on-site flow sensor can only be selected once

Extent of delivery

- 1 x sonsonic 3 calculator
- 1 x mounting plate
- 1 x mounting set (2 screws / 2 dowels)
- 3 x cable grommet (pre-assembled)
- 1 x manual including declarations of conformity

Warnings

WARNING!



Explosion hazard

Improper handling of the lithium metal battery installed in the appliance can cause the battery to explode, resulting in fire or injury.

The device and the LITHIUM METAL BATTERY

- ▶ Do not heat the appliance above the temperatures specified in this document for storage and operation.
- ▶ do not throw into the fire.
- ▶ Do not expose to water.
- ▶ do not short-circuit.
- ▶ do not open or damage.
- ▶ do not charge.
- ▶ Do not weld or solder.



WARNING!

Danger of injury due to electric shock, fire or explosion

Connecting to an external voltage (230 V) can cause injuries due to electric shock as well as explosion of the battery and subsequent fire.

- ▶ Do not connect any external power sources to the device.

i Notes

Transport and Shipping

- You may only transport the sonsonic 3 calculator in its original packaging.

UN3091 LITHIUM METAL BATTERIES IN EQUIPMENT

The certificates required for transport can be requested from ista SE, stating the article number.

Storage / Disposal

- Store the device in a dry, frost-free place.
- This product falls under Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE) and may not be disposed of as domestic waste. Dispose of the used products via the channels provided for this purpose, or return it to your local ista branch.

Notes on use and handling the meter

- The device may only be installed by trained skilled personnel!
- Only remove user seals if you are authorised to do so. The seals must be replaced after the work is completed.
- To properly adhere to calibration error limits, the current state-of-the-art as well as notes and facts in this manual must be observed.
- Always utilise the device in an environment that fulfils the indicated operating conditions.

Installation notes

- Check to see whether the installation site (flow/return) and the flow sensor pulse value is appropriate for the type sonsonic 3 calculator (see type plate and type plate loop).
- The flow sensor and temperature sensor of the energy meter must be located in the same partial circuit of the system (same circuit rule).
- Observe the cable lengths when selecting the installation site.
- The length of the connecting bend for the flow sensor may only be 10 m.
- If possible, when installing the calculator and cables, as recommended in EN 1434-6,

Clause 4.2, maintain a minimum distance of 60 cm from strong electromagnetic fields (e.g. from frequency-controlled pumps and power cables) or their wiring.

- If used as a cold meter or combined heat/cold meter, the calculator must be attached so that condensation cannot penetrate the calculator via the connected cables.
- The clamping screws of the calculator connections must be fitted on the cable, as otherwise there will be no contact.
- Only connect temperature sensor pairs and flow sensors with their own EU marking.
- Temperature sensor pairs with a maximum length of 3 m (2 wire technology) or max. 30 m (4 wire technology) are approved.
- The temperature sensors may only be installed symmetrically in the warm and cold lines.
- The lithium metal battery is fixed in this device and may not be replaced.



Installation



WARNING!

Danger of injury due to electric shock and explosion

Drilling into electricity cables or gas pipes can cause an electric shock or explosion.

- ▶ Always inspect or test the assembly area for concealed electrical cables, as well as gas pipes laid in the wall, before assembling electronics on a wall.



NOTICE

Danger of water damage

Drilling into water pipes can cause water damage.

- ▶ Inspect the assembly location for any concealed pipes which are laid in the wall before assembling the electronics.

1. Attach the mounting plate to the wall.
2. Engage calculator in mounting plate.
3. Open clamping cover.
4. Undo/remove strain relief.
5. Thread cables through sleeves.
 - Left sleeve: Pulse cable of flow sensor
 - Central sleeve: Cold line temperature sensor cable
 - Right sleeve: Hot line temperature sensor cable

- 
- Connection**

- NOTICE**

-  = hot line = red sensor marking

i **User interface**

The following table shows symbols which signify display conduct or actions required from the user within the display loop description.

Sym-bol	Description
	Displays automatically change every 2 sec
	Alternative displays, depending on the status of the device
	Displays can be retrieved with just a short click
	Display/loop can be retrieved with a long click
	Display can be retrieved by double clicking

Loop 1: Measuring loop

In the measuring loop you can read out the current measured values, the last and second-to-last reference date values for energy and volumes and the next reference date.

Number	Display	Meaning
1A		Current meter reading for thermal energy ¹
		Current meter reading for cold energy ²
1B		Last reference date value for thermal energy ¹
		Last reference date value for cold energy ²
		Last reference date value for total volume ³
		Last reference date value, cold volume ^{3,4}
		Date of last reference date
1C		Second-to-last reference date value for thermal energy ¹
		Second-to-last reference date value for cold energy ²
		Second-to-last reference date value for total volume ³

Number	Display	Meaning
		Second-to-last reference date value, cold energy ^{3,4}
		Date of second-to-last reference date
1D		Date of next reference date
1E		Current meter reading for total volume
		Current meter reading for cold volume ^{3,4}
		Current meter reading, error volume ^{5,6}

1. For heat meters and combined heat/cold meters only
2. For cold meters and combined heat/cold meters only
3. For combined heat/cold meters, if necessary, calculate the “heat volume” as the difference between the “total volume” and the sum of the “cold volume” and “error volume”.
4. For combined heat/cold meters only
5. The “error volume” is volume for which, for various reasons, no energy could be calculated.
6. If necessary, calculate the “heat volume” for heat meters or “cold volume” for cold meters as the difference between the “total volume” and the “error volume”.

Loop 2: Wireless service loop

You can initiate wireless commissioning and activate fast service beacons via the wireless service loop.

	NOTICE
	▶ Wireless M-bus telegrams can only be activated via ista radio after the activation of the bidirectional ista radio system via display 2A or 2B.
	NOTICE
	▶ After activation of the radio, manual parameterisation via the parameterising loop is no longer possible.

Number	Display	Meaning
2A		Activation of installation beacons by double-clicking (maximum 14 times); if no parametrisation takes place via ista service tools, then the radio is deactivated
		Activation of 30 fast service beacons by double-clicking (maximum 20 times a day)
		No further activation of installation beacons (at all) or service beacons (until daily change) possible
2B		One-off activation of installation beacons by double-clicking; if no parametrisation takes place via ista service tools, then the radio is activated with default parameters, parameters set via the parameterising loop are overwritten
2C		Activation of wireless M-bus telegrams by double-clicking ¹

1. Protected by password 2

Loop 2: Wireless service loop

	NOTICE
	▶ Wireless M-bus telegrams can only be activated via ista radio after the activation of the bidirectional ista radio system via display 2A or 2B.

NOTICE

- After activation of the radio, manual parameterisation via the parameterising loop is no longer possible.

2A: — Activation of installation beacons by double-clicking (maximum 14 times); if no parameterisation takes place via ista service tools, then the radio is deactivated ('SEtUP') # Activation of 30 fast service beacons by double-clicking (maximum 20 times a day)('rEAd') # No further activation of installation beacons (at all) or service beacons (until daily change) possible ('no rEAd')

2B: | One-off activation of installation beacons by double-clicking; if no parameterisation takes place via ista service tools, the radio is activated with default parameters ('A SEtUP')

2C: | Activation of wireless M-bus telegrams by double-clicking ('C1 SEtUP')¹

1.Protected by password 2

Loop 3: Diagnostics loop

In the diagnostics loop, you will find extensive information on the device's current status.

Number	Display	Meaning
3A		No existing device errors
		Existing device error ¹
		Number of days in operation since production
		Number of error days since production
3B		Current flow
3C		Current heat output ²
		Current cold output ²
3D		Current flow temperature
3E		Current return temperature
3F		Current temperature difference Δt ³
3G		Maximum flow since production
		Maximum temperature of the current billing period

Number	Display	Meaning
		Maximum temperature difference Δt of the current billing period ³

- Description of the device errors in the 'error status' section
- Depending on current count mode (heat/ cold)
- Becomes negative, if $T_{\text{flow}} < T_{\text{return}}$ (cold measurement or sensor mixed up)

Loop 4: Type plate loop

You can find information on the current configuration of the device in the type plate loop.

4A: — M-bus ID number (part of secondary address)

4B: | Flow sensor pulse value (litres per pulse) ("LP X.X") / (Flow sensor installation site for hot line ("LoC hot")¹ # Flow sensor installation site for cold line ("LoC cold")¹)

4C: | Device can no longer be read out via the module until the day changes ("no CrEdt")² # M-bus module detected with bus address (primary) ("Bus XXX")² # Pulse output module detected ("PULSEOut")²

4D: | Glycol type³ / Glycol concentration ("ConC XX")³

4E: | Radio off ("rF OFF") # WalkBy ("rF PdA") # ista radio ("rF nEt") # OMS C1 + WalkBy ("rF C1")

4F: | Radio network number (first 8 digits) # Radio network number (last 8 digits)

4G: | Measuring interval in seconds ("SEC X")

4H: | Sensor type Pt500 ("Pt 500")/ Detected sensor connection technology: 2-wire ("PtLinE 2") # Detected sensor connection technology: 4-wire ("PtLinE 4") # Sensor connection technology not detected ("PtLinE 0")

4I: | Software version

4J: | Hash code

- Display shows the planned (programmed) installation site of the flow sensor, not the actual site.
- Display only if a module was detected
- Display only for glycol meters

Loop 5: Statistics loop

In the statistics loop, you can read the values at the end of the month for energy and volumes, and the respective reference date of the last 14 months.

Number	Display	Meaning
5A		Reference date from last month
		Thermal energy value from end of last month ¹
		Cold energy value from end of last month ²
		End of month value total volume last month ³
		Cold volume last month ^{3,4}
5B – 5N		Same as 5A for the previous 13 months

- For heat meters and combined heat/cold meters only
- For cold meters and combined heat/cold meters only
- For combined heat/cold meters, if necessary, calculate the "heat volume" as the difference between the "total volume" and the "cold volume".
- For combined heat/cold meters only

Loop 5: Statistics loop

In the statistics loop, you can read the values at the end of the month for energy and volumes, and the respective reference date of the last 14 months.

5A: — Reference date of last month / End of month value for thermal energy for last month¹ / End of month value for cold energy for last month² / End of month value for total volume for last month³ / Cold volume for last month^{3,4}

5B – 5N: | As 5A for the previous 13 months

- For heat meters and combined heat/cold meters only
- For cold meters and combined heat/cold meters only
- For combined heat/cold meters, if necessary, calculate the "heat volume" as the difference between the "total volume" and the "cold volume".
- For combined heat/cold meters only

Loop 6: Tariff loop

In the tariff loop, you can read the values at the end of the month for the maximum performance and flow, and each reference date from the last 14 months.

Number	Display	Meaning
6A		Reference date from last month
		Maximum heat performance value from end of last month ¹
		Maximum cold performance value from end of last month ²
		Maximum flow value from end of last month
6B	●	Same as 6A for the previous 13 months
6N		

1. Only for heat meter and combined heat meter/cold meters
2. Only for cold meters and combined heat/cold meters

Editor

The following activities can be carried out in the editor, using the button:

Button function	Length / interval	Function in editor
Short press of button	< 2 seconds	- Jump to next point to be entered (or from last to first) - Change to next entry with selection list
Longer press of button	> 2 seconds	Change to current point to be entered
Double-click	2-times for 0.5 seconds	Exiting editor and saving changed values

The current points to be worked on are indicated by flashing.

Password entry

To avoid undesired changes to the parameterisation of the device, the parameterisation loop is protected by password 1 and the activation of wireless M-bus telegrams is protected by password 2.

- Password 1 has four digits and consists of the current month and year in the format 'MMYY' (example: January 2019 equals "0119"). You must enter the password once during the first parameterisation process. It is then valid until the next deactivation of the display.
- Password 2 has three digits and consists of the first three digits in the serial number (Ex-

ample: Serial number of the device '914000069' -> password 2 = '914'.)

You reach the screen for entering the password from the parameterisation loop or display 2C by double-clicking.

Number	Display	Meaning
PA		Entry of password 1
-PI		Password is correct
V		Password incorrect

Parameter entry

You access the entry to be edited automatically from the corresponding entry in the parameterising loop after successfully entering the password if required. After entering the required value, exit the editor with a double-click.

- PA: || Reference date
- PC: Pulse value: || Flow sensor undefined ("undEF") | 1.0 | 2.5 | 10.0 | 25.0 | 100.0 | 250.0 | 500.0 | 1000.0 | 2500.0 | 10000.0 | 25000.0 litres per pulse (LPP)¹
- PD: || M-Bus primary address ("BUS XXX")
- PE: Pulse output type || heat energy ("En hot")² | cold energy ("En cold")³ | volume ("Fluid")
- PF: Pulse output value || 1 pulse per increase of last digit in display ("Auto")
 - 1 pulse per | 0.1 | 1.0 | 10.0 | 100.0 | 1000.0 kWh⁴
 - 1 pulse per | 0.001 | 0.010 | 0.100 | 1.000 m³⁵
- PI: || Discard entry from PC ("d/ScArd") | save entry from PC ("SEt") || entry is being saved ("SEtting") / (save successful ("SEt dOnE") # save failed ("SEt FAIL"))

1. Only for TX variant
2. Only for heat and combined heat/cold meters
3. Only for cold meters and combined heat/cold meters
4. Only for heat or cold energy pulse output types
5. Only for volume pulse output type

Error status

Number	Display	Meaning
3A		Calculation unit error – check temperature sensor and replace temperature sensor and / or device if necessary ¹

Number	Display	Meaning
		Temperature measurement error – check temperature sensor and replace temperature sensor and / or device if necessary ¹
		Flow measurement error – replace device ¹
		Internal error – replace device ¹
		End of life – replace device ¹
		System error – replace device ²

1. Combinations of the stated errors are possible.
 2. Permanent display. Access to display loops no longer possible.
- 3A "ERR C": Computing unit error – check temperature sensor; replace temperature sensor and / or device if necessary¹
 - 3A "Err t": Temperature measurement error - check temperature sensor; replace temperature sensor and / or device if necessary¹
 - 3A "Err U": Internal error – replace device¹
 - 3A "Err L": End of life – replace device¹
 - "SysError": System error – replace device²

1. Combinations of the stated errors are possible.
2. Permanent display. Access to display loops no longer possible.



Startup

NOTICE

- ▶ When commissioning a heat meter, a commissioning record must be prepared in accordance with PTB K6.

1. Parametrise the device manually or via wireless connection, using the above parameterising loop.
2. Check function.
3. Clean the device exterior with a soft damp cloth. Do not use cleaning products.
4. Seal meter.



Replacement

1. Make a note of meter reading.
2. Open clamping cover.
3. Undo/remove strain relief.
4. Disconnect the cables.
5. Undo/remove terminal labelling.
6. Remove the ALU (fold back the clamp using a screwdriver).
7. For more see installation from point 2 onward.



Technical data

- *Ambient conditions to EN 1434:* Classes M1 / E1
- *Ambient temperature:* Storage: -25 °C to +55 °C, Operation: +5 °C to +55 °C
- *Relative humidity:* 5 % to 95 %, non-condensing
- *Protection class:* IP 65 as per EN 60529
- *Temperature sensors:* Typ Pt500 acc. EN 60751
- *Temperature measurement range limits (Θ) / Temperature difference limits ($\Delta\Theta$):*

	$\Theta_{\min}$	$\Theta_{\max}$	$\Delta\Theta_{\min}$	$\Delta\Theta_{\max}$
Heat meter	5 °C	150 °C	3 K	100 K
Combined heat/cold meter	1 °C	150 °C	3 K	100 K
Cold meter	1 °C	25 °C	3 K	20 K

- *Combined heat / cold meter changeover criteria:* $\Delta\Theta_{\text{grenz}} = 0.19 \text{ K}$, $\Theta_{\text{in_umsch}} = 20 \text{ °C}$
- *Pulse value:* 1 / 25 / 250 l/pulse set by the factory in accordance with type plate (T1, T25, T250 versions), 1 / 2.5 / 10 / 25 / 100 / 250 / 500 / 1000 / 2500 / 10000 / 25000 l/impulse can be adjusted oncer (TX version)
- *Impulse input:* Class IB as per EN 1434
- *Main dimensions:* Width: 93 mm, Height (without cable sockets): 134,5 mm, Height (with cable sockets): 149 mm, Depth: 35 mm
- *Power supply:* 1 x 3.6 V AA lithium metal battery
- *Service life:* 10 years of operation + 1 year operating reserve + 1 year storage
- *Wireless interfaces:* Frequency range: < 868 MHz, Maximum transmission power: < 10 mW, Wireless M-Bus: Operating mode C1 as per EN 13757-4; transmission interval: 4 minutes



Approval

- Heat (MID): DE-19-MI004-PTB029
- Cold (national approval for Germany): DE-21-M-PTB-0025
- Cold (national approval for Switzerland): CH-T2-21779-00

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