

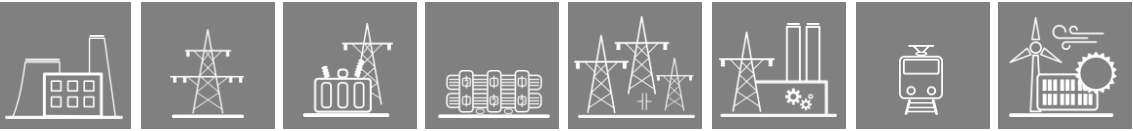
## APPLICATION GUIDE

# EuroProt+ Operating Manual with Troubleshooting Guide



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PROTECTION, AUTOMATION AND  
CONTROL FOR POWER INDUSTRY



VERSION INFORMATION

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1.0	2020-02-18	First published version	Zsarnai, Erdős
1.1	2020-03-03	Internal Fault Relay operation description added	Erdős
1.2	2020-08-14	Information about checking the hardware in the status/log menu added	Erdős
1.3	2021-04-13	CDSP 1560 new features added: <ul style="list-style-type: none"><li>• LED-test (T) icon introduced on the main LCD screen</li><li>• Extended password handling information added (password requirements, login session)</li><li>• Optional field for PRP/HSR CPU added</li><li>• Buttons of PMU functionality added</li></ul>	Erdős



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## USED SYMBOLS



Additional information



Useful information for settings.



Important part for proper usage.

## 1 Introduction

The **EuroProt+** type complex protection in respect of hardware and software is a modular device. The modules are assembled and configured according to the requirements, and then the software determines the functions. This manual describes the common properties of the numerous possibilities. It also provides technical guidance to operate the device locally with the LCD and remotely with a web browser. The individual characteristics of the specific applications are described in the manuals of the factory configurations.

## 2 Starting the device

In order to meet the device at the first time, this chapter provides information for new users to secure a safe first start-up of the device.

### 2.1 The hardware modules of the device

For technical details of the modules of the **EuroProt+** type complex protection please see the document “**Hardware description**”. The applied modules for a certain application are listed in the corresponding “**Configuration description**” document. These documents are available online on the Protecta website by selecting the desired product.

### 2.2 Fast startup

The CPU module of the device is equipped with two processors: one for performing the application functions (RDSP), the other one for processing the communication tasks (CDSP).

After powering up the device, the RDSP processor starts-up with the previously saved configuration and parameters. Generally, the power-up procedure for the RDSP and application functions takes approx. 4-5 sec. During this time the “Status LED” (see Figure 3-1) is red. If the protection functions are ready for operation the red LED turns to green, the fault relay NO contact closes (3-4 or 5-6) and the device is ready to trip after this short period. During the restart procedure after a new downloaded configuration the LED is also red for a short time. Latched red LED however means general error. In this case the protection functions are not available.

The CDSP's start-up procedure is longer, because its operating system needs time to build its file system, initializing user applications such as HMI functions and IEC61850 software stack. The availability of the touch screen of the front panel after about 25-30 seconds indicates successful termination of the start-up procedure.

### 3 Local operation on the front panel

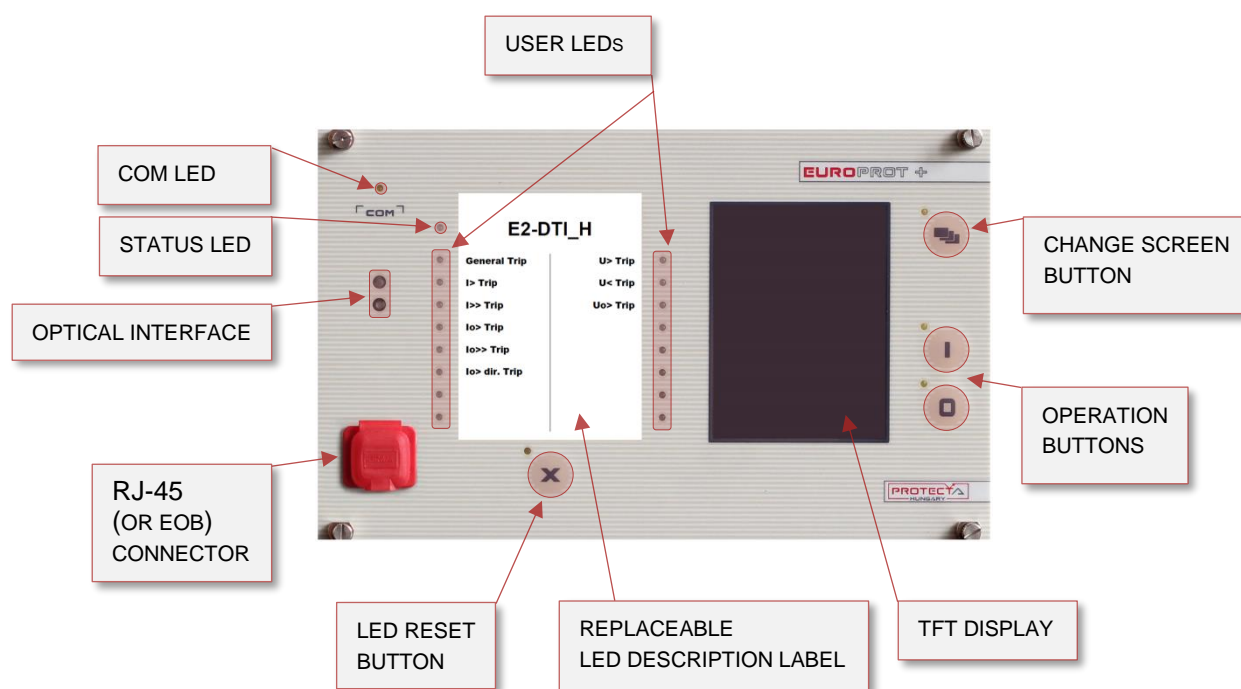


Figure 3-1 The front panel of the device

#### 3.1 The structure of the human-machine interface of the device

The EuroProt+ device HMI on the front panel contains the following elements:

Table 3-1 The elements of the front panel

FUNCTION	DESCRIPTION
User LEDs (16 pcs)	Three-colors, 3mm circular LEDs programmable by the user.
COM LED (1 pc)	Yellow, 3mm circular LED indicating front panel communication link and activity
Touch button LEDs (4 pcs)	Yellow, 3mm circular LEDs indicating touch button actions
Status LED (1 pc)	Three-color, 3mm circular LED Green: normal device operation Yellow: device is in warning state Red: device is in alarm state
Touch buttons (4 pcs)	Capacitive touch buttons (On/Off Operation, Change Screen, LED acknowledgement), see Chapter 3.2 for details.
Buzzer	Audible touch button pressure feedback
Changeable LED description label	Describes user LED functionality
3.5" or optional 5.7" display	320*240 pixels TFT display with resistive touch screen interface
Optical interface	This interface is made for EOB connection, and/or serves as a service port for Protecta personnel only.
RJ-45 connector	Supporting 10/100Base-T Ethernet connection

EOB connector (option)	<p><b>Ethernet Over Board:</b> communication interface accomplishes isolated, non-galvanic Ethernet connection with the help of a magnetically attached EOB device. This is a proprietary and patented solution from Protecta Ltd.</p> <p><b>EOB1:</b> Supporting 10Base-T Ethernet connection. Passive device with one RJ45 type connector. <u>Obsolete module.</u></p> <p><b>EOB2:</b> Supporting 10/100Base-Tx Ethernet connection. An active device that has a USB port in addition to the RJ45 connector for powering up. <u>All EOB topics in this manual are referring to <b>EOB2</b>.</u></p>
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## 3.2 Using the touch buttons

The main screen of the local LCD together with the red marked “Change screen button” and the “Operation buttons” is shown in the picture below.



Figure 3-2 The main screen

**Change screen button** - This hardware button changes the currently displayed screen for the subsequent one. The available screens and the order in which they appear by default are: the main screen, parameters, on-line, events, system settings and the custom screens which can be added by the user with the help of the EuroCAP software. The order can be changed in the LCD editor in the EuroCAP configuration tool. When pressing the “**Change screen button**” – as an example - the windows shown in Figure 3-3 can be seen and applied one-by-one, cyclically.



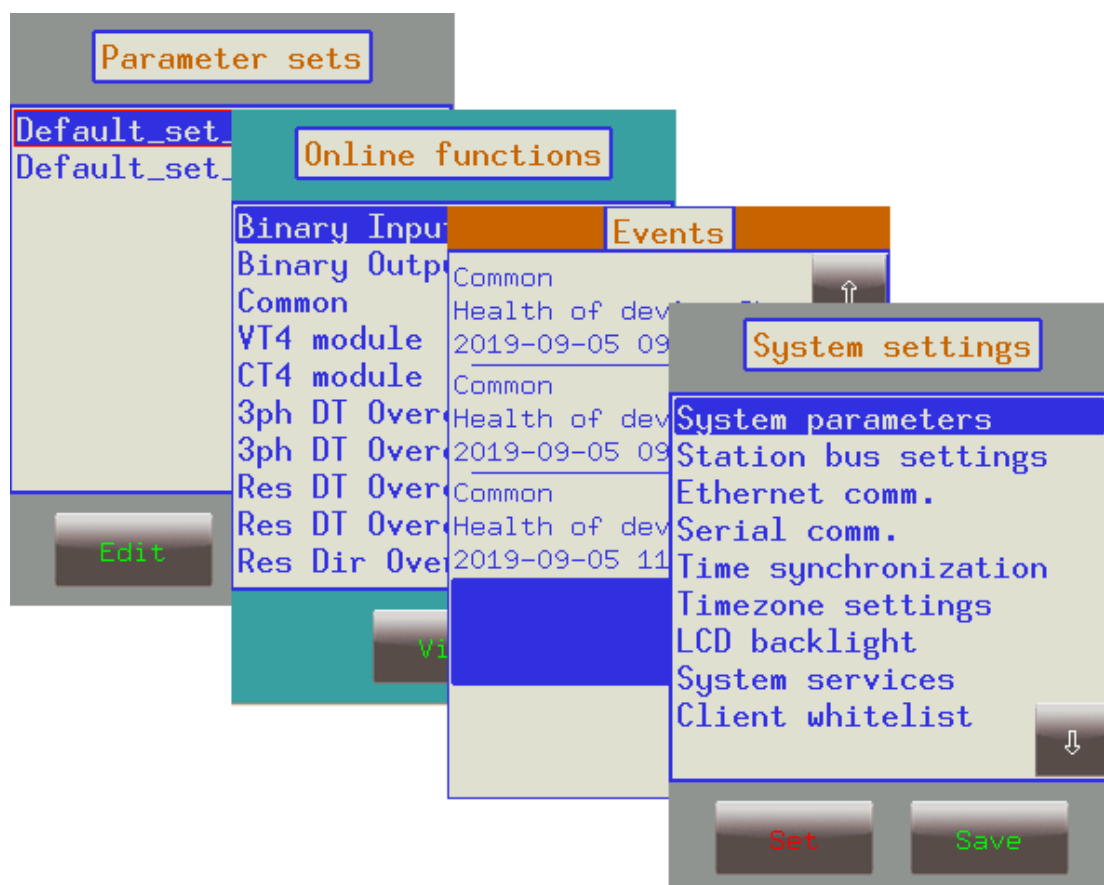


Figure 3-3 Default menu screens (excluding the main screen) displayed on the LCD

Touch the navigation icons or the displayed text lines to perform any actions via the LCD screen.

**Operation buttons** - These buttons can be used to define certain functions on customer-defined windows. For example, the user can set up these buttons to turn on/off a circuit breaker or increment/decrement the position of the tap changer of a transformer. For more information, please refer to the User-defined/Custom screen section.

**LED reset button** - This button resets all the user LEDs. The user may configure other means for this button as well by programming the 'Ackbutton' output of the Common function block with the EuroCAP software, see their external descriptions for more details.

### 3.3 Using the menu provided by the touch screen

The touchscreen is the main control area where the user will enable functions and input values by touching the screen. The touchscreen can be also remotely accessed and controlled through the web interface (for more information see the corresponding sections in the remote user interface).

#### 3.3.1 The main menu



**Lock icon** – The factory setting of the device excludes the password protection function. When touching this icon, the picture changes, enabling the modification of parameters and system settings. If limitation by password protection at operation is needed, the password application can be set via web interface. In this case the icon changes only if the correct password is entered.

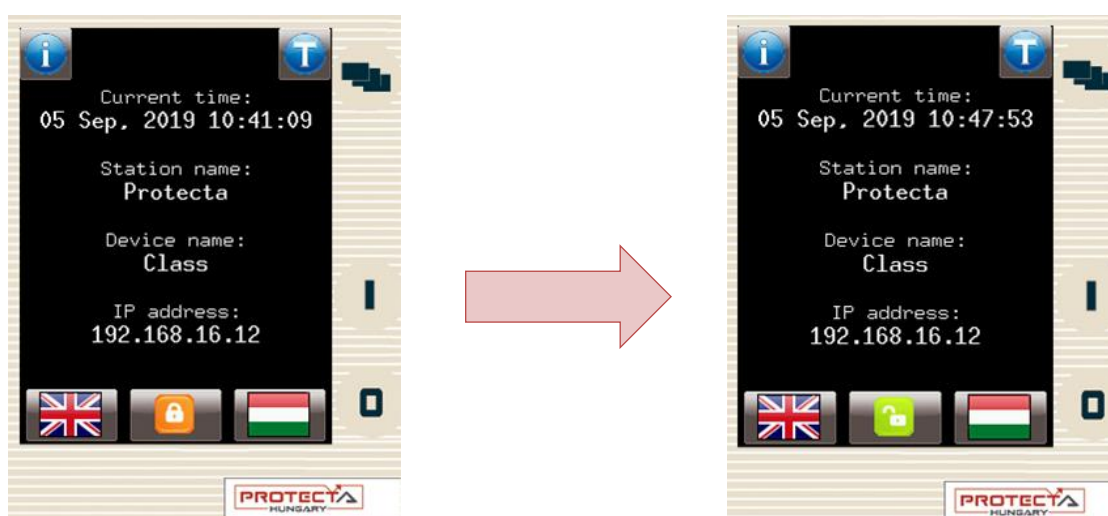


Figure 3-4 Changing the lock icon

**Default/secondary languages (optional)** - If available, the user can change the language of the device by pressing the corresponding flag. With this, the language will change (provided that the translations exist) on the following objects:

- remote web interface
- all menu points
- newly generated events
- newly created disturbance records
- device messages (e.g. command confirmation)



Note: if the language is changed by using the button on the web interface (see Chapter 4.2.1), it will change on the web interface only; the other parts from the list above will remain as they were set here

**Information button** – By pressing the “i” button located on the top left corner of the main screen, additional information is displayed as shown in Figure 3-5. The “T” button (available with CDSP version 1560 or higher only) starts the front panel LED test (see Chapter 4.2.10.3).



Figure 3-5 Additional information on main screen

### 3.3.2 The parameters menu

In this screen, the user can view, set and edit certain parameters within the device. The user can also choose which parameter set the device should use; this is done with the “Activate” button. The currently active parameter set has a red box around it (first set in the picture below).

In order to edit or activate a parameter set, touch its name first to select it: it will be highlighted in blue. Then touch the “Edit” or “Activate” button accordingly.

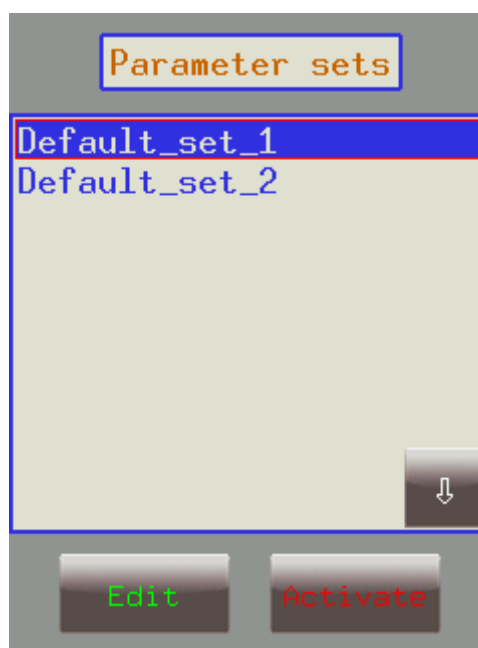


Figure 3-6 Parameter sets

**Activate button** - Activates the selected parameter set so the device will use those values. The activated parameter set will have a red box around it. Only devices configured with multiple parameter sets have an activate button. Note: if the parameterset change has a condition configured to it, the activation button will disappear. In this case, activation of the parameter sets is defined in the device configuration (e.g. binary input or software switch).

**Edit button** - This button takes the user to another screen listing the available function blocks (FBs).

The screen in Figure 3-6 will only appear if there are more than one parameter sets. Otherwise, the user is immediately taken to the function blocks. Normally, the various function blocks appear in blue. In case someone has changed a certain value within a given function block, the name of the function block in this menu item will turn red to notify the user. Within function blocks, the values of the parameters are normally green, but if they have been modified, they will also turn red. As an example, change the VT4 voltage type from 200V to 100V as follows:

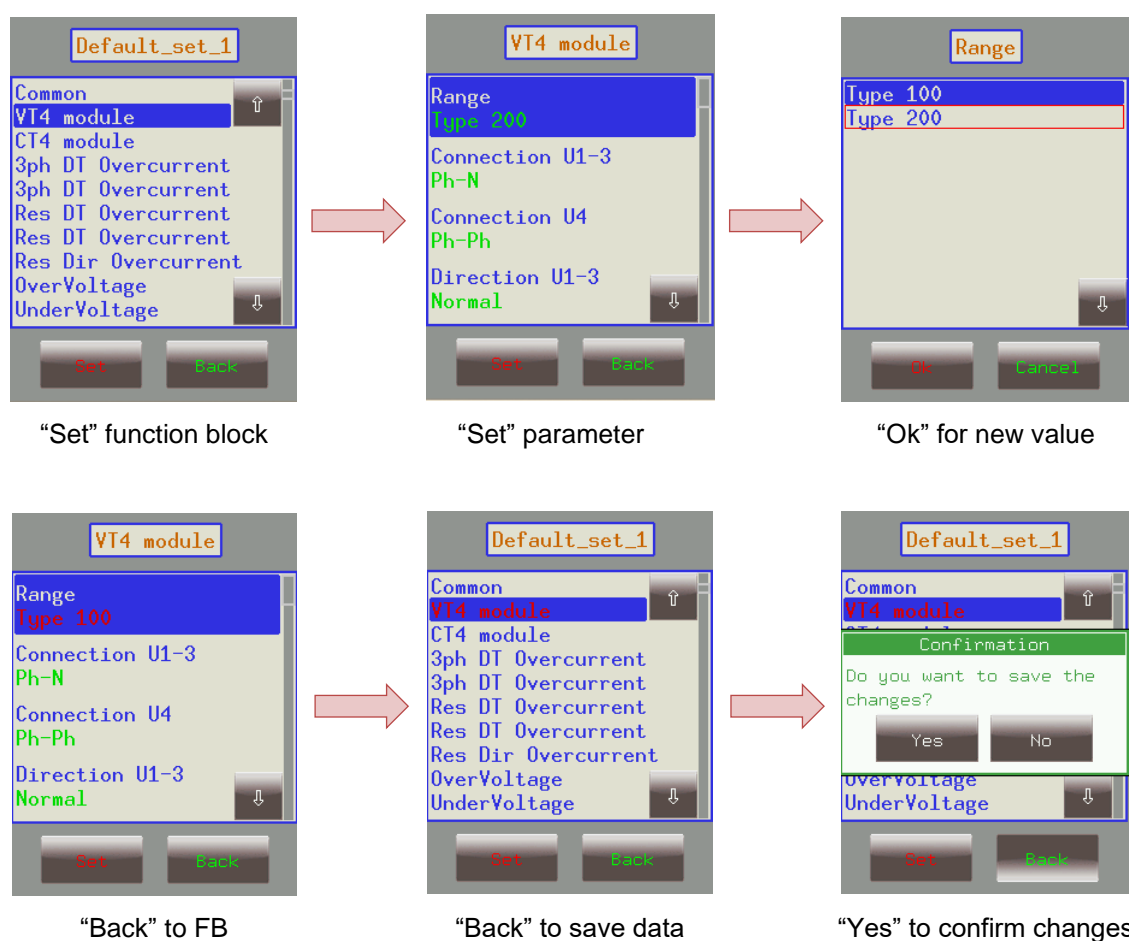


Figure 3-7 Changing VT4 module Type

**IMPORTANT!** In order to finalize all changes, the user has to go back to the screen where all the function blocks are listed and save the changes as shown above.

Also, make sure that while someone is modifying the parameters in the LCD touchscreen, another person is not doing so on the web interface since this could lead to confusion as to what the values of a parameter set are.

Other parameters can be modified similarly to the previously described VT4 voltage type. The following parameter types are available in the function blocks:

**Integer or timer** - This is a whole number, and it can be entered with the help of the number pad.

**Floating-point number** - This is a number that has a decimal point. This can also be input through the number pad.

**List item** - A list is displayed with all the possible choices. In this case the user simply needs to select the desired one (e.g. VT4 voltage type).

**Checkbox** - The user has the option of enabling or disabling the parameter.

### 3.3.3 On-line functions, Events, System settings

These menu items have the same content as described in section 4. System settings can be modified similarly to the parameters in section 3.3.2.

### 3.3.4 User-defined/Custom screens

It is possible to add screens based on the user's needs with the help of the EuroCAP software. The operation buttons can also be set up to perform certain functions. An example can be seen using a Single Line Diagram on the following page.

Let us say there is a network that is shown below and we have set up the required operational buttons to function as "on"/"off". To switch "on" the busbar disconnecter Q1, touch the icon of Q1 on the touchscreen; this will highlight the chosen object, which will start blinking. Once it starts blinking, some action must be performed with the chosen object; otherwise it will be deselected after a given timeout period. So, while it is blinking, press the "I" button, which has been configured to be the "on" button when the Q1 object is highlighted.

Now a message pops up for confirmation of this operation. Again, a limited time is available to answer this, otherwise the requested operation is canceled. Press "Ok" to confirm and another panel pops up stating that the operation was successful. After acknowledging this, the LCD is updated accordingly, with the Q1 line disconnecter in the "on" position.

Note again that this behavior was only an example; it may vary according to the configuration of the actual device.

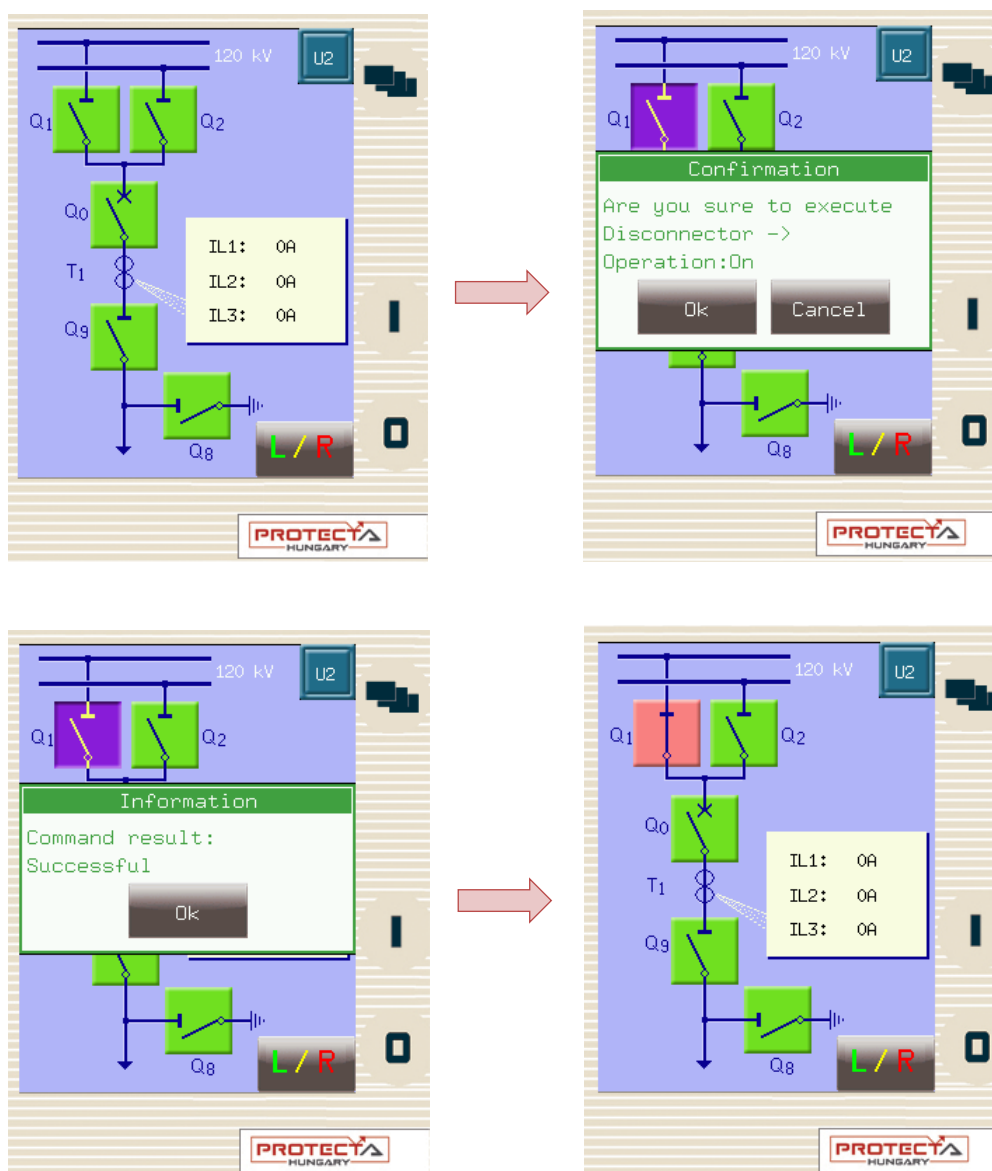


Figure 3-8 Closing Q1 disconnector

This screen is being updated continuously; a change in any sort of state or any parameter that is set up to be measured, will be shown and updated accordingly.

If there is an error with the operation (e.g. block by interlocking), the device will notify the user with another another panel popping up with the reason of the error.

## 4 Remote operation via web browser

A web browser and an Ethernet connection are needed in order to access the device interface. HTML5 compatible web browser is recommended. To properly display the data on the screen, it is recommended to have a screen resolution of at least 1024x768. The latest version of the following web browsers shall be used:

- Mozilla Firefox
- Apple Safari
- Google Chrome
- Microsoft Edge

JavaScript must also be enabled within your browser. For security reasons, the device allows only limited number of connections over the network (a maximum of 10 is guaranteed).

### 4.1 Properties of the Ethernet communication

The built-in 5-port Ethernet switch allows EuroProt+ to be connected to IP/Ethernet based networks. The following Ethernet ports are available in general:

On the front panel of the device:

- RJ-45 Ethernet or EOB (Ethernet over Board) user interface

On the rear side of the CPU unit:

- Station Bus (100Base-FX Ethernet)
- Redundant Station Bus which can be:
  - 100Base-FX Ethernet, or
  - 10/100Base-T port via RJ-45 (only one can be active of these two)
- Process bus (100Base-FX Ethernet)

The different HMI and CPU types are utilizing different ports. Further information about the available ports and the applied interfaces on various HMI and CPU types can be found in the “**Hardware description**” document.

The embedded web-server supports the following actions:

- Modifying user parameters
- Managing the event list and disturbance records
- Managing passwords
- Online displaying measured data and generated binary information
- Performing commands
- Firmware update
- Performing other administrative tasks

#### 4.1.1 The Ethernet connection

There are several ways to be connected to an Ethernet network. The availability of the below listed connection types depends on the device hardware configuration.

##### 4.1.1.1 Using the RJ-45 connection

RJ-45 connector is available on the front panel if no EOB is selected for the configuration. In addition, many CPU types also utilize an RJ-45 connector, which is located on the rear side of the device on the CPU card. Using an UTP cable with RJ-45 connector at both ends, the device can be connected directly to a computer or an ethernet switch.

#### 4.1.1.2 Using the EOB connection

EOB connection is available on the front panel if no RJ-45 connector is selected for the configuration. Attach the magnetic EOB connector to the front panel of the device (see Figure 3-1). The magnets assure the correct position of the adapter. Connect the other two ends of the cable to the RJ-45 connector and to the USB port of a computer. The special cable with magnetic connector on one end and RJ-45+USB connectors on the other end shall be ordered from Protecta.

#### 4.1.1.3 Using fiber optic connections

The different types of fiber optic interfaces for 100Base-FX Ethernet provides connection to an Ethernet switch with identical fiber optic inputs. Using this connections all IED-s on the network with client functionalities, e.g. a computer, has access to the device. For more details about the fiber optic connector types see the CPU and COM module sections in the **“Hardware description”**.

### 4.1.2 Settings needed for the Ethernet connection

The web interface of the EuroProt+ devices can be accessed over Ethernet based protocols only. Therefore, it is extremely important to set up the network before accessing the device.

To connect the device to a station or corporate network, contact the system administrator for available IP address, gateway address, net-mask, DNS and NTP server addresses.

The user can also connect directly to the device via Ethernet protocol. In the following guidance we assume, that the user connects directly to the device via computer without the presence of any active network component (e.g.: switch, ruoter).

#### 4.1.2.1 Connection to the device with fix IP address

The device uses fix IPv4 address range and the user is allowed to modify the address. User's computer must be set with fix IP address and netmask according to the used IP address range and netmask in the device.

##### Settings of the device:

The IP settings of the device get the following default values at the first start:

*IP address:* 192.168.0.15  
*Netmask:* 255.255.0.0  
*Default gateway:* 192.168.1.1  
*IP address mode:* Static IP  
*DNS1 and DNS2 address:* 0.0.0.0  
*DHCP server:* Disabled

These can be changed in the System settings menu Station bus settings submenu.

##### Settings of the user's computer (with fix IP address):

The possible IP settings of the user's computer according to the (optional) device settings above:

*IP address:* in range from 192.168.0.1 to 192.168.254.254\*  
*Netmask:* 255.255.0.0  
*Default gateway:* 192.168.0.1

*\*Note: the IP address must differ from that of the device*



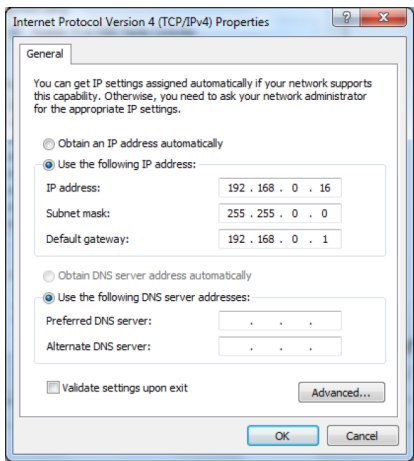


Figure 4-1 An example of settings in the user's computer with fix IP address

#### 4.1.2.2 Connection to the device with the embedded DHCP server

The embedded DHCP server can be enabled in System settings menu Station bus settings submenu.

Do not use the DHCP server function when another DHCP server is already in use on the network!

If this type of connection needs to be used only through the front panel connector, then the "Front only" setting has to be chosen for this parameter.



Figure 4-2 Enabling DHCP server for front panel control

If the DHCP server of the device is used, the following settings are recommended to be applied in the user's computer:

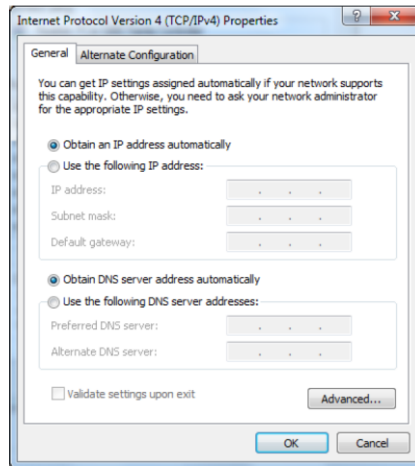


Figure 4-3 Possible settings in the user's computer with DHCP server

### 4.1.3 Using web browsers

First the user must check if the browser is accessing the device via proxy-server. If there is a proxy-server in the network, the system administrator shall be contacted in order to get access.

If this is clarified, the user can type the IP address of the device into the browser's address bar. (The IP address can be read on the main screen of the local LCD, see Figure 3-2.) After that the usual procedures of web browsing shall be followed.

## 4.2 Menu items in the web browser

### 4.2.1 Main panel

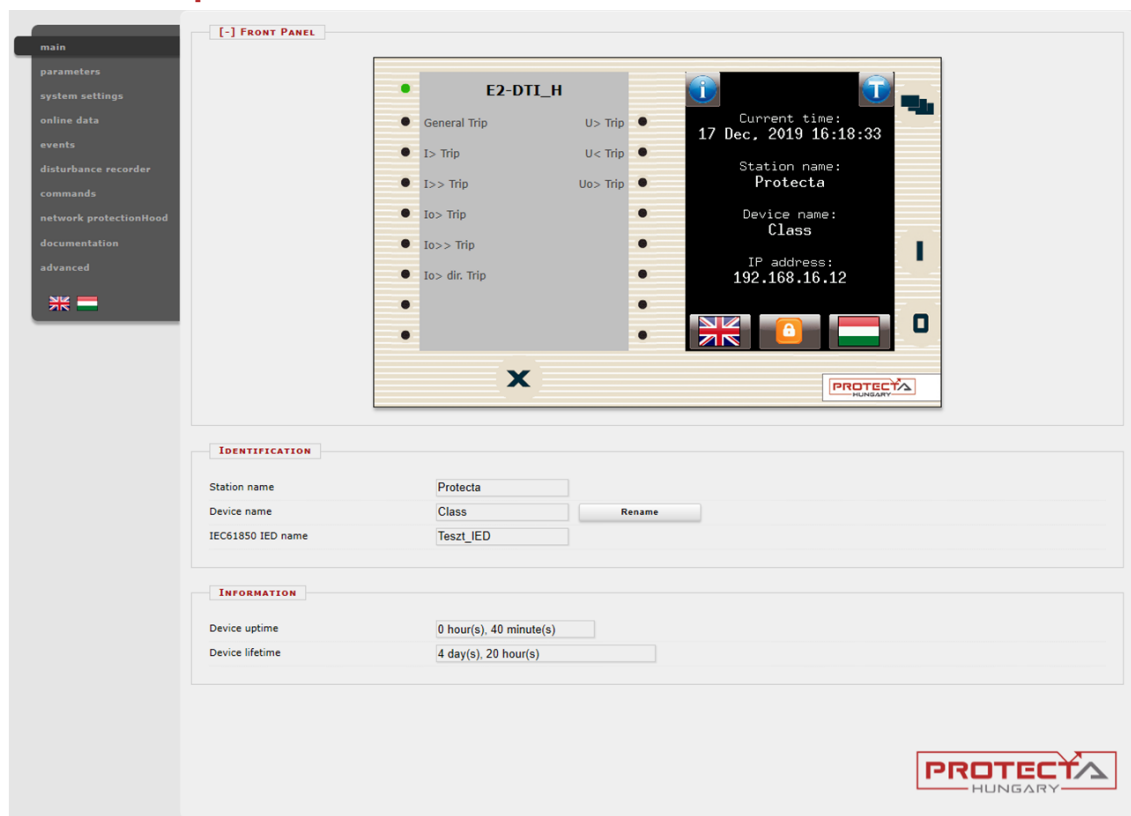


Figure 4-4 Main menu

The front panel of the device can be controlled from here (Figure 4-4). The image in the center of the screen behaves the same way as the touch screen and the LEDs, except the on (1) and the off (0) buttons. These two buttons are inactive for security reasons.

The X button on the bottom of the front panel picture initiates a LED reset. LED description text is determined by the configuration and may be different than the actual label inserted in the device front panel.

**Identification** - User can change the station and device names from this panel by typing in the new values and clicking on the Rename button. IEC61850 IED name is only for display here but can be edited in the EuroCAP tool if needed.

**Information part** - There are two fields for measuring device operating time. Uptime field displays the time elapsed from the last power on of the device. Device lifetime field value equals the number of days of the device's energized state. In case of a CDSP update, the device uptime disappears and RDSP/CDSP uptime appear.

The language button (if present) under the menus changes the displayed language of the website only. This means that the menus (parameters, settings etc.) will be shown in the chosen language, but the events and disturbance records will still be generated on the on the language set on the main local LCD screen (see Chapter 3.3.1 for details)

## 4.2.2 Parameters

Various parameters and variables can be viewed and changed in this menu item. The user can manage different parameter sets with the ability to set, rename, export and import them. A password can be applied for the import, export and set settings options. All parameters are part of a certain function block which can be individually opened or closed using the [+] or [-] symbol. Parameter values are displayed and can be modified in text fields, list boxes or check boxes.

The screenshot shows a web interface for parameter settings. At the top, there are three buttons: 'Expand all', 'Collapse all', and 'Print'. Below these, there are two expandable sections. The first section is labeled '[+] COMMON' and is currently collapsed. The second section is labeled '[-] VT4 MODULE' and is expanded. Inside the 'VT4 MODULE' section, there is a table with two main columns: 'Device value (Par set 1)' and 'New value'. The table contains the following parameters:

	Device value (Par set 1)	New value		
Range	Type 100	Type 100		
Connection U1-3	Ph-N	Ph-N		
Connection U4	Ph-Ph	Ph-Ph		
Direction U1-3	Normal	Normal		
Direction U4	Normal	Normal		
VT correction	100	100	%	(100 - 115 / 1)
Rated Primary U1-3	100.00	100	kV	(1.00 - 1000.00 / 0.01)
Rated Primary U4	100.00	100	kV	(1.00 - 1000.00 / 0.01)

Figure 4-5 Parameter settings

Buttons on the top of the parameter's sheet provide fast expanding and collapsing all the function panels and make finding a parameter easy. Print button generates a printer-friendly layout opened in a new browser window.

General layout of the parameter's sheet consists of columns:

*The first column* contains the name of the parameter, this text is coming from the configuration of the device.

*Second column* displays the current values of the selected parameter set stored in the device. The parameter set can be chosen from the combo-box of the main menu (see Figure 4-6). Changing the parameter set here doesn't mean activating it, only loading to the fields. You can find more information on activation in this chapter later.

*Third column* is used for entering the desired values by the user. The expected value range and step are shown on the right side of the parameter column.

Changing any setting in the third column will be marked with **blue function block name** and with **blue text** in the corresponding line of the first column.

The detailed description of fields are as follows:

**Textfield** - Text fields hold values that can be modified. To prevent invalid values from being loaded into the device, make sure that all values entered are within proper range. In case a wrong value is entered, the user will be alerted and the value is reset to the last correct value.

**Listbox** - By clicking on the list box, the user can choose from the available values listed within the box. (The list box represents enumerated type parameters.)

**Checkbox** - The user can enable or disable certain functions and properties with the check box, by clicking on the box. If the checkbox is ticked, the parameter is enabled. In contrast, if the check box is empty, the parameter is disabled. (The check box represents boolean or binary type parameters.)

**Unit** - This displays the unit of parameter where applicable. Not all parameters have units.

**Range/Step** - This applies only to text fields; it displays the range a value can take. The step value represents the amount by which the value can be incremented/decremented. For example, if a parameter has a default value of 100 with a range of 1-1000 and a step value of .01, its value can be changed to 99.99, or 99.98, or 99.9, or 99 or 100.01, or 100.02, or 100.1, or 101, and so on. The value cannot go below 1.00 or above 1000.00, since that would be out of range. As another example, if the same parameter had a step value of 5, then we could only change the default value of 100 to 95, or 105, and so on.

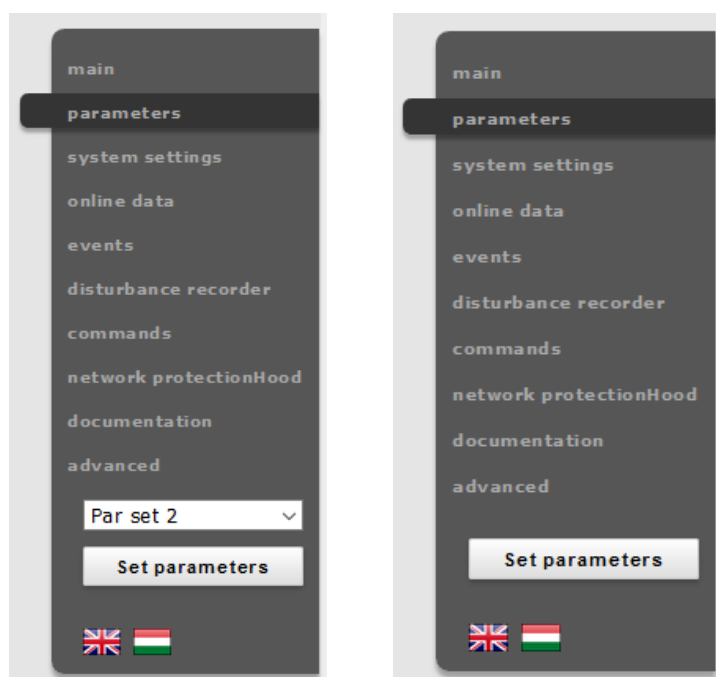


Figure 4-6 Main menu view with and without multiple parameter sets

Modified parameter values can be written into the selected parameter set by clicking Set parameters button on the main menu panel. In case of a device with only one parameter set there is no parameter set selector combo-box, as it can be seen on the right side of Figure 4-6.

Values are checked for change before the user navigates away from the actual page or another parameter set is being loaded. By pressing Cancel, the browser will remain on the actual page. By pressing OK, the browser will ignore the changes made and navigates away to the page selected.

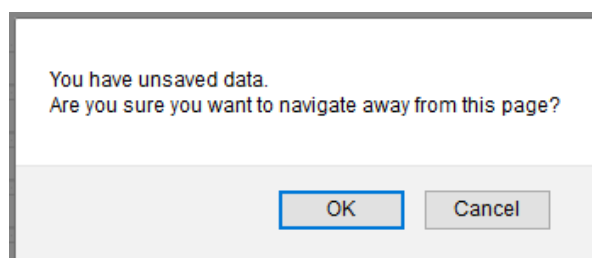


Figure 4-7 Unsaved data when leaving the page

### 4.2.2.1 Managing multiple parameter sets

Towards the bottom of the page there are options to manage parameter sets. These buttons and functions only appear if the device is configured to have more than one parameter set. The following buttons are available:

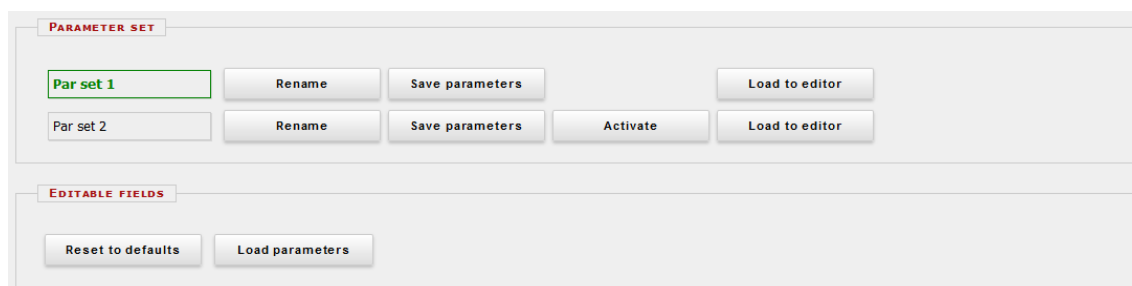


Figure 4-8 Parameter set control field

**Rename** - This renames the selected parameter set after the user typed in the desired name in the text field. Make sure that you use alphanumeric characters, spaces, dashes, or underscores as input and that no another set has the same name.

**Save parameters** - Corresponding parameter set can be saved as a \*.par file.

**Activate** - This enables to activate the parameter set that in line with the button so the device will use the values from that specific set. This button only appears, if there is more than one parameter set and there are no other specified conditions in the configuration for activating the parameter set. The active parameter set's name will be displayed in green.

Note, that activating a parameter set doesn't load the values to the edit fields above. Parameter set values can be loaded into the editable fields by using the combo-box placed in the main menu panel on the left side (see Figure 4-6) or by clicking on the Load to editor button.

**Load to editor** - This will load the parameter set in line with the button in the editable fields.

**Reset to defaults** - This resets the values on screen with the factory default settings.

**Load parameters** - This loads a previously saved parameter file and sets the values on the screen based on its contents.

### 4.2.3 System settings

This is the menu item where adjustments can be made to some device settings. This menu item can be password protected. The text fields, list boxes, and check boxes are almost the same as in the parameters menu item except for one type of text field, the IP address field, which is found only here in the system settings menu item.

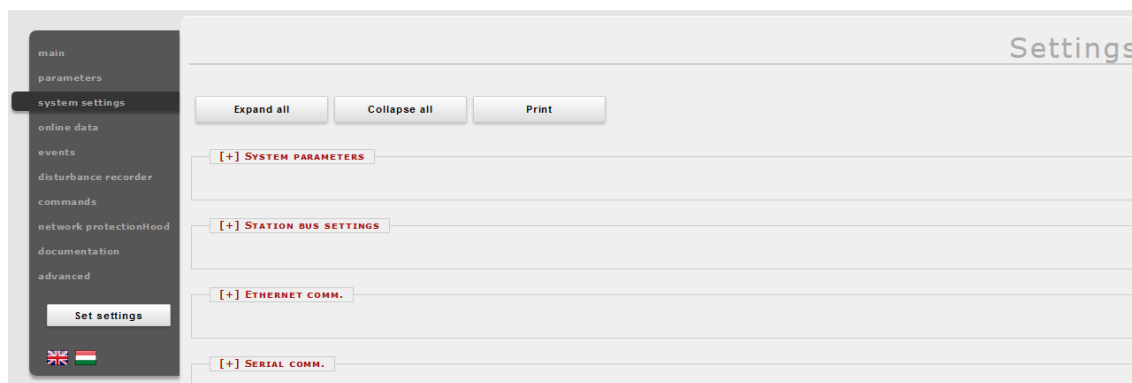


Figure 4-9 System settings menu

The behavior of the system Settings sheet is very similar to the Parameters sheet. The short description of the system settings are as follows:

**System parameters** - This field is used for front panel control and power system frequency settings.

**Station bus settings** - This field includes settings for the IPv4 based communication like IP address, IP address mode, redundancy mode, mask, gateway, and DNS addresses. The DHCP server function can be switched on with a combo-box.

*Warning: do not use the DHCP server function when other DHCP server is already in use on the network, as it may cause serious communication failures!*

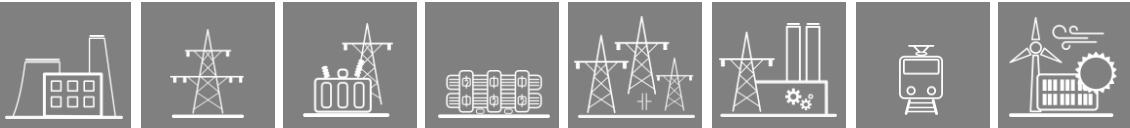
**Ethernet communication** - The device can communicate using several Ethernet based protocols at the same time. Only the IEC61850 communication is licensed, all the other protocols are available by default. The GOOSE repeat rate combo-box can be used for adjusting T0 time of the Generic Object Oriented Substation Event messages.

**Serial communication** - Only one protocol can be selected for serial communication purposes, physical parameters can be set in this field. Note that serial communication needs appropriate CPU card.

**Time synchronization** - The device handles broad range of time synchronization protocols: NTP server (SNTP), serial communication, and different pulse inputs. If Time sync. warning parameter is enabled and the device is not synchronized, an alarm is raised (status LED goes yellow).

**Time zone settings** - Use this field to set the offset to the GMT time and the settings of daylight saving.

**LCD backlight** - Parameters in this field control the behavior of the LCD panel. Backlight will switch off after its timeout. The Backlight group is useful if you have more than one device



close to each other. Touching one of them will switch on the LCD screen of all devices that belong to the same group.

**System services** - Use this field to set the web interface mode, enable secure file transfer mode, discover devices on the local network, set up remote login feature and log server.

**Client whitelist** - If this function is enabled, only the allowed clients can access the device in the selected role.

**Web Services** - When logging in with a user by entering master/setting/command password, a time-limited web session is opened. The time limits are set here.

More information can be found under the question marks located in line with the actual setting.



### 4.2.4 Online data

This displays data measured by the device. The values on the screen are updated in every second. All data on this page is read-only, therefore they cannot be modified. In case there is a counter on the page, there will be a button next to it, which will reset it.

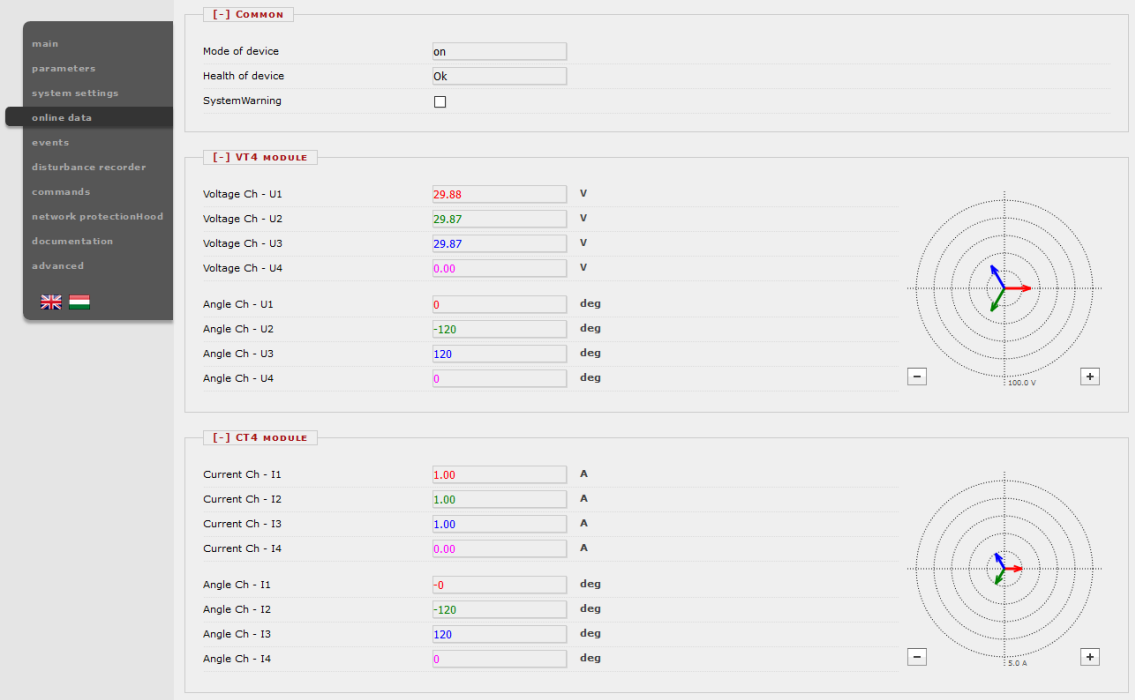


Figure 4-10 On-line sheet

Binary data are displayed as checkbox, enumerated data will be presented as text information. If user has HTML5 compatible Internet browser, certain analogue measurements will be drawn as vectors.

## 4.2.5 Events

The Events page displays the internal event list of the device. Every event is listed with time stamp, function block title, event channel title and its new status text. Time resolution is 1 ms, the device can contain approximately 10000 events. If the list goes larger than this, the oldest events get erased.

If the mouse cursor hangs over a function block name for a short time, all event lines that belong to the same function block will be highlighted. Also, if the cursor is over an event channel name, all events with the same text will be highlighted (Figure 4-11).

The Event page is not refreshed automatically, the user can refresh it by clicking on the Refresh button.

Erasing all events and exporting them to a text file is also possible.

An event filter can be utilized according to user's needs: there are filters for event row number, date and contained text, see rightmost part of the picture.

The screenshot displays the 'Events' page of the web browser interface. The main area contains a table of events with the following columns: Ordinal, Date, Time, Function block title, Event channel title, and Status. The table lists 42 events, with the first 10 events highlighted in grey. The 'EVENT FILTER' section on the right allows users to filter events by Ordinal, Date, and Contains. The sidebar on the left provides navigation options for various system functions.

Figure 4-11 Events sheet

## 4.2.6 Disturbance recorder

The Disturbance recorder (Figure 4-12) panel allows the user to download or view the recorded disturbances. Every record is stored in COMTRADE format and can be downloaded in a zipped file (with CFG, INF and DAT files inside). The displayed recording time information is used as a reference to the stored records. Downloading and erasing the records is possible one by one or for all of them. By clicking the Download all button, all records will be downloaded in one .zip file.

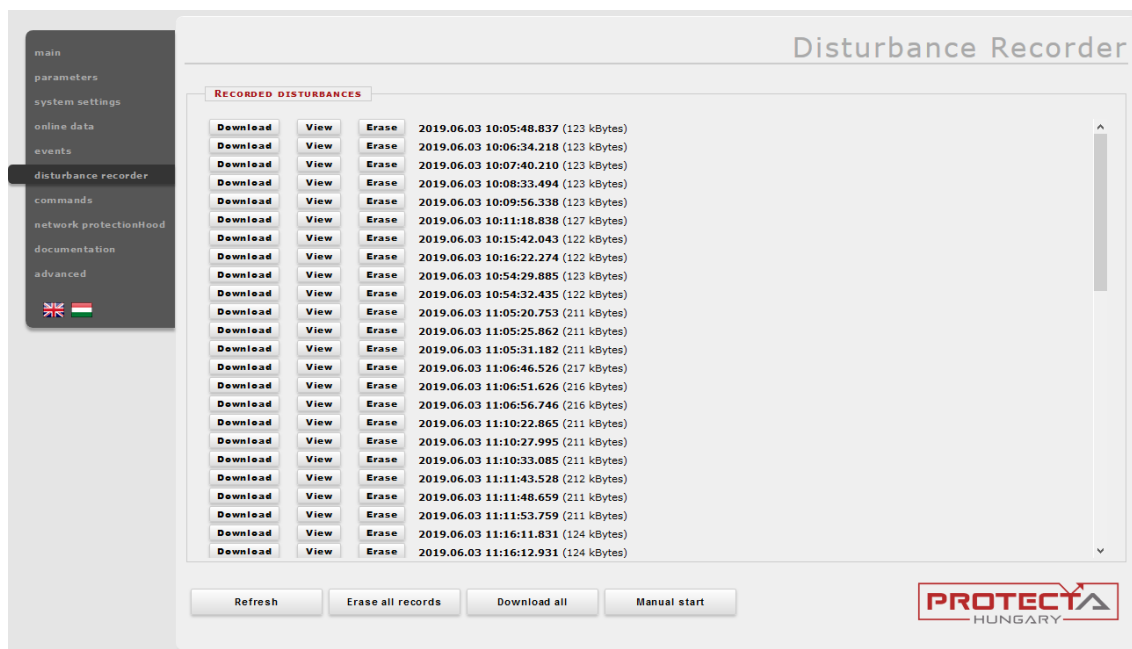


Figure 4-12 The disturbance records list panel

A simple built-in preview function makes work easier (Figure 4-13 and Figure 4-14). This viewer provides the fast evaluation possibility of the disturbance event. Both analogue and binary channels are displayed on the screen.

On the right side there is a floating panel with buttons to control the behavior of the display. Buttons with plus and minus sign used for adjusting the horizontal zoom of the picture. Clicking on the 1:1 button resets the view to the default horizontal size. Scale mode is a toggle button to change the way of the analogue channel drawing. By default, it is drawn using a common vertical scale calculated from all available analogue channels with the same unit parameter. In other words, it uses a grouping of the channels according to their unit. If the user clicks on this button, every analogue channel will be drawn with its individual scale calculated from the maximal value of that channel.

It is possible to place a maximum of 2 markers by clicking with the mouse to examine timings: until placed, the number on the first marker represents the time interval between the marker and the start of the disturbance recording (i.e.: the time 0, after the prefault time). When the marker is placed, its exact time will be shown, and now the second marker shows a time interval, but in this case between the two markers.

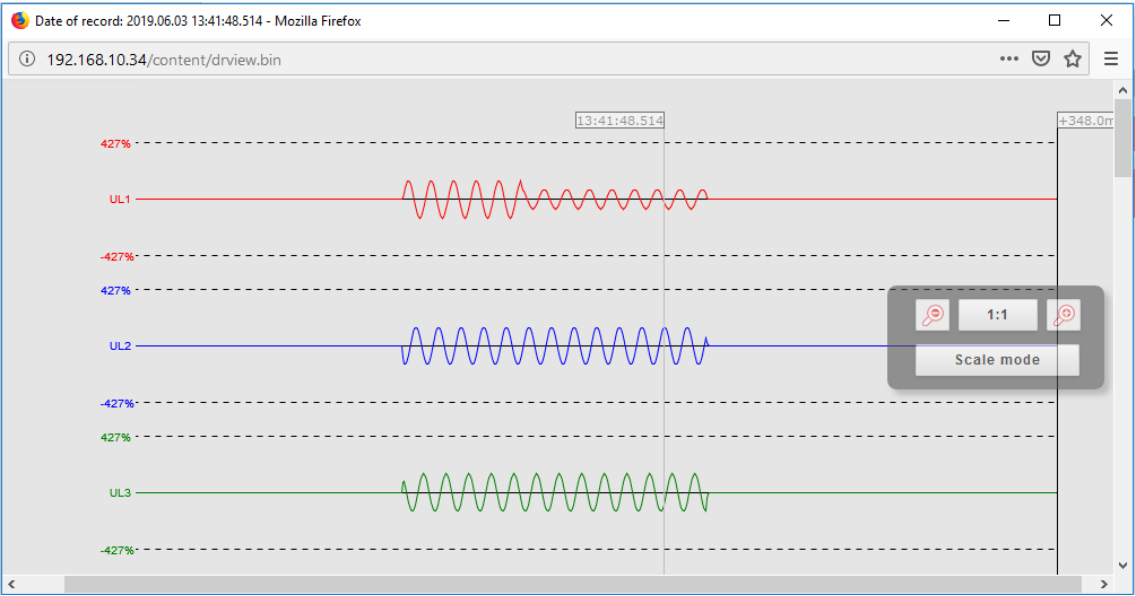


Figure 4-13 The disturbance record preview – analogue channels

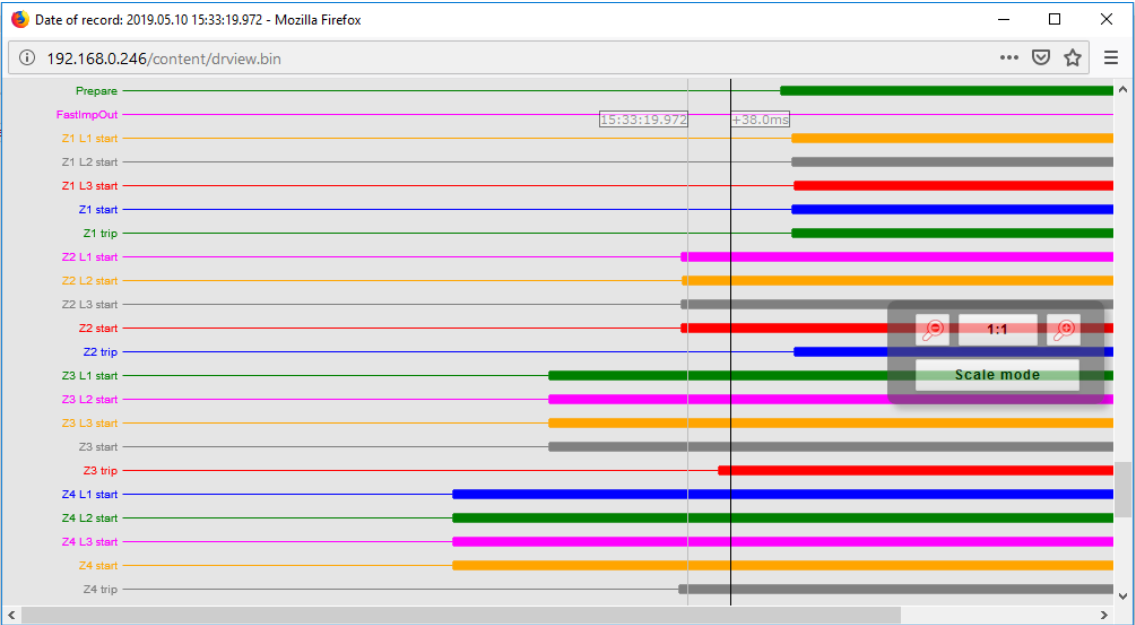


Figure 4-14 Disturbance record's binary channels

## 4.2.7 Commands

The device may contain function blocks with controllable objects whose commands appear on this page (Figure 4-15). A command can be issued by clicking the appropriate button on the field of the function. A confirmation dialog will ask the user to confirm the command (Figure 4-16).

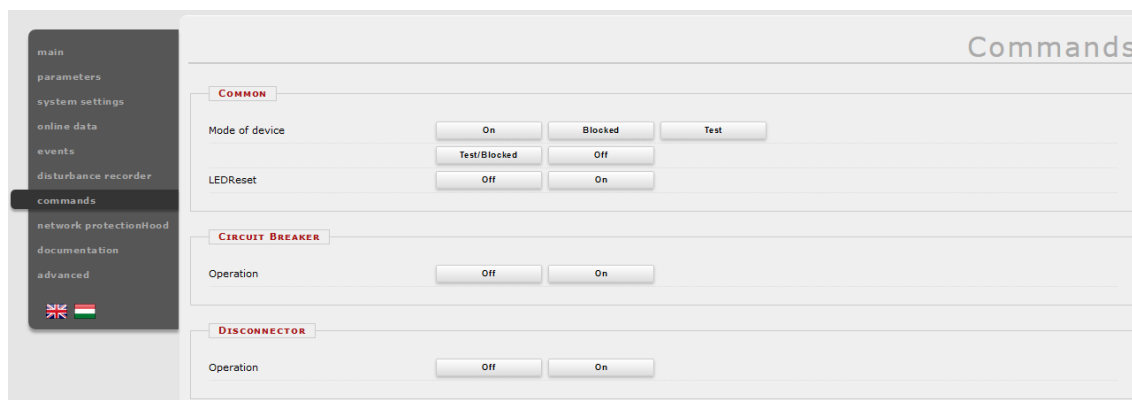


Figure 4-15 Command sheet

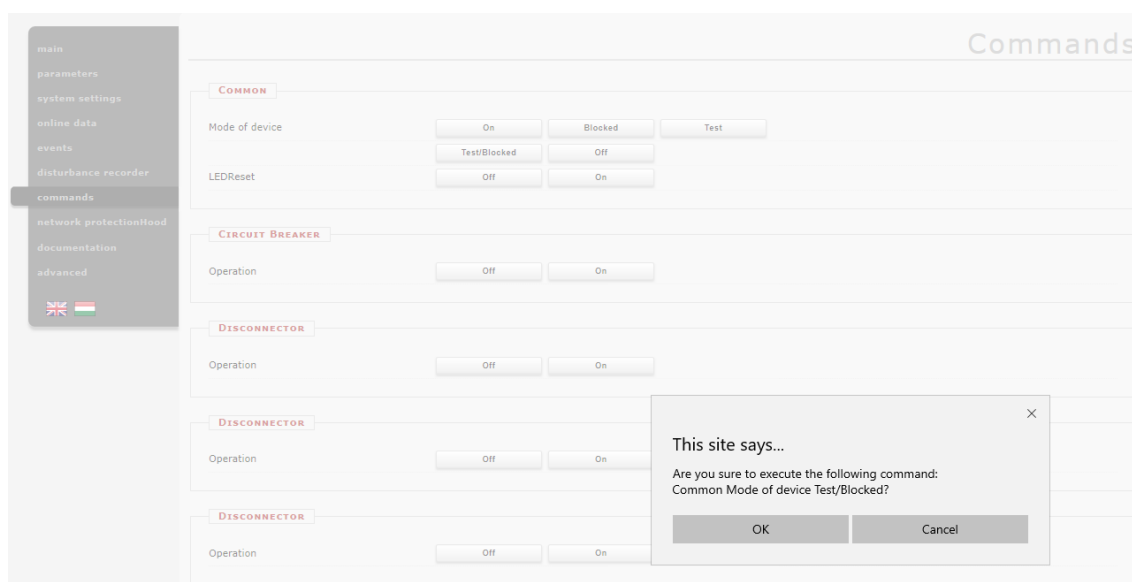


Figure 4-16 Confirmation dialog

The mode of device in the common field has 5 setting options based on IEC61850-7-410 definition; these commands are present in all EuroProt+ devices:

Table 4-1 Mode of operation commands

MODE OF DEVICE:	ON	BLOCKED	TEST	TEST/ BLOCKED	OFF
Function	active	active	active	active	not active
Outputs (to process)	generated	not generated	generated	not generated	not generated
Reporting (to client)	yes	no reporting	flagged as test	flagged as test	no reporting
Control services (from client)	accepted	rejected	accepted	accepted	rejected
Functional (process related) data	visible	visible	visible	visible	not visible

## 4.2.8 Network protectionHood

This panel shows devices that are located on the same network as the device. Compatible devices are identified and information is displayed about them. The device highlighted in red is the one that is currently accessed. By clicking on the other links, the user will be redirected to the corresponding device.

The screenshot displays the 'network protectionHood' web interface. On the left is a sidebar menu with options: main, parameters, system settings, online data, events, disturbance recorder, commands, network protectionHood (selected), documentation, and advanced. Below the menu are flags for the UK and Hungary. The main area is titled 'network protectionHood' and contains a section 'DEVICES FOUND ON THE NETWORK'. Below this is a table with columns: Health, IP address, Platform, Station name, Device name, Version, Capability, RDSP/Xilinx, and C. The table lists 18 devices. The 10th device, with IP address 192.168.12.242, is highlighted in red. At the bottom of the table area is a 'Refresh' button. The bottom right corner features the 'PROTECTA HUNGARY' logo.

Health	IP address	Platform	Station name	Device name	Version	Capability	RDSP/Xilinx	C
✓	192.168.0.246	EuroProt+	Allatorvosi lo	Geza teszt	2.8.13	I>, Id, Z<	2.8.13.2060-rc3/x0.6	2
✓	192.168.8.8	EuroProt+	Protecta	Bence_teszt	2.8.13	I>, Id, Z<	2.8.13.2060-rc2/x0.6	2
✓	192.168.10.34	EuroProt+	RDSP	E2-Line	2.8.13	I>, Id, Z<	2.8.13.2060-rc3/x0.6	2.8.13.1551
✓	192.168.10.99	EuroProt+	Mikó	MSZ modell	2.8.13	I>	2.8.13.2060-rc2/x0.6	2.8
✓	192.168.12.222	EuroProt+	EGETO	OGYD Bemérő_leag	2.8.13	I>	2.8.13.2040-H1/x0.6	2
✓	192.168.12.223	EuroProt+	EGETO	OGYD Bemérő_leag	2.8.13	I>	2.8.13.2040-H1/x0.6	2
✓	192.168.12.241	EuroProt+	EGETO	OGYD Bemérő_leag	2.8.13	I>, Id, Z<	2.8.13.2050-H3/x0.6	2
✓	192.168.12.242	EuroProt+	EGETO	OGYD Bemérő_leag	2.8.13	I>, Id, Z<	2.8.13.2050-H3/x0.6	2
✓	192.168.12.243	EuroProt+	EGETO	OGYD Bemérő_leag	2.8.13	I>, Id, Z<	2.8.13.2050-H3/x0.6	2
✓	192.168.15.73	EuroProt+	RDSP 2060	E2-MER	2.8.13	I>, Id, Z<	2.8.13.2060-rc3/x0.6	2.8
✓	192.168.15.99	EuroProt+	Unnamed station	Unnamed device	2.8.13	I>	2.8.13.2060-rc2/x0.6	2.8
✓	192.168.15.224	EuroProt+	Kiss F.	MSZ modell	2.8.14	I>	2.8.13.2060-rc2/x0.6	2.8.13.
✓	192.168.16.12	EuroProt+	Protecta	Class	2.8.13	I>, Id, Z<	2.8.13.2050-H3/x0.6	2.8
✓	192.168.19.4	EuroProt+	Protecta	DRL-Master	2.8.13	I>, Id, Z<	2.8.13.2060-rc3/x0.6	2.8.13.1550
✓	192.168.19.5	EuroProt+	Protecta	DRL-Slave	2.8.13	I>, Id, Z<	2.8.13.2060-rc3/x0.6	2.8
✓	192.168.50.59	EuroProt+	Unnamed station	Unnamed device	2.8.13	I>, Id, Z<	2.8.13.2060-rc3/x0.6	2.8
✓	192.168.73.15	EuroProt+	EGETO	LDC_G703_TESZT_2	2.8.13	I>, Id, Z<	2.8.13.2040-H1/x0.6	2
✓	192.168.143.20	EuroProt+	Fejlesztés	LineDiff_A	2.8.13	I>, Id, Z<	2.8.13.2060-rc2-54-gf9d903b94/x0.6	2.8.13.1551

Figure 4-17 Network protectionHood

## 4.2.9 Documentation

This panel displays the custom files uploaded to the built-in storage unit of the device. The user can upload any type of documents and files, which will be saved on the device and will be accessible for later use. There is an 8 MB limit available, single file size maximum is 2MB.

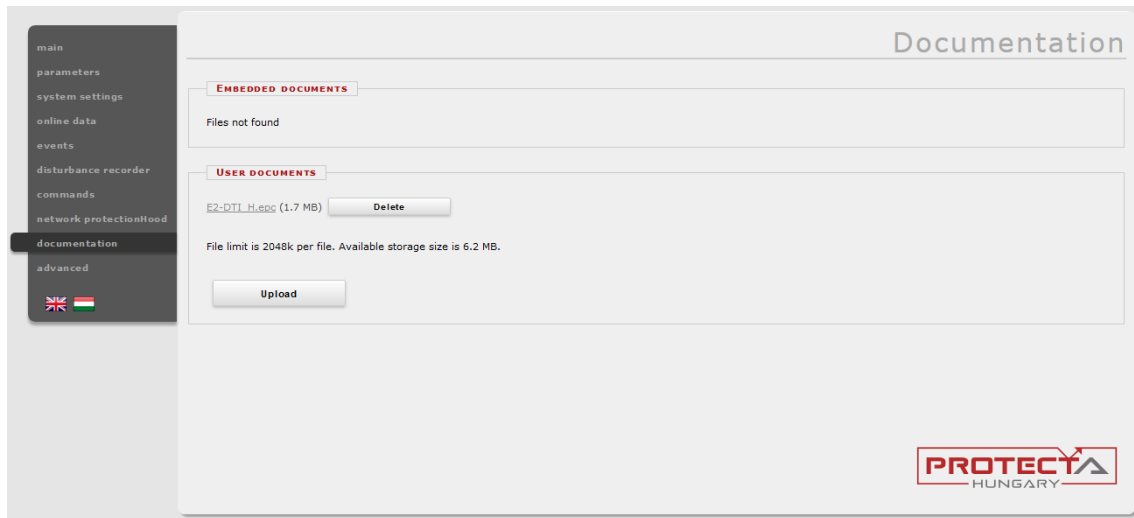


Figure 4-18 User documentation

## 4.2.10 Advanced

This menu item displays a submenu of other options available. A password can be set to allow access to these menu items.

### 4.2.10.1 Password manager

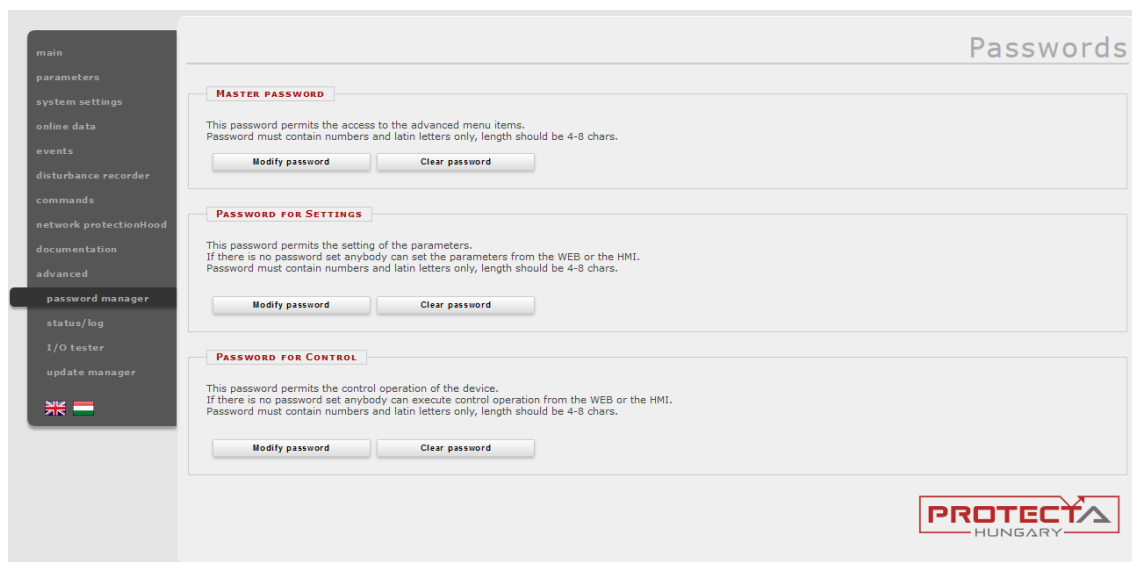


Figure 4-19 Password manager dialog

Passwords are used to prevent unauthorized access to the device. There are three password levels/users defined:

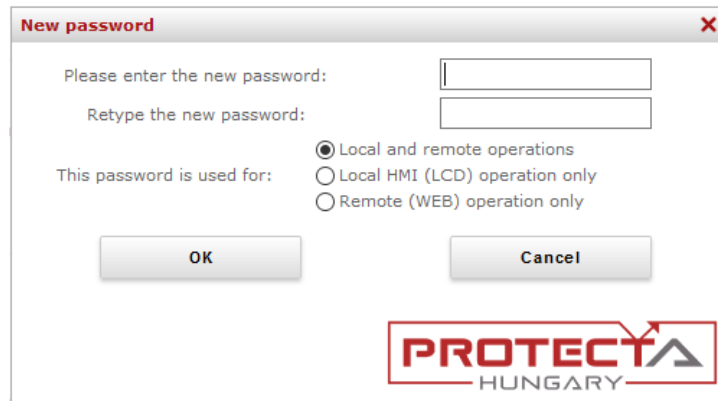
- Master password controls the access to the *advanced* menu. This prevents unauthorized access to the password control dialog also.
- Password for settings restricts the access to the *parameters* and *system settings* menus. When creating new password, the user is allowed to define its target: password for local (LCD) setting operation, password for remote (web) operation or both.
- Password for control assigns password for all control commands. When creating new password, the user is allowed to define its target here as well: password for local (LCD) commands, password for remote (web) commands (restricting access to the *commands* menu)

The user must type in the password two times to avoid typing mistakes (Figure 4-20). A password must contain the following:

1. At least 8 characters (32 maximum)
2. At least one uppercase letter
3. At least one number
4. At least one special character (+, -, ., :, <=>, \, [ ], { }, ( ), !, ? , @ , # , \$ , % , & , \* , \_ , ~ , ` , ^ , " , ' )

Devices with earlier CDSP firmware versions (1550 or older) allow numbers and basic characters only, and the password length is restricted 4-8 characters, and there are no web sessions opened for them.





**New password** [X]

Please enter the new password:

Retype the new password:

This password is used for:

- ☒ Local and remote operations
- ☐ Local HMI (LCD) operation only
- ☐ Remote (WEB) operation only

**OK** **Cancel**

**PROTECTA**  
HUNGARY

Figure 4-20 Password input dialog

Accessing a password-protected part of the device will result in logging in for a time-limited session in the device. The remaining time and a logout button appear on the left side of the screen in this case, see the picture below.

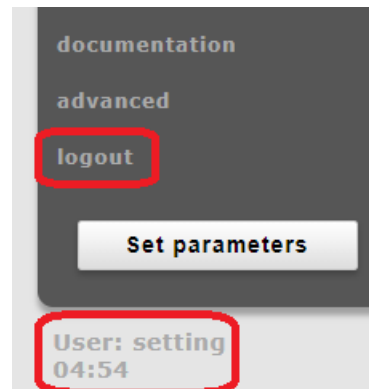


Figure 4-21 Logout and the user currently logged in on the left side

### 4.2.10.2 Status/log

Status fields' detailed information is as follows:

In the **Cards** field (Figure 4-22), it is shown how the hardware of the device matches the hardware layout defined in its configuration (created in EuroCAP → Rack Designer). In case of any mismatch, the device stops operating and goes to Error mode (Status LED turns red)

This field provides more detailed information about the hardware.

There are three rules for matching the configured and the actual hardware in the devices:

1. *These types of modules must match entirely:*
  - **ATO+** modules (analogue outputs)
  - **COM+** modules (communication modules for busbar and line diff. protections)
  - **CT+** modules (CT inputs)
  - **INJ+** modules (for DRL arc suppression coil controller)
  - **RAI+** modules (rotor earth fault injector/measurement)
  - **VT+** modules (VT inputs)
2. *For all other modules, those of the same type (see highlighted as **bold** below) can be exchanged with each other. Here are some examples:*
  - **O12+/2201** ↔ **O12+/1101** (and all other **O12+** modules)
  - **CPU+/1201** ↔ **CPU+/1501** (and all other **CPU+** modules)
  - **PS+/4201** ↔ **PS+/2301** (and all other **PS+** modules)
  - **PSTP+/2101** ↔ **PSTP+/4201** (and all other **PSTP+** modules)
3. *Special cases that are not covered by the previous two rules:*
  - **HMI+** and **HMIT+** modules (remote HMI) are also interchangeable
  - If a module can be equipped with different connector types (e.g. **VT+/2211** and **VT+/2211F** and **VT+/2211T**), then these can be exchanged among themselves

Status/Log				
CARDS				
Slot	Configured	Detected	Serial Nr.	Status
J	CPU+/1201	CPU+/1211	14102071	matched
I(0)	CT+/5151	CT+/5151	10009702	matched
H(1)	VT+/2211	VT+/2211	14108622	matched
D(5)	R8+/00	R8+/00	18102181	matched
C(6)	O12+/2201	O12+/2201	10026014	matched
A(8)	PSTP+/2101	PSTP+/2101	17132356	matched, internal use only!
HMI	HMI+/3502	HMI+/3521	10014736	matched
BUS	BUS+/4201			passive bus

Figure 4-22 Card info field

**Device nameplate** (Figure 4-23) contains product information and basic data of the device.

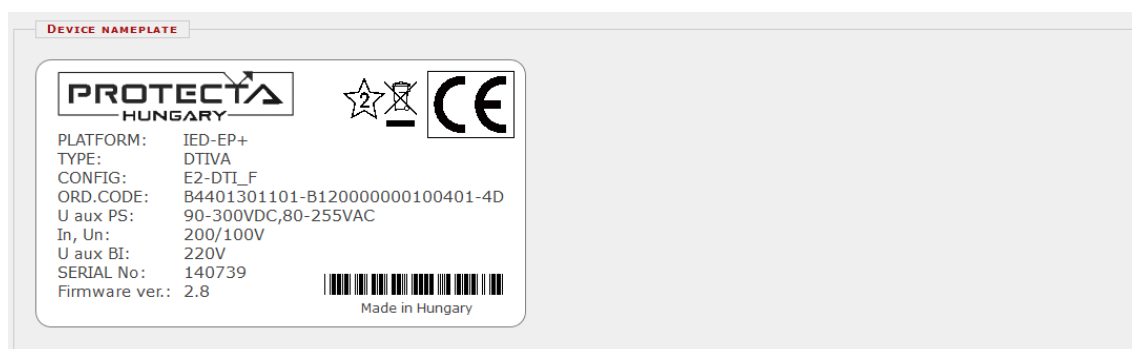


Figure 4-23 Device nameplate

In **LOG files** field (Figure 4-24) internal information about the specific part of the device (RDSP, system, LCD, etc.) can be found.

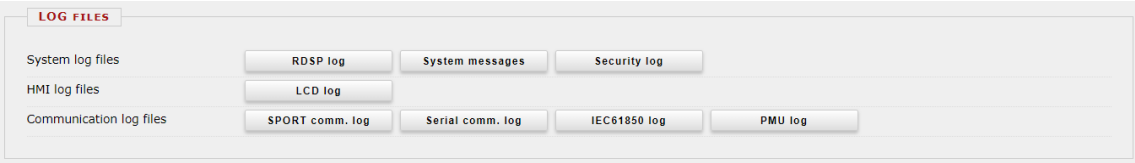


Figure 4-24 LOG files field

Serious errors (red status LED) and warnings (yellow status LED) are listed in the **Warnings and Errors** field (Figure 4-25). In the example below, time synchronization error is generated when its check box is ticked on the time sync. part of system settings page and there is no synchronization message received. For more information please refer to the [Troubleshooting guide](#).

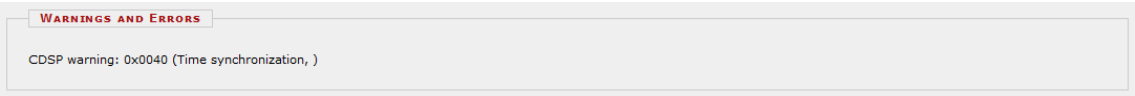


Figure 4-25 Warnings and Errors

In case of any error, it is recommended to generate a report file (Figure 4-26) using the button in the **Backup/Report** field and send it to the [support team](#). The file has .zip extension and includes event log, parameter settings, configuration data and RDSP firmware for the actual device. However, it does not include disturbance records. Oscillographic fault records can be downloaded as shown on Figure 4-12.

Make sure to check the size of the downloaded report.zip file: it should be above 10 kB. If it is below this, try to download it again with a different or an updated browser.

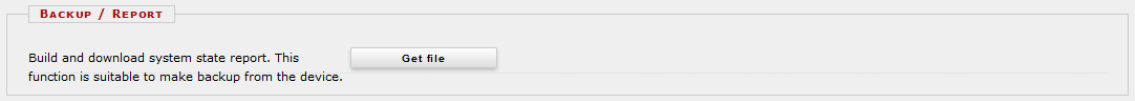


Figure 4-26 Button for getting the report.zip file

**Communication files** (Figure 4-27) for various protocols can be downloaded by clicking the appropriate button.

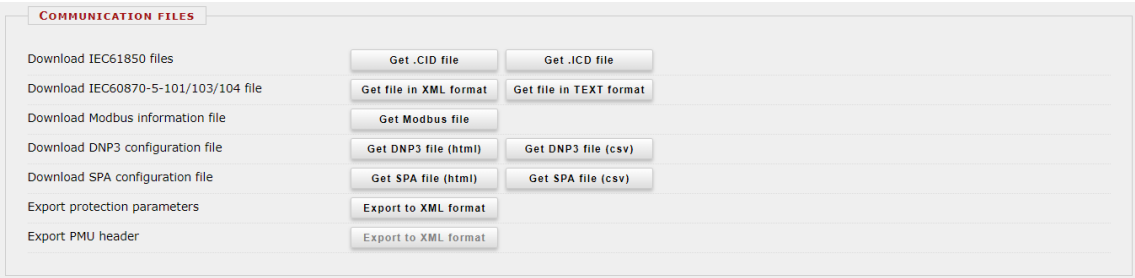


Figure 4-27 Communication files

The status of the ports of the internal switch are displayed in the **Ethernet links** field (Figure 4-28).

ETHERNET LINKS

Primary station bus fiber optic port	Down
Redundant station bus fiber optic port (optional)	Down
RJ-45 port on rear side (optional)	Up
EOB/RJ-45 port on front panel	Down
Process bus fiber optic port (optional)	Down

Figure 4-28 Ethernet link info

The PRP/HSR Status and Test field appears on devices equipped with a PRP/HSR CPU module. The communication status and test mode are set here.

PRP/HSR STATUS AND TEST

PRP/HSR module detailed status

Refresh

Phy Status:

A: link:Up remoteFault:None

B: link:Up remoteFault:None

Port A - Received Frames: 147216

Port A - Sent Frames: 154014

Port A - CRC Error: 0

Port A - LAN ID Error: 139297

Port B - Received Frames: 151861

PRP/HSR test mode

Mode H

Set

Figure 4-29 PRP/HSR (if exists) status and test

The memory info field (**Device housekeeping**) in Figure 4-30 provides information about the CDSP resources.

[ - ] DEVICE HOUSEKEEPING

Total system memory	61856 kB
Free system memory	24512 kB
Cache memory	11956 kB

Block size	Free block num.	Total free size
8k	21	
64k	4	
128k	2	
256k	3	
512k	1	
1024k	2	
2048k	2	
4096k	2	
8192k	1	

<- Reserved | Free ->

Figure 4-30 Memory info

The **Time synchronization** field (Figure 4-31) shows information about time synchronization supervision. If no external source is available, the PC operating system time can be set in the device with the Set device button.

TIME SYNCHRONIZATION

From NTP1 source	Ok
From NTP2 source	Disabled
From legacy protocol	Disabled
From binary input (pinsync)	Disabled

Set device time

Figure 4-31 Time synchronization info

4.2.10.3 I/O tester

The web page for advanced functions provides I/O simulation.

**Front panel LED test** - by clicking on this button the front LEDs will be tested with a blink sequence

**Simulate binary inputs** - by enabling this function user can simulate the inputs. For safety reason this function must be confirmed on the LCD screen on the device. The LED symbol between the SET and RESET buttons shows the current state of the input: red if activated, green if inactive. Simulation mode can be disabled with the button on top of the input control buttons. While the simulator mode is active, the Status LED of the device is yellow.

*Caution: the device is still fully functional in this mode, meaning that it can still generate trip signals!*

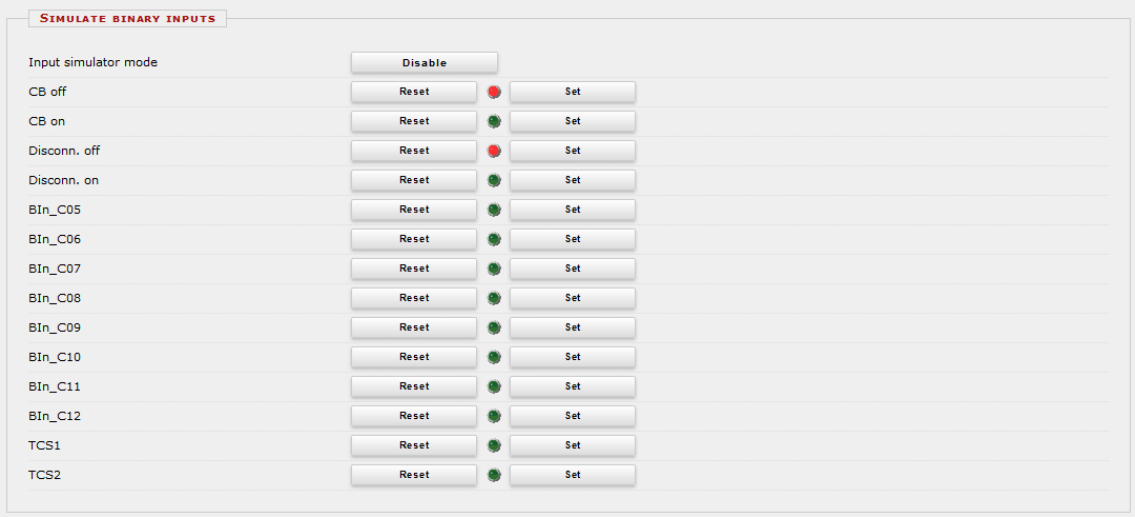


Figure 4-32 Input simulator mode

**Direct control of the output contacts** - prior to use this function the device should be switched to *Test/Blocked* mode in the *command* menu. In this operation mode, all functions of the device are blocked (i.e. protections, measurements, control functions etc.). If the mode has been changed, the option to issue direct control over the output contacts appears.

Enabling it requires confirmation on the LCD screen. After that, the output contacts can be controlled directly by the user. The LED symbol between the SET and RESET buttons shows the current state of the output: red if activated, green if inactive. To disable this function, change the Mode of the device to *On* state in the *commands* menu.

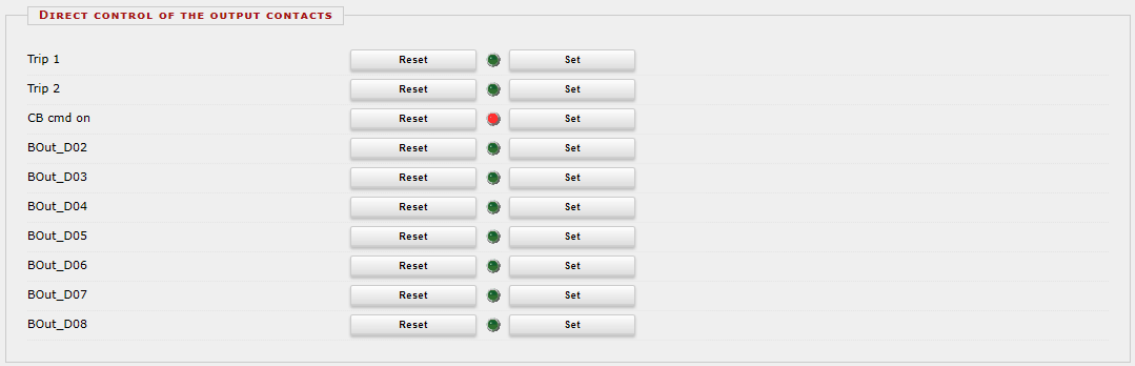


Figure 4-33 Output simulator mode

#### 4.2.10.4 Update manager

In the **Restore** field the user can upload configuration and parameter settings from a *report.zip* file into the device.

Device firmware can be upgraded when a new version is available. Information about the current **RDSP/CDSP firmware** and for the downloaded configuration file can be found in the text fields (Figure 4-34).

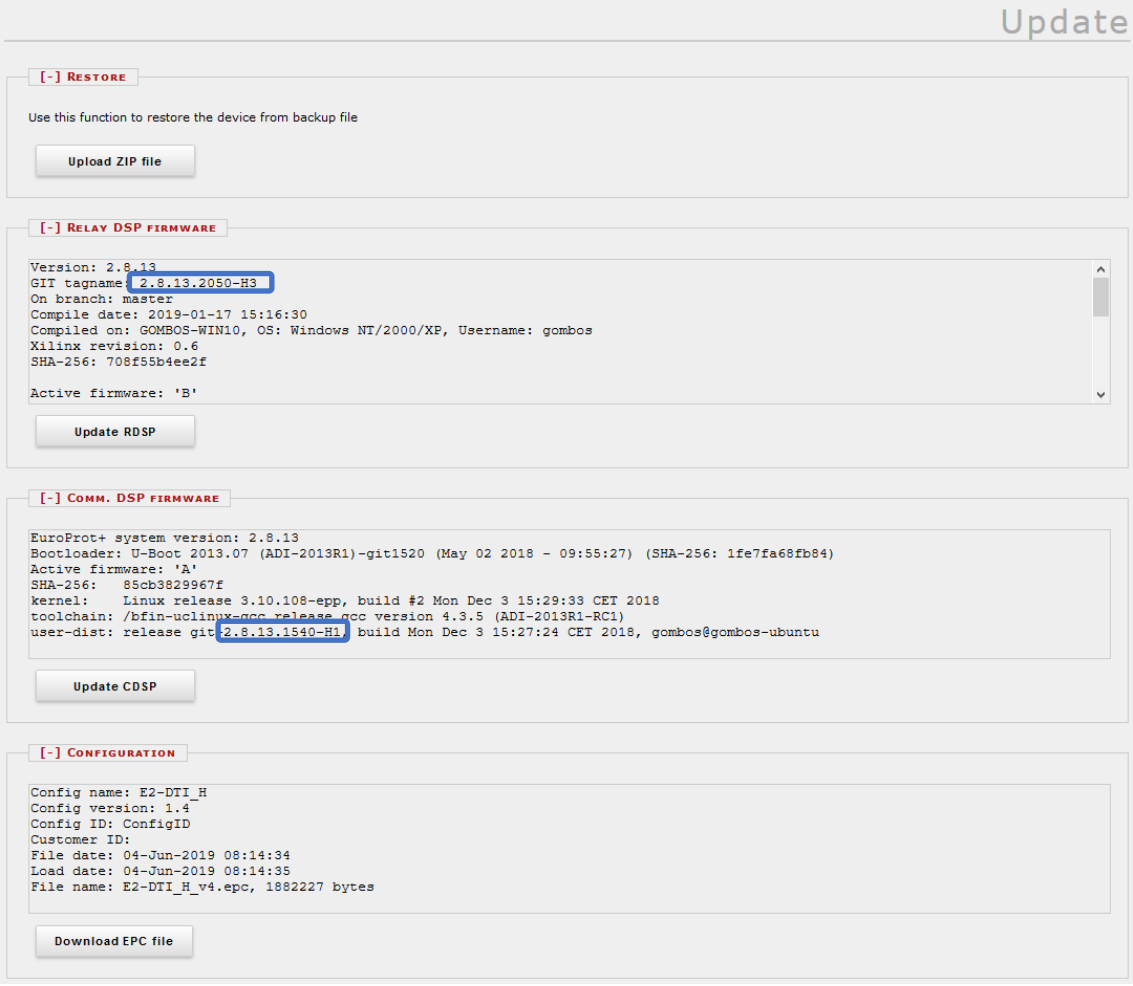
To update, click on the Update button, select the appropriate file and click OK. A dialog on the LCD will ask you to confirm updating. Detailed information about the latest firmware updates can be found on the Protecta website in the [release and revision history](#) (login required). If new firmware update is needed, please contact Protecta [support team](#).

All digital outputs (relay contacts, trip contacts) must be disconnected from the protected object(s) before commencing firmware update.

**Caution!** *Never load an older version of the firmware to the device!* Firmware update must always be done with care, because mistakes in this process may cause devices malfunction!

It is advised to get the system state report of the device (*report.zip*) before commencing the update. This way the device will be able to be restored if something goes wrong.

In the **Configuration** field the user can download the configuration file (.epc) from the device.



The screenshot shows the 'Update' web interface with four main sections:

- [-] RESTORE**: Contains the text 'Use this function to restore the device from backup file' and an 'Upload ZIP file' button.
- [-] RELAY DSP FIRMWARE**: Displays firmware details for version 2.8.13, including GIT tagname (2.8.13.2050-H3), compile date (2019-01-17 15:16:30), and active firmware ('B'). It includes an 'Update RDSP' button.
- [-] COMM. DSP FIRMWARE**: Displays system information for EuroProt+ version 2.8.13, including bootloader, active firmware ('A'), kernel (Linux release 3.10.108-epp), and user-dist (release git 2.8.13.1540-H1). It includes an 'Update CDSP' button.
- [-] CONFIGURATION**: Displays configuration details for E2-DTI\_H, including version (1.4), config ID, customer ID, file date (04-Jun-2019 08:14:34), load date (04-Jun-2019 08:14:35), and file name (E2-DTI\_H\_v4.epc, 1882227 bytes). It includes a 'Download EPC file' button.

Figure 4-34 Update manager

## 5 Troubleshooting

This section helps the user to evaluate warnings and errors experienced during device operation. If further support is required, please contact Protecta through the web support tool with detailed error description and all the information described in section 5.2.

### 5.1 Warning and Error Messages

Inappropriate or faulty conditions cause the device to give warning or error messages which can be seen in the advanced menu status/log submenu in the Warnings and Errors field. In some cases, the warning/error message can also be seen on the local display of the device.

#### 5.1.1 Warning messages in the web browser

In case of warnings the status LED turns usually yellow (exceptions are shown in the table below), and a yellow triangle appears on the web page below the menu list with an exclamation mark in it. In this case several functions are unable to work depending on the fault. The possible messages are listed in the table below.



Figure 5-1 Warning messages in the web browser

The tables on the following pages summarize the warning messages.

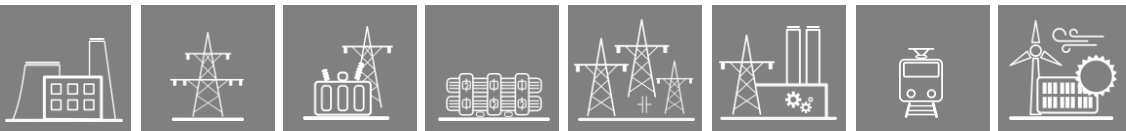


Table 5-1 RDSP Runtime warning messages

WARNING MESSAGE (RDSP RUNTIME)	EXPLANATION
0x0001 (noPSAD)	PS modules with auxiliary voltage measurement do not transmit the measured value to the CPU properly. Suspected HW error.
0x0002 (vlanMismatch)	In line protection and binary signal exchange applications the VLAN settings are inconsistent. Consistency check recommended.
0x0004 extRtcCalibMode	CPU Real Time Clock accuracy is out of the tolerance range. Internal device clock won't work accurately, while the device is switched off. Suspected HW error.
0x0010 psVoltUnstab	The device internal power supply voltage (+/-12V) is unstable on the CT/VT module. Possible power supply or backplane failure.
0x0400 siliconRevMismatch	The RDSP firmware and the CPU chip hardware versions are different.
0x8000 adControlWarn	AD converter failure on an analogue input module. The faulty module can be determined from the RDSP log, which can be opened in the advanced menu status/log submenu LOG files field. Suspected HW error.

Table 5-2 CDSP warning messages

WARNING MESSAGE (CDSP)	EXPLANATION
0x0001 (System)	System level warning (e.g.: Parallel DRL message version discrepancy)
0x0002 (Config)	Configuration inconsistency or structural problem. The system is still operating.
0x0004 (Param)	Parameter problem, such as: <ul style="list-style-type: none"> <li>- during startup the device is unable to determine the number of parameter sets</li> <li>- parallel DRL addressing warning (same master and slave address used)</li> </ul>
0x0008 (LCD application)	System level warning, which is hampering LCD startup. It may happen when the device is building up communication between the RDSP and the CDSP via the high-speed bus application (sport).
0x0040 (Time synchronization)	Time synchronization warning. Check the Time synch. settings in the system settings menu and verify the signal source.
0x0100 (RDSP comm. error)	RDSP communication problem. Software inconsistency or hardware error possible.



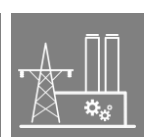
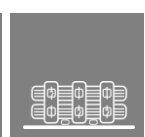


Table 5-3 Application warning messages

WARNING MESSAGE (APPLICATION)	EXPLANATION
0x0001 (diff3wVgroup)	The connection of the primary winding in primary-secondary and primary-tertiary relation is selected in contradiction (eg. Y and D) in the Transformer Differential protection function block. The function is disabled in this situation.
0x0002 (rangeMismatch)	Example: Summarized currents used in certain function blocks are measured by different CT modules, and the "Rated secondary I1-3" or the "Rated secondary I4" parameters are differently set in the corresponding "CT4 module" function blocks. Indicated with red LED.
0x0004 (nompeakMismatch)	Example: Summarized currents used in certain function blocks are measured by different types of CT modules, for which the max. measured current is different (e.g.: CT+5151 module 50x In, CT+5101 module 4. channel 12,5x In).
0x0008 (frSourceMissing)	Frequency based function blocks are used in the configuration but no frequency source is configured.
0x0010 (modeNotOn)	The mode of device according to IEC 61850 is not ON. It can be switched on in the commands menu common field.
0x0020 (userUKE)	The 'External Warning' binary status input signal of the Common function block is TRUE. This is defined by the user in the graphical logic editor. Possible reasons are status feedback failure, VT MCB failure, etc...
0x0040 (mvDistVolt)	The 'Connection U1-3' parameter of the VT4 module function block is set to Ph-Ph while the 'Operation' parameter of any distance protection or directional overcurrent function block is not Off. These functions are disabled in this situation.
0x0080 (eventRecSize)	The number of the configured events channels has reached the limit.
0x0100 (simulatorMode)	Binary input simulator mode enabled.
0x0200 (wrongSysFrv)	The set 'Power system frequency' (system settings / system parameters) and the frequency of the measured voltage are different. 50Hz measured and 60Hz set or vice versa.
0x0400 (maxILoadHigh)	The 'Max.I_load' parameter of the Busbar differential protection is set higher than the "Base sensitivity" of the differential characteristics.
0x0800 (genParamError)	Other parameter mismatch. For more details see the RDSP log.

### 5.1.2 Error messages in the web browser

In case of errors the status LED turns red. If the web page is accessible, a red STOP sign can be seen below the menu list. When an error occurs, the Fault Relay NO contact opens as well. The device is unable to operate in this state. The error messages inform the user about the hardware errors.

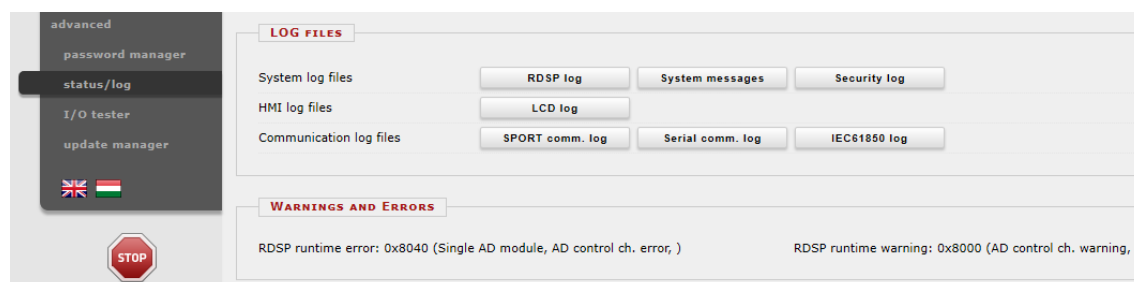


Figure 5-2 Error message in the web browser

The following tables summarize the error messages.

Table 5-4 RDSP Runtime error messages

ERROR MESSAGE (RDSP RUNTIME)	EXPLANATION
0x0004 (moduleNotAvailable)	The CPU does not detect a module during operation. Suspected HW error.
0x0008 (flashError)	Suspected HW error.
0x0010 (pldSelfCheckFailed)	Connection failure between the RDSP and the backplane communication logic. Suspected HW error.
0x0020 (relayStoppedByFwConfigUpdate)	The device has not restarted automatically after a configuration or firmware download. Repeat the download procedure.
0x0040 (singleModuleADErr)	Double AD control failure: One analogue input module is affected, which can be determined from the RDSP log based on the card serial number.
0x0080 (multiModuleADErr)	Double AD control failure: Multiple analogue input modules are affected, which can be determined from the RDSP log based on the card serial numbers.
0x0100 (allModuleADErr)	All analogue input modules are failed. Suspected power supply module or backplane failure.
0x0800 (paramLoadingFailed)	After "Set parameters" command the RDSP dataflash content is invalid. Repeat parameter setting.
0x1000 (psSecondaryVoltFailed)	Power supply internal voltage (+/-15VDC, +12VDC or 3,3VDC) is out of the specified limits.
0x4000 (psVoltFailed)	Power supply module with auxiliary voltage monitoring function detects voltage out of the limits. Check the auxiliary voltage.
0x8000 (adControlErr)	There is an error occurred in one/some of the analog input modules (e.g.: CT, VT, AIC, RTD). Replacement of the faulty module required.

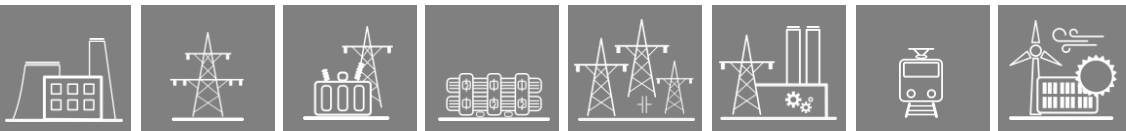


Table 5-5 RDSP Init error messages

ERROR MESSAGE (RDSP INIT)	EXPLANATION
0x0001 (hwPostError)	HW test during device start-up has detected a failure. See the RDSP log for more details.
0x0002 (configError)	Configuration download from the data flash was not succesful. Reload the configuration.
0x0004 (paramError)	Parameter download from the data flash was not successful. Reload parameter set.
0x0008 (anaCorrFailed)	It was not successful to load all the analogue channel corrections from the analogue input module. Possible failure of the analogue module, CPU or backplane.
0x0010 (cardConfMismatch)	Mismatch between the detected and configured modules. More details can be found in the advanced menu under status/log submenu in the cards field.
0x0020 (failed2LoadVars)	Reloading the configuration will rectify the problem, if there is no HW error.
0x0080 (failedNonvolVarFormat)	Suspected HW error.
0x0200 (noValidPSCard)	Unable to detect Power Supply module. Possible failure of the power supply module, CPU or backplane.
0x0800 (fwConfMismatch)	RDSP firmware does not fulfill the configuration version requirement. Certain funktion blocks used in the configuration are not implemented in the RDSP firmware, therefore an RDSP update is recommended.
0x1000 (noClearForcedModeStat)	For R&D purposes only.
0x2000 (funcLevelMismatch)	The function level of the CPU is lower than that of the downloaded configuration file. Configuration file or CPU module level modification shall be executed by Protecta staff.

Table 5-6 CDSP error messages

ERROR MESSAGE (CDSP)	EXPLANATION
0x0001 (System)	Critical system error. Corrupted file or hardware error possible. The system cannot operate reliably.
0x0002 (Config)	Critical configuration error, inconsistency or internal structural problem. The system cannot operate reliably.
0x0004 (Param)	Critical parameter error or data inconsistency on the CDSP or RDSP.
0x0020 (TCP communication)	TCP communication system error. Hardware or other system error possible.
0x0080 (File I/O)	File system error. The device cannot generate the RDSP log.
0x0100 (RDSP comm. error)	RDSP communication problem. Software inconsistency or hardware error possible.

Table 5-7 Hardware Init error messages

ERROR MESSAGE (HW INIT)	EXPLANATION
0x0004 (FRAMEError)	FRAM failure indicating CPU HW error.
0x0008 (extRTCErrror)	Real Time Clock reset generator failure indicating CPU HW error.
0x0010 (sramError)	SRAM test failed at power up indicating CPU HW error.
0x0020 (codeFlashError)	Flash IC no. 13 failed on the CPU module indicating CPU HW error.
0x0040 (dataFlashError)	Flash IC no. 14 failed on the CPU module indicating CPU HW error.
0x0080 (sdramError)	SDRAM test failed indicating CPU HW error.
0x0100 (xilinxInitError)	CPU HW error caused by the Xilinx.
0x1000 (pldSRAMMagicStrFillFailed)	If the IED started with power supply off/on switching, it tries to write a control data string in the SDRAM. If this operation fails, the error message appears indicating the CPU HW error.
0x2000 (pldSelfCheckFailed)	Self-check function detected a failure. Suspected CPU HW error.

### 5.1.3 Error messages on the LCD screen

If there is a fault while downloading a configuration to the device or updating the firmware, the device enters the emergency mode, which also means that it is unable to operate. The following error messages may appear on the LCD screen if the RDSP and CDSP major version numbers do not match, or unsuitable firmware have been loaded to the device (e.g. lower than the minimum required by the configuration).

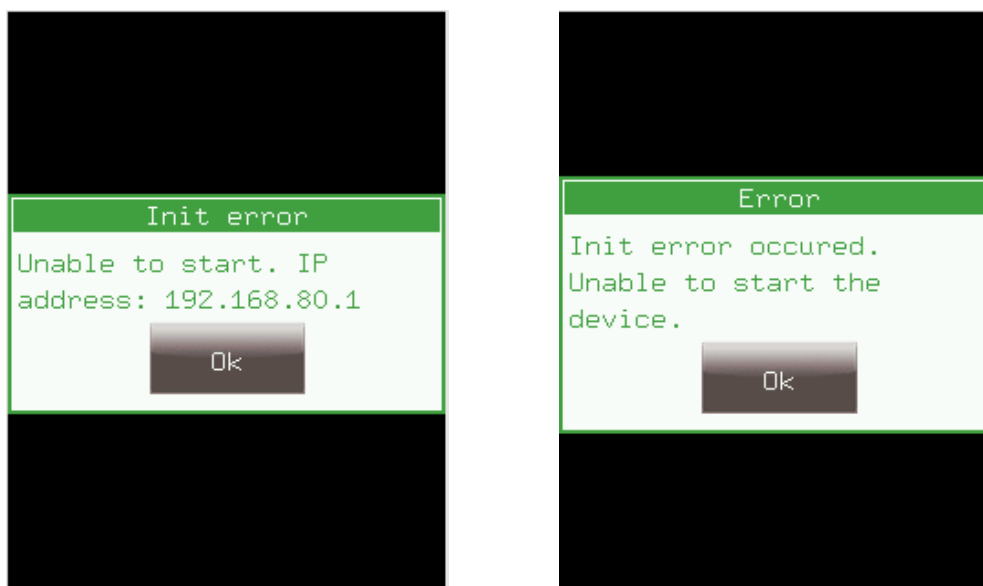


Figure 5-3 Error messages on the LCD screen

If this happens, the web page of the device will be different (see Figure 5-4), but the “report.zip” file can still be downloaded by using the *Get report file* button on it. This file is important for troubleshooting for the Protecta Support team, as it contains all necessary information about the device (firmware versions, configuration file, all the logfiles, parameters, settings etc.).

In these cases please contact Protecta Support on the web-based support system (Help Desk) here: <http://buy.protecta.hu/support/>



The following screen shows the web browser in emergency mode with all the log files and the report.zip button.

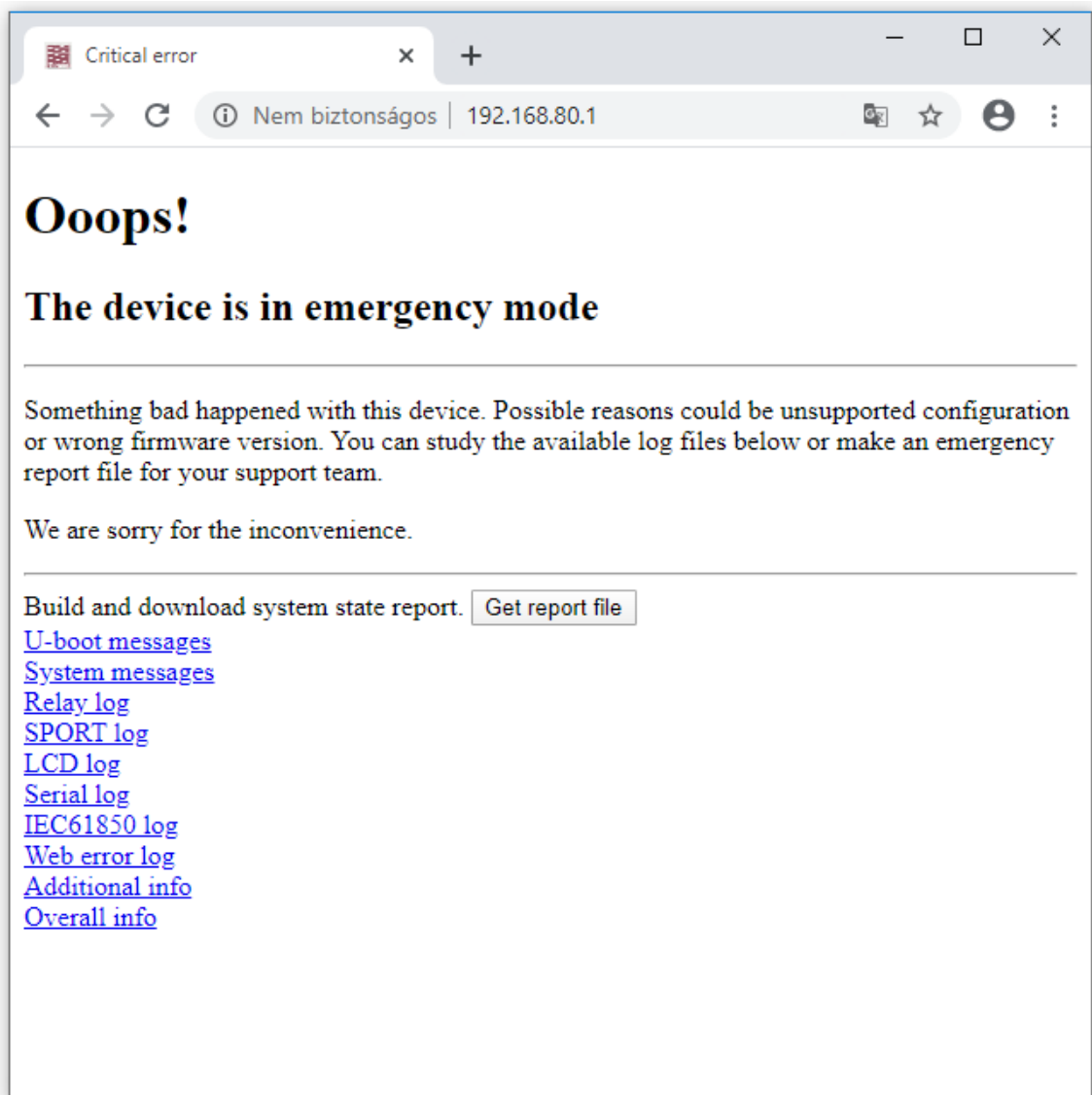


Figure 5-4 Web page of a device in emergency mode

#### 5.1.4 Operation of the IFR (Internal Fault Relay)

The relay operates in the following three occasions:

- The device is switched off or it is starting up (while the Status LED is red)
- Errors (red Status LED)
- The ExtWarning input of the Common function block is active (user-defined warning)

In any other case (normal operation, or other, non-user-defined warnings that cause a yellow status LED), the fault relay does not operate.

## 5.2 Necessary data before contacting Protecta Support

Sending the report.zip file is the preferred method in order to provide all important information to the support team. If the file cannot be downloaded for some reasons, the data below have to be provided when contacting us, so the device can be identified quickly:

- Serial No. of the device
- RDSP version
- CDSP version
- Configuration name and date

### 5.2.1 Serial Number of the Device

It can be found on the Device Nameplate which is located on the upper half of the right of the device, close to the backplane.



Figure 5-5 The device name plate

There are cases when the physical Nameplate cannot be accessed because of the location of the device. In these cases, connect to the IED on its Service Port, and open its web page. Here the serial number can be found on the virtual nameplate located in the advanced menu status/log submenu in the device nameplate field.

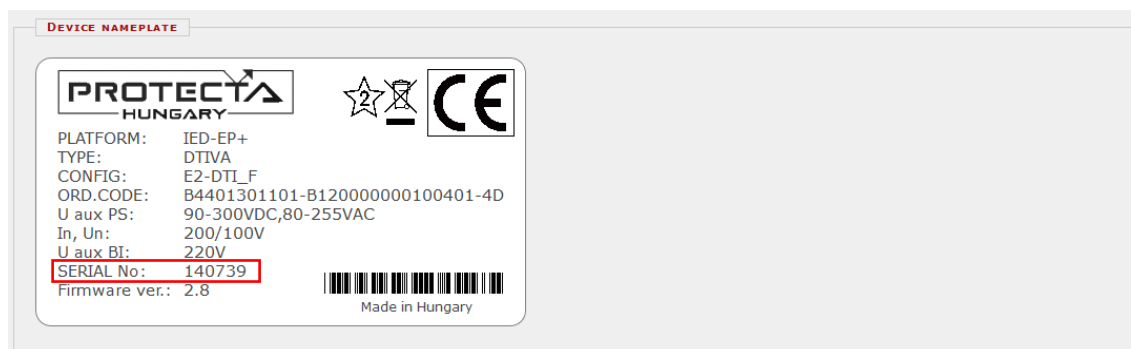


Figure 5-6 The device virtual name plate

## 5.2.2 Information about RDSP, CDSP and configuration versions

The firmware and configuration versions can be shown on the device touch screen main menu by touching either of the information „i” icons.

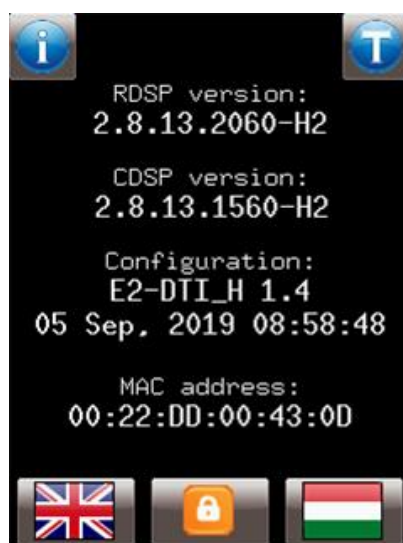


Figure 5-7 RDSP, CDSP and configuration information on the LCD

If the local screen cannot be accessed, the web page can also be used to obtain the version information in the advanced menu update manager submenu.

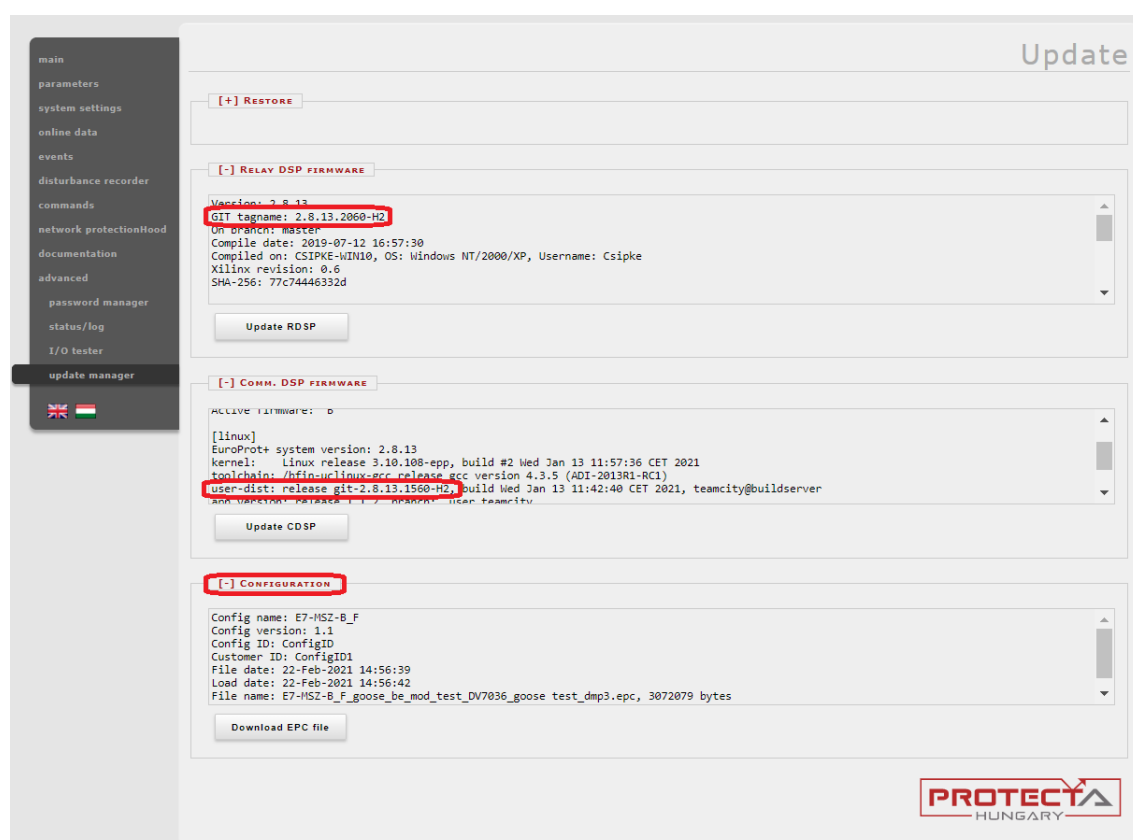


Figure 5-8 RDSP, CDSP and configuration information on the web



### 5.2.3 Black and white display for S24 devices

S24 devices with b/w display have different main screen than the others. Here all necessary information keeps rolling on the screen, so they can be read easily. The web browser interface is the same as described in the previous section.

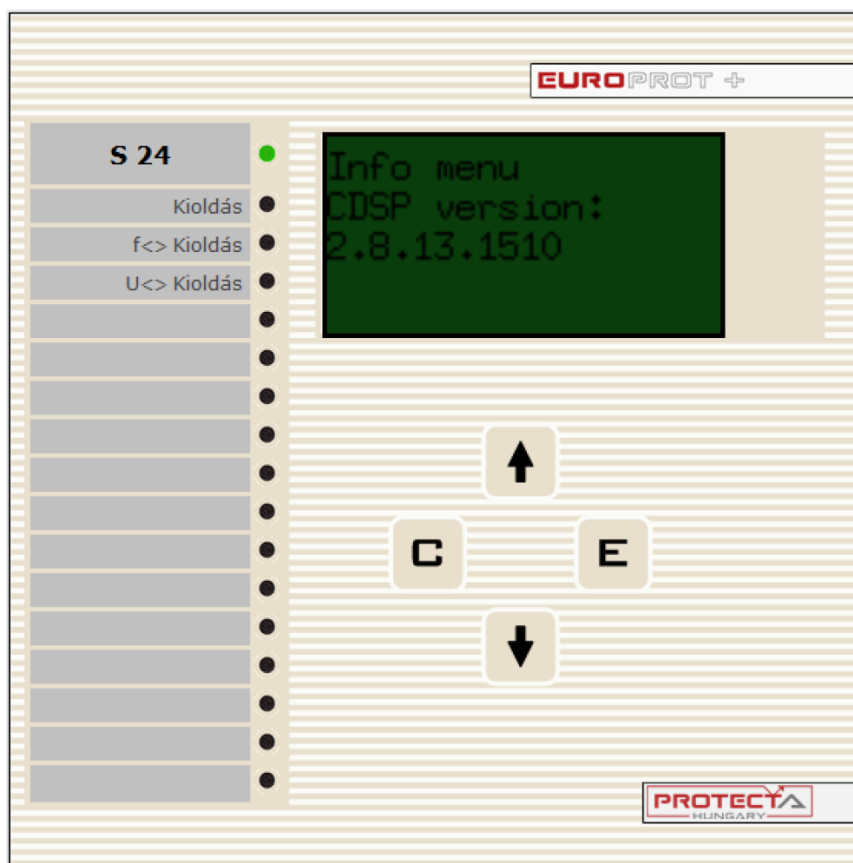


Figure 5-9 Front panel of an S24 device with B/W display

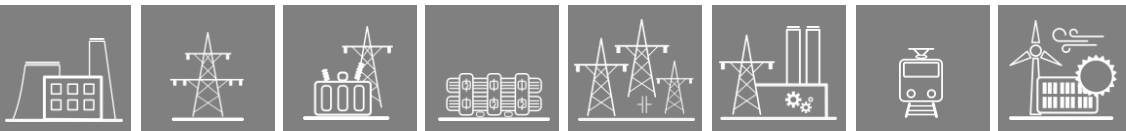
### 5.3 Quick Troubleshooting

The table below contains the typical faults and errors that may occur during commissioning or operating the device with possible reasons and solutions. If necessary, please contact the Protecta Support Team:

<https://buy.protecta.hu/support/?language=English>

Table 5-8 Typical errors

STATUS LED	LCD DISPLAY STATUS	FRONT PANEL BUTTONS	POSSIBLE FAULT	SUGGESTION
Dark	Dark	Do not react on touch.	a. No supply voltage. b. Supply voltage is out of range. c. Power supply module failure	Check the supply voltage and the LED on the power supply module.
Green	Dark	Do not react on touch.	a. LCD display failure b. In cases of CDSP version lower than 2.8.13.912 it is possible that the LCD screen froze.	In case of reason b., a CDSP firmware upgrade will fix the issue.
Green	Works but the time shown is wrong.	Working.	No time synchronization signal is received (or it is received irregularly). This way the time can go out of sync.	Use the Set device time button on the web page located in the advanced menu status/log submenu. This will set the time in the computer operating system to the device.
Yellow	Working.	Working.	There is an external time synchronization device connected and the "Timesync warning" parameter is set in the system parameters menu, but no synchronization signal is received. In this case on the web page in the advanced menu status/log submenu a warning message can be seen (0x0040 Time sync warning)	Check the settings and connections of the time synchronization device



STATUS LED	LCD DISPLAY STATUS	FRONT PANEL BUTTONS	POSSIBLE FAULT	SUGGESTION
Yellow	Working.	Working.	In the user logic there is a signal connected to the "ExtWarning" input of the Common function block, and this signal is TRUE. This will also be indicated by the Failure Relay and on the web page in the advanced menu status/log submenu a warning message can be seen (0x0020 User warning)	Check the configuration of the device using the EuroCAP tool. Look for the Common function block in the graphic editor and see what kind of signal is connected to the ExtWarning input. The most common signals may be switchgear status signal errors or VT fuse errors etc.
Red	Working	Do not react on touch	a. a HW module is faulty b. the actual HW configuration is different than the one defined in the configuration	See if there are any issues with the HW modules. These can be checked on the web page in the advanced menu status/log submenu cards field. Contact Protecta personnel using the web-based support system.