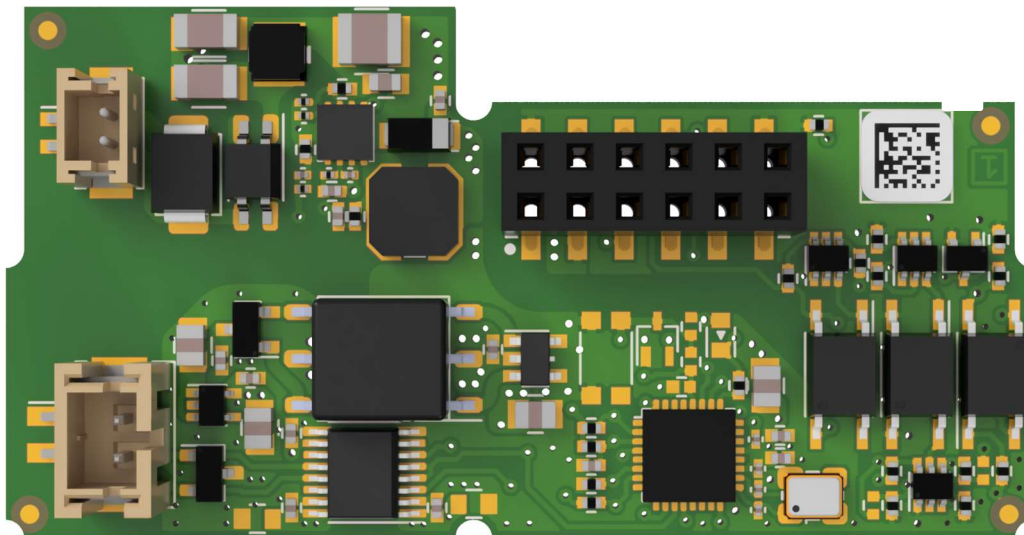


# EN-MBRTU Modbus RTU Module

For SensoStar S3 heat meter and S3C calculator



The Modbus RTU Module is designed for use with S3 heat meter and S3C calculator by Engelmann Sensor to connect them to Modbus RTU network using EIA-485 channel.

## Power supply

Connectors	CN100 (see section "External connectors")
Supply voltage	12V – 24V DC ± 10 % (SELV power supply only)
Polarity	Independent
Maximum power consumption	500 mW

## Communication interface

Connectors	CN101 (see section "External connectors")						
Communication protocol	Modbus RTU						
Channel	EIA-485 (galvanically isolated)						
Baud rate (bits per second)	1200, 2400, 4800, 9600, 14400, 19200, 38400, 56000, 57600, 115200						
Data format	<table> <tr> <td>data bits</td> <td>8</td> </tr> <tr> <td>parity bit</td> <td>even, odd, none</td> </tr> <tr> <td>stop bits</td> <td>1, 2</td> </tr> </table>	data bits	8	parity bit	even, odd, none	stop bits	1, 2
data bits	8						
parity bit	even, odd, none						
stop bits	1, 2						

## Environmental conditions

Ambient operating temperature	0 – 55 °C
Recommended storage temperature	-25 – 70 °C

## Default factory settings

Communication parameters	9600 bps, 8N1 data format (8 data bits, none parity, 1 stop bit)
Modbus Slave ID	1
Update Rate Data from Meter	600 s
Automatic Slave ID	0

## External connectors

Power Supply	CN100:	Polarity independent
EIA-485	CN101:	B (+) and A (-)



CN100	+/-	+/-	B (+)	A (-)	CN101
-------	-----	-----	-------	-------	-------

## Modbus data register list

Designation	Modbus Register	Modbus Register Type	Modbus Address	Data Value Range	Unit	Read only (RO) Read/write (R/W)
Energy	30001 or 40001	Input or Holding	0	int32	<sup>1</sup>	RO
Energy (Unit factor)	30003 or 40003	Input or Holding	2	uint16	-	RO
Energy (Unit)	30004 or 40004	Input or Holding	3	4 char ASCII	-	RO
Energy (Float)	30006 or 40006	Input or Holding	5	IEEE754	<sup>1</sup>	RO
Cooling Energy	30008 or 40008	Input or Holding	7	int32	<sup>1</sup>	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	<sup>1</sup>	RO
Tariff 1 Energy	30015 or 40015	Input or Holding	14	int32	<sup>1</sup>	RO
Tariff 1 Energy (Unit factor)	30017 or 40017	Input or Holding	16	uint16	-	RO
Tariff 1 Energy (Unit)	30018 or 40018	Input or Holding	17	4 char ASCII	-	RO
Tariff 1 Energy (Float)	30020 or 40020	Input or Holding	19	IEEE754	<sup>1</sup>	RO
Tariff 2 Energy	30022 or 40022	Input or Holding	21	int32	<sup>1</sup>	RO
Tariff 2 Energy (Unit factor)	30024 or 40024	Input or Holding	23	uint16	-	RO
Tariff 2 Energy (Unit)	30025 or 40025	Input or Holding	24	4 char ASCII	-	RO
Tariff 2 Energy (Float)	30027 or 40027	Input or Holding	26	IEEE754	<sup>1</sup>	RO
Volume	30029 or 40029	Input or Holding	28	int32	<sup>2</sup>	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	l	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	W	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	l/h	RO
Forward temperature (Fixed)	30064 or 40064	Input or Holding	63	int16	1 °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	int16	1 °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	int16	0.01 °K	RO
Temperature difference (Float)	30074 or 40074	Input or Holding	73	IEEE754	°K	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 Slave ID <sup>4</sup>	41001	Holding	1000	uint16	-	R/W
Update Rate Data from Meter	41002	Holding	1001	uint16	1 s	R/W
Baud Rate <sup>5</sup>	41003	Holding	1002	uint32	-	R/W
Data Bits <sup>5</sup>	41005	Holding	1004	uint16	-	R/W

Parity <sup>5, 6</sup>	41006	Holding	1005	uint16	-	R/W
Stop Bits <sup>5</sup>	41007	Holding	1006	uint16	-	R/W
Automatic Slave ID <sup>7</sup>	41008	Holding	1007	uint16	-	R/W
Module Serial Number	32001	Input	2000	uint64	-	RO
Module Model Number	32005	Input	2004	uint32	-	RO
Firmware Version <sup>3</sup>	32007	Input	2006	uint16	-	RO
Firmware Revision	32008	Input	2007	uint32	-	RO

- 1 Specified registers can hold data present energy in different units. Data unit is visible in (Unit) register. Available units for the register are MWh, MBTU, GJ or Gcal.
- 2 Specified registers can hold data present volume in different units. Data unit is visible in (Unit) register. Available units for the register are ml, l or m<sup>3</sup>.
- 3 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##).
- 4 This register is Modbus address of the module in the range 1-247 (01-F7 hex).
- 5 Only the values corresponding to the data format of the serial EIA-485 interface should be set in the registers (see section "Communication interface").
- 6 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).
- 7 This register with value 1 enable setting Modbus Slave ID based on heat meter primary M-Bus address. To disable set value 0.

## Error codes

Error Bit	Error Description	Trigger for Error	Effect
0	Temperature Sensor 1: Cable Break	-	No calculation of energy value.
1	Temperature Sensor 1: Short Circuit		
2	Temperature Sensor 2: Cable Break		
3	Temperature Sensor 2: Short Circuit		
4	Error at Flow Measurement System	Depends on used Measurement System: <ul style="list-style-type: none"> <li>• Coil Error</li> <li>• No Water</li> </ul>	No calculation of volume and energy values.
5	Electronic Defect	Checksum in FRAM has an unexpected value.	-
6	Reset	Restart of Device has been done: <ul style="list-style-type: none"> <li>• by watchdog (only on FW or HW error)</li> <li>• by power off / power on</li> </ul>	-
7	Low Battery	Battery voltage is equal or lower as 2.5 Volts: <ul style="list-style-type: none"> <li>• voltage level is detected on every day change</li> </ul>	-
8 - 15	Reserved	-	-
16	No readout from heat meter	Communication with the meter is not possible.	Delivered data on the Modbus is not updated with last data from meter and therefore invalid.
17 - 31	Reserved	-	-

### Meaning of the error bit state:

- If error bit is set to 1, the corresponding error is active.
- If error bit is set to 0, the corresponding error is not active.

Reserved error bits are always 0.

## Meter Compatibility

The Engelmann Modbus Module is compatible with Engelmann SensoStar meters with a compatible firmware version. The table below shows the minimum firmware versions required.

The meter's firmware version can be shown in the meter's display, for further information please refer to the meter's manual.

Meter	Minimum firmware version
Engelmann SensoStar S3	1.03/0.14
Engelmann SensoStar S3C	1.00/0.05

## Module Firmware changes list

Firmware version	Description
1.0	Initial version