Operating Instructions Manual

iTEMS v1.3

Elaborated in: May 2020

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1. Introduction

This documentation describes the software equipment for visualization and control of the stage mechanisms supplied by the company Drivecontrol, s.r.o. The layout, design, workmanship and operating conditions of the product meet the requirements specified in the confirmed order. Use of this product is possible only provided that the instructions contained in this documentation (hereinafter referred to as the "Manual") are observed and the warnings in this Manual followed. This Manual describes in detail the user interface (HMI - / Human Machine Interface) and – where necessary - it refers to the hardware parts of the system, electrical equipment of the system and/or own mechanical arrangement and layout of individual stage mechanisms - machinery.

1.1 Manufacturer

Manufacturer (designer) of the HMI software is as follows:

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Hereinafter referred to as the "Company".

If individual pages of this Manual are torn apart or separated anyhow, each page is provided with its own identification, i.e. determination and relevant manufacturer. (See Headings and Footings of individual pages).

1.2 Use of the Manual

The following pictograms are used to facilitate orientation in the Manual:

Read carefully. Clarifying or otherwise explaining information concerning the topic of the relevant chapter.

Warning, caution. Information in this section applies to an important safety instruction.

The Manual is broken down into individual chapters and sections so that the reader can make the currently needed information available quickly. The chapters are compiled logically, the HMI software itself alike.

Because it is the HMI utilizing the touch screen features, the entire system is designed so that individual choices are available just through on-screen touches. Therefore the touch area, marked graphically on the screen, is referred to as the Key in the Manual.

The words having a special meaning are capitalized in the Manual. See the previous paragraph with description of the touch area designated in the text as the "Key". Other capitalized words can also have a similar meaning.

Figures are used in the text to improve the informative value. Each figure is accompanied by a number. The text itself then refers to the figure as shown in brackets (Figure X), where X is the number of the figure in question.

The abbreviations are in capital letters.

1.3 General instructions

This Manual provides a detailed insight into the HMI for the operator.

Reading this Manual cannot be considered adequate familiarization with operation of the control system. The operator must be trained properly and must be familiar both with his / her own equipment and with individual related operating instructions.

The operator is recommended to have the Manual available near the control station so that the Manual can be consulted, while working with the equipment.

The software equipment, being the integral part of the stage technology control system, is a general management and control system delivered by our company to various theatres, but the HMI itself, mainly the manual mode, is always adapted to the specific cultural facility. The operator may consult (in emergency cases) the Manual of another cultural facility where the Company delivered the control system, however, it has to be taken into account that it may differ in several respects. In these cases, we rather recommend to download the latest Manual version from our web pages, where all its versions are displayed.

For this purpose, the Manual is designated in the heading by the system version (e.g. iTEMS v1.0) and at the same time by the code symbol of the cultural facility (order) and revision of the document, e.g. 90455 R01, etc.

1.4 Legislation

This product has been manufactured, tested and operated in conformity with the Czech and European directives, harmonized standards, decrees and regulations, and meets the safety requirements defined by them.

1.5 Copyright

This work (the Manual) has been elaborated on the basis of the investor's order and, for these purposes, it is governed by the following rules, being an author's work:

Originals of plans, sketches, drawings, graphical presentations and text descriptions (specifications) are and will remain ownership of the Company, whether or not the work, which they have been prepared for, has been implemented. The client can retain the properly authorized copies of the documentation, including reproducible copies of plans, sketches, drawings, graphical presentations and text specifications for information and as a guidance on how to use the work.

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The Company grants permission to the Client to use the author's Work (Manual) elaborated for the relevant project. Use of the Manual for the purposes other than specified is possible only with the express written consent of the Company.

1.6 General basic terms

axis	Under axis we shall understand each drive unit, generating motion in the preset direction. There are devices that have multiple axes, such as a point traction equipped with the motor-operated travel. This device has 2 axes - axis for the stroke (vertical movement) and the horizontal axis (i.e. the displacement of the device in the gridiron)
device	Shorter name for machinery / equipment. Set of one or more axes serving in a cultural facility for the preset purpose, e.g. the stage table, curtain, etc.

2. Basic information

This chapter provides basic information about use of the stage control panel and the control panel hardware; the control software integrated in the control panel is also described here in general.

2.1 Description of the control panel

The control panel guarantees full control for the theatre operator over the automated equipment during the theatre performance. With help of a touch panel (see Fig. 1: Control panel – Overall view), you can easily create individual theatre scenes, edit or delete them, and also test individual devices during a separate travel, diagnostics of individual axes and the entire system.

Panel cover

Emergency stop

RH joystick

LH joystick

Touch display

Grab handle

Panel stand
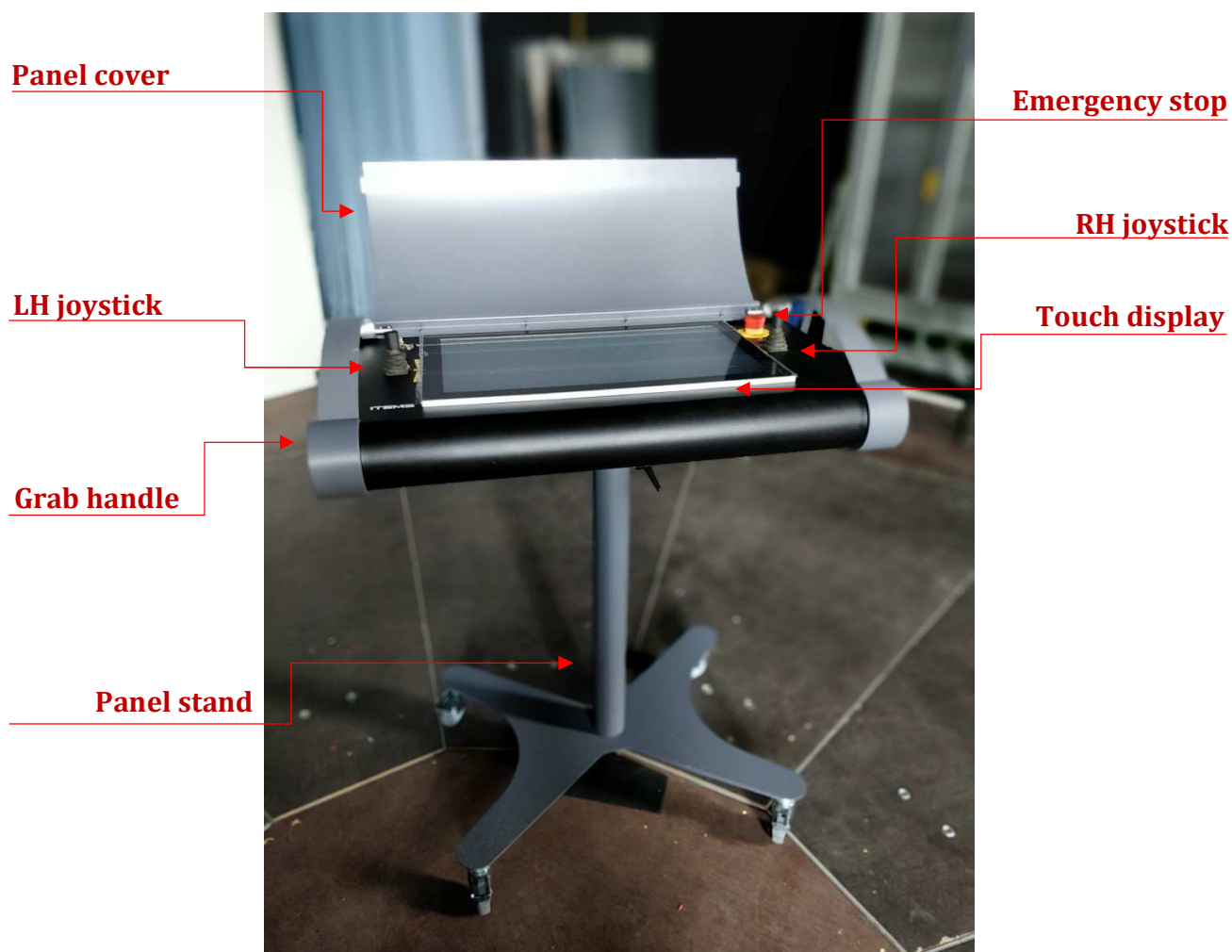
FIG. 1: CONTROL PANEL – OVERALL VIEW

A sturdy metal frame ensures the necessary toughness for the console, and the hinged cover increases stability of the touch screen and the controls. The LED strip located above the touch screen illuminates work area of the console and facilitates orientation under poor lighting conditions.

The back console part is equipped with plug-in connectors. In the central part there is the master connector combining the power supply and the communication interface for connection to the Ethernet network. The console is thus connected continuously with the control PLC processing the commands that come from the control console. Besides the master connector, there are the USB connectors for connecting the flash drives designed for performance backup. One of the USB connectors is located directly on the control console work area.

2.2   Control and signalling components

When the console lid is uncovered, access to the control and signalling elements, located on the console work area, is ensured. The whole work area can be seen in the figure (see Fig. 2: Control Panel – Front view).

FIG. 2: CONTROL PANEL – FRONT VIEW

The switch key (1), switching the entire console OFF and ON, is the basic component. The ON status is indicated by the pilot light (2). If the system is switched on, but is not yet ready for operation, this indicator flashes.

👁 If the Emergency Stop button (3) is pressed, the entire system is switched to the safe status. When the fault is removed and the Emergency Stop button released from the locked position, but fault elimination is not yet confirmed by the fault acknowledgment button (blue button on the right (4)), the white indicator (2) flashes (is not lit permanently). To turn the indicator on or to turn the whole system on, you must confirm the status by pressing the blue fault acknowledgment button (4).

In the right console part there is the Emergency Stop button (3) serving for immediate safe stop of all devices. When pressed, the button has to be unlocked (by pressing and rotating it), to restart the program. (When pressed, the button remains in the locked state for safety reasons.) The Reset button (4), combined with the signalling blue light, signals presence of a fault or confirms its elimination.

👁 Error in any of system security functions results in switching the system to a safe status. This status is signaled by blue light of the backlight control button for failure resetting. This prompts the user to press the button and confirm that the error has been removed. If this button is pressed, though the error in the security function still persists, the button is unresponsive and remains lit by the blue light. If the error in the security function was removed, the button quickly flashes and goes out. At the same time, the white indicator (2) lights up.

The main controls are the left joystick 1 (5), and the right joystick 2 (6), marked orange and green respectively. These joysticks are equipped with protection against unwanted deflection, a safety feature called the "dead man". For correct operation of the joystick, it is necessary to press it at first in the vertical direction prior to deflecting it from the equilibrium position. The joysticks are equipped with resistive potentiometers, enabling to monitor joystick deviations with a high accuracy, thus allowing the console operator to change speed of the controlled devices smoothly.

2.3   Touch screen

The LCD touch screen (see Fig. 2 - (7)) serves as the primary control element of the whole control system. The touch layer is made by applying the resistive technology. To record the touch, it is necessary to exert a moderate pressure, ideally in one point on the screen. In case of the 24"panel, the screen allows for multipoint touch. In case of the 12.1"panel we are speaking about the one-touch technology.

The LCD screen is protected by glass and a laminate film. The display built in the console meets the IP 65 protection degree.

Depending on size of the screen diagonal, different resolutions are available. For the 12.1" display, the resolution is 1024 * 768 pixels in the 4: 3 ratio, for the 24" display - 1920x1080 pixels in the 16: 9 ratio.

👁 The system recognizes a simple click, a double-click and a long-click. For each action, another function is invoked in the context of the click point. In other words, simple clicks, double clicks, and long clicks are not the same visualization commands. No other touch commands (drag, multi-finger control, etc.) are supported for the version 12". In the version 24" these features are available. Scrolling the screen is possible by dragging the screen, instead of the scrolling control on the window side. The multipoint touch technology is applied especially when moving in a 3D view, where - after a few attempts - the user will consider it user friendly, because it is very intuitive, like a cellular touch screen.

2.4   About the program

The software equipment for control and visualization of the stage mechanisms (hereinafter referred to as the Programme) is the application created by the development team of the Company. The Programme is developed and tested continuously, because development, based on own experience of operation, is also accompanied by rising requirements of the customers. The process of development is a controlled process where at the preset intervals the fully tested version is "frozen" and made available for the customer.

Upon delivery to a customer, there are no more updates of the released version, which is usually applicable by other designers. The only exception is the "necessary" update that can arise from the system error revealed by our Company, which error could have serious impact on the functionality of the whole system. In this case the necessary update will be performed. Such approach is governed by the fact that this is not a typical user software, e.g. a table processor, but a sophisticated software with a very strong link to the dedicated control mechanisms and hence a great interdependence with the entire control system programmed in the form of the programmable logic controllers – PLC.

⚠ Any "programming" intervention into the control system as well as into console software by the operator can be fatal for the entire control system. Any interventions of this type may only be performed by the trained programmers of the Company. Any found intervention results in immediate loss of warranty.

3. Description of iTEMS system visualization

This chapter contains basic information about the software installed in the control panel. The following sections describe briefly the basic actions concerning software operation, description of the basic screen, buttons and tools that are displayed on it. The basic modes that can be used for controlling the theatre performances are also described briefly. This chapter serves only for a brief familiarization, separate chapters for each individual mode are provided for a more detailed description of use in each mode.
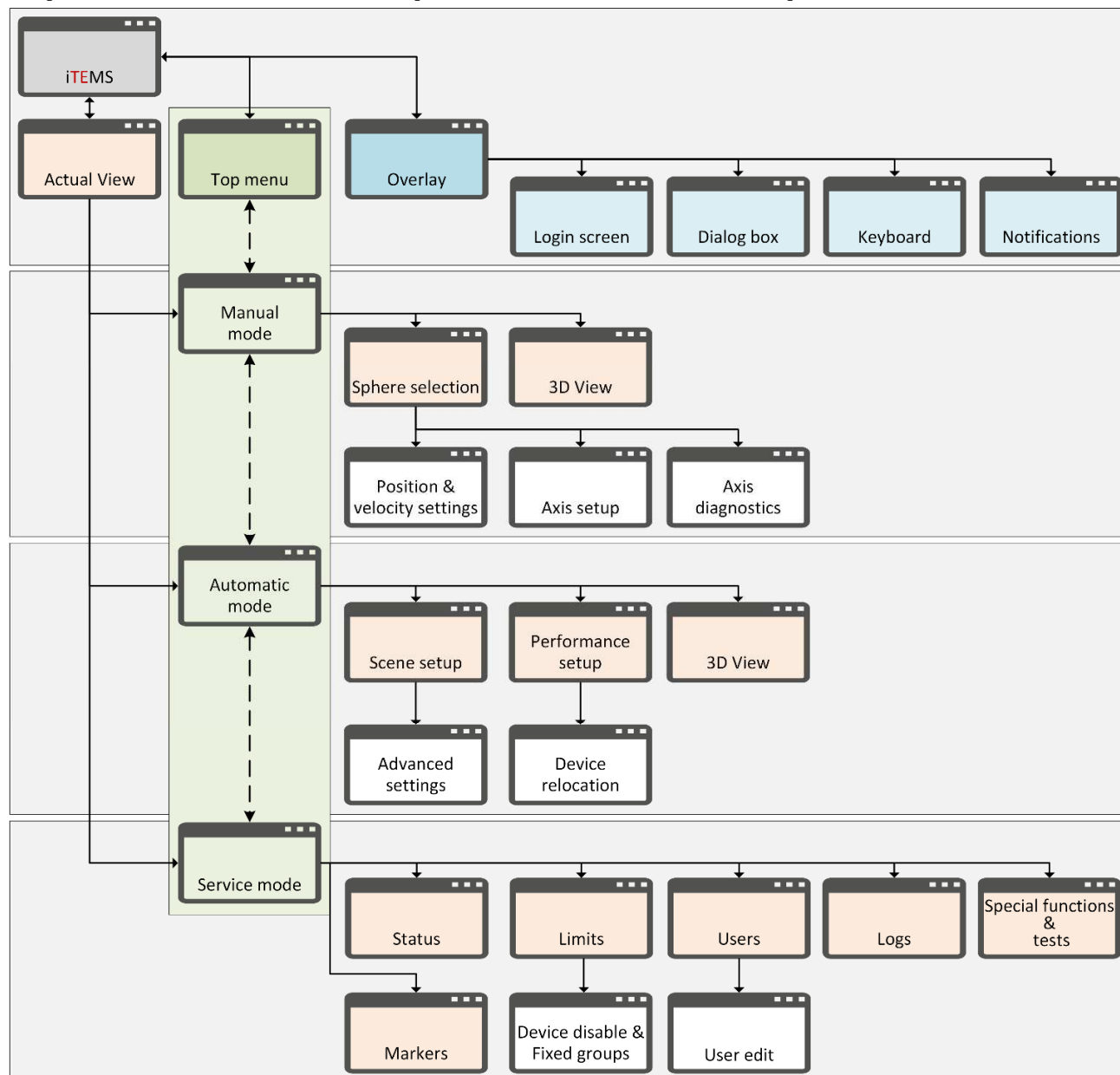
Aktuální obrazovka	Current screen	Nastavení scény	Scene setting
Horní menu	Top menu	Nastavení představení	Performance setting
Překryvná vrstva	Overlay layer	Pokročilá nastavení	Advanced settings
Přihlášení	Login	Přesun zařízení	Device movement
Dialogy	Dialogues	Servisní režim	Service mode
Klávesnice	Keyboard	Stav	State /status
Upozornění	Notice	Limity	Limits
Manuální režim	Manual mode	Uživatel	User
Sféra řízení	Control sphere	Speciální funkce	Special functions
3D pohled	3D view	Logy	Logs
Automatický režim	Automatic mode	Markery	Markers
Nastavení polohy	Position setting	Editace uživatele	Editing user details
Nastavení osy/diagnostika osy	Axis setting /Axis diagnostics		

3.1   **Starting the Program**

After connecting the power connector to the console and turning the switch key (see Fig. 2 - (1)), the console is put into operation. After the time period necessary for loading the operating system, the ITEMS visualization and control software will be started automatically; it will load all the files inevitable for its operation. All these operations are performed without any operator's intervention.
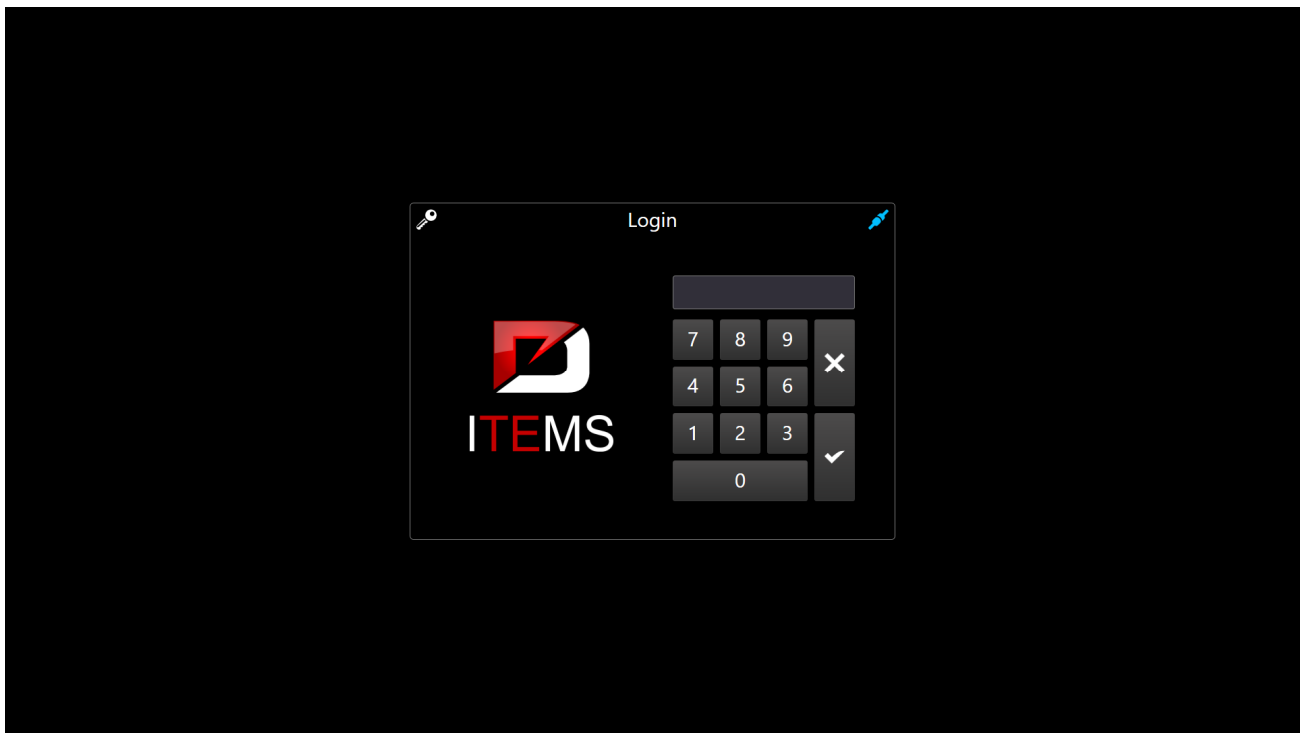
FIG. 3: USER PIN ENTERING

If the software is turned off, it can be restarted from the desktop by double-clicking the shortcut icon named "ITEMS". After the program is loaded, the operator is prompted to enter the numerical PIN code (see Fig. 3). After entering the correct PIN, the Programme will be switched to the main screen (see Fig. 4). The language version of the software is automatically selected, based on the PIN entered by the user.
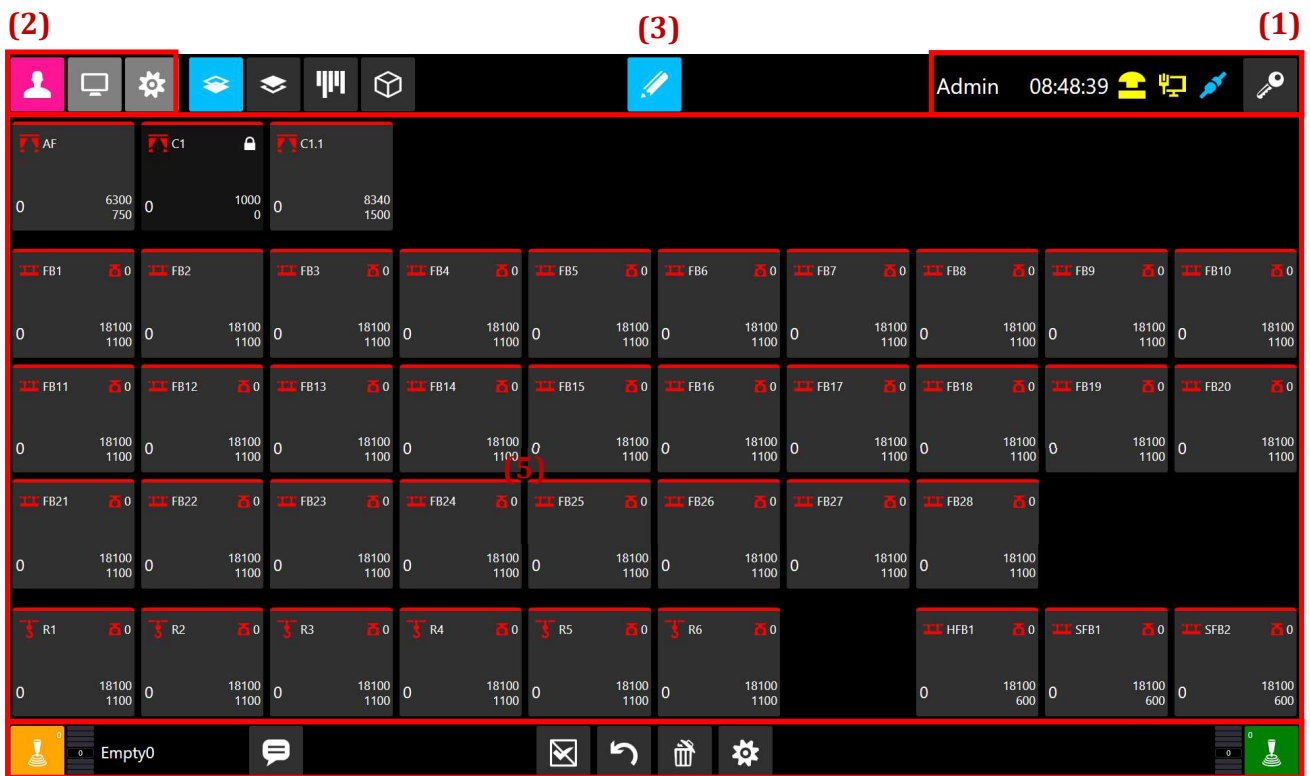
Fig. 4: Basic screen

The screen is divided into several parts. For better understanding, individual parts are named. The naming can be seen in the figure (see Fig. 4).

(x)	Name of the function or group	Purpose (description)
1	Menu Info	Menu with the Login button. To the left of the button, there is the set of information icons and the clock. The menu is accessible permanently, in all modes.
2	Menu Mode	Mode switching. Basic modes: Manual, Automatic, Service. The menu is accessible permanently, in all modes. The keys to the right of this menu change, based on the selected menu.
3	Menu Lock	Lock of editing. The menu has only one key that changes its appearance depending on the status of the lock of editing. The menu is accessible in the "travel" modes, i.e. in the manual mode and in the automatic mode. In the service mode, the "Lock" menu is not visible.
4	Menu Bottom bar	This menu contains the basic tools for the selected mode. This menu changes for each mode. Greater details - in description of how to control individual modes.
5	Work area	Under the work area we shall understand the remaining part of the screen without the Menu described above. The work area changes with each mode.

3.2 Menu Info

The menu is located on the screen in the top right corner (see Fig. 4 – (1)).

In the figure (see Fig. 5) above, you can see the Info menu in the status, where the control system is OK absolutely. There is a blue icon on the connected connector = communication with the system is OK, and one key. This key serves for user login / log off. To the left of the icon, other status icons of the application can be displayed. Meaning of individual icons is described in the following table and can be also seen in the figure (see Fig. 5) on the bottom line. At the same time, different variants of icon displaying are also presented, because simultaneous lighting of all of them at once is not possible in the standard mode.

| (x)	Name of the function or group	Purpose (description)
1	Login/Log off	Key for user login/log off.
2	Icon of communication	Communication is OK, the icon may change to the open connector and turn red, which means that console communication with the system does not work.
3	Yellow icon of the key	Wrong login and/or the server has been restarted and system re-login is necessary.
4	Yellow infinity symbol	More devices for travel have been chosen at the same time. The main power supply of the facility or other, e.g. mechanical limitations do not allow to move more than a defined set of devices at the same time. The system assesses that this limit has been exceeded, lights up this icon and avoids movement with such a large number of devices.
5	Exclamation mark in yellow triangle	Test mode of the safety/security end positions - system alert
6	Yellow Mushroom Button	The safety mushroom button has been pressed somewhere in the system, or it is necessary to reset the security circuit error by the blue hardware button on the console.
7	Yellow square with arrow	Indicates that the application is in the simulated mode. The simulated mode is described in greater details in sec. 7.6.1: User with Simulator authorization
8	Yellow monitor with socket	Communication error with PLC
9	Two yellow arrows	SLS test function in progress. Function is described in further details in chapter 7.8
10	Yellow ECB sign	This icon means the system is switched to the emergency control block.
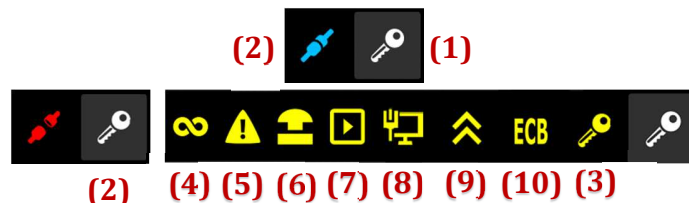
FIG. 5: MENU INFO

3.3   Menu Mode

The menu is located on the screen in the upper left corner (see Fig. 4 – (2)).

In the figure (see Fig. 6) you can see the Mode menu in the status, when the control system is switched to manual mode. The menu is in this status after the system is switched on, because the system is always started in manual mode, from where other modes are switched. Individual modes can be seen in the table. The selected mode is always visible clearly by under-lighting the selected mode in pink colour. The Mode menu is available from all operating modes.

Greater details about individual modes - see sec. 3.6 Control modes.

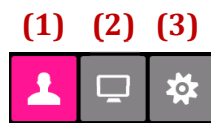| (x)	Name of the function or group
1	Manual mode
2	Automatic mode
3	Service mode

(1)   (2)   (3)

FIG. 6: MENU MODE

3.4   Menu Lock

In the figure (see Fig. 7 - (1)) the Lock menu is in the status when editing is enabled in the control system. The menu is in this status after the system is switched on, because the system is always started with permitted editing to avoid uncontrolled movement of any joystick (control lever). This menu enables to switch to the lockout status, when travel/movement with devices is permitted. If editing is locked, the key changes its appearance (see Fig. 7 – (2)).

(x)	Name of the function or group	Purpose (description)
1	Editing enabled	Editing operations can be performed. Travel with equipment is prohibited.
2	Locked	Editing is locked. Devices can be moved. In this state, only a few buttons of the mode, having no direct effect on travel, are enabled.

(1)   (2)

FIG. 7: MENU LOCK

Mode switching and manual mode sub-menus are locked in the manual mode. In the Auto mode only the keys for scene switching will be enabled.

3.5   Menu Bottom bar

The Bottom Bar Menu is an alternate menu that varies for each mode. Its function and meaning is described in each chapter (description of the relevant mode), see:

- Chapter 4: Use of the manual mode

- Chapter 5: Use of the automatic mode

- Chapter 7: Use of the service mode

3.6 Control modes

When the programme is started, you can choose between three modes, manual scene control, automatic scene control and service mode. The modes can be switched from the Mode menu (see Fig. 6). The following sections provide brief description of the modes. More detailed information about use of individual modes is described in separate chapters.

3.6.1 Manual mode

The manual mode serves only for manual controlling individual devices. It is used mainly for testing functionality of travel (movement) of optional number of devices at the same time. In the manual mode groups of devices, distributed more or less so that the display may correspond to the actual layout in the facility, are chosen from the sub-menus (see 4.1). The axes can be assigned to individual joysticks, thus creating two simple groups for travel. In the initial setting the devices move within the limits specified for them internally. The manual mode is used successfully for parallel removal of one performance and building of another performance, when the movements are not based on the preset actions and settings, but rather on the needs of the scene-shifters.

👁 More detailed information about the manual mode – see Chapter 4: Use of the manual mode

3.6.2 Automatic mode

The automatic control mode allows to pre-configure not only the devices to be moved using the joysticks, but also the limits, speed and timing of travel of individual devices. It is also possible to set accelerate of movement for a certain device. In this mode you can also edit the previously created performances, add, delete and edit individual scenes.

The devices can also be grouped and some of more advanced motion algorithms applied, e.g. position or time synchronization, triggers, multiple travel repetition, automatic creation of entries for the groups, etc.

👁 More detailed information about the automatic mode – see Chapter 5: Use of the automatic mode

3.6.3 Service mode

Service mode is the third mode. In this mode it is not possible to move the devices; its usefulness consists mainly in more detailed information about status of individual devices and safety components (circuit breakers, PLC, safety limit switches, EDM, dead man, Emergency Stop, acknowledgement, signal. discrepancy and others) and in the possibility to set the limit travel values for each device. The service mode enables to view the system log of events, containing the information not only about individual devices (axe timing / removing, errors and warnings, etc.), but also about the whole system.

👁 More detailed information about the automatic mode – see Chapter: Use of the service mode

3.7 Types of information icons and kinds of notifications and buttons/keys

There is a number of information icons and notifications in the Programme that serve for quick identification of the situation by the control panel operator. Meaning of the message is determined by the icon (type of device) and its colour (device status). In the following chapters you will find their description. Difference between the icon and the button/key will be explained as well.

3.7.1 Types of machinery

Each facility representing the machinery contains an icon specifying the type of device; the icon is displayed in the top right corner. Devices can be of the following type:

Device icon	Device type	Device icon	Device type

	Lift table of standard design			Point hoist
	Scissor lift table, secondary table			Fly bar with battery
	Stage trap door			Fly bar
	Orchestra pit table			Chain hoist
	Curtain opening and/or curtain			Point hoist arm rotation
	Curtain lifting			General symbol for machinery
	Auditorium			Table tilting
	Speakers			Chain hoist movement

3.7.2 Colour marking of information icons

The standard icon colour, representing the type of device where no unusual situation is detected (operator's attention is not requested), is gray. All possible icon colours are described in the following table:

Colour	Meaning, use
	Standard colour; means trouble-free operation (icon of the device)
	Trap door locking, NC error, loss of communication, target value numbers outside the limits
	Security bar closing, the icon indicating axis range error
	Detected error in security circuits of the system
	Frequency converter error / failure

3.7.3 Difference between the icon and the key

Framing is the basic distinguishing feature between the icon and the key (button). Icons do not have a frame around. If you click on any icon, no action takes place. Icons are informative only. Examples of icons can be seen in Fig. 8 below, icon of device type and icon of the structural (design) group. Icon between the buttons/keys is another example, see Fig. 10.
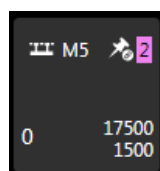
FIG. 8: EXAMPLES OF ICONS

3.7.4 Types of keys and their function

There are several types of keys/buttons. If there is a key on a black background, it is painted in gray. It can appear in several sizes, usually of square design (exceptionally as a rectangle). If the key is placed in a table, its colouring is the same as the colouring of the table and is framed by a lighter frame. The key may indicate status, i.e. ON/OFF and/or more states, or performs an action when clicked. If the status keys are clicked,

they give us a certain feedback that they have been pressed. They typically re-colour its background colour to another one and/or even their icon will be changed. The most common status key colour is light blue. In special cases, when the pressed key has to be pinpointed, a different colour is used, e.g. pink colour is used in the Mode menu (see Fig. 6), in the Lock menu even the icon is changed (see Fig. 7). An example of a status key is in the Fig. 9. The pressed key is in the middle.

The axis key is a special key type which, when assigned to a particular control lever, will be re-coloured by the lever colour. If this button is only pressed, it is framed in a lighter colour - it is selected for the next action.

The keys, directly performing an action, are not re-coloured anyhow, they do not have more states. Their interaction is obvious from the key function. When pressing a key intended for calling up any menu, the relevant menu will appear and there is no reason to re-colour the key. Similarly, for example, the loading keyboard key indicates correct functioning, because when pressed, in the field for value loading the relevant values will appear. An example of such a non-status key can be seen in Fig. 10. You can see two non-status keys here and an icon between them. From this figure the difference between the icon and the key follows clearly.

FIG. 9: EXAMPLES OF STATUS KEYS

FIG. 10: EXAMPLES OF NON-STATUS KEYS

3.7.5   Editing field

The edit field is the place where you can insert some text or numeric data. There are several areas in the visualization where you can enter the data this way. Editing is done by clicking on the edit field. Based on the type of the edit field, a large keyboard with individual characters, incl. the numeric ones, a large keyboard with individual characters incl. the numeric ones extended by the option of text colour and/or a small keyboard, numeric only, will be displayed. Impossibility to load the data other than the numeric ones into the edit fields intended for numerical data only is thus prevented. The keyboards can be seen in Fig. 11).
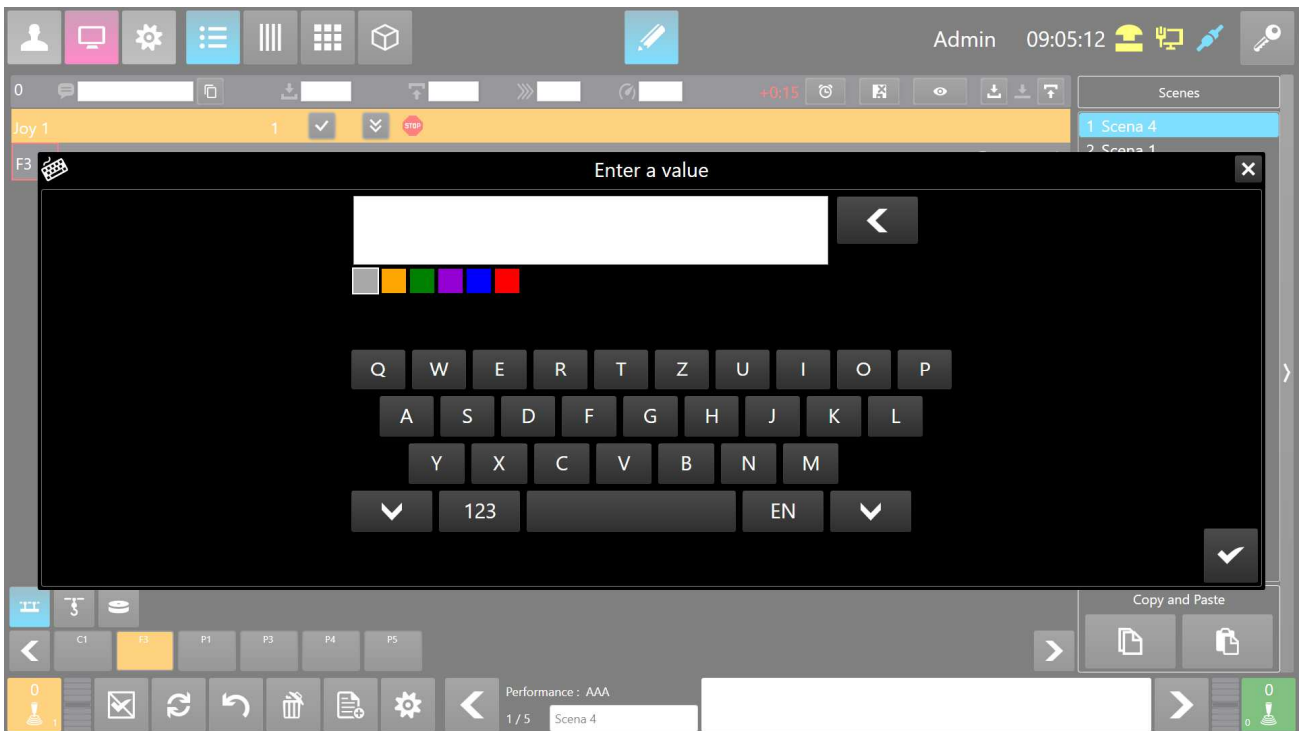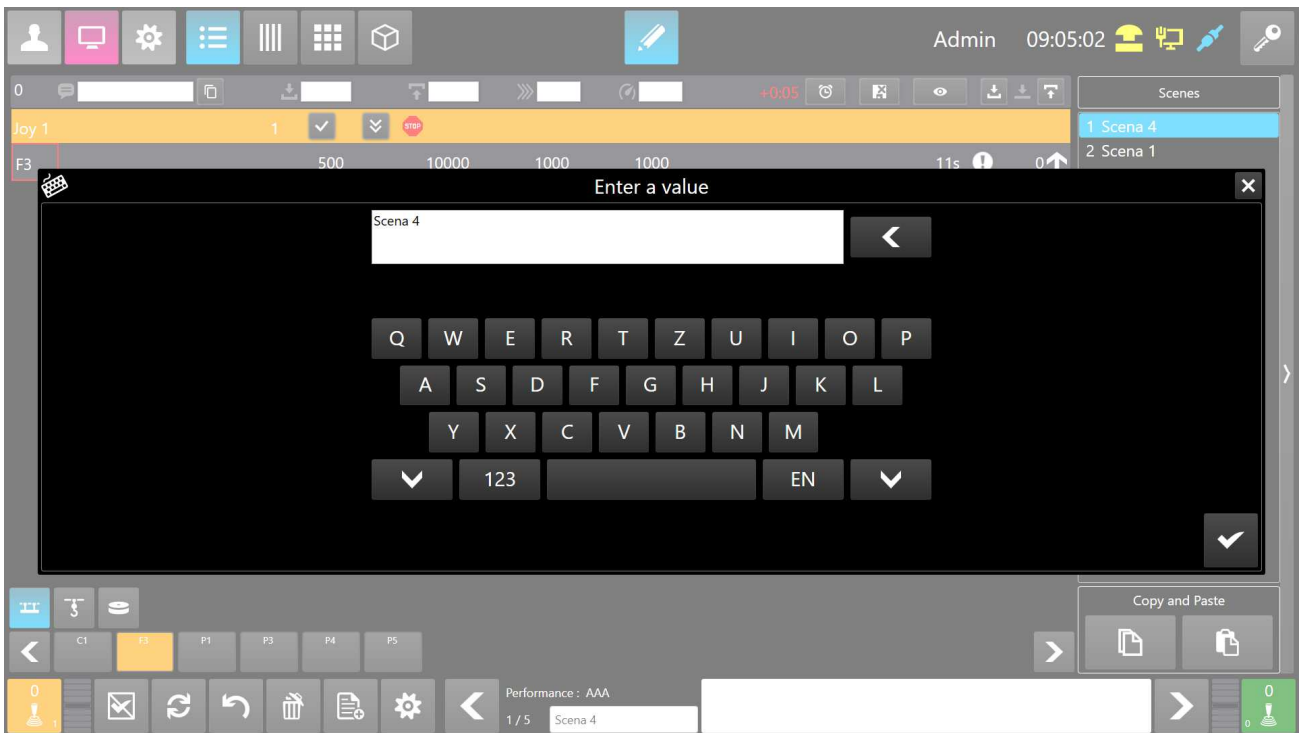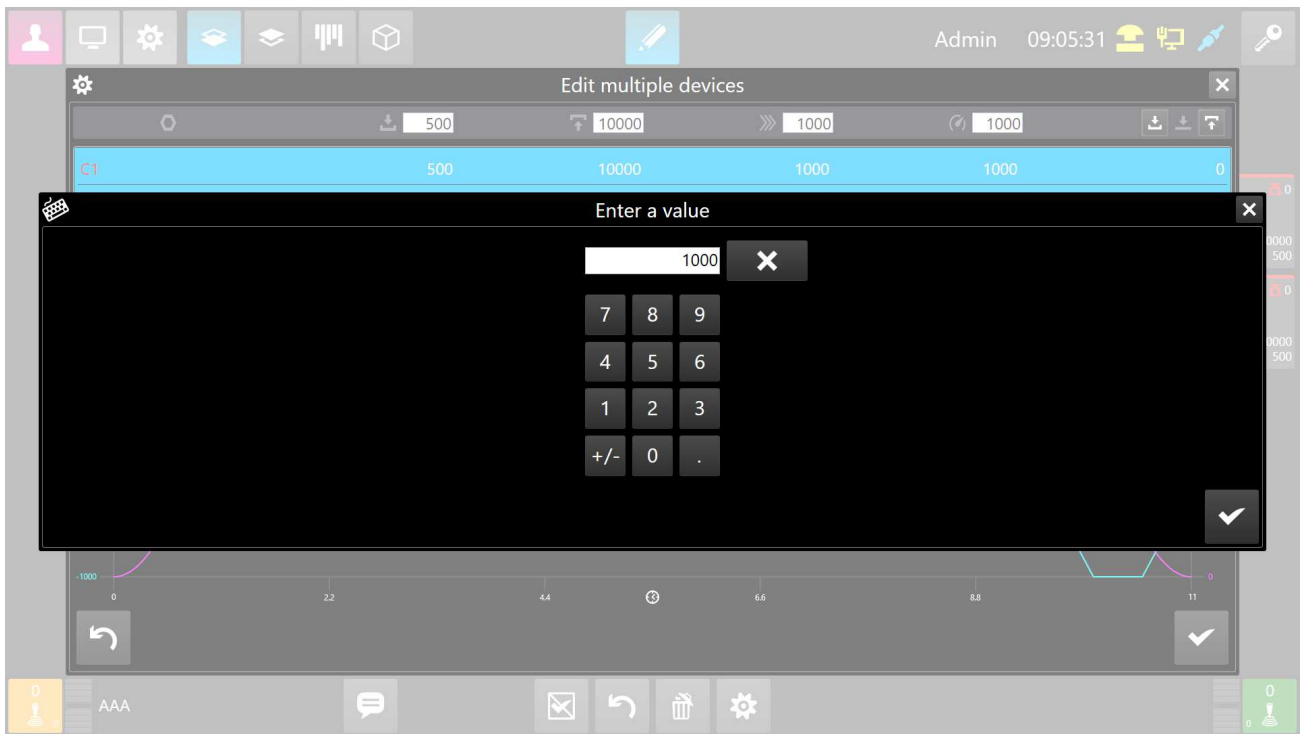
FIG. 11: KEYBOARD

4. Use of the manual mode

General description of the manual mode is contained in sec. 3.6.1. The following subchapters (sections) are intended as a guide for the real use of this mode. This mode is activated whenever the system is turned on.

4.1 Menu Mode – Sub-menu

To be able to use the manual mode, it has to be switched at first (selected when the Programme is started) - The "Manual Mode" key must be marked in pink (see Fig. 12 - (1)). To the right of the three mode switch keys, we can find the keys for switching individual device groups (2), (3), (4), the sub-menu. All the keys that can be displayed here are listed in the following table. Their meaning may be different for a particular facility (theatre, house of culture, etc.). This sub-menu is used for breakdown of a large number of devices so that all devices may fit comfortably in the work (displaying) area (see Fig. 4 - (5). For example, in one facility the fly bars can be located on one screen, the lighting batteries and the point hoists – on another screen. In another facility this sub-menu can divide, for example, the upper sphere and the lower sphere, etc. The number of these keys in the sub-menu may also differ in individual facilities. There is one common key for displaying the 3D scene (4), which is always located at the end of this Sub-menu.

(1)   (2)   (3)   (4)

FIG. 12: SELECTION OF THR MANUAL MODE

Key	Meaning	Key	Meaning
	Bottom sphere /First group		Divided sphere /Fourth group
	Top sphere /Second group		3D displaying
	Divided sphere /Third group		Auditorium
	Divided sphere/Fourth group		

👁 Not all the keys in the table may be available. It depends on the relevant technical installation. See the description above.

When switching to the manual mode, a list of devices that can be selected for the relevant travel is displayed on the work area of the screen.

4.2 Menu Bottom bar in the manual mode

In the bottom screen part there are the keys for the manual mode (see Fig. 13). Meaning of individual keys is shown in the table under the figure. The keys are accessible through all manual mode screens, except the 3D scene view, where the bottom bar is different.

In the manual mode, the axis labels are displayed, which are taken from the currently selected scene in the automatic mode. If there is no label for a given axis in the current auto-mode scene, a label from the nearest previous scene is displayed. If there is no label in the nearest previous scene, label for a device in the nearest next scene will be displayed.

FIG. 13: MENU BOTTOM BAR IN THE MANUAL MODE

(x)	Name of the function or group	Purpose (description)
1	Joystick 1 and 2	Joystick with a dead man and a deviation indicator.
2	Axis description switching	Switching axis descriptions between the current performance and the selected second performance. Used, when removing one performance and building another one in parallel. The second (alternate) performance is selected in Auto mode. See Chapter 5.9 for more details.
3	Cancelling selection	Cancels designation of one axis or more axes the same time
4	Deleting selection	Deletes assigning the selected axis to the joystick, i.e. deselects the axis from the chosen joystick. By long pressing this button, all axes will be deselected.
5	Setting device	Calls setting of a device (even for more chosen axes simultaneously).
6	Name of performance	Shows name of the current performance which affects the loaded descriptions of individual axes. 👁 Descriptions of axes are substituted in the manual mode by the first occurrence of the name in the relevant performance. Therefore, if the axis is named differently in several scenes of a given performance, do not forget it. The manual mode does not work with a scene sequence as the automatic mode. Descriptions of the axes are helpful here especially when removing one performance and building a second performance at the same time. See also the description of the key (2).
7	Default values	Sets default values for all of the selected devices

4.2.1 Joysticks – control levers

Joystick keys (see Fig. 15) serve for assigning the axes to the orange or the green joystick. Number in the top right corner of the joystick keys signals the number of devices assigned to the relevant joystick.

👁 One axis cannot be chosen for two joysticks (if installed) simultaneously.

FIG. 14: KEYS/BUTTONS WITH JOYSTICKS

4.3   Selection of a device and its assigning to joysticks

If the user is switched to the manual mode, by one click on any device in the selected sphere the relevant device is designated (see Fig. 15 or description in sec. 3.7.4 Types of keys and their functions).
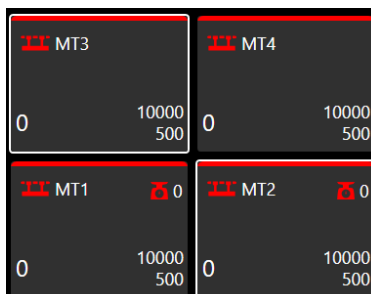
FIG. 15: SELECTION OF A DEVICE

The other unlabelled devices can be labelled afterwards. If we want to cancel the label, we can do it in several ways:

- By re-clicking on the already labelled axis, the selection will be cancelled
- By assigning the joystick
- By changing the parameters of the device (eg. Upper or lowe position, speed, acceleration)
- By pressing the Cancel Selection key (see Fig. 13 - (3)), labelling of all axes will be cancelled
- By pressing the Delete Selection key (see Fig. 13 - (4)), labelling of all axes will be deleted

If all devices, intended for realization of the manual travel, are selected/labelled, the device can be assigned to the joystick by pressing any joystick button. The labelled devices on the screen are coloured according to the joystick, which they are assigned to (see Fig. 16) - two axes are assigned to the left yellow joystick here.
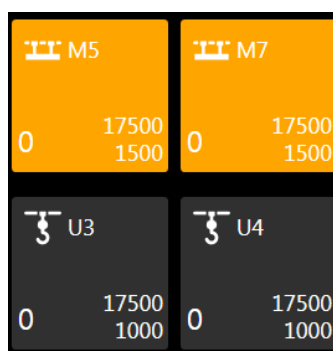
FIG. 16: ASSIGNING THE CHOSEN AXIS TO THE JOYSTICK

 If you want to assign the device to another joystick, designate it by clicking and press key of the joystick which the device shall be assigned to. The digit indicating the number of assigned devices next to the relevant joystick will change - the digit indicates only the number of the devices assigned to the currently selected sphere! When switching to another sphere, the digit will be updated (see Fig. 17).

If no device is selected and you click on the joystick button, all devices assigned to this joystick become selected.

FIG. 17: INDICATION OF THE NUMBER OF AXES ASSIGNED TO THE JOYSTICKS

To remove the assignment, click on any assigned device (more devices can be clicked as well) and by pressing the Assignment Removal key, the relevant device will be de-assigned from the joystick(s). Long pressing the Assignment Removal key serves for quick removal of all assigned devices. When all assignments are removed, the scene is again in the default state.

👁 This operation deletes only the assignment for the currently selected sphere and does not affect device setting for the second sphere.

4.4 **Editing device parameters**

A tool for adjusting device parameters is available in the manual mode. This menu can be activated by double-clicking on any device. By clicking the upper part of the device tile, you can edit the upper target position. By clicking the lower part of the device tile, you can edit the lower target position.

In case of mass editing of more devices (this applies to one device also), these devices can be designated and edited by the Device Settings key (see Fig. 13 - (5)). A configuration menu is displayed (see Fig. 18). Individual keys of this dialogue are described in the table under the figure.

FIG. 18: EDITING DEVICE PARAMETERS

(x)	Name of the function or group	Purpose (description)
1	Start position	Setting the starting (initial) position for movement.
2	Target position	Setting the target (end) position of movement.
3	Speed	Setting speed of movement.
4	Acceleration	Setting acceleration of movement.
5	Position transfer (switching)	These two keys are used to switch the current position for the starting or the target position. Goal of transfer is determined by the icon on the key that determines whether the movement goes towards the start or the target position.
6	Original values	This key serves for setting the original device values (as set in the system configuration). In other words, setting of max. movement limits, default seed and acceleration.
7	Confirmation	The key confirms and stores all changes that have been made in this screen. At the same time the window will be closed.
8	Dialogue closing	The key closes the dialogue window without confirming and saving the made changes.
9	List of devices to be edited	This section of the screen shows a list of devices to be edited. The Editing Parameters window serves for editing one device as well as for mass editing more devices simultaneously.
10	Progress displaying	In this part of the screen you can see progress and acceleration charts. The user can thus check easily, how the device will behave during start and stop, i.e. in case of changes of speed and acceleration values, i.e. checks start slope depending on time.
11	Movement direction reversal	Particular types of devices (with some exceptions) like rings have different track lengths if the device moves clockwise or counter-clockwise. If you change the direction of the movement of these special devices, you will be able to see this indication on the device tile (Figure 10).

👁 It is advisable to use acceleration settings especially for deceleration and/or some kind of optical fluency when handling a heavy load.

For the devices, parameters of which have been configured differently from the default values, a bar or an icon appears in the bottom part in the manual mode (see Fig. 19 - (1)). By default, this marking is of blue colour. Incorrect setting results in red displaying.

4.5 Description of the device tile

Some data are displayed on the tile of each manual mode device. Some of them are displayed permanently, the other ones appear in some cases only. Description of all the data can be seen in Fig. 19 and in the table below.

(12)

(11)   (12)

FIG. 19: DESCRIPTION OF THE MANUAL MODE TILE

1	Icon and designation of device	Icon of the group of devices and relevant designation.
2	Top information bar	The bar indicates non-standard status of the device. Description of colour resolution of individual meanings can be found in sec. 3.7.2 Colour marking of information Icons.
3	Current position	
4	Upper limit	If the value is pink, the relevant limit has been set or the value has been recalculated automatically (e.g. due to synchronous travel)
5	Lower limit	If the value is pink, the relevant limit has been set or the value has been recalculated automatically (e.g. due to synchronous travel)
6	Strain gauge icon and load value	
7	Icon and number of the design group	Pink number is the group number entered through the Device Limits screen (sec 7.4 Device Limits), the white number expresses the group number defined by the device design. This group cannot be removed without intervention of technicians.
8	Lock	The device is locked.
9	Description of device	Greater details see sec. 5.12 Device legend.
10	Bottom information bar	For the devices, parameters of which have been configured differently from the default values. By default, this marking is of blue colour. Incorrect setting results in red displaying.
11	Amount of the ring rotations	
12	Max/actual speed of movement	If the device is standstill, configured max speed value is displayed. When the device is moving, actual speed of the device is displayed.

4.6   Device diagnostics

In the manual scene control mode a diagnostic tool is also available; it enables to display the complete necessary information about the device. This menu can be activated by a long click on a structure representing the device (machinery). An information table (see Fig. 20) is displayed afterwards, incl. the name and type of the device diagnostic data of which are displayed.

4.7   Manual mode operation

When the device is assigned to the joysticks (see previous sub-chapters), the edit mode has to be locked by pressing the key from the Lock menu (see 3.4 Lock Menu).

👁 If you forget to lock the edit, the programme prevents any travel and displays the warning message on the screen. Only after editing is locked and the warning window disappears, it is possible to move the devices.

By pressing the physical joystick button downwards, the dead man key is activated - a safety lock against unwanted deflection. When the dead man is pressed, the dead man icon (close to the joystick figure) will be filled by the relevant colour (see Fig. 20 on the left).

FIG. 20: PRESSING DEAD MAN ON THE JOYSTICK AND RIDE

When joystick is deflected up or down, the device moves towards its upper or lower limit. The driving speed is dependent on joystick deflection and is variable continuously. The number (see Fig. 21 on the right) indicates the driving speed in percents and serves as a supplemental information. To end the travel, just release the joystick and the device will stop smoothly.

After stop the device is able to travel again according to the previous procedure.

Selected devices in the manual mode do not affect device selection in the automatic mode.

4.8 2D Mode

2D mode is a different way of manual mode display overview. We can switch to the 2D mode by clicking the button (1), see Fig. 21. This mode is useful for upper sphere devices. User gets a side vew of the actual placement of the devices and its positions. In this mode it is also possible to view the diagnostics of the devices, edit its parameters and assign them to the joysticks (or remove them) the same way as in manual mode described in the previous chapters.

The only difference is selection of the devices, that overlap in the side view. Such devices are part of the 2D mode component. Eg. Component (4) in Fig. 21 represents 2 overlapping devices. Selection of such a device can be made by clicking the dialogue button (1) in Fig. 22, which appears on the screen when you click on the component. Dialogue can be closed by clicking the cross button (2) or by clicking outside the component area.

If the width of the column allows it, two values are displayed in the lower part of the device. Upper value represents actual position of the device. Lower value represents actual speed of the device. When the device is stationary, the actual speed value changes to maximum speed of the device.

Horizontal lines displayed in the 2D mode are a graphical representation of the target positions of devices. Yellow line (2) represents bottom target and blue line (3) represents top target.

4.8.1 Relocation of the point hoists

If the relocatable point hoists are available in the system, it is possible for operator to change its visual location in the 2D view for better overview of the scene. Buttons responsible for relocation are placed in the area (5) in Fig. 21. The buttons are displayed only when the point hoist is selected, otherwise they remain hidden. Selected point hoist is relocated by the buttons with arrow marks. Button with „home" mark is intended for loading the saved device distribution from the database. The „floppy disc" button saves the actual distribution to the database.
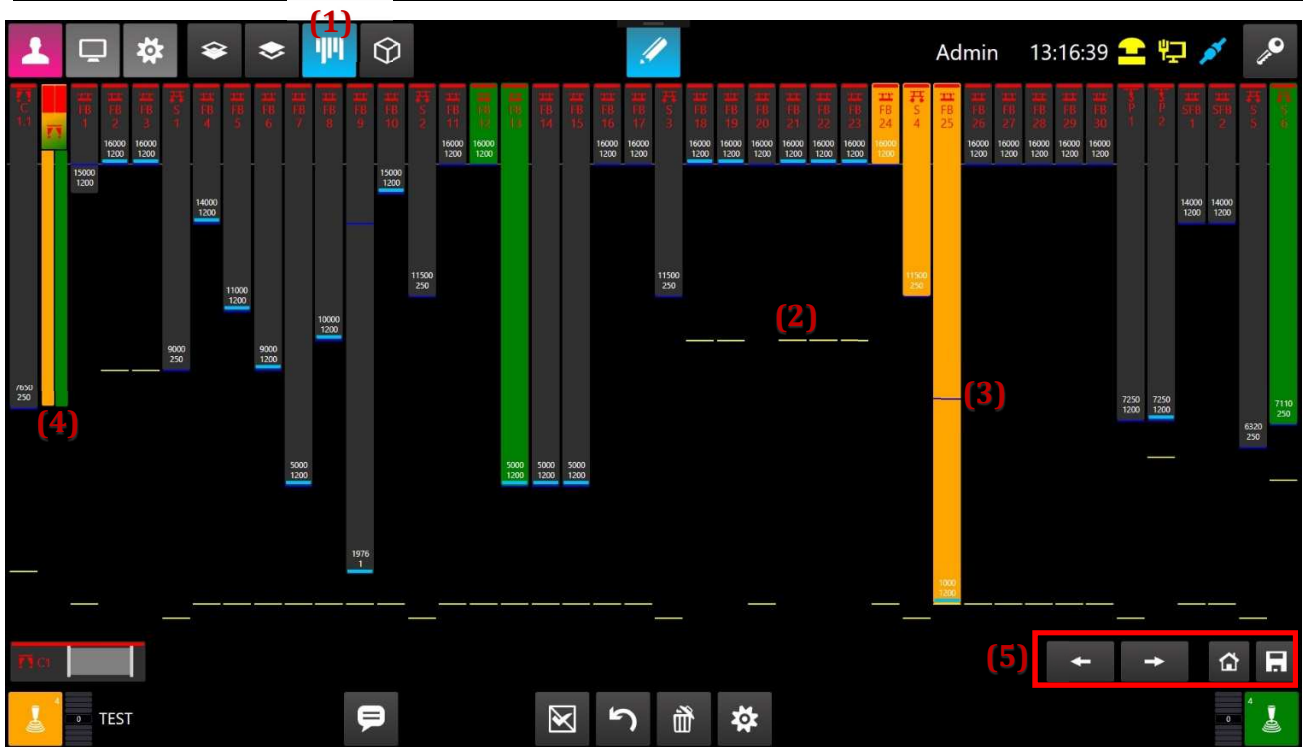
FIG. 21: 2D MODE
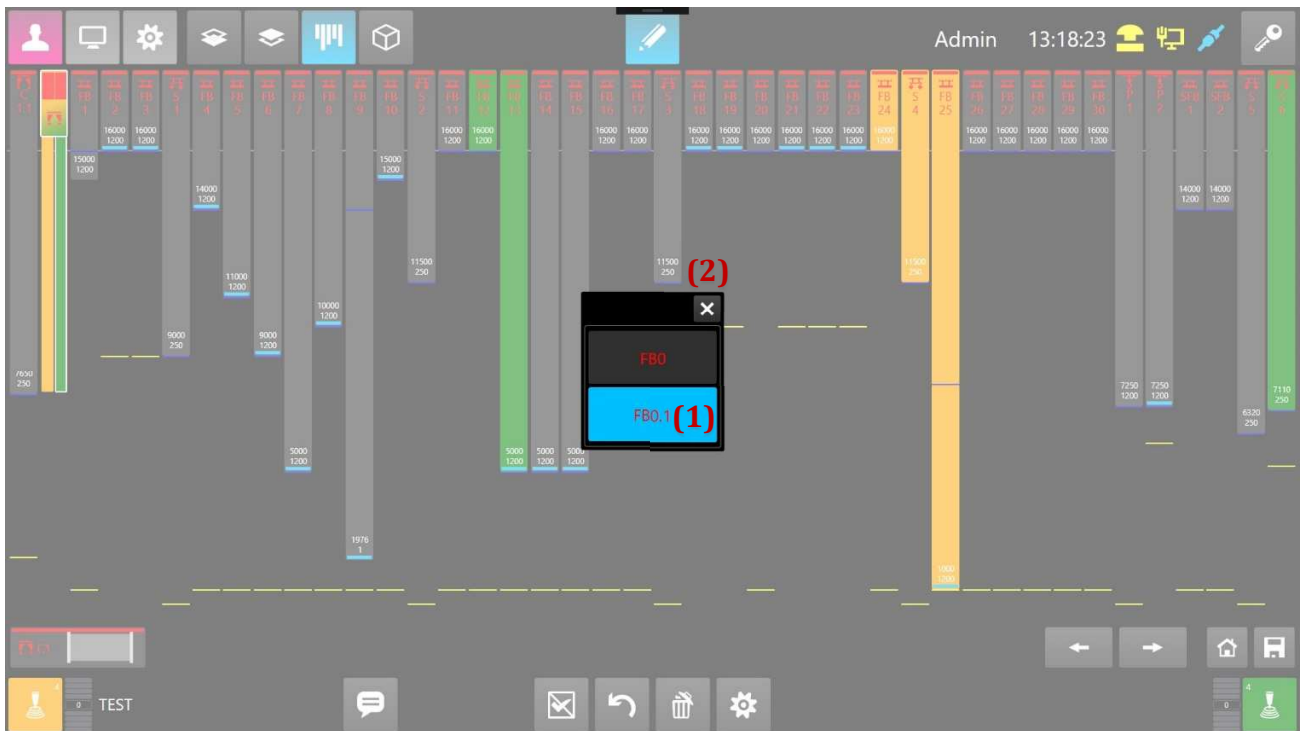
FIG. 22: SELECTION OF THE COMPONENT DEVICE

5.   Use of the automatic mode

The automatic mode allows for a more detailed configuration of travel of individual devices, assign them to a certain scene and assign these scenes to the performance. Sub-chapters below will be devoted to description of individual steps and options offered by the automatic mode.

5.1   Menu Mode – Sub-menu

To be able to use automatic mode, it has to be switched at first (not selected when the programme is started) - the Auto key must be marked in pink (see Fig. 23 - (1)). There are three keys to the right of the Mode Switch keys (see Fig. 23 - (2), (3), (4), (5)).

The key Scene: for editing individual scenes of a given performance in the tabular mode – (2).

The key Performance overview: displays overview of the whole performance and the scenes and devices within – (3).

The key Performance: for selecting the performance and for handling the performance itself and individual scenes of it – (4).

Key for 3D scene display (5). This key is the same like in the manual mode and is again located at the end of the sub-menu.

FIG. 23: SELECTION OF AUTOMATIC MODE

5.2   Bottom bar of the automatic mode

In the bottom screen part there are the keys for the automatic mode (see Fig. 23). Meaning of individual keys is shown in the table under the figure. The keys are accessible through all automatic mode screens, except the 3D scene view, where the bottom bar is different.
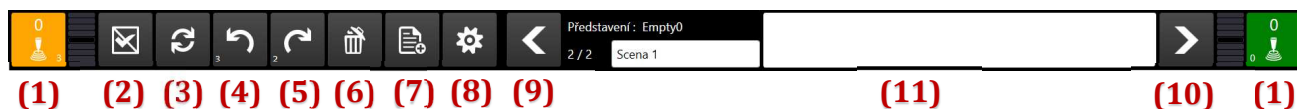
FIG. 24: BOTTOM BAR IN AUTOMATIC MODE

(x)	Name of the function or group	Purpose (description)
1	Joystick 1 and 2	Joystick with a dead man and a deviation indicator.
2	Cancelling selection	Cancels designation of one axis or more axes the same time
3	Exchange of the start and goal position	Interchanges the starting and the target position. This switching action is performed for the selected (labelled) devices.
4	Undo/Default status	By clicking this button, you can undo a previous change of the scene. Number in the left bottom corner of this button shows how many steps can be undone. By selecting a device(s) and then long clicking of this button brings the device to the default state.
5	Redo	By clicking this button, you can redo a previous change of the scene. Number in the bottom left corner shows how many steps forward can be redone.

6	Deleting selection	Deletes assigning the selected axis to the joystick, i.e. deselects the axis from the chosen joystick.
7	New scene	Creating a new scene. The newly created scene is placed after the current scene in the performance.
8	Setting device	Calls setting of a device (even for more chosen axes simultaneously).
9	Shifting the performance backwards	Shifting the performance means movement scene by scene. This key moves to the previous scene. Towards the beginning of the performance.
10	Shifting the performance forwards	This key moves to the next scene. Towards the end of the performance.
11	Scene description	In this area you can see the name of the performance. Under the name of the performance you can see the name of the current scene, with the indicator, what number has the current scene (of the total number of scenes). The edit field indicates that the scene can be renamed (a smaller edit field). In the larger edit field you can add comments to the current scene. These data are stored in the database within the given performance.

5.2.1 Joysticks – control levers

Joystick keys (see Fig. 24) serve for assigning the axes to the orange or the green joystick. Number in the top right corner of the joystick keys signals the number of devices assigned to the relevant joystick.

One axis cannot be chosen for two joysticks simultaneously.

FIG. 25: KEYS WITH JOYSTICKS

5.3 Selecting device and assigning to joysticks

In the automatic mode the device is selected from the device selection menu, which is located above the menu Bottom bar of the automatic mode. This menu can be seen in Fig. 26.

By clicking on any device from the selected sphere, the clicked device is designated (see Fig. 15 or description in sec. 3.7.4 Types of keys and their functions).

Because of a large number of axes, the axis selection keys are grouped into thematic groups by the device type. These groups can be switched by the keys of the thematic groups in the top line of this two-line menu. The thematic keys are equipped with the icons corresponding to the icons of each device type so that everything may be intuitive.

Designation of the device in the tiles of individual devices can also be accompanied by a legend (sec. 5.16 Device legends) or by the icon with the design group number (line 9 in the table, sec. **Chyba! Nenalezen zdroj odkazů.** Description of device tiles), which the devices is included into.
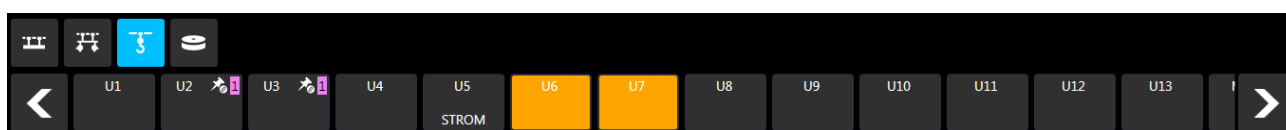
FIG. 26: SELECTING DEVICE

The other unlabelled devices can be labelled afterwards. If we want to cancel the label, we can do it in several ways:

- By re-clicking on the already labelled axis, the selection will be cancelled
- By pressing the Cancel Selection key (see Fig. 24 - (2)), labelling of all axes will be cancelled
- By pressing the Delete Selection key (see Fig. 24 - (4)), labelling of all axes will be deleted

If all devices, intended for realization of the manual travel, are selected/labelled, the device can be assigned to the joystick by pressing any joystick button. The labelled devices on the screen are coloured according to the joystick, which they are assigned to (see Fig. 26) - two axes are assigned to the left yellow joystick here.

If you want to assign the device to another joystick, designate it by clicking and press key of the joystick which the device shall be assigned to. The digit indicating the number of assigned devices next to the relevant joystick will change - the digit indicates only the number of the devices assigned to the currently selected sphere! When switching to another sphere, the digit will be updated (see Fig. 27).

FIG. 27: INDICATION OF THE NUMBER OF SELECTED AXES ASSIGNED TO JOYSTICKS

To remove the assignment, click on any assigned device (more devices can be clicked as well) and by pressing the Assignment Removal key, the relevant device will be de-assigned from the joystick(s). Long pressing the Assignment Removal key serves for quick removal of all assigned devices. When all assignments are removed, the scene is again in the default state.

👁 After de-assignment of the device from the joystick, parameters of this device remain preserved (stored). By reassigning to one of the joysticks, the device will be returned into the edit table with the previous setting. With respect to editing, each device has one step back history.

You can also select a device from the table of the already selected and assigned axes (see Fig. 27). The only difference is that selection is displayed as a blue-coloured line, because the device is presented in the table as one table line.
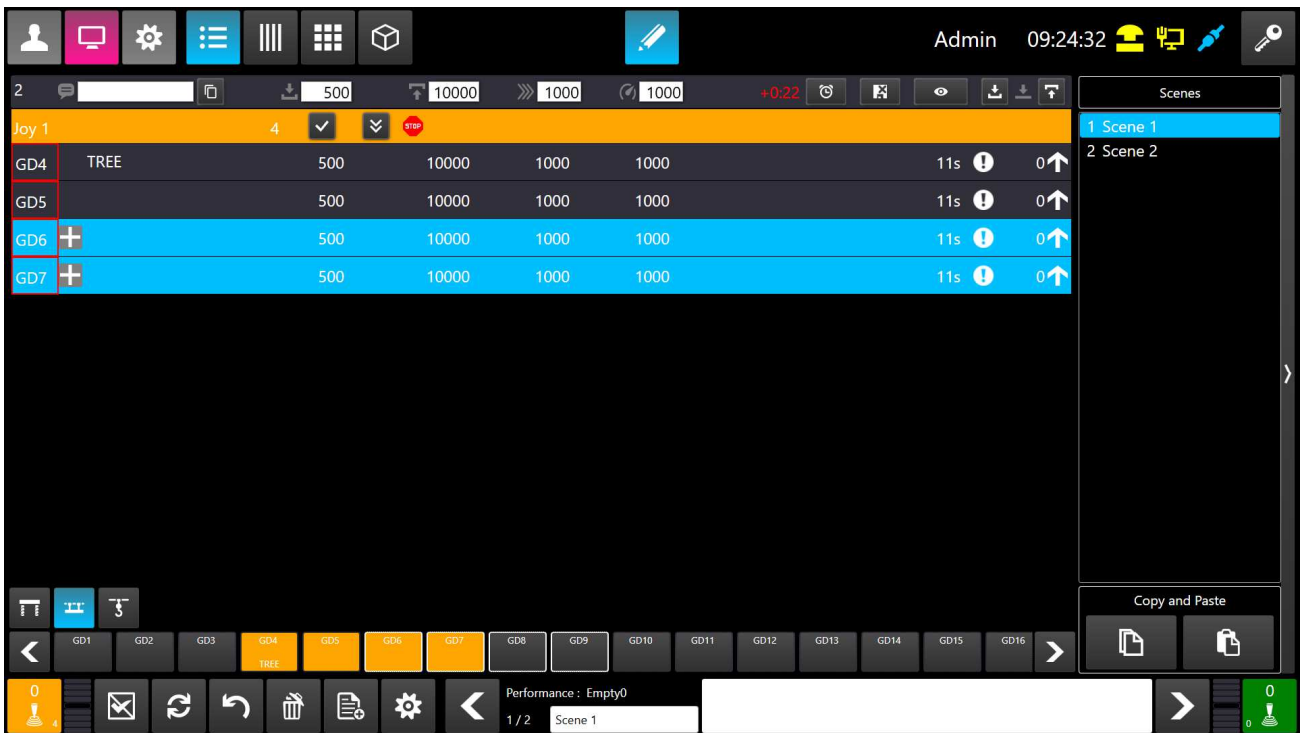
FIG. 28: SELECTION OF THE DEVICE FROM THE SCENE TABLE

5.4 Diagnostics and device event log

In automatic mode, there is also a diagnostic tool that allows you to see necessary device information. You can activate this tool by clicking the device label in the left part of the device table row of the devices that are already assigned to a joystick. After clicking the label, the diagnostic information table (see Fig. 49) with the name and type of device with diagnostic information opens.

5.5 Top auxiliary bar of the automatic mode

In the top right corner of the automatic mode (see Fig. 29) it is possible to choose trial mode (1), manual mode (2), transfer actual position to the start position (3) and transfer actual position to target position (4).
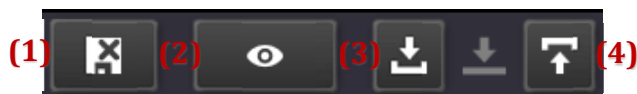
FIG. 29: TOP AUXILIARY BAR

5.5.1 Trial mode

By clicking the icon of Trial mode, the icon will turne blue (see Fig. 30).
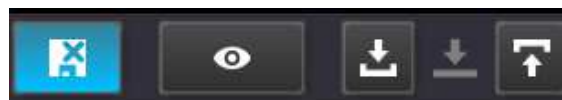
FIG. 30: TRIAL MODE

After the Trial mode activation, it is possible to make changes in the scene, which can be stored or thrown out by clicking the button again and selecting an option in the displayed dialogue. (See Fig. 31)
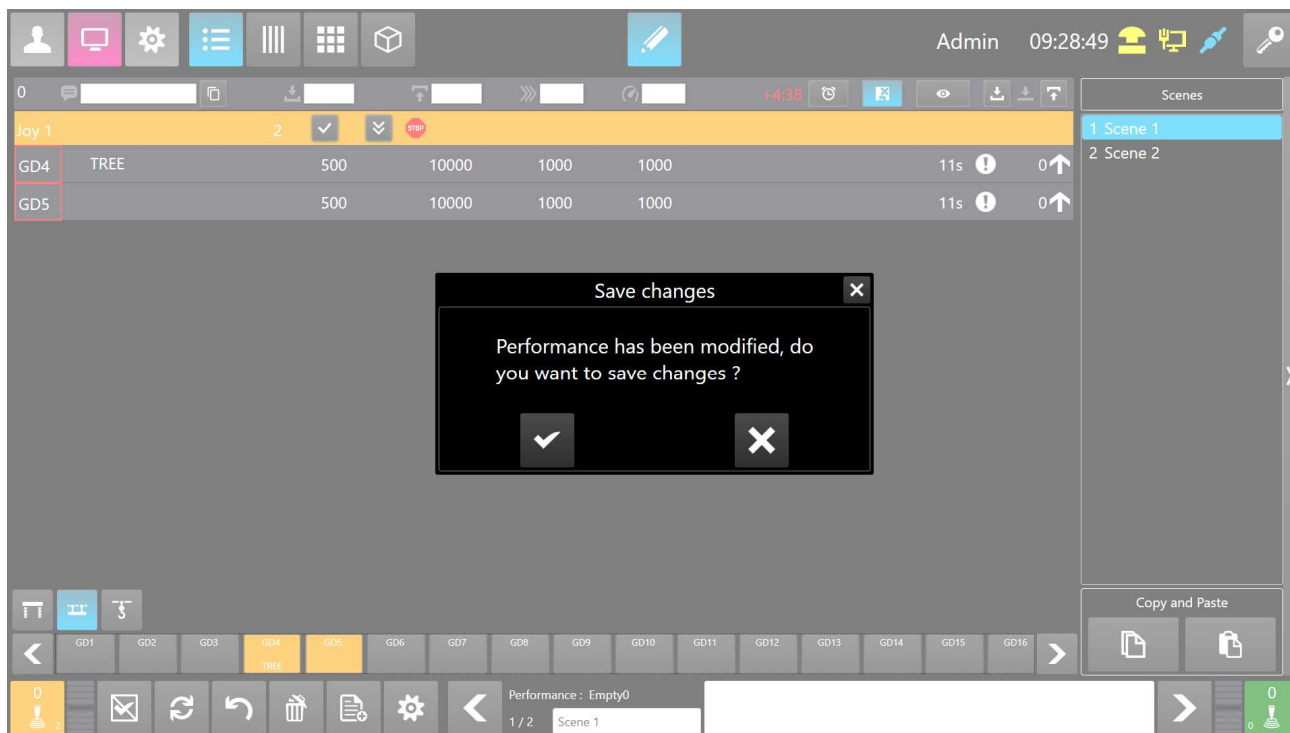
FIG. 31: TRIAL MODE DIALOGUE FOR SAVING OR THROWING THE CHANGES

5.5.2   **Manual mode inside the automatic mode**

Using the manual mode inside the automatic mode, you can select devices, which can be driven the same way as in manual mode. In this mode, the synchronization, triggers and other settings that affect the device, are disabled. This mode is activated by clicking the button "eye" (See Fig. 32).

FIG. 32: MANUAL MODE INSIDE THE AUTOMATIC MODE

5.5.3 Putting the actual position to the start/target position

The last two buttons in the top auxiliary bar (See Fig. 29 – (3) and (4)) are used to put the actual position to the start/target position. For the buttons to work, it is necessary to have one or more devices selected.

5.6 Performance

To be able to work with the automatic device travel mode, it is necessary to create at first a new performance or to load the already existing performance. When pressing the key Performance (see Fig. 23 - (4)) in the automatic mode, the requested tab is opened. The tab is divided into two parts. The left part shows the list of performances, the right part - the list of scenes of the highlighted performance. (See Fig. 33).
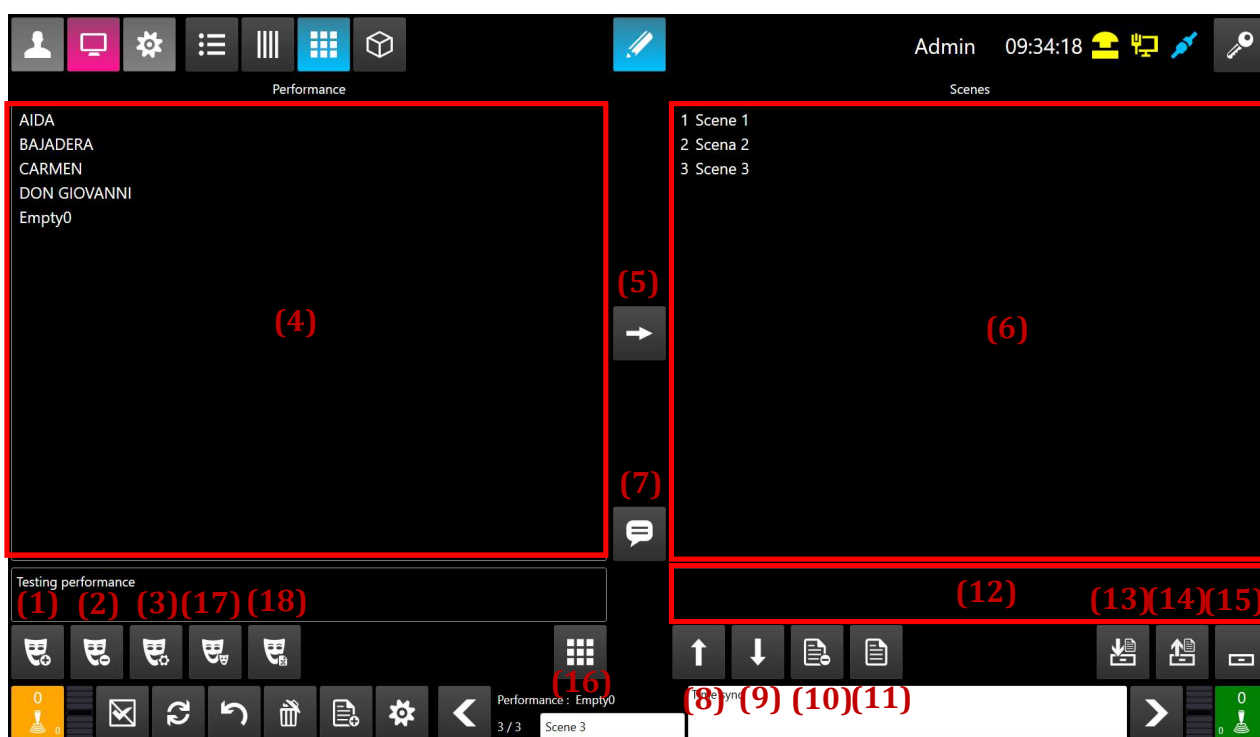
FIG. 33: EDITING PERFORMANCE

The following table describes individual operations connected with the performance and its scenes.

(x)	Name of the function or group	Purpose (description)
1	New performance(s)	A new performance is created, using a key.
2	Deleting performance	Performance is deleted through the confirmation dialogue.
3	Renaming performance	Key for change of the name of the performance.
4	List of performances	Area with the list of all available stored performances.

5	Activating performance	The key will load (activate) the selected performance (from the list of performances (4)). After the performance is activated, a list of scenes of the selected performance will appear in the image field (6).
6	List of scenes	This field displays the list of scenes of the currently loaded (activated) performance. The actions are sorted from the top down; beginning of the performance has the top position, end of the performance takes the bottom position. The scenes can be selected by clicking, and moved or deleted afterwards within the performance, incl. operations with the box (12).
7	Activating alternate performance	This key is used for loading the alternative performance. The alternative performance is used in the manual mode for simultaneous removal of one performance and building a second performance. See sec. 4.2 Menu Bottom bar in the manual mode Fig. 13 – (2).
8	Scene (action) reversing	Scene Reversing (visually Upwards) within a performance. Moves the selected scene (blue-coloured line) in that direction.
9	Scene (action) forwarding	Scene forwarding (visually downwards) within a performance. Moves the selected scene (blue-coloured line) in that direction.
10	Scene (action) deleting	Deletes the currently selected scene (in the field 6).
11	Scene activating	By pressing the key, the selected scene (in the field 6) becomes active.
12	Memory box	The box is used to copy scenes, even between different performances. This field displays the list of scenes that are currently in the box. Scenes can be selected in the same way like in the list of scenes (6).
13	Place into the box	The key moves the selected action into the box. Described further in chapter 5.7.
14	Take out of the box	The key transfers (copies) the selected action from the box into the list of actions (6). Described further in chapter 5.7.
15	Empty the box	Deletes content of the box. Described further in chapter 5.7.
16	Setting performance	The key serves for displaying the window where you can find additional options for setting the currently selected performance.
17	Performance copy	The key opens up a dialogue window. When accepted, the performance 1:1 copy is created of the active performance. The label of the new performance will be based on the original performance with the addition of "- copy"
18	Performance export	This button exports the actual performance into the text file, that is print ready or you can open the file in Excel or Notepad. The file contains all of the scenes and settings of all of the devices programmed into the performance. Its name corresponds with the name of the performance and it is placed on the backup medium in folder labelled "Export".

5.7   Scene copy between/inside the performances

You can copy the scenes inside the performance or between two performances with the help of the memory box in the performance sub-menu.

The method is as follows: We pick the scene of the performance from the scene list (6). By clicking the button (13) we put the scene into the memory box. If we want to copy the scene into another performance, we activate it by clicking button (5) from (4). In the scene list (6), we select the scene, where we want to paste

scene. If we don't select one, the copied scene will be pasted to the end of the list. We schoose a scene from the memory box and paste it to the performance by clicking the button (14). To empty the memory box, press the button (15). More in the Fig. 33, respectively in the description table below it.

If we don't want to copy the whole scene, but only few selected devices, please see chapter 5.10.

5.8 Setting the performance

The screen setting performance (Fig. 34) contains advanced options for setting the currently selected performance. Availability of individual options may vary, depending on the environment where the system is installed. This can be, for example, axis replacement and point hoist shifting. To close the window, use the confirmation key (7) or the cross (8).

5.8.1 Axis replacing during performance

Sub-menu in Fig. 34 (1) serves, for example, in case of a device failure for quick replacement of this device in the whole performance for another axis. Select the axis (into the item (2)) to be replaced by the axis in the item (3). Only the axis not yet used in the performance may be selected in the item (3). When confirmed by the key (4), the axis (2) will be replaced by the axis in (3) in all scenes of the current performance.

5.8.2 Time code

Timecode allows to start the movement of the device in the specified time. To turn the timecode on/off you need to click the button (6) inside the sub-menu (5) - Fig. 34. Actual state is dIsplayed via the button backlight. Timecode operation is described in detail in chapter sec. 5.3
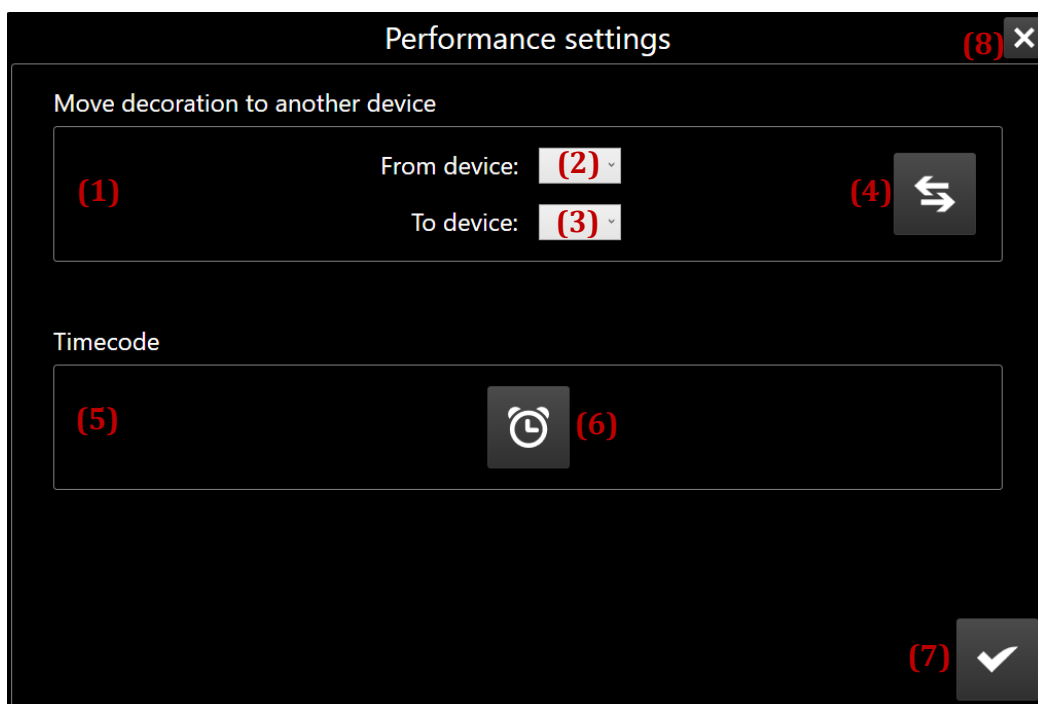

FIG. 34: SETTING THE PERFORMANCE

5.9 Scene

To edit and view the current scene, press the Scene key (see Fig. 23 - (2)).

The scene is distributed on the screen as a table depicting individual devices and created device groups on its lines. To edit the device, use the heading line which contains the input field for individual values and keys for further operations.

👁 If more devices are edited and/or if individual parameters of these devices differ, the edit field remains unchanged and/or is empty. If the parameters are identical, this field is filled in by this parameter.

The device, values of which shall be changed, has to be selected. See sec. 5.3 Selecting device and assigning to joysticks or Fig. 28.
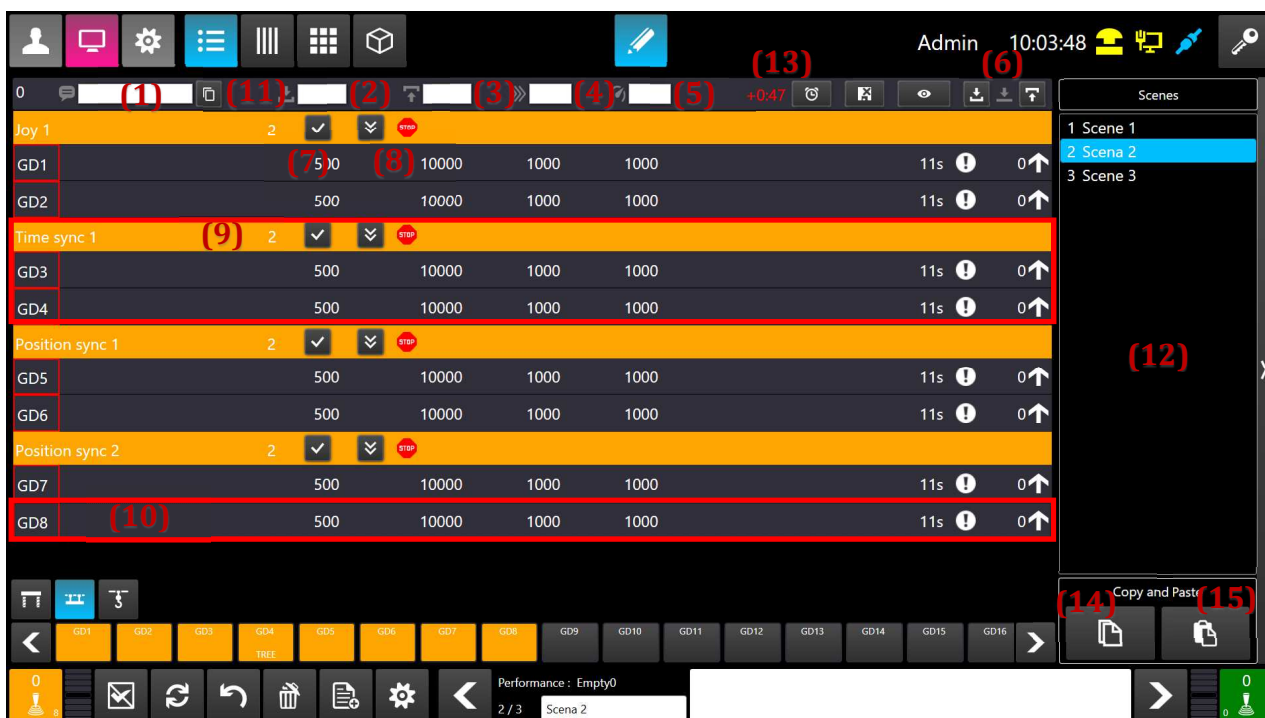
FIG. 35: SCENE

Keys with their meaning are described in the table below.

(x)	Name of the function or group	Purpose (description)
1	Device description	Device legend is set through this edit field. For a more detailed description of the use of the legend, see sec. 5.16 Device legend.
2	Start position	Setting of the start (initial) position of movement.
3	Target position	Setting of the target (end) position of movement.
4	Speed	Movement speed setting. 👁 Zařízením typu točna lze nastavit i zápornou rychlost. Znaménko rychlosti udává směr otáčení točny po vychýlení joysticku směrem vzhůru. Kladná rychlost vyvolá pohyb po směru hodinových ručiček. Záporná rychlost naopak značí pohyb proti směru hodinových ručiček.
5	Acceleration	Movement acceleration setting.
6	Position switching/transfer	These two keys are used to transfer the current position to the starting or destination position. See chapter 5.5.3.
7	Selecting device in the group	The key can select all devices of the relevant group.
8	Group roll up	The key rolls up the whole group, i.e. the devices are not visible. Only the group line is visible. This is used if the scene contains many groups, but there is no need to make adjustments in all of them. Therefore, these groups can be rolled up and more

		devices and groups can be placed in the display area. Press the key, to roll out the group again.
9	Group of devices	A group of devices is designated by a red frame in the figure. 👁 More groups with different settings can be assigned to a single joystick.
10	Device line	The device line displays all settings for individual devices. Individual parameters are arranged in columns by the appropriate icons in the table heading. These lines can be edited only through the input table heading described in (1) - (6). Besides the editable recordings, the line begins with the device index column (e.g. M1, M2, etc.). At the end of the table there is a non-editable column of the current position and before this column there is a non-editable column with status icons for that device.
11	Label copying	This button is used to copy the labels to different scenes. Further information in chapter 5.16.
12	Scene list button	This button shows/hides the scene list of active performance.
13	Remaining time	Operator can assign a time value to each scene. When the active scene switches, this time remaining time value becomes active and counts down to zero. To set the timer, click on an icon of an alarm clock next to the time value. When the timer runs out (displays 00:00), the minus sign value will change to plus sign and the timer will count upwards.
14	Copy the device to the memory	This button copies the selected devices into the memory (similar to CTRL+C). Further description is in chapter 5.10.
15	Paste the device from the memory	This button pastes the selected devices from memory to the active scene (similar to CTRL+V). Further description is in chapter 5.10.

5.10   Copy & Paste chosen devices

This function provides a possibility to copy chosen devices to other scenes or even other performances. We select the devices we want to copy from the actual scene device table. Selected devices will be stored to the memory of the computer by clicking button (14) - Fig. 35. The button turns blue, which means, the storage was succesful. Then we switch to the scene, where we want to paste the devices from memory.

To paste the devices into the scene is done by clicking the button (15) – Fig. 35. If some of the pasted devices are already present in the selected scene (have the joystick assigned to them), a dialogue will emerge in which we choose preferred action. We can either override the existing device in that scene with the pasted device settings from the memory or we can skip pasting the device and keep the original one.

To remove devices from the memory is done by long clicking the button (14) – Fig. 35 or by short clicking the same button after all devices were deselected (to deselect the devices, use button (2) – Fig. 24). Succesful memory erase is signaled by removing the blue color from the button (14) – Fig. 35.

If we require to copy the whole scene, we can use the function described in chapter 5.7.

5.11   Driving in automatic mode

Once we've created at least one scene in the performance, we can start travel. Editing is locked at first (see sec. 3.4 Lock Menu). Then, by pressing the dead man on the joystick and swinging it, movement of the devices assigned to that scene will be started.

By pushing the joystick forward, the devices will move to their target positions (see (3) in Fig. 35). On the other hand, by pulling backward, the devices will move back to their starting positions (2). Advantage of this method of control is, for example, possibility of the shear movement using one joystick only. Direction of movement of the device after deflecting the joystick forward is indicated by an arrow (11) at the end of the line. The exclamation mark (12) is displayed when the current position of the device is outside the extreme travel range.

Scene playback speed is determined by joystick deflection.

Progress bar displays shows a graphical representation of the scene state (see Fig. 36) placed in the bottom part of the screen. Progress bar shows the operator the percentage of actual distance travelled of all devices combined vs the total travel distance of all the devices combined in that scene in percentage.

> Travel in the scene is designed so that the scene ends when all devices complete their movements in their end positions. If we switch the scene before the devices arrive their target locations, in a new scene the devices will start their travel from the current position, which may not be desirable. Individual scenes should be designed so that the device in the next scene may have its starting position identical with the target positions of the previous scene.

When the scene is finished, the device moves to the next scene using the scene shift keys, see sec. 5.2 Bottom bar of the automatic mode and keys on Fig. 24 - (8) and (9).

FIG. 36: SCENE PROGRESS BAR

5.12 Multi-step device movement

Scene device movements can be composed of multiple steps. To add a new step of movement, designate the device, which the step has to be added to, and click on the key (1) - Fig. 37. After pressing it, a new table line, representing the newly created step (2), appears under the selected device.

The step line is designated with a digit representing the sequence.

If we add the first step for the selected device, a window with the flag (3) appears after the acceleration value - Fig. 37. The same window is at the same position even in the step column. The flag is used for setting the initial scene movement. Therefore, if we require that movement of device(s) in the scene starts e.g. by movement of the step number two, by clicking on the window of this step the flag will be moved there.

Steps can be given the same values likes the devices (see sec. 5.9 Scene), incl. the advanced options (sec. 5.14 Setting Advanced Options). However, a step or device with a multi-step movement cannot be included into thee synchronization groups (sec. 5.14 Setting Advanced Options).

If we want to remove the step, mark it and click the key (4) - Fig. 37.

FIG. 37: MULTI-STEP MOVEMENT

5.13 Advanced automatic mode options

If it follows from complexity of the performance, the programme is equipped with a set of advanced settings and algorithms that will be described in this sub-chapter.

5.13.1 Synchronization of groups and its types

As described in sec. 5.9 Scene, by assigning the device(s) to a joystick, a group of devices that can travel together is created. However, this group performs only this common travel, but the devices are not monitored and controlled anyhow. If any device in the group fails during the travel, the rest of the group continues toward their target locations. Only by activating the advanced features, a group, having the common travel of devices somehow monitored and controlled, can be created. We are speaking about several types of groups.

Group with asynchronous operation

The group with asynchronous run behaves as a group with the common run, i.e. the devices are not monitored and controlled with the exception of run control. If any devices of the group fails, the whole group will be stopped.

Track-synchronous group – positional

The track-synchronous group is characterized by controlling mutual positions of individual devices. The devices run at the same speed and their deviation from the position (relative to other devices) is monitored constantly. Corrections are applied during the travel so that mutual deviation in position may not exceed a certain limit. Of course, if any device of the group fails, it will cause a controlled stop of the whole group, as follows from the nature of the track synchronization. Start and target positions of the device are adjusted so that all devices may perform the same path (track).

Time-synchronous group

The time-synchronous group behaves so that the devices that have to perform different paths of motion are recalculated in terms of speed so that they may reach their target positions simultaneously. This setting is checked during the travel and possible deviations are compensated / regulated. Failure of one device from the time-synchronous group causes stop of the whole group. When using the time-synchronous group, the speed is adjusted by the device.

5.13.2 Triggers

Triggers are another item in advanced options of scene settings; we are speaking about event activated travels. The current version of the program includes a time and a position trigger.

Time trigger

Used for delayed start of one or more devices. Each device can be preset its own time constant. Using the time trigger, interesting sequences can be created, e.g. several devices in the group start their movement at a fixed (delayed) time intervals.

Position trigger

This type of trigger activates movement of one or more axes, depending on fulfilment of the condition that another axis passes through a preset position. An example of this may be as follows: activation of the lighting batteries only when the main curtain reaches the height of 4000 mm. The position trigger can be extended by determination of the direction of travel of the device, i.e. start of the relevant device is bound to trigger position. In other words, for example, the lighting battery will be triggered when the main curtain reaches the height of 4000 mm **on its way up** (when the curtain is lifted).

5.13.3 Function Repetition

Option of repetition serves for multiple repetitions of the preset run for one or more devices within the scene. In other words, the device repeats its movement between the starting position and the target position as many times as set in this function.

5.13.4 Function Timing

For the selected group of devices, the time lag between two devices is applied to within the same time sector. In other words, if the sector is set to 1s, then the first device starts with 1s time lag, the second one - with 2s time lag, and so on. The function can also be applied from the last device towards the first one.

5.13.5 Function Position

If we want to set different target locations for all selected devices, namely so that the target positions will be arranges in the descending or ascending sequence with a fixed offset, the "Position" function will be applied. A typical example: stairs from stage tables are created for the devices of the lower mechanical system.

5.13.6 Function Time calculator

With this function it is possible to enter time and/or term of travel for the selected devices, and the calculator corrects their speed so that the total period of travel may be met.

5.13.7 Combination of advanced functions (features)

By combining advanced features, it is possible to create interesting effects with groups of devices, e.g. by setting the time triggers for individual devices with the ascending sequence (e.g. 1s for the first device, 2s for the second device, etc.), and by simultaneous setting repetition for all devices, a simple wave effect can be created. Due to the visual impression, it is certainly necessary that the devices must be consecutive or must have the same physical spacing.

5.14 Setting advanced possibilities

This chapter describes practical setting of individual advanced features and functions as specified in sec. 5.13 Advanced Automatic Mode Options. The setting is called by the bottom bar key (see Fig. 24 - (8)).

Settings can be performed for one device or for more devices simultaneously. It depends on how many devices have been selected. If we select several devices that have already been assigned to the joystick, and any of the group travels (synchronization), a new group within this joystick is created automatically. If a device with a multi-step motion or a step of any device occurs within the selected devices, the synchronization option disappears from the window. Synchronization is not allowed for the step travel. Other options (triggers, etc.) do not create a group. Editing advanced features then behaves similarly like the input table heading, namely as follows: if more devices are selected and all of them have an identical parameter set, this parameter is displayed in the advanced options window as set. If the parameter does not match for all selected devices, it can be seen in the advanced options window as non-selected.

👁 If one of the selected devices is part of the multi-step motion, the sync options will not appear in the menu. Synchronization is not allowed inside of the multi-step motion. Synchronization is also disabled for devices which are not driven by frequency inverter. Position synchronization is also not available for rotation devices eg. Rings.

👁 If you select for instance the time trigger 1s for M1 and the time trigger 2s for M2, designate both devices and call the window of advanced options, value of the time trigger would be met. If you consider them individually, M1 will be set to 1s, M2 will be set to 2s. Nothing, however, prevents from selecting both of them at the same time, and setting for example 5s in the free field of the time trigger. The original triggers will be overwritten to 5 seconds for both devices. This is how all the advanced options work, and it is necessary to take it into account in case of more complex settings. Each device has certainly its advanced options displayed in the information column on the relevant line for that device - directly in the scene edit table.

The following figure (see Fig. 38) shows all the keys for the advanced options described above, and under the picture there is a table describing individual keys and options.
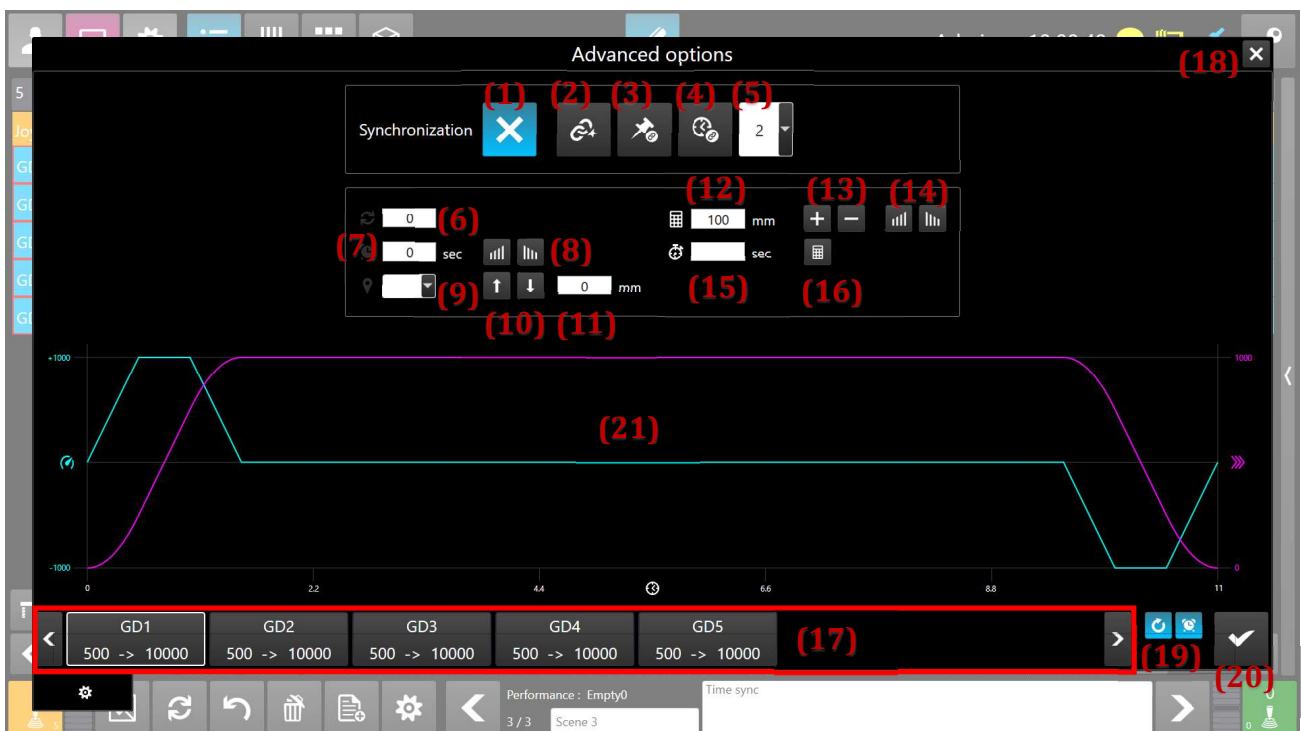

FIG. 38: WINDOW OF ADVANCED OPTIONS SETTING

Keys and description of functions:

(x)	Name of the function or group	Purpose (description)
1	Cancellation of a group	Key for cancelling the group
2	Asynchronous group	Creation of a group with asynchronous run
3	Track-synchronous groups	Creation of a group with track (position) synchronization.
4	Time-synchronous group	Creation of a group with time synchronization.
5	Number of a group	Number is assigned to individual groups.
6	Repetition	Sets the number of cycles of movement repetition.
7	Time trigger / section	Enters time (in seconds, one decimal place) for the time trigger. When using the Position function, this input field sets the section for time spacing, see (9).
8	Function Timing	Creates ascending or descending timing for the selected devices (17). Value of the section from (7) is used as the step of timing.
9	Position trigger – device	Selection of the device, on the position of which the position trigger will work.
10	Position trigger – direction	Selection of direction – for the device from (9) – which the position trigger will respond to.
11	Position trigger –position	Value of position – for the device from (9) – which the position trigger will respond to.
12	Function Position - track	Loading length of the path for the function Position.
13	Function Position – step	Extension / reduction of the step in the function Position.
14	Function Position – direction	Specification of whether the function Position will be ascending or descending
15	Function Calculator - time	Loading time, i.e. time for the function Calculator.
16	Function Calculator	The key applied the function Calculator for the selected devices.
17	List of devices	This area displays the devices, which options of this window are performed for.
18	Window closing	The key closes the window without storing the performed settings.
19	Graph drawing option	The key with error serves for switching repetition ON/OFF. Key with alarm clock switches displaying of the time trigger in the graph ON/OFF.
20	Confirmation of selection	The key confirms and stores the performed settings. At the same time the window is closed.
21	Display of progress	In this part of the screen, the charts of speed and acceleration are displayed. The operator can check how changes to the speed or acceleration will affect the device during the start or stop of the movement. Also the time to complete the movement is shown.

If the device has rotational movement eg. Ring, in the left top corner, there is also a text field, which allows to add number of rotations of the ring in the automatic mode scene.

Devices, that operate the curtain cannot be assigned with any of the described special options.

5.15 Tilted plane

If one of the objects of the scene contains point hoists, the system aids the operator with proper tilting of hoisted plane objects / decorations. The aid can calculate target positions of the point hoists for the tilt angle input. Settings of the tilted plane is located in the same window as advanced options settings and functions, described in the previous chapter. After opening the window by clicking the button of the bottom bar (Fig. 24 – (8)), we can switch to the bookmark (Fig. 39 – (1)) that contains the components to set the tilt angle up. This button is displayed only when the selected device(s) type is point hoist. If any other device is selected, the button is hidden.

Contains of the tilted plane window is described in the table and picture below (Fig. 39).

| (x)	Name of the function or group	Purpose (description)
1	3D visualisation of the target state	Visualisation contains of cube representing tilted object, yellow lines represent ropes of the point hoists and two red axes (X and Y) around which the object is tilted.
2	Slider X	Tilts the object around the X axis in range of -45°- 45° , instead of the slider, you can also use a yellow joystick on the control panel
3	Slider Y	Tilts the object around the Y axis in range of -45°- 45° - instead of the slider, you can also use a green joystick on the control panel
4	Text field of the tilt height	Position of the tilted plane above the ground.
5	Choice confirmation	You can confirm the settings and save it by clicking the button. The setup window is closed.
6	Close the setup window	You can discard previous changes by clicking the close button, which also closes the window.
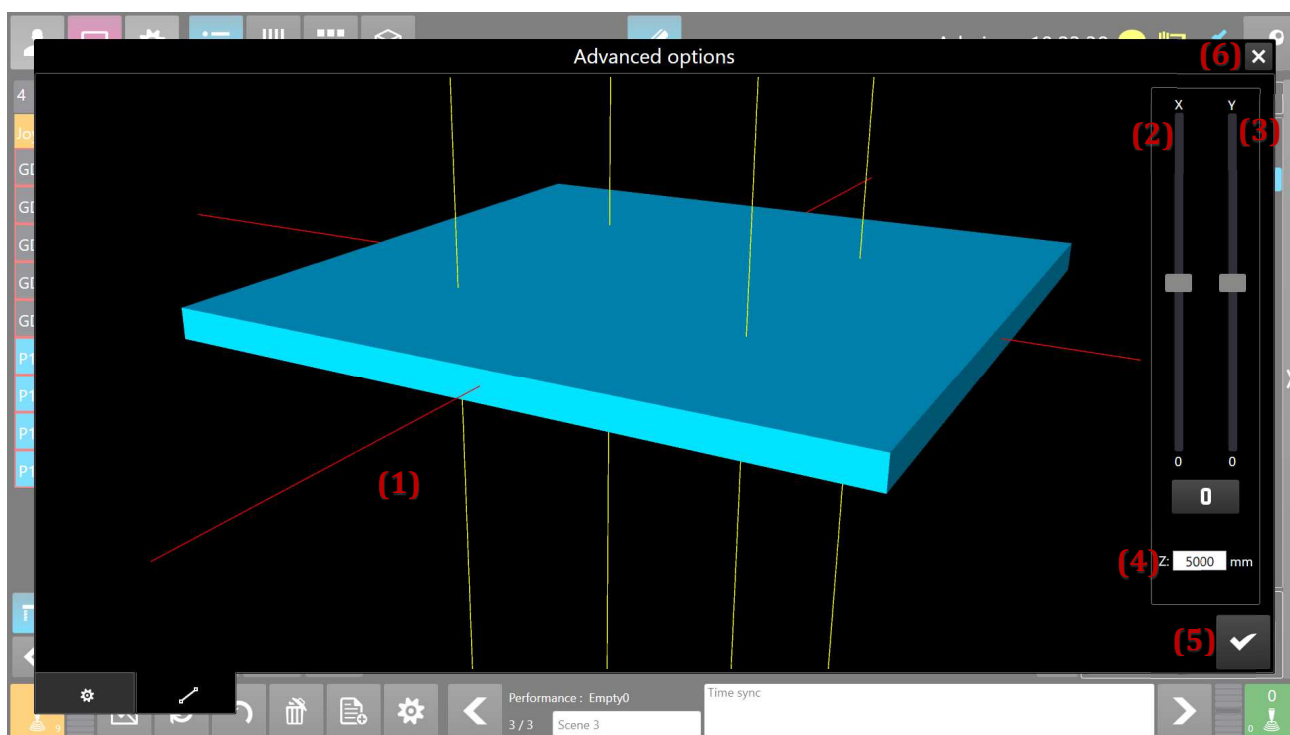
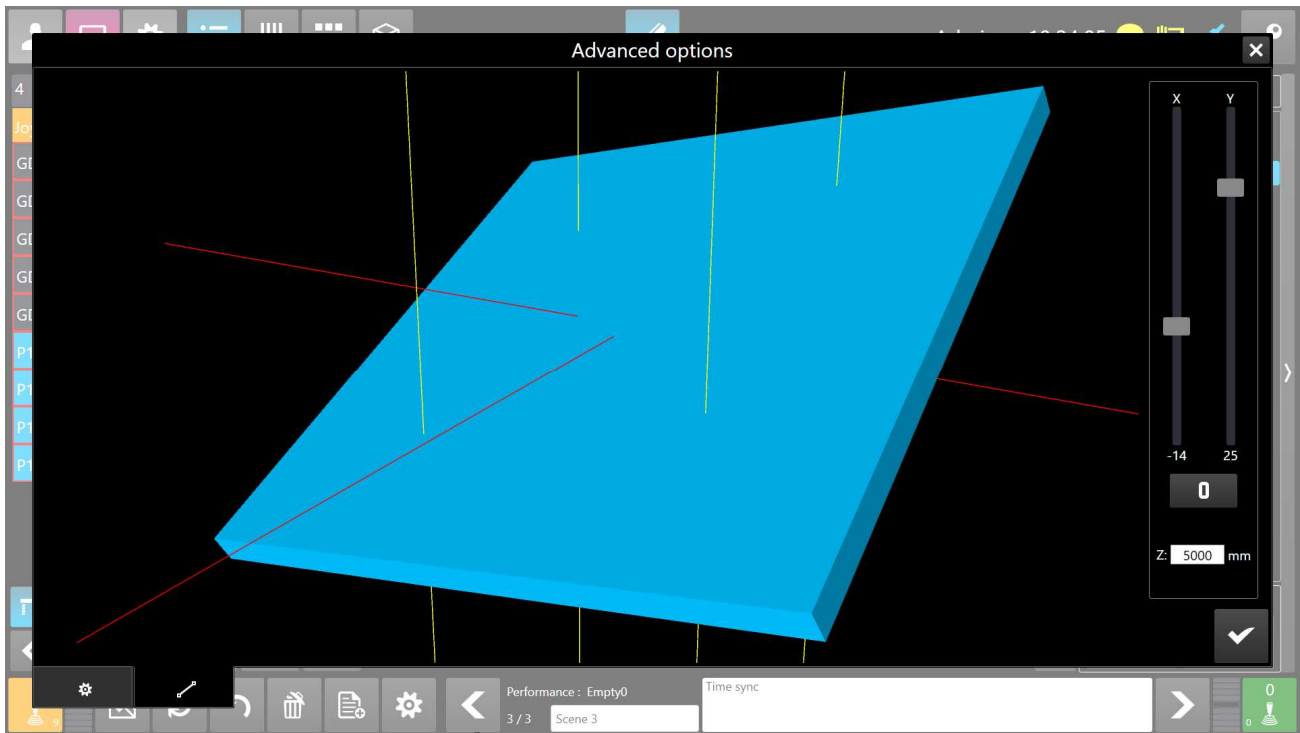*FIG. 39: WINDOW SETUP OF TILTED PLANE – OBJECT IS STRAIGHT*

FIG. 40: WINDOW SETUP OF TILTED PLANE – OBJECT IS TILTED

⚠ For a proper math function it is necessary to have the placement of the point hoists correctly entered. Chapter 7.8.5 describes how to edit the point hoist position in 3D space.

5.16 Labels (legends) of the devices

Individual devices can be named in the automatic mode by inserting the legend/label, see Fig. 35, edit field (1). Different labels/legends can be assigned to the devices for different scenes.

To copy the lable, use the button (11), see Fig. 35. After clicking the button, the dialogue windows opens up, see Fig. 41. By clicking the button (1), labels of the selected devices will be copied to every scene of the performance. Button (2) copies labels only to the scenes that are positioned after the active scene. Buttons (3) and (4) will close the dialogue.

To erase all the labels of the particular device in the active performance is done by long clicking on the object of the device in the device selection menu (Fig. 28) and accepting the pop-up dialogue.

You can view the labels on the devices even in the manual mode. The labels are taken over from automatic mode active scene. If there is no label on the device in the active scene of the performance, the label from the closest previous scene is displayed instead. If none of the previous scenes contains a label, the label is taken from the closest next scene.

You can only view the labels in manual mode, if those devices are assigned to a joystick in the active scene of the performance.
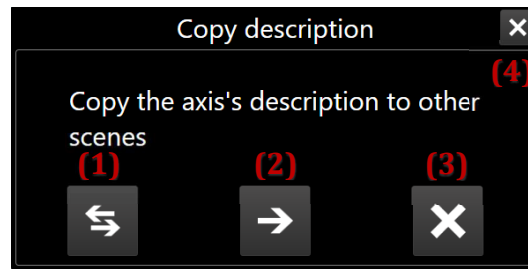
FIG. 41: LABEL COPY DIALOGUE

5.17 Performance scenes overview

Automatic mode an overview of the performance, which displays all of the scenes and all devices inside those scenes.

This view is activated by button (3) – Fig. 23.

The view consists of columns. Every column corresponds with one scene. Every scene consists of number, name of the scene and device tiles, which are grouped by the color of the joystick or sync group.
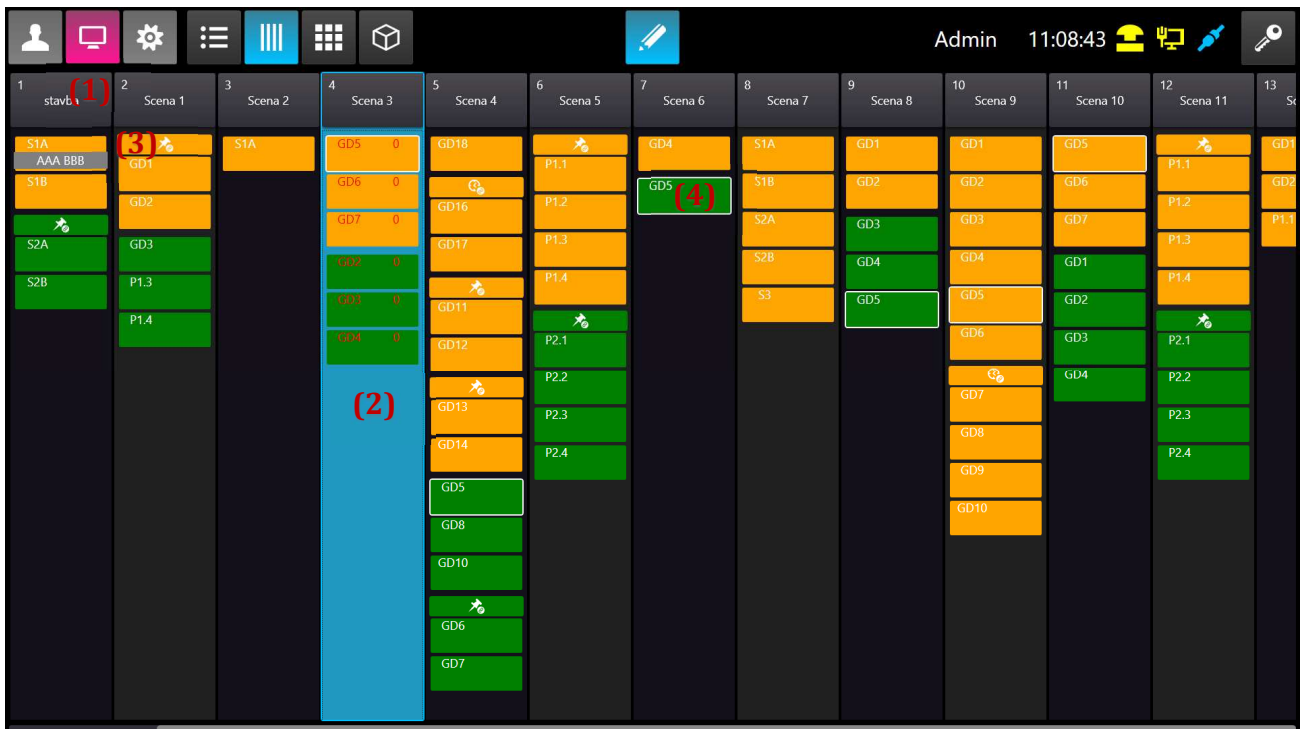

FIG. 42: PERFORMANCE OVERVIEW OF THE SCENES

(x)	Name of the function or group	Purpose (description)
1	Button with order number and scene label	By clicking this button, you select that scene as an active scene of the performance.
2	Blue highlight – active scene	Blue highlight marks the active scene of the performance.
3	Group sync indicator	Tilts the object around the Y axis in range of -45°- 45°
4	Device tile	Background color of the tile corresponds with the assigned joystick. We can select the device by short clicking the tile. This

		device will be also selected in all scenes of the performance. This helps the operator to see every use of the device in the performance. By long clicking on the tile, the diagnostics window shows up (see chapter 7.3).

5.18 Timecode

Timecode allows to start a device in a defined time frame. To be continued…

6. 3D view of the scene model

Both the manual and the automatic mode of scene control have one common tab, a 3D view of the real scene model (see Fig. 43). Graphical representation of some scene parameters is slightly different for the manual and the automatic mode. This mainly concerns expression of the travel start and destination for the automatic mode and the associated displayed path of the travelling device. In the manual mode the Bottom bar menu also differs; moving by individual actions (steps) during the performance is not displayed here, because the manual mode has no actions.
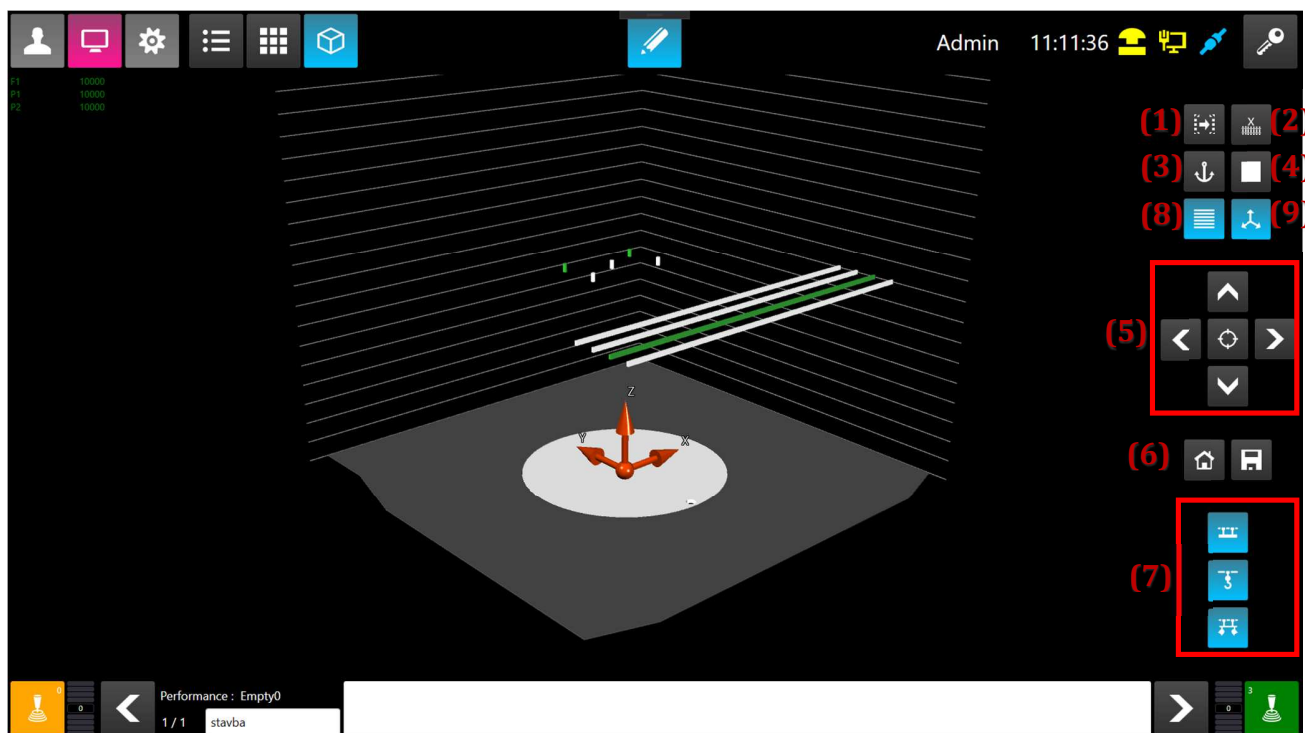

FIG. 43: 3D SCENE DISPLAYING

In the 3D model, you can see the whole theatre scene, incl. all devices that can be controlled by the operator. The survey (on the left) displays a list of the manually selected devices or a list of devices on the scene, their designation and their current position. It is possible to recognize - by colour of the device icon - whether or not the device is in the status of error and/or what kind of error it is. More information about status of the device is provided in the service mode.

During the movement of one of the devices, the movement state is displayed by big blinking arrow. If all of the devices are stationary, the arrow disappears.

On the right side of the screen there is a 3D view control menu and several filters that switch ON/OFF certain 3D view features, such as displaying start and target locations, displaying ropes, etc. They are described in greater details in the following table.

(x)	Name of the function or group	Purpose (description)
1	targets	This key controls displaying start and end position of device travel; there are four possibilities: they may not be displayed at all, only starts can be displayed or only the targets can be displayed or both values can be displayed at the same time. In

		the manual mode of scene control, start and target positions of device travel cannot be displayed.
2	Path /track	This key sets the method of drawing the travel path of the device. The path does not need to be drawn at all or, on the contrary, can be drawn in three possible ways. The first way is to show the range between the set start and target point of device travel. The second way is to display the remaining path between the current location and the target point of device travel. The third option is to display the path between the start and the target point of device travel, where the whole path of device travel is displayed. Only one method of device path displaying is available for the manual mode of device control, namely drawing the range between the limit points of device travel. The track colour is identical with the colour of the device assigned to the joystick. However, the red colour in the automatic control mode indicates the path error of the device, i.e. the device is outside the specified interval between its start and the target points.
3	Link	The key shows links of individual devices and the scene. Displaying is allowed only if the device is not assigned to the joystick.
4	Drawing	The key changes the method of drawing the stage, depending on the scene model. The stage can be displayed opaque, transparent, networked, only its circumferential curves can be displayed or it does not need to be displayed at all.
5	Views	This section of the panel is devoted to controlling the camera. Directional keys control direction of viewing the scene, the central key determines focus of the camera that can be switched between the whole scene view and between the focus on the lower or upper sphere. 👁 In case of the 10" and 24"multi touch screen, you can use multiple fingers to change views. The control is very intuitive, just like with touch cellular phones. In case of a failure, you can always go back to any predefined views, using the keys.
6	3D view loading/Storing	These keys serve for loading or storing the 3D view, incl. placing its setting in the database. This way saved setting is considered the default and is loaded automatically when the application is started.
7	Filter	This panel section contains keys with icons of all device types that the scene model contains. Activating or deactivating individual devices can affect their visibility. 👁 If the device selected for travel or having currently the error status and therefore its displaying is currently prohibited, for safety reasons the device IS displayed.

8	Horizontal reference lines	You can show/hide the horizontal reference lines. These lines can help the operator to better visualize the orientation in 3D space. Lines are distributed in 1 meter distances.
9	Coordinates system – button	This button shows/hides reference marks of coordinates system zero point and the directions of the 3D axis of the model (10).
10	Coordinates system – mark	

7. Use of service mode

The service mode serves primarily for diagnosing the theatre system and its parts, for checking the security mechanisms and for adjusting configuration of individual devices. It also serves for system settings, etc.

7.1 Menu Mode – Sub-menu

In order to use the service mode, it has to be switched at first (not selected when the programme is started) - the Service mode key must pink coloured (see Fig. 44: Service mode selection from the menu - (1)). To the right of the mode switch keys, we can find the keys (see Fig. 44 - (2), (3), (4), (5), (6), (7)). These keys enable to switch to individual service mode views. Each view is described in a separate section.

(1) (2) (3) (4) (5) (6) (7) (8)
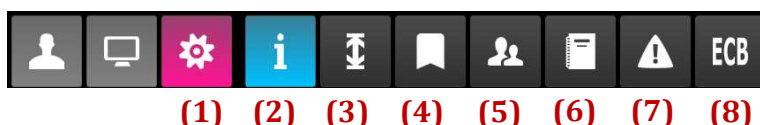
FIG. 44: SELECTING SERVICE MODE FROM MENU

The table below describes individual sub-menu screens.

(x)	Name of the function or group	Purpose (description)
1	Selected Service Mode	Key for selecting the service mode.
2	Device diagnostics	Window with system diagnostics.
3	Device limits	Setting of limits for individual devices, their putting out of operation.
4	Markers	Database of system markers.
5	User and rights administration	Window with user overview and editing, incl. the user rights.
6	System log of events	Diagnostic log of system events.
7	Special functions	Window of special functions usually accommodates different atypical settings for a particular facility, e.g. adjusting positions of manual movements of the point hoists, distribution of the manually installed trap doors, etc.
8	Emergency control functions	This window contains button for emergency control of the devices. Some of the functions are – buttons for emergency switch override, encoder disable, load cell override etc. Further description is in chapter 8.

7.2 Bottom bar of the service mode

The bottom bar of the service mode does not contain any traction control components. Travel with the devices from the service mode is not possible. Therefore, in the manual mode, it is not possible to speak directly about a menu, where any changes would appear within the scope of dialogue window change. If there are any keys in the bottom window part in the service mode, they are described in the text as the keys in the bottom screen part and not as the keys in the Bottom Bar menu.

7.3 Diagnostics

The service menu view Device Diagnostics is entered via the key (2), see Fig. 44: Selecting service mode from the menu.

The whole information system is built on two icons. Icon of the green tick – OK status. Red Cross Icon - Error.
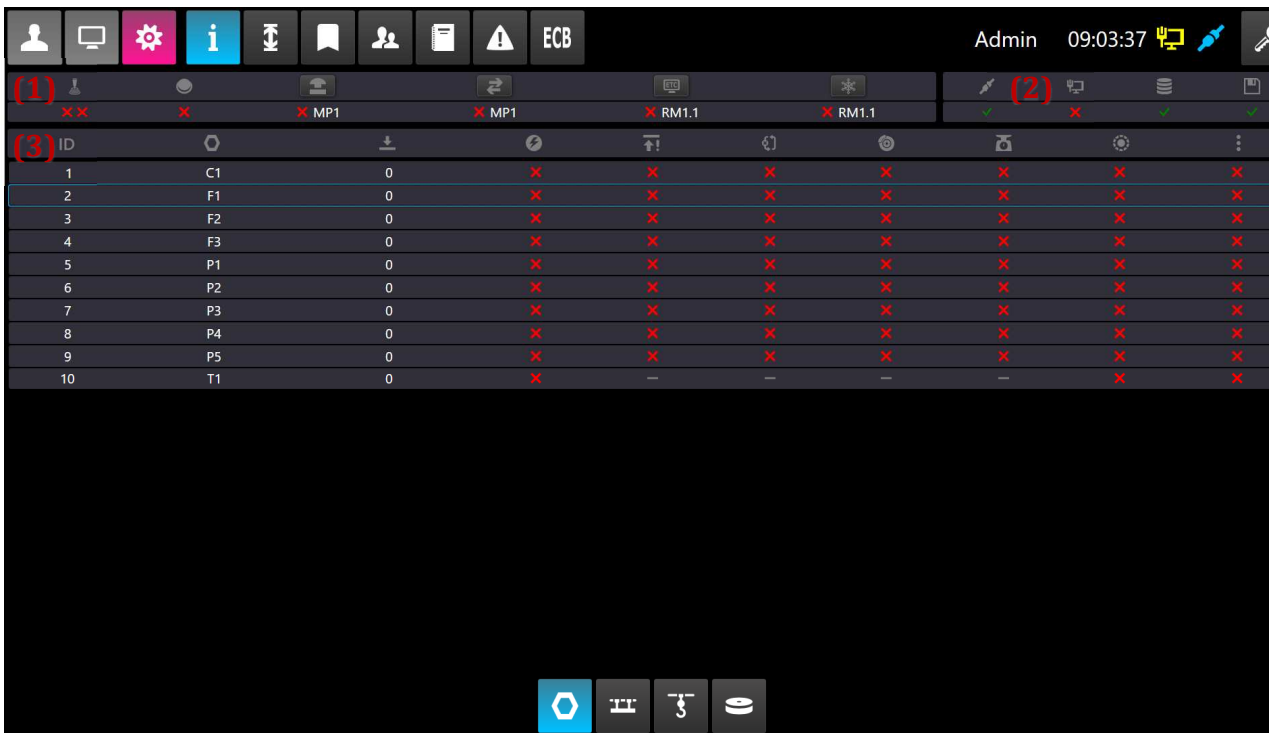
FIG. 45: DIAGNOSTICS

By clicking the keys in the bottom screen part, it is possible to filter displaying depending on the device type. The first key on the left shows everything.

The first part of the screen accommodates the control system diagnostics:
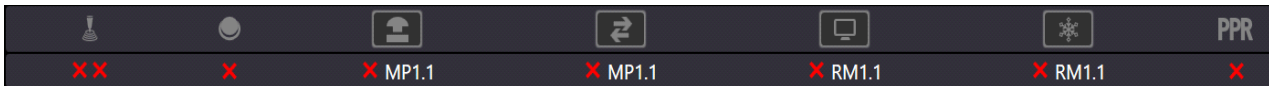

FIG. 46: CONTROL SYSTEM DIAGNOSTICS

From left to right in the figure is understood from the top to the bottom in the table:

Dead man functionality status	
Reset button functionality status	
Safety (emergency) button state	If all of the emergency stop buttons are ok, only a green mark is visible. If one of those buttons is pushed, red mark is displayed and the label of that particular button. By clicking the state or label of the button, a list of all of the buttons and their state is shown.
Safety (emergency) discrepancy state	Same functionality as described above applies to the discrepancy state (one of the two wire circuits is not connected/damaged/missing/in the wrong state). By clicking the state or label of the button, a list of all of the buttons and their discrepancy state is shown.
State of the EtherCat bus	Same functionality as described above applies to the EtherCat state bus. By clicking the state or label of the button, a list of all of the EtherCat buses and their state is shown.
State of the cabinets cooling system	By clicking this button, list of fan states and temperature sensors from all the cabinets are shown.
State of the director assistant panel	Information about on/off state of the director assisten panel. By turning on the the assistant panel, devices that are driven from this panel are blocked on other operator panels. After turning it off, the devices are unlocked and can be used again.

Diagnostics of the control computer can be seen in the second screen part:

FIG. 47: CONTROL COMPUTER DIAGNOSTICS

From left to right in the figure is understood from the top to the bottom in the table:

| Communication between panel and the server |
| Communication between server and the PLC server |
| Database status |
| Storage area status – flash disk |

The third part of the screen accommodates diagnostics of device(s). Every row corresponds to one device.

Diagnostic inputs are united into groups for simplicity (circuit brakers, end switches…) Columns of the table corresponds with these groups and show their final state. In the case you need more detailed diagnostics, it is described in the chapter 7.3.

You can select a row in the diagnostics device list for better orientation. Table below describes the meaning of every diagnostics icon.

FIG. 48: DIAGNOSTICS OF DEVICE(S)

From left to right in the figure is understood from the top to the bottom in the table:

1	Index of the device(s)
2	Name of the device
3	Actual position
4	Combined circuit brake state
5	Combined end switch state
6	Combined EDM – feedback state
7	Combined brake diagnostics state
8	Load cell state
9	Encoder state
10	Safety edge/bumper state
11	Combined state of all the doors and door locks
12	Combined state of all the others diagnostic inputs

👁 Distribution of the diagnostics parts may differ based on the specific theater or contract.

7.3.2 Detailed diagnostics of one device

Further more detailed diagnostics of the device can be displayed by long clicking or double clicking on the row of the diagnostics table. After that, diagnostics info table (see Fig. 49) is shown with the name of the device, which diagnostic data is shown.
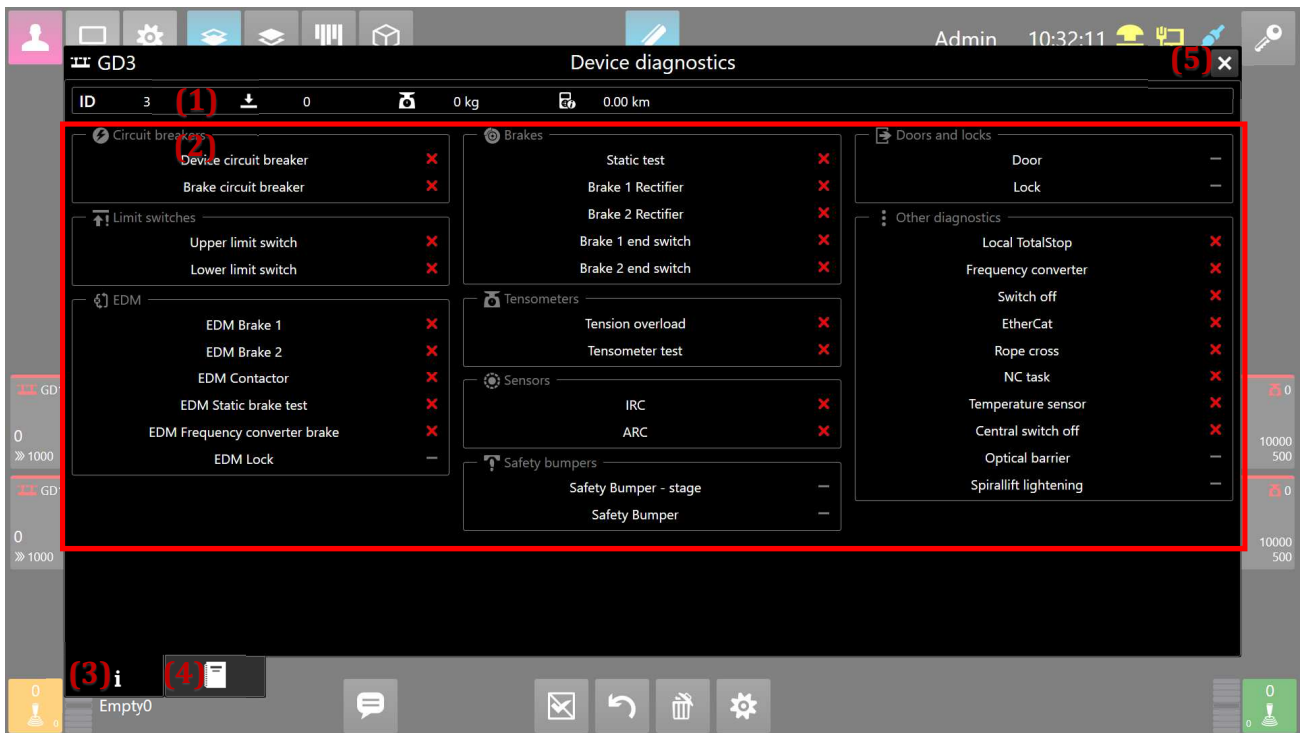
Fig. 49: Diagnostics of device(s)

Diagnostics screen contains of two parts. In the first part (1), the list of information about the device is shown. There is also ID of the device, actual position of the device, actual weight put on the device and the total distance travelled by this device.

The second part (2) contains available diagnostic information distributed into groups (circuit brakers, end switches...).

👁 Diagnostics of the safety functions of the device may differ based on the different electronic parts used in the theater.

In the bottom left corner of the screen, two buttons (3) and (4) are located. These buttons are responsible for switching between diagnostic informations and event log bookmark (Fig. 50).

System events log (Fig. 50) can be filtered to show only selected device. Each icon and column is described in the chapter 7.7.

By clicking the button in the upper right corner (5), the user leaves the diagnostic screen and goes back to the default screen.
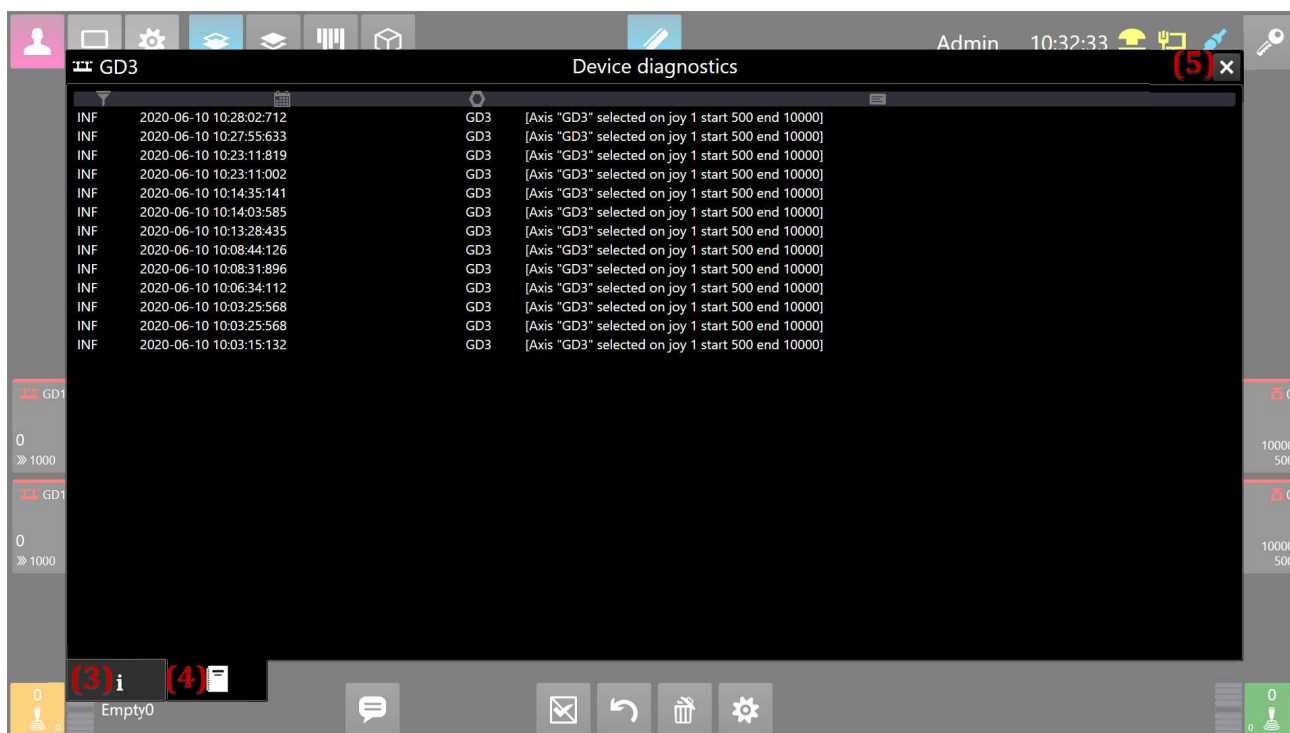
FIG. 50: SYSTEM EVENTS LOG

👁 You can find out how to acces the diagnostics inside the manual or automatic mode inside these modes without going to the service mode. It is described in the respective chapters of the Manual and Automatic mode.

7.4 Device limits

This service mode screen serves for global reconfiguration of the travel range of individual devices, using limit setting.

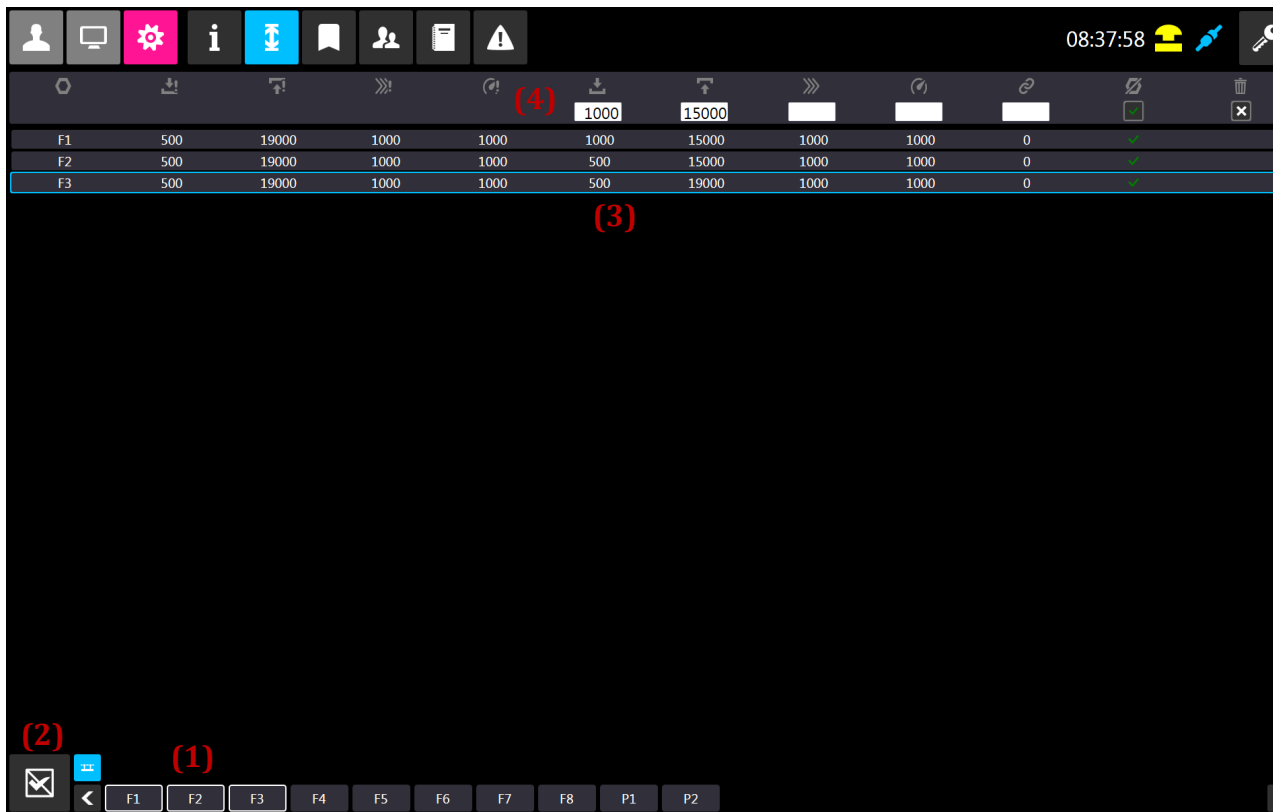The service view Device Limits is entered by clicking the key (3), see Fig. 44.

FIG. 51: DEVICE LIMITS

From left to right in the figure is understood from the top to the bottom in the table:

Device index
Lower design end position
Upper design end position
Max. speed
Max. acceleration
Lower end position – In the top bar there is the edit field for entering values
Upper end position – In the top bar there is the edit field for entering values
Speed – In the top bar there is the edit field for entering values
Acceleration – In the top bar there is the edit field for entering values
Design group – possibility to ensure positional synchronization for the device. The device behaves as a complex whole within the system – In the top bar there is the edit field for entering values
Device blocking - for example, due to its longer shutdown - there is a status change button in the top bar
Deleting presets - switching the device to its default state (elimination of limits) - In the top bar there is a button for elimination of all set limits

To create a limit, you must select a device at first. To do this, use the menu in the bottom screen part (1), which is similar to selection of the device in the automatic mode, see sec. 5.3 Selecting device and assigning to the joysticks, or the menu in Fig. 28: Selecting device. There is only one key more for mass cancellation of performed selection (2). Clicking on the key of a specific device in the menu (1), the device will be displayed in the list (3). Designate all devices in the list that limits shall be assigned to. The limits are created,

edited or deleted using the edit fields and keys in the top bar of the screen (4); their functions are described in the table above.
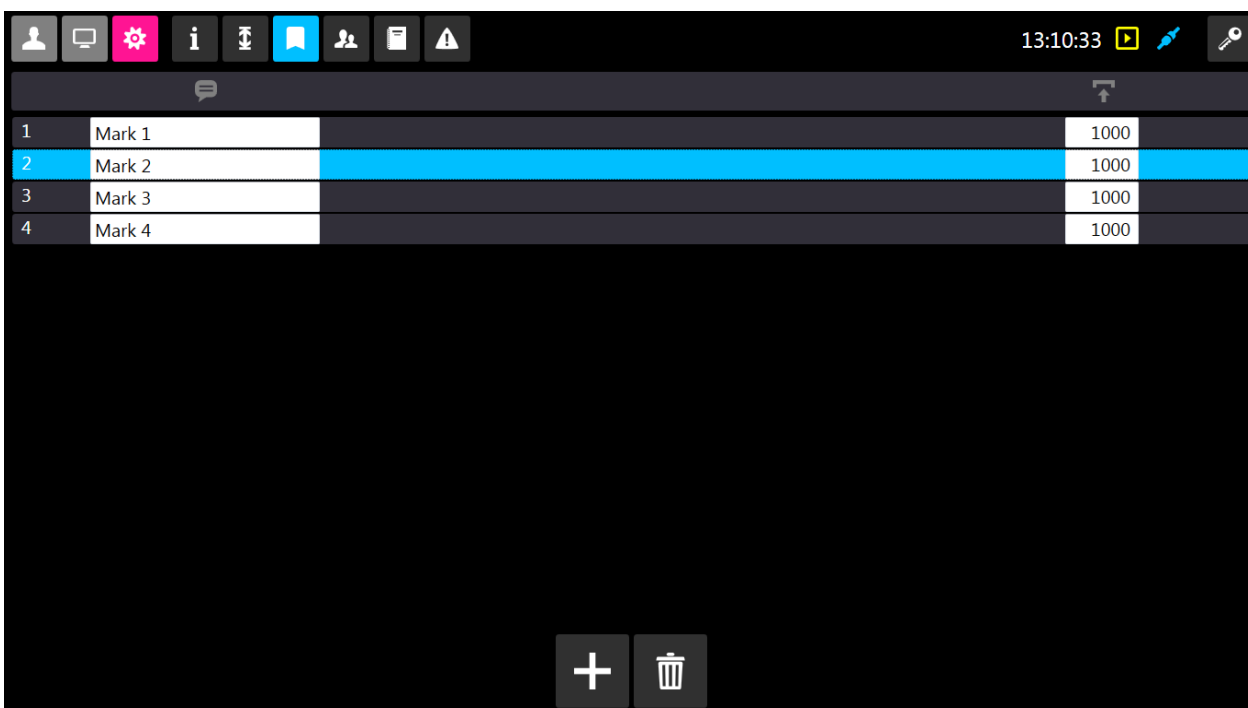
If, when editing, the value is outside the design options, the nearest permissible value will be set automatically.

Only the software limits of device travel can be changed, the design limits are fixed and can be changed by a service technician only.

7.5 Markers

The Markers service view is entered through the key (4), see Fig. 44: Selecting service mode from menu.

The system is equipped with markers, the so-called named positions, which are substitutes for the actual values. The markers are used in the automatic mode to set target locations. In this mode, these markers are defined.

FIG. 52: MARKERS

Marker is created by the plus key. It can be named arbitrarily, and the numerical value (that will represent the target position) is set. The marker can be removed by the "basket" key. In the automatic mode you can then select the marker that represents the chosen position instead of entering the target position. You can change the marker position anytime. This change will then be written into all of the target positions, that have this marker assigned.

7.6   Administration of users and rights

The service mode view Administration of users and rights is entered by pressing the key (5), see Fig. 44: Selecting service mode from menu.
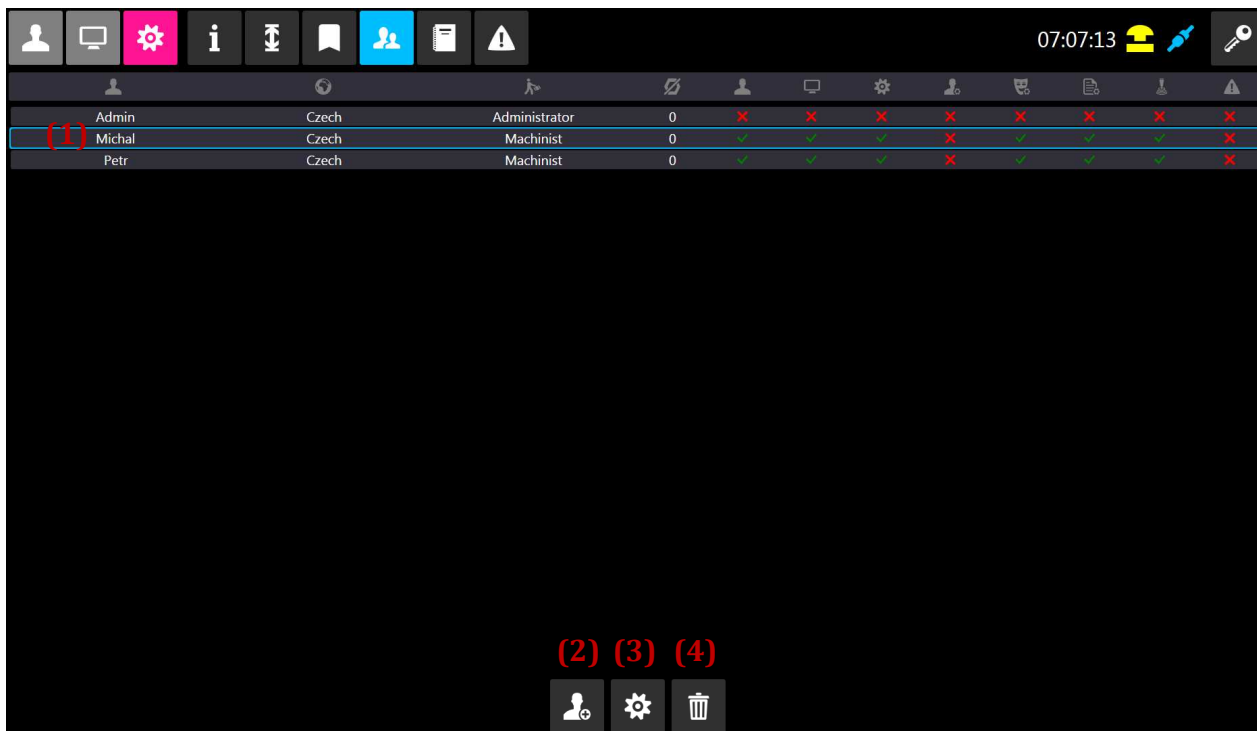
FIG. 53: ADMINISTRATION OF USERS AND RIGHTS

From left to right in the figure is understood from the top to the bottom in the table:

User name
User language
Assigning to the workgroup –Administrator, Leader, Mechanist, Worker, Inactive, Simulator
Prohibited devices
Manual mode displaying
Automatic mode displaying
Service mode displaying
Editing other users
Editing performance
Editing scenes
Devices movement control
Access into the administration page

The button (2) in the bottom screen part creates a new user.

The new user has to be then edited, and permission for individual actions has to be assigned to the new user, see the table above. Individual icons are described by text in the user edit screen.
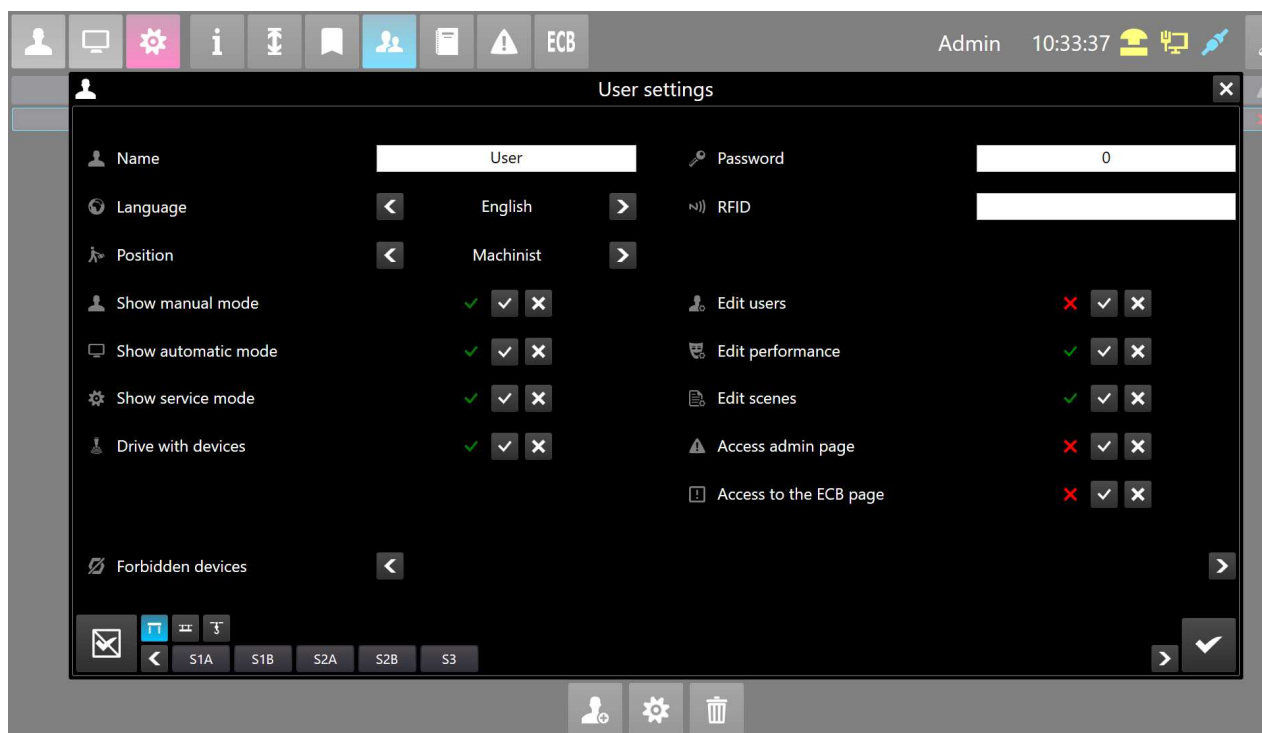
FIG. 54: USER ADMINISTRATION

In this screen (user editing), see Fig. 54: User administration, it is possible to assign a PIN code to the user and/or to set the RFID code, if the console is equipped with this reader.

👁 Two system users may not have the same PIN code. When login into the application, the user is not identified by the PIN code.

The key (3), see Fig. 53, is used for editing the already existing user. Editing is done using the screen in Fig. 53: User Administration. The user highlighted in the user list (1) will be edited.

User is deleted by selecting the user from the user list (1) and by pressing the Delete key (4). When the step is confirmed by the dialogue, the user will be removed.

7.6.1 Simulator authorized user

The simulator authorized user is not physically able to drive the devices. The axes move in the simulated way only and their movement is shown on the console screens only. When this user is logged in, you will see a notification telling you that the axes are switched to the simulated mode, and the simulated mode icon appears in the top right area of the application, see Fig. 5 Menu info (7). This notification will be displayed and the axes switched to all connected clients (consoles). Re-switching the axes to the default travel mode will occur after the simulator authorized user is logged off.

👁 The simulated mode simulates only movement and position of the device. All other changes are performed classically and are stored in the database (such as editing scenes, editing users, parameterizing devices,, …)

This mode is not available in all software mutations. It is an optional function.

7.7 System log of events

The service mode view System log of events is entered by pressing the key (6), see Fig. 44: Selecting service mode from menu.
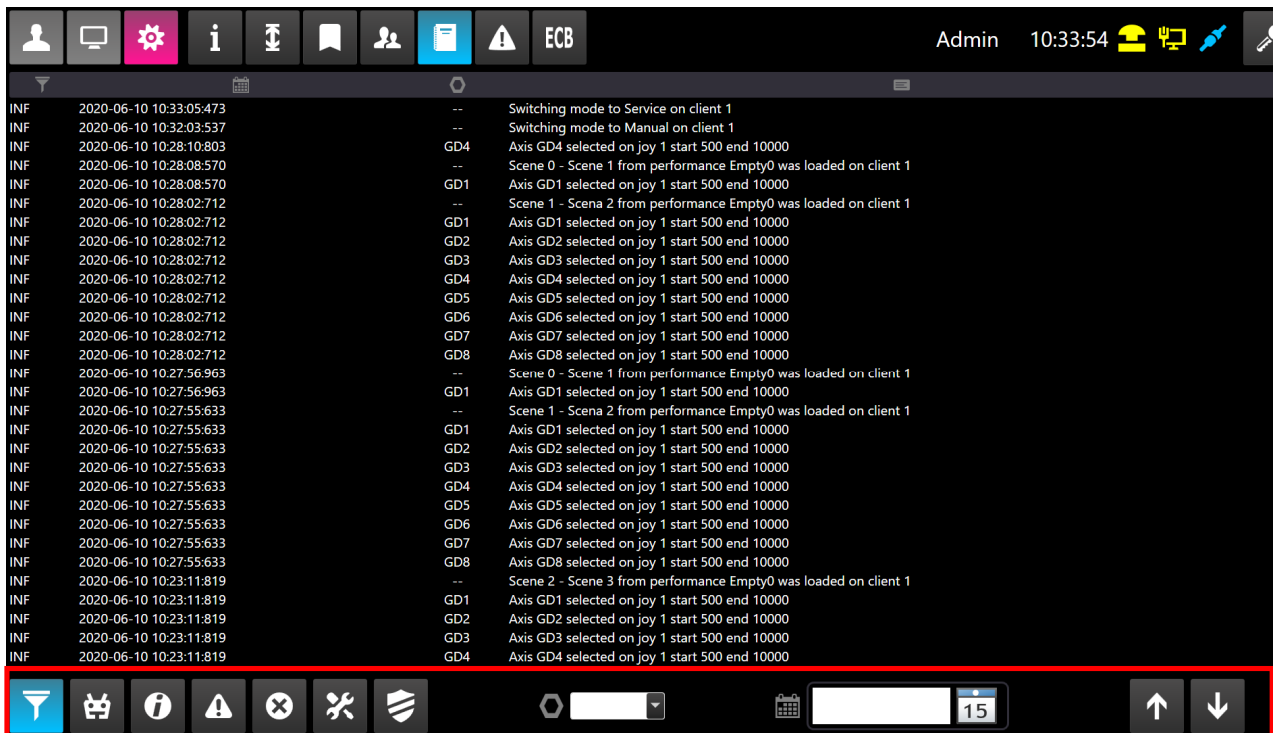
FIG. 55: SYSTEM LOG OF EVENTS

From left to right in the figure is understood from the top to the bottom in the table:

Flag for event filtration
Time tag of the event
Device which the even concerns to – if it is a system event without allocation to the device, the symbol „—„ is displayed.
Description of the event

Buttons and text fields in the bottom part of the screen shown in red border in Fig. 55 are meant for filtering the events. Events can be filtered by the category, date or device. Set filter can be cleared by pressing the first button from the left. You can page up/down by pressing the arrow buttons.

7.8   Special functions

The service mode view Special functions is entered by pressing the key (7), see Fig. 44: Selecting service mode from menu.

In the Special Functions window you can usually find different atypical settings for a particular object, e.g. setting positions of point hoist manual movements, distribution of manually installed trap doors, static brake test repetition (1), load cell test (2), device position calibration (3), database restore (4), manual database point of recovery creation (5) etc.

This screen is accessible for Administrator user rights. The trained operator is familiarized with its functions.
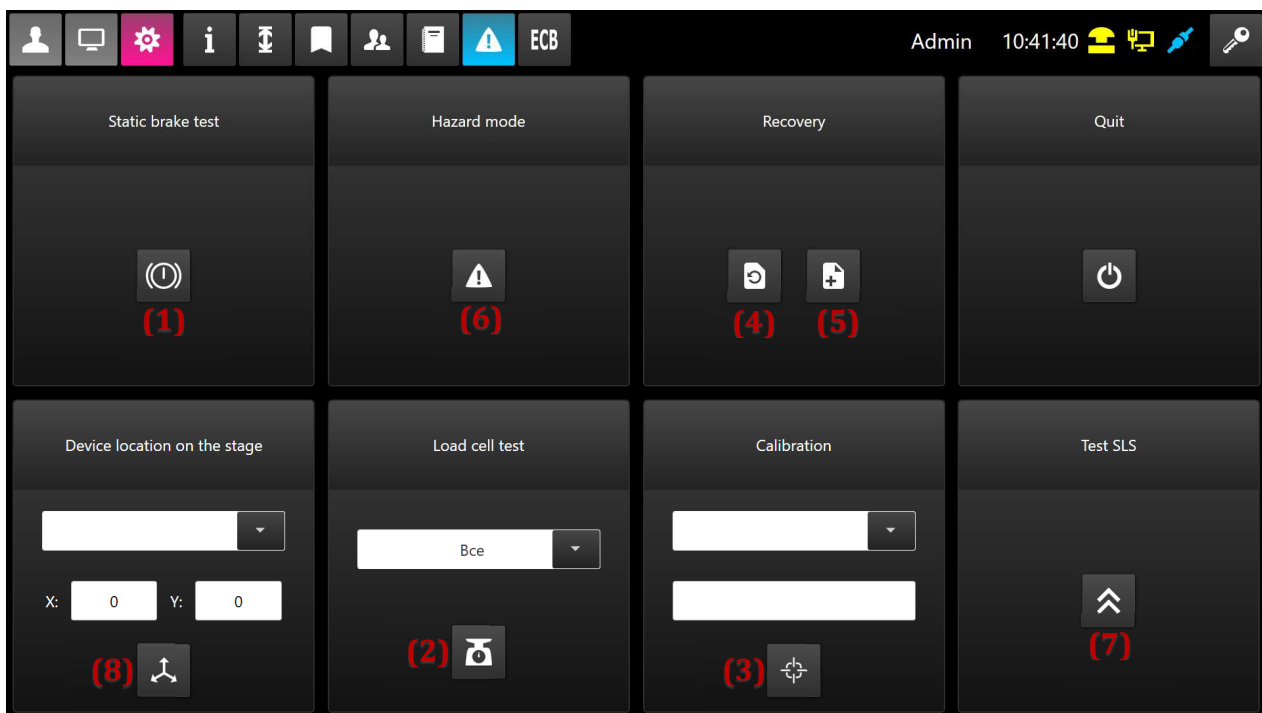
FIG. 56: EXAMPLE OF A SCREEN FOR SETTING POINT HOIST POSITIONS

7.8.1   Brake and load cell testing

Static brake test is done once per day after the system startup by pressing the blue acknowledge button. If one of those devices displays fault during the brake testing, it is possible to repeat the static brake test (Fig. 56 – (1)). Test repeats for all devices simultaneously.

To repeat the load cell test, which happens every time the control panel boots up, click on the grey field (Fig. 56), choose particular device and click the load button. You can also choose "All" from the lis to re-test every device. Test results can be verified in the diagnostics screen.

In case of the brake test or load cell test failure, the icon of the device will change its color in manual and auomatic mode. Until the problem is resolved, it is recommended to not use the device.

7.8.2   Device position calibration

To calibrate the position of the device, choose a device from the list (3), click on the while text field and enter calibration value (see Fig. 57).
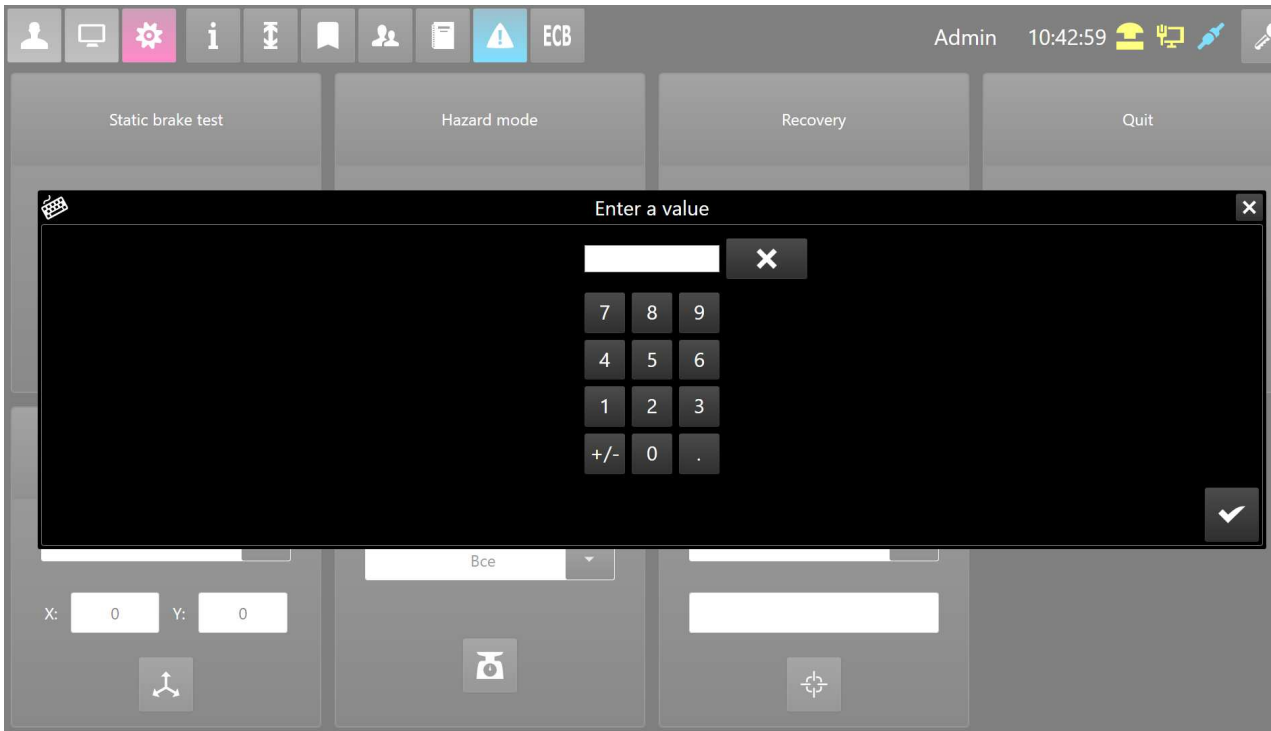
FIG. 57: SCREEN FOR POSITION CALIBRATION OF THE DEVICE

After the new position is confirmed by clicking the confirmation button, we can proceed with the calibration process by clicking the button in the bottom (See Fig. 58).
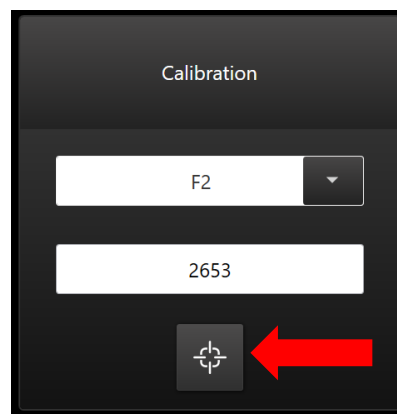

FIG. 58: BUTTON TO START THE CALIBRATION

7.8.3 Emergency limits testing

Devices that are equipped with emergency limit switches, cannot be ctivated in regular operation. To test these switches, it is necessary to activate the test in the system. It is done by clicking the button (6) – Fig. 56. After clicking the button, the emergency limit switch test icon will appear (Fig. 5 – (5)). Then we need to switch to manual mode and assign the tested device to the joystick. After the joystick is assighned and the editation is locked, the position range will automatically widen. By moving the joystick and slowly driving towards the test limit switch, we can test its function. When the switch is reached, the device will stop itself and shows an emergency limit switch indication in diagnostics. The test is complete. Now we can override

the limit switch with one of the ECB functions to be able to drive in opposite direction. The override function is described in chapter 8.

7.8.4 The SLS function test

Some devices may be equipped with a safety limited speed function (SLS). It is a safety function that can be also tested. To start the test, we press the button (7) – Fig. 56. Activated test is shown by icon (9) – Fig. 5. Then we switch to the manual mode and assign a joystick to the device which we want to test. The device has to have a higher set speed than the speed which the sls function monitors (we usually set maximum speed). Then we drive the device with the joystick until the SLS function activates and stops the device automatically. If that happens, the SLS function works as intended. By clicking the button (7) – Fig. 56, we can deactivate the test. After the test we press blue acknowledge button (4) – Fig. 2.

7.8.5 Editing the device stage placement

Some devices (eg. Point hoists) can be relocated. After the relocation, the 3D model will not match the stage and some calculations will not work properly. Therefore it is up to the operator to make the change in the control system.

To change the device position in the system can be done via buttons and text fields (8) – Fig. 56. But first it is necessary to measure the new placement of the device. The beginning for proper measurements along with the axes X and Y are marked in the 3D view of the stage (see chapter 6). Then we choose a device from the list (8) – Fig. 56 and write a proper X and Y coordinate (in milimeters) and confirm by clicking the button (8) – Fig. 56.

We can overview the 3D model of the stage, so we can be assured, that the reality matches the 3D model.
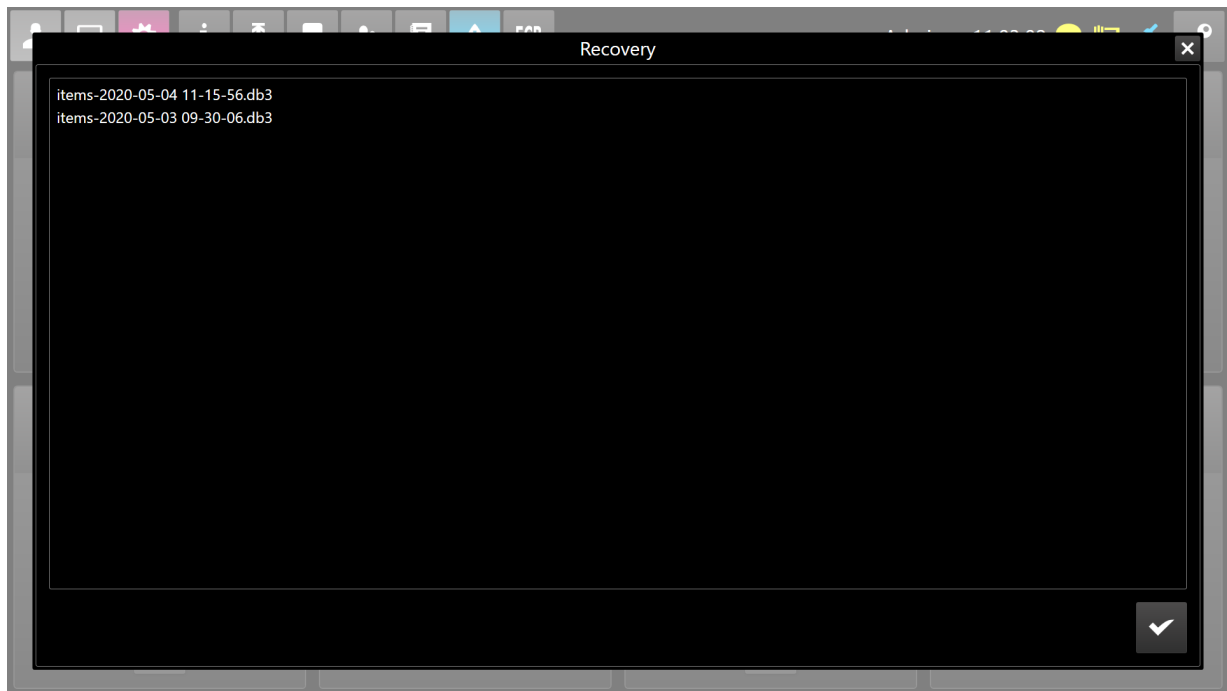
7.8.6 Database recovery

There are two buttons dedicated for the database manipulation (see Fig. 59) in the bottom part of the screen. Button (2) is intended to create a new point of database recovery. New recovery point is also created automatically when the control panel is turned on.

FIG. 59: BUTTONS TO RESTORE THE DATABASE
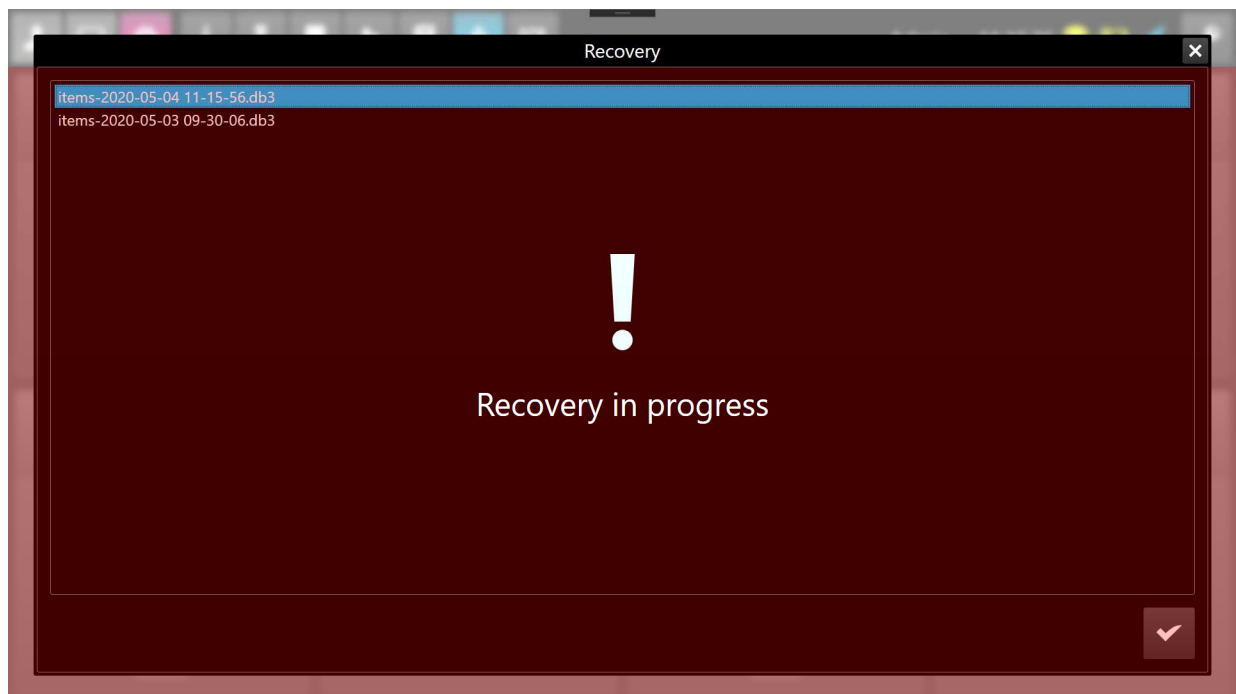AND CREATE A NEW RECOVERY POINT

By pressing the recovery button (1), a list with a database backup point is shown (Fig. 60). By selecting the proper row from the list and clicking the confirm button, the database recovery is done.

FIG. 60: DATABASE BACKUP LIST

During the database recovery, an overlay window (Fig. 61) is shown. After the overlay disappears, the recovery is completed and it is possible to continue the system operation.

FIG. 61: DATABASE RECOVERY IN PROGRESS

Button (2) creates a new recovery point manually.

8. Emergency control

Emergency control function (ECB in visualisation) is used to solve dangeours or hazardeous situations or get out of an error state or hardware malfunctions – Eg. Safety limit switch override, driving without encoder, axis switch-off override, safety edge override etc.

Attention! These functions are intended for service operators only, using them in a wrong way can irreversibly damage a stage mechanics and cause injuries and possibly death of the people involved!
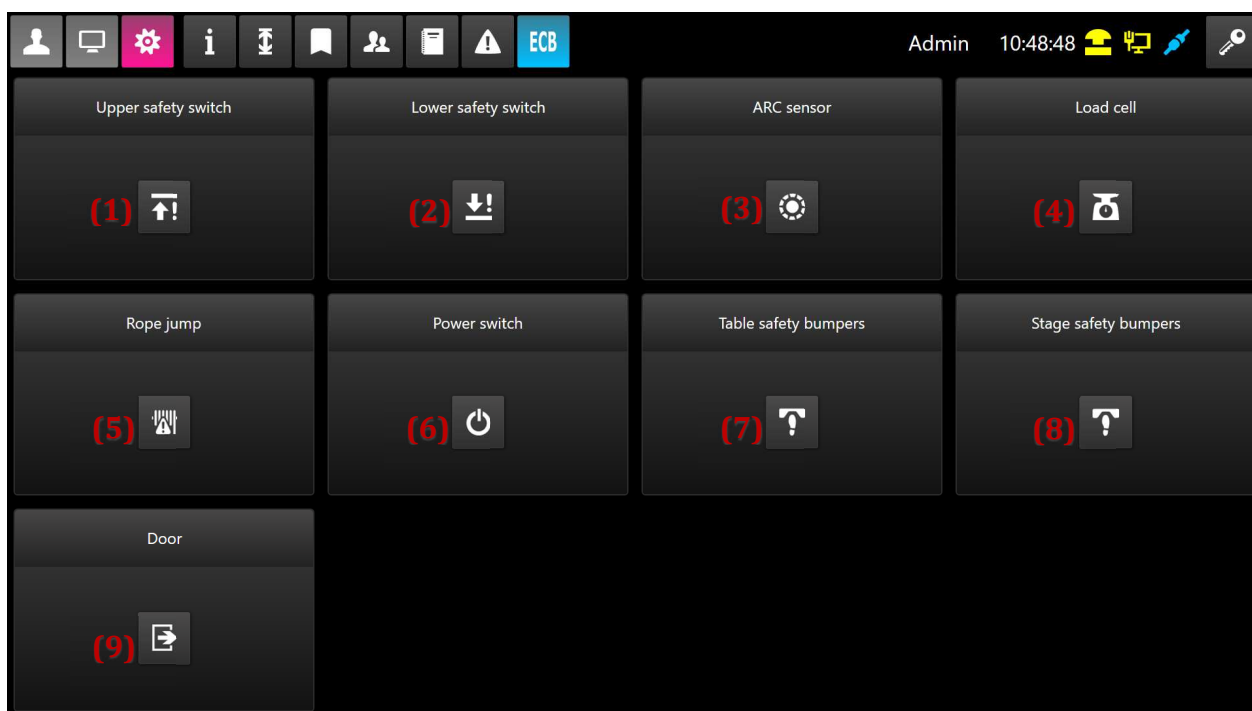
FIG. 62: EMERGENCY CONTROL FUNCTIONS

8.1 Emergency control functions access

Only a user with access rights to the emergency control page can use them. Administrator or leader can assign or remove the rights to the service operators. See chapter 7.6.

8.2 Emergency control function activation

To activate the emergency control functions, it is necessary to switch the system to the emergency control state by using the emergency control key, placed on the cabinet X. If the key is not turned on, user is not allowed to activate any function from the emergency control page. If the emergency control is active, it is indicated by an ECB icon in the top right corner (Fig. 5 – (10)).

Then by pressing the button (8) - (Fig. 44) we can switch to the emergency control screen (Fig. 62). For the screen to be visible, the user must have access rights assighned (see Chapter 8.1).

We can further active the function by clicking the button bellow the label of the function. Activated function is indicated by the blue background color.

Next, we switch the modes to the manual mode. In the right part of the bottom bar of the manual mode (Chapter 4.2), the emergency control active functions are indicated (On the Fig. 63 you can see safety limit switch and load cell overload override function activated).

FIG. 63: EMERGENCY CONTROL FUNCTIONS ACTIVATION INDICATION

8.3 Upper safety limit switch function override

⚠ Attention! These functions are intended for service operators only, using them in a wrong way can irreversibly damage a stage mechanics and cause injuries and possibly death of the people involved!

Function is intended to override the upper and lower safety limit switches.

We activate the function as described in chapter 8.2 by pressing the button (1) – Fig. 62.

In the manual mode, we select the device as usual and assign it to the joystick. We press the blue reset acknowledge button to get rid of the error state (4) – Fig. 2. We lock the screen (Chapter 3.4) and by pressing the dead man switch and deflecting the joystick downards, the device will move with low speed in the donwards direction. Function is deactivated by following chapter 8.12.

8.4 Lower safety limit switch function override

⚠ Attention! These functions are intended for service operators only, using them in a wrong way can irreversibly damage a stage mechanics and cause injuries and possibly death of the people involved!

Function is intended to override the upper and lower safety limit switches.

We activate the function as described in chapter 8.2 by pressing the button (2) – Fig. 62.

In the manual mode, we select the device as usual and assign it to the joystick. We press the blue reset acknowledge button to get rid of the error state (4) – Fig. 2. We lock the screen (Chapter 3.4) and by pressing the dead man switch and deflecting the joystick upwards, the device will move with low speed in the upwards direction. Function is deactivated by following chapter 8.12.

8.5 Encoder override function

⚠ Attention! These functions are intended for service operators only, using them in a wrong way can irreversibly damage a stage mechanics and cause injuries and possibly death of the people involved!

Function is intended to override the upper and lower safety limit switches.

This function enables the operator to drive with the device without using the absolute encoder. Eg. In the case of the encoder malfunction.

We activate the function as described in chapter 8.2 by pressing the button (3) – Fig. 62.

In the manual mode, we select the device as usual and assign it to the joystick. We press the blue reset acknowledge button to get rid of the error state (4) – Fig. 2. We lock the screen (Chapter 3.4) and by pressing the dead man switch and deflecting the joystick either way, the device will move with low speed. The ride is not affected by the position encoder os limited by the target boundaries. It is necessary to monitor the situation carefully, so nothing gets damaged or no injuries are caused.

Function is deactivated by following chapter 8.12.

8.6 Load cell override function

⚠ Attention! These functions are intended for service operators only, using them in a wrong way can irreversibly damage a stage mechanics and cause injuries and possibly death of the people involved!

Function is intended to override the upper and lower safety limit switches.

This function is intended for driving without load cell overload protection. It is used in case some device was overloaded and needs to be driven downward to remove the overweight.

We activate the function as described in chapter 8.2 by pressing the button (4) – Fig. 62.

In the manual mode, we select the device as usual and assign it to the joystick. We press the blue reset acknowledge button to get rid of the error state (4) – Fig. 2. We lock the screen (Chapter 3.4) and by pressing the dead man switch and deflecting the joystick downwards, the device will move with low speed. The load cell overload protection is not monitored. It is necessary to monitor the situation carefully, so nothing gets damaged or no injuries are caused.

Function is deactivated by following chapter 8.12.

8.7 Rope jump override function

⚠️ Attention! These functions are intended for service operators only, using them in a wrong way can irreversibly damage a stage mechanics and cause injuries and possibly death of the people involved!

Function is intended to override the upper and lower safety limit switches.

This function is intended for rope jump condition override. It is used in case some device has a problem with rope not aligned properly with drum threads or the electric signal has an issue.

We activate the function as described in chapter 8.2 by pressing the button (5) – Fig. 62.

In the manual mode, we select the device as usual and assign it to the joystick. We press the blue reset acknowledge button to get rid of the error state (4) – Fig. 2. We lock the screen (Chapter 3.4) and by pressing the dead man switch and deflecting the joystick either way, the device will move with low speed. The rope condition is not monitored during the ride, so usually one additional person next to the motor is necessary for rope monitoring. It is necessary to monitor the situation carefully, so nothing gets damaged or no injuries are caused.

Function is deactivated by following chapter 8.12.

8.8 Device switch-off override function

⚠️ Attention! These functions are intended for service operators only, using them in a wrong way can irreversibly damage a stage mechanics and cause injuries and possibly death of the people involved!

Function is intended to override the upper and lower safety limit switches.

This function allows to operate a device with some kind of electro/mechanical problem with a device switch-off.

We activate the function as described in chapter 8.2 by pressing the button (6) – Fig. 62.

In the manual mode, we select the device as usual and assign it to the joystick. We press the blue reset acknowledge button to get rid of the error state (4) – Fig. 2. We lock the screen (Chapter 3.4) and by pressing the dead man switch and deflecting the joystick either way, the device will move with low speed.

Before the ride, we need to check if the switch-off wasn't switched on purpose to protect the device or person near the device.

Function is deactivated by following chapter 8.12.

8.9 Safety edge function override of the platforms

⚠️ Attention! These functions are intended for service operators only, using them in a wrong way can irreversibly damage a stage mechanics and cause injuries and possibly death of the people involved!

Function is intended to override the upper and lower safety limit switches.

This function allows to deactivate the safety edges for the tables or similar devices. It is intended for obstacle remove that caused the safety edge to trigger.

We activate the function as described in chapter 8.2 by pressing the button (7) – Fig. 62.

In the manual mode, we select the device as usual and assign it to the joystick. We press the blue reset acknowledge button to get rid of the error state (4) – Fig. 2. We lock the screen (Chapter 3.4) and by pressing the dead man switch and deflecting the joystick upwards, the device will move with low speed.

During the ride, the safety edge is not monitored, so proceed with utmost care. Failing to do so, can cause harm to the device or seriously injure a person.

Function is deactivated by following chapter 8.12.

8.10 Safety edge function override of stationary part of the stage

⚠ Attention! These functions are intended for service operators only, using them in a wrong way can irreversibly damage a stage mechanics and cause injuries and possibly death of the people involved!

Function is intended to override the upper and lower safety limit switches.

This function allows to deactivate the safety edges for stationary part of the stage. It is intended for obstacle remove that caused the safety edge to trigger.

We activate the function as described in chapter 8.2 by pressing the button (8) – Fig. 62.

In the manual mode, we select the device as usual and assign it to the joystick. We press the blue reset acknowledge button to get rid of the error state (4) – Fig. 2. We lock the screen (Chapter 3.4) and by pressing the dead man switch and deflecting the joystick upwards, the device will move with low speed.

During the ride, the safety edge is not monitored, so proceed with utmost care. Failing to do so, can cause harm to the device or seriously injure a person.

Function is deactivated by following chapter 8.12.

8.11 Door and lock safety function override

⚠ Attention! These functions are intended for service operators only, using them in a wrong way can irreversibly damage a stage mechanics and cause injuries and possibly death of the people involved!

Function is intended to override the upper and lower safety limit switches.

This function overrides door closure and locking mechanism monitoring.

We activate the function as described in chapter 8.2 by pressing the button (9) – Fig. 62.

In the manual mode, we select the device as usual and assign it to the joystick. We press the blue reset acknowledge button to get rid of the error state (4) – Fig. 2. We lock the screen (Chapter 3.4) and by pressing the dead man switch and deflecting the joystick upwards, the device will move with low speed.

During the ride, the doors are not monitored, so proceed with utmost care. Failing to do so, can cause harm to the device or seriously injure a person.

Function is deactivated by following chapter 8.12.

8.12 Safety function override deactivation

You can deactivate the override function in a similar way to activating it. We switch to the emergency control window and by clicking any of the buttons with blue background, we deactivate that function. The background color switches to gray.

We must not forget to switch off the emergency control key off. It is done by turning the emergency control key placed on the cabinet X.

The last step is to press the blue reset acknowledge button (4) – Fig. 2, to get rid of the (now repaired) failure.

9. Touchscreen gestures

For a more user friendly control of the control system Items, some Multi-Touch gestures are implemented. The gestures are described in the paragraphs below.

9.1 Control mode switching

Control mode switching (chapter 3.3 and 3.6) can be made by pressing the buttons or by sliding two fingers on the screen to the left or the right side of the touchreen (Fig. 64).
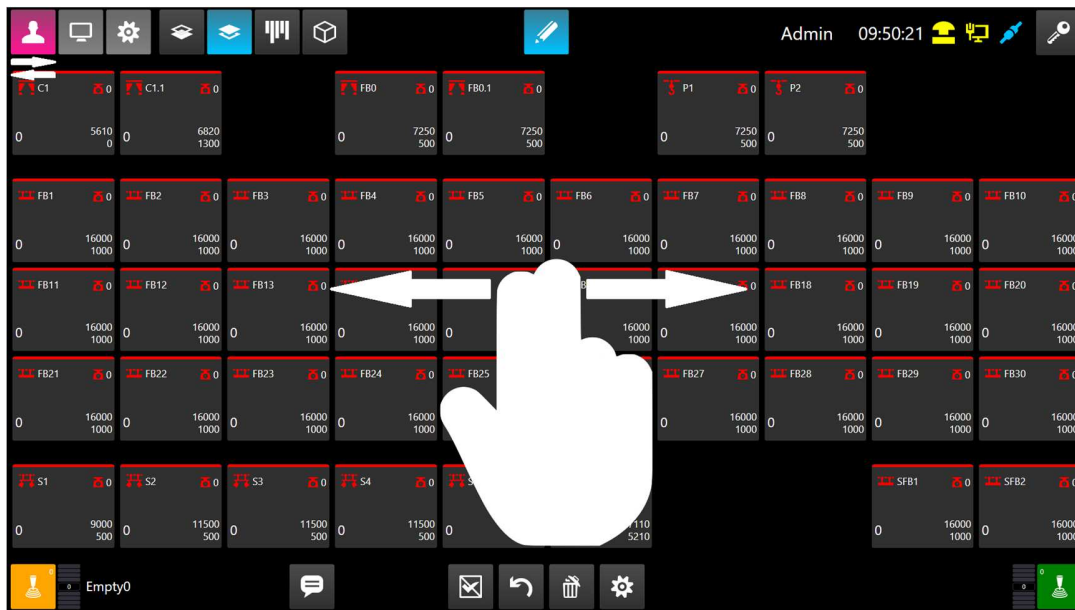
FIG. 64: CONTROL MODE MULTI-TOUCH GESTURE

9.2 Sub-menu switching

To switch between the individual sub-menu of the corresponding mode (see Chapter 4.1, 5.1 and 7.1), you can use the Multi-Touch gesture using one finger slide to either left or the right side of the touchscreen of the control panel (Fig. 65).
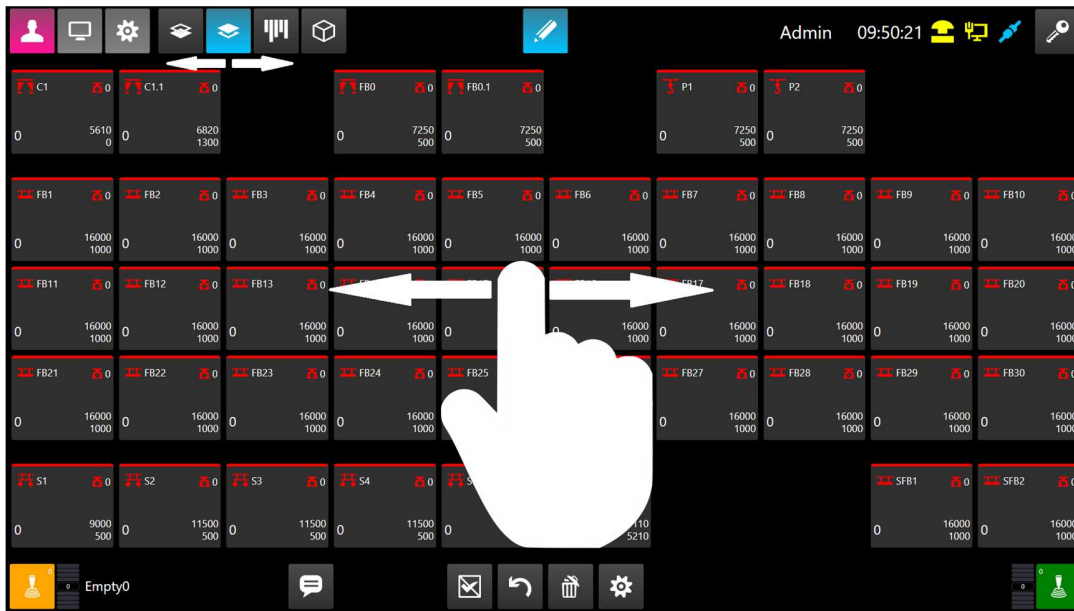
FIG. 65: SUB-MENU MULTI-TOUCH GESTURE

9.3 Target position change gesture

If a virtual keyboard for target change of the device is opened, you can change the value of the target with the gesture. Use two fingers sliding up/down on the touschreen of the control panel. During the slide, the value (1) will increase or decrease by a set amount (2).
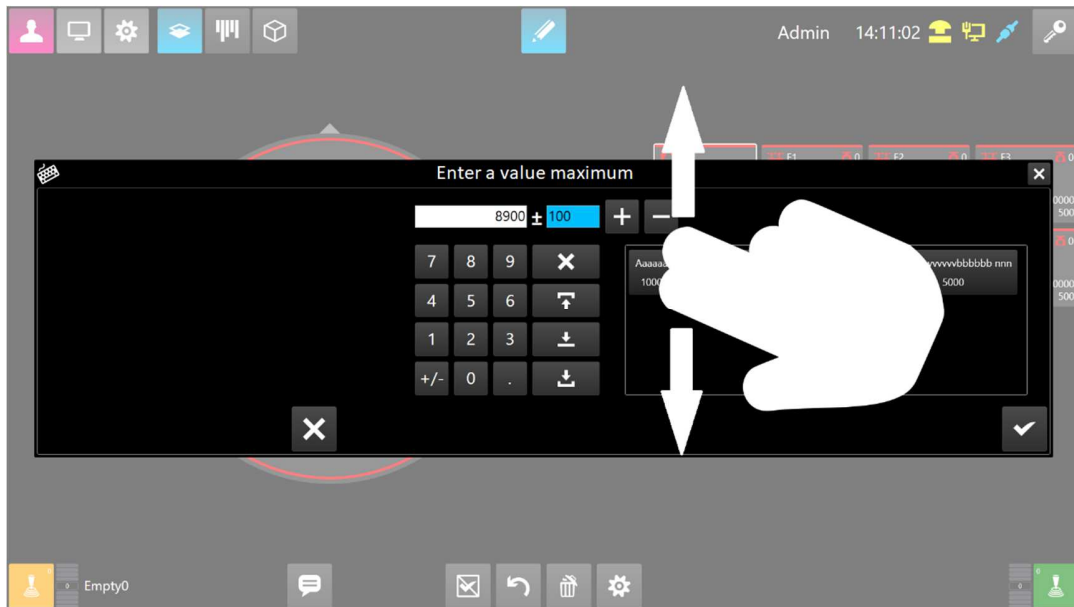
FIG. 66: TARGET POSITION CHANGE GESTURE

9.4 Display and function of the slide bar

You can slide down a bar from the top of the touscreen that contains optional functions. You can slide down the bar by sliding one finger from the top part of the touchscreen with a downward motion (Fig. 67).
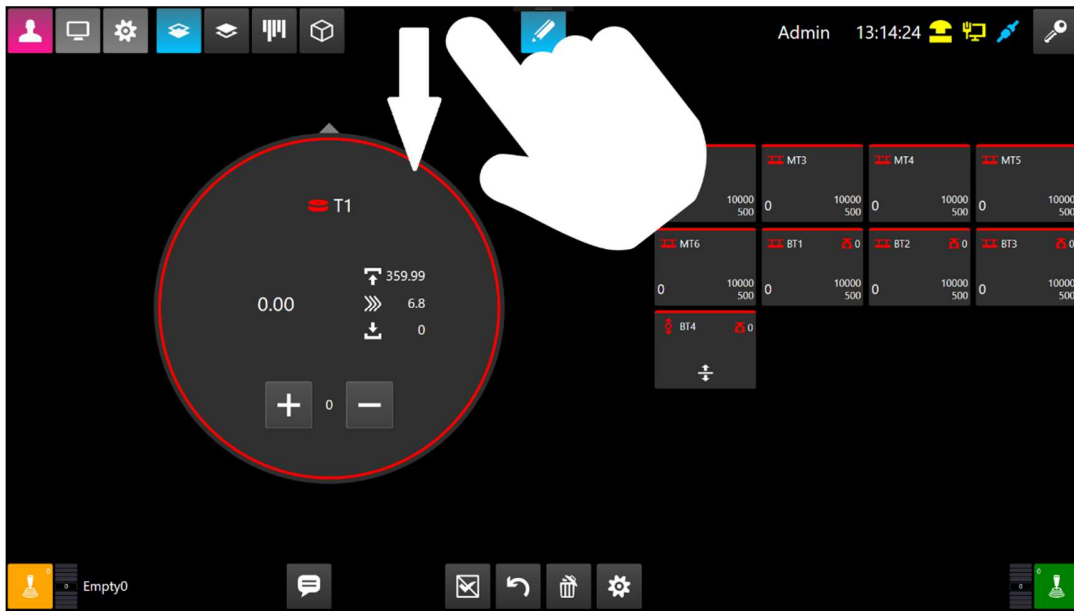
FIG. 67: GESTURE TO OPEN A OPTIONAL FUNCTIONS

After the the finger slide (Fig. 68 – (1)), the slide bar will appear. After some time of inactivity, the bar automatically slides back up. Available functions are described in the paragraphs below.
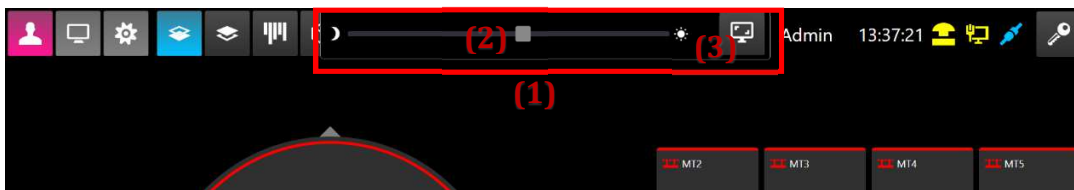
FIG. 68: SLIDING OPTIONAL FUNCTIONS BAR

9.4.1 Screen brightness adjustment

Slide bar contains a scroll bar for brightness adjustment of the touchscreen. By moving the scroll bar to the left, the display gets dimmer. By sliding right, the display gets brighter. The value of the brightness is not stored in the database. After a control panel restart, the brightness is set to the default value.

9.4.2 Screenshot

Slide bar allows the operator to make a screenshot of the active screen. Screenshot is done by clicking the button (3) - Fig. 68. Sreenshot of the screen is usually saved on the backup drive to the "Screenshot" labelled folder. The name of the particular screenshot is composed from the word "image" and a time frame, when the screenshot was made.

10. Additional monitors

The visualization software allows you to place some of the views in individual modes on separate monitors. The most common use: status displaying of individual axes where a whole set of all installed devices is clearly arranged on one monitor so that the operator may have permanent perfect overview of the status of each individual mechanism. An example of such a status monitor - see Fig. 69: Status Monitor.
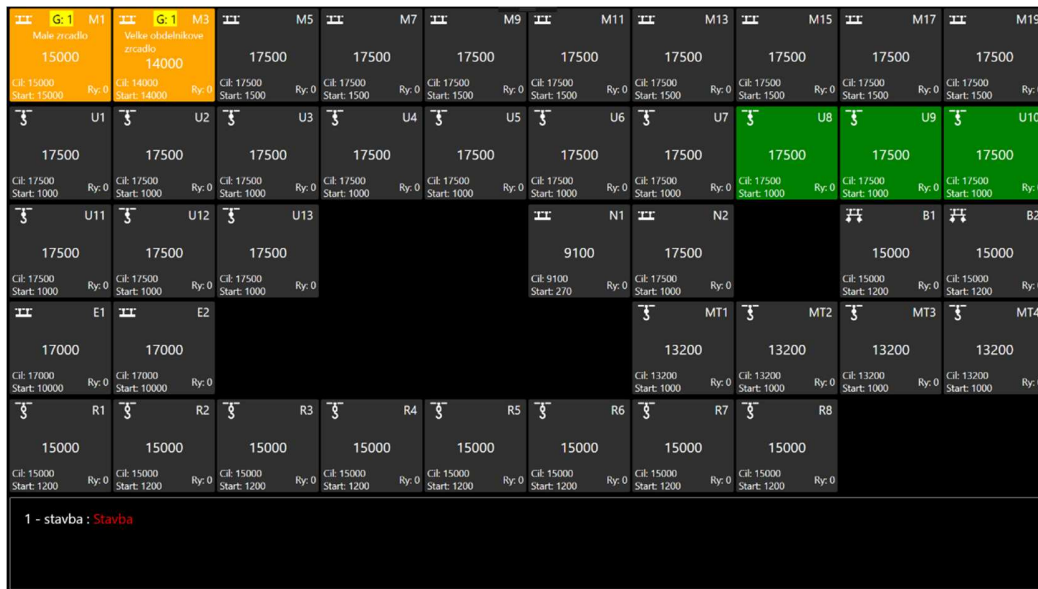
FIG. 69: STATUS MONITOR

The second most frequent use of an external monitor: displaying a 3D scene. An example of such use can be seen in Fig. 70: 3D Monitor. The 3D Monitor displays the same view as the 3D view in the application itself, which it is set from. Because it is only a monitor, the 3D displaying is not equipped by any touch keys.
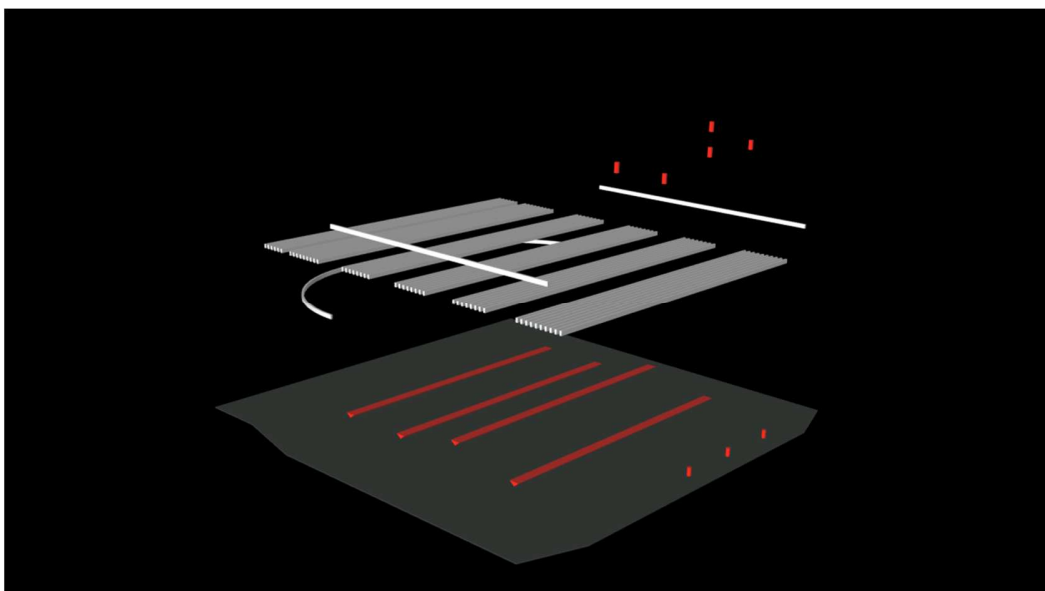
FIG. 70: 3D MONITOR

11. List of Figures: