

## 1. Application and function

This compact heat meter *microCLIMA U* is designed for measurement of the consumed heat energy in a closed heating system.

## 2. Content of the Package

- Heat meter, consisting of a detachable calculator, flow sensor and two temperature sensors, all permanently connected to each other.
- Installation kit
- Installation and Operating Instructions

## 3. General Information

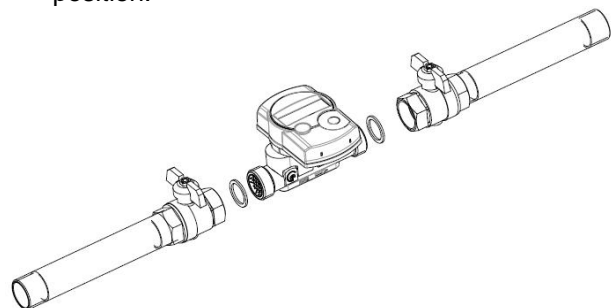
- The valid standards for the application of heat meters are EN 1434, parts 1 + 6, Council Directive on EMC 2004/22/EC, annex I and MI-004 and the relevant national verification regulations.
- The regulations for electrical installations are to be observed.
- The product meets the requirements relating to emissions in the European Council Directive EMC 2004/108/EC.
- The measurement stability of the heat meters is only guaranteed when the quality of the water meets the conditions as specified in the AGFW Recommendation FW-510.
- The identification plate of the instrument and the seals must not be removed or damaged – otherwise the guarantee and the approved application of the instrument are no longer valid!
- The heat meter left the factory in conformance with all applicable safety regulations. All maintenance and repair work is to be carried out only by qualified and authorized technical personnel.
- The direct-mounted temperature sensor and/or the external temperature sensor installation point may not be altered in any way, in particular the sealing wire must not be removed.
- The instrument must be stored and transported at temperatures above-freezing.
- To protect against damage and dirt the heat meter should only be removed from the packaging directly before installation.
- Instruments with a return-flow temperature sensor mounted directly in the flow sensor may only be mounted in the return flow.
- All details and specifications listed on the data sheet of the heat meter must be adhered to.
- All electrical connections must be laid at a minimum distance of 10 cm to sources of electromagnetic

interference (switches, controllers, pumps, etc.). All instrument connections must be laid at a minimum distance of 5 cm to other current-carrying wires.

- The temperature sensor cables must not be kinked, rolled up, lengthened or shortened.
- To clean the heat meter (only if necessary) use a slightly moist cloth.
- Categorically, all temperature sensors which are not mounted in the flow sensor must be direct-mounted.
- If more than one heat meter is installed in one unit, care must be taken to ensure that all the meters have the same installation conditions.
- Pay attention to the installation point of the heat meter:  
standard: in the return flow pipe  
optional: in the forward flow pipe (must be specifically requested when ordering).

## 4. Mounting the Flow Sensor

- Flush the pipes according to DIN/EN. Then close all the shut-off valves. Open the nearest draining valve for pressure release.
- Drain the closed-off pipe section.
- Loosen the coupling rings and remove the old heat meter.
- Remove all old gaskets.
- Clean the sealing surfaces.
- Insert new gaskets.
- Position the flow sensor correctly, taking into account the direction of flow (arrow on the side of the flow sensor)!
- Tighten the coupling rings.
- Rotate the calculator into the correct reading position.



### Note:

In order to simplify mounting in narrow installation spaces the calculator can be detached from the flow sensor.

To detach the calculator, carefully pull the upper part of the housing away from the flow sensor.

## 5. Mounting the Temperature Sensors

For pipe systems of size  $\leq$  DN25 the MID regulations require direct mounting of the temperature sensors for new installations (new construction, or retrofitted heating systems).

### Note:

During installation be sure that the return flow sensor (blue marking) is mounted in the “colder pipe” and the forward flow sensor (red marking) in the “warmer pipe”.

## 5.1. Direct mounting (ball valve and T-piece)

- Remove the blind plug/old temperature sensor and gasket/old O-ring. Clean connection surfaces.
- Slide the O-ring off the temperature sensor and insert it to the bottom of the threaded opening of the ball valve or the T-piece.
- Set the required mounting depth of the tip of the temperature sensor by tightening the cross-head screw in the correct beading on the sheath.
- The temperature sensor must not touch the bottom of the ball valve or T-piece.
- Insert the temperature sensor into the ball valve or the T-piece and tighten the screw nut to the stop.



## 6. Start of Operation

- Slowly open the shut-off valves
- Check that the meter is functioning properly and that there are no leaks.
- After confirming that the heat meter is the functioning properly, apply the seals for the temperature sensors and the flow sensor.
- When replacing a meter at the end of a verification period note the meter readings and the serial numbers of the old and new meters.

### Check the following points:

- Is the heat meter of the right size?
- Are the shut-off valves open?
- Is the heating system clear (dirt filters not clogged)?
- Are the temperature sensors and the flow sensor sealed (against manipulation)?
- Is the directional arrow on the flow sensor in line with the flow direction?
- Is a flow volume displayed?
- Is a plausible temperature difference displayed?
- For instruments with an integrated return flow temperature sensor, check, if the flow sensor is installed in the return flow.

## 7. Technical data

Data Approval	q <sub>p</sub> 2,5	q <sub>p</sub> 3,5
Accuracy class	EN 1434-1:2007, class 2 / 3	EN 1434-1:2007, class 2 / 3
Minimal flow q <sub>i</sub> /q <sub>p</sub>	1:100	1:100 1:125 1:150
Maximum flow q <sub>s</sub> /q <sub>p</sub>	2:1	2:1
Mechanical class	M1	M1
Electromagnetic class	E1	E1
Protection class	IP54	IP54
Flow disturbance class	U0	U0

Details Flow Sensor S2U				
Nominal diameter DN	mm	20	20	25
Nominal flow q <sub>p</sub>	m <sup>3</sup> /h	2.5	3.5	3.5
Max. flow q <sub>s</sub>	m <sup>3</sup> /h	5.0	7.0	7.0
Pressure drop Δp at q <sub>p</sub>	mbar	115	210	210
Nominal pressure PN	bar	16		
Maximum pressure MAP	bar	16		
Low flow threshold	l/h	12		
Installation length	mm	130	130	150
External connection thread	Zoll	G1B	G1B	G1¼B
Temp. range of medium	°C	15 ... 90		
Mounting position		horizontal; vertical		
Point of installation	standard	return flow		
	optional	forward flow		

Technical Data Calculator		
Ambient temperature	°C	5 ... 55
Temperature range	°C	1 ... 150
Temperatur difference	K	3 ... 100
Power supply		3V, lithium
Lifetime of battery		6 + 1 year
Data storage		E <sup>2</sup> PROM / daily
Display		8-digits + special
Interfaces	standard	infrared
	optional	M-Bus

Details Temperature Sensors		
PT1000		platinum precision
Connection		2 wire technique
Diameter	mm	5.0 or 5.2
Length of connecting cables	m	1.5

## 8. Display

The calculator has a liquid crystal display with 8 digits and special characters. The values that can be shown are divided into three display loops. All data can be retrieved via the key.

In standard mode (no push-button action), the information displayed is the total heat energy consumed since the meter was put into operation.

At the start you are automatically in the main loop (1st level). By pressing the push-button longer than 4 seconds you change to the next display loop. Keep the push-button pressed until you reach the desired information loop.

By pressing the push-button briefly you can scan all the information within a loop.

After 1 minute of non-use of the push-button, the display automatically returns to the main loop.

### 1. Level / Main Loop

3213 MWh

- FLOW

1) Total heat energy in MWh – standard display- alternating display without pressing at negative flow.

88888888 GJ m<sup>3</sup>  
MkWh  
23 ↓ ↑ △ °C

2) Segment test, all segments triggered simultaneously.

2999 MWh 3112.11

3) Heat energy at last billing date alternating with last billing date<sup>1)</sup>

14.7 m<sup>3</sup>

4) Total volume in m<sup>3</sup>

3456 kW

5) Current power in kW

0.468 m<sup>3</sup>  
h

6) Current flow in m<sup>3</sup>/h

1706.12

7) Current date

E000 1000 08

8) Error message (alternating binary and hexadecimal display)

### 2. Level / Technician's Loop

6.869 kW  
2

1) Maximum power in kW

1853 m<sup>3</sup>  
h  
2

2) Maximum flow in m<sup>3</sup>/h

62.20 °C  
2 ↓

3) Forward flow temperature in °C

41.80 °C  
2 ↓

4) Return flow temperature in °C

20.40 °C  
2 ↓ ↓

5) Temperature difference

d 480  
2

6) Days in operation since verification

Pt 1000 r  
2

7) Sensor type / installation Position

bu5 4  
2

8) M-bus address

12345678  
2

9) Serial number of the heat meter

102 100  
2

10) Firmware / software version

### 3. Level: Statistics Loop

2.785 MWh 3112.10  
3

1.) Previous billing date alternating with its value. Alternatively, the total volume, tariff values, or values of individual instruments connected to the optional pulse inputs can be displayed, if so set.<sup>1)</sup>

2.638 MWh 3110.11  
3

2.-16.) Monthly values: Dates alternating with their value. Alternatively, the total volume, tariff values, or the values of individual pulse counters can be displayed, if so set<sup>1)</sup>

<sup>1)</sup> Up to the end of the month the consumption and reading date for that month will be shown as 0.

## 9. Interfaces and Options

### 9.1. Optical (infrared) interface

In order for a PC to be able to communicate with a SensoStar 2U® instrument, it is necessary to connect an USB interface of the PC. The optocoupler and the necessary software „Device@Monitor“ are optionally available.

Baudrate (2400 Bd)

The optical infrared interface is activated with the key. If within 60 seconds neither a valid telegram is received nor the push-button pressed again, the interface is deactivated.


### 9.2. M-Bus

With the optional M-Bus the protective interface is galvanically separated. In a maximum-sized M-Bus network of 250 meters, 24 read-outs per day are possible for each meter. If fewer read-outs are carried out and/or fewer heat meters are installed in the network (connected to the M-Bus system), the unused amount of available read-outs is stored in the instrument to be used when needed.

### 9.2.1. General information


- The number of read-outs via the optical interface is limited.
- During communication on the M-Bus with an addressed instrument via the M-Bus it is not possible to use the other interfaces on the instrument (push-button, optical interface) and vice versa.
- The valid standards for the M-Bus protocol are EN 13757-2, EN 13757-3 and EN 1434-3 and the M-Bus Recommendation (version 4.8 from Nov. 1997) with the basic standard IEC 870 parts 1,2 and 4.
- Each meter on the M-Bus is only protected against high voltage up to the maximal allowed bus voltage ( $\pm 50V$ ).
- Additional protective measures must be provided by the level converter/Master.
- The installation of an instrument in a M-Bus network may only be carried out by authorized, qualified technical personnel.
- Attention must be paid to ensure that the cable lengths and cable cross-sections in the bus network are appropriate for the **baud rate of the connected meters (2400 baud)**.
- Recommended cable type:
- Telephone cable J-Y(ST) Y2 x 2 x 0.8 mm<sup>2</sup>


## 10. Error Codes

When the instrument detects an error, the error symbol and number are displayed.  The error can also be displayed by selecting the menu item 8) 'error display' in the first level / main loop (see loop 8 display). There are seven possible causes of error, and they can appear in combination with each other, depending on the situation. The description of the faults can be read from the display.

Display binary	Description	Display hexadecimal
1 at 1st position	check sum fault	error 40
1 at 2nd position	E <sup>2</sup> PROM fault	error 20
1 at 3rd position	Reset	error 10
1 at 4th position	Time-out TDC	error 08
1 at 5th position	REF-sensor fault	error 04
1 at 6th position	RF-sensor fault	error 02
1 at 7th position	FF-sensor fault	error 01

**Example: Time-out**

Error	Low Battery	Check sum fault	E <sup>2</sup> PROM fault	Reset	Time-out TDC	REF-Sensor fault	RF sensor fault	VF sensor fault	Error code hexadecimal (LDC)
Error code	7	6	5	4	3	2	1	0	
Display Location	1	2	3	4	5	6	7	8	
Binary display LCD									

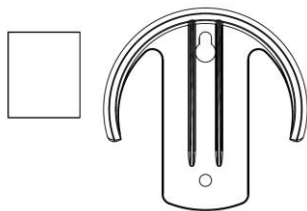
When an error occurs  in the standard display (total heat energy), with the exception of the „reset“ error, the instrument must be exchanged and sent to the manufacturer for examination.

### Error Description

Error	Effect	Possible cause
ff-sensor fault	No calculations are carried out. The registers for flow and energy are not being updated (no new data is being stored).	Sensor cable severed; sensor cable shorted circuited.
rf-sensor fault	No calculations are carried out. The registers for flow and energy are not being updated (no new data is being stored).	Sensor cable severed; sensor cable shorted circuited t.
Internal calibration errors	There is no energy calculation. The registers for flow and energy are not being updated (no new data is being stored).	A defect on the calculator circuit board.
Time-out TDC	No calculations are carried out. The registers for flow and energy are not being updated (no new data is being stored).	1. No water in flow sensor 2. Air in medium 3. Transducer/cable defect
reset	The measurements since the last storage of data in the E <sup>2</sup> PROM are lost (max. one day)	EMC
E <sup>2</sup> PROM fault	After a reset, the instrument is without function.	Defective component.
check sum fault	No calculations are carried out. The registers of flow and energy are not being updated.	Defective component.

## 11. Mounting with wall support

There is a wall mounting support and a sticker pad available, which must be ordered separately.



## 12. Declaration of Conformity

For the product described in this document we confirm, as the manufacturer, that it meets the fundamental requirements according to the

- Council Directive 2004/22/EC of 31 March 2004 on the approximation of the laws of the member states relating to measurement instruments, in particular those in annex MI-004, as well as
- the requirements relating to emissions in the European Council Directive on EMC 2004/108/EC, and the requirements according to the Council Low Voltage Directive 2006/95/EC.

The complete signed declaration can be found at [www.engelmann.de](http://www.engelmann.de).

## 13. Contacts

Maddalena S.p.A.  
Via G.B. Maddalena, 2/4  
33040 Povoletto (UD) – Italy  
Tel.: +39.0432.634811  
Fax.: +39.0432.679820  
[www.maddalena.it](http://www.maddalena.it)

Subject to technical change without prior notice