



# Smarteat45

Modbus & M-Bus Heat Meters

## Programming Manual



SmartHeat45<sup>®</sup>

## Modbus Register Map

Register	Offset	Value	Read/ Write	Format	Description
<b>Input Registers</b>					
30001	0	Total Energy - Hi	R	32 bit unsigned integer	divide by 10 to obtain actual value in KWh or MWh
30002	1	Total Energy - Lo	R		
30003	2	Instant Power - Hi	R	32 bit unsigned integer	divide by 10 to obtain actual value in KW or MW
30004	3	Instant Power - Lo	R		
30005	4	Flow Temperature	R	16 bit signed integer	divide by 10 to obtain actual value in °C
30006	5	Return Temperature	R	16 bit signed integer	divide by 10 to obtain actual value in °C
30007	6	Flow Rate - Hi	R	32 bit unsigned integer	divide by 100 to obtain actual value in m <sup>3</sup> /h
30008	7	Flow Rate - Lo	R		
30009	8	KWh / MWh	R	unicode character	"K" for KWh, "M" for MWh
30010	9	Heating / Cooling	R	unicode character	"H" for heating, "C" for cooling
30011	10	Flow / Return	R	unicode character	"F" for flow, "R" for return
30012	11	Litres per pulse	R	16 bit unsigned integer	pulse value for flow meter
30013	12	Fluid	R	unicode character	"W", "E", "P" or "V" (see notes)
30014	13	Concentration	R	16 bit unsigned integer	brine concentration in %
30015	14	Error flags	R	bit field	lower 8 bits (see notes)
30016	15	Firmware version	R	2 ascii characters	major/minor version - eg. "10" equals v1.0
<b>Holding Registers</b>					
40001	0	Address	R/W	16 bit unsigned integer	lower 8 bits (0 to 255)
40002	1	Baud rate	R/W	16 bit unsigned integer	2400, 4800, 9600 or 19200
40003	2	Parity	R/W	16 bit unsigned integer	0 = none, 1 = even or 2 = odd
40004	3	Stop bits	R/W	16 bit unsigned integer	1 or 2
40005	4	ID - Hi	R/W	8 digit bcd	eg. 0x12345678
40006	5	ID - Lo	R/W		

## General Information

This meter supports Modbus RTU over RS485 half duplex (2 wire + common). The connections are A (Tx+, D0), B (Tx-, D1) and C (common).

There is a jumper link to terminate the network if this is the end meter. When the jumper is fitted a 120R resistor is connected across the data lines.

4 commands are supported - 0x03 (read holding registers), 0x04 (read input registers), 0x06 (write single register) and 0x10 (write multiple registers).

## Heat Meter Data (read only)

Total Energy - the total amount of energy that has been measured since the meter was commissioned (in KWh or MWh depending on the setting)

Instant Power - the current power being measured (in KW or MW depending on the setting)

Flow Temperature - the current temperature in the flow pipe from the boiler or chiller (in °C)

Return Temperature - the current temperature in the return pipe to the boiler or chiller (in °C)

Flow Rate - the current flow rate being measured by the flow meter (in m<sup>3</sup>/h)

## Heat Meter Settings (read only)

KWh / MWh - whether the meter is set to measure in KWh or MWh

Heating / Cooling - whether the meter is set for a Heating system or Cooling system

Flow / Return - whether the flow meter is set as being in the Flow pipe or Return pipe

Litres per pulse - the number of litres of fluid set to be measured for each pulse from the flow meter

Fluid - the fluid used in the system (Water, Ethylene glycol, Propylene glycol or Vegetable glycerin)

Concentration - if a brine (antifreeze) solution is set as the fluid used in the system then this is the concentration of that solution

## Meter Status (read only)

Error flags - 8 bits representing whether there is a particular error present (set, 1) or not (clear, 0)

bit 0 - input 1 overload (more than 10 pulses per second on input 1)

bit 1 - input 2 overload (more than 10 pulses per second on input 2)

bit 2 - input 3 overload (more than 10 pulses per second on input 3)

bit 3 - pulse output overload (more than 10 pulses per second on the pulse output)

bit 4 - backup memory failure (the data in the backup memory has an incorrect checksum)

bit 5 - temperature sensor fault (there is a fault on one or both of the temperature sensors)

bit 6 - freezing warning (water is set as the fluid used in the system and one or both of the temperatures is below 1°C)

bit 7 - reverse energy (the flow and return temperatures are the opposite way round than expected for the system setting)

Firmware version - the firmware version of the Modbus interface

## Modbus Settings (read/write)

**The blue button on the front of the meter must be kept pressed while a write command is sent in order for it to be accepted**

Address - allowed values are 0 to 255

Baud rate - allowed values are 2400 (0x0960), 4800 (0x12C0), 9600 (2580) or 19200 (0x4B00)

Parity - allowed values are 0 (none), 1 (even) or 2 (odd)

Stop bits - allowed values are 1 or 2

ID - 4 bytes in BCD format (8 digits)

## M-bus Register Map

The default settings for this meter are –

Primary address = 1

ID = 19110201

Baud rate = 2400

Readout = All values

Using the MBconf software from [www.relay.de](http://www.relay.de) these settings can be changed via the Mbus network interface. Once the software has been installed run it and click on the “EN1434” button in the centre of the window – this will display all the setting options.

In order to communicate with the meter you will have to select the correct “COM-Port” for your Mbus Master interface and set the “Baudrate” and “M-Bus Address” to match your meter.

If this is the only device on the network you can set the “M-Bus Address” to 254 (broadcast address). You should now get a response from the meters when you click on the “SND\_NKE” button.

**Before you can change any of the Mbus settings on the meter you must first enter and save the heat meter settings such as whether it uses MWh or KWh, is in a heating or cooling system, etc.**

**In order for the Mbus settings to be written to the meter the Blue button on the front of the meter must be kept pressed while the command is being sent.**

To change the primary address enter the new address in the “Prim. Address” box and click on the “Write” button next to it.

To change the ID enter the new ID in the “ID (sec. adr)” box & click on the “Write” button next to it.

To change the baud rate select the new baud rate from the “New M-Bus Baudrate” drop down box. Remember to change the baud rate on the computer afterwards to match it by selecting from the “Baudrate” drop down box.

To change the readout enter the command in the “Custom String” box and click on the “Write CS” button. The command “08 05” will set the readout to just the energy value while the command “08 7F” will set the readout to all values.

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