

## Data sheet

# SONOMETER™1000

## Ultrasonic compact heat meter

### Description/Application



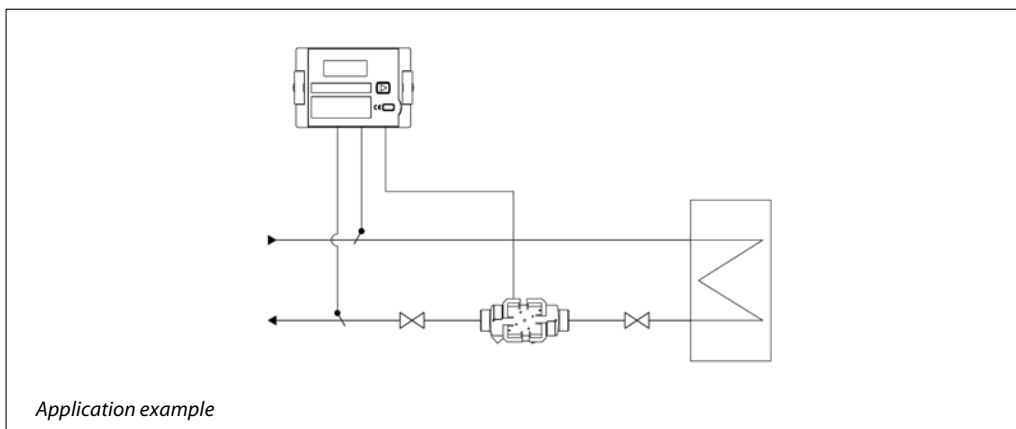
The SONOMETER™1000 is a static compact heat meter with fully electronic measurement based on the ultrasonic principle. It is especially designed for measuring the water and energy consumption in district heating or cooling networks.

### Features

- 1st. approval in Europe for ultrasonic heat meter with dynamic range of  $q_1/q_p$  1:250 in class 2 ( $q_p$  1,5 / 2,5 / 6 m<sup>3</sup>/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 meter design
- housings up to 190 mm thread and flange (PN16/25)
- Can be used as cooling, heating or combined climatic meter
- Temperature range 5-130/150 °C
- Overload temperature up to 150 °C  
( $q_p = 0,6 - 2,5$  m<sup>3</sup>/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 m<sup>3</sup>/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 - flowmeter

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 - pressure

PN16	C
PN25	D

D - cable length between calculator and flowmeter

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

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

<b>modules slot 1</b>	
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
<b>modules slot 2</b>	
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
<b>for 5.2 mm temperature sensors (pair)</b>	
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
<b>for 6 mm temperature sensors</b>	
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)
2	indirect mounting (2 free sensors)

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
D	Pt 100 / ø 6.0 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 6.0 mm / 2 m 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 6.0 mm / 20 m cable

(standard: with EN-approval)

**Modules**

	Designation	Code No.
Communication	M-Bus	<b>542 000 01</b>
	RS 232	<b>542 000 07</b>
	RS 232 with data cable	<b>542 000 30</b>
	Data cable for RS 232	<b>087H0121</b>
	Radio	<b>542 000 17</b>
Function	Module for 2 extra pulse inputs	<b>542 000 03</b>
	Module for volume and energy pulse outputs	<b>542 000 02</b>
Supply voltage	Mains unit 230 V AC	<b>542 000 04</b>
	Mains unit 24 V AC	<b>542 000 05</b>
	Battery 3,0 V DC (12 years)	<b>542 000 06</b>
	Battery 3,6 V DC (16 years, incl. Regulator)	<b>542 000 16</b>

**Accessories**
**Temperature sensors**

	Designation	Type	Diameter (mm)	Length (mm)	Cable length (m)	Code No.
	Temperature sensor pair for pockets or direct mounting		Pt 500	Ø 5.2	46	2
3						<b>541 000 09</b>
5			<b>541 000 10</b>			
10			<b>541 000 11</b>			
Pt 100			2			<b>541 000 07</b>

**Ball valves**

	Designation	Quantity	Internal thread	Code No.
	Ball valve	1	G 1/2"	<b>087HY004</b>
			G 3/4"	<b>087HY005</b>
			G 1"	<b>087HY006</b>

**Adapter for mounting temperature sensors**

	Coupling thread	Sensor thread	Code No.
	R1/2"	M10 x 1	<b>087HY003</b>

**Tailpieces for ultrasonic compact heat meter SONOMETER™1000**

	Threaded connection AGR	Inside threading cap nut IG	Code No.
	G 1/2"	G 3/4"	<b>803 014</b>
	G 3/4"	G 1"	<b>803 016</b>
	G 1"	G 1 1/4"	<b>803 018</b>

**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.hydrrometer.de](http://www.hydrrometer.de).

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

- taking into operation
- reading out measured values
- printing out meter logs
- meter configuration

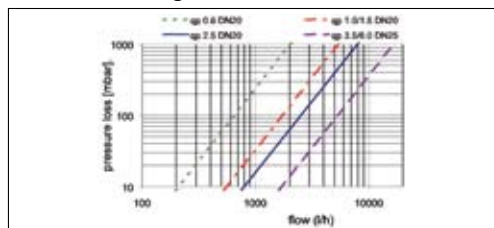
Technical data

Energy meter		q <sub>p</sub> m <sup>3</sup> /h	0.6				1,0 / 1.5				2.5			3.5			6,0			
Basic features	Ambient class		EN 1434 class C / A																	
	Protection class		calculator: IP 54 flowmeter: IP 54 (heating) / IP 64 (cooling/climatic)																	
	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																	
Flow rate ranges	Maximum	q <sub>s</sub> m <sup>3</sup> /h	1.2				2 / 3				5			7			12			
	Nominal	q <sub>p</sub> m <sup>3</sup> /h	0.6				1 / 1.5				2.5			3.5			6			
	Minimum	q <sub>i</sub> l/h	6				10 / 6				10			35			24			
	Starting	l/h	1				2,5				4			12			12			
Temperature range	Volume measuring component	°C	5...130									5...150								
Pressure loss	At q <sub>p</sub>	Δp mbar	85				36 / 75				100			44			128			
Operating pressure	Maximum	PN bar	16/25		25		16/25		25		16/25		25		25		25			
			AGZ <sup>1)</sup>		G <sup>3</sup> / <sub>4</sub> B	G1B	G1B	FL	G <sup>3</sup> / <sub>4</sub> B	G1B	G1B	FL	G1B	G1B	FL	G1 <sup>1</sup> / <sub>4</sub> B	FL	FL	G1 <sup>1</sup> / <sub>4</sub> B	FL
Diameter	Nominal	DN mm	15	20	20	20	15	20	20	20	20	20	20	25	25	32	25	25	32	
			R <sup>1</sup> / <sub>2</sub>	R <sup>3</sup> / <sub>4</sub>	R <sup>3</sup> / <sub>4</sub>	-	R <sup>1</sup> / <sub>2</sub>	R <sup>3</sup> / <sub>4</sub>	R <sup>3</sup> / <sub>4</sub>	-	R <sup>3</sup> / <sub>4</sub>	R <sup>3</sup> / <sub>4</sub>	-	R1	-	-	R1	-	-	
			AGV <sup>2)</sup>	R <sup>1</sup> / <sub>2</sub>	R <sup>3</sup> / <sub>4</sub>	R <sup>3</sup> / <sub>4</sub>	-	R <sup>1</sup> / <sub>2</sub>	R <sup>3</sup> / <sub>4</sub>	R <sup>3</sup> / <sub>4</sub>	-	R <sup>3</sup> / <sub>4</sub>	R <sup>3</sup> / <sub>4</sub>	-	R1	-	-	R1	-	-
Overall length		mm	110	130	190	110	130	190	130	190	260	260								
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	Δθ <sub>max</sub> K	177																	
	Min. temperature difference	Δθ <sub>min</sub> K	3																	
	Starting temperature difference	Δθ K	0.25																	
	Absolute temperature measuring range	θ °C	-9.9...189.9																	
Supply voltage	Operating voltage	U <sub>N</sub>	3.0 V DC / 3.6 V DC (Lithium-battery) / 230 V AC / 24 V AC																	
Miscellaneous	Complete weight	g	750	760	780	2850	750	760	780	2850	760	780	2850	1500	3500	4800	1500	3500	4800	
Flow resistance coefficient	Zeta		21.3	67.5	67.5	67.5	4.3	13.6	13.6	13.6	4.0	4.0	4.0	2.8	2.8	7.4	2.8	2.8	7.4	

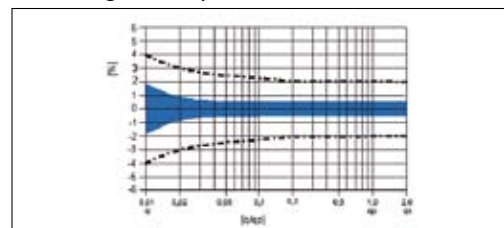
<sup>1)</sup> Connection diameter, FL - flanged connection

<sup>2)</sup> Tailpiece diameter

Pressure loss diagram



Measuring accuracy to EN 1434 Class 2



**Design and function**

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

- Ultrasonic volume measuring component
- Integrator with integral hardware and software for measuring flow rate, temperature and energy consumption
- Temperature sensors

**Integrator**

The integrator contains all the necessary circuits for recording the flow rate and temperature and for calculating, logging and displaying the data. The integrator housing can be mounted directly on the volume measuring component or on the wall. The 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 Volume Measuring Component**

The ultrasonic technology of the volume measuring component permits very high measuring accuracy and can be used in the forward or return line. The volume measuring component meets the requirements of EN 1434 / class 2 and 3. The standard cable length between the calculator and the volume measuring component 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 (Ø 5.2 mm) 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 energy, water, gas or electrical meter by HYDRO-SET. Also two accounting day's are available for both inputs.

**Pulse Output**

The 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

**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 meter on a certain day.  
Example: If the day for reading is 01.10, the meter 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, forward 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 integrator 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.

**Display Control**

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

**Tariff Function**

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

**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



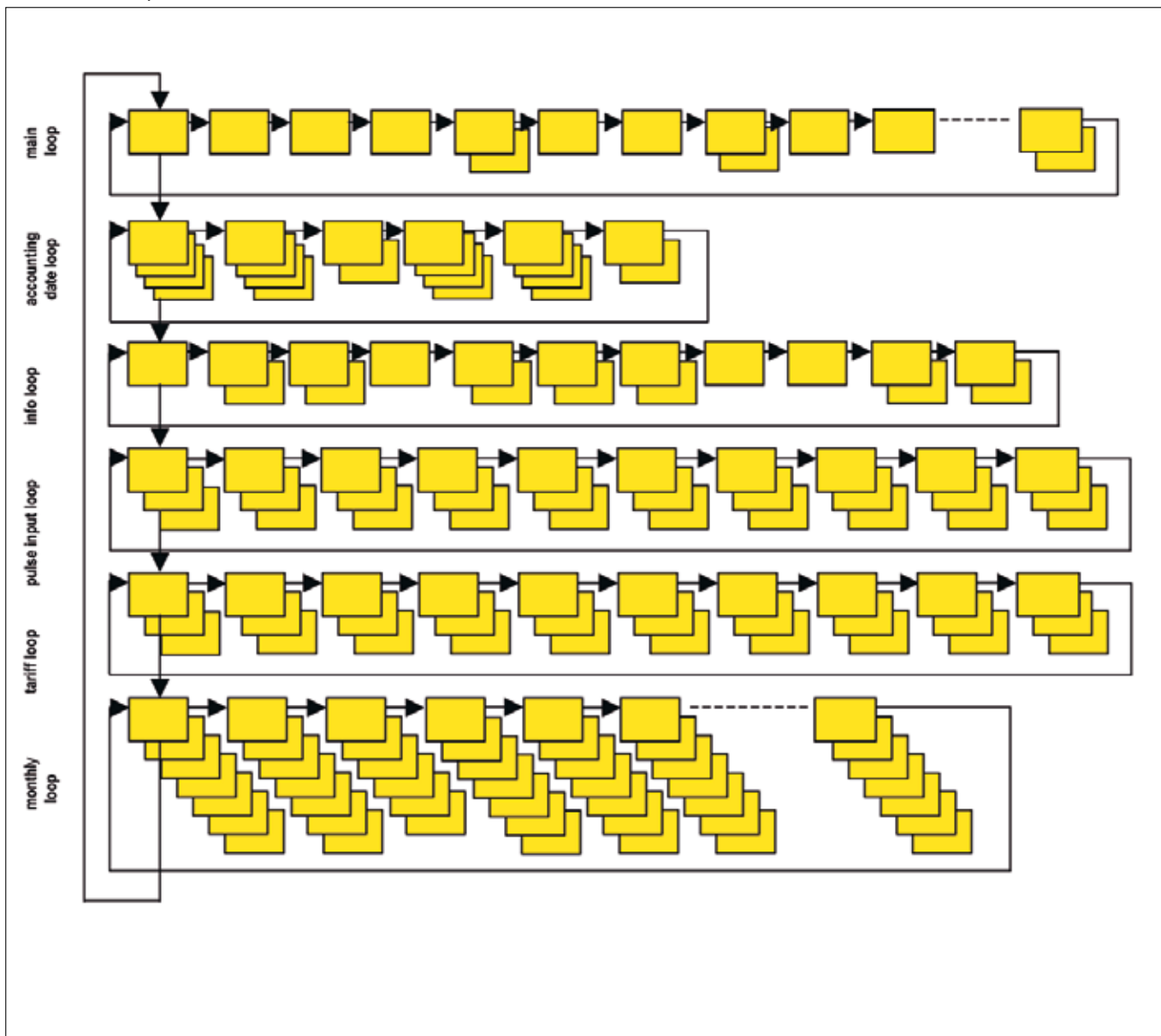
For quick visual guidance, the loops in the display are numbered from 1 to 6.

Type	LIMIT	LIMIT resolution
$\Delta T$	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

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

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

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	Forward 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 meter 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 meter 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.

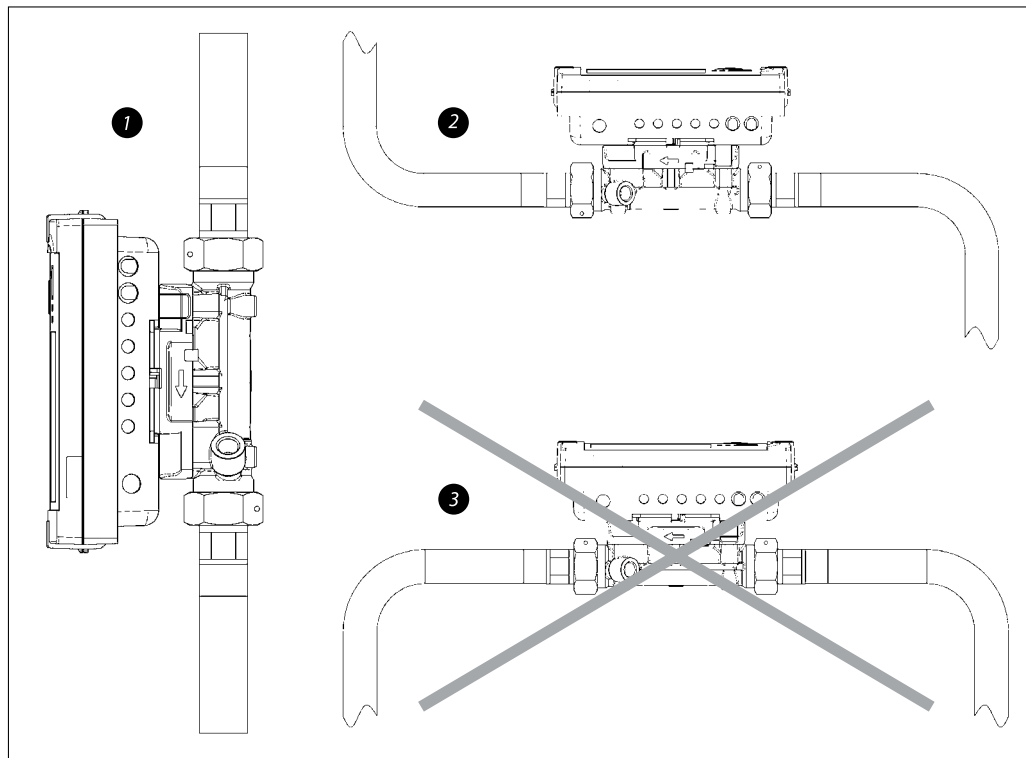
**Mounting**

Depending on the design, the heat meter is installed either in the hot line or cold line as indicated on the type plate. The volume measuring component is to be installed so that the direction of flow corresponds to the direction of the arrow on the volume measuring component.

Ensure that the volume measuring component is always filled with liquid on completion of installation. The calming sections before and after the volume measuring component are not necessary. The meter can be installed in both horizontal and vertical pipe sections, but every time so that air bubbles cannot collect in the meter. For low flow we recommend to mount the flow sensor tilted 90° into the pipe.

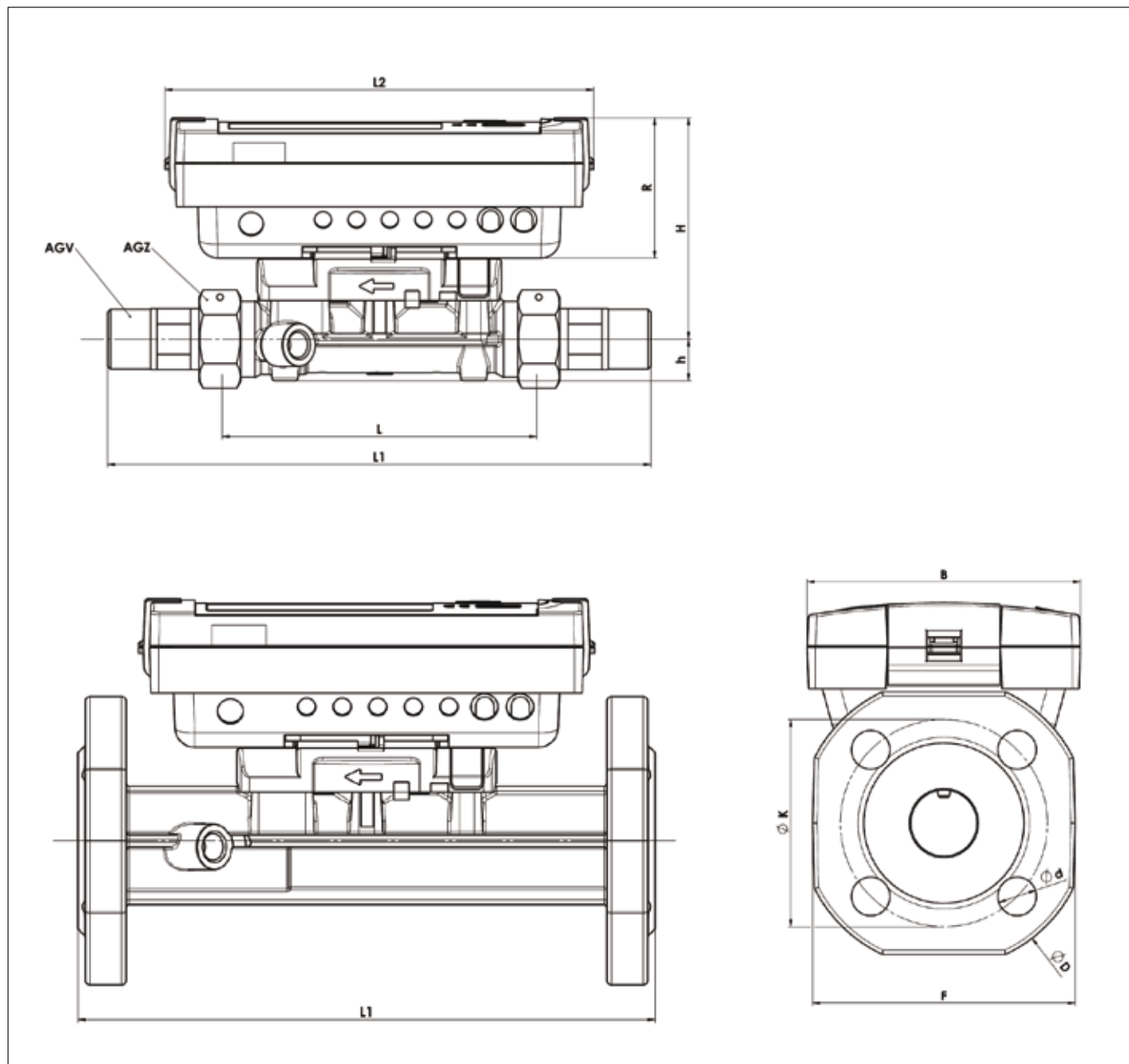
Make sure the meter is installed sufficiently far away from possible sources of electromagnetic interference (switches, electric motors, fluorescent lamps, etc.).

For cooling application and for medium temperatures more than 90° C, the integrator 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 meter should be installed in a convenient position for service and operating personnel.



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

Dimensions



Nominal size	$q_p=0,6 \text{ m}^3/\text{h}$				$q_p=1,0 / 1,5 \text{ m}^3/\text{h}$				$q_p=2,5 \text{ m}^3/\text{h}$		
	110	130	190	190	110	130	190	190	130	190	190
L [mm]	110	130	190	190	110	130	190	190	130	190	190
L1 [mm]	190	230			190	230			230		
L2 [mm]					150						
B [mm]					100						
R [mm]					50						
H [mm]	78	80	80	80	78	80	80	80	80	80	80
h [mm]	14,5	18	18	47,5	14,5	18	18	47,5	18	18	47,5
AGZ	G $\frac{3}{4}$ B DN15	G1B DN20	G1B DN20	DN20	G $\frac{3}{4}$ B DN15	G1B DN20	G1B DN20	DN20	G1B DN20	G1B DN20	DN20
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 $\frac{3}{4}$	-
D [mm]	-	-	-	105	-	-	-	105	-	-	105
d [mm]	-	-	-	14	-	-	-	14	-	-	14
F [mm]	-	-	-	95	-	-	-	95	-	-	95
K [mm]	-	-	-	75	-	-	-	75	-	-	75
Weight [kg]	0,76	0,85	0,96	2,75	0,76	0,85	0,96	2,75	0,85	0,96	2,75

Nominal size	$q_p=3,5 \text{ m}^3/\text{h}$			$q_p=6,0 \text{ m}^3/\text{h}$		
	L [mm]	260	260	260	260	260
L1 [mm]	-	-	-	-	-	-
L2 [mm]	150					
B [mm]	100					
R [mm]	50					
H [mm]	84,5	84,5	84,5	84,5	84,5	84,5
h [mm]	23	50	62,5	23	50	62,5
AGZ	G1¼B	DN 25	DN 32	G1¼B	DN 25	DN 32
AGV	R1	-	-	R1	-	-
D [mm]	-	114	139	-	114	139
d [mm]	-	14	18	-	14	18
F [mm]	-	100	125	-	100	125
K [mm]	-	85	100	-	85	100
Weight [kg]	1,5	3,5	4,8	1,5	3,5	4,8

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