

Data sheet

SONOMETER™1000

Ultrasonic compact heat meter

Description/Application

MID examination certificate
no.: DE-07-MI004-PTB021



The SONOMETER™1000 is an ultrasonic static compact heat meter especially designed for heating, cooling or combined heating/cooling application in local and district heating systems.

The SONOMETER™1000 as a compact heat meter consists of the following components:

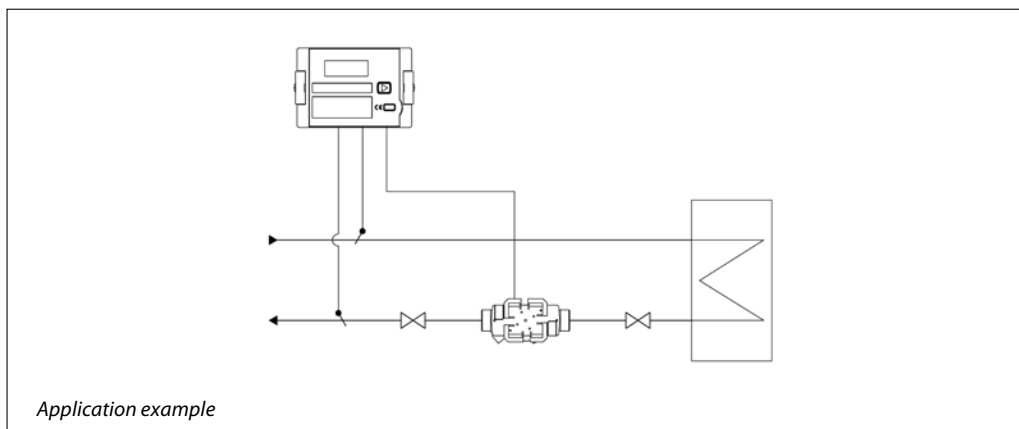
- Ultrasonic flow sensor;
- Calculator with integral hardware and software for measuring flow rate, temperature and energy consumption;
- Temperature sensors.

Features

- 1st. approval in Europe for ultrasonic heat meter with dynamic range of q_v/q_p 1:250 in class 2 (q_p 1.5 / 2.5 / 6 m³/h)
- Complete dynamic range: \geq 1:1500
- Lithium battery, 230 Vac or 24 Vac mains unit
- Battery lifetime 12 years (16 years optional)
- Patented free-beam principle
- Improved service-friendly heat meter design
- Housings up to 190 mm thread and flange (PN16/25)
- Can be configured for heating, cooling or combined heating/cooling application
- Temperature range: 5-130/150 °C
- Overload temperature up to 150 °C ($q_p = 0.6 - 2.5$ m³/h)
- Swirl-free flow around reflector
- New construction - lower pressure loss
- Robust stainless steel reflector
- Available in nominal sizes q_p 0.6 - 1.0 - 1.5 - 2.5 - 3.5 - 6 m³/h
- Measuring accuracy meets the requirements of EN 1434 class 2 and 3
- No calming sections necessary in the inlet and/or outlet (standard installation)

Special Features

- Power save mode
- NOWA test capability
- Remote reading via M-Bus, RS 232, Radio or optical interface
- Optional Plug & Play modules
- Individual tariff functions
- History memory for 24 months
- Extensive diagnostic displays
- HYDRO-SET parameterization software on Windows basis guarantees optimum adaptation to the user's specific needs



Ordering

AAA BB - C D E F G H - I J K L M - NN O



AAA - application

heat meter for heating	1HE
heat meter for cooling	1CO
heat meter for heating/cooling	1HC

BB - flow sensor

qp 0.6 m³/h / 110mm thread / DN 15 / G¾B	1A
qp 0.6 m³/h / 130mm thread / DN 20 / G1B	1B
qp 0.6 m³/h / 190mm thread / DN 20 / G1B	1C
qp 1.0 m³/h / 110mm thread / DN 15 / G¾B	1D
qp 1.0 m³/h / 130mm thread / DN 20 / G1B	1E
qp 1.0 m³/h / 190mm thread / DN 20 / G1B	1F
qp 1.5 m³/h / 110mm thread / DN 15 / G¾B	1G
qp 1.5 m³/h / 130mm thread / DN 20 / G1B	1H
qp 1.5 m³/h / 190mm thread / DN 20 / G1B	1I
qp 2.5 m³/h / 130mm thread / DN 20 / G1B	1J
qp 2.5 m³/h / 190mm thread / DN 20 / G1B	1K
qp 3.5 m³/h / 260mm thread / DN 25 / G1¼B	1L
qp 6 m³/h / 260mm thread / DN 25 / G1¼B	1M
qp 0.6 m³/h / 190mm flange DN 20	2A
qp 1.0 m³/h / 190mm flange DN 20	2B
qp 1.5 m³/h / 190mm flange DN 20	2C
qp 2.5 m³/h / 190mm flange DN 20	2D
qp 3.5 m³/h / 260mm flange DN 25	2E
qp 3.5 m³/h / 260mm flange DN 32	2F
qp 6 m³/h / 260mm flange DN 25	2G
qp 6 m³/h / 260mm flange DN 32	2H

C - nominal pressure

PN16	C
PN25	D

D - cable length between calculator and flow sensor

1.5m (standard)	A
3 m	B
5m (only for 0.6 m³/h up to 2.5 m³/h)	C

E - installation

forward	F
return	R

F - power supply

battery 3V DC (C-cell)	1
battery 3.6V DC (D-cell)	2
mains unit 230V AC	3
mains unit 24V AC	4

GH - interface modules

modules slot 1	
no module in slot 1	0
M-Bus module	A
RS-232 module	B
Real Data radio module	C
pulse input module (2 inputs)	D
modules slot 2	
no module in slot 2	0
pulse output module (2 outputs)	K
pulse input module (2 inputs)	L
combined module (2 inputs / 1 output)	M
(standard setting for pulse input modules: 100 l/pulse standard setting for pulse output modules: energy and volume, pulse value is the last digit in the display)	

I - energy units

kWh (without digit after comma)	A
MWh (with 3 digits after comma)	D
GJ (with 3 digits after comma)	G
Gcal (with 3 digits after comma)	J
MBtu (with 3 digits after comma)	M
(units with other digits after comma on request)	

O - verification

0	without approval mark
1	with approval mark
2	with approval mark and certificate
3	with approval mark and verification

NN - country code

00	Neutral code with doc's in English
BY	Belarus
BA	Bosnia
BG	Bulgaria
CN	China
HR	Croatia
CZ	Czech Republic
DK	Denmark
EE	Estonia
KZ	Kazakhstan
KG	Kirghizia
LV	Latvia
LT	Lithuania
MK	Macedonia
MD	Moldova
XM	Montenegro
PL	Poland
RO	Romania
RU	Russia
CS	Serbia
SK	Slovak Republic
SI	Slovenia
TJ	Tajikistan
TM	Turkmenistan
UA	Ukraine
UZ	Uzbekistan

M - connections (sets)

0	without
1	screwing set R ½" x G ¾ B
2	screwing set R ¾" x G 1 B
3	screwing set R 1" x G 1¼ B
4	screwing set R 1½ x G 2 B
5	weld-on tail pieces x G 1¼ B
6	weld-on tail pieces x G 2 B

L - accessories / pocket

0	without
for ø 5.2 mm temperature sensors (piece/pair)	
A	brass-pockets, 34 mm
B	brass-pockets, 50 mm
C	brass-pockets, 70 mm
D	brass-pockets, 85 mm
E	brass-pockets, 120 mm
for ø 6 mm temperature sensors (piece/pair)	
K	brass-pockets, 40 mm
L	brass-pockets, 85 mm
M	brass-pockets, 120 mm
N	stainless steel-pockets, 85 mm
O	stainless steel-pockets, 120 mm
P	stainless steel-pockets, 155 mm
Q	stainless steel-pockets, 210 mm
R	ball valve DN 15 - ½" for direct sensor (1 piece)
S	ball valve DN 20 - ¾" for direct sensor (1 piece)
T	ball valve DN 25 - 1" for direct sensor (1 piece)
U	adapter for direct sensor (1 piece)

K - temperature sensor mounting

1	one sensor mounted in the SONO 1500CT (only for direct sensor and 5.2 mm sensor qp 0.6 to 2.5 m³/h) ¹
2	indirect mounting (2 free sensors) ²
¹ one sensor pocket available	
² two sensor pockets available	

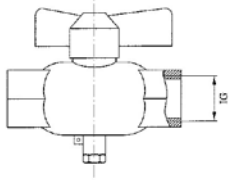
J - temperature sensors (pair)

0	without sensors
A	Pt 500 / direct sensor ø 3.3 mm / 1.5 m cable
B	Pt 500 / direct sensor ø 3.3 mm / 3.0 m cable
C	Pt 100 / ø 5.2 mm / 2 m cable
E	Pt 500 / ø 5.2 mm / 2 m cable
F	Pt 500 / ø 5.2 mm / 3 m cable
G	Pt 500 / ø 5.2 mm / 5 m cable
H	Pt 500 / ø 5.2 mm / 10 m cable
I	Pt 500 / ø 6.0mm / 1,5m cable
J	Pt 500 / ø 6.0 mm / 3 m cable
K	Pt 500 / ø 6.0 mm / 5 m cable
L	Pt 500 / ø 6.0 mm / 10 m cable
M	Pt 500 / ø 6.0mm / 20m cable (heat meter without approval)
(standard: with EN-approval)	

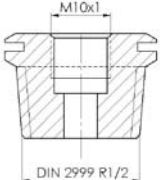
Ordering continued
Modules

	Designation	Code No.
Communication	M-Bus	542 000 01
	RS 232	542 000 07
	RS 232 with data cable	542 000 30
	Data cable for RS 232	087H0121
	Radio	542 000 17
Function	Module for 2 additional pulse inputs	542 000 03
	Module for volume and energy pulse outputs	542 000 02
	Module for 2 pulse inputs + 1 pulse output	542 000 26
Supply voltage	Mains unit 230 V AC	542 000 04
	Mains unit 24 V AC	542 000 05
	Battery 3.0 V DC (12 years)	542 000 06
	Battery 3.6 V DC (16 years) incl. power regulator	542 000 16
	Battery 3.6 V DC (16 years) without power regulator (only for meters with radio modules)	300 078 3

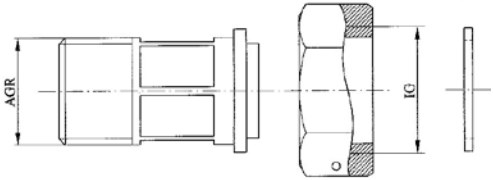
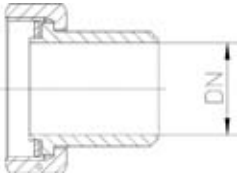
Accessories
Ball valves

	Dimension (IG)		Code No.
	G 1/2"		087HY004
	G 3/4"		087HY005
G 1"		087HY006	

Adapter for mounting temperature sensors

	Coupling thread	Sensor thread	Code No.
	R 1/2"	M10 x 1	087HY003

Tailpieces

	Threaded	Dimension (AGR x IG)	Code No.
		R 1/2" x G 3/4"	803 014
R 3/4" x G 1"	803 016		
R 1" x G 1 1/4"	803 018		
R 1 1/2" x G 2"	803 022		
	Weld-on	DN 25 x G 1 1/4"	816 263
		DN 40 x G 2"	816 264

Software

The HYDRO-SET parameterization software based on the M-Bus is a convenient tool for handling the heat meter. The HYDRO-SET software is available on web site www.hydrometer.de.

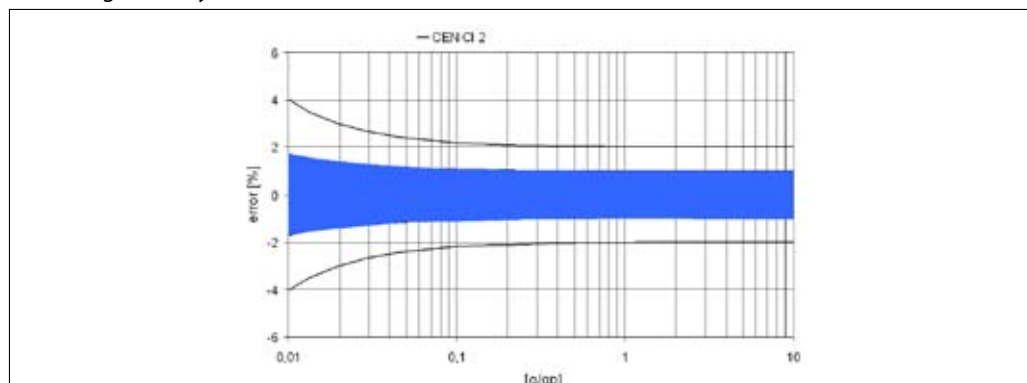
It runs on Windows 98 or later and is used for:

- commissioning
- reading out measured values
- printing out heat meter logs
- heat meter configuration

Technical data

Flow rate ranges	Nominal	q_p m ³ /h	0.6				1 / 1.5				2.5			3.5			6																			
	Maximum	q_s m ³ /h	1.2				2 / 3				5			7			12																			
	Minimum	q_i l/h	6				10 / 6				10			35			24																			
	Starting	l/h	1				2.5				4			7			7																			
Diameter	Nominal	DN mm	15		20		15		20		20		25		32		25		32																	
	Connection	AGZ ¹⁾	G¾B	G1B	FL	G¾B	G1B	FL	G1B	FL	G1¼B	FL	G1¼B	FL	G1¼B	FL																				
	Tailpiece	AGV	R½	R¾	-	R½	R¾	-	R¾	-	R1	-	R1	-	R1	-																				
Operating pressure	Maximum	PN bar	16/25		25		16/25		25		16/25		25		25		25																			
Temperature range	Flow sensor	°C	5...130										5...150																							
Medium			circulation water (pH-value: 7 - 10)																																	
Pressure loss	At q_p	Δp mbar	95		85		42 / 95		36 / 75		100		44		128																					
Zeta			21.00		59.37		3.34 / 3.36		9.05 / 8.38		4.02		2.21		5.92		2.18		5.86																	
Flow ratio		k_{vs}	61.56		65.08		154.30 / 153.90		166.67 / 173.21		250.00		527.64		530.33																					
Overall length		mm	110		130		190		110		130		190		260		260																			
Miscellaneous	Complete weight	g	750		760		780		2850		750		760		780		2850		760		780		2850		1500		3500		4800		1500		3500		4800	
Input	Temperature sensors	Type	Pt 100 or Pt 500 with 2-wire leads																																	
	Sensor current	mA	Pt100 peak < 8; rms < 0.015 Pt500 peak < 2; rms < 0.012																																	
	Measuring cycle	T s	Mains unit supply: 1 Battery: 16																																	
	Max. temperature difference	$\Delta\theta_{max}$ K	177																																	
	Min. temperature difference	$\Delta\theta_{min}$ K	3																																	
	Starting temperature difference	$\Delta\theta$ K	0.25																																	
	Absolute temperature measuring range	θ °C	-9.9...189.9																																	
Supply voltage	Operating voltage	U_N	3.0 V DC / 3.6 V DC (Lithium-battery) / 230 V AC / 24 V AC																																	
Basic features	Ambient class		EN 1434 class C / A																																	
	Protection class		calculator: IP 54 flow sensor: IP 54 (heating) / IP 64 (cooling/combined heating/cooling)																																	
	Type		Static heat meter to EN 1434																																	
	Measuring process		Ultrasonic volume measurement																																	
Display indication	Display		LCD, 7-digit																																	
	Units		MWh – kWh – GJ – Gcal – MBtu																																	
	Total values		9 999 999 – 999 999.9 – 99 999.99 – 9 999.999																																	
	Values displayed		Power - energy - flow rate - temperature																																	

¹⁾ FL - flanged connection

Measuring accuracy to EN 1434 Class 2


Design and function

The SONOMETER™1000 as a compact heat meter consists of the following components:

- Ultrasonic flow sensor;
- Calculator with integral hardware and software for measuring flow rate, temperature and energy consumption;
- Temperature sensors.

Calculator

The calculator contains all the necessary circuits for recording the flow rate and temperature and for calculating, logging and displaying the data. The calculator housing can be mounted directly on the flow sensor or on the wall. The heat meter can be conveniently read from a single-line 7-digit display with units and symbols. A push-button provides user-friendly control of the various display loops. All failures and faults are recorded automatically and shown on the LC display. To protect the reading data, all the relevant data are saved in a non-volatile memory (EEPROM). This memory saves the measured values, device parameters and types of error at regular intervals.

Ultrasonic flow sensor

The ultrasonic technology of the flow sensor permits very high measuring accuracy and can be used in the supply or return line. The flow sensor meets the requirements of EN 1434 / class 2 and 3. The standard cable length between the calculator and the flow sensor is 1.5 m (optional 5 m).

Supply voltage:

- Lithium battery 3.0 V DC (12-year life)
- Lithium battery 3.6 V DC (16-year life– optional)
- Mains unit 230 V AC or 24 V AC

Temperature Sensors

Pairs of Pt 100 or Pt 500 temperature sensors with 2-wire leads are used.

Interfaces

The SONOMETER™1000 is equipped as standard with a ZVEI optical interface with the M-Bus protocol as per EN 1434. This interface is used, for example, for communication with the HYDRO-SET parameterization software. The heat meter is equipped with two slots, one slot for communication, the second slot for pulse modules.

The following communication modules are available as options:

- Real Data Radio module
- M-Bus module to EN 1434
- RS 232 module

The RS 232 module is a serial interface and permits data exchange with the heat meter.

The Radio module communicates a list of predefined data records. This can be edited by HYDRO-SET.

Pulse Input

Two additional pulse inputs are available. The pulse value and the unit is configurable for heat, water, gas or electrical meter by HYDRO-SET. Also two accounting day's are available for both inputs.

Pulse Output

The heat meter provides levels for two optional external pulse outputs, which can be freely programmed using the HYDRO-SET software.

Possible pulse output values

- Energy
- Volume
- Tariff energy 1
- Tariff energy 2
- Tariff condition 1, limit switch
- Tariff condition 2, limit switch
- Energy error
- Volume error

Module combinations

The following module combinations for data transmission are available ex works or for retrofitting in the field (two slots):

- Pulse input module
- Pulse output module
- Pulse input module and pulse output module
- Communication modules:
 - M-Bus or
 - RS 232 or
 - radio
- In combination with
 - pulse output module
 - pulse input module

Event Memory

- Events such as changes and faults are stored in a non-volatile memory with a capacity of up to 31 entries. The following events are recorded:
 - Checksum error
 - Temperature measurement error
 - Ultrasonic echo time measurement errors
 - Start and end of test mode

Monthly Memory

The SONOMETER™1000 has a history memory of 24 months. The following values are stored in the EEPROM on the programmed date 1 ... 31 of the actual month:

- Date/ Time
- Energy
- Tariff energy 1
- Tariff energy 2
- Tariff definition 1
- Tariff definition 2
- Impulse counter 1
- Volume
- Error day counter
- Maximum monthly flow rate
- Maximum monthly power
- Date of maximum monthly flow rate
- Date of maximum monthly power
- Impulse counter 2

**Design and function,
continued**
Log Memory

The log memory is used to store consumption values. The storage frequency can be selected from various storage intervals (1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60 minutes or the default setting of 24 hours).

The data saved in the log memory can be used for the following analyses:

- Reading the calculator on a certain day.

Example: If the day for reading is 01.10, the calculator reading is displayed for the period from 01.10 of the previous year to 30.09 of the current year.

- Comparison of the last consumption period with the preceding period

Extract of possible log memory settings

Storage interval	Values	Number of data records	Recording period
5 minutes	Error status, overload time temperature, overload time flow rate, supply temperature, return temperature, date and time, energy, tariff energy 1, tariff energy 2, tariff definition 1, tariff definition 2, volume, error day counter	440	36.6 hours
15 minutes		440	110 hours
1 hour		440	18.3 days
24 hours		440	440 days

Max. Values

The calculator creates maximum values for power and flow rate based on consumption time, which are stored in the EEPROM. The integration intervals are adjustable to 6, 15, 30 or 60 minutes and 24 h. Default setting is 60 minutes.

Tariff Function

The calculator offers two optional tariff memories for monitoring plant load states for limit tariffs. Extensive tariff conditions make it possible to adapt the heat meter individually to the required customer-specific applications. The following limit types are possible: (This example applies to the display with 3 decimal places)

Type	LIMIT	LIMIT resolution
ΔT	1 ... 190 °C	1 °C
T_R	1 ... 190 °C	1 °C
P	1 ... 255 kW	1 kW
Q	100 ... 25 500 l/h	100 l/h

According to above table the energy or the time (in hours) how long the tariff condition is fulfilled will be stored in the tariff memories.

Display Control

The readings are displayed on the calculator by a 7-digit LCD with units and symbols.

Loop Structure

The SONOMETER™1000 display has six loops. Some display windows consist of two (to maximum seven) displays that are shown alternately at 4-second intervals.

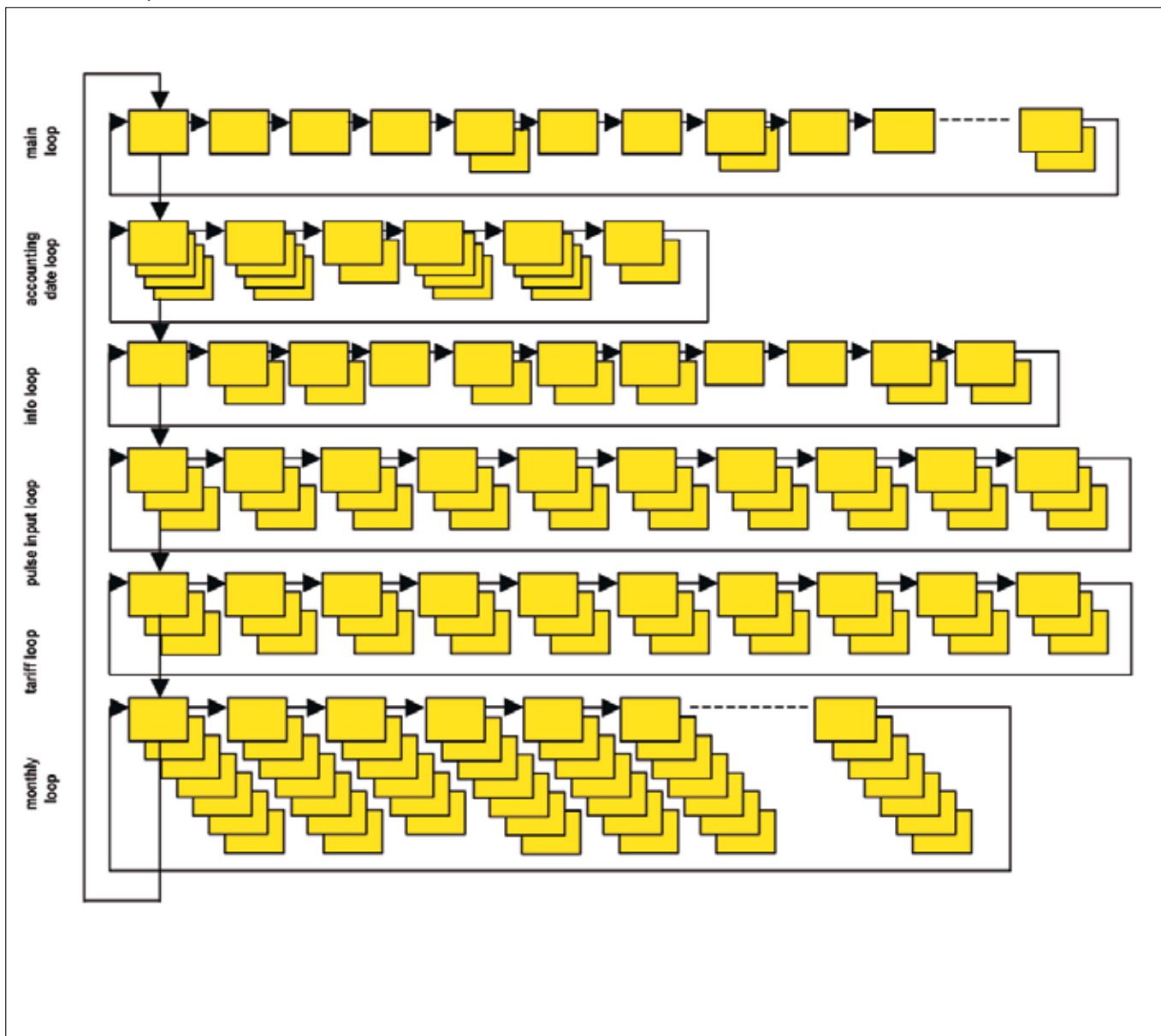
Some pictures in loops or a complete loop can be deactivated separately.



For quick visual guidance, the loops in the display are numbered from 1 to 6.

The main loop with the current data, e.g. for energy, volume and flow rate is programmed as default setting.

Overview of Loops



Informative Displays (Standard)

Loop	Sequence	Window 1	Window 2	Window 3	Window 4
"1" Main loop	1.1	Accumulated Energy			
	1.2	Volume			
	1.3	Flow			
	1.4	Power			
	1.5	Supply temperature	Return temperature		
	1.6	Difference temperature			
	1.7	Operating hours			
	1.8[off]	Monthly peak power	Date		
	1.9	Error code			
	1.10	Display test			
	1.11[off]	Tariff energy 1			
	1.12[off]	Tariff energy 2			
	1.13[off]	'In 1'	Pulse input counter 1		
	1.14[off]	'In 2'	Pulse input counter 2		
Loop	Sequence	Window 1	Window 2	Window 3 [off]	Window 4
"2" Accounting date loop	2.1	Accounting date 1	Accounting date 1 energy	Accounting date 1 volume	,Accd 1'
	2.2	Accounting date 1 previous year	Accounting date 1 previous year energy	Accounting date 1 previous year volume	,Accd 1'
	2.3	,Accd 1'	Accounting date 1 in the future		
	2.4	Accounting date 2	Accounting date 2 energy	Accounting date 2 volume	,Accd 2'
	2.5	Accounting date 2 previous year	Accounting date 2 previous year energy	Accounting date 2 previous year volume	,Accd 2'
	2.6	,Accd 2'	Accounting date 2 in the future		
Loop	Sequence	Window 1	Window 2	Window 3	Window 4
"3" Info loop	3.1	Current date			
	3.2	,SEC_Adr'	Secondary address		
	3.3	,Pri_Adr'	Primary address		
	3.4	, Pt 100 r' or , Pt 500 r'			
	3.5	Monthly peak flow rate	Date max. flow rate		
	3.6	Monthly peak power	Date max. power		
	3.7	Integration interval (maximum value)			
	3.8	Number of error day's			
	3.9	,Out1'	Pulse value and unit pulse output 1		
	3.10	,Out2'	Pulse value and unit pulse output 2		
"4" Pulse input loop	4.1	,In1'	Pulse input counter 1	Pulse value 1	
	4.2	,In2'	Pulse input counter 2	Pulse value 2	
	4.3[off]	Accounting date 1	,In1'	Acc.date 1 Pulse value 1	
	4.4[off]	Accounting date 1	,In2'	Acc.date 1 Pulse value 2	
	4.5[off]	Accounting date 1 previous year	,In1'	Acc.date 1 previous year Pulse value 1	
	4.6[off]	Accounting date 1 previous year	,In2'	Acc.date 1 previous year Pulse value 2	
	4.7[off]	Accounting date 2	,In1'	Acc.date 2 Pulse value 1	
	4.8[off]	Accounting date 2	,In2'	Acc.date 2 Pulse value 2	
	4.9[off]	Accounting date 2 previous year	,In1'	Acc.date 2 previous year Pulse value 1	
	4.10[off]	Accounting date 2 previous year	,In2'	Acc.date 2 previous year Pulse value 2	

[off] = not active

Loop	Sequence	Window 1	Window 2	Window 3	Window 4	Window 5	Window 6	Window 7
"5" Tariff loop	5.1[off]	Tariff energy 1	Tariff function 1 (e.g. ,t 01')	Limit tariff 1				
	5.2[off]	Tariff energy 2	Tariff function 2 (e.g. ,t 02')	Limit tariff 2				
	5.3[off]	Accounting date 1	Accounting date 1 tariff energy 1	,Accd 1'				
	5.4[off]	Accounting date 1	Accounting date 1 tariff energy 2	,Accd 1'				
	5.5[off]	Accounting date 1 previous year	Accounting date 1 tariff energy 1	,Accd 1'				
	5.6[off]	Accounting date 1 previous year	Accounting date 1 tariff energy 2	,Accd 1'				
	5.7[off]	Accounting date 2 tariff energy 1	Accounting date 2 tariff energy 1	,Accd 2'				
	5.8[off]	Accounting date 2	Accounting date 2 tariff energy 2	,Accd 2'				
	5.9[off]	Accounting date 2 previous year	Accounting date 2 tariff energy 2	,Accd 2'				
	5.10 [off]	Accounting date 2 previous year	Accounting date 2 tariff energy 2	,Accd 2'				
Loop	Sequence	Window 1	Window 2	Window 3 [off]	Window 4 [off]	Window 5	Window 6	Window 7
"6" Monthly value loop	6.1	Last month	Energy	Tariff energy 1	Tariff energy 2	Volume	Max. flow rate	Max. Power
	6.2	Month -1	Energy	Tariff energy 1	Tariff energy 2	Volume	Max. flow rate	Max. Power
	6.3	Month -2	Energy	Tariff energy 1	Tariff energy 2	Volume	Max. flow rate	Max. Power
	...							
	6.24	Month -23	Energy	Tariff energy 1	Tariff energy 2	Volume	Max. flow rate	Max. Power

[off] = not active

Simple operation

A push-button mounted on the front of the calculator is used to switch to the various displays. The button can be pressed for a short or long time. A short press of the button (<3 seconds) switches to the next display within a loop and a long press (>3 seconds) switches to the next display loop. The "Energy" window (sequence 1.1) in the main loop is the basic display.

The calculator switches automatically to power save mode if the button is not pressed for approx. 4 minutes and returns to the basic display when the button is pressed again. The loop settings can be programmed to suit the customer's individual requirements using the HYDRO-SET software.

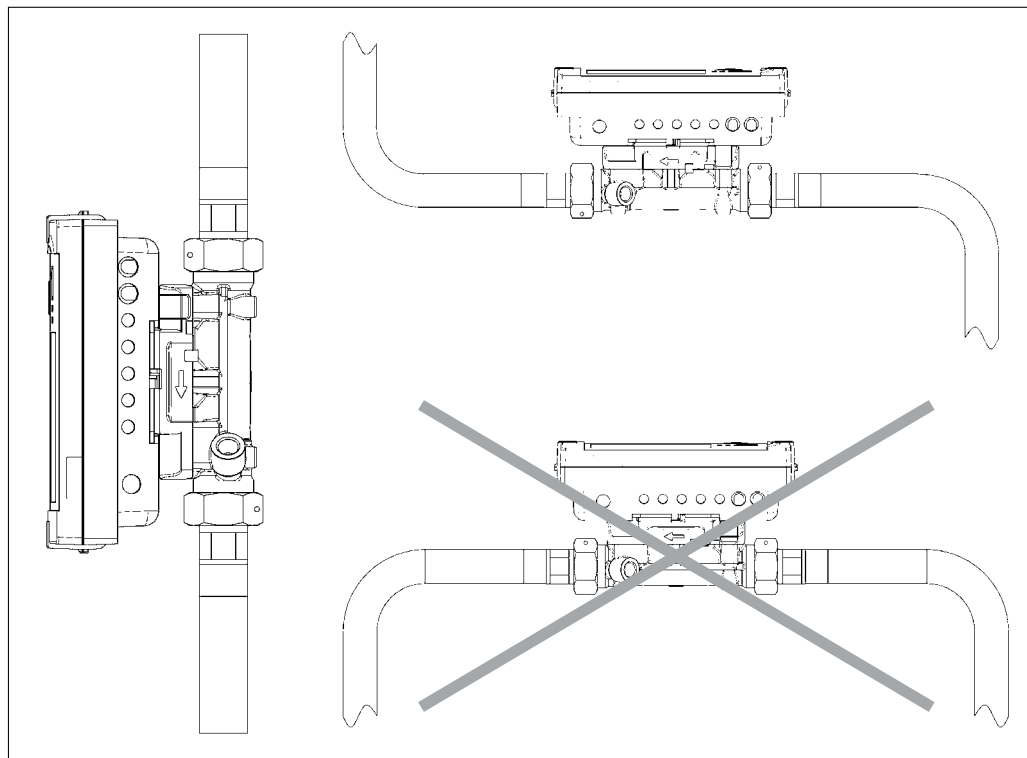
Mounting

Depending on the design, the heat meter is installed either in the supply or return line as indicated on the data plate. The heat meter is to be installed so that the direction of flow corresponds to the direction of the arrow on the flow sensor.

Ensure that the flow sensor is always filled with liquid on completion of installation. **Straight inlet/outlet pipes (calming sections) are not required for the flow sensor.** The heat meter can be installed in both horizontal and vertical pipe sections, but every time so that air bubbles cannot collect in the flow sensor. For low flow we recommend to mount the flow sensor tilted 90° into the pipe.

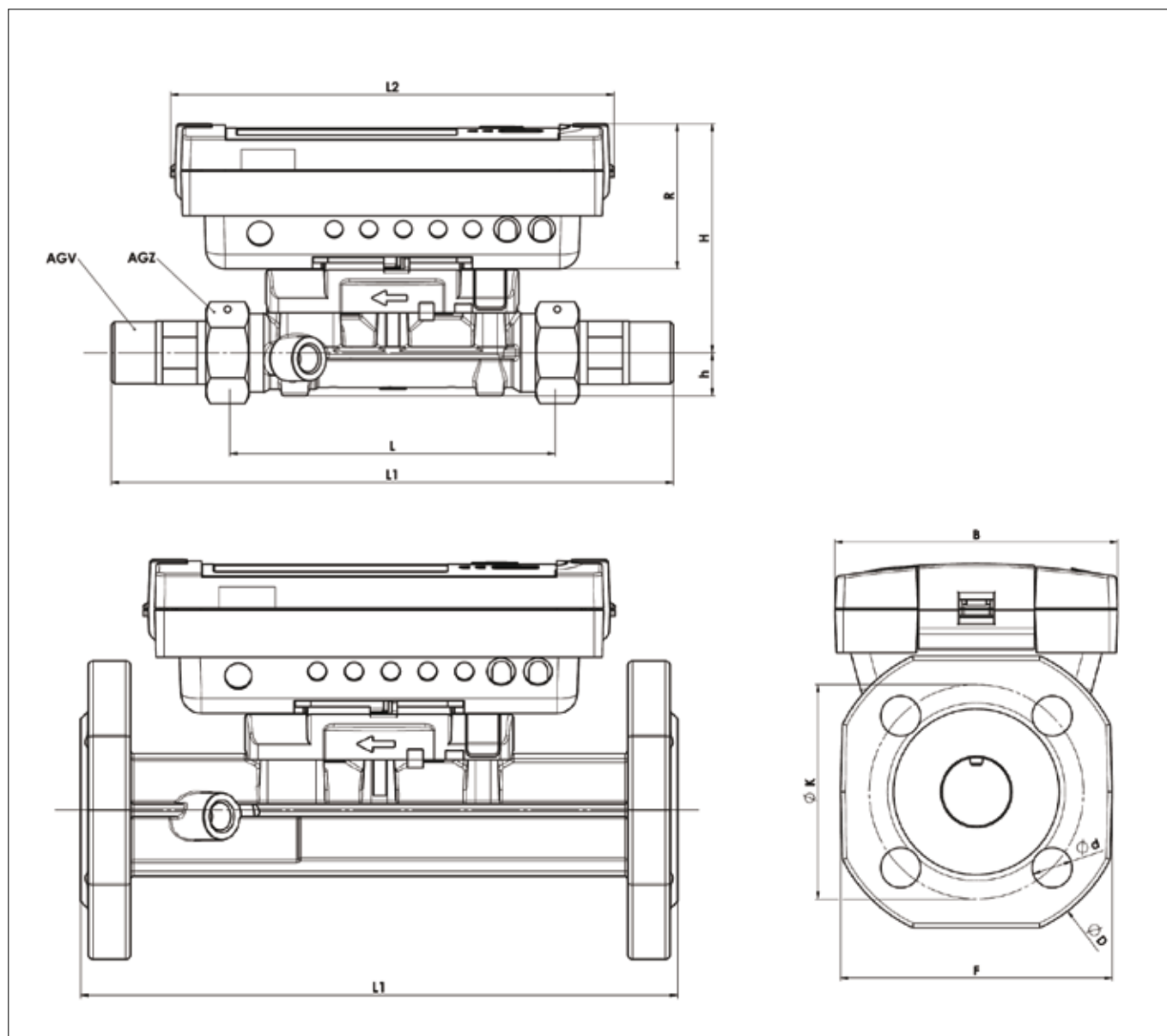
Make sure the heat meter is installed sufficiently far away from possible sources of electromagnetic interference (switches, electric motors, fluorescent lamps, etc.).

For cooling application and for medium temperatures more than 90° C, the calculator must be mounted on the wall at a sufficient distance away from heat sources using the holder supplied. It is recommended that stop valves be fitted before and after the heat meter to simplify dismantling the heat meter. The heat meter should be installed in a convenient position for service and operating personnel.



For the further information pls. refer to the SONOMETER™1000's instructions.

Dimensions



Nominal size	$q_p=0.6 \text{ m}^3/\text{h}$				$q_p=1.0 / 1.5 \text{ m}^3/\text{h}$				$q_p=2.5 \text{ m}^3/\text{h}$			$q_p=3.5 \text{ m}^3/\text{h}$			$q_p=6.0 \text{ m}^3/\text{h}$		
	L [mm]	L1 [mm]	L2 [mm]	B [mm]	R [mm]	H [mm]	h [mm]	AGZ	AGV	D [mm]	d [mm]	F [mm]	K [mm]	Weight [kg]			
L [mm]	110	130	190	190	110	130	190	190	130	190	190	260	260	260	260	260	260
L1 [mm]	190	230			190	230			230			-	-	-	-	-	-
L2 [mm]						150									150		
B [mm]						100									100		
R [mm]						50									50		
H [mm]	78	80	80	80	78	80	80	80	80	80	80	84.5	84.5	84.5	84.5	84.5	84.5
h [mm]	14.5	18	18	47.5	14.5	18	18	47.5	18	18	47.5	23	50	62.5	23	50	62.5
AGZ	G $\frac{3}{4}$ B DN 15	G1B DN 20	G1B DN 20	FL DN 20	G $\frac{3}{4}$ B DN 15	G1B DN 20	G1B DN 20	FL DN 20	G1B DN 20	G1B DN 20	FL DN 20	G1 $\frac{1}{4}$ B DN 25	FL DN 25	FL DN 32	G1 $\frac{1}{4}$ B DN 25	FL DN 25	FL DN 32
AGV	R $\frac{1}{2}$	R $\frac{3}{4}$	R $\frac{3}{4}$	-	R $\frac{1}{2}$	R $\frac{3}{4}$	R $\frac{3}{4}$	-	R $\frac{3}{4}$	R $\frac{3}{4}$	-	R1	-	-	R1	-	-
D [mm]	-	-	-	105	-	-	-	105	-	-	105	-	114	139	-	114	139
d [mm]	-	-	-	14	-	-	-	14	-	-	14	-	14	18	-	14	18
F [mm]	-	-	-	95	-	-	-	95	-	-	95	-	100	125	-	100	125
K [mm]	-	-	-	75	-	-	-	75	-	-	75	-	85	100	-	85	100
Weight [kg]	0.76	0.85	0.96	2.75	0.76	0.85	0.96	2.75	0.85	0.96	2.75	1.5	3.5	4.8	1.5	3.5	4.8

Dimensions, continued

Temperature sensors

	Designation	Type	Dimension D (mm)	L (mm)
	Direct mounted (DS)	Pt 500	ø 3.3	27.5
	ø 5.2		45	
	Pocket sensor (PS)		Pt 100	ø 5.2

Sensor pockets

	Type	Brass						Stainless steel					
	Sensor dimension (mm)	ø 5.2			ø 6.0			ø 6.0					
Length	L ₁ (mm)	42	58	78	93	128	47	92	127	98	133	168	223
	L (mm)	34	50	70	85	120	40	85	120	85	120	155	210

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