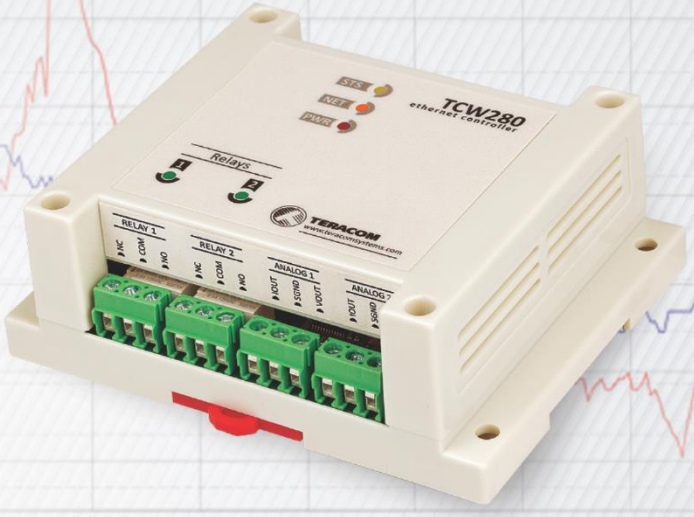
control solutions
TERACOM



TCW280 Analog output module

Revision 1.7 / October 2023

USER MANUAL

www.teracomsystems.com

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1. Short description

TCW280 is an analog output module with Ethernet interface and galvanic isolation between power supply and outputs.

It has 2 analog output channels. Every channel can work either in voltage (0/5 or 0/10V) or current loop (0/20, 4/20 or 0/24mA) mode. Generated signals have excellent stability and 12-bit resolution.

The device has also 4 digital (open drain) outputs. The digital outputs work in two modes – ON/OFF or PWM. In ON/OFF mode they can be used as a standard digital output to control devices with dry contact activation. In the PWM mode, the output can be used as an “analog” output for appropriate processes – DC motor control, LED dimming, etc. The frequency in PWM mode can be up to 2 kHz.

TCW280 has also 2 relays with normally closed and normally open contacts. Both relays can be activated from the WEB interface, M2M protocol or by the schedule.

The scheduling functionality offers 4 different schedules for single or repeated (weekly) tasks.

The module supports MODBUS TCP/IP, SNMP, and HTTP API for M2M communication.

2. Features

- Galvanically isolated outputs;
- 10/100 Mbit Ethernet connectivity;
- Password protected WEB interface;
- 2 analog outputs with voltage and current loop modes;
- 0/20, 4/20 and 0/24mA ranges for current loop mode of analog output;
- 0/5 or 0/10V ranges for voltage mode of analog output;
- 4 digital (open drain) outputs with ON/OFF or PWM modes;
- 2 relays with NO and NC contacts;
- Dynamic DNS support;
- 4 schedules with single and weekly mode;
- NTP support;
- SNMP v2 support;
- SNMP traps to up to 5 recipients;
- MODBUS TCP/IP support;
- Periodical HTTP post with current status in XML or JSON file to the remote server;
- HTTP API commands in server and client mode;
- HTTP Post to up to 3 different servers;
- Back/restore of settings for easy device multiplication;
- Firmware update over the Internet;
- DIN-Rail/wall-mountable enclosure.

3. Applications

The possible application of TCW280 are:

- Direct electronic valve actuators control;
- DC motor speed control;
- Direct dimming of RGB LED’s;
- Variable frequency drive control;
- Solenoid valve control;
- Solid state relay control;
- Remote transmission (tunneling) of analog signals.

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4. Specifications

- Physical characteristics

  Dimensions: 115 x 90 x 40 mm
  Weight: 170 g
  Mounting: wall and DIN rail

- Environmental limits

  Operating Temperature: -10 to 55°C
  Storage Temperature: -20 to 60°C
  Ambient Relative Humidity: 10 to 80% (non-condensing)

- Standards and Certifications

  Safety: EN 62368-1:2014 + EN 62368-1:2014/AC1-3:2015 + EN 62368-1:2014/A11:2017 + EN 62368-1:2014/AC:2017-03:2017, EN 62311:2008
  EMC: EN 55032: 2015 + EN 55032: 2015/AC:2016-07 + EN 55032: 2015/A11:2020
  EN 55024: 2010 + EN 55024: 2010/A1:2015
  EN 61000-3-2: 2014
  EN 61000-3-3: 2013 + EN 61000-3-3: 2013/A1:2019
  RoHS: Compliant

- Warranty

  Warranty period: 3 years

- Power supply

  Operating voltage range (including -15/+20% according to IEC 62368-1): 10 to 28 VDC
  Current consumption: 220 mA @ 12 VDC (all relays on and analog outputs at 24mA)

- Analog outputs

  Isolation: Functional isolation
  Type: Single ended
  Resolution: 12 bits
  Mode: Voltage or Current loop (WEB interface selectable)
  Ranges: 0/5V, 0/10V, 0/20mA, 4/20mA, and 0/24mA
  Accuracy: ±1%

- Digital outputs

  Isolation: Functional isolation
  Type: Open drain
  Maximum drain voltage: 24VDC
  Maximum drain current: 0.3A
  Mode: ON/OFF or PWM (WEB interface selectable)
  PWM resolution: 10 bits
  PWM frequencies: 1, 5, 10, 50, 100, 500, 1000, and 2000 Hz

  Caution! The device does not contain any internal overcurrent protection facilities on the digital outputs' lines. External fuses or short circuit current limiting circuit breakers, rated to 0.4 Amps, are to be used for overcurrent protection of the connecting lines

- Relay outputs

  Type: Form C (N.O. and N.C. contacts)
  Contact current rating: 0.5 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 @ 0.5 A resistive load
  Contact resistance: 100 milli-ohms max. (initial value)

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Pulse output: 0.1 Hz at rated load

⚠ **Caution!** The device does not contain any internal overcurrent protection facilities on the relays' contact lines. External fuses or short circuit current limiting circuit breakers, rated to 0.63 Amps, are to be used for overcurrent protection of the connecting lines.

- Internal FLASH memory

  Endurance: 100 000 cycles (any save command)
- Lithium battery

  Type: CR1220

  ⚠ **Caution!** Risk of explosion if the battery is replaced by an incorrect type.

5. Installation and setup

This device must be installed by qualified personnel.

This device must not be installed directly outdoors.

The installation consists of mounting the device, connecting to an IP network, connecting inputs and outputs, providing power and configuring via a web browser.

5.1. Mounting

TCW280 should be mounted in a clean and dry location on a not flammable surface. Ventilation is recommended for installations where the ambient air temperature is expected to be high.

Mount the device to a wall by using two plastic dowels 8x60mm (example Würth GmbH 0912 802 002) and two dowel screws 6x70mm (example Würth GmbH 0157 06 70). Attach the screws to the surface vertically. See Appendix-A, fig. 1 for mechanical details.

Maintain spacing from adjacent equipment. Allow 50 mm of space on all sides, as shown in fig.2 in Appendix A, this provides ventilation and electrical isolation

TCW280 can be mounted to a standard (35mm by 7.55mm) DIN rail. Attach the controller to the DIN rail by hooking the hook on the back of the enclosure to the DIN rail and then snap the bottom hook into place.

⚠ **Caution!** Do not cover ventilation openings.

5.2. LED indicators

The following indicators show the status of the controller:

- **Relay1**/**Relay2** (green) – these LEDs are illuminated whenever the corresponding relay is activated (the NO contact is closed and the NC contact is open);
- **PWR** (red) – in working mode shines, blinks together with STS if there is a hardware error;
- **STS** (yellow) – flashes when the main program of the controller is executed;
- **NET** (orange) – network status - ON when a link is established, blinks if there is an activity**.**

5.3. Connections

Attention! Disconnect power supply before wiring.

The correct wiring procedure is as follows:

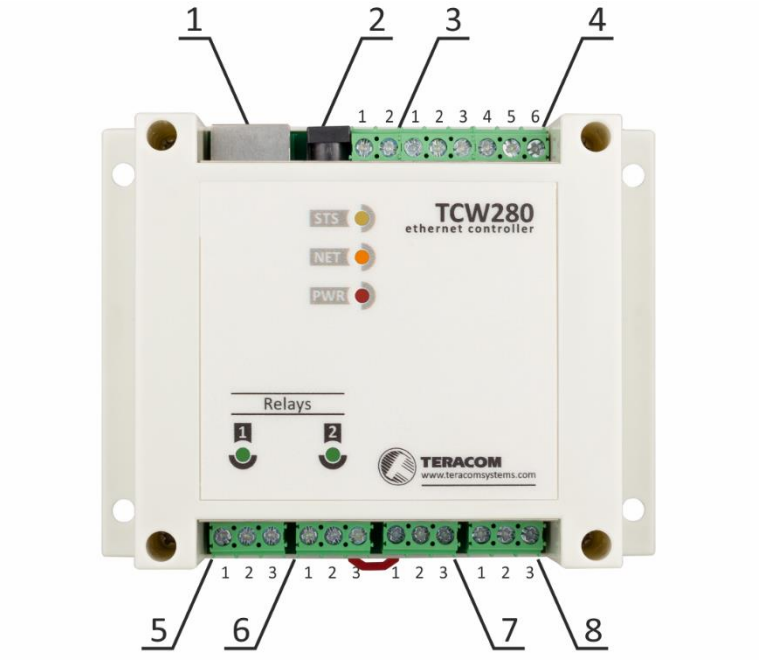
- Make sure power is turned off;
- Make wiring connections to the terminals;
- Apply power.

It is recommended to test and configure TCW280 without any controlled device. In this case, unexpected turn on will be avoided.

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Make sure that wires are properly attached to the terminals and that the terminals are tightened. Not proper wiring and configuration can cause permanent damage to TCW280 or the equipment to which it is connected or both.

Inputs and outputs' locations are shown below:



Connector 1	Ethernet - RJ45	**Connector 5**	Pin1 – Relay1-NC
Connector 2	Power - 2.1x5.5mm connector (central positive)		Pin2 – Relay1-COM Pin3 – Relay1-NO
Connector 3	Pin1 – Power positive Pin2 – Power negative (GND)	**Connector 6**	Pin1 – Relay2-NC Pin2 – Relay2-COM Pin3 – Relay2-NO
Connector 4	Pin1 – Open drain OUT4 Pin2 – SGND Pin3 – Open drain OUT3 Pin4 – Open drain OUT2 Pin5 – SGND Pin6 – Open drain OUT1	**Connector 7**	Pin1 – IOUT1 Pin2 – SGND Pin3 – VOUT1
		Connector 8	Pin1 – IOUT2 Pin2 – SGND Pin3 – VOUT2

⚠ **Caution!** If connector 3 is used, an external disconnecting device for both lines must be provided.

5.3.1. Power supply connection

TCW280 is designed to be supplied by adapter SYS1308-2412-W2E or similar, intended for use in the conditions of overvoltage category II. The power supply equipment shall be resistant to short circuit and overload in a secondary circuit.

When in use, do not position the equipment so that it is difficult to disconnect the device from the power supply.

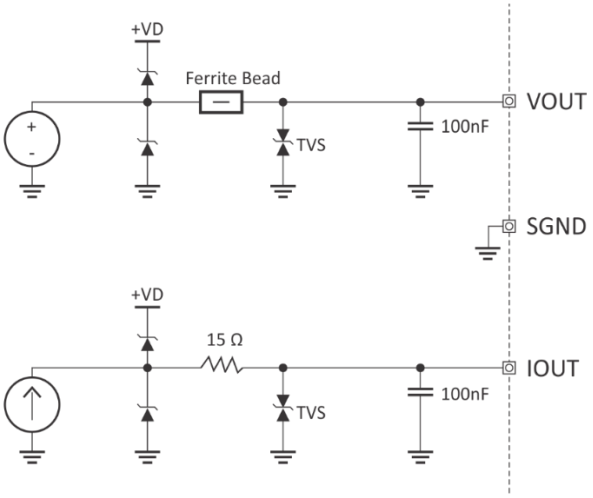
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5.3.2. Analog outputs

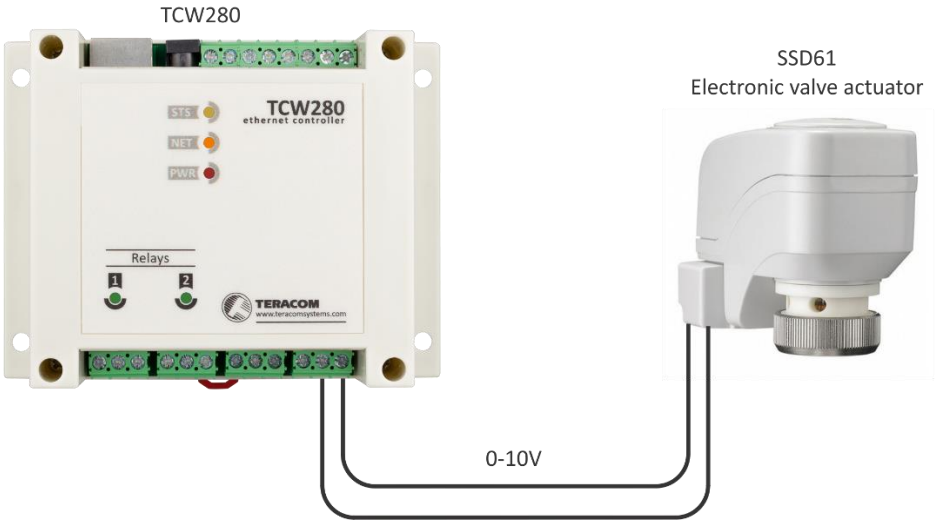
TCW280 has two isolated analog channels. Every channel can be programmed to work either in voltage or current loop mode. In the voltage mode, two ranges are supported - 0 to 5 and 0 to 10 volts. In the current loop mode, three ranges are supported – 0 to 20, 4 to 20, and 0 to 24 mA. In the current loop mode, there is an alarm notification for open loop.

Voltage and current loop outputs are single-ended and are assigned to different connectors. Using the selected mode requires connecting to the appropriate connector.

The output schematic is as follows:



Analog inputs can be used to direct control of devices with voltage or current loop inputs – electronic valve actuators, motor inverters, etc.



5.3.3. Open drain outputs

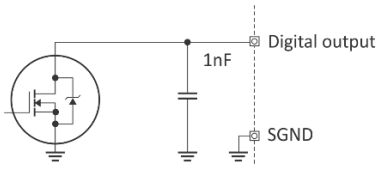
TCW280 has four isolated open drains (digital) outputs. Every digital output can be programmed to work either in ON/OFF or PWM (Pulse-width modulation) mode.

In PWM mode a few frequencies are supported. The working frequency of PWM has to be higher than the effect which is expected in the load. Every output can be set on a different Pulse-width, but the frequency is the same for all outputs in this in this mode.

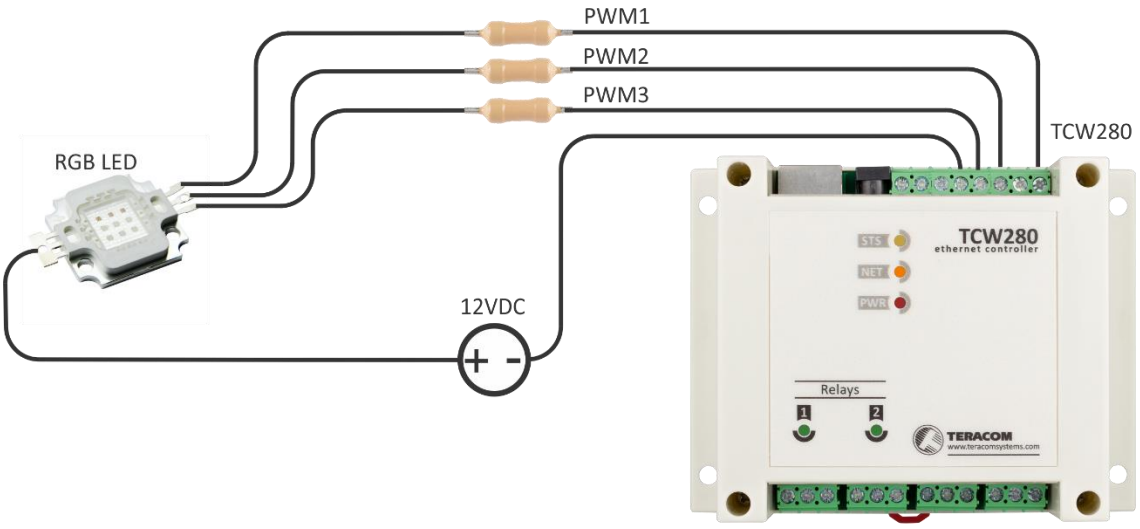
PWM is an easy way to have an analog control through a digital signal. The duty cycle of the PWM corresponds to the average value of voltage fed to the load.

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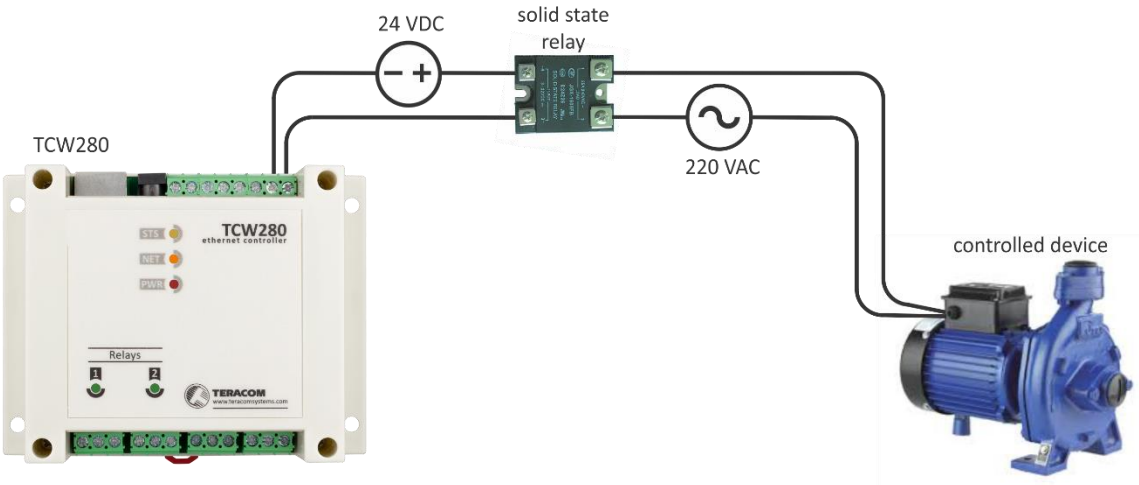
The output schematic is as follows:



The open drain outputs in PWM mode can be used for control dimming of LEDs, speed control of PMDC motor, control the angle of servo motors, etc.



The open drain outputs in ON/OFF mode can be used as a standard digital output. They can control directly the “dry contact” inputs of the controlled device. For high current loads, external solid state relay or mechanical relay should be used.



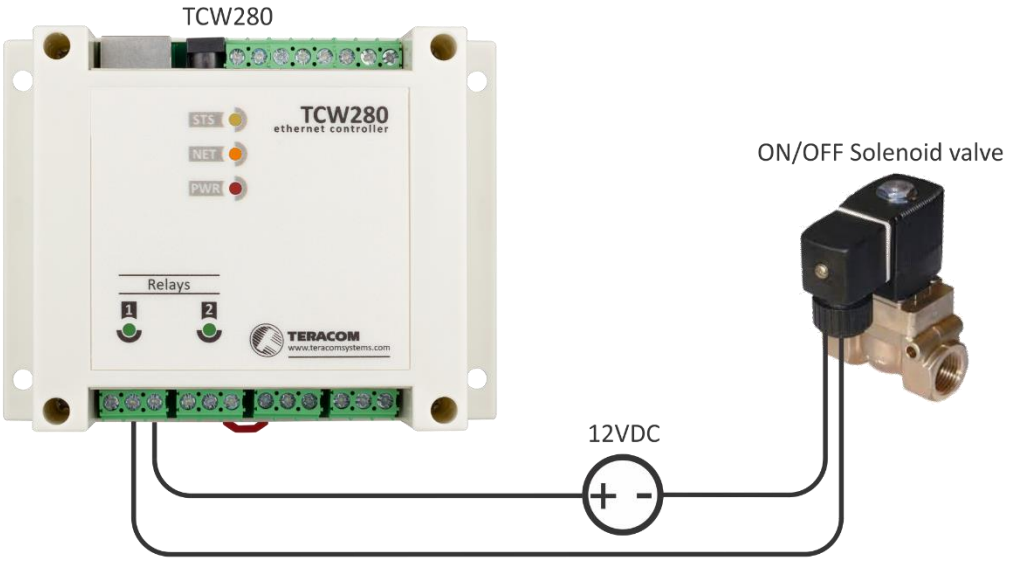
5.3.4. Relay’s connection

TCW280 has 2 relays. They can be used for switching on or off electrical and electronic devices.

The relay contacts are internally connected directly to the terminal connectors. For both relays normally open, normally closed and common contacts are available. For loads with higher switchable current/voltage than specified, an external relay should be used.

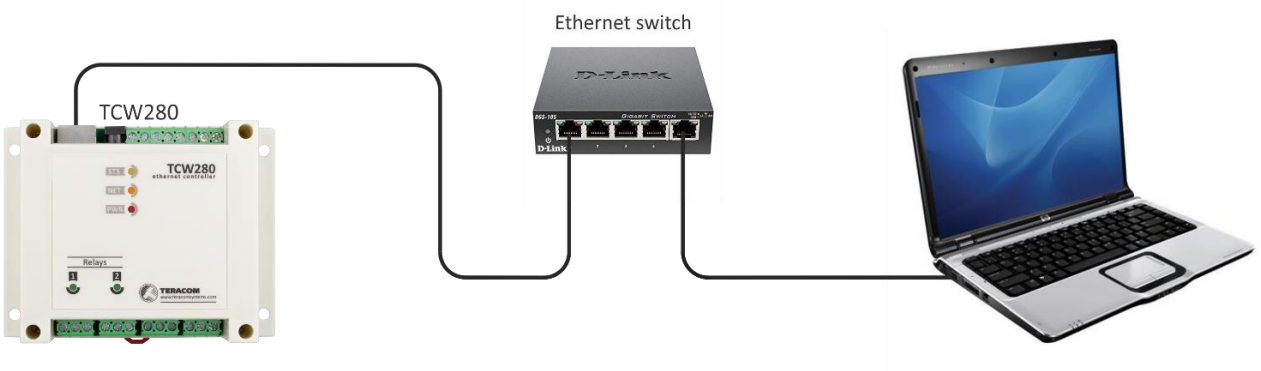
When mechanical relays switch inductive loads such as motors, transformers, relays, etc., the current will arc across the relay contacts each time the contacts open. Over the time, this cause wears on the relay contacts which shorten their life. When switching an inductive load, it is recommended that relay contact protection devices are used.

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5.3.5. Network connection

The Ethernet port of TCW280 should be connected to 10/100 Base-T Ethernet hub, switch or router.



For configuration, TCW280 may be connected directly to the Ethernet port on a computer. The device support Auto-MDIX and it is not necessary to use “crossover” cable, standard “straight-through” can be also used.



TCW280 can be used in a wireless network by connecting through a wireless router.



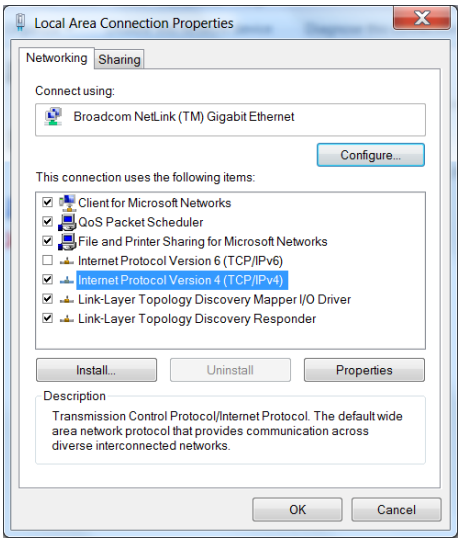
TCW280 Wireless router

5.4. Communication setup

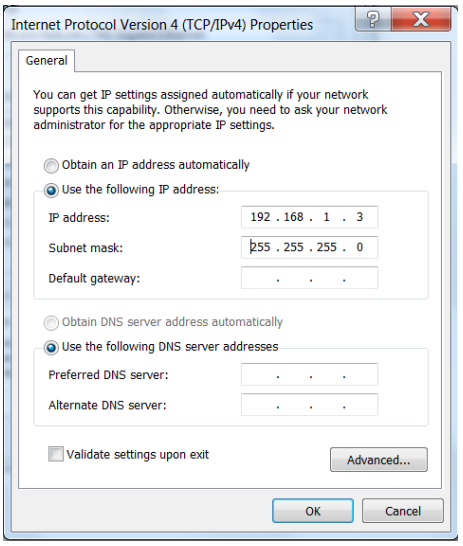
By default TCW280 is delivered with the following network settings:

IP address: ***192.168.1.2****, Subnet Mask:* ***255.255.255.0****, Default Gateway:* ***192.168.1.1***

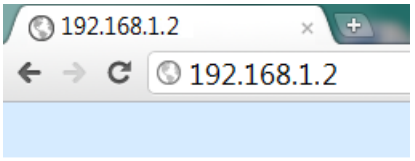
Communication with TCW280 can be established by assigning a temporary IP address to the computer. For computers with Windows OS assigning of IP address is made in "Local area connection properties":



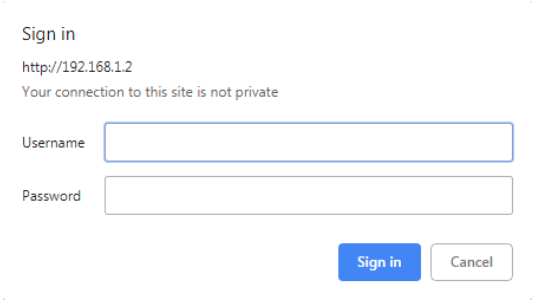
This address should be on the same network - for example 192.168.1.3:



To get access to the web interface, you should type http://192.168.1.2 into the browser.



If the network settings are correct, the login pop-up window will appear:



All TCW controllers connected to LAN can be easily found by the free tool “TCW discoverer”.

It is available for Win and Mac operating systems and can be downloaded from www.teracomsystems.com.

6. Web interface

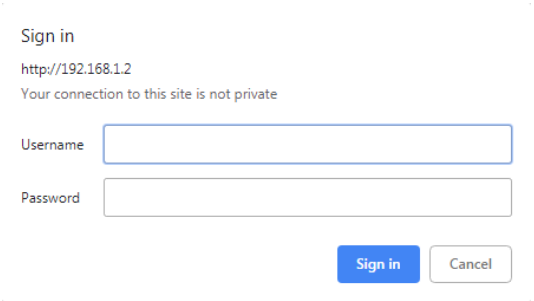
The web interface allows configuration, monitoring, and control.

All pages are UTF-8 encoded.

If the controller is properly addressing, login pop-up window appears.

Authorization data must be entered (by default username=admin, password=admin).

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



The controller supports a few active session.

6.1. Monitoring

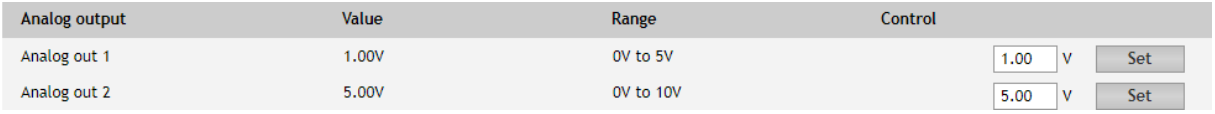
On this page can be monitored the temporary status of all outputs. There is a possibility to change them.

The page consists of three sections - "Analog outputs", "Digital outputs" and "Relays". Each section can be added/removed from the page for better observation. This is done by the "Setup->System-Display".

For convenience in the footer of the page, there is system information for the product.

6.1.1. Analog outputs section

This section contains information about the current state of each analog output as well as its operating range.



Entering a new value and pressing "Set" button changes the status of the output. There is protection against entering values outside the selected range.

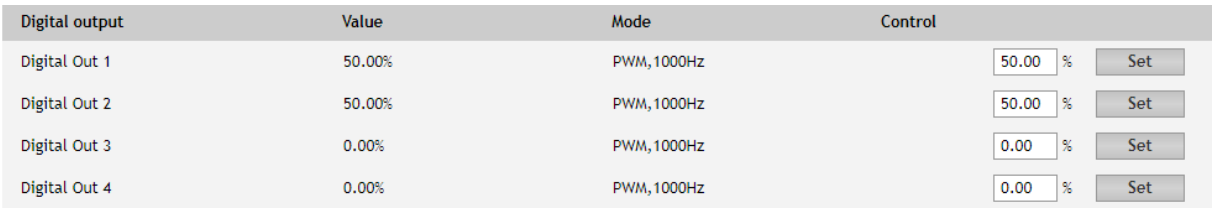
The selected output value is stored in non-volatile memory, and after a power-restore cycle, it is automatically set. This is so unless in the "Setup-> Outputs" a specific value is selected that will appear at the output when the power is turned on.

In "Setup-> Outputs" you can also change the description of each analog output, its operating mode, and its operating range.

Besides through the WEB interface, the status of analog outputs can be changed by HTTP API, SNMP, and MODBUS TCP/IP.

6.1.2. Digital outputs section

This section contains information about the current state of each digital output and its operating mode.



The control section is different for both output modes. For PWM mode, there is protection against entering invalid values. For ON/OFF mode there are activation buttons, similar to relay section.

The selected output value is stored in non-volatile memory, and after a power-restore cycle, it is automatically set. This is so unless in the "Setup-> Outputs" a specific value is selected that will appear at the output after the power is turned on.

In "Setup-> Outputs" you can change the description of each output and its mode of operation.

Besides through the WEB interface, the status of digital outputs can be changed by HTTP API, SNMP, and MODBUS TCP/IP.

6.1.3. Relays section

This section contains information about the current state of the relays and buttons for their control.



Each relay can be activated either remotely by WEB, SNMP, HTTP API, and MODBUS TCP/IP or locally, from the status of assigned schedule.

For WEB control every relay has “On”, “Off” and “Pulse” buttons. There are also “All On”, “All Off” and “Pulse All” for common control of relays. Pulse duration in seconds can be set separately for each relay in “Setup->Outputs”.

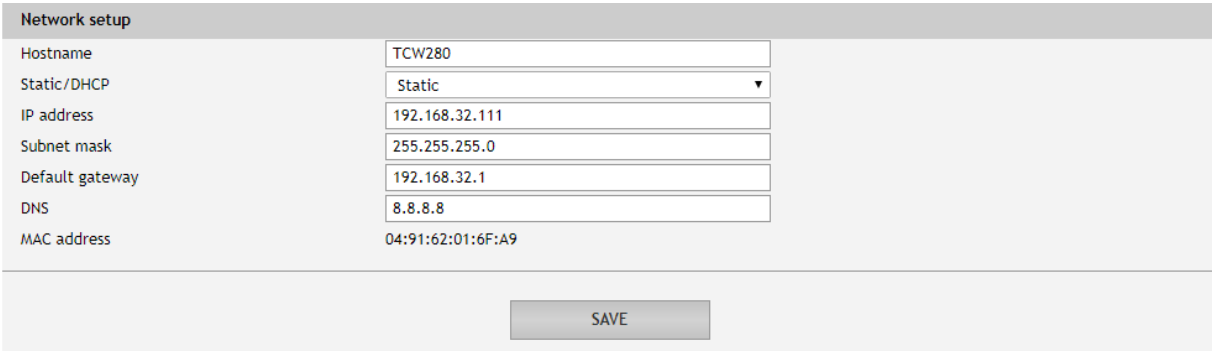
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For locally activated relays a text description of the controlling parameter is displayed rather than buttons. The local relay activation can be set in “Setup->Outputs”.

6.2. Setup

6.2.1. Network

The network parameters are set on this page.



The controller supports static and dynamic IP addresses.

It is good practice to change the default IP address of the controller immediately after first power-on. This will avoid collisions if many devices are used on the same network.

It may be necessary to clear the arp cache, each time you connect a new device to the network. This is done by typing arp -d in the command prompt window of the computer.

The “Hostname” is up to 15 characters. It is shown in the search results of TCW discoverer.

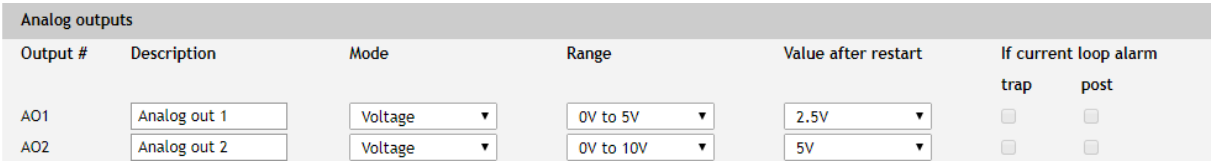
It is recommended to use public DNS server (8.8.8.8, 8.8.4.4 etc.) rather than the default gateway.

6.2.2. Outputs

On this page, descriptions and operating modes of each output can be set. After pressing "Save" button, all changes are stored in non-volatile memory.

6.2.2.1. Analog outputs

For every analog output, a description up to 15 characters can be set. The description is used to specify the output on Monitoring page and XML/JSON files.

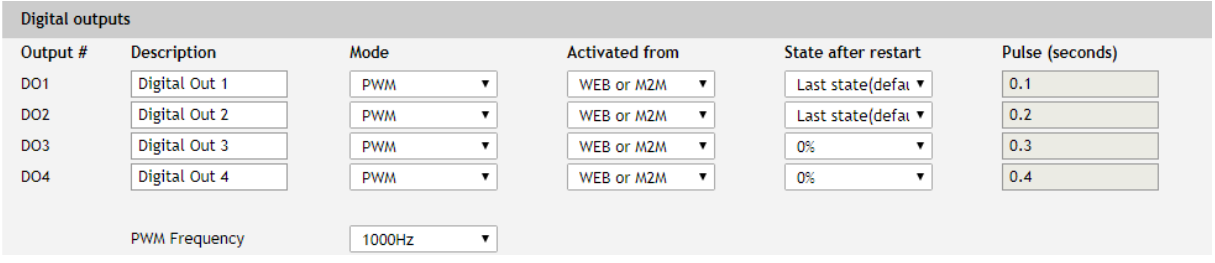


Here you set the operating mode for each output, its operating range, and the value after power on. By default, it is the last remembered one.

For current loop mode, in case of an open circuit, it is possible to send alarm messages (HTTP Post or SNMP trap).

6.2.2.2. Digital outputs

For every digital output, a description up to 15 characters can be set. The description is used to specify the output on Monitoring page and XML/JSON files.



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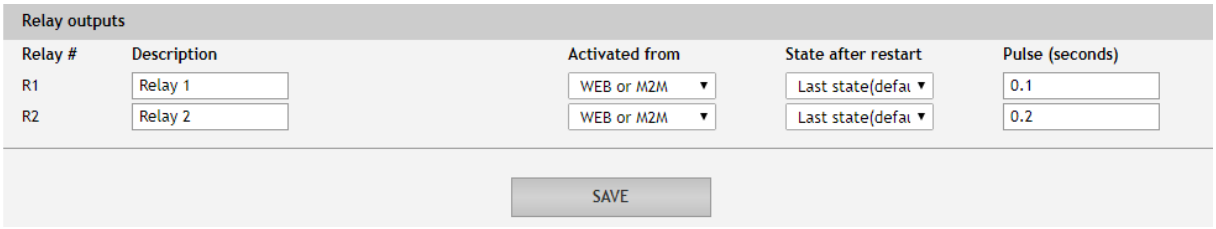
Here you set the operating mode for each output, its operating range, and the value after power on. By default, it is the last remembered one.

For PWM mode, the frequency can be selected from a drop-down menu, but it is the same for all outputs.

For ON/OFF mode, the pulse duration can be different for every digital output. The pulse duration can be in a range of 0.1 to 999999 seconds.

6.2.2.3. Relays

For every relay, a description up to 15 characters can be set. The description is used to specify the relay on Monitoring page and XML/JSON files.



Here you can choose how the relay will be activated as well as its status after the power is turned on. By default, it is the last remembered one.

The pulse duration can be different for every relay. It can be in a range of 0.1 to 999999 seconds.

6.2.3. System

On this page, some general settings can be made.

6.2.3.1. General

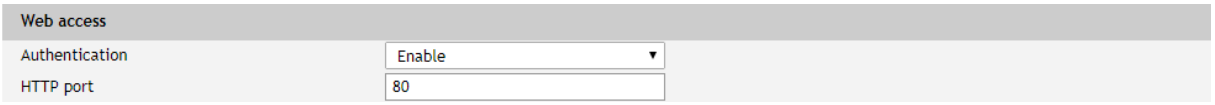
The information in this section serves to identify the device in M2M communication.



6.2.3.2. WEB access

In this section, WEB access authentication can be deactivated. By default, authentication details are admin/admin. It is strongly recommended to change them in “Administration->User/Pass”.

HTTP port for WEB access can be changed. This is useful for some routers which don’t support different outside/inside ports for port forwarding. By default HTTP port is 80.



6.2.3.3. HTTP API

In this section, HTTP API access authentication can be activated/deactivated. By default it is active.



Authentication details are same as WEB access. The controller support two types of authentication – see an explanation for HTTP API below.

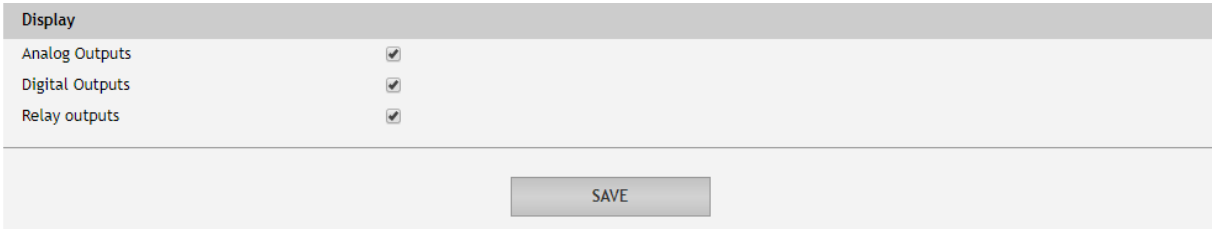
6.2.3.4. Monitoring page automatic refresh

Monitoring page refresh interval can be set between 0 and 253 seconds. Zero means no automatic refresh.



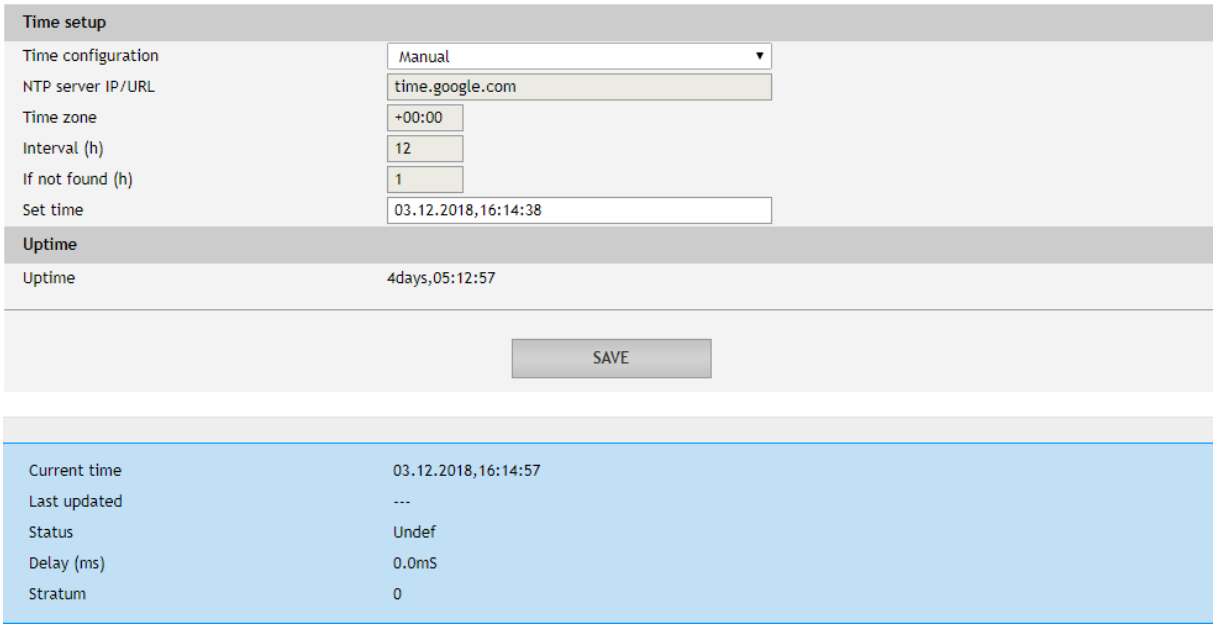
6.2.3.5. Display

All three sections on Monitoring page can be added/removed independently by appropriate setup here.



6.2.4. Time

For proper operation of schedules, there is an internal real-time clock (RTC). It can be set either manually or automatically.



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

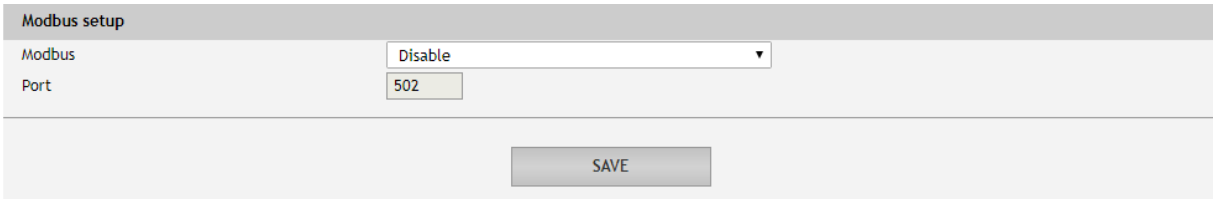
By default NTP synchronization is disabled, server – time.google.com, Time zone +00:00 and interval of 12 hours.

It is strongly recommended to use time.google.com as a time server.

6.3. Services

6.3.1. Modbus

TCW280 supports Modbus TCP/IP.

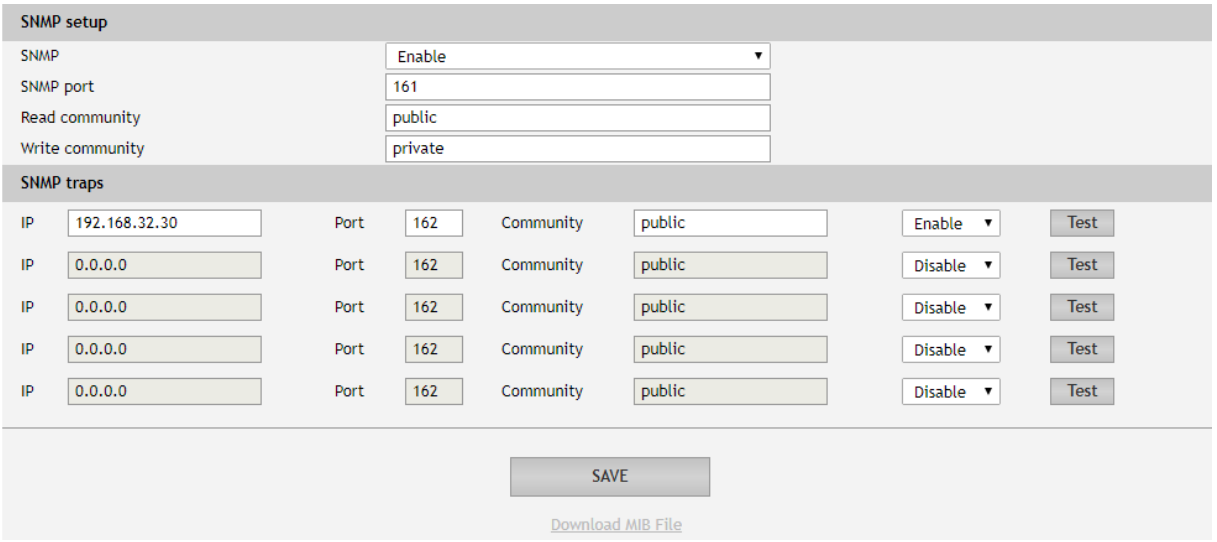


By default Modbus is disabled. Standard port for this protocol is 502. More about this functionality can be read at MODBUS section below.

6.3.2. SNMP

TCW280 supports SNMP v.2.

In this section, all necessary parameters for proper operation of SNMP can be set.



By default SNMP is disabled, the port is 161, read community is “public” and write community is “private”.

In an alarm condition, SNMP trap can be sent up to 5 independent recipients. All they can be with different port and community. There is an independent button for trap test.

SNMP traps can be sent:

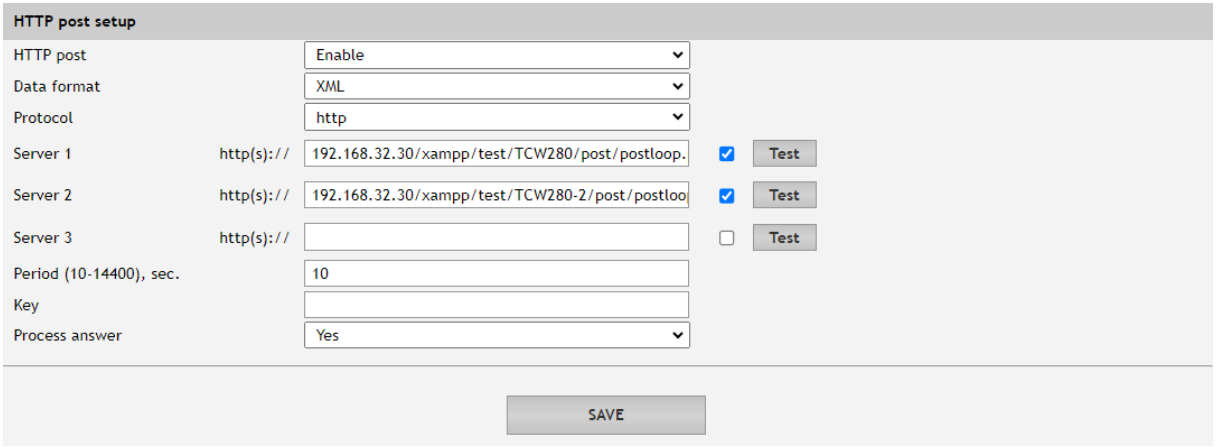
- In case of an open circuit for analog output in current loop mode;
- After restart;
- After power on.

Actual MIB file can be downloaded from here.

6.3.3. HTTP Post

TCW280 can periodically upload a file to a dedicated server, using HTTP or HTTPS Post. The HTTPS is over TLS 1.0, TLS 1.1 and TLS 1.2 with RSA as a key exchange/agreement and authentication.

The period of the post is between 10 and 14400 seconds. The file format can be XML or JSON.



In addition to the periodical post, the file can be uploaded at any alarm condition.

The HTTP Post can be sent simultaneously up to 3 different servers.

If “Process Answer” option is enabled, TCW280 will process the answer (command).

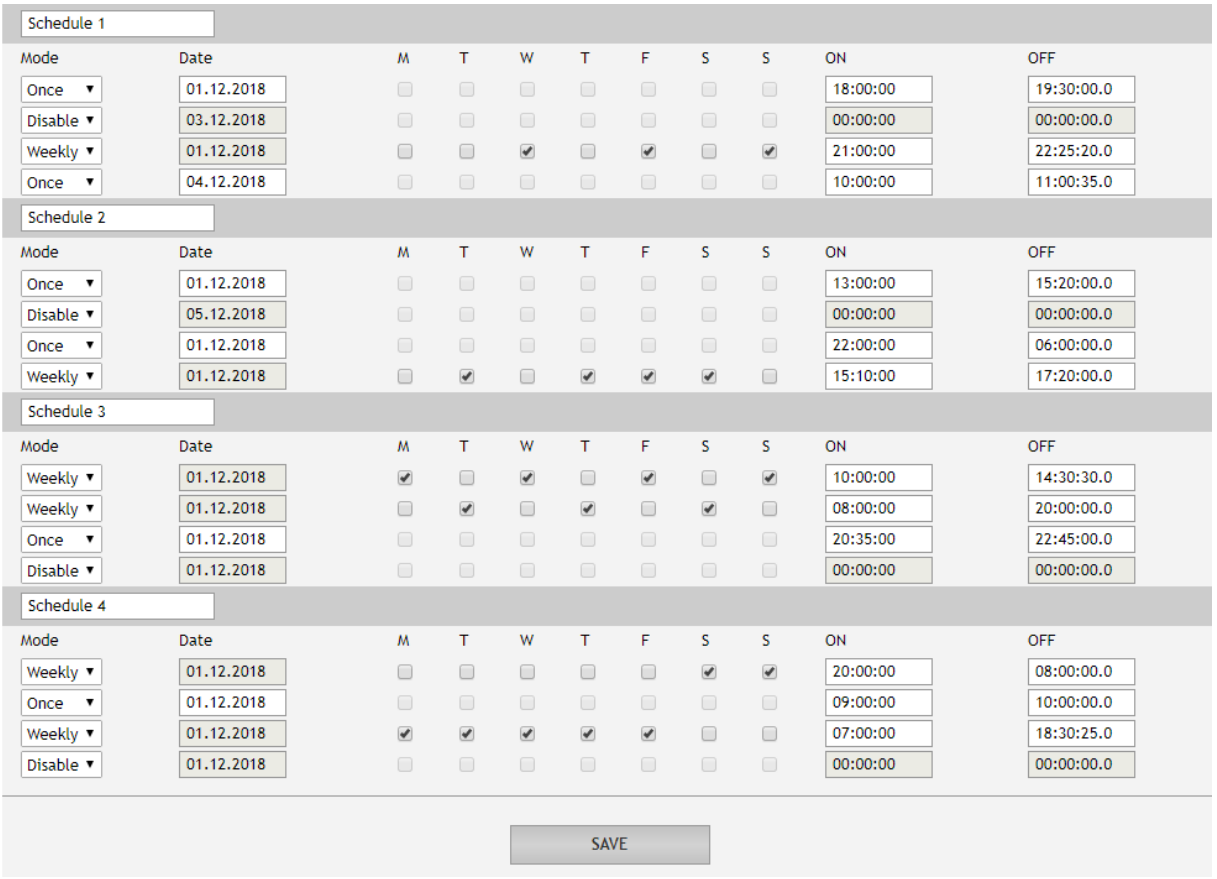
The list of valid commands is described in section HTTP API commands below.

The “Key” field value is sent in the XML/JSON and can be used for device identification.

6.3.4. Schedule

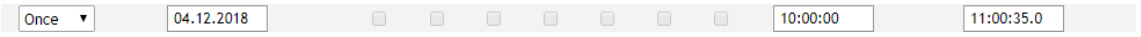
TCW280 supports four schedules. In every schedule, up to four different tasks can be set.

The schedules are useful for creating tasks that vary with calendar dates.



There are two types of schedule depending on repetition and duration:

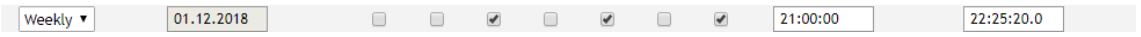
- A single task for a time period:



With the above setting, there will be an event on 04.12.2018 starts at 10:00:00 and ends in 11:00:35.

The resolution for “OFF time” is 0.1 seconds, which gives a possibility for very short pulses support.

- A weekly task for a time period:

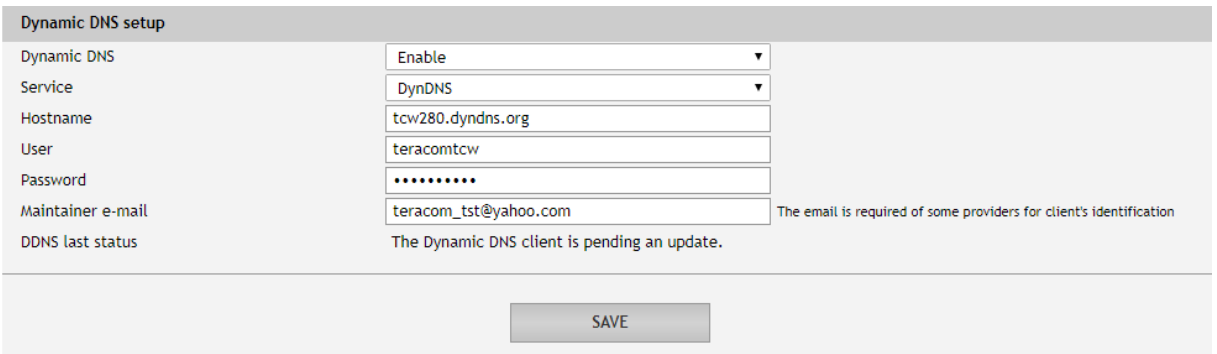


With the above setting, there will be an event on Wednesdays, Fridays, and Saturdays starting at 21:00:00 and ending in 22:25:20.

6.3.5. Dynamic DNS

With dynamic DNS, TCW280 can be accessed from the public Internet without investing in a broadband account that has a static IP address.

TCW280 supports the following DNS services – DynDNS, No-IP, and DNS-O-Matric.

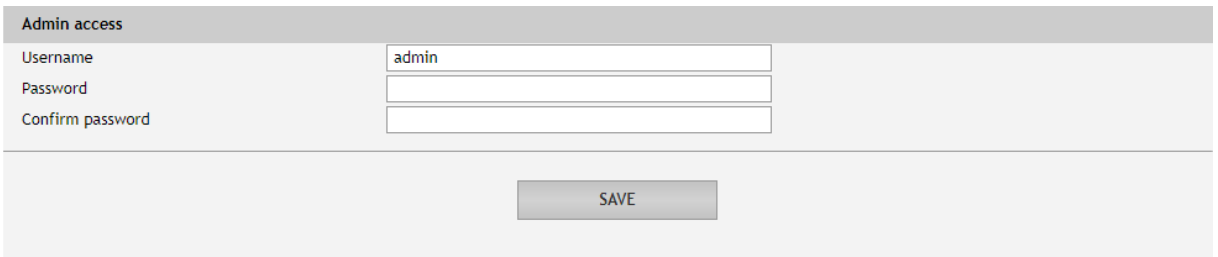


6.4. Administration

6.4.1. User/Pass

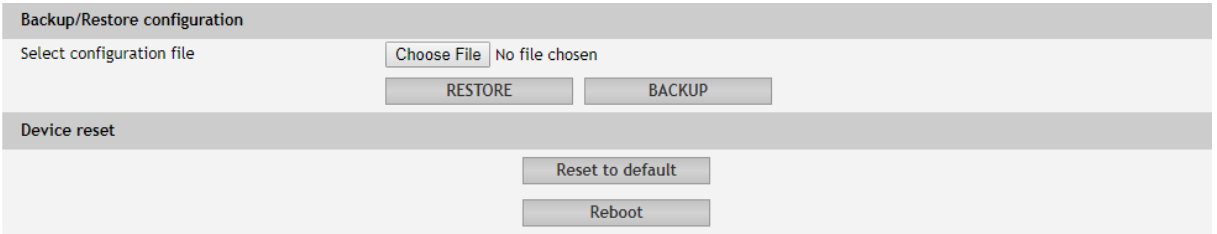
The TCW280 supports one user only. It has administrative rights.

The username and password can be up to 31 characters long.



6.4.2. Backup/Restore

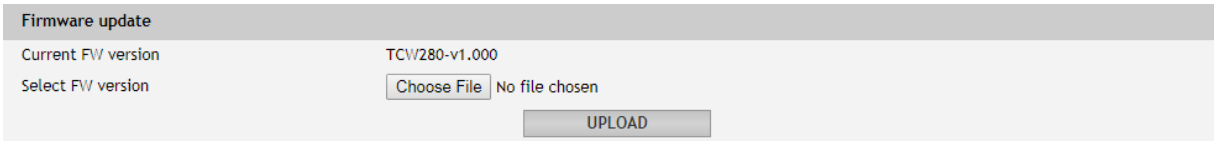
The TCW280 supports backup and restore of all user setting. All settings are saved in XML backup file. This file can be used after this for restore on many devices. This is very useful for multiplying similar settings to a batch of controllers.



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6.4.3. FW update

The TCW280 can be updated via a WEB interface.



To update the device follow the steps below:

- Go to www.teracomsystems.com and download the latest firmware;
- From **Administration->FW update** select downloaded .cod file and press “upload” button;
- After the firmware update is completed, the Login page will appear.

Attention! Don’t turn off the power supply during the update. Turning off the power supply will damage the device.

6.5. Logout

The TCW280 support multisession, but the good practice is to log out after finishing the work.

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7. Protocols and API

7.1. SNMP

Simple Network Management Protocol (SNMP) is a standard internet protocol for managing devices on IP networks. In typical uses of SNMP, one or more administrative computers, called managers, monitor and control devices on LAN. Each controlled device, at all times, executes a software component called an agent which reports information via SNMP to the manager.

The TCW280 can be configured and monitored through SNMP.

This could be done using every SNMP v.2 compatible program. Parameters that can be changed, are grouped according to their functions in the tables below. To obtain a valid OID number it is necessary to replace the “x” symbol with ”1.3.6.1.4.1.38783”.

To save the changes **configurationSaved** (OID x.5.3.4.0) should be set to "1".

product

OID	Name	Access	Description	Syntax
x.5.1.1.0	name	read-only	Device name	DisplayString
x.5.1.2.0	version	read-only	Firmware version	DisplayString
x.5.1.3.0	dateTime	read-only	Date and time	DateAndTime

setup -> network

OID	Name	Access	Description	Syntax
x.5.2.1.1.0	deviceID	read-only	Device ID is Default MAC Address	MacAddress
x.5.2.1.2.0	hostName	read-only	Host Name	DisplayString
x.5.2.1.3.0	deviceIP	read-only	Device IP Address	IpAddress

setup -> outputs -> anOutSetup -> anOut1Setup

OID	Name	Access	Description	Syntax
x.5.2.2.1.1.1.0	anOut1description	read-write	Analog out 1 description	DisplayString
x.5.2.2.1.1.2.0	anOut1mode	read-write	Analog out 1 mode	Integer { voltage(0),current(1)}
x.5.2.2.1.1.3.0	anOut1range	read-write	Analog out 1 range	Integer { volt0to5(0),volt0to10(1), ma4to20(5), ma0to20(6), ma0to24(7)}
x.5.2.2.1.1.4.0	anOut1restvalue	read-write	Analog out 1 restart value	Integer { lastValue(0),volt0of5(1), volthalfof5(2), volt5of5(3), volt0of10(4), volt5to10(5), volt10of10(6),ma0(7), ma2(8), ma4(9), ma10(10), ma12(11),ma20(12), ma22(13),ma24(14)}

setup -> outputs -> anOutSetup -> anOut2Setup

OID	Name	Access	Description	Syntax
x.5.2.2.1.2.1.0	anOut2description	read-write	Analog out 2 description	DisplayString
x.5.2.2.1.2.2.0	anOut2mode	read-write	Analog out 2 mode	Integer { voltage(0),current(1)}
x.5.2.2.1.2.3.0	anOut2range	read-write	Analog out 2 range	Integer { volt0to5(0),volt0to10(1), ma4to20(5), ma0to20(6), ma0to24(7)}
x.5.2.2.1.2.4.0	anOut2restvalue	read-write	Analog out 2 restart value	Integer { lastValue(0),volt0of5(1), volthalfof5(2), volt5of5(3), volt0of10(4), volt5to10(5), volt10of10(6),ma0(7), ma2(8), ma4(9), ma10(10), ma12(11),ma20(12), ma22(13),ma24(14)}

setup -> outputs -> digOutSetup-> digOut1Setup

OID	Name	Access	Description	Syntax
x.5.2.2.2.1.1.0	digOut1description	read-write	Digital Out 1 description	DisplayString
x.5.2.2.2.1.2.0	digOut1mode	read-write	Digital out 1 mode	Integer { onoff(0),pwm(1)}
x.5.2.2.2.1.3.0	digOut1pulseWidth	read-write	Digital out 1 Pulse x100ms	Integer32
x.5.2.2.2.1.4.0	digOut1controlledBy	read-write	Digital out 1 control logic	Integer { webORm2m(0), shedule1(1), shedule2(2), shedule3(3), shedule4(4)}
x.5.2.2.2.1.5.0	digOut1reststate	read-write	Digital out 1 restart state	Integer { lastState(0), on(1),off(2), percent0(3), percent50(4), percent100(5)}

setup -> outputs -> digOutSetup-> digOut2Setup

OID	Name	Access	Description	Syntax
x.5.2.2.2.2.1.0	digOut2description	read-write	Digital out 2 description	DisplayString
x.5.2.2.2.2.2.0	digOut2mode	read-write	Digital out 2 mode	Integer { onoff(0),pwm(1)}
x.5.2.2.2.2.3.0	digOut2pulseWidth	read-write	Digital out 2 Pulse x100ms	Integer32
x.5.2.2.2.2.4.0	digOut2controlledBy	read-write	Digital out 2 control logic	Integer { webORm2m(0), shedule1(1), shedule2(2), shedule3(3), shedule4(4)}
x.5.2.2.2.2.5.0	digOut2reststate	read-write	Digital out 2 restart state	Integer { lastState(0), on(1),off(2), percent0(3), percent50(4), percent100(5)}

setup -> outputs -> digOutSetup-> digOut3Setup

OID	Name	Access	Description	Syntax
x.5.2.2.2.3.1.0	digOut3description	read-write	Digital out 3 description	DisplayString
x.5.2.2.2.3.2.0	digOut3mode	read-write	Digital out 3 mode	Integer { onoff(0),pwm(1)}
x.5.2.2.2.3.3.0	digOut3pulseWidth	read-write	Digital out 3 Pulse x100ms	Integer32
x.5.2.2.2.3.4.0	digOut3controlledBy	read-write	Digital out 3 control logic	Integer { webORm2m(0), shedule1(1), shedule2(2), shedule3(3), shedule4(4)}
x.5.2.2.2.3.5.0	digOut3reststate	read-write	Digital out 3 restart state	Integer { lastState(0), on(1),off(2), percent0(3), percent50(4), percent100(5)}

setup -> outputs -> digOutSetup-> digOut4Setup

OID	Name	Access	Description	Syntax
x.5.2.2.2.4.1.0	digOut4description	read-write	Digital out 4 description	DisplayString
x.5.2.2.2.4.2.0	digOut4mode	read-write	Digital out 4 mode	Integer { onoff(0),pwm(1)}
x.5.2.2.2.4.3.0	digOut4pulseWidth	read-write	Digital out 4 Pulse x100ms	Integer32
x.5.2.2.2.4.4.0	digOut4controlledBy	read-write	Digital out 4 control logic	Integer { webORm2m(0), shedule1(1), shedule2(2), shedule3(3), shedule4(4)}
x.5.2.2.2.4.5.0	digOut4reststate	read-write	Digital out 4 restart state	Integer { lastState(0), on(1),off(2), percent0(3), percent50(4), percent100(5)}

setup -> outputs -> digOutSetup

OID	Name	Access	Description	Syntax
x.5.2.2.2.5.0	digOutpwmfreq	read-write	Digital outs pwm frequency	Integer { hz1(0),hz5(1),hz10(2), hz50(3),hz100(4), hz500(5),hz1000(6), hz2000(7)}

setup -> outputs -> relaysSetup-> relay1setup

OID	Name	Access	Description	Syntax
x.5.2.2.3.1.1.0	relay1description	read-write	Relay 1 description	DisplayString
x.5.2.2.3.1.2.0	relay1pulseWidth	read-write	Relay 1 Pulse x100ms	Integer32
x.5.2.2.3.1.3.0	relay1controlledBy	read-write	Relay 1 control logic	Integer { webORm2m(0), shedule1(1), shedule2(2), shedule3(3), shedule4(4)}
x.5.2.2.3.1.4.0	relay1InitState	read-write	Relay 1 restart state	Integer { lastState(0),on(1),off(2)}

setup -> outputs -> relaysSetup-> relay1setup

OID	Name	Access	Description	Syntax
x.5.2.2.3.2.1.0	relay2description	read-write	Relay 2 description	DisplayString
x.5.2.2.3.2.2.0	relay2pulseWidth	read-write	Relay 2 Pulse x100ms	Integer32
x.5.2.2.3.2.3.0	relay2controlledBy	read-write	Relay 2 control logic	Integer { webORm2m(0), shedule1(1), shedule2(2), shedule3(3), shedule4(4)}
x.5.2.2.3.2.4.0	relay2InitState	read-write	Relay 2 restart state	Integer { lastState(0),on(1),off(2)}

monitorNcontrol -> anOut-> anOut1

OID	Name	Access	Description	Syntax
x.5.3.1.1.1.0	anOut1Int	read-write	Analog out 1 x100 in Integer format	Integer32
x.5.3.1.1.2.0	anOut1Alarm	read-only	Analog out 1 alarm	integer { none(0), tempfault(1), ioutfault(4), tempioutfault(5)}

monitorNcontrol -> anOut-> anOut2

OID	Name	Access	Description	Syntax
x.5.3.1.2.1.0	anOut2Int	read-write	Analog out 2 x100 in Integer format	Integer32
x.5.3.1.2.2.0	anOut2Alarm	read-only	Analog out 2 alarm	integer { none(0), tempfault(1), ioutfault(4), tempioutfault(5)}

monitorNcontrol -> digOut-> digOut1

OID	Name	Access	Description	Syntax
x.5.3.2.1.1.0	digOut1Int	read-write	Digital out 1 x100 in Integer format	Integer32
x.5.3.2.1.2.0	digOut1State	read-write	Digital out 1 State	integer {off(0), on(1)}
x.5.3.2.1.3.0	digOut1Pulse	read-write	Digital out 1 Pulse	integer {off(0), on(1)}

monitorNcontrol -> digOut-> digOut2

OID	Name	Access	Description	Syntax
x.5.3.2.2.1.0	digOut2Int	read-write	Digital out 2 x100 in Integer format	Integer32
x.5.3.2.2.2.0	digOut2State	read-write	Digital out 2 State	integer {off(0), on(1)}
x.5.3.2.2.3.0	digOut2Pulse	read-write	Digital out 2 Pulse	integer {off(0), on(1)}

monitorNcontrol -> digOut-> digOut3

OID	Name	Access	Description	Syntax
x.5.3.2.3.1.0	digOut3Int	read-write	Digital out 3 x100 in Integer format	Integer32
x.5.3.2.3.2.0	digOut3State	read-write	Digital out 3 State	integer {off(0), on(1)}
x.5.3.2.3.3.0	digOut3Pulse	read-write	Digital out 3 Pulse	integer {off(0), on(1)}

monitorNcontrol -> digOut-> digOut4

OID	Name	Access	Description	Syntax
x.5.3.2.4.1.0	digOut4Int	read-write	Digital out 4 x100 in Integer format	Integer32
x.5.3.2.4.2.0	digOut4State	read-write	Digital out 4 State	integer {off(0), on(1)}
x.5.3.2.4.3.0	digOut4Pulse	read-write	Digital out 4 Pulse	integer {off(0), on(1)}

monitorNcontrol -> relays-> relay1

OID	Name	Access	Description	Syntax
x.5.3.3.1.1.0	relay1State	read-write	Relay 1 State	integer {off(0), on(1)}
x.5.3.3.1.2.0	relay1Pulse	read-write	Relay 1 Pulse	integer {off(0), on(1)}

monitorNcontrol -> relays-> relay2

OID	Name	Access	Description	Syntax
x.5.3.3.2.1.0	Relay2State	read-write	Relay 2 State	integer {off(0), on(1)}
x.5.3.3.2.2.0	Relay2Pulse	read-write	Relay 2 Pulse	integer {off(0), on(1)}

monitorNcontrol

OID	Name	Access	Description	Syntax
x.5.3.4.0	configurationSaved	read-write	Configuration save status SAVED/UNSAVED	integer { unsaved(0), saved(1)}
x.5.3.5.0	restartDevice	read-write	Restart Device	integer { cancel(0), restart(1)}
x.5.3.6.0	hardwareErr	read-only	Hardware Error	integer { noErr(0), hwErr(1)}

7.2. MODBUS TCP/IP

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

7.2.1. Codes and answers

7.1.1.1. Read Coil Status (FC=01)

Request

This command is requesting the ON/OFF status of discrete coils on address 100.

01 0064 0001

01: Function Code 1 (read Coil Status)

0064: The Data Address of the coil to read (0064 hex = 100)

0001: The total number of coils requested. (01 hex = 1)

Response

01 01 01

01: Function Code 1 (read Coil Status)

01: The number of data bytes to follow

01: 7 space holders & Coils 1 (0000 0001)

Due to the number of coils requested, the last data field **01** contains the status of only 1 coil. The 7 most significant bits in this data field are filled in with zeroes. The activated relay is 1.

7.1.1.2. Force Single Coil (FC=05)

Request

This command is writing the contents of discrete on address 100 to ON.

05 0064 FF00

05: Function Code 5 (Force Single Coil)

0064: The Data Address of the coil. (0064 hex = 100)

FF00: The status to write (FF00 = ON, 0000 = OFF)

Response

The normal response is an echo of the query, returned after the coil has been written.

05 0064 FF00

05: Function Code 5 (Force Single Coil)

0064: The Data Address of the coil. (0064 hex = 100)

FF00: The status written (FF00 = ON, 0000 = OFF)

7.1.1.3. Read Holding Registers (FC=03)

Request

This command is requesting the content of holding registers 500.

03 01F4 0002

03: Function Code 3 (read Holding Registers)

0064: The Data Address of the first register requested (01F4 hex = 500)

0002: The total number of registers requested. (read 2 registers each 2 bytes = 4 bytes)

Response

03 04 3FA0 0000

03: Function Code 3 (read Analog Output Holding Registers)

04: The number of data bytes to follow (2 registers x 2 bytes each = 4 bytes)

3FA0 0000: 4 bytes value

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

In the example above, a value of 1.25 is sent.

Request

This command is requesting the content of holding registers 1000.

03 03E8 0020

03: Function Code 3 (read Holding Registers)

03E8: The Data Address of the first register requested (03E8 hex = 1000)

0020: The total number of registers requested (read 32 registers each 2 bytes = 64 bytes)

Response

03 40 5265 6C61 7920 3100 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

03: Function Code 3 (read Analog Output Holding Registers)

40: The number of data bytes to follow (32 registers x 2 bytes each = 64 bytes)

5265 6C61 7920 3100 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000: 64 bytes value

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

The answer is padded with 0.

In the example above string “Relay 1” is sent.

7.1.1.4. Exception codes

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

01 Illegal function

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

02 Illegal data address

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

7.2.2. Address table

Parameter	FC	PDU decimal address	Data size	Data
Relay 1	01,05,15	100	Discrete	
Relay 2	01,05,15	101	Discrete	
Digital out 1	01,05,15	102	Discrete	
Digital out 2	01,05,15	103	Discrete	
Digital out 3	01,05,15	104	Discrete	
Digital out 4	01,05,15	105	Discrete	
Relay 1 description	03,16	15000	64 bytes UTF-8	
Relay 2 description	03,16	15032	64 bytes UTF-8	
Relay 1 pulse width	03,16	15200	32-bit Float	
Relay 2 pulse width	03,16	15202	32-bit Float	
Relay 1 activated from	03,06,16	15300	16-bit unsign int	webORm2m(0), shedule1(1), shedle2(2), sheule3(3), shedule4(4)
Relay 2 activated from	03,06,16	15301	16-bit unsign int	—"—
Relay 1 state after restart	03,06,16	15400	16-bit unsign int	lastState(0),on(1), off(2)
Relay 2 state after restart	03,06,16	15401	16-bit unsign int	—"—
Digital out 1 description	03,16	16000	64 bytes UTF-8	
Digital out 2 description	03,16	16032	64 bytes UTF-8	
Digital out 3 description	03,16	16064	64 bytes UTF-8	
Digital out 4 description	03,16	16096	64 bytes UTF-8	
Digital out 1 mode	03,06,16	16200	16-bit unsign int	onoff(0),pwm(1)
Digital out 2 mode	03,06,16	16201	16-bit unsign int	—"—
Digital out 3 mode	03,06,16	16202	16-bit unsign int	—"—
Digital out 4 mode	03,06,16	16203	16-bit unsign int	—"—
Digital out 1 pulse width	03,16	16300	32-bit Float	
Digital out 2 pulse width	03,16	16302	32-bit Float	
Digital out 3 pulse width	03,16	16304	32-bit Float	
Digital out 4 pulse width	03,16	16306	32-bit Float	
Digital out 1 activated from	03,06,16	16400	16-bit unsign int	webORm2m(0), shedule1(1), shedle2(2), sheule3(3), shedule4(4)
Digital out 2 activated from	03,06,16	16401	16-bit unsign int	—"—

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Digital out 3 activated from	03,06,16	16402	16-bit unsign int	—"—
Digital out 4 activated from	03,06,16	16403	16-bit unsign int	—"—
Digital out 1 state after restart	03,06,16	16500	16-bit unsign int	lastState(0), on(1), off(2)
Digital out 2 state after restart	03,06,16	16501	16-bit unsign int	—"—
Digital out 3 state after restart	03,06,16	16502	16-bit unsign int	—"—
Digital out 4 state after restart	03,06,16	16503	16-bit unsign int	—"—
Digital out 1 pwm duty	03,16	16600	32-bit Float	0÷100 %
Digital out 2 pwm duty	03,16	16602	32-bit Float	—"—
Digital out 3 pwm duty	03,16	16604	32-bit Float	—"—
Digital out 4 pwm duty	03,16	16606	32-bit Float	—"—
Digital out 1 state	03,06,16	16700	16-bit unsign int	off(0), on(1)
Digital out 2 state	03,06,16	16701	16-bit unsign int	—"—
Digital out 3 state	03,06,16	16702	16-bit unsign int	—"—
Digital out 4 state	03,06,16	16703	16-bit unsign int	—"—
Digital out 1 pulse	03,06,16	16800	16-bit unsign int	off(0), on(1)
Digital out 2 pulse	03,06,16	16801	16-bit unsign int	—"—
Digital out 3 pulse	03,06,16	16802	16-bit unsign int	—"—
Digital out 4 pulse	03,06,16	16803	16-bit unsign int	—"—
Digital out pwm frequency	03,06	16900	16-bit unsign int	1Hz(0), 5Hz(1), 10Hz(2), 50Hz(3), 100Hz(4), 500Hz(5), 1000Hz(6), 2000Hz(7)
Analog out 1 description	03,16	18000	64 bytes UTF-8	
Analog out 2 description	03,16	18032	64 bytes UTF-8	
Analog out 1 mode	03,06,16	18200	16-bit unsign int	voltage(0),current(1)
Analog out 2 mode	03,06,16	18201	16-bit unsign int	—"—
Analog out 1 range	03,06,16	18300	16-bit unsign int	0V to 5V(0), 0V to 10V(1), 4mA to 20mA(5), 0mA to 20mA(6), 0mA to 24mA(7)
Analog out 2 range	03,06,16	18301	16-bit unsign int	—"—
Analog out 1 value after restart	03,06,16	18400	16-bit unsign int	lastValue(0), 0V of 5V(1),2.5V of 5V(2),5V of 5V(3), 0V of 10V(4),5V of 10V(5),10V of 10V(6), 0mA(7), 2mA(8), 4mA(9), 10mA(10),

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				12mA(11), 20mA(12), 22mA(13), 24mA(14)
Analog out 2 value after restart	03,06,16	18401	16-bit unsign int	—"—
Analog out 1 value	03,16	18500	32-bit Float	
Analog out 2 value	03,16	18502	32-bit Float	
Analog out 1 alarm	03	18600	16-bit unsign int	none(0), over temperature(1), out fault(4), over temperature and out fault(5)
Analog out 2 alarm	03	18601	16-bit unsign int	—"—
Save configuration	03,06	50000		unsaved(0), saved(1)
Restart device	03,06	50001		cancel (0), restart (1)
HW error	03	50002		noErr (0), hwErr (1)
Device ID	03	50100	18 bytes UTF-8	Example: 5c:32:c5:00:ac:52
Hostname	03	50200	16 bytes UTF-8	
Device IP	03	50300	16 bytes UTF-8	Example: 192.168.1.2

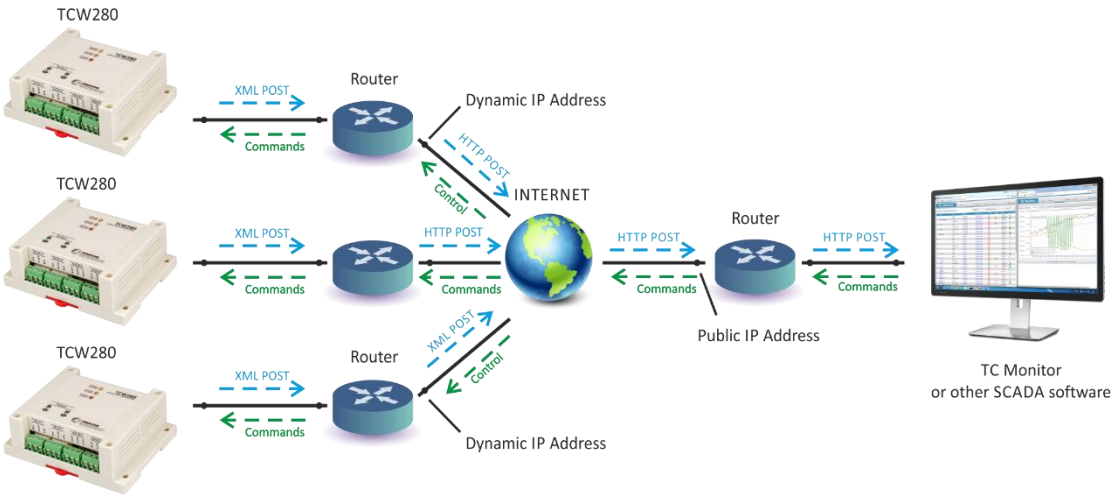
7.3. HTTP API

7.3.1. HTTP Post

TCW280 can send HTTP Post to upload XML/JSON file to a dedicated server.

This functionality is very useful if the controller is behind the router without public IP address or the user don't have access to router configuration. The server should have a public IP address.

The typical monitoring application is shown in the picture below:



HTTP post can be sent periodically or periodically plus on an alarm condition. As an answer, the server can send HTTP Get with appropriate command – see **7.3.3. HTTP commands**

To test HTTP Post follow the steps below:

- Save following code like post.php:

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

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

- Copy the post.php file on a public web server with PHP support. To verify that the script is working properly, you can type the URL (for example www.yourserverURL.com/post.php) in your web browser. If all is OK, a web page with “The PHP script is working!” will be shown.
- Set the controller to send HTTP Post to your web server. Enter the address (yourserverURL.com/post.php) in the URL field. Click on “Test HTTP Post” button.
- If the HTTP POST is received and processed, “OK” will be shown close to the button. Along with this, an XML file will be created in the same directory, where post.php is located. The file name will contain time information and looks like 20181203103318_status.xml.

7.3.2. HTTP Get

HTTP Get can be used to monitor TCW280 via XML or JSON files. The format is as follows:

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

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

See sections **7.3.4 XML file structure** and **7.3.5 JSON file structure** for details of files.

HTTP Get can be sent in anytime to TCW280 if it is on the same network or it has appropriate routing.

If there isn’t direct access to the device, HTTP Get can be sent immediately after HTTP Post receiving from the same device.

7.3.2.1. Commands

All command used with HTTP Post can be used also with HTTP Get. The right format is:

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

Where:
yyy is the command;
xxx is the parameter.
Example:
http://device.ip.address/status.xml?ron=1, will turn Relay 1 ON.

7.3.2.2. HTTP GET authentication

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

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

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Example:

http://device.ip.address/status.xml?a=admin:admin&pper=120 will set post period on 120 sec in case the username=admin and pass=admin

8.1.1. List of HTTP API commands

Command	Description
ron=**n**	Turn relay **n** ON (**n** is 1 or 2 for the respective relay) ron=1 - turn ON relay 1 ron=2 - turn ON relay 2
ron=1&ron=2	Turn both relays ON
rof=**n**	Turn relay **n** OFF (**n** is 1 or 2 for the respective relay) rof=1 - turn OFF relay 1 rof=2 - turn OFF relay 2
rof=1&rof=2	Turn both relays OFF
rtg=**n**	Toggle relay **n** state (**n** is 1 or 2 for the respective relay) rtg=1 - toggle relay 1 state rtg=2 - toggle relay 2 state
rpl=**n**	Pulse relay **n** (**n** is 1 or 2 for the respective relay) rpl=1 – pulse relay 1 rpl=2 – pulse relay 2
don=**n**	Turn digital out **n** ON (**n** is 1,2,4 or 8) don=1 – digital out 1 ON don=2 – digital out 2 ON don=4 – digital out 3 ON don=8 – digital out 4 ON
don=1&don=2&don=4&don=8	Turn four Digital outs ON
dof=**n**	Turn digital out **n** OFF (**n** is 1,2,4 or 8) dof=1 – digital out 1 OFF dof=2 – digital out 2 OFF dof=4 – digital out 3 OFF dof=8 – digital out 4 OFF
dof=1&dof=2&dof=4&dof=8	Turn four Digital outs OFF
dtg=**n**	Toggle digital out **n** state (**n** is 1,2,4 or 8) dtg=1 – toggle digital out 1 state dtg=2 – toggle digital out 2 state dtg=4 – toggle digital out 3 state dtg=8 – toggle digital out 4 state
dtg=1&dtg=2&dtg=4&dtg=8	Toggle four digital outs
dpl=1	Pulse digital out **n** (**n** is 1,2,4 or 8) dpl=1 – pulse digital out 1 dpl=2 – pulse digital out 2 dpl=4 – pulse digital out 3 dpl=8 – pulse digital out 4
doc**n**=xx.x	Set PWM duty on Digital out **n** with xx.x% **(n** is 1,2,3 or 4 for the respective digital out**)** doc1=50.0 – set 50.0% PWM duty Digital out 1

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	doc2=40.0 – set 40.0% PWM duty Digital out 2 doc3=30.0 – set 30.0% PWM duty Digital out 3 doc4=20.0 – set 20.0% PWM duty Digital out 4
dom**n**=x	Set mode Digital out **n** **(n** is 1,2,3 or 4 for the respective digital out, x=0 – ON/OFF mode, x=1 – PWM mode**)** dom1=0 - Set ON/OFF mode Digital out 1 dom2=0 - Set ON/OFF mode Digital out 2 dom3=0 - Set ON/OFF mode Digital out 3 dom4=0 - Set ON/OFF mode Digital out 4 dom1=1 - Set PWM mode Digital out 1 dom2=1 - Set PWM mode Digital out 2 dom3=1 - Set PWM mode Digital out 3 dom4=1 - Set PWM mode Digital out 4
aoc**n**=xx.xx	Set value xx.xx on Analog out **n** **(n** is 1 or 2 for the respective analog out**)** aoc**1**=4.50 - Set value 4.50 on Analog out 1 aoc**2**=10.0 - Set value 10.0 on Analog out 2
pper=300	Set http post period 300 sec
FIN	Terminate session (it makes sense only for HTTP Post)

7.3.3. XML file structure

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
<Monitor>
    <DeviceInfo>
        <DeviceName>TCW280</DeviceName>
        <HostName>TCW280</HostName>
        <ID>54:10:EC:7F:C4:90</ID>
        <FwVer>TCW280-v1.000</FwVer>
        <MnfInfo>www.teracomsystems.com</MnfInfo>
        <SysContact>info@teracomsystems.com</SysContact>
        <SysName>SysName</SysName>
        <SysLocation>SysLocation</SysLocation>
    </DeviceInfo>
    <AO>
        <AO1>
            <description>DAC out 1</description>
            <value>4.00</value>
            <unit>V</unit>
            <range>0V to 5V</range>
            <alarmState/>
            <alarm>0< /alarm>
        </AO1>
        <AO2>
            <description>DAC out 2</description>
            <value>5.00</value>
            <unit>V</unit>
            <range>0V to 5V</range>
            <alarmState/>
            <alarm>0</alarm>
        </AO2>
    </AO>
    <DO>
        <DO1>
            <description>Digital Out 1</description>
            <value>50.00</value>
            <unit>%</unit>
            <valuebin/>
            <pulseWidth>6.0</pulseWidth>
            <mode>PWM,2000Hz</mode>
            <control>0</control>
        </DO1>
        <DO2>
            <description>Digital Out 2</description>
            <value>OFF</value>
            <unit/>
            <valuebin>0</valuebin>
            <pulseWidth>7.0</pulseWidth>
            <mode>ON/OFF</mode>
            <control>0</control>
        </DO2>
        <DO3>
            <description>Digital Out 3</description>
            <value>OFF</value>
            <unit/>
            <valuebin>0</valuebin>
            <pulseWidth>8.0</pulseWidth>
            <mode>ON/OFF</mode>
            <control>0</control>
        </DO3>
        <DO4>
            <description>Digital Out 4</description>
            <value>OFF</value>
            <unit/>
            <valuebin>0</valuebin>
            <pulseWidth>9.0</pulseWidth>
            <mode>ON/OFF</mode>
            <control>0</control>
        </DO4>
        </DO>
    <R>
        <R1>
            <description>Relay 1</description>
```

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```
            <value>OFF</value>
            <valuebin>0</valuebin>
            <pulseWidth>1.0</pulseWidth>
            <control>0</control>
          </R1>
          <R2>
            <description>Relay 2</description>
            <value>OFF</value>
            <valuebin>0</valuebin>
            <pulseWidth>2.0</pulseWidth>
            <control>0</control>
          </R2>
    </R>
          <HTTPPush>
              <Key/>
              <PushPeriod>300</PushPeriod>
          </HTTPPush>
          <hwerr/>
          <Alarmed>0</Alarmed>
          <Time>
              <Date>05.12.2018</Date>
              <Time>08:45:32</Time>
          </Time>
</Monitor>
```

Where:

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

7.3.4. JSON file structure


```
{
  "Monitor": {
    "DeviceInfo": {
      "DeviceName": "TCW280",
      "HostName": "TCW280",
      "ID": "54:10:EC:7F:C4:90",
      "FwVer": "TCW280-v1.000",
      "MnfInfo": "www.teracomsystems.com",
      "SysContact": "info@teracomsystems.com",
      "SysName": "SysName",
      "SysLocation": "SysLocation"
    },
    "AO": {
      "AO1": {
        "description": "DAC out 1",
        "value": "4.00",
        "unit": "V",
        "range": "0V to 5V",
        "alarmState": "",
        "alarm": "0"
      },
      "AO2": {
        "description": "DAC out 2",
        "value": "5.00",
        "unit": "V",
        "range": "0V to 5V",
        "alarmState": "",
        "alarm": "0"
      }
    },
    "DO": {
      "DO1": {
        "description": "Digital Out 1",
        "value": "50.00",
        "unit": "%",
        "valuebin": "",
        "pulseWidth": "6.0",
        "mode": "PWM,2000Hz",
        "control": "0"
      },
      "DO2": {
        "description": "Digital Out 2",
        "value": "OFF",
        "unit": "",
        "valuebin": "0",
        "pulseWidth": "7.0",
        "mode": "ON\/OFF",
        "control": "0"
      },
      "DO3": {
        "description": "Digital Out 3",
        "value": "OFF",
        "unit": "",
        "valuebin": "0",
        "pulseWidth": "8.0",
        "mode": "ON\/OFF",
        "control": "0"
      },
      "DO4": {
        "description": "Digital Out 4",
        "value": "OFF",
        "unit": "",
        "valuebin": "0",
        "pulseWidth": "9.0",
        "mode": "ON\/OFF",
        "control": "0"
      }
    },
    "R": {
      "R1": {
        "description": "Relay 1",
        "value": "OFF",
        "valuebin": "0",
        "pulseWidth": "1.0",
        "control": "0"
```


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```
      },
      "R2": {
        "description": "Relay 2",
        "value": "OFF",
        "valuebin": "0",
        "pulseWidth": "2.0",
        "control": "0"
      }
    },
    "HTTPPush": {
      "Key": "",
      "PushPeriod": "300"
    },
    "hwerr": "",
    "Alarmed": "0",
    "Time": {
      "Date": "05.12.2018",
      "Time": "10:18:39"
    }
  }
}
```

8. Factory default settings

TCW280 can be restored to its original factory default settings in 3 different ways.

8.1. Factory default from the WEB interface

If the button “Factory default” from Administration->Backup/Restore is pressed, all parameters return to factory default except Network settings.

8.2. Factory default with the reset button

If the reset button is pressed for more than 5 seconds, while the device is working, all Network settings go to factory default.

8.3. General factory default with the reset button

For factory default reset of all parameters following steps should be executed:

- Press and hold the RESET button, then turn on the power supply;
- Yellow LED shines and red LED blinks about 5 times on a second;
- After about 5 seconds red LED will turn off, the button can be released;
- Yellow LED flashes on 1 second and red LED shines – 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 outputs mode	Voltage
Analog outputs range	0V to 10V
Digital outputs mode	ON/OFF
Digital outputs	OFF
Relay outputs	OFF

9. Environment information

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

When the controller is a part of a system, the other elements of the system shall comply with the EMC requirements and shall be intended for use in the same ambient conditions.

10. Safety

This device must not be used for medical, life-saving purposes or for any purpose where its failure could cause serious injury or the loss of life.



This product contains a coin/button cell battery. Do not ingest battery, Chemical Burn Hazard.

If the coin/button cell battery is swallowed, it can cause severe internal burns in just 2 hours and can lead to death.

Keep new and used batteries away from children.

If the battery compartment does not close securely, stop using the product and keep it away from children.

If you think batteries might have been swallowed or placed inside any part of the body, seek immediate medical attention.



To reduce the risk of fire, only flexible stranded wire, with cross section 0.5mm² or larger for wiring of digital and analog inputs and relay output of the device should be used.

To avoid electric shock and fire hazard, 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 (damage) of the controller if recommended free spaces to adjacent devices are not ensured. The joint part with external component shall have space for attachment/removal of the cable after installation.

Teracom does not guarantee successful operation of the product if the product was used under conditions deviating from the product specifications.

To ensure that the device works correctly follow the steps below:

- Ensure that the device is installed correctly, refer to this user manual;
- Log into the devices via browser program;
- Go to Monitoring page. Press “All Off” and after this “All On” buttons in relay section;
- Both relays should be activated – their LED’s should shine. At the same time flashing “STS” led should indicate the 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.

11. Maintenance

Upon completion of any service or repairs to the device or once per year, a safety check must be performed to determine that this product is in proper operating condition.

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

Appendix A

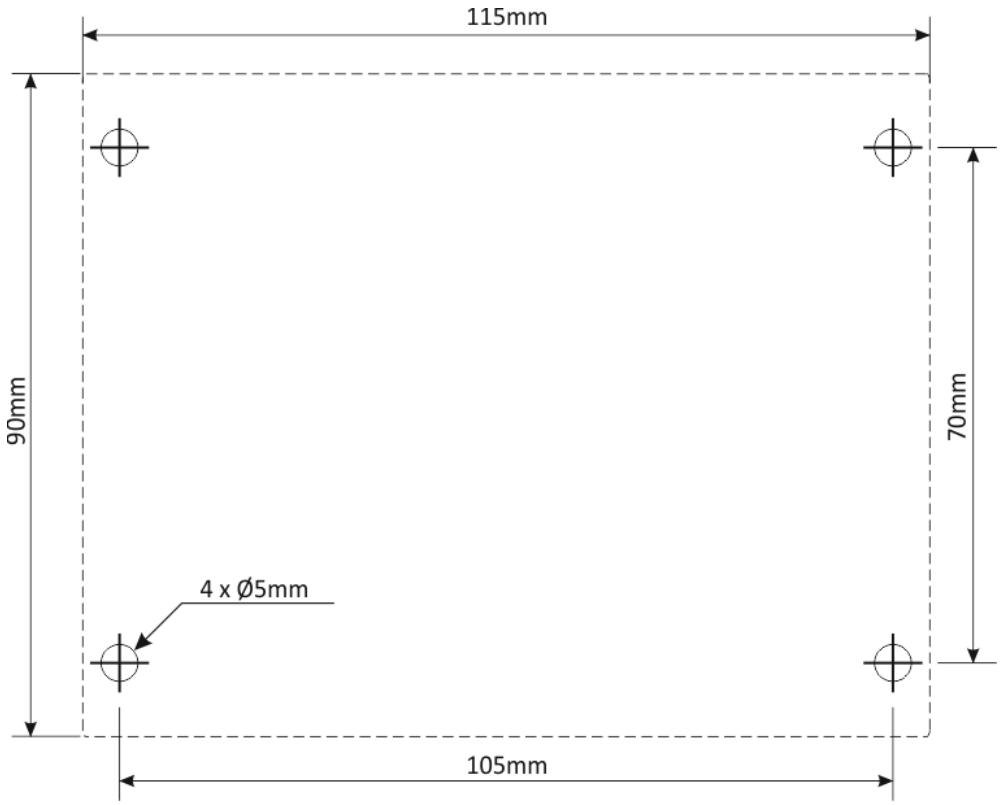


Fig.1

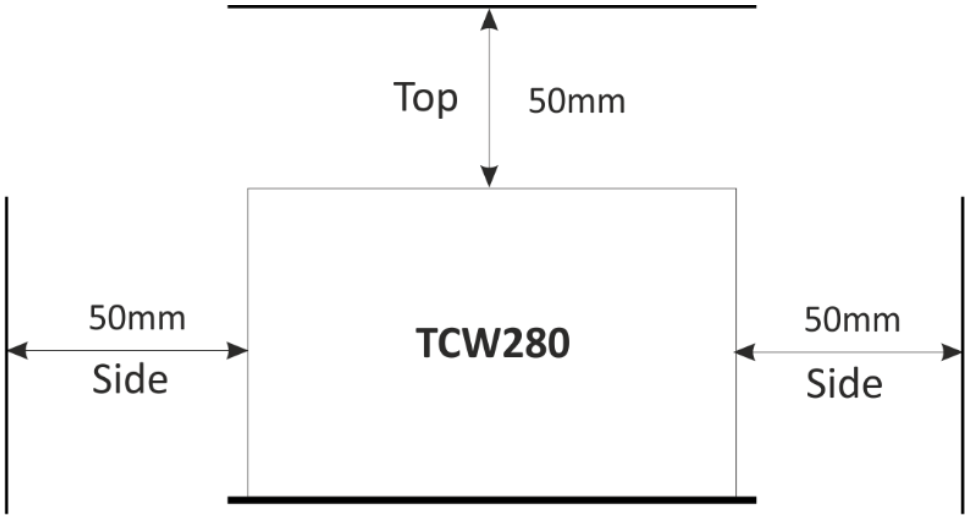


Fig.2