

1. Use of the option module

The Modbus RTU option module is used to connect the PolluTherm heat meters to Modbus RTU network using EIA-485 channel.



Picture 1: Modbus RTU module

The module is based on Modbus RTU Slave protocol which is realized according to newest specifications published by Modbus. The module EIA-485 network interface is compliant to TIA/EIA-485 standard.

1.1. Power supply

The Modbus RTU module should be powered by AC or DC (polarity insensitive) SELV power supply only.

SELV Power Supply Voltage	12-24 V AC/DC $\pm 10\%$
Power Supply Terminals	60 and 61 (polarity insensitive)
Power Consumption	max. 0.6 W
Typical Supply Current	32 mA @12 V DC

1.2. Communication interface

Connection to Modbus RTU network is realized by using galvanic isolated EIA-485 network interface.

Communication Protocol	Modbus RTU
Network Polarity	90 (non-inverting, +) and 91 (inverting, -)
Transmission Speed/Baud Rate (bits per second)	1200, 2400, 4800, 9600, 14400, 19200, 38400, 56000, 57600, 115200
Data Format	8E1 (8 data bits, even parity bit, 1 stop bit), 8O1 (8 data bits, odd parity bit, 1 stop bit), 8N1 (8 data bits, none parity bit, 1 stop bit), 8N2 (8 data bits, none parity bit, 2 stop bits)
Galvanic Isolation between Network and Option Module	299 VRMS (0-60 Hz)
Number of Devices per EIA-485 Segment Channel	Up to 256 ($\frac{1}{8}$ UL)
EIA-485 Network Topology	Bus Topology
EIA-485 Segment Channel Length	1200 m

The default communication parameters are: 9600 bps baud rate, 8N1 data format, Modbus Slave ID – 1.

Use only the dedicated two terminators on both ends of EIA-485 network channel segment. In case of any question, please contact technical support.

1.3. Environmental requirements

Operating Temperature (ambient)	+5 to +50°C
Storage Temperature	-10 to +65°C
Operating and Storage Humidity	25 to 90 % RH @50°C, non-condensing

2. Safety instructions

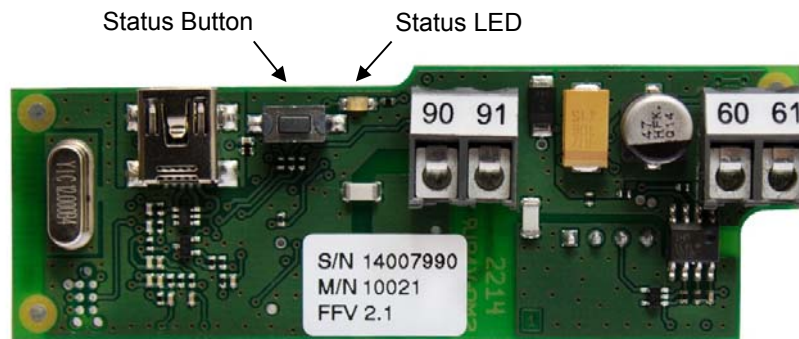
- The installation, electrical connection and commissioning the module should be made by qualified specialists only.
- The Modbus RTU option modules may only be used for the PolluTherm meters otherwise the modules or the heat meter could be damaged.
- The included lithium battery and the meter battery must not be recharged, short-circuited, put in contact with water or exposed to temperatures of more than 80°C.
- Battery and module waste may only be disposed at suitable collection centers for professional waste disposal.
- The communication modules are delivered in the form of circuit board. It is highly recommended that normal static precautions be taken in handling and assembly of this module to prevent damage and/or degradation which may be induced by ESD. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure.



3. Installation the option module in the Modbus RTU network

3.1. Status LED and Status Button functionality

The placement of the Status LED and Status Button is shown on the picture below.



Picture 2: Status Button and Status LED placement on the Modbus RTU option module

Status LED is signaling every Modbus RTU communication event. Status LED is blinking on during request receiving and response sending.

Press the button, then power on the module and hold the button pushed longer than 15 seconds to reset device to factory settings (set Modbus Slave ID to default value 1, the Update Rate parameter to default value 10 min and the communication interface to the defaults parameters – 9600 bps baud rate and 8N1 data format).

4. Modbus data register list

Designation	Modbus Register	Modbus Register Type	Modbus Address	Data Value Range	Unit ¹	Read only (RO) Read/write (R/W)
Firmware Version ²	30001 or 40001	Input or Holding	0	UInt16	-	RO
Energy	30002 or 40002	Input or Holding	1	Int32	kWh, MWh, MJ, GJ	RO
Energy (Unit factor)	30004 or 40004	Input or Holding	3	UInt16		RO
Energy (Unit)	30005 or 40005	Input or Holding	4	4 char ASCII		RO
Energy (Float)	30007 or 40007	Input or Holding	6	IEEE754		RO
Volume	30009 or 40009	Input or Holding	8	Int32	l (dm ³), m ³	RO
Volume (Unit factor)	30011 or 40011	Input or Holding	10	UInt16		RO
Volume (Unit)	30012 or 40012	Input or Holding	11	4 char ASCII		RO
Volume (Float)	30014 or 40014	Input or Holding	13	IEEE754		RO
Flow	30016 or 40016	Input or Holding	15	Int32	l/h, m ³ /h	RO
Flow (Unit factor)	30018 or 40018	Input or Holding	17	UInt16		RO
Flow (Unit)	30019 or 40019	Input or Holding	18	4 char ASCII		RO
Flow (Float)	30021 or 40021	Input or Holding	20	IEEE754		RO
Power	30023 or 40023	Input or Holding	22	Int32	W, kW	RO
Power (Unit factor)	30025 or 40025	Input or Holding	24	UInt16		RO
Power (Unit)	30026 or 40026	Input or Holding	25	4 char ASCII		RO
Power (Float)	30028 or 40028	Input or Holding	27	IEEE754		RO
Inlet temperature (Fixed)	30030 or 40030	Input or Holding	29	Int16	0.01°C	RO
Inlet temperature (Float)	30031 or 40031	Input or Holding	30	IEEE754	°C	RO
Outlet temperature (Fixed)	30033 or 40033	Input or Holding	32	Int16	0.01°C	RO
Outlet temperature (Float)	30034 or 40034	Input or Holding	33	IEEE754	°C	RO
Temperature difference (Fixed)	30036 or 40036	Input or Holding	35	Int32	0.001°C	RO
Temperature difference (Float)	30038 or 40038	Input or Holding	37	IEEE754	°C	RO
Tariff Energy	30040 or 40040	Input or Holding	39	Int32	kWh, MWh, MJ, GJ	RO
Tariff Energy (Unit factor)	30042 or 40042	Input or Holding	41	UInt16		RO
Tariff Energy (Unit)	30043 or 40043	Input or Holding	42	4 char ASCII		RO
Tariff Energy (Float)	30045 or 40045	Input or Holding	44	IEEE754		RO
Cooling Energy	30047 or 40047	Input or Holding	46	Int32	kWh, MWh, MJ, GJ	RO
Cooling Energy (Unit factor)	30049 or 40049	Input or Holding	48	UInt16		RO
Cooling Energy (Unit)	30050 or 40050	Input or Holding	49	4 char ASCII		RO
Cooling Energy (Float)	30052 or 40052	Input or Holding	51	IEEE754		RO
Fabrication Number	30054 or 40054	Input or Holding	53	Int32	-	RO

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Designation	Modbus Register	Modbus Register Type	Modbus Address	Data Value Range	Unit ¹	Read only (RO) Read/write (R/W)
Fabrication Number	30056 or 40056	Input or Holding	55	8 char ASCII	-	RO
Customer Location	30060 or 40060	Input or Holding	59	Int32	-	RO
Customer Location	30062 or 40062	Input or Holding	61	8 char ASCII		RO
Modbus Slave ID ^{3,4}	41001	Holding	1000	UInt16	-	R/W
Update Rate Data from Meter ⁵	41002	Holding	1001	UInt16	100 ms	R/W
Baud Rate	41003	Holding	1002	UInt32	-	R/W
Data Bits ⁶	41005	Holding	1004	UInt16	-	R/W
Parity ^{6,7}	41006	Holding	1005	UInt16	-	R/W
Stop Bits ⁶	41007	Holding	1006	UInt16	-	R/W

¹ Units for Energy, Volume, etc. are available in (Unit) registers and apply to (Float) values as well as integer values multiplied by (Unit factor).

Example on Energy registers - assume Energy = 43, Energy (Unit factor) = 100, Energy (Unit) = "Wh", Energy (Float) = 4300, then:

Energy register * Energy (Unit factor) register in Energy (Unit) register = 43 * 100 Wh = 4300 Wh

Energy (Float) register in Energy (Unit) register = 4300 Wh

² Higher byte of the register is major number of firmware version (0x##00). Lower byte of the register is minor number of firmware version (0x00##).

³ Lower byte of this register is Modbus address of the module in the range 1-247 (01-F7 hex).

⁴ If the higher byte is set to 1, the Modbus address will be updated to the heat meter M-Bus address. If the higher byte is set to 0, the Modbus address is static.

⁵ Default Update Rate Data from Meter is 4 seconds. Value in Modbus register is 40 because 40 * 100 ms gives 4 seconds.

⁶ The registers should be set only the values represent data format on the EIA-485 serial interface described in chapter Communication interface above.

⁷ This register is set by the ASCII char value – 'E' for Even parity (69 dec, 45 hex), 'O' for Odd parity (79 dec, 4F hex) and 'N' for None parity (78 dec, 4E hex).

More details about Modbus communication and data decoding you find in Modicon Modbus Protocol Reference Guide and MODBUS over Serial Line - Specification and Implementation Guide documents.

5. Installation the option module in the calculators

The option module would be installed in the rear socket in the opened meter.

5.1. Opening of the meter

- Remove the user seal from the housing of the meter
- Open the housing cover

PolluTherm: Press both closing clips on the lower edges of the housing cover and open cover upwards

Previous versions: Fold away the black locking latch and open housing cover

5.2. PolluTherm



Rear socket, usage of the four right contacts

The module has to be plugged in carefully in the rear socket with the six contacts.

Please make sure that the four pins of the module are plugged in the four right contacts of the socket.

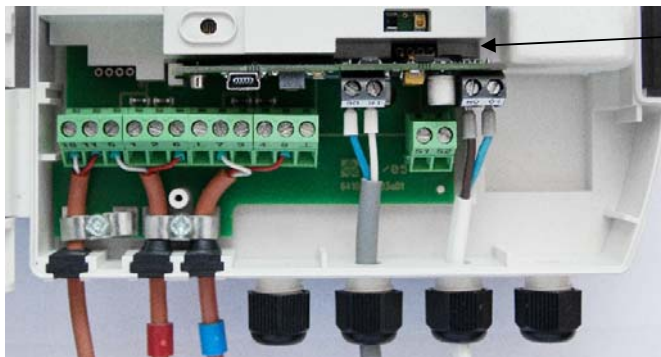
The two left contacts remain unused.

Picture 3: installed option module option module in current version of meter

For connection of cables first take the particular rubber form part from the calculator housing and pierce a hole with a small screw driver. Then take the relevant cable, put it through the hole and cause a strain relief with a cable strap (supplied). Connect the wires with the related terminals and put the rubber form part back in the housing.

Close calculator enclosure afterwards and seal it with the supplied selflock-seal.

5.3. Previous versions of PolluTherm



Rear socket

The module has to be plugged in carefully in the rear socket with the four contacts.

Picture 4: installed option module in previous version of meter

Each cable has to be put through a free cable gland and connected with the related terminals of the module.

Close the calculator housing afterwards and seal it with the supplied selflock-seal.

6. Option module firmware changes list

Firmware version	Description
2.1	Fixed readout timeouts when Slave ID based on heat meter M-Bus address option was turned on. Fixed lack of communication with the module when Slave ID based on heat meter M-Bus address option was turned on. Fixed always setting Slave ID based on heat meter M-Bus address option to on, after restarting the power supply.
2.0	Added support to update Baud Rate and Data Format (Data Bits, Parity, Stop Bits). Added support to read Customer Location and Fabrication Number as numbers. Added support to set Slave ID based on heat meter M-Bus address. Changed Temperature Difference (Fixed) precision to 0.001°C. Changed the default Update Rate from 15s to 4s. Changed the default EIA-485 interface data format to 8N1 (8 data bits, none parity bit, 1 stop bit).
1.0	Initial version.

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