

Data sheet

SONOMETER™1100

Ultrasonic compact energy meter

Description/Application

MID examination certificate
no. : DE-10-MI004-PTB003



The SONOMETER™1100 is an ultrasonic static compact energy meter especially designed for heating, cooling or combined heating/cooling application in local and district energy systems.

The SONOMETER™1100 as a compact energy meter consists of the following components:

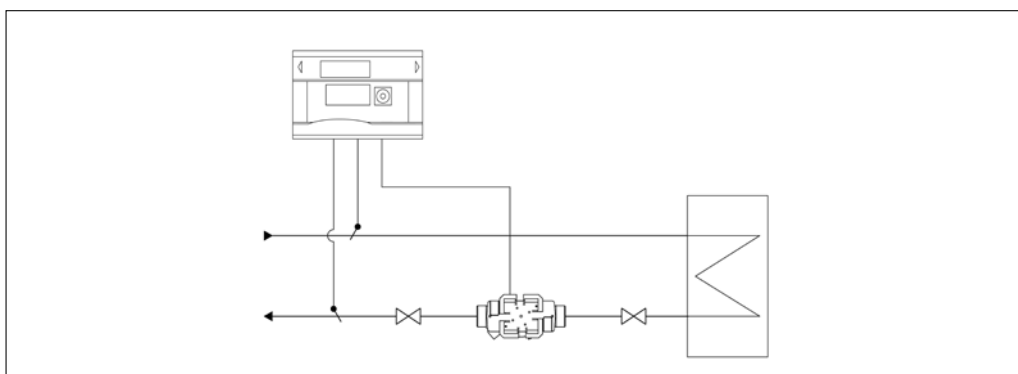
- Ultrasonic flow sensor
- Calculator with integral hardware and software for measuring flow rate, temperature and energy consumption
- Pair of temperature sensors

Features

- 1st. approval in Europe for ultrasonic energy meter with dynamic range of q_v/q_p 1 : 250 in class 2 (q_p 1.5 / 2.5 / 6 / 10 / 15 / 25 / 40 / 60 m³/h)
- Complete dynamic range: \geq 1 : 1500
- Lithium battery, 230 V AC or 24 V AC mains unit
- Battery lifetime 11 years (16 years optional)
- Unique free- beam principle
- Improved service-friendly energy meter design
- Housings with thread and flange (PN 16 / 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
- Lower pressure loss
- Robust stainless steel reflector
- Insensitive to dirt
- Available in nominal sizes q_p 0.6 / 1.5 / 2.5 / 3.5 / 6 / 10 / 15 / 25 / 40 / 60 m³/h
- Approved according to MID in class 2 and 3, and PTB K.7.2 for cooling
- No calming sections necessary in the inlet and/or outlet (standard installation)

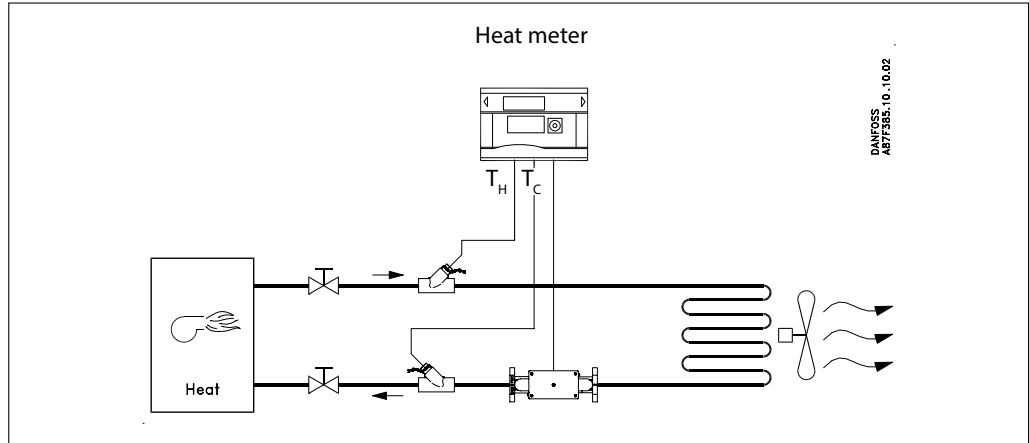
Special Features

- Power save mode
- NOWA test capability
- Remote reading via M-Bus, L-Bus, RS 232, RS 485, Radio or optical interface
- Integrated Radio 868 MHz, Open Metering Standard (OMS)
- Individual remote reading (Automatic Meter Reading) with add on modules Plug&Play
- 2 communication ports (e.g. M-Bus + pulse input)
- Improved radio performance
- Individual tariff functions
- History memory for 24 months
- Extensive diagnostic displays
- Dedicated district energy application telegram
- Suitable for Danfoss ECL Comfort controller and ECL 310 internet portal connection
- IZAR@SET parameterization software on Windows basis guarantees optimum adaptation to the user's specific needs

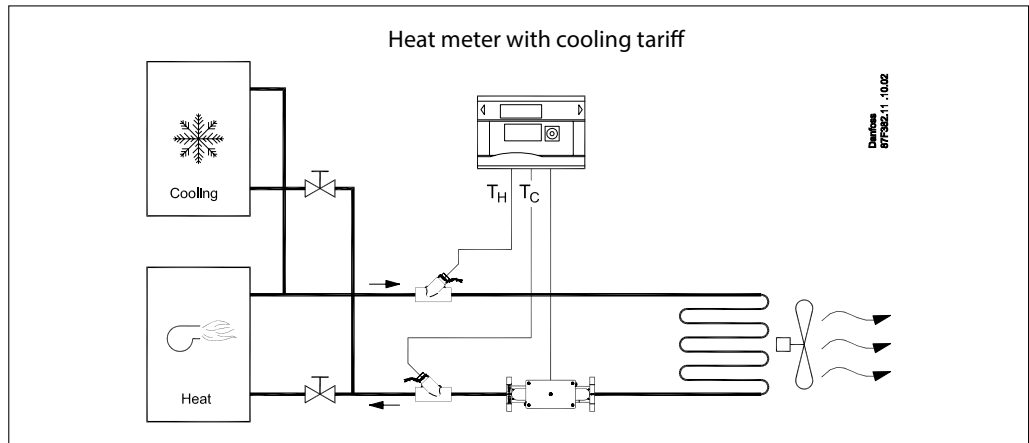


Description/Application, continued

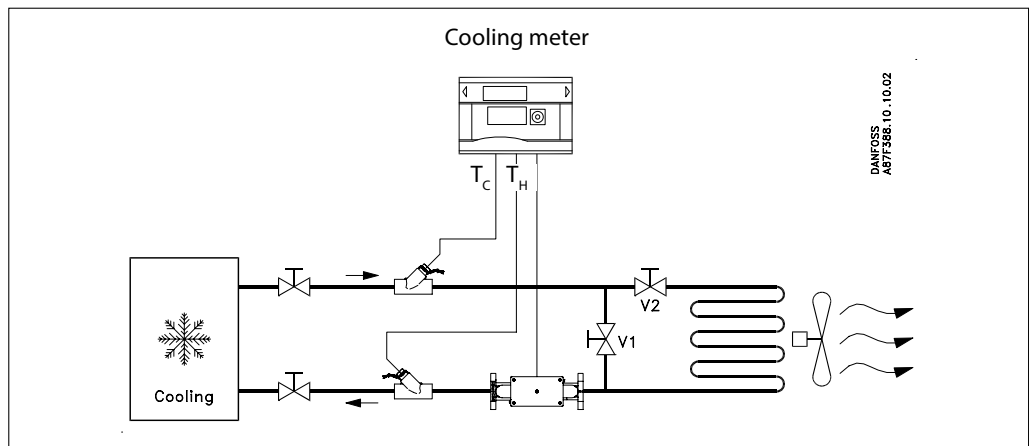
The SONOMETER™1100 is able to handle 3 types of applications (energy meter in outlet):



District heating/boiler application



Combined heating/cooling application



Chilled water application

Ordering:

The standard codes are used for ordering.

Heat meters standard codes ¹⁾:

Code no.	Flow sensor	Nominal pressure	Cable length ²⁾	Module	Energy unit	Cable length ³⁾
087G1040	qp 0.6 m ³ /h / 110mm thread / DN 15 / G¾B	PN16	1.5m	M-Bus	kWh (without digit after comma)	1.9m
087G1041	qp 1.5 m ³ /h / 110mm thread / DN 15 / G¾B	PN16	1.5m	M-Bus	kWh (without digit after comma)	1.9m
087G1042	qp 1.5 m ³ /h / 130mm thread / DN 20 / G1B	PN16	1.5m	M-Bus	kWh (without digit after comma)	1.9m
087G1043	qp 2.5 m ³ /h / 130mm thread / DN 20 / G1B	PN16	1.5m	M-Bus	kWh (without digit after comma)	1.9m
187F1120	qp 3.5 m ³ /h / 260mm thread / DN 25 / G1¼B	PN16	1.5m		kWh (without digit after comma)	1.9m
187F1121	qp 6 m ³ /h / 260mm thread / DN 25 / G1¼B	PN16	1.5m		kWh (without digit after comma)	1.9m
187F1122	qp 6 m ³ /h / 260mm flange DN 32	PN25	1.5m		kWh (without digit after comma)	1.9m
187F1123	qp 10 m ³ /h / 300mm thread / DN 40 / G2B	PN16	1.5m		MWh (with 3 digit after comma)	1.9m
187F1124	qp 10 m ³ /h / 300mm flange DN 40	PN25	1.5m		MWh (with 3 digit after comma)	1.9m
187F1125	qp 15 m ³ /h / 270mm flange DN 50	PN25	3m		MWh (with 3 digit after comma)	2.9m
187F1126	qp 25 m ³ /h / 300mm flange DN 65	PN25	3m		MWh (with 3 digit after comma)	2.9m
187F1127	qp 40 m ³ /h / 300mm flange DN 80	PN25	3m		MWh (with 2 digit after comma)	2.9m
187F1128	qp 60 m ³ /h / 360mm flange DN 100	PN25	3m		MWh (with 2 digit after comma)	2.9m
087G1118	qp 0.6 m ³ /h / 110mm thread / DN 15 / G¾B	PN16	1.5m	Radio OMS	kWh (without digit after comma)	1.9m
087G1224	qp 1.5 m ³ /h / 110mm thread / DN 15 / G¾B	PN16	1.5m	Radio OMS	kWh (without digit after comma)	1.9m
087G1120	qp 1.5 m ³ /h / 130mm thread / DN 20 / G1B	PN16	1.5m	Radio OMS	kWh (without digit after comma)	1.9m
087G1121	qp 2.5 m ³ /h / 130mm thread / DN 20 / G1B	PN16	1.5m	Radio OMS	kWh (without digit after comma)	1.9m
187F1129	qp 3.5 m ³ /h / 260mm thread / DN 25 / G1¼B	PN16	1.5m	Radio OMS	kWh (without digit after comma)	1.9m
187F1130	qp 6 m ³ /h / 260mm thread / DN 25 / G1¼B	PN16	1.5m	Radio OMS	kWh (without digit after comma)	1.9m
187F1131	qp 6 m ³ /h / 260mm flange DN 32	PN25	1.5m	Radio OMS	kWh (without digit after comma)	1.9m
187F1132	qp 10 m ³ /h / 300mm thread / DN 40 / G2B	PN16	1.5m	Radio OMS	MWh (with 3 digit after comma)	1.9m
187F1133	qp 10 m ³ /h / 300mm flange DN 40	PN25	1.5m	Radio OMS	MWh (with 3 digit after comma)	1.9m
187F1134	qp 15 m ³ /h / 270mm flange DN 50	PN25	3m	Radio OMS	MWh (with 3 digit after comma)	2.9m
187F1135	qp 25 m ³ /h / 300mm flange DN 65	PN25	3m	Radio OMS	MWh (with 3 digit after comma)	2.9m
187F1136	qp 40 m ³ /h / 300mm flange DN 80	PN25	3m	Radio OMS	MWh (with 2 digit after comma)	2.9m
187F1137	qp 60 m ³ /h / 360mm flange DN 100	PN25	3m	Radio OMS	MWh (with 2 digit after comma)	2.9m

¹⁾ Codes above are EN version heat meters with 'low temperature' (return pipe) installation. Codes with radio have D-cell battery installed and codes without radio have A-cell battery installed.

²⁾ Cable length between calculator and flow sensor.

³⁾ Cable length of temperature sensor.

More standard codes are available regarding heat meters, high temperature installation, power supply and modules.

Ordering continued:

 Heat/cooling meters standard codes ¹⁾:

Code no.	Flow sensor	Nominal pressure	Cable length ²⁾	Module	Energy unit	Cable length ³⁾
087G1206	qp 0.6 m ³ /h / 110mm thread / DN 15 / G ³ / ₄ B	PN16	1.5m	M-Bus	kWh (without digit after comma)	1.9m
087G1207	qp 1.5 m ³ /h / 110mm thread / DN 15 / G ³ / ₄ B	PN16	1.5m	M-Bus	kWh (without digit after comma)	1.9m
087G1068	qp 1.5 m ³ /h / 130mm thread / DN 20 / G1B	PN16	1.5m	M-Bus	kWh (without digit after comma)	1.9m
087G1208	qp 2.5 m ³ /h / 130mm thread / DN 20 / G1B	PN16	1.5m	M-Bus	kWh (without digit after comma)	1.9m
187F1140	qp 3.5 m ³ /h / 260mm thread / DN 25 / G1 ¹ / ₄ B	PN16	1.5m		kWh (without digit after comma)	1.9m
187F1141	qp 6 m ³ /h / 260mm thread / DN 25 / G1 ¹ / ₄ B	PN16	1.5m		kWh (without digit after comma)	1.9m
187F1142	qp 6 m ³ /h / 260mm flange DN 32	PN25	1.5m		kWh (without digit after comma)	1.9m
187F1143	qp 10 m ³ /h / 300mm thread / DN 40 / G2B	PN16	1.5m		MWh (with 3 digit after comma)	1.9m
187F1144	qp 10 m ³ /h / 300mm flange DN 40	PN25	1.5m		MWh (with 3 digit after comma)	1.9m
187F1145	qp 15 m ³ /h / 270mm flange DN 50	PN25	3m		MWh (with 3 digit after comma)	2.9m
187F1146	qp 25 m ³ /h / 300mm flange DN 65	PN25	3m		MWh (with 3 digit after comma)	2.9m
187F1147	qp 40 m ³ /h / 300mm flange DN 80	PN25	3m		MWh (with 2 digit after comma)	2.9m
187F1148	qp 60 m ³ /h / 360mm flange DN 100	PN25	3m		MWh (with 2 digit after comma)	2.9m
087G1144	qp 0.6 m ³ /h / 110mm thread / DN 15 / G ³ / ₄ B	PN16	1.5m	Radio (OMS)	kWh (without digit after comma)	1.9m
087G1145	qp 1.5 m ³ /h / 110mm thread / DN 15 / G ³ / ₄ B	PN16	1.5m	Radio (OMS)	kWh (without digit after comma)	1.9m
087G1146	qp 1.5 m ³ /h / 130mm thread / DN 20 / G1B	PN16	1.5m	Radio (OMS)	kWh (without digit after comma)	1.9m
087G1147	qp 2.5 m ³ /h / 130mm thread / DN 20 / G1B	PN16	1.5m	Radio (OMS)	kWh (without digit after comma)	1.9m
187F1149	qp 3.5 m ³ /h / 260mm thread / DN 25 / G1 ¹ / ₄ B	PN16	1.5m	Radio (OMS)	kWh (without digit after comma)	1.9m
187F1150	qp 6 m ³ /h / 260mm thread / DN 25 / G1 ¹ / ₄ B	PN16	1.5m	Radio (OMS)	kWh (without digit after comma)	1.9m
187F1151	qp 6 m ³ /h / 260mm flange DN 32	PN25	1.5m	Radio (OMS)	kWh (without digit after comma)	1.9m
187F1152	qp 10 m ³ /h / 300mm thread / DN 40 / G2B	PN16	1.5m	Radio (OMS)	MWh (with 3 digit after comma)	1.9m
187F1153	qp 10 m ³ /h / 300mm flange DN 40	PN25	1.5m	Radio (OMS)	MWh (with 3 digit after comma)	1.9m
187F1154	qp 15 m ³ /h / 270mm flange DN 50	PN25	3m	Radio (OMS)	MWh (with 3 digit after comma)	2.9m
187F1155	qp 25 m ³ /h / 300mm flange DN 65	PN25	3m	Radio (OMS)	MWh (with 3 digit after comma)	2.9m
187F1156	qp 40 m ³ /h / 300mm flange DN 80	PN25	3m	Radio (OMS)	MWh (with 2 digit after comma)	2.9m
187F1157	qp 60 m ³ /h / 360mm flange DN 100	PN25	3m	Radio (OMS)	MWh (with 2 digit after comma)	2.9m

¹⁾ Codes above are EN version heat/cooling meters with 'low temperature' (return pipe) installation. Codes with radio have D-cell battery installed and codes without radio have A-cell battery installed.

²⁾ Cable length between calculator and flow sensor.


³⁾ Cable length of temperature sensor.

More standard codes are available regarding cooling and heat/cooling meters, high temperature installation, power supply and modules.

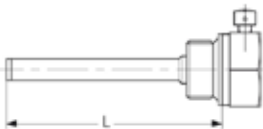
Accessories

Type	Designation	Set	Code No.
Communication	M-Bus module	1 pc	087G6027
	M-Bus module	72 pcs	087G6028
	RS232 module with cable	1 pc	087G6031
	RS485 module	1 pc	087G6032
Function	Pulse input module (2 inputs)	1 pc	087G6037
	Pulse input module (2 inputs)	72 pcs	087G6038
	Pulse output module (2 outputs)	1 pc	087G6039
	Pulse output module (2 outputs)	72 pcs	087G6040
	Combined module (2 pulse inputs / 1 pulse output)	1 pc	087G6041
	Combined module (2 pulse inputs / 1 pulse output)	72 pcs	087G6042
	Analogue output module (4-20mA)	1 pc	087G6034
Supply voltage	battery 3.6 V DC (A-cell)	1 pc	087G6020
	battery 3.6 V DC (D-cell)	1 pc	087G6022
	mains unit 230 V AC	1 pc	087G6024
	mains unit 24 V AC	1 pc	087G6025

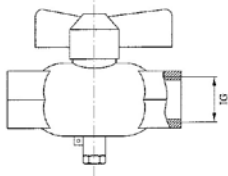
Temperature sensors

	ø 5.2 mm type	Pair	Code No.
	Pt 500/3 m cable, MID	1	087G6046
	Pt 500/5 m cable, MID	1	087G6047
	Pt 500/10 m cable, MID	1	087G6048

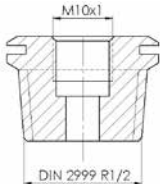
Sensor pockets

	For ø 5.2 mm type	Pair	Code No.
	brass /35 mm	1	087G6053
	brass /52 mm	1	087G6054
	brass /85 mm	1	087G6055
	brass /120 mm	1	087G6056
	stainless steel /85 mm	1	087G6057
	stainless steel /120 mm	1	087G6058
	stainless steel /155 mm	1	087G6059
stainless steel /210 mm	1	087G6060	

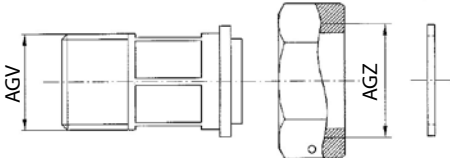
Ball valves

	Dimension (IG)	Set	Code No.
	G ½"	1 pc	187F0593
		12 pcs	087H0118
	G ¾"	1 pc	187F0592
		12 pcs	087H0119
	G 1"	1 pc	187F0591
12 pcs		087H0120	

Adapters for mounting temperature sensors

	Coupling thread	Sensor thread	Set	Code No.
	R ½"	M 10 x 1	1 pc	087G6075
	R ½"	M 10 x 1	32 pcs	087G6076

Tailpieces

	Threaded	Dimension (AGV x AGZ)	Set	Code No.
		R ½" x G ¾ B	1 pc	087G6071
		R ¾" x G 1 B	1 pc	087G6072
		R 1" x G 1¼ B	1 pc	087G6073
		R 1½" x G 2 B	1 pc	087G6074

Software

The IZAR@SET parameterization software on windows basis is a convenient tool for handling the energy meter.

It is used for:

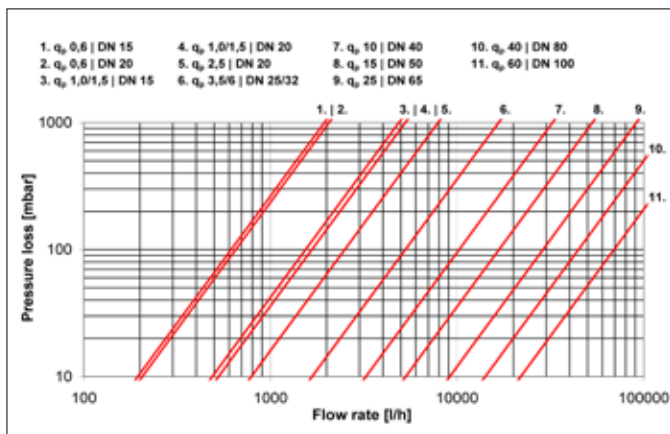
- commissioning and meter configuration
- reading out measured values
- application analysis
- print the meter protocol

Technical data

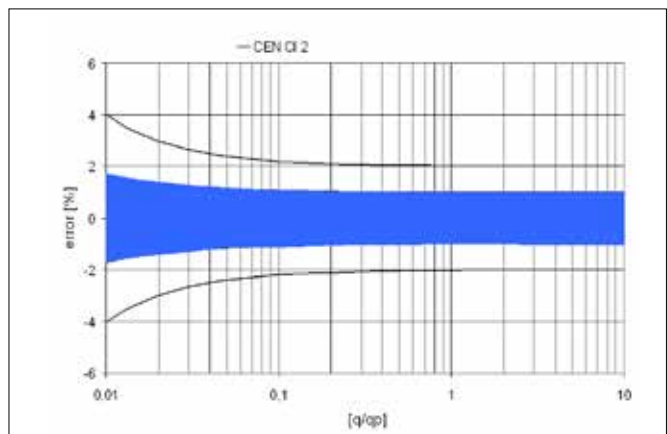
Flow rate ranges	Nominal	q_p [m³/h]	0.6				1.5				2.5				3.5				6				10				15				25				40				60																			
	Maximum	q_s [m³/h]	1.2				3				5				7				12				20				30				50				80				120																			
	Standard minimum	q_i [l/h]	6				15				25				35				60				100				150				250				400				600																			
	Extended minimum ³⁾	q_i [l/h]	-				6				10				-				24				40 ¹⁾ / 100				60 ¹⁾ / 150				100 ¹⁾ / 150				160				240 ¹⁾ / 600 ²⁾ / 1200																			
	Starting	[l/h]	1				2.5				4				7				7				20				40				50				80				120																			
Diameter	Nominal	DN [mm]	15				20				15				20				20				25				32				25				32				40				50				65				80				100			
	Connection	AGZ	G ¾B	G 1B	FL	G ¾B	G 1B	FL	G 1B	FL	G 1¼B	FL	G 1¼B	FL	G 2B	FL	FL	FL	FL	FL	FL	FL	FL	FL	FL	FL	FL	FL	FL	FL	FL	FL	FL	FL	FL	FL																						
	Tailpiece	AGV	R ½	R ¾	-	R ½	R ¾	-	R ¾	-	R 1	-	R 1	-	R 1½	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																						
Operating pressure	Maximum	PN [bar]	16 / 25				25				16 / 25				25				16 / 25				25				16 / 25				25				25				25				25				25											
Flow sensor Temp. range	heating	[°C]	5...130																5...150																																							
	cooling		5...90																5...90																																							
	heat./cool.		5...105																5...105																																							
Volume measuring cycle	T [s]	Battery supply: 1 Mains unit supply: 1/8																																																								
Medium	circulation water (pH-value: 7 - 10); if additives are used, it must meet AGFW FW510 specifications																																																									
Pressure loss	At q_p	Δp [mbar]	85				36 / 75				100				44				128				95				80				75				80				75																			
Overall length		[mm]	110	130	190	110	130	190	130	190	260	260	300	270	300	300	300	360																																								
Input	Temperature sensors	Type	Pt 500 ø5.2 mm with 2-wire leads																																																							
	Sensor current	[mA]	Pt 500 peak < 2; rms < 0.012																																																							
	Measuring cycle	T [s]	A-cell battery: 16; D-cell battery: 4 Mains unit supply: 1																																																							
	Max. temp. difference	$\Delta\theta_{max}$ [K]	177																																																							
	Min. temp. difference	$\Delta\theta_{min}$ [K]	3																																																							
	Starting temp. difference	$\Delta\theta$ [K]	0.125																																																							
	Abs. temp. measuring range	θ [°C]	1...180																																																							
Supply voltage	Operating voltage	U_N	3.6 V DC (Lithium-battery) / 230 V AC / 24 V AC																																																							
Basic features	Ambient class	class E2 + M2																																																								
	Protection class	calculator: IP 54																flow sensor: IP 54 (heating) / IP 65 (heat/cooling, cooling)																																								
	Ambient operating temperature	+5...+55 °C (> 35 °C max. 4 weeks)																																																								
	Ambient storage temperature	-25...+ 60 °C (> 35 °C max. 4 weeks)																																																								
	Max. ambient humidity	93% rel. humidity																																																								
	Type	Static energy meter																																																								
	Measuring process	Ultrasonic volume measurement																																																								
Display indication	Display	LCD, 8-digit																																																								
	Units	MWh - kWh - GJ - Gcal - MBtu - gal - GMP - °C - °F - m³ - m³/h																																																								
	Total values	99 999 999 - 9999 999.9 - 999 999.99 - 99 999.999																																																								
	Values displayed	Power - energy - flow rate - temperature - volume																																																								

¹⁾ Only for horizontal installation ²⁾ Only in rising or falling pipes or tilted installation ³⁾ Extended minimum flow rate for dynamic range of 1:250. Available on request.

Pressure loss graph



Measuring accuracy Class 2



Design and function

The SONOMETER™1100 as a compact energy meter consists of the following components:

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

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 energy meter can be conveniently read from a single-line 8-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 MID in class 2 and 3. The standard cable length between the calculator and the flow sensor is 1.5 m or 3 m (optional 5 m).

Supply voltage:

- Lithium battery 3.6 V DC A-cell (11 years typical lifetime)
- Lithium battery 3.6 V DC D-cell (16 years typical lifetime)
- Mains unit 230 V AC or 24 V AC with changeable backup battery

Temperature Sensors

Pairs of Pt 500 ϕ 5.2 mm temperature sensors with 2-wire leads are used. Cable length 2 m, 3 m, 5 m or 10 m are available.

Integrated Radio

Integrated Radio is an interface for communication with radio receiver.

- Frequency band: 868 MHz
- Type of radio telegram: Open Metering Standard (OMS)
- Transmission data updating: Online - no time delay between value measurement and data transmission
- Data transmission: Unidirectional
- Sending interval: 12...20 s; depending on length of telegram (duty cycle)

Interfaces

- Optical: ZVEI interface as standard, for communication and testing, M-Bus protocol.
- M-Bus: Configurable telegram, according to EN13757-3. Data reading and parametrization are via two wires with polarity reversal protection.
- L-Bus: Adapter for external radio module; configurable telegram, according to EN13757-3. Data reading and parametrization are via two wires with polarity reversal protection. M-Bus protocol.
- RS232: Serial interface for communication with external devices. M-Bus protocol.
- RS485: Serial interface for communication with external devices. M-Bus protocol.
- Pulse output: Module with 2 Open Collector pulse outputs (potential-free). Configurable via IZAR@SET software. Default pulse outputs are energy and volume.



For battery powered energy meters in AMR (automatic meter reading) systems the fastest M-Bus reading interval is every 3 minutes!

- Pulse input: Module with 2 pulse inputs, max. 8 Hz with minimum pulse duration of 10 msec, input resistance 2.2 M Ohms, terminal voltage 3V DC, cable length up to maximum 10m. The pulse value and the unit is configurable for energy, water, gas or electrical meter by IZAR@SET. Data can be transferred remotely. Also two accounting day's are available for both inputs.
- Combined pulse input / output: Module with 2 pulse inputs and 1 pulse output. Configurable via IZAR@SET software.
- Analogue output: Module for 4...20 mA with 2 programmable passive outputs, programmable value in case of error. Output values can be power, flow rate, temperatures. Configurable via IZAR@SET software. Only for mains powered energy meters!

		interface / slot 2					
		no modul	M-Bus	RS232	RS485	pulse input	L-Bus (for external radio)
interface / slot 1	no module	•	-	-	-	-	-
	M-Bus	•	•	•	•	-	•
	RS232	•	-	-	-	-	-
	RS485	•	-	-	-	-	-
	pulse input	•	•	•	•	-	•
	pulse output	•	•	•	•	•	•
	pulse in-/ output	•	•	•	•	-	•
	analogue output 4...20mA	•	-	-	-	-	-
	L-Bus (for external radio)	•	-	-	-	-	-

- combination is possible
- combination is not possible
- * integrated radio is always possible

Event Memory

Events such as changes and faults are stored in a non-volatile memory with a capacity of up to 127 entries. The following events are recorded:

- Checksum error
- Temperature measurement error
- Ultrasonic operating time measurement errors
- Start and end of test mode
- Changing of the main configuration

Monthly Memory

The SONOMETER™1100 has a history memory of 24 months. The following values are stored in the EEPROM on the programmable interval (daily, weekly, monthly):

- Date/ Time
- Cumulated energy
- Tariff energy 1
- Tariff energy 2
- Tariff definition 1
- Tariff definition 2
- Cumulated volume
- Error hour counter
- Value of max. flow
- Time max. flow
- Date max. flow
- Value of max. power
- Time max. power
- Date max. power
- Pulse input counter 1
- Pulse input counter 2
- Pulse 1 definition
- Pulse 2 definition
- Operating days
- Max. forward temperature
- Time max. forward temperature
- Date max. forward temperature
- Max. return temperature
- Time max. return temperature
- Date max. return temperature

**Design and function,
continued**
Log Memory

The large two log memory blocks are 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, Day in the month, Day of the week, (1024 seconds), 15th or end of month).

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

Memory block	Storage interval	Values	Date block size example	Number of data records	Recording period
area 1	1 hour	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	16 byte	556	23 days
area 2	24 hours		16 byte	299	299 days
area 1	1 hour		8 byte	1113	46 days
area 2	24 hours		8 byte	599	599 days

Max. Actual Values Memories

The calculator creates maximum values for power, flow rate and temperatures based on consumption time, which are stored in the EEPROM. The integration intervals are adjustable to 6, 15, 30 or 60 minutes, 24 hours (and 1024 seconds). Default setting is 60 minutes.

Tariff Function

The calculator offers four optional tariff memories for monitoring plant load states for limit tariffs. Extensive tariff conditions make it possible to adapt the energy 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 ... 255 °C	1 °C
T_R, T_F	1 ... 255 °C	1 °C
P	1 ... 255 kW	1 kW
Q	100 ... 25 500 l/h	100 l/h
Z		15 minutes

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 8-digit LCD with units and symbols.

Loop Structure

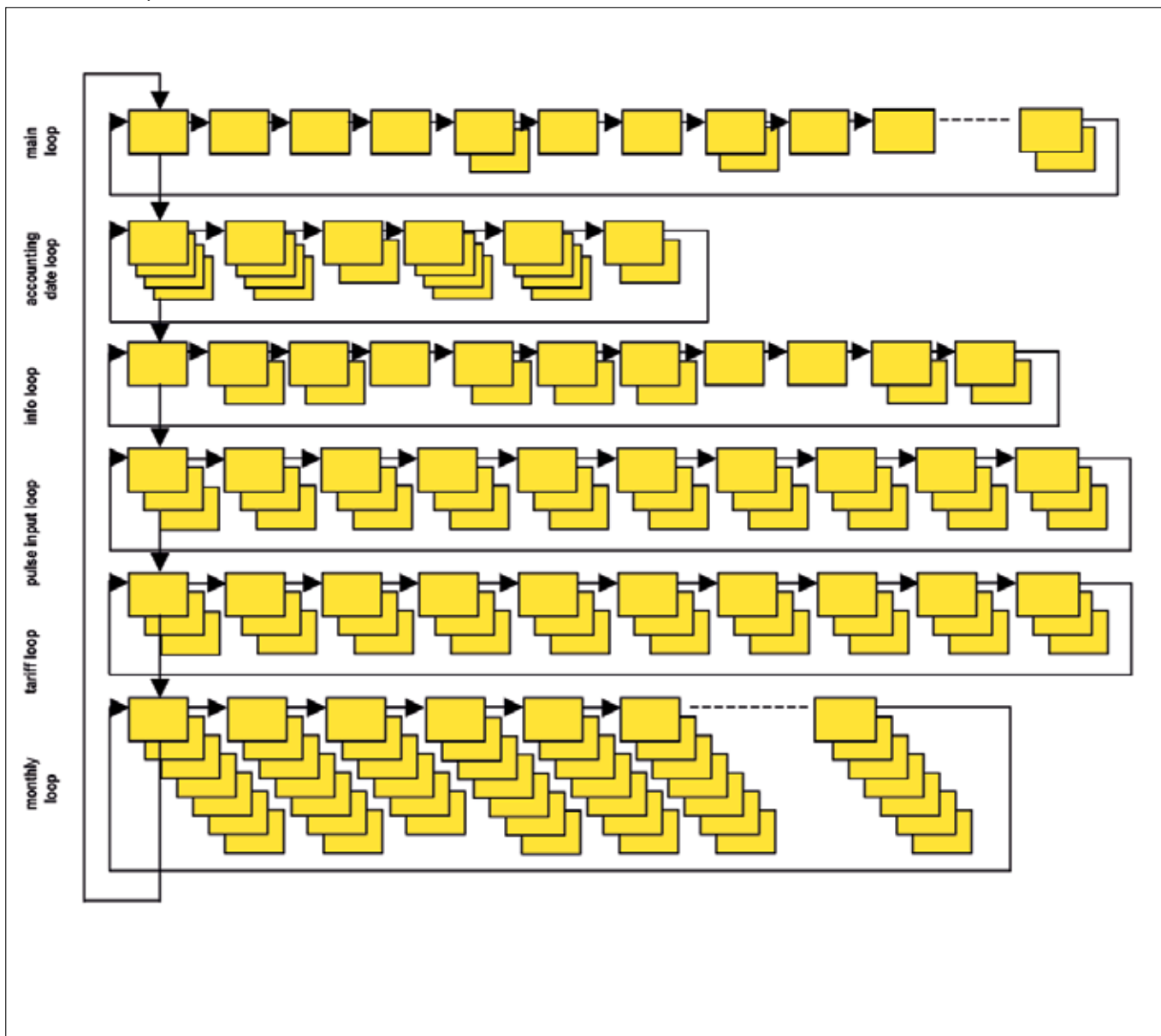
The SONOMETER™1100 display has six loops. Some display windows consist of two (to maximum seven) displays that are shown alternately at 4-second intervals. Some pictures in loops or a complete loop can be deactivated separately.



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
"1" Main loop	1.1	Accumulated energy		
	1.2	Volume		
	1.3	Accumulated energy (cooling)	(Sequence will be shown only in a heat meter with cooling tariff)	
	1.4	Flow		
	1.5	Power		
	1.6	Forward/- return temperature		
	1.7	Temperature difference		
	1.8	Operating days	Error hours	
	1.9	Error status		
	1.10	Display test		

Loop	Sequence	Window 1	Window 2	Window 3
"2" Accounting date loop	2.1	Accounting date 1	Accounting date 1 energy	,Accd 1A'
	2.2	,Accd 1'	Future accounting date 1	
	2.3	Accounting date 1 previous year	Accounting date 1 previous year energy	,Accd 1L'
	2.4	Accounting date 2	Accounting date 2 energy	,Accd 2A'
	2.5	,Accd 2'	Future accounting date 2	
	2.6	Accounting date 2 previous year	Accounting date 2 previous year energy	,Accd 2L'
	...			
	2.14	Accounting date 2 previous year	Pulse input 2	Pulse input volume 2

Loop	Sequence	Window 1	Window 2	Window 3
"3" Info loop	3.1	Current date	Current time	
	3.2	,SEC_Adr'	Secondary address	
	3.3	,Pri_Adr 1'	Primary address 1	
	3.4	,Pri_Adr 2'	Primary address 2	
	3.5	Installation position		
	3.6	,Port 1'	No. of the mounted module at port 1	
	3.7	,Port 2'	No. of the mounted module at port 2	
	3.8	Status integrated radio	(Sequence will be shown only in meters with integrated radio)	
	3.9	software version	Checksum	

Loop	Sequence	Window 1	Window 2	Window 3
"4" Pulse input loop	4.1	,In1'	Accumulated value pulse input 1	,PPI' pulse value 1
	4.2	,In2'	Accumulated value pulse input 2	,PPI' pulse value 2

Loop	Sequence	Window 1	Window 2	Window 3	Window 4	Window 5	Window 6
"5" Tariff loop	Only in a heat meter with cooling tariff.						
"6" Monthly value loop	6.1	,LOG'	date last month	energy	volume	max. flow rate	max. power
	6.2	,LOG'	date month - 1	energy	volume	max. flow rate	max. power
	6.3	,LOG'	date month - 2	energy	volume	max. flow rate	max. power
			
	6.24	,LOG'	date month - 23	energy	volume	max. flow rate	max. power

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 IZAR@SET software.

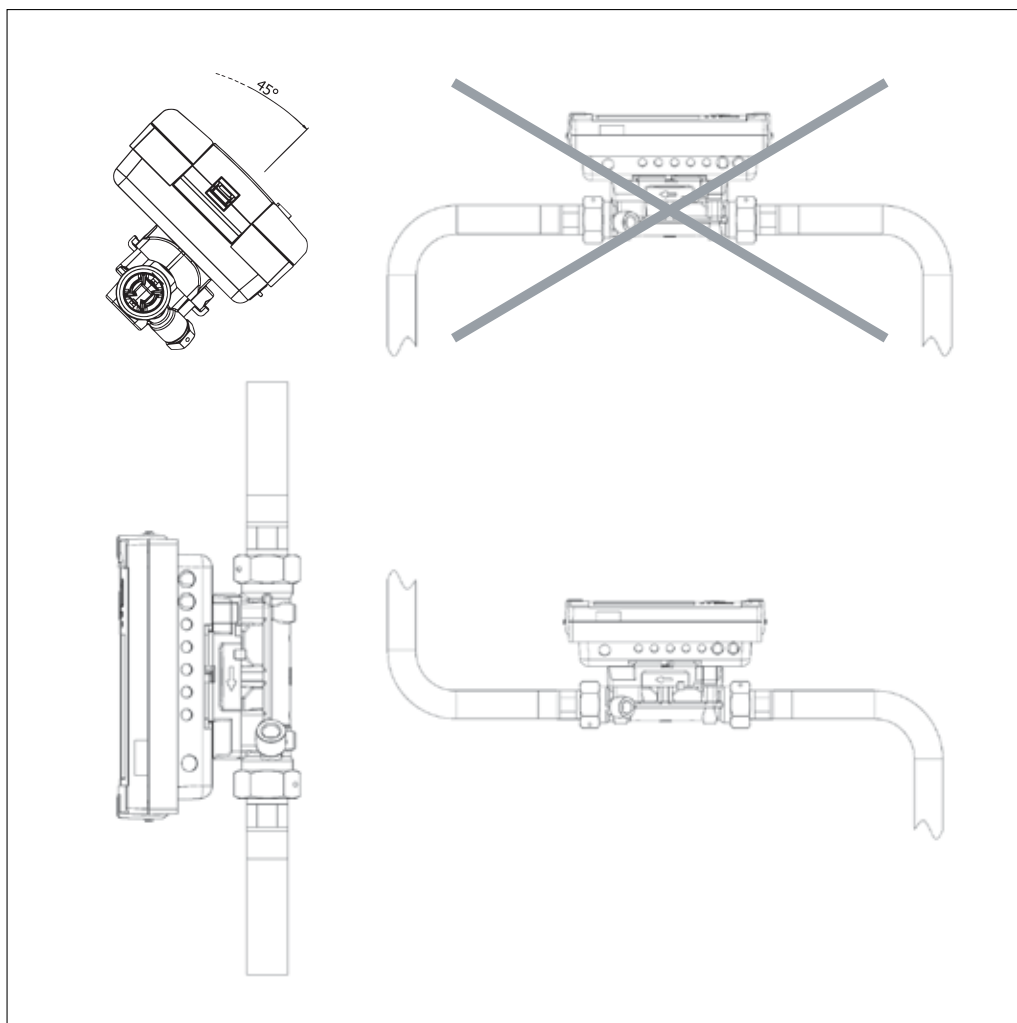
Mounting

Depending on the design, the energy meter is installed either in the low temperature or high temperature line as indicated on the type plate. The energy 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 energy meter can be installed in both horizontal and vertical pipe sections, but every time so that air bubbles cannot collect in the flow sensor. We recommend installing the flow sensor in a tilted position (45°).

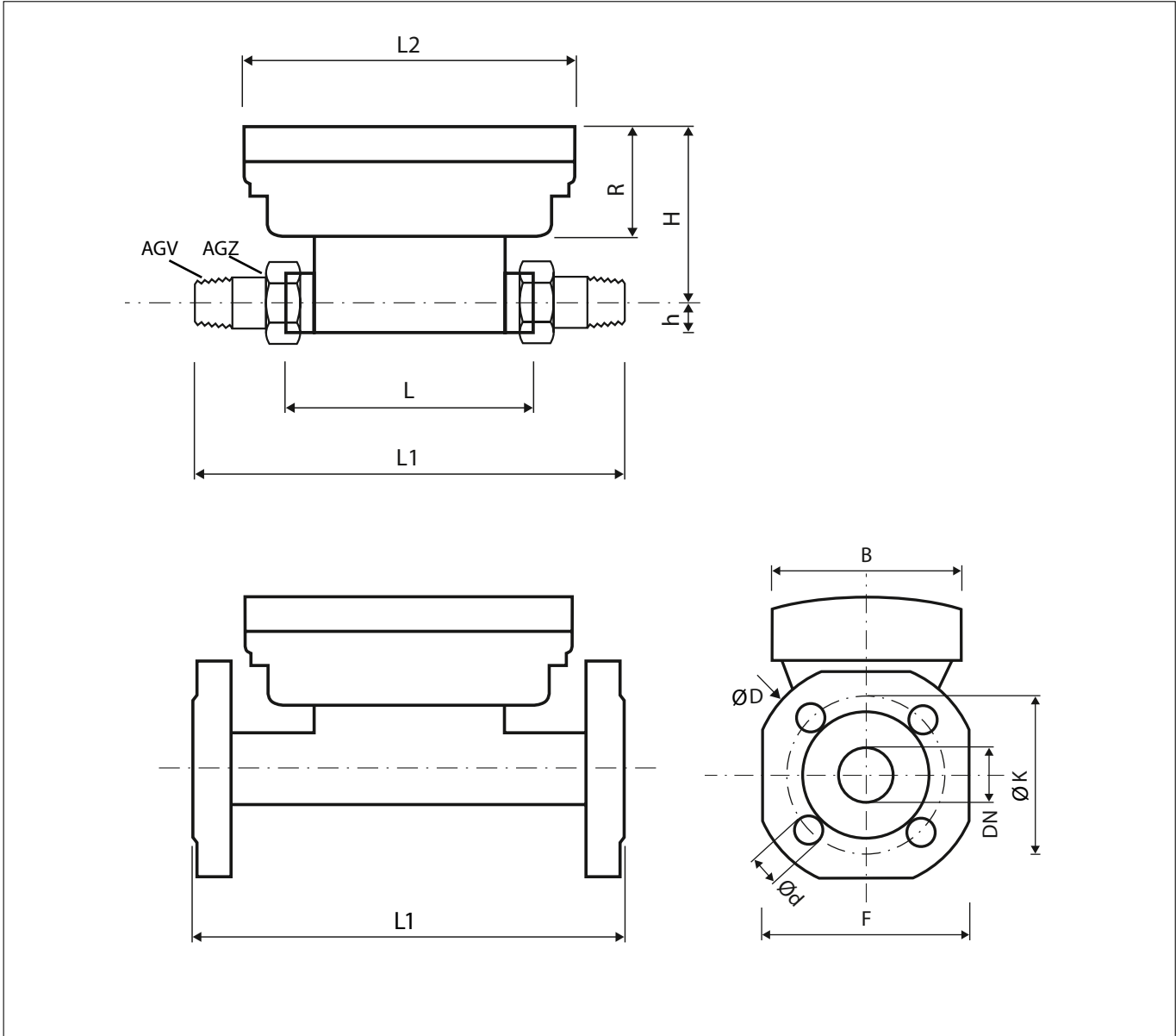
Make sure the energy meter is installed sufficiently far away from possible sources of electromagnetic interference (switches, electric motors, fluorescent lamps, etc.).

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 energy meter to simplify dismantling the energy meter. The energy meter should be installed in a convenient position for service and operating personnel.



For the further information pls. refer to the SONOMETER™1100's instructions.

Dimensions



Nominal size	$q_p = 0.6 \text{ m}^3/\text{h}$				$q_p = 1.5 \text{ m}^3/\text{h}$				$q_p = 2.5 \text{ m}^3/\text{h}$				$q_p = 3.5 \text{ m}^3/\text{h}$				$q_p = 6 \text{ m}^3/\text{h}$			$q_p = 10 \text{ m}^3/\text{h}$		$q_p = 15 \text{ m}^3/\text{h}$		$q_p = 25 \text{ m}^3/\text{h}$		$q_p = 40 \text{ m}^3/\text{h}$		$q_p = 60 \text{ m}^3/\text{h}$	
L [mm]	110	130	190	190	110	130	190	190	130	190	190	260	260	260	260	260	260	300	300	270	300	300	300	360					
L1 [mm]	180	225	285	190	180	225	285	190	225	285	190	355	260	260	260	355	260	260	434	300	270	300	300	300	360				
L2 [mm]	150												150						150										
B [mm]	100												100						100										
R [mm]	54												54						54										
H [mm]	82	84	84	84	82	84	84	84	84	84	84	88.5	88.5	88.5	88.5	88.5	88.5	94	94	99	106.5	114	119	119					
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	33	39	73.5	85	92.5	108	108					
AGZ	G3/8B DN 15	G1B DN 20	G1B DN 20	FL DN 20	G3/8B DN 15	G1B DN 20	G1B DN 20	FL DN 20	G1B DN 20	G1B DN 20	FL DN 20	G1/4B DN 25	FL DN 25	FL DN 32	G1/4B DN 25	FL DN 25	FL DN 32	G2B DN 40	FL DN 50	FL DN 65	FL DN 80	FL DN 100							
AGV	R1/2	R3/4	R3/4	-	R1/2	R3/4	R3/4	-	R3/4	R3/4	-	R1	-	-	R1	-	-	R1/2	-	-	-	-	-						
D [mm]	-	-	-	105	-	-	-	105	-	-	105	-	114	139	-	114	139	-	148	163	184	200	235						
d [mm]	-	-	-	14	-	-	-	14	-	-	14	-	14	18	-	14	18	-	18	18	18	19	22						
F [mm]	-	-	-	95	-	-	-	95	-	-	95	-	100	125	-	100	125	-	138	147	170	185	216						
K [mm]	-	-	-	75	-	-	-	75	-	-	75	-	85	100	-	85	100	-	110	125	145	160	190						
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	3.1	6.4	7.0	8.9	10.9	16.4						

Dimensions, continued

Temperature sensors

	Installation	Type	Diameter D (mm)	Length L (mm)
	Immersed (direct) or in pocket (indirect)	Pt 500	ø 5.2	45

Sensor pockets

	Type		Brass				Stainless steel			
	Sensor diameter	(mm)	ø 5.2				ø 5.2			
	Length	L1 (mm)	47	60	93	128	98	133	168	223
		L (mm)	35	52	85	120	85	120	155	210

Ball valves

	Dimension IG (mm)	Length L (mm)	Height B (mm)
	G ½"	48	77
	G ¾"	54	79
	G 1"	66	96

Tailpieces

	Dimension AGV × AGZ	Length L (mm)	Overall length L ₁ (mm)
	R ½" × G ¾ B	35	44,5
	R ¾" × G 1 B	47,5	59
	R 1" × G 1¼ B	47,5	60,5
	R 1½" × G 2 B	67	83

