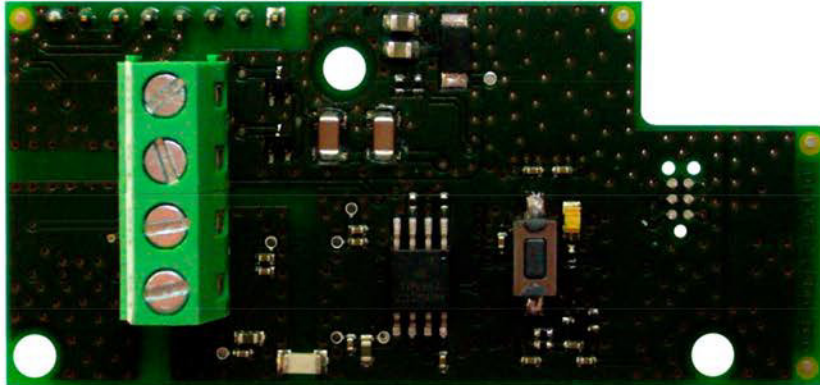


Modbus RTU Module for heat meters

Applications

The Modbus RTU module is destined to heat meters in order to connect the heat meters to Modbus RTU network using EIA-485 channel.



Features

- Module based on ARM Cortex-M3 core chip - one of the newest and stable ARM technology
- Galvanic isolation EIA-485 network interface used for easy and safe connection up to 256 devices in one network bus
- Modbus RTU Slave protocol is realized according to newest specifications published by Modbus Organization

Power supply

Polarity independent connection for SELV power supply - connectors 60 and 61

Voltage 12-24 V DC

Maximum power consumption 2 W max.

Typical supply current 50 mA

Communication interface

Connectors 90 (noninverting, +) and 91 (inverting, -)

Communication protocol Modbus RTU

Channel EIA-485 (1 kV galvanic isolated), 1/8 UL (up to 256 nodes on the bus)

Baud rate (bits per second) 1200, 2400, 4800, 9600, 14400, 19200 - default, 38400, 56000, 57600, 115200

Data format 8E1 (8 data bits, even parity bit, 1 stop bit) - default,

8O1 (8 data bits, odd parity bit, 1 stop bit),

8N2 (8 data bits, none parity bit, 2 stop bits)

Status LED and Status Button functionality

Status LED is signaling every Modbus 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 4.0 sec and the communication interface to the defaults parameters - 19200 bps baud rate and 8E1 data format).

Modbus data register list

Designation	Modbus Register	Modbus Register Type	Modbus Address	Data Value Range	Unit	Read only (RO) Read/write (R/W)
Heating Energy	30001 or 40001	Input or Holding	0	Int32	-	RO
Heating Energy (Unit factor)	30003 or 40003	Input or Holding	2	UInt16	-	RO
Heating Energy (Unit)	30004 or 40004	Input or Holding	3	4 char ASCII	-	RO
Heating Energy (Float)	30006 or 40006	Input or Holding	5	IEEE754	-	RO
Cooling Energy	30008 or 40008	Input or Holding	7	Int32	-	RO
Cooling Energy (Unit factor)	30010 or 40010	Input or Holding	9	UInt16	-	RO
Cooling Energy (Unit)	30011 or 40011	Input or Holding	10	4 char ASCII	-	RO
Cooling Energy (Float)	30013 or 40013	Input or Holding	12	IEEE754	-	RO
Tariff Energy 1	30015 or 40015	Input or Holding	14	Int32	-	RO
Tariff Energy 1 (Unit factor)	30017 or 40017	Input or Holding	16	UInt16	-	RO
Tariff Energy 1 (Unit)	30018 or 40018	Input or Holding	17	4 char ASCII	-	RO
Tariff Energy 1 (Float)	30020 or 40020	Input or Holding	19	IEEE754	-	RO
Tariff Energy 2	30022 or 40022	Input or Holding	21	Int32	-	RO
Tariff Energy 2 (Unit factor)	30024 or 40024	Input or Holding	23	UInt16	-	RO
Tariff Energy 2 (Unit)	30025 or 40025	Input or Holding	24	4 char ASCII	-	RO
Tariff Energy 2 (Float)	30027 or 40027	Input or Holding	26	IEEE754	-	RO
Volume	30029 or 40029	Input or Holding	28	Int32	-	RO
Volume (Unit factor)	30031 or 40031	Input or Holding	30	UInt16	-	RO
Volume (Unit)	30032 or 40032	Input or Holding	31	4 char ASCII	-	RO
Volume (Float)	30034 or 40034	Input or Holding	33	IEEE754	-	RO
Pulse Input Volume 1	30036 or 40036	Input or Holding	35	Int32	-	RO
Pulse Input Volume 1 (Unit factor)	30038 or 40038	Input or Holding	37	UInt16	-	RO
Pulse Input Volume 1 (Unit)	30039 or 40039	Input or Holding	38	4 char ASCII	-	RO
Pulse Input Volume 1 (Float)	30041 or 40041	Input or Holding	40	IEEE754	-	RO
Pulse Input Volume 2	30043 or 40043	Input or Holding	42	Int32	-	RO
Pulse Input Volume 2 (Unit factor)	30045 or 40045	Input or Holding	44	UInt16	-	RO
Pulse Input Volume 2 (Unit)	30046 or 40046	Input or Holding	45	4 char ASCII	-	RO
Pulse Input Volume 2 (Float)	30048 or 40048	Input or Holding	47	IEEE754	-	RO
Power	30050 or 40050	Input or Holding	49	Int32	-	RO
Power (Unit factor)	30052 or 40052	Input or Holding	51	UInt16	-	RO
Power (Unit)	30053 or 40053	Input or Holding	52	4 char ASCII	-	RO
Power (Float)	30055 or 40055	Input or Holding	54	IEEE754	kWh	RO
Flow	30057 or 40057	Input or Holding	56	Int32	-	RO
Flow (Unit factor)	30059 or 40059	Input or Holding	58	UInt16	-	RO
Flow (Unit)	30060 or 40060	Input or Holding	59	4 char ASCII	-	RO
Flow (Float)	30062 or 40062	Input or Holding	61	IEEE754	m ³ /h	RO
Forward temperature (Fixed)	30065 or 40064	Input or Holding	63	Int32	0.001 °C	RO
Forward temperature (Float)	30066 or 40066	Input or Holding	65	IEEE754	°C	RO
Return temperature (Fixed)	30068 or 40068	Input or Holding	67	Int32	0.001 °C	RO
Return temperature (Float)	30070 or 40070	Input or Holding	69	IEEE754	°C	RO
Temperature difference (Fixed)	30072 or 40072	Input or Holding	71	Int32	0.001 °C	RO
Temperature difference (Float)	30074 or 40074	Input or Holding	73	IEEE754	°C	RO
Heat Meter Serial Number (Fixed)	30076 or 40076	Input or Holding	75	UInt32	-	RO
Heat Meter Serial Number (ASCII)	30078 or 40078	Input or Holding	77	8 char ASCII	-	RO
Error Code	30082 or 40082	Input or Holding	81	UInt32	-	RO

Modbus data register list (cont.)

Designation	Modbus Register	Modbus Register Type	Modbus Address	Data Value Range	Unit	Read only (RO) Read/write (R/W)
Module Serial Number	32001	Input	2000	UInt32	-	RO
Module Model Number	32003	Input	2002	UInt32	-	RO
Firmware Version ¹	32005	Input	2004	UInt16	-	RO
Modbus Slave ID ^{2, 3}	41001	Holding	1000	UInt16	-	R/W
Update Rate Data from Meter	41002	Holding	1001	UInt16	100 ms	R/W
Baud Rate	41003	Holding	1002	UInt32	-	R/W
Data Bits ⁴	41005	Holding	1004	UInt16	-	R/W
Parity ^{4,5}	41006	Holding	1005	UInt16	-	R/W
Stop Bits ⁴	41007	Holding	1006	UInt16	-	R/W

¹ 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##).

² Lower byte of this register is Modbus address of the module in the range 1-247 (01-F7 hex).

³ 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.

⁴ The registers should be set only the values represent data format on the EIA-485 serial interface described in chapter Communication interface above.

⁵ 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.

Error codes meaning

Error designation	Error Code value in 30082 or 40082 Modbus Register is sum of following values of each error	Error code indicates on the LCD <Er ####>
Hardware status flag Er02	0x00000004	8000
Hardware status flag Er03	0x00000008	8000
End of battery live time	0x00000010	1000
Hardware status flag Er05	0x00000020	0008
Hardware status flag Er06	0x00000040	0008
Flow sensor is empty (air in the ultrasonic flow sensor)	0x00000400	0001
Reverse direction of the flow	0x00000800	0002
Temperature sensor 1 error (short circuit or sensor not connected)	0x00010000	0080
Temperature 1 < 0°C	0x00040000	00C0
Temperature 1 > 180°C	0x00080000	0080
Temperature sensor 2 error (short circuit or sensor not connected)	0x00100000	0800
Temperature 2 < 0°C	0x00400000	0C00
Temperature 2 > 180°C	0x00800000	0800
Hardware status flag Er30	0x01000000	0880
Temperature difference < 3°C	0x04000000	4000
Temperature difference > 150°C	0x08000000	2000
Flow rate grater 1,2qs	0x10000000	0004
Hardware status flag Er35	0x20000000	8000
Hardware status flag Er37	0x80000000	8000