

# PICOAL Heat meter

**Battery lifetime of 15 years**

**0.01°C temperature resolution**

**Self-adjusting A/D-Converter**

**Permanent memory**

**Low starting flow**

**Standard installation length**

**Data or pulse output**

**Flow and heat load indication**

**Complies with OIML R75**

**TS** 27.01      PTB  $\frac{22.15}{95.02}$   
061  
OIML R75      Class B



PICOAL compact heat meter is used to measure units of energy in district and central heating plants, which have water as the heat conducting medium.

The calculator can be fitted on flow meters of different sizes, produced by various manufacturers. This flexibility makes PICOAL the ideal solution for small and medium-sized consumers.

PICOAL can be supplied with either data or pulse output at no extra cost, which facilitates data acquisition and prepayment systems.

PICOAL compact heat meter is usually supplied as a complete unit. This unit comprises three different elements: a matched pair of Pt500 temperature sensors, a flow meter and a calculator.

One of the temperature sensors must be mounted in the flow and the other in the return pipe. The flow meter, which can be fitted in either the flow or return pipe, generates pulses, via the electronic pick-up, which are directly proportional to the flow of water. The flow pulses are registered by a precounter in the calculator. When a predetermined number of pulses have been received, e.g. corresponding to 10 litres, the energy is calculated.

  
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## Design

During the calculation process, the temperature measurement is calibrated prior to the temperature being measured in the flow and return pipes. The degree of cooling (differential temperature) is then determined, based on the measured temperatures. This value is multiplied by the volume of water and the K-factor (correction for density and heat content).

The value of heat energy thus derived is accumulated in the energy counter. Any remainder, which cannot be displayed due to the resolution of the display, is added to the next calculation.

PICOCAL constantly displays the amount of energy which has been accumulated in kWh, MWh or GJ, depending on the type specified. The following can be displayed by using the key on the front panel: volume of water [m<sup>3</sup>], number of operating hours, flow, return and differential temperatures [°C], water flow [l/h], actual heat load [kW], information code and display test.

The display will return to accumulated energy approx. 2 minutes after the key has been activated.

Accumulated heat and water volumes are stored at hourly intervals, together with the hour counter, in the permanent memory. This ensures that data is not lost in the event of a system fault.

PICOCAL has 12 internal registers for storing consumption data. One register is always used for hourly readings. The remaining 11 registers are used to store data at intervals of 730 hours (approx. 1 month).

The volume of heat, water and the hour counter reading are stored hourly. Furthermore, the volume of heat and water are stored monthly, as are any information codes which may have been registered.

Permanently stored data can be retrieved using Kamstrup's hand-held data acquisition terminal, MULTITERM II, via a data plug.

## Information codes

If PICOCAL registers operational disturbances, a number code will be stored in the information code register.

This number code gives exact information on what type of disturbance has occurred. The disturbance will be indicated by the letter "E" in the left-hand side of the display. This information is invaluable to both the consumer and the heat supplier.

Each information code has a number. If meter operation is disturbed twice in quick succession, the value of the first information code will be added to the value of the second code and stored in the register. E.g. information code 12 consists of two codes, number 4 and number 8.

The information codes are as follows:

- |      |   |
|------|---|
| +1   | The meter has performed a reset routine following a voltage drop or reset has been activated without anyone pressing the key on the front panel. This information code deletes all other information codes. "E" is <b>not</b> displayed.                        |
| +2   | No pulses are received from the flow meter. PICOCAL has not registered water pulses for a period of 42 successive hours. Furthermore, the differential temperature has been higher than 12°C. "E" will be displayed, provided the meter is programmed for this. |
| +4   | The sensor in the return pipe is defective. This information code will be displayed if the temperature in the return pipe has been above 135°C or below 0°C for 1-2 hours. "E" will be displayed.   |
| +8   | The sensor in the flow pipe is defective. This information code will be displayed if the temperature in the flow pipe has been above 135°C or below 0°C for more than 1-2 hours. "E" will be displayed.   |
| +128 | Battery expired. This code indicates that 15 years has elapsed since >reset hour counter< or >reset all<. "E" will be indicated in the display.   |
| +256 | Pulse error in the flow meter. This information code will be indicated if the meter has registered water pulses quicker than 1 calculation per second - or equivalent. "E" will be indicated in the display.  |

# Technical Data

## CALCULATOR

Temperature range	10...130°C
Differential temperature	3...110°C
Resolution	0.01°C
Energy counting	±0.25%...±0.75% @ Δt = 110°C...3°C
Supply voltage	3.65 V lithium-thionylchloride battery
Battery lifetime	15 years @ t <sub>BAT</sub> ≤ 35°C
Display	LCD, 7 segments, 6 digits, 7 mm
Ambient temperature	0...+55°C
Storage temperature	-20...+60°C
Weight	0.4 kg excl. flow meter
Protection class	IP 54

## DATA OUTPUT

Type	RS 232, open collector
Speed	1200 baud

## PULSE OUTPUT

Pulse rate	1 pulse per energy unit in the display
Pulse duration	50 msec.
Max. voltage (OFF)	27 Vdc
Max. current (ON)	27 mA

## COMPACT HEAT METER

Max. flow temperature (with flow meter in return pipe)	130°C
Max. return temperature	90°C
Differential temperature	3...110°C
Flow sizes, Q <sub>s</sub> (Q <sub>n</sub> )	0.6 - 1.5 - 2.5 m <sup>3</sup> /h
OIML R75	Class 4
PTB	Flow meter class B

## TEMPERATURES SENSORS

Sensor type	Pt500 in acc. with DIN/IEC 751 B
Sensor cable	Silicone
Temperature range	0...150°C
Absolute tolerance	< ±(0.3+(0.005xt)) [°C]
Differential tolerance	< ±0.025 K @ 40 and 110°C

## EMC DATA

Immunity	EN 50 082-1 PTB, Störfestigkeit
Emission	EN 50 081-1



## FLOW METER

Nominal size		DN 15	DN15	DN20
Pressure stage		PN16	PN16	PN16
Nom. flow	Q <sub>s</sub> (Q <sub>n</sub> ) [m <sup>3</sup> /h]	0.6	1.5	2.5
Max. flow	(Q <sub>max</sub> ) [m <sup>3</sup> /h]	1.2	3.0	5.0
5% limit	Q <sub>i</sub> (Q <sub>min</sub> ) [l/h]	12	30	50
Start flow	[l/h]	4	6	10
Max. medium temperature	[°C]	90	90	90
Flow at 0.1 bar pressure loss	[m <sup>3</sup> /h]	0.4	0.9	1.6
Inst. length (meter housing)	L [mm]	110	110	130
Inst. length (integral)	L1 [mm]	190	190	228
Connection thread, meter housing		G3/4B	G3/4B	G1B
Connection thread, unions		½" BSP	½" BSP	½" BSP

## Order Specification

65 - P - □ - □ - □ - □ - □□□

### Unit of Energy

kWh/MWh display	1
GJ display	2

### Temperature sensors

No temperature sensors included	0
Pt500, sensor set with pockets - 1.5 m cable	1
Pt500, temperature probe set - 1.5 m cable	3
Pt500, short, direct sensor set -1.5 m cable	5

### Adapter ring for flow meter

Hydrometer	1
Metron	2
GWF Unico	3
Werhle	4
GWF Unico 2	5

### Flow meter

PICOAL without flow meter	0
PICOAL with flow meter, $Q_5(Q_r)$ 0.6 m <sup>3</sup> /h	1
PICOAL with flow meter, $Q_5(Q_r)$ 1.5 m <sup>3</sup> /h	2
PICOAL with flow meter, $Q_5(Q_r)$ 2.5 m <sup>3</sup> /h	3

**ORDER CODE** (determined by Kamstrup)

## Accessories

Type No.	Description	Application
65-57-204	½" BSP sensor pocket, l = 40 mm	65-PX-1XX-XXX
65-57-206	½" BSP sensor pocket, l = 60 mm	65-PX-1XX-XXX
65-56-489	½" BSP to ¾" UNF nipple	65-PX-3XX-XXX
65-56-490	¾" BSP to ¾" UNF nipple	65-PX-3XX-XXX
65-56-491	½" BSP to M10X1 nipple	65-PX-5XX-XXX
65-56-492	¾" BSP to M10X1 nipple	65-PX-5XX-XXX

# Programming Number

	W	X	YY	Z	UU	AAA
	□	- □	- □□	- □	- □□	- □□□
Standard data output and full display	0					
Addressable data output and full display	1					
Standard data output and limited display	2					
Addressable data output and limited display	3					
Pulse output for energy and full display	4					
Pulse output for energy and limited display	5					
Energy in MWh or kWh *)		0				
Energy in GJ		4				
Pulse counter and decimal point position (see separate table)			YY			
Flow meter in return pipe, without control digit in display				2		
Flow meter in flow pipe, without control digit in display				3		
Flow meter in return pipe, with control digit in display				6		
Flow meter in flow pipe, with control digit in display				7		
Complete user display, no information code 1&2					11	
Limited user display/information code on request					UU	
Address, to be stated if addressable output is selected						001-126

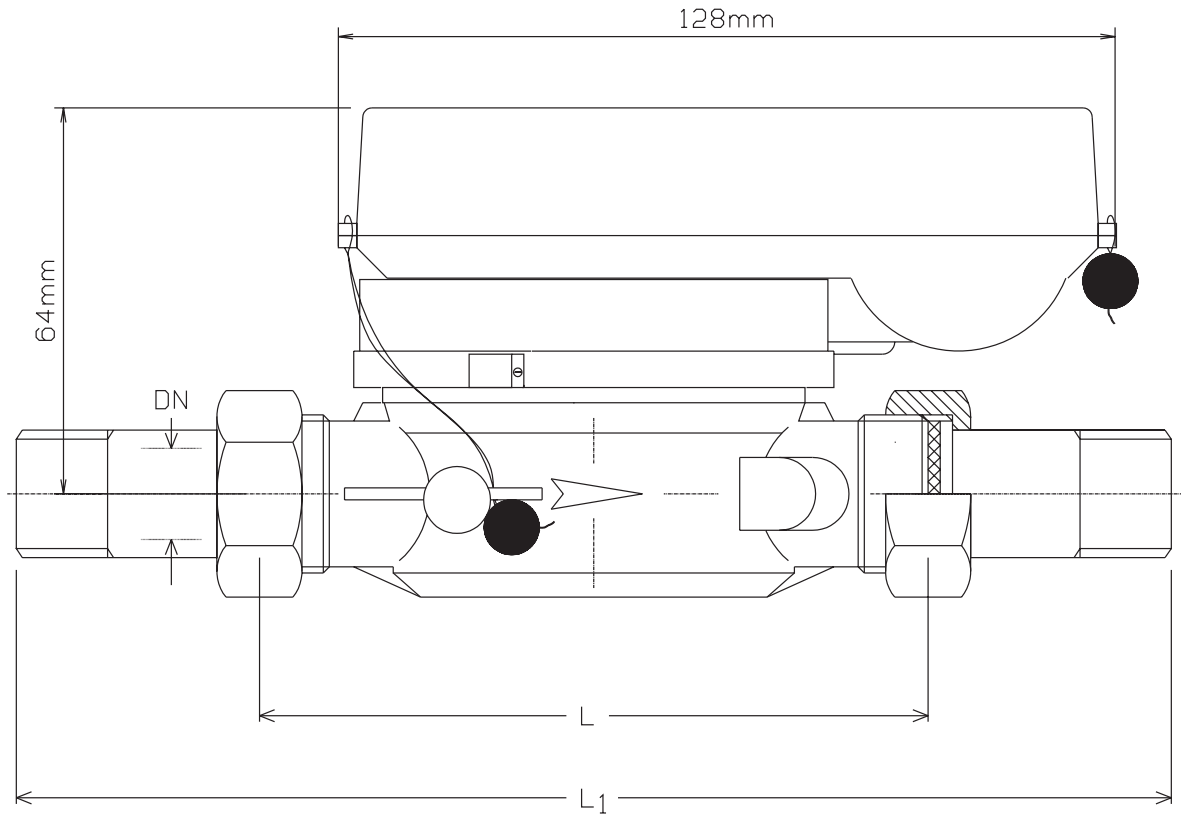
## Flow Meter Pulse Counter and Decimal Point Placement (YY-code)

Water Meter Data				Decimal Point Placement					
YY	Precounter	Pulses/l	Q <sub>s</sub> (Q <sub>n</sub> )	kWh	MWh x = 0	GJ x = 0	Water [m <sup>3</sup> ] x = 4	Power [kW]	Flow [l/h]
8	1403	140.3	0.6	0		2	2	1	0
9	957	95.7	1	0		2	2	1	2
10	646	64.6	1.5	0		2	2	1	0
11	404	40.4	1.5/2.5	0		2	2	1	0
12	502	50.2	1.5/2.5	0		2	2	1	0
13	2350	23.5	3.5		2	1	1	0	0
15	757	75.7	1	0		2	2	1	0
16	3000	300	0.6	0		2	2	1	0
17	269	26.9	1.5	0		2	2	1	0
18	665	66.5	1.5	0		2	2	1	0
19	1000	100	0.6	0		2	2	1	0
21	294	29.4		0		2	2	1	0
22	1668	166.8	0.6	0		2	2	1	0
23	864	86.4	0.75/1	0		2	2	1	0
24	522	52.2	2.5/1.5	0		2	2	1	0
25	607	60.7	1.5	0		2	2	1	0
26	420	42	1.0/2.5	0		2	2	1	0
27	2982	29.82	2.5		2	1	1	0	0
28	2424	24.24	3.5		2	1	1	0	0
29	1854	18.54	2.5/6		2	1	1	0	0
30	770	7.7	10		2	1	1	0	0
31	700	70	15		2	1	1	0	0
32	366	36	2.5	0		2	2	1	0
33	604	60.47	1.5	0		2	2	1	0
34	1230	123.05	0.6	0		2	2	1	0
36	500	50	3	0		2	2	1	0
39	256	25.6	1.5/2.5	0		2	2	1	0
40	1280	12.8	3.5		2	1	1	0	0
54	1668	166.8	0.6		3	2	2	1	0
55	607	60.7	1.5		3	2	2	1	0
56	594	59.4	1.5		3	2	2	1	0
57	3764	37.64	2.5		2	1	1	0	0
59	1403	140.3	0.6		3	2	2	1	0
60	957	95.7	1		3	2	2	1	0
61	646	64.6	1.5		3	2	2	1	0
62	404	40.4	2.5		3	2	2	1	0
63	1224	122.4	0.6/1.0	0		2	2	1	0
64	852	85.2	1.5	0		2	2	1	0
65	599	59.9	2.5	0		2	2	1	0
74	1224	122.4	0.6/1.0		3	2	2	1	0
75	852	85.24	1.5		3	2	2	1	0
76	599	59.92	2.5		3	2	2	1	0

**Note:**

■ PICOAL compact heat meter

# Dimensional Drawing



$Q_s(Q_v)$	L [mm]	L <sub>1</sub> [mm]
0.6 m <sup>3</sup> /h	110	190
1.5 m <sup>3</sup> /h	110	190
2.5 m <sup>3</sup> /h	130	228

The measurements stated apply to PICOVAL with an Hydrometer flow meter.

## **Authorized Distributor**

Please contact Kamstrup A/S for information about your nearest distributor.