merbon
SCADA

User guide

Contents

1. Introduction

This user guide is a brief overview of Merbon SCADA functions. In several steps it describes the basic functionality for new users who intend to operate the system. Therefore, this document is focused mainly on orientation in the environment and on basic user settings. The authors believe that the manual will be a useful guide for the first steps in the Merbon SCADA software.

1.1 Merbon SCADA

Merbon SCADA is used as a networked supervisory software using data communication networks as well as local communication buses. The system uses state-of-the-art technologies and communication standards, but also incorporates many proven standard technologies. The system modularity makes possible to create supervisory systems in different scales, from the simplest process visualisations to large integrated systems. The impact is put on high reliability, fast engineering and simple setup even for inexperienced users.

1.1.1 What is Merbon SCADA designed for

The SCADA software provides visualisation and easy control of data from different technologies (room sensors, heating controllers, operation and staus indicators, etc.).

Merbon SCADA displays these data as technology schemas where real-time values of all peripherals and important variables can be monitored and records the data in a history database. The history data provide trend displays of values such as temperatures, which helps to diagnose problems and optimize the system (fine tuning). This is done by setting of critical parameters, which maximizes sensitivity to alarms while maintaining comfort conditions. It is also possible to control aggregates and plants from the graphics, change setpoints, set time schedules etc., according to the user-defined graphic pages and populating the pages with technology values and parameters. A very important function is also alarm messaging, optionally using alarm pop-up windows and voice messages over the sound card of the PC.

2. Login and logout

Merbon SCADA is accessed using a web browser. Enter the URL of Merbon SCADA server into the browser address bar. This page displays the login screen:

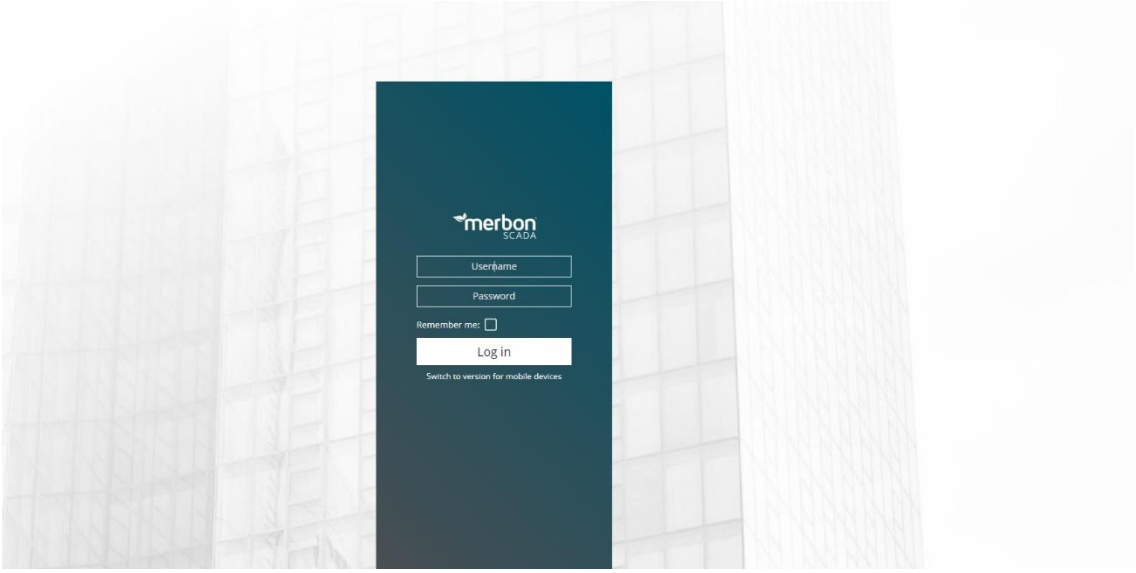

Fig. 1: Merbon SCADA Login

Enter the user name and password and click the *Login* button. User name and password are defined by system administrators, who are mostly engineers of the supplier. The functionality described below may be limited for user based on their user rights.

„*Permanent login*“ saves the login data for the current browser instance (which is the opened tab or window). After successful login, the main screen is displayed:

Fig. 2: Main screen

To log out, click the logout icon in the upper right corner .

3. Projects

After the first login, select a project. Open the list of available projects by clicking the list icon in the upper left corner. If there are more projects in the list, filter can be applied.

Fig. 3: Filter

The filter searches according to project names. Another mouse-click opens the selected project. The project opens as a new tab in the upper bar. If there are more opened projects at the same time, they can be switched between using tabs. Close a project by clicking the cross icon next to the project name.

3.1 Selection of display

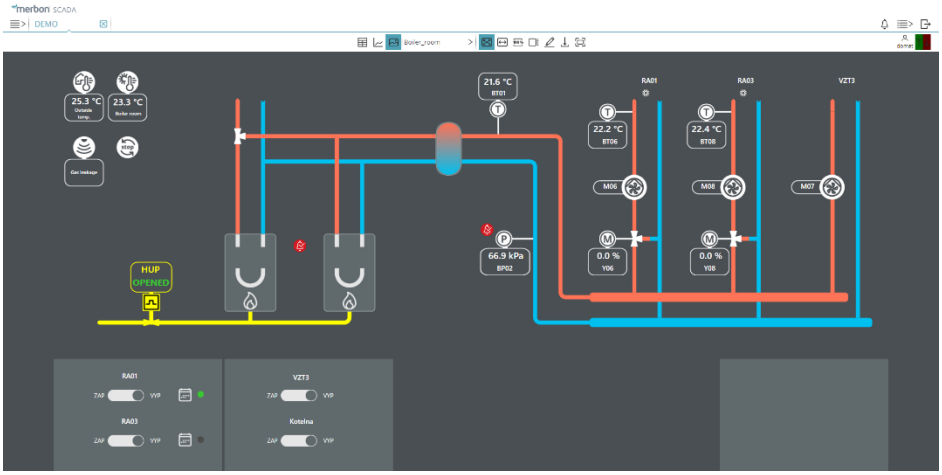

Fig. 4: Selection of display

According to the user rights, it may be possible to display Table view, , Charts or Schemas for a project. The active display has a light blue background.

3.2 Table view

Click the symbol to select valid data points or click to select invalid data points. A data point is invalid if there has been no communication with the technology. Click to display datapoints with old time stamp. To filter selected datapoints, click The bell icon displays only active alarms. The icon displays datapoints with communication errors.

In case that more of the datapoints are selected in the project table the icon will appear. Click the icon to maintain bulk actions over selected datapoints. This function is only available when same type and editable datapoints are selected. This can be checked by comparison of buttons in the *Actions* column. If they are the same you can perform the bulk edit.

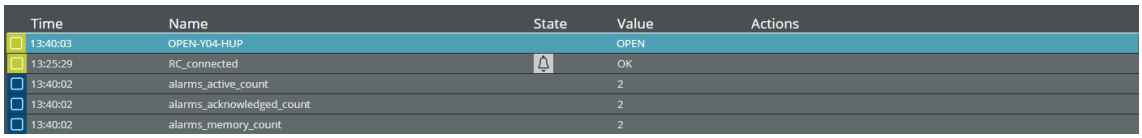

Fig. 5: Datapoint editor

Data points display information about their last communication activity (refresh), data point name, status, value, and operation.

- Using the *tick field*  , a datapoint can be selected,
- *Time* gives time of the last successful communication,
- *Name* is the data point name,
- *Status*  displays other information about the datapoint (such as active alarm),
- *Value* displays the datapoint analogue, binary, or multistate value (such as 21 °C),
- *Operation* shows possible actions that user can perform (e.g. alarm acknowledge or time schedule setup).

3.2.1 Objects

Analog setter

The datapoint value of setpoints can be set in predefined steps by clicking the „plus“ and „minus“ 

buttons, or directly entered by clicking the „INIT“ 

button.

Analog indicator

Analog indicator displays the data point value 

.

Digital setter

Switches between predefined states using buttons, such as On / Off, Manual / Auto etc. 

.

Digital indicator

Displays the current datapoint state for binary and multistate datapoints 

.

Controller time

The „operational“ button changes the controller (PLC) date and time.

Time program

Time program *TPG* represents a timetable in which are desired values of process variables (heating, ventilation, …) planned. There are 3 types of planner which differs by the type of set variable:

1. *Bool* – Desired value can only take one from 2 states which are labeled by names (default ON/OFF).
2. *Int* – Desired value can only take one from certain number of states which are labeled by any name.
3. *Real* – Desired value can be set to any number.

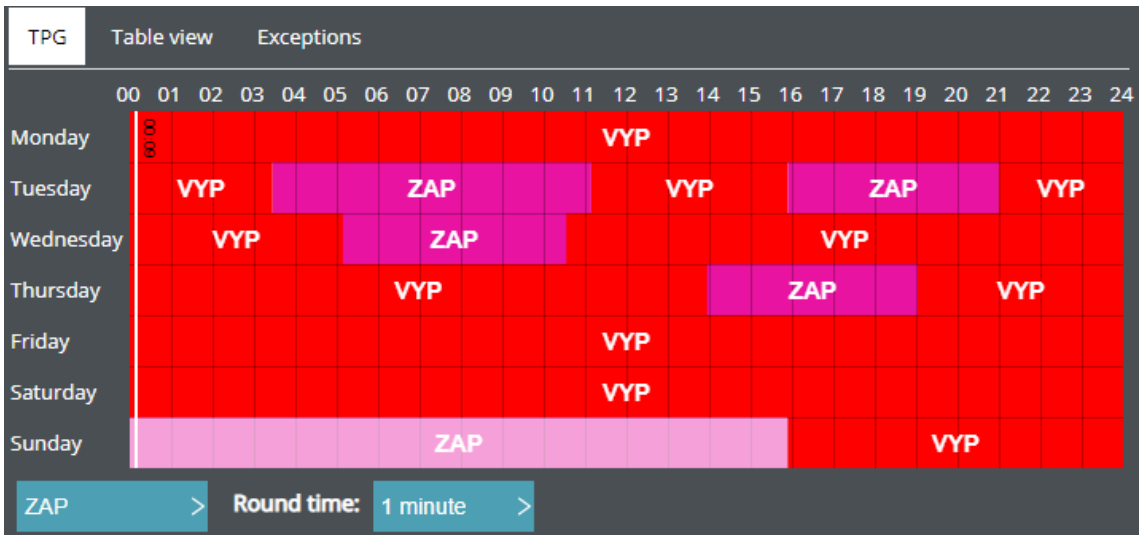

Fig. 6: Example of bool time program for space heating

Round time function divides one piece of schedule (1 hour) according to chosen value of round time. If the value is set for example to 30 minutes, then the one piece of schedule is divided to 2 pieces, to which is created interval possible to snap.

In addition to the schedule table, which is mainly graphical, it is also possible to work with interval table, which allows numerical adjustment of time intervals.

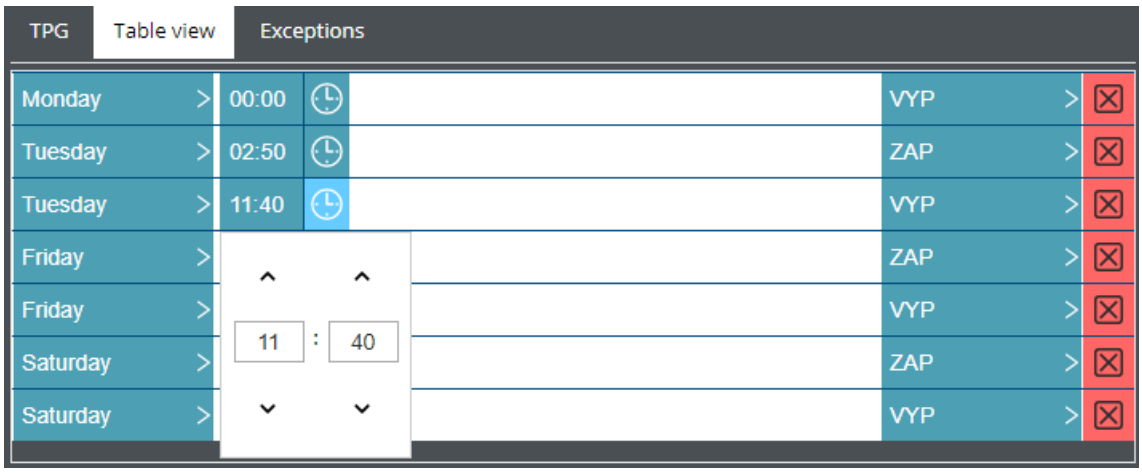

Fig. 7: Example of table view of bool time program

Exceptions have the main priority in the time program, and represent specific time intervals in which a special process control is set. A typical example could be limiting of heating at holiday times.

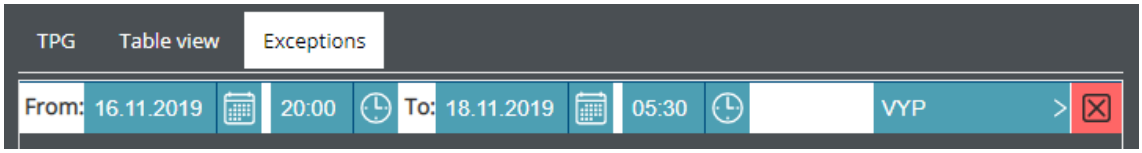

Fig. 8: Example of an exception – turning off the heating on bank holidays

Alarm

By clicking the alarm status, detailed alarm information is displayed, and alarm can be acknowledged or reset, based on its previous state. An alarm also can be displayed in a project, which means switching to the schema where the alarm is inserted.

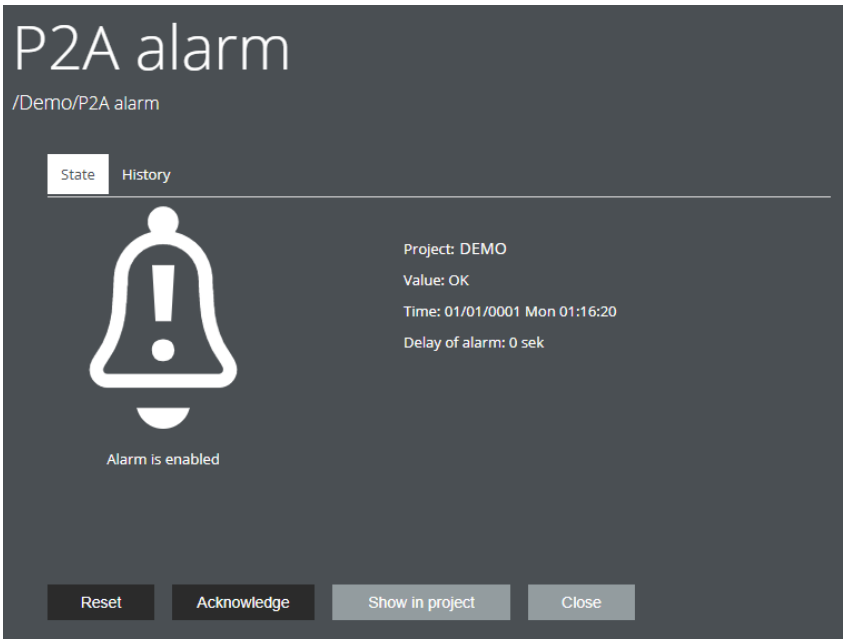

Fig. 9: Alarm status information

The *History* tab shows alarm states of this alarm data point in the past and exports the alarm history to a CSV file.

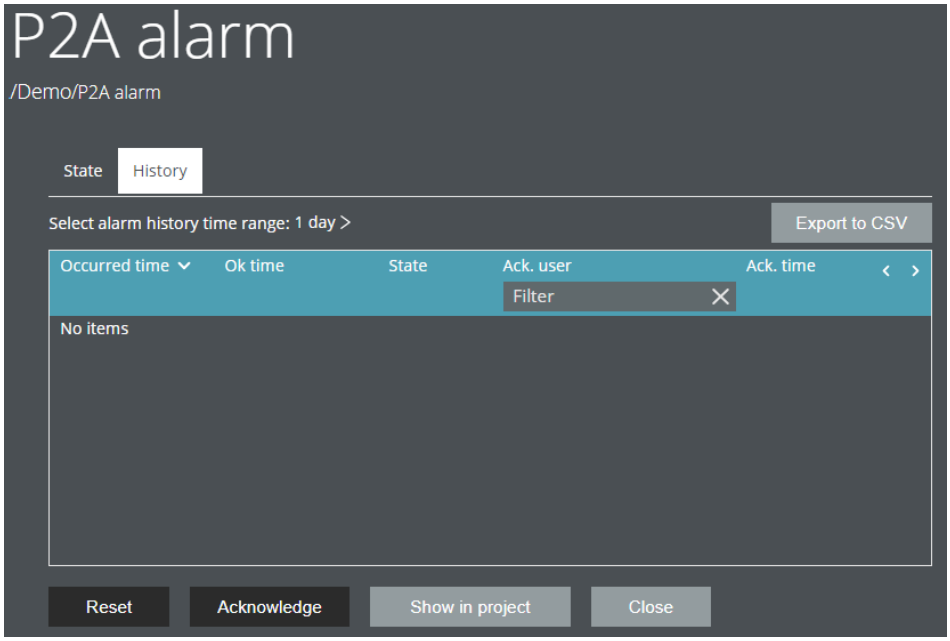

Fig. 10: Alarm status history

Alarms also can be acknowledged and reset in the Table view by buttons in the Operations tab.

3.2.2 Alarm states description

If an alarm goes active, a pop-up window as at *Fig. 6* is displayed. After the alarm has been acknowledged and the alarm input has been set back to normal (alarm goes inactive), the alarm displays as *Acknowledged, Unreset*, and can be reset. If an alarm goes active and inactive again without being acknowledged, it shall be *reset*.

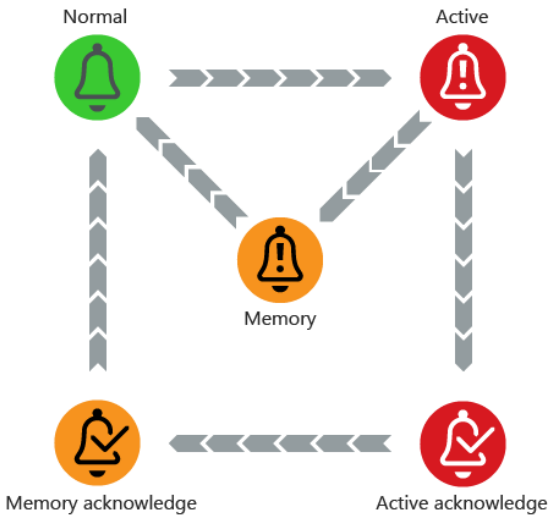

Fig. 11: Alarm states

3.3 Groups in the Table view

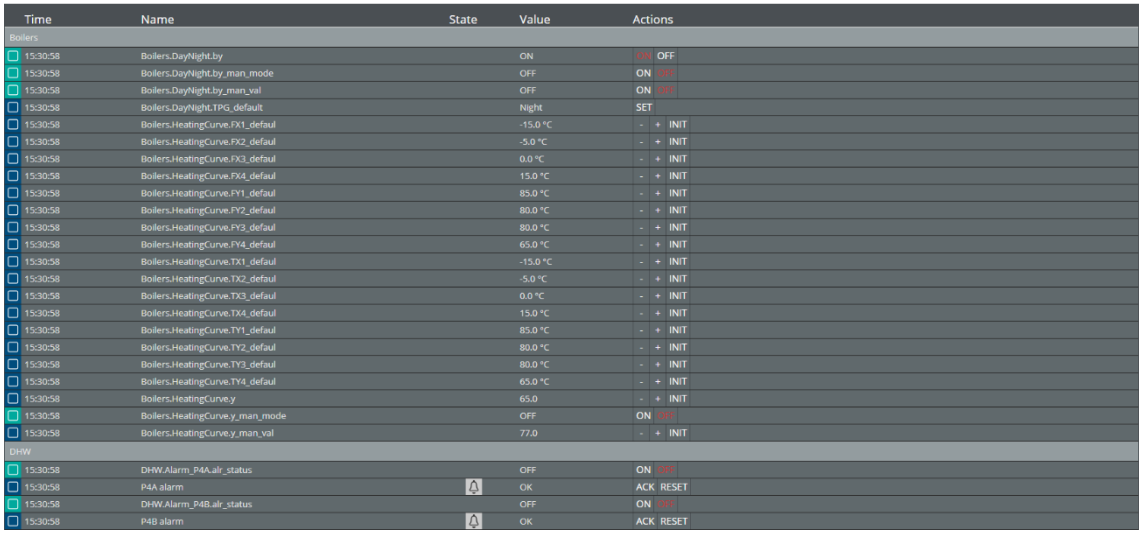

Fig. 12: Datapoint groups

The datapoint groups are separators which organizes datapoints into sections. This brings better orientation in the data table. All groups are listed in the left part of

the window of each project. If a group is clicked, the datapoints are displayed in the datapoint table.

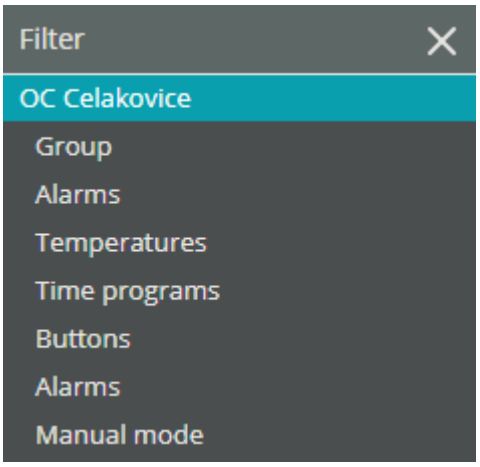

Fig. 13: Groups in a project

3.4 Schemas

A project contains one or more technology schemas. Select a schema from the list of schemas of a project:

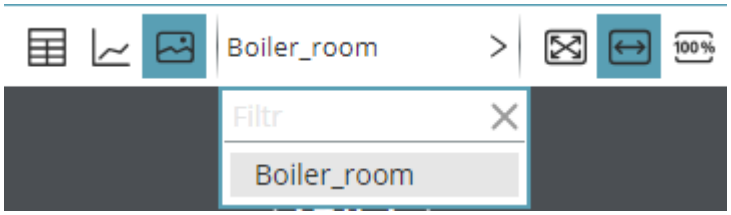

Fig. 14: List of schemas

Based on how the schemas have been engineered, it may be possible to jump between schemas directly using reference buttons.

Schemas may be displayed in three modes: Schema size is adapted to the browser window size  , Schema fits to window width  , or Schema displays in its original size  . The active option is undercolored.

The value display fields may be tagged by holding the CTRL key and clicking the fields, or just by clicking a field and ticking the checkbox. The tagged fields are marked by a black dashed line, see below.

Fig. 15: Selected data point

To unselect all fields, click the button in the upper tab bar. Individual fields can also be unmarked in the same way as they were marked.

By clicking the symbol in the upper bar, a text note in a schema can be entered. The note is then displayed as and it can be unfolded by clicking. It can be moved to another place in the schema by dragging and dropping.

3.5 Charts

After values are selected in the schemas (see previous part), they can be displayed in a time-based chart. The recorded values are retrieved from trend files or from a database. Click the button to display the trend chart:

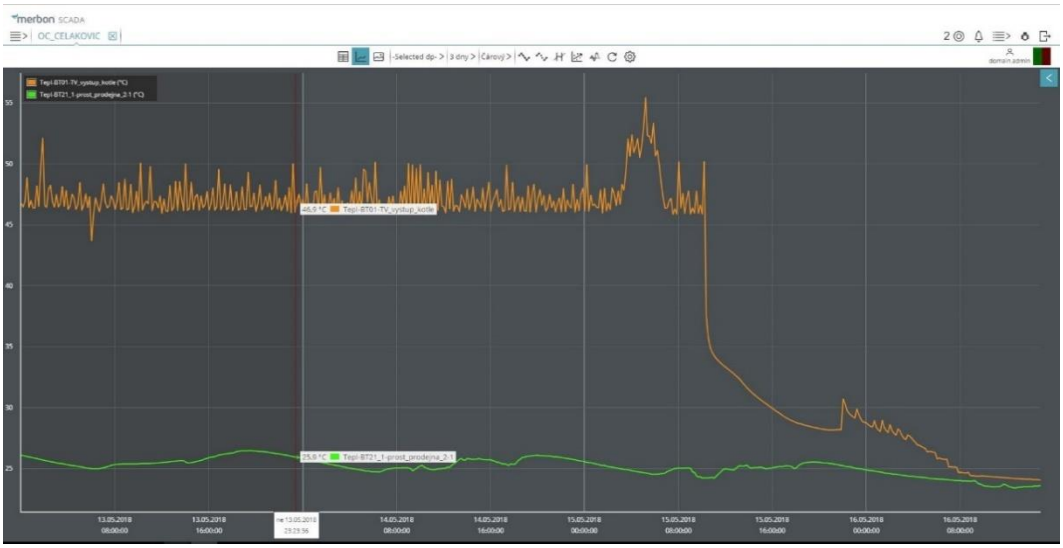

Fig. 16: Chart

The -Selected dp- > symbol indicates that the tagged data points are displayed in the trend. Apart from this, a predefined template can be selected from the list of templates. The templates must be edited at project engineering. The time span to

display is selected by clicking the 1 minuta > button. Select the required chart type by clicking the "Line" button.

Chart types

- **Line chart** – Classical chart with value plot over a certain time interval.
- **Carpet plot** – The X axis displays date, the Y axis displays time of day. The variable value is represented by the color of the field (see the scale below the chart). Note that a carpet plot can display a single variable only.
- **Modulo chart –** Draws the data point values repeatedly according to the selected time period. Select the time period by clicking the "Day" button. The values from all periods of the selected time range are displayed over a common X axis.
- **Differential line chart –** This type is basically just a graphical function that can be used to compare multiple datapoint series. It draws the datapoints connected with lines and fills the space between with the color of the series that has higher value in the specific moment of time. E.g.: Fig. 17.

  In the picture you can see area highlighted with red square. In that specific time interval the temperature of the series that is represented with the orange colour is higher. Graph function fills the space between series with orange colour so the user can see the comparison between datapoints selected by single glance.

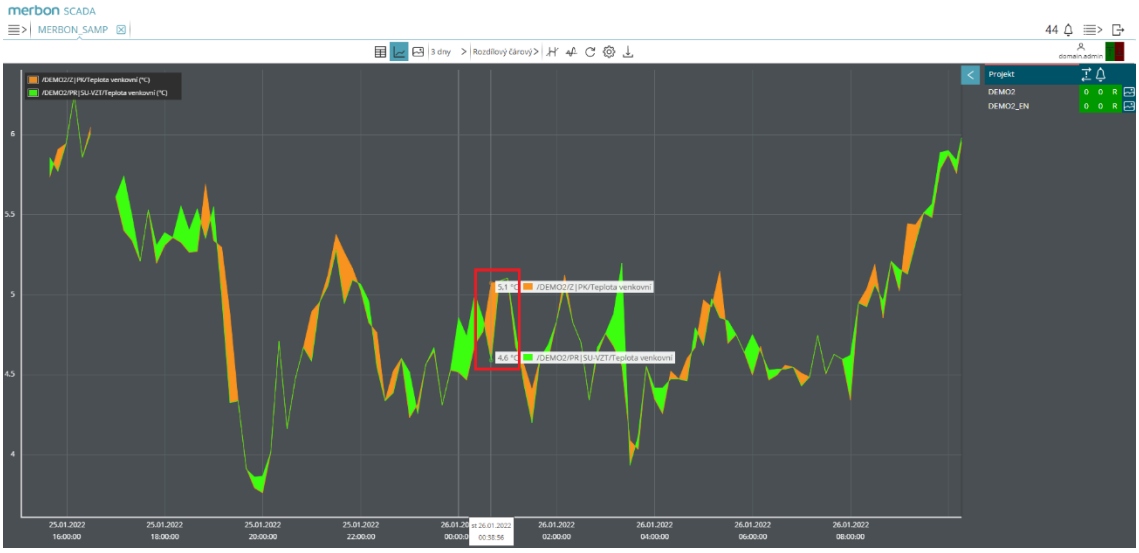

Fig. 17: Differential line chart

- **Bar graph –** The values are represented using columns of different height. Select the time period by clicking the “Day” button and the calculation mode by clicking the Minimum > button.

  Calculation type:

  - **Sum –** shows sum of the values in the selected time period
  - **Average –** shows arithmetic mean of the values in the selected time period
  - **Minimum –** shows the lowest value from the selected time period
  - **Maximum –** shows the highest value from the selected time period
  - **Difference –** shows the difference between values of the selected time interval. E.g.: If you select “Day”, graph will show you how much the value changed compared to the day before.
  - **Difference increasing -** similar function as “Difference” – it calculates the difference between values in the chronological order. When the value of the difference is positive it sums all these differences and shows the result in the graph. Negative differences are ignored. It has its greatest use when we expect specific value **to grow only** (decrease of the value is considered as an error or invalid value)**.**
    - **E.g.:** If the measured value is a meter registration and the electricity meter is replaced, standard difference would return negative value for electric consumption. However, from the point of view of measuring monthly consumption, this is an undesirable phenomenon. The Difference increasing function solves this problem in the described case so that the result will not be a negative value but a real increase in consumption measured by both the original and the new electricity meter.

If the measured values must be displayed rather than the connecting lines only, click the symbol. To cut the loaded data from the server to the current view only, click . If there are data with different ranges displayed in the same chart, it may be useful to set the optimized display , which recalculates the measured values and correlations among the variables can be found better. If the trend view shall be updated in real time, click the symbol and the trend will be displayed as an oscilloscope view. The symbols shown above are active when displayed as under-colored.

A one-time update of trend values can be invoked by the button. Use the button for extended trend plot settings. Use the symbol to display the export dialog, in which you can export data or export the graph to PNG.

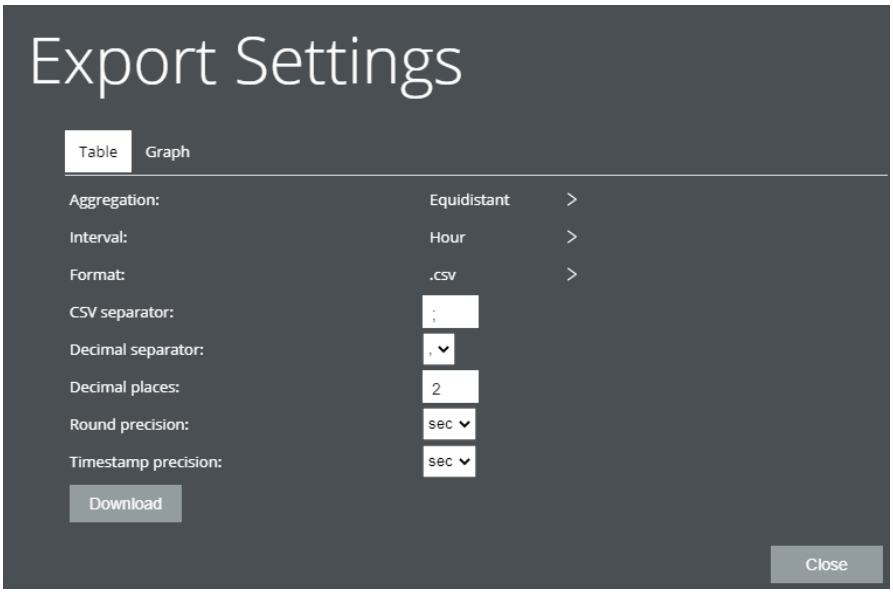

Fig. 18: Export dialog

Two export types can be selected in the export settings:

- Equidistant - Here the user can select the data sampling interval and the export will have an assigned value for each interval given.

- Accurate – With this option selected the export file will consists of values and timestamps in raw form. Just like they were saved in the file or database.

Two file format types can be selected in the export settings:

- .csv - Here the user chooses any column separator (e.g. semicolon) and a decimal separator (comma or dot). This setting is important for the subsequent display of data in MS Excel.
- .xlsx - Data will be exported to a standard MS Excel file.

In a plotted trend view, all data points can be hidden and enabled. Click the data point description to hide / display its trend line.

Fig. 19: Data point descriptions

Click the  symbol in the upper right corner of the trend to display the extended functions menu.

Set different data descriptions by clicking the buttons  - *No legend, Short legend, Complete legend* and *Hide description*. The active setting is under-colored.

To zoom or un-zoom the view, use buttons  and  . The required area also can be zoomed by dragging the mouse cursor over the area of interest. Click the < > buttons to move the X (time) axis.

4. System

System information are displayed in the upper right corner of the SCADA window.

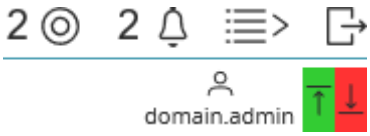

Fig. 20: System information

The logged-in user name is displayed below the person icon: domain.admin. The communication indicator shows data communicated to/from the Merbon SCADA server. The values should be up-to-date, otherwise the symbol goes active. A communication error between a particular device and process station (PLC data are of bad quality, but are communicated to SCADA) is indicated by orange arrows with exclamation mark in the schema: -11,90 °C.

If the communication dropout lasts for longer than about 10 minutes, check the connectivity to PLC with your network administrator.

The main user settings is available in the menu .

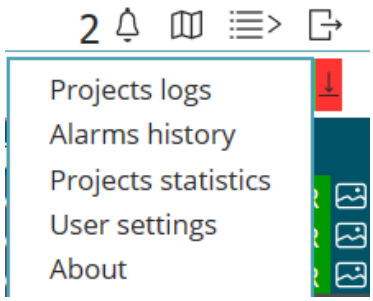

Fig. 21: Menu

4.1 Tagged data points

To achieve better readability, only tagged data points can be filtered by clicking the icon. The window displays all tagged data points across all available projects. By tagging datapoints in this window, it is possible to bring datapoints from different projects into a single trend chart.

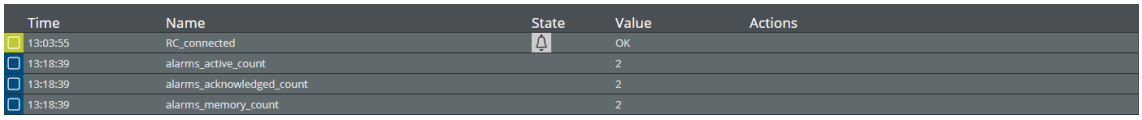

Fig. 22: Tagged datapoints

4.2 Active alarms

The Active alarms function helps the user to check in all available projects all alarms which are Active or Unacknowledged, un-reset. The master alarm symbol is in the upper right part of the main window.

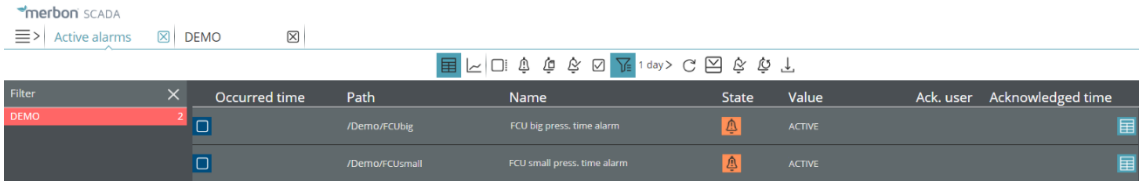

Fig. 23: Active alarms

The alarm records provide information on user acknowledgement state and time of intervention. The  icon opens the schema where the alarm point is displayed (if there is such a schema).

4.3 Menu

The basic user settings can be changed in the Settings menu: 

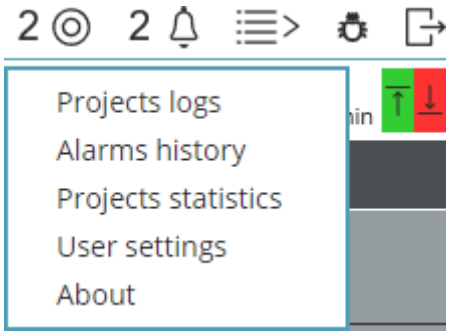

Fig. 24: Menu

4.3.1 Events

This function provides list of all user interventions and events in the project, which appeared in the past.

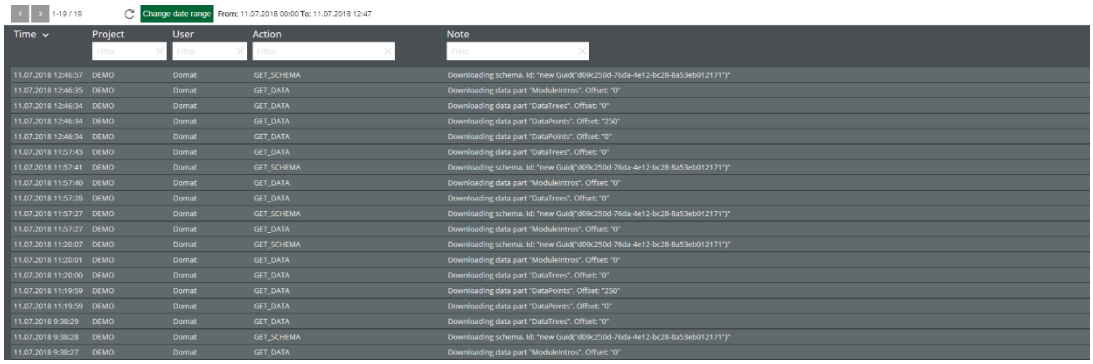

Fig. 25: Events

If there are more events in the database than fit on a single page, use the < > buttons to go to neighboring pages. The time span displayed can be limited using the Change date range button.

To refresh the event list, click ↻.

4.3.2 Alarm history

In case the Alarm Server is installed as an option, this window displays the Alarm Server event list.

4.3.3 Project statistics

The project statistics displays general information about all projects.

- *Project* – Project name
- *Status* – Indicates if a project is running (LocalRun) or not (Stopped)
- *Data points* – Number of data points (variables) in a project
- *Time of last communication* – Last datapoint update time
- *Calculation time* – Time of data processing of the whole project
- *Active* – Number of active alarms in the project
- *Acknowledged* – Number of acknowledged alarms in the project
- *Un-reset* – Number of alarms in memory in the project
- *Invalid data points* – Number of datapoints which do not have valid address and cannot communicate
- *Suspicious data points %* - Percentage of data points which may not perform correctly

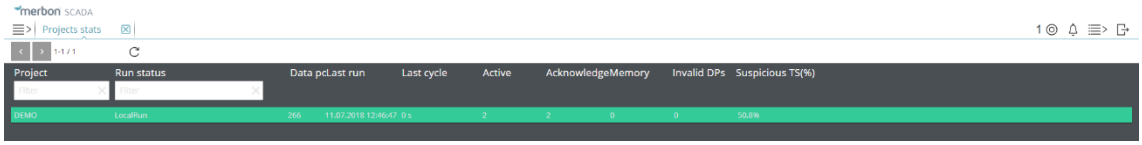

Fig. 26: Project statistics

To refresh the project statistics, click the ↻ button.

4.4 User settings

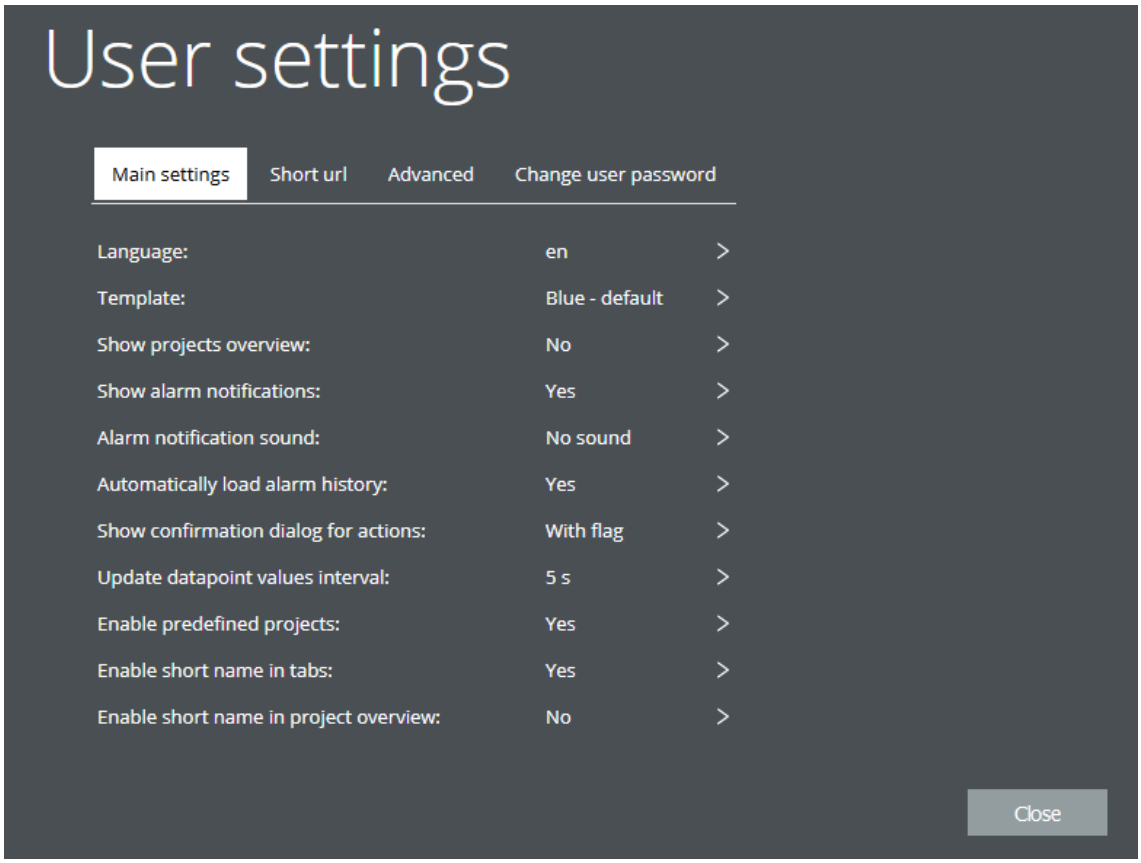

Fig. 27: User settings

The *Main settings* tab provides general SCADA settings. All changes are active immediately.

Language

To change the SCADA language, select en >. Currently supported languages are Czech *cs*, English *en* and German *de*.

Template

The basic colour pattern can be changed between blue (which is default) and grey using the Blue - default > button.

Overview panel

The overview panel provides comprehensive information about data point communication, alarms and executed projects, see the table in the right part of the SCADA window.

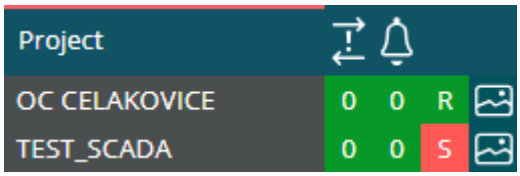

Fig. 28: Overview panel

The values in the column indicate number of communication errors in the project. The alarm icon shows number of active alarms in the project. The Run icon R indicates that the communication with this project is running, while the Stop icon S shows that the communication with this project is stopped. The Schema icon jumps to the main schema of the project.

Alarm windows

After the alarm window is deactivated, the pop-up window showing that there was an alarm event will not be displayed.

New alarm notifying sound

The notifying sound is off as default. Select a sound to be played over the client sound card from the predefined sounds.

Automatic alarm history loading

If the automatic alarm history loading is deactivated, the alarms will not be displayed in the history.

Allow button press confirmation

Allows the user to set whether to display a confirmation dialog when the button is pressed.

The user has three setting options:

Always - The dialog is always displayed.

With flag - The dialog is displayed only for those buttons for which a “Confirm button press” option has been set in RcWare.

Never - The dialog is never displayed.

Interval between communication requests

Change this value to optimize the communication interval of datapoint requests. Longer interval saves bandwidth while shorter interval provides more frequent value updates.

4.5 Short URL address

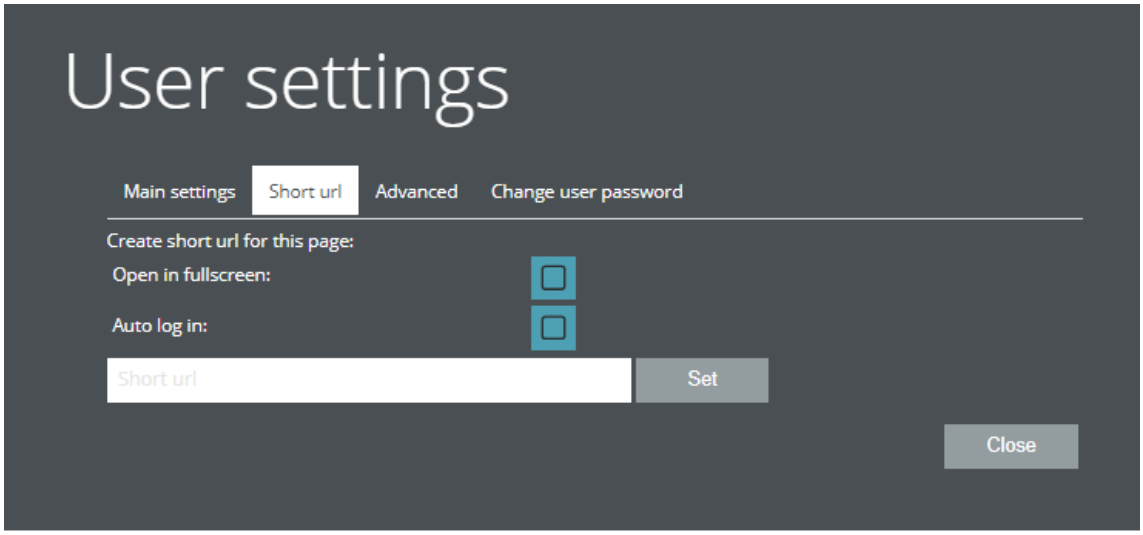

Fig. 29: Short URL address

This tab creates a URL with link to the currently opened page. Enter the requested page name in the „Short URL“ field; it will be displayed after the slash in the generated address. Example: the server is running at localhost 127.0.0.1 and the short URL is „SCADA“, the resulting URL reads http://127.0.0.1/#/SCADA.)

Fullscreen

If the „Open as fullscreen“ field is checked, the page opens as full screen rather than a window only.

Auto log-in

If the login process for the user who is referencing the page shall be avoided, just check the „Auto log in“ item, and fill in the credentials into the fields that appear. The user will be automatically logged in after opening the URL.

4.6 Advanced settings

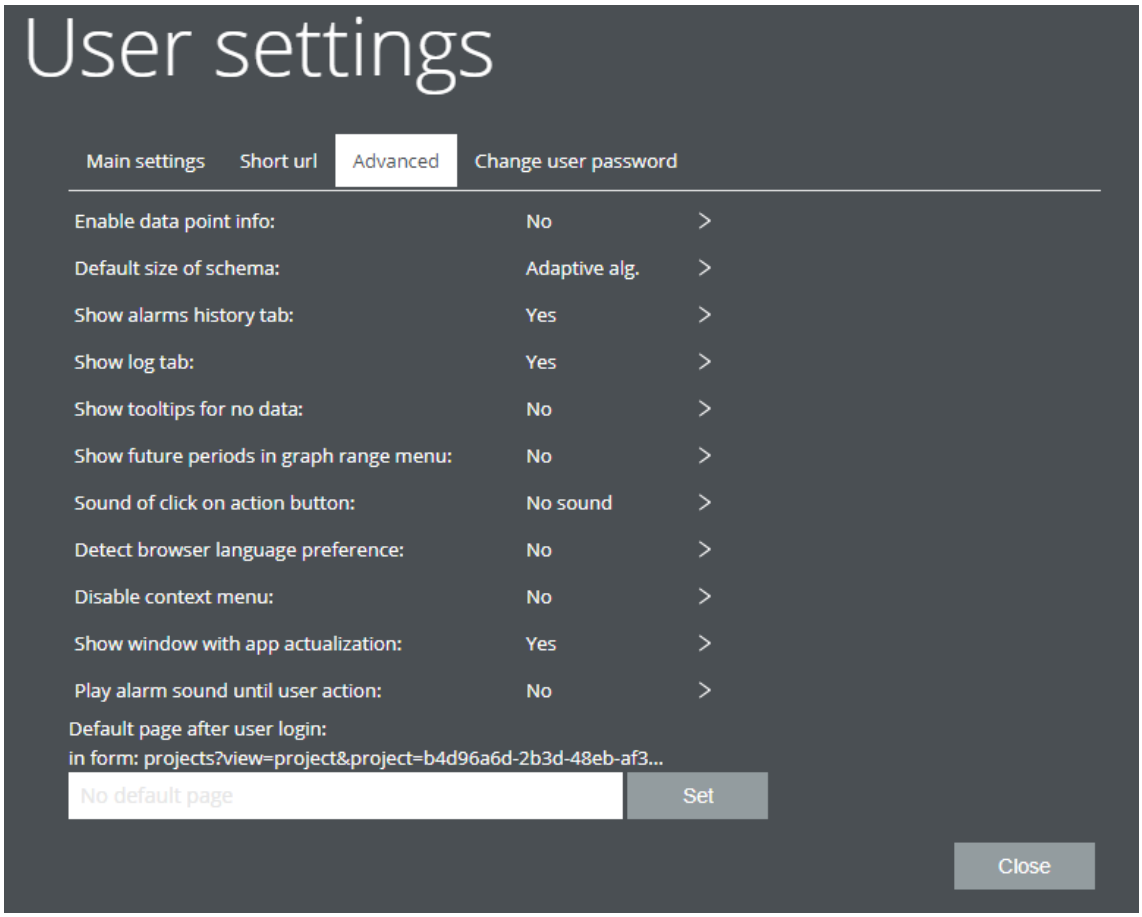

Fig. 30: Advanced settings

Display of information about datapoints

Display of information about a datapoint shows datapoint details. Tag a datapoint and click the ☰ icon. A window with datapoint details opens.

Fig. 31: Datapoint details

The *All properties* tag shows the complete information about a datapoint, such as GUID, value properties (settings minimum, settings maximum) and properties on datapoint activity.

The *Data point as XML* tag displays these properties in XML format.

Default schema size

The default schema size can be selected from the preset schema sizes.

- **Automatic size** – The schema size is set automatically according to the browser window size
- **All visible** – The schema is stretched to be visible as a whole
- **Fit to width –** The schema is stretched to fit the window width
- **Original size** – The original schema size (as edited) is kept

Show alarms history tab

If the alarm indication is deactivated, the active alarm indicator will not be displayed and there will be no indication of alarm history in the main user menu.

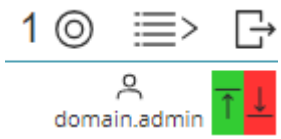

Fig. 32: Deactivation of alarm indication

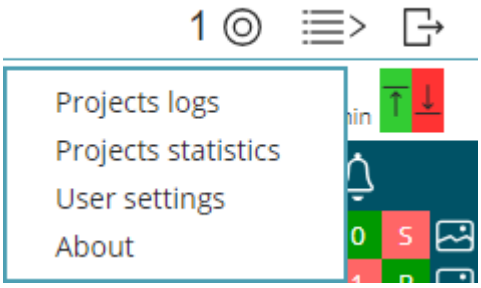

Fig. 33: Deactivation of alarm history

Show log tab

If the Show log tab is deactivated, the Events will not be displayed in the main user menu.

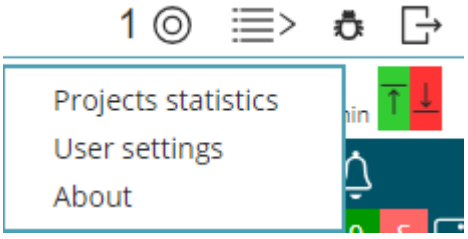

Fig. 34: Events

Show future periods in graph range menu

If this option is deactivated, it is not possible to set future time in the graph display.

Sound at button click

A sound which is played at every button click can be selected from the predefined set of sounds.

Set browser language

Set the browser language here together with the language settings of the main user settings.

Enable communication capture

Enable this option to capture communication with a project. In the lower left corner, an indicator is displayed together with a Stop button. If the *stop* 

button is clicked, the communication capture is stopped, and the recorded data can be downloaded. The capture can be resumed by clicking the *start* button. 

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4.7 Password change

The new password must comply with the following requirements:

- Must be different from the last one
- Must be at least 8 characters long, and contain one small letter and one number
- New password and New password confirmation must be identical

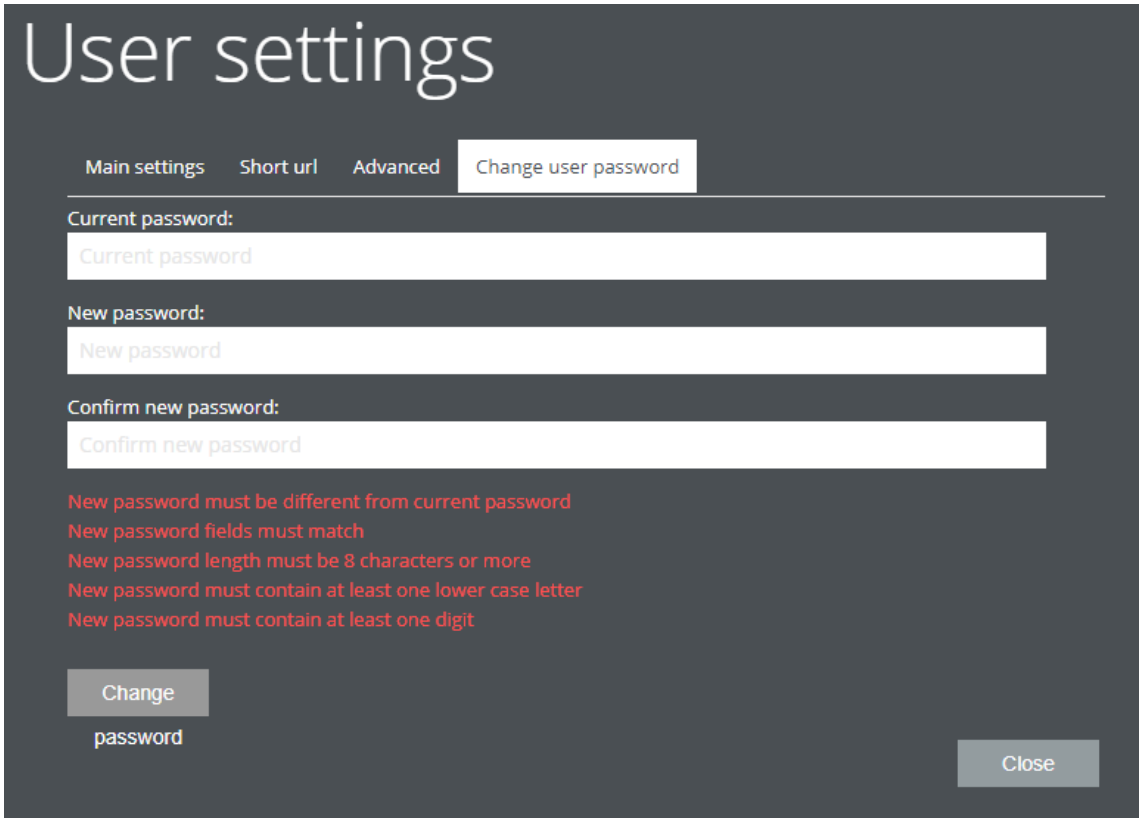

Fig. 35: Password change

The new password applies immediately after the Change icon is clicked, with automatic logout.

4.8 About

The *About* tab contains information about the current user, Merbon SCADA version and optional updates.

Please refer to your Merbon SCADA version number if you report a bug.

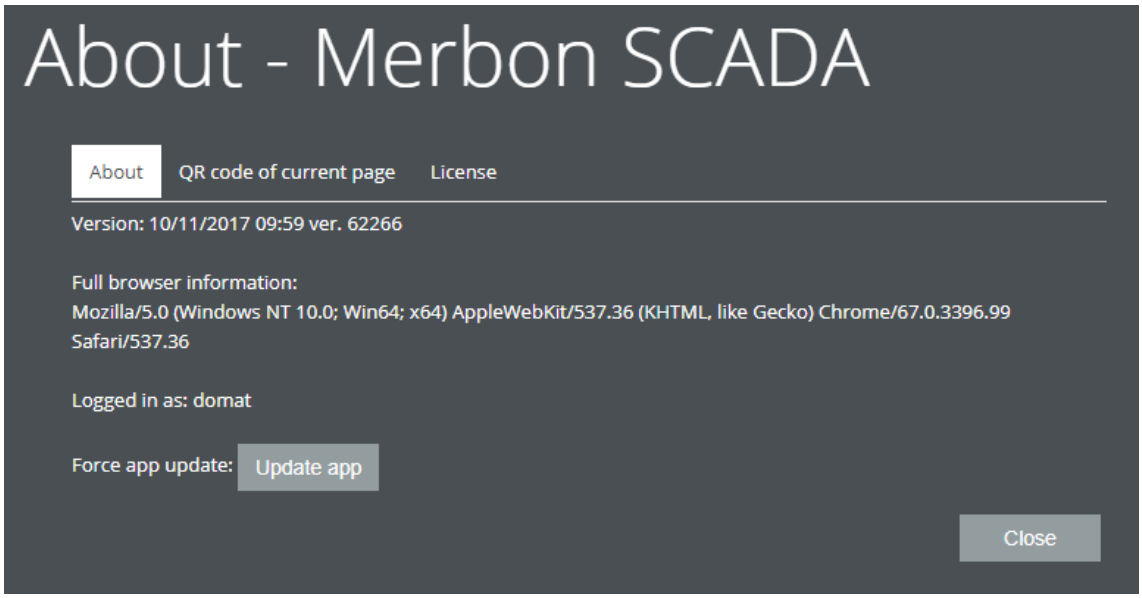

Fig. 36: About

The *Logged in as* line displays the current user name. In the *QR code of current page* tab there is a code that can be scanned and used as a direct link to this SCADA web page. Note that the URL refers to the current network environment, i.e. the link may not be available from the outside of the network. The *Licence* tab displays the licence conditoins and licence agreement.