



control solutions  
**TERACOM**



**TC Monitor - software for monitoring and control**

Revision 2.2 / July 2019

# USER MANUAL

## 1. Introduction

TC Monitor is software for monitoring and control of Ethernet (TCW) and GSM/GPRS (TCG) controllers. The supported devices are TCW122B-CM, TCW181B-CM, TCW241, TCW220, TCW210-TH, TCG120 and TCG140.

TC Monitor can collect and display data from controllers installed in different locations (sites). The collected data is stored in Firebird SQL database and can be displayed or exported in CSV format for further analysis.

TC Monitor has a simple web interface, which enables easy and fast configuration. Monitored parameters can be sensors, digital and analog inputs and relay outputs.

The free version of TC Monitor provides 10 items, this means up to 10 different parameters can be monitored and logged.

### 1.1. Minimum system requirements

TC Monitor requires:

- Operating system: Windows 7 or later;
- Free disk space: 1 GB;
- RAM: 2 GB (4 GB recommended);
- Internet connection.

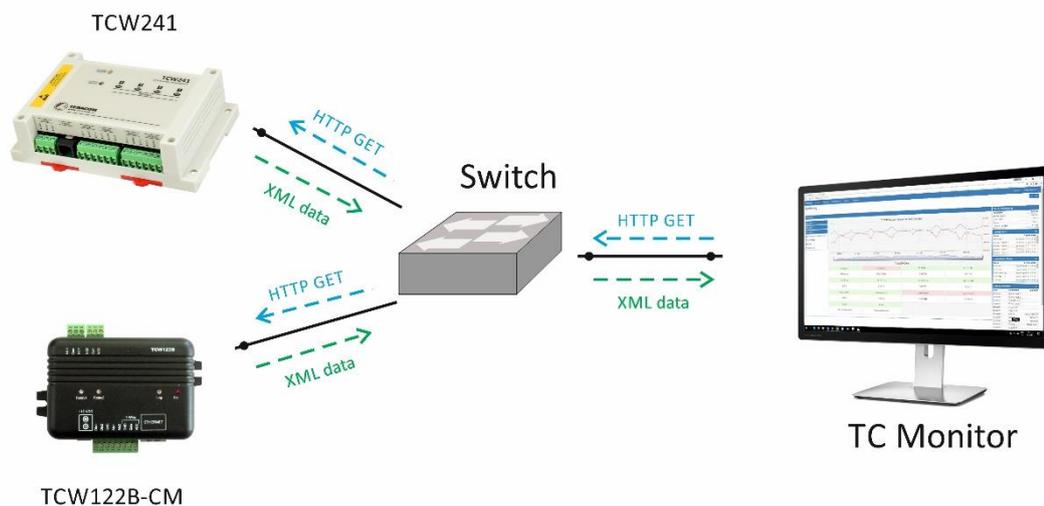
### 1.2. Basic Concept

HTTP protocol is used for data transmission between the remote devices and TC Monitor software. The monitored devices can operate in server or client mode.

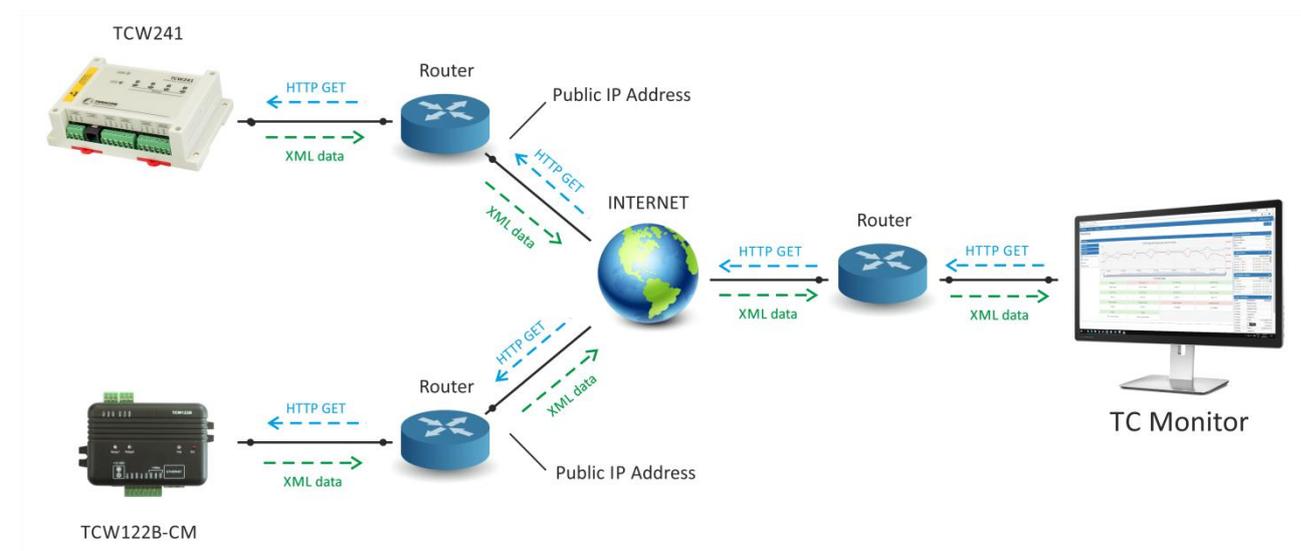
### 1.3. Server mode

In this mode, TCW device works as a server and TC Monitor as a client. TC Monitor initiates communication by sending HTTP GET request to the controller periodically. The controller answers by sending XML data.

The picture below shows operation in the same LAN:



The picture below shows operation in different LANs. In this case, remote locations must have a public IP addresses and appropriate port forwarding. A simple test for the right settings is the access to the controllers' user interface.



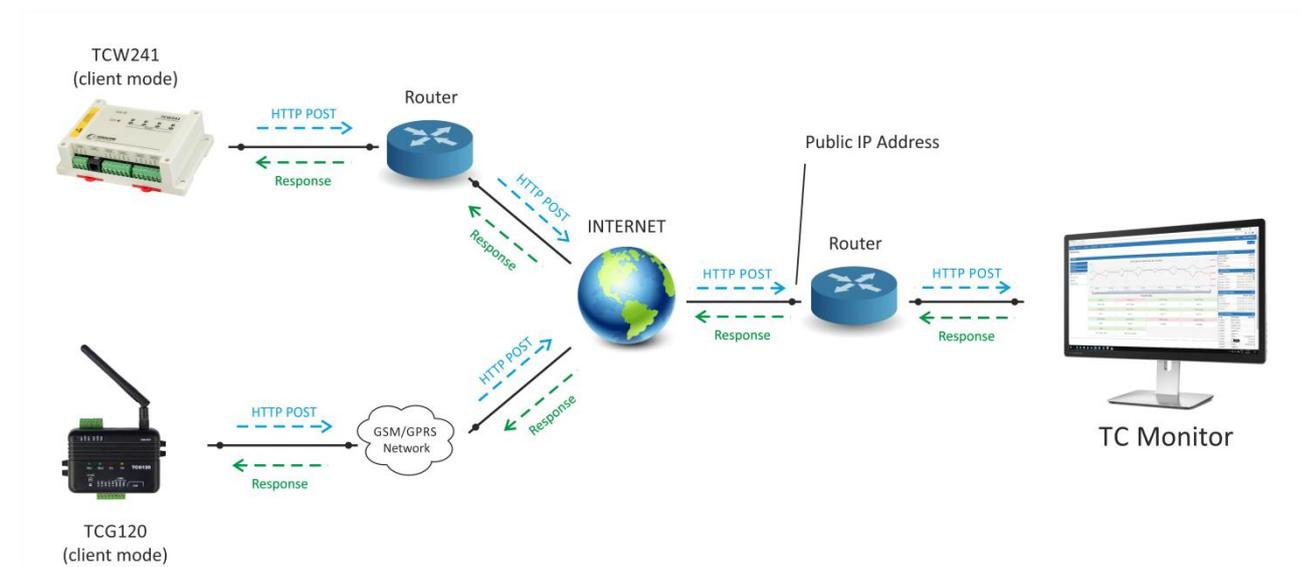
TCW122B-CM, TCW181B-CM, TCW220, TCW241 and TCW210-TH controllers support server mode operation.

#### 1.4. Client mode

In this mode, the monitored device works as a client and TC Monitor as a server.

The controller initiates communication by sending periodically HTTP POST requests to TC Monitor. Each HTTP POST request contains XML data that is processed by the software. TC Monitor answers with HTTP response message.

The response messages can be used not only for confirmation but also to send a command to the controller. The IP address (domain) of TC Monitor site should be set in the Teracom controller. If the controller is installed in different LAN, the site of TC Monitor should have a public IP address. Such application is illustrated below:



TCG120, TCG140, TCW220, TCW241 and TCW210-TH controllers support client mode operation. A typical communication session between Teracom controller in client mode and TC Monitor is shown in Appendix A.

## 2. Installation and setup

### 2.1. TC Monitor installation

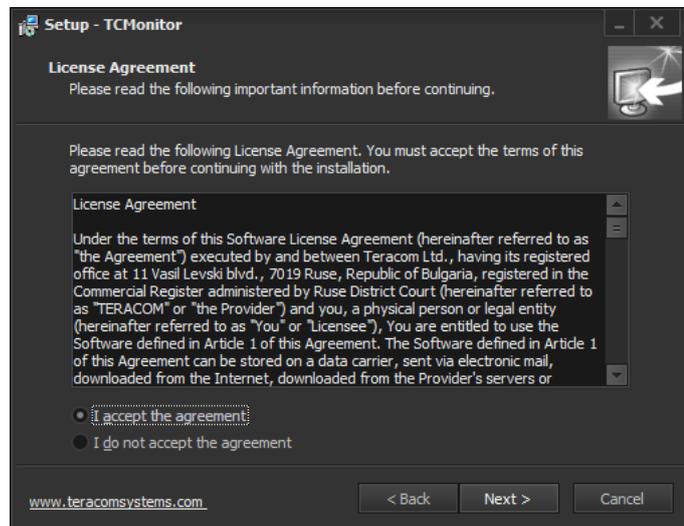
TC Monitor installation package can be downloaded from

<https://www.teracomsystems.com/software/remote-monitoring-software-tc-monitor/>.

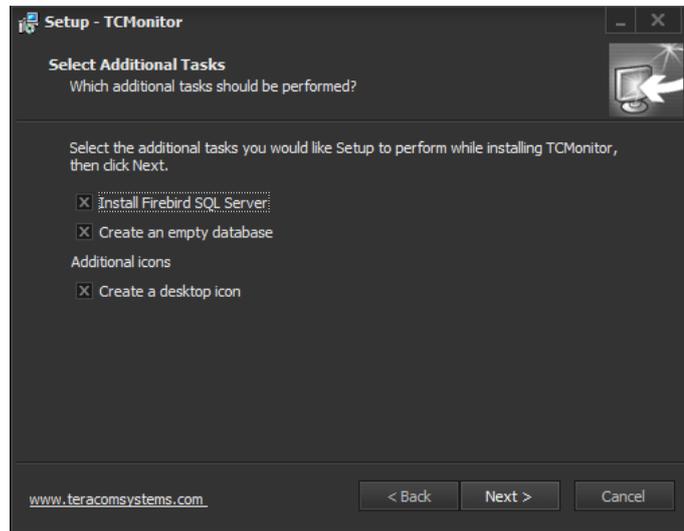
The installation process is described below. After starting the installation, the following window will appear:



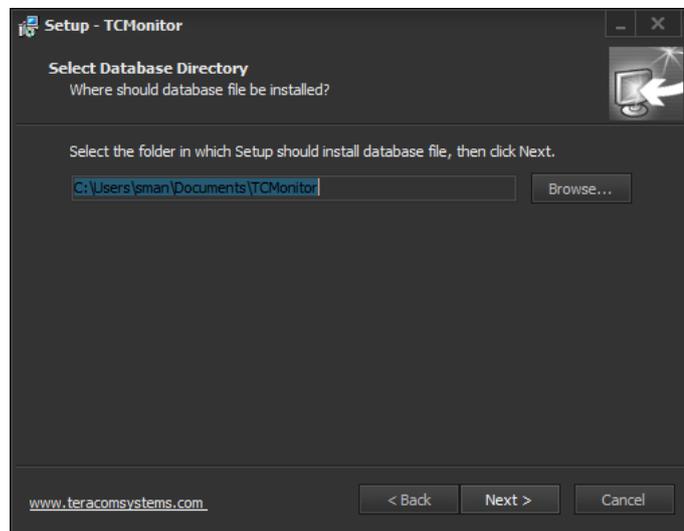
After clicking on “Next” button, the following window will appear:



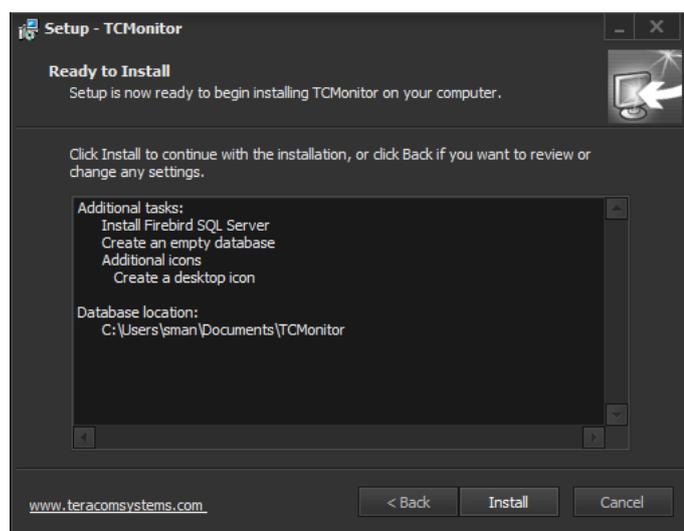
To continue the installation, you need to accept the License agreement and to click on “Next” button.



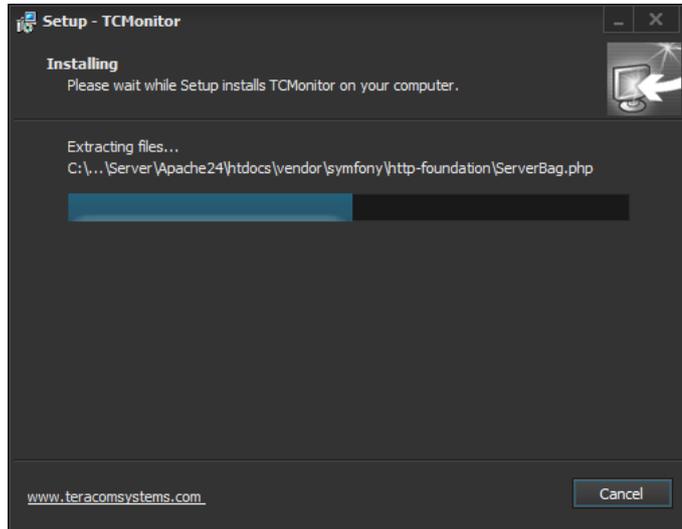
The installation package will install Firebird SQL Server on your computer. An empty database will be created. If you intend to use TC Monitor with database from a previous installation, you can uncheck the “Create an empty database” checkbox.



Select the folder in which Setup will install the database, then click “Next”.



Click “Install” to start the installation process.

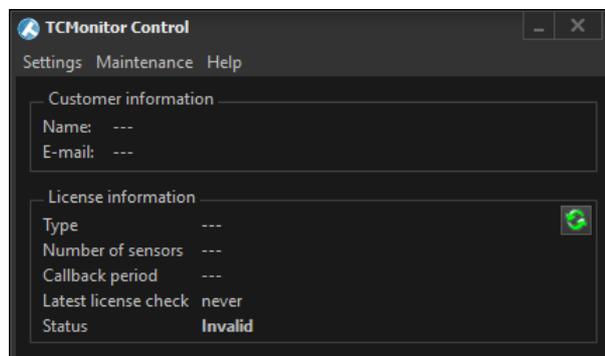


The installation takes around 2-3 minutes.

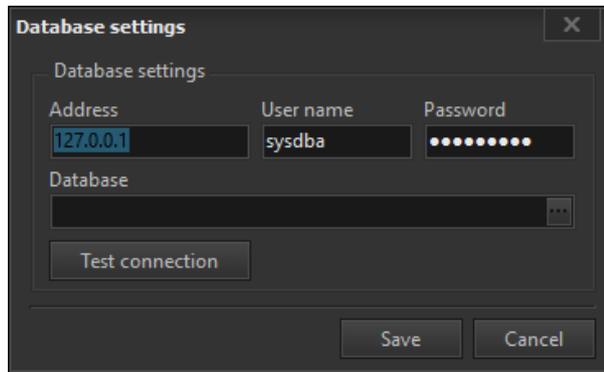


## 1.1. Program setup

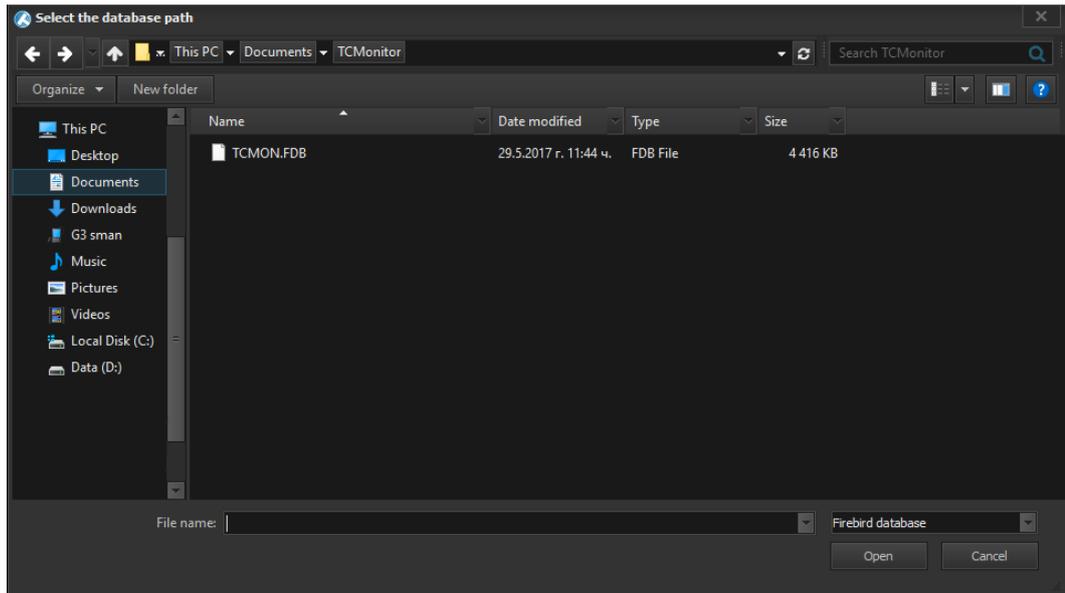
After the installation is complete, you can run the TC Monitor Control application. The following window will appear:



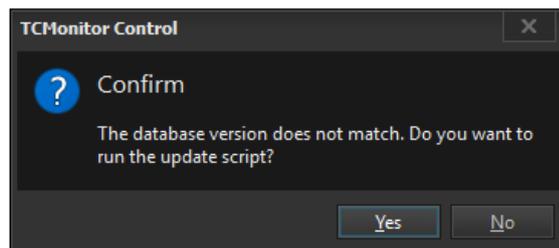
To start the program setup, go to Settings->Service Settings. The following window appears:



Leave the Address, User name and Password fields by default and select the database file:



The default database filename is TCMON.FDB. Select the file and click Open. You will receive confirmation that the connection with the database is successful. If the selected database is from a previous installation of older TC Monitor version, you may need to convert it. The following message will appear:



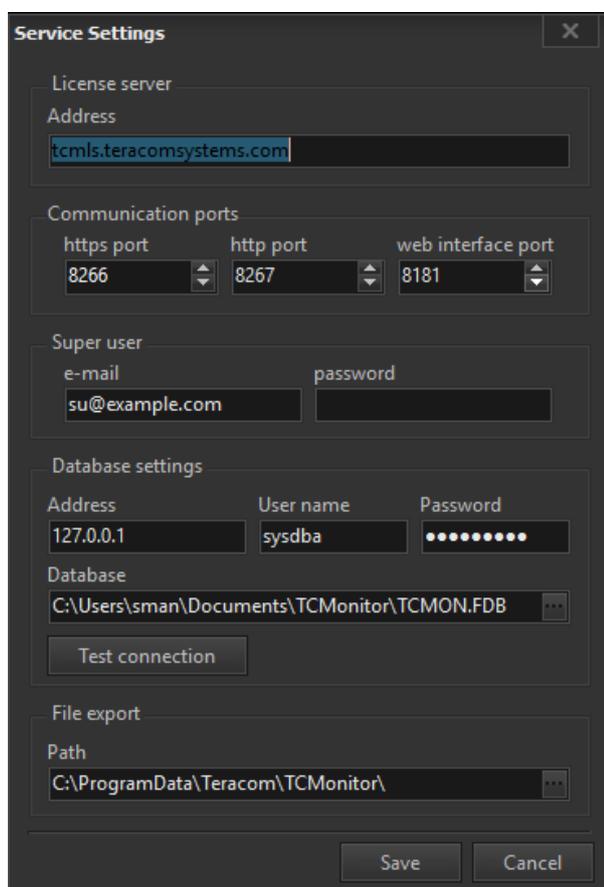
After your confirmation, the database conversion will start. This will take a few minutes, depending on the size of the database. After the process is complete, you can continue with the setup.

The Service settings window allows you to make the following settings:

- **License server address** – this setting should be left by default;
- **Communication ports** – HTTPS and HTTP ports are used when the controllers are in client mode. The WEB interface port is the port for the user interface. All these ports can be left with their default values.
- **Super user** – this is the default user in the default database (e-mail: [su@example.com](mailto:su@example.com), Password: qwerty ).

**Important!** We strongly recommend changing the password in order to prevent unauthorized access to the user interface.

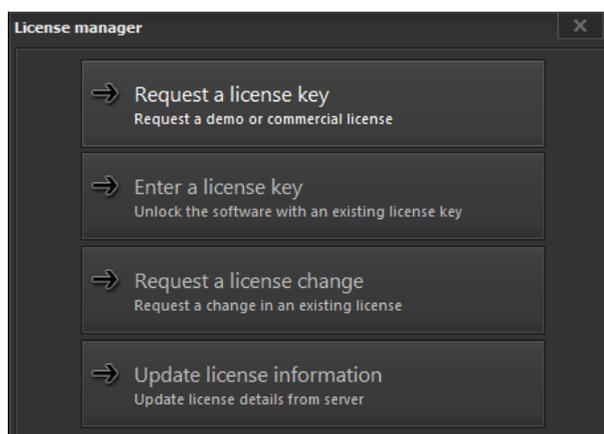
- **Database settings** – Address, User name and Password parameters may remain by default. Database file was already selected in the previous step.
- **File export** - The location where the program files will be exported.



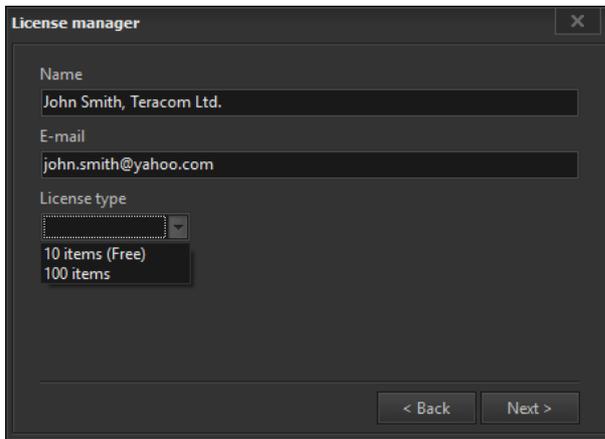
## 2.2. License management

There are two license types for TC Monitor software: free and commercial. With both license types, the software has the same functionality. The only difference is the number of the supported items. Items are the parameters that can be controlled and logged in the database – relay outputs, analog inputs, digital inputs and sensors. The free license supports up to 10 items, no matter if these items are from one or more controllers.

The licensing procedure is similar for both license types. Open the TC Monitor Control application and go to “Settings -> License management”.



Click on “Request a license key” button. The following window will appear:

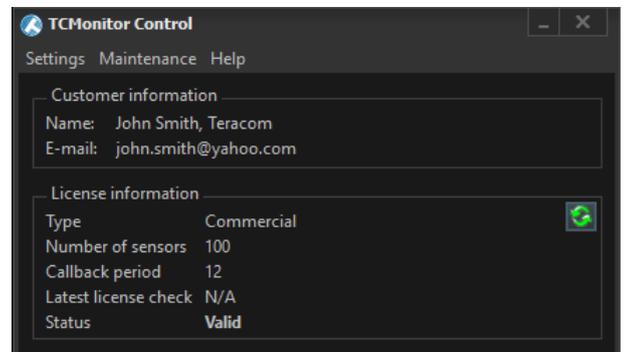


You must fill in the following fields:

- **Name** – please use the following format for this field: [Name], [Company]. If the license is for private use, just type “private” instead of company name;
- **E-mail:** - a valid email must be specified;
- **License type** – select the preferred license type. Click on “Next” button. A confirmation message will appear.

If a free license was selected, the license key will be sent to the provided email within few hours. The license key for the commercial licenses will be sent after the payment is completed.

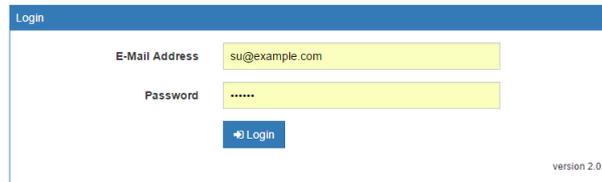
To complete the licensing process of your TC Monitor, go to License manager and click “Enter license key button”. Enter the license key and click “Next” button. You will receive a confirmation message.



The license information will appear in the TC Monitor Control window. The license status will change from “Invalid” to “Valid”. You are ready to work with TC Monitor.

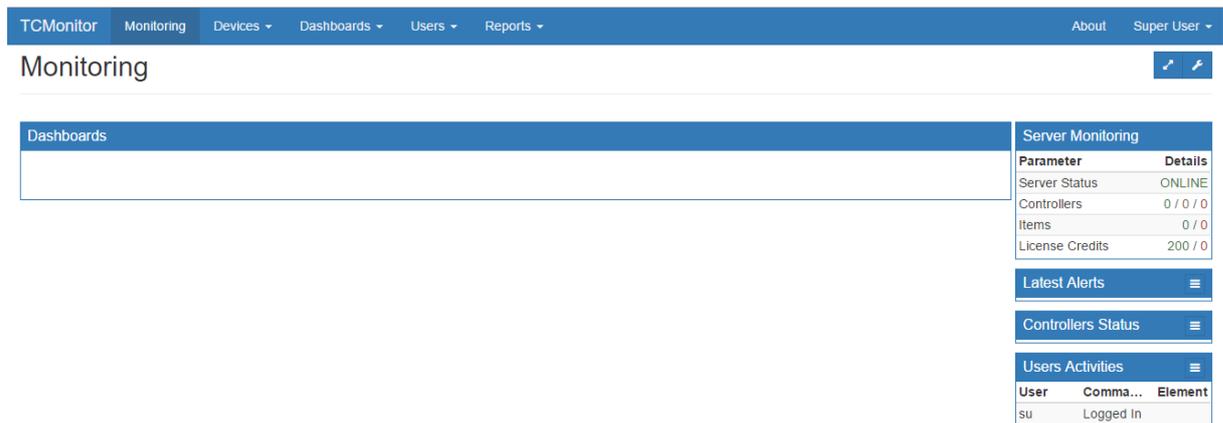
### 3. User interface

Once the program is installed, you can start working with TC Monitor. The service will be started automatically every time the computer is turned on. To access the user interface, open your web browser and go to <http://localhost:8181/>. Instead of “localhost”, you can type your IP address, for example: <http://192.168.32.44:8181>. The login page will appear:



At this point, there is only one user in the database – the Super user. The default login data for this user are e-mail: su@example.com, Password: qwerty. As mentioned above, it is strongly recommended to change the password in order to prevent unauthorized access.

The screenshot below shows the user interface of TC Monitor. There are a horizontal navigation menu, main data window and right column with modules (Server Monitoring, Latest Alerts, Controller Status and Users Activities). The modules from the right column can be hidden from the “Home Page Layout” icon in the top right corner.



Parameter	Details
Server Status	ONLINE
Controllers	0 / 0 / 0
Items	0 / 0
License Credits	200 / 0

User	Comma...	Element
su		Logged In

#### 3.1. Users

##### 3.1.1. Users->Administration

The first step is to create a new user account. Click on “Register” button to open the user registration form. The following information should be filled in:

- User Name – it is used for identification in TC Monitor;
- Email – it is used to log into the program;
- Password - it is used to log into the program;
- User Group – there are 2 user groups. The users from “Admins” group have full access to all data. The users from group “Users” have limited access to the data;
- Name – optional;
- Phone – optional.

Register a new user x

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**User Name:\***

**Email:\***

**Password:\***

**Password Confirm:\***

**User Group:\***

**Name:**

**Phone:**

Create more records

**Important!** When a new user logs on for the first time in the program, he must confirm or change his password.

### 3.1.2. Users->Users Activities

This page shows a list of all actions taken by the users. Such actions are logging in, logging out, adding a new device, change relay state, creating/renaming/deleting dashboard, creating/renaming/deleting dashboard group, renaming items etc.

## 3.2. Devices

### 3.2.1. Controllers

TCMonitor Monitoring Devices Dashboards Users Reports About Svilen Manev

#### Controllers

Search:  Filters

Show 100 entries

No	Name	Controller Model	Hostname	Type	Location	Firmware Version	Network Status	Last Connection
1	TCW220	TCW220	TCW220	Server	Garage	TCW220-v1.208	ONLINE	05.06.2017 16:57:31
2	TCW210-TH	TCW210-TH	TCW210TH	Server	Office	TCW210TH-v1.208	ONLINE	05.06.2017 16:57:29
3	TCW241	TCW241	TCW241	Server	Server Room	TCW241-v1.209	ONLINE	05.06.2017 16:57:33
4	TCW122B-CM	TCW122B-CM	TCW122B-CM	Server	Production Area1	3.02rc1	ONLINE	05.06.2017 16:57:30

Showing 1 to 4 of 4 entries

This page shows all the controllers that are added to the system. The following information is displayed:

- Name – it is used for identification in TC Monitor and can be changed later by the Admin;
- Controller model;
- Hostname;
- Type – working mode of the controllers – Server or Client;
- Location – This information is copied from the controller. It can be changed later by the user;
- Firmware version;
- Network status – shows the status of the controller – online or offline;
- Last connection – shows the time of the last successful communication with the controller.

### 3.2.1.1. Controllers in server mode

To add a new controller, click on “Add New Controllers” button on the top left corner of the screen. If the new device will work in **server mode**, the following information should be filled in:

- Name – it is used for identification in TC Monitor and can be changed later by the Admin;
- Device Type – Server;
- Update data – If "Yes" is selected, all item descriptions from the controller will be saved in the database as item names during the next connection. These descriptions (item names) can be changed later by the Admin users;
- Connection time (s) – this is the period between 2 consecutive communications between TC Monitor and the controller. The shortest possible interval for server mode is 60 seconds;
- Authentication Info – this information is required only if the HTTP/XML API authentication of the controller is enabled;
- Device settings – IP address and HTTP Port (80 by default).

Register a new controller ×

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Name:*	<input type="text" value="TCW122B-CM Office"/>
Device Type:*	<input type="text" value="Server"/>
Update Data:	<input type="text" value="No"/>
Connection Time (s):	<input type="text" value="60"/>
Authentication Info:	<input type="text" value="admin"/>
	<input type="text" value="....."/>
Device settings:*	<input type="text" value="192.168.32.169"/>
	<input type="text" value="80"/>

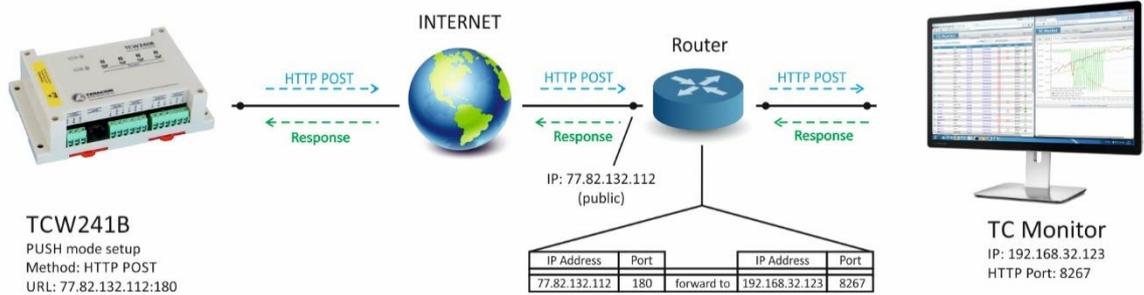
Create more records

Before saving the device parameters, it is recommended to test the connection between TC Monitor and the controller. If all connection information is set correctly, a confirmation message for successful communication will appear.

### 3.2.1.2. Controllers in client mode

One of the main features of TC Monitor is to communicate with controllers working in client mode. In this mode, the controllers send periodically HTTP Post to TC Monitor server. The software acknowledges the reception of the data and sends back a command (close the HTTP session, change relay state, settings change etc.) Typical HTTP session between TC Monitor and Teracom controller is shown in **Appendix A**.

The picture below shows an example configuration of TCW241 controller, which is installed in different LAN and works in client mode:



On the above example, TCW241 controller sends periodically HTTP Post to IP address http://77.82.132.112 (public IP address), port 180. Port 180 is forwarded to http://192.168.32.123 (IP address of TC Monitor server), port 8267 (default port for communication of the software).

Important! You should verify if the firewall of your TC Monitor server is configured properly to allow communication on the selected port.

To add a controller in client mode, “Device Type” should be set “Client”. If HTTP Post requests are received correctly by TC Monitor, the list with the controllers in client mode will appear in field “Find”. The list contains controller model + Client key. After selecting the client controller, the fields “Controller ID” and “Client Key” will be filled automatically.

Register a new controller ×

**Name:\***

**Device Type:\***

**Find:**

**Update Data:**

**Connection Time (s):**

**Device settings:\***

Create more records

### 3.2.2. Items

Items are the parameters that can be logged in the database – relay outputs, analog inputs, digital inputs and measured values from the sensors. Items page shows a list of all the items of the added controllers. The list can be filtered by status (active/disabled), type (sensor/analog input/digital input/relay) and controller. It is also possible to search for an item by its name. To start logging an item in the database, it must first be activated – select the item and click on Activate button. To edit the item name, select an item and click “Edit” button.

No	Name	Value	Dimension	Type	Controller Name	Status	Multiplier	Offset	Pulse Width	Min	Max	Hysteresis	Last Seen	Commands	Location
1	Temperature1			Sensor	TCW122B-CM	Active							never		Office
2	Humidity1			Sensor	TCW122B-CM	Active							never		Office
3	Temperature2			Sensor	TCW122B-CM	Disabled							never		Office
4	Humidity2			Sensor	TCW122B-CM	Disabled							never		Office
5	Analog input 1			Analog Input	TCW122B-CM	Disabled							never		Office
6	Analog input 2			Analog Input	TCW122B-CM	Disabled							never		Office
7	Digital input 1		discrete	Digital Input	TCW122B-CM	Active							never		Office
8	Digital input 2		discrete	Digital Input	TCW122B-CM	Active							never		Office
9	Relay 1		discrete	Relay	TCW122B-CM	Active							never	ON OFF	Office
10	Relay 2		discrete	Relay	TCW122B-CM	Active							never	ON OFF	Office

### 3.2.3. Commands

This page shows a list of commands sent from the software to the controllers. The following information is displayed:

- Controller name;
- Status – Success/Pending/Failed;
- Type – possible commands are: Switch Relay ON/OFF and Change Push Period (only for controllers in client mode);
- Attempts – if the controller is not reachable, TC Monitor attempts to send the command up to 5 times. If the command cannot be executed during these 5 attempts, then it is canceled;
- Registered Date - Time and date of command registration;
- Completed Date - Time and date of execution of the command. For controllers in server mode, the command is typically executed in a few seconds. For controllers in client mode, the command is sent when the next HTTP session from the controller to TC Monitor is established.

No	Controller Name	Status	Type	Attempts	Registered Date	Completed Date
1	TCW220	PENDING	Relay Switch OFF	0	07.06.2017 19:46:58	-
2	TCW122B-CM	SUCCESS	Relay Switch ON	0	07.06.2017 19:45:55	07.06.2017 19:45:56
3	TCW220	SUCCESS	Push Period	0	07.06.2017 13:59:45	07.06.2017 14:00:12

### 3.2.4. Action Log

This page shows a list with the following logged actions:

- Change the command status;
- Change the controller status;
- Change the item in alarm state.

### 3.3. Dashboards

#### 3.3.1. Graphic Dashboards

The graphic dashboards are used to display the logged data in graphical form. Up to 4 items with maximum 2 different dimensions can be displayed in single graphic. To create a graphic dashboard, click on “Add New Dashboard” button. The following window will appear:

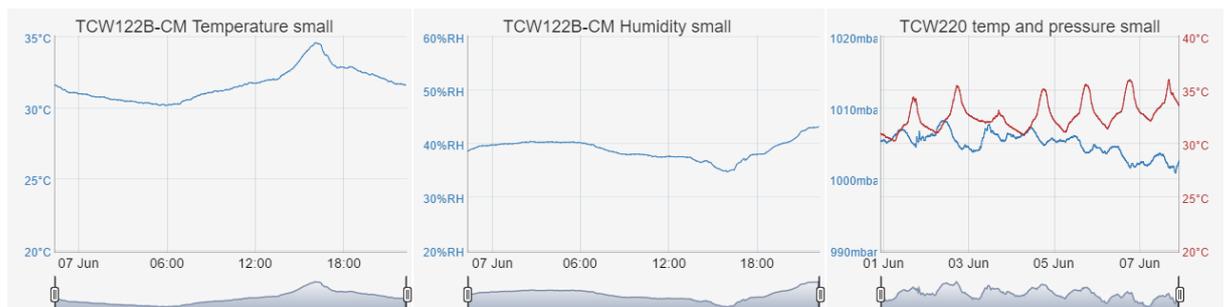
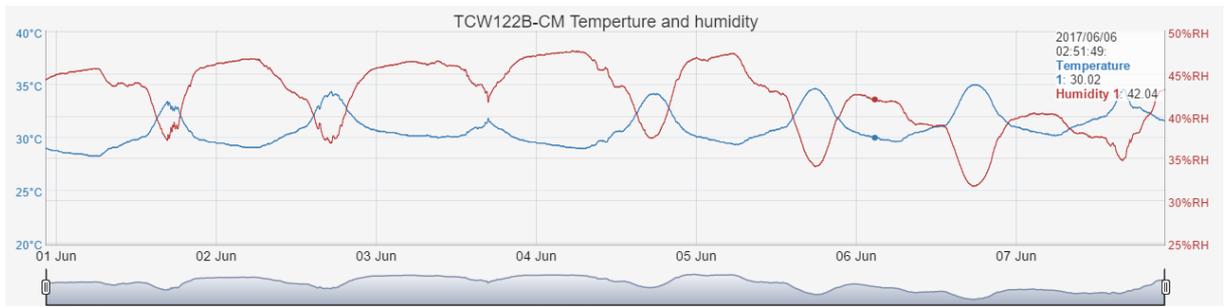
The screenshot shows a window titled "Edit dashboard" with a close button (X) in the top right corner. The window contains the following configuration fields:

- Name:** TCW122B-CM Temperature medium
- Index:** 8
- Dashboard Type:** Graphic
- Real Time:** No
- Graphic Size:** Medium
- Display Period:** Week
- Approximation Type:** Manuel
- Approximation:** 5 Minutes
- Manual Axis Range:** Yes
- Axis Range (y):** 20, 40
- Enable Additional Axis Range:** No
- Items:** + -  
1. Temperature 1 (°C)

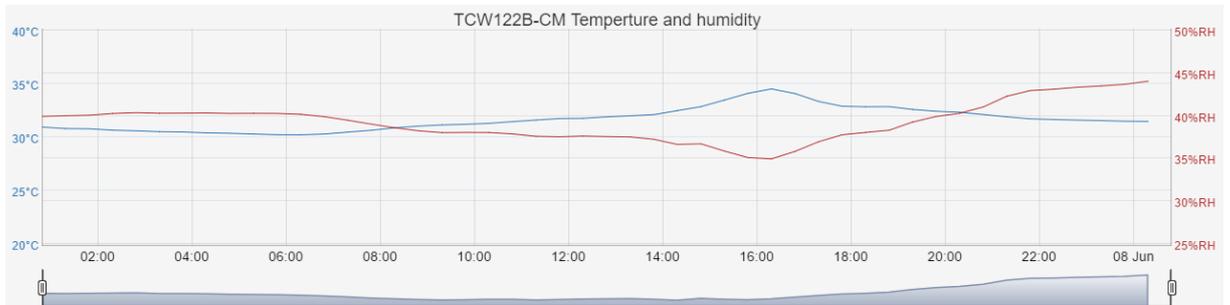
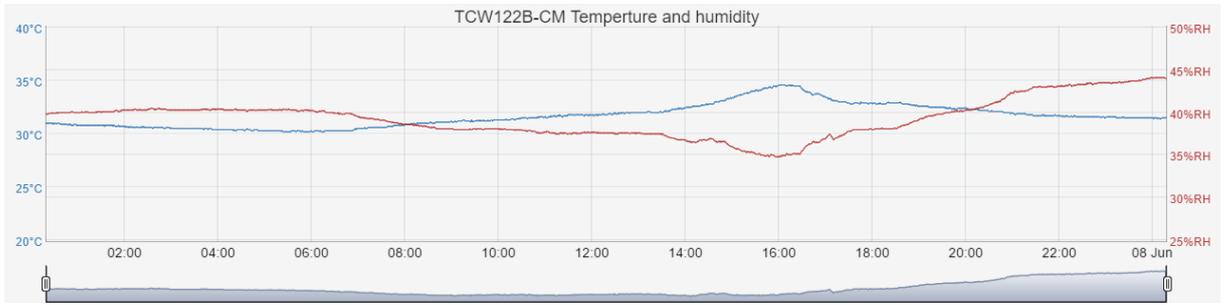
At the bottom right of the window, there are two buttons: "Close" and "Save".

The following information should be filled in:

- Name;
- Index – this index is used only to organize the dashboards list;
- Dashboard – Graphic;
- Real time – if it is set to “Yes”, the dashboard will display the latest values (up to 100 values) of selected item. The graphic will be refreshed automatically. If real time is disabled, the graphic can display longer time period – from 1 day up to 1 year;
- Graphic size – this parameter defines the width of the graphic which appears on monitoring page. Below are 3 examples with large, medium and small size dashboards:



- Display period – it can be selected from 1 day to 1 year. It is recommended to set the display period as short as possible to ensure that the initial data on the Monitoring page is loaded quickly. It is possible later to select a different display period;
- Items – use the “+” button to add items to the graph. Up to 4 items can be added.
- Manual axis Range – sometimes it is useful to set fixed axis range for the selected item;
- Enable Additional Axis Range – additional axis range can be set if there is an item with a different dimension in the added items. The first set axis range refers to the first dimension in the items list and the second range of the second dimension.
- Approximation type – if the approximation is disabled, every single logged value for the selected item will be displayed. This may lead to increase the data loading time, especially if a longer displayed period is selected. If the data is logged every minute and 5 min approximation is selected, only 1 approximated value per every 5 minutes will be displayed. This will affect slightly the graph, but will significantly reduce the loading time. Below are 2 graphs, the first one is without approximation, the second is with 5 min. approximation:



### 3.3.2. Data Dashboards

The data dashboards are used to display the latest value/state of the monitored items. Each dashboard may contain items from different controllers. These dashboards are updated periodically with the most recently saved values in the database. To create a data dashboard, click on “Add New Dashboard” button. The following window will appear:

Edit dashboard
✕

---

**Name:\***

**Index:**

**Dashboard Type:\***

**Real Time:\***

**Refresh period (s):\***

**Font Size:\***

**Approximation:\***

**Items:\***

---

The following information should be filled in:

- Name;
- Index – this index is used only to organize the dashboards list;
- Dashboard – Data;
- Refresh period – this is the period in which the data will be updated;
- Font size – change the font size of the item descriptions and the measured values;

- Items – use the “+” button to add items to the graph. Use drag and drop to reorder the items list.

The example below shows a data dashboard with 8 items. The “Air pressure” item is marked in red because the controller sends information that this parameter is in alarm state.

Server Room			
Temperature 1	Humidity 1	Air Pressure	Battery 1
31.3 °C	44.6 %RH	1107.6 mbar	4.9 V
Door	Window	Heating	Cooling
CLOSED	CLOSED	OFF	ON

TCW241, TCW220, TCW210-TH and TCG120 can report the alarm state of the measured items.

Another useful feature of data dashboards is to control the relay outputs of the controllers. This can be done by clicking on the item (Relay output). An indication will appear that the command is in status “pending”. Once the command is executed, the relay state will change. If the controller is in server mode, the command is typically executed within a seconds. For controllers in client mode, the command is sent when the next HTTP session from the controller to TC Monitor is established.

Server Room			
Temperature 1	Humidity 1	Air Pressure	Battery 1
31.9 °C	40.5 %RH	1111.1 mbar	4.9 V
Door	Window	Heating	Cooling
CLOSED	CLOSED	ON	ON

**Important!** Please ensure that the relays are set to be controlled manually or by HTTP, otherwise sending commands will not be possible.

### 3.3.3. Live Data Dashboards

The data displayed in Live Data dashboards is taken directly from controllers that work in server mode. TC Monitor requests new data once per second and updates the Live Data dashboards. The received values are not logged in the database.

### 3.3.4. Dashboard Groups

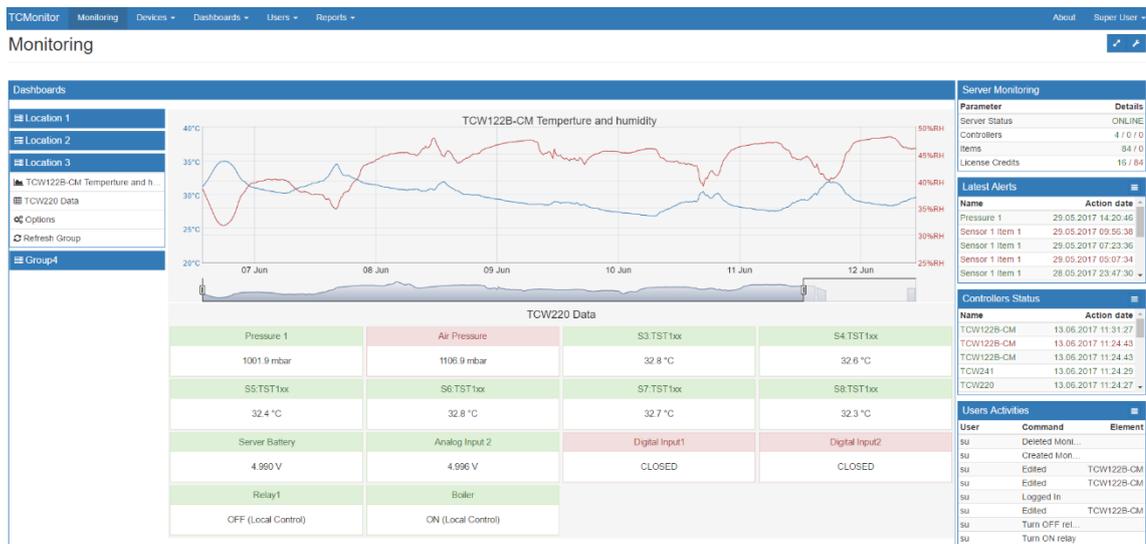
The dashboard groups are used to determine the display order of the dashboards on the monitoring page. Usually, the groups are based on certain attributes - location, functionality or other. A group may contain dashboards with items from different controllers. To add a new group, go to Dashboards -> Groups and click on “Add New Group” button. The following screen will appear:

The following information should be filled in:

- Name;
- Index – this index is used to determine the display order. The group with index 1 will be displayed on the monitoring page after user login;
- Dashboards – click on “+” button to add dashboards to the group. The added Dashboards can be reordered using drag and drop. Note that data or large graphic dashboards will occupy the whole row width on the monitoring page. Medium and small graphic dashboards will occupy respectively 1/2 and 1/3 of the page width. Thus, if you add 2 medium dashboards one after the other, they will occupy the whole row.

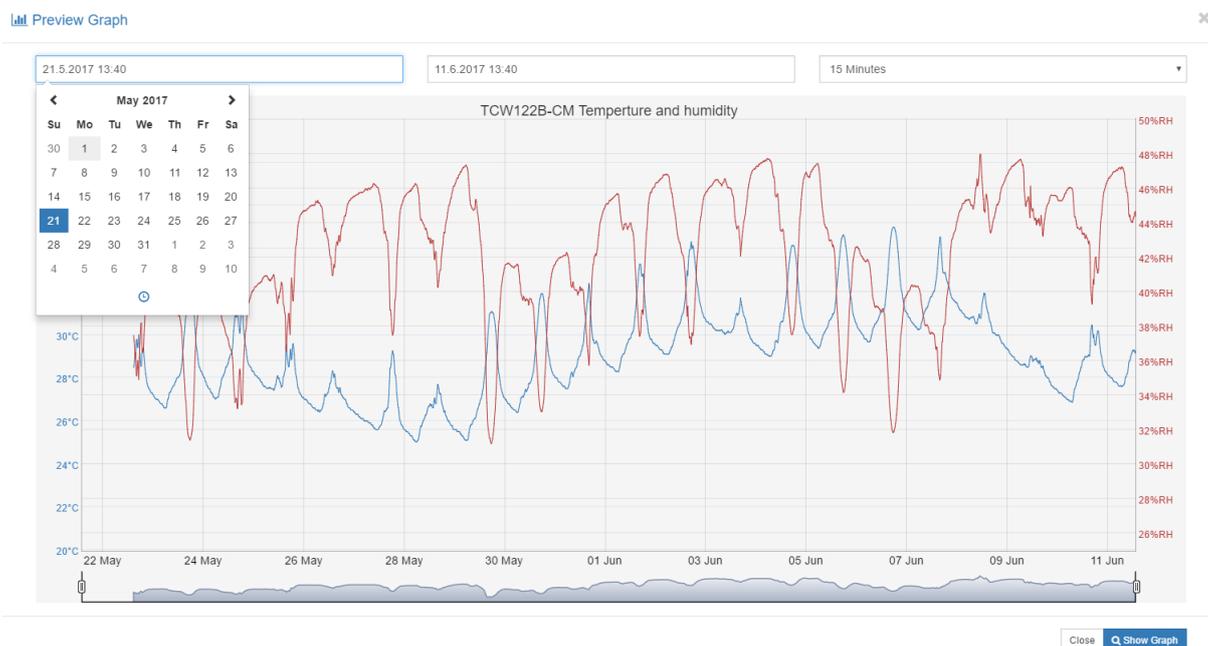
### 3.4. Monitoring page

If the controllers, dashboards and groups are made correctly, the monitoring page will look like the example below:



The dashboard groups are listed in the left vertical menu. Clicking one of the groups will list the content of this group and the corresponding dashboards will be loaded.

If you click on a graphic dashboard from the left vertical menu, the “Preview” option will appear. By clicking on “Preview”, the selected graphic dashboard will be displayed in a separate larger window with a possibility to select a custom display period.



On the right side of the monitoring page there are the following modules:

- Server Monitoring – shows the status of the server, the status of the controllers and the number of the used items;
- Latest alerts – shows the latest alarms of the logged items;
- Controllers Status – shows the network status of the controllers;
- Users Activities – shows the latest users activities.

### 3.5. User access rights

TC Monitor allows you to restrict the rights of individual users to certain features. Only users from group “Admin” can add controllers, rename items, create dashboards, create dashboard groups, add new users etc.

When you add a user to group “Users”, it is possible to give or deny the following permissions:

- View server status;
- View device access log;
- View commands log;
- View user access log;
- View alert tables;
- View graphic dashboards;
- View items;
- View controllers;
- Execute commands;
- View devices (menu);
- View certain dashboard groups.

## 3.6. Reports

### 3.6.1. Latest Data

This page shows a list of the latest records in the database. The records can be filtered by controller, item and time period.

### 3.6.2. Export Files

The logged data can be exported in .csv format. To do this, go to Reports->Export Files and click on "Export Items Data" button. Select a name, item and period and click "Save". The export file will be created. Highlight the export file and click on "Download" button to save the exported file on your local computer.

## 4. Database Maintenance

The database maintenance is important for the proper operation of TC Monitor. TC Monitor control tool allows you to create backups, to restore the database from the backup file and to configure an automatic backup.

### 4.1. Database backup

To create database backup, follow the steps below:

1. Go to Maintenance->Database->Backup.
2. Select filename and location.
3. Click Save button.

Backup file with .fbk extension will be created.

### 4.2. Database restore

To restore the database from the backup file, follow the steps below:

1. Go to Maintenance->Database->Restore.
2. Select backup file.
3. Select database file name and path.
4. Click OK button

The data will be restored to the database file and confirmation message will appear. If a new database was created, go to Settings->Service Settings to select the new database.

### 4.3. Create auto backup

To enable the automatic backup, go to Maintenance->Database->Configure auto backup. Select backup directory, day and time for the auto backup start.

### 4.4. Export items data

This functionality is used when you want to export only data for a specific period. Go to Maintenance->Items Data->Export and select the export period. Click "Export" button and write the file name. A file with .sql extension will be created.

**Important!** The exported file can be imported later only in the same database, which was used to create the file. If some items are deleted in the meantime, the import will not be possible.

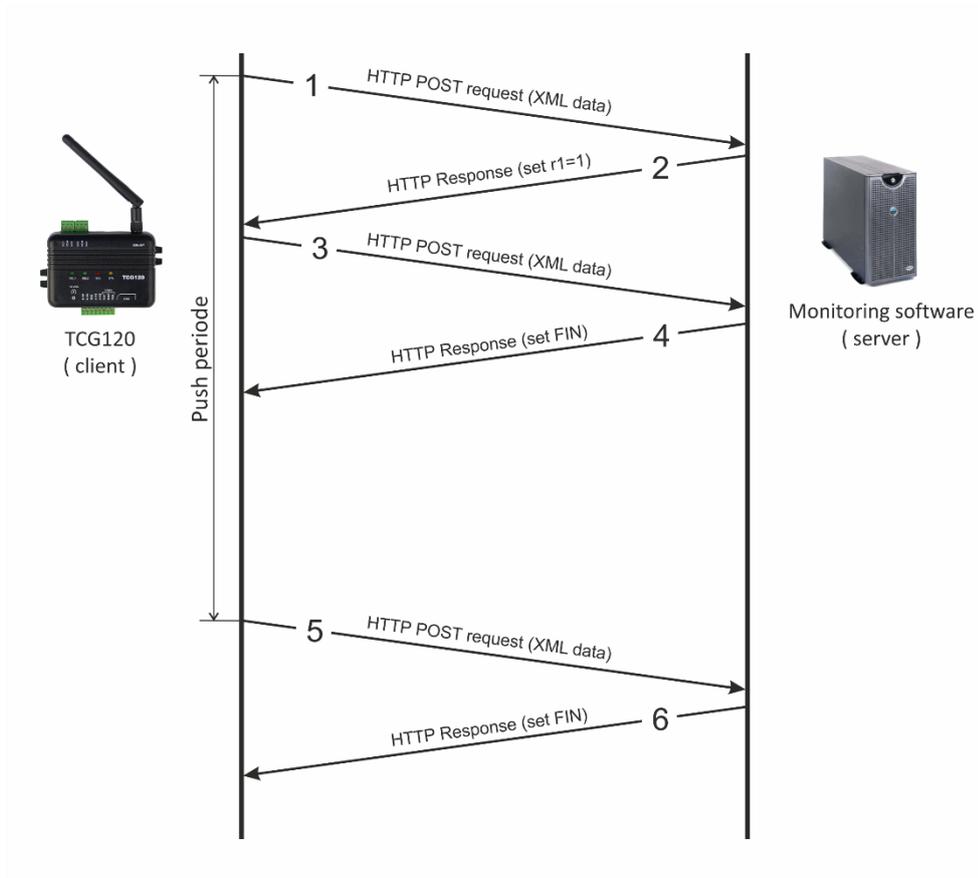
#### **4.5. Import items data**

To import items data, go to Maintenance->Items Data->Import, select the file to import (.sql extension) and click “Import” button.

#### **4.6. Delete items data**

It is recommended periodically to delete old items data if it is no longer needed. This will ensure fast loading times for the dashboards. To delete items data, go to Maintenance->Items Data->Delete and select a date. After clicking on “Execute” button, all data until the selected date will be erased from the database.

A typical HTTP session between TCG120 (**client** mode) and TC Monitor is shown below:



- 1** TCG120 sends HTTP POST request with XML data to the remote server;
- 2** SERVER returns HTTP response message, which contains “set r1=1” command as a brief text in the message body;
- 3** TCG120 sends HTTP POST request to confirm receiving of the “set r1=1” command;
- 4** SERVER sends HTTP response, which includes “set FIN” in the message body. This indicates that there are no pending commands and the session can be closed;
- 5** TCG120 sends next HTTP POST request to the server in connection with Push period timer;
- 6** SERVER answers with “set FIN” - there is no pending commands and the session can be closed.