# Sewi AQS/TH Modbus **Sewi TH Modbus** Indoor sensors

#### Manual

Item numbers 30174 (Sewi AQS/TH Modbus), 30175 (Sewi TH Modbus)



# Safety and use instructions

Installation, testing, operational start-up and troubleshooting should only be performed by a qualified electrician.



 Inspect the device for damage before installation. Only put undamaged devices into operation.

· Comply with the locally applicable directives, regulations and provisions for electrical installation.

• Immediately take the device or system out of service and secure it against unintentional switch-on if risk-free operation is no longer guaranteed.

Use the device exclusively for building automation and observe the operating instructions. Improper use, modifications to the device or failure to observe the operating instructions will invalidate any warranty or guarantee claims.

Operate the device only as a fixed-site installation, i.e. only in assembled condition and after conclusion of all installation and operational start-up tasks, and only in the surroundings designated for it.

Elsner Elektronik is not liable for any changes in norms and standards which may occur after publication of these operating instructions.

For information on installation, maintenance, disposal, scope of delivery and technical data, please refer to the installation instructions.

# Description

The indoor sensors Sewi AQS/TH Modbus and Sewi TH Modbus measure the indoor temperature and humidity and also calculate the dew point temperature. The Sewi AQS/TH also records the CO2 concentration.

The devices are Modbus slaves with a RS485 interface and a RTU protocol. The Modbus master, such as PC, SPS or MC can read the Sewi Modbus Indoor Sensors measurement values with "Function 04h (Read Input Register)".

#### Sewi TH Modbus Indoor Sensor Functions:

- Temperature measurements
- Humidity measurements
- Calculating the dew point temperature

Sewi AQS/TH Modbus Indoor Sensor Functions:

- Measuring the CO2 concentration in the air
- Temperature measurements
- Humidity measurements
- Calculating the dew point temperature

#### Tips for Dew Point Calculation:

The sensors Sewi Modbus calculate the ambient dew point temperature. This value can be used for dew point monitoring. This would require another sensor for measuring the surface temperature of the wall or pipe. Also, the dew point needs to be monitored (compare with temperatures) in the Modbus master.

Monitoring predetermines the possible condensate build-up on the surface, giving a chance for timely countermeasures.

#### 2.0.1. Measuring accuracy

After applying the supply voltage, it can take up to 5 minutes until the CO2 measured value is output correctly.

The CO<sub>2</sub> sensor uses the last 7 minimum CO<sub>2</sub> values for automatic sensor calibration. These 7 minimum values must be at least 18 hours apart and within the range of 400 to 450 ppm (fresh air).

#### Sewi Modbus Indoor Sensors

### 3. Commissioning

After the operating voltage has been applied, the device will enter an initialisation phase lasting a few seconds. During this phase no information can be received or sent via the bus.

# 3.1. Bus communication

#### 3.1.1. Bus load

Baud rate: 19,200 Parity: Even

Setting the slave address:

larger than 247 are invalid.

be set to ON for address 47.

"EE MB" switch: without function

Interface parameters:

Timing: Off

"-32768".

0

2

Byte

no.

0

1

2

4

5

6

7

**Register** Parameter

Variable

Command

Slave address

CRC Low Byte

**CRC High Byte** 

Temperature

**Relative humidity** 

4.1.2. Query string from the master

Start Address High Byte

Start Address Low Byte

Word Count High Byte

Word Count Low Byte

The RS485 transceiver used has a 1/8 standard RS485 bus load (1/8 unit load) and can achieve at least 2.4V at 54 Ohm. It is operated in the location of a bus with 32 users with standard bus load. If users with less than the standard bus load are connected to an RS485 bus, then the bus can be operated with more users. For instance, if users with a 1/8 bus load are connected, then up to  $32 \times 8 = 256$  users can be connected to the bus.

#### **3.1.2. Setting the bus communication**



Fig. 1:

Regist
0
1
2
3
4

32768".

Byte no.	Variable		Explanation
0	Slave address	xx	
1	Command	04H	Read Input Registers
2	Start Address High Byte	xx	Register start address
3	Start Address Low Byte	xx	
4	Word Count High Byte	d Count High Byte xx Nu	
5	Word Count Low Byte	xx	
6	CRC Low Byte	xx	
7 CRC High Byte		xx	

01h, 04h, 00h, 00h, 00h, 05h, 30h, 09h

32768".

Byte	
no.	
0	
1	Γ
2	
3	
4	
5	
6	
7	
8	
9	ſ
10	
11	
12	
13	Γ

14

4.1.3. Output string for the master	

Example query string for reading all data for slave address 1:

Before the first measurement and in case of a faulty sensor, all registers are at "-32768".

Byte no.	Register address	Variable		Explanation
0		Slave address	xx	
1		Command	04H	Read Input Register
2		Number of bytes	xx	Master requirement * 2
3	0	Temperature High Byte	xx	with prefix, value/10 =
4		Temperature Low Byte	хх	Temperature xx.x°C

Byte
no.
5
6
7
8
9

10

is set to ON, it has the corresponding baud rate.

"TERM" switch: Bus termination 124 Ohms

Transfer protocol

4.1. Sewi TH Modbus (30175):

"ODD" or "NONE" can switch the corresponding parity check.

4.1.1. Function 04H Read Input Register TH-AP Modbus

Before the first measurement and in case of a faulty sensor, all registers are at

XX

04H

хх

XX

xх

хх

хх

XX

Data Type Data Value

Signed 16Bit 0 to 1,000

Dew point temperature Signed 16Bit -400 to +1,250 -40 to +125°C

Signed 16Bit -400 to +1,250

Explanation

Read Input Registers

Register start address

Number of registers to read

Range

-40 to +125°C

0 to 100%

Detailed view of the DIP switches

TERM				

If all DIP switches are in the OFF position (factory setting), the following parameters are set: Address: 1

The slave address is set in the 8-bit DIP switch "address". Address 1 is selected, if

all switches are at OFF. Address 0 is reserved for broadcast information. Addresses

The address has binary coding. So, for example, switches 1, 2, 3, 4 and 6 need to

The interface parameters are set in the second 8-bit DIP switch. If the first 4 swit-

ches are set to OFF, the binary rate setting is 19,200 baud. If one of these switches

Parity: If both switches are "ODD" and "NONE" on "OFF", the parity is EVEN. Only

Register address	Variable		Explanation
l	Relative Humidity High Byte	xx	Value/10 = relative humidity xx.x%
	Relative Humidity Low Byte	хх	
2	Dew point Temperature High Byte	xx	with prefix, value/10 = Dew point Temperature
	Dew point Temperature Low Byte	xx	xx.x°C
	CRC Low Byte	xx	
	CRC High Byte	xx	

# 4.2. Sewi AQS/TH Modbus

# 4.2.1. Function 04H Read Input Register TH-AP Modbus

Before the first measurement and in case of a faulty sensor, all registers are at "-

ər	Parameter	Data Type	Data Value	Range
	Temperature	Signed 16Bit	-400 to +1,250	-40 to +125°C
	Relative humidity	Signed 16Bit	0 to 1,000	0 to 100%
	Dew point temperature	Signed 16Bit	-400 to +1,250	-40 to +125°C
	CO <sub>2</sub>	Signed 16Bit	100 to +10,000	100 to +10,000
	CO2 module Autocalibration Mode 1 = on; 0 = off	16 Bit	0 to 1	

#### 4.2.2. Query string from the master

#### **4.2.3. Output string for the master**

Before the first measurement and in case of a faulty sensor, all registers are at "-

Register address	Variable		Explanation	
	Slave address	XX		
	Command	04H	Read Input Register	
	Number of bytes	xx	Master requirement * 2	
0	Temperature High Byte	xx	Value/10 = with prefix,	
	Temperature Low Byte	xx	Temperature xx.x°C	
1	Relative Humidity High Byte	xx	Value/10 = relative humidity xx.x%	
	Relative Humidity Low Byte	xx	-	
2	Dew point Temperature High Byte	xx	Value/10 = with prefix, Dew point Temperature	
	Dew point Temperature Low Byte	xx	xx.x°C	
3	CO <sub>2</sub> High Byte	xx	Value = CO <sub>2</sub> in xxx ppm	
	CO <sub>2</sub> Low Byte	xx	-	
4	Autocalibration Mode High Byte	0	1 = on; 0 = off	
	Autocalibration Mode Low Byte	xx		
	CRC Low Byte	xx		
	CRC High Byte	xx		