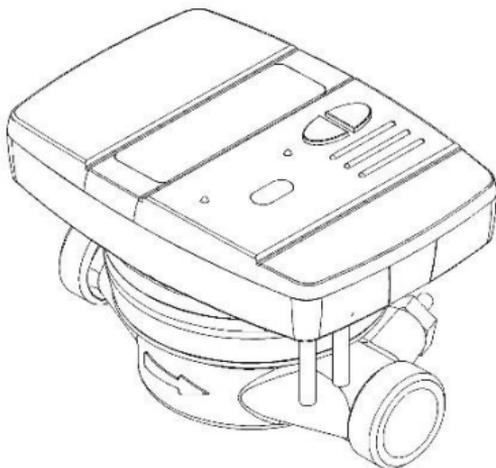


Hydrocal-M3

Heat meter, compact version



EN 1434

USER MANUAL

PREMISE

The installation must be carried out by qualified personnel only. The manufacturer doesn't assume any responsibility for improper installation or damages caused by third parties.

WARNING

The meter contains potentially dangerous batteries: handle carefully and do not dump in the environment.

**THE TOP CALCULATION/ELECTRONIC UNIT
MUST NOT BE SEPARATED FROM THE BOTTOM BRASS BODY.**

INTRODUCTION

The model Hydrocal-M3 is a compact heat meter that measures the thermal energy used in the heating and cooling systems.

The meter allows to measure the thermal energy passing into a hydraulic circuit used for heating and/or for cooling, it also allows the acquisition of the volume measured by up to 2 water meters equipped with pulse emitter.

The meter is equipped with a pulse emitter output for the heating data transmission and with a Wired M-Bus network port.

PACKAGE CONTENTS

- Hydrocal-M3 heat meter
- User manual
- Adhesive seal
- Declaration of conformity

GENERAL INFORMATION

Before proceeding with the installation and configuration of the product, read carefully the instructions described in this manual. For further technical questions, please contact the Technical Support.

The installation must be carried out by qualified personnel only.

The relevant regulations regarding the instrument are the EN1434 (1-6) and Directive 2004/22/CE (Annex MI-004).

Any tampering of the meter or removal of the seals will void the warranty provided.

For proper energy accounting, always respect the mounting type prescribed (inlet pipe mounting / return pipe mounting). Always refer to the indications reported on the lid of the meter.

INSTALLATION

HYDRAULIC PART

BEFORE MOUNTING

Before the meter installation make sure that the two ends of the inlet and outlet pipe are perfectly aligned, clean them with the utmost care. Moreover, make sure there is a suitable filter placed at the inlet and that clean and undamaged gaskets are inserted on both sides.

Upstream and downstream the meter install an appropriate water flow interception and regulation devices suitable to allow inspection and maintenance of the meter, control of the water flow and eventual sealing of the system.

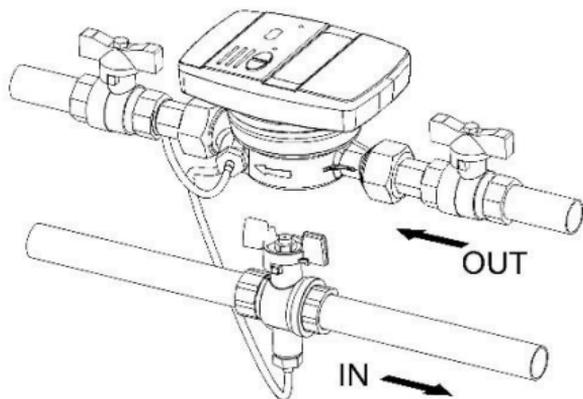
It is necessary to pay attention to the direction of the flow. Install the meter according to the water flow following the direction indicated by the arrow embossed on the meter body. Install the meter respecting the position designation (in accordance with the indication on the lid of the meter itself).

To ensure a correct measurement, make sure that there is no air inside of the pipe and make sure that there are no debris in the fluid (potentially dangerous for the turbine of the meter).

MOUNTING

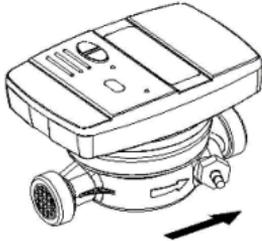
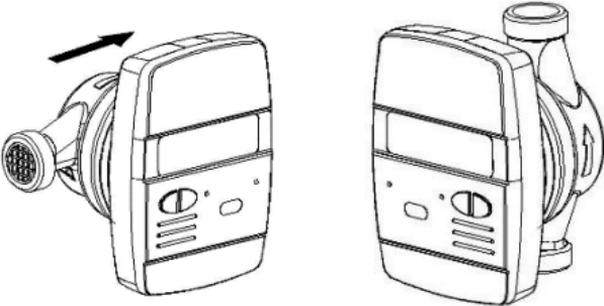
Always respect the type of installation prescribed (inlet pipe\outlet pipe). Always refer to the information reported on the lid of the meter.

The picture below refers to a typical installation of a heat meter, standard version (return pipe installation) and horizontal mounting.

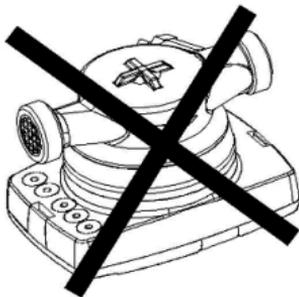


ALLOWED MOUNTING POSITIONS

All the versions of the heat meters can be installed both horizontally and vertically. For a better performance it is preferable, however, the horizontal installation, with the turbine axis perpendicular to the ground and the reading mechanism facing upwards.

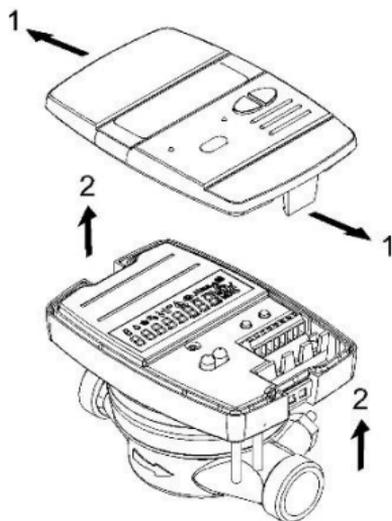
	<p>Position allowed. Ideal for a better metering performance.</p>
	<p>Positions allowed.</p>

“Upside down” mounting position is not allowed (see picture below).



ELECTRONIC UNIT

Open the electronic unit by leveraging on the two hooks [1] and remove the cover [2].



For the specific connection instructions, refer to the appropriate sections included in this manual.

After the installation, connection, configuration and commissioning, close the cover and apply adhesives sealing.



TEMPERATURE SENSORS INSTALLATION

The heat meter is equipped with two PT1000 temperature sensors in accordance with the MID 2004/22/CE and EN1434 approvals.

For a proper installation, always proceed in accordance with the guidelines prescribed by law.

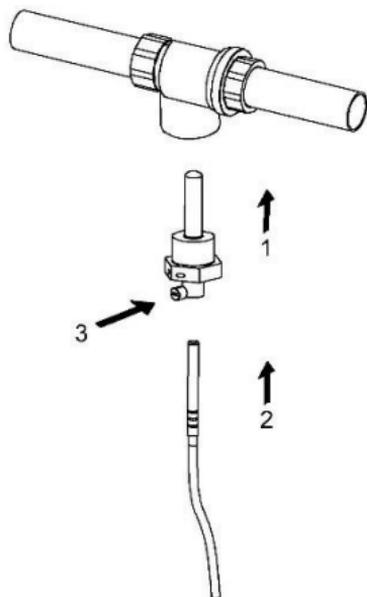
In the standard version (return pipe mounting position), the return sensor is already built into the brass body. The inlet sensor instead, must be installed in a ball valve or in a socket mounted in the inlet pipe and compliant with the requirements of the sensor itself.

Vice versa, the version for installation on the inlet pipe the temperature probe inserted on the brass body correspond to the inlet pipe probe, and the return probe will required to be installed into a valve or socket into the outlet pipe.

Before the installation of the temperature sensor, it is necessary to intercept the flow (close the ball valve or the appropriate shutters).

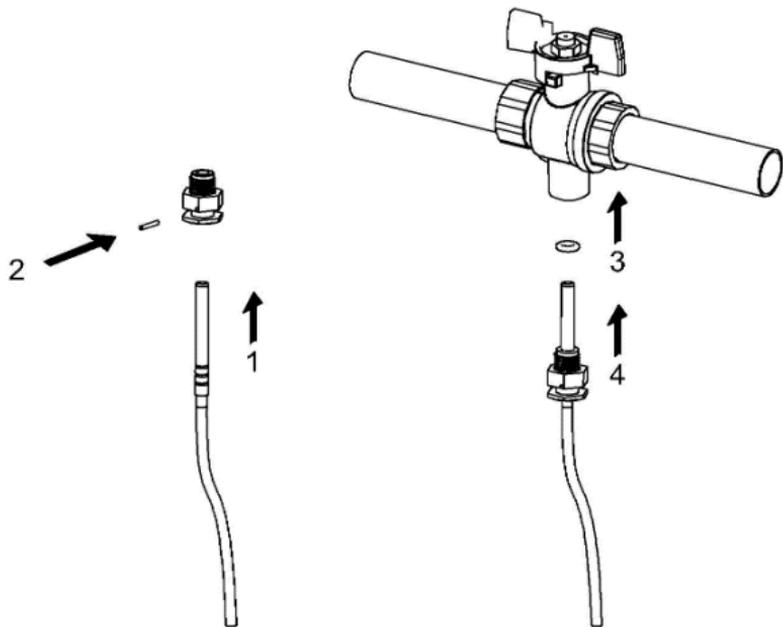
INSTALLATION IN A SOCKET

For this kind of installation, first of all it is necessary to screw the socket in the pipe [1]. Then, insert the temperature sensor [2] and tighten the screw [3].



BALL VALVE INSTALLATION

For this kind of installation, first of all it is necessary to insert the temperature sensor in the threaded nut [1] and insert the closing pin [2]. Unscrew the plug screw from the valve and place proper gaskets [3] (included in the package) in order to guarantee a safe installation. Then, insert the temperature sensor by screwing it on the threaded guide [4] and finally make sure that it is well tighten.



Warning:

- For a correct temperature measurement, the probe tip must be located in the center of the pipe. In addition, the axis of the probe must be perpendicular to the pipe axis (see figure).
- The temperature sensors must be sealed after installation in the sockets.

CONNECTIONS AVAILABLES

The meter gives the following possibilities of external connections:

- 2 pulse inputs for connecting of two water meters with pulse emitters (the liter\pulse ratios supported are 0.1 – 0.25 – 1- 2.5 – 10 – 25 – 100 – 250 – 1000)
- 1 pulse output for the sending of the thermal energy counting (heating only) for the connection to a pulse acquisition system (the Kwh\pulse ratios selectable are 1 – 10 – 100)
- 1 port for connection to a digital protocol network MBUS (Meter bus), suitable for consumption and operative data acquisition.

Tighten all the terminals carefully, making sure that the connections are completely secure.

Warning: Be careful when entering cables into the terminal in order to avoid potential malfunctioning caused by the contact between the sheath and clamp.

TERMINAL BOARD DESCRIPTION

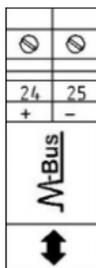
24	25	16	17	51	52	54	55
+	-	+	-	+	-	+	-
MBUS		ENERGY OUT		C1 IN		C2 IN	
							
↕		↓		↑		↑	

Numeri	Indicazione	Descrizione
24/25	MBUS	M-Bus network connection
16/17	ENERGY OUT	Heating pulse output
51/52	C1 IN	Volume meter input 1
54/55	C2 IN	Volume meter input 1

M-BUS NETWORK CONNECTION

The inputs/outputs "M-Bus" (24 and 25) are dedicated to the meter connection with an M-Bus network cable.

For the connection is not necessary to respect the polarity, although it is advisable to keep the same polarity on the entire cable network.



Warning: the M-Bus network is using voltage that can damage the device when applied to terminals dedicated to other functions, so be careful when connecting to this interface.

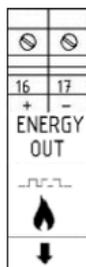
Note: In order not to negatively affect the battery lifetime of the meter, it is recommended to read the device via M BUS twice a day maximum (if read daily).

PULSE OUTPUT CONNECTIONS

The meter is equipped with an Open-Collector pulse output (30V):

- heating units output: ENERGY OUT (16, 17)

These outputs can be connected to a compatible totalizer or to a signal converter.



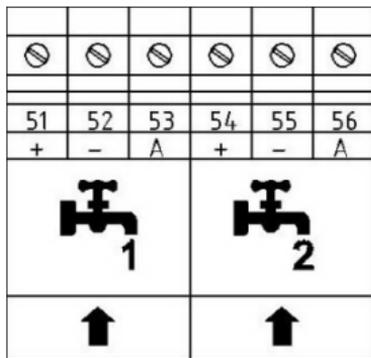
VOLUME METERS C1/C2IN CONNECTION

The inputs C1 IN (51, 52, 53) and C2 IN (54, 55, 56) are dedicated to the flowmeters for hot and cold sanitary water.

The heat meter is compatible with flowmeters with pulse output OC (open collector) or OA (reed), with pulse value “liters/pulse” (strictly compliant to the value set on the meter).

Terminals 53 and 56 are reserved for eventual Anti-tampering wire connection.

Warning: when using flow meters with Open-Collector (OC) output, it is necessary to follow the correct connection polarity.



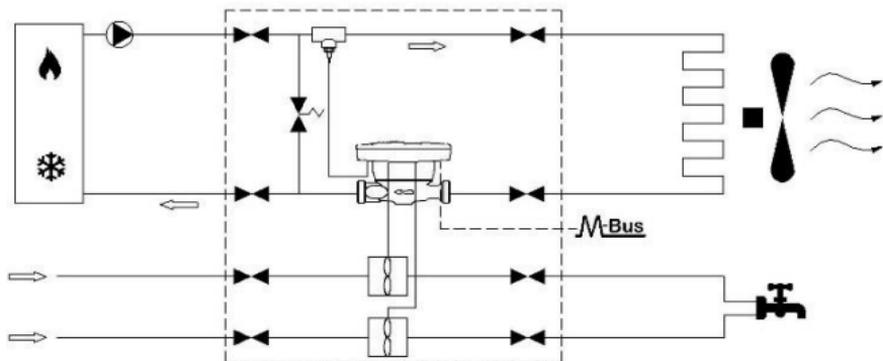
FUNCTIONALITY

The heat meter **HYDROCAL M3** is equipped with dedicated sections for the thermal energy measurement of a heating/cooling (on request) system and for the volume measurement of the hot/cold sanitary water system.

The meter is suitable for two-pipe domestic systems, in boiler room installations or any other compatible application.

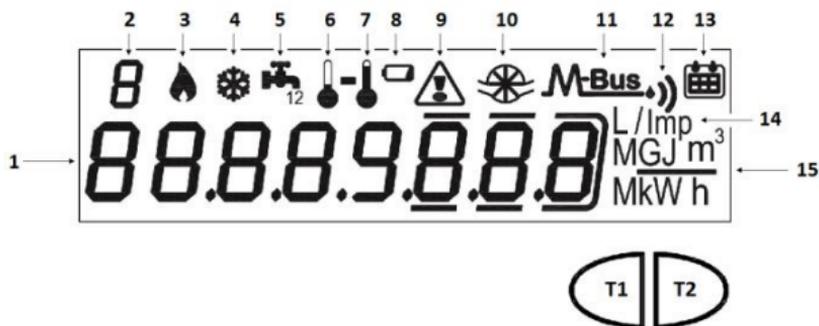
In residential systems, usually two pipes systems, the measurement of the thermal energy takes place on a single section, both in heating and cooling cycle.

The picture below reports a typical connection diagram.



DISPLAY AND BUTTONS

The heat meter is equipped in the front with a liquid crystal display and two buttons (T1 and T2), useful for the configuration of the parameters and for the readings.



- 1) Eight-digit numeric field;
- 2) Single-digit numeric index (menu level);
- 3) Heating data index;
- 4) Cooling data index;
- 5) Circuits 1-2 for hot/cold sanitary water index;
- 6) Return flow temperature index;
- 7) Inlet flow temperature index;

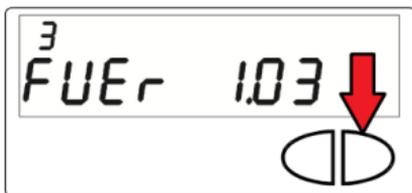
- 8) Battery level indicator;
- 9) Faults indicator;
- 10) Heating system flowmeter index;
- 11) Wired M-Bus data index;
- 11+12) Wireless M-Bus data index (predisposition);
- 13) Historical data index;
- 14) Pulse value index (k);
- 15) Measurement unit index;
- T1) Level selection button;
- T2) scroll button within the selected level;

PROGRAMMING MENU

The programming menu is useful for the ordinary programming of the meter and for configured data verification.

PROGRAMMING MENU ACCESS

To enter the programming menu, press the T1 button and select level 3. Then keep the T2 button pressed for more than 3 seconds.



Once this is done, you will be prompted to enter a password for security reasons. Select the digit using the T2 button and change the single numbers with the T1 button.

The password is communicated by the manufacturer to the installer only.



After entering the password, it is possible to start the parameters configuration.

The configuration screens are divided into 10 sub-levels. Here below there is a “step by step” guide for the correct configuration of the heat meter:

1) The first parameter that has be configured is the pulse value “k” of the C1 cold/hot water meter.

The value can be selected by using the button T1: 0.1–0.25–1–2.5–10–25–100–250–1000 L/imp



Confirm the selected parameter by holding the T2 button for more than 3 seconds, thus moving to the next parameter.

2) The second parameter that has be configured is the update of the consumption data reported on the C1 hot/cold water meter dial. Select the digit using the T2 button and change the single numbers with the T1 button.



Confirm the selected parameter by holding the T2 button for more than 3 seconds, thus moving to the next parameter.

3) The third parameter that has be configured is the pulse value "k" of the C2 cold/hot water meter.

The value can be selected by using the button T1: 0.1–0.25–1–2.5–10–25–100–250–1000 L/imp



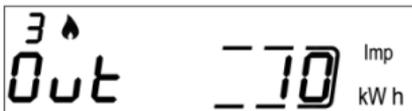
Confirm the selected parameter by holding the T2 button for more than 3 seconds, thus moving to the next parameter.

4) The fourth parameter that has be configured is the update of the consumption data reported on the C2 hot/cold water meter dial. Select the digit using the T2 button and change the single numbers with the T1 button.



Confirm the selected parameter by holding the T2 button for more than 3 seconds, thus moving to the next parameter.

5) The fifth parameter that has be configured is the pulse value "k" of the OC pulse heating output (hot out). The value can be selected by using the button T1: 0 - 1 - 10 - 100 - 1000 kWh/imp



Confirm the selected parameter by holding the T2 button for more than 3 seconds, thus moving to the next parameter.

6) The sixth parameter that has be configured is the secondary address of the Wired M-Bus (M-Bus) of the heating data. Select the digit using the T2 button and change the single numbers with the T1 button.



Confirm the selected parameter by holding the T2 button for more than 3 seconds, thus moving to the next parameter.

7) The seventh parameter that has been configured is the primary address of the Wired M-Bus (M-Bus) of the heating data. Select the digit using the T2 button and change the single numbers with the T1 button.



Confirm the selected parameter by holding the T2 button for more than 3 seconds, thus moving to the next parameter.

8) The eighth parameter that has been configured is the secondary address of the Wired M-Bus (M-Bus) of the cooling data. Select the digit using the T2 button and change the single numbers with the T1 button.



Confirm the selected parameter by holding the T2 button for more than 3 seconds, thus moving to the next parameter.

9) The ninth parameter that has been configured is the primary address of the Wired M-Bus (M-Bus) of the cooling data. Select the digit using the T2 button and change the single numbers with the T1 button.



Confirm the selected parameter by holding the T2 button for more than 3 seconds, thus moving to the next parameter.

10) Finally to exit the menu and save the configured parameters, select the number [1] in the ESC panel by using the button T1. On the contrary, select the number [0] to return to the first sublevel



Warning: before confirming the settings saving, make sure to properly set all parameters, in particular the input pulse value of the flow sensor as it is no longer editable.

CONSULTING MENU

The consulting menu is divided in six levels by a numeric index, always shown in the left-upper part of the display.

By pressing the T1 button it is possible to choose the desired level, and by pressing the T2 button it is possible to consult the sublevels of the preset level.

Here below, it is shown the navigation map of the consulting menu.

LEVEL 1: CUMULATIVE VALUES



1.1 Accounted energy (Heating) – cumulative value



1.2 Display test – All segments on



1.3 Display test – All segments off



1.4 Accounted energy (cooling) – cumulative value



1.5 Volume useful for the accounting (heating) – cumulative value



1.6 Volume useful for the accounting (cooling) – cumulative value



1.7 Total volume (first pulse input - C1) – cumulative value (optional)



1.8 Total volume (second pulse input – C2) – cumulative value (optional)

LEVEL 2: ACTUAL ACCOUNTING VALUES

2 
000000.000 kW

2.1 Actual power

2  
000000.000 $\frac{\text{m}^3}{\text{h}}$

2.2 Actual flow rate

2 
050.3 C

2.3 Inlet flow temperature

2 
033.8 C

2.4 Return flow temperature

2 
016.5 C

2.5 Temperature difference

LEVEL 3: SETTINGS (DISPLAYING ONLY)

3
0 1234567

3.1 Serial number

3
FUEr 1.03

3.2 Firmware version

3
AUEr 1.02

3.3 Communication Firmware version

3
23.03.14

3.4 Current Date

3
L/imp
1

3.5 Liters/pulse value for input flow sensor
(set during production process)

3
Unit 0 MWh

3.6 Measurement unit (0= Mwh, 1= GJ)

3
L/imp
0.1

3.8 Liters/pulse value for first input flow
meter (C1)

3
00000.100 m³

3.9 Starting value first input flow meter (C1)

3
L/imp
0.1

3.11 Liters/pulse value for second input flow
meter (C2)

3
00000.177 m³

3.12 Starting value second input flow meter
(C2)

3
Out 10
imp
kW h

3.14 Liters/pulse value for heating pulse
output (Hot out)

3 ▲ M-Bus
140000008

3.16 M-Bus Secondary address (Heating)

3 ▲ M-Bus
bus 001

3.17 M-Bus Primary address (Heating)

3 ❁ M-Bus
940000001

3.18 M-Bus Secondary address (Cooling)

3 ❁ M-Bus
bus 002

3.19 M-Bus Primary address (Cooling)

LEVEL 3: SETTINGS (CONFIGURATION)

The setting of the parameters can be enabled by pressing T2 for 3 seconds while viewing one of the points of the level 3.

3
PR 8888

3s.1 Password request to enable parameters setting

3 ❁
--10 L/imp

3s.4 Liters/pulse value setting for first input flow meter (C1)

3 ❁
000002.00 m³

3s.5 Starting value setting for first input flow meter (C1)

3 ❁
--1 L/imp

3s.7 Liters/pulse value setting for second input flow meter (C2)

3 ❁
000003.17 m³

3s.8 Starting value setting for second input flow meter (C2)

3 [▲]
0ut ---10 Imp
kWh

3 [▲] M-Bus
14000000

3 [▲] M-Bus
bus 00

3 [⊗] M-Bus
94000000

3 [⊗] M-Bus
bus 00

3
Esc ---0

3s.10 Liters/pulse value setting for heating pulse output (Hot out)

3s.12 M-Bus Secondary address setting (Heating)

3s.13 M-Bus Primary address setting (Heating)

3s.14 M-Bus Secondary address setting (Cooling)

3s.15 M-Bus Primary address setting (Cooling)

3s.16 Saving parameters settings and exit
1 = save and exit, 0 = don't exit

LEVEL 4: MEMORY DAY DATA



4.1 Memory Day



4.2 Accounted Energy (heating) – cumulative value at memory day



4.3 Accounted Energy (cooling) – cumulative value at memory day



4.4 Accounted Volume (C1) – accounted volume at memory day (optional)



4.5 Accounted Volume (C2) – accounted volume at memory day (optional)

Memory day setting:

- View any of the points in the level 4
- Press and hold T2 button for 3 seconds.
- The setting screen will be displayed.
- Enter the desired date in the gg.mm format (T1 - digit increase, T2 - selection digit).
- Confirm the setting by pressing and holding the T2 button for 3 seconds.

LEVEL 5: HISTORICAL DATA



5.1 Total operation hours during calculation



5.2 Total lifetime hours



5.3 Historical data storage (up to 26 possible values, saving at the end of the month)



5.3.1 Accounted Energy (heating) – cumulative value at historical memory day



5.3.2 Accounted Energy (cooling) – cumulative value at historical memory day



5.3.3 Accounted Volume (C1) – accounted volume at historical memory day (optional)



5.3.4 Accounted Volume (C2) – accounted volume at historical memory day (optional)

LEVEL 6: ERRORS AND FAULTS



5.1 Functioning hours during error



5.2 Active error list



5.3 Number of accesses with installer password



5.3.1 Date of last modified setup parameters

COMMISSIONING

Premise: the procedures explained in this paragraph must be carried out only after the conclusion of the installation phases, the connection procedures and after the testing of the hot/cold water and heating/cooling systems.

Warning: once the meter has accounted energy and volumes, some of the settable parameters will no longer be editable. It is important to set all parameters carefully before the final commissioning.

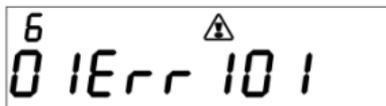
COMMISSIONING PROCEDURE

- 1) Ensure that the electrical wirings are carried out correctly;
- 2) Check in the level 3 that all parameters are correctly set.
- 3) Verify that the flowmeters and volume meters, the temperature sensors etc. are installed correctly. (always refer to the installation manuals specific to every product)
- 4) Start the heating system:
 - Check if the registered values are coherent (inlet/return temp.)
 - Check the totalized volume and current flowrate;
- 5) Start the hot/cold sanitary water system:
 - Check if the registered values are coherent (volume)
- 6) Check that no error is active.
- 7) Apply eventual adhesive sealing.

ERRORS AND FAULTS

when one or more anomalies occur, the heat meter will signal the recorded error and will display the following icon: .

The log of all faults is shown at level 6 of the consulting menu, where the abbreviation *Err* followed by three digits identifies the anomaly.



Here is a list of all the error codes:

Error	Description	Prescription	Notes
Err101	One of the two temperature sensor cables is cut; At least one cable is disconnected	Check the integrity and the connection of the temperature sensor cables.	Return the meter to the manufacturer. Resettable via IR (factory setting)
Err102	One of two temperature sensor measurement out of range; at least one sensor is damaged. The error resets after the sensor replacement.	Check the integrity and the functioning of the temperature sensors.	Return the meter to the manufacturer. Resettable via IR (factory setting)
Err103	Reading/writing error; Memory of historical data damaged.	Return the device to the manufacturer.	
Err104	Calendar Error (time bases corrupted); Faulty time bases oscillator.	Return the device to the manufacturer.	
Err105	MBUS communication interface error	Return the device to the manufacturer.	The error doesn't affect the meter correct measurement.
Err106	Reserved		
Err107	Loss of power supply	Return the device to the manufacturer for repairing	
Err108	Electronics case opening	Return the device to the manufacturer for repairing	
Err201	Reserved		
Err202	Reserved		
Err203	Battery life below 1 year	Return the device to the manufacturer.	
Err204	Negative delta T and cooling measurement disabled	Flow active, negative delta T for more than 60 min and cooling measurement disabled	Resettable by installer
Err205	Reserved		
Err206	Reserved		
Err207	Reserved		
Err301	MBUS data exchange interactions limit reached	Wait 00:00 of the current day before sending additional data requests through MBUS interface	
Err302	Negative delta T and cooling measurement disabled (temporary error)	Flow active, negative delta T and cooling measurement disabled	It auto-resets when delta T turns positive, after 60min of error permanence it switches to Err204

BATTERY AND REPLACEMENT PROCEDURES

The heat meter constantly checks the battery status (average lifetime: 10 years) and signals the imminent discharge showing the icon  on the display. The signal will be shown one year before the complete discharge.

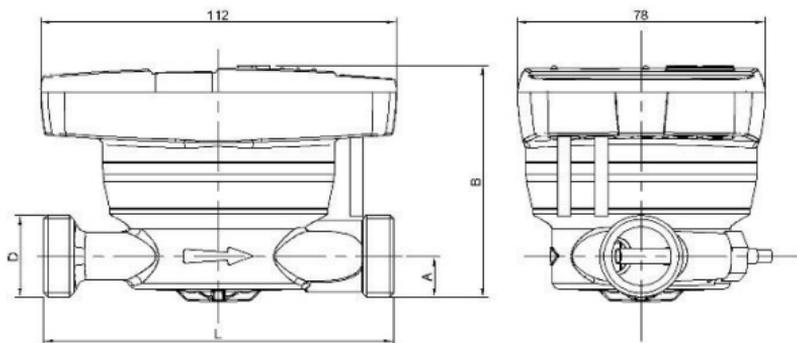


For the replacement, contact the manufacturer.

Warning: the meter is equipped with non-rechargeable batteries, that can be dangerous when used improperly. In order to reduce the risks, it is necessary to respect the following precautions:

- Don't recharge the battery;
- Don't put the battery in short circuit;
- Don't expose the battery at temperatures higher than 85°C.
- Don't use open flames near the meter
- Don't let the meter make contact with water
- Always dispose the batteries in compliance with current regulations
- Always use original spare parts authorized by the manufacturer.

HEAT METER DATA SHEET



Diameter	L	A	B	D
DN15 (1/2")	110 mm	13 mm	74 mm	3/4"
DN20 (3/4")	130 mm	17 mm	78 mm	1"

Model	Hydrocal M3												
Power supply	Battery supply												
Battery type	Li-SoCl ₂ Lithium-thionyl chloride, 3,6V 6Ah												
Battery Life	10 years +1 (depending on the version)												
Operating temperature range	5 ÷ 55°C												
Storage temperature range	-10 ÷ 55°C												
Dimensions	112 x 78 x 76.5mm												
Weights	635g (DN15); 708g (DN20)												
IP protection grade	IP54												
Approval	2004/22/CE MID (Module B) Certificate nr. IT-002-15-MI004-NB2213 EN1434												
Environmental class	A (E1, M1)												
Temperature measurement range, MID approved (heating applications)	Θ: 5÷90°C												
Temperature difference range, MID approved (heating applications)	ΔΘ: 3÷70K												
Temperature measurement range (cooling)	Θ: 0.2÷24°C												
Temperature difference range (cooling)	ΔΘ: 0.2÷20K												
Accuracy class	2												
Range	Depending on diameter and nominal flow rate												
	<table border="1"> <thead> <tr> <th>DIAMETER</th> <th>Q_p (m³/h)</th> <th>Range (H/V)</th> </tr> </thead> <tbody> <tr> <td>DN15</td> <td>0.6</td> <td>25/25</td> </tr> <tr> <td>DN15</td> <td>1.5</td> <td>50/50</td> </tr> <tr> <td>DN20</td> <td>2.5</td> <td>50/50</td> </tr> </tbody> </table>	DIAMETER	Q _p (m ³ /h)	Range (H/V)	DN15	0.6	25/25	DN15	1.5	50/50	DN20	2.5	50/50
DIAMETER	Q _p (m ³ /h)	Range (H/V)											
DN15	0.6	25/25											
DN15	1.5	50/50											
DN20	2.5	50/50											
Operative counting conditions	Heating: ΔΘ≥1K and fluid temperature ≥5°C (accounting enabling conditions) Cooling: ΔΘ≤0.2K and fluid temperature ≤24°C												
Maximum measurable power	650 kW												
Display	LCD, 8 digits + icons												
Measurement unit	MWh (standard), GJ (optional)												
Temperature sensors	Pt1000												
Cable length	1.5 m												
Pulse inputs	2 dedicated for the sanitary water volume meters												
Pulse input class	Class IA (default): Open Collector or electromagnetic contact (reed).												
Pulse input maximum frequency	5 Hz												
Maximum length pulse emitter cable	3 m												
Installation site of flowmeter	Return flow pipe (Default), Inlet flow pipe (optional). Always refer to the indication on the cover of the meter.												
Supported vector fluid	Water												

