FLYIT 3.0 MANUAL

Author: FM, FW, GP
Authorized by:
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spidercam gmbh (austria) | gewerbestr. 10, 9181 feistritz im rosental, austria | phone: +43 4228 20040 0
austria@spidercam.tv | commercial court and register: landesgericht klagenfurt fn292635x | vat-id: atu63366226

CONTENT

spidercam gmbh (austria) | gewerbestr. 10, 9181 feistritz im rosental, austria | phone: +43 4228 20040 0
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1 QUICKSTART

Follow these steps to get Flyit 3.0 running quickly.

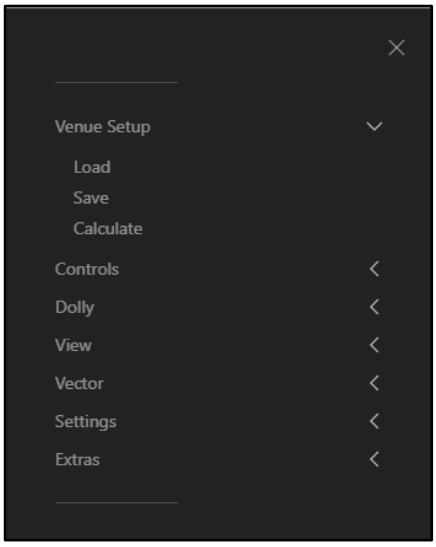
1.1 CONNECT AND POWER UP

After the system has been setup power up the control station. Flyit 3.0 is running on the system Laptop (not the control station itself), so connect it to the control station, and turn it on.

1.2 LAUNCH

Once the Laptop is powered Opera will start automatically. If this doesn't happen, manually open Opera by double-clicking the red "O" symbol on the desktop. The URL to access Flyit 3.0 is "localhost:18253/flyit".

1.3 SETUP A NEW VENUE



In the top right corner, you will find the main menu. Click it and select „Venue Setup"- „New" to create a new venue.

Take tachymeter measurements, choose the used tachymeter (Leica TCR or Builder) and enter the measured values for each pulley in the corresponding field.

Make sure to choose the correct tachymeter settings (horizontal rotation, Vertical 0°, tachymeter height)

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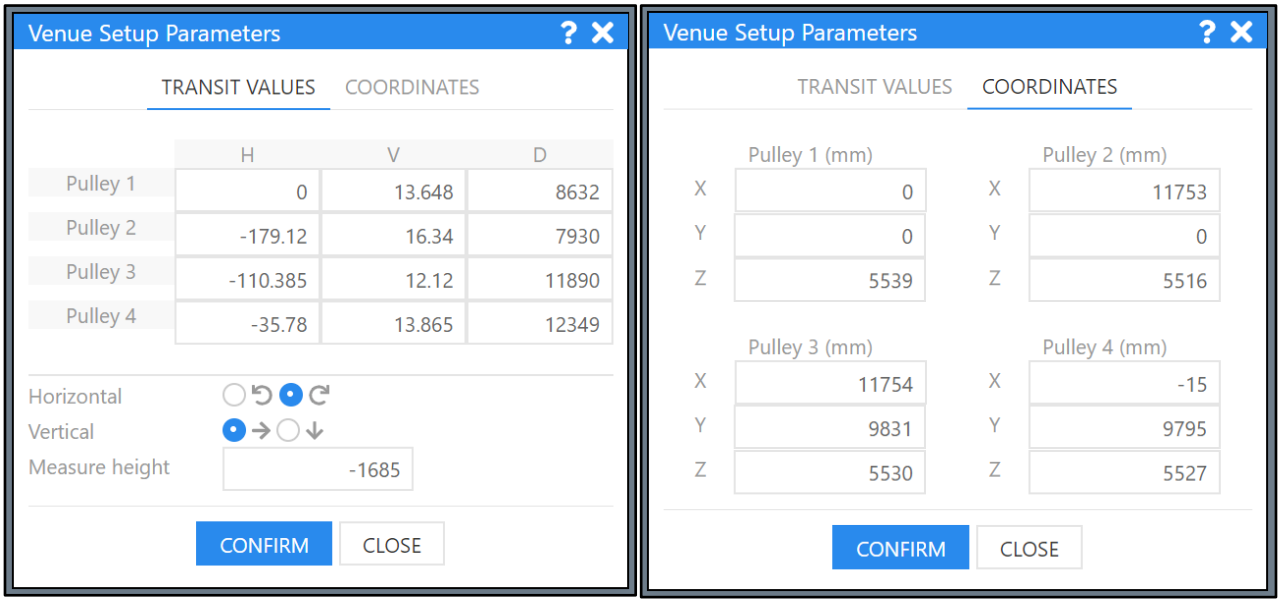
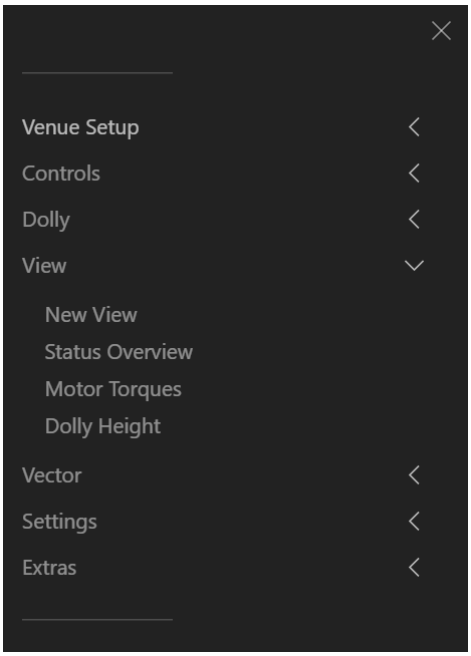


Click confirm once all values have been entered.

1.4 The 3D-View



To adjust the borders, open the 3D-View. Click the main menu on the top right and select “View” – “New View”. A window will appear with the tabs “Top” (for top down view), “Side” (for Side View), “Vertical” (for vertical view) and “3D” (for 3D-view). Usually “3D” is automatically select, if not click on “3D” to activate the view.

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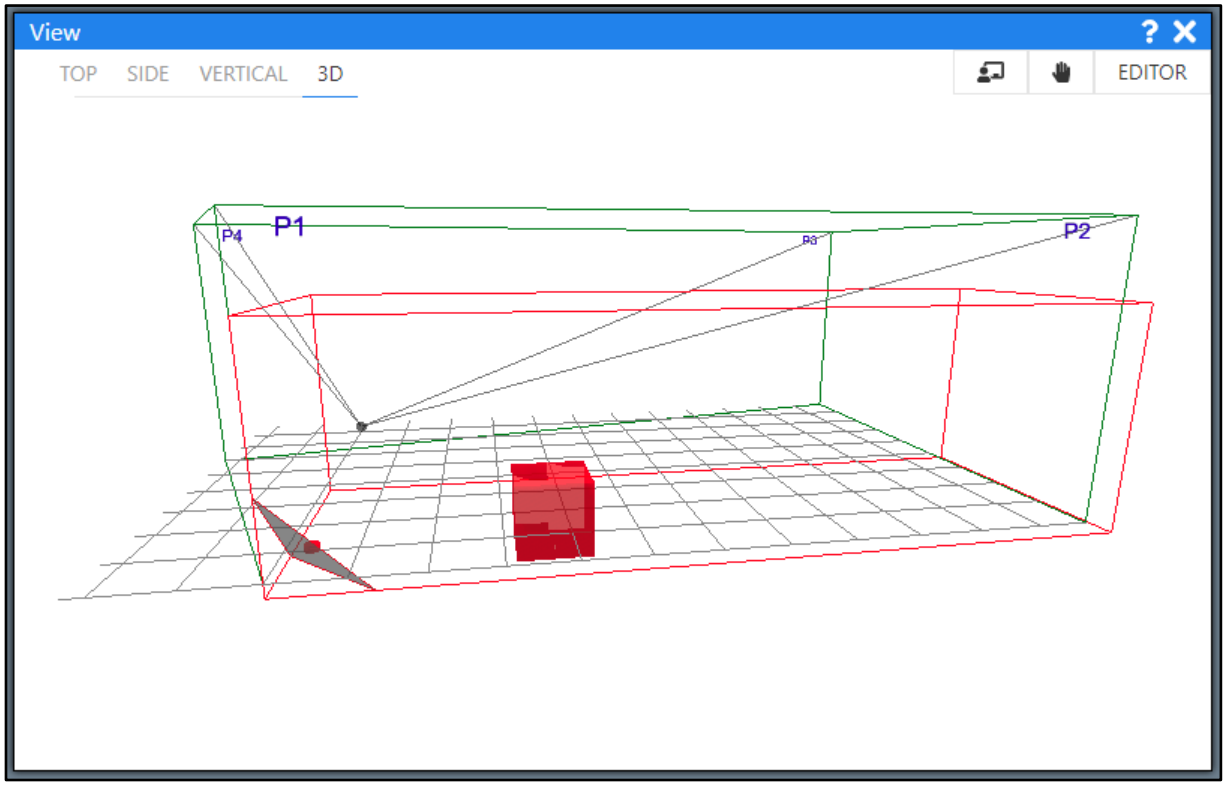

1.4.1 Overview and Legend

You should now see your venue, with the four Pulleys labelled P1 through P4, and a green cuboid showing the “absolute borders”. They can be hidden under “Program Settings” (see 2.2.6.2).

The purple cuboid represents the “system borders”. This is maximum theoretical Flying area, deriving from the absolute borders minus safety distance to the pulleys (for side borders) and the sag angle (for the top border). They can be hidden under “Program Settings” (see 2.2.6.2).

The red cuboid represents the “user borders”. They define your flying area, and can be altered, but not beyond the system borders. They are always visible.

1.5 The Editor (Borders)

Open the editor by clicking the “Editor” button in the top right corner of the view window.

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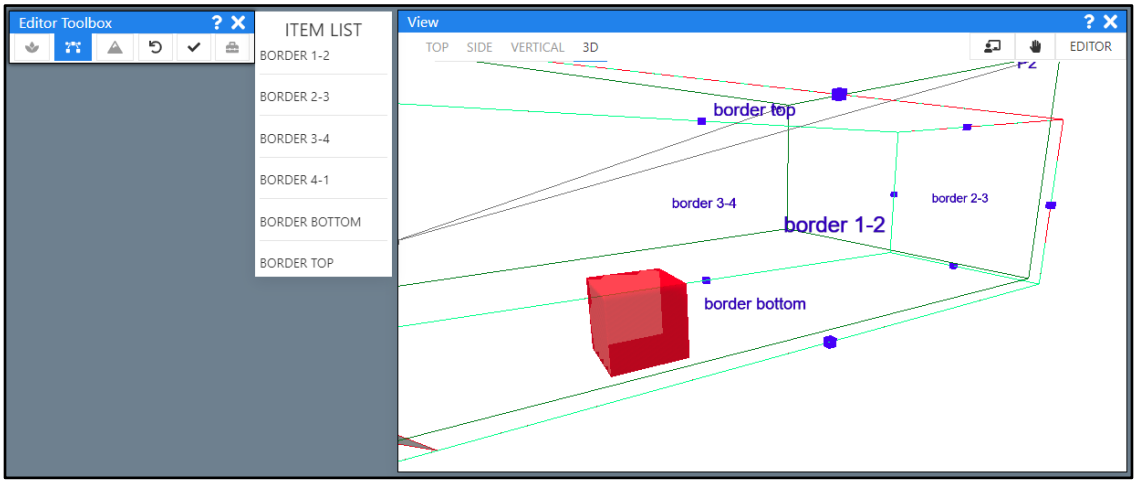
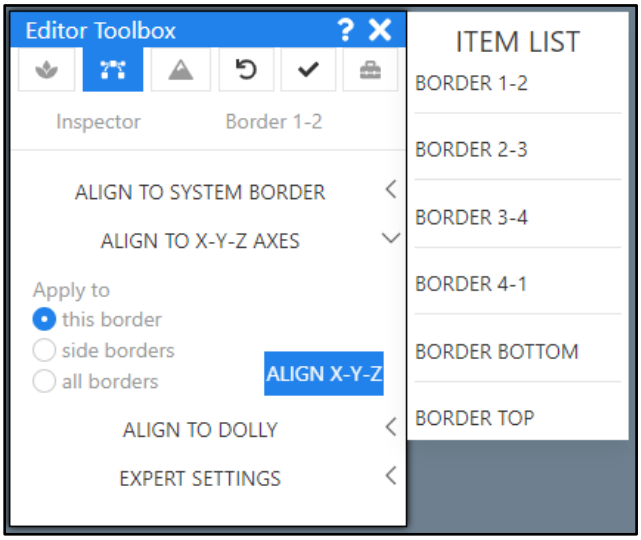


The window “Editor Toolbox” will open, click the “Borders” button (second button from the left showing five interconnected points). The item list and 3D-View will show the respective borders.

In the 3D-View you will also see blue squares on each side of the border rectangles. These “border points” can be used to adjust individual aspects of the borders.

1.5.1 Adjusting a Border

Once a border is selected you have different option to adjust it.



In the 3D-View you can click and drag the arrow to move the entire border in this axis. Alternatively, you can select a border point (don’t forget: Unselect = double click) and move the border line around. This allows for a very flexible border setup

Adjust the borders to reflect a safe flying area and click the “Apply” button (Check mark symbol on the right in the editor toolbox). Your borders are now applied and active.

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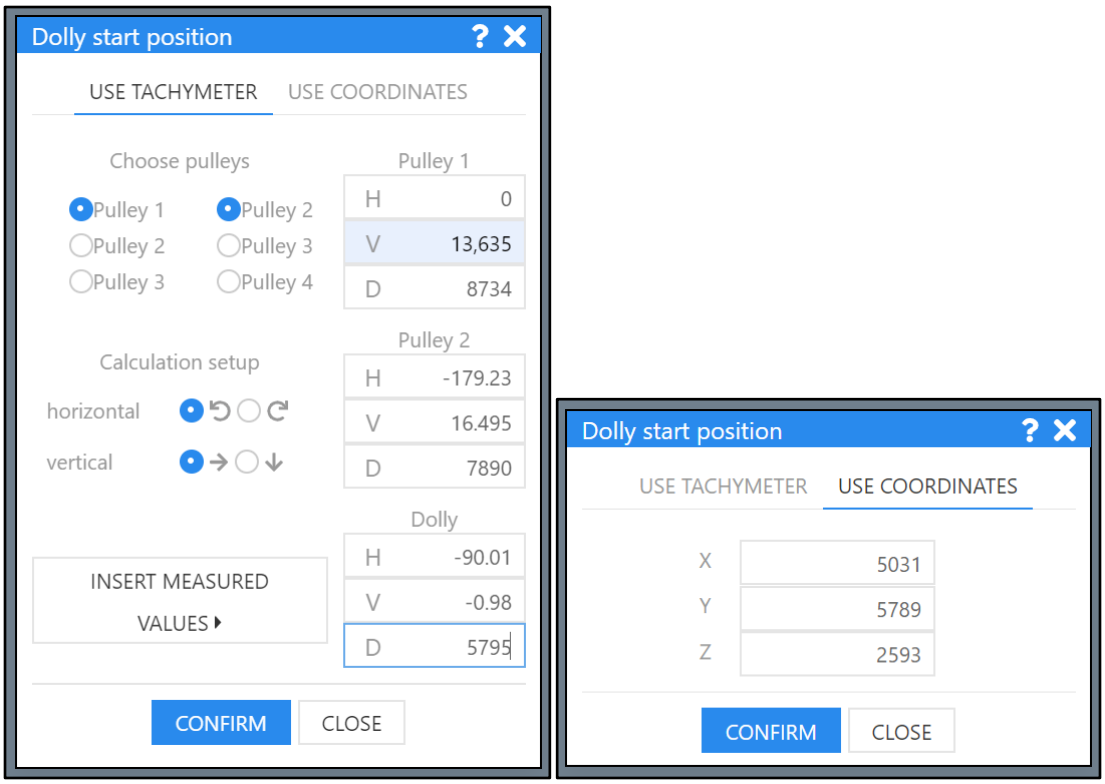
1.6 Enter Dolly Start position

Select the main menu on the top right of the screen and click “Dolly” – “Dolly start position”.

If your tachymeter provides distances and angles, use the “Use tachymeter” tab, if it provides coordinate values (or you know the coordinates) use the “Coordinates” tab.

Use tachymeter: Take tachymeter measurements and input the measured values for 2 pulleys (needed as a reference) and the dolly itself. If the tachymeter hasn’t been moved yet, you can click “Insert measured values” to recall the previously measured values for the Pulleys.



Click “Confirm” once you have input the values, and the Dolly will now be visible in the 3D-View. The dolly is represented by the point, where the four winch lines meet; the grey sphere represents the “safety bubble” around the dolly used for the collision avoidance.

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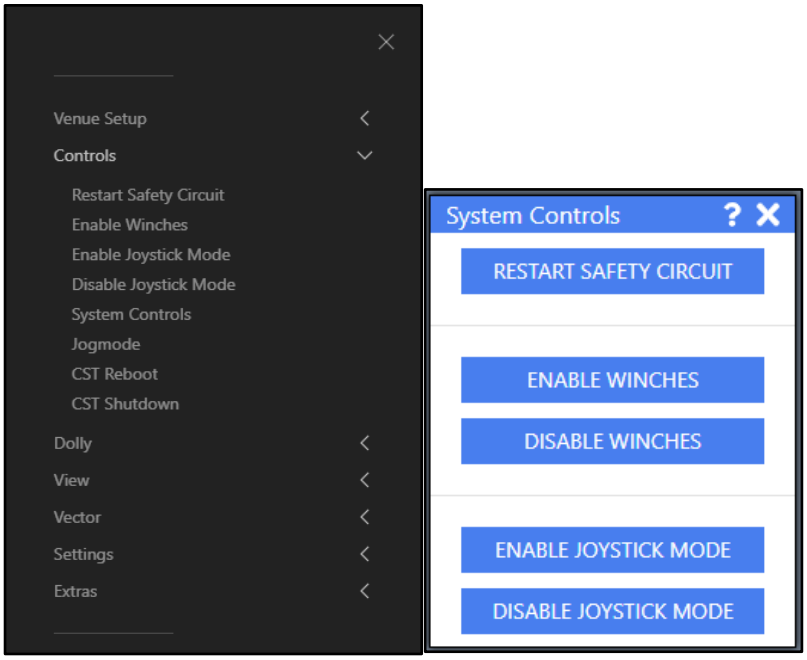
1.7 Activate Winches



To activate the Winches either use the System Control Panel and click “Enable Winches” or go the main menu, select “Controls” and click on “Enable Winches”.

1.8 Joystick Mode

To Enable Joystick mode either use the System Control Panel and click “Enable Joystick Mode” or go the main menu, select “Controls” and click on “Enable Joystick Mode”.

The system is now ready to fly.

Please operate carefully, and always keep safety in mind.

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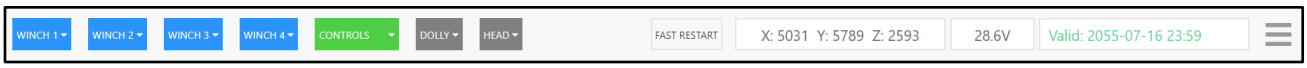
2 MANUAL

This is a complete list of all menus, buttons and settings found across Flyit 3.0.

2.1 MAIN HEADER

The main header contains the most important information in a compact form. Many system states are color-coded.



Winch color codes

Color	State
	Not connected
	Connected, safety off, motors off
	A safety sensor has been detected
	Safety restarted, motors off
	Motors activated

Controls color codes

Color	State
	Not connected
	A safety sensor has been detected
	Safety restarted
	Connected

Dolly color codes

Color	State
	Not connected / not found
	Connected

Head color codes

Color	State
	Not connected / not found
	Connected

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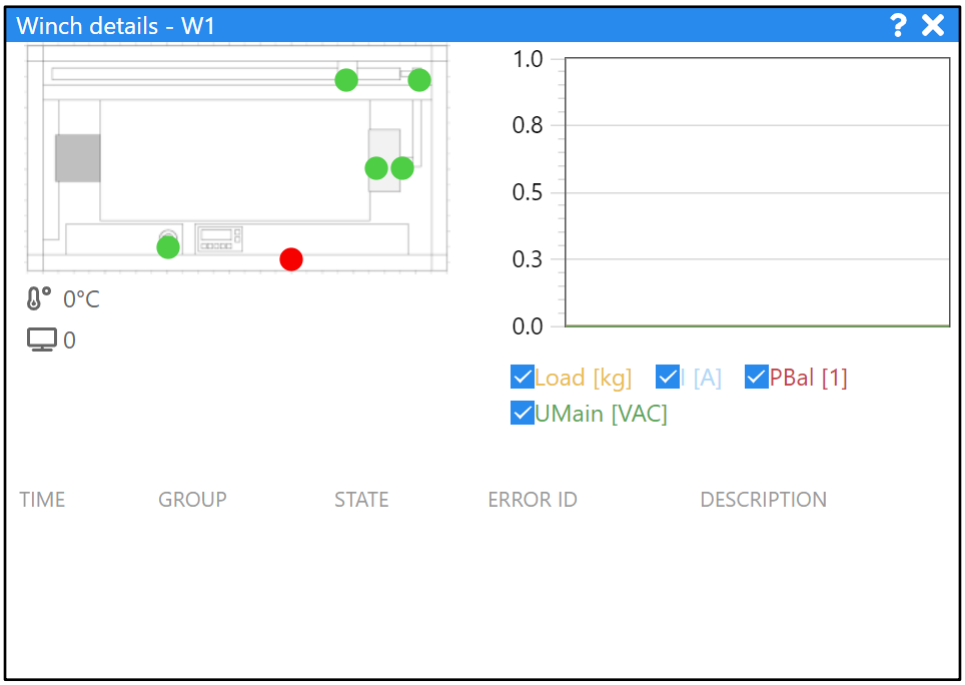
2.1.1 WINCH

Additional information about a single winch can be requested by clicking on one of winch buttons in the main header.

The following window will open:



The winch details window shows additional safety information, like the status of the brakes feedback, drive information like temperature and the display message.

The chart on the right shows live data of torque, main voltage (input power), the actual current consumption and the actual regen resistor power of the selected winch.

Not all systems will provide additional information, currently only torques are available on all systems.

On the bottom is an error log, showing registered errors of the selected winch.

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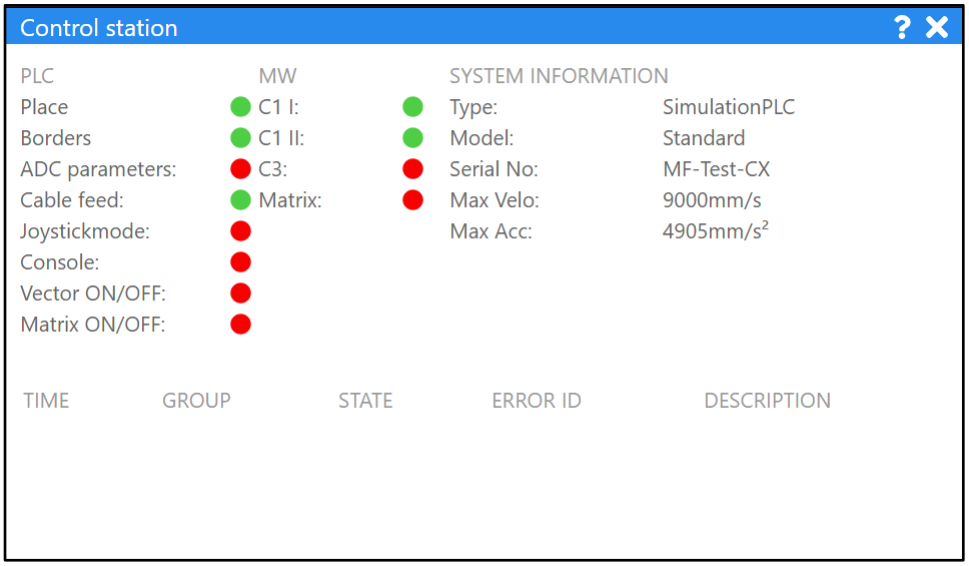
2.1.2 CONTROLS

Additional status informatio of the control station can be requested by a click on controls in the main header.

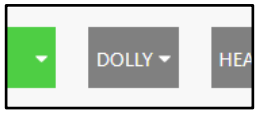
This will open the following window:



The three blocks show the state of the PLC, the middle ware and system specific details of the current system.

At the bottom there is also a filtered error list, showing control station and middle ware errors.

2.1.3 DOLLY



Green light signals a Field Dolly + has been found and is properly connected. A grey light signal either no dolly has been found, or the dolly has no components that communicate with the control station – for example the light dolly.

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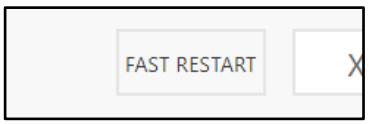
2.1.4 NEWTON HEAD

Green light signals a Newton head has been found and is properly connected.

2.1.5 FAST RESTART



The fast restart is used to quickly get the system into joystick mode (and ready to fly). It is generally useable once all information of the venue and dolly have been entered.

Opposed to Flyit 2, it is now also possible to use it after starting up the system, as long as the venue setup is the same one as on the previous run.

The main reason for this, is to prevent any position errors caused by “Calculate dolly position out of cable lengths” in older FlyIt versions.

To ensure fast restart is working please check its functionality once you have successfully activated joystick mode manually.

On “spidercam light” systems after changing the cable exit switches in the winches, [fast restart] is blocked. Only a manual remeasurement of the dolly start position is possible in this case.

Confirming coordinates in <Dolly start position> disables the [fast restart] option. Once “joystick mode” has been activated manually [fast restart] will abe available again.

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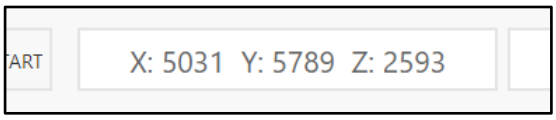
2.1.6 CURRENT DOLLY POSITION

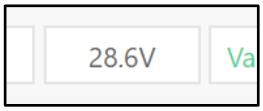


This info field shows the current dolly coordinates in X/Y/Z.

The coordinates displayed are the internally calculated coordinates of the dolly and do not necessarily show the same values as Vector output.

Clicking on the Dolly position window will open the “Z-Axis” window.

2.1.7 BATTERY VOLTAGE



This field shows the measured battery voltage of the newton.

KNOWN BUG: Sometime the displayed value will be 6.41VDC. This is due to a data protocol discrepancy and happens, when the voltage is greater than 25.5VDC.

“---”VDC will be shown in case no voltage information is provided

2.1.8 LICENSE STATE

The third info field shows the current license state and the expiry date. Possible states are: “Invalid”, “Unknown”, “Valid”, “Expired”.

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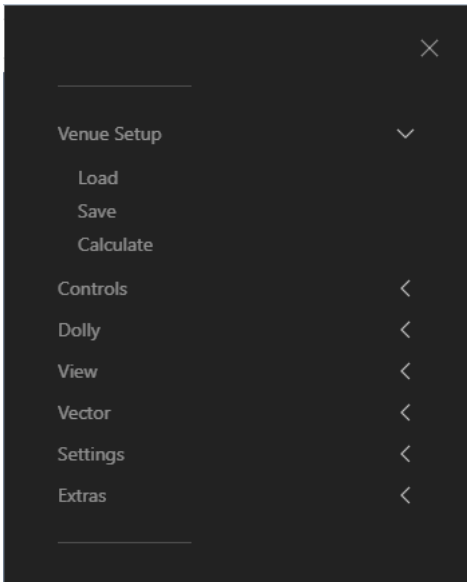
2.2 MAIN MENU

On the top right corner of Flyit 3.0 you will find the Main menu, symbolized by three horizontal lines ("Burger menu"). Clicking it will open the Main menu, from where you access almost all system relevant features and settings. It houses the submenus:

- Venue Setup
- Controls
- Dolly
- View
- Vector
- Settings
- Extras

2.2.1 VENUE SETUP



The Venue Setup menu is the entry point to start operation of a Spidercam system after powering up.

- **Load**: load an existing venue setup from disk.
- **Save**: store a new or edited venue setup to disk.
- **Calculate**: Generate a new venue setup with Tachymeter measured values or known pulley positions. To set up a new venue, please see 1.3 Setup a New venue.

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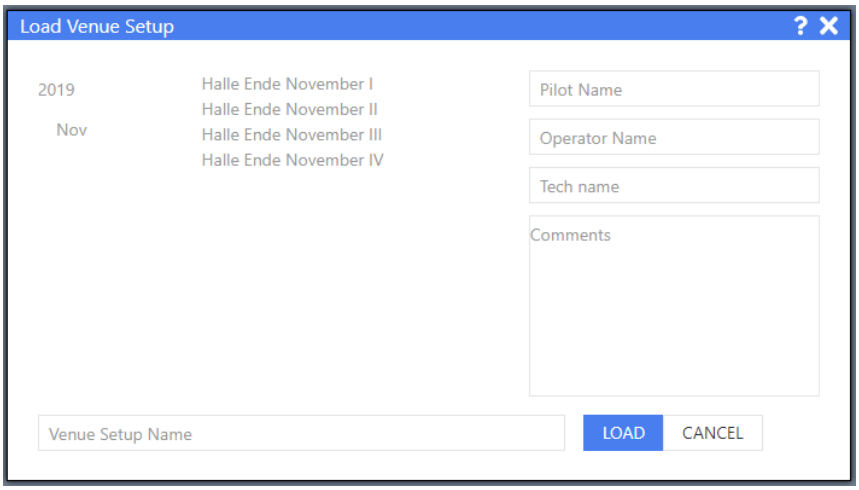
After a venue setup has been generated or loaded, the actual pulley positions can be seen and manipulated here at any time.

2.2.1.1 Load / Save a venue setup



The file dialog window divides into three sections. In the left section, available venues can be narrowed down to certain date hierarchies (year, month); the middle section shows corresponding venue setups. The right section contains additional information of a chosen venue setup, this can be edited on saving a venue.

The chosen venue setup name appears in the bottom left window; on saving, a new name can be chosen here. Click [Save] to save a venue setup. If you choose to save on an existing venue setup name, a conformation request will be prompted.

Loading an existing venue setup can be initiated by clicking [Load] or double-clicking on a name in the middle section.

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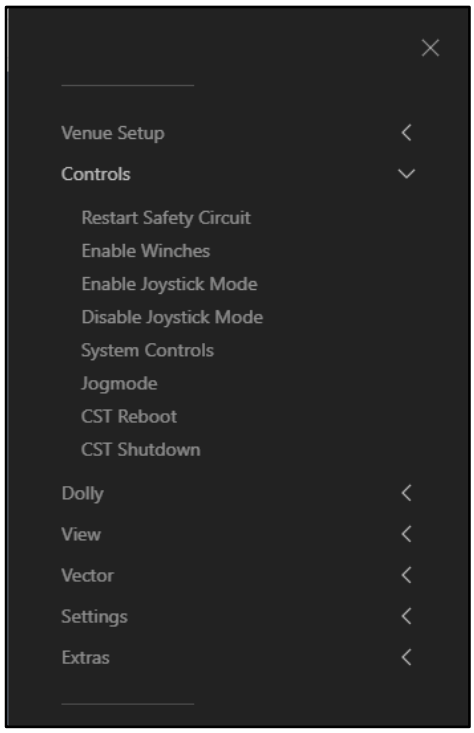
2.2.2 CONTROLS



The Controls menu contains all instances which will enable and disable the Spidercam system electrically and make it ready to fly.

- **Restart Safety Circuit**: triggers the supervising safety watchdog to check for operations clearance of all winches and operator controls. Only after clearance has been granted, power can be applied to the motors and joysticks can be enabled.
- **Enable Winches**: motor drivers and motors will be powered up and winch brakes will be released.
- **Enable Joystick Mode**: operator joysticks will be activated, and Spidercam system can be flown.
- **Disable Joystick Mode**: joysticks will be deactivated but motors will stay powered up.
- **System Controls**: opens a window to keep above control instances available on main screen.
- **Jog Mode**: opens a window to manually wind ('jog') catenary cables in and out each winch separately.
- **CST Reboot**: reboot control station.
- **CST Shutdown**: shut down control station. Mandatory before powering down.

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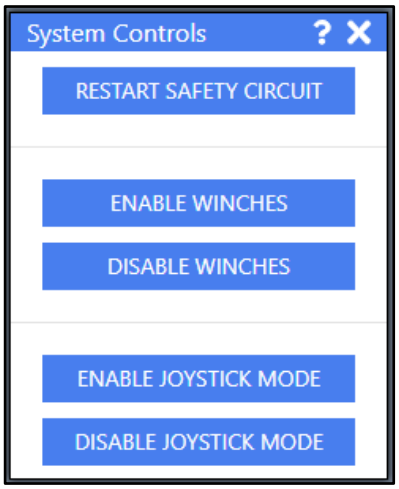
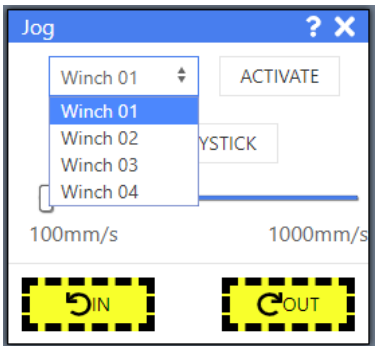
2.2.2.1 SYSTEM CONTROLS



The System Control Window allows to keep often-used control commands available on main screen for better efficiency. No need to use Main Menu for these commands anymore.

2.2.2.2 JOG MODE



The Jog mode allows to manually operate winches independently for winding in / out catenary cables.

Precondition for using the Jog Mode is that the Safety Circuit has been restarted or winch motors are activated (check color status in the main header - 2.1) and Joystick Mode is disabled.

A winch to jog must be chosen from the upper left menu. If the motor of the respective winch is not active, please press [ACTIVATE] afterwards. Choose jog speed between 100 mm/s and 1000 mm/s with the slider.

[IN] or [OUT] will rotate the winches accordingly.

[USE JOYSTICK] is reserved for future use.

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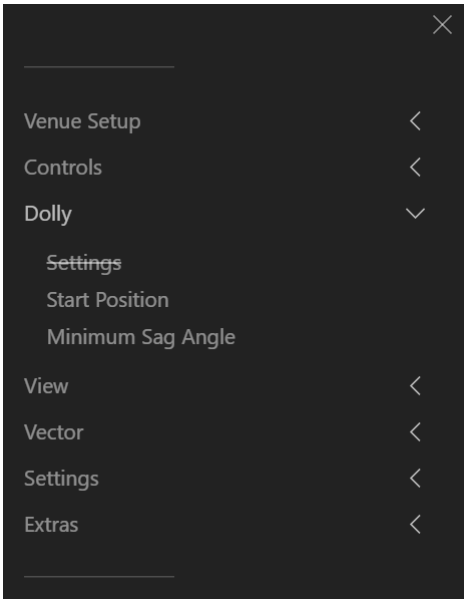
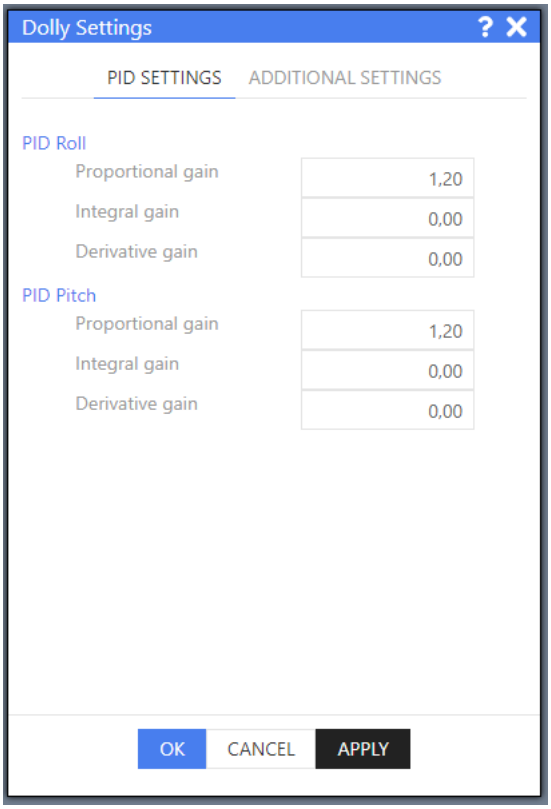
2.2.3 DOLLY



This menu handles operations related to the spidercam Dolly. It consists of the two submenus “Settings” and “Start Position”.

2.2.3.1 SETTINGS



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The Dolly settings define the behaviour of the dolly and has two submenus: “PID Settings” and “Additional settings”.

The **PID Settings** allow you to adjust several dolly behaviours by defining the Roll and Pitch gains.

Proportional Gain

The P-part (out of PID) will result in a proportional reaction against discrepancy of must-value.

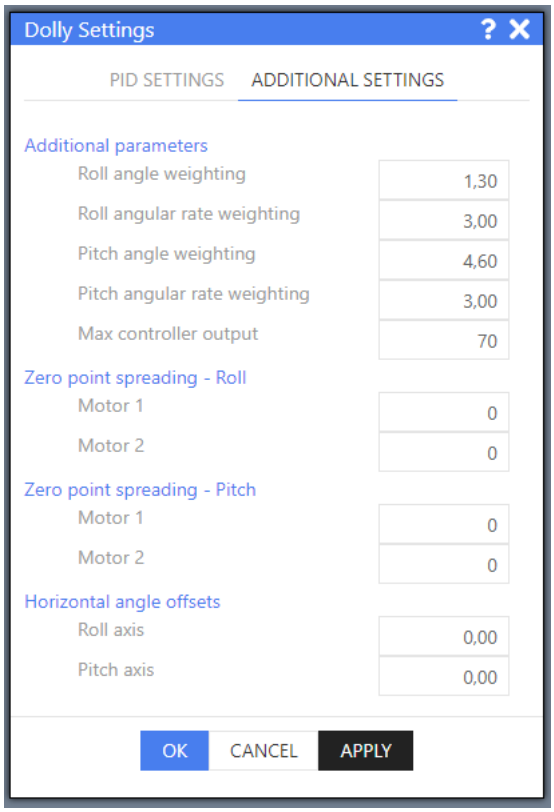
Integral Gain

The I-part (out of PID) will result in a reaction according time and discrepancy against the must-value. This part of the control loop will not be used for spidercam Dolly stabilization normally.

Derivative Gain

The D-part (out of PID) will be used in connection with P- and/or I-part only. The reaction depends on speed of discrepancy despite the amount of deviation.

Usually also this part of the control loop will not be used for spidercam Dolly stabilization.



The “Additional settings” control the dolly behaviour by changing how the dolly stabilization reacts to the IMU inputs.

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Additional parameters - Weighting

Defining discrepancy will be done by taking under account deviation of Angle and deviation of Angular Rate (speed). By giving the Weighting value both inputs will be set in a certain relation together. This relation will make possible to stop the motion exactly when reaching the zero (upright) position of Dolly frame. The moving of dolly frame is done by little motors. When stopping the motors the frame will keep turning and will therefore swing over zero position. Because of this the control loop has to command the motors to turn backwards to stop motion in time. When adjusting this relation in a right manner the Dolly frame will stop at zero position without swinging over. As a general rule the Weighting for Angular Rate should be set higher than Weighting of Angle.

Roll Angle Weighting

Weighting of angle deviation of roll axis

Roll Angular Rate Weighting

Weighting of angular rate of roll axis

Pitch Angle Weighting

Weighting of angle deviation of pitch axis

Pitch Angular Rate Weighting

Weighting of angular rate of pitch axis

Maximum Controller Output

This parameter will give the limit at which deviation (discrepancy) the gyro motors will work with maximum output against the offset. This parameter will give a simple method to set up the control with either hard or soft response also. A small value will give hard response; a bigger value will give a soft response.

Zero point spreading

The gyro motors are controlled in their speed by a PWM electronic. By adjusting this parameter (Offset Stabilization) starting of the gyro motors will be guaranteed despite friction in motor and gearing at low values. With other words: this parameter will overcome stick-slip behaviour of gyro motors.

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As a rule of thumb small values should be used here. Too big values will result in too strong reactions of gyro motors when start moving.

Roll

Offset value of motors 1 and 2 of roll axis.

Pitch

Offset value of motors 1 and 2 of pitch axis.

Horizontal Angel Offsets

In case the Dolly shows a constant inclination in either roll or pitch axis, these parameters will give the ability to correct the attitude.

Roll Axis

Offset value for roll axis

Pitch Axis

Offset value for pitch axis

2.2.3.2 START POSITION

This menu is used to input the current Dolly position. It is needed to tell Flyit where within its coordinate system (defined by the Pulley positions) the dolly is located. Once input, the system will link the dolly position to the current Winch cable lengths to enable controlled movements.

You have two option to enter the dolly position:

If your tachymeter provides distances and angles, use the “Tachymeter” tab, if it provides coordinate values (or you know the coordinates) use the “Coordinates” tab.

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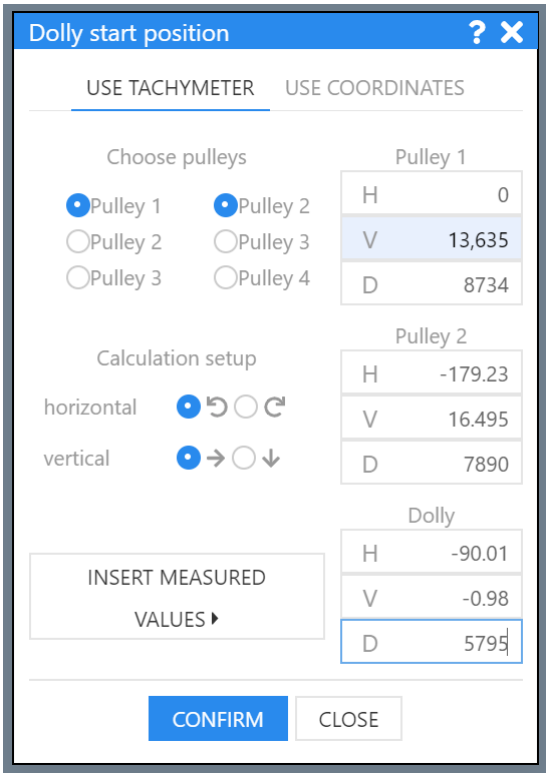
2.2.3.2.1 TACHYMETER



Firstly choose the tachymeter you use: The “TCR” unit displays horizontal angle, vertical angle and direct distance to target, while the “Builder” unit displays horizontal angle, target height and ground distance to target.

Choose pulleys: in order to enter the Dolly position, the software needs to know the position of the tachymeter. It is calculated by measuring two pulleys. You can choose which Pulleys to measure by selecting them among the available points.

Enter the measured values for the “Leica TCR”: “H” for the horizontal angle (in °), “V” for the vertical angle (in °) and “D” for the distance from the tachymeter to the dolly (in mm).

Or, if using the “Leica Builder”: “H” for the horizontal angle (in °), “→” for the ground distance to the dolly (in mm) and “↑” for the height of the dolly (in mm).

Calculation setup allows you to mirror the measuremnet options of the tachymeter: The horizontal angle can be measured clockwise or counterclockwise, click the repsective icon to match the tachymeter option.

The vertical angle can be measured by conidering the hotizontal orientation as 0°, or the facing down as 0°. Click the respective icon to match the tachymeter option. (TCR only)

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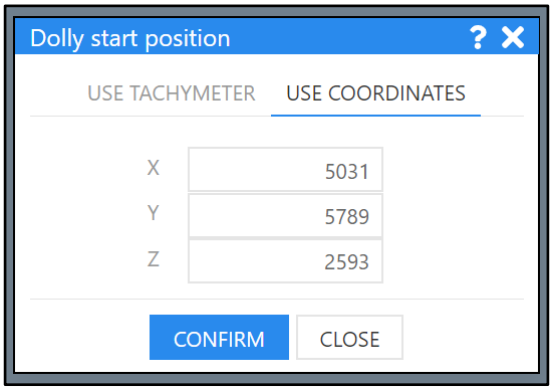
Insert measured values: if you haven't moved the tachymenter since you entered the values for the "Venue setup", you can have the system recall these values and enter them.

Clicking "Confirm" will calculate the dolly position and open the window showing the dolly coordinates. Click close to close the window.

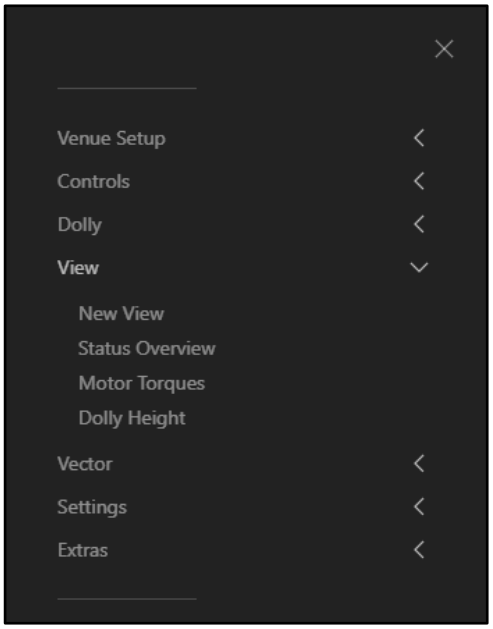
2.2.3.2.2 USE COORDINATES



If you know the dolly coordinates, e.g. if you saved them from the day before, you can enter them in this field. X – Y – Z represent the position on the according axis in mm.

Click confirm to apply the dolly position. Click close to close the window.

2.2.4 VIEW



The View menu allows access to all kinds of system monitoring.

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New View: A new window will be opened to see and edit the venue setup.

Status Overview: Monitor window to supervise the status of all system components and safety sensors.

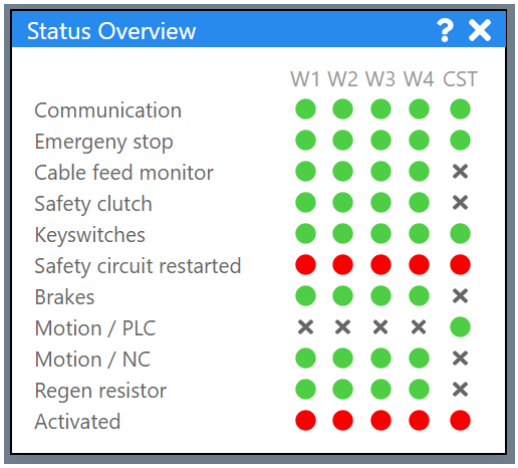
Motor Torques: Monitor window to see the cable load in kg of all winches simultaneously.

Dolly Height: Monitor window to see the Z position of the Spidercam Dolly in large numbers.

2.2.4.1 3D-View and Editor

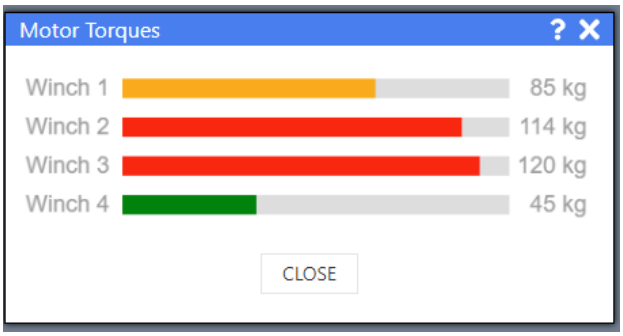
The Editor is the main tool for editing borders and border obstacles in the venue setup. Please see VIEW AND EDITOR for a detailed description.

2.2.4.2 Status Overview



This shows the status of connections and safety features of all winches and the control station.

2.2.4.3 Motor Torques



The Motor Torques window displays the actual load in kilograms of all four winches.

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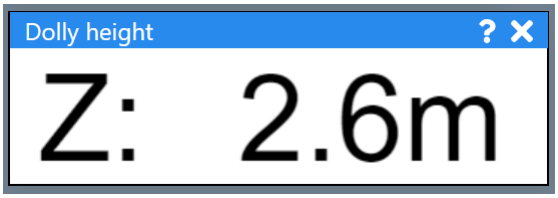
Green color (until 80kg of force) signals safe operation.

Yellow color signals a load above 80kg. The system is safe, but operating close to its limit (within its reserve). This kind of load exceedance is acceptable for a short time but should not be constant.

Red color signals a load of 100kg or more. This is beyond the system limit and will cause an emergency stop if the load isn't reduced quickly.

Operating the system with a load of >100kg will cause an emergency stop

2.2.4.4 Dolly Height

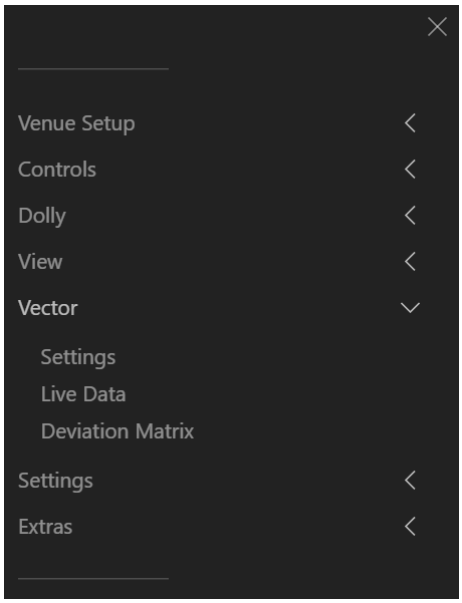


Large display of Z for better readability on main screen.

Window can be opened by clicking X-Y-Z display in Main Header, too.

2.2.5 Vector

AR-tracking data via X-Y-Z calculation, IMU information (Newton), camera / lens data.



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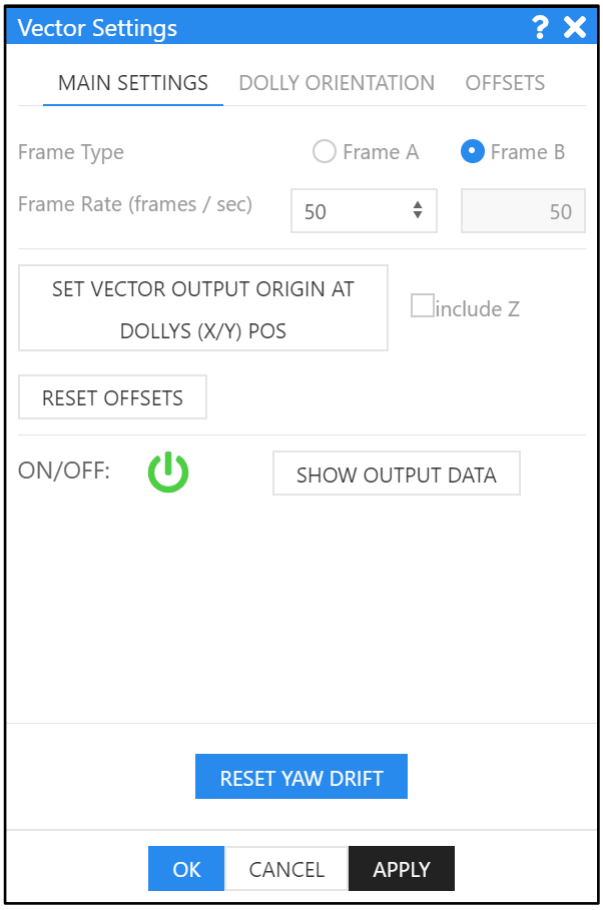
2.2.5.1 SETTINGS

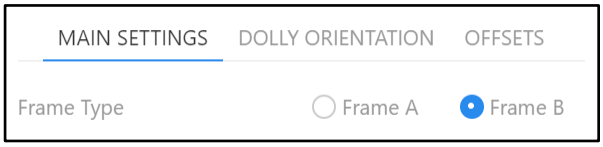
The Vector settings are divided into three major blocks. These are:

- Main settings
- Dolly Orientation
- Offsets



2.2.5.1.1 MAIN SETTINGS – FRAME TYPE

In this window, the frame type can be chosen.



Frame A:

It is not recommended to use this frame type in combination with a FD+. If this frame type is necessary, please contact support first.

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Frame B:

Frame layout:

Tag-Name	H	L	X_t	Y_t	Z_t	Pitch	Roll	Yaw	Z	F	CRC
Byte-Offset:	0	2	4	8	12	16	20	24	28	30	32

Legend

Tag	Name	Datatype	Units	Description
H	Header	UINT16	[1]	Frame identification bytes, Default: 0x56 0x53
L	Length	UINT16	[1]	Total length in bytes; Type A: 0x29, Type B: 0x21
X_t	X coord	FLOAT32	[mm]	Camera X position
Y_t	Y coord	FLOAT32	[mm]	Camera Y position
Z_t	Z coord	FLOAT32	[mm]	Camera Z position
Pitch	Y rot	INT32	[1/1000°]	Camera rotation around Y
Roll	X rot	INT32	[1/1000°]	Camera rotation around X
Yaw	Z rot	INT32	[1/1000°]	Camera rotation around Z
Z	Zoom	UINT16	[1]	Zoom value (wide to tele) 0 .. 65535
F	Focus	UINT16	[1]	Focus value (near to far) 0 .. 65535
CRC	Checksum	UINT8	[1]	Checksum (Sum of bytes 1..33) modulo 256

2.2.5.1.1.1 MAIN SETTINGS – FRAME RATE

The frame rate defines, how many tracking data packets will be provided per second. This can also be automatically achieved by connecting a gen-lock signal to the control station.

On K-Bus systems (til SC250H) it is necessary to select the same expected frame rate here, as the received one on the gen-lock input!

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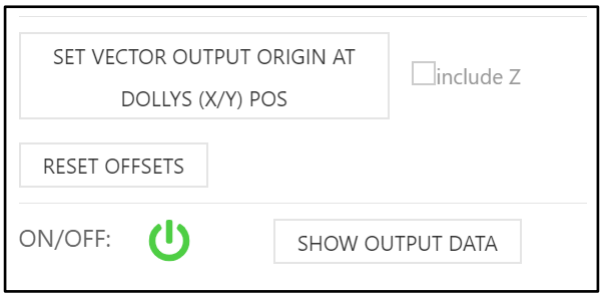
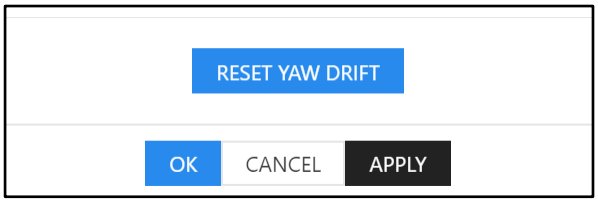
2.2.5.1.2 MAIN SETTINGS – BASIC OPERATIONS



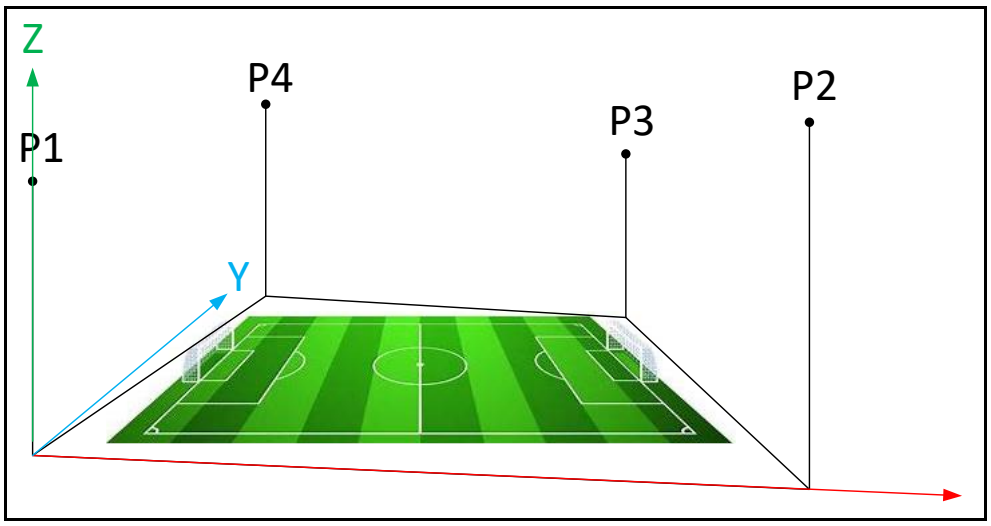


Set Vector output origin:

Spidercam´s coordinate system is right-handed. The given tracking data is in Spidercam´s coordinate space.

The origin or “X/Y/Z (0/0/0)” is defined as the projection of Pulley 01 to the operating ground.

The X-Axis is defined as the line going through measured Pulley 01 and Pulley 02.



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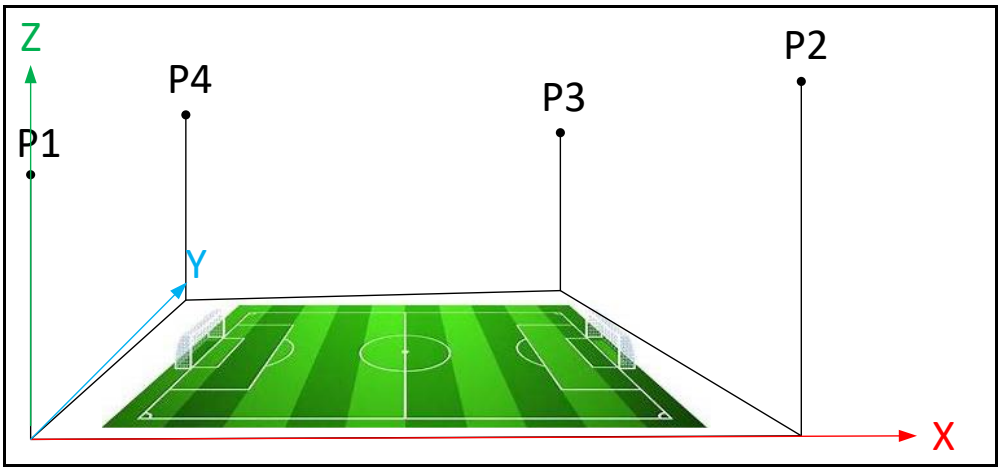
Rotated spidercam venue setup:



Even a rotated place doesn´t necessarily align with any FOP (Field of play) lines!

With [Set Vector output origin to Dollys (X/Y) pos] the coordinate origin can be set to any reachable position inside the venue setup. This is very helpful for the graphics provider, since they typically use the center of the FOP as their origin, and their graphics are built around their origin.

In some rare cases it might be useful to add the Z-position as well. Check the given checkbox “include Z” to set the origin into air, instead of the measured ground.

If the origin wasn´t set correctly, it can be overwritten, by moving the dolly to the correct one and clicking the [Set Vector output origin to Dollys (X/Y) pos] again.

Also, every set origin can be cleared, by clicking [RESET OFFSETS] button.

Use the “ON/OFF” switch to switch Vector outputs on or off. The color of the button gives a feedback about the current state

…Vector is OFF

…Vector is ON

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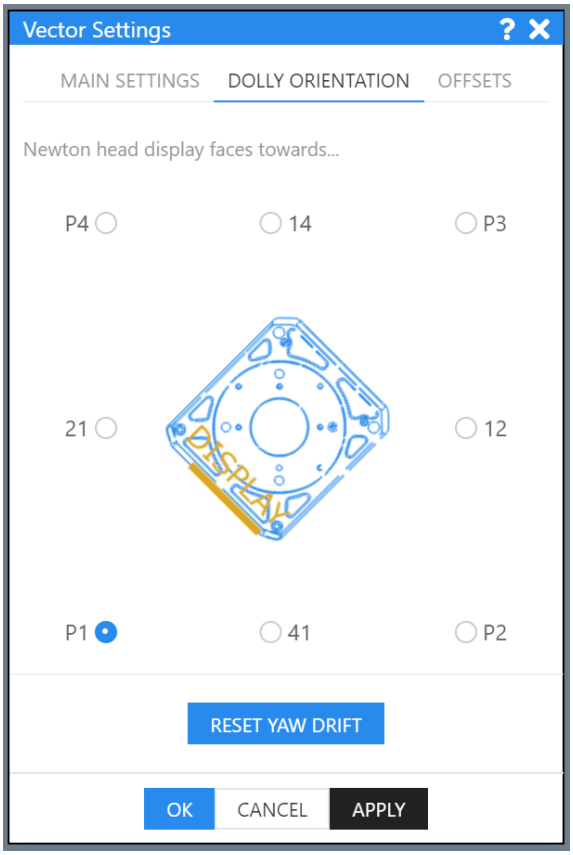
To see the current results of the vector output, use the “Show output data” button. It opens another window, displaying the live vector data, as it would be received by any graphics provider. See 2.3.2 Checking Vector output for more information.

After setting the coordinate origin, it is useful to clear any yaw offsets in the system. This can be achieved by clicking [Reset yaw drift] button.

Use [OK] or [APPLY] to save any changes in the system. Use [CANCEL] to dismiss any changes and to close the vector settings window.

2.2.5.1.3 ORIENTATION



The orientation block describes, how the dolly – respectively the remote head – is attached to the world coordinate space. The Field dolly and light dolly can be mounted each in four different ways, resulting in 8 different possible settings.

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Important for the setup is, in which direction the Newton head display faces. There are two restrictions.

A field dolly can only have the options “12 – 23 – 34 – 41”

A light dolly can only have the options “P1 – P2 – P3 – P4”

This is given by the mechanics of the dolly suspension.

To determine the right settings, check where the display faces towards and select the corresponding setup.

Example: The light dolly is attached, that Newton display faces towards pulley 1. In this case “P1” should be selected.

It is not necessary to add any additional Yaw offset for the light dolly, after selecting the correct orientation, as it was necessary in older versions!

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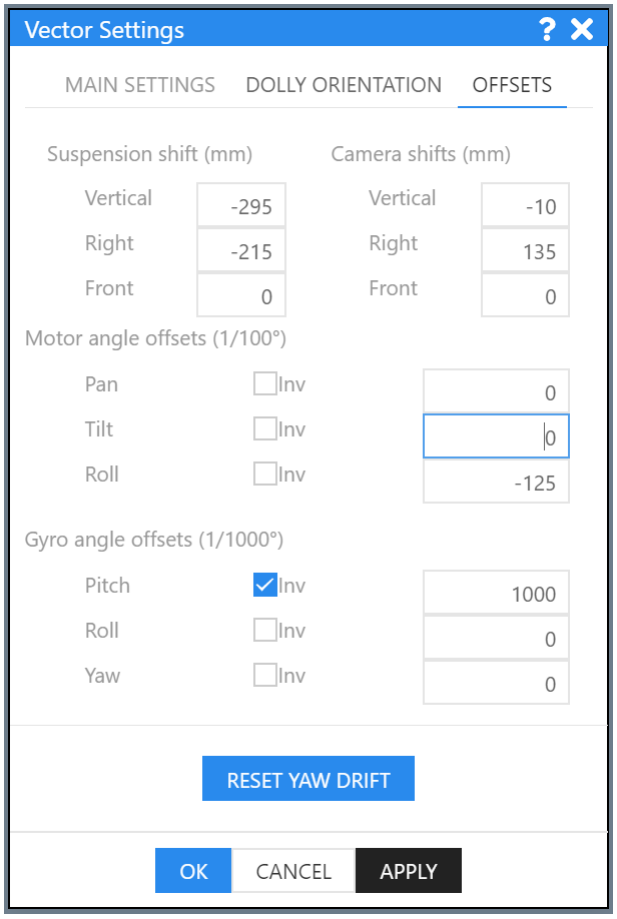
2.2.5.1.4 OFFSETS



In this block, the translational offsets of the Newton head after balancing and, if necessary, the rotational offsets can be adjusted.

Please consider, that motor angles are given in 1/100° while gyro angles are given in 1/1000°

All angular values can be inverted to change the counting direction.

Which distances need to be measured for the arm and camera shifts can be taken from the picture below:

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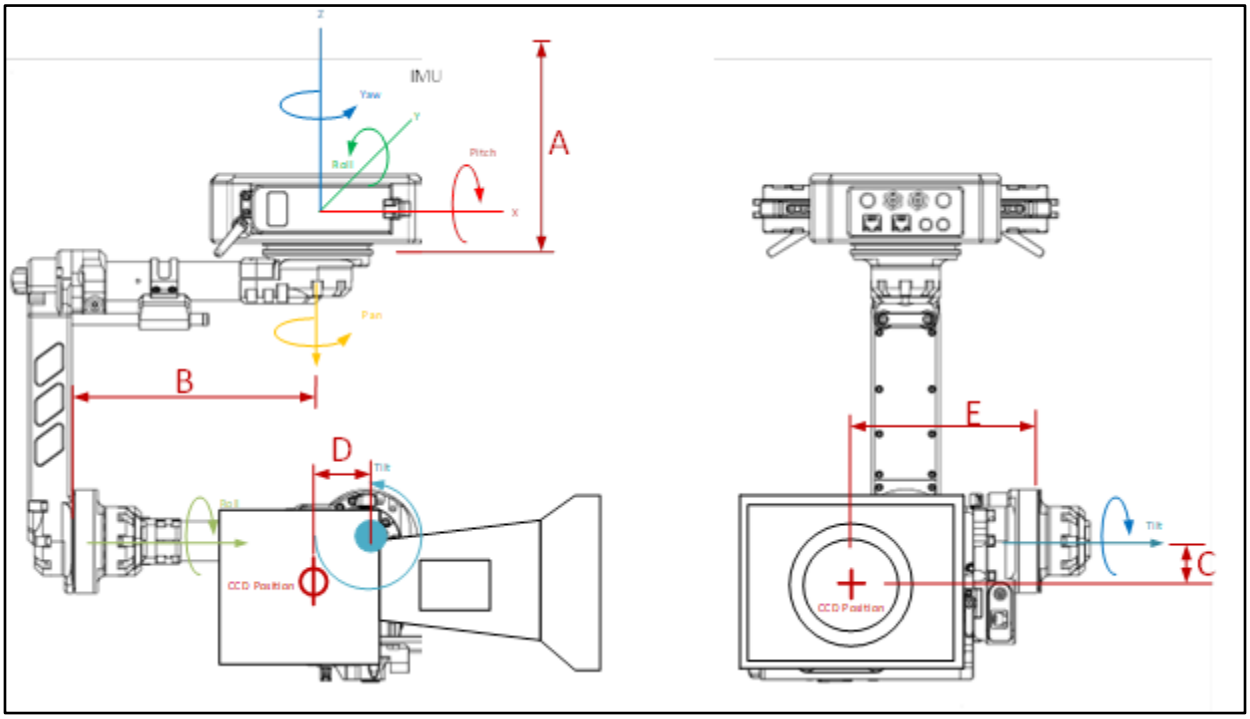
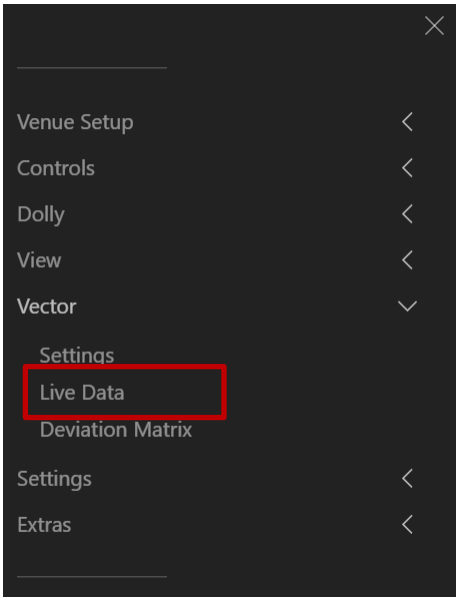


2.2.5.2 Live Data

The provided tracking data can be verified by two different ways. Open Main menu → Vector →Live Data,



or by clicking “Show output data” button in Vector settings main window. Both options will open the following view:

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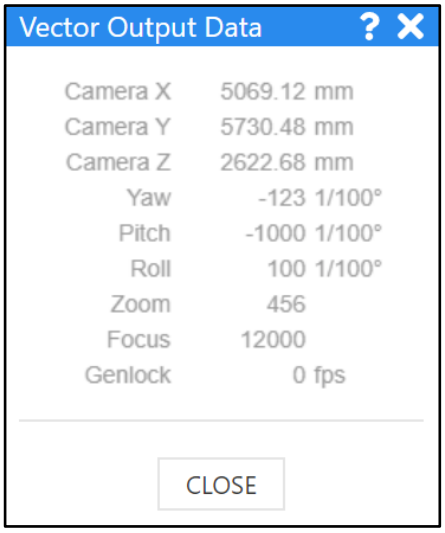

The “current dolly position feedback” in the main header and the “vector output data” can show different values!

Vector output differs from dolly position:

This can have several reasons. The typical case would be a set output origin for Vector, as described in Main settings – basic operations

A second reason could be an active deviation matrix as described in chapter 2.4 Matrix

If the window shows all values at -1, there are no Vector settings loaded to PLC yet, or Vector wasn´t enabled since control station has booted.

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2.2.5.3 Deviation Matrix

The deviation matrix helps to improve the positional accuracy for AR tracking data. A number of points within the flying area will be measured with the tachymeter and saved to the system. Based on this matrix of “corrected” values the system will determine a more precise vector output coordinate.

As establishing a Matrix is time consuming, it is mainly feasible for AR productions over a longer period on the same venue setup, or if a higher accuracy is required.

Depending on the size of the matrix, the measurement time can reach 4h!

The matrix only improves the X, Y and Z-coordinates of the vector output, and cannot counteract external impacts like wind.

The matrix setup is available in Main menu → Vector →Deviation matrix

2.2.5.3.1 New Matrix

To create a new Matrix, the following preconditions are required:

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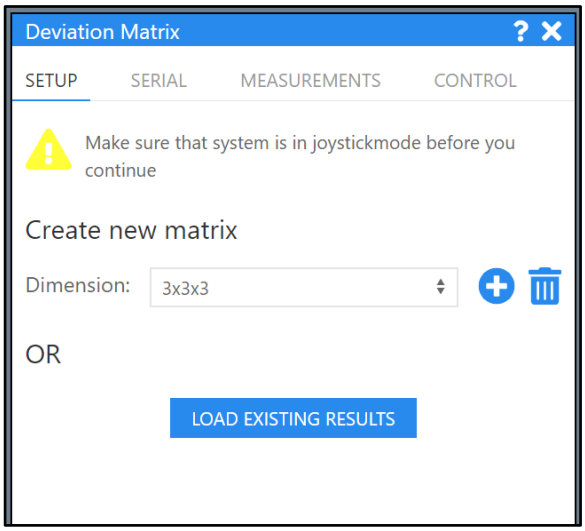
- Venue setup completed
- Borders adjusted (maximum possible flight space determined)
- No obstacles are placed yet
- A position for the theodolite has been found, where the entire flight space can be reached with the laser
- System is in Joystick mode
- The flight space will be available for the entire required measurement time

2.2.5.3.2 MATRIX WINDOW

The matrix window is grouped into four blocks

- Setup
- Serial
- Measurements
- Control



First a size must be defined. The matrix size is chosen based on the number of measurement points in the X-Axis, Y-Axis and Z-Axis. “5x5x3” would represent a matrix with 25 points per level over three levels.

On big venue setups, like cricket fields, it is highly recommended to choose a 7x7x4 matrix or higher.

In studios, where high accuracy is necessary, the matrix size should be 5x5x4 or higher.

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When measurement time becomes a limiting factor, it can be roughly calculated the following way:

Assuming a theodolite with a serial interface is available:

$t_{measurement} = \text{SIZE x } 30\text{s}$

Example, 7x7x4 Matrix:

$t_{measurement} = 7 * 7 * 4 * \ 30s = 5880s = 98\,\text{min} \approx 1h40min$

Without a serial interface between theodolite and computer:

$t_{measurement} = \text{SIZE x } 70\text{s}$

Using previous example:

$t_{measurement} = 7 * 7 * 4 * \ 70s = 13720s \approx 229\,\text{min} \approx 3h50min$

After a size have been chosen, click the  symbol to create the matrix. If it was a mistake, the  symbol can be used to delete the matrix.

If a matrix has been measured on the given venue setup, it is possible to restore the results by clicking the “Load existing results” button.

After creating a matrix the system will respond with the following results:

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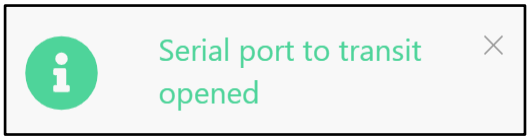

This represents the system checking if a tachymeter is connected. A tachymeter connected via the serial port can automatically transit measurement data to the control Station and shorten the time needed to feed the matrix significantly.

Also every open view shows the matrix points to measure.

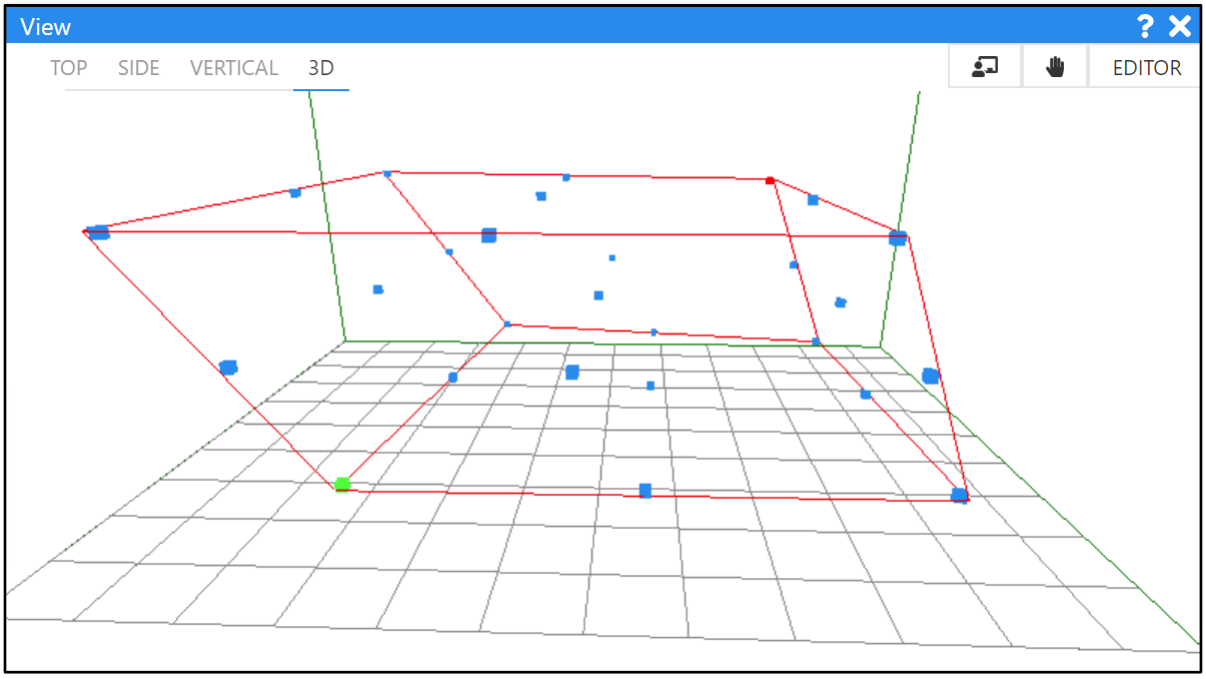

Figure 2-16 shows a venue setup with a 3x3x3 matrix – all matrix points are shown as blue cubes. The first point (0,0,0) is shown as a green cube, the last one (2,2,2) is red.

The matrix is created and can be measured now. The next step would be the measurement of the base line.

2.2.5.4 BASE LINE

Once the matrix is defined and created, the base line needs to be measured. This is comparable with measuring the dolly start position.

Currently, only pulley 1 and pulley 2 are possible for the base measurement. Aim the transit to pulley 1 and set the horizontal angle to 0. Other combinations will be available soon.

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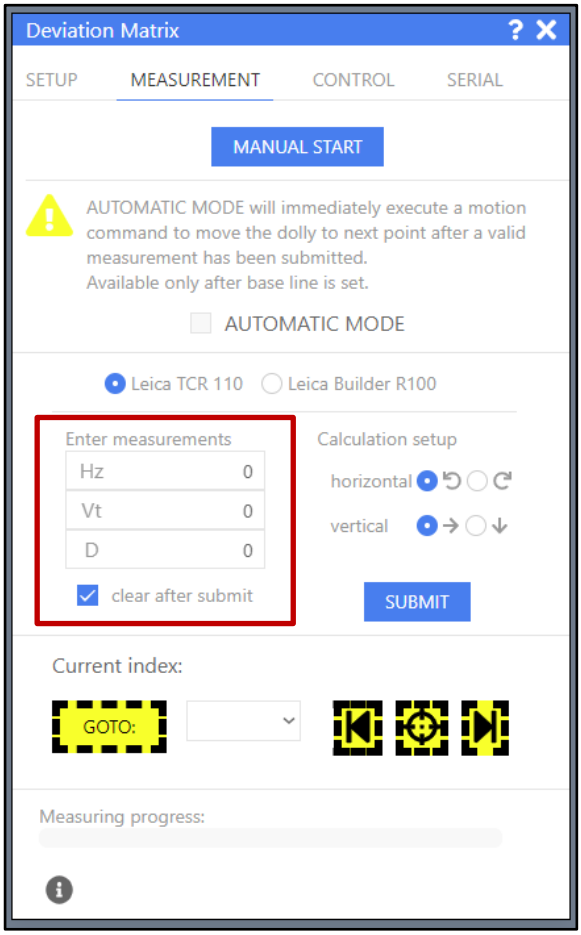
Make sure that the theodolite is in a position, where every matrix point is reachable and also pulley 1 and pulley 2.

There are two options now, to measure the base. If a serial port is connected to the transit, the measurements get directly into the computer by pushing the “DIST” or “M & R” (depending on the model) button on the transit.

In case of no COM port, open the “Measurements” tab in the deviation matrix window and enter the measured values there.



Submit the measured values. The [SUBMIT] button has the same functionality without a serial port, as the [DIST] button on the theodolite.

After measuring pulley 1, there will be a feedback that the first base point has been measured.

After measuring pulley 2, there will be a feedback that the second base point has been measured. Also there will be a confirm dialog, if the matrix measurement should be started.

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By completing the base measurement, the system is ready to feed the matrix with positional deviation values.

2.2.5.5 FEEDING THE MATRIX

If the confirm dialog after measuring the base line has been confirmed, the matrix measurement starts, but it will not move to the first point automatically.

Use the  button to move the current matrix index, which would be 0/0/0 at start. The first point is shown as a green cube in the view. Make sure, that the path to that point is without any obstacles or use the joysticks to move the dolly close to that point. Hit the button when the dolly is close.

If it was cancelled, it is possible to start the measurement by clicking “Start Matrix Measurement”.

Check the “Automatically move to next point” option. If it is set, the dolly will immediately move to first matrix position (green cube), when “Start matrix Measurement” button is clicked.

Clicking any yellow and black button (like  or ) will cause an immediate system movement without further warning. Make sure the flight path is fee of obstacles before clicking!

2.2.5.5.1 INDEX CONTROL

Before the matrix measurement has started, the index will be shown as -1.

Afterwards the index represents the position of a point, where the layout is x,y,z, counting from 0 to size -1.

Example:

- In a 3x3x3 matrix, the point in the center would have the following index:
- Size in X = 3, so lowest x is 0, max x is size-1 = 2, the point in the middle has index 1
- Size in Y = 3, so lowest y is 0, max y is size-1 = 2, the point in the middle has index 1
- Size in Z = 3, so lowest z is 0, max z is size-1 = 2, the point in the middle has index 1

  The index of the center has an index of: x-index, y-index, z-index = 1,1,1

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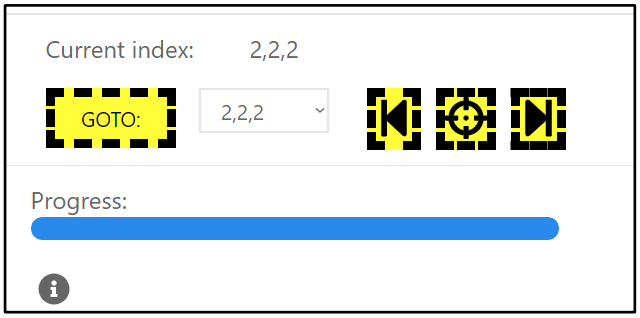
	Use this button to move to previous matrix point
	Use this button to move to current matrix point
	Use this button to move to next matrix point
	Use this button to move to a selected index

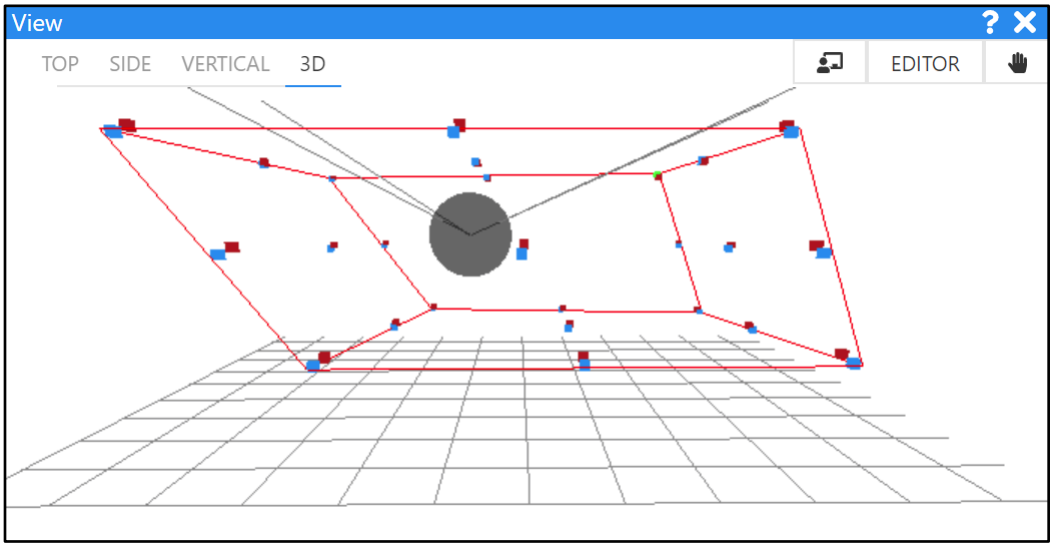
Feeding the matrix is a straight forward process. If the option “Automatically move to next point” is active, the system moves the dolly to the next matrix point, after the current point has been measured. The trigger is the “DIST” button on the transit, or the “submit” button in the measurements block.



The progress bar indicates roughly how many points have been already measured.

Continue this step until the last position (red cube in view) is measured.

Every matrix point in the view should now also have a neighbour cube in maroon color, showing the measured coordinate compared to the calculated system coordinate.



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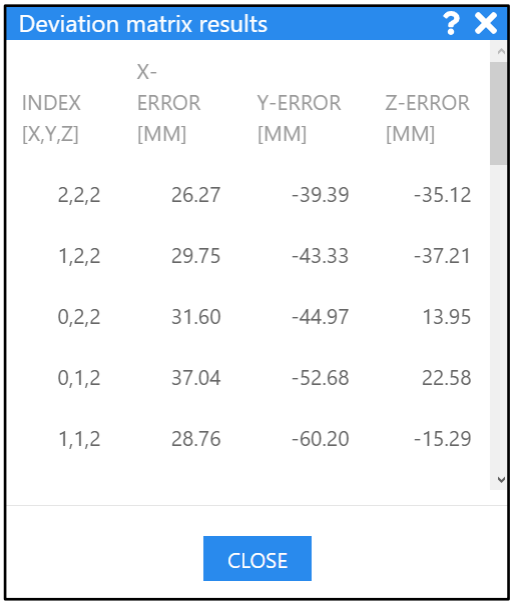
If the results look plausible, continue with 2.4.5 Save matrix. If some measurements went wrong, continue with 2.4.4 Correcting indicidual matrix points

2.2.5.6 CORRECTING INDIVIDUAL MATRIX POINTS

When all matrix points are measured, the results can be viewed in “Control” tab “Show results”.



The results window shows only the error between the system position and the measured theodolite position.

If some values don´t look correct, it might be useful to remeasure them by using the following tools:

Disable the option “Automatically move to next point”

Use the index control buttons to move to matrix points, where the measurements look wrong.

By adding new measurements to the point, existing measurements will be overwritten with the latest result.

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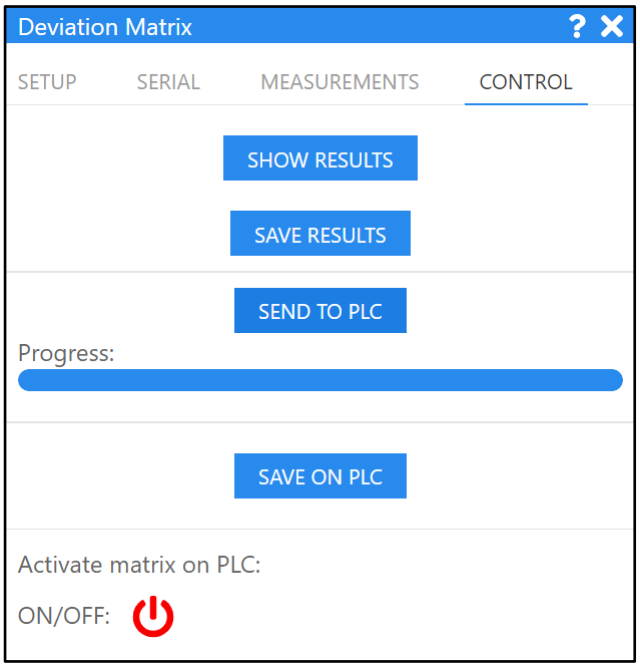
2.2.5.7 SAVE MATRIX



Use the [Show results] button to open the deviation matrix results window.

Use the [Save results] button to save the matrix in the middleware.

Use the [Send to PLC] button to send the saved results to the PLC in control station.

Sending the results to PLC can take several seconds, independent of the size of the matrix. The progress bar shows how much has been transmitted

After a successful transmission, the system will show the following notification:

To keep the results on the PLC, use the “Save on PLC” button. The system will give the following feedback:

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2.2.5.8 Activate Matrix

Finally the matrix can be activated by using the ON/OFF button.

…Matrix correction is OFF

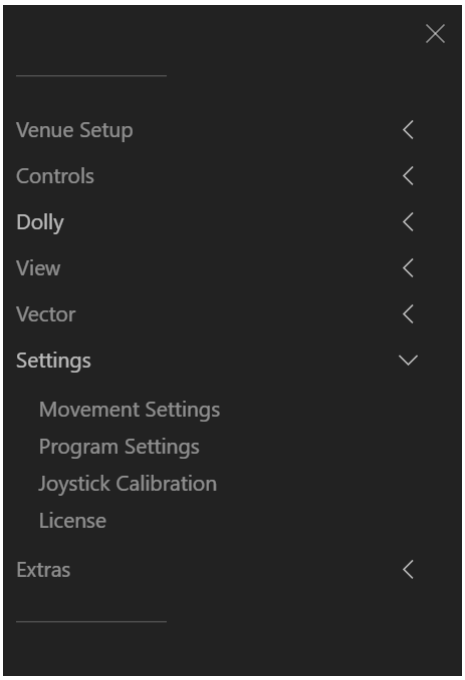
…Matrix correction is ON

2.2.5.9 Checking Matrix output

The results of the calculation can be verified, by moving the dolly close to a matrix point and compare the vector output (see 2.3.2) with system´s dolly position. The difference should match the deviation matrix results error values (see 2.4.4) on that index.

2.2.6 Settings

“Settings” allow you to access various system settings, divided into four parts:



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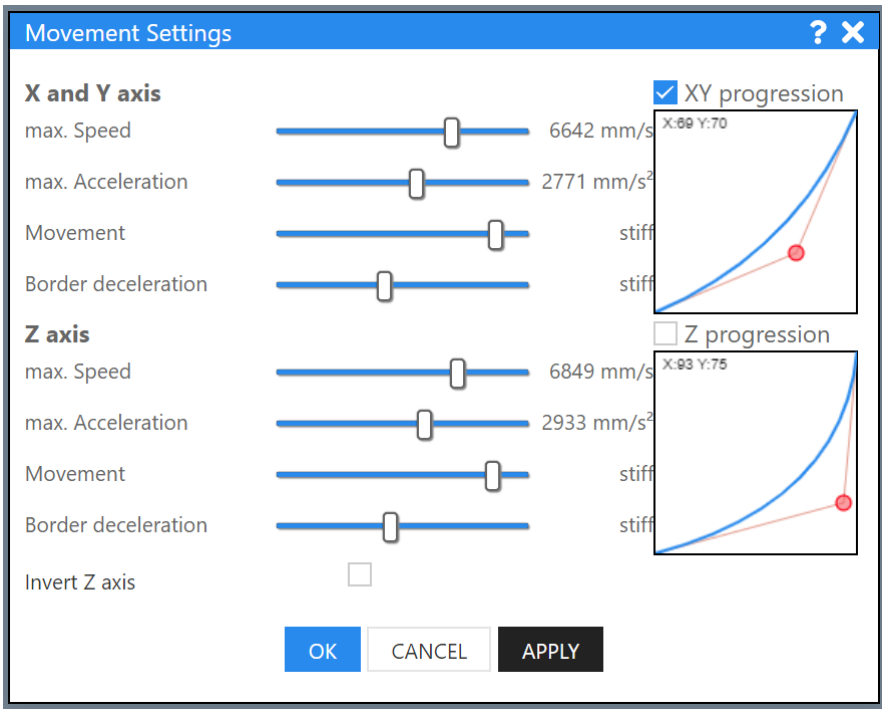
2.2.6.1 Movement Settings



Movement settings allow you to adjust several options directly impacting the dolly movement.

X and Y axis: The following settings apply to movement in the X and Y axis.

“max. Speed”: You can lower the systems maximum speed here. The maximum speed depends on the used system and cannot be exceeded. The value is set in mm/s.

“max. Acceleration”: You can adjust the systems maximum acceleration. The maximum acceleration depends on the used system and cannot be exceeded. The value is set in mm/s².

“Movement”: You can adjust how stiff or smooth the system will act when accelerating. A very smooth settings allows more stable moves, while stiff settings allow quicker reaction.

“Border deceleration”: You can adjust how smooth or stiff the system decelerates when approaching a border or obstacle. A smooth setting will gradually decelerate the system when approaching a border (and allow more stable moves), while a stiff setting will allow the system to keep higher speeds when approaching a border (and coming to a harder stop in shorter time).

Z axis: The following settings apply to movement in Z axis.

“max. Speed”: You can lower the systems maximum speed here. The maximum speed depends on the used system and cannot be exceeded. The value is set in mm/s.

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“max. Acceleration”: You can adjust the systems maximum acceleration. The maximum acceleration depends on the used system and cannot be exceeded. The value is set in mm/s².

“Movement”: You can adjust how stiff or smooth the system will act when accelerating. A very smooth settings allows more stable moves, while stiff settings allow quicker reaction.

“Border deceleration”: You can adjust how smooth or stiff the system decelerates when approaching a border or obstacle. A smooth setting will gradually decelerate the system when approaching a border (and allow more stable moves), while a stiff setting will allow the system to keep higher speeds when approaching a border (and coming to a harder stop in shorter time).

“Invert Z axis”: Activating the checkbox will invert joystick input for the Z-axis. “Inverted” means moving the joystick “up” will cause the dolly to go “down” (and vice versa). Whenever activating joystick mode a warning will appear to remind you whether the Z-axis is inverted or not.

XY progression

By dragging the red point in the graphic, you can adjust the joystick progression; meaning altering how directly the system reacts to joystick inputs. Activate the checkbox to use your settings instead of the standard (linear) progression. This value only applies to X and Y axis.

Z progression

By dragging the red point in the graphic, you can adjust the joystick progression; meaning altering how directly the system reacts to joystick inputs. Activate the checkbox to use your settings instead of the standard (linear) progression. This value only applies to Z axis.

OK, CANCEL, APPLY

“OK” will apply all changes made so far and close the “Movement settings” window.

“Cancel” will discard any changes that haven’t been applied yet and close the “Movement settings” window.

“Apply” will apply the current changes, but not close the “Movement settings” window.

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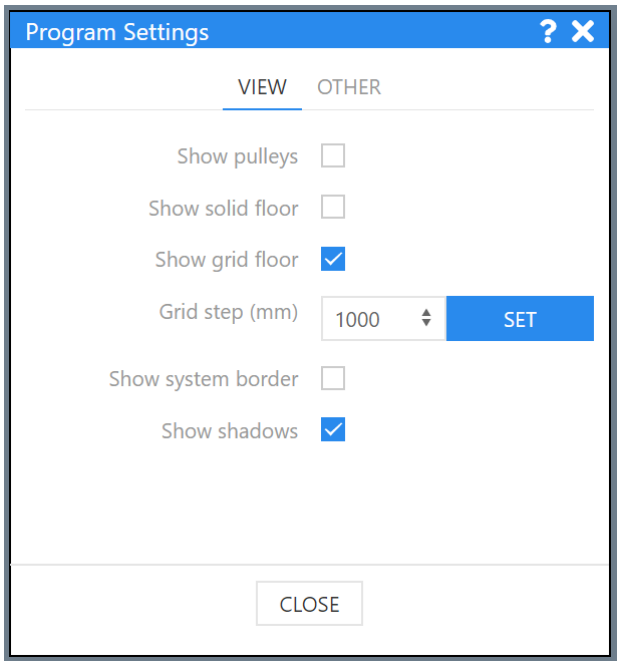
2.2.6.2 PROGRAM SETTINGS



Program settings alter the “View” windows of Flyit, and mainly consist of checkboxes.

Show Pulleys

Activate this checkbox to make the Pulleys visible in all the view windows. They will be labelled “P1” through “P4” respectively.

Show solid floor

Activate this checkbox to make the floor (ground level) visible in the 3D-view. It will appear as a light blue plane on the bottom of the flying area. You need a solid floor to show shadows (see below).

Show grid floor

Activate this checkbox to overlay a grid on the floor (ground level) in all the view windows.

Grid step

Use this to change the grid steps. Enter a number in mm and click “set” to apply. Needs an activated “Show grid floor” to take effect.

Show system border

Activate this checkbox to show the system border in all view windows. The system border will be shown in purple and cannot be changed by user inputs.

Show shadows

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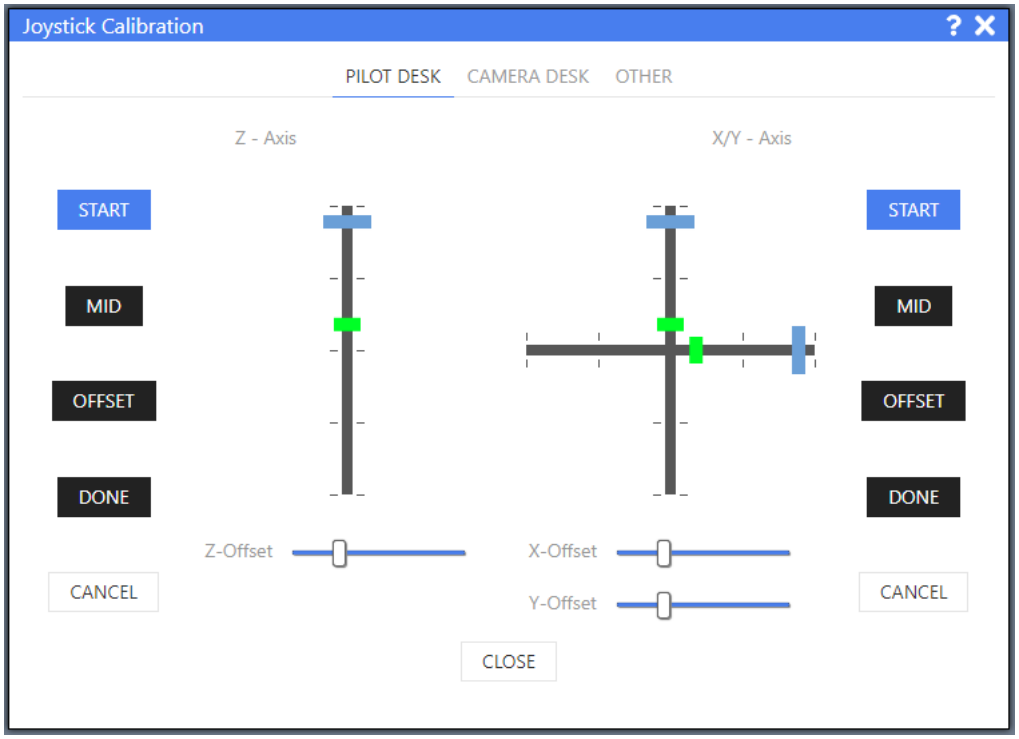
Activate this checkbox to allow obstacles to cast a shadow on the floor. This helps to better determine obstacle heights and position in space. Needs an activated “Show solid floor” to take effect.

Close

Click close to close the window. Any changes are automatically applied.

2.2.6.3 JOYSTICK CALIBRATION



Use this menu to calibrate the systems joysticks.

2.2.6.3.1 PILOT DESK

Analogue to the physical “pilot desk” the left part is to calibrate the Z-Axis stick (represented by a single vertical line), and the right part to calibrate the X-Y- axis stick (represented by a vertical and horizontal line in a cross shape). The visual feedback shows the current joystick position, the mid range (“dead zone”) and maximum amplitude.

Click “Start” on the respective joystick you wish to calibrate and follow the guide until you are done. You will be asked to perform the following steps:

- Determine the joystick “zero” by releasing the joystick
- Determine the maximum amplitude by pushing the joystick fully up and down several times (Z-axis) or fully up and down as well as left and right (X/Y axis)

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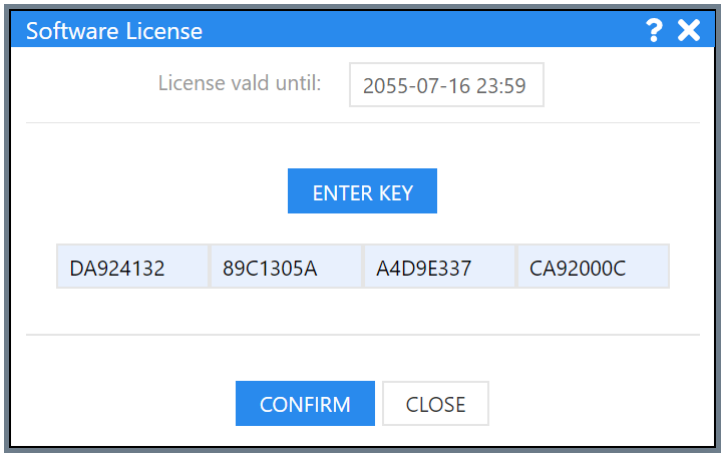
- Define the offset by adjusting the slider below the visual feedback graphic

When you are done click “Close” to close the window

2.2.6.3.2 OTHER

Reserved for later use.

2.2.6.4 LICENSE



This window shows the current license validity and allows you to enter a new license key.

License valid until:

This field shows the expiration date of the current license.

ENTER KEY

Enter the software license key here.

CONFIRM

Apply the new key.

CLOSE

Close the window. This will not apply any changes, so make sure to click “CONFIRM” first.

2.2.7 EXTRAS

The extras menu contains 4 blocks:

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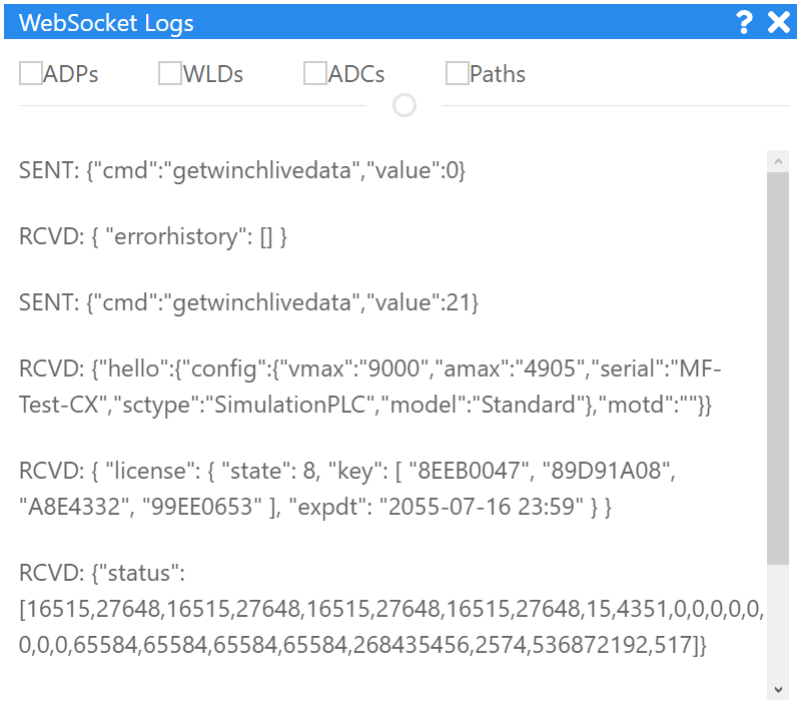
- Log window
- Motion playback (see 2.2 Motion playback)
- Cancel command (see 3.7.7.2 Cancel command)
- About (see 3.7.7.3 About)

2.2.7.1 Log window

The log window is primary for debugging purposes and support crew.

The logger needs significant system resources to work. Use the logger only for debugging purposes. Keeping the logger active during a production, could slow down and delay the view!

It shows raw messages between middle ware and GUI.



The log window has some filters active to prevent unnecessary message overloading of the GUI.

In case that some specific, by default filtered values, should be shown, set the related checkbox.

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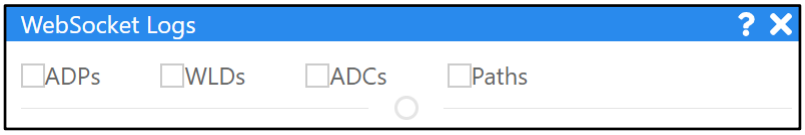

Legend:

ADP Actual Dolly Position (gets typically updated with 60fps)

WLD Winch Live Data (gets typically updated with 10fps)

ADC Analog Digital Conversion (is only active during console calibration and gets typically updated with 20fps)

Paths Motion playback paths and its progress (progress is only active during path playback, but updates also with 60fps)

2.2.7.2 Motion Playback

The motion playback feature allows recording of movements and group them into sequences. Recorded paths can´t be modified. Motion playback is useful when there is at least one move, which needs to be repeated several times during a production.

Currently it is only possible to playback X-Y-Z coordinates of the dolly. The interface to the remote head is still under development.

It is available in main menu→Extras→Motion Playback

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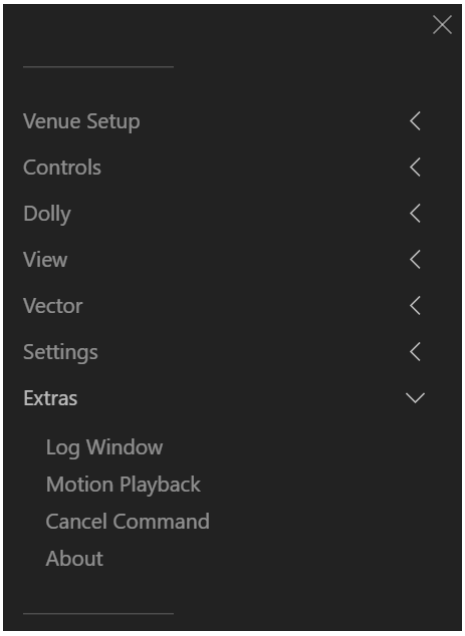
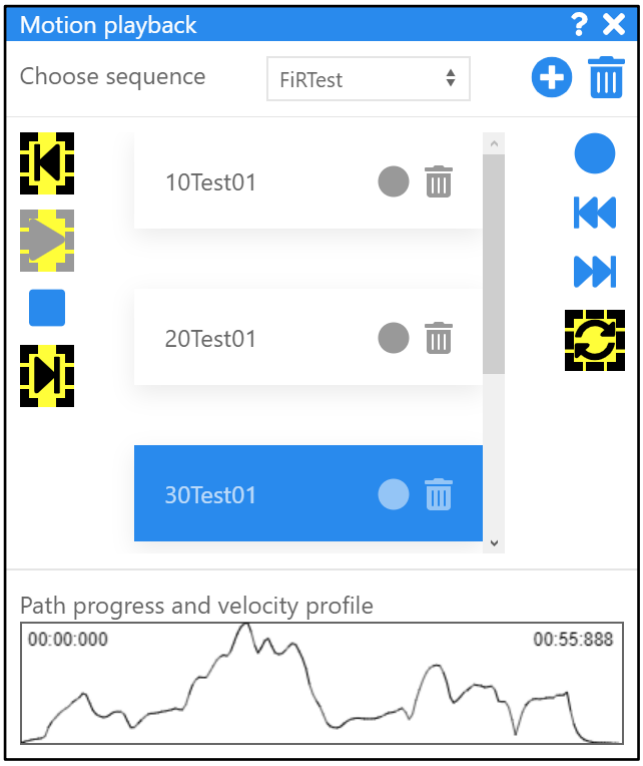


The feature hasn´t changed from the existing version, but the user interface was face lifted.

Overview



The menu contains motion buttons (colored yellow and black), which will immediately execute a movement command. Always make sure that you are aware of what will happen!

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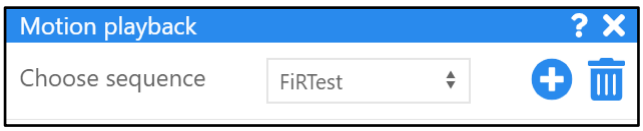
2.2.7.2.1 SEQUENCES

Basically, moves are grouped in sequences. Every sequence represents a file folder on the computer, containing the recorded moves while the sequence was selected.

It is highly recommended to create a new sequence on a new venue setup and record moves to it. Using moves/sequences from other venue setups might cause unexpected play back behaviour!

2.2.7.2.1.1 ADD/DELETE/SELECT SEQUENCES



A click on the  button opens a dialog to enter the name of the new sequence. Only numbers and letters are allowed to name a sequence.

To select an existing sequence, use the combo box to choose one of the listed sequences.

If a sequence should be deleted, click the  button to open a confirm dialog where the delete process can be confirmed or rejected.

Avoid deleting existing sequences from other venue setups. They might get reused on other systems on the corresponding venue setup. The delete function is basically to delete sequences with type errors and to remove test sequences!

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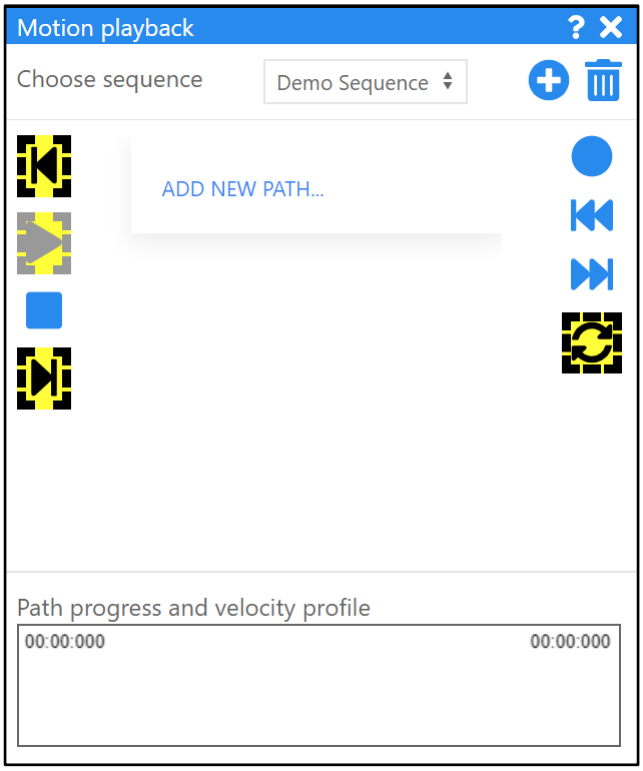
After creating a new sequence, the system will set the new one as default and will now always load that sequence, except another one will be chosen.

An empty sequence is shown in figure 2-4



An empty sequence has no path files in it, so also the path progress and velocity profile is empty.

But everything is prepared to add a move to that sequence.

2.2.7.2.2 RECORD A NEW MOVE

Click the [Add new path:] link to add new path file. A popup will open and asks for the name of the new path:

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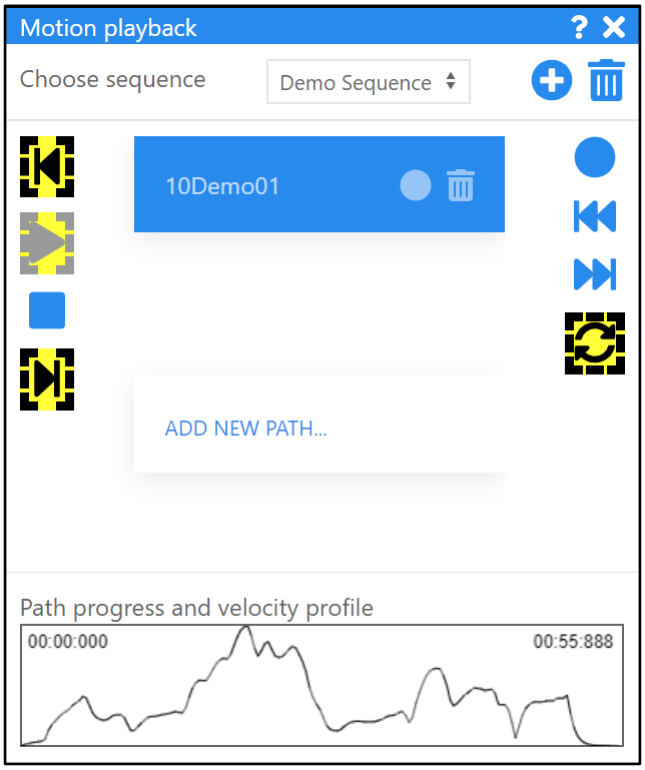
Currently, all files in a sequence are ordered by their name. It is highly recommended to add a number code, which allows inserting later. Example: 10MyShow01, 20MyShow01. This allows to later add a path between these by creating 15MyShow01

After a new path file has been created, a move can be recorded.

Use the button to record a movement. While recording is active, the record button is red.

To stop recording press the record button again.

2.2.7.2.3 MOVE OVERVIEW



The result of a recorded path is shown in Path progress and velocity profile and in all views.

The velocity profile shows the velocity of the dolly at specific path progress, in a range from 0 to 100%.

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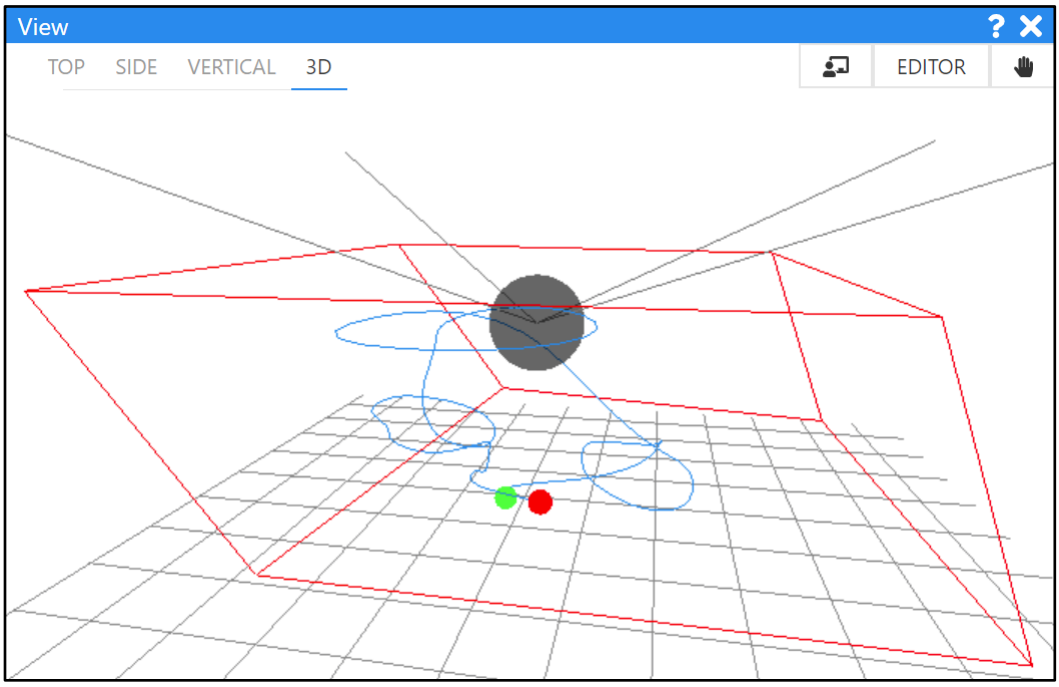
Also the elapsed time on the left as the remaining time on the right is visible. If the movement hasn´t started, the remaining time represents the entire playback time.

In the view, the path is rendered as a blue line. A green sphere shows the start position of the recorded move, the red sphere shows the last position of the recorded path as shown in figure 2-8.

The previous button and the next button can be used to switch between recorded paths, as long as no movement is active. When the previous command reaches the first one in the list, it will select the last one and continues stepping backwards through the path list. The next button continues stepping forward and jumps to the first entry after reaching the last path in the list.

Alternatively, recordings can be selected by clicking on the name in the list.

Figure



When at least one path has been recorded, the system is able to play back it and the play button will be inactive.

2.2.7.2.4 PLAY MOVE (AUTOMATED MOVE)

Before it is possible to play a move, the dolly must be on its start position.

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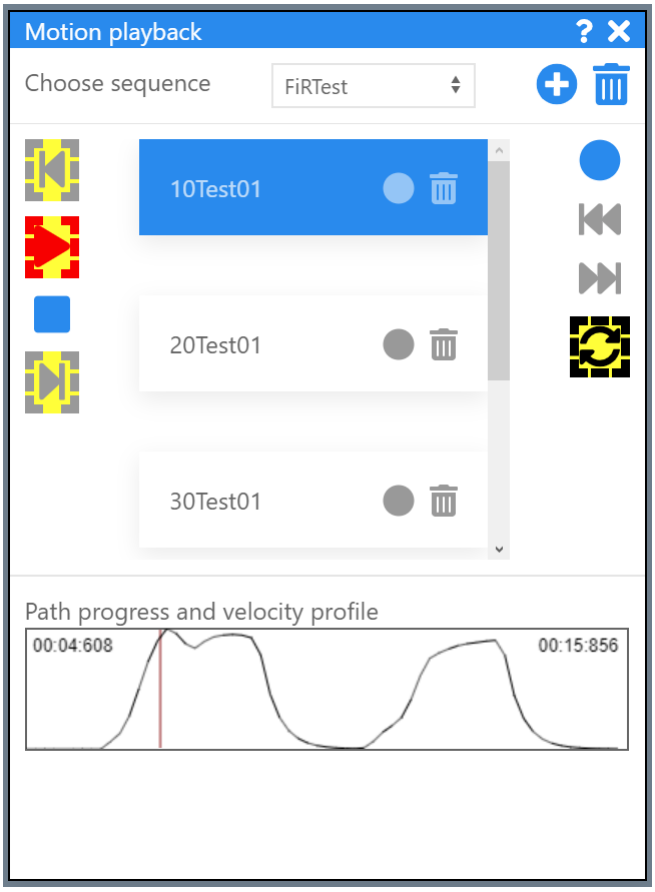
Use move to start button  to bring the dolly to the start position (green sphere in figure 2-8) of a path. The dolly will use the shortest path from its actual position to the start position.

At start position, the play button will become active. Click it to start the playback and the play button will become highlighted (see figure 2-9)

During all movements, the stop button  is active and can be used to interrupt movements. Also using the joysticks during any movements will interrupt them and the dolly follows the joystick inputs. An error message will inform the user about any interruption.

During playback, the elapsed and remaining time will be updated in real time. A red bar on the velocity profile also shows the progress of a current move. This is very helpful, when there are recorded phases with 0 velocity. It helps the operator to determine the current playback state (see figure 2-9).



2.2.7.2.5 DELETE MOVE

Any recordings can be deleted, by clicking the  icon on the selected path. A deleted path can´t be restored.

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2.2.7.2.6 SEQUENCE: LOOP

The loop button  can be used to activate and stop a playback loop.

The loop begins with the current selected path and moves the dolly to its start position. Once reached, playback automatically starts. When the end position has been reached, the next path will be loaded and the dolly moves to its start position, starts playback, and so on...

The loop will run until the loop button will be clicked again. After the click, the last step will be finished. If the dolly is moving to a start position it will stop at its start position. If a playback is running, it finishes the current path playback

2.2.7.3 CANCEL COMMAND

In some very cases every command send to the middle ware leads to an “C2 is already executing a command” error. In this case; when the program is stuck in a specific state, the current executed command can be canceled with [Cancel Command]. C2 is forced back into “Idle” mode listening for new incoming commands.

2.2.7.4 ABOUT

The about window shows the GUI software version information.

It gives an overview of added features to the previous version and also a list of fixed bugs, experienced in previous version.

The list contains also a block with older versions and its feature and bug list.

This helps to compare the versions with the used software and should help finding and fixing bugs faster.

Figure 3-8 shows an example of the about window.

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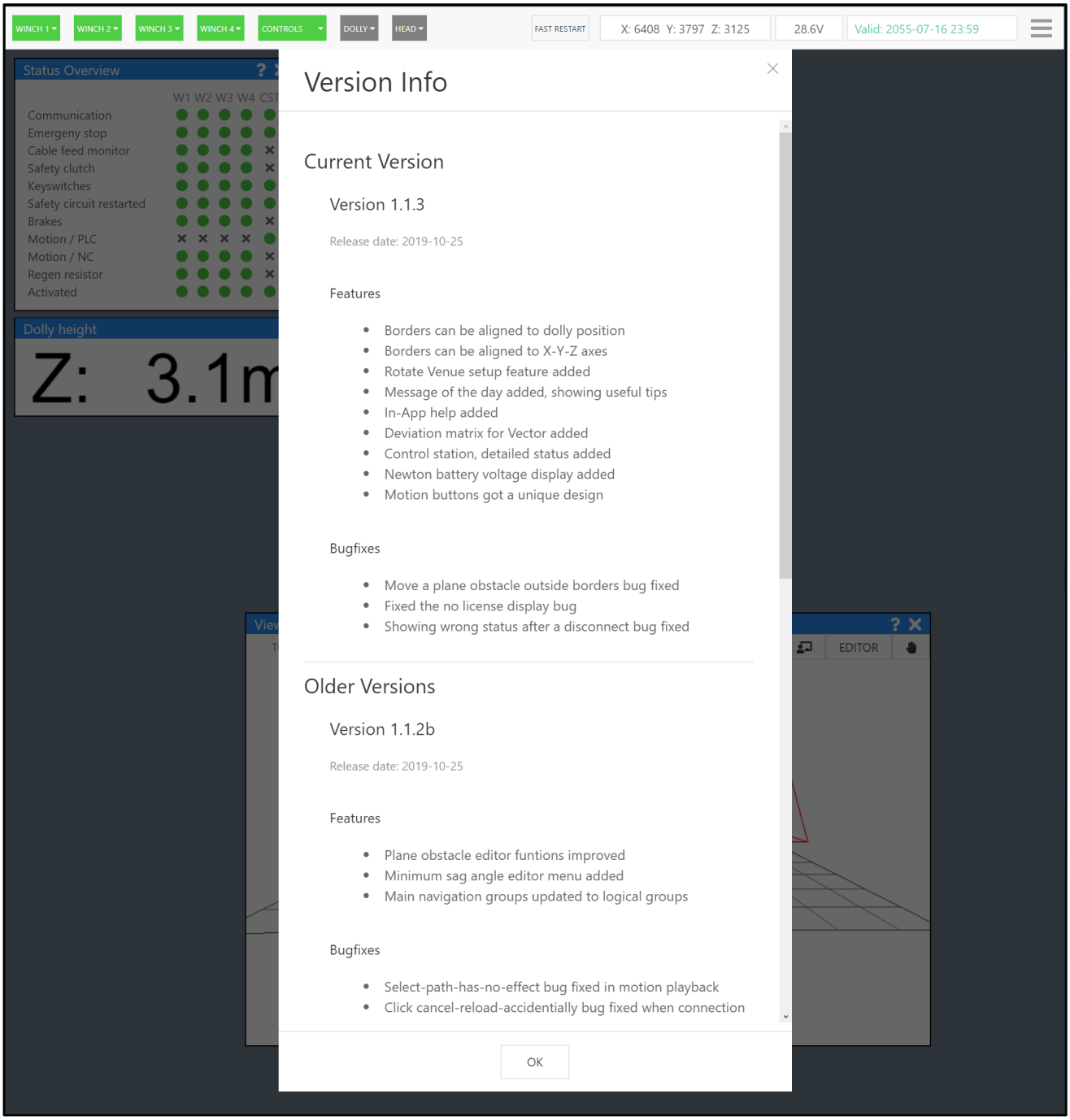

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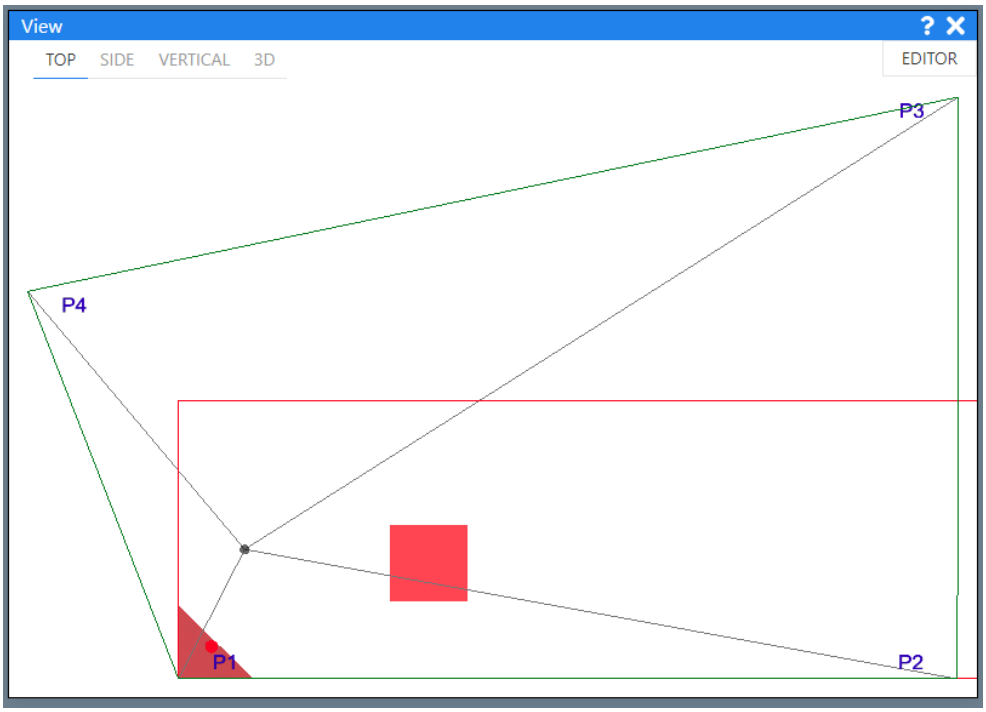
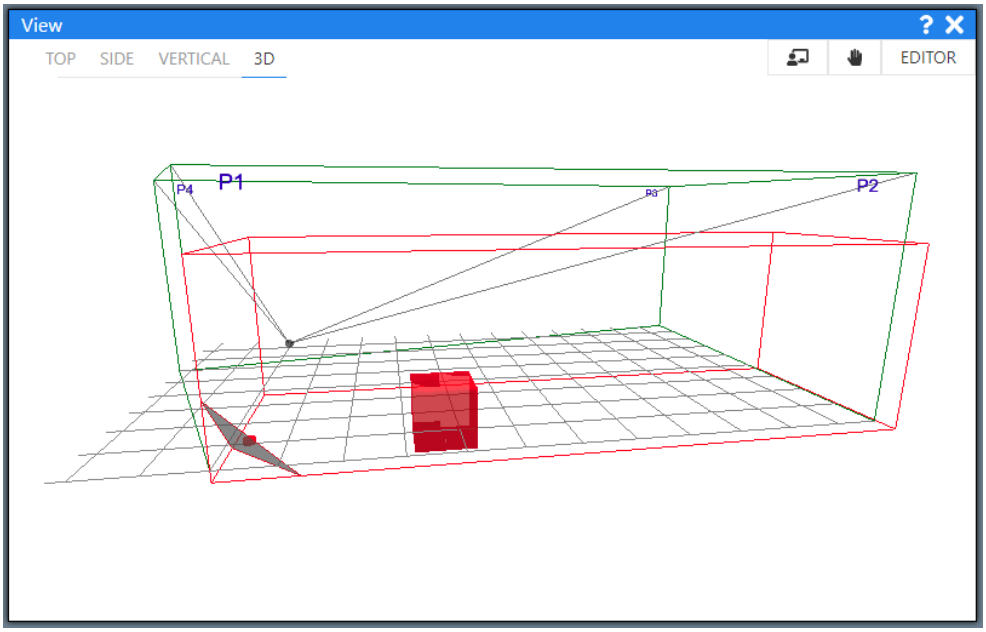
3 View and Editor

3.1 View

The View visualizes the venue setup including all components, like pulleys, borders, dolly, and border obstacles. Its basic function is like the view window in older versions but has a significantly broader range of functions in FlyIt 3.0.





In each instance of the View, you can choose the projection. Three orthographic projections

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- TOP view <1>
- SIDE view <2>
- VERTICAL view <3>

and one perspective projection

- 3D view <4>

can be chosen by switching the top left tabs or pressing the respective key on the keyboard.

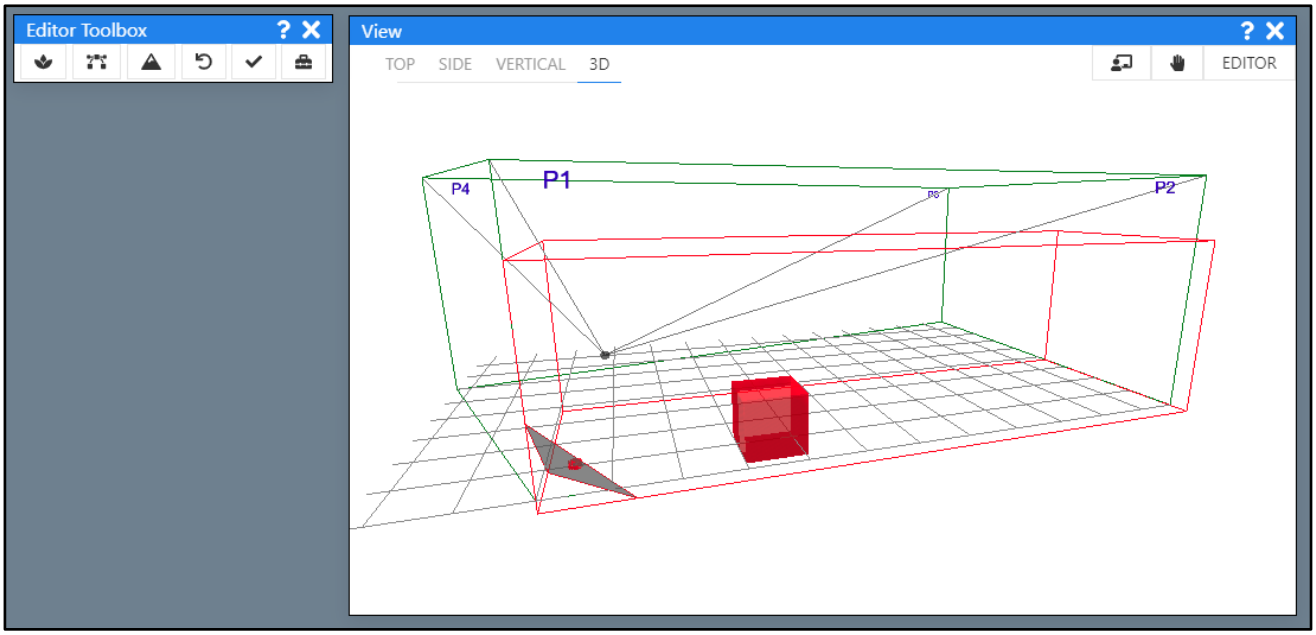
In the 3D view, you can change the point of view. This is activated by holding <W> on the keyboard or clicking the button on the top right of each window (visible in 3D view only). Dragging the mouse rotates around (left-click-hold), zooms, (wheel) or shifts (right-click-hold) the point of view.

To reset the point of view, click the button (visible in 3D view only).

Display options to show and hide the following elements can be accessed in program settings menu, see Program settings:

- Pulleys
- System borders
- Solid floor
- Grid floor

3.2 EDITOR



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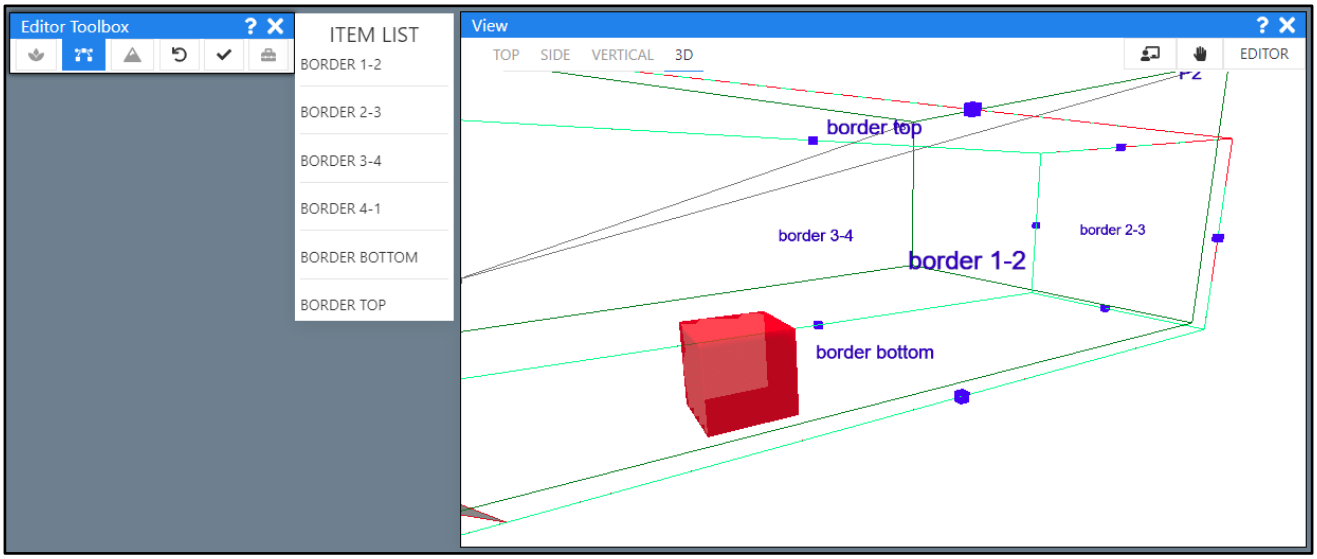
The Editor is the main tool for editing borders and obstacles in the venue setup. After clicking the <EDITOR> button in any View, a new window 'Editor Toolbox' will appear. This toolbox contains all control resources to initiate adding, removing or editing of borders and border obstacles. Changes can be applied either by entering numbers in the respective controls inside the Editor Toolbox, or by mouse control in the graphical interface in any View. Regardless where and how changes are applied, all numbers in Editor Toolbox and borders and obstacle display in all Views will be always updated in real time. If borders or obstacles are selected, the Editor will extend vertically and reveal the Inspector, which provides access to the object's parameters.

3.2.1.1 BORDER SETUP

Activate the border setup by clicking the  button.



Borders in FlyIt 3.0 will no longer being set up by entering discrete numbers of the corners, as in older versions. Borders are defined as planes which limit the fly space. In total, 6 planes aka borders are part of each venue setup:

- border 1-2: vertical, between pulleys 1 and 2
- border 2-3: vertical, between pulleys 2 and 3
- border 3-4: vertical, between pulleys 3 and 4
- border 4-1: vertical, between pulleys 4 and 1
- border bottom: horizontal, on the floor
- border top: horizontal, upper border

Borders exist twice, a) as system borders which cannot be edited and are defined by the hardware parameters of the system, and b) as user borders, which can be edited as described below. User borders cannot be moved anywhere outside the system border bounding.

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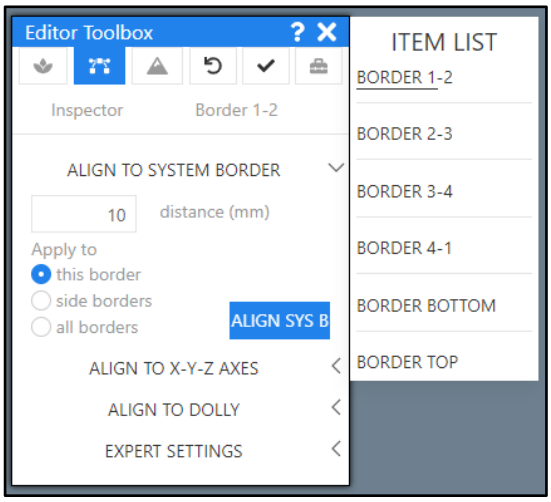
If border setup is enabled, a border list will grow from the right side of the Editor. Simultaneously, border names and small blue handles will appear in the Views.

Setup in the graphical interface:

- Click a border name in a View or in the border list. A Translation Gizmo (see Gizmos) will appear; use gizmo to **shift** the border.
- Click a blue handle, a gizmo will appear; use gizmo to **tilt** the border.
- Borders cannot be shifted or tilted beyond the dolly position.
- Unselect a chosen border name or handle by double-clicking in the View.

Setup in the Inspector:

- Click a border name in a View or in the border list. The Inspector will show up in the Editor toolbox.



Align to system border:

User borders will be aligned to the system borders with definable distance. Can be applied to either:

- the currently selected border (this border),
- all side (vertical) borders or
- all borders at a time.

As the System bottom border is always zero, the minimum flying height is set by applying this control to the bottom border and defining the desired distance.

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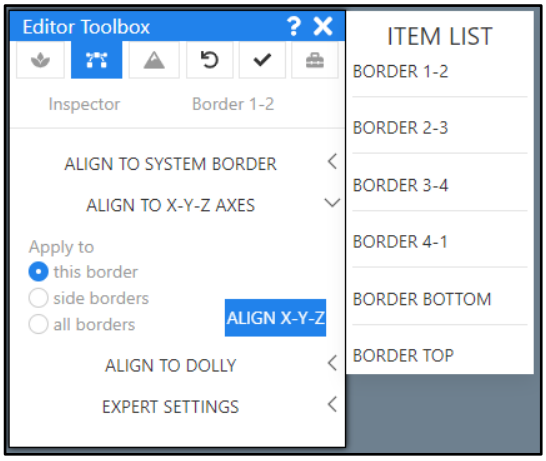
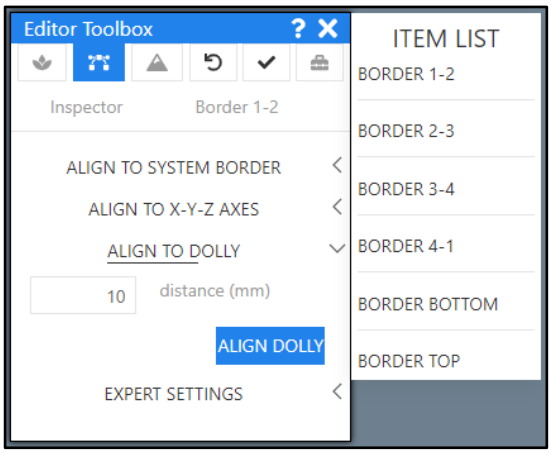


Align to X-Y-Z axes:

User borders will be aligned to the main axes (X, Y, Z). This can help to achieve a symmetrical flying area. Can be applied to multiple borders, too.

Borders will be rotated around their center point; this operation may result in User borders sticking out of System borders in adverse circumstances. If this has happened, use <Align to system border> to restore.



Align to Dolly:

User border will be shifted towards the Dolly at a definable distance.

This can help to set up borders by moving the Dolly to maximum positions in the flying field and set borders accordingly.

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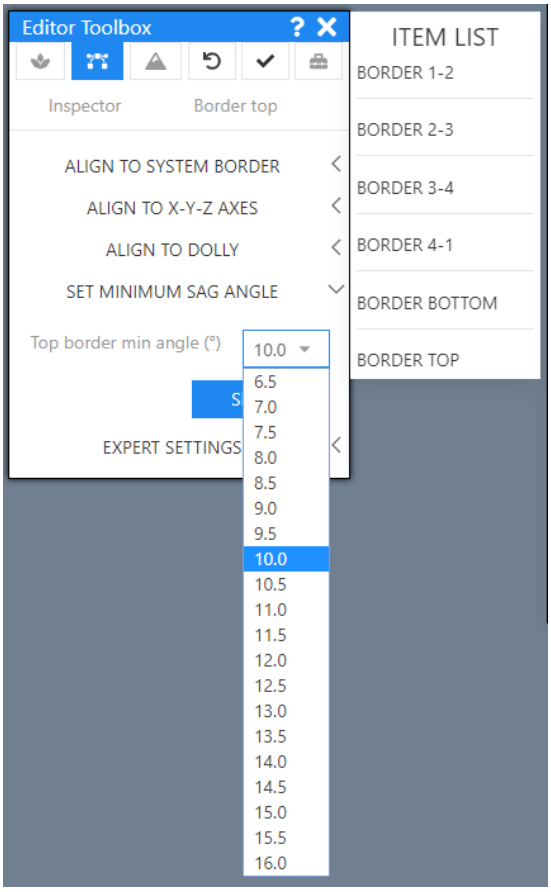

Set Minimum Sag angle:

Available only when “border top” has been chosen; see Minimum sag angle

Expert settings:

Do not alter these values without profound knowledge of plane parameters.

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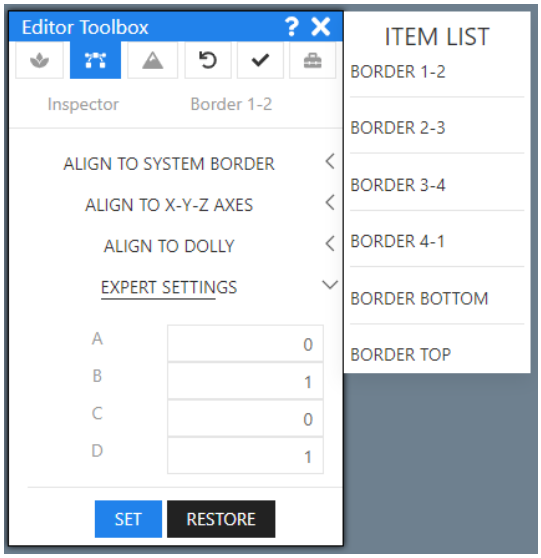

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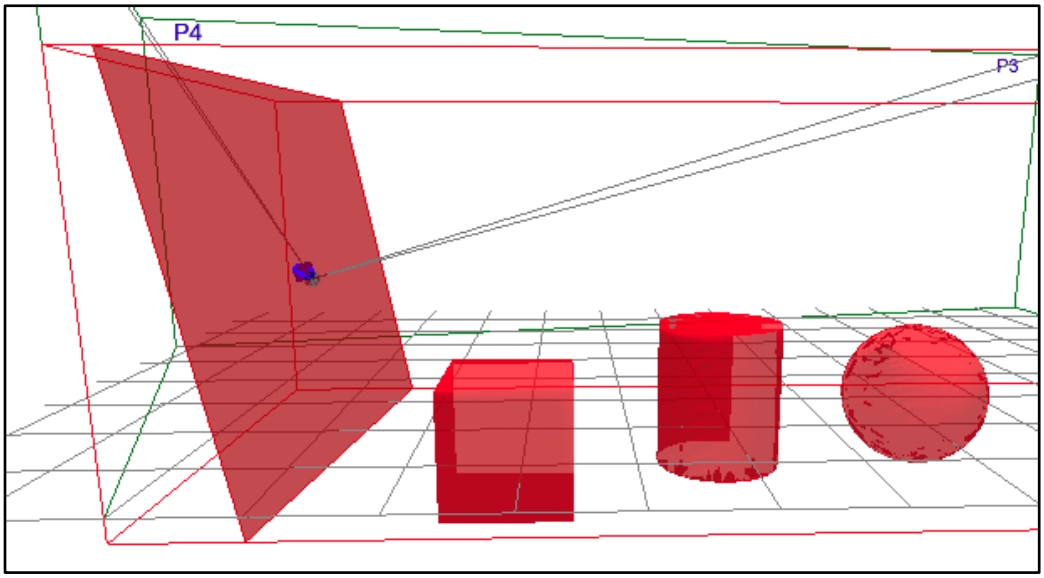
3.2.1.2 Collision Avoidance – Obstacle setup

To prevent collisions between the Dolly and static obstacles, Flyit 3.0 allows to define areas in the venue setup where the Dolly cannot be moved into, even if the operator would initiate such a movement. The Dolly will behave like at every other side border and stop outside of these areas, following the main border deceleration settings.

For setting up these forbidden areas, virtual objects can be spawned in any View. These objects are called 'border obstacles' and are made of one of the following geometric shapes:

- Plane – behave as borders
- Cube
- Cylinder
- Sphere



A total number of ten (10) obstacles at a time can be applied to every venue setup.

Catenary cables are NOT monitored by the Collision avoidance. They can pass through virtual objects freely, and in turn might collide with real-world obstacles!

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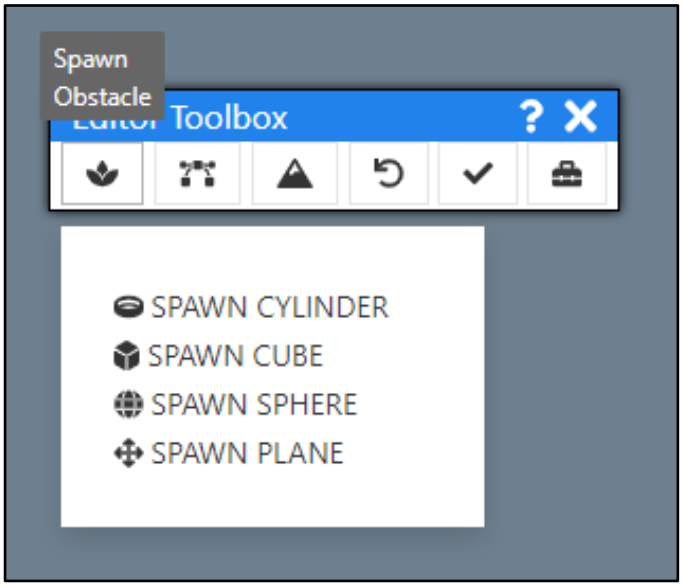
3.2.1.3 ADD OBSTACLE

New border objects will initially being added at actual Dolly position at level zero (if a Cube, Sphere or Cylinder shape has been selected) or, seen from the standard operators position, on the right side of the Dolly, in vertical and facing-left orientation (if a Plane shape has been selected).

As most obstacles are ground based, the operator can easily move the Dolly above the desired position and spawn a suitable object. Of course, the object can be altered to any other position after being spawned.



Objects are added by clicking the <Spawn Obstacle> button in the Editor Toolbox (symbol). A dropdown list will appear to select the geometric shape.

3.2.1.4 EDIT: TRANSLATE – ROTATE - SCALE

Depending on the geometric shape, objects can be edited in different transformation modes. The following modes are available on the different shapes:

- Cube – Translate, Rotate, Scale
- Sphere – Translate, Scale
- Cylinder – Translate, Rotate, Scale
- Plane – Translate, Rotate

Being able to edit the objects ensures that a virtual object will match the real object at best.

Edit Obstacle mode is entered by clicking the <Edit Obstacles> button ( ) in the Editor Toolbox. The button will appear inverted while the Edit Obstacle mode is enabled. Other operations like 'Edit

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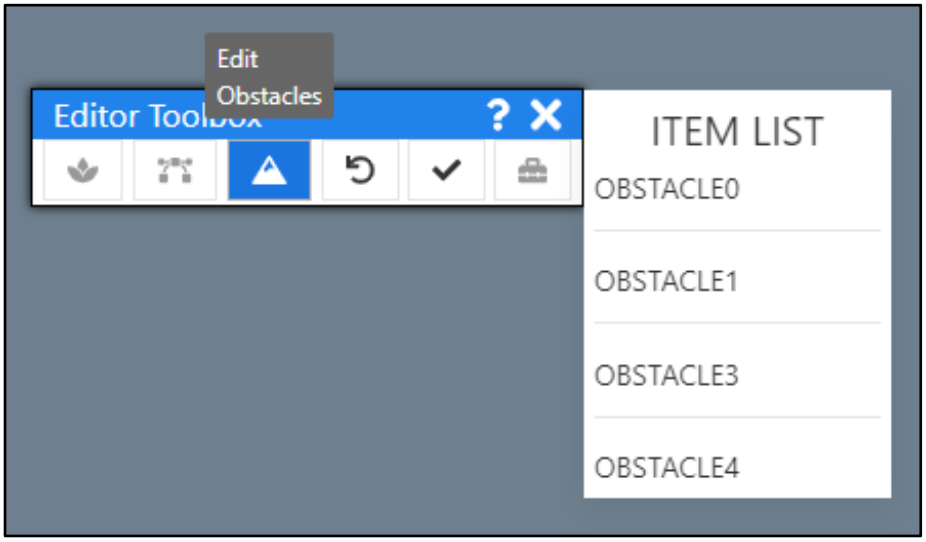
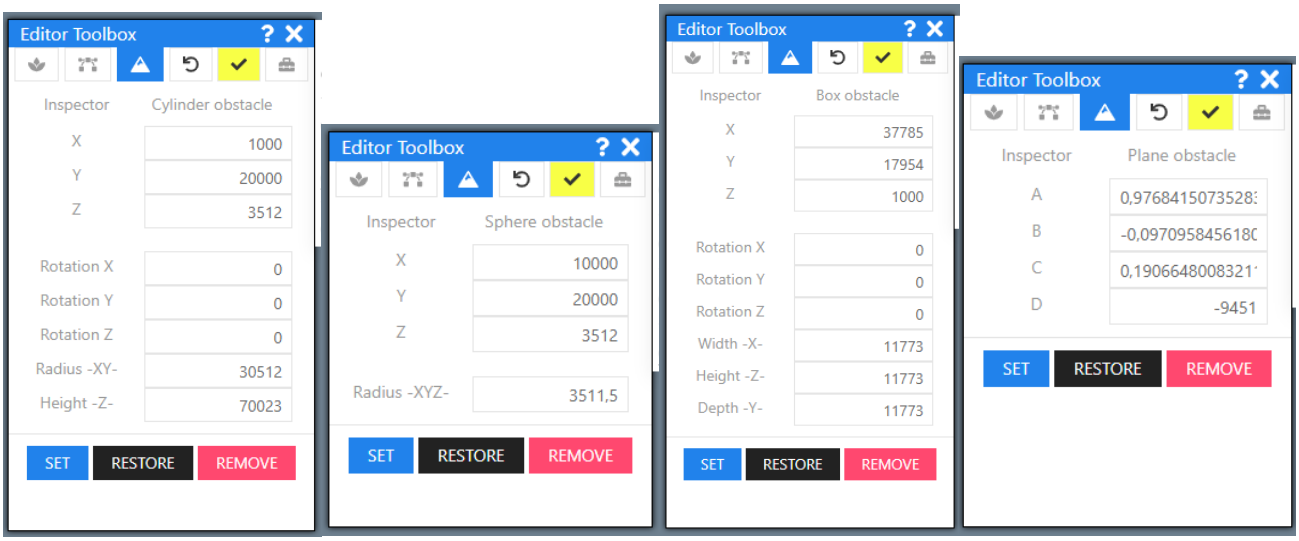
Borders' or 'Spawn Obstacle' cannot be selected while Edit Obstacle mode is enabled and vice versa. To leave edit mode, please click the <Edit Obstacles> button again.



In Edit Obstacle mode, an obstacle list will grow from the right side of the Editor Toolbox. This list contains all obstacles existent in the Venue setup. If the list is empty, no obstacles exist in the Venue setup and hence cannot being edited. In this case, please deselect Edit Obstacle mode and spawn Obstacles first.

Obstacles can be selected from either the list or by left click in any View. Unselecting or change between obstacles can be done by either select a different one from the list or left double click in any View and left click on a different one.



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If an obstacle has been selected, the Editor Toolbox will expand vertically for displaying the Inspector and the respective parameters as shown below.

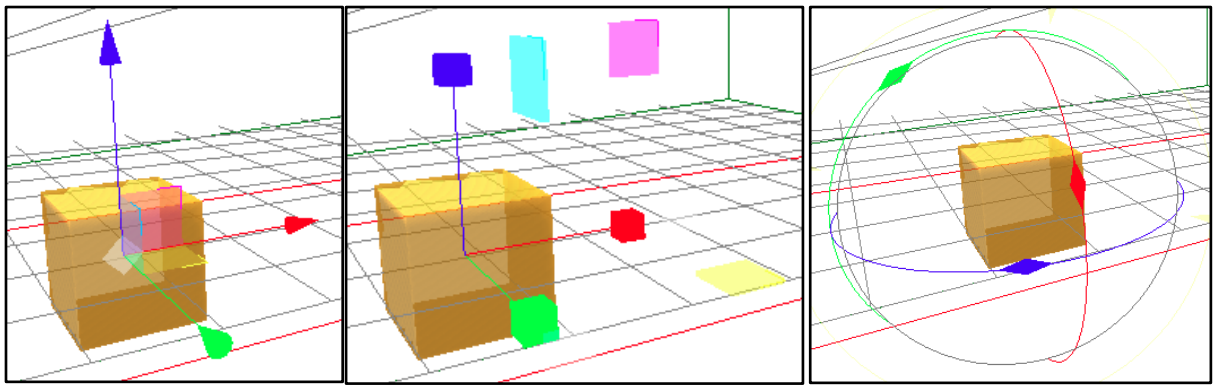
After entering numbers in the Inspector fields, the values need to be confirmed by either pressing [Enter] on keyboard or left clicking <Set> button. Changes will be visible in all Views right away.

<Restore> will restore the selected obstacle to its last transmitted / saved position, size and rotation.

<Remove> will remove the selected obstacle from the Venue setup.

3.2.1.5 GIZMOS

In any View, a selected obstacle or border will change its colour and a transformation Gizmo will appear. With this Gizmo, obstacles or borders can be edited in the graphical interface.



From left to right: [T] Translate – [S] Scale – [R] Rotate. To switch between transformation modes, press the respective letter on the keyboard. If a transformation mode is invalid for the selected obstacle shape or border, it cannot be selected. By default, on select, a notification for telling valid modes will appear on screen.

The transformation Gizmo can be used by left click, hold and drag on an arrow shaft (but not on the obstacle itself). The obstacle or border will follow the operation in real time, both numerically in the Inspector and graphically in all Views.

3.2.1.6 UNDO, SAVE

Before confirming changes to the Venue setup in the next step, all recent changes can be undone by clicking the ↩ button. This will restore the venue setup to the state after the last confirm. The function is similar to the <Restore> button in Edit: Translate – Rotate - Scale but will affect all object changes and not just the selected object.

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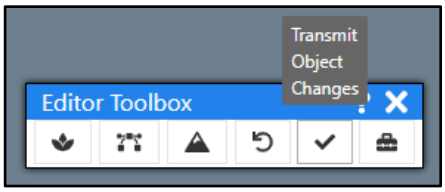
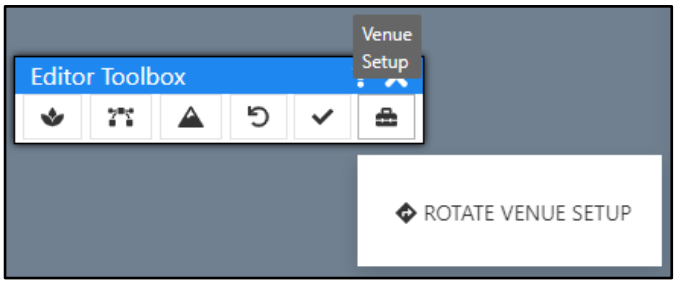
All changes in the Venue setup need to be transmitted to the Control Station to become operative. This is done by the <Transmit Object Changes> button (✔ symbol).



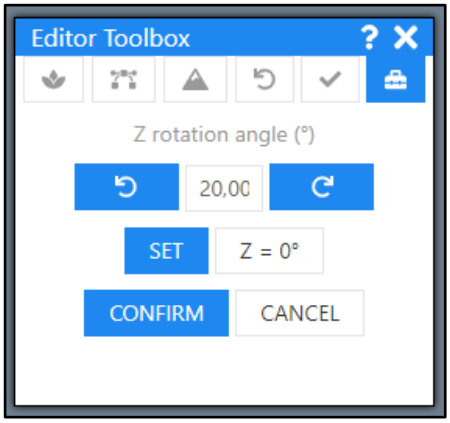
To assist the operator whether alterations has been transmitted or not, the <Transmit Object Changes> button will turn yellow if changes have been made.

3.2.1.7 General venue setup tools



The Venue setup folder contains further global setup controls. A dropdown menu with choices will appear.

3.2.1.8 Rotate venue setup



Access rotate place through the venue setup tools.

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Changes will be visible in any view directly. To confirm a rotation, click [Confirm] to let the Z rotation being sent to the system and become effective.

To leave, click [Cancel] or select ‘Rotate Venue Setup’ again.

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4 DIAGNOSIS AND TROUBLESHOOTING

This part of manual contains information on errors, guidelines how to locate problems and basic troubleshooting assistance.

4.1 ERRORS

Basically, there is to distinguish between errors and notifications.

All errors have the following layout:

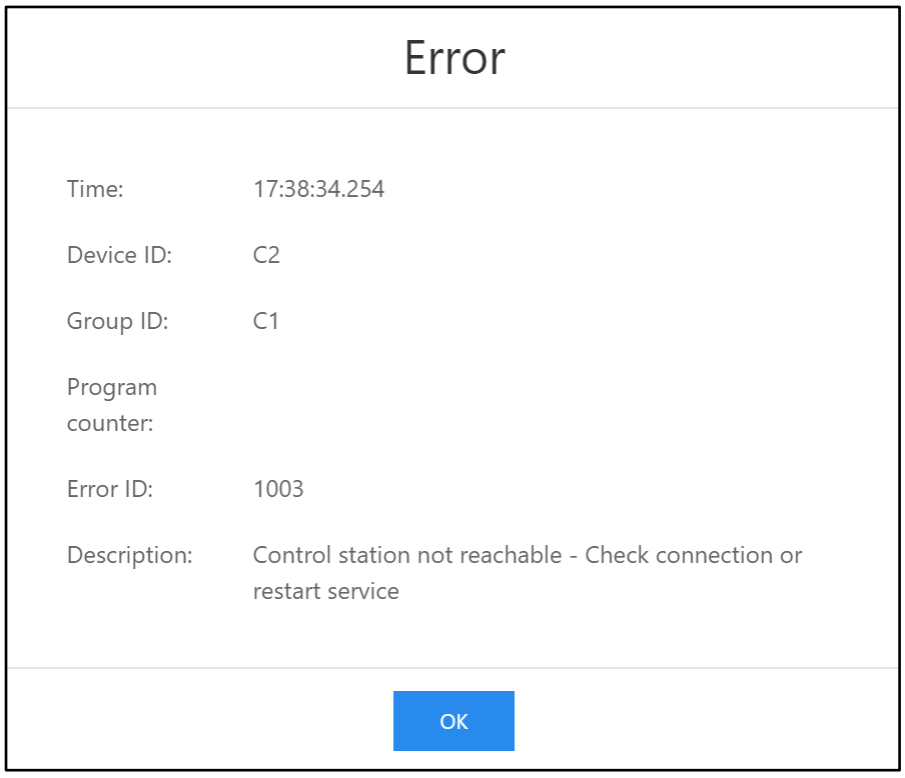

FIGURE 4-1: ERROR EXAMPLE

Legend:

Time	The PLC time stamp, when the error was detected
Device ID	The device which detected the error
Group ID	The application group, the error is related to
Program Counter	The current state machine state of PLC or middle ware, depending of the device
Error ID	A unique number in the current group
Description	A description of the error

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Device IDs:

Identifier	Number	Description
C1	10	PLC, respectively control station
C2		Middle ware, Laptop
C3		Third party computer (any third party connected to middle ware)
Dolly	95	Spidercam dolly (includes remote head, this one has no own device id)
W1	11	Winch 1
W2	12	Winch 2
W3	13	Winch 3
W4	14	Winch 4

4.2 NOTIFICATIONS

Notifications are short feedback messages for asynchronous click commands. They appear for a few seconds and disappear automatically.

Also, the small “X” button can be used to close them manually, in case notification disturbs/overlays needed windows.

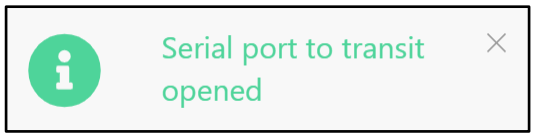

FIGURE 4-2: NOTIFICATION EXAMPLE

There are different types of notifications described in the following paragraphs.

4.2.1 SUCCESS NOTIFICATIONS

This type is always coloured green and appears after successfully changing settings, saving venue setup, transceiving objects, etc.

FIGURE 4-3: SUCCESS NOTIFICATION

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4.2.2 Special Success notifications

Some notifications include extra information about the system state or about some special settings. This should help the operator to prevent damages to the system.

The most relevant example is the “Z-axis inverted” information:

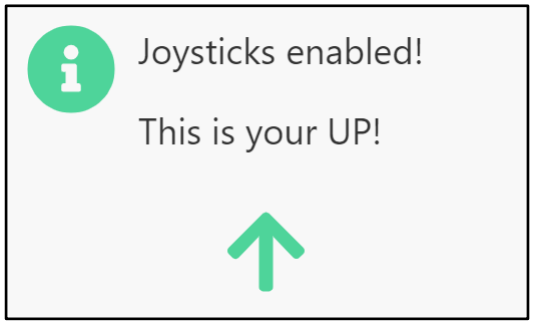

FIGURE 4-4:SPECIAL SUCCESS NOTIFICATION

4.2.3 Hint Notifications

Notifications with blue color code provide helpful information to users. There is also a checkbox to disable this type of notifications. It can be also set in Main menu → Settings → Program → Messages.

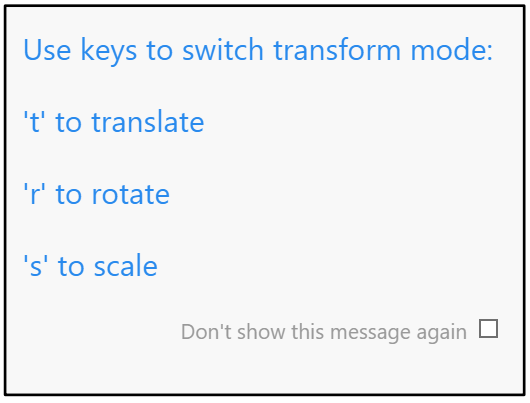

FIGURE 4-5: HINT NOTIFICATIONS

4.2.4 Warning notifications

Orange colored notifications represent warnings, which have no influence on operating, but on convenience.

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FIGURE 4-6: WARNING NOTIFICATIONS

4.2.5 DANGER NOTIFICATIONS

Danger notifications (color code red) will not initiate an emergency stop, but they describe actions which can´t be processed, until the faults are cleared.

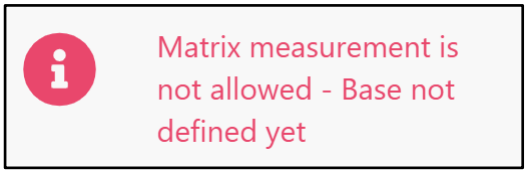

FIGURE 4-7: DANGER NOTIFICATIONS

4.3 ERROR CODES

4.3.1 SPECIAL ERROR CODES

4.3.1.1 GROUP 104

Group 104 doesn't represent an error. It has the same layout as an error but is used to represent "Actions", like joystick activation for example. This helps to get a timing dependency between actions and resulting errors, to improve troubleshooting.

Error ID	Description
1	C1 in Error state, recording cancelled
2	Failed to write path to disk
4	Joysticks used during path playback
8	Joysticks used during path playback
16	Joystick mode aborted, playback will not be executed
32	Pan motor error, playback will not be executed
64	Tilt motor error, playback will not be executed

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austria@spidercam.tv | commercial court and register: landesgericht klagenfurt fn292635x | vat-id: atu63366226

4.3.2 MOTION PLAYBACK ERROR CODES

4.3.2.1 C1 ERRORS

4.3.2.1.1 GROUP 116

Error ID	Description
2	C1 in Error state, recording cancelled
3	Failed to write path to disk
8	Joysticks used during path playback
9	Joysticks used during path playback
10	Joystick mode aborted, playback will not be executed
11	Pan motor error, playback will not be executed
12	Tilt motor error, playback will not be executed
13	Timeout while waiting for Dolly´s InPosition flag
14	Timeout while waiting for Dolly´s InPosition flag
15	Playback stopped by border collition
16	Joysticks used during move to position
17	Playback stopped by following error - System couldn´t follow path
200	Console buttons are disabled in this state

4.3.2.2 C2 ERRORS

4.3.2.2.1 GROUP PATHFILE

Error ID	Description
1	Cannot read path file
2	Selected path file is empty - Record a path to selected file
3	Selected file not found
4	File already exists
5	Selected sequence doesnt exist
6	Sequence already exists
7	Selected file not found
8	No settings file found
9	Creating sequence failed
10	Name not accepted. Only characters A..Z a..z 0..9 are allowed
11	Name not accepted. Name shouldn´t be empty
12	Creating path file failed
13	Found path points outside user borders
14	Found path points inside an obstacle

4.3.2.2.2 GROUP RECORDING

Error ID	Description

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1	C1 is busy, record cancelled
2	C1 in Error state, recording cancelled
3	Failed to write path to disk
4	Failed to write path settings to disk

4.3.2.2.3 GROUP PLAYBACK

Error ID	Description
1	Dolly is not in start position
2	C2 is not in correct state to start playback
3	Buffer error
4	Error while moving to start position
5	Error while waiting at start position
6	Dolly moved away from start position
7	Error while moving to end position
8	Error while moving to position

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