

# RAY

## MECHANICAL COMPACT METER

# SAPPEL



### APPLICATION

Ray is a fully electronic multi-jets compact heat meter or compact cooling and heat meter with impeller scanning for recording energy and volume data. Ray is equipped with 2 temperature sensors. Ray is available in heating and heating / cooling versions.

### FEATURES

- ▶ MID approved class 2 from ND 15 mm qp 0,6 m<sup>3</sup>/h up to ND 40 mm qp 10 m<sup>3</sup>/h
- ▶ Lithium battery, lifetime 12 years
- ▶ Optical ZVEI interface equipped as standard
- ▶ Single-line 7-digit display
- ▶ Options pulses outputs (energy/volume), M-Bus or Radio
- ▶ Temperature range 5°C to 90°C

### COMPONENTS

- Volume measuring component (DN 15 - 40)
- 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 is available under [www.hydrometer.de](http://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. t° difference	$\Delta\Theta$	K	+147
Min. t° difference	$\Delta\Theta$	K	+3
Starting t° difference	$\Delta\Theta$	K	+0.25
Absolute t° measurement range	$\Theta$	°C	0 ... 150

### SUPPLY VOLTAGE

RAY			
Operating voltage	$U_N$	$V_{DC}$	3.0 (lithium battery)
Battery lifetime			12 years
Nominal power	$P_N$	$\mu W$	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
Pulse	Output energy and volume for heat meters, output 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	$\mu$ A/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 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)	
Approval		EN 1434 (22.52 / 00.02) / EC type examination certificate (DE-07-MI004-PTB030)	

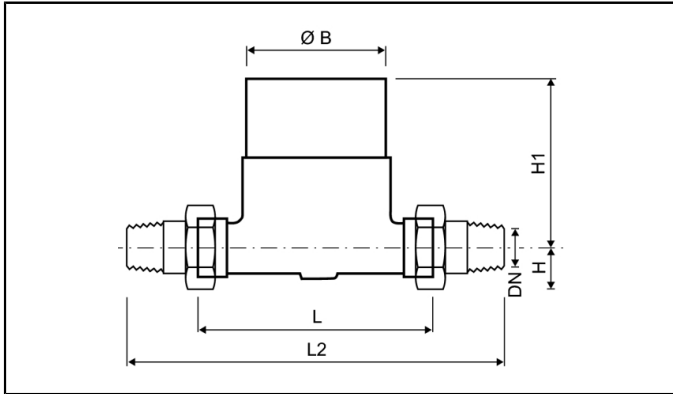
### TECHNICAL DATA

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

# RAY DN 15 - 20

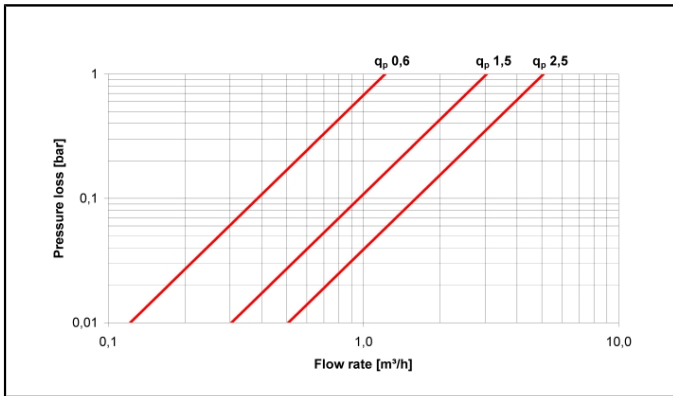
## MECHANICAL COMPACT METER

### DIMENSIONS

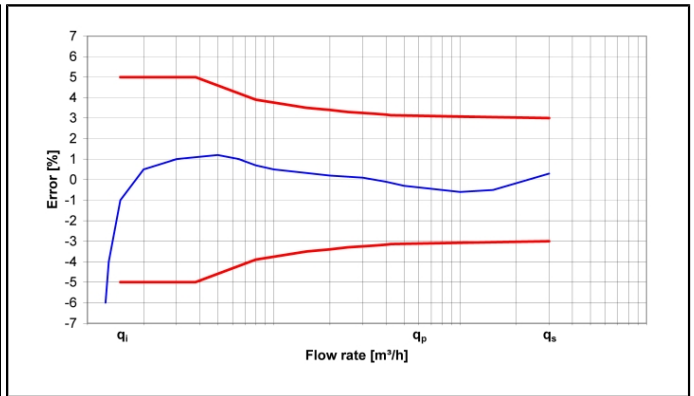


Nominal diameter	DN	mm	15	15	20
Nominal flow rate	$q_p$	$m^3/h$	0.6	1.5	2.5
Overall length	L	mm	110	110	130
Overall length with coupling	L2	mm	190	190	210
Connection thread on meter		Inch	G $\frac{3}{4}$ B	G $\frac{3}{4}$ B	G1B
Connection thread of coupling		Inch	R $\frac{1}{2}$	R $\frac{1}{2}$	R $\frac{3}{4}$
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 METER

## PRODUCT PICTURE



Standard M-Bus, Pulse



Radio

## GENERAL

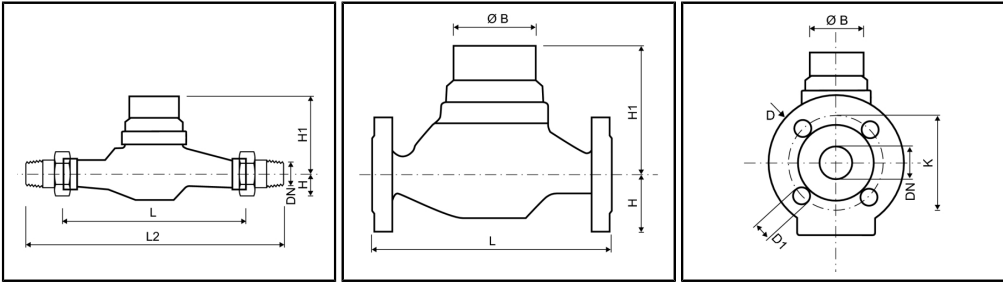
DN 25 - 40   horizontal		
Temperature range	°C	5 ... 90
Ambient operating temperature	°C	0 ... 55
Ambient storage temperature	°C	-20 ... 55
Nominal pressure	PN bar	16
Mounting position		Horizontal
Cable length of temperature sensor		1.5 m, 6 m free
Cable length of temperature sensor - installation in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

## TECHNICAL DATA

Nominal diameter	DN	mm	25	40
Nominal flow rate	q <sub>p</sub>	m <sup>3</sup> /h	6	10
Maximum flow rate	q <sub>s</sub>	m <sup>3</sup> /h	12	20
Minimum flow rate	q <sub>i</sub>	l/h	120	200
Starting flow rate		l/h	60	100
Pressure loss at q <sub>p</sub>	Δp	mbar	190	240
Flow rate at 0.1 bar pressure loss		m <sup>3</sup> /h	4.35	6.45
Flow resistance coefficient Zeta			4.4	1.04

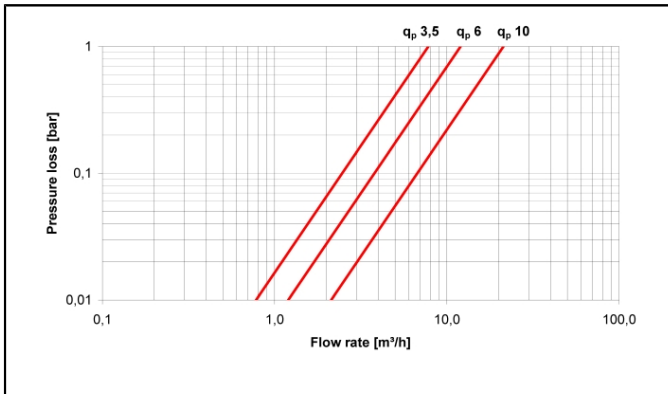
# RAY DN 25 - 40 | horizontal MECHANICAL COMPACT METER

## DIMENSIONS

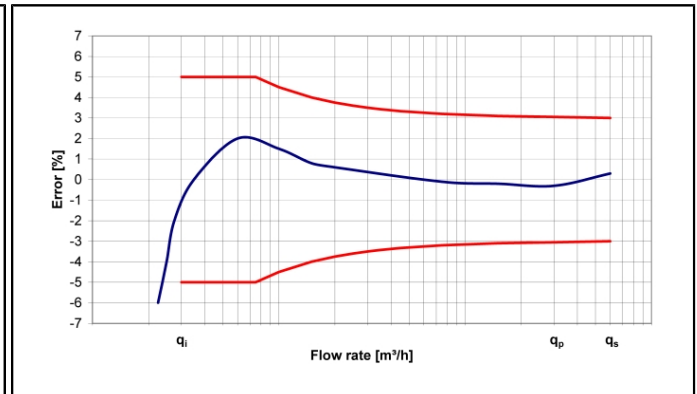


Nominal diameter	DN	mm	25	40
Nominal flow rate	$q_p$	m <sup>3</sup> /h	6	10
Overall length	L	mm	260	300
Overall length with coupling	L2	mm	378	438
Connection thread on meter		Inch	G1¼B	G2B
Connection thread of coupling		Inch	R1	R1½
Flange diameter	D	mm	115	150
Hole circle diameter	K	mm	85	110
Number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

## PRESSURE LOSS GRAPH / TYPICAL ERROR GRAPH



Pressure loss graph



Typical error graph