

Designed for accuracy in all applications:



combimeter® II

Heat and Volume Meters

Functional description

The new ***combimeter®II*** is a heat meter which, with its advanced electronic metering technology, is designed for the accurate metering of even the largest of heat loads.

Its flow metering unit is based on the electromagnetic measuring principle, which works without moving parts, and is therefore particularly reliable and durable.

The electronic processor unit controls the entire meter, from the power supply through the metering circuits and calculations down to the information displays.

The ***combimeter®II*** provides the basis for a wide range of consumption analyses.

Performance features

All functions of the ***combimeter®II*** are controlled electronically. The meter can be individually programmed using Windows-based software programs with an easy-to-operate user interface. It can therefore be tailored to suit the needs of the specific user or application.

An M-bus interface is integrated as a standard feature.

The flow metering unit is available in 11 different sizes for flow ranges between 0.015 m³/h and 180 m³/h.

Interfaces

In addition to an integrated display, data can be read out in the following ways: (optional modules)

- via an optical interface to the ZVEI standard or
- via the integrated M-bus interface to the EN 1434 standard.

Application

The ***combimeter®II*** is a heat meter tailor-made to suit the special needs of district and communal heating.

Benefits

- High accuracy over a long period thanks to the combination of the magnetically inductive measuring principles and advanced electronics
- Wide field of applications thanks to the large number of hardware and software modules available
- Very wide metering range and low pressure drop
- High data security even in the event of a power failure
- Data tailored to the customer's needs thanks to individual programming options
- User-friendly installation and operation
- System analyses through max./min. memory
- Individual billing using tariff configurable counters.

*The ***combimeter®II*** is the static heat meter, specially designed for district heating.*

combimeter® II

High performance from all components

Intelligent processor unit

The processor unit contains high-tech circuits for coil excitation in the flow metering unit, for measuring flow rates and temperature, for integration, calculation, logging and data display.

The **combimeter® II** processor unit has been specially designed for ease of use. The new and attractive design with its low overall height ensures easy installation of the meter. The meter can be conveniently read from a back lit two-line LCD. Two buttons permit user-friendly control of the various display loops. All measurement inputs can be either screw terminal or plug-in connections.

The processor unit is connected to the power supply. Reliable meter reading is ensured even if the voltage drops, as all information is stored in a non-volatile memory (EPROM), preventing any loss of data.

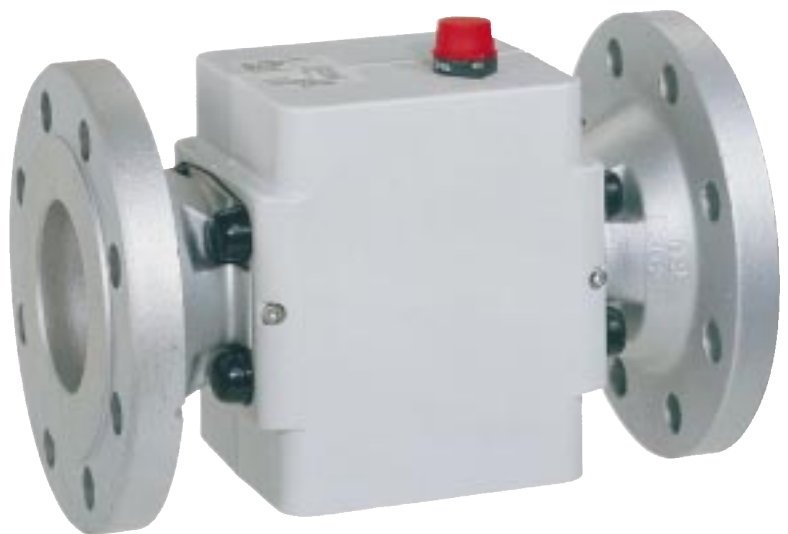
Accurate flow metering unit

The flow metering unit is based on the magnetic induction measuring principle. Its measuring cross section is rectangular, with electrodes over the entire height. This gives it a large metering range and makes it independent of the flow profile.

The unit is designed so that it corresponds to the maximum flow rate of the system and is available for installation either in the flow or return lines. The unit can be installed without straight lengths of pipe at the inlet or outlet and high metering accuracy is ensured.

The flow metering unit satisfies the requirements of EN 1434 and its measuring characteristics are even better than those of the previous model.

A long-life battery ensures operation of the real-time clock in the event of a power failure and, at the same time, records how long power is off.



combimeter® //

Temperature sensors

combimeter® // temperature sensors are supplied with protection pockets and cables for connection to the processor unit.

The **combimeter® //** consists of

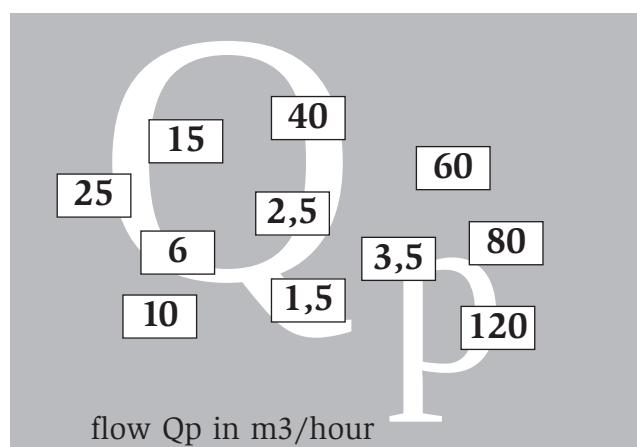
- the flow metering unit
- the processor unit
- the temperature sensors



A wide range of meter sizes

The **combimeter® //** is available in 11 different sizes, i.e. with 11 different flow metering units covering flow ranges from 0.015 m³/h to 180 m³/h.

The flow metering units are sized as illustrated, Qs representing the maximum admissible continuous flow. All meters can record Qp + 50%.



combimeter® II

Accessories for tailored solutions

Expansion modules

combimeter® II has two plug-in locations for expansion modules to connect external equipment.

Analog module

The analog module has two electrically isolated 4-20 mA outputs as a standard feature. These two outputs can be programmed separately, for example, for flow rate, heat load, flow temperature, return temperature or temperature difference.

Digital I/O module

The digital I/O module has two contact inputs with a common earth connection as well as two electrically isolated passive outputs.

RS-232 module

The communication module RS-232 is a serial interface for communications with external equipment, e.g. a PC.

M-bus interface

The M-bus interface is integrated as standard.



Software

combitest® II

The *combitest® II* software is an M-bus-based tool for reading out the meter configuration. It runs under Windows 95 and is used for

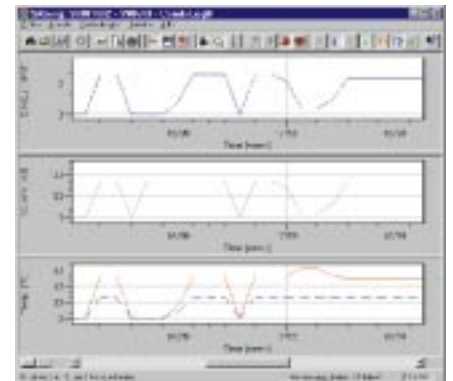
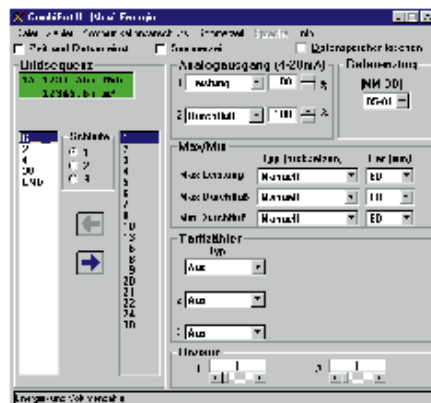
- reading out the meter data (apart from the data log)
- archiving and printing out
- implementing customer-specified changes

combiset® II

combiset® II is the central service software tool for the user. It is a menu-driven, easy-to-use Windows 95 programme for setting a customised application, e.g. configuration of heat and volume meters, tariff setting and user displays.

combilog® II

combilog® II reads out the data logs of the heat meter, archives them, presents the meter readings and prints diagrams and tables. *combilog® II* is also based on M-bus and runs under Windows 95.



Data logging functions

Two logging modules are active in the **combimeter® //**:

- Data log for consumption values
- Change log for faults and operator changes

The values from both logs can be read using a PC.

The data log
is divided into two sections:

- The short-time log contains average values for the following:
 - Flow rate
 - Heat output*
 - Flow temperature*
 - Return temperature*
- All these values are time-stamped.

- The long-run log contains the following counter values:
 - Energy consumption*
 - Volume of water
 - Hours run
 - Forward energy*
 - Tariff counters (energy* and volume)

These values are time-stamped with the date, year and weekday.

* only applies to the heat meter.

The short-run log is normally used for troubleshooting and optimisation. The long-run log is normally used for consumption analyses; the values can be used for calculations, e.g. average return temperature.

The change log
The last 30 faults or changes (e.g. clock adjustments) are continuously recorded and time-stamped. Thus following types of failure can be identified:

- Power failure
- Temperature sensors
- Internal communications
- Check sum
- Clock adjustment

Logging frequency	Data recorded	Logging period
Every 6 minutes	Flow rate (ø)	2 days
	Heat output (ø)	
Every hour	Flow temperature (ø)	14 days
	Return temperature (ø)	
Every 24 hours	Volume counter	1 year
1st and 15th of every month	Hours run	7 years
	Tariff counter	
	Forward energy (ø)	
	(flow temperature x volume)	

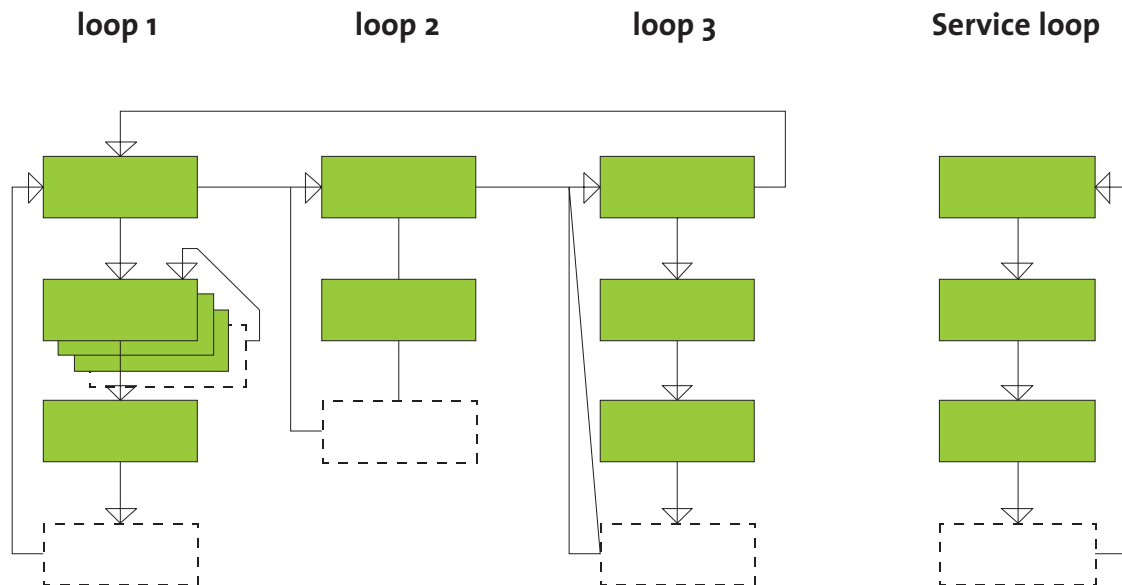
This table shows the logging frequencies and the logging periods.

User-friendly control of the display

The display of the **combimeter® II** has three user loops and a service loop.

Each user loop may contain up to 24 individual windows.

Standard settings of the loops



The first loop is the main loop and contains the current data for flow, energy and time/date as a standard feature. The second and third loops can be used as desired for all other functions, e.g. min. max. tariffs etc. All three user loops can be individually programmed with the *combiset® II* software.

Information on certain functions is spread over two windows. In this case the display automatically alternates every four seconds between these two windows.

Furthermore, there are windows that are "behind each other". This is the case when windows have the same function but display different values, e.g. 13 max. or min. storage intervals. These windows can then be activated consecutively with the control buttons.

6 minutes after operation of the buttons the meter automatically returns to the main window.

The fourth loop is a "service loop". This loop contains windows that are available to the service technician for information or configuration purposes. The windows in this loop cannot be changed.

Simple control

The displays are accessed with two control buttons on the front panel of the meter, one with an arrow pointing to the right, the other with an arrow pointing downwards.

The button with the arrow pointing downwards is used:



- to change to the next window in the active loop.
- to change to the next loop
- to change to the service loop.

The button with the arrow pointing to the right is used:



- to change to the windows behind each other
- to configure within the service loop
- to change to the next loop
- to change to the service loop.

Information displays

The display permits the indication of a wide variety of informative data:

No.	First display	Second display	Description
1	XX 1234.567 MWh 40.0° 123,4 kW		Main ENERGY counter Current temperature difference and output
2	XX 1234.567 MWh t1 = 80° t2 = 40°		Hour counter (2 decimal places) Current temperatures 1 and 2
3	XX 1234.567 m³ 1.23 m³/h		Main VOLUME counter Current flow rate
4	XX 1.23 m³/h 40.0° 123,4 kW		Current flow rate Current temperature difference and output
5	XX 12345 h t1 = 80° t2 = 40°		Hour counter (no decimal places) Current temperatures 1 and 2
6	XX 1234.567 MWh 1.2345.67 m³		Main ENERGY counter Main VOLUME counter
7	XX > ## 0.00 kW YYMMDD hhmm/hhmm	XX > ## t1 = 80° t2 = 40°	MAX. output [## = index 1-13] + temp. 1 & 2 Date and time interval
8	XX I1 = 1234567 I2 = 1234567		Pulse counter 1 Pulse counter 2
10	XX > ## 0.97 m³/h YYMMDD hhmm/hhmm	XX > ## t1 = 80° t2 = 40°	MAX. flow rate [## = index 1-13] + temp. 1 & 2 Date and time interval
13	XX < ## 0.00 m³/h YYMMDD hhmm/hhmm	XX < ## t1 = 80° t2 = 40°	MIN. flow rate [## = index 1-13] + temp. 1 & 2 Date and time interval
16	XX YYDDMM 1234.567 MWh	XX YYDDMM 1234.567 MWh	Main ENERGY and VOLUME readings 1st and 15th of the last month
18	XX 27.808 MWh YYMMDD / YYMMDD	XX 681.94 m³ f = 79,3° t = 33,5°	Total consumption of previous year with average flow temperature and temperature difference
19	XX 17.756 MWh YYMMDD / YYMMDD	XX 402.84 m³ f = 81,5° t = 34,1°	Consumption of previous year up to set day with average forward flow and temperature difference
20	XX 15.284 MWh YYMMDD / YYMMDD	XX 389.04 m³ f = 84,3° t = 34,1°	Consumption of this year up to set day with average forward flow and temperature difference
21	XX T# hhmm/hhmm ww 1234.567 MWh	XX T# hhmm/hhmm ww 1234.567MWh	Tariff counter # [1-13] (example work week type)
22	XX RD: YYMMDD 52346 m³	XX RD: YYMMDD 23511 kWh	Volume and energy readings on the M-bus set day (reading date)
24	XX 1234567 E		Forward energy counter (flow temperature) counts: (volume pulses) * Tf/100
30	XX [S] hh:mm YYYY-MM-DD W		Current time: summertime, time of day Year, month, date and weekday (Monday = 1)

The default settings display the following windows:

- in loop 1
windows 2,4,6,30
- in loop 2
windows 16,18,19,20
- in loop 3
windows 7,10,13

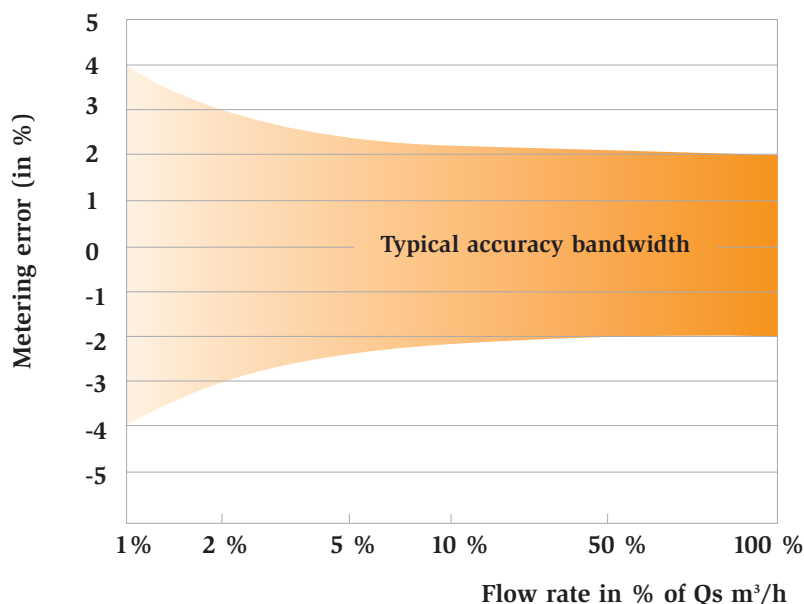
However, the first three loops can be individually programmed as required with the software module *combiset® II*.

Information display (volume meter)

No.	First display	Description
3	XX 1234.567 m ³ 1.23 m ³ /h	Main VOLUME counter Current flow rate
10	XX > ## 0.97 m ³ /h YYMMDD hhmm/hhmm	MAX. flow rate [# # = index 1-13] Date and time interval
13	XX < ## 0.00 m ³ /h YYMMDD hhmm/hhmm	MIN. flow rate [# # = index 1-13] Date and time interval
30	XX [S] hh:mm YY-MM-DD W	Current time: summer time, time of day Year, month, date and weekday (Monday = 1)
46	XX YYMMDD 1.2345.67 m ³	Main VOLUME reading last 1st and 15th of last month
51	XX T# hhmm/hhmm ww 1.2345.67 m ³	Tariff counter # [1-13] (example work week type)
100	XX 1234.567 m ³ 1234.567 h	Volume counter Hour counter (2 decimal places)
102	XX 1234.567 m ³ 12345 h	Volume counter Hour counter (no decimal places)
103	XX 12345.67 h	Hour counter (2 decimal places)
104	XX 1.23 m ³ /h	Current flow rate
105	XX 12345 h	Hour counter (no decimal places)
114	XX 1234.567 m ³ YYMMDD / YYMMDD	Volume consumption, last year
115	XX 1234.567 m ³ YYMMDD / YYMMDD	Volume consumption, last year up to today
116	XX 1234.567 m ³ YYMMDD / YYMMDD	Volume consumption, this year up to today

Mesuring accuracy

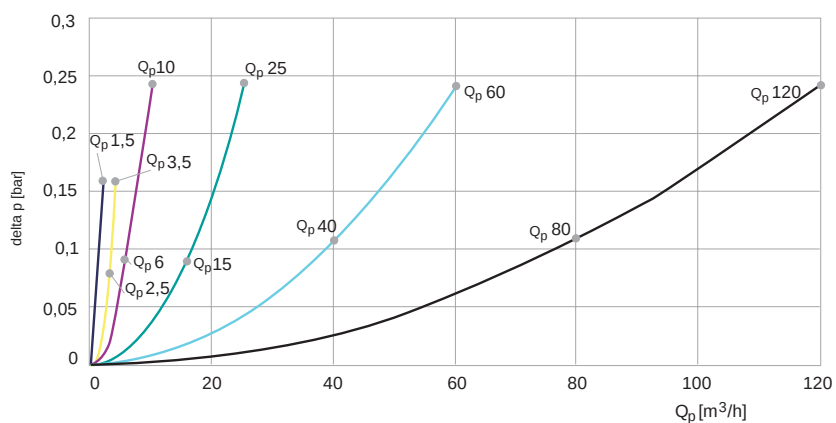
Energy accuracy range in accordance with EN 1434, class 2



combimeter® //

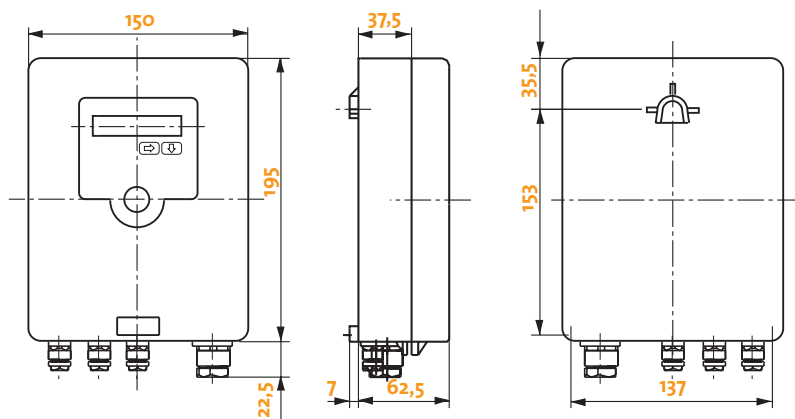
Pressure drop curves

Typical pressure drop curves for
combimeter® // type 1.5 - type 120

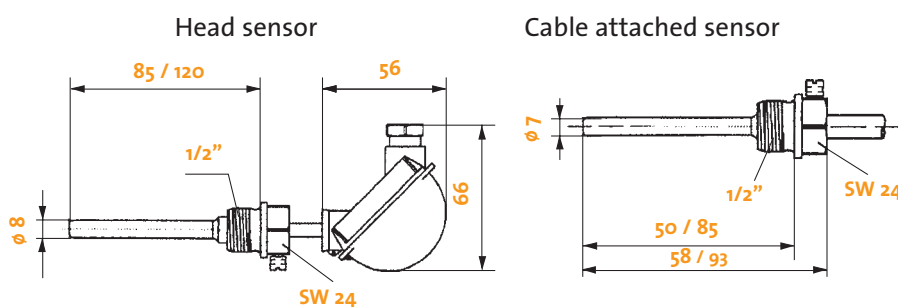


Dimensions

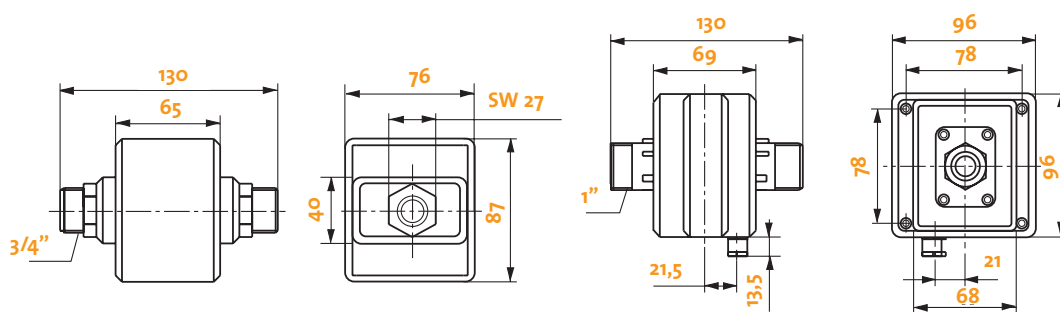
Processor unit



Sensor with protection pockets

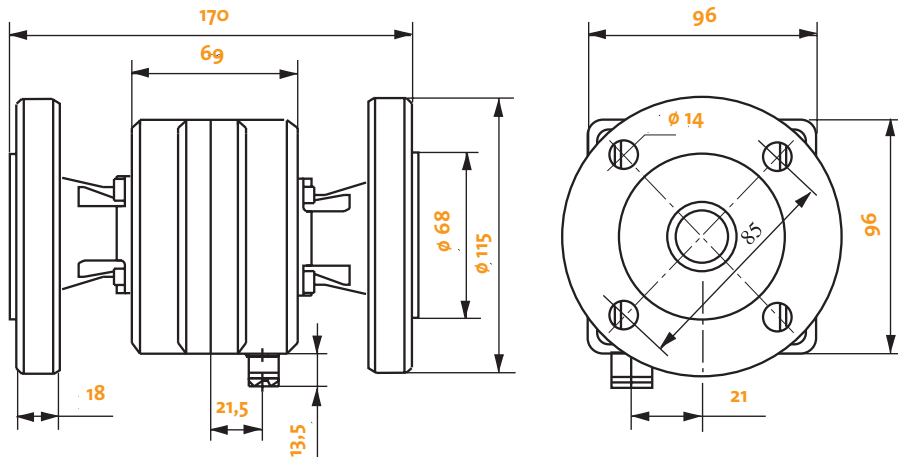


Flow metering unit

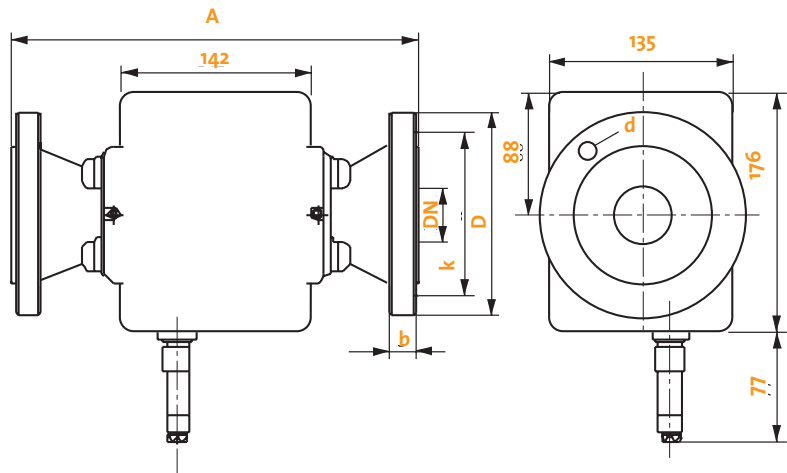


Dimensions

Flow metering unit
Type 2.5
(screwed connections)



Flow metering unit
Type 10 - 120



Flow unit Type					80 / 120	
		40 / 60				
		15 / 25				
		10				
DN	mm	40	50	65	80	100
A	mm	300	270	300	300	360
D	mm	150	165	185	200	235
k	mm	110	125	145	160	190
b	mm	20	22	24	26	28
d	mm	18	18	18	18	23
d	Number	4	4	8	8	8

Technical specifications

Processor unit			1.5	2.5	3.5	6	10	15	25	40	60	80	120	Unit
Display Readings	Total energy		9 999 999 - 999 999.9 - 9 999.999											
	Energy unit		kWh - MWh - GJ - Gcal - MBTU											
	Total volume		9 999 999 - 999 999.9 - 99 999.99 - 9 999.999											
	Current values		Output - Flow rate - Temperature											
Temperature input	Temperature sensor	Type	Pt100 / 4-wire or 2-wire											
	Sensor current		peak = 2. rms = 0.07											
	Metering cycle	per	2											
	Maximum temperature difference	Δ* max	± 110											
	Minimum temperature difference	Δ* min	± 3											
	Start-up range Differential temperature	Δ*	± 0.5											
	Absolute temperature measuring range	*	1 ... 160											
	Energy range	Max. energy	Ps	0.2	0.33	0.47	0.80	1.33	2.0	3.3	5.3	8.0	10.7	16.0
Max. energy at qp		Pi	0.19	0.32	0.45	0.77	1.28	1.9	30.2	5.1	7.7	10.2	15.4	MW
Min. energy at qi		Pi	1.5	2.5	3.5	6	10	15	25	40	60	80	120	kW
Power supply	Operating voltage	Un	230 (24) + 10% - 15 %, 50 Hz											
	Energy consumption													
Divers	Dimensions	H x W x D	195 x 150 x 65											mm
	Weight		0.9											Kg
	Protection class		IP 54											

Flow metering unit			1.5	2.5	3.5	6	10	15	25	40	60	80	120	Unit	
Flow ranges	Maximum	qs	2.25	3.75	5.25	9	15	22.5	37.5	60	90	120	180	m³/h	
	Nom. flow	qp	1.5	2.5	3.5	6	10	15	25	40	60	80	120	m³/h	
	Minimum	qi	0.015	0.025	0.036	0.06	0.1	0.15	0.25	0.4	0.6	0.8	1.2	m³/h	
	Start-up		0.0015	0.0025	0.0036	0.006	0.010	0.015	0.025	0.04	0.06	0.08	0.12	m³/h	
Pressure drop		Δp	0.16	0.09	0.16	0.10	0.10	0.10	0.25	0.11	0.25	0.11	0.25	Bar	
Oper. pressure	max.	PN	16	16 / 25											
Pipe/flange connections		DN	3/4"	1" / 25			40/50/65/80/100							mm	
Pipe/flange connections	Total length		130	130 - 190				300/270/300/300/360							mm
Pipe/flange connections	Material		brass	brass/grey cast iron				grey cast iron							
Medium	Working range in °C		20-90	20 - 130										°C	
Conductivity		min.	20											µS/cm	
Installation	Position			as required											
Weight	(incl. 3 m cable)		1.3	1.8 / 4.2				13.8/13.8/14.4/16.5/19.2							kg
Cable length			3 m and 10 m												
Protection class			IP 54												

Technical specifications

Energy meter				Unit
Basic features	Ambient class		Class C (+5°C to +55°C, installation in industrial plants)	
	Protection class		IP 54	
			Output - Flow rate - Temperature	
Readings in display	Unit		kWh - MWh - GJ - Gcal - MBTU	
	Total volume		9 999 999 - 999 999.9 - 99 999.99 - 9 999.999	m ³
	Current volume		Output - Flow rate - Temperature	
	Temperature sensor	Type	Pt100 / 4-wire or 2-wire	
	Sensor current		Peak = 2. ms = 0.07	
Temperature input	Metering cycle	Period	2	s
	Maximum temp. difference	Δ*max	± 110	K
	Minimum temp. difference	Δ*min	± 3	K
	Start-up range differential temp.	Δ*	± 0.5	K
Volume pulse input	Absolute temp. metering range	*	1 ... 160	°C
	Pulse values		0.1 - 1 - 2.5 - 10 - 25 - 100 - 250 - 1000	l
	Frequency	max.	50	Hz
(Contact or open collector)	Pulse duration		10 - 150	ms
	Input voltage (open)		4.5 ... 5.5	V
	Input voltage (closed)	max.	1.4	V
Power supply	Input impedance	min.	820	k
	Operating voltage	Un	230(24) + 10% - 15%, 50 Hz	Vac
Miscellaneous	Energy consumption		3	W
	Dimensions	H x B x T	195 x 150 x 65	mm
	Weight		0.9	kg

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Technical specifications

Energy meter			Unit
Basic features	Ambient class		Class C (+5°C to +55°C, installation in industrial plants)
	Protection class		IP 54
			Output - Flow rate - Temperature
Readings in display	Unit		kWh - MWh - GJ - Gcal - MBTU
	Total volume		9 999 999 - 999 999.9 - 99 999.99 - 9 999.999
	Current volume		Output - Flow rate - Temperature
	Temperature sensor	Type	Pt100 / 4-wire or 2-wire
	Sensor current		Peak = 2. ms = 0.07
Temperature input	Metering cycle	Period	2
	Maximum temp. difference	$\Delta^* \text{max}$	± 110
	Minimum temp. difference	$\Delta^* \text{min}$	± 3
	Start-up range differential temp.	Δ^*	± 0.5
Volume pulse input	Absolute temp. metering range	*	1 ... 160
	Pulse values		0.1 - 1 - 2.5 - 10 - 25 - 100 - 250 - 1000
	Frequency	max.	50
(Contact or open collector)	Pulse duration		10 - 150
	Input voltage (open)		4.5 ... 5.5
	Input voltage (closed)	max.	1.4
Power supply	Input impedance	min.	820
	Operating voltage	Un	230(24) + 10% - 15%, 50 Hz
Miscellaneous	Energy consumption		3
	Dimensions	H x B x T	195 x 150 x 65
	Weight		0.9

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