



APPLICATION

Fully electronic compact heat meter or compact cooling and heat meter with impeller scanning for recording energy and volume data. Highly accurate recording of all billing data in a heating circuit or a cooling / heating circuit at medium temperatures from 5 °C up to 90 °C.

FEATURES

- ▶ Electronic sensor control for recording flow rate
- ▶ Lithium battery, lifetime 12 years
- ▶ Optical ZVEI interface equipped as standard
- ▶ Adjustable reading date for billing
- ▶ Rotatable integrator
- ▶ Single-line 7-digit display for easy meter reading

COMPONENTS

- Volume measuring component (DN 15 - 100)
- Calculator, contains hardware and software for measuring flow rate, temperature and energy consumption
- Temperature sensor permanently connected in integrator

CALCULATOR - BASIC FEATURES

RAY	
Ambient class	EN 1434 class C / MID E1 + M1
Protection class DIN 40050 / IEC-EN 60529	IP 54 (heat meter) IP 68 (combined cooling-heat / heat-cooling meter)
Interfaces standard	Optical ZVEI according IEC 870-5
Interfaces optional	M-Bus, radio, pulse

Note: HYDRO-SET Software for configuration of meters, readout of measured values and printout of meter logs. Available under www.hydrometer.de (Products - downloads)

DISPLAY

RAY	
Display indication	LCD, 7-digit
Unit	MWh - kWh - GJ - MJ - kW - m³/h - l/h - m³ - l
Total values	9,999,999 - 999,999.9 - 99,999.99 - 9,999.999
Values displayed	Power - energy - flow rate - temperature - energy on reading date - reading date

TEMPERATURE INPUT

RAY			
Temperature sensor type			Pt 500 / 2-wire
Measuring cycle	T	s	16
Max. temperature difference	$\Delta\Theta$	K	+147
Min. temperature difference	$\Delta\Theta$	K	+3
Starting temperature difference	$\Delta\Theta$	K	+0.25
Absolute temperature measurement range	Θ	°C	0 ... 150

SUPPLY VOLTAGE

RAY			
Operating voltage	U_N	V_{DC}	3.0 (lithium battery)
Battery lifetime			12 years
Nominal power	P_N	μW	30

INTERFACES

RAY	
Optical	ZVEI interface for communication, M-Bus protocol
M-Bus	According to EN 1434-3. Data reading and parametrization are via two wires with polarity reversal protection.
Radio	868 MHz, real data or open metering protocol (not configurable, it's an own version)
Pulse	Output for energy and volume of heat meters, output for cooling energy and heat energy for cooling-heat meters (open collector)

RADIO INTERFACE - SPECIFICATION

RAY		
Frequency	MHz	868.95
Protocol	Real data (according EN 13757) or open metering	
Transmission power	mW	25
Transmission interval	sec.	64
Communication	BLUETOOTH OPTOHEAD and HYDRO-SET or IZAR@MOBILE	

VOLUME- / ENERGY PULSE OPEN COLLECTOR

RAY		
Max. frequency	Hz	4
Max. input voltage	V	30
Max. input current	mA	100
Max. voltage drop at active output	V/mA	2/27
Max. current through inactive output	µA/V	5/30
Max. reverse voltage without destroying outputs	V	6
Pulse duration	ms	125
Min. pulse break	ms	125

RAY DN 15 - 20

MECHANICAL COMPACT ENERGY METER

PRODUCT PICTURE



Standard M-Bus, Pulse



Radio

GENERAL

DN 15 - 20		
Temperature range	°C	5 ... 90
Ambient operating temperature	°C	0 ... 55
Ambient storage temperature	°C	-20 ... 55
Nominal pressure	PN bar	16
Mounting position	In any position, also overhead	
Cable length of temperature sensor	0.4 m mounted in housing, 1.5 m free	
Cable length of temperature sensor - installation in return pipe	1.5 m / 0.4 m (forward sensor / return sensor)	
Cable length of temperature sensor - installation in forward pipe	0.4 m / 1.5 m (forward sensor / return sensor)	
Approval	EN 1434 (22.52 / 00.02) / EC type examination certificate (DE-07-MI004-PTB030)	

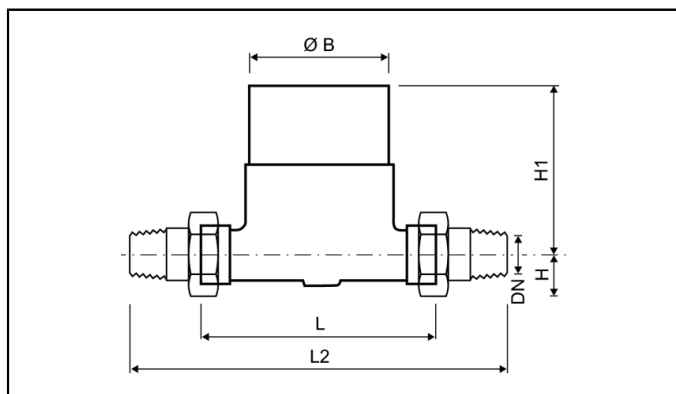
TECHNICAL DATA

Nominal diameter	DN	mm	15	15	20
Nominal flow rate	q _p	m ³ /h	0.6	1.5	2.5
Maximum flow rate	q _s	m ³ /h	1.2	3	5
Minimum flow rate	q _i	l/h	6	15	25
Starting flow rate		l/h	1.5 - 2	3 - 4	5 - 6
Pressure loss at q _p	Δp	mbar	243	243	242
Flow rate at 0.1 bar pressure loss		m ³ /h	0.385	0.962	1.607
Flow resistance coefficient Zeta			56.25	9	10.24

RAY DN 15 - 20

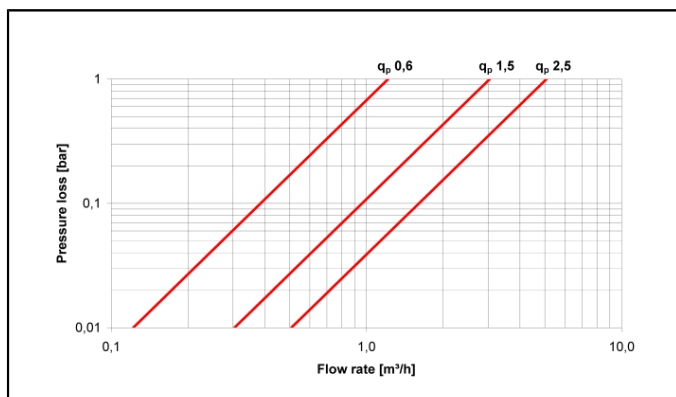
MECHANICAL COMPACT ENERGY METER

DIMENSIONS

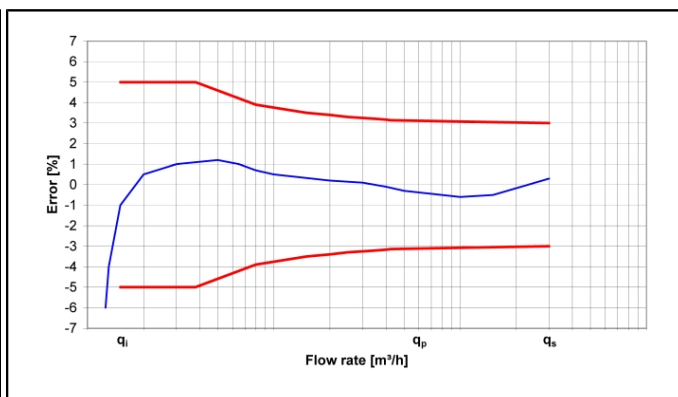


Nominal diameter	DN	mm	15	15	20
Nominal flow rate	q_p	m ³ /h	0.6	1.5	2.5
Overall length	L	mm	110	110	130
Overall length with coupling	L2	mm	190	190	210
Connection thread on meter		Inch	G $\frac{3}{4}$ B	G $\frac{3}{4}$ B	G1B
Connection thread of coupling		Inch	R $\frac{1}{2}$	R $\frac{1}{2}$	R $\frac{3}{4}$
Height	H	mm	20	20	20
Height	H1	mm	75	75	75
Diameter	$\varnothing B$	mm	63	63	63
Weight without coupling		kg	0.9	0.9	1

PRESSURE LOSS GRAPH / TYPICAL ERROR GRAPH



Pressure loss graph



Typical error graph

RAY DN 25 - 40 | horizontal

MECHANICAL COMPACT ENERGY METER

PRODUCT PICTURE



Standard M-Bus, Pulse



Radio

GENERAL

DN 25 - 40 horizontal		
Temperature range	°C	5 ... 90
Ambient operating temperature	°C	0 ... 55
Ambient storage temperature	°C	-20 ... 55
Nominal pressure	PN bar	16
Mounting position	Horizontal	
Cable length of temperature sensor	1.5 m, 6 m free	
Cable length of temperature sensor - installation in return pipe	6 m / 1.5 m (forward sensor / return sensor)	
Cable length of temperature sensor - installation in forward pipe	1.5 m / 6 m (forward sensor / return sensor)	
Approval	EN 1434 (22.52 / 06.02) / EC type examination certificate (DE-09-MI004-PTB001)	

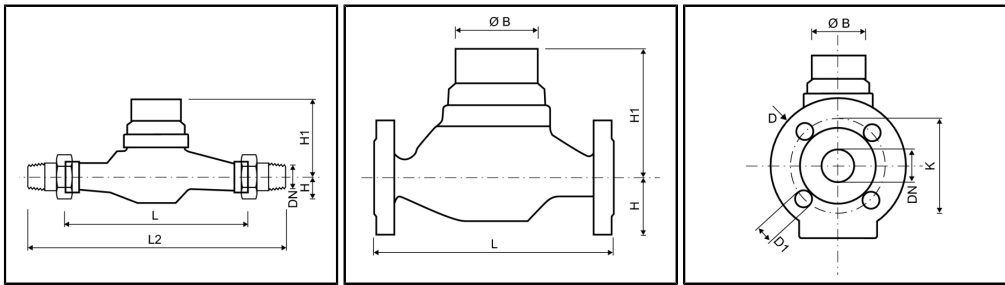
TECHNICAL DATA

Nominal diameter	DN	mm	25	25	40
Nominal flow rate	q _p	m³/h	3.5	6	10
Maximum flow rate	q _s	m³/h	7	12	20
Minimum flow rate	q _i	l/h	70	120	200
Starting flow rate		l/h	35	60	100
Pressure loss at q _p	Δp	mbar	170	190	240
Flow rate at 0.1 bar pressure loss		m³/h	2.68	4.35	6.45
Flow resistance coefficient Zeta			13	4.4	1.04

RAY DN 25 - 40 | horizontal

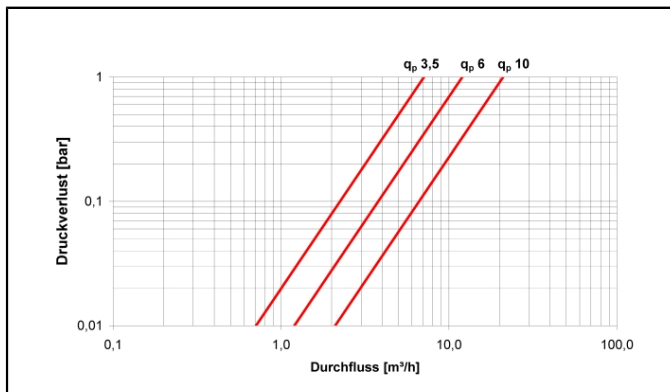
MECHANICAL COMPACT ENERGY METER

DIMENSIONS

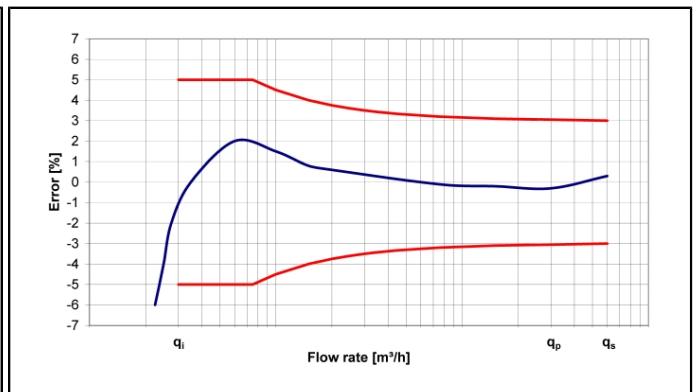


Nominal diameter	DN	mm	25	25	40
Nominal flow rate	q _p	m ³ /h	3.5	6	10
Overall length	L	mm	260	260	300
Overall length with coupling	L2	mm	378	378	438
Connection thread on meter	Inch		G1¼B	G1¼B	G2B
Connection thread of coupling	Inch		R1	R1	R1½
Flange diameter	D	mm	115	115	150
Hole circle diameter	K	mm	85	85	110
Number of screwholes	pcs		4	4	4
Screw hole diameter	D1	mm	18	18	18
Height	H	mm	45	45	50
Height	H1	mm	110	110	125
Diameter	Ø B	mm	63	63	63
Weight without coupling		kg	2.9	2.9	5.1
Weight with flanges		kg	4.9	4.9	8.6

PRESSURE LOSS GRAPH / TYPICAL ERROR GRAPH



Pressure loss graph



Typical error graph

RAY DN 25 - 40 | vertical

MECHANICAL COMPACT ENERGY METER

PRODUCT PICTURE



Standard M-Bus, Pulse



Radio

GENERAL

DN 25 - 40 vertical		
Temperature range	°C	5 ... 90
Ambient operating temperature	°C	0 ... 55
Ambient storage temperature	°C	-20 ... 55
Nominal pressure	PN bar	16
Mounting position	Rising pipe, downpipe	
Cable length of temperature sensor	1.5 m, 6 m free	
Cable length of temperature sensor - installation in return pipe	6 m / 1.5 m (forward sensor / return sensor)	
Cable length of temperature sensor - installation in forward pipe	1.5 m / 6 m (forward sensor / return sensor)	
Approval	EN 1434 (22.52 / 06.02) / EC type examination certificate (DE-09-MI004-PTB001)	

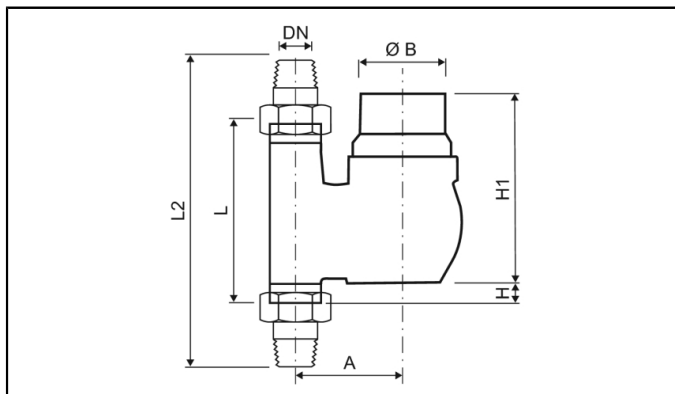
TECHNICAL DATA

Nominal diameter	DN	mm	25	25	40
Nominal flow rate	q _p	m ³ /h	3.5	6	10
Maximum flow rate	q _s	m ³ /h	7	12	20
Minimum flow rate	q _i	l/h	70	120	200
Starting flow rate		l/h	35	60	100
Pressure loss at q _p for installation in rising pipes		mbar	250	250	490
Pressure loss at q _p for installation in downpipes		mbar	0.29	250	250
Flow rate at 0.1 bar pressure loss - rising pipes		m ³ /h	2.21	3.79	4.52
Flow rate at 0.1 bar pressure loss - downpipes		m ³ /h	2.05	3.79	6.33
Flow resistance coefficient Zeta			13	4.4	1.04

RAY DN 25 - 40 | vertical

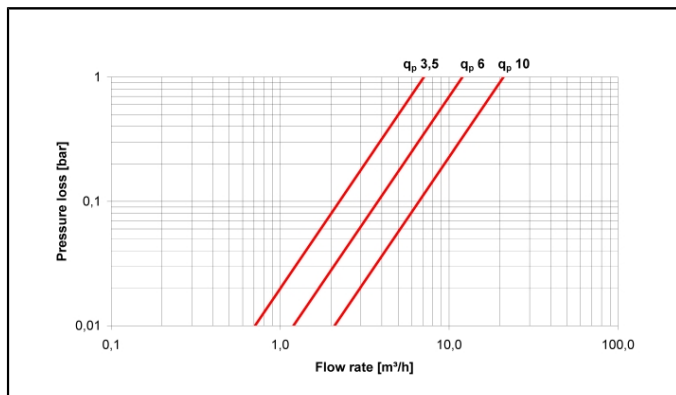
MECHANICAL COMPACT ENERGY METER

DIMENSIONS

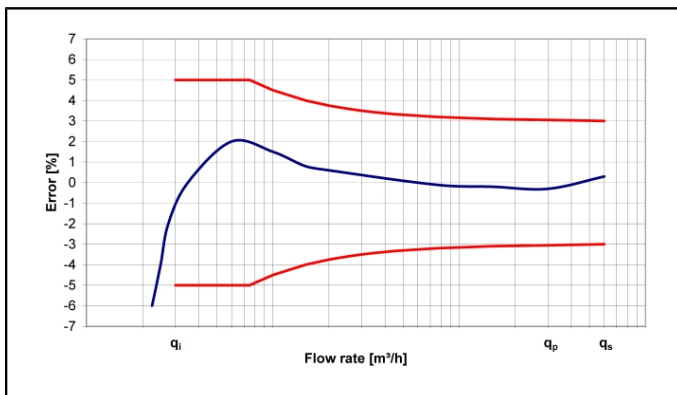


Nominal diameter	DN	mm	25	25	40
Nominal flow rate	q _p	m ³ /h	3.5	6	10
Overall length	L	mm	135 / 150	135 / 150	150 / 200
Overall length with coupling	L2	mm	253 / 268	253 / 268	338
Connection thread on meter		Inch	G1¼B	G1¼B	G2B
Connection thread of coupling		Inch	R1	R1	R1½
Height	H1	mm	161	161	191
Diameter	Ø B	mm	63	63	63
Width	A	mm	146	146	185
Weight without coupling		kg	3.1	3.1	5.5

PRESSURE LOSS GRAPH / TYPICAL ERROR GRAPH



Pressure loss graph



Typical error graph

RAY DN 50 - 100

MECHANICAL COMPACT ENERGY METER

PRODUCT PICTURE



Standard M-Bus, Pulse



Radio

GENERAL

			DN 50 - 100
Temperature range	°C		0 ... 90
Ambient operating temperature	°C		0 ... 55
Ambient storage temperature	°C		-20 ... 55
Nominal pressure	PN	bar	16
Mounting position			Horizontal
Cable length of temperature sensor			6 m, 6 m
Cable length of temperature sensor - installation in return pipe			6 m / 6 m (forward sensor / return sensor)
Cable length of temperature sensor - installation in forward pipe			6 m / 6 m (forward sensor / return sensor)
Approval			EN 1434 (22.52 / 01.02)

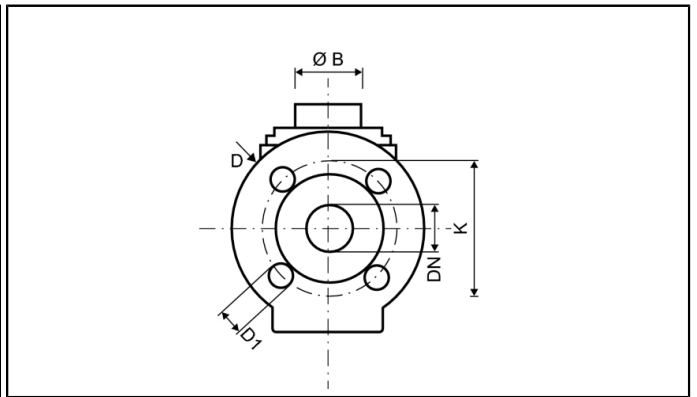
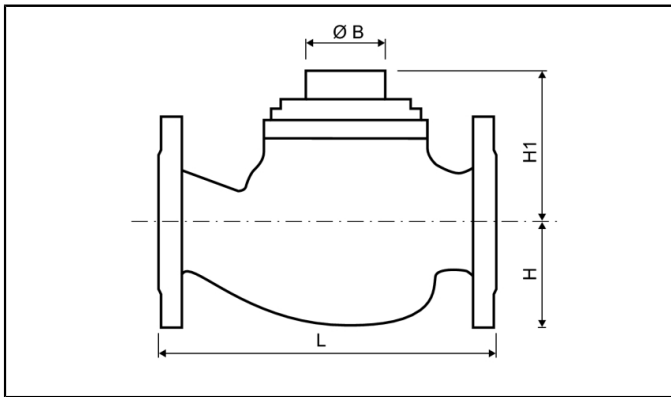
TECHNICAL DATA

Nominal diameter	DN	mm	50	65	80	100
Nominal flow rate	q_p	m ³ /h	15	25	40	60
Maximum flow rate	q_s	m ³ /h	30	50	80	120
Permissible continuous load (HY)		m ³ /h	50	50	110	140
Minimum flow rate	q_i	l/h	300	500	800	1200
Starting flow rate		l/h	60	60	90	90
Pressure loss at q_p	Δp	mbar	62	142	80	100
Flow rate at 0.1 bar pressure loss		m ³ /h	19.05	20.99	44.77	60
Flow resistance coefficient Zeta			2.8	6.6	3.3	4.5

RAY DN 50 - 100

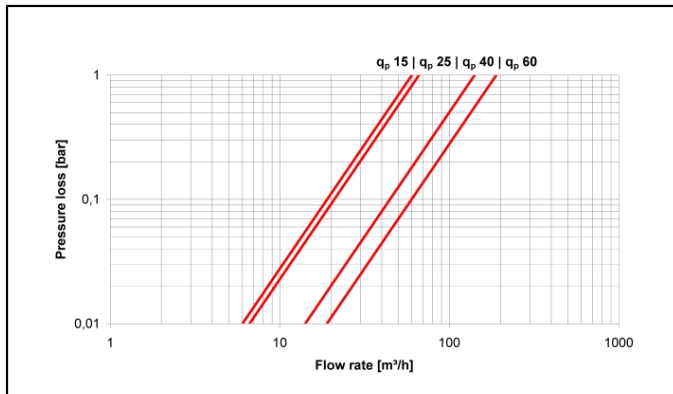
MECHANICAL COMPACT ENERGY METER

DIMENSIONS

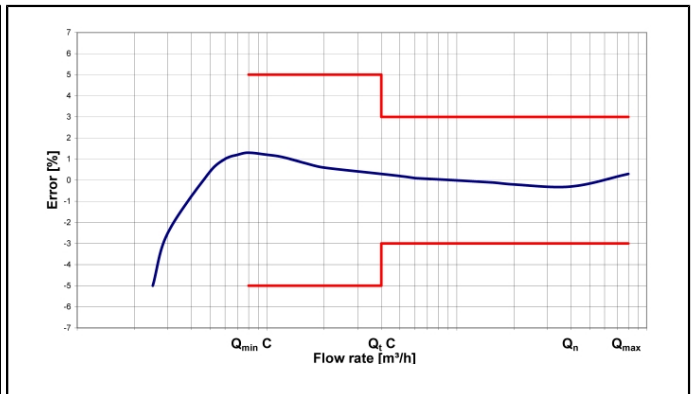


Nominal diameter	DN	mm	50	65	80	100
Nominal flow rate	q_p	m ³ /h	15	25	40	60
Overall length	L	mm	270	300	300	360
Flange diameter	D	mm	165	185	200	220
Hole circle diameter	K	mm	125	145	160	180
Number of screwholes		pcs	4	4	4 / 8	8
Screw hole diameter	D1	mm	18	18	18	18
Height	H	mm	85	97	102	113
Height	H1	mm	125	125	160	170
Diameter	Ø B	mm	84	97	102	113
Weight with flanges		kg	14.2	18	24	28

PRESSURE LOSS GRAPH / TYPICAL ERROR GRAPH



Pressure loss graph



Typical error graph

HYDROMETER

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