control solutions
TERACOM

TCW210-TH Temperature and humidity data logger

Revision 1.23 / October 2024

USER MANUAL

www.teracomsystems.com

1. Introduction

The TCW210-TH is a temperature and humidity data logger with an embedded web server. It allows real-time monitoring of temperature, humidity, and dew point data, as well as chart visualization via a standard web browser—no additional software required. The device supports standard M2M protocols like SNMP, Modbus TCP/IP, and HTTP/API for seamless integration into various applications. It is also compatible with popular IoT analytics platforms like ThingSpeak.

The logger supports up to eight temperature or humidity-temperature sensors, which can be connected through either the 1-Wire interface (commonly used in home automation) or the more durable Modbus RTU over RS-485 interface.

All monitored data can be stored in the device's internal FLASH memory, with records created at pre-set time intervals and/or triggered by alarm conditions. The memory capacity ensures storage for at least 36 days of data with minute-by-minute logging. Log files can be periodically uploaded to a dedicated server using HTTP/HTTPS POST, and stored data can be viewed on four graph pages.

Additionally, the device can periodically upload an XML/JSON file containing all monitored parameters to a server via HTTP/HTTPS POST. For each monitored parameter, the device can send email alerts and SNMP traps to up to five recipients. Alarm notifications can also be sent via HTTP/HTTPS POST using XML/JSON status files.

2. Features

- Data logger with a capacity for up to 70,000 records
- Supports 1-Wire and Modbus RTU sensors
- HTTP API command support for easy integration
- Periodic HTTP/HTTPS POST of XML/JSON status files for client-server applications
- SNMP v.2 support
- SNMP traps for alarm alerts to up to 5 recipients
- Modbus TCP/IP support for industrial automation
- SMTP with TLS encryption for secure email notifications
- Support for TLS 1.0, TLS 1.1, and TLS 1.2
- Email notifications for up to 5 recipients for alarm conditions
- ThingSpeak service integration for IoT analytics
- NTP support for time synchronization
- Back-up/Restore functionality for configuration settings
- Dynamic DNS support for easy remote access
- 10/100 Mb Ethernet connectivity with Auto-MDIX
- Configurable ports for HTTP, SNMP, and Modbus TCP/IP
- Password-protected web-based configuration and control
- Extended temperature range for harsh environments
- Wide power supply voltage range for flexible installation
- Support for remote firmware updates for easy device maintenance.

3. Applications

The TCW210-TH is ideal for environmental monitoring, building automation, and industrial automation. It excels in monitoring temperature and humidity, whether used as a standalone device through a web browser or as part of larger SCADA (Supervisory Control and Data Acquisition) systems in industrial control.

Some common application examples include:

- Pharmaceutical and food processing and storage facilities
- Clean rooms and laboratories
- HVAC systems
- Greenhouses and farms
- Electronics assembly environments

Its versatility makes it a reliable choice for industries requiring precise environmental monitoring and control

4. Specifications

- Physical characteristics

  Dimensions: 130 x 70 x 30 mm
  Weight: 140 g

- Environmental limits

  Operating temperature range: -20 to 55°C
  Storage temperature range: -25 to 60°C
  Operating relative humidity range: 5 to 85% (non-condensing)

- Warranty

  Warranty period: 3 years

- Power supply

  Operating voltage range (including -15/+20% according to IEC 62368-1): 10 to 28 VDC
  Current consumption: 170 mA @ 12 VDC

- 1-Wire and RS485 interface

  Output voltage (+VW): 5.0 ± 0.3 VDC
  Maximum output current (+VW): 0.2 A

- Internal FLASH memory

  Endurance: 100 000 cycles (Every settings change is a memory cycle.)

- Lithium battery

  Type: CR1220

  Caution: Replacing the battery with an incorrect type may result in an explosion.

5. LED indicators

The TCW210-TH controller includes the following LED indicators to display its status:

- **PWR** (red) – Steady ON in normal operation; blinks in sync with the STS LED in the event of a hardware error;
- **STS** (yellow) – Flashes to indicate that the controller's main program is running;
- **NET** (orange) – Indicates network status; remains ON when a network link is established, and blinks to show network activity.

6. Installation and setup

Qualified personnel must install the device. It shouldn't be installed outside directly.

The installation process involves mounting the device, connecting it to an IP network, attaching inputs and outputs, supplying power, and configuring it through a web browser.

6.1. Mounting

The TCW210-TH should be installed in a clean, dry location on a non-flammable surface. For installations where high ambient temperatures are expected, proper ventilation is recommended to ensure reliable operation.

To maintain sufficient ventilation and electrical isolation, allow 50 mm of space on all sides of the device, as illustrated in Appendix A. Ensure appropriate spacing between adjacent equipment to avoid overheating and ensure safe operation.

6.2. Connection

Warning! Power off before wiring.

To ensure proper installation, follow these steps:

- Turn off the power before beginning any wiring;
- Connect all sensors securely to the appropriate terminals;
- Turn on the power after all connections are made.

Ensure that all cables are securely attached. Improper wiring or configuration can lead to permanent damage to the TCW210-TH, the connected equipment, or both. Double-check all connections before powering on to avoid potential hazards.

Connector 1	Ethernet - RJ45	**Connector 4**	Pin1 – not connected (most left)
Connector 2	Power - 2.1x5.5mm connector, central positive		Pin2 – not connected
Connector 3	Pin1 – GND (most left)		Pin3 – not connected
	Pin2 – GND		Pin4 – 485-
	Pin3 – 1-Wire Data		Pin5 – 485+
	Pin4 – 1-Wire GND		Pin6 – not connected
	Pin5 – +VDD		Pin7 – +VDD
	Pin6 – +VDD (most right)		Pin8 – GND

6.2.1. Power supply

TCW210-TH must be powered by the adapter SYS1308(N)-2412-W2E or equivalent, suitable for overvoltage category II and certified for safety compliance. The power supply device should be able to withstand short circuits and secondary circuit overloads. Ensure the equipment is easily accessible for disconnecting from the power supply during use.

6.2.2. 1-Wire interface

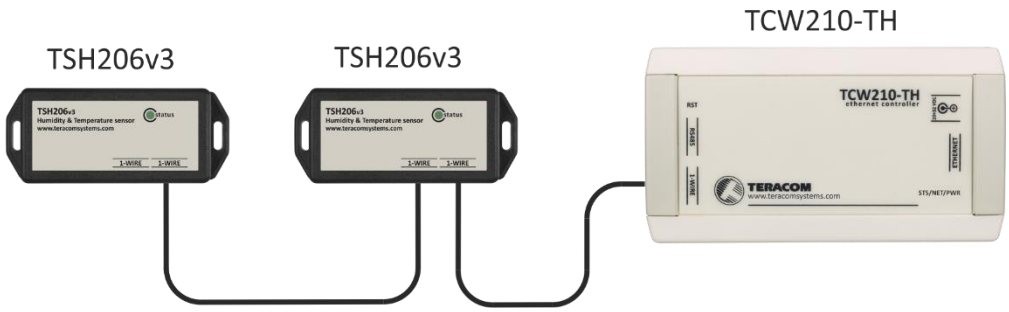
The TCW210-TH supports connecting up to 8 sensors across both interfaces (1-Wire and RS-485 combined).

The device is compatible with 1-Wire temperature and humidity-temperature sensors, allowing for easy integration and monitoring of environmental conditions.

1-Wire, a registered trademark of Analog devices Inc., is designed for connecting multiple sensors over short wiring distances. It is not suitable for long distances or environments with significant electromagnetic interference (EMC). For best practices, refer to Guidelines for Reliable Long-Line 1-Wire Networks.

The sensors typically have three wires: positive voltage (+VDD), ground (GND), and bidirectional data (Data). The specific wire colors for each sensor are provided in the sensor's user manual.

For reliable operation with multiple sensors, it is strongly recommended to use a "daisy-chained" (linear) topology:



Connections to the 1-Wire interface can be made using a standard RJ-12 connector, ensuring simple and secure integration of sensors.

Several factors influence the maximum allowable length of the wires, including the type of cable used, the number of sensors, ambient electromagnetic noise, and the network topology of the sensor connections.

It is strongly recommended to use only UTP (Unshielded Twisted Pair) or FTP (Foiled Twisted Pair) cables, with a total cable length limited to 30 meters. While longer distances may still function, error-free operation cannot be guaranteed beyond the recommended length.

For optimal performance, Teracom guarantees proper operation only when using Teracom 1-Wire sensors.

6.2.3. RS-485 interface

The TCW210-TH supports up to 8 sensors across both 1-Wire and RS-485 interfaces combined.

This device is compatible with Modbus RTU (over RS-485) temperature and humidity-temperature sensors. RS-485 is an industry-standard for serial communication, suitable for long distances and environments with significant electrical noise, such as industrial settings.

Modbus RTU protocol specifies that address of the device should be between 1 and 247. The user should take care of appropriate address settings.

For multi-sensors systems "daisy-chained" (linear topology) should be used:

Connections are made using UTP/FTP cables with RJ-45 connectors, following the Ethernet wiring standard ANSI/TIA/EIA T568B. The wiring pinout is as follows:

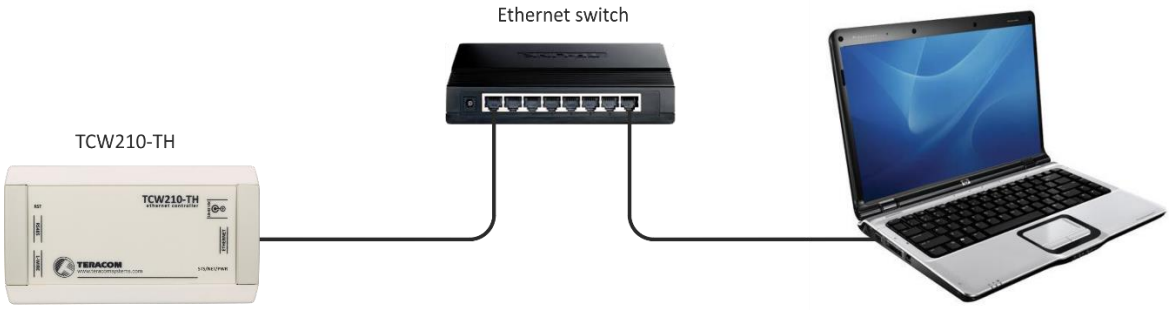
Pin	Color	Pin	Color
1	Orange/White	5	Blue/White Tracer
2	Orange	6	Green
3	Green/White	7	Brown/White Tracer
4	Blue	8	Brown

Proper termination of the RS-485 bus is critical. The last sensor in the chain must have a 120-ohm terminator installed on its unused RJ-45 socket. This terminator is included with the module. Although RS-485 can work over longer distances, we recommend keeping the total cable length within 30 meters for optimal performance.

Attention! Ensure the correct termination of the bus to prevent communication errors.

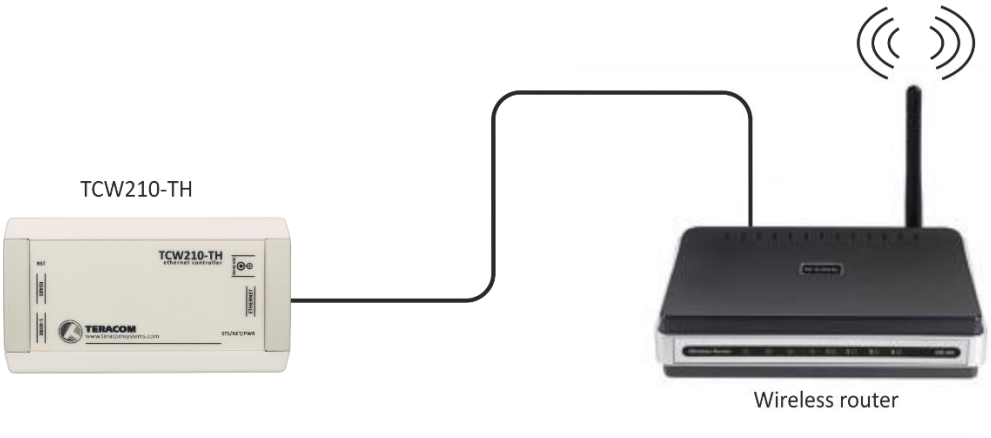
6.2.4. Network connection

The Ethernet port of TCW210-TH should be connected to 10/100 Base-T Ethernet hub, switch or router.



For configuration purposes, the TCW210-TH can be directly connected to the Ethernet port of a computer. The device supports Auto-MDIX, so either a standard "straight-through" cable or a "crossover" cable can be used.

TCW210-TH can also be integrated into a wireless network by connecting it through a wireless router.

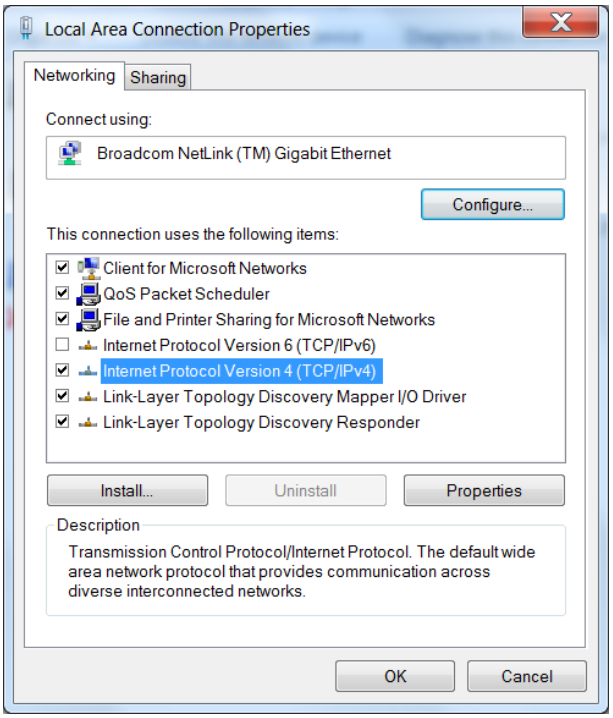


6.3. Communication setup

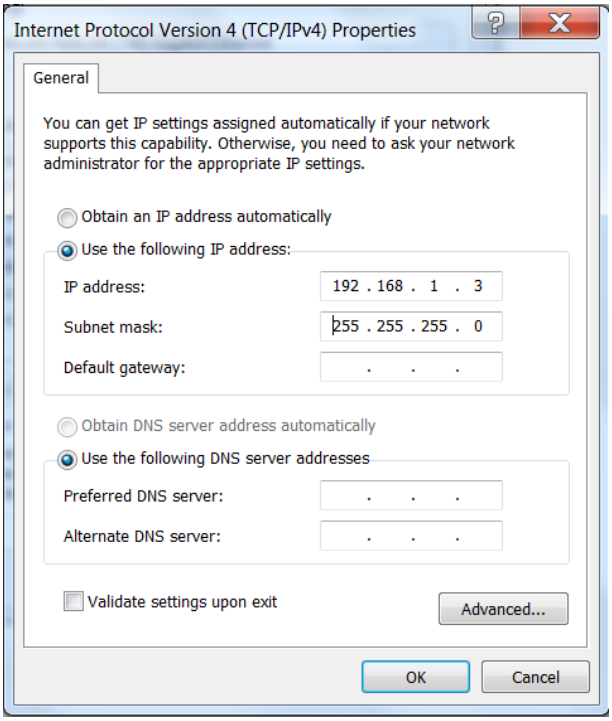
The TCW210-TH is shipped with the following default network settings:

- IP Address: 192.168.1.2
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.1.1

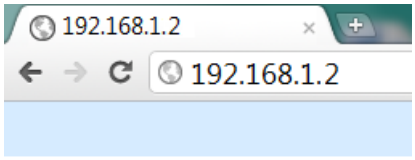
To establish communication with the TCW210-TH, you can assign a temporary IP address to your computer. For computers running Windows OS, this can be done through the “Local Area Connection Properties”:



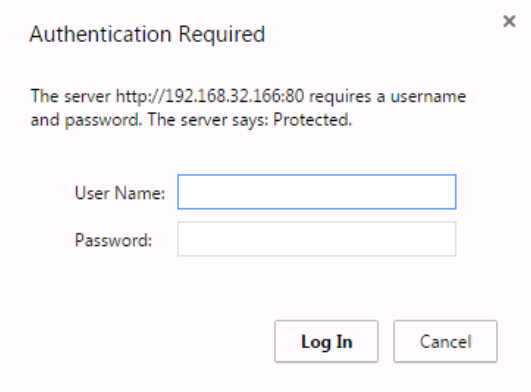
The temporary IP address should be on the same network; for example, you can use 192.168.1.3:



To access the web interface, enter http://192.168.1.2 into your browser's address bar:



If the network settings are configured correctly, a login pop-up window will appear:



The default authorization credentials are as follows: username: admin and password: admin.

It is highly recommended to change both the username and password to prevent unauthorized access.

All TCWxxx controllers connected to the LAN can be easily located using the free tool “TCW Discoverer.” This tool is available for both Windows and Mac operating systems and can be downloaded from www.teracomsystems.com.

7. Web interface

The web interface enables configuration, monitoring, and control of the TCW210-TH. All pages are UTF-8 encoded. Please note that the device supports HTTP only; HTTPS is not available.

7.1. Monitoring

The Monitoring menu provides access to all parameters in two formats: data view (Monitoring -> Data) and graphical view (Monitoring -> Graph).

7.1.1. Data

1-Wire sensors

Pos	Description	Temperature	Humidity	Dew point	ID
1	S1:TST1xx	22.438°C	------	------	[2867895F07000058]
2	S2	------	------	------	[0000000000000000]
3	S3	------	------	------	[0000000000000000]
4	S4	------	------	------	[0000000000000000]

Modbus sensors

Pos	Description	Temperature	Humidity	Dew point	Address
5	S5	22.439°C	31.444%RH	4.694°C	1
6	S6	------	------	------	0
7	S7	------	------	------	0
8	S8	------	------	------	0

The current state of the TCW210-TH can be viewed on the monitoring page. This page is divided into two sections: one for 1-Wire sensors and one for Modbus RTU sensors.

The TCW210-TH supports a maximum of eight sensors, which can be connected to both interfaces in a ratio that can be adjusted in the "Sensors ratio setup" section found on the Setup->Sensors page. By default, four Modbus RTU sensors are configured.

In the 1-Wire sensors section, all detected sensors are displayed. These sensors must first be set up in the "1-Wire sensors setup" section on the Setup->Sensors page. For Teracom 1-Wire temperature sensors, the readings are shown under the "Temperature" column. For dual sensors, such as the TSH2xx series, both the "Temperature" and "Humidity" columns are utilized, and the Dew point is automatically calculated.

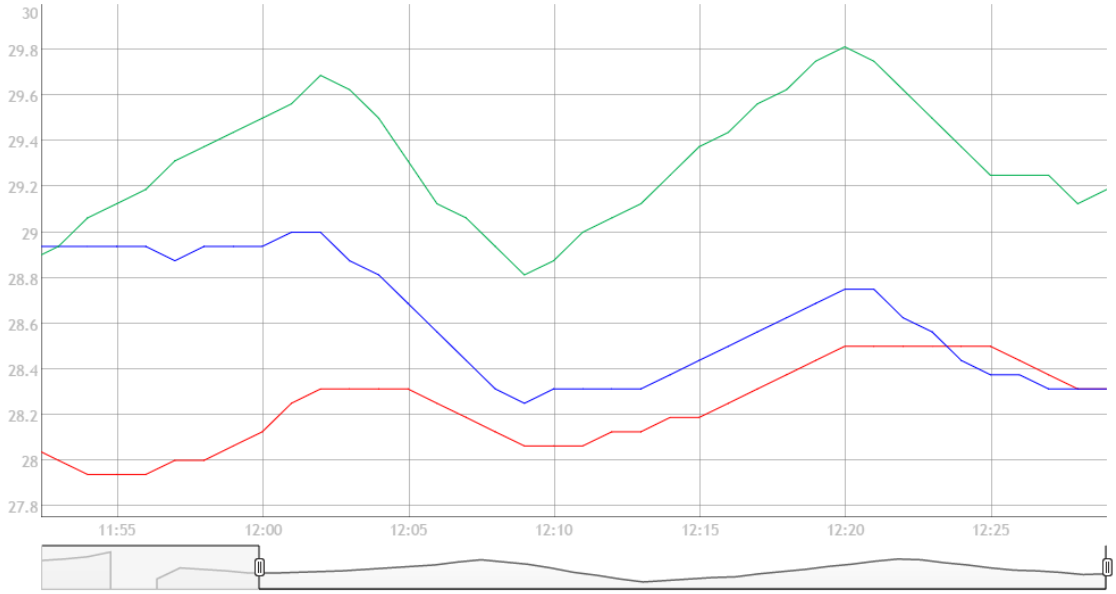
The Modbus RTU sensors section displays all connected Modbus sensors, which should be configured on the Setup->Sensors page.

For every sensor, the monitoring page provides a description, value, and ID information. Descriptions can be up to 15 characters long, and default descriptions can be modified on the Setup->Conditions page. Dual sensors will show both parameters (temperature and humidity), and the Dew point parameter is calculated automatically for them.

Additionally, the page can be set to automatically refresh at intervals between 0 and 253 seconds, where a setting of 0 disables automatic refreshing. This refresh rate can be configured in the Setup->System->Monitoring page automatic refresh section, with a default value of 1 second

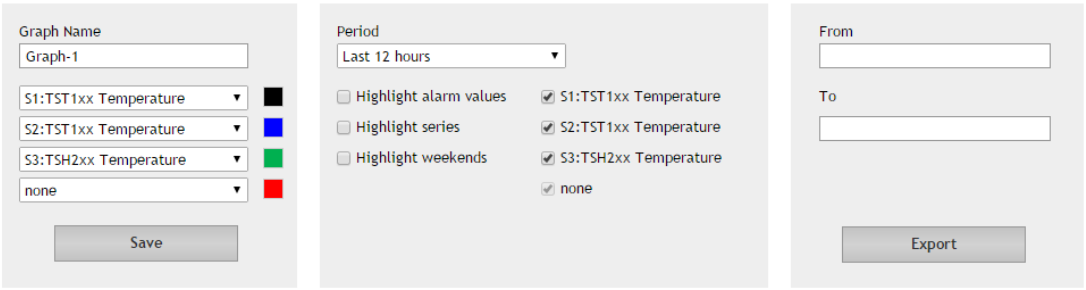
7.1.2. Graphs

Each graph page can display up to four parameters, with the option for two different dimensions.



Users can assign different colors to each parameter for better visualization. Additionally, several checkboxes are available for modifying the display settings.

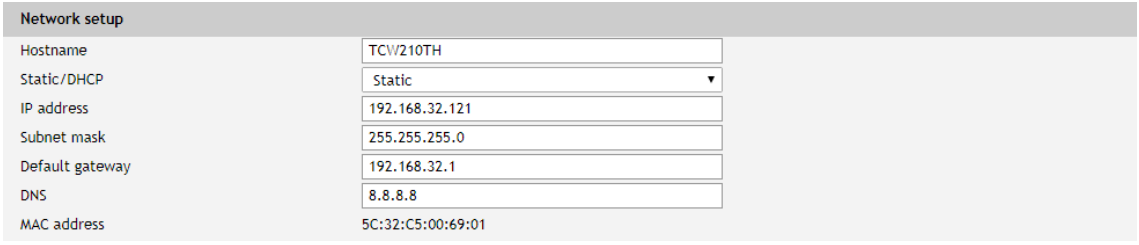
The page also allows for the export of monitored parameters.



7.2. Setup

7.2.1. Network

Network parameters are configured in this section.



The controller supports both static and dynamic IP addresses. It is advisable to change the default IP address of the controller immediately after the first power-on to prevent potential IP address conflicts when multiple devices are connected to the same network.

Each time a new device is connected to the network, it may be necessary to clear the ARP cache. This can be done by entering arp -d in the command prompt on the computer.

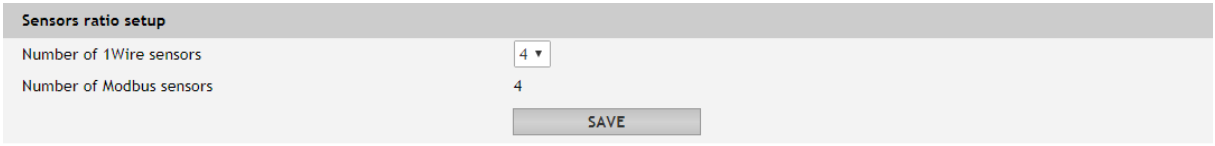
The “Hostname” can be up to 15 characters long and will appear in the search results of the TCW Discoverer tool.

Public DNS servers (such as 8.8.8.8 or 8.8.4.4) can be used instead of the default gateway.

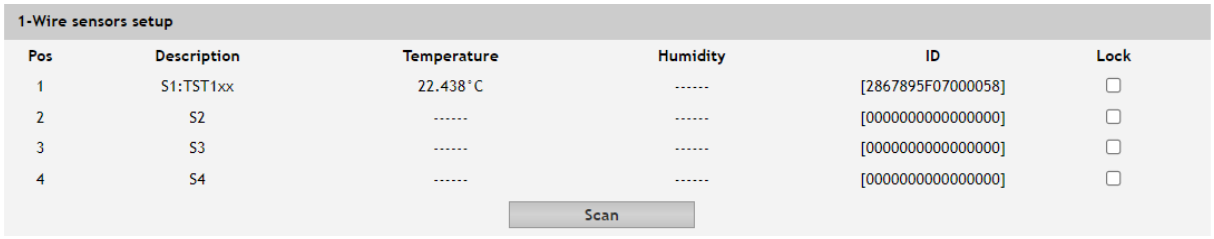
7.2.2. Sensors

7.2.2.1. Sensors ratio setup

This section allows you to configure the ratio between 1-Wire and Modbus RTU sensors. The default ratio is set to 4:4



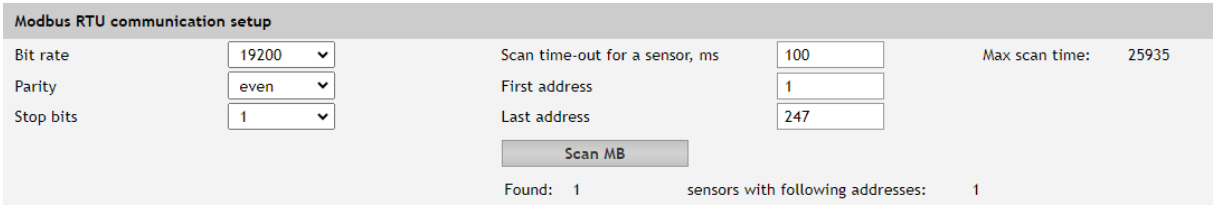
7.2.2.2. 1-Wire sensors setup



1-Wire sensors are detected either upon power-on or by clicking the “Scan for New Sensors” button. All detected sensors are displayed in ascending order based on their unique ID numbers.

To lock a 1-Wire sensor in a specific position, each sensor must be added individually. After adding each sensor, perform a new scan and lock the newly detected sensor in its designated position. If all sensors are locked, removing a sensor from the middle will not affect the positions of the remaining sensors after a reset. This feature is particularly useful when the TCW210-TH is integrated into a monitoring and control system managed via SNMP or HTTP API commands.

7.2.2.3. Modbus RTU communication setup

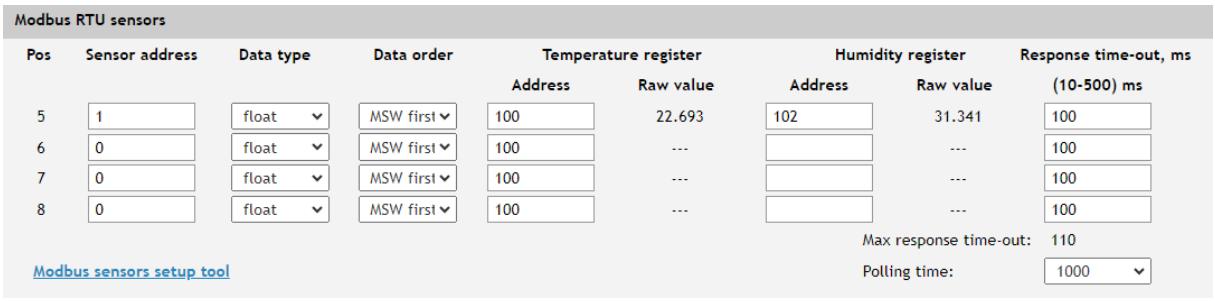


The TCW210-TH supports Modbus RTU communication over the RS-485 interface. All sensors connected to this interface must operate with the same communication settings. By default, the device is configured with the standard Modbus RTU settings: 19200 baud rate, Even parity, and 1 stop bit.

In the right part of this section, there is a tool for scanning the Modbus RTU interface. To optimize scan time, the appropriate address segment should be configured first. After making these adjustments, click the “Save” button at the bottom of the page to apply the changes.

7.2.2.4. Modbus RTU sensors

The TCW210-TH is compatible with both Teracom and third-party Modbus RTU sensors.



Before adding these sensors, the user must ensure that each sensor has a unique address, as using two sensors with the same address is not permitted. It is advisable to scan for new sensors before making any changes.

For each sensor, the appropriate register address, data type, and data order must be configured. Be sure to save all changes. If the settings are correct, the corresponding data will be displayed in the “Raw Value” columns.

The TCW210-TH supports Modbus RTU sensors with a response time-out ranging from 10 to 500ms. By default, the response time-out for a new sensor is set to 100ms, but it is recommended to use the minimum response time specified by the sensor's manufacturer.

The total selected response time-out for all sensors contributes to the maximum response time-out for the system. The polling time refers to the interval between two consecutive readings of the same sensor, affecting the system's reaction time. By default, this polling time is set to 1 second.

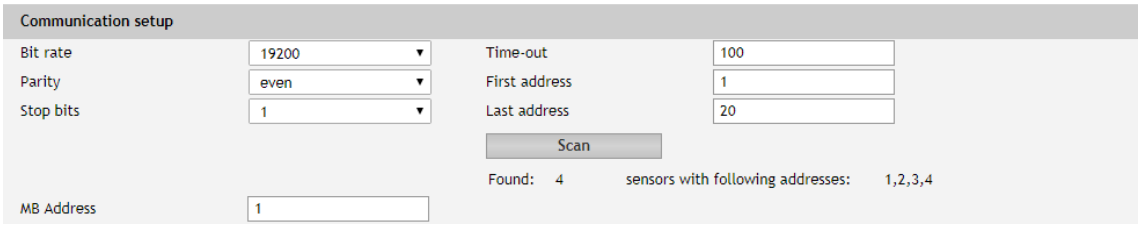
Important: The maximum response time-out must not be less than the polling time.

7.2.2.5. Sensor setup tool

A link to the Sensor Setup Tool is provided at the bottom of the Modbus RTU Sensors section. This tool can be utilized to modify communication settings for the sensors or simply to read information from a specific register.

7.2.2.5.1. Communication setup

This section is similar to the general Modbus RTU Communication Setup. The only additional field is the Sensor Address. Changes made in this section are not saved and do not alter the general settings of the TCW210-TH.

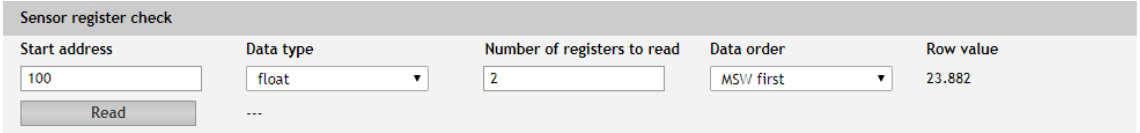


7.2.2.5.2. Sensor communication register setup

This section of the tool is used to check and modify the status of the communication registers for the sensor.

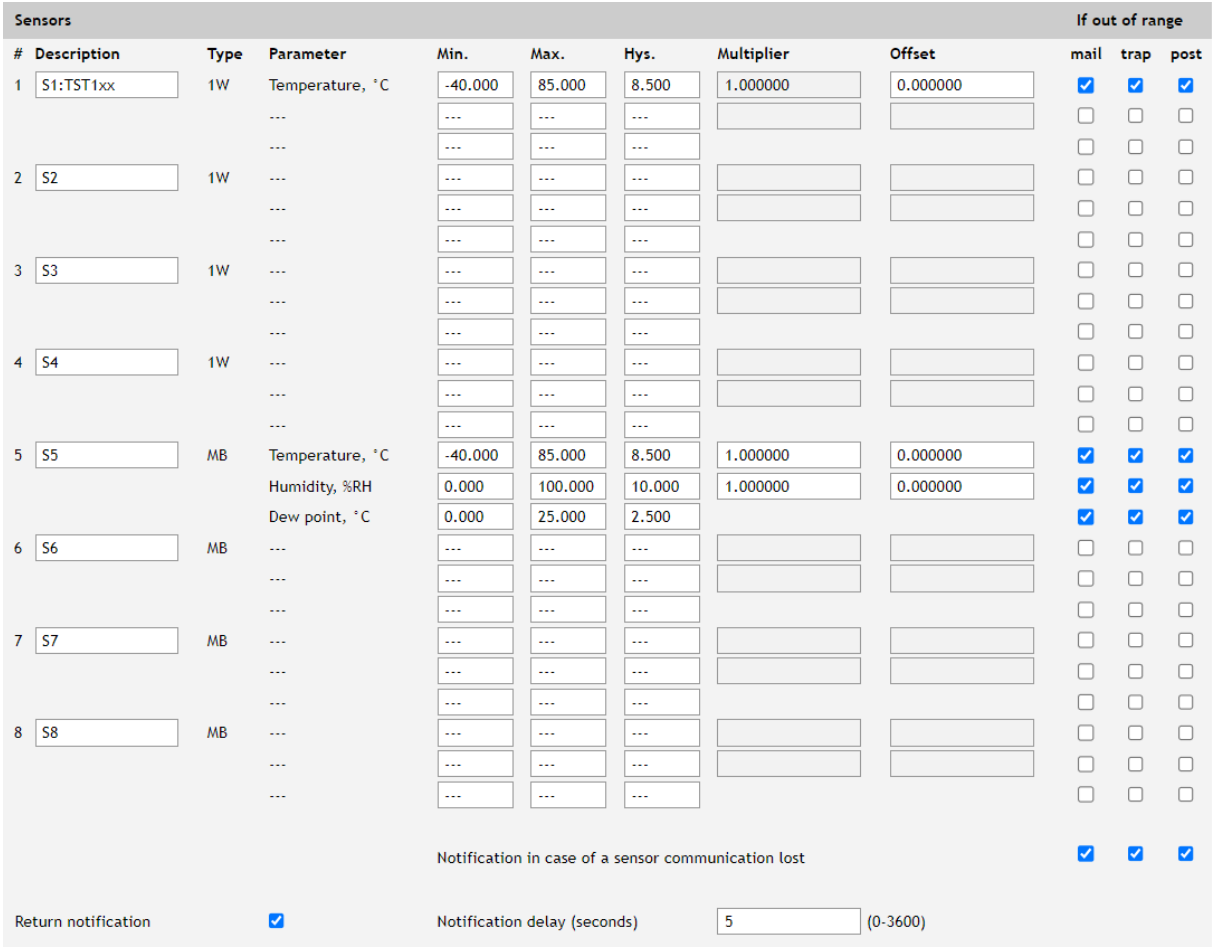
7.2.2.5.3. Sensor register check

This section of the tool is utilized for a comprehensive check of the sensor registers.



7.2.3. Conditions

This section is dedicated to configuring the trigger and alert conditions for 1-Wire and Modbus RTU sensors.



Sensors								If out of range		
#	Description	Type	Parameter	Min.	Max.	Hys.	Multiplier	Offset	mail	trap	post
1	S1:TST1xx	1W	Temperature, °C	-40.000	85.000	8.500	1.000000	0.000000	☑	☑	☑
			---	---	---	---			☐	☐	☐
			---	---	---	---			☐	☐	☐
2	S2	1W	---	---	---	---			☐	☐	☐
			---	---	---	---			☐	☐	☐
			---	---	---	---			☐	☐	☐
3	S3	1W	---	---	---	---			☐	☐	☐
			---	---	---	---			☐	☐	☐
			---	---	---	---			☐	☐	☐
4	S4	1W	---	---	---	---			☐	☐	☐
			---	---	---	---			☐	☐	☐
			---	---	---	---			☐	☐	☐
5	S5	MB	Temperature, °C	-40.000	85.000	8.500	1.000000	0.000000	☑	☑	☑
			Humidity, %RH	0.000	100.000	10.000	1.000000	0.000000	☑	☑	☑
			Dew point, °C	0.000	25.000	2.500			☑	☑	☑
6	S6	MB	---	---	---	---			☐	☐	☐
			---	---	---	---			☐	☐	☐
			---	---	---	---			☐	☐	☐
7	S7	MB	---	---	---	---			☐	☐	☐
			---	---	---	---			☐	☐	☐
			---	---	---	---			☐	☐	☐
8	S8	MB	---	---	---	---			☐	☐	☐
			---	---	---	---			☐	☐	☐
			---	---	---	---			☐	☐	☐
				Notification in case of a sensor communication lost					☑	☑	☑
Return notification		☑		Notification delay (seconds)			5	(0-3600)			

For each sensor, a description of up to 15 characters can be assigned.

The "Offset" field is available for all sensors, allowing for simple adjustments to the displayed value. For all Modbus RTU sensors, a multiplier is enabled, although for Teracom sensors, this should be set to 1.

Each parameter includes fields for trigger conditions, specifically “Min,” “Max,” and “Hys.” The “Min” and “Max” values define the boundaries of the operational range for the monitored parameter. A “Max” trigger condition is triggered when the value exceeds the specified upper limit, while a “Min” trigger condition is activated when the value falls below the defined lower limit. In both cases, the monitored parameter is considered out of range.

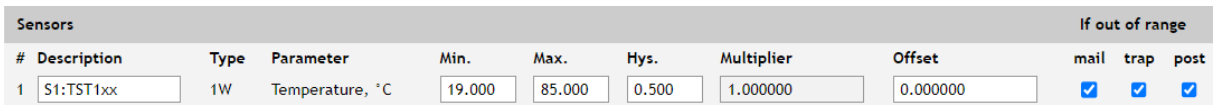
Returning to the acceptable range for the monitored parameter occurs when the value exceeds (Min + Hys) or drops below (Max - Hys). Hysteresis (“Hys”) is incorporated to prevent excessive triggering when the value fluctuates around the trigger points.

Example:

In this scenario, a TCW210-TH, a TST100 sensor, and an appropriate heater are used to manage room temperature. The desired minimum temperature is set at 19°C, while the initial temperature is 17°C. The TST100 sensor is assigned as the first 1-Wire sensor.

Local activation for Relay1 is configured based on Sensor1 with the following parameters:

Min = 19, Max = 85, and Hys = 0.5.

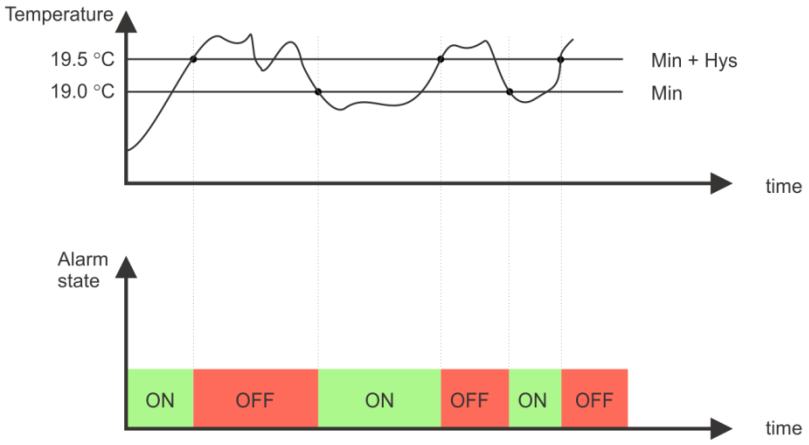


Sensors								If out of range		
#	Description	Type	Parameter	Min.	Max.	Hys.	Multiplier	Offset	mail	trap	post
1	S1:TST1xx	1W	Temperature, °C	19.000	85.000	0.500	1.000000	0.000000	☑	☑	☑

When the controller is powered on, Relay1 is immediately activated because the monitored temperature is below the acceptable range. This action turns on the heater, causing the temperature to rise.

As the temperature increases and reaches 19.5°C (19.0 + 0.5), it falls within the defined range (trigger condition), and Relay1 is deactivated, turning the heater off.

However, as the temperature begins to drop and reaches 19°C, it goes out of range (trigger and alert conditions), which reactivates the relay, turning the heater back on. Additionally, an email notification is sent to alert about the temperature change.



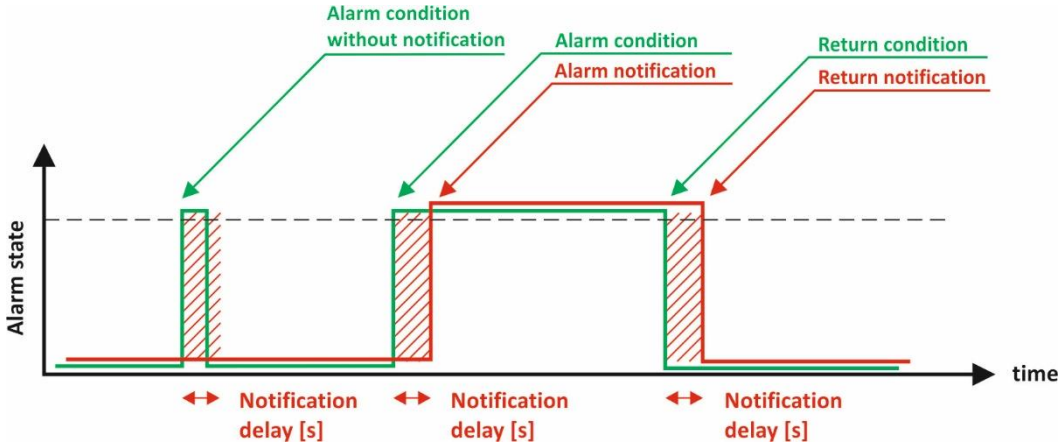
The “Max” value should be set sufficiently high above the desired temperature to prevent unnecessary trigger and alert conditions.

Each sensor or analog input has three independent alert methods available when an alarm condition occurs: email notifications, SNMP traps, and HTTP/HTTPS POSTs (XML file). Each method can be activated via a checkbox.

The “Max” value should be set sufficiently high above the desired temperature to prevent unnecessary trigger and alert conditions. Each sensor or analog input has three independent alert methods available when an alarm condition occurs: email notifications, SNMP traps, and HTTP/HTTPS POSTs (XML file). Each method can be activated via a checkbox.

There is a global checkbox labeled “Return notification” for all sensors and analog inputs. When selected, notifications will also be sent when a parameter returns to within the defined range.

Additionally, a “Notification delay” parameter is available globally for all sensors and analog inputs. This feature acts as a filter for short alarm conditions, helping to reduce false alerts.

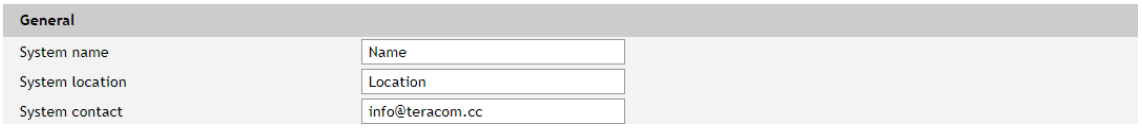


7.2.4. System

This page allows you to configure various general settings for the system.

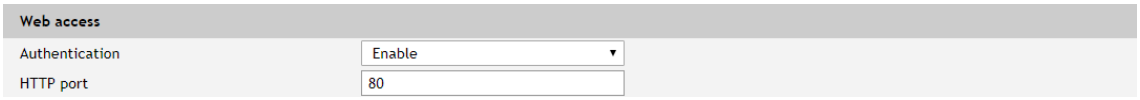
7.2.4.1. General

This section allows you to configure general parameters for device identification.



7.2.4.2. WEB access

This section allows you to deactivate WEB access authentication, which is enabled by default with the credentials of admin/admin. You can also change the HTTP port for WEB access, which can be useful for certain routers that do not support separate outside/inside ports for port forwarding. The default HTTP port is set to 80.



7.2.4.3. HTTP API

This section allows you to activate or deactivate HTTP API access authentication, which is enabled by default.

The authentication details are the same as for WEB access. The controller supports two types of authentications; refer to the explanation for HTTP API below for more information.

7.2.4.4. Monitoring page automatic refresh

The refresh interval for the monitoring page can be configured to range from 0 to 253 seconds. A setting of zero indicates that automatic refresh is disabled.

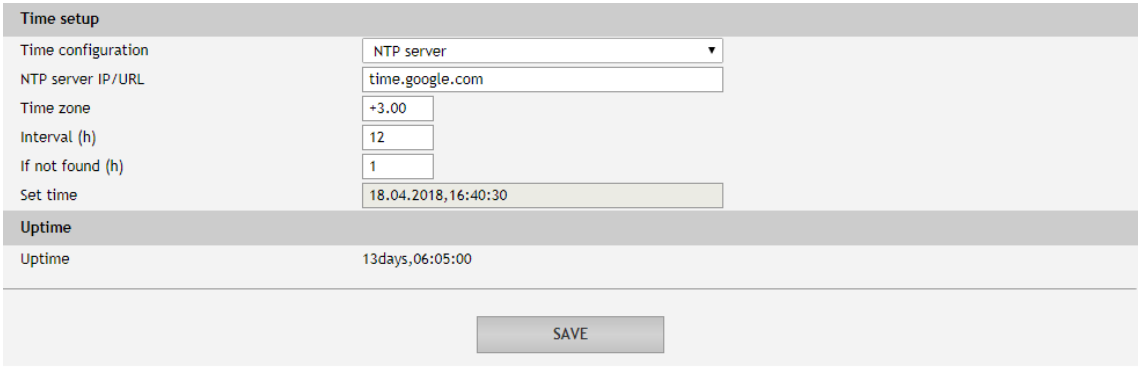
7.2.4.5. Display

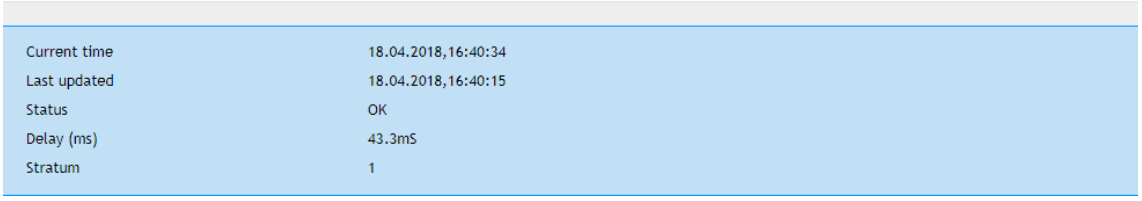
In this section, you can select the working units for the temperature (Celsius or Fahrenheit).

Each section of the Monitoring Page has a checkbox; when checked, the corresponding section will be displayed.

7.2.5. Time

The internal real-time clock (RTC) of the controller can be configured either manually or automatically.





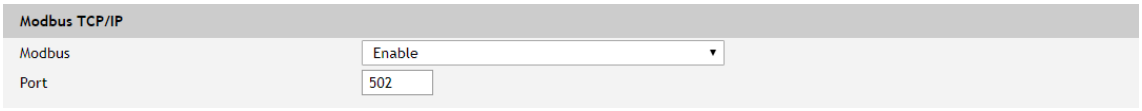
For automatic clock synchronization, the controller supports NTP (Network Time Protocol), and all necessary parameters for this synchronization are available in this section.

By default, NTP synchronization is disabled, with the server set to time.google.com, a time zone of +00:00, and an interval of 12 hours.

7.3. Services

7.3.1. Modbus TCP/IP

TCW210-TH supports Modbus TCP/IP via the Ethernet interface.



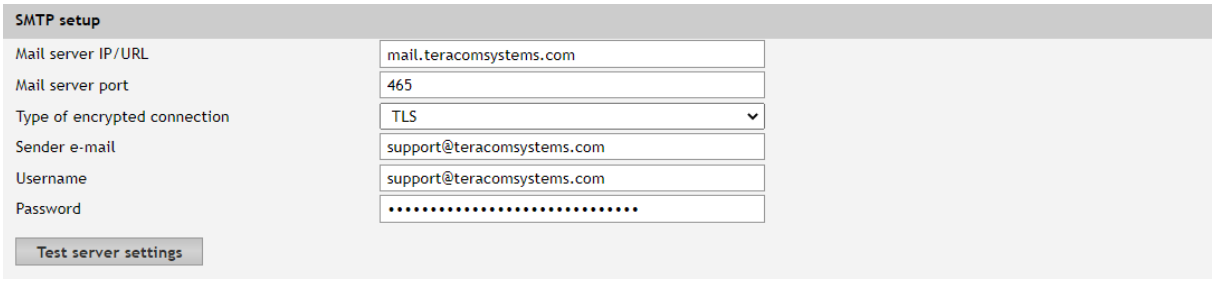
By default, Modbus functionality is disabled. The standard port for this protocol is 502.

A table containing the register addresses can be found in section, titled " Modbus TCP/IP".

7.3.2. SMTP

This page allows you to input the valid SMTP settings for email alerts and specify the recipients' addresses.

7.3.2.1. SMTP setup



The mail server address can be configured using either a hostname (e.g., mail.teracomsystems.com) or an IP address. By default, the SMTP port is set to 25 for non-encrypted connections. If the default port does not work, please consult your Internet Service Provider (ISP).

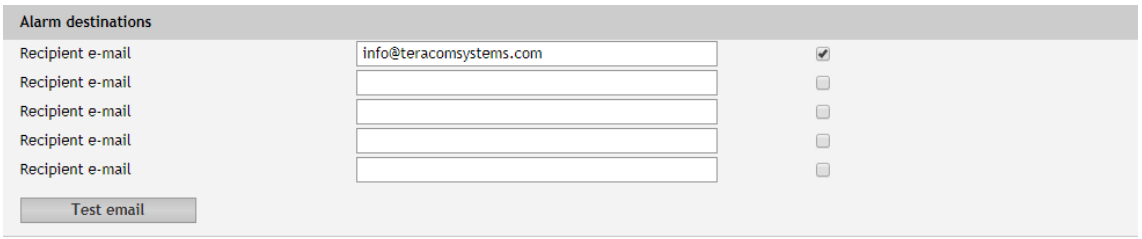
The sender's email, username, and password are standard authentication details, each allowing for up to 128 characters in length.

A button is available to test the server settings, providing feedback on the results. In this test, the sender and recipient email addresses are the same.

For secure communication with mail servers, the Transport Layer Security (TLS) protocol is employed. The TCW210-TH supports TLS versions 1.0, 1.1, and 1.2, using RSA for key exchange, agreement, and authentication. This ensures compatibility with nearly all public servers.

Please note that STARTTLS is not supported.

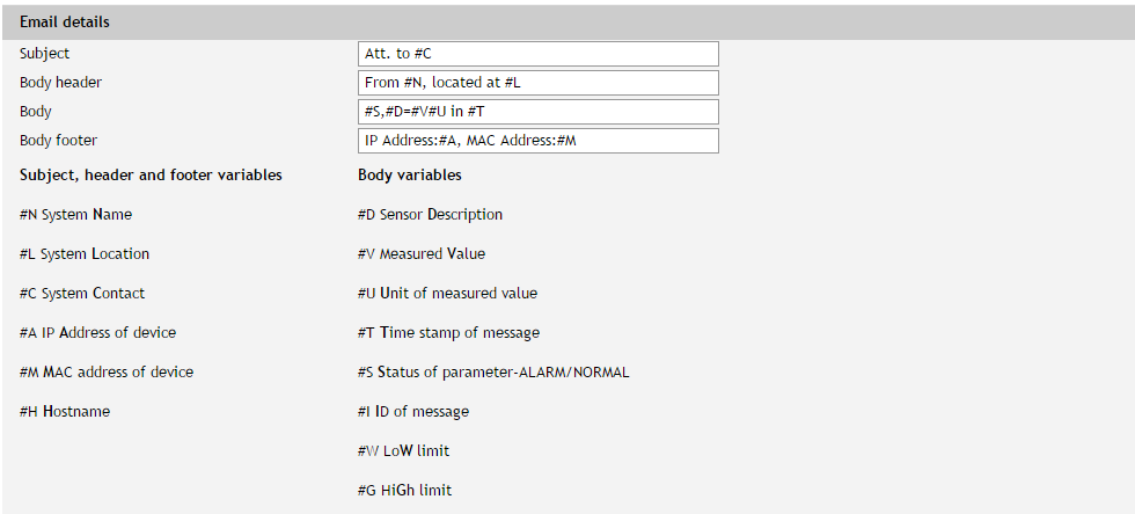
7.3.2.2. Alarm destination



You can configure up to five email recipients, each of whom can be activated independently using a checkbox.

7.3.2.3. E-mail details

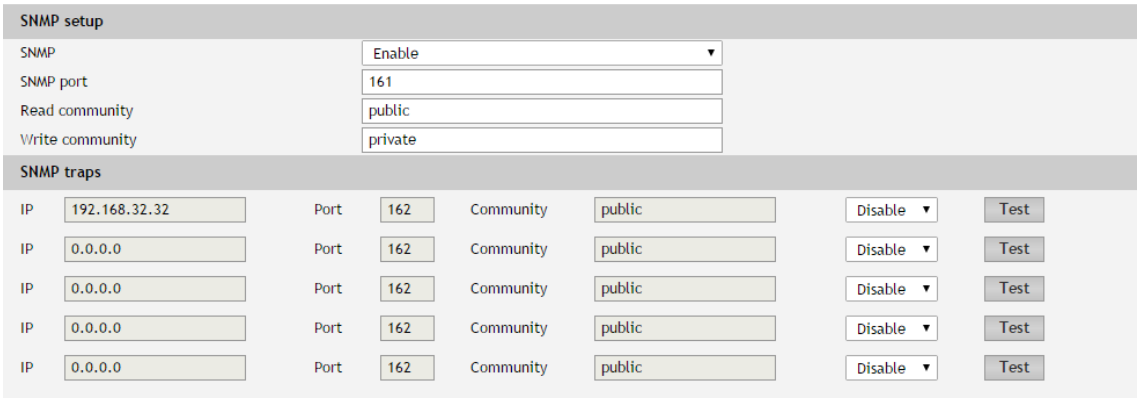
The subject, body header, body, and footer of the email can be customized using a predefined set of keys. All available keys are described on the page.



7.3.3. SNMP

The TCW210-TH supports SNMP v.2, allowing the device to integrate into monitoring and control systems using the SNMP protocol.

This section allows you to configure all necessary parameters for the proper operation of SNMP.



By default, SNMP is disabled, with the port set to 161. The read community is set to "public," and the write community is set to "private." In the event of an alarm condition, SNMP traps can be sent to up to five independent recipients, each capable of having different ports and communities. A dedicated button is available for testing the SNMP trap functionality.

SNMP traps can be triggered under the following conditions:

- An event occurs (status change) on Digital Inputs.
- A measured parameter on Analog Inputs falls outside the specified range.
- A measured parameter on the 1-Wire bus exceeds the defined limits.
- A restart condition is initiated.

An SNMP trap will be sent following a reset.

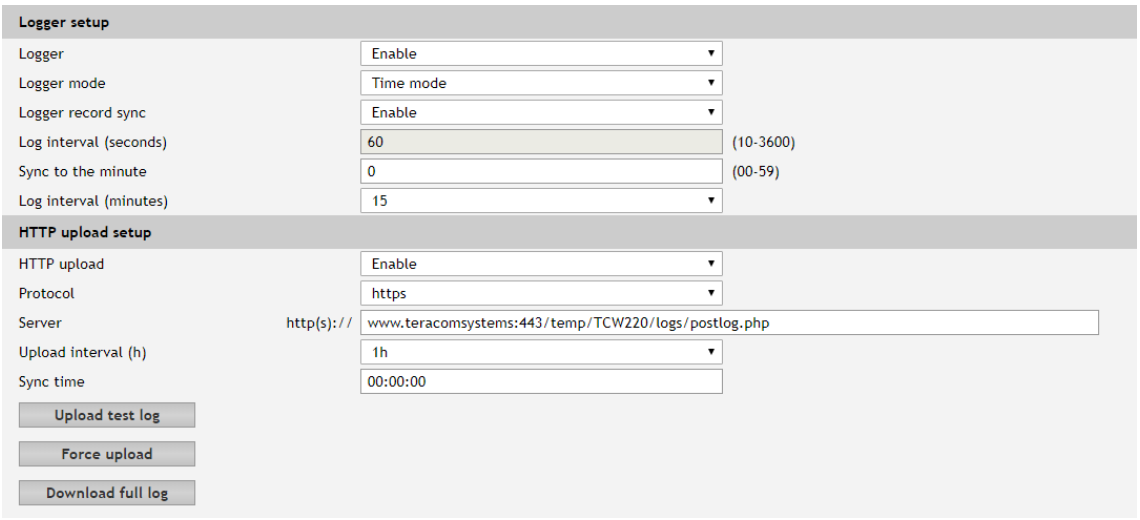
The current MIB file can be downloaded from here.

7.3.4. Logger

The TCW210-TH supports logger for all monitored parameters. The records are made in a circular buffer within the internal flash memory. When the buffer is full, the oldest values are overwritten with the newest ones.

7.3.4.1. Logger

The TCW210-TH supports logger for all monitored parameters.



The logger operates in three modes: Time, Alarm, and Time & Alarm. Each mode defines what triggers a record to be saved in the logger's memory.

- In Time mode, records are created at regular intervals defined by the "Log Interval" setting.
- In Alarm mode, records are generated whenever an alarm condition occurs.
- In Time & Alarm mode, both conditions are used to determine when records are logged.

The log interval specifies the duration between two log entries. It's important to note that reducing the log interval increases the resolution of the data but also decreases the duration for which records can be retained.

The logger can be synchronized to a specific minute within each hour, which is particularly useful for monitoring utilities such as electricity, water, or gas meters. The log interval can be selected from a dropdown menu, allowing for values between 1 and 60 minutes. The "Sync to the Minute" field indicates which minute of each hour will be used for synchronization. While any minute can be selected, it is recommended to use the default value of 00 for optimal performance.

Example:

Current settings:

- Current time: 09:12
- Logger record sync: Enable;
- Sync to the minute: 00;
- Sync interval: 15 minutes.

With these settings, the logger will create four records per hour at HH:00, HH:15, HH:30, and HH:45.

When the device powers up, the first record will be created immediately at 09:12. Subsequent records will be logged at 09:15, 09:30, 09:45, 10:00, 10:15, and so on.

There are two methods to access the logger records:

- Download Full Log File: Use the "Download Full Log" option in the web interface*;*
- Periodic Upload: The last unsent records can be automatically uploaded to a designated HTTP server.

Records are uploaded in CSV file format using either the HTTP or HTTPS protocol. The HTTPS upload is secured using TLS 1.0, TLS 1.1, or TLS 1.2, with RSA used for key exchange and authentication.

The upload interval can be selected from the menu, ranging from 1 to 24 hours. If this service is enabled, ensure that the real-time clock (NTP service) is functioning correctly.

The HTTP server for uploads can be specified by either a domain name or an IP address, so be sure to configure the DNS settings properly.

The "Sync Time" setting determines the specific moment in the day when the upload period is synchronized.

Example:

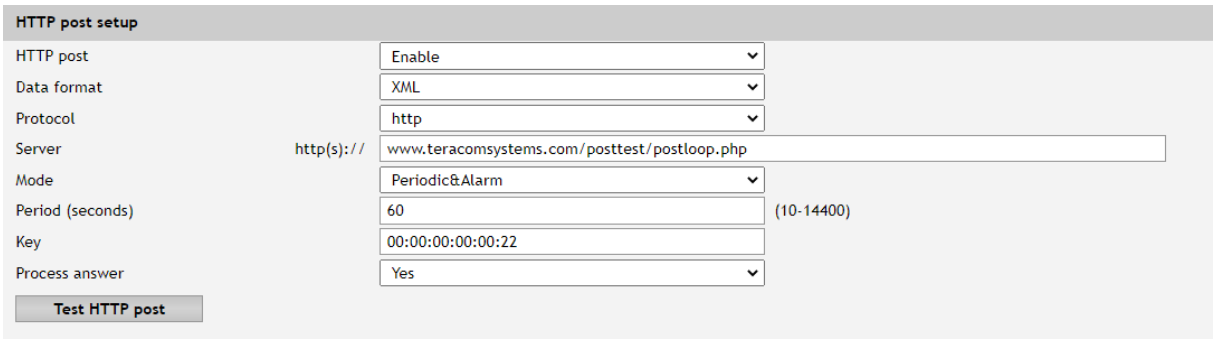
If the upload period is set to 3 hours and the sync time is 09:00, the upload schedule will be as follows: 09:00, 12:00, 15:00, 18:00, 21:00, 00:00, 03:00, and 06:00. If the current time is 19:31 and periodic upload is enabled, the first upload will occur at 21:00.

The “Force Upload” button allows you to manually initiate an upload of the recorded information between the last periodic upload and the current time.

By default, the logger is disabled. For additional information about the logger, please refer to the Data Logger section.

7.3.5. HTTP POST

TCW210-TH can periodically upload a file to a designated server using HTTP or HTTPS POST. The HTTPS connection utilizes TLS 1.0, TLS 1.1, and TLS 1.2 for secure key exchange and authentication via RSA. The posting interval can be set between 10 seconds and 14,400 seconds, and the supported file formats include XML and JSON.



By default, the mode is set to "Periodic & Alarm." This allows for both periodic uploads and additional uploads during any alarm condition. If the "Periodic Only" mode is selected, only regular uploads will occur without any alarm-triggered POSTs. Conversely, if "Alarm Only" is chosen, only POSTs related to alarms will be executed, excluding periodic uploads.

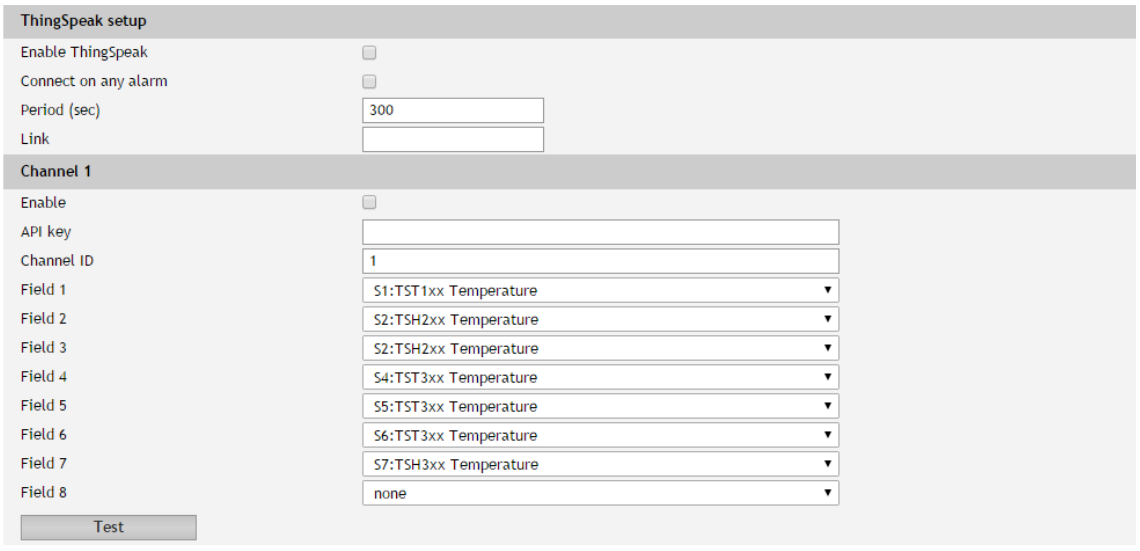
The value in the "Key" field is included in the XML/JSON payload and can be utilized for device identification. If the "Process Answer" option is enabled, the TCW210-TH will handle responses from the remote server, with a list of valid commands available in the section on "HTTP API commands”.

7.3.6. Cloud

The ThingSpeak server is an open data platform and API designed for the Internet of Things (IoT). It enables users to collect, store, analyze, visualize, and act on data gathered from various sensors.

The central component of ThingSpeak activity is the channel, which includes an API key, channel ID, and eight data fields.

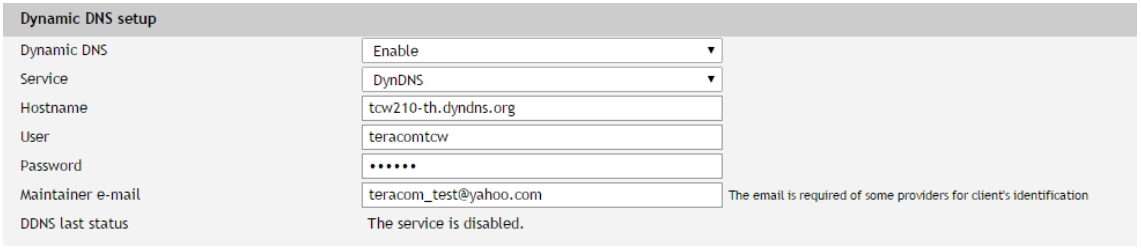
The TCW210-TH features four channel sections: Channel 1, Channel 2, Channel 3, and Channel 4.



7.3.7. Dynamic DNS

With dynamic DNS, the TCW210-TH can be accessed from the public Internet without the need for a broadband account with a static IP address.

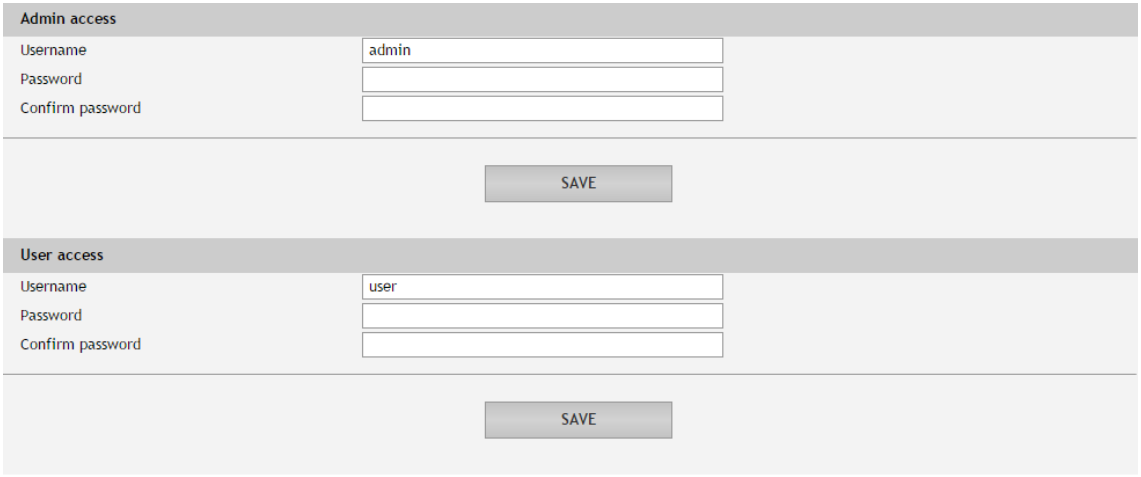
TCW210-TH supports the following DNS services: DynDNS, No-IP, and DNS-O-Matric.



7.4. Administration

7.4.1. User/Password

The TCW210-TH supports two user roles: "Admin" and "User."



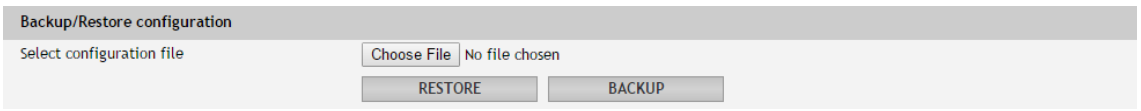
The Admin role has full administrative rights and can modify all settings.

The User role has limited access, allowing only viewing of the Monitoring page and preventing any modifications to settings.

Both usernames and passwords can be up to 31 characters in length.

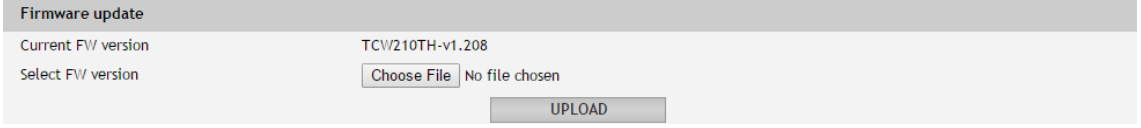
7.4.2. Backup/Restore

TCW210-TH allows for the backup and restoration of all user settings. These settings are saved in an XML backup file, which can be utilized for restoring configurations on multiple devices. This feature is particularly useful for applying similar settings across a batch of controllers.



7.4.3. FW update

The TCW210-TH can be updated through the web interface.



To update the device, follow these steps:

- Go to www.teracomsystems.com and download the latest firmware;
- From Administration->FW update select downloaded .cod file and click “Upload” button;
- Once the firmware update is complete, the Login page will appear.

Important: Do not turn off the power supply during the update process, as this can damage the device.

7.5. Logout

The TCW210-TH supports multi-session access; however, it is recommended to log out after completing your tasks for security and best practices.

8. Protocols and API

8.1. SNMP

The Simple Network Management Protocol (SNMP) is a standard internet protocol used for managing devices on IP networks. In typical SNMP implementations, one or more administrative computers, referred to as managers, monitor and control devices on a Local Area Network (LAN). Each managed device continuously runs a software component known as an agent, which reports information via SNMP to the manager.

The TCW210-TH can be configured and monitored using SNMP. This can be achieved with any SNMP v.2 compatible program. The parameters that can be modified are organized by function in the tables below. To obtain a valid Object Identifier (OID) number, replace the “x” symbol with “1.3.6.1.4.1.38783.” To save the changes, set configurationSaved (OID x.2.3.5.0) to "1".

product

OID	Name	Access	Description	Syntax
x.4.1.1.0	name	read-only	Device name	DisplayString
x.4.1.2.0	version	read-only	Firmware version	DisplayString
x.4.1.3.0	date	read-only	Release date	DateAndTime

setup -> network

OID	Name	Access	Description	Syntax
x.4.2.1.1.0	deviceID	read-only	Device ID (default MAC address)	MacAddress
x.4.2.1.2.0	hostName	read-only	Hostname	DisplayString
x.4.2.1.3.0	deviceIP	read-only	Device IP address	IpAddress

setup -> io -> sensorsSetup -> sensor1setup

OID	Name	Access	Description	Syntax
x.4.2.2.1.1.1.0	s1description	read-write	Sensor 1 description	DisplayString
x.4.2.2.1.1.2.1.0	s11MAXInt	read-write	S11 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.1.2.2.0	s11MINInt	read-write	S11 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.1.2.3.0	s11HYSTInt	read-write	S11 hysteresis value x1000 in Integer format	Integer32
x.4.2.2.1.1.2.4.0	s11MULTInt	read-write	S11 multiplier value x1000 in Integer format	Integer32
x.4.2.2.1.1.2.5.0	s11OFFSETInt	read-write	S11 offset value x1000 in Integer format	Integer32
x.4.2.2.1.1.3.1.0	s12MAXInt	read-write	S12 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.1.3.2.0	s12MINInt	read-write	S12 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.1.3.3.0	s12HYSTInt	read-write	S12 hysteresis value x1000 in Integer format	Integer32
x.4.2.2.1.1.3.4.0	s12MULTInt	read-write	S12 multiplier value x1000 in Integer format	Integer32
x.4.2.2.1.1.3.5.0	s12OFFSETInt	read-write	S12 offset value x1000 in Integer format	Integer32
x.4.2.2.1.1.4.1.0	s13MAXInt	read-write	S13 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.1.4.2.0	s13MINInt	read-write	S13 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.1.4.3.0	s13HYSTInt	read-write	S13 hysteresis value x1000 in Integer format	Integer32

setup -> io -> sensorsSetup -> sensor2setup

OID	Name	Access	Description	Syntax
x.4.2.2.1.2.1.0	s2description	read-write	Sensor2 description	DisplayString
x.4.2.2.1.2.2.1.0	s21MAXInt	read-write	s21 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.2.2.2.0	s21MINInt	read-write	S21 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.2.2.3.0	s21HYSTInt	read-write	S21 hysteresis value x1000 in Integer format	Integer32
x.4.2.2.1.2.2.4.0	s21MULTInt	read-write	S21 multiplier value x1000 in Integer format	Integer32
x.4.2.2.1.2.2.5.0	s21OFFSETInt	read-write	S21 offset value x1000 in Integer format	Integer32
x.4.2.2.1.2.3.1.0	s22MAXInt	read-write	S22 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.2.3.2.0	s22MINInt	read-write	S22 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.2.3.3.0	s22HYSTInt	read-write	S22 hysteresis value x1000 in Integer format	Integer32
x.4.2.2.1.2.3.4.0	S22MULTInt	read-write	S22 multiplier value x1000 in Integer format	Integer32
x.4.2.2.1.2.3.5.0	s22OFFSETInt	read-write	S22 offset value x1000 in Integer format	Integer32
x.4.2.2.1.2.4.1.0	s23MAXInt	read-write	S23 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.2.4.2.0	s23MINInt	read-write	S23 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.2.4.3.0	s23HYSTInt	read-write	S23 hysteresis value x1000 in Integer format	Integer32

setup -> io -> sensorsSetup -> sensor3setup

OID	Name	Access	Description	Syntax
x.4.2.2.1.3.1.0	s3description	read-write	Sensor 3 description	DisplayString
x.4.2.2.1.3.2.1.0	s31MAXInt	read-write	S31 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.3.2.2.0	s31MINInt	read-write	S31 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.3.2.3.0	s31HYSTInt	read-write	S31 hysteresis value x1000 in Integer format	Integer32
x.4.2.2.1.3.2.4.0	s31MULTInt	read-write	S31 multiplier value x1000 in Integer format	Integer32
x.4.2.2.1.3.2.5.0	s31OFFSETInt	read-write	S31 offset value x1000 in Integer format	Integer32
x.4.2.2.1.3.3.1.0	s32MAXInt	read-write	S32 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.3.3.2.0	s32MINInt	read-write	S32 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.3.3.3.0	s32HYSTInt	read-write	S32 hysteresis value x1000 in Integer format	Integer32
x.4.2.2.1.3.3.4.0	s32MULTInt	read-write	S32 multiplier value x1000 in Integer format	Integer32
x.4.2.2.1.3.3.5.0	s32OFFSETInt	read-write	S32 offset value x1000 in Integer format	Integer32
x.4.2.2.1.3.4.1.0	s33MAXInt	read-write	S33 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.3.4.2.0	s33MINInt	read-write	S33 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.3.4.3.0	s33HYSTInt	read-write	S33 hysteresis value x1000 in Integer format	Integer32

setup -> io -> sensorsSetup -> sensor4setup

OID	Name	Access	Description	Syntax
x.4.2.2.1.4.1.0	s4description	read-write	Sensor 4 description	DisplayString
x.4.2.2.1.4.2.1.0	s41MAXInt	read-write	S41 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.4.2.2.0	s41MINInt	read-write	S41 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.4.2.3.0	s41HYSTInt	read-write	S41 hysteresis value x1000 in Integer format	Integer32
x.4.2.2.1.4.2.4.0	s41MULTInt	read-write	S41 multiplier value x1000 in Integer format	Integer32
x.4.2.2.1.4.2.5.0	s41OFFSETInt	read-write	S41 offset value x1000 in Integer format	Integer32
x.4.2.2.1.4.3.1.0	s42MAXInt	read-write	S42 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.4.3.2.0	s42MINInt	read-write	S42 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.4.3.3.0	s42HYSTInt	read-write	S42 hysteresis value x1000 in Integer format	Integer32
x.4.2.2.1.4.3.4.0	s42MULTInt	read-write	S42 multiplier value x1000 in Integer format	Integer32
x.4.2.2.1.4.3.5.0	s42OFFSETInt	read-write	S42 offset value x1000 in Integer format	Integer32
x.4.2.2.1.4.4.1.0	s43MAXInt	read-write	S43 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.4.4.2.0	s43MINInt	read-write	S43 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.4.4.3.0	s43HYSTInt	read-write	S43 hysteresis value x1000 in Integer format	Integer32

setup -> io -> sensorsSetup -> sensor5setup

OID	Name	Access	Description	Syntax
x.4.2.2.1.5.1.0	s5description	read-write	Sensor 5 description	DisplayString
x.4.2.2.1.5.2.1.0	s51MAXInt	read-write	S51 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.5.2.2.0	s51MINInt	read-write	S51 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.5.2.3.0	s51HYSTInt	read-write	S51 hysteresis value x1000 in Integer format	Integer32
x.4.2.2.1.5.2.4.0	s51MULTInt	read-write	S51 multiplier value x1000 in Integer format	Integer32
x.4.2.2.1.5.2.5.0	s51OFFSETInt	read-write	S51 offset value x1000 in Integer format	Integer32
x.4.2.2.1.5.3.1.0	s52MAXInt	read-write	S52 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.5.3.2.0	s52MINInt	read-write	S52 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.5.3.3.0	s52HYSTInt	read-write	S52 hysteresis value x1000 in Integer format	Integer32
x.4.2.2.1.5.3.4.0	s52MULTInt	read-write	S52 multiplier value x1000 in Integer format	Integer32
x.4.2.2.1.5.3.5.0	s52OFFSETInt	read-write	S52 offset value x1000 in Integer format	Integer32
x.4.2.2.1.5.4.1.0	s53MAXInt	read-write	S53 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.5.4.2.0	s53MINInt	read-write	S53 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.5.4.3.0	s53HYSTInt	read-write	S53 hysteresis value x1000 in Integer format	Integer32

setup -> io -> sensorsSetup -> sensor6setup

OID	Name	Access	Description	Syntax
x.4.2.2.1.6.1.0	s6description	read-write	Sensor 6 description	DisplayString
x.4.2.2.1.6.2.1.0	s61MAXInt	read-write	S61 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.6.2.2.0	s61MINInt	read-write	S61 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.6.2.3.0	s61HYSTInt	read-write	S61 hysteresis value x1000 in Integer format	Integer32
x.4.2.2.1.6.2.4.0	s61MULTInt	read-write	S61 multiplier value x1000 in Integer format	Integer32
x.4.2.2.1.6.2.5.0	s61OFFSETInt	read-write	S61 offset value x1000 in Integer format	Integer32
x.4.2.2.1.6.3.1.0	s62MAXInt	read-write	S62 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.6.3.2.0	s62MINInt	read-write	S62 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.6.3.3.0	s62HYSTInt	read-write	S62 hysteresis value x1000 in Integer format	Integer32
x.4.2.2.1.6.3.4.0	s62MULTInt	read-write	S62 multiplier value x1000 in Integer format	Integer32
x.4.2.2.1.6.3.5.0	s62OFFSETInt	read-write	S62 offset value x1000 in Integer format	Integer32
x.4.2.2.1.6.4.1.0	s63MAXInt	read-write	S63 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.6.4.2.0	s63MINInt	read-write	S63 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.6.4.3.0	s63HYSTInt	read-write	S63 hysteresis value x1000 in Integer format	Integer32

setup -> io -> sensorsSetup -> sensor7setup

OID	Name	Access	Description	Syntax
x.4.2.2.1.7.1.0	s7description	read-write	Sensor 7 description	DisplayString
x.4.2.2.1.7.2.1.0	s71MAXInt	read-write	S71 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.7.2.2.0	s71MINInt	read-write	S71 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.7.2.3.0	s71HYSTInt	read-write	S71 hysteresis value x1000 in Integer format	Integer32
x.4.2.2.1.7.2.4.0	s71MULTInt	read-write	S71 multiplier value x1000 in Integer format	Integer32
x.4.2.2.1.7.2.5.0	s71OFFSETInt	read-write	S71 offset value x1000 in Integer format	Integer32
x.4.2.2.1.7.3.1.0	s72MAXInt	read-write	S72 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.7.3.2.0	s72MINInt	read-write	S72 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.7.3.3.0	s72HYSTInt	read-write	S72 hysteresis value x1000 in Integer format	Integer32
x.4.2.2.1.7.3.4.0	s72MULTInt	read-write	S72 multiplier value x1000 in Integer format	Integer32
x.4.2.2.1.7.3.5.0	s72OFFSETInt	read-write	S72 offset value x1000 in Integer format	Integer32
x.4.2.2.1.7.4.1.0	s73MAXInt	read-write	S73 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.7.4.2.0	s73MINInt	read-write	S73 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.7.4.3.0	s73HYSTInt	read-write	S73 hysteresis value x1000 in Integer format	Integer32

setup -> io -> sensorsSetup -> sensor8setup

OID	Name	Access	Description	Syntax
x.4.2.2.1.8.1.0	s8description	read-write	Sensor 8 description	DisplayString
x.4.2.2.1.8.2.1.0	s81MAXx10Int	read-write	S81 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.8.2.2.0	s81MINx10Int	read-write	S81 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.8.2.3.0	s81HYSTx10Int	read-write	S81 hysteresis value x1000 in Integer format	Integer32
x.4.2.2.1.8.2.4.0	s81MULTInt	read-write	S81 multiplier value x1000 in Integer format	Integer32
x.4.2.2.1.8.2.5.0	s81OFFSETInt	read-write	S81 offset value x1000 in Integer format	Integer32
x.4.2.2.1.8.3.1.0	s82MAXx10Int	read-write	S82 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.8.3.2.0	s82MINx10Int	read-write	S82 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.8.3.3.0	s82HYSTx10Int	read-write	S82 hysteresis value x1000 in Integer format	Integer32
x.4.2.2.1.8.3.4.0	s82MULTInt	read-write	S82 multiplier value x1000 in Integer format	Integer32
x.4.2.2.1.8.3.5.0	s82OFFSETInt	read-write	S82 offset value x1000 in Integer format	Integer32
x.4.2.2.1.8.4.1.0	s83MAXx10Int	read-write	S83 maximum value x1000 in Integer format	Integer32
x.4.2.2.1.8.4.2.0	s83MINx10Int	read-write	S83 minimum value x1000 in Integer format	Integer32
x.4.2.2.1.8.4.3.0	s83HYSTx10Int	read-write	S83 hysteresis value x1000 in Integer format	Integer32

monitorNcontrol -> sensors -> sensor1

OID	Name	Access	Description	Syntax
x.4.3.1.1.1.0	s11Int	read-only	S11 value x1000 in Integer format	Integer32
x.4.3.1.1.2.0	s12Int	read-only	S12 value x1000 in Integer format	Integer32
x.4.3.1.1.3.0	s13Int	read-only	S13 value x1000 in Integer format	Integer32
x.4.3.1.1.4.0	s1ID	read-only	S1 ID value	OCTET STRING (SIZE (16))
x.4.3.1.1.5.1.0	s11Al	read-only	S11 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.1.5.2.0	s12Al	read-only	S12 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.1.5.3.0	s13Al	read-only	S13 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.1.6.0	s11RawInt	read-only	S11 raw value x1000 in Integer format	Integer32
x.4.3.1.1.7.0	s12RawInt	read-only	S12 raw value x1000 in Integer format	Integer32

monitorNcontrol -> sensors -> sensor2

OID	Name	Access	Description	Syntax
x.4.3.1.2.1.0	s21Int	read-only	S21 value x1000 in Integer format	Integer32
x.4.3.1.2.2.0	s22Int	read-only	S22 value x1000 in Integer format	Integer32
x.4.3.1.2.3.0	s23Int	read-only	S23 value x1000 in Integer format	Integer32
x.4.3.1.2.4.0	s2ID	read-only	S2 ID value	OCTET STRING (SIZE (16))
x.4.3.1.2.5.1.0	s21Al	read-only	S21 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.2.5.2.0	s22Al	read-only	S22 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.2.5.3.0	s23Al	read-only	S23 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.2.6.0	s21RawInt	read-only	S21 raw value x1000 in Integer format	Integer32
x.4.3.1.2.7.0	s22RawInt	read-only	S22 raw value x1000 in Integer format	Integer32

monitorNcontrol -> sensors -> sensor3

OID	Name	Access	Description	Syntax
x.4.3.1.3.1.0	s31Int	read-only	S31 value x1000 in Integer format	Integer32
x.4.3.1.3.2.0	s32Int	read-only	S32 value x1000 in Integer format	Integer32
x.4.3.1.3.3.0	s3ID	read-only	S3 ID value	OCTET STRING (SIZE (16))
x.4.3.1.3.5.1.0	s31Al	read-only	S31 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.3.5.2.0	s32Al	read-only	S32 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.3.5.3.0	s33Al	read-only	S33 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.3.6.0	s31RawInt	read-only	S31 raw value x1000 in Integer format	Integer32
x.4.3.1.3.7.0	s32RawInt	read-only	S32 raw value x1000 in Integer format	Integer32

monitorNcontrol -> sensors -> sensor4

OID	Name	Access	Description	Syntax
x.4.3.1.4.1.0	s41Int	read-only	S41 value x1000 in Integer format	Integer32
x.4.3.1.4.2.0	s42Int	read-only	S42 value x1000 in Integer format	Integer32
x.4.3.1.4.3.0	s43Int	read-only	S43 value x1000 in Integer format	Integer32
x.4.3.1.4.3.0	s4ID	read-only	S4 ID value	OCTET STRING (SIZE (16))
x.4.3.1.4.5.1.0	s41Al	read-only	S41 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.4.5.2.0	s42Al	read-only	S42 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.4.5.3.0	s43Al	read-only	S43 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.4.6.0	s41RawInt	read-only	S41 raw value x1000 in Integer format	Integer32
x.4.3.1.4.7.0	s42RawInt	read-only	S42 raw value x1000 in Integer format	Integer32

monitorNcontrol -> sensors -> sensor5

OID	Name	Access	Description	Syntax
x.4.3.1.5.1.0	s51Int	read-only	S51 value x1000 in Integer format	Integer32
x.4.3.1.5.2.0	s52Int	read-only	S52 value x1000 in Integer format	Integer32
x.4.3.1.5.3.0	s53Int	read-only	S53 value x1000 in Integer format	Integer32
x.4.3.1.5.4.0	s5ID	read-only	S5 ID value	OCTET STRING (SIZE (16))
x.4.3.1.5.5.1.0	s51Al	read-only	S51 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.5.5.2.0	s52Al	read-only	S52 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.5.5.3.0	s53Al	read-only	S53 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.5.6.0	s51RawInt	read-only	S51 raw value x1000 in Integer format	Integer32
x.4.3.1.5.7.0	s52RawInt	read-only	S52 raw value x1000 in Integer format	Integer32

monitorNcontrol -> sensors -> sensor6

OID	Name	Access	Description	Syntax
x.4.3.1.6.1.0	s61Int	read-only	S61 value x1000 in Integer format	Integer32
x.4.3.1.6.2.0	s62Int	read-only	S62 value x1000 in Integer format	Integer32
x.4.3.1.6.3.0	s63Int	read-only	S63 value x1000 in Integer format	Integer32
x.4.3.1.6.4.0	s6ID	read-only	S6 ID value	OCTET STRING (SIZE (16))
x.4.3.1.6.5.1.0	s61Al	read-only	S61 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.6.5.2.0	s62Al	read-only	S62 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.6.5.3.0	s63Al	read-only	S63 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.6.6.0	s61RawInt	read-only	S61 raw value x1000 in Integer format	Integer32
x.4.3.1.6.7.0	s62RawInt	read-only	S62 raw value x1000 in Integer format	Integer32

monitorNcontrol -> sensors -> sensor7

OID	Name	Access	Description	Syntax
x.4.3.1.7.1.0	s71Int	read-only	S71 value x1000 in Integer format	Integer32
x.4.3.1.7.2.0	s72Int	read-only	S72 value x1000 in Integer format	Integer32
x.4.3.1.7.3.0	s73Int	read-only	S73 value x1000 in Integer format	Integer32
x.4.3.1.7.4.0	s7ID	read-only	S7 ID value	OCTET STRING (SIZE (16))
x.4.3.1.7.5.1.0	s71Al	read-only	S71 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.7.5.2.0	s72Al	read-only	S72 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.7.5.3.0	s73Al	read-only	S73 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.7.6.0	s71RawInt	read-only	S71 raw value x1000 in Integer format	Integer32
x.4.3.1.7.7.0	s72RawInt	read-only	S72 raw value x1000 in Integer format	Integer32

monitorNcontrol -> sensors -> sensor8

OID	Name	Access	Description	Syntax
x.4.3.1.8.1.0	s81Int	read-only	S81 value x1000 in Integer format	Integer32
x.4.3.1.8.2.0	s82Int	read-only	S82 value x1000 in Integer format	Integer32
x.4.3.1.8.3.0	s83Int	read-only	S83 value x1000 in Integer format	Integer32
x.4.3.1.8.4.0	s8ID	read-only	S8 ID value	OCTET STRING (SIZE (16))
x.4.3.1.8.5.1.0	s81Al	read-only	S81 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.8.5.2.0	s82Al	read-only	S82 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.8.5.3.0	s83Al	read-only	S83 alarm status	INTEGER {normal(0),alarm(1)}
x.4.3.1.8.6.0	s81RawInt	read-only	S81 raw value x1000 in Integer format	Integer32
x.4.3.1.8.7.0	s82RawInt	read-only	S82 raw value x1000 in Integer format	Integer32

monitorNcontrol

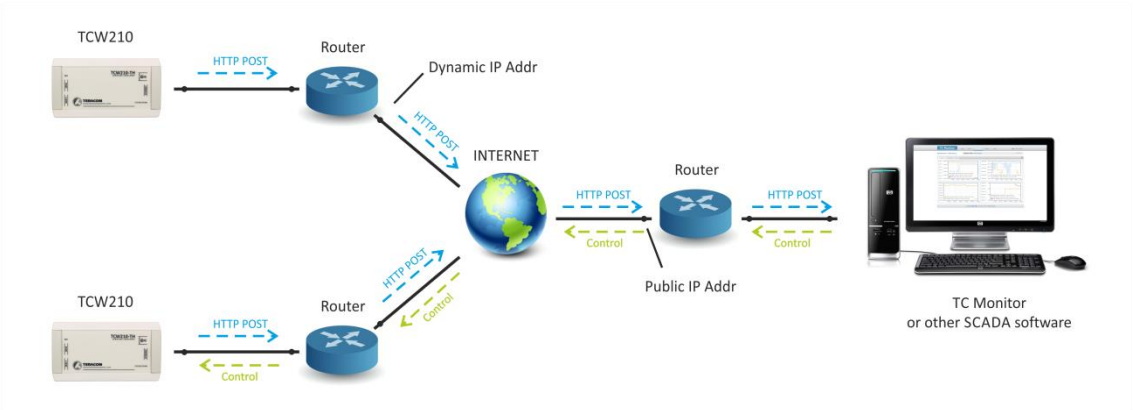
OID	Name	Access	Description	Syntax
x.4.3.5.0	configurationSaved	read-write	Configuration save status SAVED/UNSAVED	INTEGER { unsaved(0), saved(1) }
x.4.3.6.0	restartDevice	read-write	Restart Device	INTEGER { cancel(0), restart(1) }
x.4.3.7.0	temperatureUnit	read-only	Unit of the all temperature values	INTEGER { celcius(0), fahrenheit(1) }
x.4.3.8.0	hardwareErr	read-only	Hardware Error	INTEGER { noErr(0), owErr(1), hwErr(2) }

8.2. HTTP API

8.2.1. HTTP POST

TCW210-TH can execute HTTP/HTTPS POST requests to upload XML or JSON files to a dedicated server. This functionality is particularly useful when the controller is situated behind a router without a public IP address or when the user lacks access to the router's configuration. It is important to note that the server should possess a public IP address.

The typical monitoring application is shown in the picture below:



HTTP/HTTPS POSTs can be sent either periodically or periodically in conjunction with alarm conditions. In response, the server can send an HTTP GET request with the appropriate command—refer to section 8.2.3 for details on HTTP API commands.

To test HTTP/HTTPS POST functionality, follow these steps:

- Save following code like post.php:

```
<?php
    define("FILENAME", 'status.xml');
    define("FOLDER", '');
    define("SEPARATOR", '');
    define("STR_SUCCESS", 'set FIN');
    define("STR_ERROR", 'error');

    if($_SERVER['REQUEST_METHOD'] == 'POST'){
        $datePrefix = date('YmdHis', strtotime('now'));
        $pathname = FOLDER.SEPARATOR.$datePrefix.'_'.FILENAME;
        $postdata = file_get_contents("php://input");
        $handle = fopen($pathname, 'w+');
        $content = var_export($postdata, true);
        fwrite($handle, substr($content, 1, strlen($content)-2));
        fclose($handle);
        echo (($handle === false) ? STR_ERROR : STR_SUCCESS)."\r\n";
    }
        else {
            echo "The PHP script is working!";
        }
?>
```

- Upload the post.php file to a public web server that supports PHP. To ensure the script is functioning correctly, enter the URL (for example, www.yourserverURL.com/post.php) in your web browser. If successful, a webpage displaying “The PHP script is working!” will appear.
- Configure the TCW210-TH controller to send HTTP/HTTPS POST requests to your web server. Input the URL (yourserverURL.com/post.php) in the URL field, and click the “Test HTTP POST” button.
- If the HTTP/HTTPS POST request is received and processed successfully, “OK” will be displayed next to the button. Additionally, an XML file will be created in the same directory where post.php is located. The filename will include a timestamp, formatted as 20151120103318_status.xml.

8.2.2. HTTP GET

HTTP GET can be utilized to monitor the TCW210-TH by retrieving XML or JSON files. The format for accessing the status is as follows:

http://device.ip.address/status.xml

http://device.ip.address/status.json

For further details regarding the structure of these files, refer to sections 8.2.4 XML file structure and 8.2.5 JSON file structure.

HTTP GET requests can be sent at any time to the TCW210-TH if it is on the same network or has appropriate routing. If there is no direct access to the device, an HTTP GET can be sent immediately after receiving an HTTP POST from the same device.

8.2.2.1. Commands

All commands used with HTTP POST are also applicable to HTTP GET. The correct format for sending commands is:

http://device.ip.address/status.xml?yyy=xxx

Where:

yyy is the command;

xxx is the parameter

Example:

http://device.ip.address/status.xml?pper=120 will set the POST period to 120 seconds.

8.2.2.2. HTTP GET authentication

If HTTP API authentication is enabled, basic access authentication is required to access the status.xml file. The format of the command is detailed in the table below:

XML/HTTP API authentication	Format
enabled	http://device.ip.address/status.xml?a=uuuu:pppp
disabled	http://device.ip.address/status.xml

Example:

To set the POST period to 120 seconds, the following command can be used, assuming the username is admin and the password is admin
http://device.ip.address/status.xml?a=admin:admin&pper=120

8.2.3. List of HTTP API commands

Command	Description
sn**pt**=30.0	Set Min of sensor to 30.0 (**p** is 1,2,3,4,5,6,7 or 8 for the respective sensor **t** is 1 or 2 for the respective parameter of sensor) sn12=30.0 will set Min for sensor 1, parameter 2
sx**pt**=40.0	Set Max of sensor to 40.0 (**p** is 1,2,3,4,5,6,7 or 8 for the respective sensor **t** is 1 or 2 for the respective parameter of sensor) sx42=40.0 will set Min for sensor 4, parameter 2
sy**pt**=2.0	Set Hys of sensor to 2.0 (**p** is 1,2,3,4,5,6,7 or 8 for the respective sensor **t** is 1 or 2 for the respective parameter of sensor) sy81=2.0 will set Hys for sensor 8, parameter 1
delsen=xxxx	Notification delay for sensors (xxxx is between 0 and 3600)
dataf=x	Data format XML/JSON for HHTP POST – 0 XML, 1 JSON
pushtls=x	HTTP/HTTPS protocol, where x is 0 for HTTP and 1 for HTTPS
purl=yyy	URL for HTTP POST to Server 1, where yyy is a full path to php file. Example: purl=212.25.45.120:30181/xampp/test/posttest.php
pper=x	HTTP POST period in seconds (x is between 10 and 14400)
dk=xxx	HTTP POST key – xxx is up to 17 characters
save	Save all previous changes (except relays' one) in the FLASH memory. **As every save reflects the FLASH cycles (endurance), this command should be used very carefully.** pper=120&save – will set Post period to 120 seconds and save it
FIN	Terminate session. (It works with HTTP/HTTPS POST, but not with HTTP GET)

8.2.4. XML file structure

```
<Monitor>
  <DeviceInfo>
      <DeviceName>TCW210-TH</DeviceName>
      <HostName>TCW210TH</HostName>
      <ID>54:10:EC:0C:1D:E1</ID>
      <FwVer>TCW210TH-v1.252</FwVer>
      <MnfInfo>www.teracomsystems.com</MnfInfo>
      <SysContact>info@teracomsystems.com</SysContact>
      <SysName>SysName</SysName>
      <SysLocation>SysLocation</SysLocation>
  </DeviceInfo>
  <S>
      <S1>
          <description>S1:TST1xx</description>
          <id>2867895F07000058</id>
          <SenType>1W</SenType>
          <addr>---</addr>
          <item1>
              <value>22.875</value>
              <unit>°C</unit>
              <alarm>0</alarm>
              <min>19.000</min>
              <max>85.000</max>
              <hys>0.500</hys>
          </item1>
          <item2>
              <value>---</value>
              <unit>---</unit>
              <alarm>0</alarm>
              <min>---</min>
              <max>---</max>
              <hys>---</hys>
          </item2>
          <item3>
              <value>---</value>
              <unit>---</unit>
              <alarm>0</alarm>
              <min>---</min>
              <max>---</max>
              <hys>---</hys>
          </item3>
      </S1>
      <S2>
          <description>S2</description>
          <id>0000000000000000</id>
          <SenType>1W</SenType>
          <addr>---</addr>
          <item1>
              <value>---</value>
```

<unit>---</unit>
<alarm>0</alarm>
<min>---</min>
<max>---</max>
<hys>---</hys>
</item1>
<item2>
<value>---</value>
<unit>---</unit>
<alarm>0</alarm>
<min>---</min>
<max>---</max>
<hys>---</hys>
</item2>
<item3>
<value>---</value>
<unit>---</unit>
<alarm>0</alarm>
<min>---</min>
<max>---</max>
<hys>---</hys>
</item3>
</S2>
<S3>
<description>S3</description>
<id>0000000000000000</id>
<SenType>1W</SenType>
<addr>---</addr>
<item1>
<value>---</value>
<unit>---</unit>
<alarm>0</alarm>
<min>---</min>
<max>---</max>
<hys>---</hys>
</item1>
<item2>
<value>---</value>
<unit>---</unit>
<alarm>0</alarm>
<min>---</min>
<max>---</max>
<hys>---</hys>
</item2>
<item3>
<value>---</value>
<unit>---</unit>
<alarm>0</alarm>
<min>---</min>
<max>---</max>
<hys>---</hys>
</item3>

```
</S3>
<S4>
    <description>S4</description>
    <id>0000000000000000</id>
    <SenType>1W</SenType>
    <addr>---</addr>
    <item1>
        <value>---</value>
        <unit>---</unit>
        <alarm>0</alarm>
        <min>---</min>
        <max>---</max>
        <hys>---</hys>
    </item1>
    <item2>
        <value>---</value>
        <unit>---</unit>
        <alarm>0</alarm>
        <min>---</min>
        <max>---</max>
        <hys>---</hys>
    </item2>
    <item3>
        <value>---</value>
        <unit>---</unit>
        <alarm>0</alarm>
        <min>---</min>
        <max>---</max>
        <hys>---</hys>
    </item3>
</S4>
<S5>
    <description>S5</description>
    <id>CD00000000000000</id>
    <SenType>MB</SenType>
    <addr>1</addr>
    <item1>
        <value>22.963</value>
        <unit>°C</unit>
        <alarm>0</alarm>
        <min>-40.000</min>
        <max>85.000</max>
        <hys>8.500</hys>
    </item1>
    <item2>
        <value>31.279</value>
        <unit>%RH</unit>
        <alarm>0</alarm>
        <min>0.000</min>
        <max>100.000</max>
        <hys>10.000</hys>
    </item2>
```

```
        <item3>
            <value>5.073</value>
            <unit>°C</unit>
            <alarm>0</alarm>
            <min>0.000</min>
            <max>25.000</max>
            <hys>2.500</hys>
        </item3>
    </S5>
    <S6>
        <description>S6</description>
        <id>0000000000000000</id>
        <SenType>MB</SenType>
        <addr>2</addr>
        <item1>
            <value>24.742</value>
            <unit>°C</unit>
            <alarm>0</alarm>
            <min>-40.000</min>
            <max>85.000</max>
            <hys>8.500</hys>
        </item1>
        <item2>
            <value>---</value>
            <unit>---</unit>
            <alarm>0</alarm>
            <min>---</min>
            <max>---</max>
            <hys>---</hys>
        </item2>
        <item3>
            <value>---</value>
            <unit>---</unit>
            <alarm>0</alarm>
            <min>---</min>
            <max>---</max>
            <hys>---</hys>
        </item3>
    </S6>
    <S7>
        <description>S7</description>
        <id>0000000000000000</id>
        <SenType>MB</SenType>
        <addr>0</addr>
        <item1>
            <value>---</value>
            <unit>---</unit>
            <alarm>0</alarm>
            <min>---</min>
            <max>---</max>
            <hys>---</hys>
        </item1>
```

```
            <item2>
                <value>---</value>
                <unit>---</unit>
                <alarm>0</alarm>
                <min>---</min>
                <max>---</max>
                <hys>---</hys>
            </item2>
            <item3>
                <value>---</value>
                <unit>---</unit>
                <alarm>0</alarm>
                <min>---</min>
                <max>---</max>
                <hys>---</hys>
            </item3>
        </S7>
        <S8>
            <description>S8</description>
            <id>0000000000000000</id>
            <SenType>MB</SenType>
            <addr>0</addr>
            <item1>
                <value>---</value>
                <unit>---</unit>
                <alarm>0</alarm>
                <min>---</min>
                <max>---</max>
                <hys>---</hys>
            </item1>
            <item2>
                <value>---</value>
                <unit>---</unit>
                <alarm>0</alarm>
                <min>---</min>
                <max>---</max>
                <hys>---</hys>
            </item2>
            <item3>
                <value>---</value>
                <unit>---</unit>
                <alarm>0</alarm>
                <min>---</min>
                <max>---</max>
                <hys>---</hys>
            </item3>
        </S8>
    </S>
    <HTTPPush>
        <Key/>
        <PushPeriod>300</PushPeriod>
    </HTTPPush>
```

```
    <hwerr/>
    <Alarmed>0</Alarmed>
    <Scannig/>
    <Time>
        <Date>11.10.2023</Date>
        <Time>08:45:18</Time>
    </Time>
</Monitor>
```

Where:

<value>---</value> and <unit>---</unit> means no sensor on this position;

<alarm>1</alarm> means there is trigger condition.

8.2.5. JSON file structure

```
{
  "Monitor": {
    "DeviceInfo": {
      "DeviceName": "TCW210-TH",
      "HostName": "TCW210TH",
      "ID": "54:10:EC:0C:1D:E1",
      "FwVer": "TCW210TH-v1.252",
      "MnfInfo": "www.teracomsystems.com",
      "SysContact": "info@teracomsystems.com",
      "SysName": "SysName",
      "SysLocation": "SysLocation"
    },
    "S": {
      "S1": {
        "description": "S1:TST1xx",
        "id": "2867895F07000058",
        "SenType": "1W",
        "addr": "---",
        "item1": {
          "value": "23.063",
          "unit": "°C",
          "alarm": "0",
          "min": "19.000",
          "max": "85.000",
          "hys": "0.500"
        },
        "item2": {
          "value": "---",
          "unit": "---",
          "alarm": "0",
          "min": "---",
          "max": "---",
          "hys": "---"
        },
        "item3": {
          "value": "---",
          "unit": "---",
          "alarm": "0",
          "min": "---",
          "max": "---",
          "hys": "---"
        }
      },
      "S2": {
        "description": "S2",
        "id": "0000000000000000",
        "SenType": "1W",
        "addr": "---",
        "item1": {
          "value": "---",
          "unit": "---",
          "alarm": "0",
          "min": "---",
          "max": "---",
          "hys": "---"
```

```
    },
    "item2": {
      "value": "---",
      "unit": "---",
      "alarm": "0",
      "min": "---",
      "max": "---",
      "hys": "---"
    },
    "item3": {
      "value": "---",
      "unit": "---",
      "alarm": "0",
      "min": "---",
      "max": "---",
      "hys": "---"
    }
  },
  "S3": {
    "description": "S3",
    "id": "0000000000000000",
    "SenType": "1W",
    "addr": "---",
    "item1": {
      "value": "---",
      "unit": "---",
      "alarm": "0",
      "min": "---",
      "max": "---",
      "hys": "---"
    },
    "item2": {
      "value": "---",
      "unit": "---",
      "alarm": "0",
      "min": "---",
      "max": "---",
      "hys": "---"
    },
    "item3": {
      "value": "---",
      "unit": "---",
      "alarm": "0",
      "min": "---",
      "max": "---",
      "hys": "---"
    }
  },
  "S4": {
    "description": "S4",
    "id": "0000000000000000",
    "SenType": "1W",
    "addr": "---",
    "item1": {
      "value": "---",
      "unit": "---",
      "alarm": "0",
      "min": "---",
      "max": "---",
      "hys": "---"
    },
    "item2": {
      "value": "---",
      "unit": "---",
      "alarm": "0",
      "min": "---",
      "max": "---",
      "hys": "---"
    },
    "item3": {
      "value": "---",
      "unit": "---",
      "alarm": "0",
      "min": "---",
      "max": "---",
      "hys": "---"
    }
```

```
},
"S5": {
  "description": "S5",
  "id": "CD00000000000000",
  "SenType": "MB",
  "addr": "1",
  "item1": {
    "value": "23.160",
    "unit": "°C",
    "alarm": "0",
    "min": "-40.000",
    "max": "85.000",
    "hys": "8.500"
  },
  "item2": {
    "value": "31.803",
    "unit": "%RH",
    "alarm": "0",
    "min": "0.000",
    "max": "100.000",
    "hys": "10.000"
  },
  "item3": {
    "value": "5.483",
    "unit": "°C",
    "alarm": "0",
    "min": "0.000",
    "max": "25.000",
    "hys": "2.500"
  }
},
"S6": {
  "description": "S6",
  "id": "00000000000000000",
  "SenType": "MB",
  "addr": "2",
  "item1": {
    "value": "25.125",
    "unit": "°C",
    "alarm": "0",
    "min": "-40.000",
    "max": "85.000",
    "hys": "8.500"
  },
  "item2": {
    "value": "---",
    "unit": "---",
    "alarm": "0",
    "min": "---",
    "max": "---",
    "hys": "---"
  },
  "item3": {
    "value": "---",
    "unit": "---",
    "alarm": "0",
    "min": "---",
    "max": "---",
    "hys": "---"
  }
},
"S7": {
  "description": "S7",
  "id": "00000000000000000",
  "SenType": "MB",
  "addr": "0",
  "item1": {
    "value": "---",
    "unit": "---",
    "alarm": "0",
    "min": "---",
    "max": "---",
    "hys": "---"
  },
  "item2": {
    "value": "---",
    "unit": "---",
```

```
            "alarm": "0",
            "min": "---",
            "max": "---",
            "hys": "---"
          },
          "item3": {
            "value": "---",
            "unit": "---",
            "alarm": "0",
            "min": "---",
            "max": "---",
            "hys": "---"
          }
        },
        "S8": {
          "description": "S8",
          "id": "0000000000000000",
          "SenType": "MB",
          "addr": "0",
          "item1": {
            "value": "---",
            "unit": "---",
            "alarm": "0",
            "min": "---",
            "max": "---",
            "hys": "---"
          },
          "item2": {
            "value": "---",
            "unit": "---",
            "alarm": "0",
            "min": "---",
            "max": "---",
            "hys": "---"
          },
          "item3": {
            "value": "---",
            "unit": "---",
            "alarm": "0",
            "min": "---",
            "max": "---",
            "hys": "---"
          }
        }
      },
      "HTTPPush": {
        "Key": "",
        "PushPeriod": "300"
      },
      "hwerr": "",
      "Alarmed": "0",
      "Scannig": "",
      "Time": {
        "Date": "11.10.2023",
        "Time": "09:00:12"
      }
    }
  }
```

8.3. Modbus TCP/IP

Modbus TCP/IP is a serial communications protocol originally published by Modicon in 1979. It facilitates master-slave/client-server communication between intelligent devices. This protocol is commonly employed to connect a supervisory computer with a remote terminal unit (RTU) within supervisory control and data acquisition (SCADA) systems.

Modbus TCP/IP operates over Ethernet, enabling communication between devices such as sensors, actuators, and controllers. The protocol is widely adopted due to its simplicity and reliability in industrial and automation applications. It allows for the exchange of data and commands, making it an essential component for integrating and monitoring various devices within a networked environment.

8.3.1. Codes and answers

8.3.1.1. Read Holding Registers (FC=03)

Request

This command is requesting the content of holding registers 19800.

03 4D58 0002

03: The Function Code 3 (read Holding Registers)
4D58: The Data Address of the first register requested (4D58 hex = 19800)
0002: The total number of registers requested. (read 2 registers each 2 byte = 4 bytes)

Response

03 04 41BD 0655

03: The Function Code 3 (read Sensor 1 Part 1 Holding Registers)
04: The number of data bytes to follow (2 registers x 2 bytes each = 4 bytes)
41BD 0655: 4 bytes value

All holding registers with float value are sent in big-endian.

In the example, the above value of 23.628 is sent.

Request

This command is requesting the content of holding registers 18100.

03 46B4 0020

03: Function Code 3 (read Sensor 1 description Holding Registers)
46B4: The Data Address of the first register requested (46B4 hex = 18100)
0020: The total number of registers requested (read 32 registers each 2 byte = 64 bytes)

Response

03 40 5365 6E73 6F72 3100 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

03: Function Code 3 (read Holding Registers)
40: The number of data bytes to follow (32 registers x 2 bytes each = 64 bytes)
5365 6E73 6F72 3100 0000 0000 0000 0000 0000 0000 0000 0000

0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

0000 0000 0000 0000 0000 0000 0000 0000: 64 bytes value

All holding registers with strings are sent in big-endian.

The answer is padded with 0.

In the example above string “Sensor1” is sent.

8.3.1.2. Exception codes

All exceptions are signaled by adding 0x80 to the function code of the request, and following this byte by a single reason byte for example as follows:

01 Illegal function

The function code received in the query is not an allowable action for the controller.

02 Illegal data address

The data address received in the query is not an allowable address for the slave. More specifically, the combination of the reference number and transfer length is invalid. For a controller with 100 registers, a request with offset 96 and length 4 would succeed, a request with offset 96 and length 5 will generate exception 02.

8.3.2. Address table

Parameter	FC	PDU decimal address	Data size	Data
Number of installed sensors	03	18000	16-bit Integer	
Sensor 1 description	03,16	18100	64 bytes UTF-8	
Sensor 2 description	03,16	18132	64 bytes UTF-8	
Sensor 3 description	03,16	18164	64 bytes UTF-8	
Sensor 4 description	03,16	18196	64 bytes UTF-8	
Sensor 5 description	03,16	18228	64 bytes UTF-8	
Sensor 6 description	03,16	18260	64 bytes UTF-8	
Sensor 7 description	03,16	18292	64 bytes UTF-8	
Sensor 8 description	03,16	18324	64 bytes UTF-8	
Sensor 1, S11 dimension	03	18400	64 bytes UTF-8	
Sensor 1, S12 dimension	03	18432	64 bytes UTF-8	
Sensor 1, S13 dimension	03	18464	64 bytes UTF-8	
Sensor 2, S21 dimension	03	18496	64 bytes UTF-8	
Sensor 2, S22 dimension	03	18528	64 bytes UTF-8	
Sensor 2, S23 dimension	03	18560	64 bytes UTF-8	
Sensor 3, S31 dimension	03	18592	64 bytes UTF-8	
Sensor 3, S32 dimension	03	18624	64 bytes UTF-8	
Sensor 3, S33 dimension	03	18656	64 bytes UTF-8	
Sensor 4, S41 dimension	03	18688	64 bytes UTF-8	
Sensor 4, S42 dimension	03	18720	64 bytes UTF-8	
Sensor 4, S43 dimension	03	18752	64 bytes UTF-8	
Sensor 5, S51 dimension	03	18784	64 bytes UTF-8	
Sensor 5, S52 dimension	03	18816	64 bytes UTF-8	
Sensor 5, S53 dimension	03	18848	64 bytes UTF-8	
Sensor 6, S61 dimension	03	18880	64 bytes UTF-8	
Sensor 6, S62 dimension	03	18912	64 bytes UTF-8	
Sensor 6, S63 dimension	03	18944	64 bytes UTF-8	

Sensor 7, S71 dimension	03	18976	64 bytes UTF-8	
Sensor 7, S72 dimension	03	19008	64 bytes UTF-8	
Sensor 7, S73 dimension	03	19040	64 bytes UTF-8	
Sensor 8, S81 dimension	03	19072	64 bytes UTF-8	
Sensor 8, S82 dimension	03	19104	64 bytes UTF-8	
Sensor 8, S83 dimension	03	19136	64 bytes UTF-8	
Sensor 1, S11 max	03,16	19200	32-bit Float	
Sensor 1, S12 max	03,16	19202	32-bit Float	
Sensor 1, S13 max	03,16	19204	32-bit Float	
Sensor 2, S21 max	03,16	19206	32-bit Float	
Sensor 2, S22 max	03,16	19208	32-bit Float	
Sensor 2, S23 max	03,16	19210	32-bit Float	
Sensor 3, S31 max	03,16	19212	32-bit Float	
Sensor 3, S32 max	03,16	19214	32-bit Float	
Sensor 3, S33 max	03,16	19216	32-bit Float	
Sensor 4, S41 max	03,16	19218	32-bit Float	
Sensor 4, S42 max	03,16	19220	32-bit Float	
Sensor 4, S43 max	03,16	19222	32-bit Float	
Sensor 5, S51 max	03,16	19224	32-bit Float	
Sensor 5, S52 max	03,16	19226	32-bit Float	
Sensor 5, S53 max	03,16	19228	32-bit Float	
Sensor 6, S61 max	03,16	19230	32-bit Float	
Sensor 6, S62 max	03,16	19232	32-bit Float	
Sensor 6, S63 max	03,16	19234	32-bit Float	
Sensor 7, S71 max	03,16	19236	32-bit Float	
Sensor 7, S72 max	03,16	19238	32-bit Float	
Sensor 7, S73 max	03,16	19240	32-bit Float	
Sensor 8, S81 max	03,16	19242	32-bit Float	
Sensor 8, S82 max	03,16	19244	32-bit Float	
Sensor 8, S83 max	03,16	19246	32-bit Float	
Sensor 1, S11 min	03,16	19300	32-bit Float	
Sensor 1, S12 min	03,16	19302	32-bit Float	
Sensor 1, S13 min	03,16	19304	32-bit Float	
Sensor 2, S21 min	03,16	19306	32-bit Float	
Sensor 2, S22 min	03,16	19308	32-bit Float	
Sensor 2, S23 min	03,16	19310	32-bit Float	
Sensor 3, S31 min	03,16	19312	32-bit Float	
Sensor 3, S32 min	03,16	19314	32-bit Float	
Sensor 3, S33 min	03,16	19316	32-bit Float	
Sensor 4, S41 min	03,16	19318	32-bit Float	
Sensor 4, S42 min	03,16	19320	32-bit Float	
Sensor 4, S43 min	03,16	19322	32-bit Float	
Sensor 5, S51 min	03,16	19324	32-bit Float	
Sensor 5, S52 min	03,16	19326	32-bit Float	
Sensor 5, S53 min	03,16	19328	32-bit Float	
Sensor 6, S61 min	03,16	19330	32-bit Float	
Sensor 6, S62 min	03,16	19332	32-bit Float	

Sensor 6, S63 min	03,16	19334	32-bit Float	
Sensor 7, S71 min	03,16	19336	32-bit Float	
Sensor 7, S72 min	03,16	19338	32-bit Float	
Sensor 7, S73 min	03,16	19340	32-bit Float	
Sensor 8, S81 min	03,16	19342	32-bit Float	
Sensor 8, S82 min	03,16	19344	32-bit Float	
Sensor 8, S83 min	03,16	19346	32-bit Float	
Sensor 1, S11 hysteresis	03,16	19400	32-bit Float	
Sensor 1, S12 hysteresis	03,16	19402	32-bit Float	
Sensor 1, S13 hysteresis	03,16	19404	32-bit Float	
Sensor 2, S21 hysteresis	03,16	19406	32-bit Float	
Sensor 2, S22 hysteresis	03,16	19408	32-bit Float	
Sensor 2, S23 hysteresis	03,16	19410	32-bit Float	
Sensor 3, S31 hysteresis	03,16	19412	32-bit Float	
Sensor 3, S32 hysteresis	03,16	19414	32-bit Float	
Sensor 3, S33 hysteresis	03,16	19416	32-bit Float	
Sensor 4, S41 hysteresis	03,16	19418	32-bit Float	
Sensor 4, S42 hysteresis	03,16	19420	32-bit Float	
Sensor 4, S43 hysteresis	03,16	19422	32-bit Float	
Sensor 5, S51 hysteresis	03,16	19424	32-bit Float	
Sensor 5, S52 hysteresis	03,16	19426	32-bit Float	
Sensor 5, S53 hysteresis	03,16	19428	32-bit Float	
Sensor 6, S61 hysteresis	03,16	19430	32-bit Float	
Sensor 6, S62 hysteresis	03,16	19432	32-bit Float	
Sensor 6, S63 hysteresis	03,16	19434	32-bit Float	
Sensor 7, S71 hysteresis	03,16	19436	32-bit Float	
Sensor 7, S72 hysteresis	03,16	19438	32-bit Float	
Sensor 7, S73 hysteresis	03,16	19440	32-bit Float	
Sensor 8, S81 hysteresis	03,16	19442	32-bit Float	
Sensor 8, S82 hysteresis	03,16	19444	32-bit Float	
Sensor 8, S83 hysteresis	03,16	19446	32-bit Float	
Sensor 1, S11 multiplier	03,16	19500	32-bit Float	
Sensor 1, S12 multiplier	03,16	19502	32-bit Float	
Sensor 1, S13 multiplier	03,16	19504	32-bit Float	
Sensor 2, S21 multiplier	03,16	19506	32-bit Float	
Sensor 2, S22 multiplier	03,16	19508	32-bit Float	
Sensor 2, S23 multiplier	03,16	19510	32-bit Float	
Sensor 3, S31 multiplier	03,16	19512	32-bit Float	
Sensor 3, S32 multiplier	03,16	19514	32-bit Float	
Sensor 3, S33 multiplier	03,16	19516	32-bit Float	
Sensor 4, S41 multiplier	03,16	19518	32-bit Float	
Sensor 4, S42 multiplier	03,16	19520	32-bit Float	
Sensor 4, S43 multiplier	03,16	19522	32-bit Float	
Sensor 5, S51 multiplier	03,16	19524	32-bit Float	
Sensor 5, S52 multiplier	03,16	19526	32-bit Float	
Sensor 5, S53 multiplier	03,16	19528	32-bit Float	

Sensor 6, S61 multiplier	03,16	19530	32-bit Float	
Sensor 6, S62 multiplier	03,16	19532	32-bit Float	
Sensor 6, S63 multiplier	03,16	19534	32-bit Float	
Sensor 7, S71 multiplier	03,16	19536	32-bit Float	
Sensor 7, S72 multiplier	03,16	19538	32-bit Float	
Sensor 7, S73 multiplier	03,16	19540	32-bit Float	
Sensor 8, S81 multiplier	03,16	19542	32-bit Float	
Sensor 8, S82 multiplier	03,16	19544	32-bit Float	
Sensor 8, S83 multiplier	03,16	19546	32-bit Float	
Sensor 1, S11 offset	03,16	19600	32-bit Float	
Sensor 1, S12 offset	03,16	19602	32-bit Float	
Sensor 1, S13 offset	03,16	19604	32-bit Float	
Sensor 2, S21 offset	03,16	19606	32-bit Float	
Sensor 2, S22 offset	03,16	19608	32-bit Float	
Sensor 2, S23 offset	03,16	19610	32-bit Float	
Sensor 3, S31 offset	03,16	19612	32-bit Float	
Sensor 3, S32 offset	03,16	19614	32-bit Float	
Sensor 3, S33 offset	03,16	19616	32-bit Float	
Sensor 4, S41 offset	03,16	19618	32-bit Float	
Sensor 4, S42 offset	03,16	19620	32-bit Float	
Sensor 4, S43 offset	03,16	19622	32-bit Float	
Sensor 5, S51 offset	03,16	19624	32-bit Float	
Sensor 5, S52 offset	03,16	19626	32-bit Float	
Sensor 5, S53 offset	03,16	19628	32-bit Float	
Sensor 6, S61 offset	03,16	19630	32-bit Float	
Sensor 6, S62 offset	03,16	19632	32-bit Float	
Sensor 6, S63 offset	03,16	19634	32-bit Float	
Sensor 7, S71 offset	03,16	19636	32-bit Float	
Sensor 7, S72 offset	03,16	19638	32-bit Float	
Sensor 7, S73 offset	03,16	19640	32-bit Float	
Sensor 8, S81 offset	03,16	19642	32-bit Float	
Sensor 8, S82 offset	03,16	19644	32-bit Float	
Sensor 8, S83 offset	03,16	19646	32-bit Float	
Sensor 1 ID	03	19700	16 bytes UTF-8	Example: 2860B85F07000094
Sensor 2 ID	03	19708	16 bytes UTF-8	
Sensor 3 ID	03	19716	16 bytes UTF-8	
Sensor 4 ID	03	19724	16 bytes UTF-8	
Sensor 5 ID	03	19732	16 bytes UTF-8	
Sensor 6 ID	03	19740	16 bytes UTF-8	
Sensor 7 ID	03	19748	16 bytes UTF-8	
Sensor 8 ID	03	19756	16 bytes UTF-8	
Sensor 1, S11 value	03	19800	32-bit Float	
Sensor 1, S12 value	03	19802	32-bit Float	
Sensor 1, S13 value	03	19804	32-bit Float	
Sensor 2, S21 value	03	19806	32-bit Float	

Sensor 2, S22 value	03	19808	32-bit Float	
Sensor 2, S23 value	03	19810	32-bit Float	
Sensor 3, S31 value	03	19812	32-bit Float	
Sensor 3, S32 value	03	19814	32-bit Float	
Sensor 3, S33 value	03	19816	32-bit Float	
Sensor 4, S41 value	03	19818	32-bit Float	
Sensor 4, S42 value	03	19820	32-bit Float	
Sensor 4, S43 value	03	19822	32-bit Float	
Sensor 5, S51 value	03	19824	32-bit Float	
Sensor 5, S52 value	03	19826	32-bit Float	
Sensor 5, S53 value	03	19828	32-bit Float	
Sensor 6, S61 value	03	19830	32-bit Float	
Sensor 6, S62 value	03	19832	32-bit Float	
Sensor 6, S63 value	03	19834	32-bit Float	
Sensor 7, S71 value	03	19836	32-bit Float	
Sensor 7, S72 value	03	19838	32-bit Float	
Sensor 7, S73 value	03	19840	32-bit Float	
Sensor 8, S81 value	03	19842	32-bit Float	
Sensor 8, S82 value	03	19844	32-bit Float	
Sensor 8, S83 value	03	19846	32-bit Float	
Sensor 1, S11 row value	03	19900	32-bit Float	
Sensor 1, S12 row value	03	19902	32-bit Float	
Sensor 1, S13 row value	03	19904	32-bit Float	
Sensor 2, S21 row value	03	19906	32-bit Float	
Sensor 2, S22 row value	03	19908	32-bit Float	
Sensor 2, S23 row value	03	19910	32-bit Float	
Sensor 3, S31 row value	03	19912	32-bit Float	
Sensor 3, S32 row value	03	19914	32-bit Float	
Sensor 3, S33 row value	03	19916	32-bit Float	
Sensor 4, S41 row value	03	19918	32-bit Float	
Sensor 4, S42 row value	03	19920	32-bit Float	
Sensor 4, S43 row value	03	19922	32-bit Float	
Sensor 5, S51 row value	03	19924	32-bit Float	
Sensor 5, S52 row value	03	19926	32-bit Float	
Sensor 5, S53 row value	03	19928	32-bit Float	
Sensor 6, S61 row value	03	19930	32-bit Float	
Sensor 6, S62 row value	03	19932	32-bit Float	
Sensor 6, S63 row value	03	19934	32-bit Float	
Sensor 7, S71 row value	03	19936	32-bit Float	
Sensor 7, S72 row value	03	19938	32-bit Float	
Sensor 7, S73 row value	03	19940	32-bit Float	
Sensor 8, S81 row value	03	19942	32-bit Float	
Sensor 8, S82 row value	03	19944	32-bit Float	
Sensor 8, S83 row value	03	19946	32-bit Float	
Sensor 1, S11 alarm status	03	20000	16-bit unsign int	normal (0), alarm (1)
Sensor 1, S12 alarm status	03	20001	16-bit unsign int	normal (0), alarm (1)

Sensor 1, S13 alarm status	03	20002	16-bit unsign int	normal (0), alarm (1)
Sensor 2, S21 alarm status	03	20003	16-bit unsign int	normal (0), alarm (1)
Sensor 2, S22 alarm status	03	20004	16-bit unsign int	normal (0), alarm (1)
Sensor 2, S23 alarm status	03	20005	16-bit unsign int	normal (0), alarm (1)
Sensor 3, S31 alarm status	03	20006	16-bit unsign int	normal (0), alarm (1)
Sensor 3, S32 alarm status	03	20007	16-bit unsign int	normal (0), alarm (1)
Sensor 3, S33 alarm status	03	20008	16-bit unsign int	normal (0), alarm (1)
Sensor 4, S41 alarm status	03	20009	16-bit unsign int	normal (0), alarm (1)
Sensor 4, S42 alarm status	03	20010	16-bit unsign int	normal (0), alarm (1)
Sensor 4, S43 alarm status	03	20011	16-bit unsign int	normal (0), alarm (1)
Sensor 5, S51 alarm status	03	20012	16-bit unsign int	normal (0), alarm (1)
Sensor 5, S52 alarm status	03	20013	16-bit unsign int	normal (0), alarm (1)
Sensor 5, S53 alarm status	03	20014	16-bit unsign int	normal (0), alarm (1)
Sensor 6, S61 alarm status	03	20015	16-bit unsign int	normal (0), alarm (1)
Sensor 6, S62 alarm status	03	20016	16-bit unsign int	normal (0), alarm (1)
Sensor 6, S63 alarm status	03	20017	16-bit unsign int	normal (0), alarm (1)
Sensor 7, S71 alarm status	03	20018	16-bit unsign int	normal (0), alarm (1)
Sensor 7, S72 alarm status	03	20019	16-bit unsign int	normal (0), alarm (1)
Sensor 7, S73 alarm status	03	20020	16-bit unsign int	normal (0), alarm (1)
Sensor 8, S81 alarm status	03	20021	16-bit unsign int	normal (0), alarm (1)
Sensor 8, S82 alarm status	03	20022	16-bit unsign int	normal (0), alarm (1)
Sensor 8, S83 alarm status	03	20023	16-bit unsign int	normal (0), alarm (1)
Save configuration	03,06	50000	16-bit unsign int	unsaved (0), saved (1)
Restart device	03,06	50001	16-bit unsign int	cancel (0), restart (1)
Temperature unit	03,06	50002	16-bit unsign int	Celsius (0), Fahrenheit (1)
HW error	03,06	50003	16-bit unsign int	noErr (0), hwErr (1)
Device ID	03	50100	18 bytes UTF-8	Example: 5c:32:c5:00:ac:52
Hostname	03	50200	16 bytes UTF-8	
Device IP	03	50300	16 bytes UTF-8	Example: 192.168.1.2

8.4. Modbus RTU

8.4.1. Communication parameters

For Modbus RTU, TCW210-TH supports the following communication parameters:

- Baud rate – 2400, 4800, 9600, 19200, 38400, or 57600;
- Data bits – 8;
- Stop bits – 1 or 2;
- Parity – Odd or Even;

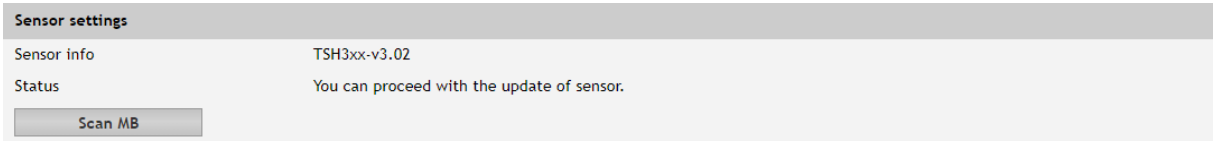
The factory default communication parameters for the device are the standard ones for Modbus RTU:

- Baud rate – 19200;
- Data bits – 8;
- Stop bits – 1;
- Parity – Even;

8.4.2. Teracom sensors update tool

The TCW210-TH supports the Teracom sensor firmware update tool, which is available at http://device.ip.address/teracom485.htm.
Attention! To make any changes to a Modbus RTU sensor, it should be the only device on the RS-485 bus.

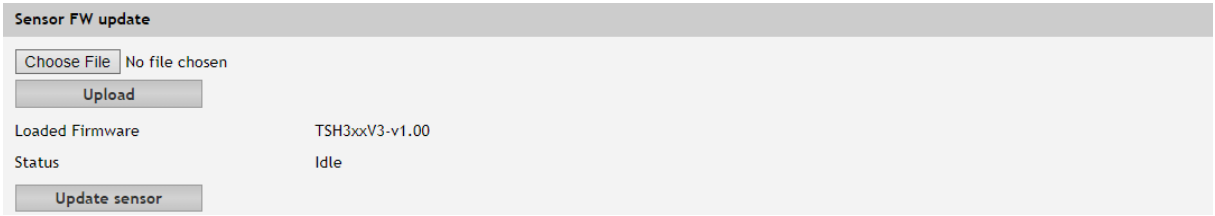
8.4.2.1. Sensor settings



The tool operates using the current Modbus RTU communication parameters. To avoid communication collisions, it is advisable to configure both the TCW210-TH and the sensor with the factory default Modbus RTU communication parameters. This practice ensures smooth operation. The default Modbus RTU communication parameters for the TCW210-TH are detailed in Section 8.4.1.

Before making any changes, it is strongly recommended to scan for the sensor settings. This scan will provide information about the current firmware version of the sensor and verify whether the sensor is the only device on the bus.

8.4.2.2. Sensor FW update



To initiate the firmware update, the appropriate file must first be uploaded to the sensor. After the upload is complete, click the “Update” button to proceed.

8.5. Logger

The logger uses a circular buffer in the device's FLASH memory. When the buffer becomes full, new data automatically overwrites the oldest entries, ensuring that the FLASH memory always holds the most recent complete log. There is no command to clear the log, and a copy of the full log is always available for download.

The number of log entries depends on the length of descriptions and the type of characters used. In the worst-case scenario (with 15-byte descriptions using characters from the upper range of UTF-8), the logger can store approximately 52,000 records, which is sufficient for 36 days with records logged every minute.

New log data can also be periodically uploaded as a file to a dedicated HTTP server at time intervals of 1, 2, 3, 4, 6, 8, 12, or 24 hours. The data is uploaded in CSV format, using a semicolon (;) as the delimiter.

Each log file begins with a header row, and all rows (including the header) start with a record ID and a timestamp.

The structure of each log entry (record) is as follows:

ID	Time	Type of record	Inputs value	Relays	Alarm conditions

ID	A unique 32-bit number assigned to each row (record).
Time	The timestamp of the record in the format yyyy.mm.dd, hh:mm.
Type of record	Specifies the reason for the log entry. The available record types are:
	"Time" For periodical record;
	"Event" For records triggered by an alarm condition;
	"Type" For header records;
	"Start" Created after a power-up event;
	"Restart" Created after a reset event;
	"Power Down" Generated after a power-down event;
	"Bad" For problematic records.
Inputs value	Lists the values of all monitored inputs in the following order: sensors, analog inputs, and digital inputs.
Alarm conditions	Indicates the alarm status for each input. A value of "1" means an active alarm condition.

Example of the log file:

```
1131901;15.10.2015,01:02:23;Type;S11/°C;S12;S21/°C;S22;S31/°C;S32;S41/°C;S42;S51/°C;S52;S61/°C;S62;S71/°C;S72;S81/°C;S82;A1/V;A2/V;D1;D2;R1;R2;S1
1/°C;S12;S21/°C;S22;S31/°C;S32;S41/°C;S42;S51/°C;S52;S61/°C;S62;S71/°C;S72;S81/°C;S82;A1/V;A2/V;D1;D2;
1131902;15.10.2015,01:02:23;Time;18.250;;18.375;;18.125;;18.500;;18.188;;18.125;;18.375;;18.375;;11.352;0.065;1;0;1;0;1;;1;;1;;1;;1;;1;;1;;1;0;1;0;
1131903;15.10.2015,01:02:23;Event;18.250;;18.438;;18.125;;18.500;;18.188;;18.125;;18.313;;18.375;;11.352;0.066;0;1;0;1;1;;1;;1;;1;;1;;1;;1;;1;0;0;1;
1131904;15.10.2015,01:02:24;Time;18.250;;18.438;;18.125;;18.500;;18.188;;18.125;;18.313;;18.375;;11.352;0.066;0;1;0;1;1;;1;;1;;1;;1;;1;;1;;1;0;0;1;
1131905;15.10.2015,01:02:25;Time;18.250;;18.375;;18.125;;18.500;;18.188;;18.125;;18.313;;18.375;;11.352;0.066;0;1;0;1;1;;1;;1;;1;;1;;1;;1;;1;0;0;1;
1131906;15.10.2015,01:02:26;Time;18.250;;18.375;;18.125;;18.500;;18.188;;18.125;;18.313;;18.313;;11.352;0.066;0;1;0;1;1;;1;;1;;1;;1;;1;;1;;1;0;0;1;
1131907;15.10.2015,01:02:27;Time;18.250;;18.375;;18.125;;18.438;;18.188;;18.125;;18.313;;18.313;;11.352;0.066;0;1;0;1;1;;1;;1;;1;;1;;1;;1;;1;0;0;1;
1131908;15.10.2015,01:02:27;Event;18.250;;18.375;;18.125;;18.438;;18.188;;18.125;;18.313;;18.313;;2.198;9.092;0;1;0;1;1;;1;;1;;1;;1;;1;;1;;0;0;0;1;
```

9. Factory default settings

TCW210-TH can be restored to its original factory default settings in three different ways.

9.1. Factory default from WEB interface

Pressing the “Factory default” button in the Administration -> Backup/Restore section will reset all parameters to their factory defaults, except for network settings.

9.2. Factory default with the reset button

If the reset button is pressed for more than 5 seconds while the device is powered on, all network settings will be reverted to factory defaults.

9.3. General factory default with the reset button

To perform a complete factory reset of all parameters, follow these steps:

- Press and hold the RESET button, then turn on the power supply.
- The yellow LED will illuminate, and the red LED will blink approximately five times per second.
- After about 5 seconds, the red LED will turn off, and you can release the button.
- The yellow LED will flash once per second while the red LED remains illuminated, indicating that the device is in working mode with factory default settings.

The factory default settings are:

Username	admin
Password	admin
IP Address	192.168.1.2
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.1
SNMPConfiguration	disabled
readCommunity	public
writeCommunity	private

10. Environment information

This equipment is intended for use in a Pollution Degree 2 environment, at altitudes of up to 2000 meters.

When the controller is part of a larger system, all other elements of the system must comply with EMC (Electromagnetic Compatibility) requirements and be suitable for use under the same ambient conditions.

11. Safety

This device must not be used for medical or life-saving purposes or for any application where its failure could result in serious injury or loss of life.

To reduce the risk of fire, use only flexible stranded wire with a cross-section of 0.5mm² or larger for wiring digital and analog inputs and relay outputs of the device.

To avoid electric shock and fire hazards, do not expose this product to liquids, rain, or moisture. Objects filled with liquids, such as vases, should not be placed on this device.

There is a risk of overheating (and potential damage) to the controller if the recommended free spaces next to adjacent devices are not maintained. Ensure that there is sufficient space for attaching and removing cables after installation.

Teracom does not guarantee the successful operation of the product if it is used under conditions that deviate from the product specifications.

To ensure that the device works correctly follow these steps:

- Ensure that the device is installed properly by referring to this user manual;
- Log in to the device using a web browser;
- Complete the necessary setup;
- Install TSH1XX or TST1XX sensor on the 1-Wire bus;
- Install TSH3XX or TST3XX sensor on the RS-485 bus;
- Navigate to the “Monitoring page” of the web interface. The correct parameter values should be displayed, and the flashing “STS” LED should indicate proper operation.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Teracom Ltd. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

12. Maintenance

After any service or repair of the device, or at least once a year, a safety check must be performed to ensure that the product is in proper operating condition.

Clean the device only with dry cloth. Do not use liquid cleaners or aerosol cleaners. Do not use a magnetic/static cleaning device (dust remover) or any kind of abrasive materials to clean the device.

Following these guidelines will help maintain the device in optimal condition and ensure its longevity.

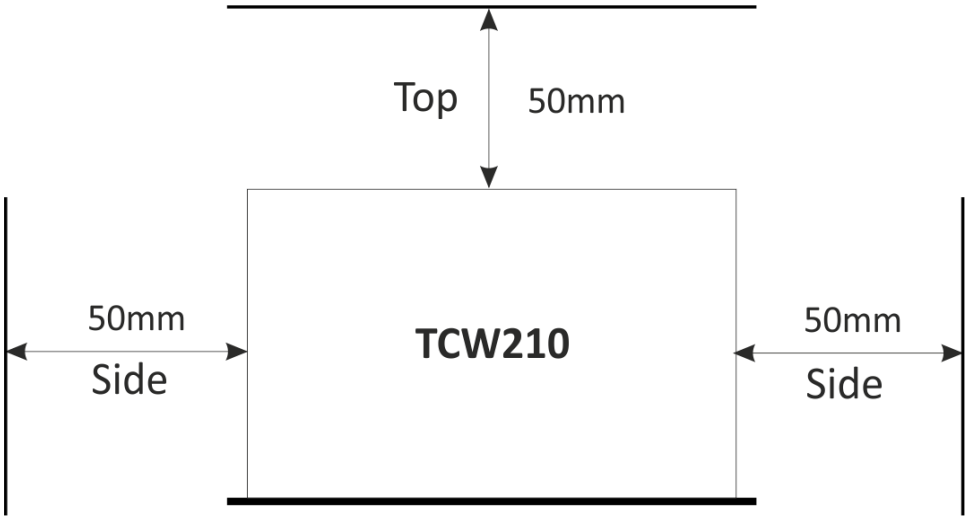


Fig.1