Ethernet controller TCW181B-CM
Users manual

1. Short description

TCW181B-CM is 8-channel Ethernet relay board, which is designed to work in IP-based networks and managed by WEB interface or SNMP programs. The device can be used stand-alone or as a part of control and monitoring systems. Its I/O interface - 8 relay outputs and 1 digital input, is suitable for solving specific problems in various fields such as remote control, process automation, home automation and others.

2. Features

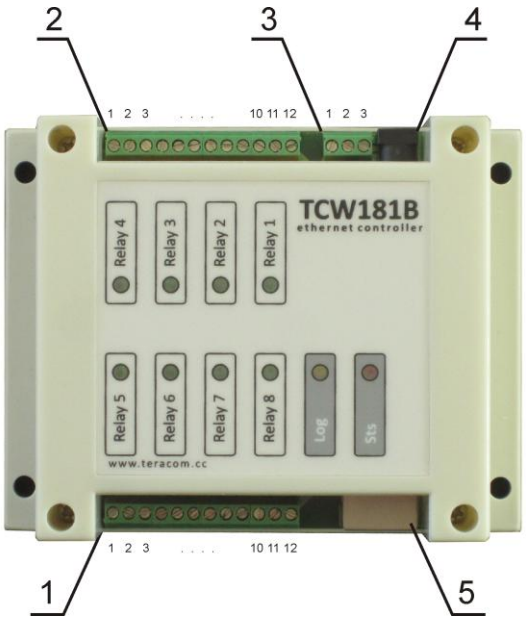
- 10 Mb Ethernet connectivity;
- Password protected web based configuration and control;
- 1 digital input with "logic level" and "dry contact" modes;
- 8 relays with NO and NC contacts;
- SNMP v.1 support;
- Sending SNMP Traps messages under certain conditions;
- Sending E-mail messages under certain conditions;
- SMTP with authorization (SSL is not supported);
- HTTP and SNMP port changing;
- HTTP and XML API commands;
- Remote FTP firmware update.

3. Technical parameters

Supply voltage, VDC	12 ± 2
Maximum current (with all relays ON), mA	370
Weight, g	205
Dimensions, mm	115 x 90 x 40
Operating temperature, °C	0 to +40
Maximum humidity in 0 to 31°C range, %RH	80
Maximum humidity at 40°C (linear slope between 31-40°C), %RH	50
Minimum high level input voltage for digital inputs, VDC	+2.5
Maximum low level input voltage for digital inputs, VDC	+0.8
Maximum input voltage for digital inputs, VDC	+5.5
Maximum switchable current for relay contacts, A	3
Maximum switchable voltage for relay contacts, VAC/VDC	30/24

4. Connectors

The location of the connectors and LED's are shown below:



Connector 1
- Pin 1/2/3 - NO/COM/NC of Relay5
- Pin 4/5/6 - NO/COM/NC of Relay6
- Pin 7/8/9 - NO/COM/NC of Relay7
- Pin 10/11/12 - NO/COM/NC of Relay8

Connector 2
- Pin 1/2/3 - NC/COM/NO of Relay4
- Pin 4/5/6 - NC/COM/NO of Relay3
- Pin 7/8/9 - NC/COM/NO of Relay2
- Pin 10/11/12 - NC/COM/NO of Relay1

Connector 3
- Pin 1 - Digital input (**DI**)*
- Pin 2 - Ground
- Pin 3 - +12VDC

Connector 4 - Power, Ø2mm, central positive

Connector 5 - Ethernet – RJ45

* Operating mode is selected by jumper DI on PCB - closed for "dry contact" and open for "logic level". By default jumper is closed.

5. LED indicators

The following indicators show the status of the controller:

- **Relay 1 to 8 status** (green) - turns ON when the corresponding relay is activated;
- **Sts** (red) – flashes when the main program of controller is executed;
- **Log** (yellow) – turns ON when someone is logged to the controller via WEB interface;
- **Link** (green) – located on the Ethernet connector, turns ON when the device is connected to the LAN;
- **Act** (yellow) – located on the Ethernet connector, flashes when activity on the LAN is detected.

6. Powering

TCW181B-CM is designed to be supplied by adapter SYS1421-0612-W2E or similar, intended for use in the conditions of overvoltage category II, and priorly assessed for compliance with safety requirements. The power supply equipment shall be resistant to short circuit and overload in secondary circuit.

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

7. 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.

8. 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.

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 controller, if recommended free spaces to adjacent devices are not ensured. 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 devices are installed correctly, refer this user manual;
- log in to the devices via browser program;
- make proper set up;
- set up the digital inputs to work in “dry contact” mode;
- short the “DI” and “GND”;
- Switch on “Monitoring page” of WEB interface – proper value for digital input should be displayed in the same time **Sts** led should flashes;
- When you push the button “All On”, all relays should be activated and all relay’s status LED’s should be constantly shine.

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.

9. Maintenance

Upon completion of any service or repairs to the device or once per year, safety check must be perform 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.

10.Installation

This device must be installed by qualified personnel.

This device must not be installed directly outdoors.

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

TCW181B-CM can be wall or flat, not flammable surface mounted, in a clean and dry location room. Ventilation is recommended for installations where 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 on fig.2 in Appendix A, this provides ventilation and electrical isolation

TCW181B-CM 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.

PCB only variant (**TCW181**) should be installed in not flammable box. See Appendix-A, fig. 1 for mechanical details. Maintain spacing from adjacent equipment. Allow 50 mm of space on all sides, as shown on fig.2 in Appendix A. This provides ventilation and electrical isolation.

11. Configuration

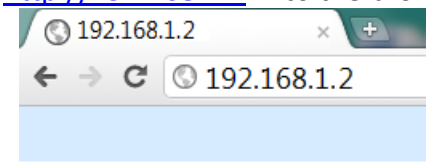
Please follow the steps below for proper installation :

1. Mount the controller in a dry and ventilated place.
2. Connect the Ethernet port to a 10/100MB Ethernet network. For direct connection to a PC use a “crossover” cable.
3. Connect the I/O pins of the controller according to the required application.
4. Connect the power supply.

If the red LED blinks, the power supply is OK. By default **TCW181B-CM** comes 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 **TCW181B-CM** can be established by assigning a temporary IP address to the computer. This address should be in 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.

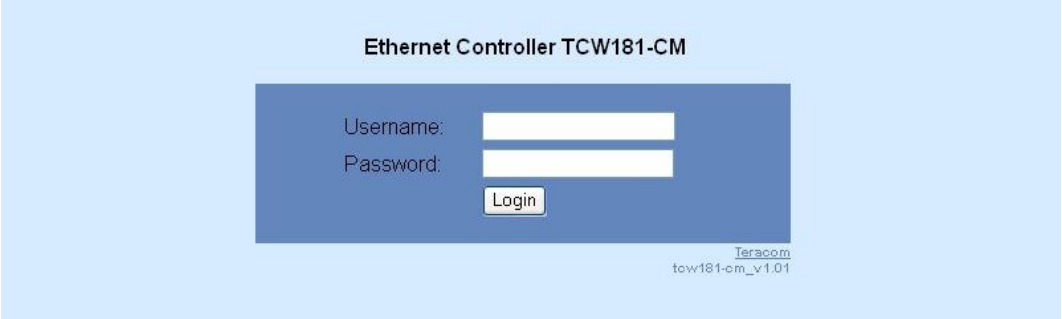


If the network settings are correct, the “Login” page will appear.

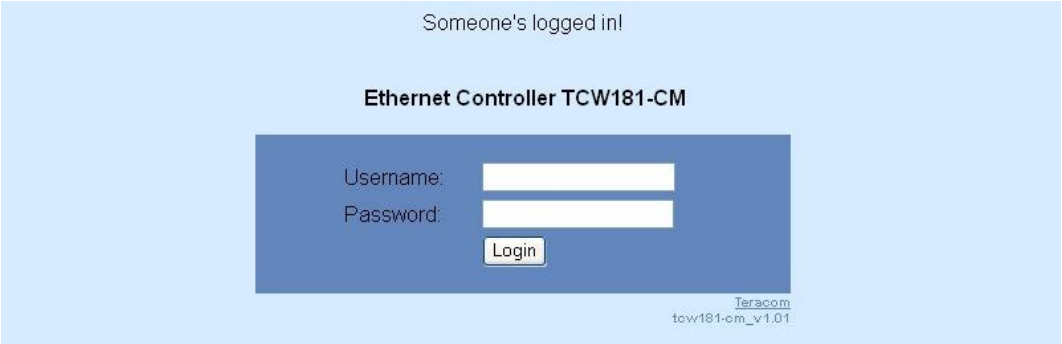
The web based interface allows configuration, monitoring and control. Recommended browser is Internet Explorer at 1024x768 resolutions.

11.1 Login page

After opening the “Login” page, 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 only one active session – only one user can operate the device. If another user tries to login, the following message appears: “Someone’s logged in”:



The active session will be terminated automatically, if the current user stays inactive for 2 minutes.

11.2 Monitoring page

After successful authorization, the “Monitoring” page appears:

The “Monitoring” page provides information about the state of the relays and digital input.

The state of the relay can be changed by appropriate “ON/OFF” button. To change the state of relay for a while, “Pulse” button should be pressed. Duration of the pulse is specified in “Pulse Duration” field of “I/O Setup” page.

Three buttons are located on the bottom of the page:

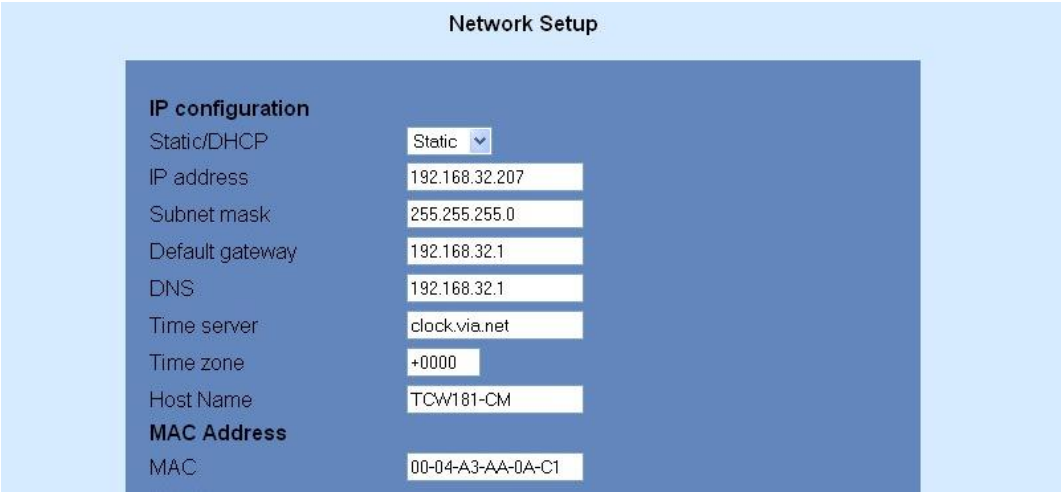
- “All ON” – click on this button will turn all relays ON
- “All OFF” – click on this button will turn all relays OFF
- “Pulse All” – click on this button will change the states of all relay outputs for a time, specified in “Pulse Duration” field of “I/O Setup” page.

11.3 Network Setup page

The Network parameters are set on this page.

For “IP configuration” and “MAC address” section, following parameters can be changed:

- **IP configuration** – IP Address can be static or dynamic (DHCP server should be present in the network);
- **IP address, Subnet mask , Default gateway** – these fields are active if IP address is static;
- **DNS** – these fields is mandatory, if domain names are used instead of IP addresses. By default DNS has the same Ip address as Default gateway;
- **Time Server** and **Time Zone** – these fields are not mandatory, they are used when e-mail must be sent;
- **Host Name** – up to 16 symbols, it appears as a “Subject” in sent e-mails;
- **MAC** – device MAC address.

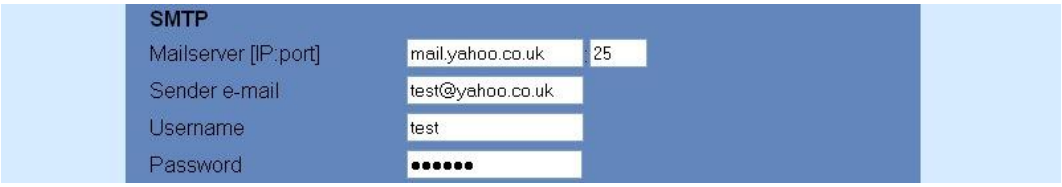


The good practice is to change the default IP address of controller immediately after first power-on. This will avoid collisions if many devices are used in the same network. It may be necessary to clear the arp cache, each time you connect a new device to the network. This is done by typing *arp -d* in the command prompt window of computer.

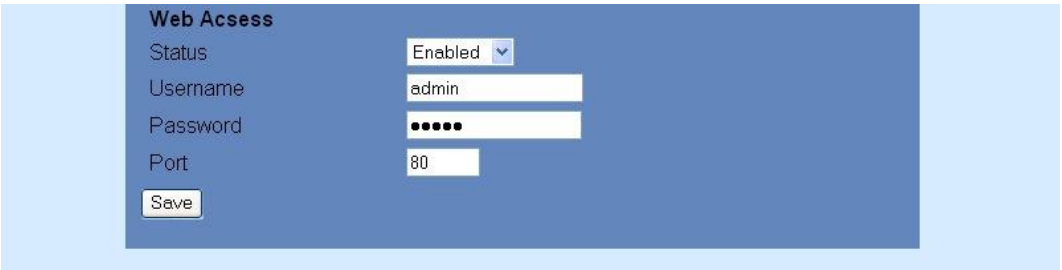
To set up the SMTP server details, the following fields should be completed:

- **Mail server [IP:port]** – domain or IP address + port of SMTP mail server. To use domain name, IP address in field DNS must be correct**;**
- **E-mail** – sender e-mail;
- **Username** and **Password** – authentication details for mail server**.**

Mail server is considered server for sending mails. Secure Socket Layer is not supported.



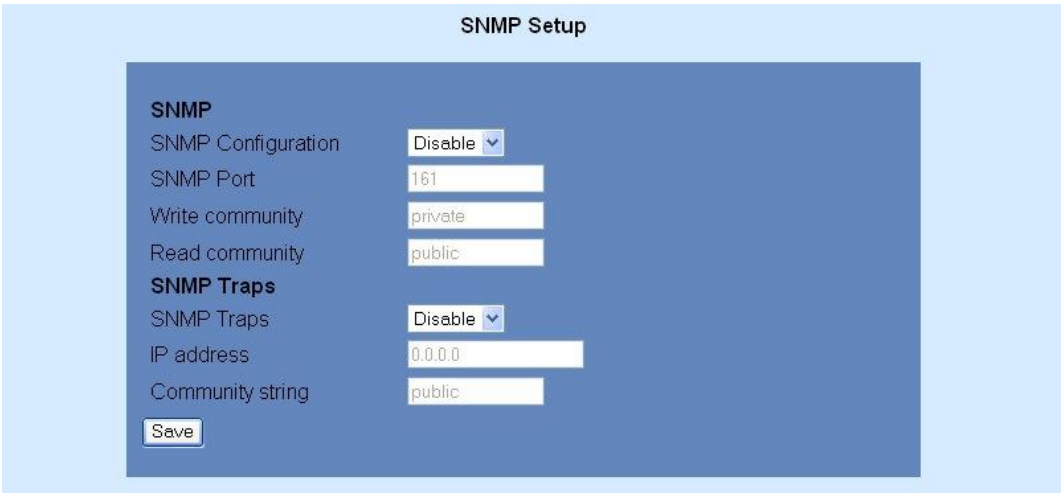
Authentication details for WEB access to **TCW181B-CM-CM** can be set in the last section. Only one user is supported.



11.4 SNMP Setup page

TCW181B-CM supports SNMP v.1 that enables trap delivery to an SNMP management application. This enables the device to be part of large monitoring and control networks. The possible settings for "SNMP" section are:

- **SNMP Configuration** – enable/disable SNMP;
- **Read-Write community** – performs client authentication;
- **Read-Only community** – performs client authentication;
- **SNMP Traps** – enable/disable SNMP trap messages;
- **IP address** – IP address of the receiving host
- **Community string** – performs client authentication
- **Trap Interval** - time interval in seconds for SNMP trap messages;
- **Max. Traps number** – maximum number of SNMP trap messages sent, if trap condition is present



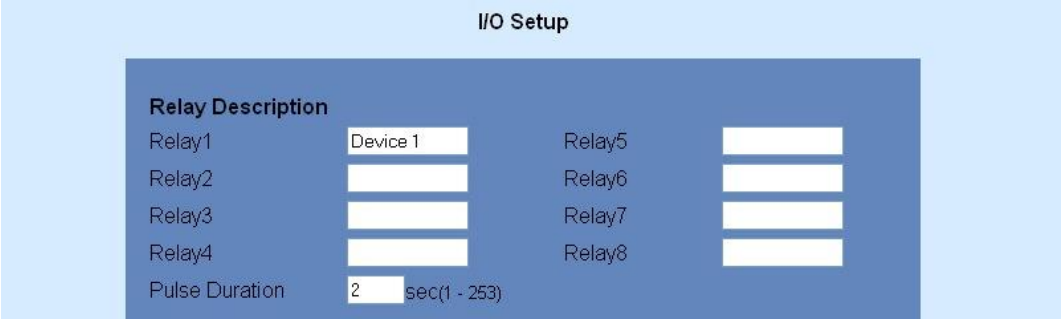
SNMP traps are sent if:

- event occurs (status change) on Digital Input;
- restart condition.

11.5 I/O Setup page

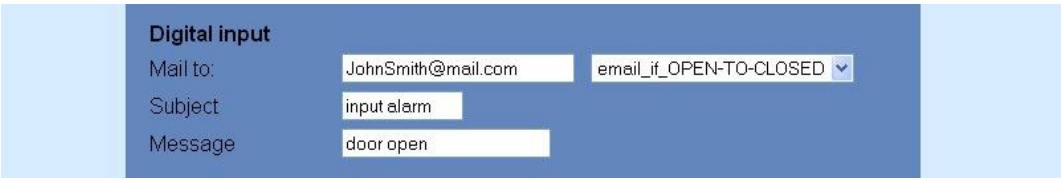
The following parameters can be set for the relays:

- **Description** – brief description of the output, maximum 10 characters can be used;
- **Pulse Duration** – time for relay activation when "Pulse" button on "Monitoring" page is pressed. This setting applies to all 8 relays.



Every change on digital input can mange e-mail sending. Following parameters must be set:

- **Mail to** – e-mail address of recipient;
- **Subject** – e-mail subject;
- **Message** – e-mail body.



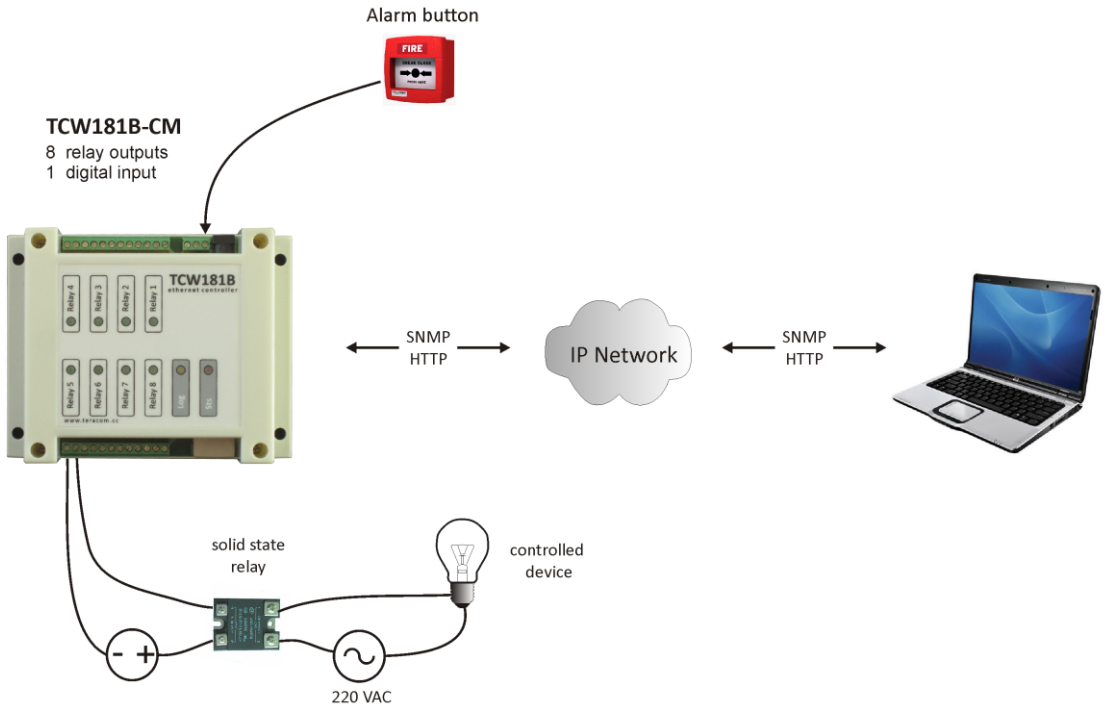
Important! It is necessary to set SMTP server settings on "Network Setup" page, to successfully send e-mail messages.

In the example above, if an event occurs (closing contact) the controller will send e-mail message to *info@teracom.cc* with subject "input alarm" and body "door open".

Automatic monitoring page refresh interval can be set from 1 to 253 second. If 0 is chosen - no automatic refresh.

12. Remote control application example

The controlled device is connected in series with the relay contacts. User can operate **TCW181B-CM** using either WEB browser or SNMP application. The relays can be managed independently of each other.



The above example is included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Teracom Ltd. cannot assume responsibility or liability for actual use based on the example.

13. Control and monitoring using SNMP

TCW181B-CM can be configured and monitored through SNMP (Simple Network Management Protocol). This could be done using every SNMPv.1 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 the ”1.3.6.1.4.1.38783**”**. To save the changes **configurationSaved** (OID x.6.0) should be set to "1".

13.1 Product

OID	Name	Access	Description	Syntax
x.1.1.0	name	read-only	Device name	String
x.1.2.0	version	read-only	Software version	String
x.1.3.0	date	read-only	Release date	String

13.2 SNMP Setup

OID	Name	Access	Description	Syntax
x.2.1.0	trapEnabled	read-write	TRAP messages enable/disable	INTEGER { Yes(1), No(0) }
x.2.2.0	trapReceiverIPAddress	read-write	TRAP messages receiver address	IpAddress
x.2.3.0	trapCommunity	read-write	TRAP community	String (SIZE (0..13))

13.3 Monitor and control

OID	Name	Access	Description	Syntax
x.3.1.0	digitalInput	read-only	**Digital input** state	INTEGER { OPEN(1),CLOSED(0) }
x.3.2.0	Relay1	read-write	**Relay 1** state	INTEGER { ON(1), OFF(0) }
x.3.3.0	Relay2	read-write	**Relay 2** state	INTEGER { ON(1), OFF(0) }
x.3.4.0	Relay3	read-write	**Relay 3** state	INTEGER { ON(1), OFF(0) }
x.3.5.0	Relay4	read-write	**Relay 4** state	INTEGER { ON(1), OFF(0) }
x.3.6.0	Relay5	read-write	**Relay 5** state	INTEGER { ON(1), OFF(0) }
x.3.7.0	Relay6	read-write	**Relay 6** state	INTEGER { ON(1), OFF(0) }
x.3.8.0	Relay7	read-write	**Relay 7** state	INTEGER { ON(1), OFF(0) }
x.3.9.0	Relay8	read-write	**Relay 8** state	INTEGER { ON(1), OFF(0) }
x.3.10.0	Pulse1	read-write	**Relay 1** pulse state	INTEGER (0..255)
x.3.11.0	Pulse2	read-write	**Relay 2** pulse state	INTEGER (0..255)
x.3.12.0	Pulse3	read-write	**Relay 3** pulse state	INTEGER (0..255)
x.3.13.0	Pulse4	read-write	**Relay 4** pulse state	INTEGER (0..255)
x.3.14.0	Pulse5	read-write	**Relay 5** pulse state	INTEGER (0..255)
x.3.15.0	Pulse6	read-write	**Relay 6** pulse state	IINTEGER (0..255)
x.3.16.0	Pulse7	read-write	**Relay 7** pulse state	INTEGER (0..255)
x.3.17.0	Pulse8	read-write	**Relay 8** pulse state	INTEGER (0..255)
x.3.18.0	allOn	read-write	Set all relays On	INTEGER (0..255)
x.3.19.0	allOff	read-write	Set all relays Off	INTEGER (0..255)
x.3.20.0	allPulse	read-write	Pulse all relays	INTEGER (0..255)

13.4 Network

OID	Name	Access	Description	Syntax
x.4.1.0	deviceIPAddress	read-write	Device IP address	IpAddress
x.4.2.0	subnetMask	read-write	Subnet Mask	IpAddress
x.4.3.0	gateway	read-write	Gateway	IpAddress
x.4.4.0	deviceMACAddress	read-write	Device MAC Address	OCTET STRING (SIZE(6))
x.4.5.0	dhcpConfig	read-write	DHCP ON/OFF	INTEGER { ON(1), OFF(0) }
x.4.6.1.1.0	filterMACAddress1	read-only	MAC Filter 1 (Gateway)	OCTET STRING (SIZE(6))
x.4.6.1.2.0	filterMACEnable1	read-write	MAC Filter 1 ON/OFF	INTEGER { ENABLED(1), DISABLED(0) }
x.4.6.2.1.0	filterMACAddress2	read-write	MAC Filter 2	OCTET STRING (SIZE(6))
x.4.6.2.2.0	filterMACEnable2	read-write	MAC Filter 2 ON/OFF	INTEGER { ENABLED(1), DISABLED(0) }
x.4.6.3.1.0	filterMACAddress3	read-write	MAC Filter 3	OCTET STRING (SIZE(6))
x.4.6.3.2.0	filterMACEnable3	read-write	MAC Filter 3 ON/OFF	INTEGER { ENABLED(1), DISABLED(0) }
x.4.7.1.0	VLANStatus	read-write	VLAN status	INTEGER { ENABLED(1), DISABLED(0) }
x.4.7.2.0	VlanId	read-write	VLAN ID	INTEGER (0..4095)

13.5 I/O Setup

OID	Name	Access	Description	Syntax
x.5.1.0	relayPulseDuration	read-write	Global Pulse duration	INTEGER (1..253)
x.5.2.0	Relay1description	read-write	Relay 1 description	String (SIZE (0..11))
x.5.3.0	Relay2description	read-write	Relay 2 description	String (SIZE (0..11))
x.5.4.0	Relay3description	read-write	Relay 3 description	String (SIZE (0..11))
x.5.5.0	Relay4description	read-write	Relay 4 description	String (SIZE (0..11))
x.5.6.0	Relay5description	read-write	Relay 5 description	String (SIZE (0..11))
x.5.7.0	Relay6description	read-write	Relay 6 description	String (SIZE (0..11))
x.5.8.0	Relay7description	read-write	Relay 7 description	String (SIZE (0..11))
x.5.9.0	Relay8description	read-write	Relay 8 description	String (SIZE (0..11))
x.5.10.0	digitalInputAction	read-write	Digital Input Action condition	INTEGER { MAIL_IF_CLOSED_TO_OPEN(2), MAIL_IF_OPEN_TO_CLOSED(1), NO_ACTION(0) }
x.5.11.0	digitalInputTo	read-write	Digital Input event receiver's e-mail address	String (SIZE (0..38))
x.5.12.0	digitalInputSubject	read-write	Digital Input event e-mail's subject	String (SIZE (0..11))
x.5.13.0	digitalInputBody	read-write	Digital Input event e-mail's body	String (SIZE (0..22))
x.6.0	configurationSaved	read-write	Configuration save status SAVED/UNSAVED	INTEGER { SAVED(1), UNSAVED(0) }
x.7.0	restartDevice	read-write	Restart Device	INTEGER { RESTART(1), CANCEL(0) }

14. XML and HTTP API commands

XML is often preferred choice when it comes to M2M communication and system integration. The monitored values are transmitted in **status.xml** file that can be easily processed by software applications.

Below is the structure of the XML file, which is located at: http://device.ip.address/status.xml:

```
<Monitor>
  <Device>TCW181B-CM</Device>                 Device Type
  <FW>tcw181-cmv1.01</FW>                     Firmware version
  <DigitalInput>OPEN</DigitalInput>           Digital input state
  <Relay1>ON</Relay1>                         Relay 1 state
  <Relay2>OFF</Relay2>                        Relay 2 state
  <Relay3>ON</Relay3>                         Relay 3 state
  <Relay4>OFF</Relay4>                        Relay 4 state
  <Relay5>ON</Relay5>                         Relay 5 state
  <Relay6>OFF</Relay6>                        Relay 6 state
  <Relay7>ON</Relay7>                         Relay 7 state
  <Relay8>OFF</Relay8>                        Relay 8 state
</Monitor>
```

The relay outputs can be controlled by sending HTTP commands:

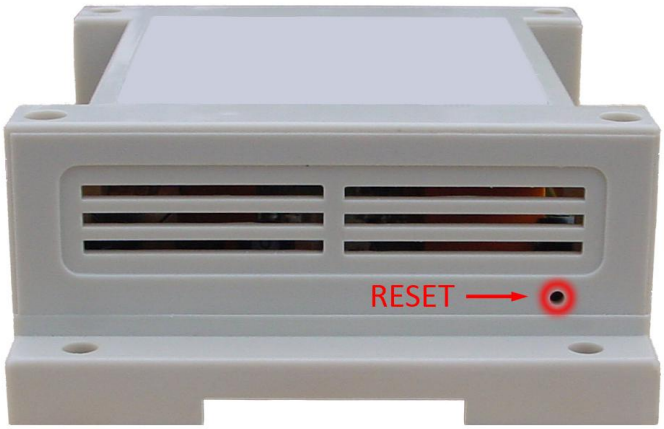
Command	Description
http://device.ip.address/?r**X**=1	Turn Relay **X** ON
http://device.ip.address/?r**X**=0	Turn Relay **X** OFF
http://device.ip.address/?tg**X**=1	Toggle Relay **X** state
http://device.ip.address/?pl**X**=1	Pulse Relay **X**
http://your.ip.address/?r**X**=1&r**Y**=1	Turn both relays **X** and **Y** ON
http://your.ip.address/?r**X**=0&r**Y**=0	Turn both relays **X** and **Y** OFF

Note: **X** and **Y** are the number of the corresponding relay output (1 to 8)

15. Factory default settings

TCW181B-CM can be restored to its original factory default settings, following the steps below:

- Turn off the power supply;
- Press and hold the RESET button then turn on the power supply;
- The LED's STS and LOG will flash 14 times, after that they will turn on. In this moment the RESET button should be released.



The factory default settings are:

User Name (Admin)	admin
Password (Admin)	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

16. Firmware update

TCW181B-CM supports remote firmware update. To update the device follow the steps below:

- Download the **TCW1XX_Update_Tool** program from www.teracom.cc;
- Download the latest firmware version file (*.cod) from www.teracom.cc;
- Start the program and update the firmware.

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

Rev. 1 – September 2012

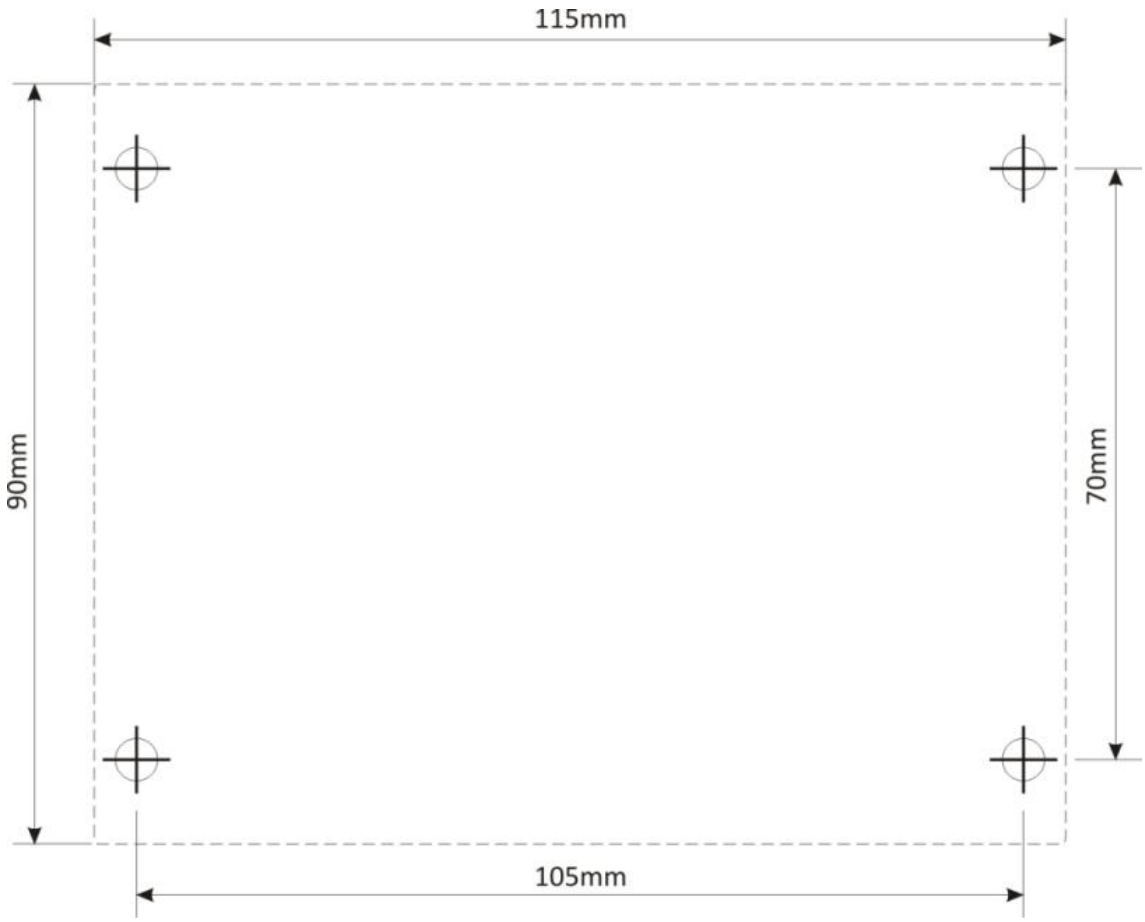

115mm
90mm
70mm
105mm

Fig.1

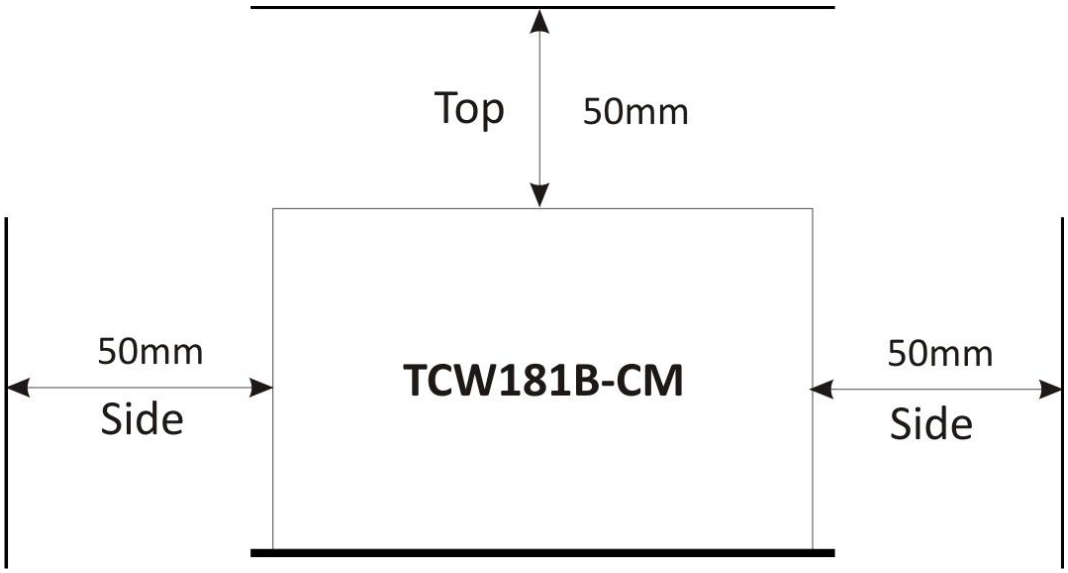

Top
50mm
50mm
Side
TCW181B-CM
50mm
Side

Fig.2