# CONTECA™ heat energy meter

## 7504 series

### Function

CONTECA™ is a direct heat energy meter designed to measure and record thermal energy usage in residential and commercial buildings, for heating only, cooling only, or both heating and cooling.

The CONTECA™ meter features an 8-digit liquid crystal display that enables easy reading of BTU consumed as well as a range of technical data indicating equipment operating status and logged data.

Each CONTECA™ includes a heat meter with an electronic calculator and user interface, two temperature sensors, and sensor holder bodies, fittings included. The rotary pulse flow meter comes with the CONTECA meter kit. In addition to the two temperature inputs and flow meter input, 4 additional pulse inputs are available for optional equipment monitoring. Data logging is integral and menu accessible in each CONTECA. Multiple units can be connected to the CONTECA Datalogger for access to all units on the network. The CONTECA is easy to install and commission, and is certified to ASTM E3137/E3137M-17 Standard Specification for Heat Meter Instruments by ICC-ES, and Directive 2014/32/EU EN 1434 (MI 004).

The CONTECA™ heat meter has integral RS485 protocol 2-wire communication for remote access and configuration. M-bus protocol is used with the CONTECA Datalogger (default). The protocol can be changed to Modbus when using the CONTECA heat meter directly with a Modbus BAS or when using the Modbus-to-BACnet gateway for communication to a BACnet BAS. Up to 250 CONTECA meters can connect to one CONTECA data logger.

### Product range

CONTECA™ Heat meter kit, complete with heat meter code 750405A,

two integral temperature sensors, two sensor holder bodies and rotary pulse flow meter, and :

| | | |
|---|---|---|
| 7504_0A series | male NPT pipe connections | sizes ½", ¾" & 1"with unions |
| 7504_3A series | female NPT pipe connections | sizes 1", 1¼" & 1 ½" with unions |
| 7504_6A series | press pipe connections | sizes ½", ¾" & 1" with unions |
| 7504_9A series | sweat pipe connections | sizes ½", ¾" & 1" with unions |
| Code 750450 | Datalogger | |
| Code NA10520 | Modbus-to-BACnet gateway | |

### Technical specifications

#### Heat meter:

| | |
|---|---|
| Materials: -Housing & cover: | ABS, RAL 9004 |
| Power supply: | 24 VAC, 50/60 Hz, 1W |
| Data transmission: | 2-wire RS485; selectable Modbus or M-bus (for use with datalogger) |
| Ambient temperature: | 40 — 113°F (4— 45°C) |
| Environmental rating (protection class): | NEMA 3S (IP 54) |
| Pulse inputs: | Class 1B per EN 1434-2 |
| Certification: | ASTM E3137/E3137M-17 by ICC-ES |
| | Directive 2014/32/EU EN 1434 (MI 004) |

#### Temperature sensors:

| | |
|---|---|
| Cable length*: | 26¼ ft. (8 m) |
| Sensor type: | 100 kOhm NTC matched |
| Temperature sensitivity: | < 0.1°F (0.05°C) |
| Temperature sensor thermowell: | Stainless steel |
| Sensor holder body: | Brass |
| Max. working pressure: | 150 psi (10 bar) |

*Extra length of the 26¼ ft. cable must be carefully coiled and mounted in a safe place. Do not cut or splice.

### Flow meters:

| | |
|---|---|
| Flow meter type: | |
| | Single jet (½" - 1" to 10 gpm); Multiple jet (1" to 1½" to 45 gpm) |
| Body material: | Brass |
| Pulse output: | class OA-OC in accordance with EN 1434-2 |
| Body threads: | ISO 228 male straight |
| Piping connections: | Dual unions, tailpieces NPT, sweat, press |
| Max. working pressure: | 235 psi (16 bar) |
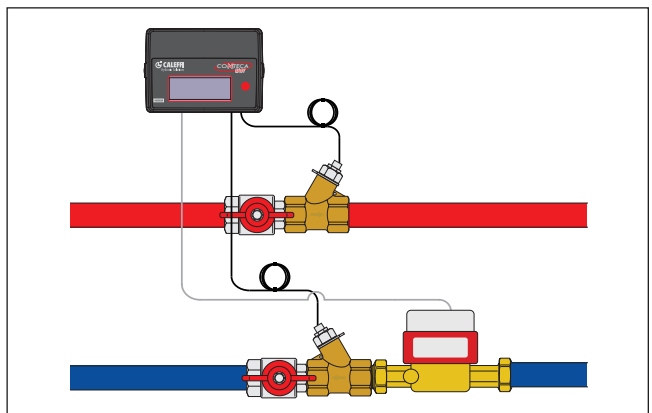
**Flow rates**

| Code | Size | Flow meter type | Liters per pulse | Minimum Flow rate (gpm) | Maximum flow rate (gpm) |
|------|------|-----------------|------------------|-------------------------|-------------------------|
| **7504**4xA | ½" | Single jet | 1 (.26 gal) | 0.25 | 10 |
| **7504**5xA | ¾" | | | | |
| **7504**6xA | 1" | | | | |
| **7504**63A | 1" | Multiple jet | 2.5 (.66 gal) | 0.3 | 15 |
| **7504**73A | 1¼" | | 10 (2.6 gal) | 0.5 | 25 |
| **7504**83A | 1½" | | | 1 | 45 |

Flow rate range for combined flow meter and 2 sensor holder bodies.

**Hydraulic characteristics**
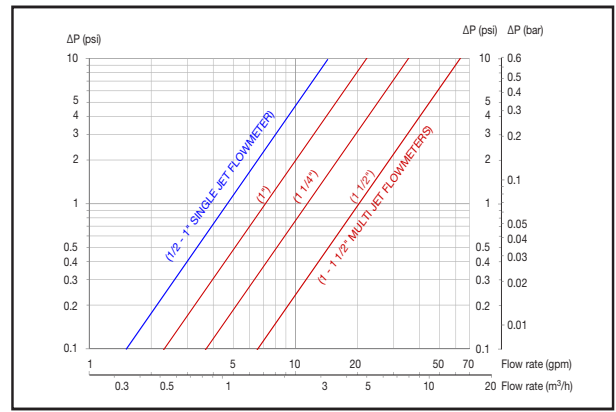


| | Single jet flow meter | | | Multiple jet flow meter | | |
|---|---|---|---|---|---|---|
| | ½" | ¾" | 1" | 1" | 1 ¼" | 1 ½" |
| Cv | 5.0 | | | 6.8 | 11.7 | 19.6 |

Flow rate range for combined flow meter and 2 sensor holder bodies.

**Dimensions**



Single jet flow meter

Temp sensor holder body

Multiple jet flow meter

Temp sensor holder body
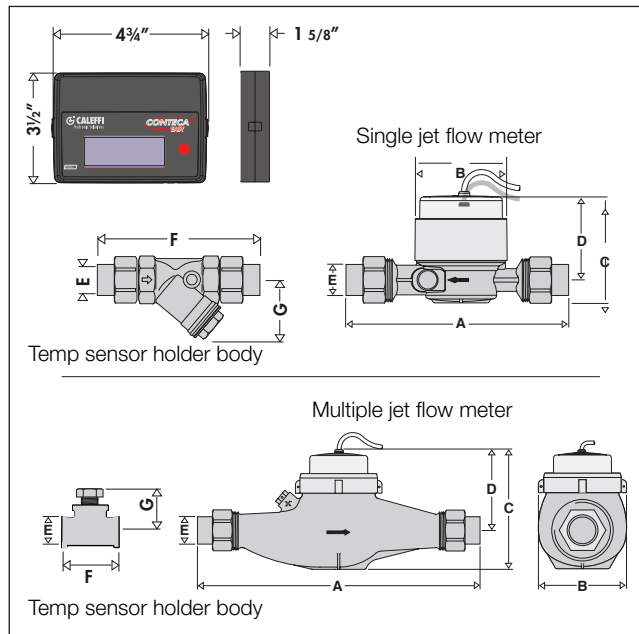
| Code | A | Flow meter Lay length | B | C | D | ends* | E | F | Sensor holder Lay length | G | Wt (lb) |
|------|---|----------------------|---|---|---|-------|---|---|--------------------------|---|---------|
| **7504**49A | 6 7/8" | na | | | | sweat | ½" | 7 ¼" | na | 2" | 6.2 |
| **7504**40A | 8 3/8" | na | | | | mnpt | | 8 ¾" | na | | |
| **7504**46A | 7 1/8" | 5 5/8" | | | | press | | 5 ¾" | 4 ¼" | | |
| **7504**59A | 7 3/8" | na | 3 1/8" | 4 ¼" | 3 ½" | sweat | ¾" | 7 ¾" | na | | 7.1 |
| **7504**50A | 7 5/8" | na | | | | mnpt | | 8" | na | | |
| **7504**56A | 7 ¾" | 5 ¾" | | | | press | | 6 1/8" | 4 1/8" | | |
| **7504**69A | 8 5/8" | na | | | | sweat | 1" | 9" | na | | 7.9 |
| **7504**60A | 8 3/8" | na | | | | mnpt | | 8 ¾" | na | | |
| **7504**66A | 8" | 6" | | | | press | | 6 3/8" | 4 3/8" | | |
| **7504**63A | 12 ¼" | na | 4" | 5 3/8" | 3 ¾" | fnpt | 1" | 5 1/8" | na | 2 1/16" | 11.5 |
| **7504**73A | 12 ¼" | na | 4" | 5 3/8" | 3 ¾" | fnpt | 1 ¼" | 5 7/8" | na | 2 3/8" | 12.1 |
| **7504**83A | 17 ¼" | na | 5 ¼" | 6 7/16" | 4 5/8" | fnpt | 1 ½" | 5 5/8" | na | 2 5/16" | 18.7 |

*end connections are the same for the flowmeter and sensor holder bodies for each code.
ex: code 750449A has union sweat ends on both the flow meter and the sensor holder bodies.

## Installation

To ensure accurate energy measurement, plan the installation for easy initial installation, commissioning and future maintenance. Install the flow meter in a location that will be easy to perform periodic maintenance.

Install shut-off valves upstream and downstream of the flow meter to aid installation and maintenance. Install a strainer or other filtering device upstream of the flow meter.

Install the temperature sensor thermowells into the brass sensor holder bodies, following the respective flow directions and properly located for the supply (red label) and return (blue label) positions. The corresponding supply and return pipes must be integral to the same flow rate as measured by the flow meter.

Sensor cables are factory pre-wired. Do not modify the length of the sensor cables. The sensor cables must not be spliced for shortening or extending because this will adversely affect functionality and accuracy. Coil up excess cable and secure in safe place to prevent damage.

The flow meter must be installed on the return pipe and in the horizontal position with the turbine axis vertical (meter facing upward), following the flow direction indicated by the arrow on the body.

After installing all CONTECA™ heat meter kit components follow the electrical connections instructions.

When installation is completed all components need to be lead sealed. Follow the provided lead sealing procedure in the instructions include product package .

**1) Diagram of system with metering on manifold with several stages.**
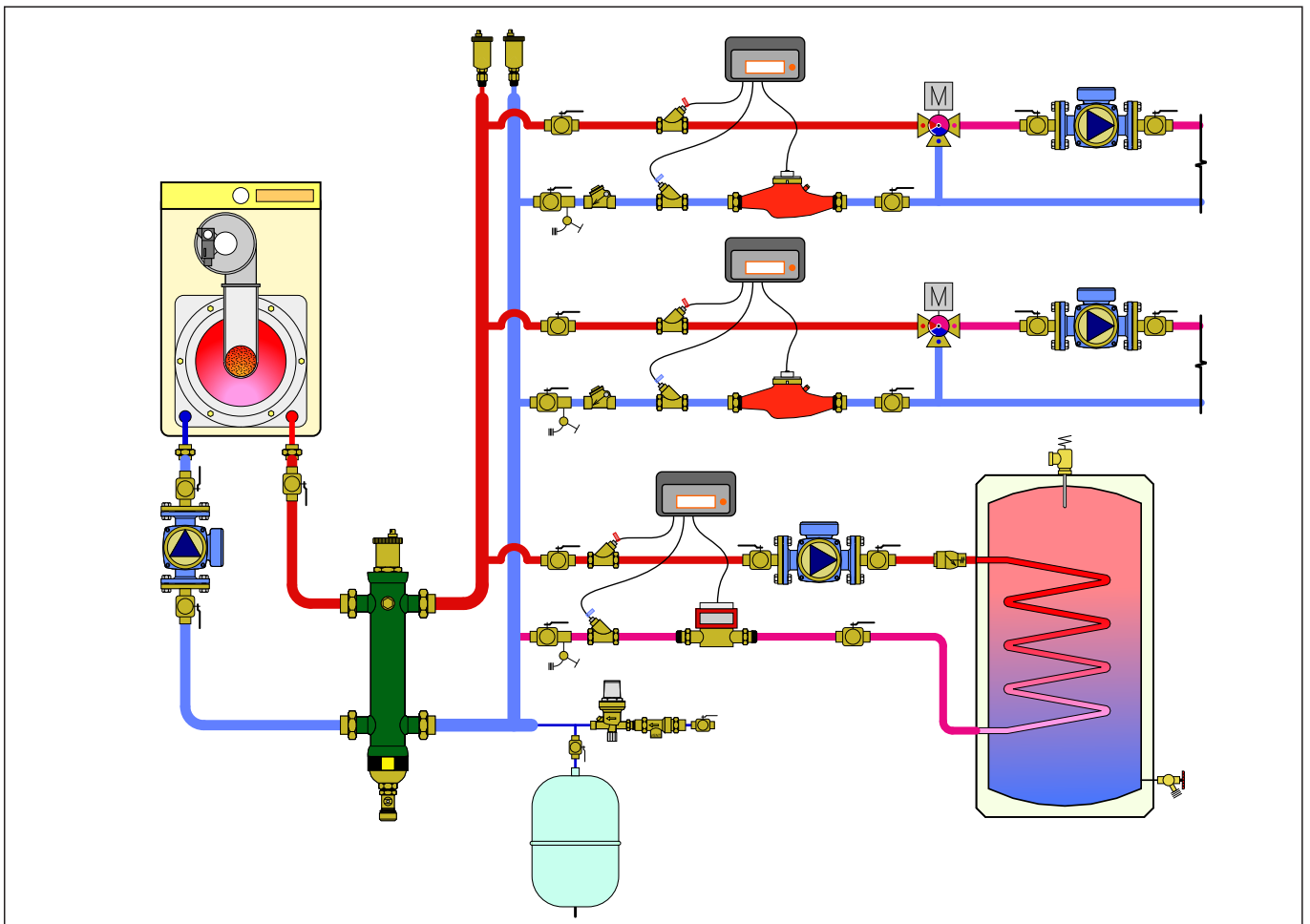
**2) Diagram of user circuit - Control with 2-way zone valves**



To/from boiler
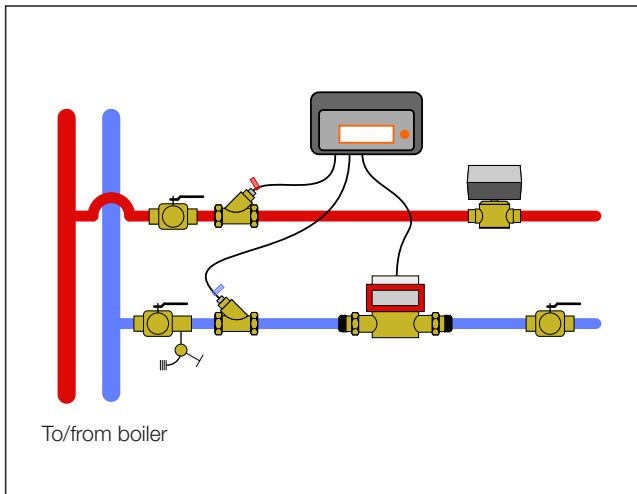
When mounting in a box or directly on a wall, use the screws provided in the package and insert them in the slots (A) to mount correctly.
Disassemble the user interface from the wiring base by releasing the side locking tabs (B) to access the wiring terminal pins.
After connecting the desired wiring, re-assemble the heat meter by connecting the user interface to the wiring base, making sure the pins line up to avoid bending any pins.

Sensors are pre-wired to the circuit board, no connections for the sensor are made on the wiring terminal.



REAR PART OF THE BOX

STRAIN RELIEF CABLE HOLDER

PATH OF THE CABLE
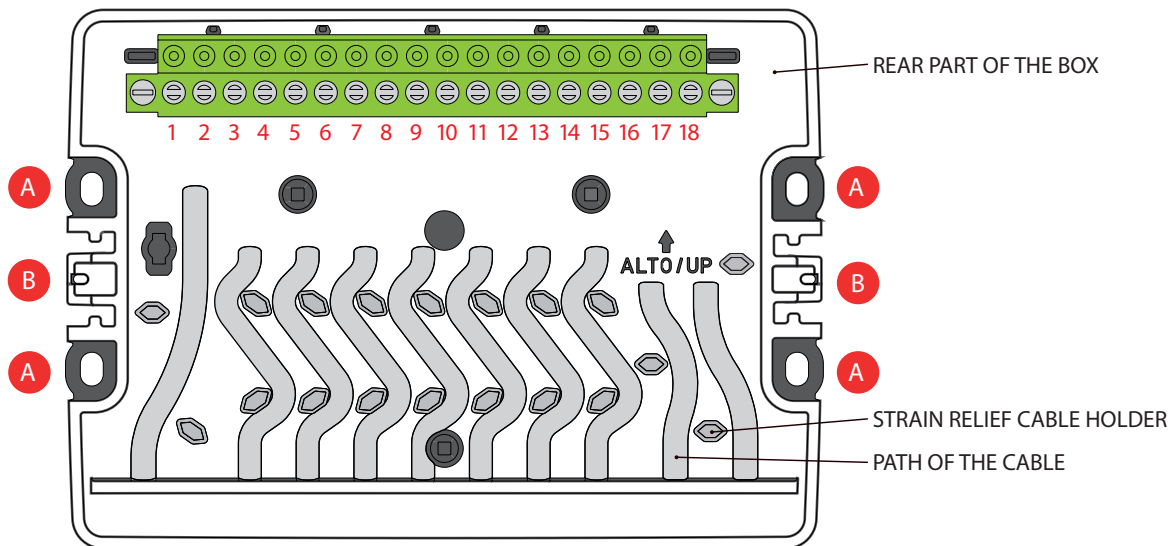
| Pins | Description |
|---|---|
| 1 - 2 | OUT 2 - Open collector pulse output for COOLING units. GND=2 / duration 120 ms / Vmax 24V (dc) - 50 mA |
| 2 - 3 | OUT 1 - Open collector pulse output for HEATING units. GND=2 / duration 120 ms / Vmax 24V (dc) - 50 mA |
| 4 | NOT used |
| 5 - 6 | IN 4 - 4th pulse input (generic). GND=6 |
| 6 - 7 | IN 3 - 3rd pulse input (generic). GND=6 |
| 8 - 9 | IN 2 - Pulse input for optional DCW. GND=9 |
| 9 - 10 | IN 1 - Pulse input for optional DHW. GND=9 |
| 11 - 12 | Pulse input for the heating volume meter |
| 13 - 14 | Digital input (Dry contact: it must be a volt free contact) |
| 15 - 16 | Power supply 24 V (ac)  50 / 60 Hz - 1W |
| 17 - 18 | Transmission Bus RS-485 / RS-485 A=18  (Rx) RS-485 B=17 (Tx) |

## • Power supply and energy flow meter inputs

15 - 16   Power supply 24 V (AC).

11 - 12   Flow meter pulse input.

The 24 V (AC) electric supply line should be used solely for the heat meters.
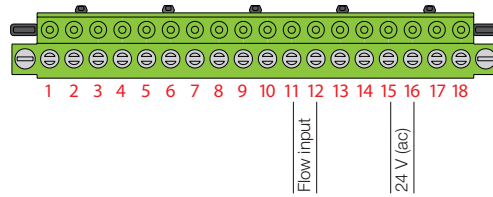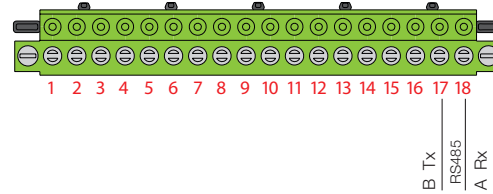
## • Network connection

In the case of data transmission via bus use the following terminals:

17 - 18      Polarized transmission bus - Bus RS-485

17 Tx (RS-485-B)      18 Rx (RS-485-A)

For the transmission bus, use a shielded 2-conductor AWG 22.
**Note: The transmission polarity must be fully observed.**

**(Pin 4 is not used)**

## • Energy pulse outputs
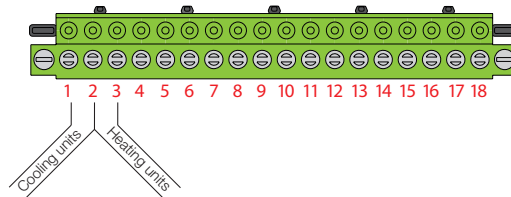
2 - 3      Heating units output to remote data gathering device (kBTU)

1 - 2      Cooling units output to remote data gathering device (kBTU)

Output specifications:
1 PULSE = 1 kBTU - open collector contact
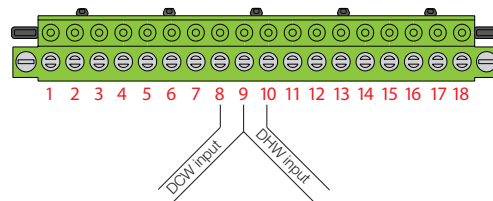Pulse duration: 120 ms
**Max. frequency - 1 Hz**

## • Domestic hot and cold water inputs

8 - 9      Pulse input for optional DCW (gal)

9 - 10    Pulse input for optional DHW (gal)

1 PULSE = 1 gal
Pulse duration: 120 ms
**Max. frequency - 1 Hz**

## • Additional pulse inputs

ie: Watt Hour meter - Gas meter
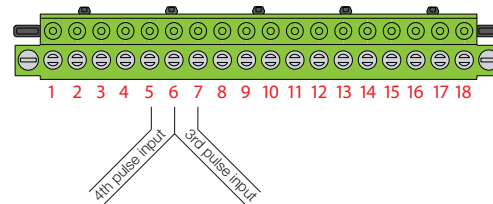The metering system must be provided with a volt free contact and the weight of the pulse must be indicated.

1 Pulse = 0.1 kWh electric energy
1 Pulse = 1 $Nm^3$ gas

6 - 7   3rd pulse input
5 - 6   4th pulse input

Minimum pulse duration: 120 ms
**Max. frequency - 1 Hz**

## • Digital input

The digital input must be potential free (class IB).

13 - 14   Connection of the auxilliary microswitch of the zone valve (ON/OFF status). When in the ON status an internal register logs the hours of circuit operation. This input does not affect the meter calculations or function.

**Notes:** - Each 7504 series device is supplied with a tamper-proof lead sealing kit for the temperature probes and for the plastic electronics box.

- Make the cables to pass through the cable fairleads and the strain relief cable holders.
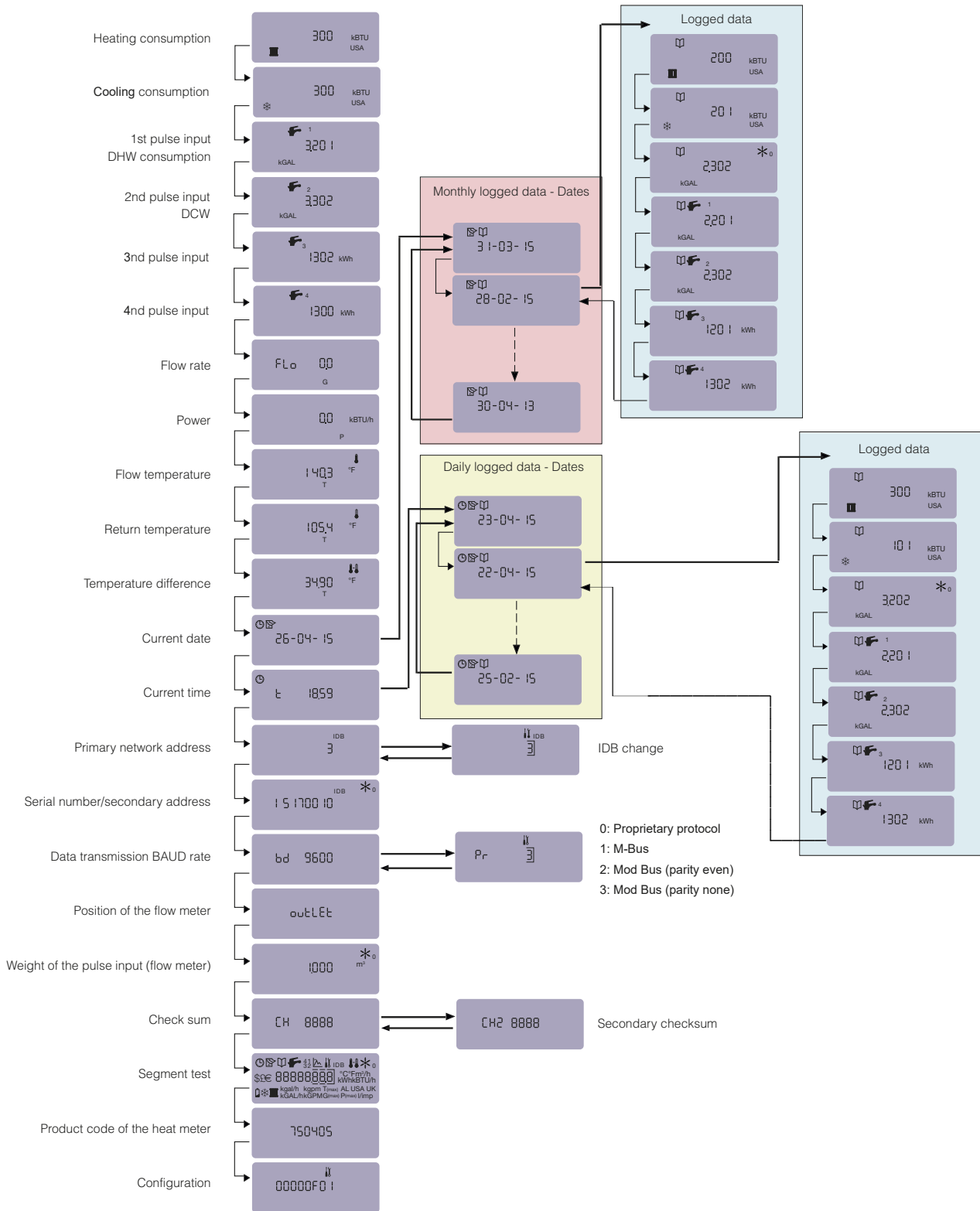The basic function of the partition is to protect the electronics card from dust and jets of water.
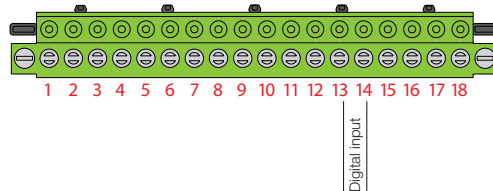
## Operating information

The accumulated energy amounts are retrieved in a non-volatile memory device (EEPROM) each time the units of measurement are completed (1 BTU) and, at the same time, this increase causes the display to be updated (see "User information cycle").

## User information cycle

The CONTECA™ heat meter has a liquid crystal display. The display is activated by pressing the button on the front.
Scroll through the various information windows by repeatedly pressing the button briefly. In some views, holding the button for several seconds allows additional information to be shown on the display.

| Label | Display |
|---|---|
| Heating consumption | 300 kBTU USA |
| Cooling consumption | 300 kBTU USA |
| 1st pulse input DHW consumption | 3201 kGAL |
| 2nd pulse input DCW | 3302 kGAL |
| 3nd pulse input | 1302 kWh |
| 4nd pulse input | 1300 kWh |
| Flow rate | FLo 0,0 G |
| Power | 0,0 kBTU/h P |
| Flow temperature | 1403 °F T |
| Return temperature | 105,4 °F T |
| Temperature difference | 3490 °F T |
| Current date | 26-04-15 |
| Current time | t 1859 |
| Primary network address | IDB 3 |
| Serial number/secondary address | 15170010 IDB |
| Data transmission BAUD rate | bd 9600 |
| Position of the flow meter | outLEt |
| Weight of the pulse input (flow meter) | 1000 m³ |
| Check sum | CH 8888 |
| Segment test | 88888888 |
| Product code of the heat meter | 750405 |
| Configuration | 00000F01 |

**Monthly logged data - Dates**

31-03-15
28-02-15
30-04-13

**Daily logged data - Dates**

23-04-15
22-04-15
25-02-15

**IDB change**

3 IDB

Pr 3

0: Proprietary protocol
1: M-Bus
2: Mod Bus (parity even)
3: Mod Bus (parity none)

**Secondary checksum**

CH2 8888

**Logged data**

200 kBTU USA
201 kBTU USA
2,302 kGAL
2,201 kGAL
2,302 kGAL
1201 kWh
1302 kWh

**Logged data**

300 kBTU USA
101 kBTU USA
3,202 kGAL
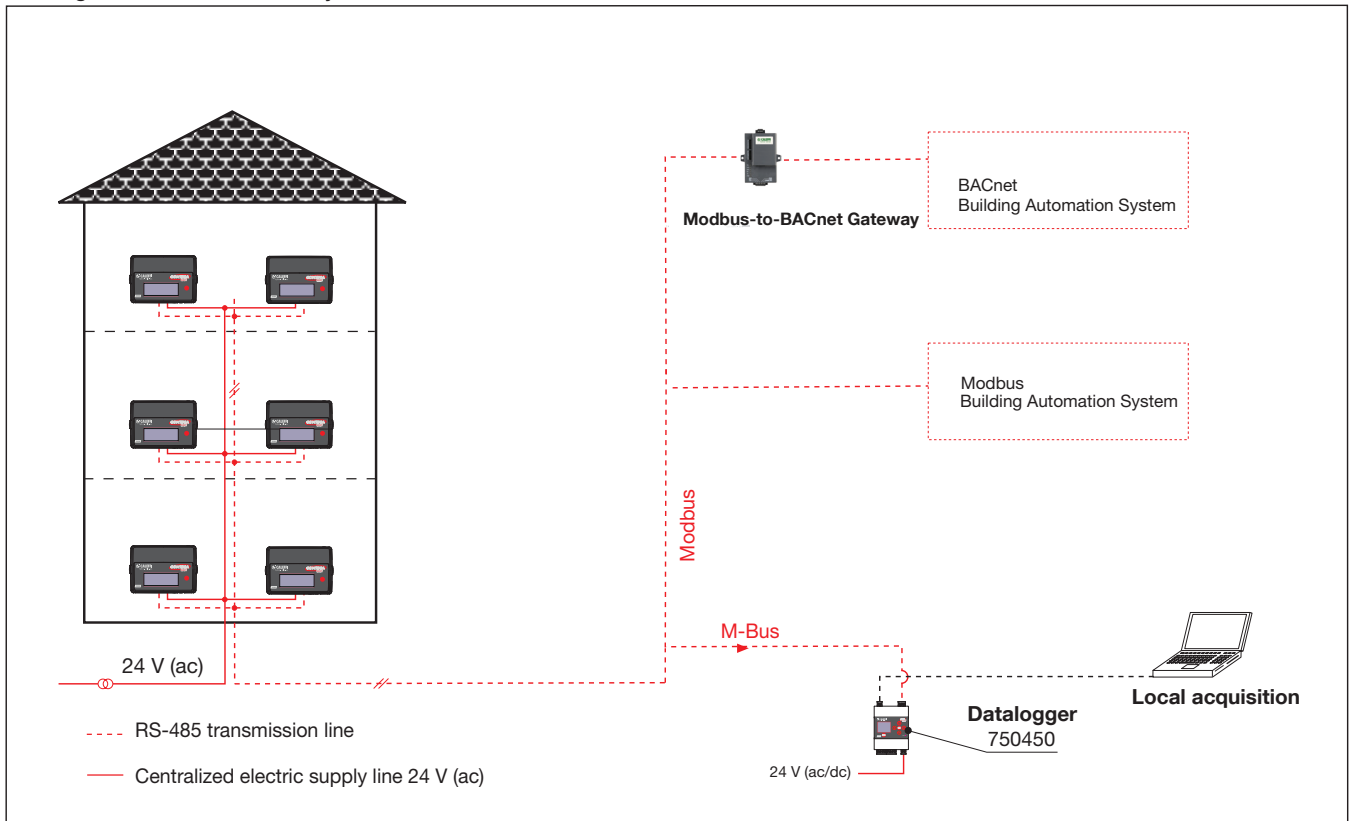2,201 kGAL
2,302 kGAL
1201 kWh
1302 kWh

**Important !**

→ press the front button **for 10 seconds and release** the button

Contact Caleffi for the special procedure to configure CONTECA™ for measuring heat energy of fluids other than water, such as glycol.

**User information details**

A. Heating Consumption is a calculated totalization of heating energy (BTUs). Heating is calculated only when supply temperature is above 72°F (factory set). There is also a fixed minimum temperature difference of 0.7°F (deadband) below which no BTU calculation takes place.

B. Cooling Consumption is a calculated totalization of cooling energy (BTUs) Cooling is calculated only when supply temperature is below 64°F (factory set).

C. 1st pulse input DHW is a totalized value of DHW consumption (kGal), if used

D. 2nd pulse input DCW is a totalized value of DCW consumption (kGal), if used

E. 3d and 4th pulse inputs are totalized values for those inputs, if used

F. Flow rate is the instantaneous GPM at the flow meter

G. Power is the instantaneous energy usage (kBTU/hr) calculated by the meter

H. Flow (supply) temperature, return temperature, and temperature difference are current values

I.  Current date is also the entry point to Monthly Logged Data (hold button for 10 sec). Select the month desired and the display will show the totalized heating energy, cooling energy, flow volume and the 4 pulse inputs for the selected month

J.  Current time is also the entry point to Daily Logged Data (hold button for 10 sec). Select the day desired and the display will show the totalized heating energy, cooling energy, flow volume and the 4 pulse inputs for the selected day

K. Primary Network address is used when multiple CONTECA™ are connected, each must be unique when using a network application

L. Serial Number/Secondary address is a unique identifier and and cannot be changed

M. Data transmission BAUD rate is 9600 baud and is the entry point for the communication protocol (if network is used). Set to 1, M-bus, if using a CONTECA™ Datalogger and set to 2 or 3 if using Modbus and/or the Modbus-to-BACnet gateway.

N. Position of the flow meter defaults to "outlet" or return pipe. All BTU calculations assume the meter is mounted on the return pipe; this can be changed if necessary; consult Caleffi.

O. Weight of the pulse input flow meter is volume per pulse

P. Checksum is for information only

Q. Segment test allows the user to make sure all the elements in the display are functional

R. Product Code is the base model of the meter itself

S. Configuration is the version of the firmware in the meter

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**Building transmission network layout**



24 V (ac)

Modbus

M-Bus

Modbus-to-BACnet Gateway

BACnet
Building Automation System

Modbus
Building Automation System

Local acquisition

Datalogger
750450

24 V (ac/dc)

---- RS-485 transmission line

— Centralized electric supply line 24 V (ac)

## Lead sealing

The CONTECA™ heat meter package contains lead sealing components for the temperature sensors and the heat meter.
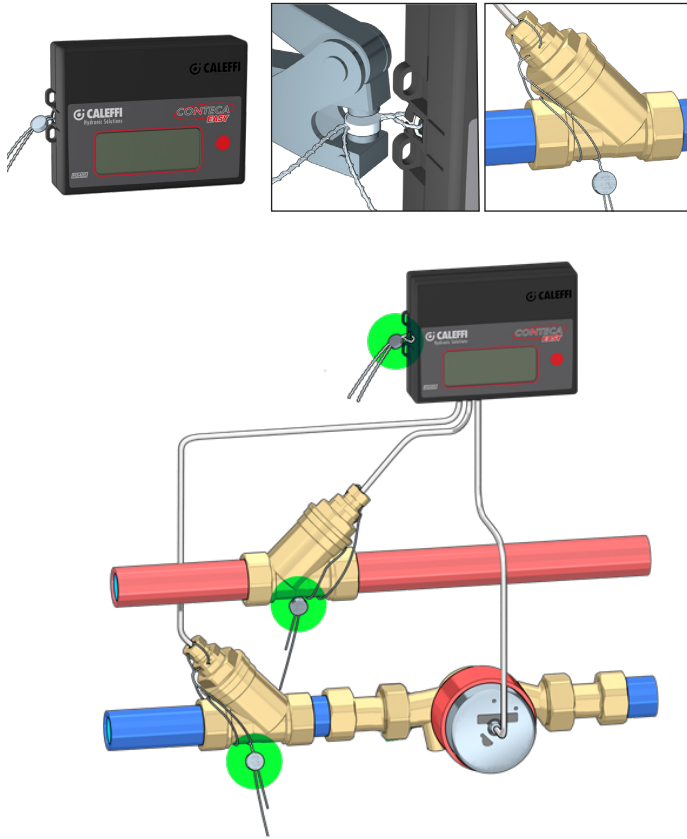




## 750450  CONTECA™ Datalogger

The CONTECA™ datalogger allows acquisition and logging of the consumption data from CONTECA heat meters via M-Bus communication. The integrated browser provides logged and instantaneous data, and report generaton. The CONTECA datalogger can be set up locally via web interface by connecting a PC to one ethernet port with switch functionality.

The SMART function allows the automatic detection of the heat meters connected to the network. Data can be obtained with the automatic report generation, making the system user-friendly and reduces the number of operations to run.

Maximum number of heat meters: 250.



Main specifications of the datalogger:
- Power supply: 24 V (dc) ±10%, 24 V (ac) - 3 W.
- 2 Ethernet ports: ETH1 (PoE), ETH2.
- Ambient temperature range: 32 - 122°F.
- Mounting: on a 35 mm DIN rail

## NA10520  Modbus-to-BACnet gateway



Converts CONTECA™ controller Modbus (RS-485 serial) output communication to BACnet IP or MSTP communication.

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## SPECIFICATION SUMMARY

### Series 7504

Direct heat energy meter for heating and cooling systems. **Heat meter:** 8-digit liquid crystal display. Power supply 24 VAC - 50/60 Hz, power consumption 1 W. Data transmission 2-wire RS485; selectable Modbus or M-bus (for use with Datalogger). Ambient temperature range 40°F to 113°F (4°C to 45°C). Environmental rating (protection class) NEMA 3X (IP54). Pulse inputs Class 1B per EN 1434-2; two temperature inputs, one flow meter input, and 4 additional inputs. Certified to ASTM E3137/E3137M-17 Standard Specification for Heat Meter Instruments by ICC-ES, and Directive 2014/32/EU EN 1434 (MI 004). **Temperature sensors:** Cable length 26.25 feet (8 meters). 100 kOhm NTC matched sensors. Temperature sensitivy <0.1°F (0.05°C). Stainless steel temperature sensor thermowell and brass sensor holder body. Maximum working pressure 150 psi (10 bar). **Rotary pulse flow meter:** Brass body with sweat, press or NPT male connections, ½", ¾" or 1" single jet turbine flow meter, flow rates 0.25 gpm to 10 gpm; NPT female 1", 1¼" and 1½" multiple jet turbine flow meter, flow rates 0.3 gpm to 45 gpm. Maximum working pressure 235 psi (16 bar). Maximum fluid temperature 265°F (130°C). Pulse output class OA-OC in accordance with EN 1434-2. Equipped with lead seals to prevent tampering. Provide with optional Datalogger, code 750450 and, if needed, code NA10520 Modbus-to-BACnet gateway.

### Code 750450

Datalogger for BTU usage data acquisition and logging. Communication via RS-485 physical layer in M-Bus protocol. Power supply 24 V (dc) - 3 W or 24 V (ac) - 3 W. Integrated web interface. Daily data logging: 10 years. Mounting on a 35 mm DIN rail (EN 60715). 2 Ethernet ports. Reports in .XLS or .CSV format. Maximum number of heat meters connected 250. Ambient temperature range 2°F to 122°F (4 to 50°C).

### Code NA10520

Modbus-to-BACnet gateway. Modbus RS-485 serial output to BACnet IP or MSTP communication.

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*We reserve the right to make changes and improvements to the products and related data in this publication, at any time and without prior notice.*