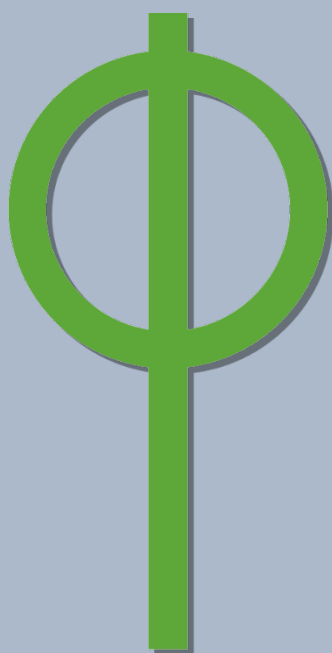


LIGHT

STUDIO 485

Software Instructions Manual

Read the manual carefully before operating this software



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The contents of this manual have been verified to correspond to the specifications of the software. However, deviations cannot be ruled out. Therefore, a complete correspondence between the manual and the real software cannot be guaranteed. The information in this manual is regularly checked, and corrections may be made in subsequent versions.

The visualizations shown in this manual are only illustrative.

Table of Contents

Table of Contents

1 Light Studio.....	4
1.1 Introduction.....	4
1.2 Main Window.....	5
1.2.1 Main Menu.....	5
1.2.1.1 Lights.....	5
1.2.1.2 Protocols.....	6
1.2.1.3 Settings.....	6
1.2.1.4 Info.....	7
1.2.2 Lights Control.....	7
1.2.2.1 Light Control Panel.....	7
1.2.2.2 Running Protocol.....	9
1.3 Protocol Editor.....	10
1.3.1 Editor Environment.....	10
1.3.1.1 Available Protocols.....	10
1.3.1.2 Protocol Detail.....	11
1.3.2 Choosing Protocol for Light.....	14
1.4 Calibration Manager.....	16
1.4.1 Lights and Available Calibrations.....	16
1.4.2 Calibration Detail.....	18
1.5 Group Manager.....	20
1.5.1 Available Group Configurations.....	20
1.5.2 Group Configuration Detail.....	22
2 List of Figures, Tables.....	25

1 Light Studio

This section of the manual contains description of the Light Studio 485 application.

1.1 Introduction

Light Studio 485 is application for controlling PSI Fytopanel family lights and PSI SLxxx family lights (using LC500 converter box) from PC.

It allows grouping of the physical light channels to logical light channels, making simultaneous control of multiple light panels easy. Physical channels can be grouped automatically based on the predefined attributes, or by user from the grouping interface.

Logical light channels can be calibrated from user defined calibration points. Calibrated light channel is then controlled in absolute units. Calibration can be saved to and loaded from file, which allows fast switching of calibration profiles (useful when changing panel distance to the object).

Logical light channel can be controlled directly from the main screen, or it can run a protocol. Protocols are defined by user and are built from predefined basic blocks (continuous and ramp). Protocol timing is independent for each logical channel, but it allows simultaneous start of multiple channels and time offset for each channel.

1.2 Main Window

After starting application *Main Screen* (Fig 1) with following items is displayed:

- *Main Menu* (Fig 1-1) – more detailed structure of this menu bar in chapter 1.2.1 Main Menu
- *Lights Control* (Fig 1-2) – displays the available lights and allows their control, more in chapter 1.2.2 Lights Control
- *Application Logs* (Fig 1-3) – lists the basic information on performed tasks and errors

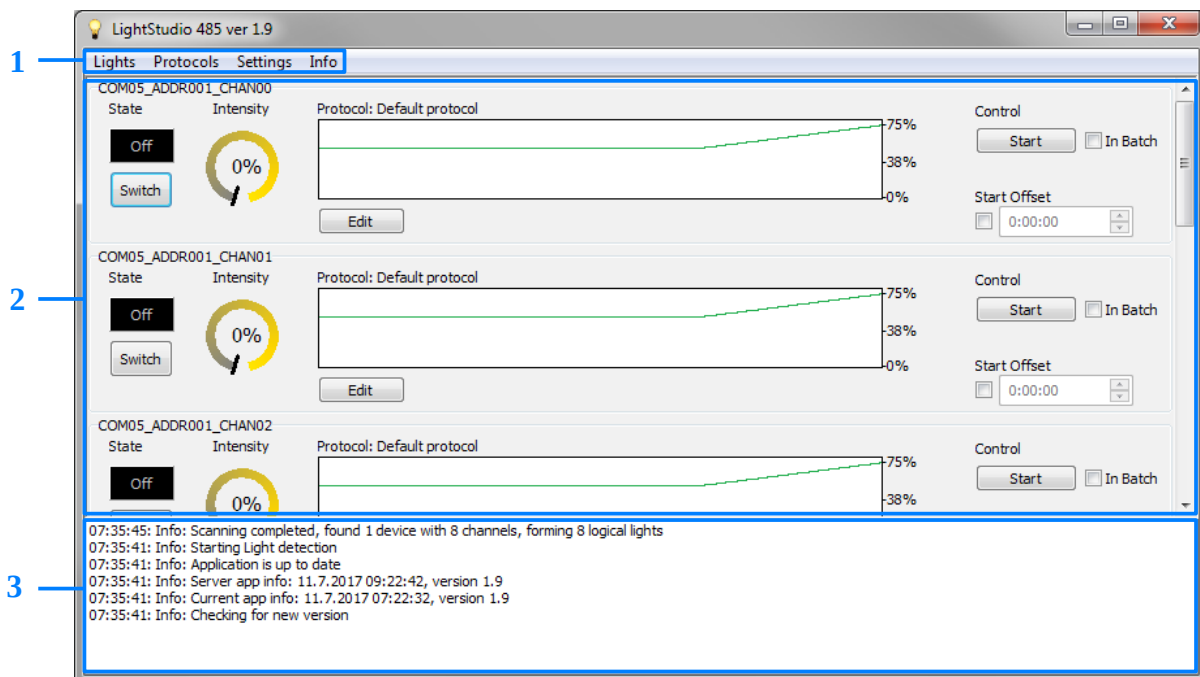


Fig 1: Main Screen

1.2.1 Main Menu

Using the corresponding items of the *Main Menu* can be accessed the controls of *Lights*, *Protocols*, *Settings* and the application *Info*. For each of the four menu items, a context menu with the appropriate control options is available. Each *Main Menu* item is described in one of the following four chapters.

1.2.1.1 Lights

Context menu for the item *Lights* (Fig 2) allows *Rescan* option (Fig 2-1).

When the application is started, the connected light devices are automatically detected and is not necessary to run this process manually. *Rescan* option allows to restart the lights detection without

having to restart the entire application. Starting of lights scanning is also available as key shortcut, under *Ctrl+R* combination. During the detection, information about this process is displayed (Fig 3). After the scanning process is completed, basic information about the detected lights is logged into the *Log* (Fig 1-3) and the *Light Control* panels are added to the *Lights Control* (Fig 1-2).

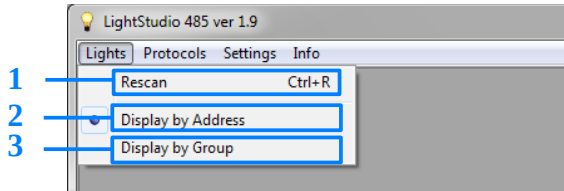


Fig 2: Lights Context Menu

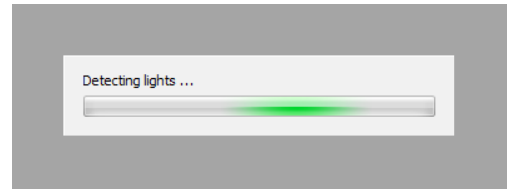


Fig 3: Lights Detection in Progress

By switching the other two options in the *Lights* context menu, the *Light Control* panel can be displayed by individual channel addresses (Fig 2-2) or by defined groups (Fig 2-3). More about group configurations in chapter (1.5 Group Manager).

1.2.1.2 Protocols

Context menu for the item *Protocols* (Fig 4) contains a single item *Edit* (Fig 4-1). After selecting this option, the *Protocol Editor* window is opened. Use of this editor is described in chapter 1.3 Protocol Editor.

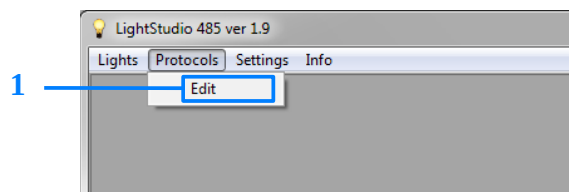


Fig 4: Protocols Context Menu

1.2.1.3 Settings

Context menu for the item *Settings* contains two items.

The first item is *Calibration* (Fig 5-1), which opens the *Calibration Manager* window to calibrate the lights. A shortcut for this action is *Ctrl+C* combination. For more detailed information about the light calibration process, see the chapter 1.4 Calibration Manager.

The second item is *Group Configuration* (Fig 5-2), also available by shortcut under *Ctrl+G* combination. After selecting this item, the *Group Manager* window is available. Creating group configurations for which this window is designed is described in the chapter 1.5 Group Manager.

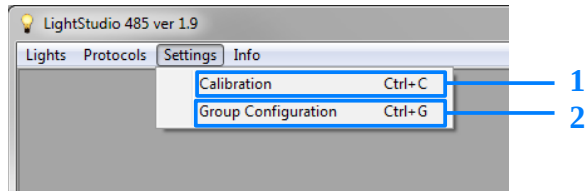


Fig 5: Settings Context Menu

1.2.1.4 Info

Checking for new version of application is performed every time the application is started or after clicking *Update* item (Fig 6-1) in *Info* context menu. Information about update status is logged into the *Log* (Fig 1-3). If new version of Light Studio is available, dialog is displayed with user confirmation of the update process. If the update is confirmed, new software version is downloaded and installed and the application is restarted.

About item (Fig 6-2) shows brief information about the Light Studio application (Fig 7) – current version, author company and E-mail contact for support.

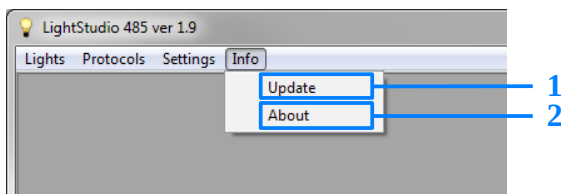


Fig 6: Info Context Menu

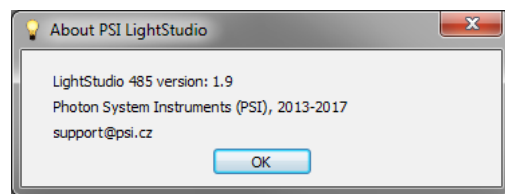


Fig 7: About PSI Light Studio

1.2.2 Lights Control

Lights Control (Fig 1-2) holds the individual panels (Fig 8) to control each independent light source or predefined group of lights. If no device has been detected, the *Lights Control* remains empty.

1.2.2.1 Light Control Panel

The Light Control Panel represents the smallest controllable light element. Panel controls one independent light source if the option *Display by Address* (Fig 2-2) is selected in the *Main Menu*. For a selected *Display by Group* option (Fig 2-3), the panel can represent a whole group of lights. Group Members are defined by the group configuration file (more in chapter 1.5 Group Manager). Controlling the group of lights as a whole is reflected on each of its members.

Each panel is identified by the system path to the light (*Display by Address*) or calibration and group name (*Display by Group*) at the top of the panel (Fig 8-1).

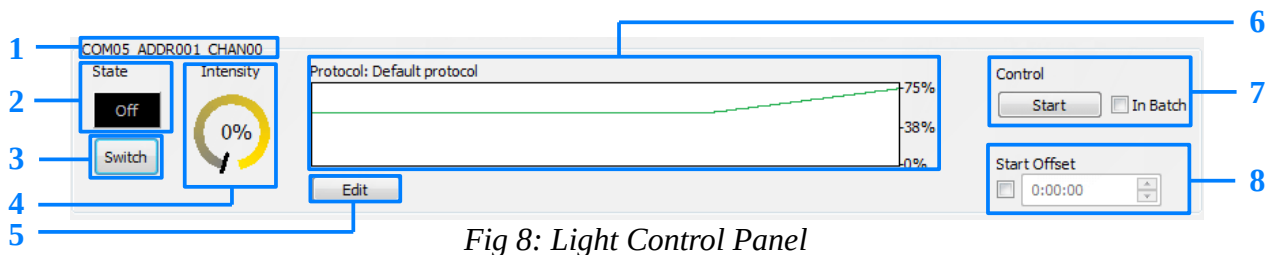

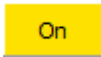
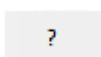





Fig 8: Light Control Panel

State of light or group (Fig 8-2) which is switchable by the *Switch* button (Fig 8-3) is presented graphically:

-  the light or group is off
-  the light or group is on
-  unknown state – typical initial state of group with lights in different states

Setting the *Intensity* of the light is enabled by the tune knob (Fig 8-4). By default, intensity is set in percent. In case light channel has calibration assigned, absolute value of intensity in μE is counted automatically and is also displayed. The tune knob may display the following information:

-  intensity in percent – the light is not calibrated
-  intensity in percent with the calculated value in μE – the light is calibrated
-  unknown intensity – typical initial state of a group with lights of different intensity settings

Operation of the light or group can be controlled by a protocol that indicates the sequence of steps to be performed. *Edit* button (Fig 8-5) is used to open the *Protocol Editor* window in which the existing protocol can be assigned or created new one, more in chapter 1.3.2 Choosing Protocol for Light.

The progress of the selected protocol is plotted in the chart (Fig 8-6). Whether the intensity in the graph is plotted in percent or μE depends on the protocol type. The protocol type can be specified in the Protocol Editor, more in chapter 1.3 Protocol Editor.

Section *Control* (Fig 8-7) is designed to run the protocol. The protocol can be started for each single light separately or for all lights included in the batch at the same time. Batch is synchronously executable group of lights.

In Batch check box (Fig 9-2, Fig 10-2) specifies whether the light will be included in the batch. When checked, light is included in batch. In this case, clicking any *Start Batch* button (Fig 10-1), runs protocols for all lights in the batch at once. When unchecked, light is a separate unit whose protocol is individually executable with the appropriate *Start* button(Fig 9-1).

Checking the *Start Offset* checkbox (Fig 8-8) allow to specify a required time offset in which the protocol starts running.

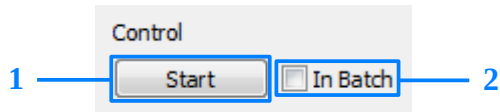


Fig 9: Protocol Start – Single Light

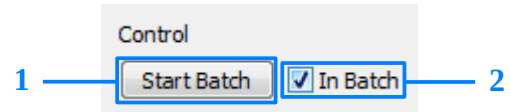


Fig 10: Protocol Start – Lights in Batch

1.2.2.2 Running Protocol

The manual control items of the lights (Fig 11-3, 4, 5, 7) are disabled when the protocol is running.

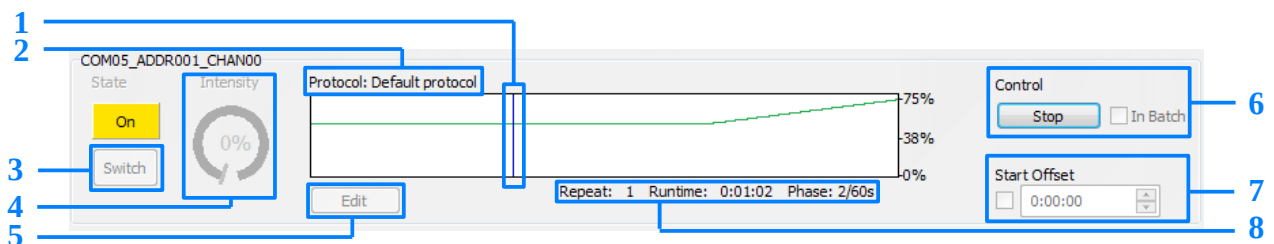


Fig 11: Light Control Panel – Running Protocol

Chart titled by protocol name (Fig 11-2) tracks dynamically the current position at the protocol time (Fig 11-1) and provides basic progress information (Fig 11-8) – protocol repeat number, total run time and time position of the current phase.

After starting, the protocol runs always in an infinite loop and it is only possible to stop it in the *Control* section (Fig 11-6).

Stopping the protocol proceeds analogous to its starting (1.2.2 Lights Control) differently for individual lights and for lights in the batch. Clicking the *Stop* button (Fig 12-1), stops only protocol for appropriate light. Clicking any *Stop Batch* button (Fig 13-1), stops protocols for all lights in the batch at once.

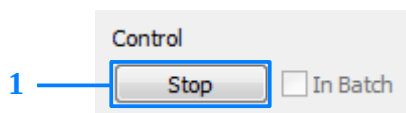


Fig 12: Protocol Stop – Single Light

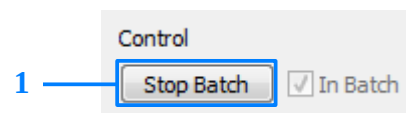


Fig 13: Protocol Stop – Lights in Batch

1.3 Protocol Editor

Protocol Editor (Fig 14) is independent window used to design a light protocols. Window can be opened by appropriate option from the *Main Menu* (Fig 4-1) or by *Edit* button (Fig 8-5) in each *Light Control* panel. The second option is primarily intended for assign a protocol to selected light, however the protocol creation functions are fully preserved in it.

Opening the *Protocol Editor* from the *Main Menu* is possible even if no devices are connected.

1.3.1 Editor Environment

The *Protocol Editor* window consists of a list of *Available Protocols* (Fig 14-1) with buttons (Fig 14-2) for managing these protocols and of description of the protocol in *Detail* (Fig 14-3).

Clicking button *Ok* (Fig 14-3) closes the *Protocol Editor* window.

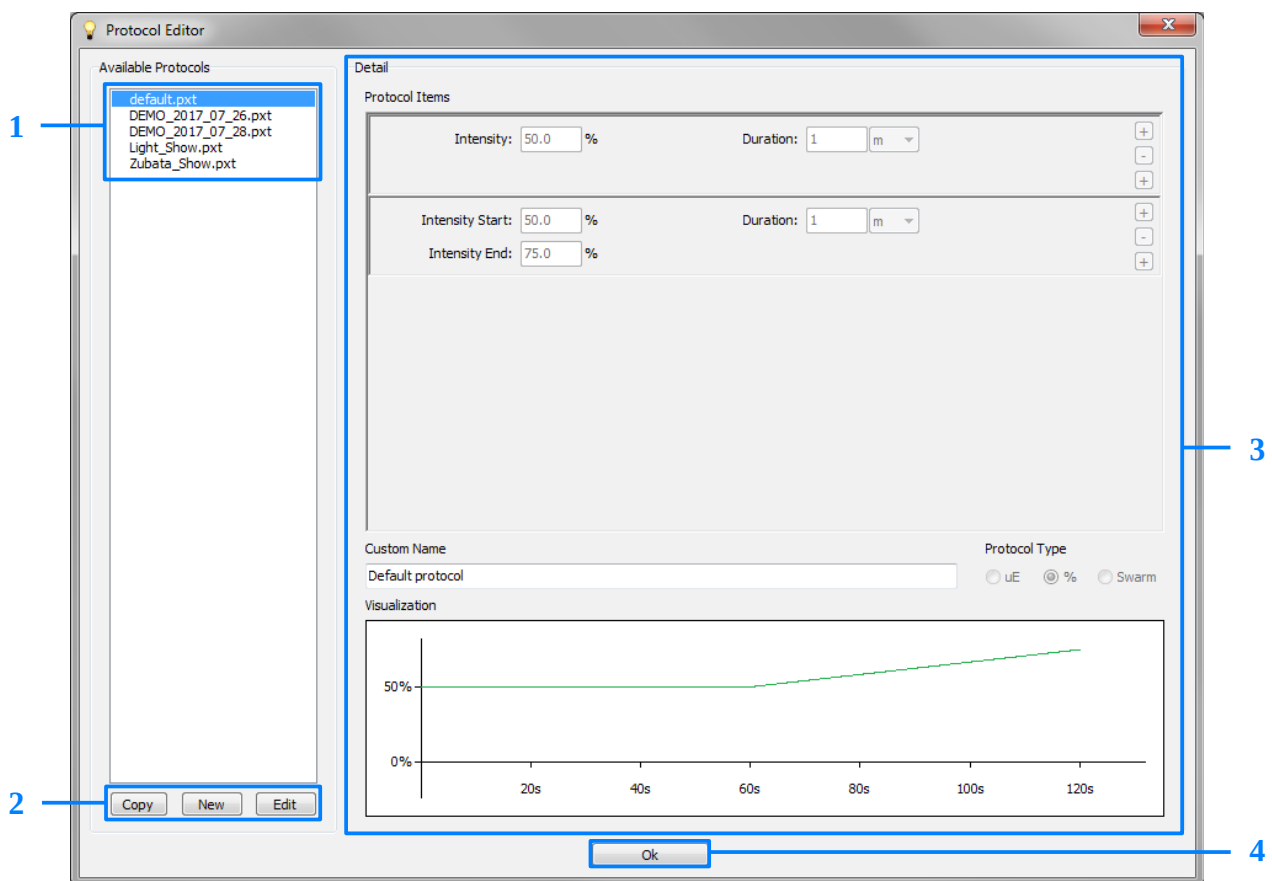


Fig 14: Protocol Editor

1.3.1.1 Available Protocols

The Light Studio works with the protocol files from the folder “protocols” located in the

application startup folder.

A list of *Available Protocols* (Fig 14-1) is displayed on the left side of the editor window, along with the buttons (Fig 14-2) for basic protocol handling. Set of function buttons is available in various operation:

- **Copy** creates copy of selected protocol. The window (Fig 15) for naming the copy file is opened first. Then the newly copied protocol is added in the *Available Protocols* list (Fig 14-1) and is prepared for adjustment in protocol editing mode. *Copy* button is not available in the editing mode.
- **New** creates new protocol. The window (Fig 15) for naming the newly created file is opened first. Then the newly created protocol is added in the *Available Protocols* list (Fig 14-1) and is prepared for adjustment in protocol editing mode. *New* button is not available in the editing mode.
- **Edit** switches to the editing mode for selected protocol by the enabling of the editing controls (Fig 14-3). *Edit* button is not available in protocol editing mode. Alternatively, the switching to the editing mode can be achieved by the context menu option above the selected protocol (Fig 16-1).
- **Cancel** *Cancel* button is available only in protocol editing mode and it is used to switch to the viewer mode without saving the changes.
- **Save** *Save* button is available only in the editing mode and it is used to save edited protocol to the file. After storing the protocol, the editing mode is switched to the viewer mode.

The existing protocol can be deleted by the context menu option above this protocol (Fig 16-2). The user is prompted to confirm the dialog box before permanently deleting the protocol file.

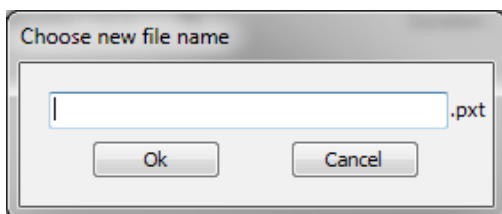


Fig 15: Naming Protocol File

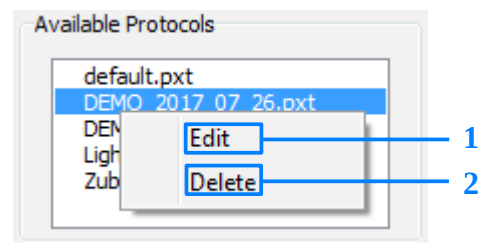


Fig 16: Protocols Context Menu

1.3.1.2 Protocol Detail

The detailed protocol definition is displayed for the selected protocol in the right window part. There are individual *Protocol Items* (Fig 17-1) creating the protocol, their progress *Visualization* in

the chart (Fig 17-8), the protocol *Custom Name* (Fig 17-7) and *Protocol Type* (Fig 17-12). All of these controls are read-only in protocol viewing mode and are editable only in protocol editing mode.

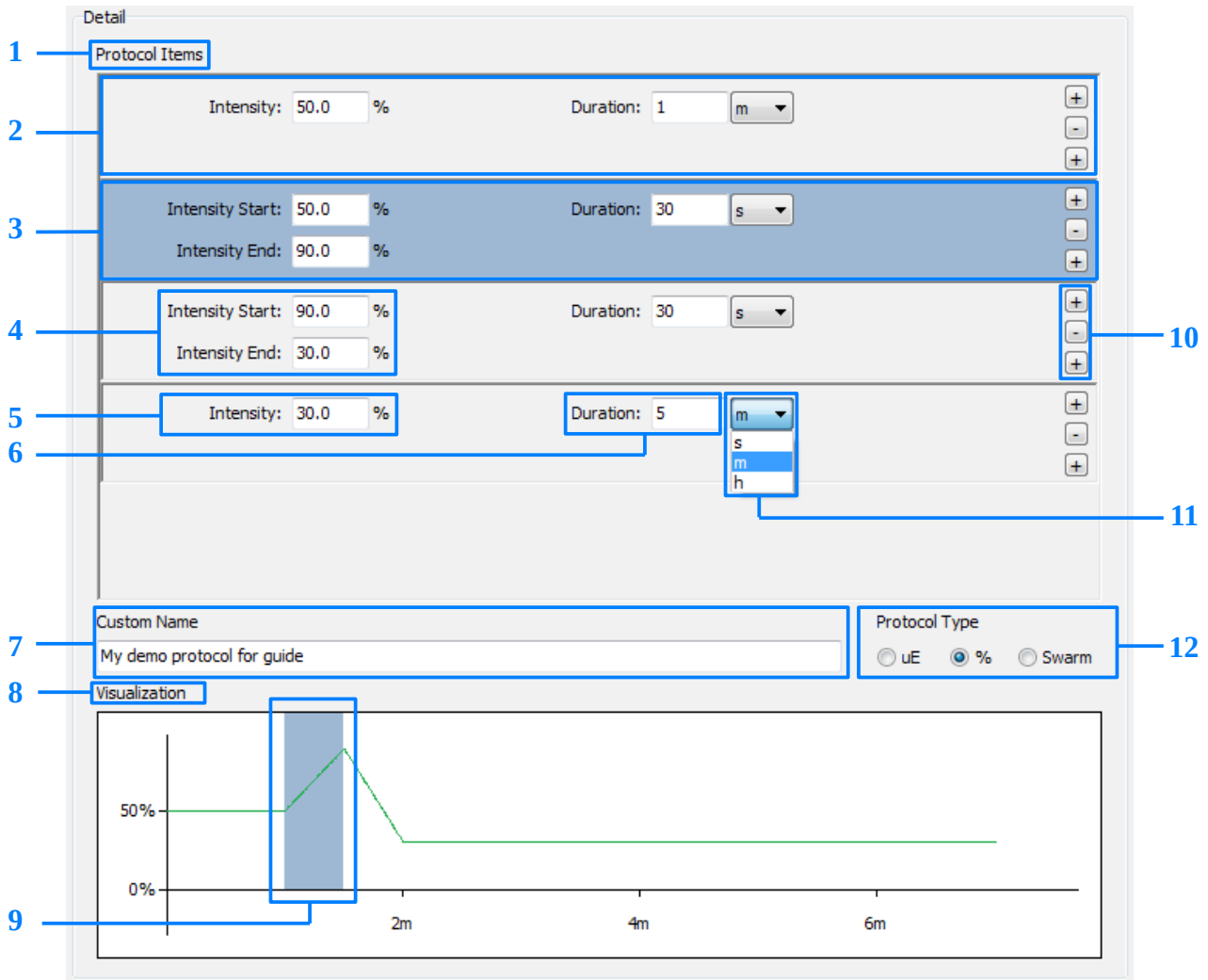


Fig 17: Protocol Detail

Protocol setup can be done by editing individual *Protocol Items* (Fig 17-1). The *Item* is understood a separate panel representing one section of the protocol. Three buttons (Fig 17-10) are used to add/remove individual *Items*. *Item* can be removed with the middle button. The upper button adds a new *Item* above the current *Item* whereas the lower button adds new *Item* below.

Two types of *Items* can be added. The selection of *Item* type is determined by the context menu (Fig 18) that appears after clicking the button .

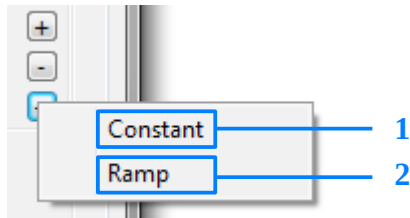


Fig 18: Add Item Context Menu

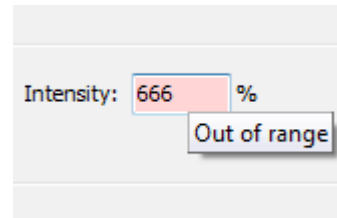


Fig 19: Invalid Value

The first options *Constant* (Fig 18-1) adds a constant-progress *Item* (Fig 17-2). This *Item* contains field for selecting constant light intensity (Fig 17-5) and duration of light (Fig 17-6). Duration can be defined in seconds, minutes or hours (Fig 17-11). The second options *Ramp* (Fig 18-2) adds an *Item* with linearly increasing/decreasing progress (Fig 17-3). In this case, the intensity is defined by the initial and the final value (Fig 17-4). Linear course between those values forms the final intensity of this *Item* in the selected duration.

For each entered numeric input, validation is performed. Invalid input values are highlighted immediately (Fig 19).

Protocol *Item* selected by the click is highlighted (Fig 17-3). The part of the protocol chart corresponding to the selected *Item* is also highlighted (Fig 17-9).

The specified *Custom Name* of protocol (Fig 17-7) is displayed in the *Light Control* panel (Fig 11-2) in main window of application.

Protocol Type can be changed by the appropriate radio button selection (Fig 17-12). Process of editing the protocol allows working with the light intensity values in percentage or μE . *Protocol Type* in percent is available for all light channels, *Protocol Type* in μE is for calibrated light channels (more about calibration process in chapter 1.4 Calibration Manager) and *Protocol Type* Swarm is for swarm light channels.

The *Protocol Type* Swarm is special protocol type, that is available only for SLxxx lights connected by LC500 converter box. It allows very fast light pulsing of two predefined logical light channels groups.

For *Protocol Type* Swarm, the context menu of the button is expanded by elements *Swarm Constant* and *Swarm Pulse* (Fig 20).

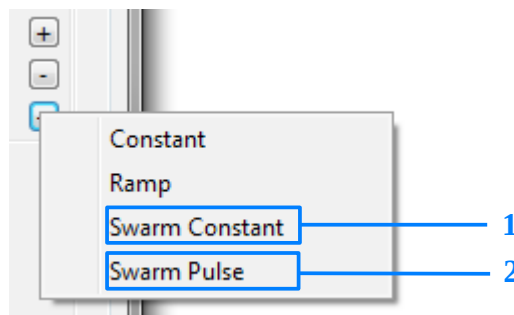


Fig 20: Add Item Context Menu – Swarm Type

Swar Constant item adds panel that controls light intensity of light channels in the swarm group. Buttons (Fig 21-3,4) are used to add/remove light channels which are controlled.

Swarm Pulse item adds panel that allows pulsing of the light channels. Each light channel is assigned to Pulse1 (P1) or Pulse2 (P2) group (Fig 21-6). Each pulse group has its duration (Fig 21-7). When protocol execution runs this item, first all light channels assigned to the Pulse1 group are turned on to corresponding intensity for given duration and light channels from Pulse2 group are turned off, and then the same applies in the opposite way for Pulse2 group. These „pulses“ are repeated for the duration of the interval.

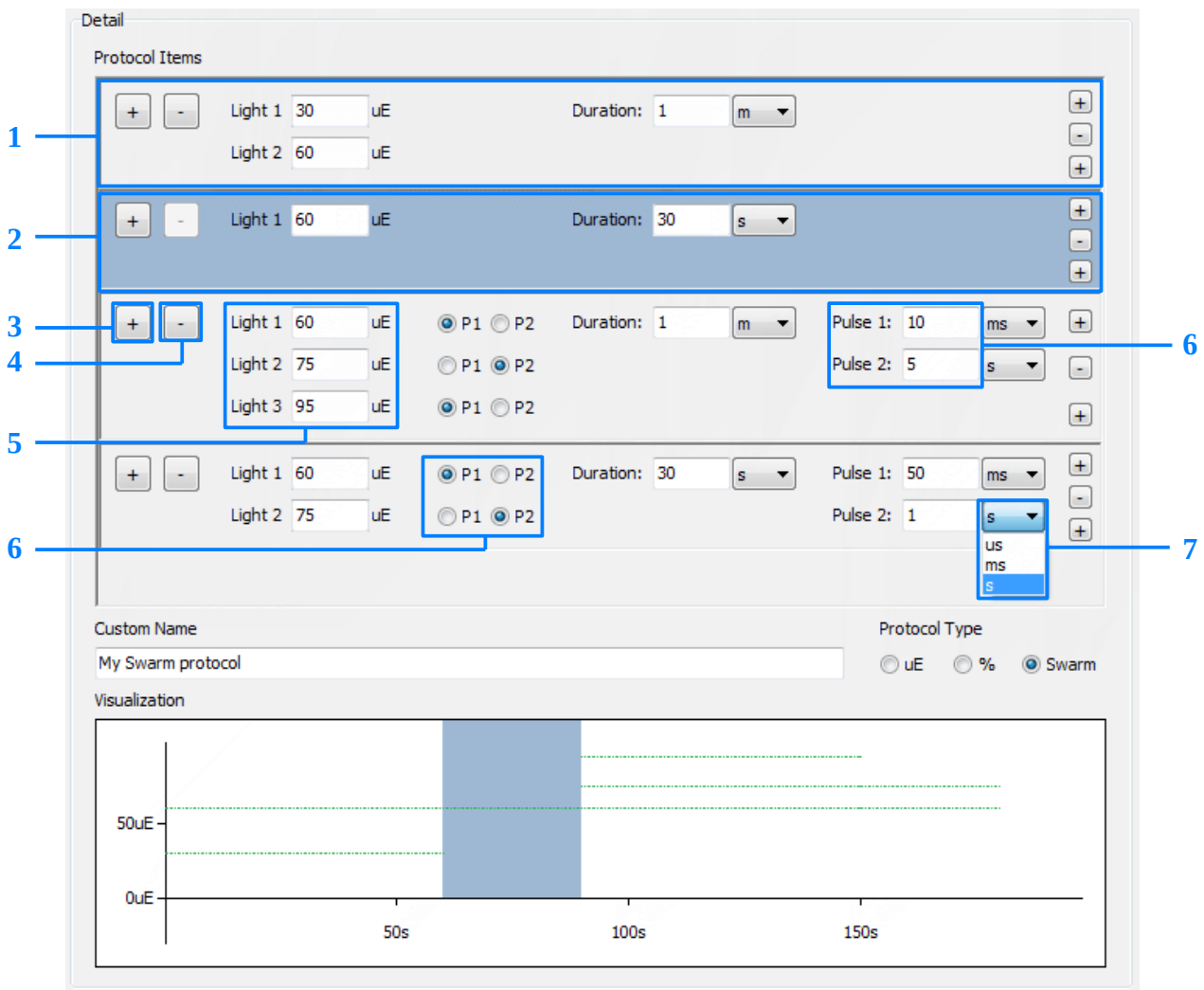


Fig 21: Protocol Detail – Swarm Type

1.3.2 Choosing Protocol for Light

To assign a protocol to the light is necessary to click the *Edit* button (Fig 8-5) in *Light Control* panel. Design and work in open *Protocol Editor* is the same as described in chapter 1.3.1 Editor Environment.

The name of the editor window is different (Fig 22-1) and includes the name of the light or group for which the protocol is currently being selected.

The availability of the protocols depends on the *Protocol Type* and the calibration of the light. For calibrated lights, *Protocol Type* in percentage and in μE is available. In contrast, *Protocol Type in μE* cannot be assigned to the uncalibrated lights, so they are not even listed in the *Available Protocols* (Fig 14-1). Swarm protocols can be only assigned to swarm light groups (more about that in the 1.5 Group Manager)

One of the *Available Protocols* is marked with an asterisk (Fig 22-2). The marked protocol is currently assigned to this light. The context menu for all protocols in the list contains a *Select* option (Fig 22-3) that is used to change the selection.

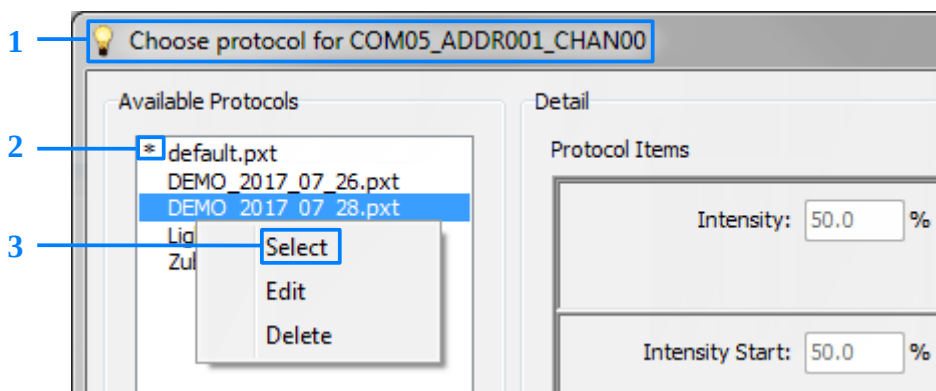


Fig 22: Choose Protocol for Light

1.4 Calibration Manager

Calibration Manager (Fig 23) is independent window designed to produce calibration files for logical light channels. *Calibration Manager* can be opened by appropriate option from the *Main Menu* (Fig 5-1). Opening the *Calibration Manager* window is possible even if the device is not connected.

The *Calibration Manager* window consists of a list of connected logical *Lights* (Fig 23-1), *Available Calibrations* (Fig 23-2) with buttons (Fig 23-3) for managing these calibrations and of the calibration description in *Detail* (Fig 23-4).

Clicking button *Ok* (Fig 23-5) closes the *Calibration Manager* window.

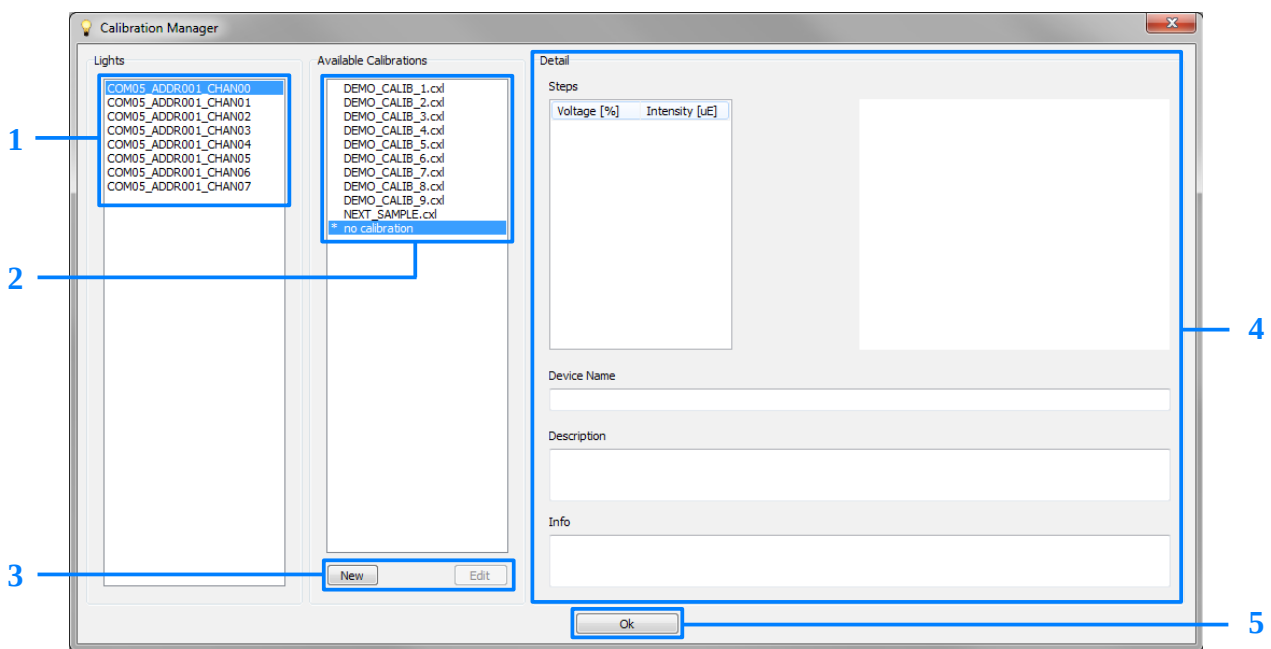


Fig 23: Calibration Manager

1.4.1 Lights and Available Calibrations

The Light Studio works with the calibration files from the folder “calibrations” located in the application startup folder.

One of the available calibration files in the list is marked with an asterisk (Fig 24-2). The marked calibration file is currently assigned to the light selected (Fig 24-1) in the list. By switching the light selection, choice of calibration file for each individual light from the list can be accessed. The context menu for all calibration files contains a *Select* option (Fig 24-3) that is used to change the selection.

At the end of the list of *Available Calibrations* is item “no calibration” (Fig 24-6) – the initial state of the light without calibration.

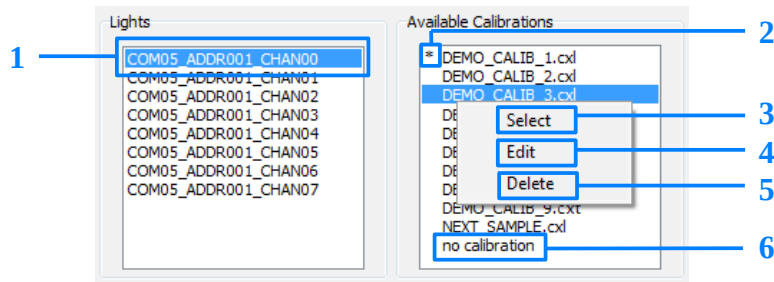


Fig 24: Lights and Available Calibrations

Set of function buttons (Fig 23-3) for basic calibration files handling is available in various operation:

- **New** creates new calibration file. The window (Fig 25) for naming the newly created file is opened first. Then the newly created calibration file is added in the *Available Calibrations* list (Fig 23-1) and is prepared for adjustment in editing mode. *New* button is not available in editing mode.
- **Edit** switches to the editing mode for selected file by the enabling of the editing controls (Fig 23-4). *Edit* button is not available in the editing mode. Alternatively, the switching to editing mode can be achieved by the context menu option above the selected file (Fig 24-4).
- **Cancel** *Cancel* button is available only in the editing mode and it is used to switch to the viewer mode without saving the changes.
- **Done** *Done* button is available only in the editing mode and it is used to save calibration file. After storing the calibration file, the editing mode is switched to viewer mode.

The existing calibration file can be deleted by the context menu option above this file(Fig 24-5). The user is prompted to confirm the dialog box before permanently deleting the calibration file.

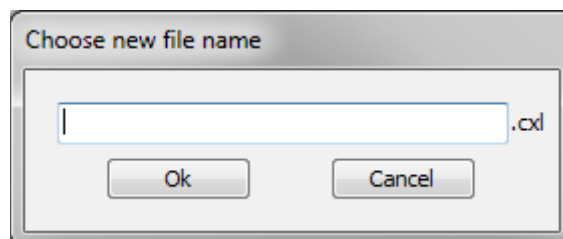


Fig 25: Naming Calibration File

1.4.2 Calibration Detail

The detailed calibration definition is displayed for the selected calibration file (Fig 26-1) in the right window part. There are table (Fig 26-3) and chart (Fig 26-9) of individual calibration *Steps*, the *Device Name* (Fig 26-6), *Description* of calibration (Fig 26-7) and calibration *Info* (Fig 26-8). All of these controls are read-only in the viewing mode and are editable only in the editing mode.

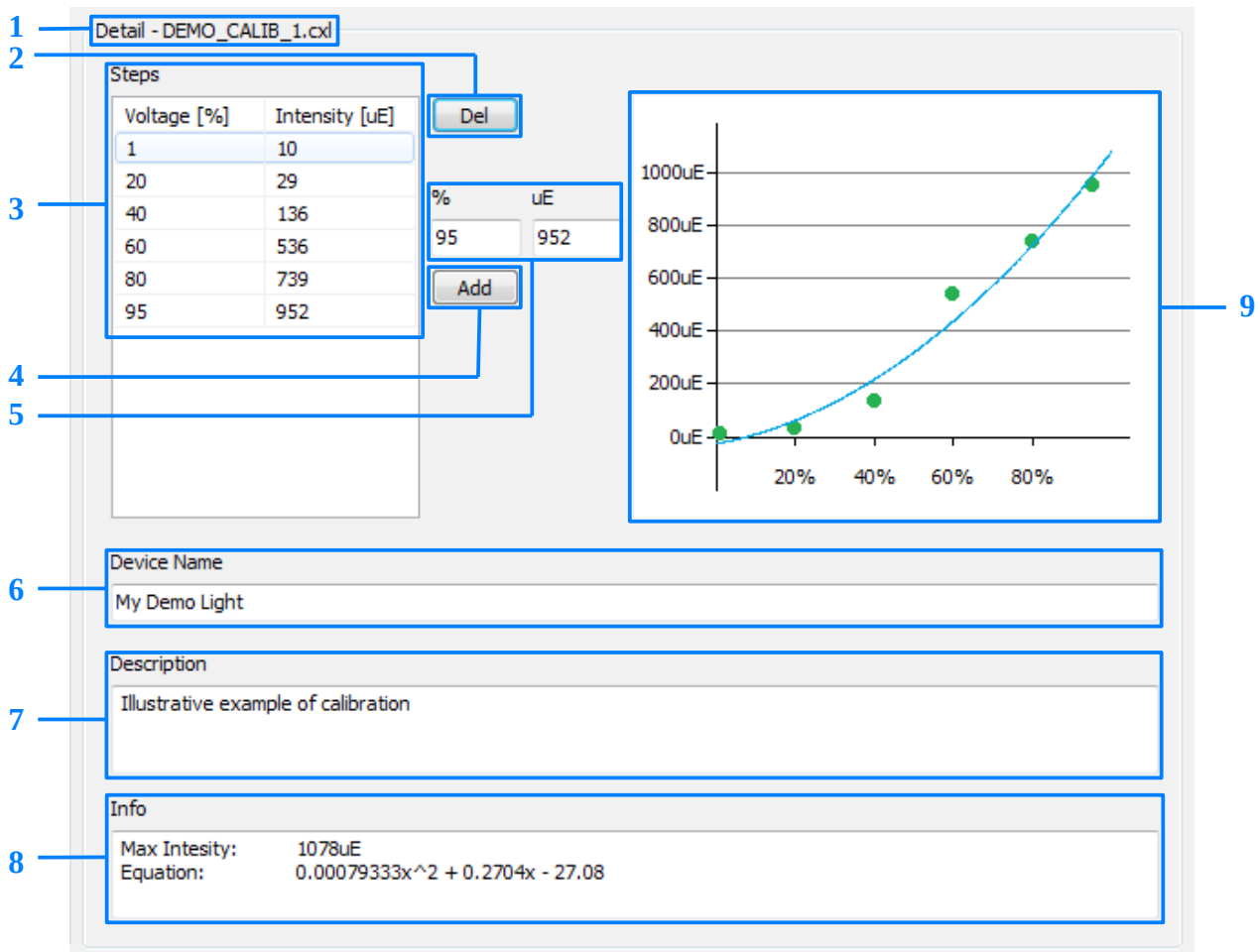


Fig 26: Calibration Detail

In addition, controls for adding/deleting individual calibration *Steps* are available in editing mode.

These controls include the pairs of fields (Fig 26-5) for entering the light intensity in percent and the corresponding value of the intensity in μE .

The specified calibration pair of values representing one calibration *Step* is added to the steps table (Fig 26-3) when the *Add* button (Fig 26-4) is pressed. The selected row can be deleted from the table by pressing *Del* button (Fig 26-2).

For each entered numeric input, validation is performed. Invalid input values are highlighted immediately (Fig 27).

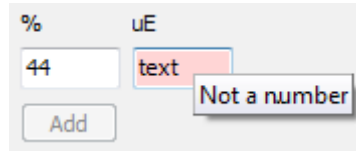


Fig 27: Invalid Value

The individual calibration *Steps* added to the table are automatically plotted in the dependency chart (Fig 26-9). Displaying chart requires at least three calibration *Steps*. Curve fitting occurs for at least four specific *Steps*, least squares method with second order polynomial (quadratic) is used. The *Info* about the mathematical function equation describing the calibration curve and maximum intensity corresponding to 100% voltage is displayed in (Fig 26-8).

The specified *Device Name* (Fig 26-6) is displayed with the name of the light in the *Light Control* panel (Fig 8-1) in main window of application.

Into the *Description* field (Fig 26-7), it is possible to insert a note to calibration. This description is informative only and is displayed only in this dialog.

1.5 Group Manager

Group Manager (Fig 28) is independent window designed to produce files with defined group configurations of physical light channels. *Group Manager* can be opened by appropriate option from the *Main Menu* (Fig 5-2). Opening the *Group Manager* window is possible even if the device is not connected.

The *Calibration Manager* window consists of a list of *Available Group Configurations* (Fig 28-1) with buttons (Fig 28-2) for managing these configurations and description of the group configuration in *Detail* (Fig 28-3).

Clicking button *Ok* (Fig 28-4) closes the *Group Manager* window.

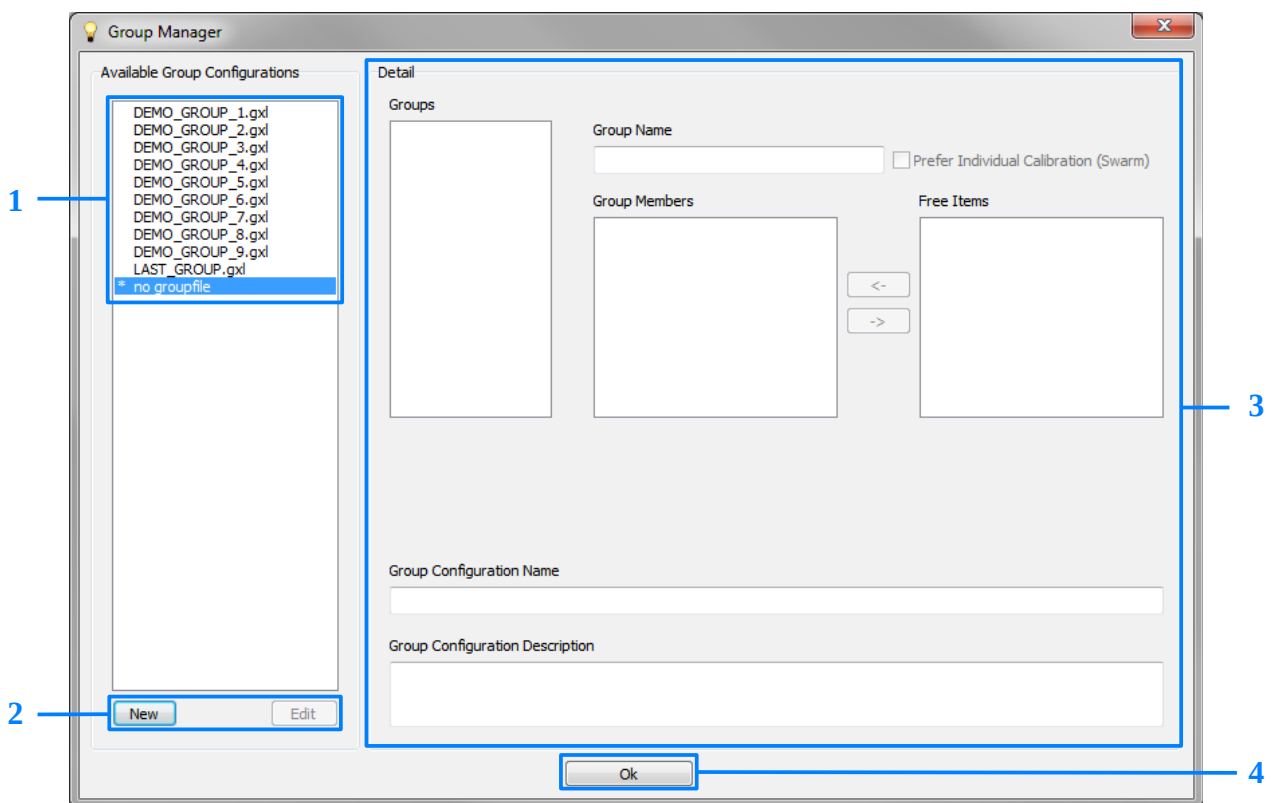


Fig 28: Group Manager

1.5.1 Available Group Configurations

The Light Studio works with the configuration files from the folder “*group_configs*” located in the application startup folder.

One of the available configuration files is marked with an asterisk (Fig 29-1). The marked configuration file is currently selected to use. After switching the *Display by Groups* option in the *Main Menu* (Fig 2-3), this configuration will be displayed in the *Lights Control* (Fig 1-2). The

context menu for all configuration files contains a *Select* option (Fig 29-3) that is used to change the selection.

At the end of the list of *Available Group Configurations* is item “no groupfile” (Fig 29-2) – the initial state in which no configuration is used.

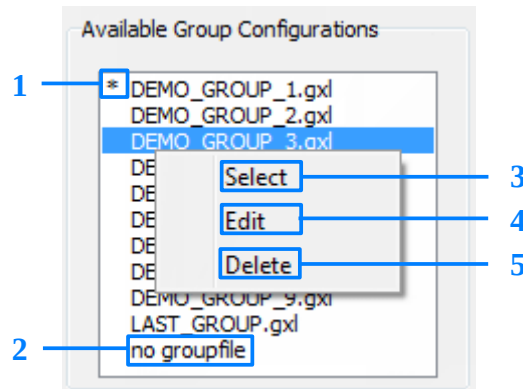


Fig 29: Available Group Configurations

Set of function buttons (Fig 28-2) for basic configuration files handling is available in various operation:

- **New** creates new configuration file. The window (Fig 30) for naming the newly created file is opened first. Then the newly created configuration file is added in the *Available Group Configurations* list (Fig 28-1) and is prepared for adjustment in the editing mode. *New* button is not available in the editing mode.
- **Edit** switches to the editing mode for selected file by the enabling of the editing controls (Fig 28-3). *Edit* button is not available in the editing mode. Alternatively, the switching to the editing mode can be achieved by the context menu option above the selected file (Fig 29-4).
- **Cancel** *Cancel* button is available only in the editing mode and it is used to switch to the viewer mode without saving the changes.
- **Done** *Done* button is available only in the editing mode and it is used to save configuration file. After storing the configuration file, the editing mode is switched to the viewer mode.

The existing configuration file can be deleted by the context menu option above this configuration file (Fig 29-5). The user is prompted to confirm the dialog box before permanently deleting the calibration file.

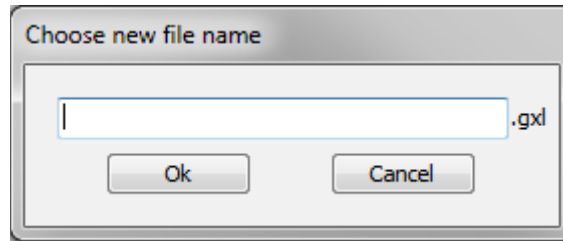


Fig 30: Naming Group Configuration File

1.5.2 Group Configuration Detail

The detailed configuration definition is displayed for the selected configuration file (Fig 31-1) in the right window part. All of controls in *Detail* section (Fig 28-3) are read-only in viewing mode and are editable only in editing mode.

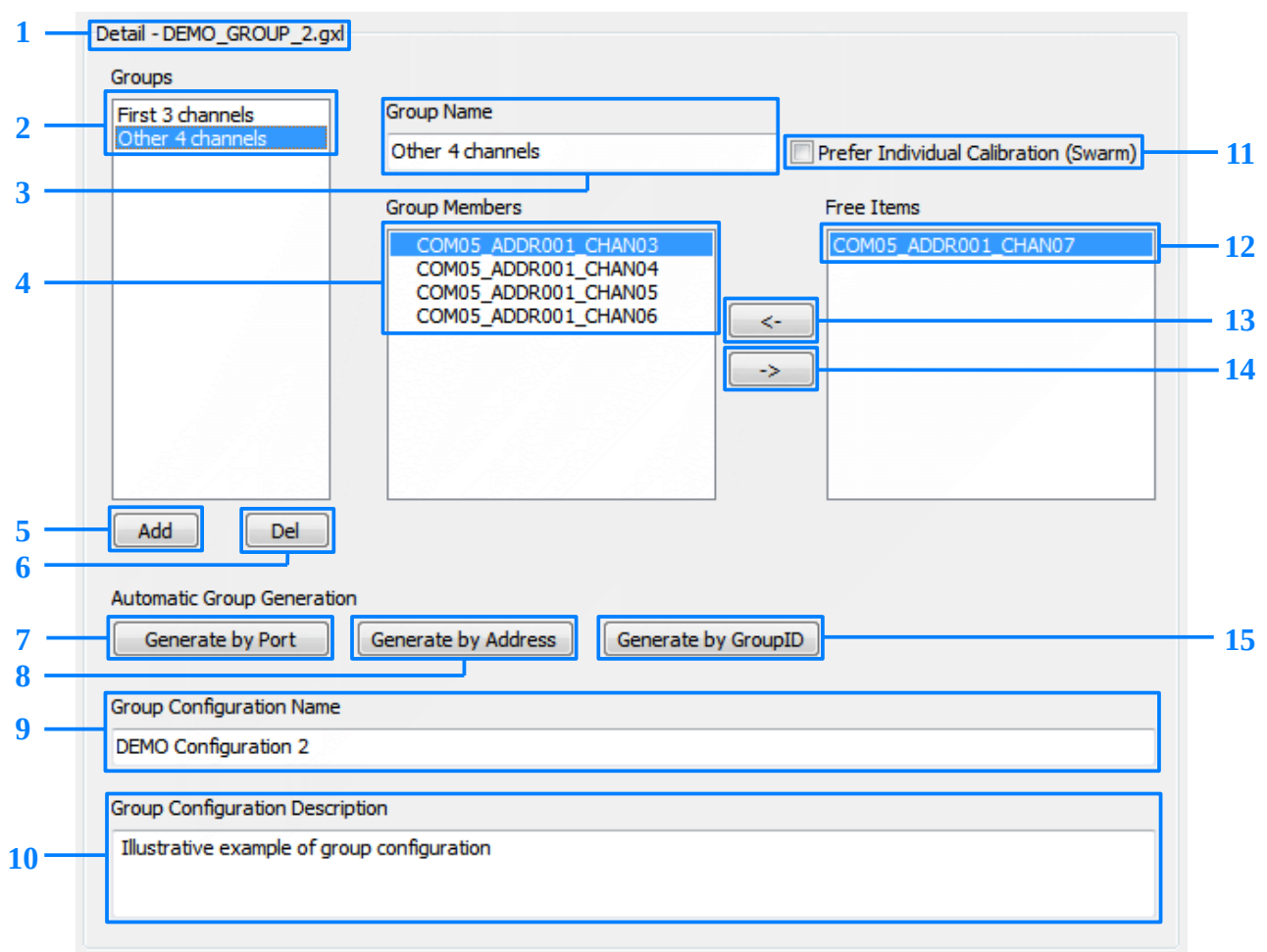


Fig 31: Group Configuration Detail

One configuration can include multiple groups of lights that are added to the list of *Groups* (Fig 31-2) one by one using the *Add* button (Fig 31-5). The *Del* button (Fig 31-6) deletes the currently selected group from the list.

Each selected group can be renamed in the *Group Name* field (Fig 31-3).

Within one configuration, each light can be assigned only to one group. Selected light can be transferred from the list of currently *Free Items* (Fig 31-12) to the list of *Group Members* (Fig 31-4) by the button marked with the corresponding directional arrow (Fig 31-13). The arrow button in the opposite direction (Fig 31-14) is for removing the selected member from the group.

Besides creating any groups by the user, groups can be generated automatically or combined.

For automatic group generation, one of the following buttons can be used:

- *Generate by Port* (Fig 31-7) – generates configuration based on the COM port of the light panels
- *Generate by Address* (Fig 31-8) – generates configuration based on the Address of the light panels
- *Generate by GroupID* (Fig 31-15) – generates configuration based on the GroupID of the light panels

In automatic group generation, all lights from existing groups are first released by deleting all groups from the list (Fig 31-2). Then all lights are divided into the new groups according to the selected criterion.

If some light channels of the previously created configuration are disconnected at that moment, they are marked with a letter “D” in the *Group Members* list (Fig 32-1). Disconnected lights can only be removed from the group. But they will not appear in the list of free items (Fig 32-2) and they can not be grouped until they are reconnected.

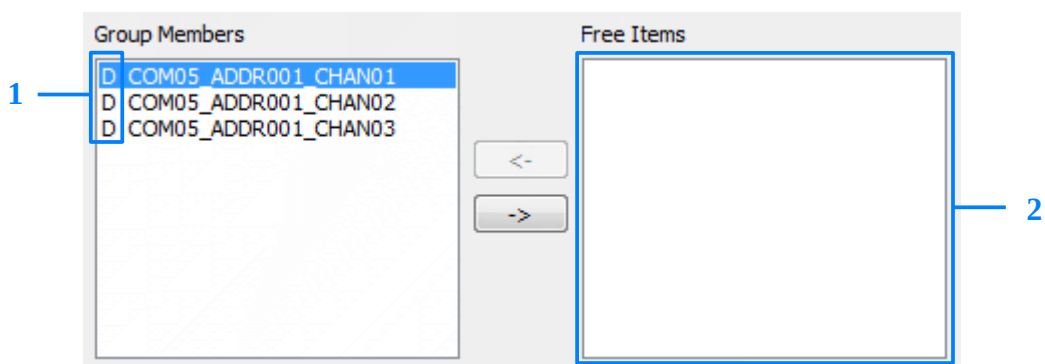


Fig 32: Disconnected Lights in Group

Checkbox *Prefer Individual Calibration (Swarm)* (Fig 31-11) is used to create swarm groups. Swarm groups are composed from individually calibrated light channels and are enabled only when light panels are connected using LC500 device. Purpose of this group type is to allow user create protocols with very short (tens of microseconds) flashing pulses of two groups of lights.

The specified *Group Configuration Name* (Fig 31-9) is displayed for group in the *Light Control* panel (Fig 8-1) in main window, when choosing *Display by Groups* option (Fig 2-3).

Into the *Group Configuration Description* field (Fig 31-10), it is possible to insert a note for the configuration. This text is only informative and is shown only in this dialog window.

2 List of Figures, Tables

Fig 1: Main Screen.....	5
Fig 2: Lights Context Menu.....	6
Fig 3: Lights Detection in Progress.....	6
Fig 4: Protocols Context Menu.....	6
Fig 5: Settings Context Menu.....	7
Fig 6: Info Context Menu.....	7
Fig 7: About PSI Light Studio.....	7
Fig 8: Light Control Panel.....	8
Fig 9: Protocol Start – Single Light.....	9
Fig 10: Protocol Start – Lights in Batch.....	9
Fig 11: Light Control Panel – Running Protocol.....	9
Fig 12: Protocol Stop – Single Light.....	9
Fig 13: Protocol Stop – Lights in Batch.....	9
Fig 14: Protocol Editor.....	10
Fig 15: Naming Protocol File.....	11
Fig 16: Protocols Context Menu.....	11
Fig 17: Protocol Detail.....	12
Fig 18: Add Item Context Menu.....	13
Fig 19: Invalid Value.....	13
Fig 20: Add Item Context Menu – Swarm Type.....	13
Fig 21: Protocol Detail – Swarm Type.....	14
Fig 22: Choose Protocol for Light.....	15
Fig 23: Calibration Manager.....	16
Fig 24: Lights and Available Calibrations.....	17
Fig 25: Naming Calibration File.....	17
Fig 26: Calibration Detail.....	18
Fig 27: Invalid Value.....	19
Fig 28: Group Manager.....	20
Fig 29: Available Group Configurations.....	21
Fig 30: Naming Group Configuration File.....	22
Fig 31: Group Configuration Detail.....	22
Fig 32: Disconnected Lights in Group.....	23