

Telem SCADA System

User's Guide

Software Manual

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1. Telem SCADA System User's Software

Telem SCADA System user's software works on Windows operating systems. This software enables to:

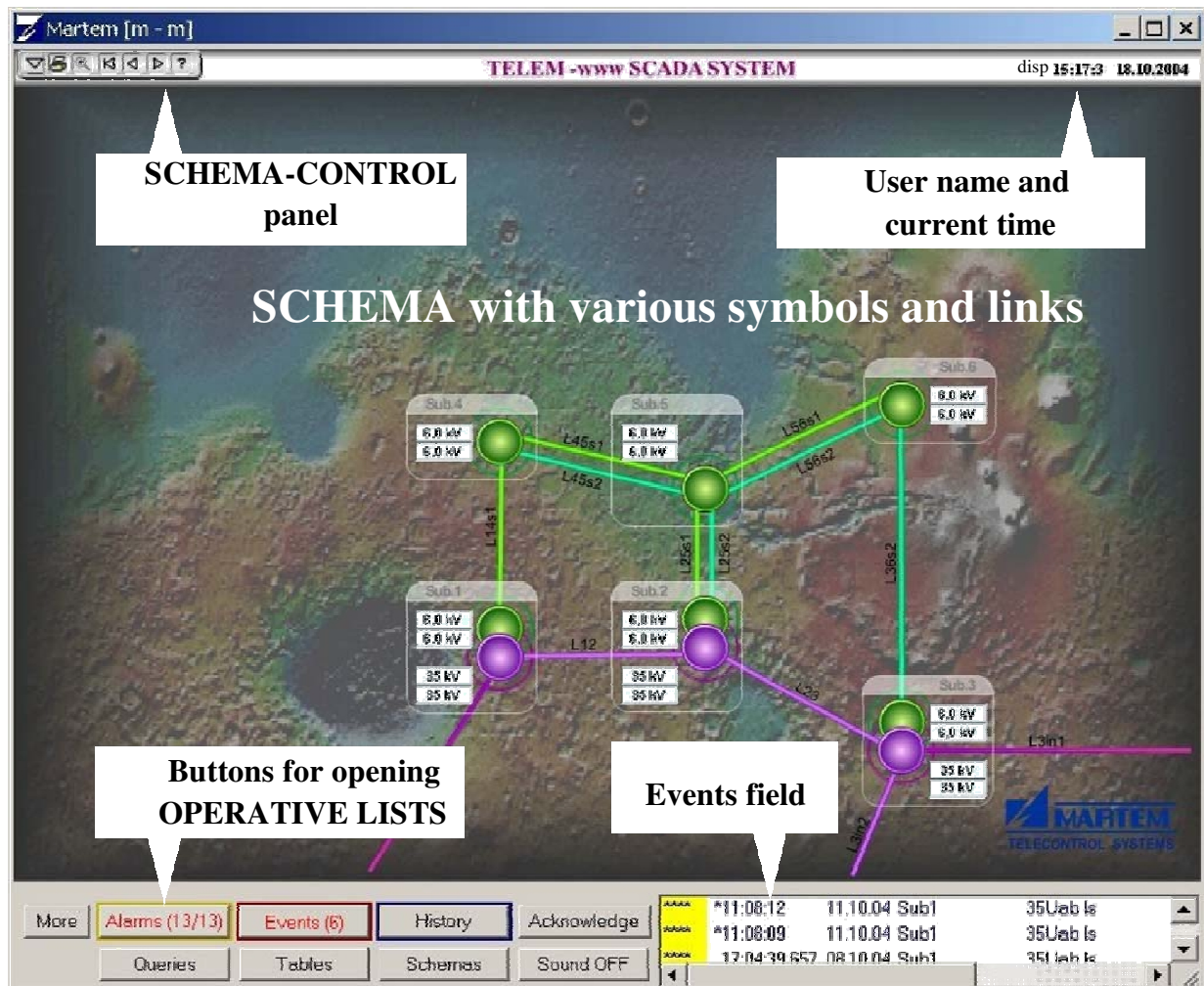
1. Display graphical schemas of substations with the real status of switches and analog measurement values
2. Complete control operations with switches
3. Get history and events data
4. Configure and view tables and trends about the unlimited number of measurements
5. Load different additional graphical drawings and documents for help
6. Support of multiple languages according to UTF-8 and ISO/IEC 8859-13 coding
7. Data exchange over OPC, OLE and DDE interfaces
8. Export/import of configuration data to/from ASCII, CSV format files
9. Saving reports to ASCII, CSV format files
10. Make SQL database requests from any programming languages
11. Optional API link for other programming languages including C and JAVA

To open the SCADA user's main window, start the program Client.exe (folder c:\TelemClient\)) and log into the system.



A schema of system overview is opened.

2. Main Window of User Interface



The red color of Alarms and Events button text indicates the presence of alarms and unacknowledged events. The amount of alarms and events is also presented on the buttons.

Events field

Last 12 high priority events (with priorities 1...3) are displayed in the events area. These events can be acknowledged using the Acknowledge button.

Priority	Time	Substation	Name	Event	Value
12:07:46.268	01.04.04	Sub2	CB 3	ON	
12:06:52	01.04.04	Sub2	35Uab Is	-> HiHi	40.46
11:34:38.937	01.04.04	Sub2	P-total	<- Lo	330.93
11:35:14.086	01.04.04	Sub2	35Uab Is	<- Lo	33.40

The color of the event line depends on the priority level. Clicking on this event changes the displayed schema to the schema of the respective substation. To see all the unacknowledged events, choose the Events from the menu buttons area.

2.1. Warnings

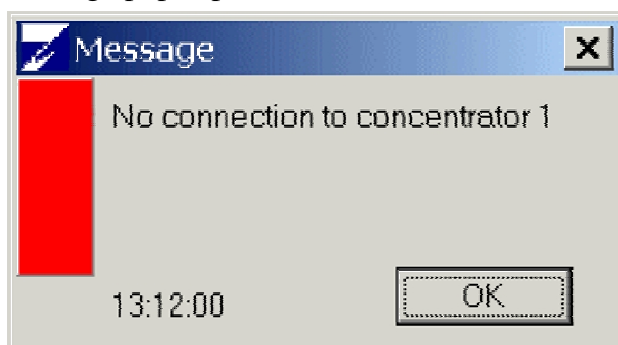
In case the connection with the system server is lost, the surrounding area of the menu buttons is painted red. This indicates that no operations are accessible.



The green surrounding the menu buttons area indicates that the data receiving process from the system server to schema symbols is not finished.



If the Server loses the connection with one of the Data Concentrators, the following message pops up:

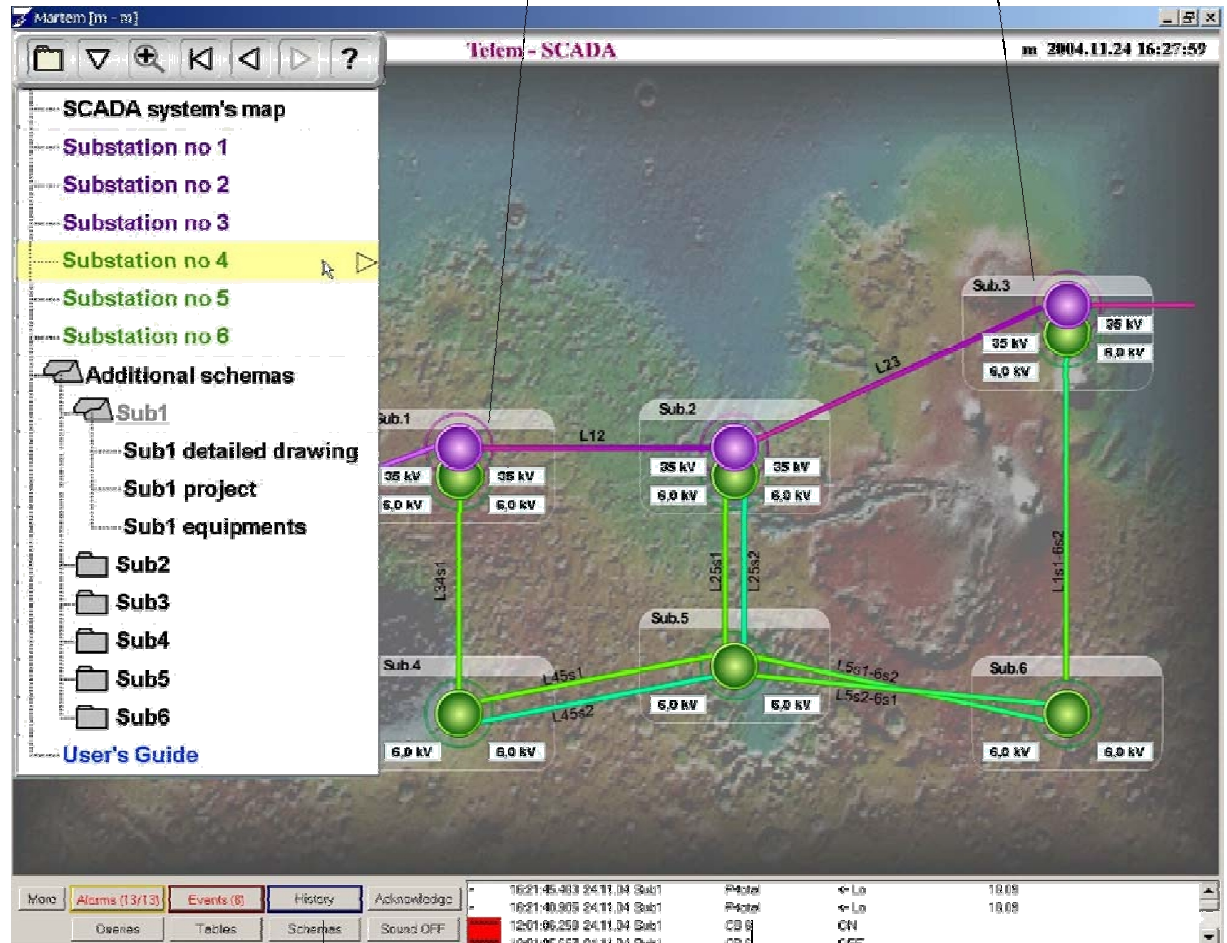


2.2. Choosing the Schema

The first schema is usually the map of the SCADA system. The next schema can be opened from:

- schema's menu

- substation's symbol on the schema (links to other schemas)



- "Schemas" button

- events area

2.3. Representation of Information on Schemas

Real-time positions of switches, statuses of alarm signals and analog measurement values are displayed on the schema. The schema can contain buttons for opening panels or layers to display additional data or measurements and buttons for opening other schemas. Using the line coloring system "LineColor" allows you to display the colors of all the schema lines, transformers, bars etc. that represent their voltage status.

- status of switches and signals schemas

- links to other

- measurements values

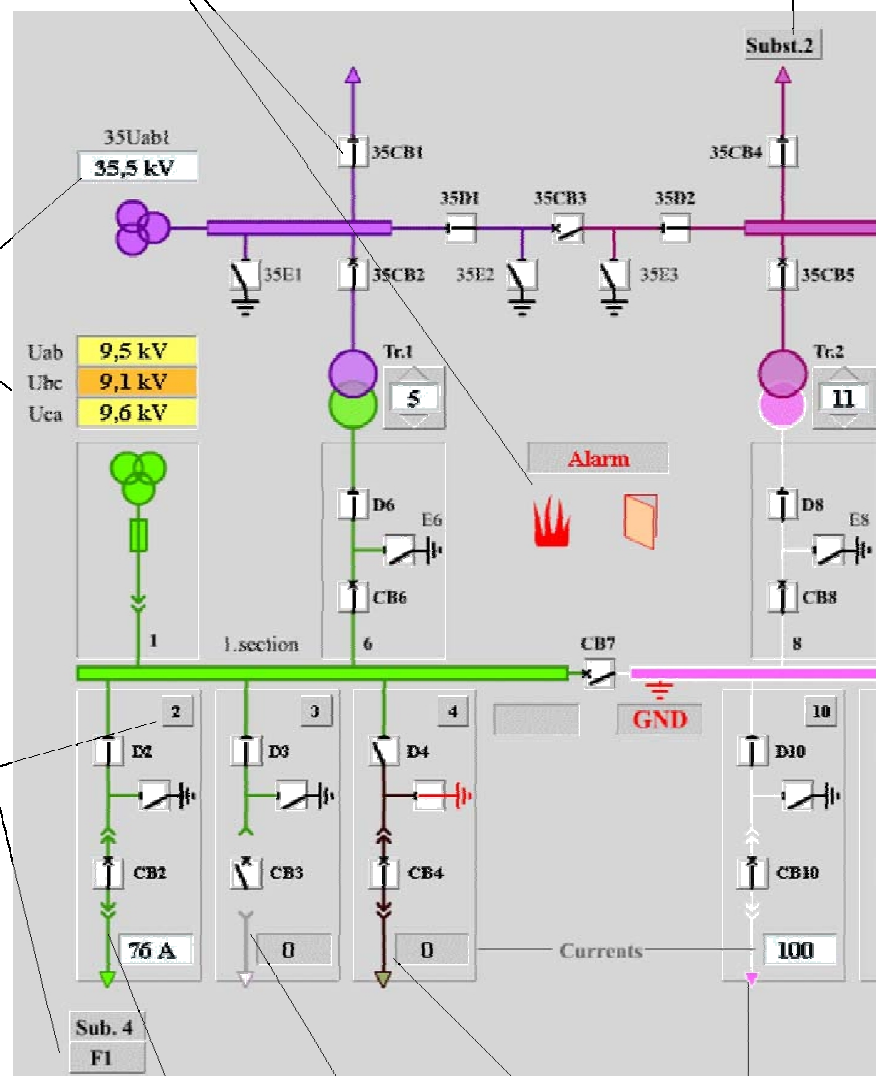
- buttons for opening additional data panels

- color of lines and other symbols depending on their voltage status:

- normal voltage - unconnected line

-grounded

-short circuit



2.3.1. Displaying Filled SWITCH Symbols

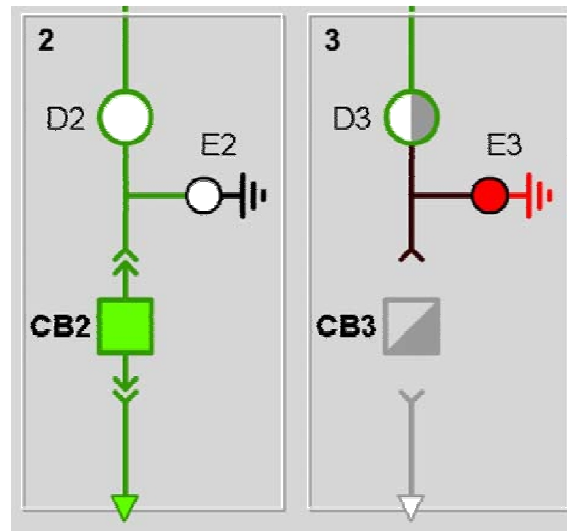
Circuit breakers, disconnectors, earth-switches and other switches can be displayed as circles and rectangles; the type of fill and the color indicate the position.

**Disconnecter
OPENED (OFF)**

**Earth-switch
OPENED (OFF)**

**Circuit breaker
CLOSED (ON)**

**Truck
CLOSED (ON)**



**Disconnecter
UNDETERMINED
position**

**Earth-switch
CLOSED (ON)**

**Circuit breaker
FAULT
position**

**Truck
OPENED (OFF)**

2.3.2. Displaying Classic SWITCH Symbols

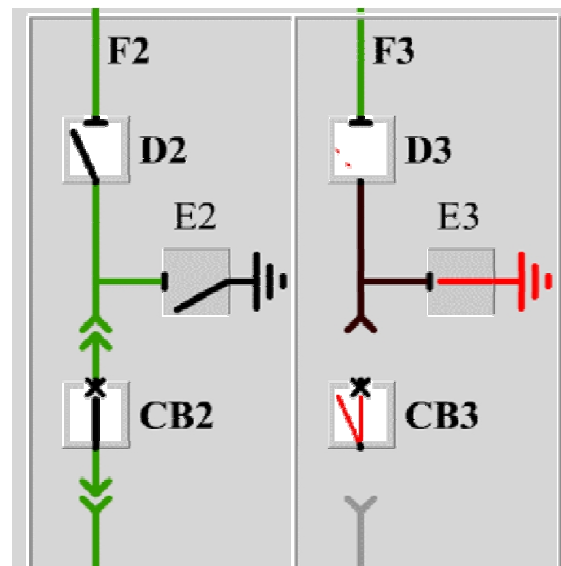
Circuit breakers, disconnectors, earth-switches and other switches can be displayed as classical switch symbols with additional graphical elements to determine the switch type.

**Disconnecter
OPENED (OFF)**

**Earth-switch
OPENED (OFF)**

**Circuit breaker
CLOSED (ON)**

**Truck
CLOSED (ON)**



**Disconnecter
UNDETERMINED
position**

**Earth-switch
CLOSED (ON)**

**Circuit breaker
FAULT
position**

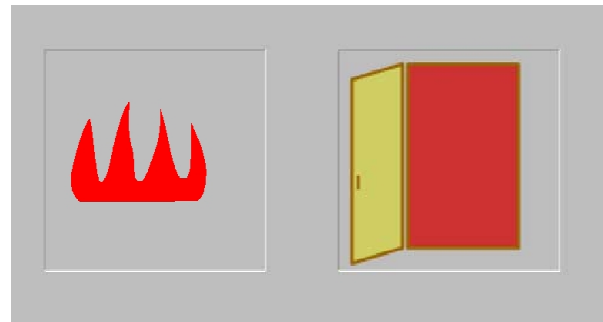
**Truck
OPENED (OFF)**

2.4. Displaying ALARM Signals

Statuses of alarm signals are displayed on the schema. These signals can be displayed as text messages or graphical symbols.

Graphical version:

the picture appears and disappears according to the signal status (ON or OFF). The picture can be animated.



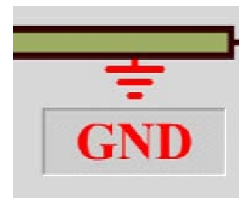
Text version:

signal status information is displayed as text, both signal positions can have their own texts with desired color



Combined version:

signal status information is displayed as text and picture, both signal positions can have their own texts and graphical drawings



2.5. Representation of analog measurement information

Analog measurement value units can be displayed in the different ways:

- the unit is placed into the measurement field

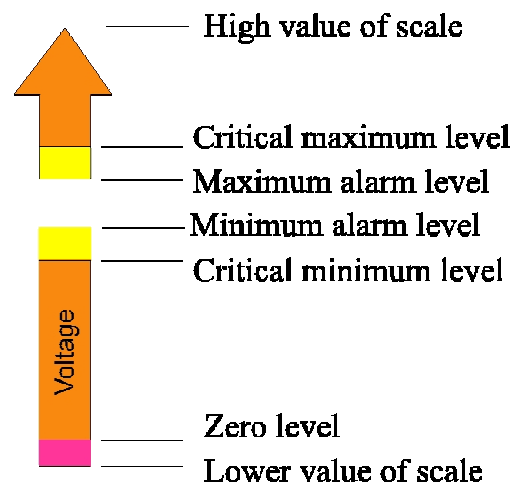
Uab	100 kV
Ubc	107 kV
Uca	85.5 kV

- the unit is placed outside the measurement field

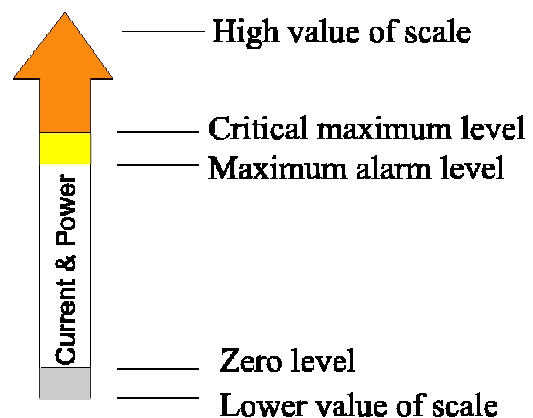
Ua	35,7	kV
Ia	10,5	A
P	1132	kW

Information about the status of measurement values is displayed as background color:

Voltage	
Critical range	113.5 kV
Alarm range	107.5 kV
Normal	100.5 kV
Alarm range	92 kV
Critical range	89 kV
Zero zone	0 kV



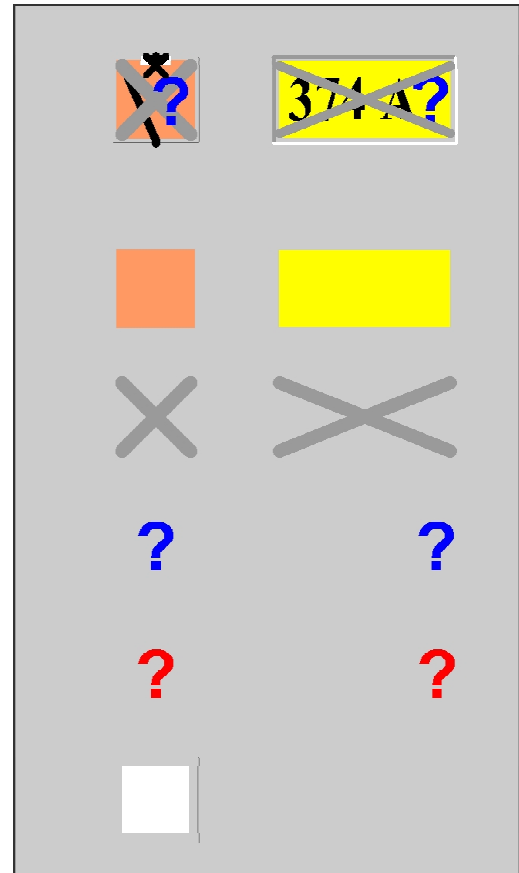
Current and Power	
Critical range	231 A
Alarm range	211 A
Normal	190 A
	4 A
Zero zone	0 A



2.6. Representation of Additional Information

In addition to switch position or analog measurement value and its range, status symbols display the following information:

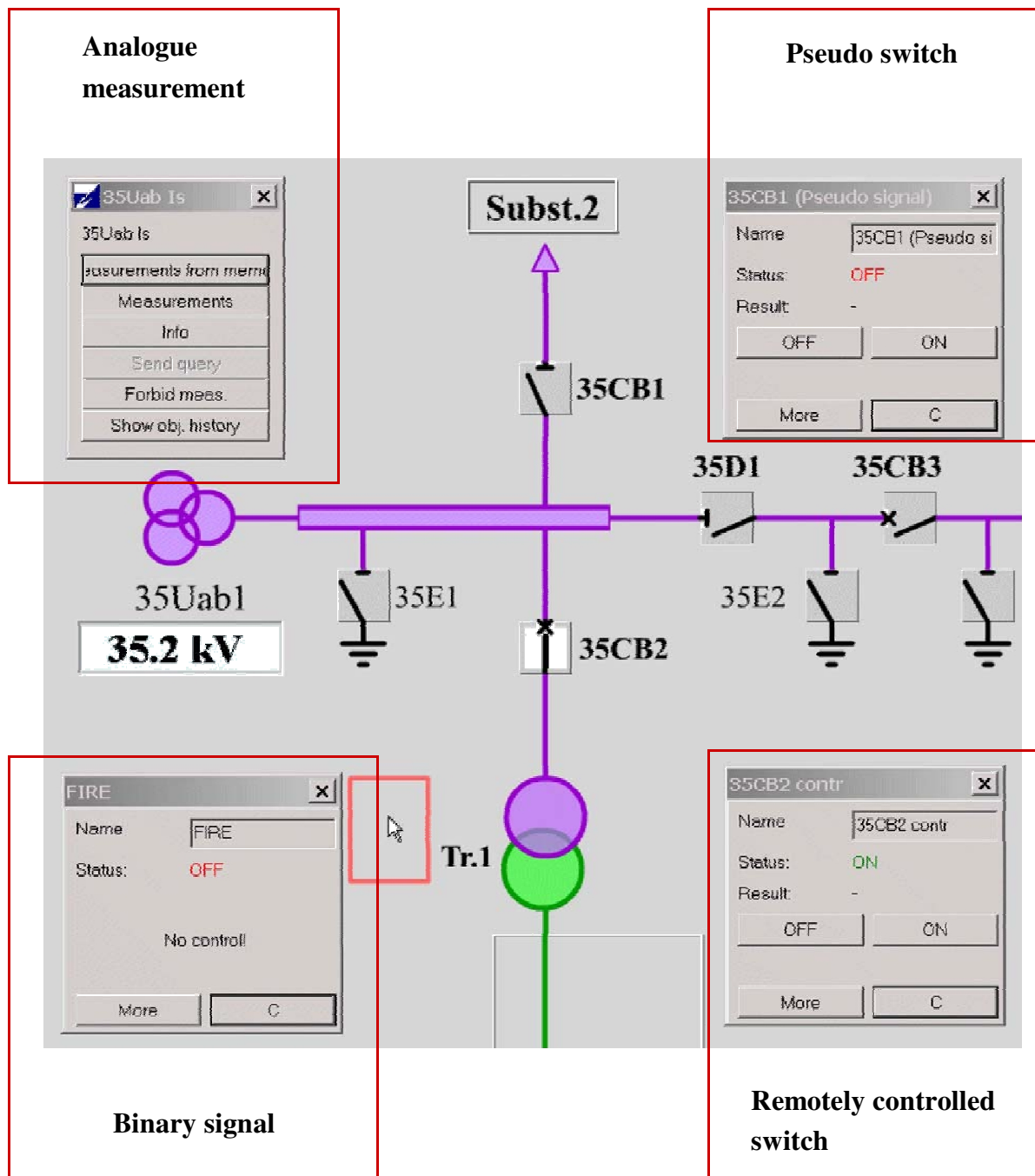
1. Unacknowledged event
 - a blinking background
2. Disabled signal or measurement
 - diagonal crossed lines on the element
3. No connection with the controller (not updated)
 - BLUE question mark on the element
4. Information not topical
 - RED question mark on the element
5. Telecontrolled switch
 - white rectangle (on the background area)



3. Operating with schema symbols

After clicking on a symbol on the schema, object window is opened.

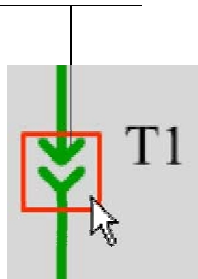
The appearance of the object window depends on the object's type:



3.1. Operating with binary signals

Binary signals usually represent switch positions and disturbance signals.

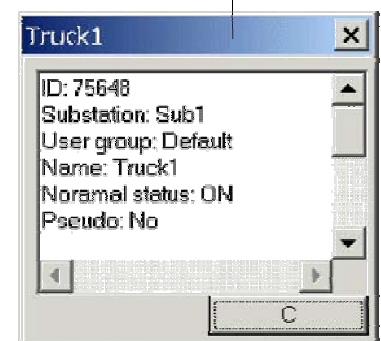
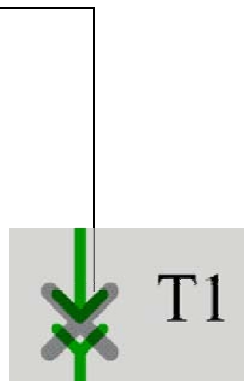
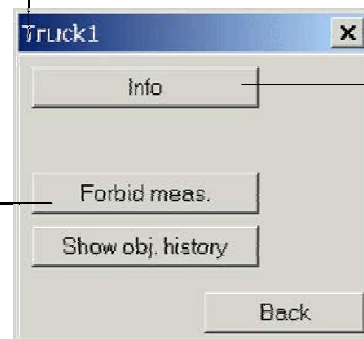
After clicking on a binary object symbol on the schema, status window is opened.



Clicking the "More" button opens the next window.

"Info" button opens the information window with basic configuration parameters.

"Forbid meas." button forbids the measurement. This means that this signal does not create events anymore. The forbidden measurement is crossed over on the schema:



3.2. Controlling Objects

3.2.1. Remotely Controlled Switches

Select the switch by clicking on the symbol. The control window opens where the object name and position are displayed.

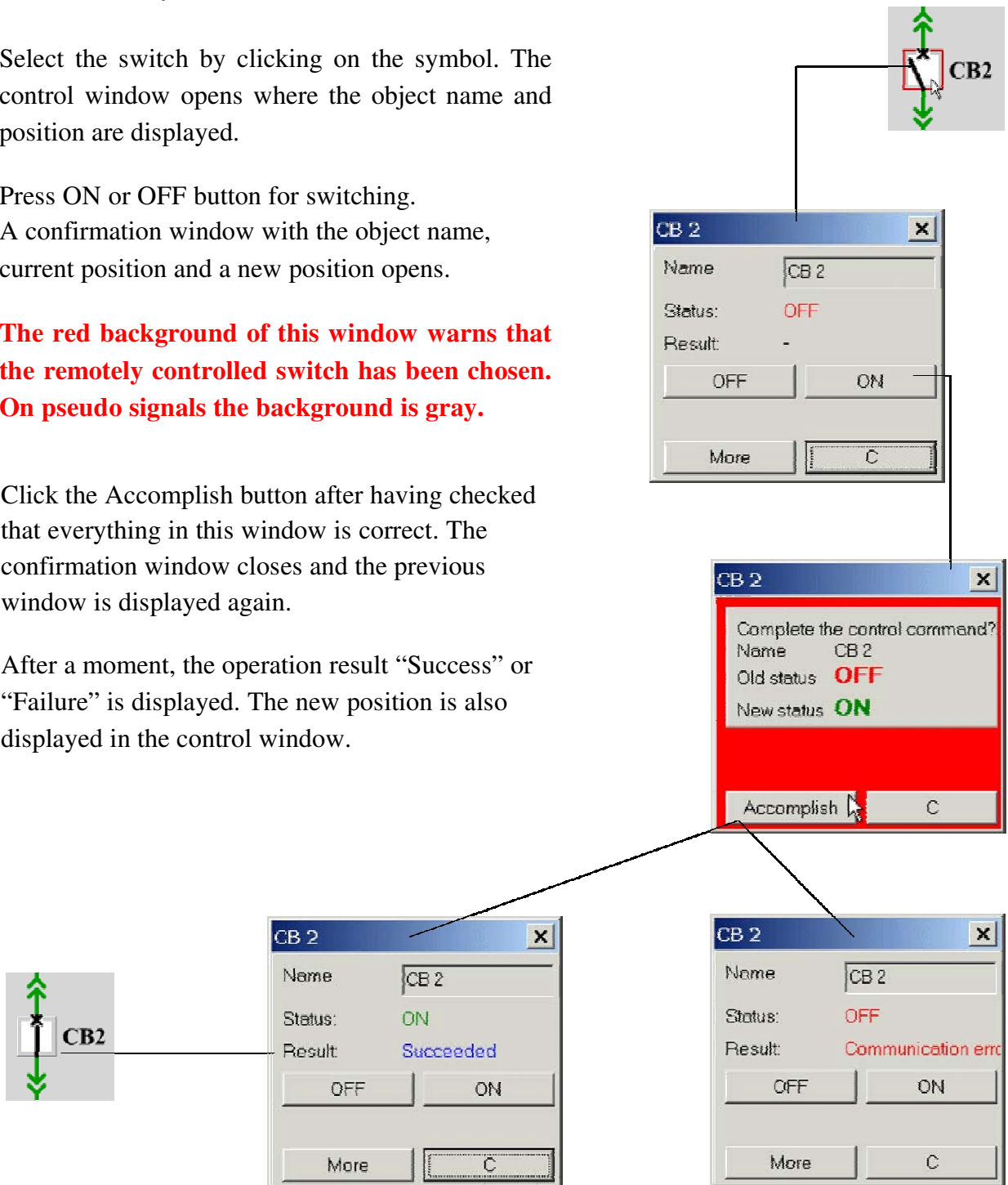
Press ON or OFF button for switching.

A confirmation window with the object name, current position and a new position opens.

The red background of this window warns that the remotely controlled switch has been chosen. On pseudo signals the background is gray.

Click the Accomplish button after having checked that everything in this window is correct. The confirmation window closes and the previous window is displayed again.

After a moment, the operation result “Success” or “Failure” is displayed. The new position is also displayed in the control window.



3.2.2. Forbidding Control Operations

Control operation of switches or other controlled digital signals can be banned. One switch can have more than one ban. Every ban has a description (the reason why the control operation is forbidden) that can be seen in the forbidding window.

To forbid the control operation of some switches:

- Click the “Forbid control” button on the switch management window. The forbidding window opens.

- Insert the text about the cause of forbidding and click the "Send" button. A new text line appears into the forbidding list.

To remove the ban, select the item from the forbidding list and click the “Cancel the ban” button.

The control operation is possible again if all bans are removed.

The text “Control forbidden” is displayed in the switch management window for switches with forbidden control operations. Buttons ON and OFF have inactive statuses.

The 'CB 2' window displays the following information:

- Name: CB 2
- Status: OFF (in red)
- Result: -
- Buttons: OFF, ON, More, and C (highlighted with a dashed border).

The 'CB 2' window displays the following buttons:

- Info
- Forbid control
- Forbid meas.
- Show obj. history
- Back (highlighted with a dashed border)

The 'CB 2' window displays the following information:

- Text input field: Out of order {m}
- Buttons: Cancel the ban, Insert new forbidding text, Send (with a mouse cursor), and Back.

The 'CB 2' window displays the following information:

- Name: CB 2
- Status: OFF (in red)
- Result: -
- Buttons: OFF, ON, More, and C (highlighted with a dashed border).
- Text below buttons: Control forbidden

3.2.3. Forbidding Signals

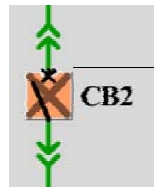
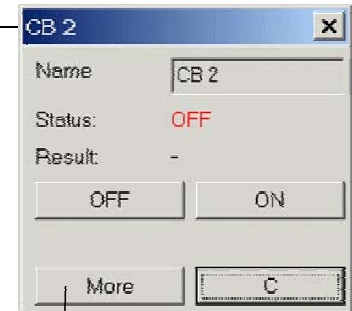
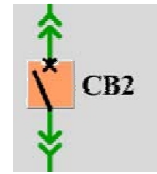
Sometimes signals must be disabled to prevent events overflow.

Select the switch by clicking on the symbol. The control window opens where the object name and position are displayed.

Click the "More" button to open an additional window.

Button "Forbid meas." forbids the measurement. This means that this signal does not create events anymore.

The symbol of the forbidden object is crossed over on the schema; its position and other additional attributes are still displayed.



3.2.4. Switching Pseudo-switches

Pseudo signals are binary objects that are updated only by operators; they are not connected to measurement equipment.

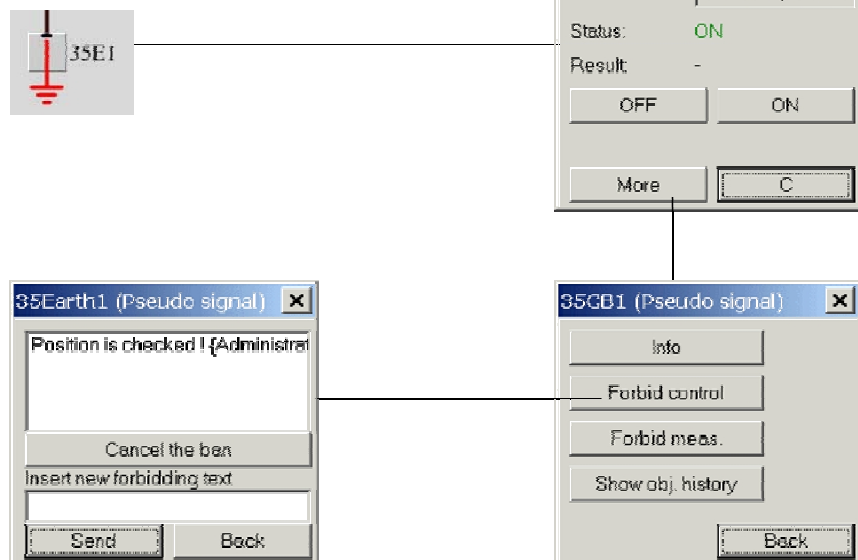
The control operation of pseudo signals is performed in the same way as the control operation of remotely controlled objects. The difference is in the background color of the confirmation window which is gray in case of pseudo-signals.

Press ON or OFF button to switch.

The confirmation window with the object name, current position and a new position opens.

Click the "Accomplish" button. The confirmation window closes and the previous window is displayed again. The new position is displayed in the control window.

The buttons "Forbid control" and "Forbid meas." operate similarly to the remotely controlled switches but these actions are nearly pointless.



3.2.5. Operating with Analog Measurements

The window of analog object is opened after clicking on the object on the schema.

The Info button opens the information window with basic configuration parameters.

The diagram illustrates the workflow for operating with analog measurements. It starts with a schema object '35Uab1' showing '36.8 kV'. Clicking on this object opens a window '35Uab Is' displaying configuration parameters. From this window, the 'Info' button opens a menu with several options: 'Measurements from mem.', 'Measurements', 'Info', 'Send query', 'Forbid meas.', and 'Show obj. history'. Clicking 'Forbid meas.' changes the schema object to '0 kV' with a red background. Clicking 'Show obj. history' opens a 'History: 35Uab Is' window showing a table of measurement events.

History: 35Uab Is

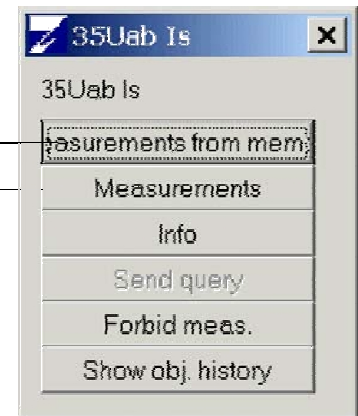
Prior	time	Substation	Name	Status	Value	Ackn. time
statok	*10:43:20	29.11.04 Sub1	35Uab Is	<- Lo	33.60	16:30:11 29.11.04
statok	*10:43:16	29.11.04 Sub1	35Uab Is	<- LoLo	32.90	16:30:08 29.11.04
statok	*10:43:09	29.11.04 Sub1	35Uab Is	-> LoLo	29.56	
statok	*10:43:06	29.11.04 Sub1	35Uab Is	-> Lo	32.45	
statok	*10:42:55	29.11.04 Sub1	35Uab Is	-> LoLo	28.41	
statok	10:41:50.114	29.11.04 Sub1	35Uab Is	<- Lo	33.05	16:30:19 29.11.04

3.2.6. Analog Measurement Trends

The “Measurements” from memory button brings up a table and a graphic of last measurement values from the server memory buffer. The measurement interval for the memory buffer is 1 minute and the period length is specified in server’s configuration.

The “Measurements” button brings up the measurement table and the graphic from the database. The measurement interval for every measurement is separately specified in the configuration database.

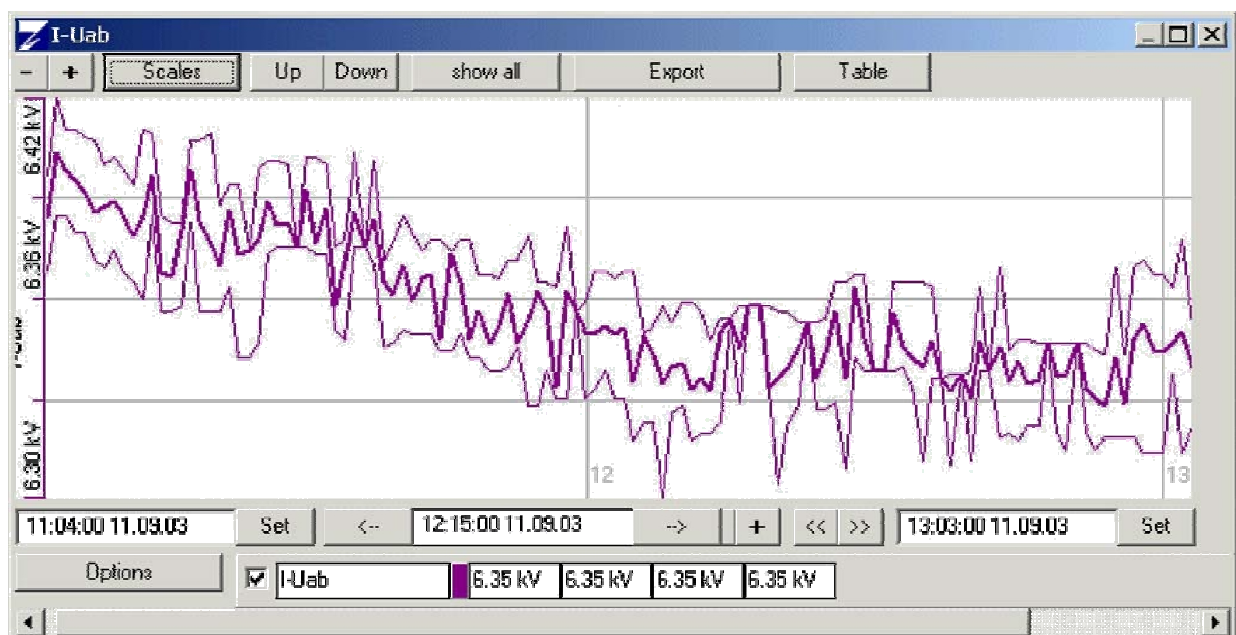
The “Send query” button obtains the values of the last measurement from the lower level controller. This has an effect on Telem RTU modules if the RTU modules have the appropriate configuration.



Table

graph I-Uab 00:00:00 11.09.03 Set 14:00:00 11.09.03 Set Update table Export

Options	I-Ua	Min	Max	Average	I-Ub	Min	Max	Average	I-Uc
00:00:00 11.09.03	3.67	3.67	3.67	3.67					
01:00:00 11.09.03	3.67	3.67	3.67	3.67					
02:00:00 11.09.03	3.67	3.67	3.67	3.67					
03:00:00 11.09.03	3.67	3.67	3.67	3.67					
04:00:00 11.09.03	3.67	3.67	3.67	3.67					



4. Operative Lists of SCADA System

To open an operative list, click on the following buttons:

"Alarms" opens a list of binary signals with abnormal positions and analog measurements with abnormal values. The red color of the Alarms button text indicates the presence of alarms. The amount of active alarms and the total amount of alarms is also presented on the button.

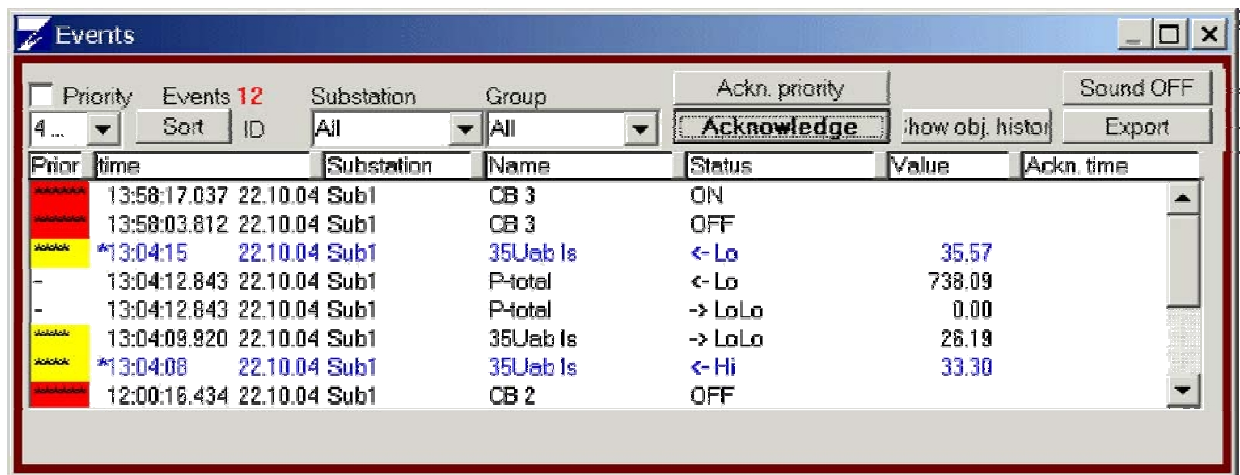
"Events" opens a list of unacknowledged events. The red color of the Events button text indicates the presence of unacknowledged events. The amount of events is also presented on the button.

"History" opens a list of events independent from acknowledgement.



4.1. Event List

To see all the unacknowledged events, choose Events from the menu buttons area.



Event list has records about changes of digital signals and deviations of analog measurements over stated limits. Depending on measurement priority, different alarm sounds can be applied.

Higher priority events are also presented in the events window under the schemas.

Events can be printed out or exported to Excel or text files.

4.1.1. Actions with the Event List

The events can be sorted:

- by a time tag
- by time of reception

The events can be acknowledged:

- by one (button Acknowledge)
- by priority groups (button Ackn. priority)

After event acknowledgement, the event is visible only in the history list.

The events can be filtered:

- measurements
- priority
- by substation -user
- group

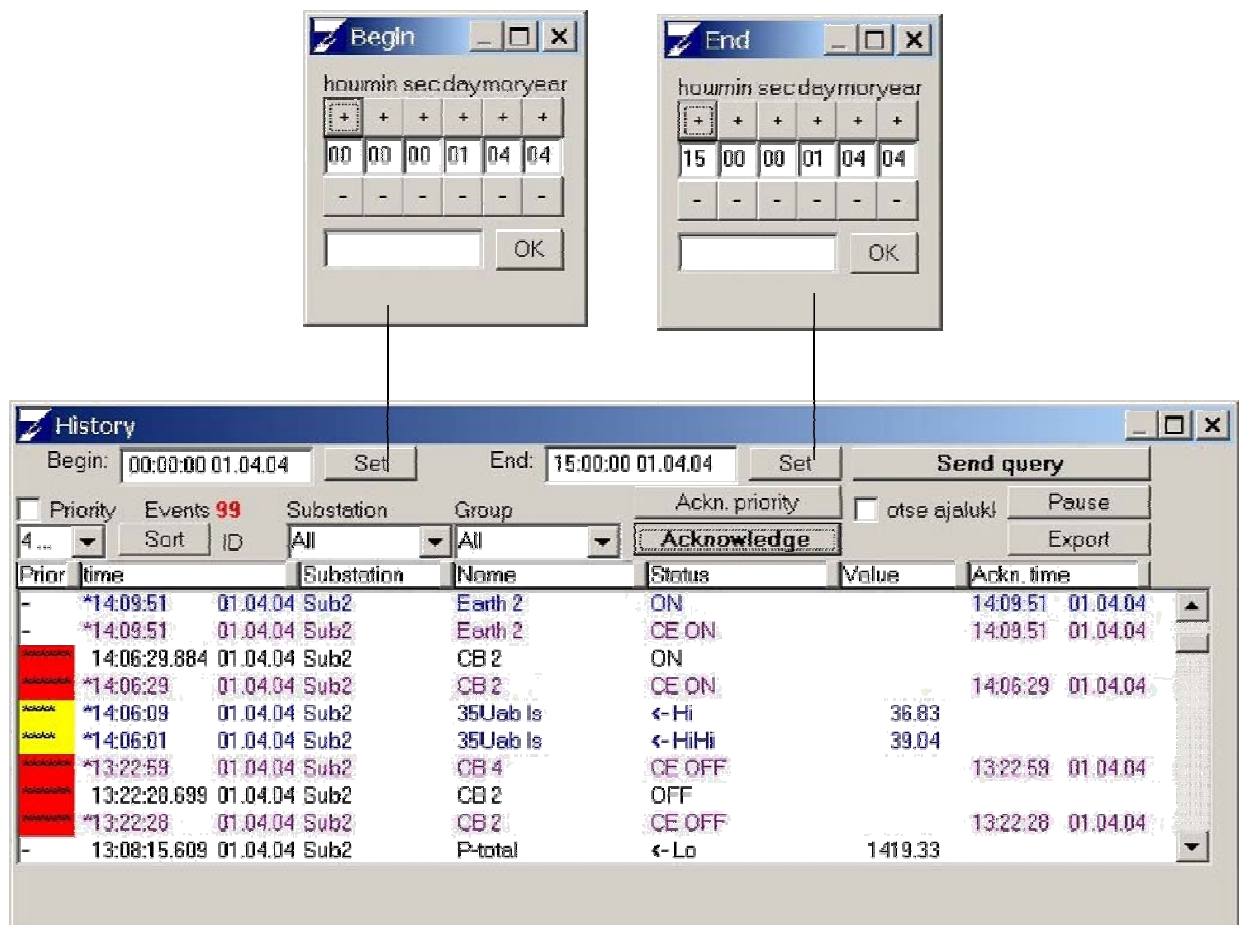


4.2. History List

When opening the history list, data of the current day is displayed. The same sorting and filtering operations are possible as in the event window. Both acknowledged and unacknowledged events are displayed in the history window.

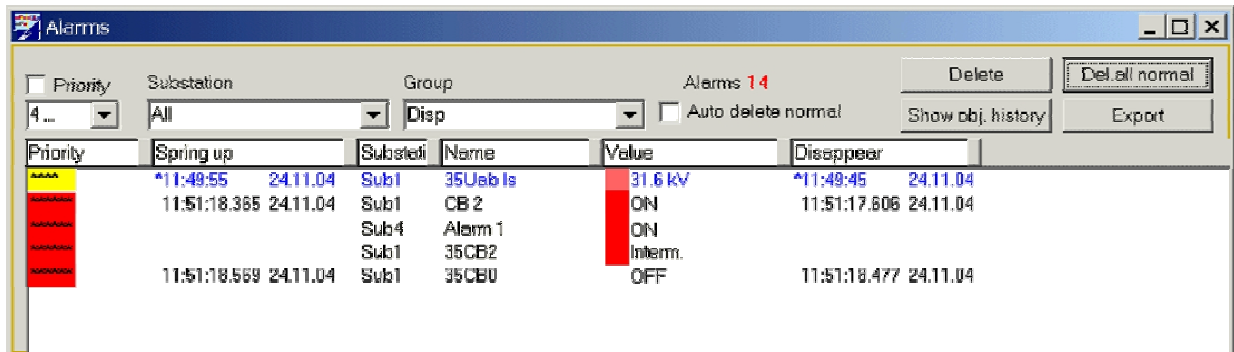
In case of huge event quantity, Pause button can be used for stopping the data flow from the server.

A desired time period can be set for the history window.



4.3. Alarms List

To see the alarms list, choose Alarms from the menu buttons area.



Alarms list has records about abnormal positions of digital signals and abnormal values of analog measurements only if these digital or analog signals are attributed as "alarm" in the database. The records are added to the alarms list if a digital signal changes to an abnormal position or an analog measurement changes over stated alarm or critical rates. If normal status is restored (alarm disappears), the record disappears from list as well ("Auto delete normal" is activated) or the records could be deleted with buttons Delete or Del. all normal. Queries for Priority, Substation or User's Group can be made from the alarm list. A colored square in the value column indicates the active status (abnormal position or value) of this signal.

Alarms can be printed out or exported to Excel or text files.

4.4. Tables and Trends

Analog measurement values are saved to the database with an interval specified on system configuration. For every measurement the instant value and the average, minimum and maximum values of the period are saved.

Users can configure their own tables and trends from these saved measurement values as they like.

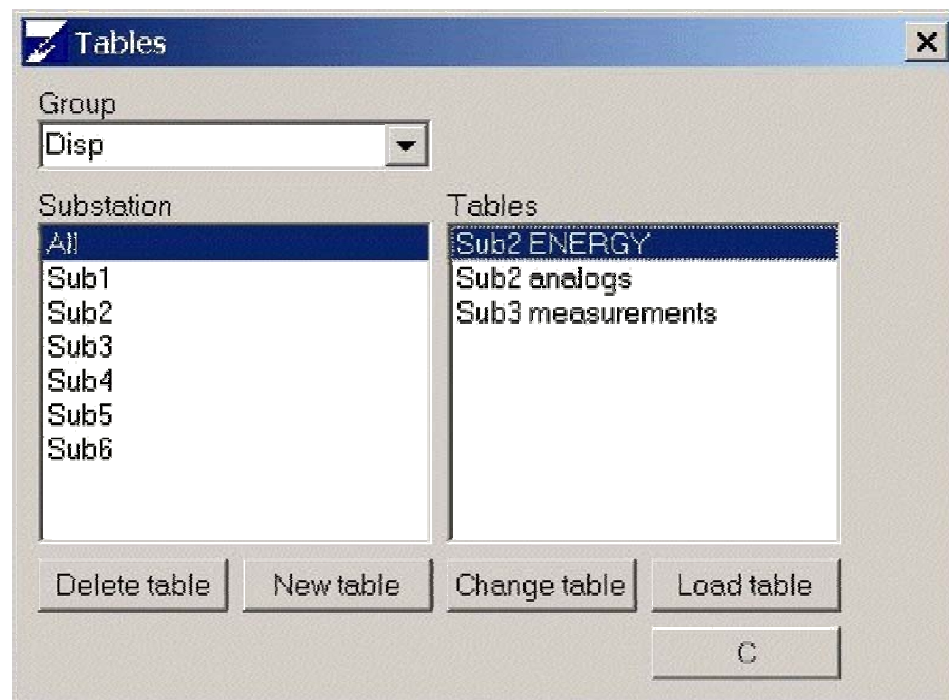
There can be unlimited number of measurements placed to the trends.

One trend window and table can contain the values of up to 16 analog measurements, which makes together with average, minimum and maximum values up to 64 curves on one trend view. The number of measurements on one trend view can be increased on request.

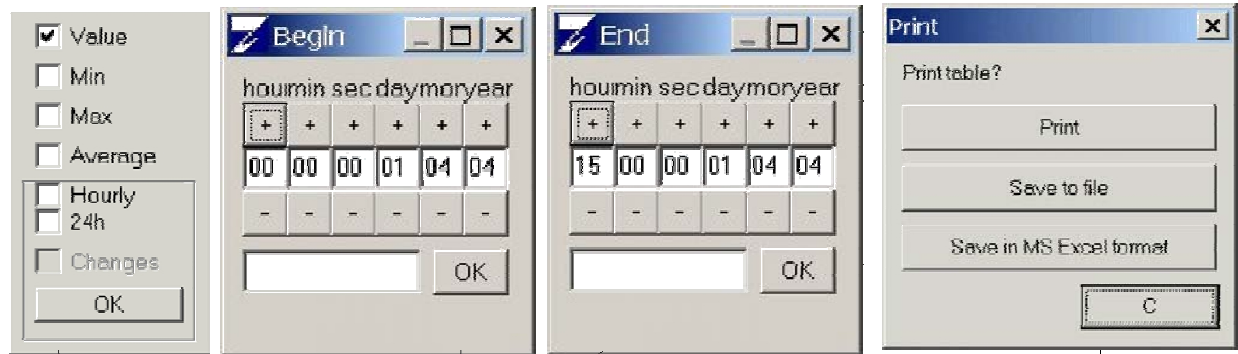
To open a predefined table:

- click the "Tables" button in user's workspace
- select the user group
- choose the substation
- choose the table
- click the "Load table" button

Set the start and end time on the open table; the current day is selected by default.



4.4.1. Actions with Tables



Button "Options" opens a window where desired value types can be chosen

From buttons "Set" the desired time period can be set for the table.

Pressing the button "Update table" loads the table data from the server

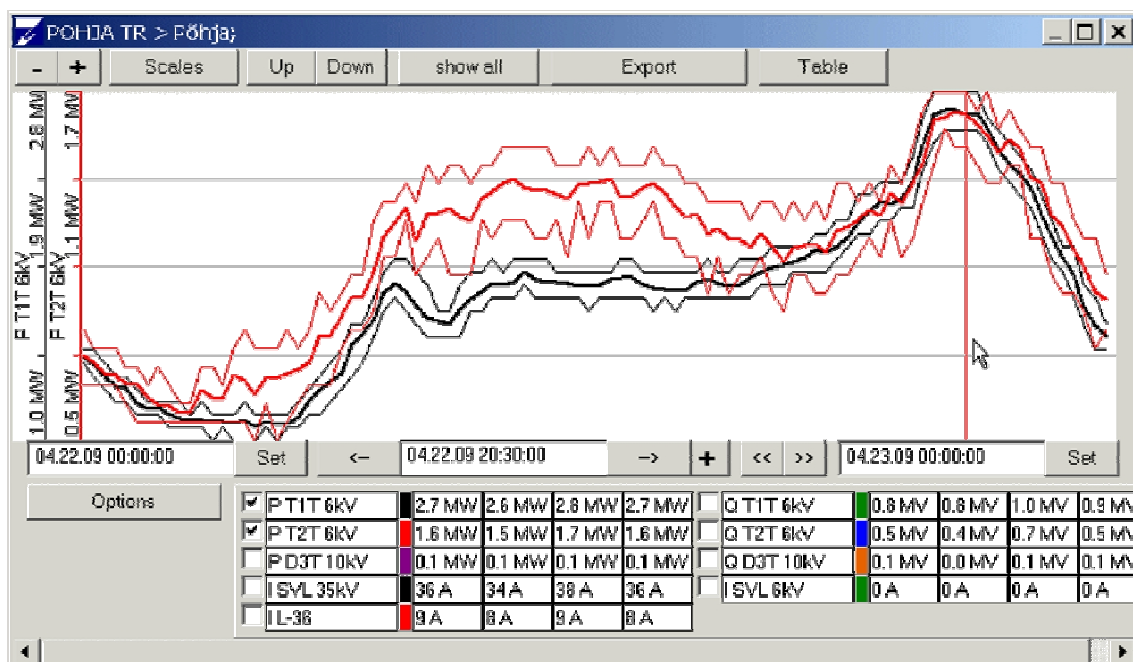
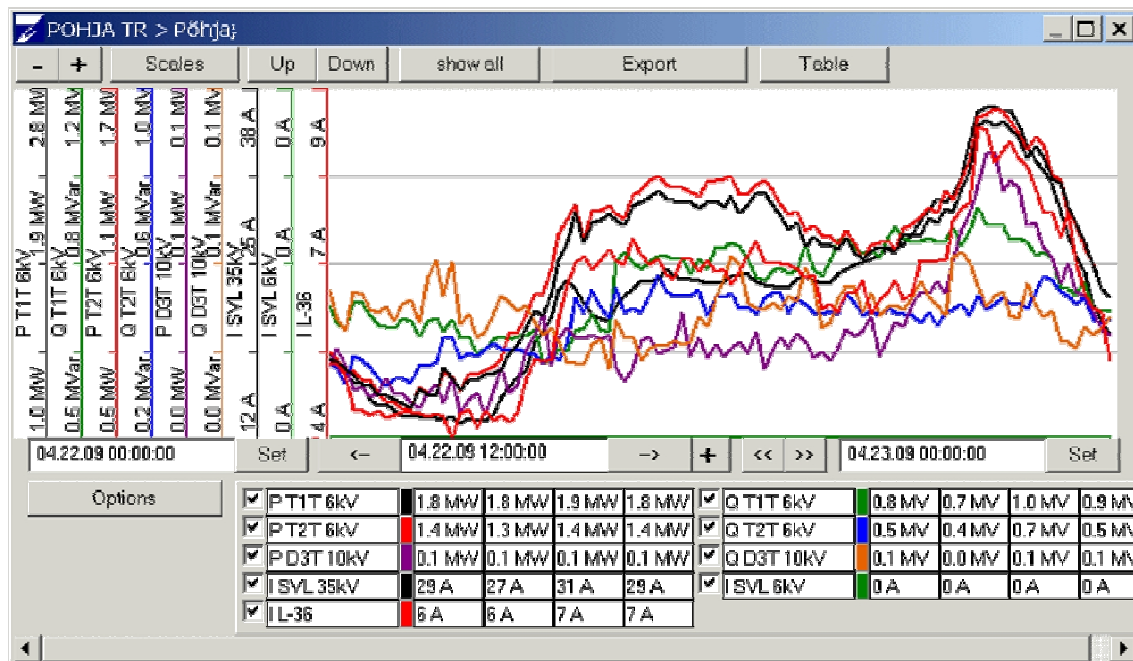
Button "Export" opens a window for printing or saving to a file in text or Excel format.

The main 'Table' window displays a data table with the following columns: Options, I-Ua, Min, Max, Average, I-Ub, Min, Max, Average, and I-Uc. The data is organized into rows representing time intervals. The first row shows values for 00:00:00 11.09.03, and subsequent rows show values for 01:00:00 11.09.03, 02:00:00 11.09.03, 03:00:00 11.09.03, and 04:00:00 11.09.03. The values for I-Ua, Min, Max, and Average are consistently 3.67, while I-Ub, Min, Max, and Average are consistently 3.70, and I-Uc is consistently 3.65.

Options	I-Ua	Min	Max	Average	I-Ub	Min	Max	Average	I-Uc
00:00:00 11.09.03	3.67	3.67	3.67	3.67	3.70	3.70	3.70	3.70	3.65
01:00:00 11.09.03	3.67	3.67	3.67	3.67	3.70	3.70	3.70	3.70	3.65
02:00:00 11.09.03	3.67	3.67	3.67	3.67	3.70	3.70	3.70	3.70	3.65
03:00:00 11.09.03	3.67	3.67	3.67	3.67	3.70	3.70	3.70	3.70	3.65
04:00:00 11.09.03	3.67	3.67	3.67	3.67	3.70	3.70	3.70	3.70	3.65

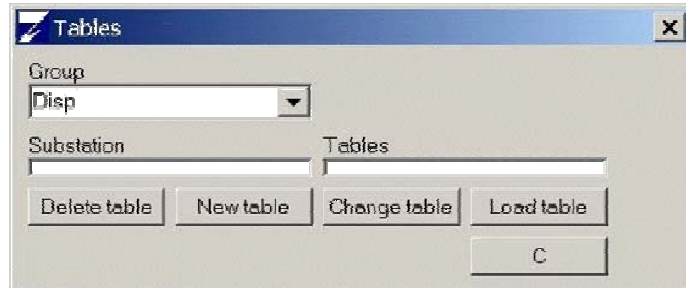
4.5. Trends

When clicking the "Graph" button on the table, data from the table can be viewed in form of trends.



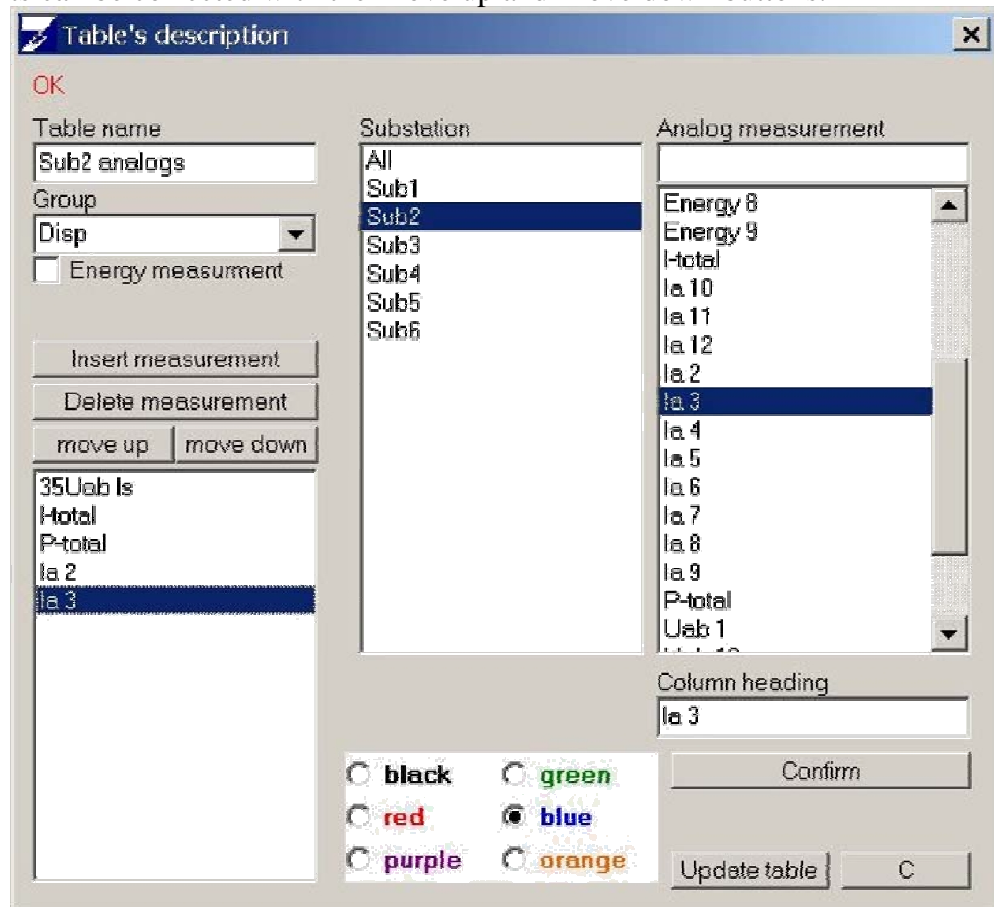
4.6. Configuring a New Table

Click on the “New table” button:



- Insert the Table name
- Change the user group, if needed
- Press the Insert measurement button
- Choose the Substation; after this the measurements of this substation are displayed - Choose the measurement
- Choose the trend color for this measurement
- Change the column name (measurement name for the trend and the table), if needed
- Click the Confirm button

Inserted measurements are placed on left side of window in the list. The sequence of measurements can be corrected with the Move up and Move down buttons.



To end configuration, click "Update table".

4.7. Queries

System has prepared database queries to get various information about measurement items. Main menu has a button for opening the window of standard queries.

To make a query:

- Select the query type:
 - digital or analog measurement
- Select the substation, user group and priority level
- Mark other filtration conditions
- Click the “Send query” button and see the result in the form of a table

Queries

Send query:

☒ Digital measurement
☐ Analog measurement

Substation: All
Group: All
Priority: 4 ...

Filter

☒ out of normal status
☒ out of alarm
☒ out of knit
☒ measurment forbidden

Send query

Digital measurement

14:25:25 01.04.04: Export

Name	Substation	Status	Noramal stat	Pseudo
CB 2	Sub2	ON	ON	
CB 3	Sub2	OFF	ON	
Sub1 c13 comm.	Sub1	Intern.	OFF	
Sub1 c14 comm.	Sub1	Intern.	OFF	

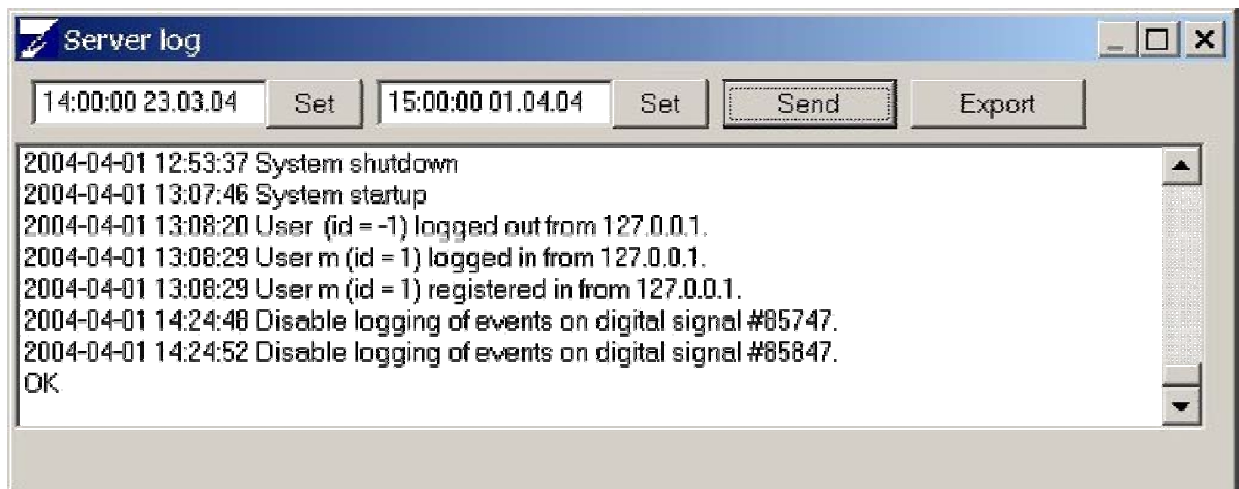
4.8. System Log

System log contains records about various system statuses and events. It is mainly needed for system maintenance. To open the log window, click the menu buttons More / System log.

System log includes the following events:

- Client computer logins and logouts
- Registered dispatchers
- Failed connections with clients and data concentrators
- Attempts of unauthorized connections and logins with client's IP address

System log can also be exported to Excel or text file.



5.1. Schema-Control Panel

Panel for control of graphical schemas is located in the left-top corner of the window. This panel allows you to open substation schemas and configure their views. User can choose between 2 modifications of control levels:

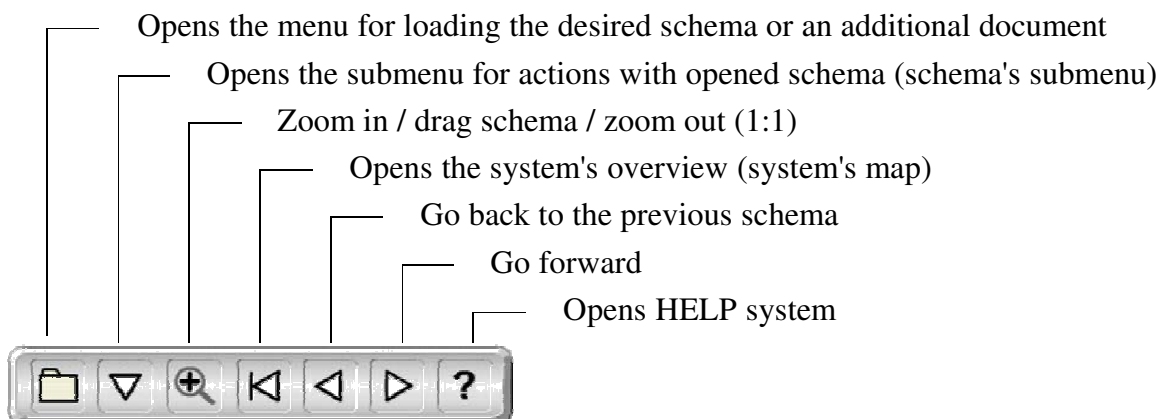
- control.swf - for small system
- control_3x100fof.swf - allows you to show schemas (files) or folders on 3 levels.

The use of both modifications is similar. The following description explains the features of control_3x100fof.swf.

Schema-control panel is used for:

- Loading schemas or other documents and pictures
- Moving back and forward between schemas
- Zoom in, drag and zoom to 1:1 (can also be chosen with the right mouse button)
- Hiding and showing element groups (schema layers): ground switches, current measurements, energy measurements etc.
- Hiding and showing additional measurement panels
- Adjust background brightness
- Save the changed view settings of the schema to a file (saves only for the current client's PC). Next time the schema is opened, the saved settings are used.
- Save the view of the currently displayed schema symbol status to a file (saves only for the current client's PC).
- Open the view of the schema symbol status from the file.
- Turn line coloring ON/OFF
- Turn Test window ON/OFF (only for system administrator during the testing period)
- Print schema (with white background)
- Open Telem-SCADA Help system

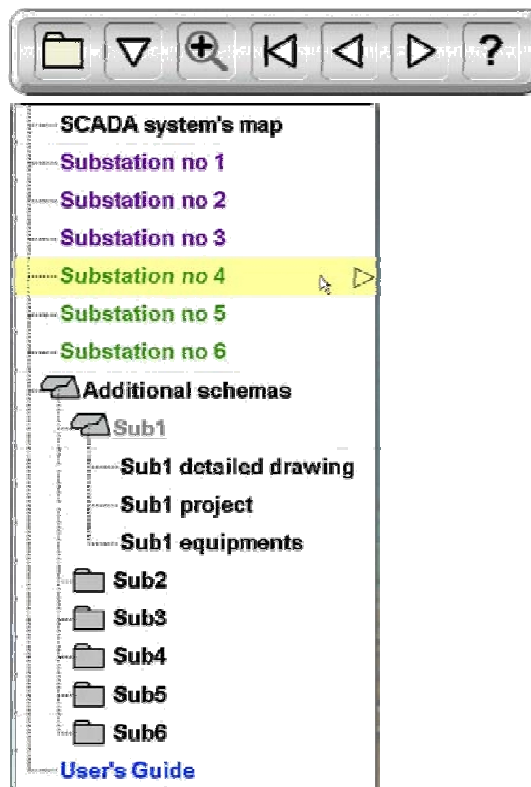
5.2. Using Schema-control panel buttons:



5.3. Choosing a Schema from the Schema-Control Panel's Menu

- Open the menu for loading the desired schema or an additional document from the button with a folder icon
- Clicking on the right side of the menu item opens the chosen schema
- If the folder icon is displayed on the left side of the item then clicking on it opens or closes this folder

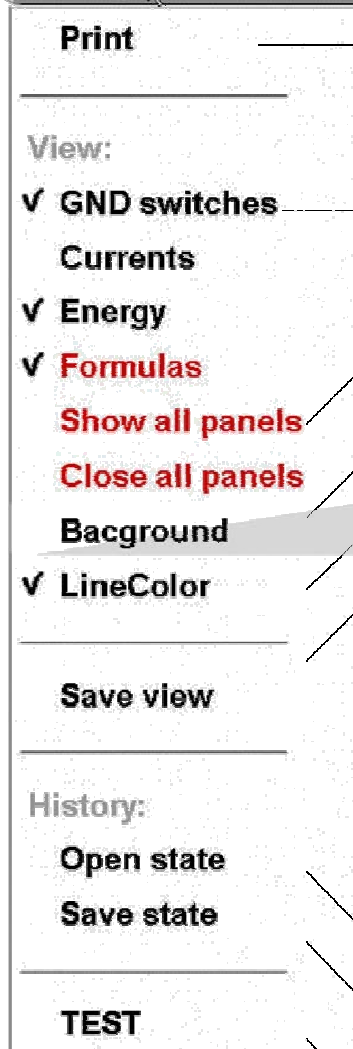
Clicking on the right side of the menu item with the folder icon also opens a schema.



5.4. Using the Submenu of the Schema-Control Panel

The submenu of the schema-control panel allows you to configure the view of substation schemas and performs printing and file systems actions:

- Print schema (with white background)
- Open/close "layers". Layers with special names are displayed with different color
- Adjust background brightness
- Save the changed view settings of the schema to a file (saves only for this client's PC)
Next time the schema is opened, the saved settings are used.
- Turn Test window ON/OFF (only for system administrator during the testing period)



Print — Print the current schema

Some schema symbols can be grouped into layers. Visibility of these groups is controlled by the "View" section in the schema control menu. Menu contains only the names of the layers that exist on the current schema.

Items "Show all panels" and "Close all panels" appear dynamically if the action is possible (additional panels exist).

Show all panels — Change the background brightness of the schema.

Close all panels — Turn the line coloring feature ON or OFF for the current schema.

Background — Save the setting of the current schema configured with the "View" section in the control menu (for this client's workstation only). Next time this schema opens using the saved configuration.

LineColor — If line coloring (Linecolor) is turned on, you can save the schema view to history. In this case all the current switch positions and analog measurement values are saved to the file (only for this client's PC). The default file name consists of the current date, time and the schema name.

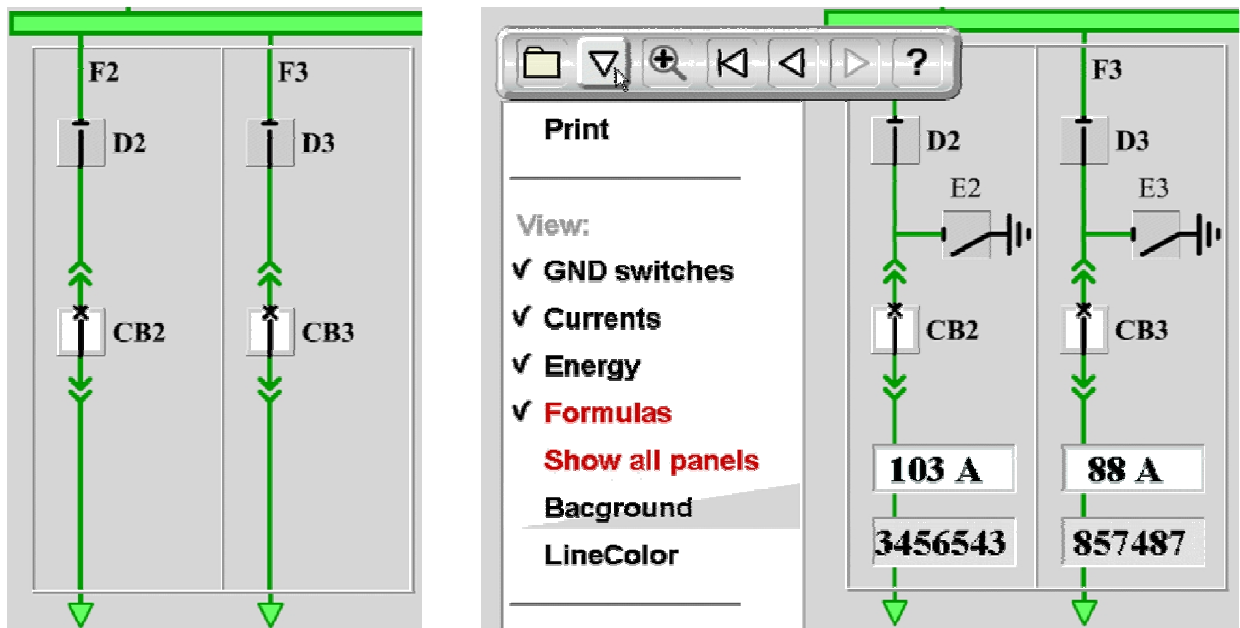
Save view — Open the previously saved symbol states of the current schema from the file (for this client's workstation only).

History: — Save the current symbol states of the current schema into a file

Open state — Enable or disable the "Test" panel (for system administrator only)

5.4.1. Controlling layers

Visibility of layers is controlled by the "View" section in the schema control menu. The menu contains only the names of these pseudo layers that exist on the current schema.



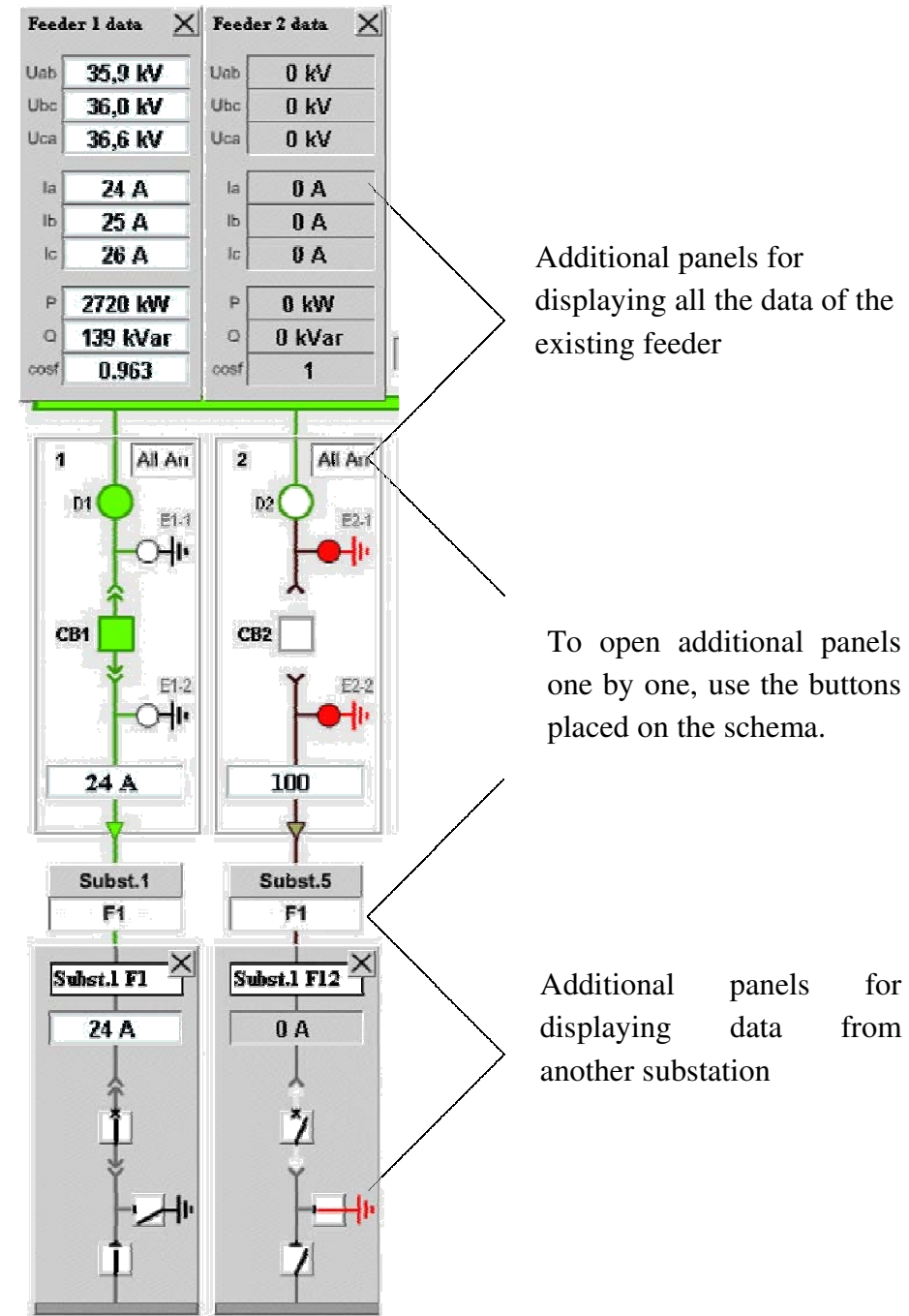
A schema with hidden layers

The "GND switches, Currents and Energy" layers are displayed

5.4.2. Controlling Additional Panels

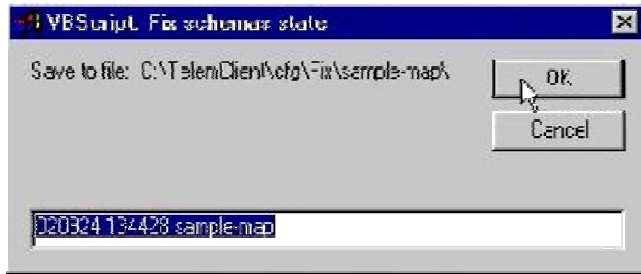
Additional panels are used for displaying more information about the feeder on this schema or getting rapidly data from another schema (substation).

Menu items "Show all panels" and "Close all panels" on the Schema-control panel allow you to open and close all the panels at the same time.



5.4.3. Saving the Status of Schema Symbols into a File

If line coloring (Linecolor) is turned on, you can save the view of schema symbol status to a history file. In this case all the current switch positions and analog measurement values are saved to the file (only for the current client's PC). The default file name consists of the current date, time and the schema name.



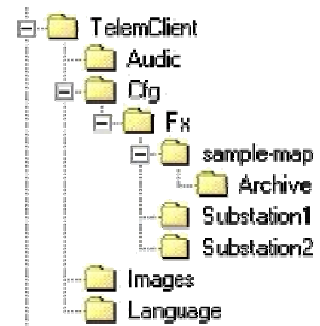
File name can be edited:



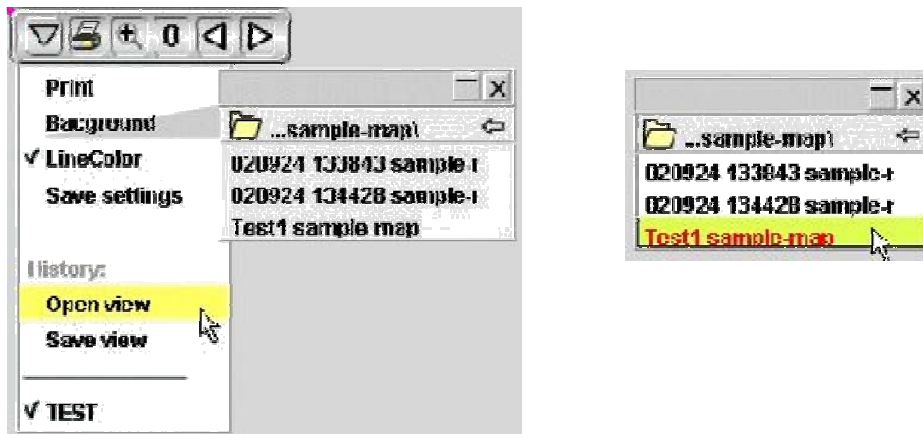
Maximum number of schema view files saved with the default name is 10. If you save the 11th schema file with the default name, the oldest file whose name starts with a number will be automatically deleted. View files with edited names (name starts with a letter) can only be deleted manually.

All the view files of one schema are saved to the client PC into the folder `C:\Telemclient\cfg\fix\[schema name]`. History views of schemas can also be opened from subfolders but moving files to subfolders can only be done manually.

View files of the schema “sample-map” are saved to this folder. These files can be manually moved to subfolders from where the program is capable to read them.



5.4.4. Open the Status of Schema Symbols from the File



Note:

If the schema's history view is opened, the clock in the schema's corner displays the time when this view was saved.

Second click on the chosen history item will offer the possibility to delete this item:

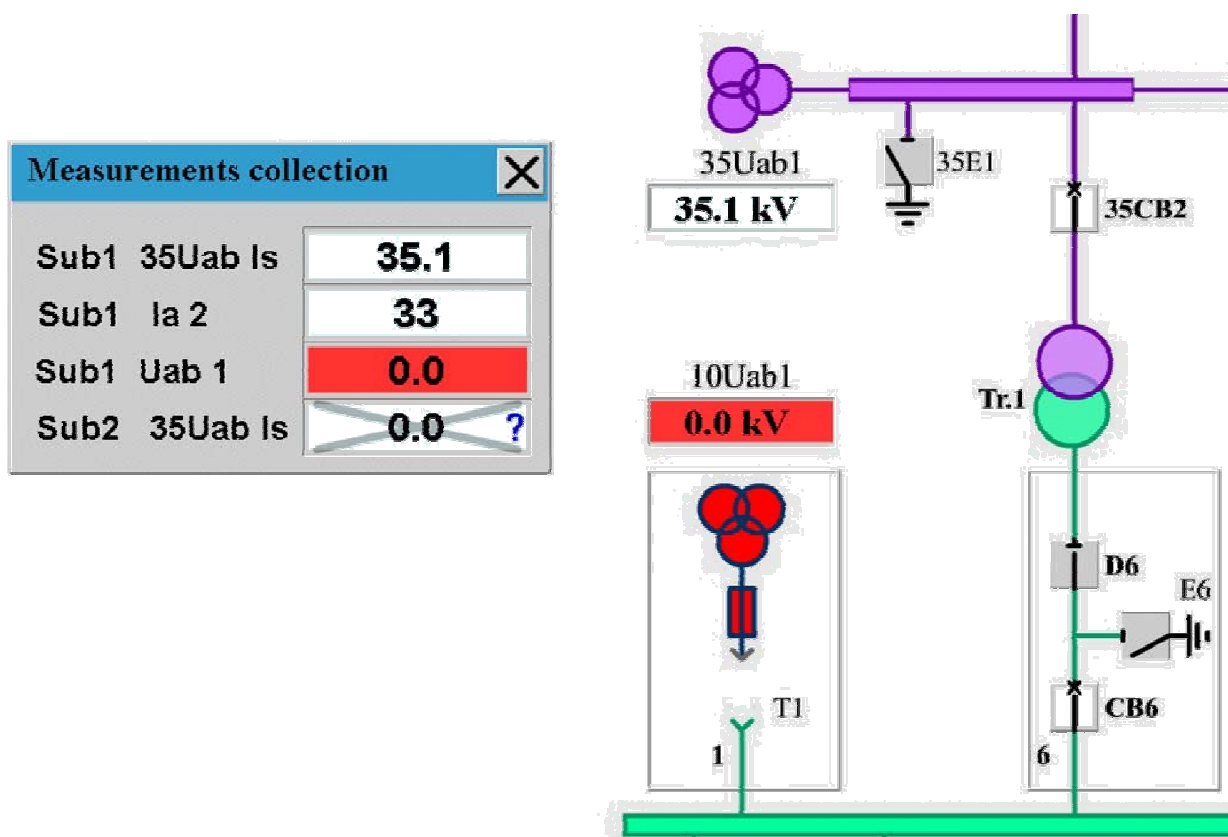


5.5. Measurements Collection

Measurements collection is an additional panel for displaying some measurement values chosen from any schema.

"Drag out" operation with the measurement symbol opens this panel with the first measurement in the collection.

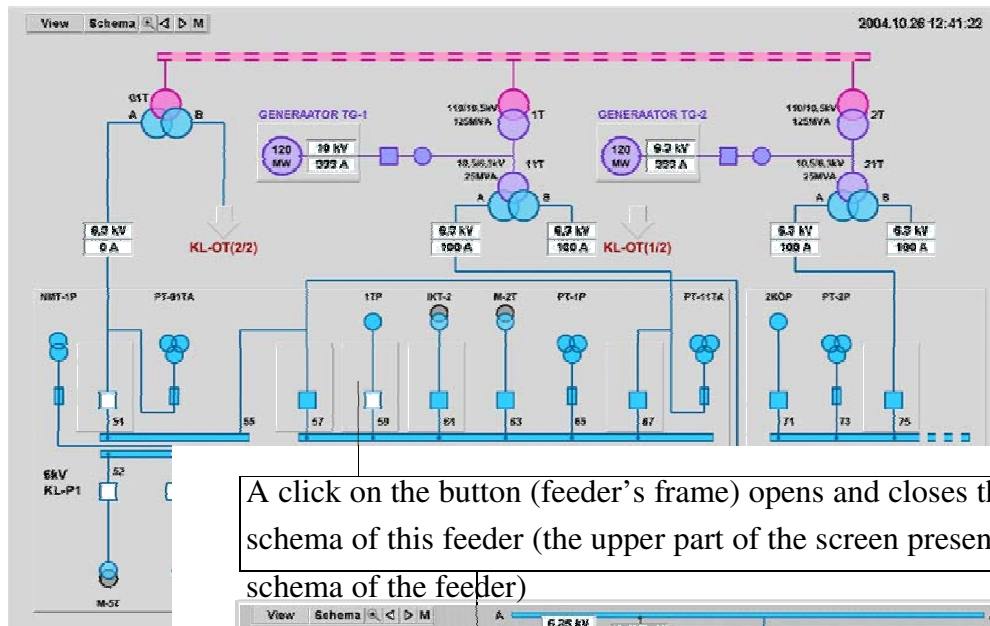
"Drag out" operation with the next measurement symbol adds the next measurement into the collection. Measurements collection panel stays on any schema until it is closed.



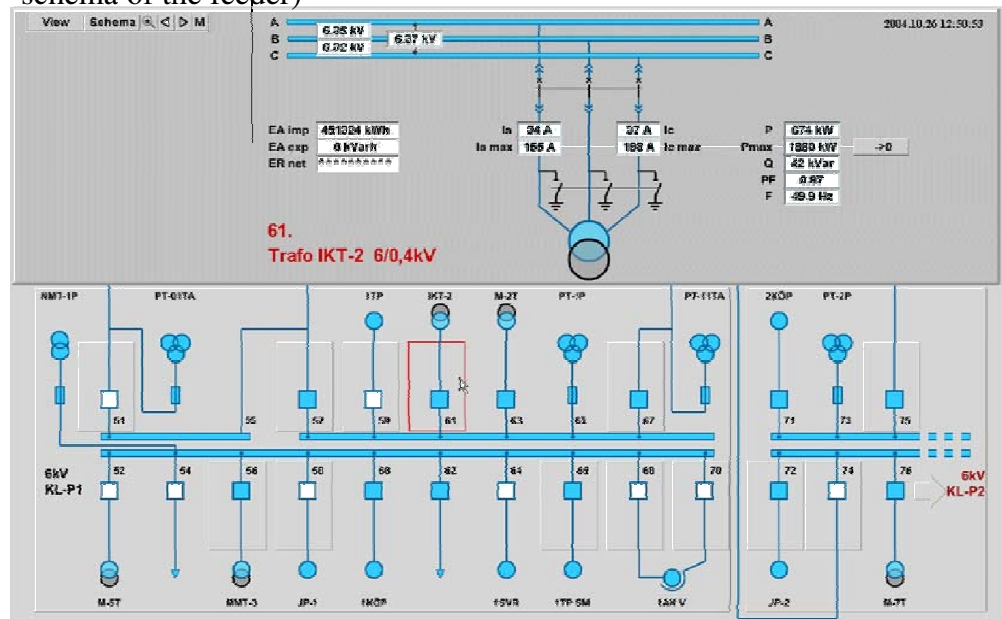
5.6. Additional Schema

An additional schema is useful for displaying the detailed part (feeder) of the schema. The additional schema has all the main schema's properties and options but its size is usually smaller than that of the main schema. If the additional schema is opened, the main schema also stays visible.

A click on special link symbols opens and closes the corresponding additional schema



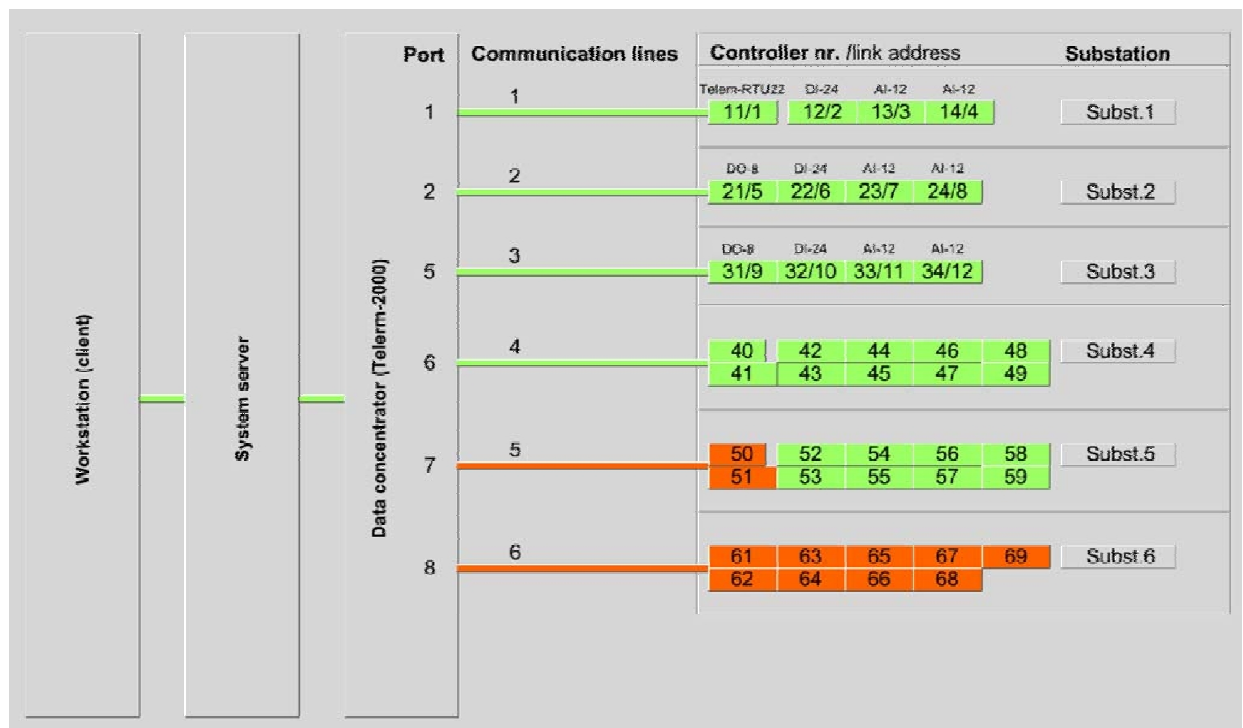
A click on the button (feeder's frame) opens and closes the additional schema of this feeder (the upper part of the screen presents a detailed schema of the feeder)



6. Examples

6.1. A schema of Communication Status

A schema of communication is useful for displaying overview of system's communication lines and device statuses. This example displays the statuses of communication lines and RTUs with corresponding color.



6.2. An Illustrative Schema of Devices

This schema illustrates LEDs of substation devices and statuses of other indicators.

