



DataSheet

Temperature and Humidity Sensor

Model AK2

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Chapter 1

Introduction of Temperature and Humidity Sensor



Modbus temperature and humidity sensor model AK2

Sensor Information

Sensor Information

The 2AK sensor uses a Swiss chip from Sensirion, with a temperature measurement range of -20 to +85°C and a humidity measurement range of 0 to 100%.

The actual temperature measurement accuracy is $\pm 0.3^{\circ}\text{C}$, and the humidity measurement accuracy is $\pm 3\%$. (Although the Swiss sensor documentation specifies higher accuracy, the company's commitment to the customer is within the specified range.)

Communication Protocols

This device has two hardware platforms for communication:

1. The first communication channel: The 485Rs platform, which implements the RTU Modbus software protocol and is capable of establishing communication on this network.
2. The second communication channel: The Ethernet network or LAN cable, supporting the Json, TCP Modbus, and HTTP software protocols.

The communication protocols embedded in this device allow connections to various PLCs, DCSs, and RTUs, and it can also connect with equipment that supports TCP Modbus, Json, and RTU Modbus.

Applications

The measurement accuracy of this sensor makes it suitable for use in server rooms, animal breeding centers, poultry farms, mushroom cultivation halls, greenhouses, and all storage and industrial environments, as well as laboratories, cold storage, office buildings, residential buildings, and more.

Note

- Since this device has a series of thermostat modes, it can be used in cases where temperature or humidity control is required.
- This sensor is specifically designed for displaying and monitoring temperature and humidity in industrial systems.

Relay Applications

The relays in the 2AK sensor have three different control modes:

Mode 1: Modbus network-based

Mode 2: Based on ambient temperature

Mode 3: Based on ambient humidity

Each relay has the capability to have its own mode defined separately. For example, one relay can be set based on temperature, while another can be set based on the Modbus network.

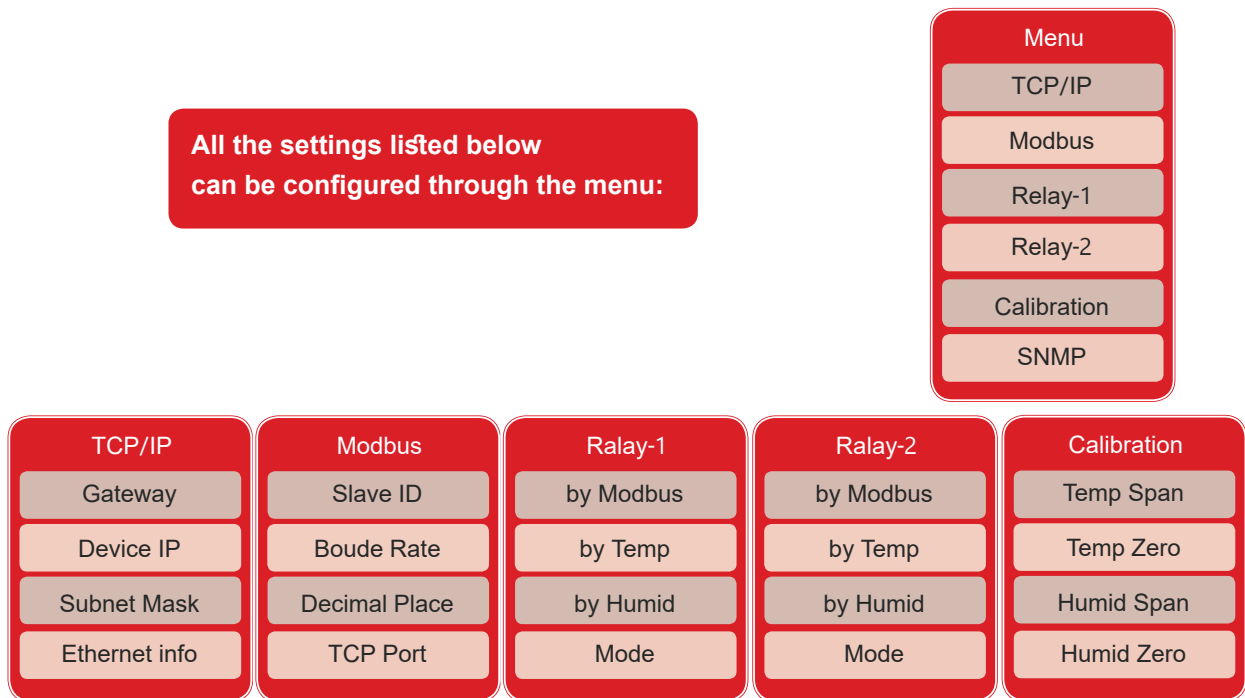
Thermostatic Mode

When the relays are set based on temperature and humidity, they operate by defining a range for them: a temperature is received as the setpoint, for example, 25°C, and a range, such as 2°C, is defined for hysteresis. Based on this information, the control range is set between 23°C and 27°C. In thermostatic modes, there are two modes: decreasing and increasing, which are explained in the relevant section.

Device Display and Menu

On this display, the temperature and humidity measured by the sensor are shown by default, and whenever you want, you can enter the menu by pressing the menu button.

The device has a 1.3-inch OLED display. It has four buttons that are used for device settings.



How to perform a hardware reset of the device

If you do not have information about the IP or device specifications for any reason and want to re-store it to the factory default settings, press the Reset button for 5 seconds to observe the Reset indicators on the device.



Web service

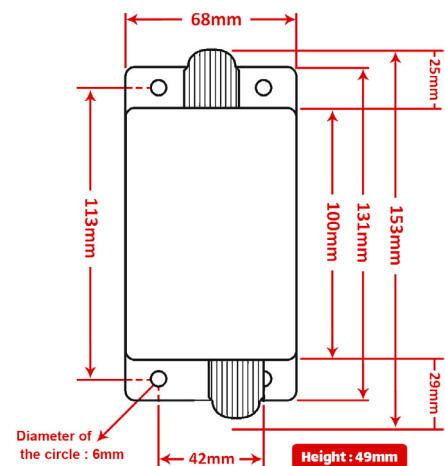
If you want to use this sensor under a network (you define an IP for the device), by entering the IP, the web service will open, and all settings can be made through the web service.

One of the applications of the web service is that, for example, if these sensors are used in an internal Ethernet network of an organization or a refinery, you can remotely configure all settings through the network.

In a case where you are using this sensor in an environment where a modem with a valid IP exists, by applying a series of network settings, you will have the ability to connect remotely via the internet to the web service of this device, view the temperature and humidity values, and make any necessary adjustments to the device.

Physical Dimensions and Box

- Dimensions: 153 * 68 * 52 mm
- Weight: 200 grams
- Body made of ABS
- Can be mounted on the wall
- By adding the 01DRG module, which is also available on the website, it can be installed in electrical panels and DIN rails
- 1 meter input cable, 7 x 0.20 mm
- Equipped with a 30 cm perforated metal protective cover for the temperature and humidity sensor (One of the key features of this cover is its resistance to dust penetration and direct water spray, as well as its suitability for use in high-temperature industrial environments.)



Chapter 2

Guide **Quick Start**

1

User guide for Modbus RTU communication over RS-485 network

Slave ID	✓	Click
Baud Rate	✓	Click
Desimal Plases	✓	Click
Reading Modbus Registers	✓	Click

3

Instructions for Configuring the Device as a Thermostat

First, set the relay control mode.	Temperature	✓	Click
	humidity	✓	Click
Point Set		✓	Click
Hystersis Set		✓	Click
Relays Direction Set		✓	Click

2

User Guide for Modbus TCP Communication over LAN

IP	✓	Click
Gateway	✓	Click
Subnetmask	✓	Click
TCP Port	✓	Click
Desimal Plases	✓	Click
Slave ID	✓	Click
Reading Modbus Registers	✓	Click

4

Instructions for Accessing the Device's Web Service and Reading Data from its JSON Output

IP	✓	Click
Gateway	✓	Click
Subnetmask	✓	Click

5

Instructions for Controlling Relays via Modbus

Connection Set	✓	First, complete Table 1 or Table 2.
Setting the relay control mode to Modbus	✓	Click
Reviewing the relay Modbus table	✓	Click

For example, if you intend to use the Modbus TCP network, first complete the table related to Modbus TCP over LAN. Then, proceed to this section.

Alternatively, if you plan to use Modbus RTU over RS-485, make sure to configure those settings first, and only then follow the instructions for controlling the relays via Modbus

Addresses of Modbus houses

(Modbus registers)

Setting the Slave address using the Modbus network

Paramater Address		PLC Standard Address	Modbus Function	Access	Register Type	Data Type	Description
Dec	Hex						
1	0x01	40002	03 / 06	R/W	Holding Reg	16-bit	For setting RS-485 communication address. Range: 2 ~ 255 / Default = 2

To apply device settings using Baud Rate

Paramater Address		PLC Standard Address	Modbus Function	Access	Register Type	Data Type	Description
Dec	Hex						
8	0x08	40009	03 / 06	R/W	Holding Reg	16-bit	Table No. 1

Table No. 1

Set	0	1	2	3	4	5	6	7	8	9	10	11	12
Describtion	Baud Rate 4800	Baud Rate 9600	Baud Rate 19200	Baud Rate 28800	Baud Rate 38400	Baud Rate 48000	Baud Rate 57600	Baud Rate 67200	Baud Rate 76800	Baud Rate 86400	Baud Rate 96000	Baud Rate 105600	Baud Rate 115200

To apply device settings using Decimal Places

Paramater Address		PLC Standard Address	Modbus Function	Access	Register Type	Data Type	Description
Dec	Hex						
9	0x09	40010	03 / 06	R/W	Holding Reg	16-bit	Table No. 2

Table No. 2

Set	0	1	2
Describtion	0	0.0	0.00

Relay control and reading via the Modbus network

In all cases, you can read the information related to the last relay status through the 0D and 0E registers via the Modbus network. If you wish to control these relays via the Modbus network, you should select the appropriate settings for relay control via Modbus from the menu or web service. Then, within the same register, you will have write access, allowing you to change the relay status through the Modbus network using its standard functions.

Paramater Address		PLC Standard Address	Modbus Function	Access	Register Type	Data Type	Description
Dec	Hex						
13	0x0D	40014	03 / 06	R/W	Holding Reg	16-bit	Set/Read status of Relay-1 Only used in by Modbus Control
14	0x0E	40015	03 / 06	R/W	Holding Reg	16-bit	Set/Read status of Relay-2 Only used in by Modbus Control

Sensor Data Acquisition via Modbus Network

to read the temperature values, you can use Modbus register 2, and for reading humidity levels, use Modbus register 3.

Registers 0B and 0C function exactly the same as registers 2 and 3.

The reason temperature and humidity data are available in two registers is due to legacy support. Older versions of our IC-based sensors used to store temperature and humidity values in registers 0B and 0C.

This allows users with existing PLC programs or custom applications designed for the older sensors to continue working without changes.

However, for new implementations, we recommend using registers 2 and 3

Paramater Address		PLC Standard Address	Modbus Function	Access	Register Type	Data Type	Description
Dec	Hex						
2	0x02	40003	03	R	Holding Reg	16-bit	Present Celsius temperature measured.
3	0x03	40004	03	R	Holding Reg	16-bit	Present Percentage of humidity measured.
11	0x0B	40012	03	R	Holding Reg	16-bit	Present Celsius temperature measured.
12	0x0C	40013	03	R	Holding Reg	16-bit	Present Percentage of humidity measured.

Sensor Calibration Using the Modbus Network

These boxes are used for calibrating the temperature and humidity sensors. Box number 4 is used for the temperature Zero value, and box number 5 is for the temperature Span value. Similarly, boxes 6 and 7 are used for the Zero and Span values of humidity, respectively. For more details, please refer to the Calibration section in the display menu.

Paramater Address		PLC Standard Address	Modbus Function	Access	Register Type	Data Type	Description
Dec	Hex						
4	0x04	40005	03 / 06	R/W	Zero Temp	16-bit	Set Zero/Offset for Temprature (°C). Valid Range: -10.00 to +10.00
5	0x05	40006	03 / 06	R/W	Span Temp	16-bit	Set Span/Gain for Temprature (°C). Valid Range: -10.00 to +10.00
6	0x06	40007	03 / 06	R/W	Zero Humid	16-bit	Set Zero/Offset for Humidity(%). Valid Range: -10.00 to +10.00
7	0x07	40008	03 / 06	R/W	Span Humid	16-bit	Set Span/Gain for Humidity(%). Valid Range: -10.00 to +10.00

Thermostatic relay settings via the Modbus network

If you wish to use the relay in temperature and humidity thermostat modes, it is necessary to set the values for the Point and Hysteresis related to the temperature or humidity mode of your choice for each relay in their corresponding registers.

If you wish to set the temperature Point for Relay number 1, you should use register F0. Similarly, to set the temperature Point for Relay number 2, you should use register Hex13 or Decimal19.

Paramater Address		PLC Standard Address	Modbus Function	Access	Register Type	Data Type	Description
Dec	Hex						
15	0x0F	40016	03 / 06	R/W	T1 Point	16-bit	Set Temp point (°C) for Relay-1 switch, Only used in by Temp Control
16	0x10	40017	03 / 06	R/W	T1 Hyster-esis	16-bit	Set Temp range for Relay-1 switch, Only used in by Temp Control
17	0x11	40018	03 / 06	R/W	H1 Point	16-bit	Set Humid point (%) for Relay-1 switch, Only used in by Humid Control
18	0x12	40019	03 / 06	R/W	H1 Hys-teresis	16-bit	Set Humid range for Relay-1 switch, Only used in by Humid Control
19	0x13	40020	03 / 06	R/W	T2 Point	16-bit	Set Temp point (°C) for Relay-2 switch, Only used in by Temp Control
20	0x14	40021	03 / 06	R/W	T2 Hyster-esis	16-bit	Set Temp range for Relay-2 switch, Only used in by Temp Control
21	0x15	40022	03 / 06	R/W	H2 Point	16-bit	Set Humid point (%) for Relay-2 switch, Only used in by Humid Control
22	0x16	40023	03 / 06	R/W	H2 Hys-teresis	16-bit	Set Humid range for Relay-2 switch, Only used in by Humid Control

Chapter 4

Menu
Usage Guide

1.Network Settings

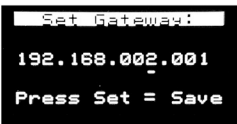
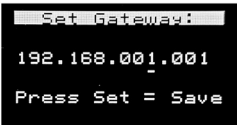
1.1.Methods for Setting the Gateway

The gateway acts as a portal for connecting the 2AK device to external networks (such as the internet or other networks). This configuration is essential in situations where your device needs to send data to or receive data from devices or servers outside the local area network (LAN).

By pressing the button , you enter the sensor menu page. The first option is IP/TCP, and by pressing the button , you enter the IP/TCP page. Pressing the button  again will take you to the Gateway Set page.



If the gateway settings are correctly configured, after exiting the menu, a message will be displayed indicating that by pressing the button , the device will restart and the settings will be applied.

	1.By pressing the button  , we change the gateway to 1.	
2.By pressing the button  , we save the changes.		
We return to the main page.		
	By pressing the button  , we select "Ok."	
The device will restart.		
		

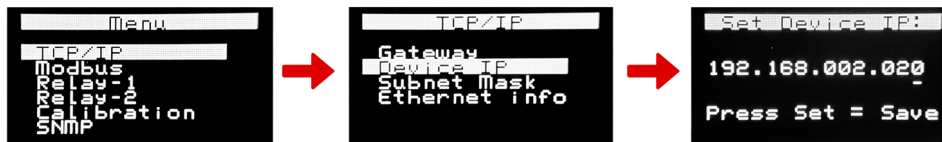
In this example, we want to change the device's gateway from 192.168.2.1 to 192.168.1.1.

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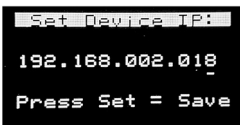
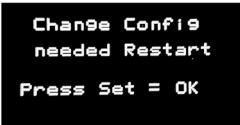
1.2. Methods for Setting IP Address

The IP address is a unique identifier for devices in the network, used for sending and receiving data. This address helps the device be identified in the network and enables it to communicate with other devices.

By pressing the button  you enter the sensor menu page. The first option is IP/TCP, and by pressing the button , you enter the IP/TCP page. In this section, by pressing the button , the cursor moves to the Device IP option, and then by pressing the button , you will enter the Set Device IP page.



If the IP Device settings are correctly configured, after exiting the menu, a message will appear indicating that by pressing the button , the device will restart and the settings will be applied.

 1. By pressing the button , we change the IP Device to 18.	
2. We press the button  to save the changes. 	In this example, we want to change the device's IP Device from 192.168.2.20 to 192.168.2.18
3. We return to the main page.	
 4. By pressing the button , we select "OK."	
5. The device will restart. 	

1.3. Methods for Setting Subnet Mask

The Subnet Mask is a numerical value that defines the range of a network (Subnet)



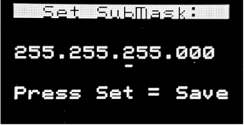
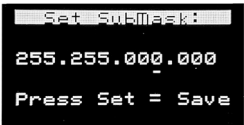
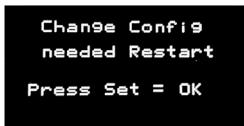
Suppose your 2AK device is configured with the IP address 192.168.1.10 and the Subnet Mask is 255.255.255.0. If you want to send data to a device with the IP address 192.168.2.20, these two devices are on different networks, and a direct connection cannot be established unless a gateway is used. The gateway will route the data between the two different subnets, enabling communication between the devices.

By pressing the button , you enter the Sensor Menu page. The first option is TCP/IP, and by pressing the button , you will enter the TCP/IP page. In this section, by pressing the button , the cursor moves to the Subnet Mask option, and then by pressing the button , you will enter the Set SubMask page.



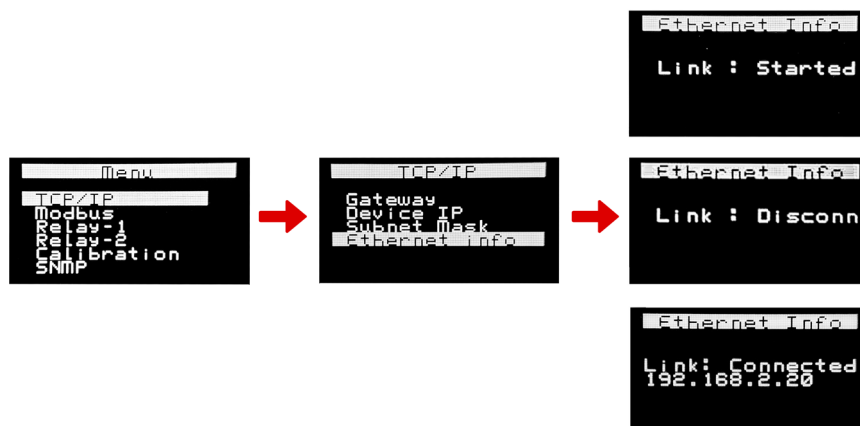
If the Subnet Mask settings are correctly configured, after exiting the menu, a message will appear indicating that by pressing the button , the device will restart and the settings will be applied.



 1. By pressing the button , we change the Subnet Mask to 255.0.0.0.	
2. We press the button  to save the changes.	
3. We return to the main page.	In this example, we want to change the Subnet Mask of the device from 255.255.255.0 to 255.255.0.0.
 4. By pressing the button , we select "Ok."	
5. The device will restart.	

1.4. Checking the Network Module Conditions

By pressing the button , you enter the Sensor Menu page. The first option is TCP/IP, and by pressing the button , you will enter the TCP/IP page. In this section, by pressing the button , the cursor moves to the Ethernet Info option, and then by pressing the button , you will enter the Ethernet Info page.



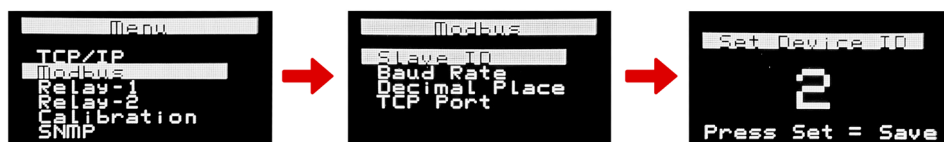
Link : Started	This state indicates that the network module has been properly initialized and is ready for operation.
Link : Disconn	This state indicates that the device has lost its connection to the upstream network and is no longer connected to the network.
Link : Connected	This state indicates that the device has successfully connected to its upstream network and shows the IP address that has been assigned to the device. Note: If the displayed IP address differs from the IP address set by the user, it indicates that the gateway or subnet mask settings for the device have not been correctly defined.

2. Modbus Settings Configuration

2.1. Methods for Configuring Modbus Address (Slave ID)

All devices in a Modbus network have a unique address, which is referred to as the Slave ID in the Modbus protocol. To configure this parameter, follow the steps outlined below.

By pressing the button , you enter the Sensor Menu page. The second option is Modbus; by pressing the button , the cursor moves to this option, and by pressing the button , you will enter the Modbus page. In this section, the first option is Slave ID, and by pressing the button , you will enter the Set Slave ID page.



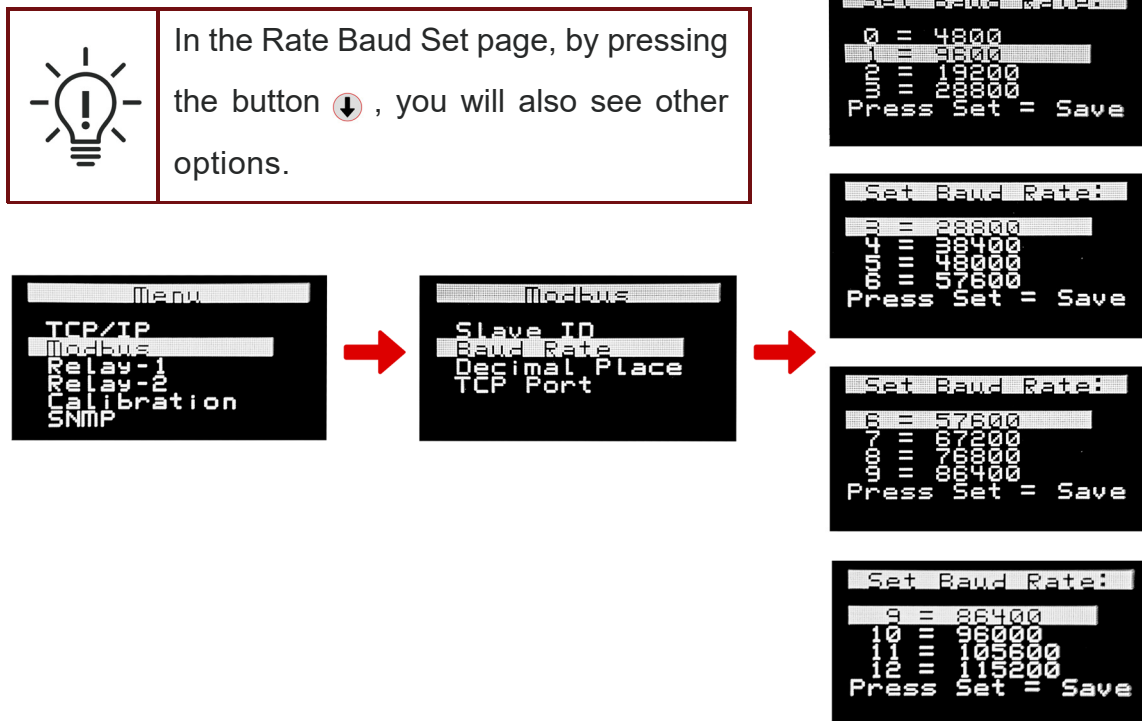
By pressing the button  and , you can change the Slave ID settings within the range of 2 to 255. By pressing  Save, the settings will be stored and applied.

2.2. Methods for Configuring Baud Rate for RS-485 Port

Baud Rate refers to the number of signals transmitted or received per second in a serial communication. This value determines the speed of data transfer between devices and is expressed in bits per second (bps).

It is crucial that this value is set the same on both the transmitting and receiving devices. If the baud rates are different between devices, data will not be transmitted or received correctly.

By pressing the button , you enter the Sensor Menu page. The second option is Modbus; by pressing the button , you move the cursor to the Modbus option, and by pressing the button , you enter the Modbus page. In this section, by pressing the button , the cursor moves to the Baud Rate option, and then by pressing the button , you will enter the Set Baud Rate page.



2.3.Methods for Configuring Decimal Digits in Modbus Network

In a Modbus network, sometimes we need the output value to have two decimal places, or it can be set with one decimal place or without any decimal places, depending on the project requirements and sensitivity. To configure this, follow these steps:



Assume that the actual value is 27.32°C. Based on the above settings, the values read in Modbus are as follows, and the specialist divides the output number by 100, 10, or 1 based on their configuration. Please refer to the table below.

Actual temperature	Number of decimals	Needs division to become a real number	Output number
27.32 Celsius	Without decimals = 27	1	27
	One decimal place = 273	10	27.3
	Two decimal places = 2732	100	27.32

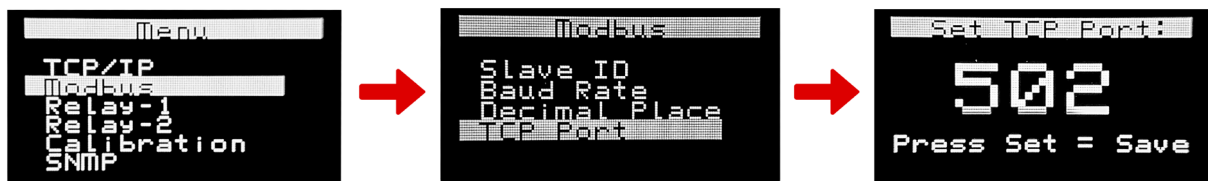
By pressing the button  , you enter the Sensor Menu page. The second option is Modbus. By pressing the button  , the cursor moves to the Modbus option, and by pressing the button  , you enter the Modbus page. Then, by pressing the button  , the cursor moves to the Decimal Place option, and after pressing the button  , you will enter the Set Decimal Place page.



2.4. To configure the Modbus TCP port, follow these steps

The Modbus TCP protocol is used for data transfer between industrial devices and control systems through Ethernet networks. It typically uses port 502 for communication. This protocol allows your 2AK device to establish a communication link with a SCADA server, transmitting sensor data via the Modbus TCP protocol.

By pressing the button , you enter the Sensor Menu page. The second option is Modbus. By pressing the button , the cursor moves to the Modbus option, and by pressing the button , you enter the Modbus page. Then, by pressing the button , the cursor moves to the TCP Port option, and after pressing the button , you will enter the Set TCP Port page.



3. Configuration Parameters for Relay 1

3.1. Configuration Methods for Setting Relay 1 as a Modbus-Controlled Output

In this section of the device, the user can configure the relay settings based on the Modbus protocol. Modbus is a standard communication protocol commonly used in industrial automation systems for data exchange between devices

Relay Settings According to Standard Modbus Function Codes

By pressing the button  , you enter the Sensor Menu page. The third option is Relay-1, and by pressing the button  , you enter the Relay-1 Ctrl page. In this section, the cursor is on the first option, By Modbus, and by pressing the button  , you enter the Are you sure? page.

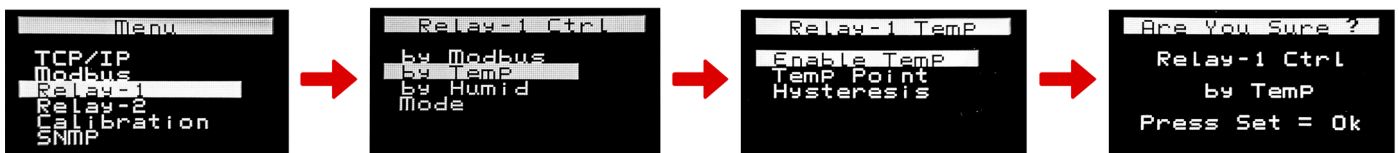


In the Relay 1 section, if one of the modes and Modbus, Temp, or Humid , is activated, the other two modes will be automatically deactivated

3.2. Temperature Configuration

3.2.1. Relay 1 Configuration Methods in Automatic Control Mode

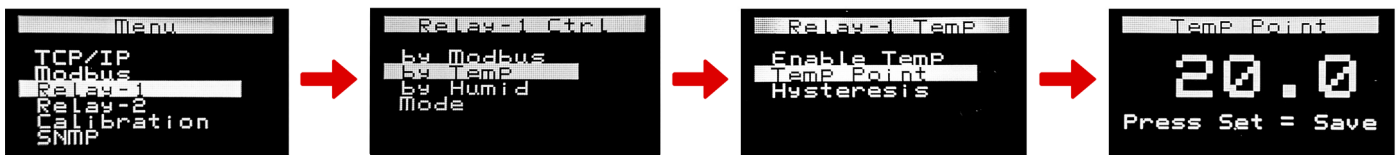
By pressing the button  , you enter the Sensor Menu page. The third option is Relay-1. By pressing the button  the cursor moves to Relay-1, and by pressing the button  , you enter the Relay-1 Ctrl page. By pressing the button  , the cursor moves to By Temp, and by pressing the button  , you enter the Relay-1 Temp page. If it is enabled, you will see Enable Temp on the display. To disable it, press the button  , and then press the button  to select OK.



In Relay 1, if one of the modes Modbus and Temp and Humid , is activated, the other two modes will be automatically deactivated.

3.2.2. Methods for Configuring Desired Temperature for Relay 1 Control

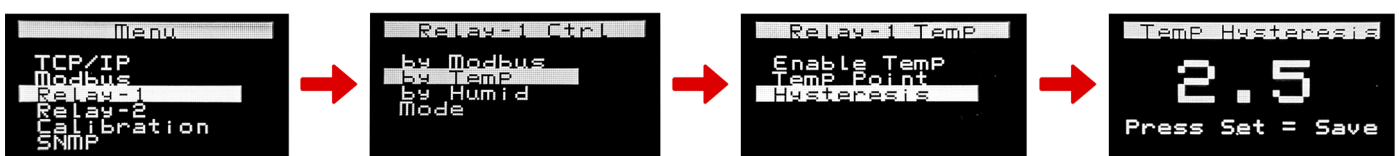
By pressing the button , you enter the Sensor Menu page. The third option is Relay-1. By pressing the button , the cursor moves to Relay-1, and by pressing the button , you enter the Relay-1 Ctrl page. By pressing the button , the cursor moves to By Temp, and by pressing the button , you enter the Relay-1 Temp page. In this section, by pressing the button , the cursor moves to Temp Point, and by pressing the button , you enter the Temp Point page. On this page, the values can be adjusted by pressing the  and  buttons. Pressing the button  saves and applies the changes.



The adjustable range for “Point Temp” is from -20 to +75 degrees Celsius, and each time the button is pressed, the value changes by 0.1 units

3.2.3. Configuration Methods for Setting the Standard Control Temperature Range of Relay 1

By pressing the button , you enter the Sensor Menu page. The third option is Relay-1. By pressing the button , the cursor moves to Relay-1, and by pressing the button , you enter the Relay-1 Ctrl page. By pressing the button , the cursor moves to By Temp, and by pressing the button , you enter the Relay-1 Temp page. In this section, by pressing the button , the cursor moves to Hysteresis, and by pressing the button , you enter the Temp Hysteresis page. On this page, the values can be adjusted as decimal numbers using the  and  buttons. Pressing the button  saves and applies the changes.



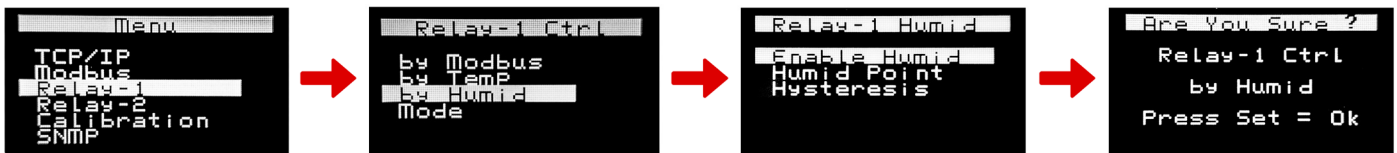


The adjustable range for Temp Hysteresis is from 0.5 to 10, and each time the button  and  is pressed, the value changes by 0.1 units

3.3. Humidity

3.3.1 Configuration Methods for Relay 1 in Automatic Air Humidity Regulation Mode

By pressing the button , you enter the Sensor Menu page. The third option is Relay-1. By pressing the button , the cursor moves to Relay-1, and by pressing the button , you enter the Relay-1 Ctrl page. By pressing the button , the cursor moves to By Humid, and by pressing the button , you enter the Relay-1 Humid page. If it is enabled, you will see Enable Humid on the display. To disable it, press the button , and then press the button  to confirm by selecting OK.



In Relay 1, when one of the modes Modbus and Temp and Humid, is activated, the other two modes will be automatically deactivated

3.3.2. Configuration Methods for Desired Humidity Control of Relay

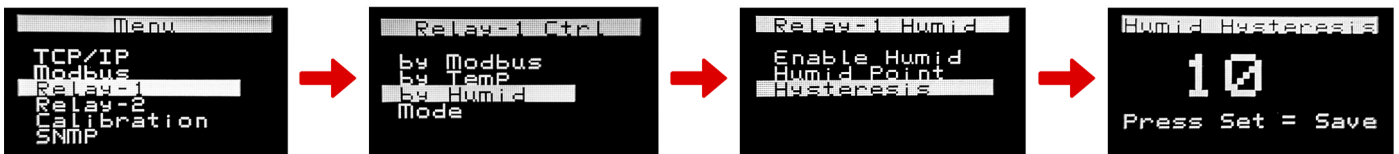
By pressing the button , you enter the Sensor Menu page. The third option is Relay-1. By pressing the button , the cursor moves to Relay-1, and by pressing the button , you enter the Relay-1 Ctrl page. By pressing the button , the cursor moves to By Humid, and by pressing the button , you enter the Relay-1 Humid page. In this section, by pressing the button , the cursor moves to Humid Point, and by pressing the button , you enter the Humid Point page. On this page, the values can be adjusted as decimal numbers using the  and  buttons. Pressing the button  saves and applies the changes.



The adjustable range for Point Humid is from 10 to 90, and each time the buttons  and  is pressed, the value changes by 1 unit.

3-3-3 Configuration Methods for the Standard Humidity Control Range of Relay 1

By pressing the button  you enter the Sensor Menu page. The third option is Relay-1. By pressing the button , the cursor moves to Relay-1, and by pressing the button , you enter the Relay-1 Ctrl page. By pressing the button , the cursor moves to By Humid, and by pressing the button , you enter the Relay-1 Humid page. In this section, by pressing the button , the cursor moves to Hysteresis, and by pressing the button , you enter the Humid Hysteresis page. On this page, the values can be adjusted as decimal numbers using the  and  buttons. Pressing the button  saves and applies the changes.



The adjustable range for Humid Hysteresis is from 1 to 10, and each time the button  and  is pressed, the value increases or decreases by 1 unit

3.4. Mode

3.4.1. Configuration Methods for Setting Automatic Mode as Decrement Mode

By pressing the button , you enter the Sensor Menu page. The third option is Relay-1. By pressing the button , the cursor moves to Relay-1, and by pressing the button , you enter the Relay-1 Ctrl page. By pressing the button , the cursor moves to Mode, and by pressing the button , you enter the Relay-1 Mode page.



The decreasing mode is used when the device is connected to cooling systems. For example, if you want to reduce the temperature or humidity in the environment when the relay is activated, you should use the decreasing mode

The decreasing mode operates in such a way that when the maximum threshold of the range is reached, an “ON” command is issued, and when the minimum threshold is reached, an “OFF” command is issued



3.4.2. Methods for Configuring the Automatic Mode as Increasing Mode

By pressing the button , you enter the Sensor Menu page. The third option is Relay-1. By pressing the button , the cursor moves to Relay-1, and by pressing the button , you enter the Relay-1 Ctrl page. By pressing the button , the cursor moves to Mode, and by pressing the , you enter the Relay-1 Mode page.



When we want to increase parameters such as temperature or humidity in the environment using a system, we use the increasing mode. In the increasing mode, when the parameter reaches the minimum threshold, the relay turns on, and when it reaches the maximum threshold, the relay turns off.

4. Configuration Parameters for Relay 2

The settings for Relay-2 are similar to those of Relay-1, with the only difference being that in the settings menu, you must select option number 4 (related to Relay-2) and then proceed with the necessary configurations.



5. Calibration Settings

5.1. Methods for Setting the Span Coefficient for Calibration

In the calibration process, the span functions as a multiplier that indicates the rate of change of the measured value relative to the actual value. This is represented by the equation:

$$\text{zero} + x \times \text{span} = y$$

Where x is the measured value, and span is the coefficient applied to adjust it.

The adjustable range for Span Temp is from -10 to +10, and with each press of the button, the value changes by 0.01 units.

By pressing the button , you enter the Sensor Menu page. The fifth option is Calibration. By pressing the button , the cursor moves to Calibration, and by pressing the button , you enter the Calibration page. In this section, the cursor is on the first option, Temp Span A, and by pressing the button , you enter the Set Temp Span page.



5.2. Methods for Setting the Zero Coefficient for Temperature Sensor Calibration

In this equation, Zero acts as the intercept and represents the base value that must be added to the product of $x \times \text{span}$ in order to obtain the final measured value.

The adjustable range for Zero Temp is from -100 to +100, and with each press of the button, the value changes by 0.05 units.

By pressing the button , you enter the Sensor Menu page. The fifth option is Calibration. By pressing the button , the cursor moves to Calibration, and by pressing the button , you enter the Calibration page. In this section, by pressing the button , the cursor moves to the second option, Temp Zero B, and by pressing the button , you enter the Set Temp Zero page.



5.3. Methods for Setting the Span Coefficient for Air Humidity Sensor Calibration

For humidity, the Span also acts as a multiplier that indicates the rate of change of the measured values relative to the actual scale.

The adjustable range for Span Humid is from -10 to +10, and with each press of the button, the value changes by 0.01 units.



Suppose the sensor measures relative humidity in the range of 10% to 90%, but the actual range should be converted to 0% to 100%.

In this case, the Span is calculated as follows:

$$\text{Span} = (10 - 90) / (0 - 100) = 1.25$$

By pressing the button , you enter the Sensor Menu page. The fifth option is Calibration. By pressing the button , the cursor moves to Calibration, and by pressing the button , you enter the Calibration page. In this section, by pressing the button , the cursor moves to the third option, Humid Span A, and by pressing the button , you enter the Set Humid Span page.



5.4. Methods for Setting the Zero Coefficient for Air Humidity Sensor Calibration

Zero here also refers to the intercept and acts as the base value for humidity conversion. The adjustable range for Humid Zero is from -10 to +10, and each press of the  and  keys changes the value by 0.05 units.

By pressing the button , you enter the Sensor Menu page. The fifth option is Calibration. By pressing the button , the cursor moves to Calibration, and by pressing the button , you enter the Calibration page. In this section, by pressing the button , the cursor moves to the fourth option, Humid Zero B, and by pressing the button , you enter the Set Humid Zero page.



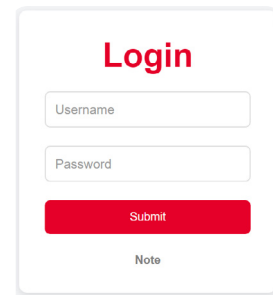
Chapter 5

Guide for Using the Web Service

The default IP address of the device is 192.168.1.20.

Username: admin

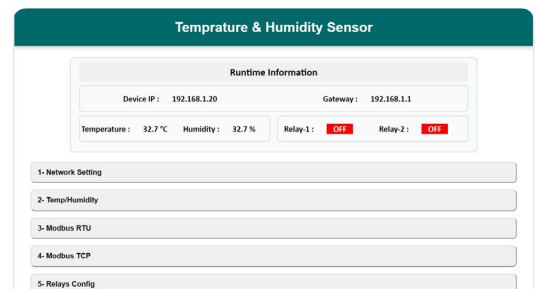
Password: admin



Runtime information

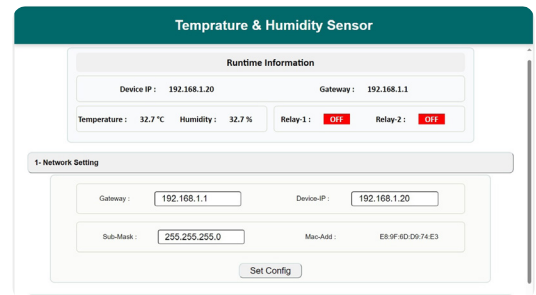
In this section, you can view real-time information on the web service, including the following:

- Gateway
- Device IP
- Status of Relay 1 and Relay 2 (on/off)
- Temperature and Humidity Levels



Network Setting

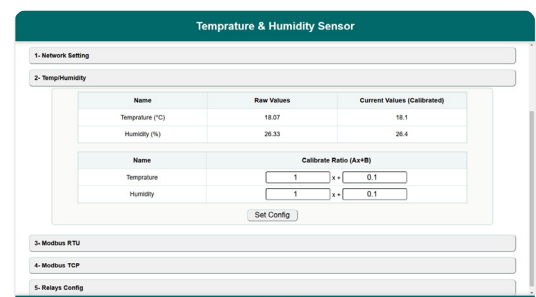
In this section, you can view and modify three parameters: Device IP, Gateway, and Subnet Mask. After making the changes, you need to press the Config Set button and wait for the success message to appear.



Temp & Humidity

For the calibration of the temperature and humidity sensor, you can use this section. The raw values are displayed in the Values Raw section, and you can also see the calibrated values.

To adjust either of these, you can apply a Span or Zero adjustment, and then press the Config button to save the changes.

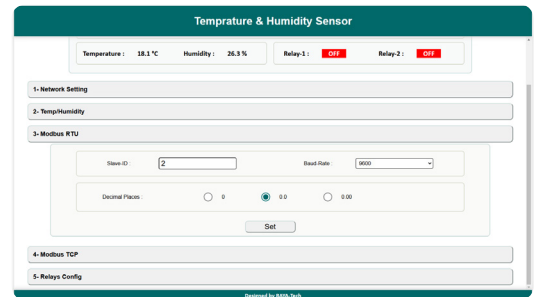


Modbus RTU

In this section, you need to set two parameters:

1. Slave ID
2. Sensor Baud Rate
3. Places Decimal

This means you can define how many decimal places you want the output to have on the RTU Modbus output over the RS-485 network.

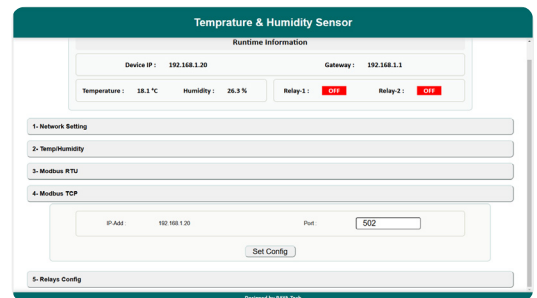


Modbus TCP

In this section, the IP address that the device uses to provide the TCP Modbus service is exactly the same as the Device IP.

The default port for this service is set to 502, which is the standard port for TCP Modbus.

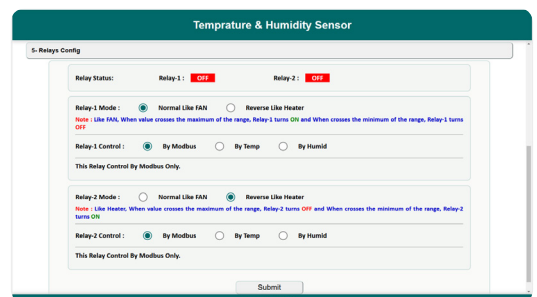
If needed, you can use this section to change the port.



Relays config

Each relay has a control relay that can be configured either via Modbus or based on the temperature sensor or humidity sensor to change its state.

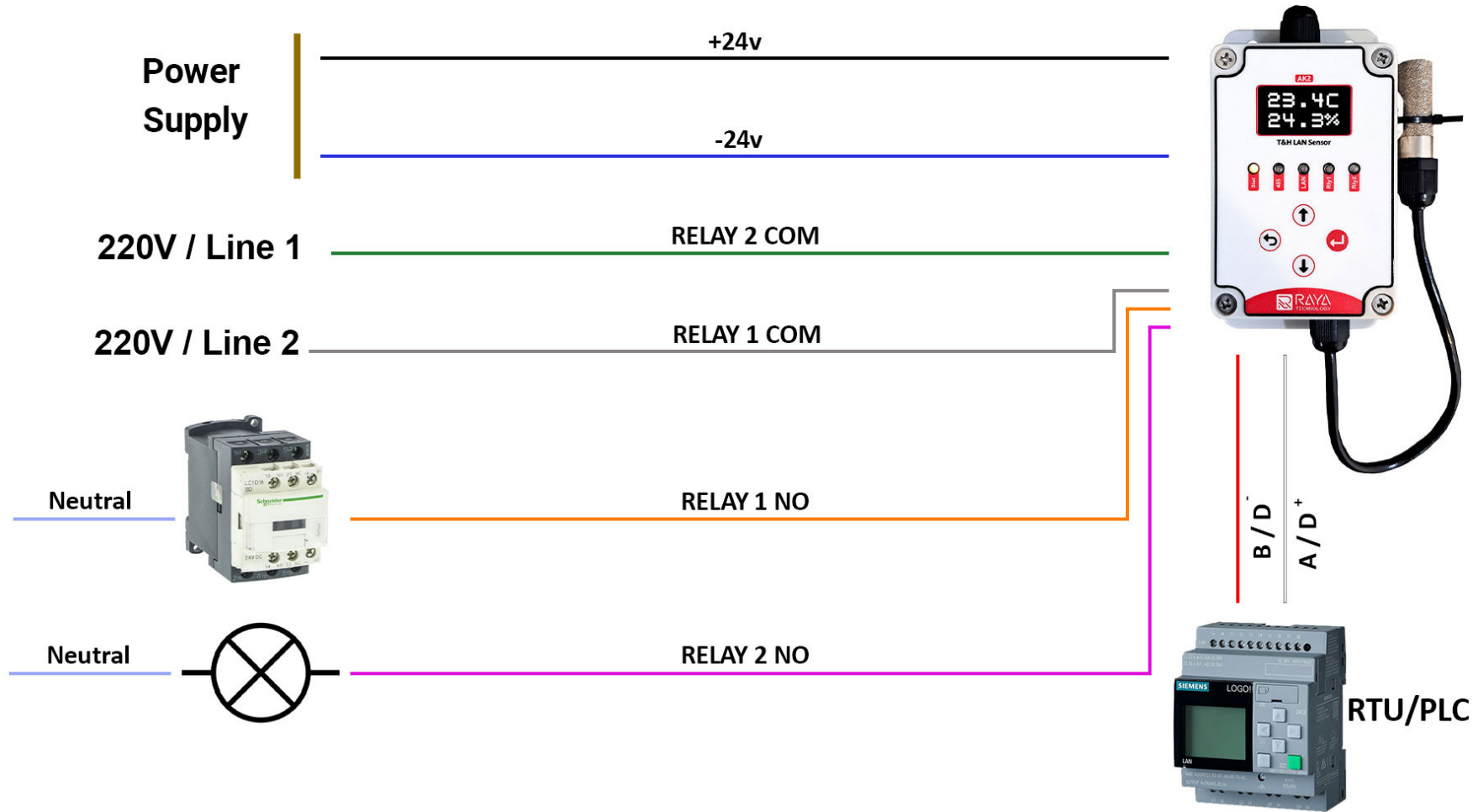
In temperature and humidity modes, you can also set the decreasing or increasing modes specifically for Relay 1.



Chapter 6

Wiring Guide

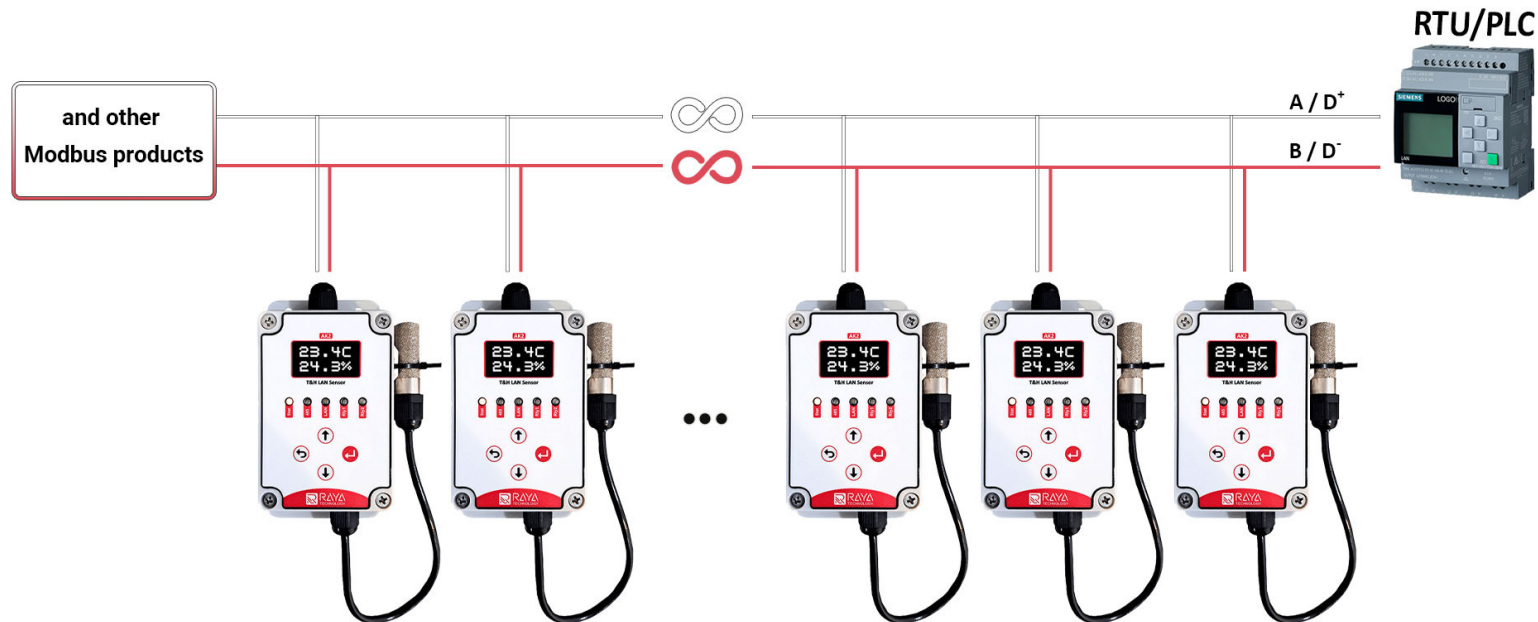
Wiring



RS485 Network Wiring



Nominally, up to 128 Modbus devices can be present on a single network. However, based on practical experience, the recommended number is a maximum of 25 Modbus nodes per Modbus network.





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