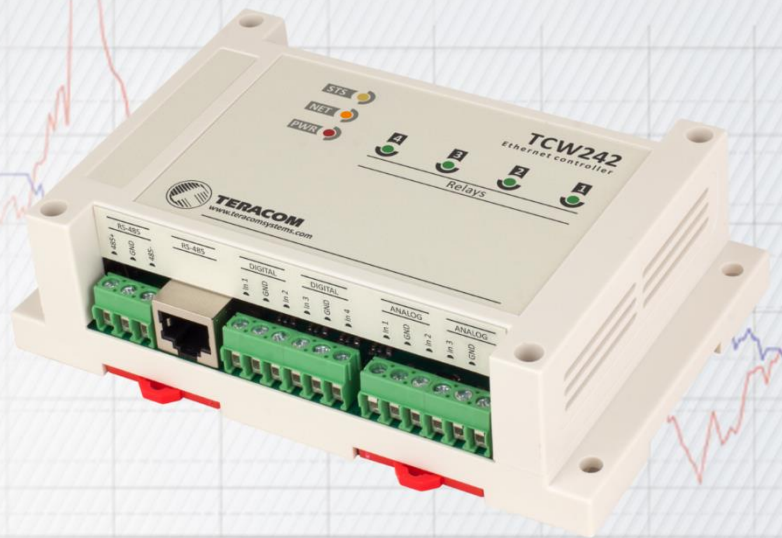




control solutions

TERACOM



TCW242 Industrial IoT module

USER MANUAL

1. Introduction

The TCW242 is an industrial-grade IoT (Internet of Things) module that offers advanced monitoring and control capabilities for industrial applications. Equipped with Ethernet connectivity and data logging functionality, this device allows users to easily monitor and analyze a wide range of parameters. The device features 4 digital inputs, 4 analog inputs, an RS-485 interface for connecting Modbus RTU sensors, 4 relays and up to 24 Modbus RTU relays. The analog inputs can be configured to work in either current loop (0-20mA) or voltage (0-10V) modes, providing flexibility in monitoring devices.

The TCW242 supports up to 24 Teracom and third-party Modbus RTU sensors, allowing users to configure up to 24 independent monitoring channels. Each channel can be set up using up to 2 input parameters and/or constants and can be configured as either discrete or general channels. This provides users with a wide range of monitoring options. In addition to monitoring capabilities, the device also offers robust alarm functionality. Users can configure up to 24 independent alarms with 5 different user-selectable states. Each alarm can be set up using up to 2 limits and hysteresis and can be assigned to a specific channel. In this case, in an alarm state, the assigned channel is colored on the monitoring page and graphs, providing users with a visual indication of the alarm state.

The device also supports a variety of communication protocols for M2M (machine-to-machine) communication, including SNMP, HTTP API, Modbus TCP/IP, and MQTT. These protocols allow for easy integration with other industrial systems and devices, providing users with a wide range of options for data analysis and control. Overall, the TCW242 industrial IoT module is a powerful and versatile device that offers advanced monitoring and control capabilities for industrial applications.

2. Features

- Ethernet connectivity at 10/100 Mbps with automatic cable detection;
- HTTP/HTTPS server support
- Web-based configuration and control with password protection;
- 4 digital inputs for dry contacts;
- 4 analog inputs with 0-10V and 0-20mA options;
- 4 relays with NO/NC contacts, plus support for up to 24 Modbus RTU relays;
- Modbus RTU for up to 24 sensors (registers);
- Monitor up to 24 channels;
- Set up to 24 independent alarms;
- SNMPv3 protocol support;
- Alarm notifications via SNMP traps;
- HTTP API commands;
- Periodical HTTP/HTTPS POST of XML/JSON status files for client-server systems;
- Modbus TCP/IP protocol support;
- MQTT 3.1.1 protocol support;
- Dynamic DNS with DynDNS, No-IP, and DNS-O-Matic support;
- NTP protocol support;
- Data logging capacity for up to 70,000 records;
- Schedule single or repeating tasks;
- Custom functions available;
- ICMP Ping Watchdogs;
- Mounts on DIN rail;
- Option to backup and restore settings;

- Remote firmware update capability.

3. Applications

The industrial IoT module is a versatile solution for a variety of applications in the light industry. Its robust design and advanced features make it ideal for remote monitoring and control in communication facilities, food and beverage storage, greenhouses, water stations, and other industrial settings. With its advanced communication options, the module can easily be integrated into existing systems, and its flexible design allows it to be configured to meet the specific needs of each application. Whether you need to monitor temperature and humidity in a greenhouse or manage water levels at a water station, this industrial IoT module is a reliable and cost-effective solution.

4. Specifications

- Physical characteristics
Dimensions: 145 x 90 x 40 mm
Weight: 200 g
- Environmental limits
Operating temperature range: -20 to 55°C
Storage temperature range: -25 to 60°C
Operating relative humidity range: 10 to 80% (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: 0.35A @ 12VDC (without Modbus RTU sensors powering)
- RS-485 interface for MODBUS RTU sensors
Isolation: Non-isolated
Output voltage (pin 7 of RJ-45): 5.0 ± 0.3 VDC
Maximum output current (pin 7 of RJ-45): 0.2 A
- Digital inputs
Isolation: Non-isolated
Mode: OPEN/CLOSED ("Dry contact") or COUNTER
Maximum input voltage: +5.5VDC
Sampling rate: 1mS
Digital filtering time interval: 5 to 60000mS
- Analog inputs
Isolation: Non-isolated
Type: Single-ended
Resolution: 12 bits
Mode: Voltage or current loop
Input Range: 0/10V or 0/20mA
Accuracy: $\pm 1\%$
Input impedance in voltage mode: 1mega-ohm (min.)
Input impedance in current loop mode: 455ohm
- Relay outputs
Type: Form C (N.O. and N.C. contacts)

Contact current rating: 3 A @ 24 VDC, 30 VAC (resistive load)
Initial insulation resistance: 100 mega-ohms (min.) @ 500 VDC
Mechanical endurance: 10 000 000 operations
Electrical endurance: 100 000 operations @ 3 A resistive load
Contact resistance: 50 milli-ohms max. (initial value)
Minimum pulse output: 0.1 Hz at rated load

CAUTION: The device does not contain any internal overcurrent protection facilities on the relay's contact lines.

External fuses or short circuit current limiting circuit breakers, rated to 3 Amps, are to be used for overcurrent protection of the connecting lines.

- Internal FLASH memory
Settings segment endurance: 100 000 cycles (Every setting change is a memory cycle).
Data logger segment endurance: 100 000 full scrolls (70000 records) of the logger.
Update segment endurance: 100 000 cycles (updates).
- Lithium battery
Type: CR1220



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

5. LED indicators

The following indicators show the status of the controller:

- **REL1 - REL4** (green) – This LED lights up when the corresponding relay is activated, meaning the normally open (NO) contact is connected to the common (COM) terminal
- **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 configuration

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 TCW242 must be installed in a clean, dry, and non-flammable location. Ventilation is recommended for high ambient temperature environments.

To mount the device, use two plastic dowels (e.g. Würth GmbH 0912 802 002) and two dowel screws (e.g. Würth GmbH 0157 06 70) to secure it to a wall. Refer to fig.1 in Appendix D for mechanical details.

Leave 50 mm of space on all sides for ventilation and electrical isolation. Refer to fig.2 in Appendix D.

The device can also be attached to a standard DIN rail (35mm by 7.55mm) by hooking the back of the enclosure onto the rail and snapping the bottom into place.

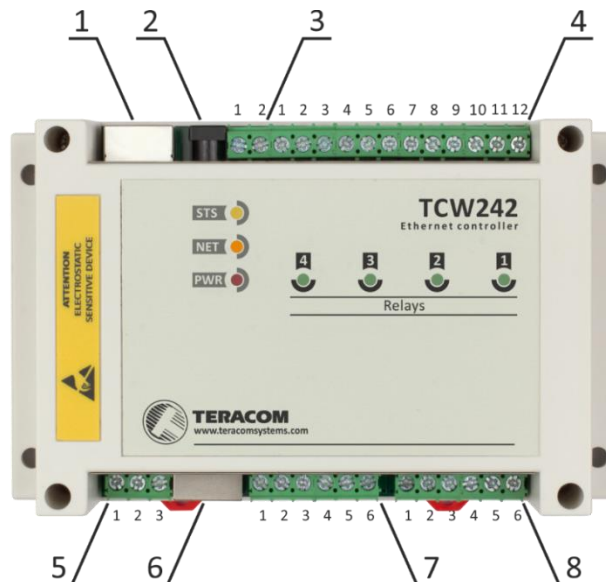
6.2. Connection

Warning! Power off before wiring.

Follow these steps for correct wiring:

- Turn off power;
- Connect wires to terminals;
- Turn on the power.

Ensure that wires are securely attached to terminals and tightened. Improper wiring or configuration can cause permanent damage to TCW242 or connected equipment.



Connector 1	Ethernet - RJ45	Connector 6	Pin1 – not connected (most left)
Connector 2	Power - 2.1x5.5mm connector, central positive		Pin2 – not connected
Connector 3	Pin1 – Power positive		Pin3 – not connected
	Pin2 – Power negative		Pin4 – RS485-
Connector 4	Pin1 – NC Relay4		Pin5 – RS485+
	Pin2 – COM Relay4		Pin6 – not connected
	Pin3 – NO Relay4		Pin7 – +VDD
	Pin4 – NC Relay3	Connector 7	Pin1 – Digital In 1
	Pin5 – COM Relay3		Pin2 – GND
	Pin6 – NO Relay3		Pin3 – Digital In 2
	Pin7 – NC Relay2		Pin4 – Digital In 3
	Pin8 – COM Relay2		Pin5 – GND
	Pin9 – NO Relay2		Pin6 – Digital In 4
	Pin10 – NC Relay1	Connector 8	Pin1 – Analog In 1
	Pin11 – COM Relay1		Pin2 – GND
	Pin12 – NO Relay1		Pin3 – Analog In 2
Connector 5	Pin1 – RS485+		Pin4 – Analog In 3
	Pin2 – GND		Pin5 – GND
	Pin3 – RS485-		Pin6 – Analog In 4

6.2.1. Power supply connection

TCW242 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. Digital inputs connection

Note that all inputs are not isolated from the power supply ground.

The digital inputs of TCW242 in OPEN/CLOSED mode can monitor devices with "dry contact" outputs such as door contacts, push buttons, PIR detectors, etc.

To connect an alarm button and PIR detector to TCW242, connect one side to the "Digital In" terminal and the other side to the "GND" terminal, as illustrated in a picture:

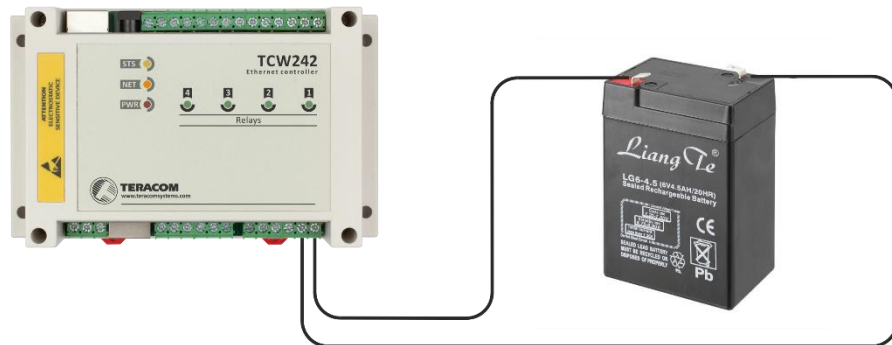


For COUNTER mode, the inputs can monitor devices with a "dry contact" pulse output interface. The maximum cable length should not exceed 30 meters.

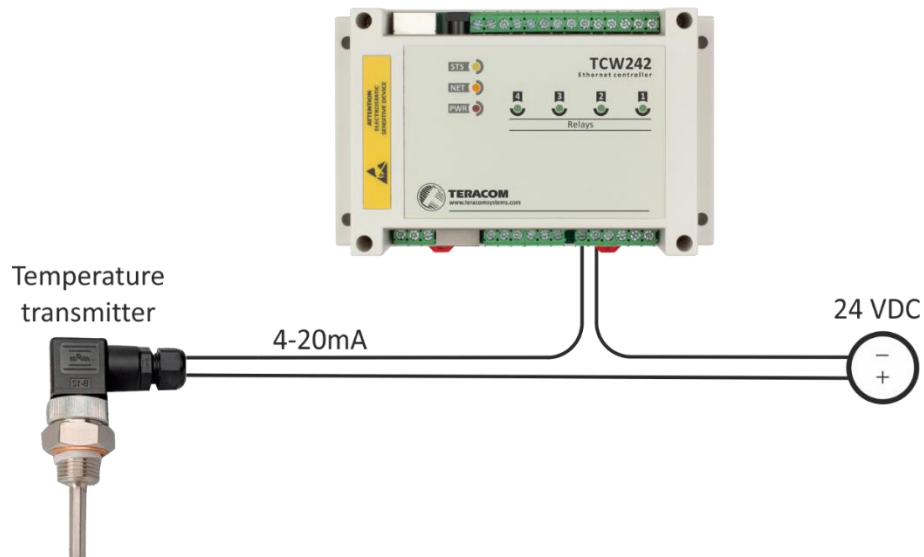
6.2.3. Analog inputs connection

Note that all inputs are not isolated from the power supply ground.

The analog inputs of TCW242 can be used to monitor devices with voltage and current loop outputs and connect directly to sensors, such as temperature and humidity sensors, voltage and current transducers, etc. The illustration shows how to connect a battery to the analog input of TCW242 in voltage mode, with the positive terminal connected to "Analog In" and the negative terminal to "GND".



The illustration shows how to connect a temperature sensor with a current loop output to the analog input. Connect the active terminal to "Analog In" and the shield terminal to "GND".



The maximum cable length should not exceed 30 meters.

6.2.4. RS-485 connection

The RS-485 interface is not isolated from the power supply ground.

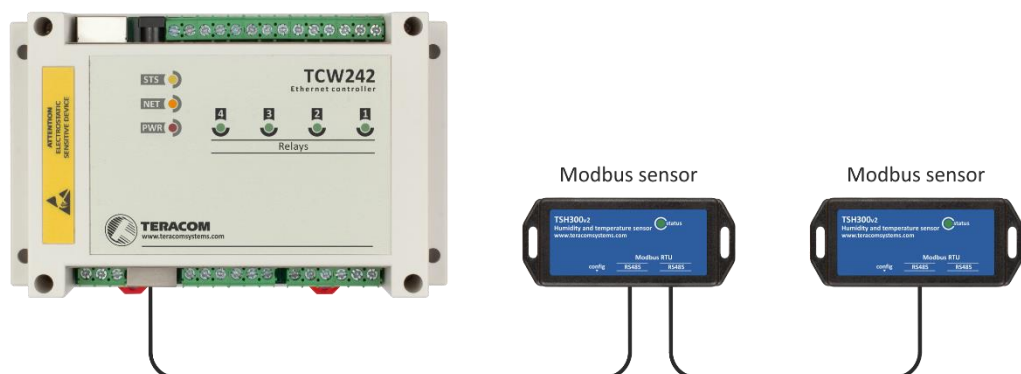
RS-485 is an industry-standard for serial communication, ideal for long-distance connections and environments with high electrical noise, such as industrial settings.

The TCW242 is compatible with Modbus RTU (over RS-485) slave devices and supports connections with up to 24 compatible devices, including those from Teracom and third-party manufacturers.

Connections are made using a standard RJ-45 connector, with the pinout specified in the “Modbus over Serial Line Specification and Implementation Guide”, available at www.modbus.org.

To maintain signal integrity, it is essential to use 120-ohm line terminators at both ends of the RS-485 bus. The TCW242 includes one terminator and should be installed at one end of the line, leaving the other end for the user to terminate.

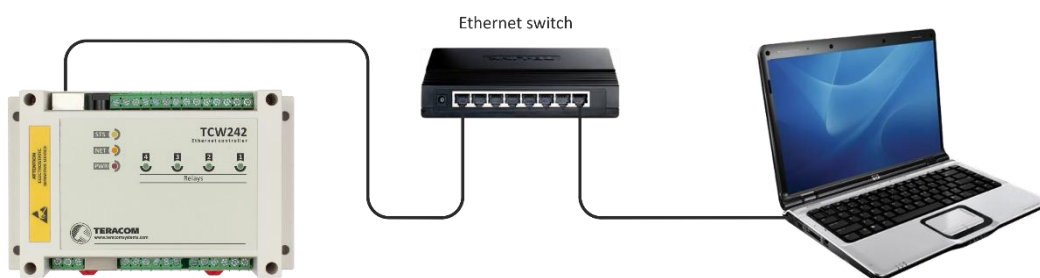
For setups with multiple devices, a daisy-chain (linear) topology is strongly recommended:



It is recommended to use only UTP or FTP cables. Keep the total cable length within 30 meters; however, functionality has been observed over longer distances.

6.2.5. Ethernet connectivity

The Ethernet port of TCW242 should be connected to a 10/100 Base-T Ethernet hub, switch, or router.



For configuration purposes, the TCW242 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.



TCW242 can also be integrated into a wireless network by connecting it through a wireless router.

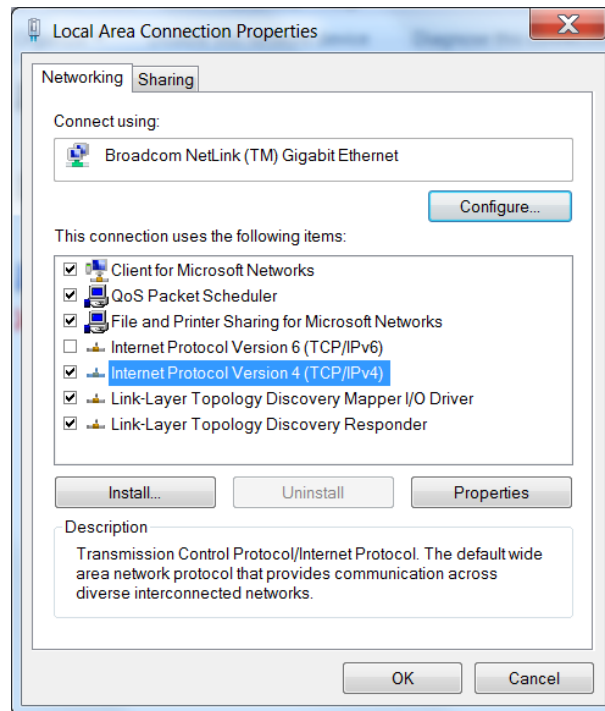


6.3. Communication setup

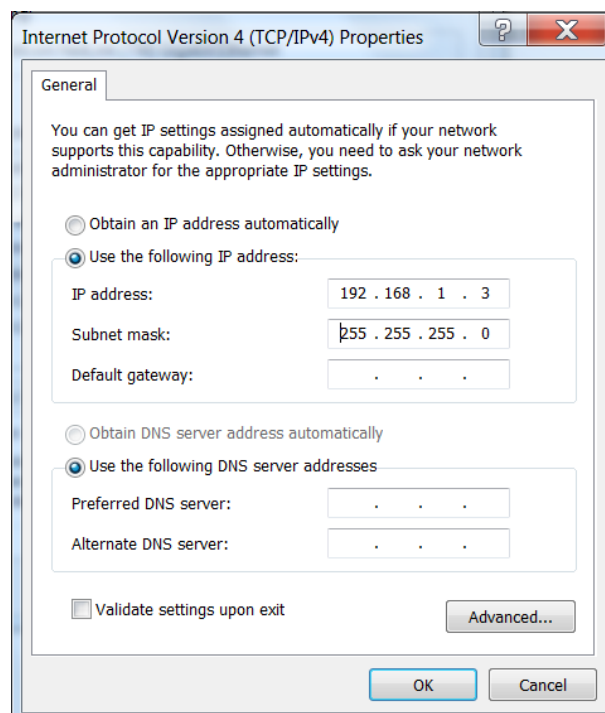
The TCW242 is shipped with the following default network settings:

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

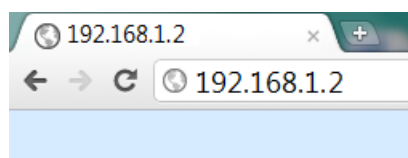
To establish communication with the TCW242, you can assign a temporary IP address to your computer. For computers running Windows OS, this can be done through the “Local Area Connection Properties”:



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:

A screenshot of a 'Sign in' login pop-up window. The window has a white background and a thin border. At the top, it says 'Sign in' followed by the URL 'http://192.168.1.2' and a warning: 'Your connection to this site is not private'. Below this, there are two input fields: 'Username' and 'Password'. At the bottom right, there are two buttons: 'Sign in' (in blue) and 'Cancel' (in white).

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.

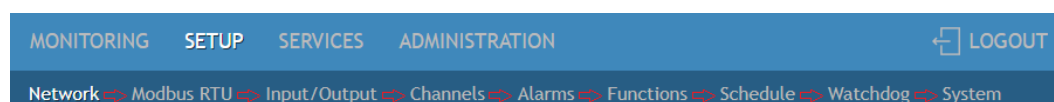
All TCWxxx controllers connected to the LAN can be easily located using the free tool “TCW Discoverer”. This tool is available for both Windows and Mac operating systems and can be downloaded from www.teracomsystems.com.

7. Set up concept

The primary setup channel for the device is the web interface, which is recommended for use as it provides access to a broader range of settings than available through SNMP and HTTP API commands. For proper setup, follow these steps:

- Network Configuration: Begin by configuring the network settings.
- Primary Parameters: Set the primary parameters, including Modbus RTU sensors/relays, analog inputs, and digital inputs.
- Channel Creation: Create channels from the configured primary parameters. Each channel can combine up to two primary parameters and constants using mathematical operations; however, a channel may also be based on a single primary parameter.
- Alarm Setup: After channel configuration, proceed to set up alarms. Note that alarms work with channels rather than primary parameters. Each alarm can have up to two conditions, potentially involving different channels. While alarms operate independently of channels, they can also be assigned to a specific channel if needed.
- Functions, Schedules, and Watchdog: Once alarms are set, configure Functions, Schedules, and Watchdog parameters.
- Service Activation: When all previous settings are complete, activate the desired services, such as the data logger, SNMP, HTTP API, and others.

In summary, the correct setup process should follow this sequence:



8. Web interface

The web interface facilitates configuration and monitoring tasks, with all pages encoded in UTF-8. The controller accommodates multiple active sessions, and for the web interface, the device is compatible with both HTTP and HTTPS.

8.1. Monitoring

This section displays the status of all channels, relays, Modbus RTU relays, and alarms in both text and graphical formats.

The Data and Alarms pages refresh automatically at intervals between 0 and 253 seconds, where zero disables auto-refresh. This interval can be configured in the Setup → System → Refresh of Channels and Alarms Pages section, with a default setting of 1 second.

8.1.1. Channels, relays and Modbus RTU relays

This page displays the current values of all channels, along with their alarm statuses, as well as the statuses of relays and Modbus RTU relays. The information is updated at the set refresh interval.

Channels				
Channel	Description	Value	Unit	Status
1	>7	4.000		
2	Temp.	25.790	Celsius	Normal
3	Szafa 1	26.987	*C	
4	V04	---		

Relays			
Relay	Description	Status	Control
1	Main Lamp	OFF	ON OFF Pulse
2	Relay 2	OFF	controlled by AL02
3	Relay 3	OFF	controlled by AL03
4	Relay 4	OFF	controlled by Function 1
			All On All Off Pulse All

Modbus RTU relays			
Relay	Description	Status	Control
1	Modbus Relay 1	No connection, wait ON	ON OFF
			All On All Off

Each relay can be activated remotely via the web interface, HTTP API, MQTT, SNMP, or locally based on the status of assigned Alarms, Any alarm, Schedules, Functions, or Watchdogs.

For web control, each relay provides "On" "Off" and "Pulse" buttons, as well as "All On" "All Off" and "Pulse All" buttons for collective relay control. The pulse duration, in seconds, can be individually configured for each relay in the "Setup -> Input/Output -> Relay Outputs" section.

For Modbus RTU relays controlled via the web interface, only "On" and "Off" buttons are available, with no "Pulse" functionality. However "All On" and "All Off" buttons are available for collective control of Modbus RTU relays.

For relays activated locally, a text description of the controlling parameter is shown instead of control buttons. Parameters for local relay activation can be configured in the "Setup -> Input/Output -> Relay Outputs" or "Setup -> Input/Output -> Modbus Relay Outputs" sections.

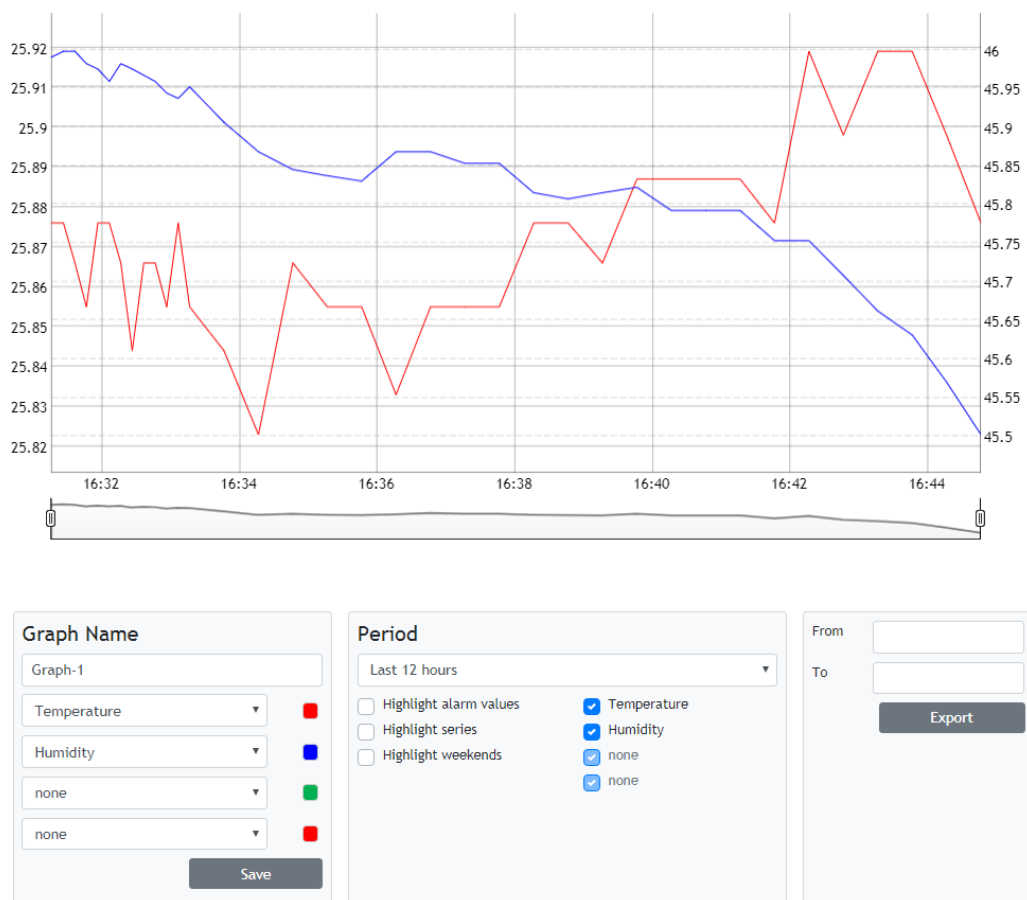
8.1.2. Alarms

This page displays the status of all alarms. The information is updated at the refresh interval.

Alarms	Description	Status
1	AL01-AN	Normal
2	AL02-T	Warning
3	AL03-H	Minor
4	AL04-D1	Critical

8.1.3. Graphs

Channels with their alarm statuses, alarms, relays, and Modbus RTU relays can be visually monitored through the tabs Graph-1 to Graph-6. Each graph supports up to 4 items with 2 different dimensions, and the curve color for each item can be selected. Alarm statuses are displayed with fixed colors, and you can modify the display using checkboxes.



To view past information, the data logger must be active. Please note that graph information is static and not updated in real-time. To see the latest information, reload the page. It is also possible to export the information as a CSV file.

8.2. Setup

8.2.1. Network

The network parameters can be set on this page.

Network setup

Hostname	TCW242
Static/DHCP	Static
IP address	192.168.1.2
Subnet mask	255.255.255.0
Default gateway	192.168.1.1
DNS	8.8.8.8
MAC address	5c:32:c5:00:ac:57

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.

8.2.2. Modbus RTU

8.2.2.1. Modbus RTU communication setup

This section allows you to set the communication parameters of the RS-485 interface – bit rate, parity, and a number of stop bits. By default, the settings are 19200, even parity, and 1 stop bit. It is mandatory that all sensors on the bus use the same bit rate, parity, and a number of stop bits. Before to add any sensor to the interface its parameters should be set up properly.

In the right part of the section, there is a tool which scans the bus and reports the number of the found sensor together with their addresses. It is very useful at a time when you add new sensors. It is recommended to use a small address segment to speed up the scan process.

Playing with “Scan time-out for sensor answer” it is possible to find this parameter for an unknown sensor. The test starts with a large time-out (for example 500ms) and gradually decreases the time until the sensor stops responding. In order for the operation sustainability, the found time should be increased with for example 20%.

Modbus RTU communication setup

Bit rate	19200	Scan time-out for sensor answer, ms	100	Max scan time:	24700
Parity	even	First address	1		
Stop bits	1	Last address	247		

Scan

Found: 1

sensors with following addresses: 1

8.2.2.2. Modbus RTU sensors/relays allocation

The TCW242 supports simultaneous connections for up to 24 Modbus RTU devices/registers. Users can specify how many of these will be allocated for Modbus RTU relays, with the remaining registers available for sensor use, up to the total of 24.

Please note that the maximum number of relays that can be configured is dependent on the higher-numbered sensors utilized on the Setup -> Channels page. To increase the number of relays, you may need to remove channels that are using these higher-numbered sensors.

Modbus RTU sensors/relays allocation

Number of Modbus RTU relays:
4

Number of Modbus RTU sensors:
20

Save

Before proceeding with any further settings on this page, ensure you press the "Save" button

8.2.2.3. Modbus RTU sensors

This section allows you to add, delete or edit Modbus RTU sensors. All they are primary parameters and can be used in forming of channels.

It is recommended to add sensors one by one using the scan tool described in 8.2.2.1.

The maximum number of sensor which can be added depends of the set allocation in 8.2.2.2. Modbus RTU sensors/relays allocation.

Modbus RTU sensors

#	Description	Device address	Data type	Data order	Register type	Register address	Time-out	Multiplier	Offset	Value	Actions
1	S01	1	float	MSW first	Holding	100	100	1.000	0.000	24.968	Edit Delete
2	S02	1	float	MSW first	Holding	102	100	1.000	0.000	27.306	Edit Delete

[Add](#)

The Multiplier and offset works as follows:

$$\text{Value} = (\text{Raw_Value} * \text{Multiplier}) + \text{Offset}.$$

If you want to see the raw value of the sensor/register set Multiplier=1 and Offset=0.

8.2.2.4. Modbus RTU relays

This section allows you to add, delete, or edit Modbus RTU relays.

Modbus RTU relays

#	Description	Device address	Data type	Data order	Register type	Register address	Time-out			Value	Actions
1	MBR01	1			Coil	1	100			No connection, wait ON	Edit Delete

[Add](#)

Modbus RTU relays serve as an extension to the built-in relays in the TCW242. Users can utilize the Teracom TDO340 or a comparable product from another manufacturer as Modbus RTU relays.

The number of Modbus RTU relays is user-defined (refer to Section 8.2.2.2), with a maximum limit of 24.

8.2.2.5. Polling

In accordance with the MODBUS convention, the address range for slaves is from 1 to 247. During operation, all sensors are polled consecutively. The controller expects a response within the defined "response time-out". If a sensor fails to respond within this time frame, the controller will move on to the next sensor. If the same sensor does not respond for three consecutive polls, the device will assume it is not present in the system, but it will continue to attempt polling that sensor.

Given this process, it is crucial to carefully configure the response time-out. On one hand, the time-out must be sufficiently long to allow the sensor to respond; on the other hand, the total of all sensor time-outs contributes to the "maximum response time-out" of the entire system, which ultimately affects the system's overall responsiveness.

For reliable system operation, polling of each sensor occurs at a fixed interval, referred to as "Polling time". This interval is user-selectable and can be set to 1, 2, 3, 4, 5, 10, 15, 30, 60, 120, or 180 seconds, with a default value of 1 second.

Max response time-out: 433

Polling time: ⓘ 2000 ▾

The "Maximum response time-out" is calculated as the sum of the response time-outs set for all Modbus RTU sensors/relays.

It is essential to ensure that the "Polling time" is greater than or equal to the "Maximum response time-out".

8.2.2.6. **Sensor setup tool**

The device has also a simple but useful tool for configuration and control of Modbus RTU devices. It can change the addresses and communication parameters of sensors from different manufacturers.

Communication setup

Bit rate19200 ▾

Parityeven ▾

Stop bits1 ▾

Time-out100

First address1

Last address247

Scan

Found: 1
sensors with following addresses: 1

MB Address1

Sensor communication register setup

Bit rate register #11

Parity, stop register #12

Address register #10

Value19200

Value1

Value1 (1 -:- 247)

Read

Write

Transfer successful.

Sensor registers check/update

Start address100

Data typefloat ▾

Number of registers2

Data orderMSW first ▾

Value30.800

Read

Write

Transfer successful.

8.2.3. **Input/Output**

This page enables the configuration of relays, Modbus RTU relays, as well as analog and digital inputs.

8.2.3.1. **Analog inputs**

The TCW242 has 4 analog inputs. All they are non-isolated from the power supply ground. Every analog input can work in voltage (0-10V) or current loop mode (0-20mA).

Analog inputs						
#	Description	Multiplier	Offset	Mode	Value	Actions
1	A01	1.000	0.000	0-10V	0.000	Edit
2	A02	1.000	0.000	0-10V	0.000	Edit
3	A03	1.000	0.000	0-10V	0.000	Edit
4	A04	1.000	0.000	0-10V	0.000	Edit

For every analog input, the "Unit" "Multiplier" and "Offset" fields are available to convert the raw voltage or current into meaningful engineering units.

By default and after "Factory default settings" procedure: Multiplier=1.00, Offset=0.00 and Mode=0-10V.

The scaled value is calculated using the following formula:

$$SV = RV * MU + OF$$

Where:

SV – scaled (displayed) value;

RV – raw voltage from the source;

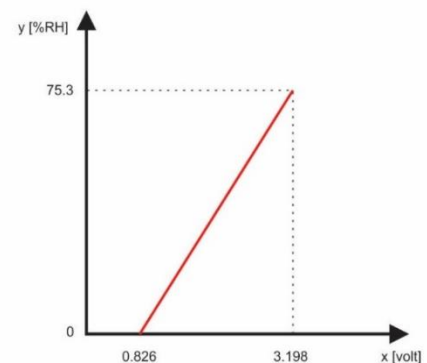
MU – multiplier;

OF – offset.

Example:

For the humidity sensor HIH-4000-003, the following data is available from the datasheet:

VOUT = 0.826 at 0% RH
VOUT = 3.198 at 75.3% RH



The sensor outputs raw voltage values, but our goal is to convert these into corresponding relative humidity (RH) values. To achieve this, we use a multiplier and an offset. These parameters enable us to calculate the relative humidity for any voltage within the sensor's operational range.

Calculation of the multiplier (MU)

The multiplier (MU) is determined by the ratio of the change in relative humidity ($\Delta RH\%$) to the change in voltage (ΔV). Geometrically, this resembles finding the slope of a line. For this sensor, the line is represented by the equation $\Delta RH\% / \Delta V$. We can calculate the multiplier as follows:

$$MU = (75.3 - 0) / (3.198 - 0.826) = 75.3 / 2.372 = 31.745 \%RH/V$$

Calculation of the offset (OF)

The offset (OF) is calculated using the multiplier and one of the known points. By substituting the scaled value (SV) and the corresponding raw value (RV) into the equation $SV = RV * MU + OF$, we can solve for the offset:

$$OF = SV - (RV * MU)$$

Using the point where $SV = 0$ and $RV = 0.826$, we find:

$$OF = 0 - (0.826 * 31.745) = 0 - 26.22 = -26.22$$

We can also calculate the offset using the other known point, where $SV = 75.3$ and $RV = 3.198$:

$$OF = 75.3 - (3.198 * 31.745) = 75.3 - 101.52 = -26.22$$

Final formula

Thus, the formula for this sensor become:

$$SV = RV * 31.745 - 26.22$$

Verification

To verify the accuracy of this formula, let's check the case where $V_{OUT} = 0.826\text{ V}$ (0%RH):

$$SV = 0.826 * 31.745 - 26.22 = 26.22 - 26.22 = 0\text{ \%RH}$$

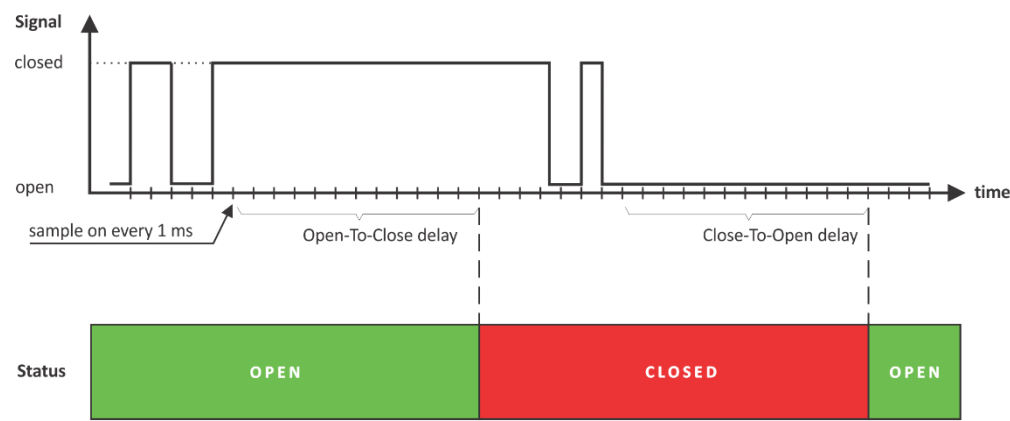
This confirms that the formula accurately converts voltage readings to their corresponding relative humidity values.

8.2.3.2. Digital inputs

The TCW242 features four digital inputs, all of which are non-isolated from the power supply ground. Each digital input can operate in either OPEN/CLOSE mode or COUNTER mode. In COUNTER mode, counting can be configured to occur on rising edges, falling edges, or both. Additionally, the COUNTER mode allows for the setup of an initial counter value.

Digital inputs								
#	Description	Closed state	Open state	C/O delay	O/C delay	Mode	Value	Actions
1	D1	CLOSED	OPEN	5	5	Discrete(Open/Closed)	OPEN	Edit
2	D2	CLOSED	OPEN	5	5	Counter(Rising edge)	10158	Edit
3	D3	CLOSED	OPEN	5	5	Counter(Falling edge)	11	Edit
4	D4	CLOSED	OPEN	5	5	Counter(Both edges)	16	Edit

There are two configurable delays: Open-to-Close and Close-to-Open, each ranging from 5 to 60,000 milliseconds. These delays can be utilized for additional digital filtering and are applicable in both modes.



In the picture above, the Open-to-Close and Close-to-Open delays are both set to 13 milliseconds.

8.2.3.3. Relay outputs

The TCW242 features 4 relay outputs that can be controlled through the web interface, HTTP API, SNMP, Functions, Schedules, Watchdogs, or locally using alarm conditions. The web control for each relay provides "On", "Off", and "Pulse" buttons, along with "All On", "All Off", and "Pulse All" for collective control. The pulse duration can be set individually for each relay.

Relay outputs

#	Description	Pulse	Activated from	Action on alarm condition	Status	Actions
1	Main Lamp	0.1	Web or M2M	Turn on	OFF	Edit
2	Relay 2	0.2	AL02	Turn on	OFF	Edit
3	Relay 3	0.3	AL03	Turn on	OFF	Edit
4	Relay 4	0.4	Function 1	Single pulse	OFF	Edit

Relays state after restart: Off

The "Relay state after restart" can be configured to "On", "Off", or "Last state". Selecting "Off" may be a good safety option.

8.2.3.4. Modbus RTU relay outputs

The TCW242 supports up to 24 Modbus RTU relay outputs. They can be controlled in the same way as built-in relay outputs—via the web interface, HTTP API, SNMP, Functions, Schedules, Watchdogs, or locally using alarm conditions.

The web control for each relay provides "On" and "Off" buttons, along with "All On" and "All Off" for collective control. Pulse activation of Modbus RTU relays is not supported.

Modbus relay outputs

#	Description		Activated from	Action on alarm condition	Status	Actions
1	Modbus Relay 1		Web or M2M	Turn on	No connecti...	Edit

Relays state after restart: Last state

The "Relay state after restart" can be configured to "On", "Off", or "Last state". Selecting "Off" may be a good safety option.

8.2.4. Channels

This section allows you to add, delete, or edit channels. All channels can be monitored on the monitoring pages, and their values can be recorded periodically by the data logger. Up to 24 channels can be configured.

#	Description	Parameter 1	OP 1	Parameter 2	OP 2	Coefficient 1	OP 3	Coefficient 2	Units	Type	Actions
1	V01-Analog	A01							V	General	Edit Delete
2	V02-Temperature	S01-Temperature							°C	General	Edit Delete
3	V03-Humidity	S01-Humidity							%RH	General	Edit Delete
4	V04-digital	D3								Counter	Edit Delete

[Create](#)

There are two types of channels:

- Discrete: Formed by a single digital input in OPEN/CLOSE mode.
- General: Formed by up to two primary parameters and constants. It's important to note that, the sequence of operations is OP1, followed by OP2, and finally OP3.

8.2.5. Alarms

This section allows you to add, delete, or edit alarms, with a maximum of 24 alarms available for configuration.

There are four types of alarms: Warning, Minor, Major, and Critical. Alarms can only be formed using channels. While alarms are independent, they can be assigned to any channel, with no restrictions on which channel can receive the alarm.

Each alarm can utilize up to two conditions, which can be logically combined using the operators AND and OR. It is not mandatory for both conditions to use the same channel; conditions from different channels can be combined within a single alarm.

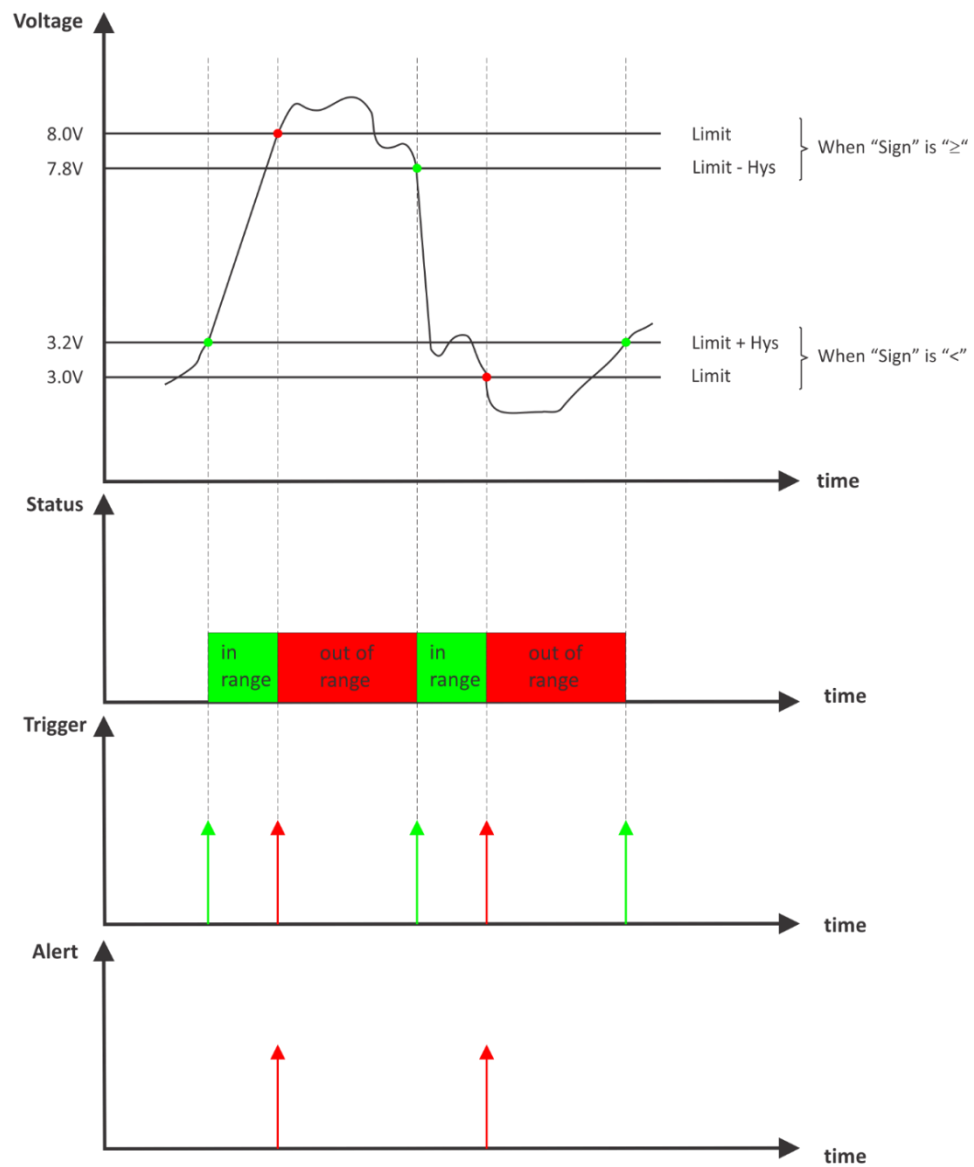
#	Description	Condition 1			Func	Condition 2			Type	Assigned to	Action			Actions
		Channel	Sign	Limit / State		Channel	Sign	Limit / State			Action 1	Action 2	Action 3	
1	AL01-Analog	V01-Analog	≥	5.000					Warning	V01-Analog	None	None	None	Edit Delete
2	AL02-temp	V02-Temperature	≥	30.000					Warning	V02-Temperature	Trap C1	Trap C2	None	Edit Delete
3	AL03-humi	V03-Humidity	≥	45.000					Minor	V03-Humidity	Trap C1/2	None	None	Edit Delete
4	AL04-DI3	V04-digital	≥	5.000					Major	V04-digital	HTTP Post	None	None	Edit Delete

[Create](#)

The “Limit” indicates the boundary of the working range for the monitored channel. A trigger condition occurs when the value exceeds the limit (“Sign” is “≥”) or falls below the limit (“Sign” is “<”). In both scenarios, the monitored parameter goes out of range.

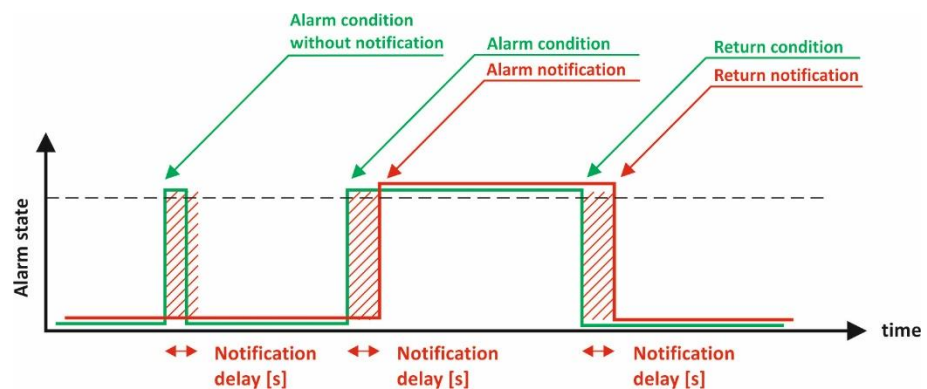
Returning to the acceptable range for the observed channel is considered when the value exceeds the Limit + Hysteresis (“Sign” is “<”) or falls below the Limit – Hysteresis (“Sign” is “≥”). Hysteresis is employed to prevent excessive triggering when the value fluctuates around the trigger point.

It is strongly recommended not to set Hysteresis to 0.0.



For each alarm, the "Return Notification" option is available. When this option is selected, a notification will also be sent when the parameter returns to the acceptable range.

Additionally, each alarm has a "Notification Delay" parameter, which serves as a useful filter for brief alarm conditions.



8.2.6. Functions

This section allows you to set up four separate functions, each of which can include up to four alarm conditions connected by AND and OR operators. The functions can be selected from a

drop-down menu to activate local relays. Each function has parameters for "Action delay" and "Action on return".

#	Condition 1	Func	Condition 2	Func	Condition 3	Func	Condition 4	Action		Actions
								Action 1	Action 2	
1	AL02-D1	AND	AL03-D2					SNMP Trap	None	Edit Delete
2	AL01-TST300-T	OR	AL02-D1					HTTP Post	None	Edit Delete

[Create](#)

8.2.7. Schedule

The TCW242 features 4 schedules, each with up to 4 tasks. The schedules allow you to create tasks based on calendar dates and can be combined with alarms for more advanced control. Two relays can control a single device, with one following the alarm and the other following the schedule.

Schedule setup

Schedule 1

Mode	Date	Mon	Tue	Wed	Thu	Fri	Sat	Sun	ON	OFF
Weekly	01.01.2016	☒	☒	☒	☒	☒	☐	☐	08:00:00	17:00:00.0
Weekly	01.01.2016	☐	☐	☐	☐	☐	☒	☒	12:00:00	12:00:03.0
Disable	01.01.2016	☐	☐	☐	☐	☐	☐	☐	00:00:00	23:59:59.9
Disable	01.01.2016	☐	☐	☐	☐	☐	☐	☐	00:00:00	23:59:59.9

Schedule 2

Mode	Date	Mon	Tue	Wed	Thu	Fri	Sat	Sun	ON	OFF
Once	19.07.2020	☐	☐	☐	☐	☐	☐	☐	08:00:00	08:59:59.9
Disable	01.01.2016	☐	☐	☐	☐	☐	☐	☐	00:00:00	23:59:59.9
Disable	01.01.2016	☐	☐	☐	☐	☐	☐	☐	00:00:00	23:59:59.9
Disable	01.01.2016	☐	☐	☐	☐	☐	☐	☐	00:00:00	23:59:59.9

Schedule 3

Mode	Date	Mon	Tue	Wed	Thu	Fri	Sat	Sun	ON	OFF
Disable	01.01.2016	☐	☐	☐	☐	☐	☐	☐	00:00:00	23:59:59.9
Disable	01.01.2016	☐	☐	☐	☐	☐	☐	☐	00:00:00	23:59:59.9
Disable	01.01.2016	☐	☐	☐	☐	☐	☐	☐	00:00:00	23:59:59.9
Disable	01.01.2016	☐	☐	☐	☐	☐	☐	☐	00:00:00	23:59:59.9

Schedule 4

Mode	Date	Mon	Tue	Wed	Thu	Fri	Sat	Sun	ON	OFF
Disable	01.01.2016	☐	☐	☐	☐	☐	☐	☐	00:00:00	23:59:59.9
Disable	01.01.2016	☐	☐	☐	☐	☐	☐	☐	00:00:00	23:59:59.9
Disable	01.01.2016	☐	☐	☐	☐	☐	☐	☐	00:00:00	23:59:59.9
Disable	01.01.2016	☐	☐	☐	☐	☐	☐	☐	00:00:00	23:59:59.9

There are two types of schedules depending on repetition and duration: single tasks and weekly tasks.

A resolution of 0.1 seconds for "OFF time" allows for short pulse support.

Here are some examples:

- A single task for a time period:

The screenshot shows a configuration interface for a single task. It includes a dropdown menu set to 'Once', a date field set to '19.07.2020', and a time range from '08:00:00' to '09:00:00'. There are also several empty checkboxes for other days of the week.

With the above setting, an event will occur on 19.07.2020 from 08:00 to 09:00.

- A weekly task for a time period:

The screenshot shows a configuration interface for a weekly task. It includes a dropdown menu set to 'Weekly', a date field set to '01.01.2016', and checkboxes for each day of the week (Monday to Sunday). The time range is set from '08:00:00' to '17:00:00'.

With the above setting, an event will occur every weekday starting at 08:00 and ending at 17:00.

- A weekly task for a time period which includes midnight:

The screenshot shows a configuration interface for a weekly task that spans midnight. It includes a dropdown menu set to 'Weekly', a date field set to '01.01.2016', and checkboxes for each day of the week. The time range is set from '23:00:00' to '24:00:00' for one day and '00:00:00' to '01:00:00' for the next day.

With the above configuration, there will be an event lasting 2 hours, occurring from Monday 23:00:00 to Tuesday 01:00:00.

8.2.8. Watchdog

The Watchdog feature enables the remote supervision of network devices using the ICMP protocol. In the absence of an ICMP echo reply (outgoing ping) or an ICMP echo request (incoming ping), it activates a relay, which can trigger a reboot for certain devices. The TCW242 provides up to four independent Watchdogs.

#	Description	Mode	IP/Hostname	Ping period	Watchdog timeout	Startup delay	Maximum number of activations	Actions
1	Watchdog1	incoming ping	0.0.0.0	10	20	60	5	Edit Delete
2	Watchdog2	outgoing ping	192.168.32.112	10	40	120	5	Edit Delete
3	Watchdog3	outgoing ping	192.168.32.2	10	60	120	5	Edit Delete
4	Watchdog4	outgoing ping	192.168.32.30	5	30	180	5	Edit Delete

[Create](#)

Ping test

IP/Hostname: [Ping](#) Reply from 192.168.32.1: time=1m5

Each Watchdog can be configured to operate in either ICMP echo reply (outgoing ping) or ICMP echo request (incoming ping) mode, or it can be disabled. Disabling the Watchdog will retain the previous settings.

The Ping reply timeout establishes the duration within which a ping reply must be received and is applicable solely for outgoing pings.

The Ping period sets the time gap between individual pings, which is exclusively applied for outgoing pings.

The Watchdog timeout dictates the duration within which an echo reply (outgoing ping) or echo request (incoming ping) must occur; beyond this period, the Watchdog is triggered.

The startup delay specifies the waiting period after a reboot before the Watchdog reactivates.

The Maximum number of activations determines the consecutive instances of relay activations during sequential Watchdog triggers.

To activate a given relay, the corresponding Watchdog must be connected to this relay in the "Setup -> Input/Output -> Relay outputs" or "Setup -> Input/Output -> Modbus relay outputs" section.

8.2.9. System

This page allows you to configure various general system parameters.

General

System name: TCW242

System location: Location

System contact: info@teracomsystems.com

Web access

Authentication: Enable

Web server: HTTPS

HTTP port: 80

HTTPS port: 443

HTTP API

Authentication: Enable

Monitoring page automatic refresh

Interval (0-253), seconds: 1

Display

Channels: ☒

Relays: ☒

Alarm colors

Warning:

Minor:

Major:

Critical:

Save

The system name, system location, and system contact information are used for device identification and are presented in SNMPv3 and XML/JSON status files.

By default, web access authentication is enabled with the credentials admin/admin. The web server typically operates over the HTTP protocol through port 80, which is customizable. This flexibility is particularly useful for routers that do not support separate outside/inside ports for port forwarding.

To enhance security, the web server can transition to HTTPS, defaulting to port 443, also customizable. The implementation of HTTPS utilizes TLS 1.0, TLS 1.1, and TLS 1.2, with RSA serving as the key exchange, agreement, and authentication mechanism.

It's important to note that the TCW242 uses a self-signed certificate for HTTPS, which may trigger a "Your connection is not private" warning in some web browsers. Additionally, the TCW242 operates with limited resources, meaning that running in HTTPS mode may be slower than in HTTP mode. For optimal performance in HTTPS mode, we recommend using Firefox due to its lower resource requirements compared to other browsers.

HTTP API access authentication is also enabled by default, with the same credentials as web access. The controller supports two types of authentication; further details can be found in the explanation for the HTTP API below.

The refresh interval can be set between 0 and 253 seconds, where a setting of zero means no automatic refresh.

Alarm colors are fixed and provided here for informational purposes only.

8.3. Services

8.3.1. NTP

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

The screenshot shows the 'Time setup' configuration page. It includes a 'Time configuration' dropdown set to 'Manual'. Below it are input fields for 'NTP server IP/URL' (time.google.com), 'Time zone' (+00:00), 'Interval (h)' (12), and 'If not found (h)' (1). A 'Set time' field shows '15.05.2019,13:54:13'. Under the 'Uptime' section, it displays '0days,00:03:31'. A 'Save' button is at the bottom. A status bar at the bottom shows 'Current time' as '15.05.2019,13:54:26', 'Last updated' as '---', 'Status' as 'Undefined', and 'Stratum' as '0'.

Time setup	
Time configuration	Manual
NTP server IP/URL	time.google.com
Time zone	+00:00
Interval (h)	12
If not found (h)	1
Set time	15.05.2019,13:54:13
Uptime	
Uptime	0days,00:03:31
Save	

Status	
Current time	15.05.2019,13:54:26
Last updated	---
Status	Undefined
Stratum	0

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.

8.3.2. SMTP

This page is used to enter valid SMTP settings for email alerts and recipients' addresses.

8.3.2.1. SMTP setup

The screenshot shows the 'SMTP setup' configuration page. It includes input fields for 'Mail server IP/URL' (mail.teracomsystems.com), 'Mail server port' (465), 'Type of encrypted connection' (SSL/TLS), 'Sender e-mail' (support@teracomsystems.com), 'Username' (support@teracomsystems.com), and 'Password' (masked with dots). A 'Test server settings' button is at the bottom.

SMTP setup	
Mail server IP/URL	mail.teracomsystems.com
Mail server port	465
Type of encrypted connection	SSL/TLS
Sender e-mail	support@teracomsystems.com
Username	support@teracomsystems.com
Password	
Test server settings	

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. In the TCW242, each of these fields can accommodate 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 TCW242 supports TLS versions 1.0, 1.1, and 1.2, using RSA for key exchange, agreement, and authentication. STARTTLS is also supported.

8.3.2.2. Alarm destination

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

Alarm destinations

Recipient e-mail	info@teracomsystems.com	☒
Recipient e-mail	test@gmail.com	☒
Recipient e-mail		☐
Recipient e-mail		☐
Recipient e-mail		☐

Test email

8.3.2.3. 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.

Subject, header and footer variables

- #N System Name
- #L System Location
- #C System Contact
- #A IP Address of device
- #M MAC address of device
- #H Hostname

8.3.3. SNMP

TCW242 supports SNMPv2 and SNMPv3. The default parameters are as follows:

- SNMP: Disabled
- Port: 161
- SNMPv3: Disabled
- read community: public
- write community: private
- Security User Name: teracom
- Security Level: noAuthNoPriv
- Authentication Protocol: none
- Authentication Password: Trc:Auth#135
- Privacy Protocol: none
- Privacy Password: Trc:Priv&246

The more advanced SNMPv3 offers enhanced security management for administration, authentication, and privacy. SNMPv3 provides the following configuration options:

- No authentication and no privacy (noAuthNoPriv) - Typically used for monitoring;
- Authentication and no privacy (authNoPriv) - Usually employed for control;
- Authentication and privacy (authPriv) - Commonly used for handling sensitive data.

User-based Authentication Mechanism is based on the following:

- MD5 message-digest algorithm in HMAC;
- SHA, an optional alternative algorithm;
- None authentication.

User-based Privacy Mechanism is based on the following:

- Data Encryption Standard (DES);
- Advanced Encryption Standard (AES);
- None encryption.

For alarm notifications, an SNMP trap can be sent to up to five independent recipients. Each trap can use a different port and community. An SNMP trap is also sent after a reset.

The current MIB file can be downloaded from the link at the bottom of the web page.

SNMP setup

SNMP	Enable
SNMP port	161
SNMPv3	Enable
Read community	public
Write community	private
Security User Name	teracom
Security Level	authNoPriv
Authentication Protocol	MD5
Authentication Password	Trc:Auth#135
Privacy Protocol	none
Privacy Password	Trc:Priv&246

SNMP traps

IP	Port	Community	Status	Action
192.168.32.30	162	public	Enable	Test
0.0.0.0	162	public	Disable	Test
0.0.0.0	162	public	Disable	Test
0.0.0.0	162	public	Disable	Test
0.0.0.0	162	public	Disable	Test

Save[Download MIB File](#)

8.3.4. Logger

The TCW242 supports logger for all channels and alarms.

Logger setup

Logger: Enable

Logger mode: Time mode

Logger record sync: Disable

Log interval (10-3600), seconds: 120

Sync to the minute, (00-59): 0

Log interval, minutes: 15

HTTP upload setup

HTTP upload: Disable

Server:

Upload interval (h): 1h

Sync time: 00:00:00

Upload test log Force upload Download full log

Save

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.

By default, the logger is disabled.

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 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.

8.3.5. HTTP POST

TCW242 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.

The screenshot shows the 'HTTP post setup' configuration page. It includes the following fields and options:

- HTTP post:** A dropdown menu set to 'Enable'.
- Data format:** A dropdown menu set to 'XML'.
- Protocol:** A dropdown menu set to 'https'.
- Server 1:** A text field containing 'http(s):// www.teracomsystems.com:443/temp/pos' with a 'Test' button (checked).
- Server 2:** A text field containing 'http(s):// www.teracomsystems.com:443/posttestlc' with a 'Test' button (checked).
- Server 3:** A text field containing 'http(s)://' with a 'Test' button (unchecked).
- Period:** A text field containing '00:05:00'.
- Connect on any alarm:** An unchecked checkbox.
- Key:** An empty text field.
- Process answer:** A dropdown menu set to 'Server 1'.
- Save:** A button at the bottom center.

HTTP/HTTPS POST requests can be sent to up to three independent servers. These servers can be addressed using either a domain name or an IP address.

The “Period” can be set between 1 minute and 48 hours and can also be changed remotely via the HTTP API. This parameter determines how frequently the control software receives up-to-date information from the TCW242, allowing it to make changes to some parameters. A shorter “Period” means closer to real-time operation; however, this also results in increased data traffic across the network.

If the checkbox “Connect on any alarm” is selected, the HTTP/HTTPS POST request will be sent during an alarm condition.

The “Key” field is user-defined; its value is sent in the XML/JSON file and can be used for device identification.

If the “Process Answer” option is enabled, the TCW242 will execute commands sent by the remote server as a response to the HTTP/HTTPS POST.

For more details about HTTP/HTTPS POST, please refer to the HTTP API section.

8.3.6. Dynamic DNS

With dynamic DNS, the TCW242 can be accessed from the public Internet without the need for a broadband account with a static IP address.

TCW242 supports the following DNS services: DynDNS, No-IP, and DNS-O-Matic.

The screenshot shows the 'Dynamic DNS setup' configuration page. It includes a dropdown menu for 'Dynamic DNS' set to 'Enable', a dropdown for 'Service' set to 'DynDNS', and input fields for 'Hostname', 'User', 'Password', and 'Maintainer e-mail'. A status message at the bottom indicates 'The current configuration is not valid.' and a 'Save' button is at the bottom right.

8.3.7. Modbus TCP/IP

TCW242 supports Modbus TCP/IP via the Ethernet interface.

The screenshot shows the 'Modbus TCP setup' configuration page. It includes a dropdown menu for 'Modbus TCP' set to 'Enable' and an input field for 'Port' set to '502'. A 'Save' button is at the bottom right.

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 " Modbus TCP/IP".

8.3.8. MQTT

The TCW242 supports MQTT version 3.1.1 in both "Publisher" and "Subscriber" modes. This section outlines the settings required to configure the MQTT protocol on the device.

8.3.8.1. MQTT General setup

This section allows configuration of the general parameters for MQTT operation. By default, the MQTT publish and MQTT subscribe services are disabled. After enabling them, the controller establishes a connection with the MQTT broker, whose parameters are configured in the fields "Server", "Port", "Username", and "Password". The "Username" and "Password" fields allow up to 31 characters, while the "Server name" field supports up to 127 characters. The publishing interval ranges from 1 minute to 48 hours.

MQTT setup

MQTT	Enable	
MQTT Subscribe	Enable	Connected.
Relays state on connection loss	Keep last state	Warning! <i>i</i>
MB relays state on connection loss	All MB relays OFF	Warning! <i>i</i>
Data format	JSON	
MQTT mode	TLS/SSL	
Server	192.168.32.65	Test
Port	8883	
Username	subtrc1	
Password	*****	
Period <i>i</i>	00:01:00	
Client ID <i>i</i>	TCW242	
Topic name	GEO	

Channels

Channels topic name	GEO
---------------------	-----

Messages can be sent to the MQTT broker in JSON or plain text format, with an option for an encrypted (TLS) or unencrypted connection. In case of a connection loss with the MQTT broker, the following settings for the behavior of local and Modbus relays are provided: "All relays OFF", "All relays ON" and "Keep last state".

In the "Topic name" field, the root topic is set, in which the MQTT publish and MQTT subscribe services will operate.

Note: The System ID is used as the Client ID.

8.3.8.2. MQTT Channels topics

In this section, the publishing parameters for each channel are configured.

Channels

Channels topic name:

Channel #	Topic	Publish value	Publish state
CH1	Boiler	☒ <i>i</i>	☒ <i>i</i>
CH2	Oven	☒ <i>i</i>	☐ <i>i</i>
CH3	3	☐ <i>i</i>	☐ <i>i</i>
CH4	4	☐ <i>i</i>	☐ <i>i</i>

It is possible to monitor all 24 channels, with each channel's value and status available for publishing. With these settings, the exact topics for values and statuses will be:

- GEO/GEO/Boiler/value
- GEO/GEO/Boiler/state
- GEO/GEO/Oven/value

8.3.8.3. MQTT Alarms topics

In this section, the publishing parameters for each alarm are configured.

Alarms

Alarms topic name

Alarm #	Topic		Publish state
AL1	WaterTemp		☒
AL2	AirFlow		☒
AL3	3		☐
AL4			☐

With these settings, the exact topics for alarm statuses will be:

- GEO/alarm/WaterTemp/state
- GEO/alarm/AirFlow/state

It is possible to monitor all 24 alarms, with the status of each alarm available for publishing.

8.3.8.4. MQTT Relay topics

In this section, the subscription parameters for each built-in relay are configured.

Relays

Relays topic name

Relay #	Topic		Publish state
R1	Motor1		☒
R2	Lamp2		☒
R3			☐

With these settings, the exact topics for relay statuses will be:

- GEO/relays/Motor1/state
- GEO/relays/Lamp2/state

It is possible to control all four built-in relays.

8.3.8.5. MQTT Modbus RTU relay topics

In this section, the subscription parameters for each MODBUS relay are configured.

Modbus relays

Modbus relays topic name

Modbus relay #	Topic		Publish state
MBR1	Door1		☒
MBR2			☐

With these settings, the exact topic for MBR1 status will be:

- GEO/mbrel/Door1/state

It is possible to control all configured Modbus RTU relays.

8.3.8.6. Relay control using MQTT Subscribe method

The built-in and the Modbus RTU relays of TCW242 can be controlled using the MQTT subscribe method. After enabling the MQTT subscribe service, the device automatically subscribes to the following topics:

- GEO/relays/Motor1/command , where “GEO” is the **root topic** and “Motor1” is the topic for the specific built-in relay (relay 1 In the above example).
- GEO/mbrel/Door1/command , where “GEO” is the **root topic** and “Door1” is the topic for the specific Modbus RTU relay (relay 1 In the above example).

Publishing a value of 0 or 1 in the above topics will turn the respective relay on or off.

8.3.8.7. Configuration and Control of TCW242 Using MQTT Subscribe Method

After enabling the MQTT subscribe service, the TCW242 module subscribes to the following topic: GEO/api , where “GEO” is the **root topic**. Publishing a specific command in text format will cause the controller to read and execute it. For example:

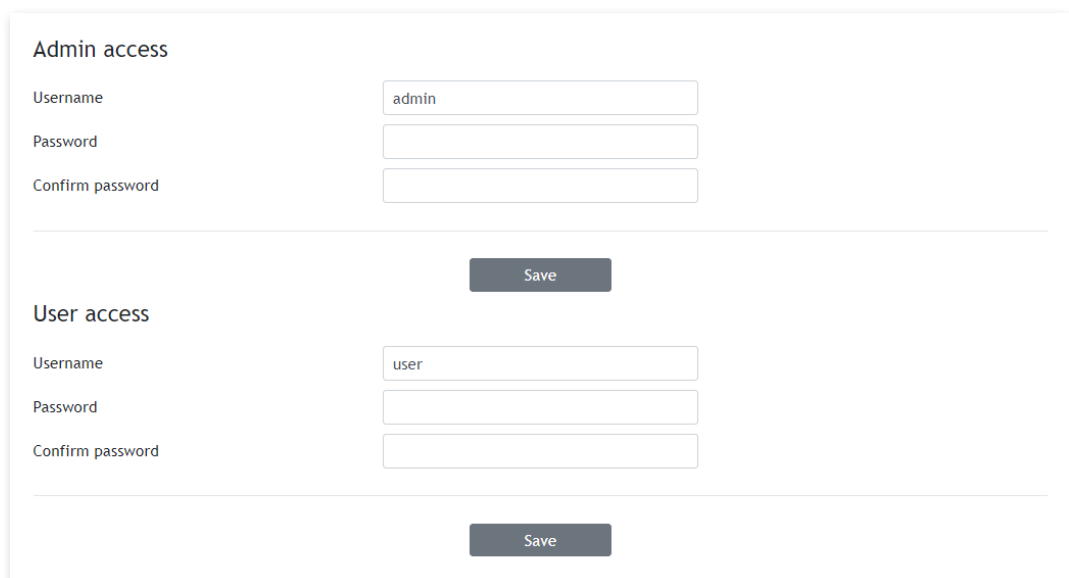
- The command **rpl=1** will make the relay 1 to perform a pulse
- The command **ron=2** will turn relay 2 on.
- The command **pper=15** will change the HTTP post period to 15 seconds

A full list of supported commands can be found in the “List of HTTP commands” paragraph.

8.4. Administration

8.4.1. User/Pass

The TCW242 supports two user roles: "Admin" and "User".



The screenshot displays two configuration sections within a web interface. The top section, titled "Admin access", contains three input fields: "Username" with the value "admin", "Password", and "Confirm password". Below these fields is a grey "Save" button. The bottom section, titled "User access", also contains three input fields: "Username" with the value "user", "Password", and "Confirm password". Below these fields is another grey "Save" button. The interface is clean with a light grey background and white form boxes.

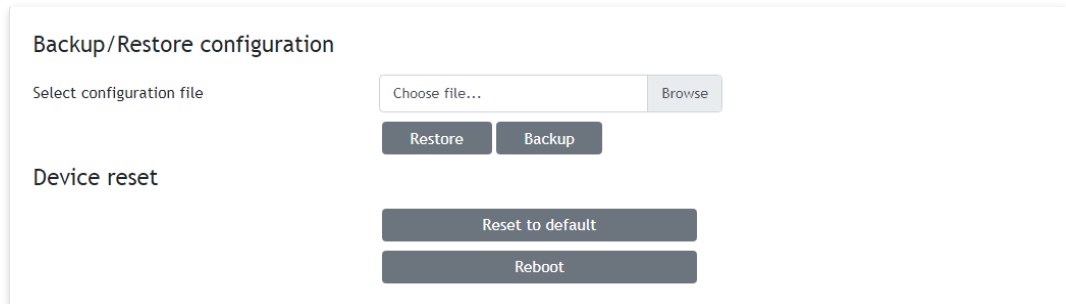
The Admin role has full administrative rights and can modify all settings.

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.

8.4.2. Backup/Restore

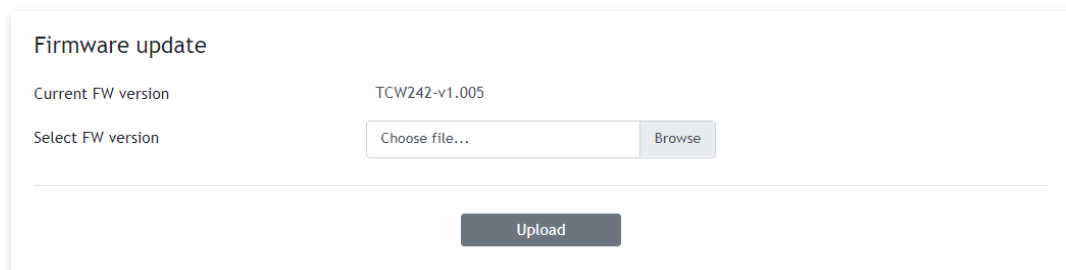
The TCW242 allows for the backup and restoration of all user settings. These settings are saved in an XML backup file, which can be utilized for restoring configurations on multiple devices. This feature is particularly useful for applying similar settings across a batch of controllers.



The screenshot shows a web interface titled "Backup/Restore configuration". It contains two main sections. The first section, "Select configuration file", includes a text input field with the placeholder "Choose file...", a "Browse" button to its right, and two buttons labeled "Restore" and "Backup" below the input field. The second section, "Device reset", contains two buttons labeled "Reset to default" and "Reboot" stacked vertically.

8.4.3. FW update

The TCW242 can be updated through its web interface.



The screenshot shows a web interface titled "Firmware update". It displays the "Current FW version" as "TCW242-v1.005". Below this, the "Select FW version" section includes a text input field with the placeholder "Choose file...", a "Browse" button to its right, and an "Upload" button centered below a horizontal line.

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.

8.5. Logout

The TCW242 supports multi-session access; however, it is recommended to log out after completing your tasks for security and best practices.

9. Protocols and API

9.1. SNMP

The TCW242 supports SNMP (Simple Network Management Protocol), a standard protocol for managing IP network devices, allowing administrative computers (managers) to monitor and control them. The device can be configured and monitored using an SNMP v.2 or v.3 compatible program, with parameters grouped by function. To obtain a valid OID number, replace "!" with "1.3.6.1.4.1.38783". To save changes, set configurationSaved (OID !.8.6.3.0) to "1".

product

OID	Name	Access	Description	Syntax
!8.1.1.0	name	read-only	Device name	DisplayString
!8.1.2.0	version	read-only	Firmware version	DisplayString
!8.1.3.0	date	read-only	Release date	DisplayString

setup -> network

OID	Name	Access	Description	Syntax
!8.2.1.1.0	deviceId	read-only	Device ID (default MAC address)	MacAddress
!8.2.1.2.0	hostName	read-only	Hostname	DisplayString (SIZE (0..38))
!8.2.1.3.0	deviceIP	read-only	Device IP address	IpAddress

setup -> parameters -> mbSensors -> mbSensorsTable -> mbSensorsEntry -> msSensIndex 1 to 24
replace "?" with a number from 1 to 24 in the table below

OID	Name	Access	Description	Syntax
!8.2.2.1.1.1.2.?	mbSenDescription.?	read-write	Sensor description	DisplayString
!8.2.2.1.1.1.3.?	mbSenMult.?	read-write	Sensor multiplier x1000 in Integer format	Integer32
!8.2.2.1.1.1.4.?	mbSenOffset.?	read-write	Sensor offset x1000 in Integer format	Integer32
!8.2.2.1.1.1.5.?	mbSenVal.?	read-only	Sensor value x1000 in Integer format	Integer32
!8.2.2.1.1.1.6.?	mbSenCounter.?	read-only	Sensor as 32-bit Counter	Counter32

setup -> parameters -> analogInputs -> analogInpTable -> analogInpEntry -> analogInpIndex 1 to 4
replace "?" with a number from 1 to 4 in the table below

OID	Name	Access	Description	Syntax
!8.2.2.2.1.1.2.?	analogInpDescription.?	read-write	Analog input description	DisplayString
!8.2.2.2.1.1.3.?	analogInpMult.?	read-write	Analog input multiplier x1000 in Integer format	Integer32
!8.2.2.2.1.1.4.?	analogInpOffset.?	read-write	Analog input offset x1000 in Integer format	Integer32
!8.2.2.2.1.1.5.?	analogInpMode.?	read-write	Analog input mode - 0-10V or 4-20mA	Integer32
!8.2.2.2.1.1.6.?	analogInpValue.?	read-only	Analog input value x1000 in Integer format	Integer32

setup -> parameters -> digitalInputs -> digitalInpTable -> digitalInpEntry -> digitalInpIndex 1 to 4
replace "?" with a number from 1 to 4 in the table below

OID	Name	Access	Description	Syntax
!8.2.2.3.1.1.2.?	digInpDescription.?	read-write	Digital Input description	DisplayString
!8.2.2.3.1.1.3.?	digInpLowLevel.?	read-write	Digital Input closed state	DisplayString
!8.2.2.3.1.1.4.?	digInpHighLevel.?	read-write	Digital Input open state	DisplayString
!8.2.2.3.1.1.5.?	digInpMode.?	read-write	Digital Input mode - Discrete or Counter	INTEGER { openClosed(0), risingEdge(1), fallingEdge(2), bothEdges(3) }
!8.2.2.3.1.1.6.?	digInpCloseToOpenDelay.?	read-write	Digital input Close To Open delay	Integer32(0..60000)
!8.2.2.3.1.1.7.?	digInpOpenToCloseDelay.?	read-write	Digital input Open To Close delay	Integer32(0..60000)
!8.2.2.3.1.1.8.?	digInpCounterInitValue.?	read-only	Digital input counter initial value	Integer32
!8.2.2.3.1.1.9.?	digInpValue.?	read-only	Digital input value	Unsigned32

setup -> parameters -> relaySetup -> relOutSetupTable -> relOutSetupEntry -> relOutSetupIndex 1 to 4
 replace “?” with a number from 1 to 4 in the table below

OID	Name	Access	Description	Syntax
I.8.2.2.4.1.1.2.?	relOutDescription.?	read-write	Relay description	DisplayString
I.8.2.2.4.1.1.3.?	relOutPulseWidth.?	read-write	Relay Pulse x100ms	Integer32
I.8.2.2.4.1.1.4.?	relOutActivation.?	read-write	Relay activated from	INTEGER {webHttpApi(0), al01(1), al02(2), al03(3), al04(4), al05(5), al06(6), al07(7), al08(8), al09(9), al10(10), al11(11), al12(12), al13(13), al14(14), al15(15), al16(16), al17(17), al18(18), al19(19), al20(20), al21(21), al22(22), al23(23), al24(24), anyAlarm(25), schedule1(26), schedule2(27), schedule3(28), schedule4(29), func1(30), func2(31), func3(32), func4(33), watchdog1(34), watchdog2(35), watchdog3(36), watchdog4(37) }
I.8.2.2.4.1.1.5.?	relOutAction.?	read-write	Relay action on alarm condition	INTEGER {on(0), pulse(2)}
I.8.2.2.4.2.0	relOutAfterRst	read-write	Relay state after restart	INTEGER {off(0), on(1), laststate(2)}

setup -> parameters -> modbusRelaySetup -> modbusRelOutSetupTable -> modbusRelOutSetupEntry -> modbusRelOutSetupIndex 1 to 24
 replace “?” with a number from 1 to 24 in the table below

OID	Name	Access	Description	Syntax
I.8.2.2.5.1.1.2.?	relOutDescription.?	read-write	Relay description	DisplayString
I.8.2.2.5.1.1.4.?	relOutActivation.?	read-write	Relay activated from	INTEGER {webHttpApi(0), al01(1), al02(2), al03(3), al04(4), al05(5), al06(6), al07(7), al08(8), al09(9), al10(10), al11(11), al12(12), al13(13), al14(14), al15(15), al16(16), al17(17), al18(18), al19(19), al20(20), al21(21), al22(22), al23(23), al24(24), anyAlarm(25), schedule1(26), schedule2(27), schedule3(28), schedule4(29), func1(30), func2(31), func3(32), func4(33), watchdog1(34), watchdog2(35), watchdog3(36), watchdog4(37) }
I.8.2.2.5.2.0	relOutAfterRst	read-write	Relay state after restart	INTEGER {off(0), on(1), laststate(2)}

monitorNcontrol -> channels -> chanTable -> chanEntry -> chIndex 1 to 24

replace “?” with a number from 1 to 24 in the table below

OID	Name	Access	Description	Syntax
!8.3.1.1.1.2.?	chType.?	read-write	Channel type	INTEGER {general(0), cumulative(1), discrete(2), counter(3)}
!8.3.1.1.1.3.?	chdescription.?	read-write	Channel description	DisplayString
!8.3.1.1.1.4.?	chParam1.?	read-write	Channel parameter 1	INTEGER {none(0), s01(3), s02(4), s03(5), s04(6), s05(7), s06(8), s07(9), s08(10), s09(11), s10(12), s11(13), s12(14), s13(15), s14(16), s15(17), s16(18), s17(19), s18(20), s19(21), s20(22), s21(23), s22(24), s23(25), s24(26), a01(27), a02(28), a03(29), a04(30), a05(31), a06(32), d01(33), d02(34), d03(35), d04(36)}
!8.3.1.1.1.5.?	chOP1.?	read-write	Channel operand 1	INTEGER {none(0), multiplication(1), division(2), sum(3), subtract(4)}
!8.3.1.1.1.6.?	chParam2.?	read-write	Channel parameter 2	INTEGER {none(0), one(1), null(2), s01(3), s02(4), s03(5), s04(6), s05(7), s06(8), s07(9), s08(10), s09(11), s10(12), s11(13), s12(14), s13(15), s14(16), s15(17), s16(18), s17(19), s18(20), s19(21), s20(22), s21(23), s22(24), s23(25), s24(26), a01(27), a02(28), a03(29), a04(30), a05(31), a06(32), d01(33), d02(34), d03(35), d04(36)}
!8.3.1.1.1.7.?	chOP2.?	read-write	Channel operand 2	INTEGER {none(0), multiplication(1), division(2), sum(3), subtract(4)}
!8.3.1.1.1.8.?	chCoef1.?	read-write	Channel coefficient 1 x1000 in Integer format	Integer32
!8.3.1.1.1.9.?	chOP3.?	read-write	Channel operand 3	INTEGER {none(0), multiplication(1), division(2), sum(3), subtract(4)}
!8.3.1.1.1.10.?	chCoef2.?	read-write	Channel coefficient 2 x1000 in Integer format	Integer32
!8.3.1.1.1.11.?	chUnit.?	read-write	Channel unit	DisplayString
!8.3.1.1.1.13.?	chValue.?	read-only	Channel value x1000 in Integer format	Integer32
!8.3.1.1.1.14.?	chCounter.?	read-only	Channel as 32-bit counter	Counter32
!8.3.1.1.1.15.?	chAlarmStatus.?	read-only	Channel alarm status	INTEGER {undefined(0), normal(1), indeterminate(2), warning(3), minor(4), major(5), critical(6)}

monitorNcontrol -> relays -> relOutTable -> relOutEntry -> relayIndex 1 to 4

replace “?” with a number from 1 to 4 in the table below

OID	Name	Access	Description	Syntax
!8.3.2.1.1.2.?	relayState.?	read-write	Relay state	INTEGER {off(0), on(1)}
!8.3.2.1.1.3.?	relayPulse.?	read-write	Relay pulse	INTEGER {off(0), on(1)}

monitorNcontrol -> alarmsTable -> alarmsEntry -> alIndex 1 to 24

replace “?” with a number from 1 to 24 in the table below

OID	Name	Access	Description	Syntax
!8.3.3.1.1.2.?	alDescription.?	read-write	Alarm description	DisplayString
!8.3.3.1.1.3.?	alCond1Channel.?	read-write	Alarm condition 1 channel	INTEGER {none(0), v01(1), v02(2), v03(3), v04(4), v05(5), v06(6), v07(7), v08(8), v09(9), v10(10), v11(11), v12(12), v13(13), v14(14), v15(15), v16(16), v17(17), v18(18), v19(19), v20(20), v21(21), v22(22), v23(23), v24(24)}
!8.3.3.1.1.4.?	alCond1Operand.?	read-write	Alarm condition 1 operand	INTEGER{larger(1), less(2)}
!8.3.3.1.1.5.?	alCond1Limit.?	read-write	Alarm condition 1 limit x1000 in Integer format	Integer32
!8.3.3.1.1.6.?	alCond1Hys.?	read-write	Alarm condition 1 hysteresis x1000 in Integer format	Integer32
!8.3.3.1.1.7.?	alCond1AlarmState.?	read-write	Alarm condition 1 discrete alarm state	INTEGER {open(0), closed(1)}
!8.3.3.1.1.8.?	alCondLogic.?	read-write	Alarm conditions logic	INTEGER{none(0), and(1), or(2)}
!8.3.3.1.1.9.?	alCond2Channel.?	read-write	Alarm condition 2 channel	INTEGER {none(0), v01(1), v02(2), v03(3), v04(4), v05(5), v06(6), v07(7), v08(8), v09(9), v10(10), v11(11), v12(12), v13(13), v14(14), v15(15), v16(16), v17(17), v18(18), v19(19), v20(20), v21(21), v22(22), v23(23), v24(24)}
!8.3.3.1.1.10.?	alCond2Operand.?	read-write	Alarm condition 2 operand	INTEGER{larger(1), less(2)}
!8.3.3.1.1.11.?	alCond2Limit.?	read-write	Alarm condition 2 limit x1000 in Integer format	Integer32
!8.3.3.1.1.12.?	alCond2Hys.?	read-write	Alarm condition 2 hysteresis x1000 in Integer format	Integer32
!8.3.3.1.1.13.?	alCond2AlarmState.?	read-write	Alarm condition 2 discrete alarm state	INTEGER {open(0), closed(1)}
!8.3.3.1.1.14.?	alType.?	read-write	Alarm type	INTEGER {warning(3), minor(4), major(5), critical(6)}
!8.3.3.1.1.15.?	alAssigned.?	read-write	Alarm assigned to	INTEGER {none(0), v01(1), v02(2), v03(3), v04(4), v05(5), v06(6), v07(7), v08(8), v09(9), v10(10), v11(11), v12(12), v13(13), v14(14), v15(15), v16(16), v17(17), v18(18), v19(19), v20(20), v21(21), v22(22), v23(23), v24(24)}
!8.3.3.1.1.16.?	alActionDelay.?	read-write	Alarm action delay	Integer32
!8.3.3.1.1.17.?	alActionOnReturn.?	read-write	Alarm action on return	INTEGER {no(0), yes(1)}
!8.3.3.1.1.18.?	alAction1.?	read-write	Alarm action 1	INTEGER {none(0), trapcond1(1), trapcond2(2), trapcond1and2(3), postiostate(4)}
!8.3.3.1.1.19.?	alAction2.?	read-write	Alarm action 2	INTEGER {none(0), trapcond1(1), trapcond2(2), trapcond1and2(3), postiostate(4)}
!8.3.3.1.1.20.?	alAction3.?	read-write	Alarm action 3	INTEGER {none(0),

				trapcond1(1), trapcond2(2), trapcond1and2(3), postiostate(4)}
!8.3.3.1.1.21.?	alStatus.?	read-write	Alarm status	INTEGER { undefined(0), normal(1), indeterminate(2), warning(3), minor(4), major(5), critical(6) }

monitorNcontrol

OID	Name	Access	Description	Syntax
!8.3.4.0	configurationSaved	read-write	Configuration save status SAVED/UNSAVED	INTEGER { unsaved(0), saved(1) }
!8.3.5.0	restartDevice	read-write	Restart Device	INTEGER { cancel(0), restart(1) }
!8.3.6.0	hardwareErr	read only	Hardware Error	INTEGER { noErr(0), hwErr(1) }

monitorNcontrol-> funcTable -> funcEntry -> funcIndex 1 to 4

replace “?” with a number from 1 to 4 in the table below

OID	Name	Access	Description	Syntax
!8.3.7.1.1.2.?	funcState.?	read only	Function state	INTEGER { false(0), true(1) }
!8.3.7.1.1.3.?	funcAl.?	read only	Function alarm	INTEGER { normal(0), alarm(1) }

monitorNcontrol -> modbusrelays -> modbusRelOutTable -> modbusRelOutEntry -> modbusRelayIndex 1 to 24

replace “?” with a number from 1 to 4 in the table below

OID	Name	Access	Description	Syntax
!8.3.8.1.1.2.?	relayState.?	read-write	Relay state	INTEGER { off(0), on(1) }

monitorNcontrol-> wdTable -> wdEntry -> wdIndex 1 to 4

replace “?” with a number from 1 to 4 in the table below

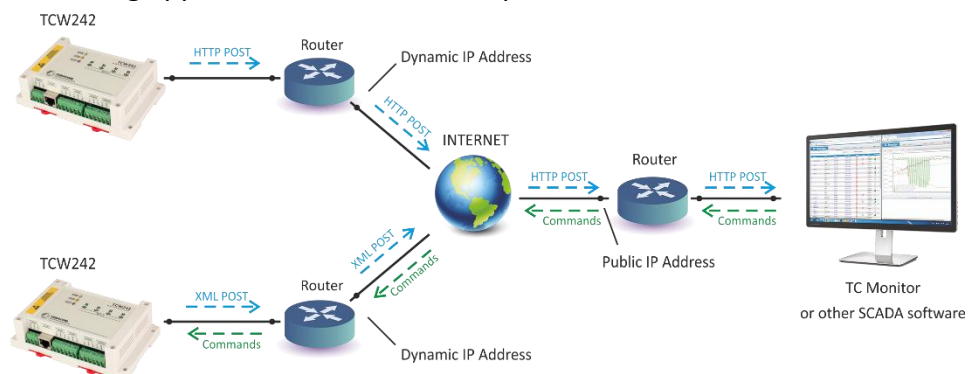
OID	Name	Access	Description	Syntax
!8.3.9.1.1.2.?	wdState.?	read only	Watchdog state	INTEGER { false(0), true(1) }

9.2. HTTP API

9.2.1. HTTP POST

The TCW242 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 9.2.3 for details on HTTP API commands

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

- Save the following code as 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 TCW242 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 20190420103318_status.xml.

9.2.2. HTTP/HTTPS GET

HTTP/HTTPS GET can be utilized to monitor the TCW242 by retrieving XML or JSON files. The format for accessing the status is as follows:

`http(s)://device.ip.address/status.xml`

`http(s)://device.ip.address/status.json`

For further details regarding the structure of these files, refer to Appendix A XML file structure and Appendix B JSON file structure.

HTTP/HTTPS GET requests can be sent at any time to the TCW242 if it is on the same network or has appropriate routing.

If there is no direct access to the device, an HTTP/HTTPS GET can be sent immediately after receiving an HTTP/HTTPS POST from the same device.

9.2.2.1. Commands

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

`http(s)://device.ip.address/status.xml?yyy=xxx`

Where:

yyy is the command;
xxx is the parameter.

Example:

To set the POST period to 300 seconds, the following command can be used

http(s)://device.ip.address/status.xml?pper=300

9.2.2.2. HTTP/HTTPS GET authentication

If HTTP/HTTPS 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(s)://device.ip.address/status.xml?a=uuuu:pppp
disabled	http(s)://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(s)://device.ip.address/status.xml?a=admin:admin&pper=120

9.2.3. List of HTTP API commands

Command	Description
dataf=x	Data format XML/JSON for HTTP POST – 0 XML, 1 JSON
pushtls=x	HTTP/HTTPS protocol, where x is 0 for HTTP and 1 for HTTPS
purl1=yyy	URL for HTTP POST to Server 1, where yyy is a full path to the PHP file. Example: purl=212.25.45.120:30181/xampp/test/posttest1.php
purl2=yyy	URL for HTTP POST to Server 1, where yyy is a full path to the PHP file. Example: purl=212.25.45.120:30181/xampp/test/posttest2.php
purl3=yyy	URL for HTTP POST to Server 1, where yyy is a full path to the PHP file. Example: purl=212.25.45.120:30181/xampp/test/posttest3.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
ron=n	Turn relay ON (n is 1,2,4 or 8) ron=1 - will turn ON relay 1 ron=2 - will turn ON relay 2 ron=4 - will turn ON relay 3 ron=8 - will turn ON relay 4
ron=1&ron=2&ron=4&ron=8	Turn four relays ON
rof=n	Turn relay OFF (n is 1,2,4 or 8) rof=1 - will turn OFF relay 1 rof=2 - will turn OFF relay 2 rof=4 - will turn OFF relay 3 rof=8 - will turn OFF relay 4
rof=1&rof=2&rof=4&rof=8	Turn four relays OFF
rpl=n	Pulse relay n (n is 1,2,4 or 8) rpl=1 – will pulse relay 1 rpl=2 – will pulse relay 2 rpl=4 – will pulse relay 3 rpl=8 – will pulse relay 4

mdata=x	Data format JSON/Plain text for MQTT Publish – 0 JSON, 1 Plain text
mmode=x	Publish protocol, where x is 0 for unsecure and 1 for TLS/SSL
muser=xxxx	Username authentication for MQTT, where xxxx is a username
mpass=xxxx	Password authentication for MQTT, where xxxx is a password
murl=yyy	URL for MQTT publish, where yyy is a path murl=212.25.45.120
mport=yyyy	Port for MQTT publish, where yyyy is a port mport=1883
mper=x	MQTT publish period in seconds (x is between 60 and 172800) mper=600 – will set MQTT publish period to 600 seconds
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)

9.3. 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.

9.3.1. Codes and answers

9.3.1.1. Read Coil Status (FC=01)

Request

Command to obtain ON/OFF status of discrete coils at address 100.

01 0064 0001

Response

01 01 01

9.3.1.2. Force Single Coil (FC=05)

Request

This command sets the state of discrete address 100 to "ON".

05 0064 FF00

Response

The typical response is a copy of the request, sent back after writing to the coil.

05 0064 FF00

9.3.1.3. Read Discrete Inputs (FC=02)

Request

This command is asking for the status of 4 discrete inputs.

02 0064 0004

Response

02 01 0C

9.3.1.4. Read Holding Registers (FC=03)

Request

This command requests the value of holding register 19300.

03 4B64 0002

Response

03 04 41DD 4210

Request

This command requests the value of holding register 18100.

03 46B4 0008

Response

03 10 54 65 6D 70 65 72 61 74 75 72 65 00 00 00 00 00

9.3.1.5. Write Single Register (FC=06)

Request

This command writes a value to the single register at address 18300.

06 477C 0003

Response

06 477C 0003

9.3.1.6. Write Multiple Registers (FC=16)

Request

This command writes a value to the single register at address 18300.

10 477C 0002 04 0003 0004

Response

10 477C 0002

9.3.1.7. Exception codes

All exceptions are indicated by adding 0x80 to the function code in the request, followed by a single reason byte. For example:

01 Illegal function:

The function code received in the query is not a valid action for the controller.

02 Illegal data address:

The data address received in the query is not a valid address for the slave. Specifically, the reference number and transfer length combination is invalid. A request with offset 96 and length 4 would succeed, but a request with offset 96 and length 5 would result in exception code 02.

9.3.2. Main registers address table

The table below lists the most commonly used registers. A complete list of Modbus TCP/IP registers can be found in Appendix C.

Note: Changes can be saved by setting "Configuration Saved" to 1.

Parameter	FC	PDU decimal address	Data size	Data
Relay 1	01,05,15	100	Discrete	
Relay 2	01,05,15	101	Discrete	

Relay 3	01,05,15	102	Discrete	
Relay 4	01,05,15	103	Discrete	
Digital input 1	02	100	Discrete	
Digital input 2	02	101	Discrete	
Digital input 3	02	102	Discrete	
Digital input 4	02	103	Discrete	
Analog input 1 value	03	14400	32-bit Float	
Analog input 2 value	03	14402	32-bit Float	
Analog input 3 value	03	14404	32-bit Float	
Analog input 4 value	03	14406	32-bit Float	
Channel 1 value	03	19300	32-bit Float	
Channel 2 value	03	19302	32-bit Float	
Channel 3 value	03	19304	32-bit Float	
Channel 4 value	03	19306	32-bit Float	
Channel 5 value	03	19308	32-bit Float	
Channel 6 value	03	19310	32-bit Float	
Channel 7 value	03	19312	32-bit Float	
Channel 8 value	03	19314	32-bit Float	
Channel 9 value	03	19316	32-bit Float	
Channel 10 value	03	19318	32-bit Float	
Channel 11 value	03	19320	32-bit Float	
Channel 12 value	03	19322	32-bit Float	
Channel 13 value	03	19324	32-bit Float	
Channel 14 value	03	19326	32-bit Float	
Channel 15 value	03	19328	32-bit Float	
Channel 16 value	03	19330	32-bit Float	
Channel 17 value	03	19332	32-bit Float	
Channel 18 value	03	19334	32-bit Float	
Channel 19 value	03	19336	32-bit Float	
Channel 20 value	03	19338	32-bit Float	
Channel 21 value	03	19340	32-bit Float	
Channel 22 value	03	19342	32-bit Float	
Channel 23 value	03	19344	32-bit Float	
Channel 24 value	03	19346	32-bit Float	
Alarm 1 status	03	22000	16-bit unsign int	undefined(0), normal(1), indeterminate(2), warning(3), minor(4), major(5), critical(6)
Alarm 2 status	03	22001	16-bit unsign int	—"—
Alarm 3 status	03	22002	16-bit unsign int	—"—
Alarm 4 status	03	22003	16-bit unsign int	—"—
Alarm 5 status	03	22004	16-bit unsign int	—"—
Alarm 6 status	03	22005	16-bit unsign int	—"—
Alarm 7 status	03	22006	16-bit unsign int	—"—
Alarm 8 status	03	22007	16-bit unsign int	—"—

Alarm 9 status	03	22008	16-bit unsign int	—"—
Alarm 10 status	03	22009	16-bit unsign int	—"—
Alarm 11 status	03	22010	16-bit unsign int	—"—
Alarm 12 status	03	22011	16-bit unsign int	—"—
Alarm 13 status	03	22012	16-bit unsign int	—"—
Alarm 14 status	03	22013	16-bit unsign int	—"—
Alarm 15 status	03	22014	16-bit unsign int	—"—
Alarm 16 status	03	22015	16-bit unsign int	—"—
Alarm 17 status	03	22016	16-bit unsign int	—"—
Alarm 18 status	03	22017	16-bit unsign int	—"—
Alarm 19 status	03	22018	16-bit unsign int	—"—
Alarm 20 status	03	22019	16-bit unsign int	—"—
Alarm 21 status	03	22020	16-bit unsign int	—"—
Alarm 22 status	03	22021	16-bit unsign int	—"—
Alarm 23 status	03	22022	16-bit unsign int	—"—
Alarm 24 status	03	22023	16-bit unsign int	—"—
Save configuration	03,06	24000	16-bit unsign int	unsaved(0), saved(1)

9.4. Modbus RTU

9.4.1. Communication parameters

For Modbus RTU, TCW242 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.

9.4.2. Teracom sensors update tool

The TCW242 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.

9.4.2.1. Sensor settings

Sensor settings

Sensor info

TSH3xxV3-v1.04

Status

You can proceed with the update of sensor.

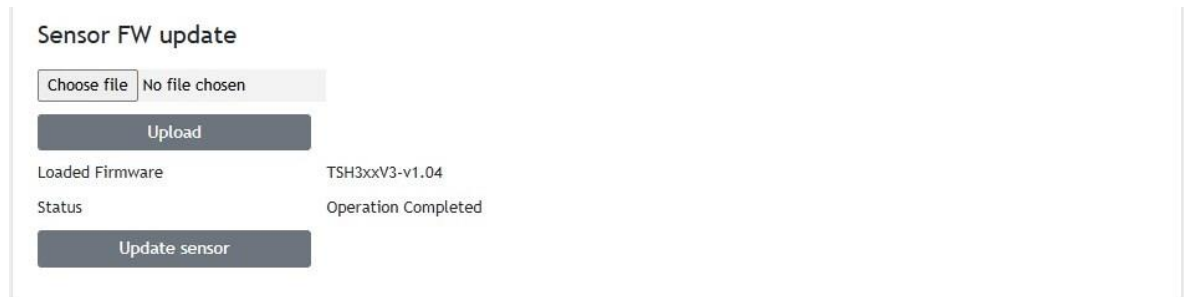
Scan MB

The tool operates using the current Modbus RTU communication parameters. To avoid communication collisions, it is advisable to configure both the TCW242 and the sensor with

the factory default Modbus RTU communication parameters. This practice ensures smooth operation. The default Modbus RTU communication parameters for the TCW242 are detailed in Section 9.4.1.

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.

9.4.2.2. Sensor FW update



The screenshot displays a web interface for updating the sensor's firmware. At the top, it says "Sensor FW update". Below this, there is a file selection area with a "Choose file" button and a "No file chosen" status. An "Upload" button is positioned below the file selection. Further down, the "Loaded Firmware" is listed as "TSH3xxV3-v1.04" and the "Status" is "Operation Completed". At the bottom, there is an "Update sensor" button.

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

9.5. MQTT

MQTT (Message Queuing Telemetry Transport) is a lightweight, client-server publish/subscribe messaging transport protocol. It is open, simple, and designed for easy implementation. MQTT is widely used across various industries, including automotive, manufacturing, telecommunications, oil, and gas, among others.

The TCW242 supports “Publisher” and “Subscriber” mode.

The official site for the MQTT protocol is mqtt.org.

For comprehensive explanations suitable for both beginners and professionals, refer to these resources:

- [The Easiest Guide to Getting Started with MQTT](http://emqx.com) at emqx.com
- [MQTT Essentials](http://hivemq.com) at hivemq.com

9.6. Data Logger

The logger utilizes a circular buffer in FLASH memory. When the buffer is full, new data overwrites the oldest entries, ensuring that the FLASH memory continuously stores a complete log. There is no command to clear the log, but a copy of the full log is always available for download.

The number of records that can be stored depends on the length of the descriptions and the types of characters used. In the worst-case scenario—using 15-byte descriptions with characters from the upper range of UTF-8—the total number of records is approximately 52,371. This capacity is sufficient for 36 days of logging at one-minute intervals.

In most cases, the data logger can retain around 71,400 records, which allows for 49 days of logging at one-minute intervals.

New records can be periodically uploaded as a CSV file to a designated HTTP server at intervals of 1, 2, 3, 4, 6, 8, 12, and 24 hours. A semicolon is used as the delimiter in the CSV format.

The first row of the log file always contains the header. All rows, including the header, begin with the record ID and timestamp.

The structure of one row (record) in the log is as follows:

ID	Time	Type of record	Channels - values/units	Relays - conditions	Channels - states/units	Alarms - values/descriptions
----	------	----------------	-------------------------	---------------------	-------------------------	------------------------------

ID	32-bit unique number for every row (record).		
Time	a time stamp of record, in format dd.mm.yyyy, hh:mm:ss.		
Type of record	following types of records are available:		
	"Time"	for periodical record;	
	"Event"	for record initiated by alarm condition;	
	"Type"	for header record;	
	"Start"	after power-up condition;	
	"Restart"	after reset condition;	
	"Power Down"	after power-down condition;	
	"Bad"	for a problematic record	
Channels - values/units	Channels 1 to 24 values/units		
Relays - conditions	Relays 1 to 4 conditions		
Channels - states/units	Channels 1 to 24 states/units		
	For chanel types General, Cumulative and Discrete following states are available:		
	0 – "Undefined"		
	1 – "Normal"		
	2 – "Indeterminate"		
	3 – "Warning"		
	4 – "Minor"		
	5 – "Major"		
	6 – "Critical"		
	For channel type Counter following states are available:		
	8 – "Undefined"		
	9 – "Normal"		
	10 – "Indeterminate"		
	11 – "Warning"		
	12 – "Minor"		
	13 – "Major"		
	14 – "Critical"		
Alarms - values/descriptions	Alarms 1 to 24 values/descriptions		

The following alarm values are available:

- 0 – “Undefined”
- 1 – “Normal”
- 2 – “Indeterminate”
- 3 – “Warning”
- 4 – “Minor”
- 5 – “Major”
- 6 – “Critical”

An example of the log file /fragment channels - values/units/:

```
ID;Time;Type;Ch1/°C;Ch2/%RH;Ch3;Ch4;Ch5;Ch6;Ch7;Ch8;Ch9;Ch10;Ch11;Ch12;Ch13;Ch14;Ch15;Ch16;Ch17;Ch18;Ch19;Ch20;Ch21;Ch22;Ch23;Ch24....  
25114;19.07.2022,16:49:49; Time;25.319;54.512;118.833;229.877;0.000;6587.396;,,,,,,,,,,,,,,,,,,,,;
```

An example of the log file /fragment relays - conditions/:

```
ID;Time;Type;...R1,R2,R3,R4....  
25114;19.07.2022,16:49:49; Time;1,1,0,0;,,,,,,,,,,,,,,,,,,,,;
```

An example of the log file /fragment channels - states/units/:

```
ID;Time;Type;....ChSt1/°C;ChSt2/%RH;ChSt3;ChSt4;ChSt5;ChSt6;ChSt7;ChSt8;ChSt9;ChSt10;ChSt11;ChSt12;ChSt13;ChSt14;ChSt15;ChSt16;ChSt17;ChSt18;  
ChSt19;ChSt20;ChSt21;ChSt22;ChSt23;ChSt24....  
25114;19.07.2022,16:49:49;Time;....3;5;0;2;2;2;,,,,,,,,,,,,,,,,,,,,;
```

An example of the log file /fragment alarms - values/descriptions/:

```
ID;Time;Type;...Al1/AL1-T;Al2/AL2-H;Al3;Al4;Al5;Al6;Al7;Al8;Al9;Al10;Al11;Al12;Al13;Al14;Al15;Al16;Al17;Al18;Al19;Al20;Al21;Al22;Al23;Al24....  
25114;19.07.2022,16:49:49;Time;....3;5;0;0;0;0;,,,,,,,,,,,,,,,,,,,,;
```

10. Factory default settings

TCW242 can be restored to its original factory default settings in three different ways.

10.1. Factory reset without network settings

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

10.2. Factory reset for network settings only

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.

10.3. Full factory reset

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
Analog inputs unit	voltage
Analog inputs multiplier	1.000
Analog inputs offset	0.000
Analog inputs mode	Voltage
Digital inputs mode	Open/Closed

11. Operating environment

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.

12. Safety precautions

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:

- Properly install the device, refer to the manual;
- Log in to the device using a browser program;
- Configure the device properly;
- Short the "Din1" and "GND";
- Go to the "Input/Output page" of the WEB interface, and check that the proper parameter value is displayed in the Digital Inputs section;
- Go to the "Modbus sensors" page of the WEB interface and install the Modbus RTU (TSH3XX/TST3XX or third-party) sensor, and check that the proper parameters are displayed;
- 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.

13. 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.

XML file structure

```

<Monitor>
  <DeviceInfo>
    <DeviceName>TCW242</DeviceName>
    <HostName>TCW242 </HostName>
    <ID>5c:32:c5:00:ac:57</ID>
    <FwVer>TCW242-v3.002</FwVer>
    <MnflInfo>www.teracomsystems.com</MnflInfo>
    <SysContact>info@teracomsystems.com</SysContact>
    <SysName>TCW242</SysName>
    <SysLocation>Location</SysLocation>
  </DeviceInfo>
  <CH>
    <CH1>
      <type>0</type>
      <description>V01-TST300v4-T</description>
      <value>25.601</value>
      <valuebin/>
      <unit/>
      <alarmbin>3</alarmbin>
      <alarm>Warning</alarm>
      <selch>3</selch>
    </CH1>
    <CH2>
      <type>2</type>
      <description>V02-D1</description>
      <value>OPEN</value>
      <valuebin>1</valuebin>
      <unit/>
      <alarmbin>1</alarmbin>
      <alarm>Normal</alarm>
      <selch>31</selch>
    </CH2>
    <CH3>
      <type>2</type>
      <description>V03-D2</description>
      <value>OPEN</value>
      <valuebin>1</valuebin>
      <unit/>
      <alarmbin>1</alarmbin>
      <alarm>Normal</alarm>
      <selch>32</selch>
    </CH3>
    <CH4>
      <type>0</type>
      <description>V04</description>
      <value>---</value>
      <valuebin/>
      <unit/>
      <alarmbin>0</alarmbin>
      <alarm/>
      <selch>0</selch>
    </CH4>
    <CH5>
      <type>0</type>
      <description>V05</description>
      <value>---</value>
      <valuebin/>
      <unit/>
      <alarmbin>0</alarmbin>
      <alarm/>
      <selch>0</selch>
    </CH5>
    <CH6>
      <type>0</type>
      <description>V06</description>
      <value>---</value>
      <valuebin/>
      <unit/>
      <alarmbin>0</alarmbin>
      <alarm/>
      <selch>0</selch>
    </CH6>
    <CH7>
      <type>0</type>

```

```

    <description>V07</description>
    <value>---</value>
    <valuebin/>
    <unit/>
    <alarmbin>0</alarmbin>
    <alarm/>
    <selch>0</selch>
</CH7>
<CH8>
    <type>0</type>
    <description>V08</description>
    <value>---</value>
    <valuebin/>
    <unit/>
    <alarmbin>0</alarmbin>
    <alarm/>
    <selch>0</selch>
</CH8>
<CH9>
    <type>0</type>
    <description>V09</description>
    <value>---</value>
    <valuebin/>
    <unit/>
    <alarmbin>0</alarmbin>
    <alarm/>
    <selch>0</selch>
</CH9>
<CH10>
    <type>0</type>
    <description>V10</description>
    <value>---</value>
    <valuebin/>
    <unit/>
    <alarmbin>0</alarmbin>
    <alarm/>
    <selch>0</selch>
</CH10>
<CH11>
    <type>0</type>
    <description>V11</description>
    <value>---</value>
    <valuebin/>
    <unit/>
    <alarmbin>0</alarmbin>
    <alarm/>
    <selch>0</selch>
</CH11>
<CH12>
    <type>0</type>
    <description>V12</description>
    <value>---</value>
    <valuebin/>
    <unit/>
    <alarmbin>0</alarmbin>
    <alarm/>
    <selch>0</selch>
</CH12>
<CH13>
    <type>0</type>
    <description>V13</description>
    <value>---</value>
    <valuebin/>
    <unit/>
    <alarmbin>0</alarmbin>
    <alarm/>
    <selch>0</selch>
</CH13>
<CH14>
    <type>0</type>
    <description>V14</description>
    <value>---</value>
    <valuebin/>
    <unit/>
    <alarmbin>0</alarmbin>
    <alarm/>
    <selch>0</selch>

```

```

</CH14>
<CH15>
  <type>0</type>
  <description>V15</description>
  <value>---</value>
  <valuebin/>
  <unit/>
  <alarmbin>0</alarmbin>
  <alarm/>
  <selch>0</selch>
</CH15>
<CH16>
  <type>0</type>
  <description>V16</description>
  <value>---</value>
  <valuebin/>
  <unit/>
  <alarmbin>0</alarmbin>
  <alarm/>
  <selch>0</selch>
</CH16>
<CH17>
  <type>0</type>
  <description>V17</description>
  <value>---</value>
  <valuebin/>
  <unit/>
  <alarmbin>0</alarmbin>
  <alarm/>
  <selch>0</selch>
</CH17>
<CH18>
  <type>0</type>
  <description>V18</description>
  <value>---</value>
  <valuebin/>
  <unit/>
  <alarmbin>0</alarmbin>
  <alarm/>
  <selch>0</selch>
</CH18>
<CH19>
  <type>0</type>
  <description>V19</description>
  <value>---</value>
  <valuebin/>
  <unit/>
  <alarmbin>0</alarmbin>
  <alarm/>
  <selch>0</selch>
</CH19>
<CH20>
  <type>0</type>
  <description>V20</description>
  <value>---</value>
  <valuebin/>
  <unit/>
  <alarmbin>0</alarmbin>
  <alarm/>
  <selch>0</selch>
</CH20>
<CH21>
  <type>0</type>
  <description>V21</description>
  <value>---</value>
  <valuebin/>
  <unit/>
  <alarmbin>0</alarmbin>
  <alarm/>
  <selch>0</selch>
</CH21>
<CH22>
  <type>0</type>
  <description>V22</description>
  <value>---</value>
  <valuebin/>
  <unit/>

```

```

    <alarmbin>0</alarmbin>
    <alarm/>
    <selch>0</selch>
</CH22>
<CH23>
    <type>0</type>
    <description>V23</description>
    <value>---</value>
    <valuebin/>
    <unit/>
    <alarmbin>0</alarmbin>
    <alarm/>
    <selch>0</selch>
</CH23>
<CH24>
    <type>0</type>
    <description>V24</description>
    <value>---</value>
    <valuebin/>
    <unit/>
    <alarmbin>0</alarmbin>
    <alarm/>
    <selch>0</selch>
</CH24>
</CH>
<AL>
    <AL1>
        <description>AL01-TST300-T</description>
        <alarmbin>3</alarmbin>
        <alarm>Warning</alarm>
        <assign>1</assign>
    </AL1>
    <AL2>
        <description>AL02-D1</description>
        <alarmbin>1</alarmbin>
        <alarm>Normal</alarm>
        <assign>2</assign>
    </AL2>
    <AL3>
        <description>AL03-D2</description>
        <alarmbin>1</alarmbin>
        <alarm>Normal</alarm>
        <assign>3</assign>
    </AL3>
    <AL4>
        <description>AL04</description>
        <alarmbin>0</alarmbin>
        <alarm/>
        <assign>0</assign>
    </AL4>
    <AL5>
        <description>AL05</description>
        <alarmbin>0</alarmbin>
        <alarm/>
        <assign>0</assign>
    </AL5>
    <AL6>
        <description>AL06</description>
        <alarmbin>0</alarmbin>
        <alarm/>
        <assign>0</assign>
    </AL6>
    <AL7>
        <description>AL07</description>
        <alarmbin>0</alarmbin>
        <alarm/>
        <assign>0</assign>
    </AL7>
    <AL8>
        <description>AL08</description>
        <alarmbin>0</alarmbin>
        <alarm/>
        <assign>0</assign>
    </AL8>
    <AL9>
        <description>AL09</description>
        <alarmbin>0</alarmbin>

```

```

    <alarm/>
    <assign>0</assign>
</AL9>
<AL10>
    <description>AL10</description>
    <alarmbin>0</alarmbin>
    <alarm/>
    <assign>0</assign>
</AL10>
<AL11>
    <description>AL11</description>
    <alarmbin>0</alarmbin>
    <alarm/>
    <assign>0</assign>
</AL11>
<AL12>
    <description>AL12</description>
    <alarmbin>0</alarmbin>
    <alarm/>
    <assign>0</assign>
</AL12>
<AL13>
    <description>AL13</description>
    <alarmbin>0</alarmbin>
    <alarm/>
    <assign>0</assign>
</AL13>
<AL14>
    <description>AL14</description>
    <alarmbin>0</alarmbin>
    <alarm/>
    <assign>0</assign>
</AL14>
<AL15>
    <description>AL15</description>
    <alarmbin>0</alarmbin>
    <alarm/>
    <assign>0</assign>
</AL15>
<AL16>
    <description>AL16</description>
    <alarmbin>0</alarmbin>
    <alarm/>
    <assign>0</assign>
</AL16>
<AL17>
    <description>AL17</description>
    <alarmbin>0</alarmbin>
    <alarm/>
    <assign>0</assign>
</AL17>
<AL18>
    <description>AL18</description>
    <alarmbin>0</alarmbin>
    <alarm/>
    <assign>0</assign>
</AL18>
<AL19>
    <description>AL19</description>
    <alarmbin>0</alarmbin>
    <alarm/>
    <assign>0</assign>
</AL19>
<AL20>
    <description>AL20</description>
    <alarmbin>0</alarmbin>
    <alarm/>
    <assign>0</assign>
</AL20>
<AL21>
    <description>AL21</description>
    <alarmbin>0</alarmbin>
    <alarm/>
    <assign>0</assign>
</AL21>
<AL22>
    <description>AL22</description>

```

```

        <alarmbin>0</alarmbin>
        <alarm/>
        <assign>0</assign>
    </AL22>
    <AL23>
        <description>AL23</description>
        <alarmbin>0</alarmbin>
        <alarm/>
        <assign>0</assign>
    </AL23>
    <AL24>
        <description>AL24</description>
        <alarmbin>0</alarmbin>
        <alarm/>
        <assign>0</assign>
    </AL24>
</AL>
<R>
    <R1>
        <description>Relay 1</description>
        <value>OFF</value>
        <valuebin>0</valuebin>
        <pulseWidth>0.3</pulseWidth>
        <control>Any Alarm</control>
    </R1>
    <R2>
        <description>Relay 2</description>
        <value>OFF</value>
        <valuebin>0</valuebin>
        <pulseWidth>1.0</pulseWidth>
        <control>Watchdog1</control>
    </R2>
    <R3>
        <description>Relay 3</description>
        <value>OFF</value>
        <valuebin>0</valuebin>
        <pulseWidth>1.0</pulseWidth>
        <control>Watchdog3</control>
    </R3>
    <R4>
        <description>Relay 4</description>
        <value>OFF</value>
        <valuebin>0</valuebin>
        <pulseWidth>1.0</pulseWidth>
        <control>Watchdog4</control>
    </R4>
</R>
<MBR>
    <MBR1>
        <description>Modbus Relay 1</description>
        <value>No connection,wait ON</value>
        <valuebin>0</valuebin>
        <control>0</control>
        <conn>0</conn>
        <valid>1</valid>
    </MBR1>
    <MBR2>
        <description>Modbus Relay 2</description>
        <value>No connection</value>
        <valuebin>0</valuebin>
        <control>0</control>
        <conn>0</conn>
        <valid>0</valid>
    </MBR2>
    <MBR3>
        <description>Modbus Relay 3</description>
        <value>No connection</value>
        <valuebin>0</valuebin>
        <control>0</control>
        <conn>0</conn>
        <valid>0</valid>
    </MBR3>
    <MBR4>
        <description>Modbus Relay 4</description>
        <value>No connection</value>
        <valuebin>0</valuebin>
        <control>0</control>

```

```

    <conn>0</conn>
    <valid>0</valid>
</MBR4>
<MBR5>
    <description>Modbus Relay 5</description>
    <value>No connection</value>
    <valuebin>0</valuebin>
    <control>0</control>
    <conn>0</conn>
    <valid>0</valid>
</MBR5>
<MBR6>
    <description>Modbus Relay 6</description>
    <value>No connection</value>
    <valuebin>0</valuebin>
    <control>0</control>
    <conn>0</conn>
    <valid>0</valid>
</MBR6>
<MBR7>
    <description>Modbus Relay 7</description>
    <value>No connection</value>
    <valuebin>0</valuebin>
    <control>0</control>
    <conn>0</conn>
    <valid>0</valid>
</MBR7>
<MBR8>
    <description>Modbus Relay 8</description>
    <value>No connection</value>
    <valuebin>0</valuebin>
    <control>0</control>
    <conn>0</conn>
    <valid>0</valid>
</MBR8>
<MBR9>
    <description>Modbus Relay 9</description>
    <value>No connection</value>
    <valuebin>0</valuebin>
    <control>0</control>
    <conn>0</conn>
    <valid>0</valid>
</MBR9>
<MBR10>
    <description>Modbus Relay 10</description>
    <value>No connection</value>
    <valuebin>0</valuebin>
    <control>0</control>
    <conn>0</conn>
    <valid>0</valid>
</MBR10>
<MBR11>
    <description>Modbus Relay 11</description>
    <value>No connection</value>
    <valuebin>0</valuebin>
    <control>0</control>
    <conn>0</conn>
    <valid>0</valid>
</MBR11>
<MBR12>
    <description>Modbus Relay 12</description>
    <value>No connection</value>
    <valuebin>0</valuebin>
    <control>0</control>
    <conn>0</conn>
    <valid>0</valid>
</MBR12>
<MBR13>
    <description>Modbus Relay 13</description>
    <value>No connection</value>
    <valuebin>0</valuebin>
    <control>0</control>
    <conn>0</conn>
    <valid>0</valid>
</MBR13>
<MBR14>
    <description>Modbus Relay 14</description>

```

```

    <value>No connection</value>
    <valuebin>0</valuebin>
    <control>0</control>
    <conn>0</conn>
    <valid>0</valid>
</MBR14>
<MBR15>
    <description>Modbus Relay 15</description>
    <value>No connection</value>
    <valuebin>0</valuebin>
    <control>0</control>
    <conn>0</conn>
    <valid>0</valid>
</MBR15>
<MBR16>
    <description>Modbus Relay 16</description>
    <value>No connection</value>
    <valuebin>0</valuebin>
    <control>0</control>
    <conn>0</conn>
    <valid>0</valid>
</MBR16>
<MBR17>
    <description>Modbus Relay 17</description>
    <value>No connection</value>
    <valuebin>0</valuebin>
    <control>0</control>
    <conn>0</conn>
    <valid>0</valid>
</MBR17>
<MBR18>
    <description>Modbus Relay 18</description>
    <value>No connection</value>
    <valuebin>0</valuebin>
    <control>0</control>
    <conn>0</conn>
    <valid>0</valid>
</MBR18>
<MBR19>
    <description>Modbus Relay 19</description>
    <value>No connection</value>
    <valuebin>0</valuebin>
    <control>0</control>
    <conn>0</conn>
    <valid>0</valid>
</MBR19>
<MBR20>
    <description>Modbus Relay 20</description>
    <value>No connection</value>
    <valuebin>0</valuebin>
    <control>0</control>
    <conn>0</conn>
    <valid>0</valid>
</MBR20>
<MBR21>
    <description>Modbus Relay 21</description>
    <value>No connection</value>
    <valuebin>0</valuebin>
    <control>0</control>
    <conn>0</conn>
    <valid>0</valid>
</MBR21>
<MBR22>
    <description>Modbus Relay 22</description>
    <value>No connection</value>
    <valuebin>0</valuebin>
    <control>0</control>
    <conn>0</conn>
    <valid>0</valid>
</MBR22>
<MBR23>
    <description>Modbus Relay 23</description>
    <value>No connection</value>
    <valuebin>0</valuebin>
    <control>0</control>
    <conn>0</conn>
    <valid>0</valid>

```

```

</MBR23>
<MBR24>
  <description>Modbus Relay 24</description>
  <value>No connection</value>
  <valuebin>0</valuebin>
  <control>0</control>
  <conn>0</conn>
  <valid>0</valid>
</MBR24>
</MBR>
<FUNC>
  <FUNC1>
    <alarmbin>0</alarmbin>
    <alarm>Normal</alarm>
  </FUNC1>
  <FUNC2>
    <alarmbin>1</alarmbin>
    <alarm>Alarm</alarm>
  </FUNC2>
  <FUNC3>
    <alarmbin>0</alarmbin>
    <alarm>Normal</alarm>
  </FUNC3>
  <FUNC4>
    <alarmbin>0</alarmbin>
    <alarm>Normal</alarm>
  </FUNC4>
</FUNC>
<WDG>
  <WDG1>
    <description>Watchdog1</description>
    <modebin>3</modebin>
    <mode>incoming ping</mode>
    <host>0.0.0.0</host>
    <state>0</state>
  </WDG1>
  <WDG2>
    <description>Watchdog2</description>
    <modebin>2</modebin>
    <mode>outgoing ping</mode>
    <host>192.168.32.112</host>
    <state>0</state>
  </WDG2>
  <WDG3>
    <description>Watchdog3</description>
    <modebin>2</modebin>
    <mode>outgoing ping</mode>
    <host>192.168.32.2</host>
    <state>0</state>
  </WDG3>
  <WDG4>
    <description>Watchdog4</description>
    <modebin>2</modebin>
    <mode>outgoing ping</mode>
    <host>192.168.32.30</host>
    <state>0</state>
  </WDG4>
</WDG>
<HTTPPost>
  <Key/>
  <PostPeriod>60</PostPeriod>
</HTTPPost>
<MQTT>
  <Period>300</Period>
</MQTT>
<Sys>
  <hwerr/>
  <HighAlarmbin>3</HighAlarmbin>
  <HighAlarm>Warning</HighAlarm>
</Sys>
<Time>
  <Date>04.01.2024</Date>
  <Time>16:06:23</Time>
</Time>
</Monitor>

```

Where:

<CH1>... <CH24> - channels;

<AL1> ... <AL24> - alarms;

<R1> ... <R4> - relays

<MBR1> ... <MBR24> - MODBUS relays

<FUNC1> ... <FUNC4> - functions

<WDG1> ... <WDG4> - watchdogs

<valuebin> - number values 0 or 1;

<alarmbin> - number values from 0 to 6;

<alarm> - Undefined, Normal, Indeterminate, Warning, Minor, Major, Critical;

<assign>0</assign> - alarm not assigned to any channel;

<selch>0</selch> - channel is not displayed on Monitoring -> Channels section

<state>1</state> - watchdog is activated

JSON file structure

```

{
  "Monitor": {
    "DeviceInfo": {
      "DeviceName": "TCW242",
      "HostName": "TCW242-E",
      "ID": "5c:32:c5:00:ac:57",
      "FwVer": "TCW242-v3.002",
      "MnflInfo": "www.teracomsystems.com",
      "SysContact": "info@teracomsystems.com",
      "SysName": "TCW242",
      "SysLocation": "Location"
    },
    "CH": {
      "CH1": {
        "type": "0",
        "description": "V01-TST300v4-T",
        "value": "26.070",
        "valuebin": "",
        "unit": "",
        "alarmbin": "1",
        "alarm": "Normal",
        "selch": "3"
      },
      "CH2": {
        "type": "2",
        "description": "V02-D1",
        "value": "OPEN",
        "valuebin": "1",
        "unit": "",
        "alarmbin": "1",
        "alarm": "Normal",
        "selch": "31"
      },
      "CH3": {
        "type": "2",
        "description": "V03-D2",
        "value": "OPEN",
        "valuebin": "1",
        "unit": "",
        "alarmbin": "1",
        "alarm": "Normal",
        "selch": "32"
      },
      "CH4": {
        "type": "0",
        "description": "V04",
        "value": "---",
        "valuebin": "",
        "unit": "",
        "alarmbin": "0",
        "alarm": "",
        "selch": "0"
      },
      "CH5": {
        "type": "0",
        "description": "V05",
        "value": "---",
        "valuebin": "",
        "unit": "",
        "alarmbin": "0",
        "alarm": "",
        "selch": "0"
      },
      "CH6": {
        "type": "0",
        "description": "V06",
        "value": "---",
        "valuebin": "",
        "unit": "",
        "alarmbin": "0",
        "alarm": "",
        "selch": "0"
      },
      "CH7": {

```

```

    "type": "0",
    "description": "V07",
    "value": "---",
    "valuebin": "",
    "unit": "",
    "alarmbin": "0",
    "alarm": "",
    "selch": "0"
  },
  "CH8": {
    "type": "0",
    "description": "V08",
    "value": "---",
    "valuebin": "",
    "unit": "",
    "alarmbin": "0",
    "alarm": "",
    "selch": "0"
  },
  "CH9": {
    "type": "0",
    "description": "V09",
    "value": "---",
    "valuebin": "",
    "unit": "",
    "alarmbin": "0",
    "alarm": "",
    "selch": "0"
  },
  "CH10": {
    "type": "0",
    "description": "V10",
    "value": "---",
    "valuebin": "",
    "unit": "",
    "alarmbin": "0",
    "alarm": "",
    "selch": "0"
  },
  "CH11": {
    "type": "0",
    "description": "V11",
    "value": "---",
    "valuebin": "",
    "unit": "",
    "alarmbin": "0",
    "alarm": "",
    "selch": "0"
  },
  "CH12": {
    "type": "0",
    "description": "V12",
    "value": "---",
    "valuebin": "",
    "unit": "",
    "alarmbin": "0",
    "alarm": "",
    "selch": "0"
  },
  "CH13": {
    "type": "0",
    "description": "V13",
    "value": "---",
    "valuebin": "",
    "unit": "",
    "alarmbin": "0",
    "alarm": "",
    "selch": "0"
  },
  "CH14": {
    "type": "0",
    "description": "V14",
    "value": "---",
    "valuebin": "",
    "unit": "",
    "alarmbin": "0",
    "alarm": ""
  }

```

```

    "selch": "0"
  },
  "CH15": {
    "type": "0",
    "description": "V15",
    "value": "---",
    "valuebin": "",
    "unit": "",
    "alarmbin": "0",
    "alarm": "",
    "selch": "0"
  },
  "CH16": {
    "type": "0",
    "description": "V16",
    "value": "---",
    "valuebin": "",
    "unit": "",
    "alarmbin": "0",
    "alarm": "",
    "selch": "0"
  },
  "CH17": {
    "type": "0",
    "description": "V17",
    "value": "---",
    "valuebin": "",
    "unit": "",
    "alarmbin": "0",
    "alarm": "",
    "selch": "0"
  },
  "CH18": {
    "type": "0",
    "description": "V18",
    "value": "---",
    "valuebin": "",
    "unit": "",
    "alarmbin": "0",
    "alarm": "",
    "selch": "0"
  },
  "CH19": {
    "type": "0",
    "description": "V19",
    "value": "---",
    "valuebin": "",
    "unit": "",
    "alarmbin": "0",
    "alarm": "",
    "selch": "0"
  },
  "CH20": {
    "type": "0",
    "description": "V20",
    "value": "---",
    "valuebin": "",
    "unit": "",
    "alarmbin": "0",
    "alarm": "",
    "selch": "0"
  },
  "CH21": {
    "type": "0",
    "description": "V21",
    "value": "---",
    "valuebin": "",
    "unit": "",
    "alarmbin": "0",
    "alarm": "",
    "selch": "0"
  },
  "CH22": {
    "type": "0",
    "description": "V22",
    "value": "---",
    "valuebin": "",

```

```

    "unit": "",
    "alarmbin": "0",
    "alarm": "",
    "selch": "0"
  },
  "CH23": {
    "type": "0",
    "description": "V23",
    "value": "---",
    "valuebin": "",
    "unit": "",
    "alarmbin": "0",
    "alarm": "",
    "selch": "0"
  },
  "CH24": {
    "type": "0",
    "description": "V24",
    "value": "---",
    "valuebin": "",
    "unit": "",
    "alarmbin": "0",
    "alarm": "",
    "selch": "0"
  }
},
"AL": {
  "AL1": {
    "description": "AL01-TST300-T",
    "alarmbin": "1",
    "alarm": "Normal",
    "assign": "1"
  },
  "AL2": {
    "description": "AL02-D1",
    "alarmbin": "1",
    "alarm": "Normal",
    "assign": "2"
  },
  "AL3": {
    "description": "AL03-D2",
    "alarmbin": "1",
    "alarm": "Normal",
    "assign": "3"
  },
  "AL4": {
    "description": "AL04",
    "alarmbin": "0",
    "alarm": "",
    "assign": "0"
  },
  "AL5": {
    "description": "AL05",
    "alarmbin": "0",
    "alarm": "",
    "assign": "0"
  },
  "AL6": {
    "description": "AL06",
    "alarmbin": "0",
    "alarm": "",
    "assign": "0"
  },
  "AL7": {
    "description": "AL07",
    "alarmbin": "0",
    "alarm": "",
    "assign": "0"
  },
  "AL8": {
    "description": "AL08",
    "alarmbin": "0",
    "alarm": "",
    "assign": "0"
  },
  "AL9": {
    "description": "AL09",

```

```

    "alarmbin": "0",
    "alarm": "",
    "assign": "0"
  },
  "AL10": {
    "description": "AL10",
    "alarmbin": "0",
    "alarm": "",
    "assign": "0"
  },
  "AL11": {
    "description": "AL11",
    "alarmbin": "0",
    "alarm": "",
    "assign": "0"
  },
  "AL12": {
    "description": "AL12",
    "alarmbin": "0",
    "alarm": "",
    "assign": "0"
  },
  "AL13": {
    "description": "AL13",
    "alarmbin": "0",
    "alarm": "",
    "assign": "0"
  },
  "AL14": {
    "description": "AL14",
    "alarmbin": "0",
    "alarm": "",
    "assign": "0"
  },
  "AL15": {
    "description": "AL15",
    "alarmbin": "0",
    "alarm": "",
    "assign": "0"
  },
  "AL16": {
    "description": "AL16",
    "alarmbin": "0",
    "alarm": "",
    "assign": "0"
  },
  "AL17": {
    "description": "AL17",
    "alarmbin": "0",
    "alarm": "",
    "assign": "0"
  },
  "AL18": {
    "description": "AL18",
    "alarmbin": "0",
    "alarm": "",
    "assign": "0"
  },
  "AL19": {
    "description": "AL19",
    "alarmbin": "0",
    "alarm": "",
    "assign": "0"
  },
  "AL20": {
    "description": "AL20",
    "alarmbin": "0",
    "alarm": "",
    "assign": "0"
  },
  "AL21": {
    "description": "AL21",
    "alarmbin": "0",
    "alarm": "",
    "assign": "0"
  },
  "AL22": {

```

```

    "description": "AL22",
    "alarmbin": "0",
    "alarm": "",
    "assign": "0"
  },
  "AL23": {
    "description": "AL23",
    "alarmbin": "0",
    "alarm": "",
    "assign": "0"
  },
  "AL24": {
    "description": "AL24",
    "alarmbin": "0",
    "alarm": "",
    "assign": "0"
  }
},
"R": {
  "R1": {
    "description": "Relay 1",
    "value": "OFF",
    "valuebin": "0",
    "pulseWidth": "0.3",
    "control": "Any Alarm"
  },
  "R2": {
    "description": "Relay 2",
    "value": "OFF",
    "valuebin": "0",
    "pulseWidth": "1.0",
    "control": "Watchdog1"
  },
  "R3": {
    "description": "Relay 3",
    "value": "OFF",
    "valuebin": "0",
    "pulseWidth": "1.0",
    "control": "Watchdog3"
  },
  "R4": {
    "description": "Relay 4",
    "value": "OFF",
    "valuebin": "0",
    "pulseWidth": "1.0",
    "control": "Watchdog4"
  }
},
"MBR": {
  "MBR1": {
    "description": "Modbus Relay 1",
    "value": "No connection, wait ON",
    "valuebin": "0",
    "control": "0",
    "conn": "0",
    "valid": "1"
  },
  "MBR2": {
    "description": "Modbus Relay 2",
    "value": "No connection",
    "valuebin": "0",
    "control": "0",
    "conn": "0",
    "valid": "0"
  },
  "MBR3": {
    "description": "Modbus Relay 3",
    "value": "No connection",
    "valuebin": "0",
    "control": "0",
    "conn": "0",
    "valid": "0"
  },
  "MBR4": {
    "description": "Modbus Relay 4",
    "value": "No connection",
    "valuebin": "0",

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"control": "0",
"conn": "0",
"valid": "0"
},
"MBR5": {
"description": "Modbus Relay 5",
"value": "No connection",
"valuebin": "0",
"control": "0",
"conn": "0",
"valid": "0"
},
"MBR6": {
"description": "Modbus Relay 6",
"value": "No connection",
"valuebin": "0",
"control": "0",
"conn": "0",
"valid": "0"
},
"MBR7": {
"description": "Modbus Relay 7",
"value": "No connection",
"valuebin": "0",
"control": "0",
"conn": "0",
"valid": "0"
},
"MBR8": {
"description": "Modbus Relay 8",
"value": "No connection",
"valuebin": "0",
"control": "0",
"conn": "0",
"valid": "0"
},
"MBR9": {
"description": "Modbus Relay 9",
"value": "No connection",
"valuebin": "0",
"control": "0",
"conn": "0",
"valid": "0"
},
"MBR10": {
"description": "Modbus Relay 10",
"value": "No connection",
"valuebin": "0",
"control": "0",
"conn": "0",
"valid": "0"
},
"MBR11": {
"description": "Modbus Relay 11",
"value": "No connection",
"valuebin": "0",
"control": "0",
"conn": "0",
"valid": "0"
},
"MBR12": {
"description": "Modbus Relay 12",
"value": "No connection",
"valuebin": "0",
"control": "0",
"conn": "0",
"valid": "0"
},
"MBR13": {
"description": "Modbus Relay 13",
"value": "No connection",
"valuebin": "0",
"control": "0",
"conn": "0",
"valid": "0"
},
"MBR14": {

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    "description": "Modbus Relay 14",
    "value": "No connection",
    "valuebin": "0",
    "control": "0",
    "conn": "0",
    "valid": "0"
  },
  "MBR15": {
    "description": "Modbus Relay 15",
    "value": "No connection",
    "valuebin": "0",
    "control": "0",
    "conn": "0",
    "valid": "0"
  },
  "MBR16": {
    "description": "Modbus Relay 16",
    "value": "No connection",
    "valuebin": "0",
    "control": "0",
    "conn": "0",
    "valid": "0"
  },
  "MBR17": {
    "description": "Modbus Relay 17",
    "value": "No connection",
    "valuebin": "0",
    "control": "0",
    "conn": "0",
    "valid": "0"
  },
  "MBR18": {
    "description": "Modbus Relay 18",
    "value": "No connection",
    "valuebin": "0",
    "control": "0",
    "conn": "0",
    "valid": "0"
  },
  "MBR19": {
    "description": "Modbus Relay 19",
    "value": "No connection",
    "valuebin": "0",
    "control": "0",
    "conn": "0",
    "valid": "0"
  },
  "MBR20": {
    "description": "Modbus Relay 20",
    "value": "No connection",
    "valuebin": "0",
    "control": "0",
    "conn": "0",
    "valid": "0"
  },
  "MBR21": {
    "description": "Modbus Relay 21",
    "value": "No connection",
    "valuebin": "0",
    "control": "0",
    "conn": "0",
    "valid": "0"
  },
  "MBR22": {
    "description": "Modbus Relay 22",
    "value": "No connection",
    "valuebin": "0",
    "control": "0",
    "conn": "0",
    "valid": "0"
  },
  "MBR23": {
    "description": "Modbus Relay 23",
    "value": "No connection",
    "valuebin": "0",
    "control": "0",
    "conn": "0",

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    "valid": "0"
  },
  "MBR24": {
    "description": "Modbus Relay 24",
    "value": "No connection",
    "valuebin": "0",
    "control": "0",
    "conn": "0",
    "valid": "0"
  }
},
"FUNC": {
  "FUNC1": {
    "alarmbin": "0",
    "alarm": "Normal"
  },
  "FUNC2": {
    "alarmbin": "0",
    "alarm": "Normal"
  },
  "FUNC3": {
    "alarmbin": "0",
    "alarm": "Normal"
  },
  "FUNC4": {
    "alarmbin": "0",
    "alarm": "Normal"
  }
},
"WDG": {
  "WDG1": {
    "description": "Watchdog1",
    "modebin": "3",
    "mode": "incoming ping",
    "host": "0.0.0.0",
    "state": "0"
  },
  "WDG2": {
    "description": "Watchdog2",
    "modebin": "2",
    "mode": "outgoing ping",
    "host": "192.168.32.112",
    "state": "0"
  },
  "WDG3": {
    "description": "Watchdog3",
    "modebin": "2",
    "mode": "outgoing ping",
    "host": "192.168.32.2",
    "state": "0"
  },
  "WDG4": {
    "description": "Watchdog4",
    "modebin": "2",
    "mode": "outgoing ping",
    "host": "192.168.32.30",
    "state": "0"
  }
},
"HTTPPost": {
  "Key": "",
  "PostPeriod": "60"
},
"MQTT": {
  "Period": "300"
},
"Sys": {
  "hwerr": "",
  "HighAlarmbin": "1",
  "HighAlarm": "Normal"
},
"Time": {
  "Date": "04.01.2024",
  "Time": "16:36:26"
}
}
}

```

Modbus TCP/IP full address table

Parameter	FC	PDU decimal address	Data size	Data
Relay 1	01,05,15	100	Discrete	
Relay 2	01,05,15	101	Discrete	
Relay 3	01,05,15	102	Discrete	
Relay 4	01,05,15	103	Discrete	
MB relay 1	01,05	200	Discrete	See Note 1 after the table.
MB relay 2	01,05	201	Discrete	—"—
MB relay 3	01,05	202	Discrete	—"—
MB relay 4	01,05	203	Discrete	—"—
MB relay 5	01,05	204	Discrete	—"—
MB relay 6	01,05	205	Discrete	—"—
MB relay 7	01,05	206	Discrete	—"—
MB relay 8	01,05	207	Discrete	—"—
MB relay 9	01,05	208	Discrete	—"—
MB relay 10	01,05	209	Discrete	—"—
MB relay 11	01,05	210	Discrete	—"—
MB relay 12	01,05	211	Discrete	—"—
MB relay 13	01,05	212	Discrete	—"—
MB relay 14	01,05	213	Discrete	—"—
MB relay 15	01,05	214	Discrete	—"—
MB relay 16	01,05	215	Discrete	—"—
MB relay 17	01,05	216	Discrete	—"—
MB relay 18	01,05	217	Discrete	—"—
MB relay 19	01,05	218	Discrete	—"—
MB relay 20	01,05	219	Discrete	—"—
MB relay 21	01,05	220	Discrete	—"—
MB relay 22	01,05	221	Discrete	—"—
MB relay 23	01,05	222	Discrete	—"—
MB relay 24	01,05	223	Discrete	—"—
Digital input 1	02	100	Discrete	
Digital input 2	02	101	Discrete	
Digital input 3	02	102	Discrete	
Digital input 4	02	103	Discrete	
Relay 1 description	03,16	10000	16 bytes UTF-8	
Relay 2 description	03,16	10008	16 bytes UTF-8	
Relay 3 description	03,16	10016	16 bytes UTF-8	
Relay 4 description	03,16	10024	16 bytes UTF-8	
Relay 1 pulse width	03,16	10100	32-bit Float	

Relay 2 pulse width	03,16	10102	32-bit Float	
Relay 3 pulse width	03,16	10104	32-bit Float	
Relay 4 pulse width	03,16	10106	32-bit Float	
Relay 1 activated from	03,06,16	10200	16-bit unsign int	webHttpApi(0), al01(1), al02(2), al03(3), al04(4), al05(5), al06(6), al07(7), al08(8), al09(9), al10(10), al11(11), al12(12), al13(13), al14(14), al15(15), al16(16), al17(17), al18(18), al19(19), al20(20), al21(21), al22(22), al23(23), al24(24), anyAlarm(25), schedule1(26), schedule2(27), schedule3(28), schedule4(29)
Relay 2 activated from	03,06,16	10201	16-bit unsign int	—"—
Relay 3 activated from	03,06,16	10202	16-bit unsign int	—"—
Relay 4 activated from	03,06,16	10203	16-bit unsign int	—"—
Relay 1 action on alarm	03,06,16	10300	16-bit unsign int	on(0), pulse(2)
Relay 2 action on alarm	03,06,16	10301	16-bit unsign int	on(0), pulse(2)
Relay 3 action on alarm	03,06,16	10302	16-bit unsign int	on(0), pulse(2)
Relay 4 action on alarm	03,06,16	10303	16-bit unsign int	on(0), pulse(2)
Relays state after restart	03,06	10400	16-bit unsign int	off(0), on(1), laststate(2)
Digital input 1 Description	03,16	12000	16 bytes UTF-8	
Digital input 2 Description	03,16	12008	16 bytes UTF-8	
Digital input 3 Description	03,16	12016	16 bytes UTF-8	
Digital input 4 Description	03,16	12024	16 bytes UTF-8	
Digital input 1 closed state description	03,16	12100	16 bytes UTF-8	
Digital input 2 closed state description	03,16	12108	16 bytes UTF-8	
Digital input 3 closed state description	03,16	12116	16 bytes UTF-8	
Digital input 4 closed state description	03,16	12124	16 bytes UTF-8	
Digital input 1 open state description	03,16	12200	16 bytes UTF-8	
Digital input 2 open state description	03,16	12208	16 bytes UTF-8	
Digital input 3 open state description	03,16	12216	16 bytes UTF-8	

Digital input 4 open state description	03,16	12224	16 bytes UTF-8	
Digital input 1 mode	03,06,16	12300	16-bit unsign int	openClosed(0), risingEdge(1), fallingEdge(2), bothEdges(3)
Digital input 2 mode	03,06,16	12301	16-bit unsign int	—"—
Digital input 3 mode	03,06,16	12302	16-bit unsign int	—"—
Digital input 4 mode	03,06,16	12303	16-bit unsign int	—"—
Digital input 1 close to open delay	03,16	12400	32-bit unsign int	
Digital input 2 close to open delay	03,16	12402	32-bit unsign int	
Digital input 3 close to open delay	03,16	12404	32-bit unsign int	
Digital input 4 close to open delay	03,16	12406	32-bit unsign int	
Digital input 1 open to close delay	03,16	12500	32-bit unsign int	
Digital input 2 open to close delay	03,16	12502	32-bit unsign int	
Digital input 3 open to close delay	03,16	12504	32-bit unsign int	
Digital input 4 open to close delay	03,16	12506	32-bit unsign int	
Digital input 1 counter init value	03,16	12600	32-bit unsign int	
Digital input 2 counter init value	03,16	12602	32-bit unsign int	
Digital input 3 counter init value	03,16	12604	32-bit unsign int	
Digital input 4 counter init value	03,16	12606	32-bit unsign int	
Digital input 1 counter value	03	12700	32-bit unsign int	
Digital input 2 counter value	03	12702	32-bit unsign int	
Digital input 3 counter value	03	12704	32-bit unsign int	
Digital input 4 counter value	03	12706	32-bit unsign int	
Analog input 1 description	03,16	14000	16 bytes UTF-8	
Analog input 2 description	03,16	14008	16 bytes UTF-8	
Analog input 3 description	03,16	14016	16 bytes UTF-8	
Analog input 4 description	03,16	14024	16 bytes UTF-8	
Analog input 1 multiplier	03,16	14100	32-bit Float	
Analog input 2 multiplier	03,16	14102	32-bit Float	
Analog input 3 multiplier	03,16	14104	32-bit Float	
Analog input 4 multiplier	03,16	14106	32-bit Float	
Analog input 1 offset	03,16	14200	32-bit Float	
Analog input 2 offset	03,16	14202	32-bit Float	
Analog input 3 offset	03,16	14204	32-bit Float	
Analog input 4 offset	03,16	14206	32-bit Float	
Analog input 1 mode(V/mA)	03,06,16	14300	16-bit unsign int	0-10V(0), 4-20mA(1)
Analog input 2 mode(V/mA)	03,06,16	14301	16-bit unsign int	0-10V(0), 4-20mA(1)
Analog input 3 mode(V/mA)	03,06,16	14302	16-bit unsign int	0-10V(0), 4-20mA(1)
Analog input 4 mode(V/mA)	03,06,16	14303	16-bit unsign int	0-10V(0), 4-20mA(1)

Analog input 1 value	03	14400	32-bit Float	
Analog input 2 value	03	14402	32-bit Float	
Analog input 3 value	03	14404	32-bit Float	
Analog input 4 value	03	14406	32-bit Float	
MB sensor 1 description	03,16	16000	16 bytes UTF-8	
MB sensor 2 description	03,16	16008	16 bytes UTF-8	
MB sensor 3 description	03,16	16016	16 bytes UTF-8	
MB sensor 4 description	03,16	16024	16 bytes UTF-8	
MB sensor 5 description	03,16	16032	16 bytes UTF-8	
MB sensor 6 description	03,16	16040	16 bytes UTF-8	
MB sensor 7 description	03,16	16048	16 bytes UTF-8	
MB sensor 8 description	03,16	16056	16 bytes UTF-8	
MB sensor 9 description	03,16	16064	16 bytes UTF-8	
MB sensor 10 description	03,16	16072	16 bytes UTF-8	
MB sensor 11 description	03,16	16080	16 bytes UTF-8	
MB sensor 12 description	03,16	16088	16 bytes UTF-8	
MB sensor 13 description	03,16	16096	16 bytes UTF-8	
MB sensor 14 description	03,16	16104	16 bytes UTF-8	
MB sensor 15 description	03,16	16112	16 bytes UTF-8	
MB sensor 16 description	03,16	16120	16 bytes UTF-8	
MB sensor 17 description	03,16	16128	16 bytes UTF-8	
MB sensor 18 description	03,16	16136	16 bytes UTF-8	
MB sensor 19 description	03,16	16144	16 bytes UTF-8	
MB sensor 20 description	03,16	16152	16 bytes UTF-8	
MB sensor 21 description	03,16	16160	16 bytes UTF-8	
MB sensor 22 description	03,16	16168	16 bytes UTF-8	
MB sensor 23 description	03,16	16176	16 bytes UTF-8	
MB sensor 24 description	03,16	16184	16 bytes UTF-8	
MB sensor 1 multiplier	03,16	16200	32-bit Float	
MB sensor 2 multiplier	03,16	16202	32-bit Float	
MB sensor 3 multiplier	03,16	16204	32-bit Float	
MB sensor 4 multiplier	03,16	16206	32-bit Float	
MB sensor 5 multiplier	03,16	16208	32-bit Float	
MB sensor 6 multiplier	03,16	16210	32-bit Float	
MB sensor 7 multiplier	03,16	16212	32-bit Float	
MB sensor 8 multiplier	03,16	16214	32-bit Float	
MB sensor 9 multiplier	03,16	16216	32-bit Float	
MB sensor 10 multiplier	03,16	16218	32-bit Float	
MB sensor 11 multiplier	03,16	16220	32-bit Float	
MB sensor 12 multiplier	03,16	16222	32-bit Float	
MB sensor 13 multiplier	03,16	16224	32-bit Float	
MB sensor 14 multiplier	03,16	16226	32-bit Float	
MB sensor 15 multiplier	03,16	16228	32-bit Float	
MB sensor 16 multiplier	03,16	16230	32-bit Float	
MB sensor 17 multiplier	03,16	16232	32-bit Float	
MB sensor 18 multiplier	03,16	16234	32-bit Float	

MB sensor 19 multiplier	03,16	16236	32-bit Float	
MB sensor 20 multiplier	03,16	16238	32-bit Float	
MB sensor 21 multiplier	03,16	16240	32-bit Float	
MB sensor 22 multiplier	03,16	16242	32-bit Float	
MB sensor 23 multiplier	03,16	16244	32-bit Float	
MB sensor 24 multiplier	03,16	16246	32-bit Float	
MB sensor 1 offset	03,16	16300	32-bit Float	
MB sensor 2 offset	03,16	16302	32-bit Float	
MB sensor 3 offset	03,16	16304	32-bit Float	
MB sensor 4 offset	03,16	16306	32-bit Float	
MB sensor 5 offset	03,16	16308	32-bit Float	
MB sensor 6 offset	03,16	16310	32-bit Float	
MB sensor 7 offset	03,16	16312	32-bit Float	
MB sensor 8 offset	03,16	16314	32-bit Float	
MB sensor 9 offset	03,16	16316	32-bit Float	
MB sensor 10 offset	03,16	16318	32-bit Float	
MB sensor 11 offset	03,16	16320	32-bit Float	
MB sensor 12 offset	03,16	16322	32-bit Float	
MB sensor 13 offset	03,16	16324	32-bit Float	
MB sensor 14 offset	03,16	16326	32-bit Float	
MB sensor 15 offset	03,16	16328	32-bit Float	
MB sensor 16 offset	03,16	16330	32-bit Float	
MB sensor 17 offset	03,16	16332	32-bit Float	
MB sensor 18 offset	03,16	16334	32-bit Float	
MB sensor 19 offset	03,16	16336	32-bit Float	
MB sensor 20 offset	03,16	16338	32-bit Float	
MB sensor 21 offset	03,16	16340	32-bit Float	
MB sensor 22 offset	03,16	16342	32-bit Float	
MB sensor 23 offset	03,16	16344	32-bit Float	
MB sensor 24 offset	03,16	16346	32-bit Float	
MB sensor 1 value	03	16400	32-bit Float	
MB sensor 2 value	03	16402	32-bit Float	
MB sensor 3 value	03	16404	32-bit Float	
MB sensor 4 value	03	16406	32-bit Float	
MB sensor 5 value	03	16408	32-bit Float	
MB sensor 6 value	03	16410	32-bit Float	
MB sensor 7 value	03	16412	32-bit Float	
MB sensor 8 value	03	16414	32-bit Float	
MB sensor 9 value	03	16416	32-bit Float	
MB sensor 10 value	03	16418	32-bit Float	
MB sensor 11 value	03	16420	32-bit Float	
MB sensor 12 value	03	16422	32-bit Float	
MB sensor 13 value	03	16424	32-bit Float	
MB sensor 14 value	03	16426	32-bit Float	
MB sensor 15 value	03	16428	32-bit Float	
MB sensor 16 value	03	16430	32-bit Float	

MB sensor 17 value	03	16432	32-bit Float	
MB sensor 18 value	03	16434	32-bit Float	
MB sensor 19 value	03	16436	32-bit Float	
MB sensor 20 value	03	16438	32-bit Float	
MB sensor 21 value	03	16440	32-bit Float	
MB sensor 22 value	03	16442	32-bit Float	
MB sensor 23 value	03	16444	32-bit Float	
MB sensor 24 value	03	16446	32-bit Float	
MB sensor 1 counter	03	16500	32-bit unsign int	
MB sensor 2 counter	03	16502	32-bit unsign int	
MB sensor 3 counter	03	16504	32-bit unsign int	
MB sensor 4 counter	03	16506	32-bit unsign int	
MB sensor 5 counter	03	16508	32-bit unsign int	
MB sensor 6 counter	03	16510	32-bit unsign int	
MB sensor 7 counter	03	16512	32-bit unsign int	
MB sensor 8 counter	03	16514	32-bit unsign int	
MB sensor 9 counter	03	16516	32-bit unsign int	
MB sensor 10 counter	03	16518	32-bit unsign int	
MB sensor 11 counter	03	16520	32-bit unsign int	
MB sensor 12 counter	03	16522	32-bit unsign int	
MB sensor 13 counter	03	16524	32-bit unsign int	
MB sensor 14 counter	03	16526	32-bit unsign int	
MB sensor 15 counter	03	16528	32-bit unsign int	
MB sensor 16 counter	03	16530	32-bit unsign int	
MB sensor 17 counter	03	16532	32-bit unsign int	
MB sensor 18 counter	03	16534	32-bit unsign int	
MB sensor 19 counter	03	16536	32-bit unsign int	
MB sensor 20 counter	03	16538	32-bit unsign int	
MB sensor 21 counter	03	16540	32-bit unsign int	
MB sensor 22 counter	03	16542	32-bit unsign int	
MB sensor 23 counter	03	16544	32-bit unsign int	
MB sensor 24 counter	03	16546	32-bit unsign int	
Channel 1 type	03,06,16	18000	16-bit unsign int	general(0), discrete(2) , counter(3)
Channel 2 type	03,06,16	18001	16-bit unsign int	—"—
Channel 3 type	03,06,16	18002	16-bit unsign int	—"—
Channel 4 type	03,06,16	18003	16-bit unsign int	—"—
Channel 5 type	03,06,16	18004	16-bit unsign int	—"—
Channel 6 type	03,06,16	18005	16-bit unsign int	—"—
Channel 7 type	03,06,16	18006	16-bit unsign int	—"—
Channel 8 type	03,06,16	18007	16-bit unsign int	—"—
Channel 9 type	03,06,16	18008	16-bit unsign int	—"—
Channel 10 type	03,06,16	18009	16-bit unsign int	—"—
Channel 11 type	03,06,16	18010	16-bit unsign int	—"—
Channel 12 type	03,06,16	18011	16-bit unsign int	—"—
Channel 13 type	03,06,16	18012	16-bit unsign int	—"—
Channel 14 type	03,06,16	18013	16-bit unsign int	—"—

Channel 15 type	03,06,16	18014	16-bit unsign int	—"—
Channel 16 type	03,06,16	18015	16-bit unsign int	—"—
Channel 17 type	03,06,16	18016	16-bit unsign int	—"—
Channel 18 type	03,06,16	18017	16-bit unsign int	—"—
Channel 19 type	03,06,16	18018	16-bit unsign int	—"—
Channel 20 type	03,06,16	18019	16-bit unsign int	—"—
Channel 21 type	03,06,16	18020	16-bit unsign int	—"—
Channel 22 type	03,06,16	18021	16-bit unsign int	—"—
Channel 23 type	03,06,16	18022	16-bit unsign int	—"—
Channel 24 type	03,06,16	18023	16-bit unsign int	—"—
Channel 1 description	03,16	18100	16 bytes UTF-8	
Channel 2 description	03,16	18108	16 bytes UTF-8	
Channel 3 description	03,16	18116	16 bytes UTF-8	
Channel 4 description	03,16	18124	16 bytes UTF-8	
Channel 5 description	03,16	18132	16 bytes UTF-8	
Channel 6 description	03,16	18140	16 bytes UTF-8	
Channel 7 description	03,16	18148	16 bytes UTF-8	
Channel 8 description	03,16	18156	16 bytes UTF-8	
Channel 9 description	03,16	18164	16 bytes UTF-8	
Channel 10 description	03,16	18172	16 bytes UTF-8	
Channel 11 description	03,16	18180	16 bytes UTF-8	
Channel 12 description	03,16	18188	16 bytes UTF-8	
Channel 13 description	03,16	18196	16 bytes UTF-8	
Channel 14 description	03,16	18204	16 bytes UTF-8	
Channel 15 description	03,16	18212	16 bytes UTF-8	
Channel 16 description	03,16	18220	16 bytes UTF-8	
Channel 17 description	03,16	18228	16 bytes UTF-8	
Channel 18 description	03,16	18236	16 bytes UTF-8	
Channel 19 description	03,16	18244	16 bytes UTF-8	
Channel 20 description	03,16	18252	16 bytes UTF-8	
Channel 21 description	03,16	18260	16 bytes UTF-8	
Channel 22 description	03,16	18268	16 bytes UTF-8	
Channel 23 description	03,16	18276	16 bytes UTF-8	
Channel 24 description	03,16	18284	16 bytes UTF-8	
Channel 1 parameter 1	03,06,16	18300	16-bit unsign int	none(0), s01(3), s02(4), s03(5), s04(6), s05(7), s06(8), s07(9), s08(10), s09(11), s10(12), s11(13), s12(14), s13(15), s14(16), s15(17), s16(18), s17(19), s18(20), s19(21), s20(22), s21(23), s22(24), s23(25), s24(26), a01(27), a02(28), a03(29), a04(30), d01(31), d02(32), d03(33), d04(34)
Channel 2 parameter 1	03,06,16	18301	16-bit unsign int	—"—
Channel 3 parameter 1	03,06,16	18302	16-bit unsign int	—"—
Channel 4 parameter 1	03,06,16	18303	16-bit unsign int	—"—

Channel 5 parameter 1	03,06,16	18304	16-bit unsign int	—"—
Channel 6 parameter 1	03,06,16	18305	16-bit unsign int	—"—
Channel 7 parameter 1	03,06,16	18306	16-bit unsign int	—"—
Channel 8 parameter 1	03,06,16	18307	16-bit unsign int	—"—
Channel 9 parameter 1	03,06,16	18308	16-bit unsign int	—"—
Channel 10 parameter 1	03,06,16	18309	16-bit unsign int	—"—
Channel 11 parameter 1	03,06,16	18310	16-bit unsign int	—"—
Channel 12 parameter 1	03,06,16	18311	16-bit unsign int	—"—
Channel 13 parameter 1	03,06,16	18312	16-bit unsign int	—"—
Channel 14 parameter 1	03,06,16	18313	16-bit unsign int	—"—
Channel 15 parameter 1	03,06,16	18314	16-bit unsign int	—"—
Channel 16 parameter 1	03,06,16	18315	16-bit unsign int	—"—
Channel 17 parameter 1	03,06,16	18316	16-bit unsign int	—"—
Channel 18 parameter 1	03,06,16	18317	16-bit unsign int	—"—
Channel 19 parameter 1	03,06,16	18318	16-bit unsign int	—"—
Channel 20 parameter 1	03,06,16	18319	16-bit unsign int	—"—
Channel 21 parameter 1	03,06,16	18320	16-bit unsign int	—"—
Channel 22 parameter 1	03,06,16	18321	16-bit unsign int	—"—
Channel 23 parameter 1	03,06,16	18322	16-bit unsign int	—"—
Channel 24 parameter 1	03,06,16	18323	16-bit unsign int	—"—
Channel 1 op 1	03,06,16	18400	16-bit unsign int	none(0), multiplication(1), division(2), sum(3), subtract(4)
Channel 2 op 1	03,06,16	18401	16-bit unsign int	—"—
Channel 3 op 1	03,06,16	18402	16-bit unsign int	—"—
Channel 4 op 1	03,06,16	18403	16-bit unsign int	—"—
Channel 5 op 1	03,06,16	18404	16-bit unsign int	—"—
Channel 6 op 1	03,06,16	18405	16-bit unsign int	—"—
Channel 7 op 1	03,06,16	18406	16-bit unsign int	—"—
Channel 8 op 1	03,06,16	18407	16-bit unsign int	—"—
Channel 9 op 1	03,06,16	18408	16-bit unsign int	—"—
Channel 10 op 1	03,06,16	18409	16-bit unsign int	—"—
Channel 11 op 1	03,06,16	18410	16-bit unsign int	—"—
Channel 12 op 1	03,06,16	18411	16-bit unsign int	—"—
Channel 13 op 1	03,06,16	18412	16-bit unsign int	—"—
Channel 14 op 1	03,06,16	18413	16-bit unsign int	—"—
Channel 15 op 1	03,06,16	18414	16-bit unsign int	—"—
Channel 16 op 1	03,06,16	18415	16-bit unsign int	—"—
Channel 17 op 1	03,06,16	18416	16-bit unsign int	—"—
Channel 18 op 1	03,06,16	18417	16-bit unsign int	—"—
Channel 19 op 1	03,06,16	18418	16-bit unsign int	—"—
Channel 20 op 1	03,06,16	18419	16-bit unsign int	—"—
Channel 21 op 1	03,06,16	18420	16-bit unsign int	—"—
Channel 22 op 1	03,06,16	18421	16-bit unsign int	—"—
Channel 23 op 1	03,06,16	18422	16-bit unsign int	—"—
Channel 24 op 1	03,06,16	18423	16-bit unsign int	—"—
Channel 1 parameter 2	03,06,16	18500	16-bit unsign int	none(0), s01(3), s02(4),

				s03(5), s04(6), s05(7), s06(8), s07(9), s08(10), s09(11), s10(12), s11(13), s12(14), s13(15), s14(16), s15(17), s16(18), s17(19), s18(20), s19(21), s20(22), s21(23), s22(24), s23(25), s24(26), a01(27), a02(28), a03(29), a04(30), d01(31), d02(32), d03(33), d04(34)
Channel 2 parameter 2	03,06,16	18501	16-bit unsign int	—"—
Channel 3 parameter 2	03,06,16	18502	16-bit unsign int	—"—
Channel 4 parameter 2	03,06,16	18503	16-bit unsign int	—"—
Channel 5 parameter 2	03,06,16	18504	16-bit unsign int	—"—
Channel 6 parameter 2	03,06,16	18505	16-bit unsign int	—"—
Channel 7 parameter 2	03,06,16	18506	16-bit unsign int	—"—
Channel 8 parameter 2	03,06,16	18507	16-bit unsign int	—"—
Channel 9 parameter 2	03,06,16	18508	16-bit unsign int	—"—
Channel 10 parameter 2	03,06,16	18509	16-bit unsign int	—"—
Channel 11 parameter 2	03,06,16	18510	16-bit unsign int	—"—
Channel 12 parameter 2	03,06,16	18511	16-bit unsign int	—"—
Channel 13 parameter 2	03,06,16	18512	16-bit unsign int	—"—
Channel 14 parameter 2	03,06,16	18513	16-bit unsign int	—"—
Channel 15 parameter 2	03,06,16	18514	16-bit unsign int	—"—
Channel 16 parameter 2	03,06,16	18515	16-bit unsign int	—"—
Channel 17 parameter 2	03,06,16	18516	16-bit unsign int	—"—
Channel 18 parameter 2	03,06,16	18517	16-bit unsign int	—"—
Channel 19 parameter 2	03,06,16	18518	16-bit unsign int	—"—
Channel 20 parameter 2	03,06,16	18519	16-bit unsign int	—"—
Channel 21 parameter 2	03,06,16	18520	16-bit unsign int	—"—
Channel 22 parameter 2	03,06,16	18521	16-bit unsign int	—"—
Channel 23 parameter 2	03,06,16	18522	16-bit unsign int	—"—
Channel 24 parameter 2	03,06,16	18523	16-bit unsign int	—"—
Channel 1 op 2	03,06,16	18600	16-bit unsign int	none(0), multiplication(1), division(2), sum(3), subtract(4)
Channel 2 op 2	03,06,16	18601	16-bit unsign int	—"—
Channel 3 op 2	03,06,16	18602	16-bit unsign int	—"—
Channel 4 op 2	03,06,16	18603	16-bit unsign int	—"—
Channel 5 op 2	03,06,16	18604	16-bit unsign int	—"—
Channel 6 op 2	03,06,16	18605	16-bit unsign int	—"—
Channel 7 op 2	03,06,16	18606	16-bit unsign int	—"—
Channel 8 op 2	03,06,16	18607	16-bit unsign int	—"—
Channel 9 op 2	03,06,16	18608	16-bit unsign int	—"—
Channel 10 op 2	03,06,16	18609	16-bit unsign int	—"—
Channel 11 op 2	03,06,16	18610	16-bit unsign int	—"—
Channel 12 op 2	03,06,16	18611	16-bit unsign int	—"—
Channel 13 op 2	03,06,16	18612	16-bit unsign int	—"—
Channel 14 op 2	03,06,16	18613	16-bit unsign int	—"—

Channel 15 op 2	03,06,16	18614	16-bit unsign int	—"—
Channel 16 op 2	03,06,16	18615	16-bit unsign int	—"—
Channel 17 op 2	03,06,16	18616	16-bit unsign int	—"—
Channel 18 op 2	03,06,16	18617	16-bit unsign int	—"—
Channel 19 op 2	03,06,16	18618	16-bit unsign int	—"—
Channel 20 op 2	03,06,16	18619	16-bit unsign int	—"—
Channel 21 op 2	03,06,16	18620	16-bit unsign int	—"—
Channel 22 op 2	03,06,16	18621	16-bit unsign int	—"—
Channel 23 op 2	03,06,16	18622	16-bit unsign int	—"—
Channel 24 op 2	03,06,16	18623	16-bit unsign int	—"—
Channel 1 coeff 1	03,16	18700	32-bit Float	
Channel 2 coeff 1	03,16	18702	32-bit Float	
Channel 3 coeff 1	03,16	18704	32-bit Float	
Channel 4 coeff 1	03,16	18706	32-bit Float	
Channel 5 coeff 1	03,16	18708	32-bit Float	
Channel 6 coeff 1	03,16	18710	32-bit Float	
Channel 7 coeff 1	03,16	18712	32-bit Float	
Channel 8 coeff 1	03,16	18714	32-bit Float	
Channel 9 coeff 1	03,16	18716	32-bit Float	
Channel 10 coeff 1	03,16	18718	32-bit Float	
Channel 11 coeff 1	03,16	18720	32-bit Float	
Channel 12 coeff 1	03,16	18722	32-bit Float	
Channel 13 coeff 1	03,16	18724	32-bit Float	
Channel 14 coeff 1	03,16	18726	32-bit Float	
Channel 15 coeff 1	03,16	18728	32-bit Float	
Channel 16 coeff 1	03,16	18730	32-bit Float	
Channel 17 coeff 1	03,16	18732	32-bit Float	
Channel 18 coeff 1	03,16	18734	32-bit Float	
Channel 19 coeff 1	03,16	18736	32-bit Float	
Channel 20 coeff 1	03,16	18738	32-bit Float	
Channel 21 coeff 1	03,16	18740	32-bit Float	
Channel 22 coeff 1	03,16	18742	32-bit Float	
Channel 23 coeff 1	03,16	18744	32-bit Float	
Channel 24 coeff 1	03,16	18746	32-bit Float	
Channel 1 op 3	03,06,16	18800	16-bit unsign int	none(0), multiplication(1), division(2), sum(3), subtract(4)
Channel 2 op 3	03,06,16	18801	16-bit unsign int	—"—
Channel 3 op 3	03,06,16	18802	16-bit unsign int	—"—
Channel 4 op 3	03,06,16	18803	16-bit unsign int	—"—
Channel 5 op 3	03,06,16	18804	16-bit unsign int	—"—
Channel 6 op 3	03,06,16	18805	16-bit unsign int	—"—
Channel 7 op 3	03,06,16	18806	16-bit unsign int	—"—
Channel 8 op 3	03,06,16	18807	16-bit unsign int	—"—
Channel 9 op 3	03,06,16	18808	16-bit unsign int	—"—
Channel 10 op 3	03,06,16	18809	16-bit unsign int	—"—
Channel 11 op 3	03,06,16	18810	16-bit unsign int	—"—

Channel 12 op 3	03,06,16	18811	16-bit unsign int	—"—
Channel 13 op 3	03,06,16	18812	16-bit unsign int	—"—
Channel 14 op 3	03,06,16	18813	16-bit unsign int	—"—
Channel 15 op 3	03,06,16	18814	16-bit unsign int	—"—
Channel 16 op 3	03,06,16	18815	16-bit unsign int	—"—
Channel 17 op 3	03,06,16	18816	16-bit unsign int	—"—
Channel 18 op 3	03,06,16	18817	16-bit unsign int	—"—
Channel 19 op 3	03,06,16	18818	16-bit unsign int	—"—
Channel 20 op 3	03,06,16	18819	16-bit unsign int	—"—
Channel 21 op 3	03,06,16	18820	16-bit unsign int	—"—
Channel 22 op 3	03,06,16	18821	16-bit unsign int	—"—
Channel 23 op 3	03,06,16	18822	16-bit unsign int	—"—
Channel 24 op 3	03,06,16	18823	16-bit unsign int	—"—
Channel 1 coeff 2	03,16	18900	32-bit Float	
Channel 2 coeff 2	03,16	18902	32-bit Float	
Channel 3 coeff 2	03,16	18904	32-bit Float	
Channel 4 coeff 2	03,16	18906	32-bit Float	
Channel 5 coeff 2	03,16	18908	32-bit Float	
Channel 6 coeff 2	03,16	18910	32-bit Float	
Channel 7 coeff 2	03,16	18912	32-bit Float	
Channel 8 coeff 2	03,16	18914	32-bit Float	
Channel 9 coeff 2	03,16	18916	32-bit Float	
Channel 10 coeff 2	03,16	18918	32-bit Float	
Channel 11 coeff 2	03,16	18920	32-bit Float	
Channel 12 coeff 2	03,16	18922	32-bit Float	
Channel 13 coeff 2	03,16	18924	32-bit Float	
Channel 14 coeff 2	03,16	18926	32-bit Float	
Channel 15 coeff 2	03,16	18928	32-bit Float	
Channel 16 coeff 2	03,16	18930	32-bit Float	
Channel 17 coeff 2	03,16	18932	32-bit Float	
Channel 18 coeff 2	03,16	18934	32-bit Float	
Channel 29 coeff 2	03,16	18936	32-bit Float	
Channel 20 coeff 2	03,16	18938	32-bit Float	
Channel 21 coeff 2	03,16	18940	32-bit Float	
Channel 22 coeff 2	03,16	18942	32-bit Float	
Channel 23 coeff 2	03,16	18944	32-bit Float	
Channel 24 coeff 2	03,16	18946	32-bit Float	
Channel 1 unit	03,16	19000	16 bytes UTF-8	
Channel 2 unit	03,16	19008	16 bytes UTF-8	
Channel 3 unit	03,16	19016	16 bytes UTF-8	
Channel 4 unit	03,16	19024	16 bytes UTF-8	
Channel 5 unit	03,16	19032	16 bytes UTF-8	
Channel 6 unit	03,16	19040	16 bytes UTF-8	
Channel 7 unit	03,16	19048	16 bytes UTF-8	
Channel 8 unit	03,16	19056	16 bytes UTF-8	
Channel 9 unit	03,16	19064	16 bytes UTF-8	

Channel 10 unit	03,16	19072	16 bytes UTF-8	
Channel 11 unit	03,16	19080	16 bytes UTF-8	
Channel 12 unit	03,16	19088	16 bytes UTF-8	
Channel 13 unit	03,16	19096	16 bytes UTF-8	
Channel 14 unit	03,16	19104	16 bytes UTF-8	
Channel 15 unit	03,16	19112	16 bytes UTF-8	
Channel 16 unit	03,16	19120	16 bytes UTF-8	
Channel 17 unit	03,16	19128	16 bytes UTF-8	
Channel 18 unit	03,16	19136	16 bytes UTF-8	
Channel 19 unit	03,16	19144	16 bytes UTF-8	
Channel 20 unit	03,16	19152	16 bytes UTF-8	
Channel 21 unit	03,16	19160	16 bytes UTF-8	
Channel 22 unit	03,16	19168	16 bytes UTF-8	
Channel 23 unit	03,16	19176	16 bytes UTF-8	
Channel 24 unit	03,16	19184	16 bytes UTF-8	
Channel 1 value	03	19300	32-bit Float	
Channel 2 value	03	19302	32-bit Float	
Channel 3 value	03	19304	32-bit Float	
Channel 4 value	03	19306	32-bit Float	
Channel 5 value	03	19308	32-bit Float	
Channel 6 value	03	19310	32-bit Float	
Channel 7 value	03	19312	32-bit Float	
Channel 8 value	03	19314	32-bit Float	
Channel 9 value	03	19316	32-bit Float	
Channel 10 value	03	19318	32-bit Float	
Channel 11 value	03	19320	32-bit Float	
Channel 12 value	03	19322	32-bit Float	
Channel 13 value	03	19324	32-bit Float	
Channel 14 value	03	19326	32-bit Float	
Channel 15 value	03	19328	32-bit Float	
Channel 16 value	03	19330	32-bit Float	
Channel 17 value	03	19332	32-bit Float	
Channel 18 value	03	19334	32-bit Float	
Channel 19 value	03	19336	32-bit Float	
Channel 20 value	03	19338	32-bit Float	
Channel 21 value	03	19340	32-bit Float	
Channel 22 value	03	19342	32-bit Float	
Channel 23 value	03	19344	32-bit Float	
Channel 24 value	03	19346	32-bit Float	
Channel 1 counter	03	19400	32-bit unsign int	
Channel 2 counter	03	19402	32-bit unsign int	
Channel 3 counter	03	19404	32-bit unsign int	
Channel 4 counter	03	19406	32-bit unsign int	
Channel 5 counter	03	19408	32-bit unsign int	
Channel 6 counter	03	19410	32-bit unsign int	
Channel 7 counter	03	19412	32-bit unsign int	

Channel 8 counter	03	19414	32-bit unsign int	
Channel 9 counter	03	19416	32-bit unsign int	
Channel 10 counter	03	19418	32-bit unsign int	
Channel 11 counter	03	19420	32-bit unsign int	
Channel 12 counter	03	19422	32-bit unsign int	
Channel 13 counter	03	19424	32-bit unsign int	
Channel 14 counter	03	19426	32-bit unsign int	
Channel 15 counter	03	19428	32-bit unsign int	
Channel 16 counter	03	19430	32-bit unsign int	
Channel 17 counter	03	19432	32-bit unsign int	
Channel 18 counter	03	19434	32-bit unsign int	
Channel 19 counter	03	19436	32-bit unsign int	
Channel 20 counter	03	19438	32-bit unsign int	
Channel 21 counter	03	19440	32-bit unsign int	
Channel 22 counter	03	19442	32-bit unsign int	
Channel 23 counter	03	19444	32-bit unsign int	
Channel 24 counter	03	19446	32-bit unsign int	
Channel 1 alarm status	03	19500	16-bit unsign int	undefined(0), normal(1), indeterminate(2), warning(3), minor(4), major(5), critical(6)
Channel 2 alarm status	03	19501	16-bit unsign int	—"—
Channel 3 alarm status	03	19502	16-bit unsign int	—"—
Channel 4 alarm status	03	19503	16-bit unsign int	—"—
Channel 5 alarm status	03	19504	16-bit unsign int	—"—
Channel 6 alarm status	03	19505	16-bit unsign int	—"—
Channel 7 alarm status	03	19506	16-bit unsign int	—"—
Channel 8 alarm status	03	19507	16-bit unsign int	—"—
Channel 9 alarm status	03	19508	16-bit unsign int	—"—
Channel 10 alarm status	03	19509	16-bit unsign int	—"—
Channel 11 alarm status	03	19510	16-bit unsign int	—"—
Channel 12 alarm status	03	19511	16-bit unsign int	—"—
Channel 13 alarm status	03	19512	16-bit unsign int	—"—
Channel 14 alarm status	03	19513	16-bit unsign int	—"—
Channel 15 alarm status	03	19514	16-bit unsign int	—"—
Channel 16 alarm status	03	19515	16-bit unsign int	—"—
Channel 17 alarm status	03	19516	16-bit unsign int	—"—
Channel 18 alarm status	03	19517	16-bit unsign int	—"—
Channel 19 alarm status	03	19518	16-bit unsign int	—"—
Channel 20 alarm status	03	19519	16-bit unsign int	—"—
Channel 21 alarm status	03	19520	16-bit unsign int	—"—
Channel 22 alarm status	03	19521	16-bit unsign int	—"—
Channel 23 alarm status	03	19522	16-bit unsign int	—"—
Channel 24 alarm status	03	19523	16-bit unsign int	—"—
Alarm 1 description	03,16	20000	16 bytes UTF-8	
Alarm 2 description	03,16	20008	16 bytes UTF-8	
Alarm 3 description	03,16	20016	16 bytes UTF-8	

Alarm 4 description	03,16	20024	16 bytes UTF-8	
Alarm 5 description	03,16	20032	16 bytes UTF-8	
Alarm 6 description	03,16	20040	16 bytes UTF-8	
Alarm 7 description	03,16	20048	16 bytes UTF-8	
Alarm 8 description	03,16	20056	16 bytes UTF-8	
Alarm 9 description	03,16	20064	16 bytes UTF-8	
Alarm 10 description	03,16	20072	16 bytes UTF-8	
Alarm 11 description	03,16	20080	16 bytes UTF-8	
Alarm 12 description	03,16	20088	16 bytes UTF-8	
Alarm 13 description	03,16	20096	16 bytes UTF-8	
Alarm 14 description	03,16	20104	16 bytes UTF-8	
Alarm 15 description	03,16	20112	16 bytes UTF-8	
Alarm 16 description	03,16	20120	16 bytes UTF-8	
Alarm 17 description	03,16	20128	16 bytes UTF-8	
Alarm 18 description	03,16	20136	16 bytes UTF-8	
Alarm 19 description	03,16	20144	16 bytes UTF-8	
Alarm 20 description	03,16	20152	16 bytes UTF-8	
Alarm 21 description	03,16	20160	16 bytes UTF-8	
Alarm 22 description	03,16	20168	16 bytes UTF-8	
Alarm 23 description	03,16	20176	16 bytes UTF-8	
Alarm 24 description	03,16	20184	16 bytes UTF-8	
Alarm 1 condition 1 channel	03,06,16	20200	16-bit unsign int	none(0), v01(1), v02(2), v03(3), v04(4), v05(5), v06(6), v07(7), v08(8), v09(9), v10(10), v11(11), v12(12), v13(13), v14(14), v15(15), v16(16), v17(17), v18(18), v19(19), v20(20), v21(21), v22(22), v23(23), v24(24)
Alarm 2 condition 1 channel	03,06,16	20201	16-bit unsign int	—"—
Alarm 3 condition 1 channel	03,06,16	20202	16-bit unsign int	—"—
Alarm 4 condition 1 channel	03,06,16	20203	16-bit unsign int	—"—
Alarm 5 condition 1 channel	03,06,16	20204	16-bit unsign int	—"—
Alarm 6 condition 1 channel	03,06,16	20205	16-bit unsign int	—"—
Alarm 7 condition 1 channel	03,06,16	20206	16-bit unsign int	—"—
Alarm 8 condition 1 channel	03,06,16	20207	16-bit unsign int	—"—
Alarm 9 condition 1 channel	03,06,16	20208	16-bit unsign int	—"—
Alarm 10 condition 1 channel	03,06,16	20209	16-bit unsign int	—"—
Alarm 11 condition 1 channel	03,06,16	20210	16-bit unsign int	—"—
Alarm 12 condition 1 channel	03,06,16	20211	16-bit unsign int	—"—
Alarm 13 condition 1 channel	03,06,16	20212	16-bit unsign int	—"—
Alarm 14 condition 1 channel	03,06,16	20213	16-bit unsign int	—"—
Alarm 15 condition 1 channel	03,06,16	20214	16-bit unsign int	—"—
Alarm 16 condition 1 channel	03,06,16	20215	16-bit unsign int	—"—
Alarm 17 condition 1 channel	03,06,16	20216	16-bit unsign int	—"—
Alarm 18 condition 1 channel	03,06,16	20217	16-bit unsign int	—"—
Alarm 19 condition 1 channel	03,06,16	20218	16-bit unsign int	—"—
Alarm 20 condition 1 channel	03,06,16	20219	16-bit unsign int	—"—

Alarm 21 condition 1 channel	03,06,16	20220	16-bit unsign int	—"—
Alarm 22 condition 1 channel	03,06,16	20221	16-bit unsign int	—"—
Alarm 23 condition 1 channel	03,06,16	20222	16-bit unsign int	—"—
Alarm 24 condition 1 channel	03,06,16	20223	16-bit unsign int	—"—
Alarm 1 condition 1 operand	03,06,16	20300	16-bit unsign int	larger(0), less(1)
Alarm 2 condition 1 operand	03,06,16	20301	16-bit unsign int	larger(0), less(1)
Alarm 3 condition 1 operand	03,06,16	20302	16-bit unsign int	larger(0), less(1)
Alarm 4 condition 1 operand	03,06,16	20303	16-bit unsign int	larger(0), less(1)
Alarm 5 condition 1 operand	03,06,16	20304	16-bit unsign int	larger(0), less(1)
Alarm 6 condition 1 operand	03,06,16	20305	16-bit unsign int	larger(0), less(1)
Alarm 7 condition 1 operand	03,06,16	20306	16-bit unsign int	larger(0), less(1)
Alarm 8 condition 1 operand	03,06,16	20307	16-bit unsign int	larger(0), less(1)
Alarm 9 condition 1 operand	03,06,16	20308	16-bit unsign int	larger(0), less(1)
Alarm 10 condition 1 operand	03,06,16	20309	16-bit unsign int	larger(0), less(1)
Alarm 11 condition 1 operand	03,06,16	20310	16-bit unsign int	larger(0), less(1)
Alarm 12 condition 1 operand	03,06,16	20311	16-bit unsign int	larger(0), less(1)
Alarm 13 condition 1 operand	03,06,16	20312	16-bit unsign int	larger(0), less(1)
Alarm 14 condition 1 operand	03,06,16	20313	16-bit unsign int	larger(0), less(1)
Alarm 15 condition 1 operand	03,06,16	20314	16-bit unsign int	larger(0), less(1)
Alarm 16 condition 1 operand	03,06,16	20315	16-bit unsign int	larger(0), less(1)
Alarm 17 condition 1 operand	03,06,16	20316	16-bit unsign int	larger(0), less(1)
Alarm 18 condition 1 operand	03,06,16	20317	16-bit unsign int	larger(0), less(1)
Alarm 19 condition 1 operand	03,06,16	20318	16-bit unsign int	larger(0), less(1)
Alarm 20 condition 1 operand	03,06,16	20319	16-bit unsign int	larger(0), less(1)
Alarm 21 condition 1 operand	03,06,16	20320	16-bit unsign int	larger(0), less(1)
Alarm 22 condition 1 operand	03,06,16	20321	16-bit unsign int	larger(0), less(1)
Alarm 23 condition 1 operand	03,06,16	20322	16-bit unsign int	larger(0), less(1)
Alarm 24 condition 1 operand	03,06,16	20323	16-bit unsign int	larger(0), less(1)
Alarm 1 condition 1 limit	03,16	20400	32-bit Float	
Alarm 2 condition 1 limit	03,16	20402	32-bit Float	
Alarm 3 condition 1 limit	03,16	20404	32-bit Float	
Alarm 4 condition 1 limit	03,16	20406	32-bit Float	
Alarm 5 condition 1 limit	03,16	20408	32-bit Float	
Alarm 6 condition 1 limit	03,16	20410	32-bit Float	
Alarm 7 condition 1 limit	03,16	20412	32-bit Float	
Alarm 8 condition 1 limit	03,16	20414	32-bit Float	
Alarm 9 condition 1 limit	03,16	20416	32-bit Float	
Alarm 10 condition 1 limit	03,16	20418	32-bit Float	
Alarm 11 condition 1 limit	03,16	20420	32-bit Float	
Alarm 12 condition 1 limit	03,16	20422	32-bit Float	
Alarm 13 condition 1 limit	03,16	20424	32-bit Float	
Alarm 14 condition 1 limit	03,16	20426	32-bit Float	
Alarm 15 condition 1 limit	03,16	20428	32-bit Float	
Alarm 16 condition 1 limit	03,16	20430	32-bit Float	
Alarm 17 condition 1 limit	03,16	20432	32-bit Float	
Alarm 18 condition 1 limit	03,16	20434	32-bit Float	

Alarm 19 condition 1 limit	03,16	20436	32-bit Float	
Alarm 20 condition 1 limit	03,16	20438	32-bit Float	
Alarm 21 condition 1 limit	03,16	20440	32-bit Float	
Alarm 22 condition 1 limit	03,16	20442	32-bit Float	
Alarm 23 condition 1 limit	03,16	20444	32-bit Float	
Alarm 23 condition 1 limit	03,16	20446	32-bit Float	
Alarm 1 condition 1 hysteresis	03,16	20500	32-bit Float	
Alarm 2 condition 1 hysteresis	03,16	20502	32-bit Float	
Alarm 3 condition 1 hysteresis	03,16	20504	32-bit Float	
Alarm 4 condition 1 hysteresis	03,16	20506	32-bit Float	
Alarm 5 condition 1 hysteresis	03,16	20508	32-bit Float	
Alarm 6 condition 1 hysteresis	03,16	20510	32-bit Float	
Alarm 7 condition 1 hysteresis	03,16	20512	32-bit Float	
Alarm 8 condition 1 hysteresis	03,16	20514	32-bit Float	
Alarm 9 condition 1 hysteresis	03,16	20516	32-bit Float	
Alarm 10 condition 1 hysteresis	03,16	20518	32-bit Float	
Alarm 11 condition 1 hysteresis	03,16	20520	32-bit Float	
Alarm 12 condition 1 hysteresis	03,16	20522	32-bit Float	
Alarm 13 condition 1 hysteresis	03,16	20524	32-bit Float	
Alarm 14 condition 1 hysteresis	03,16	20526	32-bit Float	
Alarm 15 condition 1 hysteresis	03,16	20528	32-bit Float	
Alarm 16 condition 1 hysteresis	03,16	20530	32-bit Float	
Alarm 17 condition 1 hysteresis	03,16	20532	32-bit Float	
Alarm 18 condition 1 hysteresis	03,16	20534	32-bit Float	
Alarm 19 condition 1 hysteresis	03,16	20536	32-bit Float	
Alarm 20 condition 1 hysteresis	03,16	20538	32-bit Float	
Alarm 21 condition 1 hysteresis	03,16	20540	32-bit Float	
Alarm 22 condition 1 hysteresis	03,16	20542	32-bit Float	
Alarm 23 condition 1 hysteresis	03,16	20544	32-bit Float	
Alarm 24 condition 1 hysteresis	03,16	20546	32-bit Float	
Alarm 1 condition 1 discrete al. state	03,06,16	20600	16-bit unsign int	open(0), closed(1)
Alarm 2 condition 1 discrete al. state	03,06,16	20601	16-bit unsign int	open(0), closed(1)
Alarm 3 condition 1 discrete al. state	03,06,16	20602	16-bit unsign int	open(0), closed(1)
Alarm 4 condition 1 discrete al. state	03,06,16	20603	16-bit unsign int	open(0), closed(1)
Alarm 5 condition 1 discrete al. state	03,06,16	20604	16-bit unsign int	open(0), closed(1)
Alarm 6 condition 1 discrete al. state	03,06,16	20605	16-bit unsign int	open(0), closed(1)
Alarm 7 condition 1 discrete al. state	03,06,16	20606	16-bit unsign int	open(0), closed(1)
Alarm 8 condition 1 discrete al. state	03,06,16	20607	16-bit unsign int	open(0), closed(1)
Alarm 9 condition 1 discrete al. state	03,06,16	20608	16-bit unsign int	open(0), closed(1)

Alarm 10 condition 1 discrete al. state	03,06,16	20609	16-bit unsign int	open(0), closed(1)
Alarm 11 condition 1 discrete al. state	03,06,16	20610	16-bit unsign int	open(0), closed(1)
Alarm 12 condition 1 discrete al. state	03,06,16	20611	16-bit unsign int	open(0), closed(1)
Alarm 13 condition 1 discrete al. state	03,06,16	20612	16-bit unsign int	open(0), closed(1)
Alarm 14 condition 1 discrete al. state	03,06,16	20613	16-bit unsign int	open(0), closed(1)
Alarm 15 condition 1 discrete al. state	03,06,16	20614	16-bit unsign int	open(0), closed(1)
Alarm 16 condition 1 discrete al. state	03,06,16	20615	16-bit unsign int	open(0), closed(1)
Alarm 17 condition 1 discrete al. state	03,06,16	20616	16-bit unsign int	open(0), closed(1)
Alarm 18 condition 1 discrete al. state	03,06,16	20617	16-bit unsign int	open(0), closed(1)
Alarm 19 condition 1 discrete al. state	03,06,16	20618	16-bit unsign int	open(0), closed(1)
Alarm 20 condition 1 discrete al. state	03,06,16	20619	16-bit unsign int	open(0), closed(1)
Alarm 21 condition 1 discrete al. state	03,06,16	20620	16-bit unsign int	open(0), closed(1)
Alarm 22 condition 1 discrete al. state	03,06,16	20621	16-bit unsign int	open(0), closed(1)
Alarm 23 condition 1 discrete al. state	03,06,16	20622	16-bit unsign int	open(0), closed(1)
Alarm 24 condition 1 discrete al. state	03,06,16	20623	16-bit unsign int	open(0), closed(1)
Alarm 1 function	03,06,16	20700	16-bit unsign int	none(0), and(1), or(2)
Alarm 2 function	03,06,16	20701	16-bit unsign int	none(0), and(1), or(2)
Alarm 3 function	03,06,16	20702	16-bit unsign int	none(0), and(1), or(2)
Alarm 4 function	03,06,16	20703	16-bit unsign int	none(0), and(1), or(2)
Alarm 5 function	03,06,16	20704	16-bit unsign int	none(0), and(1), or(2)
Alarm 6 function	03,06,16	20705	16-bit unsign int	none(0), and(1), or(2)
Alarm 7 function	03,06,16	20706	16-bit unsign int	none(0), and(1), or(2)
Alarm 8 function	03,06,16	20707	16-bit unsign int	none(0), and(1), or(2)
Alarm 9 function	03,06,16	20708	16-bit unsign int	none(0), and(1), or(2)
Alarm 10 function	03,06,16	20709	16-bit unsign int	none(0), and(1), or(2)
Alarm 11 function	03,06,16	20710	16-bit unsign int	none(0), and(1), or(2)
Alarm 12 function	03,06,16	20711	16-bit unsign int	none(0), and(1), or(2)
Alarm 13 function	03,06,16	20712	16-bit unsign int	none(0), and(1), or(2)
Alarm 14 function	03,06,16	20713	16-bit unsign int	none(0), and(1), or(2)
Alarm 15 function	03,06,16	20714	16-bit unsign int	none(0), and(1), or(2)
Alarm 16 function	03,06,16	20715	16-bit unsign int	none(0), and(1), or(2)
Alarm 17 function	03,06,16	20716	16-bit unsign int	none(0), and(1), or(2)
Alarm 18 function	03,06,16	20717	16-bit unsign int	none(0), and(1), or(2)
Alarm 19 function	03,06,16	20718	16-bit unsign int	none(0), and(1), or(2)
Alarm 20 function	03,06,16	20719	16-bit unsign int	none(0), and(1), or(2)
Alarm 21 function	03,06,16	20720	16-bit unsign int	none(0), and(1), or(2)

Alarm 22 function	03,06,16	20721	16-bit unsign int	none(0), and(1), or(2)
Alarm 23 function	03,06,16	20722	16-bit unsign int	none(0), and(1), or(2)
Alarm 24 function	03,06,16	20723	16-bit unsign int	none(0), and(1), or(2)
Alarm 1 condition 2 channel	03,06,16	20800	16-bit unsign int	none(0), v01(1), v02(2), v03(3), v04(4), v05(5), v06(6), v07(7), v08(8), v09(9), v10(10), v11(11), v12(12), v13(13), v14(14), v15(15), v16(16), v17(17), v18(18), v19(19), v20(20), v21(21), v22(22), v23(23), v24(24)
Alarm 2 condition 2 channel	03,06,16	20801	16-bit unsign int	—"—
Alarm 3 condition 2 channel	03,06,16	20802	16-bit unsign int	—"—
Alarm 4 condition 2 channel	03,06,16	20803	16-bit unsign int	—"—
Alarm 5 condition 2 channel	03,06,16	20804	16-bit unsign int	—"—
Alarm 6 condition 2 channel	03,06,16	20805	16-bit unsign int	—"—
Alarm 7 condition 2 channel	03,06,16	20806	16-bit unsign int	—"—
Alarm 8 condition 2 channel	03,06,16	20807	16-bit unsign int	—"—
Alarm 9 condition 2 channel	03,06,16	20808	16-bit unsign int	—"—
Alarm 10 condition 2 channel	03,06,16	20809	16-bit unsign int	—"—
Alarm 11 condition 2 channel	03,06,16	20810	16-bit unsign int	—"—
Alarm 12 condition 2 channel	03,06,16	20811	16-bit unsign int	—"—
Alarm 13 condition 2 channel	03,06,16	20812	16-bit unsign int	—"—
Alarm 14 condition 2 channel	03,06,16	20813	16-bit unsign int	—"—
Alarm 15 condition 2 channel	03,06,16	20814	16-bit unsign int	—"—
Alarm 16 condition 2 channel	03,06,16	20815	16-bit unsign int	—"—
Alarm 17 condition 2 channel	03,06,16	20816	16-bit unsign int	—"—
Alarm 18 condition 2 channel	03,06,16	20817	16-bit unsign int	—"—
Alarm 19 condition 2 channel	03,06,16	20818	16-bit unsign int	—"—
Alarm 20 condition 2 channel	03,06,16	20819	16-bit unsign int	—"—
Alarm 21 condition 2 channel	03,06,16	20820	16-bit unsign int	—"—
Alarm 22 condition 2 channel	03,06,16	20821	16-bit unsign int	—"—
Alarm 23 condition 2 channel	03,06,16	20822	16-bit unsign int	—"—
Alarm 24 condition 2 channel	03,06,16	20823	16-bit unsign int	—"—
Alarm 1 condition 2 operand	03,06,16	20900	16-bit unsign int	larger(0), less(1)
Alarm 2 condition 2 operand	03,06,16	20901	16-bit unsign int	larger(0), less(1)
Alarm 3 condition 2 operand	03,06,16	20902	16-bit unsign int	larger(0), less(1)
Alarm 4 condition 2 operand	03,06,16	20903	16-bit unsign int	larger(0), less(1)
Alarm 5 condition 2 operand	03,06,16	20904	16-bit unsign int	larger(0), less(1)
Alarm 6 condition 2 operand	03,06,16	20905	16-bit unsign int	larger(0), less(1)
Alarm 7 condition 2 operand	03,06,16	20906	16-bit unsign int	larger(0), less(1)
Alarm 8 condition 2 operand	03,06,16	20907	16-bit unsign int	larger(0), less(1)
Alarm 9 condition 2 operand	03,06,16	20908	16-bit unsign int	larger(0), less(1)
Alarm 10 condition 2 operand	03,06,16	20909	16-bit unsign int	larger(0), less(1)
Alarm 11 condition 2 operand	03,06,16	20910	16-bit unsign int	larger(0), less(1)
Alarm 12 condition 2 operand	03,06,16	20911	16-bit unsign int	larger(0), less(1)

Alarm 13 condition 2 operand	03,06,16	20912	16-bit unsign int	larger(0), less(1)
Alarm 14 condition 2 operand	03,06,16	20913	16-bit unsign int	larger(0), less(1)
Alarm 15 condition 2 operand	03,06,16	20914	16-bit unsign int	larger(0), less(1)
Alarm 16 condition 2 operand	03,06,16	20915	16-bit unsign int	larger(0), less(1)
Alarm 17 condition 2 operand	03,06,16	20916	16-bit unsign int	larger(0), less(1)
Alarm 18 condition 2 operand	03,06,16	20917	16-bit unsign int	larger(0), less(1)
Alarm 19 condition 2 operand	03,06,16	20918	16-bit unsign int	larger(0), less(1)
Alarm 20 condition 2 operand	03,06,16	20919	16-bit unsign int	larger(0), less(1)
Alarm 21 condition 2 operand	03,06,16	20920	16-bit unsign int	larger(0), less(1)
Alarm 22 condition 2 operand	03,06,16	20921	16-bit unsign int	larger(0), less(1)
Alarm 23 condition 2 operand	03,06,16	20922	16-bit unsign int	larger(0), less(1)
Alarm 24 condition 2 operand	03,06,16	20923	16-bit unsign int	larger(0), less(1)
Alarm 1 condition 2 limit	03,16	21000	32-bit Float	
Alarm 2 condition 2 limit	03,16	21002	32-bit Float	
Alarm 3 condition 2 limit	03,16	21004	32-bit Float	
Alarm 4 condition 2 limit	03,16	21006	32-bit Float	
Alarm 5 condition 2 limit	03,16	21008	32-bit Float	
Alarm 6 condition 2 limit	03,16	21010	32-bit Float	
Alarm 7 condition 2 limit	03,16	21012	32-bit Float	
Alarm 8 condition 2 limit	03,16	21014	32-bit Float	
Alarm 9 condition 2 limit	03,16	21016	32-bit Float	
Alarm 10 condition 2 limit	03,16	21018	32-bit Float	
Alarm 11 condition 2 limit	03,16	21020	32-bit Float	
Alarm 12 condition 2 limit	03,16	21022	32-bit Float	
Alarm 13 condition 2 limit	03,16	21024	32-bit Float	
Alarm 14 condition 2 limit	03,16	21026	32-bit Float	
Alarm 15 condition 2 limit	03,16	21028	32-bit Float	
Alarm 16 condition 2 limit	03,16	21030	32-bit Float	
Alarm 17 condition 2 limit	03,16	21032	32-bit Float	
Alarm 18 condition 2 limit	03,16	21034	32-bit Float	
Alarm 19 condition 2 limit	03,16	21036	32-bit Float	
Alarm 20 condition 2 limit	03,16	21038	32-bit Float	
Alarm 21 condition 2 limit	03,16	21040	32-bit Float	
Alarm 22 condition 2 limit	03,16	21042	32-bit Float	
Alarm 23 condition 2 limit	03,16	21044	32-bit Float	
Alarm 24 condition 2 limit	03,16	21046	32-bit Float	
Alarm 1 condition 2 hysteresis	03,16	21100	32-bit Float	
Alarm 2 condition 2 hysteresis	03,16	21102	32-bit Float	
Alarm 3 condition 2 hysteresis	03,16	21104	32-bit Float	
Alarm 4 condition 2 hysteresis	03,16	21106	32-bit Float	
Alarm 5 condition 2 hysteresis	03,16	21108	32-bit Float	
Alarm 6 condition 2 hysteresis	03,16	21110	32-bit Float	
Alarm 7 condition 2 hysteresis	03,16	21112	32-bit Float	
Alarm 8 condition 2 hysteresis	03,16	21114	32-bit Float	
Alarm 9 condition 2 hysteresis	03,16	21116	32-bit Float	
Alarm 10 condition 2 hysteresis	03,16	21118	32-bit Float	

Alarm 11 condition 2 hysteresis	03,16	21120	32-bit Float	
Alarm 12 condition 2 hysteresis	03,16	21122	32-bit Float	
Alarm 13 condition 2 hysteresis	03,16	21124	32-bit Float	
Alarm 14 condition 2 hysteresis	03,16	21126	32-bit Float	
Alarm 15 condition 2 hysteresis	03,16	21128	32-bit Float	
Alarm 16 condition 2 hysteresis	03,16	21130	32-bit Float	
Alarm 17 condition 2 hysteresis	03,16	21132	32-bit Float	
Alarm 18 condition 2 hysteresis	03,16	21134	32-bit Float	
Alarm 19 condition 2 hysteresis	03,16	21136	32-bit Float	
Alarm 20 condition 2 hysteresis	03,16	21138	32-bit Float	
Alarm 21 condition 2 hysteresis	03,16	21140	32-bit Float	
Alarm 22 condition 2 hysteresis	03,16	21142	32-bit Float	
Alarm 23 condition 2 hysteresis	03,16	21144	32-bit Float	
Alarm 24 condition 2 hysteresis	03,16	21146	32-bit Float	
Alarm 1 condition 2 discrete al. state	03,06,16	21200	16-bit unsign int	open(0), closed(1)
Alarm 2 condition 2 discrete al. state	03,06,16	21201	16-bit unsign int	open(0), closed(1)
Alarm 3 condition 2 discrete al. state	03,06,16	21202	16-bit unsign int	open(0), closed(1)
Alarm 4 condition 2 discrete al. state	03,06,16	21203	16-bit unsign int	open(0), closed(1)
Alarm 5 condition 2 discrete al. state	03,06,16	21204	16-bit unsign int	open(0), closed(1)
Alarm 6 condition 2 discrete al. state	03,06,16	21205	16-bit unsign int	open(0), closed(1)
Alarm 7 condition 2 discrete al. state	03,06,16	21206	16-bit unsign int	open(0), closed(1)
Alarm 8 condition 2 discrete al. state	03,06,16	21207	16-bit unsign int	open(0), closed(1)
Alarm 9 condition 2 discrete al. state	03,06,16	21208	16-bit unsign int	open(0), closed(1)
Alarm 10 condition 2 discrete al. state	03,06,16	21209	16-bit unsign int	open(0), closed(1)
Alarm 11 condition 2 discrete al. state	03,06,16	21210	16-bit unsign int	open(0), closed(1)
Alarm 12 condition 2 discrete al. state	03,06,16	21211	16-bit unsign int	open(0), closed(1)
Alarm 13 condition 2 discrete al. state	03,06,16	21212	16-bit unsign int	open(0), closed(1)
Alarm 14 condition 2 discrete al. state	03,06,16	21213	16-bit unsign int	open(0), closed(1)
Alarm 15 condition 2 discrete al. state	03,06,16	21214	16-bit unsign int	open(0), closed(1)
Alarm 16 condition 2 discrete al. state	03,06,16	21215	16-bit unsign int	open(0), closed(1)
Alarm 17 condition 2 discrete al. state	03,06,16	21216	16-bit unsign int	open(0), closed(1)
Alarm 18 condition 2 discrete al. state	03,06,16	21217	16-bit unsign int	open(0), closed(1)
Alarm 19 condition 2 discrete al. state	03,06,16	21218	16-bit unsign int	open(0), closed(1)

Alarm 20 condition 2 discrete al. state	03,06,16	21219	16-bit unsign int	open(0), closed(1)
Alarm 21 condition 2 discrete al. state	03,06,16	21220	16-bit unsign int	open(0), closed(1)
Alarm 22 condition 2 discrete al. state	03,06,16	21221	16-bit unsign int	open(0), closed(1)
Alarm 23 condition 2 discrete al. state	03,06,16	21222	16-bit unsign int	open(0), closed(1)
Alarm 24 condition 2 discrete al. state	03,06,16	21223	16-bit unsign int	open(0), closed(1)
Alarm 1 type	03,06,16	21300	16-bit unsign int	warning(3), minor(4), major(5), critical(6)
Alarm 2 type	03,06,16	21301	16-bit unsign int	—"—
Alarm 3 type	03,06,16	21302	16-bit unsign int	—"—
Alarm 4 type	03,06,16	21303	16-bit unsign int	—"—
Alarm 5 type	03,06,16	21304	16-bit unsign int	—"—
Alarm 6 type	03,06,16	21305	16-bit unsign int	—"—
Alarm 7 type	03,06,16	21306	16-bit unsign int	—"—
Alarm 8 type	03,06,16	21307	16-bit unsign int	—"—
Alarm 9 type	03,06,16	21308	16-bit unsign int	—"—
Alarm 10 type	03,06,16	21309	16-bit unsign int	—"—
Alarm 11 type	03,06,16	21310	16-bit unsign int	—"—
Alarm 12 type	03,06,16	21311	16-bit unsign int	—"—
Alarm 13 type	03,06,16	21312	16-bit unsign int	—"—
Alarm 14 type	03,06,16	21313	16-bit unsign int	—"—
Alarm 15 type	03,06,16	21314	16-bit unsign int	—"—
Alarm 16 type	03,06,16	21315	16-bit unsign int	—"—
Alarm 17 type	03,06,16	21316	16-bit unsign int	—"—
Alarm 18 type	03,06,16	21317	16-bit unsign int	—"—
Alarm 19 type	03,06,16	21318	16-bit unsign int	—"—
Alarm 20 type	03,06,16	21319	16-bit unsign int	—"—
Alarm 21 type	03,06,16	21320	16-bit unsign int	—"—
Alarm 22 type	03,06,16	21321	16-bit unsign int	—"—
Alarm 23 type	03,06,16	21322	16-bit unsign int	—"—
Alarm 24 type	03,06,16	21323	16-bit unsign int	—"—
Alarm 1 assigned to channel	03,06,16	21400	16-bit unsign int	none(0), v01(1), v02(2), v03(3), v04(4), v05(5), v06(6), v07(7), v08(8),v09(9), v10(10), v11(11), v12(12), v13(13), v14(14), v15(15), v16(16),v17(17), v18(18), v19(19), v20(20), v21(21), v22(22), v23(23), v24(24)
Alarm 2 assigned to channel	03,06,16	21401	16-bit unsign int	—"—
Alarm 3 assigned to channel	03,06,16	21402	16-bit unsign int	—"—
Alarm 4 assigned to channel	03,06,16	21403	16-bit unsign int	—"—
Alarm 5 assigned to channel	03,06,16	21404	16-bit unsign int	—"—
Alarm 6 assigned to channel	03,06,16	21405	16-bit unsign int	—"—

Alarm 7 assigned to channel	03,06,16	21406	16-bit unsign int	—"—
Alarm 8 assigned to channel	03,06,16	21407	16-bit unsign int	—"—
Alarm 9 assigned to channel	03,06,16	21408	16-bit unsign int	—"—
Alarm 10 assigned to channel	03,06,16	21409	16-bit unsign int	—"—
Alarm 11 assigned to channel	03,06,16	21410	16-bit unsign int	—"—
Alarm 12 assigned to channel	03,06,16	21411	16-bit unsign int	—"—
Alarm 13 assigned to channel	03,06,16	21412	16-bit unsign int	—"—
Alarm 14 assigned to channel	03,06,16	21413	16-bit unsign int	—"—
Alarm 15 assigned to channel	03,06,16	21414	16-bit unsign int	—"—
Alarm 16 assigned to channel	03,06,16	21415	16-bit unsign int	—"—
Alarm 17 assigned to channel	03,06,16	21416	16-bit unsign int	—"—
Alarm 18 assigned to channel	03,06,16	21417	16-bit unsign int	—"—
Alarm 19 assigned to channel	03,06,16	21418	16-bit unsign int	—"—
Alarm 20 assigned to channel	03,06,16	21419	16-bit unsign int	—"—
Alarm 21 assigned to channel	03,06,16	21420	16-bit unsign int	—"—
Alarm 22 assigned to channel	03,06,16	21421	16-bit unsign int	—"—
Alarm 23 assigned to channel	03,06,16	21422	16-bit unsign int	—"—
Alarm 24 assigned to channel	03,06,16	21423	16-bit unsign int	—"—
Alarm 1 delay	03,16	21500	32-bit Float	
Alarm 2 delay	03,16	21502	32-bit Float	
Alarm 3 delay	03,16	21504	32-bit Float	
Alarm 4 delay	03,16	21506	32-bit Float	
Alarm 5 delay	03,16	21508	32-bit Float	
Alarm 6 delay	03,16	21510	32-bit Float	
Alarm 7 delay	03,16	21512	32-bit Float	
Alarm 8 delay	03,16	21514	32-bit Float	
Alarm 9 delay	03,16	21516	32-bit Float	
Alarm 10 delay	03,16	21518	32-bit Float	
Alarm 11 delay	03,16	21520	32-bit Float	
Alarm 12 delay	03,16	21522	32-bit Float	
Alarm 13 delay	03,16	21524	32-bit Float	
Alarm 14 delay	03,16	21526	32-bit Float	
Alarm 15 delay	03,16	21528	32-bit Float	
Alarm 16 delay	03,16	21530	32-bit Float	
Alarm 17 delay	03,16	21532	32-bit Float	
Alarm 18 delay	03,16	21534	32-bit Float	
Alarm 19 delay	03,16	21536	32-bit Float	
Alarm 20 delay	03,16	21538	32-bit Float	
Alarm 21 delay	03,16	21540	32-bit Float	
Alarm 22 delay	03,16	21542	32-bit Float	
Alarm 23 delay	03,16	21544	32-bit Float	
Alarm 24 delay	03,16	21546	32-bit Float	
Alarm 1 action on return	03,06,16	21600	16-bit unsign int	no(0), yes(1)
Alarm 2 action on return	03,06,16	21601	16-bit unsign int	no(0), yes(1)
Alarm 3 action on return	03,06,16	21602	16-bit unsign int	no(0), yes(1)
Alarm 4 action on return	03,06,16	21603	16-bit unsign int	no(0), yes(1)

Alarm 5 action on return	03,06,16	21604	16-bit unsign int	no(0), yes(1)
Alarm 6 action on return	03,06,16	21605	16-bit unsign int	no(0), yes(1)
Alarm 7 action on return	03,06,16	21606	16-bit unsign int	no(0), yes(1)
Alarm 8 action on return	03,06,16	21607	16-bit unsign int	no(0), yes(1)
Alarm 9 action on return	03,06,16	21608	16-bit unsign int	no(0), yes(1)
Alarm 10 action on return	03,06,16	21609	16-bit unsign int	no(0), yes(1)
Alarm 11 action on return	03,06,16	21610	16-bit unsign int	no(0), yes(1)
Alarm 12 action on return	03,06,16	21611	16-bit unsign int	no(0), yes(1)
Alarm 13 action on return	03,06,16	21612	16-bit unsign int	no(0), yes(1)
Alarm 14 action on return	03,06,16	21613	16-bit unsign int	no(0), yes(1)
Alarm 15 action on return	03,06,16	21614	16-bit unsign int	no(0), yes(1)
Alarm 16 action on return	03,06,16	21615	16-bit unsign int	no(0), yes(1)
Alarm 17 action on return	03,06,16	21616	16-bit unsign int	no(0), yes(1)
Alarm 18 action on return	03,06,16	21617	16-bit unsign int	no(0), yes(1)
Alarm 19 action on return	03,06,16	21618	16-bit unsign int	no(0), yes(1)
Alarm 20 action on return	03,06,16	21619	16-bit unsign int	no(0), yes(1)
Alarm 21 action on return	03,06,16	21620	16-bit unsign int	no(0), yes(1)
Alarm 22 action on return	03,06,16	21621	16-bit unsign int	no(0), yes(1)
Alarm 23 action on return	03,06,16	21622	16-bit unsign int	no(0), yes(1)
Alarm 24 action on return	03,06,16	21623	16-bit unsign int	no(0), yes(1)
Alarm 1 action 1	03,06,16	21700	16-bit unsign int	none(0), trapcond1(1), trapcond2(2), trapcond1and2(3), postiostate(4), mqttpublish(6)
Alarm 2 action 1	03,06,16	21701	16-bit unsign int	—"—
Alarm 3 action 1	03,06,16	21702	16-bit unsign int	—"—
Alarm 4 action 1	03,06,16	21703	16-bit unsign int	—"—
Alarm 5 action 1	03,06,16	21704	16-bit unsign int	—"—
Alarm 6 action 1	03,06,16	21705	16-bit unsign int	—"—
Alarm 7 action 1	03,06,16	21706	16-bit unsign int	—"—
Alarm 8 action 1	03,06,16	21707	16-bit unsign int	—"—
Alarm 9 action 1	03,06,16	21708	16-bit unsign int	—"—
Alarm 10 action 1	03,06,16	21709	16-bit unsign int	—"—
Alarm 11 action 1	03,06,16	21710	16-bit unsign int	—"—
Alarm 12 action 1	03,06,16	21711	16-bit unsign int	—"—
Alarm 13 action 1	03,06,16	21712	16-bit unsign int	—"—
Alarm 14 action 1	03,06,16	21713	16-bit unsign int	—"—
Alarm 15 action 1	03,06,16	21714	16-bit unsign int	—"—
Alarm 16 action 1	03,06,16	21715	16-bit unsign int	—"—
Alarm 17 action 1	03,06,16	21716	16-bit unsign int	—"—
Alarm 18 action 1	03,06,16	21717	16-bit unsign int	—"—
Alarm 19 action 1	03,06,16	21718	16-bit unsign int	—"—
Alarm 20 action 1	03,06,16	21719	16-bit unsign int	—"—
Alarm 21 action 1	03,06,16	21720	16-bit unsign int	—"—
Alarm 22 action 1	03,06,16	21721	16-bit unsign int	—"—
Alarm 23 action 1	03,06,16	21722	16-bit unsign int	—"—
Alarm 24 action 1	03,06,16	21723	16-bit unsign int	—"—

Alarm 1 action 2	03,06,16	21800	16-bit unsign int	none(0), trapcond1(1), trapcond2(2), trapcond1and2(3), postiostate(4), mqttpublish(6)
Alarm 2 action 2	03,06,16	21801	16-bit unsign int	—"—
Alarm 3 action 2	03,06,16	21802	16-bit unsign int	—"—
Alarm 4 action 2	03,06,16	21803	16-bit unsign int	—"—
Alarm 5 action 2	03,06,16	21804	16-bit unsign int	—"—
Alarm 6 action 2	03,06,16	21805	16-bit unsign int	—"—
Alarm 7 action 2	03,06,16	21806	16-bit unsign int	—"—
Alarm 8 action 2	03,06,16	21807	16-bit unsign int	—"—
Alarm 9 action 2	03,06,16	21808	16-bit unsign int	—"—
Alarm 10 action 2	03,06,16	21809	16-bit unsign int	—"—
Alarm 11 action 2	03,06,16	21810	16-bit unsign int	—"—
Alarm 12 action 2	03,06,16	21811	16-bit unsign int	—"—
Alarm 13 action 2	03,06,16	21812	16-bit unsign int	—"—
Alarm 14 action 2	03,06,16	21813	16-bit unsign int	—"—
Alarm 15 action 2	03,06,16	21814	16-bit unsign int	—"—
Alarm 16 action 2	03,06,16	21815	16-bit unsign int	—"—
Alarm 17 action 2	03,06,16	21816	16-bit unsign int	—"—
Alarm 18 action 2	03,06,16	21817	16-bit unsign int	—"—
Alarm 19 action 2	03,06,16	21818	16-bit unsign int	—"—
Alarm 20 action 2	03,06,16	21819	16-bit unsign int	—"—
Alarm 21 action 2	03,06,16	21820	16-bit unsign int	—"—
Alarm 22 action 2	03,06,16	21821	16-bit unsign int	—"—
Alarm 23 action 2	03,06,16	21822	16-bit unsign int	—"—
Alarm 24 action 2	03,06,16	21823	16-bit unsign int	—"—
Alarm 1 action 3	03,06,16	21900	16-bit unsign int	none(0), trapcond1(1), trapcond2(2), trapcond1and2(3), postiostate(4), mqttpublish(6)
Alarm 2 action 3	03,06,16	21901	16-bit unsign int	—"—
Alarm 3 action 3	03,06,16	21902	16-bit unsign int	—"—
Alarm 4 action 3	03,06,16	21903	16-bit unsign int	—"—
Alarm 5 action 3	03,06,16	21904	16-bit unsign int	—"—
Alarm 6 action 3	03,06,16	21905	16-bit unsign int	—"—
Alarm 7 action 3	03,06,16	21906	16-bit unsign int	—"—
Alarm 8 action 3	03,06,16	21907	16-bit unsign int	—"—
Alarm 9 action 3	03,06,16	21908	16-bit unsign int	—"—
Alarm 10 action 3	03,06,16	21909	16-bit unsign int	—"—
Alarm 11 action 3	03,06,16	21910	16-bit unsign int	—"—
Alarm 12 action 3	03,06,16	21911	16-bit unsign int	—"—
Alarm 13 action 3	03,06,16	21912	16-bit unsign int	—"—
Alarm 14 action 3	03,06,16	21913	16-bit unsign int	—"—
Alarm 15 action 3	03,06,16	21914	16-bit unsign int	—"—
Alarm 16 action 3	03,06,16	21915	16-bit unsign int	—"—

Alarm 17 action 3	03,06,16	21916	16-bit unsign int	—"—
Alarm 18 action 3	03,06,16	21917	16-bit unsign int	—"—
Alarm 19 action 3	03,06,16	21918	16-bit unsign int	—"—
Alarm 20 action 3	03,06,16	21919	16-bit unsign int	—"—
Alarm 21 action 3	03,06,16	21920	16-bit unsign int	—"—
Alarm 22 action 3	03,06,16	21921	16-bit unsign int	—"—
Alarm 23 action 3	03,06,16	21922	16-bit unsign int	—"—
Alarm 24 action 3	03,06,16	21923	16-bit unsign int	—"—
Alarm 1 status	03	22000	16-bit unsign int	undefined(0), normal(1), indeterminate(2), warning(3), minor(4), major(5), critical(6)
Alarm 2 status	03	22001	16-bit unsign int	—"—
Alarm 3 status	03	22002	16-bit unsign int	—"—
Alarm 4 status	03	22003	16-bit unsign int	—"—
Alarm 5 status	03	22004	16-bit unsign int	—"—
Alarm 6 status	03	22005	16-bit unsign int	—"—
Alarm 7 status	03	22006	16-bit unsign int	—"—
Alarm 8 status	03	22007	16-bit unsign int	—"—
Alarm 9 status	03	22008	16-bit unsign int	—"—
Alarm 10 status	03	22009	16-bit unsign int	—"—
Alarm 11 status	03	22010	16-bit unsign int	—"—
Alarm 12 status	03	22011	16-bit unsign int	—"—
Alarm 13 status	03	22012	16-bit unsign int	—"—
Alarm 14 status	03	22013	16-bit unsign int	—"—
Alarm 15 status	03	22014	16-bit unsign int	—"—
Alarm 16 status	03	22015	16-bit unsign int	—"—
Alarm 17 status	03	22016	16-bit unsign int	—"—
Alarm 18 status	03	22017	16-bit unsign int	—"—
Alarm 19 status	03	22018	16-bit unsign int	—"—
Alarm 20 status	03	22019	16-bit unsign int	—"—
Alarm 21 status	03	22020	16-bit unsign int	—"—
Alarm 22 status	03	22021	16-bit unsign int	—"—
Alarm 23 status	03	22022	16-bit unsign int	—"—
Alarm 24 status	03	22023	16-bit unsign int	—"—
MB relay 1 description	03,16	22200	16 bytes UTF-8	
MB relay 2 description	03,16	22208	16 bytes UTF-8	
MB relay 3 description	03,16	22216	16 bytes UTF-8	
MB relay 4 description	03,16	22224	16 bytes UTF-8	
MB relay 5 description	03,16	22232	16 bytes UTF-8	
MB relay 6 description	03,16	22240	16 bytes UTF-8	
MB relay 7 description	03,16	22248	16 bytes UTF-8	
MB relay 8 description	03,16	22256	16 bytes UTF-8	
MB relay 9 description	03,16	22264	16 bytes UTF-8	
MB relay 10 description	03,16	22272	16 bytes UTF-8	
MB relay 11 description	03,16	22280	16 bytes UTF-8	
MB relay 12 description	03,16	22288	16 bytes UTF-8	

MB relay 13 description	03,16	22296	16 bytes UTF-8	
MB relay 14 description	03,16	22304	16 bytes UTF-8	
MB relay 15 description	03,16	22312	16 bytes UTF-8	
MB relay 16 description	03,16	22320	16 bytes UTF-8	
MB relay 17 description	03,16	22328	16 bytes UTF-8	
MB relay 18 description	03,16	22336	16 bytes UTF-8	
MB relay 19 description	03,16	22344	16 bytes UTF-8	
MB relay 20 description	03,16	22352	16 bytes UTF-8	
MB relay 21 description	03,16	22360	16 bytes UTF-8	
MB relay 22 description	03,16	22368	16 bytes UTF-8	
MB relay 23 description	03,16	22376	16 bytes UTF-8	
MB relay 24 description	03,16	22384	16 bytes UTF-8	
MB relay 1 activated from	03,06,16	22400	16-bit unsign int	webHttpApi(0), al01(1), al02(2), al03(3), al04(4), al05(5), al06(6), al07(7), al08(8), al09(9), al10(10), al11(11), al12(12), al13(13), al14(14), al15(15), al16(16), al17(17), al18(18), al19(19), al20(20), al21(21), al22(22), al23(23), al24(24), anyAlarm(25), schedule1(26), schedule2(27), schedule3(28), schedule4(29)
MB relay 2 activated from	03,06,16	22401	16-bit unsign int	—"—
MB relay 3 activated from	03,06,16	22402	16-bit unsign int	—"—
MB relay 4 activated from	03,06,16	22403	16-bit unsign int	—"—
MB relay 5 activated from	03,06,16	22404	16-bit unsign int	—"—
MB relay 6 activated from	03,06,16	22405	16-bit unsign int	—"—
MB relay 7 activated from	03,06,16	22406	16-bit unsign int	—"—
MB relay 8 activated from	03,06,16	22407	16-bit unsign int	—"—
MB relay 9 activated from	03,06,16	22408	16-bit unsign int	—"—
MB relay 10 activated from	03,06,16	22409	16-bit unsign int	—"—
MB relay 11 activated from	03,06,16	22410	16-bit unsign int	—"—
MB relay 12 activated from	03,06,16	22411	16-bit unsign int	—"—
MB relay 13 activated from	03,06,16	22412	16-bit unsign int	—"—
MB relay 14 activated from	03,06,16	22413	16-bit unsign int	—"—
MB relay 15 activated from	03,06,16	22414	16-bit unsign int	—"—
MB relay 16 activated from	03,06,16	22415	16-bit unsign int	—"—
MB relay 17 activated from	03,06,16	22416	16-bit unsign int	—"—
MB relay 18 activated from	03,06,16	22417	16-bit unsign int	—"—
MB relay 19 activated from	03,06,16	22418	16-bit unsign int	—"—
MB relay 20 activated from	03,06,16	22419	16-bit unsign int	—"—
MB relay 21 activated from	03,06,16	22420	16-bit unsign int	—"—
MB relay 22 activated from	03,06,16	22421	16-bit unsign int	—"—

MB relay 23 activated from	03,06,16	22422	16-bit unsign int	—"—
MB relay 24 activated from	03,06,16	22423	16-bit unsign int	—"—
MB relays state after restart	03,06	22450	16-bit unsign int	off(0), on(1), laststate(2)
Watchdog 1 state	03	22500	16-bit unsign int	false(0), true(1)
Watchdog 2 state	03	22501	16-bit unsign int	false(0), true(1)
Watchdog 3 state	03	22502	16-bit unsign int	false(0), true(1)
Watchdog 4 state	03	22503	16-bit unsign int	false(0), true(1)
Function 1 state	03	23000	16-bit unsign int	false(0), true(1)
Function 2 state	03	23001	16-bit unsign int	false(0), true(1)
Function 3 state	03	23002	16-bit unsign int	false(0), true(1)
Function 4 state	03	23003	16-bit unsign int	false(0), true(1)
Function 1 alarm state	03	23100	16-bit unsign int	normal(0), alarm(1)
Function 2 alarm state	03	23101	16-bit unsign int	normal(0), alarm(1)
Function 3 alarm state	03	23102	16-bit unsign int	normal(0), alarm(1)
Function 4 alarm state	03	23103	16-bit unsign int	normal(0), alarm(1)
Save configuration	03,06	24000	16-bit unsign int	unsaved(0), saved(1)
Restart device	03,06	24001	16-bit unsign int	cancel(0), restart(1)
HW error	03	24002	16-bit unsign int	noErr(0), hwErr(1)
Device ID	03	24100	18 bytes UTF-8	Example: 5c:32:c5:00:ac:52
Hostname	03	24200	16 bytes UTF-8	
Device IP	03	24300	16 bytes UTF-8	Example: 192.168.1.2

Note 1: For the MODBUS relays, command 01 allows only one relay.
If there is no connection to the MODBUS relay, on the commands Read Coils and Write Single Coil, the TCW242 will return error code 04 (SLAVE DEVICE FAILURE).

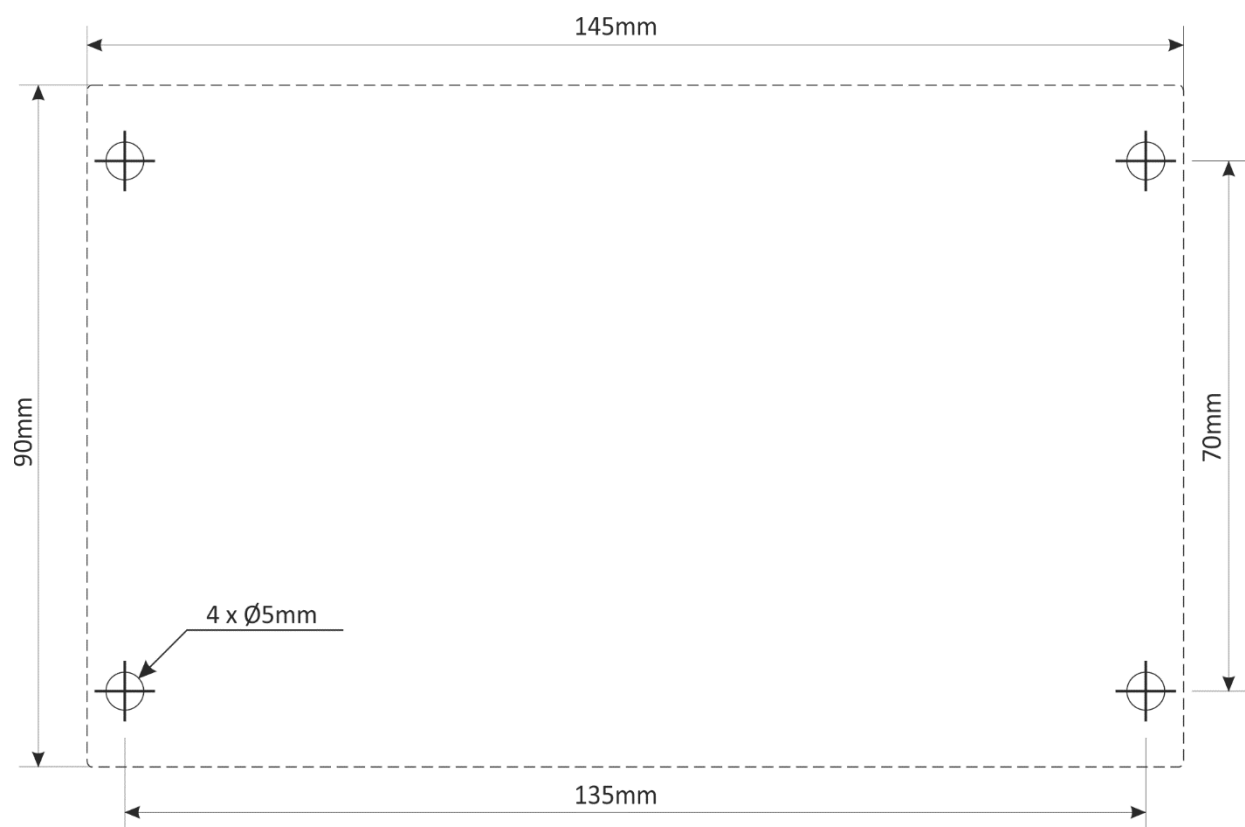


Fig.1

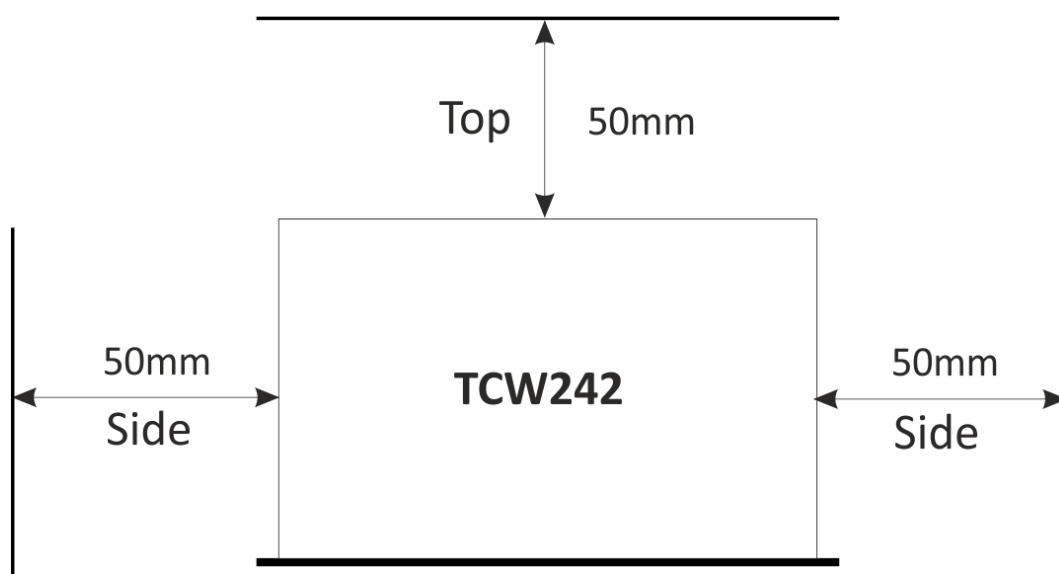


Fig.2