



User manual ZLP-Manager 20.3

Table of contents

1. Preface	4
2. Safety instructions	6
3. Introduction	8
3.1 Software structure	8
4. Getting started	10
4.1 Installation	10
4.1.1 System requirements	10
4.1.2 Installation preparation	10
4.1.3 Linux® Installation	10
4.1.4 Windows® Installation	10
4.1.5 Create Desktop Icon	11
4.2 Graphical User Interface (GUI)	12
4.2.1 Launching ZLP-Manager	12
4.2.2 Language Settings	13
4.2.3 Structure of the user interface	14
4.2.3.1 Title bar	15
4.2.3.2 Menu bar	15
4.2.3.3 Ribbon bar	18
4.2.3.4 Tree view	18
4.2.3.5 Activity log window	19
4.2.3.6 Configuration file display	20
4.2.3.7 Status bar	20
4.2.3.8 Draw Area and Coordinate system information	21
4.2.3.9 GUI Elements	22
4.2.3.10 Tab bar	23
4.2.3.11 Window options	23
4.3 Projector detection	23
4.3.1 Automatic Projector scan	24
4.3.2 Detection of multiple projectors	25
4.3.3 Set IP range	26
4.3.4 Projector not found	27
4.3.5 Deactivate or Reconnecting Projectors	30
4.3.6 Standard coordinate system	31
4.4 Software registration	31
4.4.1 Registration procedure	32
4.4.2 Perform registration	32
4.4.3 Load license file	36
4.4.4 Error messages during loading the license	37
4.5 Projector Setup	40
4.5.1 Preparation	40
4.5.2 Starting and running projector setup	41
4.5.3 Help in case of problems	50
4.6 Projecting with the projector	51
4.6.1 Import data	51
4.6.2 Activate, Project and Delete Polylines	52
4.6.3 Test projection	53
4.7 Help menu	53
4.7.1 Dock_Help	54
4.7.2 Software version	55
5. Advanced Features	56
5.1 Customizing the User interface	56
5.1.1 Creating DockWidgets / Docking windows	57
5.1.1.1 DockWidget-Types	59
5.1.1.2 Arrangement possibilities of DockWidgets	60
5.1.2 Creating GUIWidgets / Control elements	67
5.1.2.1 Customizing the Ribbon Bar	72
5.1.2.2 Generating and editing tabs	72
5.1.2.3 Button connections overview	73
5.1.2.4 Changing the default icon for GUI Elements	76
5.1.3 Customizing the Draw Area	77
5.1.4 Maximize main window of ZLP Suite	86
5.2 Projector setup - Additional Features	86

5.2.1 Setup settings	86
5.2.2 Projector Setup from File	94
5.2.3 Changing Projector Setup	94
5.2.4 Set up multiple projectors on one coordinate system	95
5.3 Reference point search	96
5.3.1 Result reference point search	98
5.3.2 Show reference points	99
5.4 Import & export of projection files	99
5.4.1 Supported file formats	99
5.4.1.1 HPGL	99
5.4.1.2 DXF	100
5.4.1.3 ZLP	100
5.4.1.4 REF	100
5.4.2 Data import	100
5.4.3 Data export	101
5.4.4 Data exchange via z-io	101
5.4.5 Starting an external program via the ZLP-Manager	102
5.4.6 ZLP Import Export Tool	102
5.4.7 Properties View	105
5.5 Projecting with the Projector (Expert Mode)	106
5.5.1 Further functions of the tree view	109
5.5.2 Multicolor projection	112
5.5.3 Assign and project pen colors	113
5.5.4 Start and stop projection	114
5.6 Projector connection	114
5.6.1 Changing Projector Connection	114
5.6.2 Disconnect projector	115
5.6.3 Projector IDList dialog	115
5.7 Clipping planes	117
5.7.1 Create clipping planes	118
5.7.2 Edit clipping planes	121
5.7.3 Clipping planes settings	123
5.7.4 Remove clipping planes	125
5.7.5 Possible partitioning of clipping planes	126
5.8 Data backup	129
5.8.1 System backup	129
5.8.2 Load and save ZLP-Manager configuration file	134
5.8.3 Load and save ZLP-Service configuration file	135
5.9 Projection editor	135
5.10 Height offset	142
5.11 User manager	144
5.11.1 User Manager - Settings and View	144
5.11.2 User Account	147
5.11.3 User Right Groups	149
5.12 Process support	151
5.12.1 WorkflowManager	151
5.13 Remote Control	161
5.13.1 Setting the remote control mode using a button	167
5.14 ZLP-Manager Scripts	168
5.14.1 Load Script	168
5.14.2 Create Script	170
5.15 ZLP-Service connection	171
5.15.1 ZLP-Service	171
5.15.2 Running the ZLP-Service	171
5.15.3 ZLP-Service state	173
5.15.4 Changing ZLP-Service connection	173
5.15.5 ZLP-Service Version Numbers	174
5.15.6 Reset ZLP-Service configuration	174
6. Glossary	176

1. Preface

Dear customer,

With this user manual we want to help you to operate your ZLP laser projector together with the associated control software ZLP-Suite efficiently, properly and safely, to achieve the best projection results and to achieve a maximum lifetime of the laser projector.

Please read the manual carefully and familiarize yourself with the software and laser projector before using it for your work process.

Make sure that all persons working with the laser projector and its control software have read and understood this manual before starting any work.

To ensure safe operation and prevent injury and product damage, paying particular attention given [Safety instructions](#) .

Always keep the user manual in an easily accessible place close to the place of use.

For the use of the laser projector, the applicable laws and regulations for the respective country at provincial, federal, European or international level must be observed.

Validity

This manual applies exclusively to the operation of the ZLP 1 and ZLP 2 laser projectors from Z-LASER GmbH.

It is available in German and English at:

Z-LASER GmbH
Merzhauserstr. 134
79100 Freiburg
Deutschland

Tel: +49 761 296 44-44
Fax: +49 761 296 44-55
e-Mail: info@z-laser.de

or with the respective country representative.

Hints

Please note that all screenshots used in this manual are intended to provide a basic understanding and, depending on the operating system and laser projector used, may differ from the windows shown on your screen or the actual design.

Trademark

The Z-LASER® logo is a registered trademark of Z-LASER GmbH. Z-LASER® is a registered trademark of Z-LASER GmbH.

Microsoft® and Windows® are registered trademarks of Microsoft® Corporation in the United States and other countries.

Linux® is a trademark of Linus Torvalds, registered in the United States and other countries.

Copyright

This manual, including all its contents in text and image, are the exclusive property of Z-LASER GmbH. All rights reserved.

For the authorized user exists a simple right of use within the scope of the contract purpose.

Reproduction, duplication, distribution, processing and translation of this documentation or parts thereof, is not permitted without prior written permission of Z-LASER GmbH and is punishable by law. Likewise, no part of this manual may be made public or otherwise made available for interactive retrieval, stored in databases or transmitted without the written consent of Z-LASER.

In the case of a copyright infringement, Z-LASER reserves the right to assert all rights.

Disclaimer and Limitation of Liability

This manual has been compiled and published to the best of our knowledge and belief. It contains the latest technical information and product information associated with the current version number. Despite the greatest possible care, no liability can be assumed for accuracy, completeness and up-to-dateness. Changes are reserved.

Z-LASER GmbH accepts no liability for personal injury, damage to property, damage to the product or consequential damage resulting from non-observance of this manual and the operating instructions of the laser projector, improper use of the product, repairs, opening the projector housing and any other actions of Non-qualified or not by Z-LASER certified electricians on the product or in the use of unauthorized spare parts arise or have arisen. It is forbidden to carry out any modifications or technical modifications to the product.

© Z-LASER GmbH 2020

2. Safety instructions

Safety instructions are used for occupational safety and accident prevention. They must be observed and adhered to. In order not to endanger yourself or others and to ensure safe operation of the laser projector, it is essential to observe the safety instructions in this manual as well as the safety instructions in the operating instructions manual of the respective projector.

Make sure that all persons working on or with the laser projector have been informed about and understood the possible dangers of laser radiation.

The software may only be used as intended with the laser projector. In case of improper use, all warranty claims expire. The resulting risk and possible damages are the sole responsibility of the operator.

Keep the instruction manual for the ZLP-Suite as well as for your laser projector constantly near the place of use.

Please observe the respective accident prevention regulations, health and safety regulations and safety regulations of your country and comply with them. Information must be obtained before starting work.

Laser Safety

With the help of the software ZLP-Suite you operate a laser projector of the company Z-LASER GmbH. Persons using class 2 to class 4 laser equipment, or who are in laser ranges of class 3B or class 4 laser equipment, must have been instructed in the behavior to be observed. The instructions must be repeated and documented in accordance with the respective accident prevention regulations of the state at regular intervals.

Mark the work area in which the laser projector projected clearly and permanently in accordance with the safety regulations for laser safety of your country.

To avoid dangerous reflections, do not install or use mirrors or reflective objects and surfaces in the area of the laser beam.

Never look directly into the laser beam or with optical instruments!

Close your eyes and turn away immediately should the laser beam hit your eyes or dazzle you.

Never remove or damage the protective glass on the exit window of the laser projector.

Never open the projector cabinet and never operate the projector with the case open.

Make sure which laser class your laser projector is assigned to. The laser class can be found on the rating plate on your device. Regulation 11 of the German Social Accident Insurance (DGUV) contains further information regarding the safe operation of laser systems for Germany.

For all countries outside Germany, the corresponding regulations regarding laser safety must be observed. It is essential to observe the safety instructions in the corresponding manual for the laser projectors ZLP 1 or ZLP 2 and to comply with them.

Electronic components

All safety instructions for handling electronic components can be found in the corresponding manual for the laser projectors ZLP 1 and ZLP 2.

Motion sensor

The laser projector ZLP 2 is equipped with a motion sensor for your personal safety. This detects persons who are in the danger zone of the laser beam path and switches off the laser beam automatically. Never cover or block the motion sensor with paper, plaster, tape or the like. Further information can be found in the manual for the ZLP 2.

Emergency switch

The laser projector is additionally equipped with a key switch for switching the laser beam on and off. Before using the ZLP-Suite laser control software, be sure to familiarize yourself with the safety information provided by the laser projector. Make sure that the laser projector can be turned off at any time. This can either be done on the projector itself via the on / off switch, the key switch or via a specially installed emergency switch. Further information can be found in the manual for the ZLP 1 and ZLP 2.

Administrator rights

In some cases, such as software installation or network setting, you need administrator rights on your

computer. Make sure you have the appropriate rights.

Passwords

Certain applications of the ZLP Suite may also be assigned passwords. Always keep passwords in a safe place away from unauthorized access.

3. Introduction

The laser projection software ZLP-Manager has the task to prepare graphical data for the projection and to transmit them to the laser projector. At the same time, the ZLP-Manager offers the possibility to visualize, manipulate, move or remove projection data via its user interface. In addition, methods can be applied to display the projection data in an optimized way for the respective application.

This manual is divided into two parts:

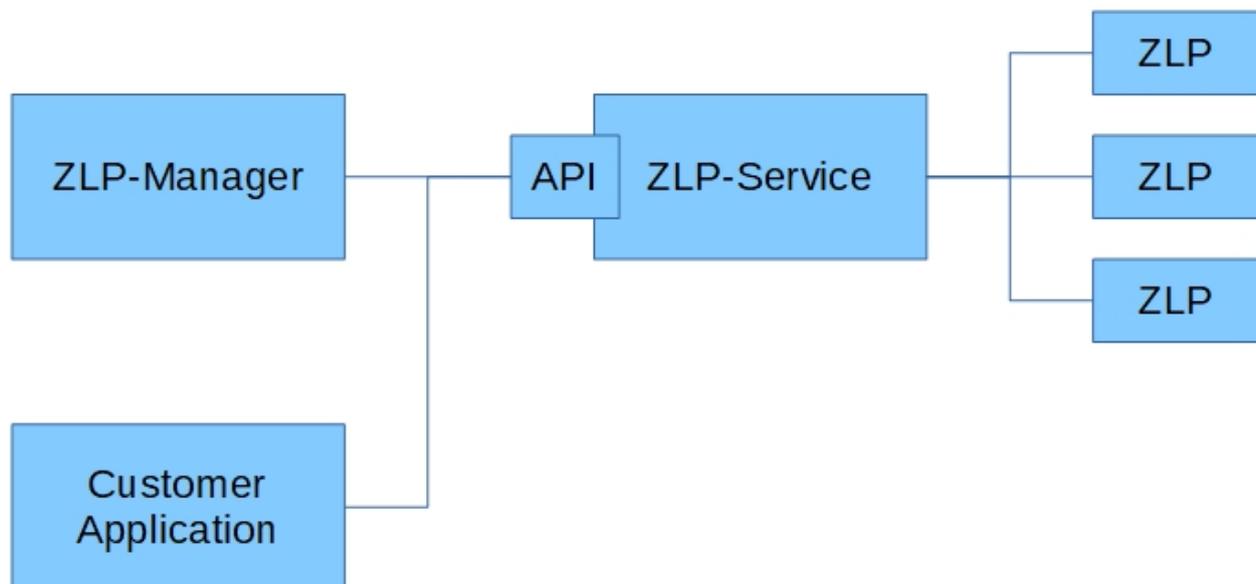
The first part ([Getting Started](#)) explains the basic functions needed to get the ZLP-Manager running, set up the projector, and perform simple projections. It is aimed at operators with only limited computer skills. No prior knowledge of operating software is required. It is a step-by-step guide that guides the reader through each process.

The second part ([Advanced Features](#)) is for already experienced users and those who want to expand and / or deepen their software knowledge. The understanding of the technical terms and their meaning is assumed for this part. The structure is thematic, partly as a workshop with exercises. The second part contains all the additional functions that go beyond the basic application of the first part.

Working with the ZLP-Manager requires knowledge of Windows® operating systems.

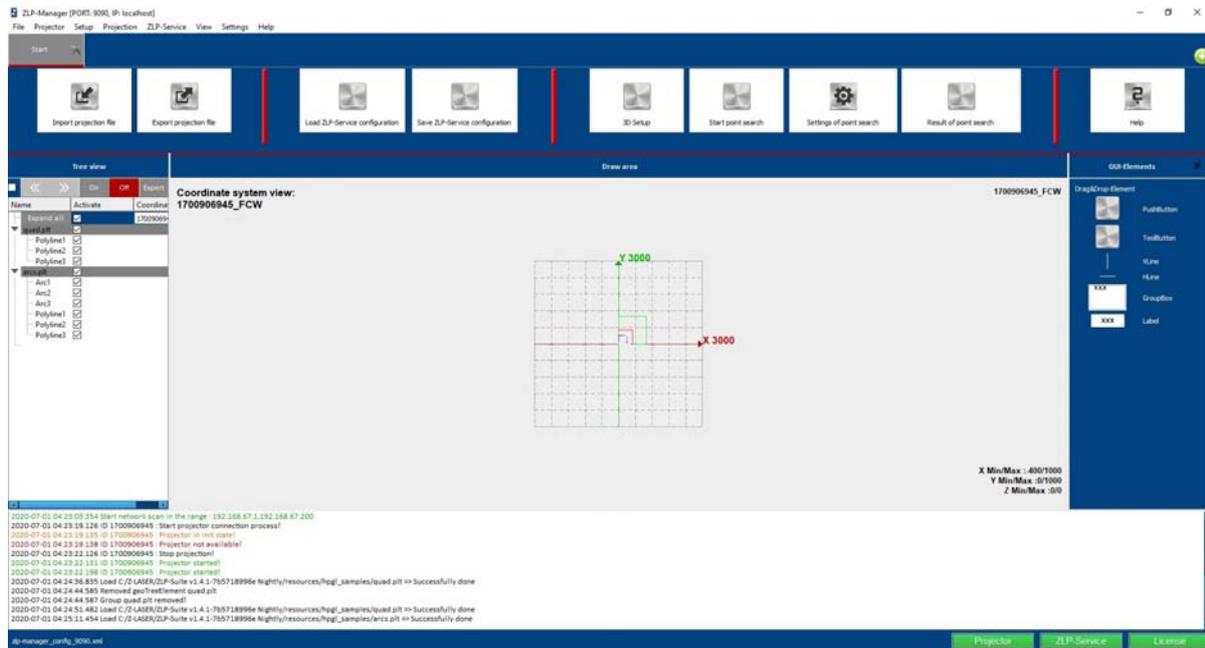
3.1 Software structure

The laser projection software ZLP-Suite consists of several programs, which can be either used only together, or independently.



1. The application program ZLP-Manager with graphical user interface (GUI)

Here you can load, visualize, manipulate, move, set up and control your projection system, and much more.



2. The ZLP-Service

The ZLP-Service program manages the projectors and calculates the projection paths. This service runs in the background of your ZLP-Manager GUI. For projector communication, each ZLP-Manager instance must be associated with one ZLP-Service.

The ZLP-Service also allows direct communication with the projector without user interface.

This possibility of direct communication through various scripts or app applications is explained in the second part of the manual and is intended for advanced users.

```

C:\Z-LASER\ZLP-Suite 20.3\bin\ZLP-Service.exe
-----
Version: 1.4.1-5bebb09d79 20.3 Final Release (Release)
Start ZLP-Service at interfaces:
    fe80::d08e:c823:5cc2:22dd
    169.254.218.17
    fe80::ccdd:e7bf:c83c:a299
    fe80::5830:55b1:650b:87c2
    2003:72:af6b:f701:489a:b6e9:a093:4e66
    fe80::50c7:1ca6:b65f:d7d8
    ::1
    fe80::11e0:49fb:f945:4513
at port: 9090
"quit ZLP-Service" with ctrl+c
-----
2020-07-07 05:35:35.197 [info] [zService.cpp:83] zService::onStart:
2020-07-07 05:35:35.199 [info] [zService.cpp:84] zService::onStart: Start ZLP-ServiceInterface...
2020-07-07 05:35:35.199 [info] [zServiceInterfaceProcess.cpp:59] zServiceInterfaceProcess::thriftServerThreadFunction: S
tarte Server-Thread ... warte auf Client-Verbindungen
2020-07-07 05:35:35.201 [info] [zRcCommandProcessor.cpp:547] zRcCommandProcessor::startThread:
2020-07-07 05:35:35.202 [info] [zRcCommandProcessor.cpp:553] zRcCommandProcessor::startThread:
2020-07-07 05:35:35.202 [info] [zService.cpp:211] zService::checkLicense: Updating list of running projectors:
2020-07-07 05:35:35.203 [info] [zLicense.cpp:114] zLicense::setConnectedProjectorSerials: serials=''
2020-07-07 05:35:35.203 [info] [zRcCommandProcessor.cpp:190] zRcCommandProcessor::onNewFrames: Push back new IR frame in
to RcCommandProcessor's
queue
2020-07-07 05:35:35.204 [info] [zRcCommandProcessor.cpp:190] zRcCommandProcessor::onNewFrames: Push back new IR frame in
to RcCommandProcessor's
queue
2020-07-07 05:35:35.204 [info] [zRcCommandProcessor.cpp:190] zRcCommandProcessor::onNewFrames: Push back new IR frame in
to RcCommandProcessor's
queue
2020-07-07 05:35:35.204 [info] [zRcCommandProcessor.cpp:190] zRcCommandProcessor::onNewFrames: Push back new IR frame in
to RcCommandProcessor's
queue

```

4. Getting started

In this part, you will become familiar with the basic functions of the ZLP-Manager step by step. You will learn how

- to install, register and start the software,
- the user interface is structured,
- the projector is connected and set up.

At the end of the first part you will be able to set up a projector and display simple projections.

4.1 Installation

4.1.1 System requirements

To control the laser projector with the supplied ZLP-Suite software, the PC should fulfill at least the following requirements:

Operating system (64 bit):	Windows® 10, Linux Mint® LMDE2 (based on Linux Debian® 8)
Graphics card / chip:	supports at least OpenGL 2.0
Screen resolution:	at least XGA (1024x768)
Hard disk space:	at least 400 MB free space
Memory:	at least 200 MB of free RAM
LAN port	
Keyboard and mouse	

4.1.2 Installation preparation

In order to use the full functionality of the ZLP-Suite Setup you should have made the following preparations:

1. The physical connection between the laser projector and your PC has been established. This can be done via the direct LAN connection to your PC or via a network switch.
2. The projector is connected to the power supply and switched on.
3. The status indicator light on the front of the projector should be static green when turned on. This indicates that the laser projector is ready for operation.
4. Make sure that you have administrator rights for the PC on which ZLP-Suite will be installed.

4.1.3 Linux® Installation

The installation under Linux® is done via a shell script. The script installer is located on the supplied USB stick.

1. Open the terminal and navigate to the folder of the installation script `ZLP-Suite-<version>-Linux.sh`.
2. Run the script `./ZLP-Suite-<version>-Linux.sh` and press Enter.
3. Follow the instructions in the terminal
 - * Accept license
 - * Set installation path
4. Folder is created and file is unpacked

4.1.4 Windows® Installation

The installation is done via the included installation file `ZLP-Suite-<version>.exe`.

Double-click the `ZLP Suite-<version>.exe` file to start the installation manager. Follow the instructions of the wizard and press either **Next** or **Cancel**.

1. The Installation Manager will start directly.

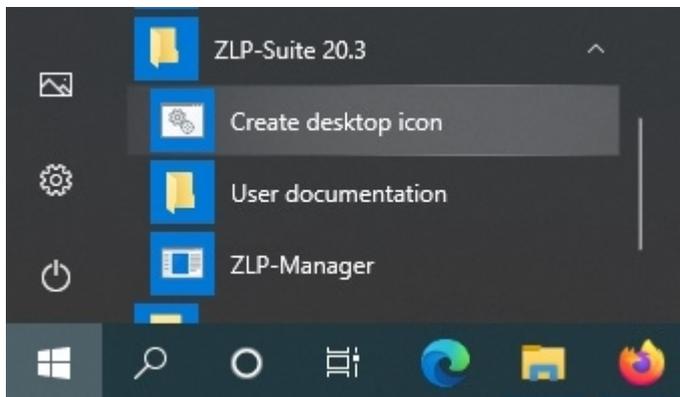
2. Click **Accept** to confirm the license agreement.
3. Select the target folder where the ZLP Suite is to be installed. The installation wizard automatically creates the complete folder structure in the specified installation path. The Browse button can be used to select a different path.
4. In the next step you can specify the Start menu folder for the program shortcut. Click the **Install** button to start the installation process.
5. Installation progress is displayed. Displayed details allow you to see which files are currently being installed.
6. Installation successfully completed. Click **Finish** to exit the installation wizard.
7. If the installation was successful, the installation directory has the following folder structure:
 - `bin/` Contains all executable files
 - `data/` and loaded license files. All files generated at runtime are stored here. This includes log files, configuration files, workflows
 - `documentation/` ZLP-Suite Documentation and SDK Description
 - `lib/` Libraries required by the program
 - `resources/` Includes sample files, icons, projection files, Manager scripts and workflows
8. The ZLP-Suite software is now installed and ready to use. It can now be started via the **Start menu → Programs → ZLP-Manager**. In addition, a desktop icon can be created. Please read the chapter [Create Desktop Icon](#). When running the ZLP-Manager firewall messages may appear. Access must be allowed.
9. To use the ZLP-Manager to its full extent, the registration process must first be completed. This is described in the chapter [Software registration](#).

4.1.5 Create Desktop Icon

Open the `bin` folder in the ZLP-Suite installation directory.

Select the file `create_desktop_icon.bat` and open it by double click.

Alternatively, you can open the ZLP-Manager <version> folder under the Windows® start menu and click the **Create desktop icon** entry.



A command line window opens. Follow the instructions.

Enter a port number in the range between 9000-10000 and press the Enter key.

Now enter the IP address and press the Enter key again.

If no value is entered, but the Enter key is pressed directly, the default value `9090` is used for the port and the default address `localhost` is used for the IP address.

Afterwards it will be checked whether an instance with the entered port number already exists on the desktop. If so, a new port value can be entered or the existing shortcut can be replaced.

To replace the existing shortcut, press the letter **Y**.

To cancel the operation and not overwrite the existing shortcut, press the letter **N**.

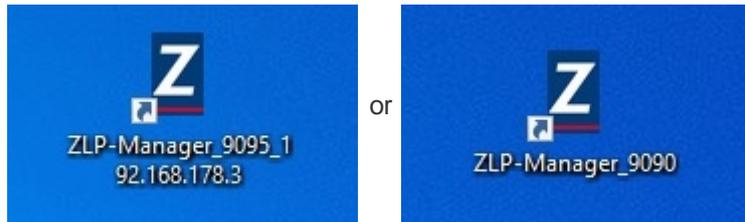
If you want to enter a different port number and IP address, press the letter **E**.

Complete your entry with the Enter key.

Press any key to close the input window.

A desktop icon with the name `ZLP-Manager_PortNumber_IPADDRESS` has now been created on your desktop. If the IP address is `localhost`, only the port number is used for the symbol name.

The ZLP-Manager can now be opened by double-clicking on the corresponding desktop icon.



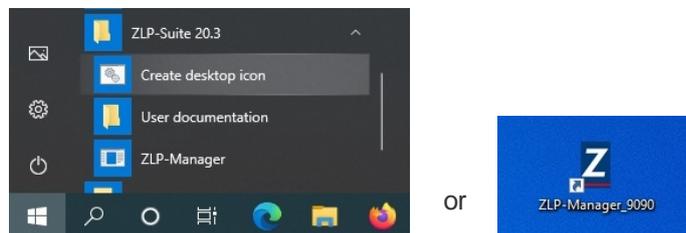
4.2 Graphical User Interface (GUI)

Now familiarize yourself with the graphical user interface of the ZLP-Manager. In the following chapters you will learn everything about how to start the ZLP-Manager for the first time, how to set the language and how the user interface is structured.

4.2.1 Launching ZLP-Manager

Call up the ZLP-Manager by opening the `ZLP-Suite <version>` folder in the Windows® Start menu and click the ZLP-Manager entry (see figure on the right).

Alternatively, you can double-click the desktop icon that you created in the chapter [Create desktop icon](#).



To make the ZLP-Manager executable, a so-called **ZLP-Service** is started in the background (see illustration on the right). The ZLP-Manager cannot run without this service. At the beginning, the standard configuration file of the ZLP-Service is loaded and checked whether a valid license file is already available. Wait until the software is fully loaded and both windows (GUI and ZLP-Service) are open. This process will not take a few seconds. If the ZLP-Service window was inadvertently closed during a session, the ZLP-Manager automatically restarts the program after a short time or as soon as a function is called.

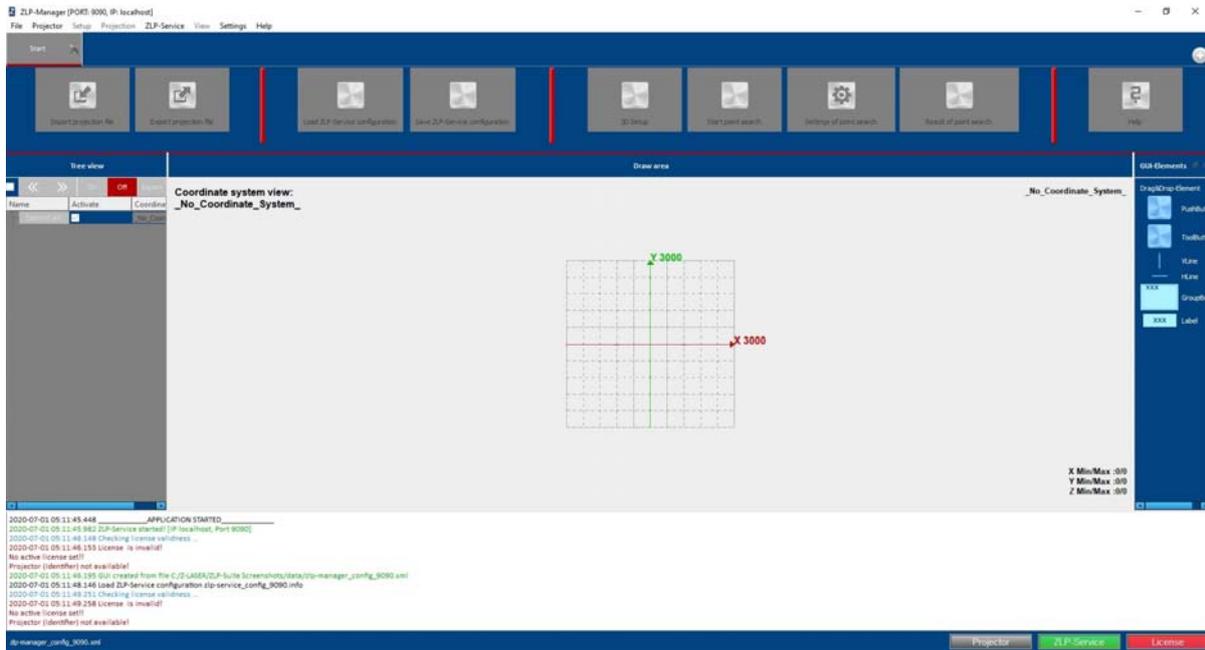
The user interface opens in English by default the first time.

If you wish to customize the user interface in your language, please proceed as described in the chapter [Language settings](#).

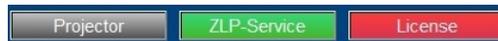
```

CAZ-LASER\ZLP-Suite 20.3\bin\ZLP-Service.exe
-----
Version: 1.4.1-5b6bb09d79 20.3 Final Release (Release)
Start ZLP-Service at InterFaces:
  fe80:d08e:c823:5cc2:22dd
  169.254.218.17
  fe80:1cddde7bf:c83c:a299
  fe80:5830:55b1:650b:87c2
  2003:72:af0b:f701:489a:bde9:a093:4e66
  fe80:50c7:1ca6:b65f:d7d8
  :1
  fe80:11e0:49fb:f945:4513
at port: 9090
"quit ZLP-Service" with ctrl+c
-----
2020-07-07 05:35:35.197 [Info] [zService.cpp:83] zService::onStart:
2020-07-07 05:35:35.199 [Info] [zService.cpp:84] zService::onStart: Start ZLP-ServiceInterface,..
2020-07-07 05:35:35.199 [Info] [zServiceInterfaceProcess.cpp:59] zServiceInterfaceProcess::thriftServerThreadFunction: S
starte Server-Thread ... warte auf Client-Verbindungen
2020-07-07 05:35:35.201 [Info] [zRcCommandProcessor.cpp:547] zRcCommandProcessor::startThread:
2020-07-07 05:35:35.202 [Info] [zRcCommandProcessor.cpp:553] zRcCommandProcessor::startThread:
2020-07-07 05:35:35.202 [Info] [zService.cpp:211] zService::checkLicenses: Updating list of running projectors:
2020-07-07 05:35:35.203 [Info] [zLicense.cpp:114] zLicense::setConnectedProjectorSerials: serials=""
2020-07-07 05:35:35.203 [Info] [zRcCommandProcessor.cpp:190] zRcCommandProcessor::onNewFrames: Push back new IR frame in
to RCommandProcessor's queue
2020-07-07 05:35:35.204 [Info] [zRcCommandProcessor.cpp:190] zRcCommandProcessor::onNewFrames: Push back new IR frame in
to RCommandProcessor's queue
2020-07-07 05:35:35.204 [Info] [zRcCommandProcessor.cpp:190] zRcCommandProcessor::onNewFrames: Push back new IR frame in
to RCommandProcessor's queue
2020-07-07 05:35:35.204 [Info] [zRcCommandProcessor.cpp:190] zRcCommandProcessor::onNewFrames: Push back new IR frame in
to RCommandProcessor's queue

```



If a laser projector has not yet been detected or if there is no connection to the projector, the button **Projector** appears on a grey background in the lower right corner of the user interface.



If the ZLP-Service has successfully connected to the ZLP-Manager instance, the **ZLP-Service** button is highlighted in green.

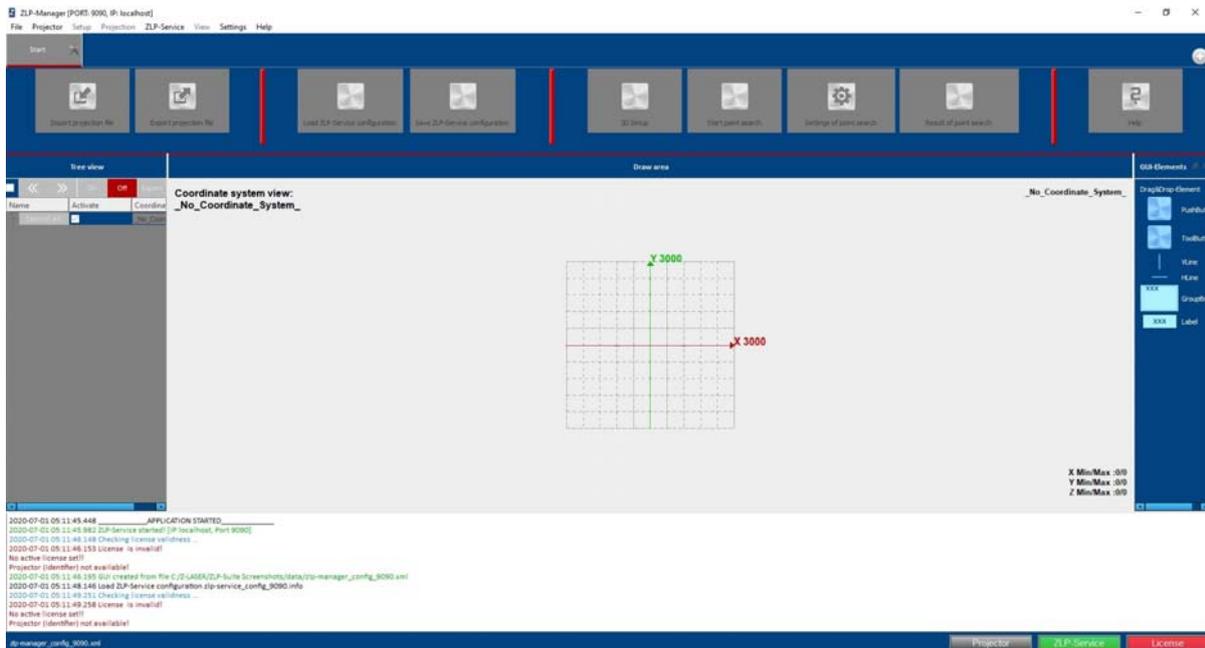
If a valid license file was found, the **License** button appears green, the ZLP-Manager is unlocked and can be used immediately. If no valid license file could be loaded, e.g. because the registration process has not been completed yet, the License button is highlighted in red. On the ZLP-Manager user interface, most functions will then remain grayed out. In the log output window, the error message

License is invalid!
No active license set!!
Projector (Identifier) not available!
 appears.

You can still have your laser projector detected by the ZLP-Manager. This function is license independent. Go to the chapter [Automatic Projector Scan](#).

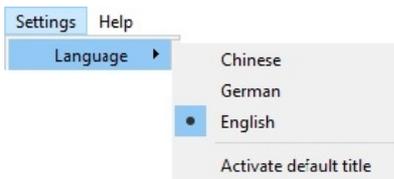
4.2.2 Language Settings

The user interface of the ZLP-Manager opens in English by default the first time.



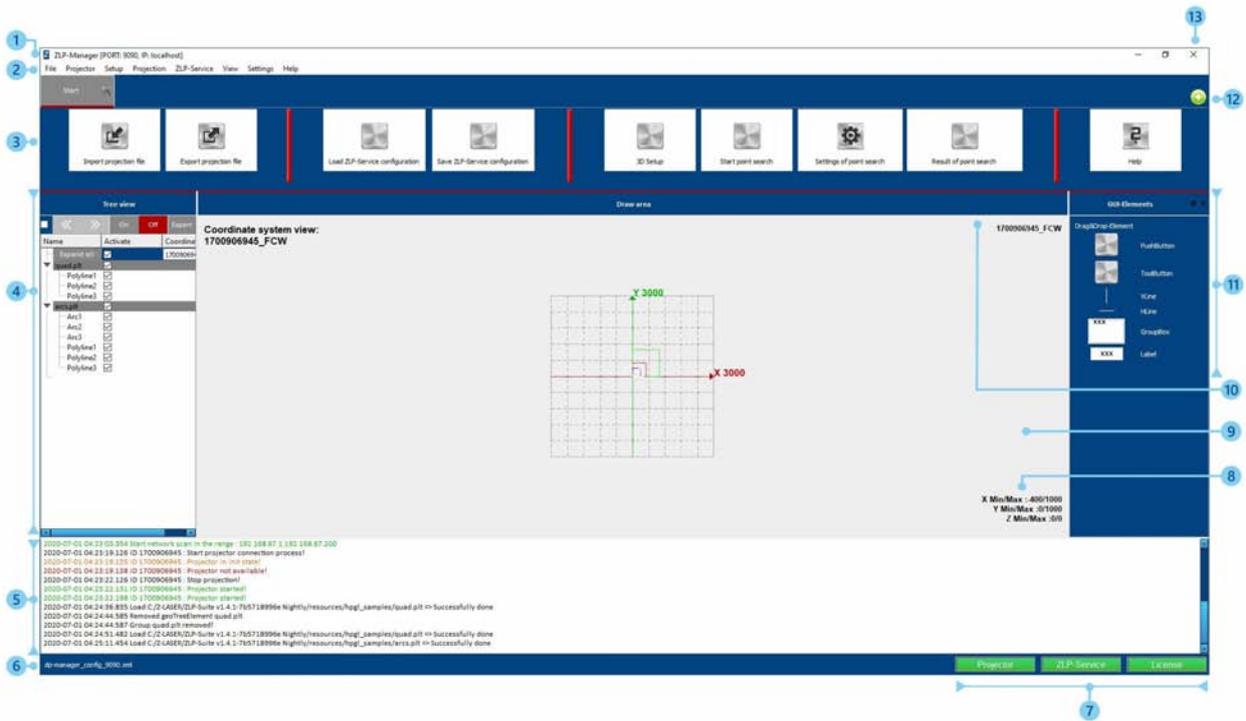
If you wish to change the language to Chinese or German, please proceed as follows:

1. Open the entry **Settings** → **Language** in the menu bar.
2. Select one of the three available languages (Chinese, German, English). The user interface of the ZLP-Manager immediately adopts the language setting.
3. If the language setting has not been adopted correctly for all dialogs, close and restart the ZLP-Manager.



4.2.3 Structure of the user interface

This is an overview of the default ZLP-Manager user interface.



The main elements of the user interface are:

1. Title bar
2. Menu bar
3. Ribbon bar
4. Tree view
5. Activity log window
6. Config file Info
7. Status bar
8. Coordinate info
9. Draw Area
10. Coordinate info
11. GUI-Elements
12. Tab bar
13. Window options

Additional information regarding the structure of the user interface can be found in the chapter [Customizing the user interface](#).

4.2.3.1 Title bar

In the title bar **Z** ZLP-Manager [PORT: 9090, IP: localhost] you will find information from left to right:

- Z-Logo
- Software name **ZLP-Manager**
- the port number of the ZLP-Service instance
- the IP address of the ZLP-Service instance

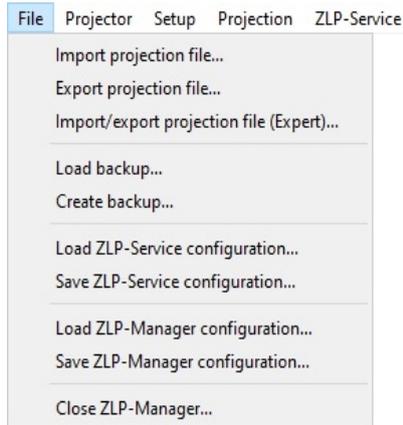
4.2.3.2 Menu bar

In the menu bar you will find the following menu items from left to right:

File Projector Setup Projection Service View Settings Help

Menu entry

File



Functions

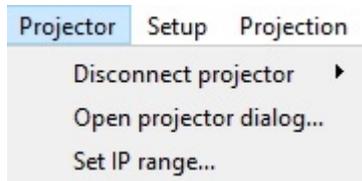
- Import and Export of projection files,
- Loading and creating backups,
- Loading and saving of ZLP-Service and ZLP-Manager configurations,
- Closing the ZLP-Manager

Links

Further information under:

- [Import data](#)
- [Import & Export of projection files](#)
- [Data backup](#)
- [Load & save ZLP-Service configuration](#)
- [Load & save ZLP-Manager configuration](#)

Projector

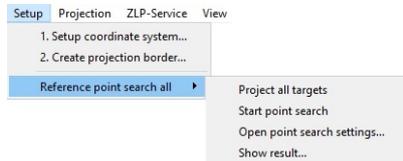


- disconnect a projector,
- open the projector dialog to search for projectors in the network,
- set the IP range for the projector search

Further information under:

- [Projector detection](#)

Setup

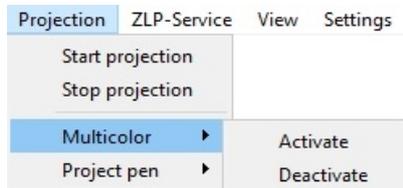


- Set up the coordinate system,
- Create projection clipping planes,
- Projecting all reference points,
- Starting the reference point search,
- Make settings for the points search,
- Display the result of the last points search

Further information under:

- [Projector setup](#)
- [Reference point search](#)
- [Clipping planes](#)

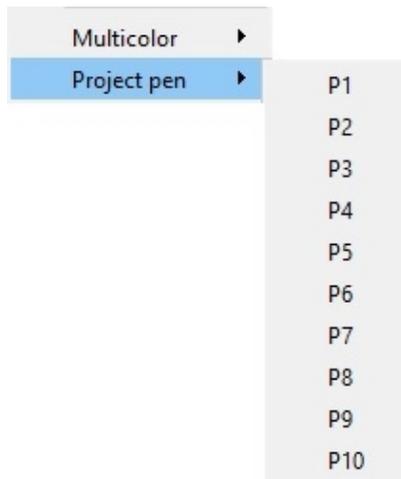
Projection



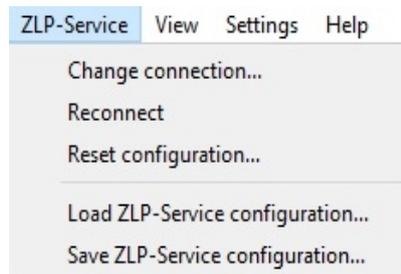
- Start and stop projection,
- Turn on and off the multicolor mode within the overlap area when using different laser colors
- Select the pen color to be projected

Further information under:

- [Activate, project and delete polylines](#)
- [Test projection](#)
- [Multicolor projection](#)
- [Assign and project pen colors](#)



ZLP-Service

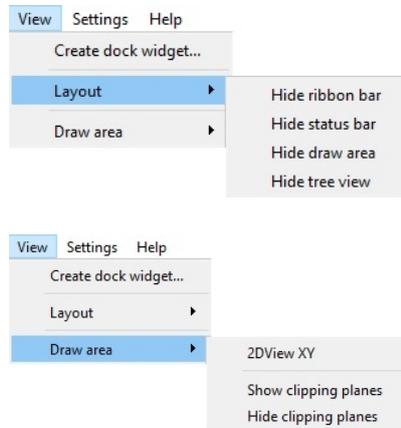


- Change the IP and port number of the ZLP-Service connection,
- Reconnect the ZLP-Service,
- Reset the current ZLP-Service configuration,
- Load or save a ZLP-Service configuration

Further information under:

- [ZLP-Service connection](#)

View

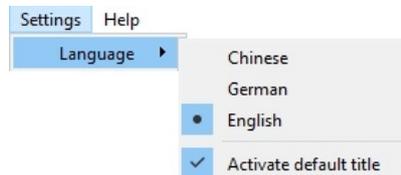


- Create DockWidgets,
- Hide the ribbon bar, status bar, the drawing area and the tree view,
- Set the drawing area to 2D view XY,
- Show and hide plane areas

Further information under:

- [DockWidgets](#)
- [Customizing the user interface](#)
- [Customizing the Draw Area](#)
- [Clipping planes](#)

Settings

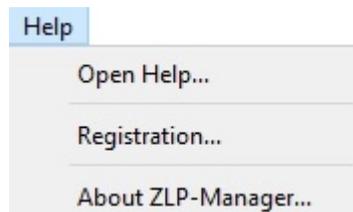


- Change the language of the user interface,

Further information under:

- [Language settings](#)

Help



- Open the help menu,
- Start the registration process,
- Getting information about the software version

Further information under:

- [Help menu](#)
- [Software registration](#)
- [Software version](#)

4.2.3.3 Ribbon bar

The ribbon bar shows the following buttons from left to right:



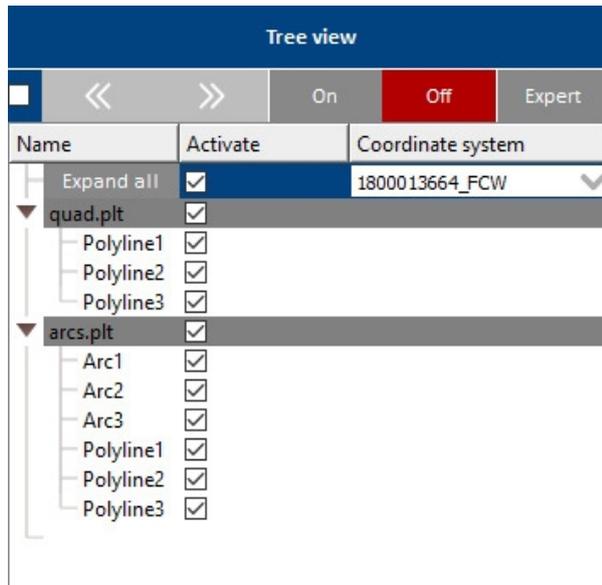
The ribbon bar can be individually changed and/or extended at any time using additional buttons (see chapter [GUI-Elements](#) and [Generating and editing Tabs](#)).

Using the standard ribbon bar in the **Start** tab, the following functions can be executed:

Menu entry	Functions	Related links
Import projection file	Opens the file explorer to load the	Import data and Data import
Export projection file	Opens the file explorer to save the current projection data.	Data export
Load ZLP-Service configuration	Opens the file explorer to load the	ZLP-Service connection and Load & save ZLP-Service configuration
Save ZLP-Service configuration	Opens the file explorer to save the current ZLP-Service configuration file.	Load & save ZLP-Service configuration
3D Setup	Opens the projector setup dialog.	Projector setup
Start point search	Opens a dialog window for the reference point search. Note that you must set up the projector first and afterwards select a coordinate system for the point search.	Reference point search
Settings of point search	Opens a dialog window for setting the parameters for the point search. Note that you first have to set up the projector and then select a coordinate system.	Reference point search
Result of point search	The result of the points search is displayed in a new window.	Result of point search
Help	Opens the Help Dock widget.	Help menu

4.2.3.4 Tree view

All loaded projection files are displayed within the tree view.



Each loaded file is added to the tree as a group element. If a coordinate system was previously selected, each loaded projection file is directly assigned to this coordinate system. Only active elements assigned to a coordinate system can be projected.

For more information on the assignment of projection elements, refer to the chapter [Activate, project and delete polylines](#).

The tree view can be hidden using the menu entry [View → Hide tree view](#).

4.2.3.5 Activity log window

The activity log window serves as information source for all steps that are performed during the operation of the ZLP-Manager. All events with date and time are logged and additionally saved as a `log file`.

All messages have the format date + time + message.

Functional description

- The activity log window is fixed and cannot be moved, but can be hidden using the menu entry [View → Hide status bar](#).
- DockWidgets can be placed above and next to the log window.
- The activity log window shows a time and date stamp.
- Message format: date + timestamp + message
- Date format {DD.MM.YYYY} where the month is not represented in numbers but abbreviated by letters (for example Apr for April)
- Time stamp {hh.mm.ss}

Message types

Type	Example of use	Color
Normal	All simple messages that set parameters, open dialogs or successfully load and save files.	black
Error	All error messages like projectors could not be connected, license invalid, points search failed etc.	red

Warning	Button was not assigned to any known function, translation entry not found, projector is in INIT state	yellow/orange
Process	Checking license, Running Script	blue
Positive result	Point search could be started, projector was connected, projection was started, license is valid.	green

Example of an activity log output

```

30 Jun 2020 00:12:56 _____APPLICATION STARTED_____
30 Jun 2020 00:12:56
30 Jun 2020 00:13:01 Service started! [IP localhost, Port 9090]
30 Jun 2020 00:13:01 Checking license validness ...
30 Jun 2020 00:13:01 License is invalid!
No active license set!!
Projector (Identifier) not available!
30 Jun 2020 00:13:01 XML Reader start reading from file C:/Z-LASER/ZLP-Suite 20.2/data/suite_config_9090.xml
30 Jun 2020 00:13:02 GUI created from file C:/Z-LASER/ZLP-Suite 20.2/data/suite_config_9090.xml
30 Jun 2020 00:13:03 XML Reader start reading from file C:/Z-LASER/ZLP-Suite 20.2/data/suite_config_9090.xml
30 Jun 2020 00:13:03 Load service configuration service_config_9090.info
30 Jun 2020 00:13:04 Checking license validness ...
30 Jun 2020 00:13:04 License is valid!

```

This output is also stored as a log file in the data folder of the ZLP-Suite directory (for example C:\Z-LASER\ZLP-Suite 20.4\data\log) under the name `zlp_manager_year-month-day_port.log` (e.g. `zlp_manager_2020-06-20_9090.log`).

4.2.3.6 Configuration file display

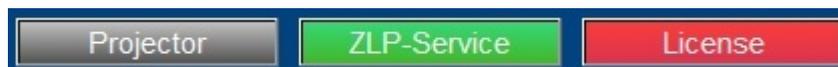
The configuration file display is located in the lower left corner of the ZLP-Manager just underneath the Activity log window. It indicates which ZLP-Manager configuration file currently is being used.

`zlp-manager_config_9090.xml`

How to create your own interface configuration is described in the chapter [Customizing the User interface](#). How to save and load the ZLP-Manager configuration file is explained [here](#).

4.2.3.7 Status bar

The status bar shows the status of the projector, ZLP-Service and the license by means of signal colors. It is permanently visible in the lower right corner of the ZLP-Manager user interface.



The color meaning is explained below:

Projector status

Projector All activated projectors are connected

Projector At least one of the activated projectors is no longer connected

Projector There have been no searches for a projector yet

ZLP-Service status

ZLP-Service The ZLP-Service has been successfully connected

ZLP-Service The ZLP-Service could not be connected

ZLP-Service The version numbers of ZLP-Service and ZLP-Manager do not match. This can lead to limited functionality and unexpected behavior.

License status

License A valid license has been loaded

License No valid license has been loaded

4.2.3.8 Draw Area and Coordinate system information

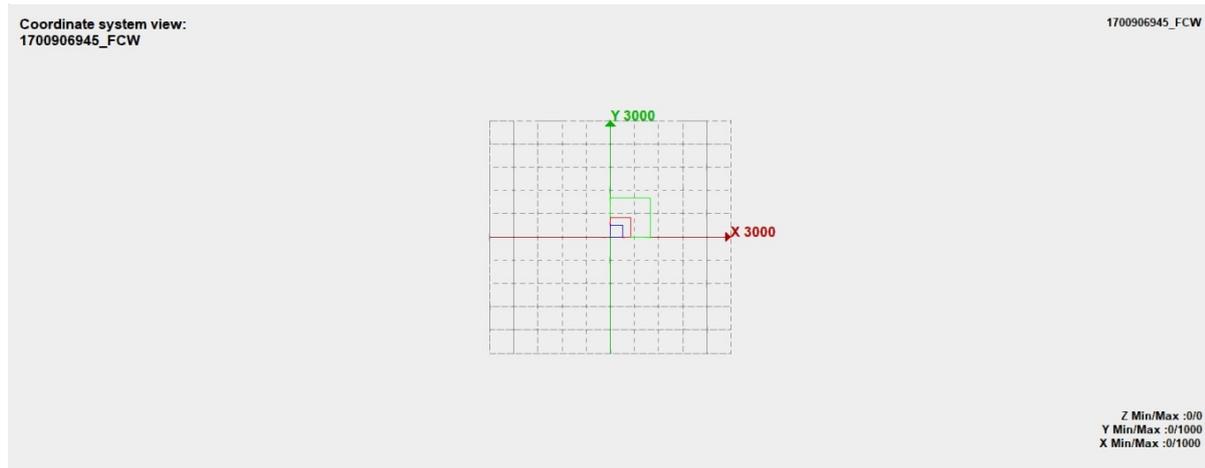
The draw area is the central element of the ZLP-Manager. It is closely related to the tree view. Within the central drawing area, all polylines are displayed in a coordinate system.

If, for example, polylines are activated or removed, these changes will also apply to the tree view.

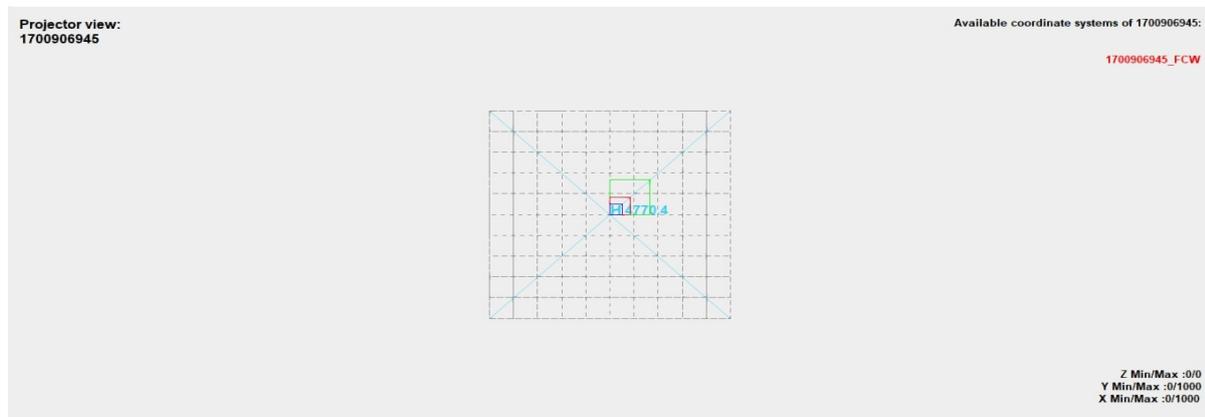
Various labels are displayed in the corners of the central view window, and their meaning will be explained in the following table.

Corner	Label
upper left	Differentiation between coordinate system and projector view: this is followed by the name of the coordinate system or the projector.
upper right	Name of the coordinate system set. In the projector view (see picture 2) all coordinate systems belonging to the projector are listed. The active coordinate system is marked red in the projector view only. If no coordinate system has been selected yet, the entry is empty.
lower right	Min/Max coordinates of the polylines in X-, Y-, and Z-plane. The specification always refers to the totality of all polylines in the coordinate system.

1. Coordinate system view



2. Projector view

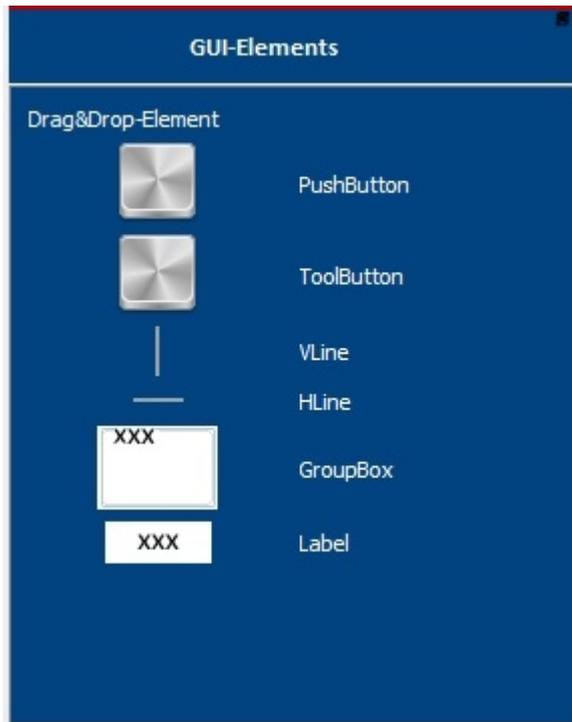


How to adapt the drawing area to your requirements and which additional functions you can find there, is described in the chapter [Customizing the Draw Area](#).

4.2.3.9 GUI Elements

The DockWidget **GUI-Elements** contains various button elements that can be placed within a tab in the menu band or in a docking window, for example, by dragging and dropping them.

GUI elements are used to provide additional ZLP-Manager functions. The individual design options of the individual elements allow the creation of interfaces for each user or operating process, so that only relevant functions are visible. Description texts, element sizes and individual symbols can be defined. These settings can be adjusted at any time via the context menu of the element. Further information on this can be found in the chapter [Customizing the user interface](#).



WidgetElement	Description
PushButton	Creates a button. The icon size corresponds to the button size.
ToolButton	Creates a button with a frame. In the center is the icon.
VLine	Creates a vertical dividing line. Has no other function.
HLine	Creates a horizontal dividing line. Has no other function.
GroupBox	Can group all elements listed here. Can be used for function grouping.
Label	Creates a label element.

4.2.3.10 Tab bar

With the green plus sign it is possible to create several tabs. Each tab can be assigned an own ribbon bar with various buttons and symbols.



The generation of different tabs and the adaptation of the button icons are particularly suitable for the design of different workflows. For more information, go to the chapter [Generating and Editing Tabs](#).

4.2.3.11 Window options

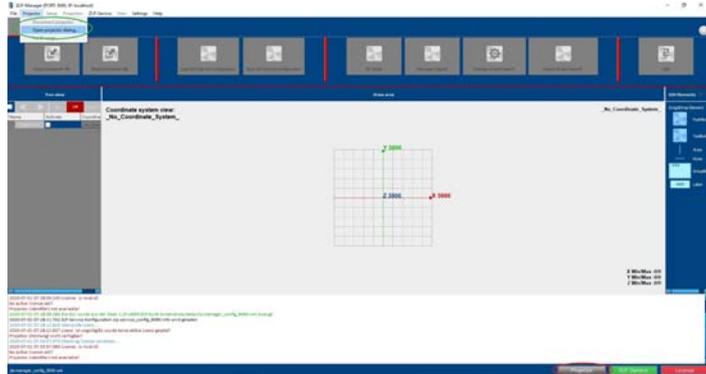
You can use the window options  to minimize, resize/enlarge, and close the window.

4.3 Projector detection

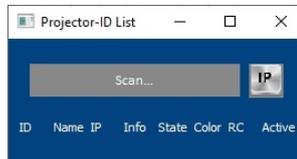
4.3.1 Automatic Projector scan

Before starting the automatic projector search, make sure the projector is turned on and connected to the same network as the control PC. Then follow the instructions below.

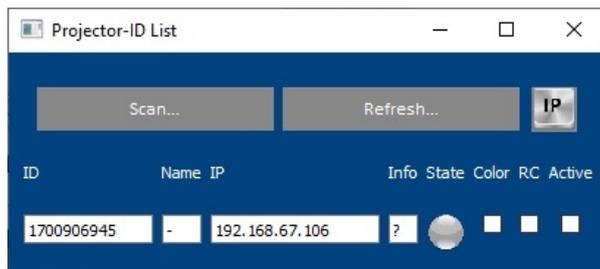
Open the ZLP-Manager. Click on the **Projector** button on the status bar in the lower right corner of the user interface (red mark) or open the projector dialog via the menu entry **Projector → Open projector dialog** (green mark).



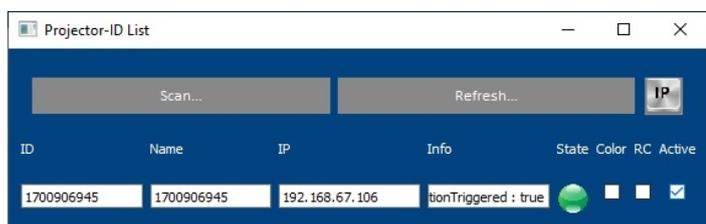
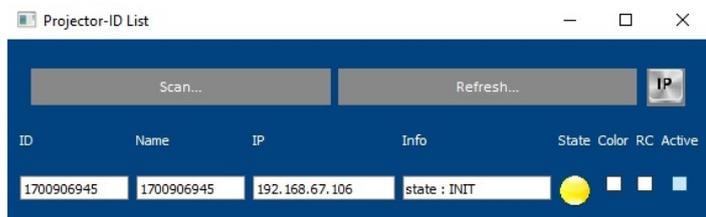
The projector search window opens. Click **Scan** to perform an automatic IP address search. The projector search automatically detects all projectors in the network. Therefore it is not necessary to know the IP address of the projector in advance. However, if you already know the IP address of your projector or only want to perform a scan in a certain IP range, you can enter the IP address directly by clicking on the grey IP button. Read more about this in the chapter [Set IP range](#).



To connect the projector to the ZLP-Manager, the projector only needs to be activated. To do this, press the last checkbox **Active** to set the check mark.

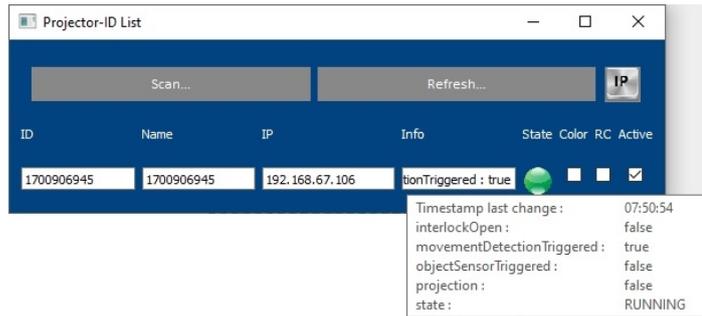


The status indicator now changes from grey to yellow (INIT state) to green (RUNNING state).



As soon as the projector is connected, all projector information such as temperature, motion sensor or projection state is displayed when moving the mouse pointer over the Info field.

As long as the projector is connected to the current ZLP-Service instance, no further instances can access the projector until you release (deactivate) the projector. For more information, refer to the chapter [Deactivate or Reconnecting Projectors](#).



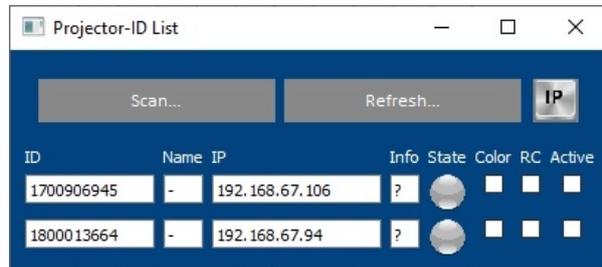
Close the dialog window.

The Projector button at the status bar has now changed from grey to green to indicate that the projector has been successfully connected to the ZLP-Manager. You can now [register](#) the ZLP-Manager or, if you have already done so, [set up](#) your projector. If no projector was found, please refer to the chapter [Projector not found](#).

4.3.2 Detection of multiple projectors

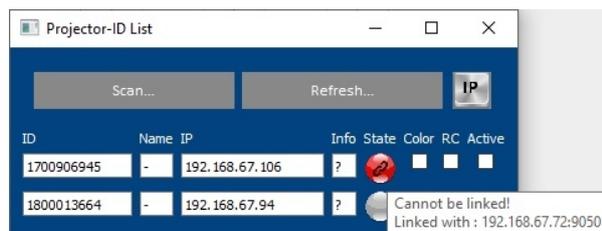
The detection of multiple projectors in the network is automatically performed by default. The search is performed as described in the chapter [Automatic Projector scan](#).

Perform an automatic projector search. The ZLP-Manager automatically detects all projectors in the network and lists them in the adjacent projector dialog window.



Projectors which cannot be connected because being occupied by another instance are

indicated by the icon in the **Status** column. If you move the mouse pointer over the bracket symbol, an ToolTip will appear indicating that the projector cannot be connected. Additionally, the IP address and port number of the ZLP-Manager instance that the projector is currently connected to is also specified.

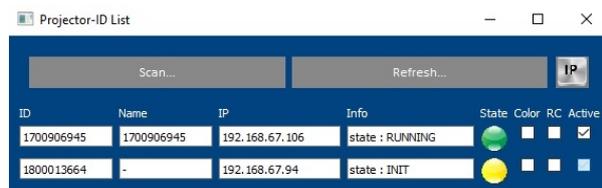


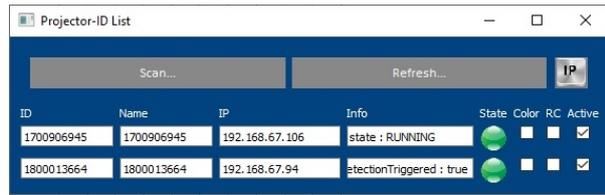
Select all projectors you want to connect to the ZLP-Manager by clicking the appropriate checkbox **Active**.

The status indicator changes from grey to yellow (INIT state) to green (RUNNING state).

The projectors are successfully connected to the ZLP-Manager.

You can now close the projector dialog box.





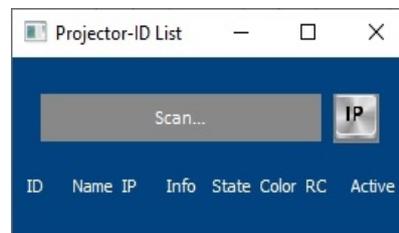
The Projector button at the bottom right of your user interface has now changed from grey  to green  to indicate that the projector has been successfully connected to the ZLP-Manager.

For multi-projection systems, the next step is to define which of your projectors will become the master. A master projector means those projector for which a projector license is needed. Up to 15 additional projectors can be connected to the system via the master projector as long as it is active and connected (not switched off). The projector license is only valid as long as the connection to the master projector is maintained. As soon as the projector is disconnected from the network or switched off, the license becomes invalid and the ZLP-Manager can no longer be used. Now [register](#) your master projector.

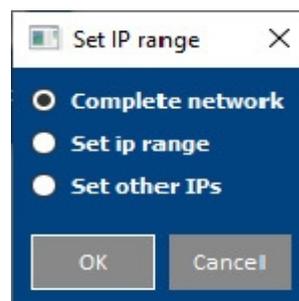
4.3.3 Set IP range

To automatically connect a projector to the ZLP-Manager, make sure that the projector is in the same network as the control PC. However, if the projector is located in a different subnet, the IP range can be set via the IP settings dialog. This allows the projector to be identified more quickly. Alternatively, the projector can also be connected directly to the PC running the ZLP-Manager or ZLP-Service. If no DHCP server is available, the projector can be accessed via its [default IP address 192.168.10.10](#).

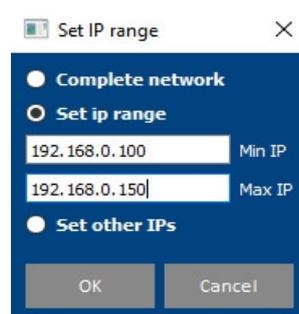
Open the projector dialog window. Click on the button **IP**.



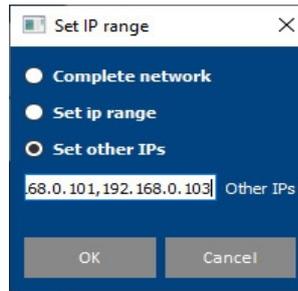
By default, the **Complete network** option is active. Alternatively, the IP range or, if known, the projector IP address can be entered directly. However, only one option can be selected. The next time you search for a projector, you will only search for projectors in this range. If, for example, fixed IPs were set, the projectors can be found more quickly..



If you select the **Set IP Range** entry, enter the **lower IP range** in the **Min IP** line and the **upper IP range** in the **Max IP**.



If you select the **Set other IPs** entry instead, you can also enter other IPs outside the IP range. These IPs must be separated by commas (e.g. 192.168.100.1,192.168.100.3).



After you have set your settings, confirm them with **Ok**. Then click the **Scan...** button again. The system will now search in the desired area or only for the IPs entered. A new search removes all previously not activated projectors from the list and adds the newly found ones.

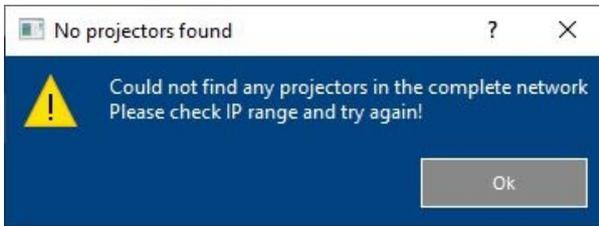
4.3.4 Projector not found

Attention!

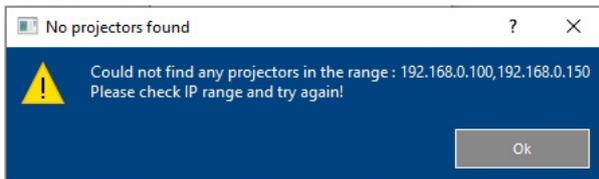


**To follow the instructions in this chapter, you must have administrator rights on your PC!
If necessary, contact your IT technician or network administrator!**

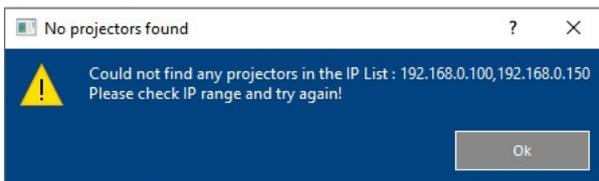
Sometimes no projector could be found. The following error message may be displayed:



if the projector search has been unsuccessful in the entire network



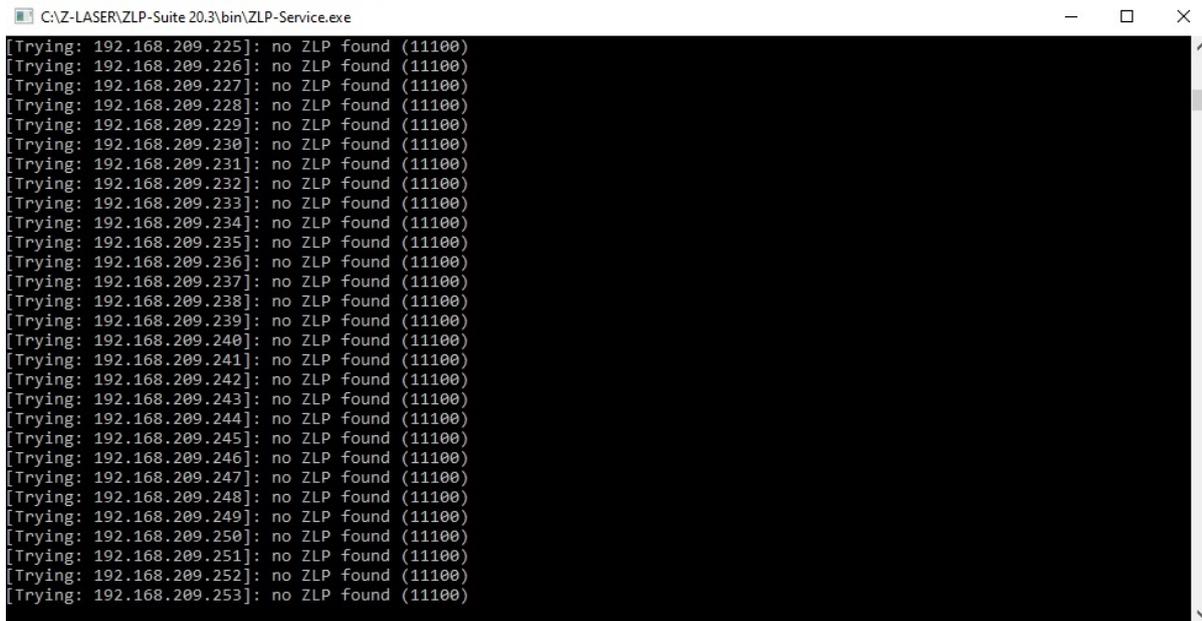
if the projector search within a given IP range was unsuccessful



if the projector search was unsuccessful under the set IP addresses

First check the projector is connected to the network by the network cable. In the **ZLP-Service** window (black window, see figure below), check which network the projector was searched in.

The projector may be searched in the wrong network. This can be the case, for example, if you are working with your PC in several networks.



```

C:\Z-LASER\ZLP-Suite 20.3\bin\ZLP-Service.exe
[Trying: 192.168.209.225]: no ZLP found (11100)
[Trying: 192.168.209.226]: no ZLP found (11100)
[Trying: 192.168.209.227]: no ZLP found (11100)
[Trying: 192.168.209.228]: no ZLP found (11100)
[Trying: 192.168.209.229]: no ZLP found (11100)
[Trying: 192.168.209.230]: no ZLP found (11100)
[Trying: 192.168.209.231]: no ZLP found (11100)
[Trying: 192.168.209.232]: no ZLP found (11100)
[Trying: 192.168.209.233]: no ZLP found (11100)
[Trying: 192.168.209.234]: no ZLP found (11100)
[Trying: 192.168.209.235]: no ZLP found (11100)
[Trying: 192.168.209.236]: no ZLP found (11100)
[Trying: 192.168.209.237]: no ZLP found (11100)
[Trying: 192.168.209.238]: no ZLP found (11100)
[Trying: 192.168.209.239]: no ZLP found (11100)
[Trying: 192.168.209.240]: no ZLP found (11100)
[Trying: 192.168.209.241]: no ZLP found (11100)
[Trying: 192.168.209.242]: no ZLP found (11100)
[Trying: 192.168.209.243]: no ZLP found (11100)
[Trying: 192.168.209.244]: no ZLP found (11100)
[Trying: 192.168.209.245]: no ZLP found (11100)
[Trying: 192.168.209.246]: no ZLP found (11100)
[Trying: 192.168.209.247]: no ZLP found (11100)
[Trying: 192.168.209.248]: no ZLP found (11100)
[Trying: 192.168.209.249]: no ZLP found (11100)
[Trying: 192.168.209.250]: no ZLP found (11100)
[Trying: 192.168.209.251]: no ZLP found (11100)
[Trying: 192.168.209.252]: no ZLP found (11100)
[Trying: 192.168.209.253]: no ZLP found (11100)

```

If the correct network is detected, but the projector is not found within it, specify the IP range for the projector search by setting the minimum and maximum IP range (see chapter [Set IP range](#)) and restart the search.

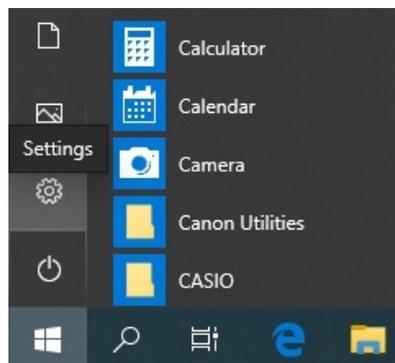
If you already know the projector's IP address, you can enter it directly under [Set other IPs](#) and perform the search again.

Usually the projector is recognized in this way.

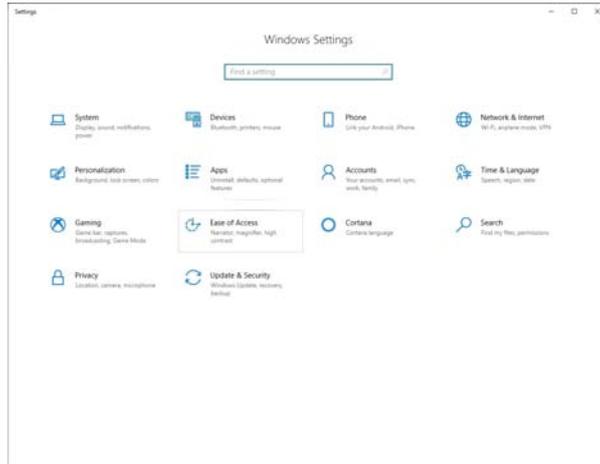
However, if you notice in the ZLP-Service window that the projector search is not running on the same network as the projector, but on the wrong network, you must edit the network connections and disable the wrong network. Under Windows® there are several ways to fix this problem. If the setting change described below does not lead to success, please contact your network administrator!

If you discover that the projector search is not running on the same but on the wrong network, you need to edit the network connections and deactivate the wrong network. Under Windows® there are several ways to fix this problem. If the setting changes described below fail, please contact your network administrator!

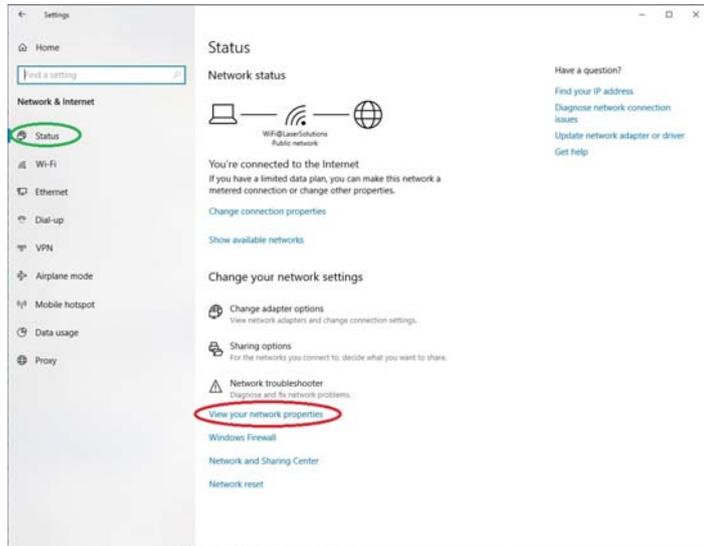
1. Select the Settings icon from the Windows® start menu.



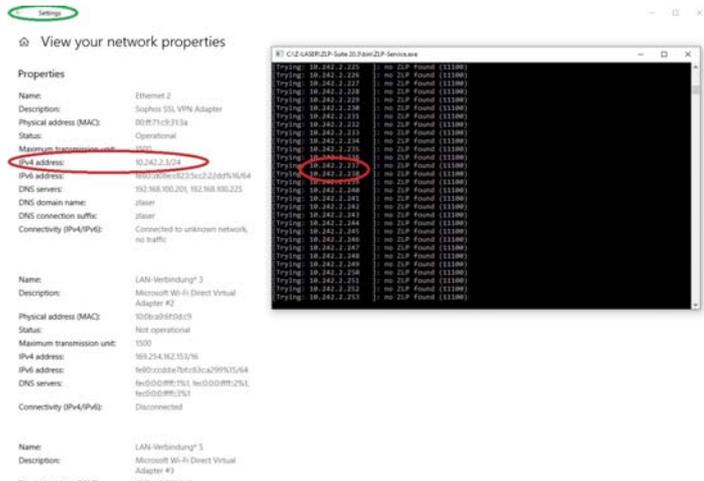
2. The **Windows® Settings** dialog window opens.
Open the entry **Network & Internet**.



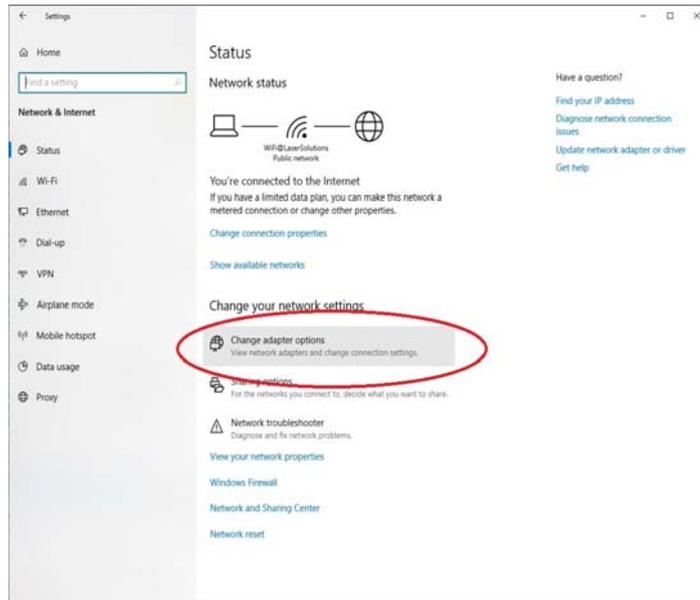
3. The adjacent dialog window opens.
Select **Status** (highlighted in green) from the left menu bar and then **View your network properties** (highlighted in red) from the right selection area under the category **Network troubleshooter**.



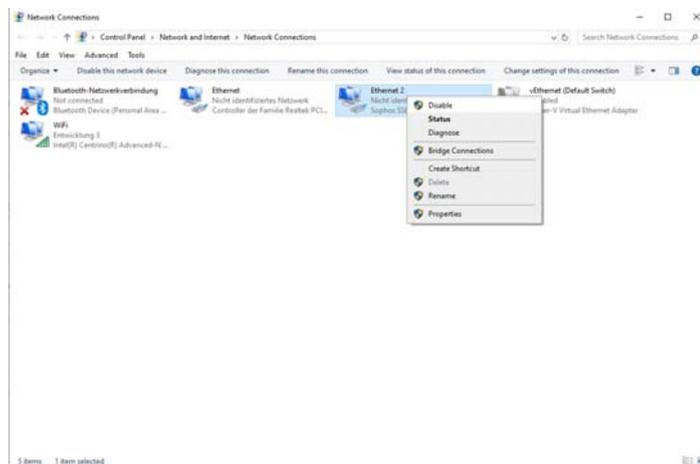
4. An overview window opens that lists all networks and their properties to which your PC is or was currently connected.
Go through the list and find out the network whose IP address matches the IP address listed in the ZLP-Service window (compare the red markers in the adjacent figure). Here only the first 3 blocks are significant. Remember the name of the network.
Then click on the back arrow in the top left window (see green marking) to return to the start page of the settings dialog.



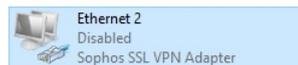
5. In the status menu select the **Change Adapter Options** entry under the **Change Network Settings** theme (see red marking in the adjacent figure).



6. The adjacent dialog window opens. Now right-click on the icon of the network you want to deactivate and select the **Disable** entry.



7. The network entry changes its status to **Disabled**.



You can now close all windows of the Windows® Control Panel.

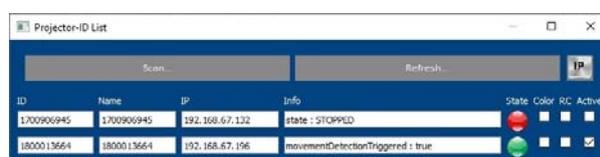
Perform the **Automatic Projector scan** again and simultaneously check in the ZLP-Service window whether the projector search is in the correct IP range. If not, please repeat the setting changes described above and disable all networks where the projector search is performed incorrectly. If necessary, adjust the IP range for the search (see chapter **Set IP range**).

If the network setting changes described above do not work and all interfering networks have already been deactivated, but no projector can be found, please contact your IT technician or network administrator.

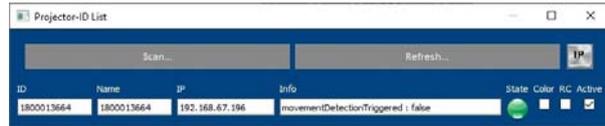
4.3.5 Deactivate or Reconnecting Projectors

Deactivate projectors

In the projector dialog, removing the check mark **Active** disconnects the projector and makes it available for other ZLP-Manager instances. In the info field the message **state: STOPPED** is displayed.

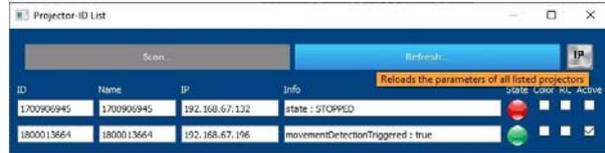


Once the projector is disabled and the ZLP-Manager is restarted, the deactivated projector no longer appears in the projector list.



Reconnecting projectors

If a projector has been manually removed (deactivated), it can be reconnected using the projector dialog. Open the dialog and press the **Refresh** button. The system checks whether all projectors in the list are still available.



If the projector has been temporarily connected to another instance and therefore is no longer available, a corresponding icon is displayed in the status bar. If you move the mouse pointer over the red light signal, a tooltip informs you which instance (IP address) the projector is currently connected to.

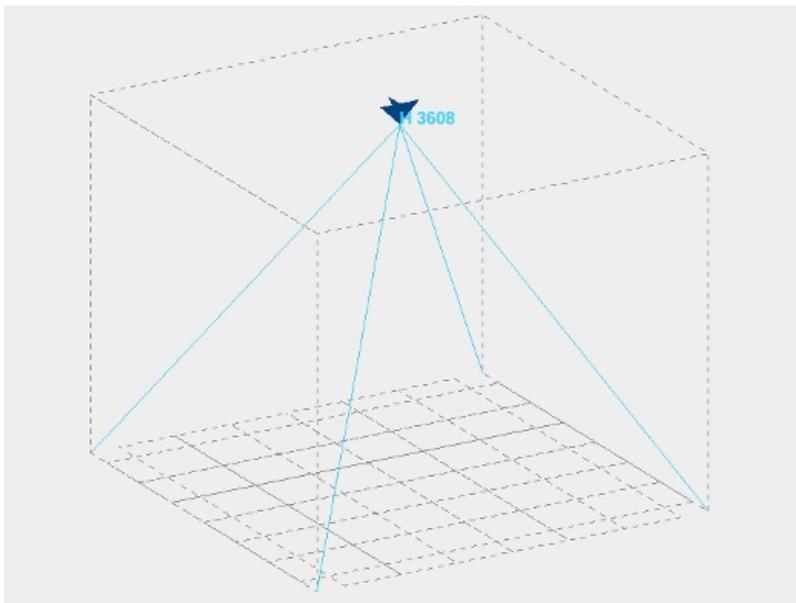


4.3.6 Standard coordinate system

After connecting a projector, its default coordinate system is automatically available. The name consists of the projector serial number and the ending FCW. The ending FCW stands for Factory Calibration Wall. You can project into this coordinate system with the corresponding projector without previous setup.

The standard coordinate system is therefore well suited to test the general functionality of a projector without prior set up of the system.

It is a right-handed Cartesian coordinate system. Its origin is between 3.6 m and 4.5 m vertically from the projection centre in front of the projector, depending on the projector's opening angle. The X axis points to the right, the Y axis to the top and the Z axis to the projector.



4.4 Software registration

To use the ZLP-Manager, you first have to register it and generate a license file. Only with a valid license file

all functions of the software will be unlocked and it can be used to its full extent. Up to this point almost all buttons are greyed out.

4.4.1 Registration procedure

The ZLP-Suite is licensed exclusively by Z-LASER GmbH.

The following data is required for the registration of the ZLP-Suite:

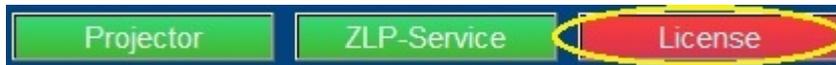
- the runtime
- Customer data
- the modules to be registered

After the software registration the file `register_serial_number.txt` is created, which has to be sent to Z-LASER by e-mail. A license file is then created from your data and sent to you. As soon as the generated license file has been loaded with the ZLP-Manager, it is released for full use.

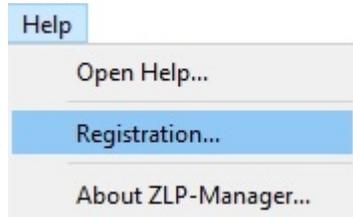
4.4.2 Perform registration

Using the registration dialog the ZLP-Suite can be registered, the current license can be displayed or a new license can be loaded.

Open the registration dialog either via the button **License** in the status bar



or open the entry **Registration...** in the **Help** menu



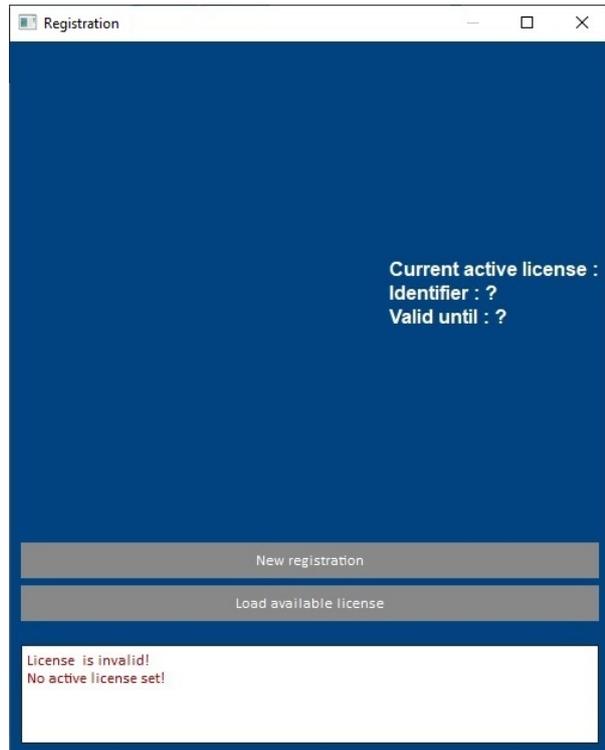
1. The upper part of the dialog box contains the following three kinds of information

- the name of the currently active license
- the identification number (ID of the projector)
- the validity period

If a license has never been loaded before, the first field is empty, there is a question mark in the identification and validity field.

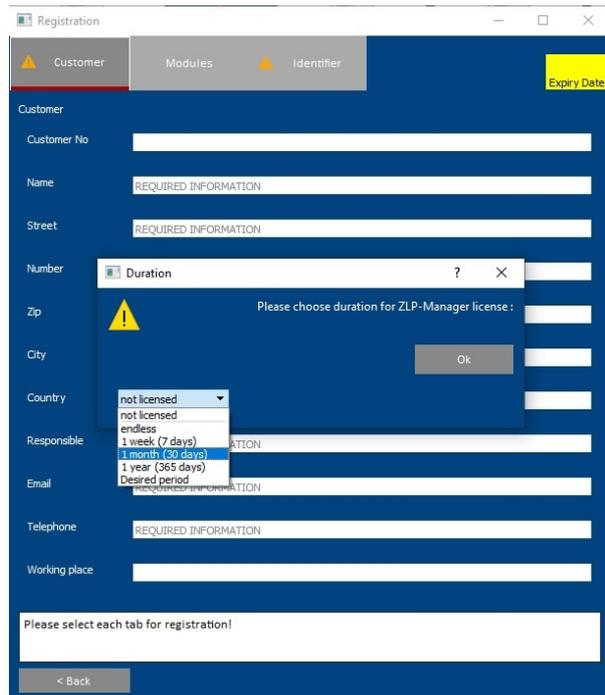
If you already have a valid license, you can upload it directly by clicking on the grey button **Load available license**. A dialog window opens where you can select the directory and the license file.

If you do not have a valid license yet, click on the grey **New Registration** button.



2. Select the period how long the license should be valid and click **OK**.

If no period has been set yet, the dialog can be opened again using the **Expiry date** button in the upper right corner of the registration dialog. As long as no period has been set, the button is yellow. It becomes white as soon as a validity period has been selected.



3. Now enter your customer information. Fields with required information must be filled in.



The warning symbol indicates where information is still incomplete. Only when all fields with required information have been filled in, the warning symbol disappears and the software can be registered.

4. In the **Modules** tab, select the desired function modules to extend the software functionality by specifying the registration period.

Please note: Some function modules are subject to a fee!

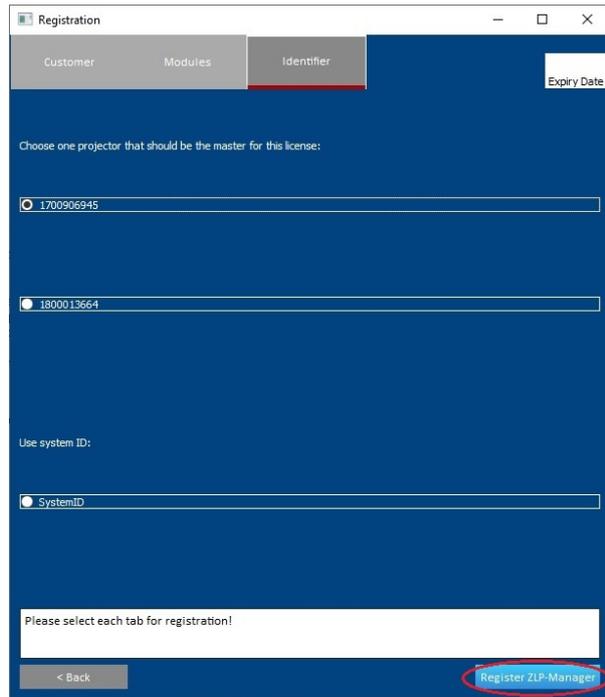
5. In the **Identifier** tab, you can select either a projector or a system license. The **projector license** is linked to the **serial number of the projector**. This means that this projector must be connected for the license to be recognized as valid. However, the projector with the projector license can be operated from any computer on which a ZLP-Suite is installed. If you are using a projector system **with several projectors**, the projector license specifies the projector that will be used as the **master projector**. It is not necessary to purchase a separate license for each projector. To unlock the ZLP-Manager and using it to its full extent, the master projector must be located in the projector system and must always be connected to the ZLP-Manager.

If you want to use the **system license** instead, it is **coupled to the PC** on which you have installed the ZLP-Suite. The projector can only be controlled from the PC on which you have installed and registered the ZLP-Suite.

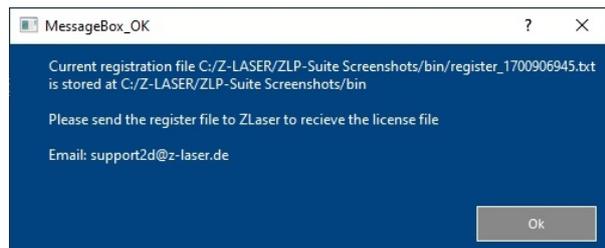
When all required fields have been filled in, the

warning icons  disappear and the **Register ZLP-Manager** button appears in the lower right corner. Press it to start the registration process.

6. Click **Yes**, to generate the registration file. Click **No**, to cancel the registration process.



7. A registration file was created under the name and path specified in the dialog box. Send the registration file to the specified email address to receive the license file. Close all dialog boxes.



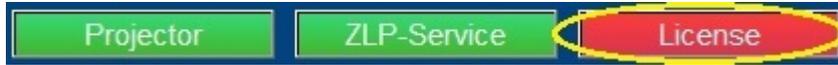
As soon as you have sent the generated registration file `register_ProjectorSerialNumber.txt` to Z-LASER, you will receive a valid license file by email within 2-3 working days. The license file contains the name of the projector series and the file extension `.lic` (`ProjectorSerialNumber.lic`). Save the received license file under any path on your computer and additionally save it in a separate location. If necessary, create a new folder.

Proceed to the next chapter [Load license file](#).

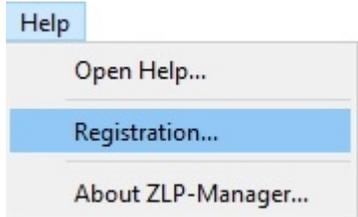
4.4.3 Load license file

First, make sure the projector is connected to the ZLP-Manager. If necessary, perform a projector search first.

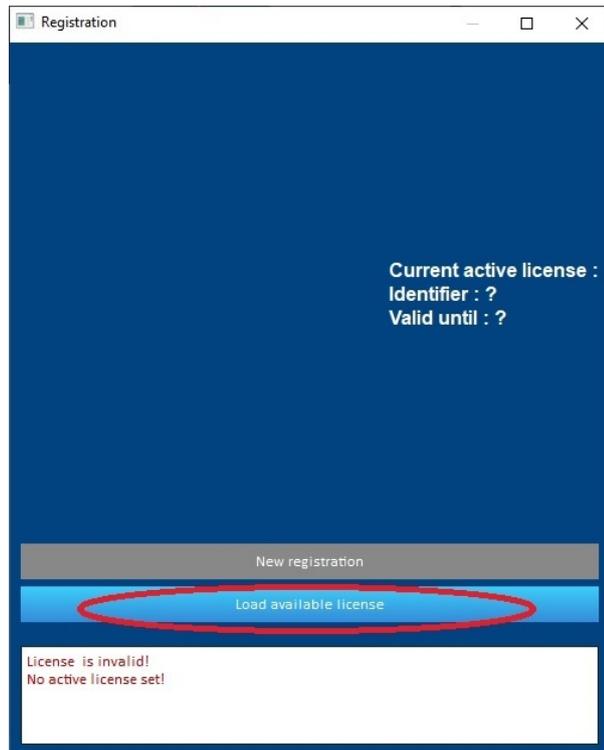
Open the registration dialog again either by clicking the License button in the status bar



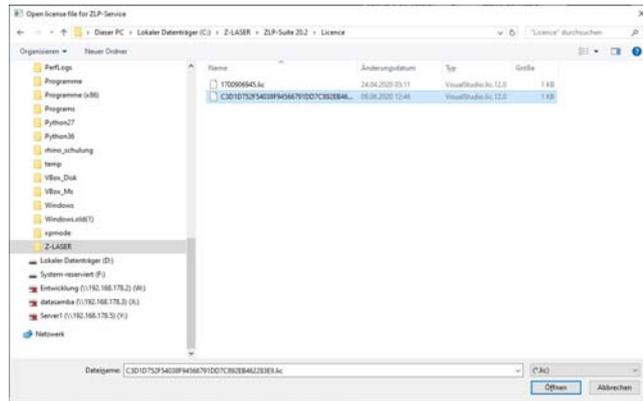
or open the entry **Registration...** in the help menu



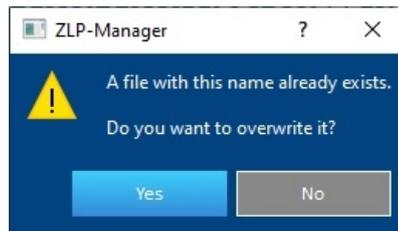
1. Click the button **Load available license**.



2. The file explorer windows will open. Navigate to the path where the license file is located. Click to open it.



3. If a license file with the same name has already been loaded, a message window appears indicating that this file already exists. If you want to overwrite this file, click **Yes**.



4. If the license has been successfully loaded, a green message appears in the dialog window indicating that the license is valid (see green marking in the adjacent figure). More over, a third grey button **Show active license** appears (see yellow marking). In addition, entries are now located in the upper area of the dialog box next to the three information for :

- the name of the currently active license
- the identifier (identification number ID of the projector or system ID)
- the validity period

For the validity period:

1 = infinite validity

The expiry date is entered for all other limited periods.



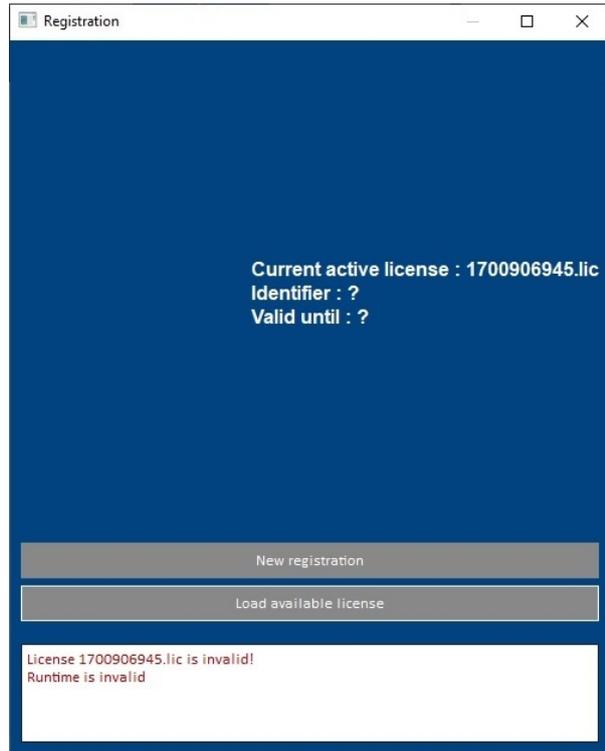
If there occur error messages when loading the license file, you can find help in the chapter [Error messages during loading the license](#).

4.4.4 Error messages during loading the license

This chapter provides an overview of possible error messages that may occur when loading a license file, their cause, and how to fix them.

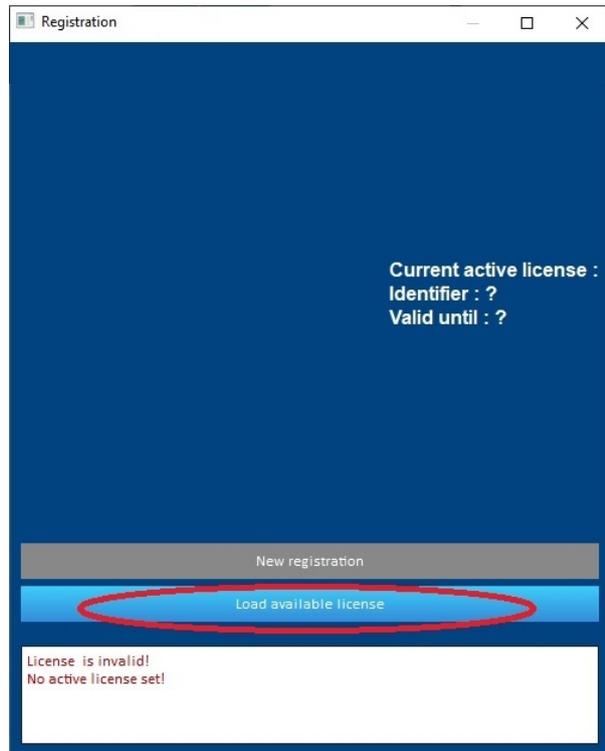
**License xxx.lic is invalid!
Runtime is invalid!**

If this error message appears, the **runtime period** of the license has **expired**. Load a new, still valid license or make a new registration.



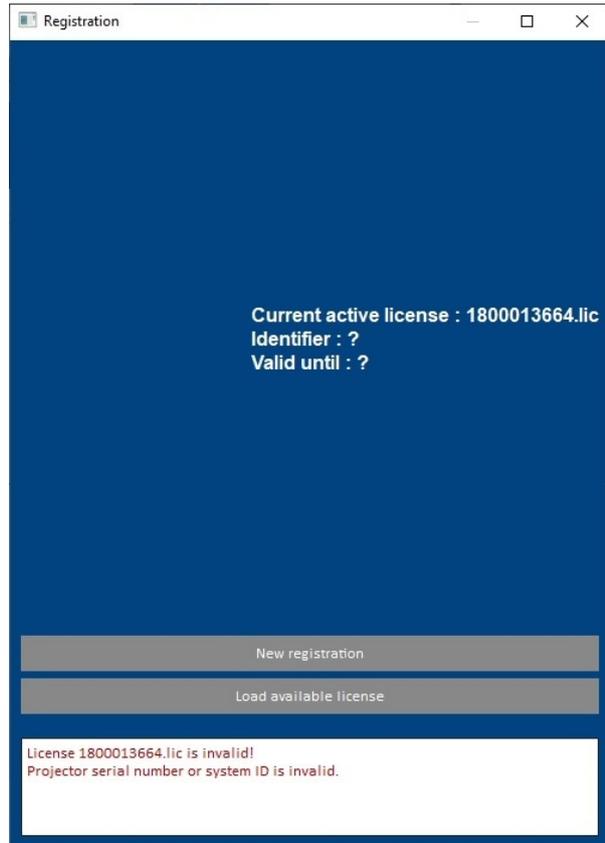
**License xxx.lic is invalid!
No active license set!**

This error message usually appears at the beginning of a registration process if a valid license has not been loaded yet. In this case, press the **Load available license** button to select and load a license from your computer. If no license exists yet, you must first go through the registration process.



License xxx.lic is invalid!
Projector serial number or system ID is invalid.

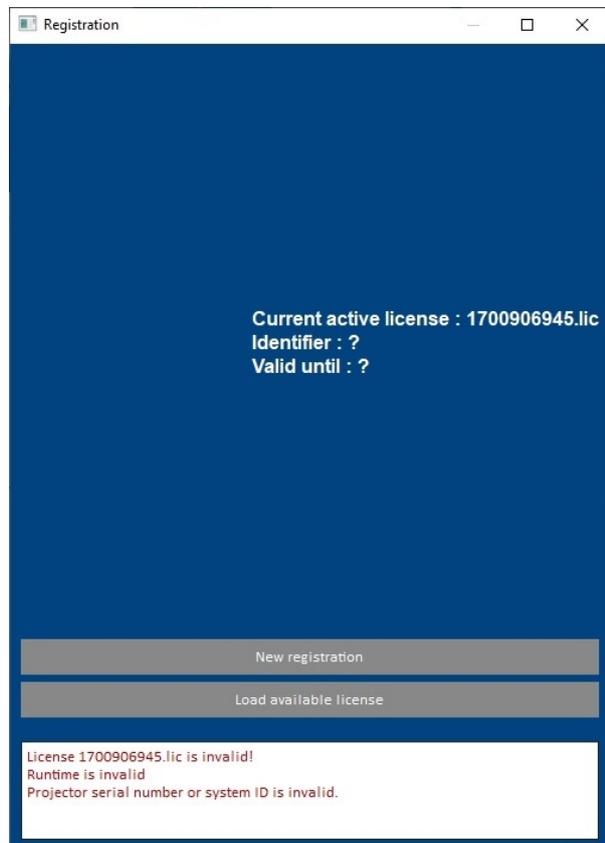
This error message appears if the license was created for another projector and the serial number of the currently active projector does not match the ID of the license.
 Either load the license associated with the projector or select the projector to which the license was validated.



License xxx.lic is invalid!
Runtime is invalid
Projector serial number or system ID is invalid.

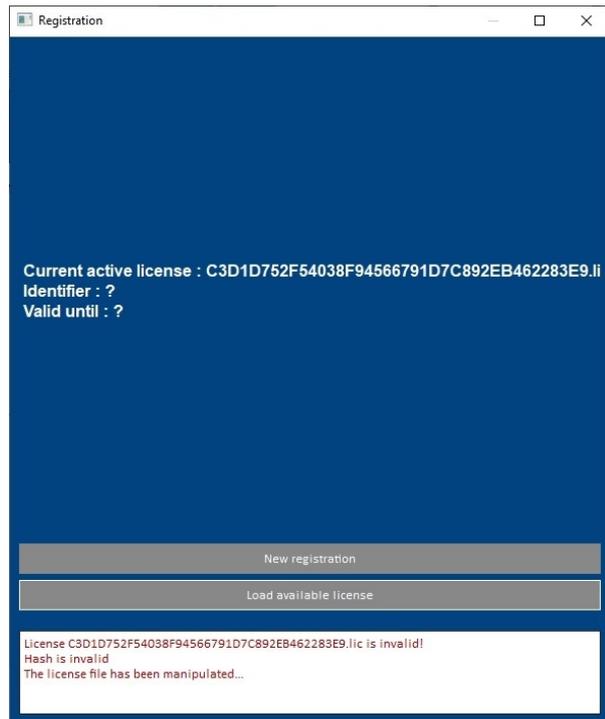
This is a combination of several errors. The loaded license is no longer valid because the runtime has expired. In addition, the license file does not match the selected projector.

Connect the correct projector to the ZLP-Manager or select another license that is still valid.
 Otherwise, please register again.



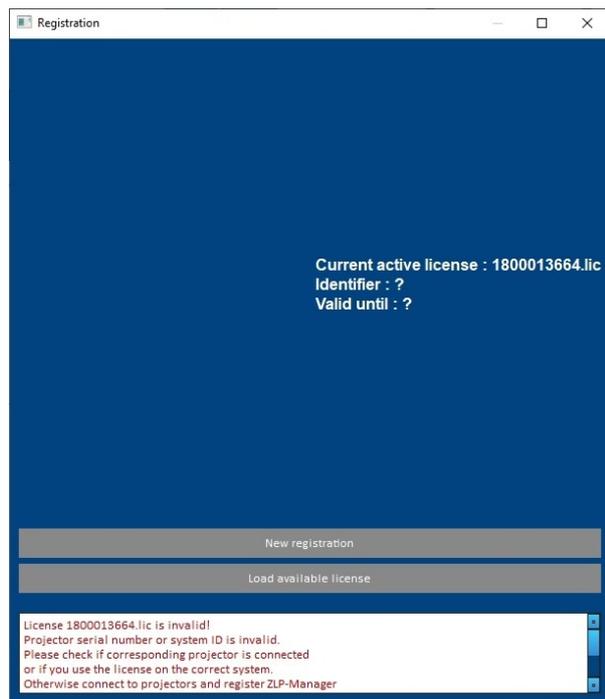
License xxx.lic is invalid!
 Hash is invalid
 The license file has been manipulated...

This error message appears when changes have been made to the license file. Undo the changes or create a new registration.



License xxx.lic is invalid!
 Projector serial number or system ID is invalid...

Follow the instructions on this error message. First, check whether the corresponding projector is connected or whether this system license can be used on your PC. Otherwise, connect additional projectors to the ZLP-Manager and re-register the software.



4.5 Projector Setup

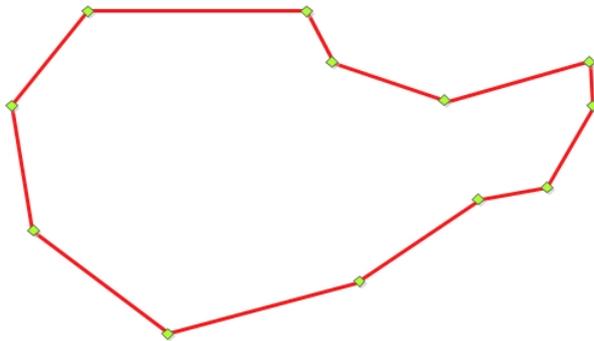
In order to use the laser projector, it is necessary to set it up on the intended work surface. When the projector is set up, a user coordinate system is created and the projector is set up on it using reference points. The coordinates are then transformed into the factory calibration plane of the projector. Each setup is saved as a new user coordinate system into which objects, polylines and circles can then be projected. Without projector setup, only the factory coordinate system with the identifier **ProjectorID_FCW** is available, into which you can project (see chapter [Standard coordinate system](#)).

4.5.1 Preparation

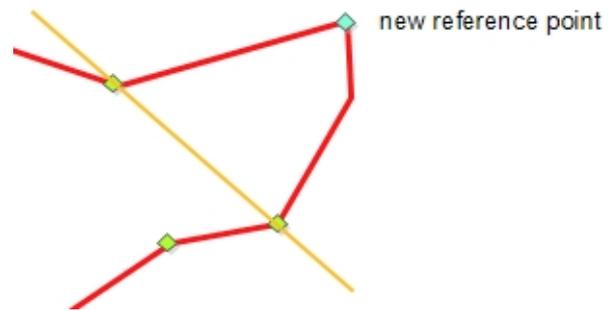
First define the position of the reference points. You can define any number of points. In order to obtain a result that is as accurate as possible, it is advisable to have at least 4 points. Reference points are usually located close to the corners just outside your working area. Furthermore, they should be within the maximum projection area and have a minimum distance of 200 mm to the displayed lines of the maximum projection area. Reference points must be measured directly on the setup object or loaded from construction files and the coordinates must be transferred in the 3D setup dialog.

When setting up, select a corner point of the setup object as zero point P0 (0,0,0), for example. Measure further points from the zero point to measure in the maximum volume of the setup object. Set further points at the edge of the setup object at prominent points such as edges, curves, peaks or valleys. Select additional intermediate points if the connecting line of two consecutive points intersects a large part of the setup object (see figure below).

Setting reference points



Connecting line of two points



The reference points will later be used to compensate minimal mechanical and electronic drifts.

If possible, attach reflectors to the setup surface at the position of the desired reference points. Reflectors help the projector to automatically find the reference points by reflecting the laser beam.

If you use the supplied reflectors, they must be immovable but visible to the projector at all times. There must be no objects, devices, etc. in front of the points. The best way to mount the reflectors is to drill them to the selected reference points on your setup surface.

If it is not possible to attach the supplied reflectors, you must mark the reference points elsewhere, for example by attaching reflector foil.

4.5.2 Starting and running projector setup

Starting projector setup

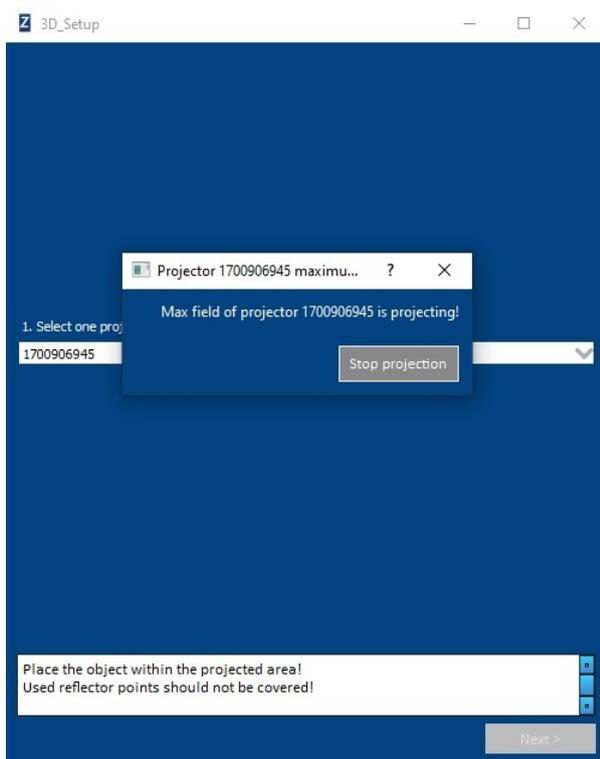
To start the setup dialogue either click on the **3D Setup** button in the menu bar (see red marking in the following illustration) or open the menu entry **Setup → 1. Set up coordinate system...**



Follow the instructions in the dialog box that opens. Use the **Next** and **Back** buttons to navigate through the dialog. At the bottom there is an info field in which instructions and error messages are displayed.

If only one projector is connected, it is automatically selected and its maximum field projected, otherwise a projector must be selected from the dropdown list before the maximum field can be displayed.

Single projector

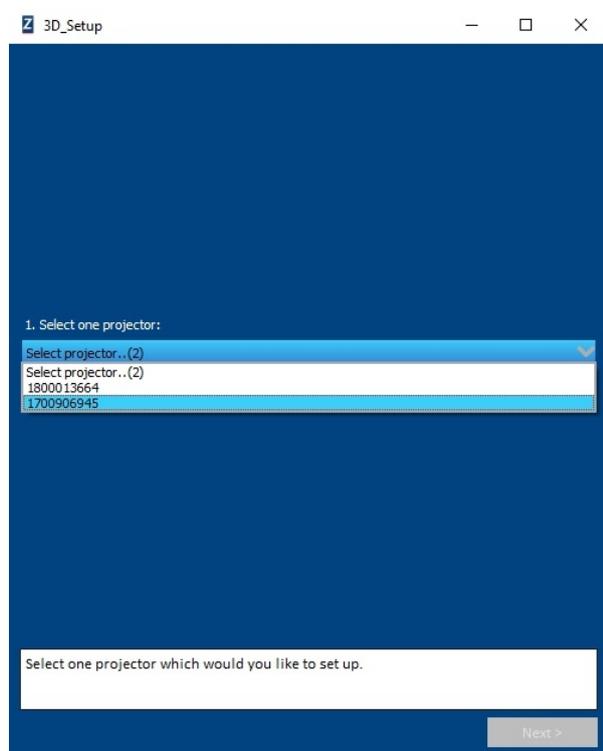


Multiple projectors



1. Step: Select projector

Select a projector from the dropdown list for which you want to perform the setup. The number displayed in brackets corresponds to the number of projectors in the list. If there is only one projector in the list, it is automatically selected.

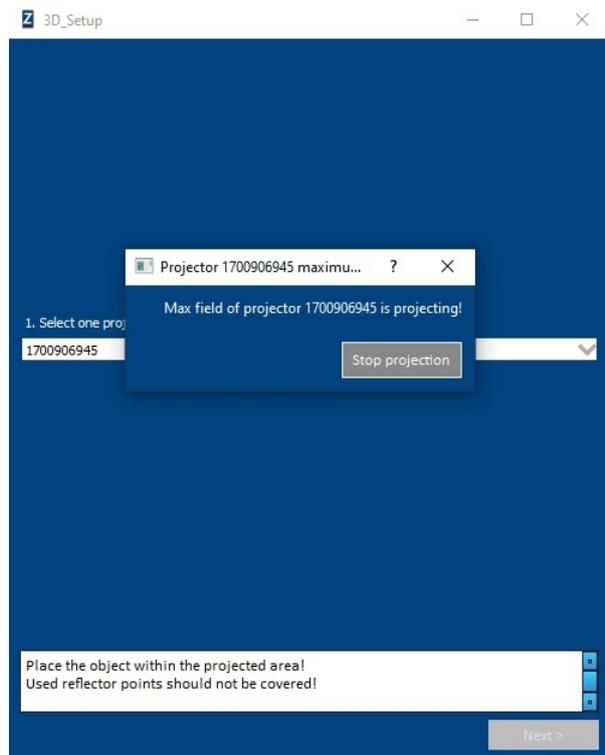


2. Step: Place the setup object within the Max field

Once a projector is selected, the maximum projection area and a center cross are immediately projected on the surface. The projector can only project within this area. Now

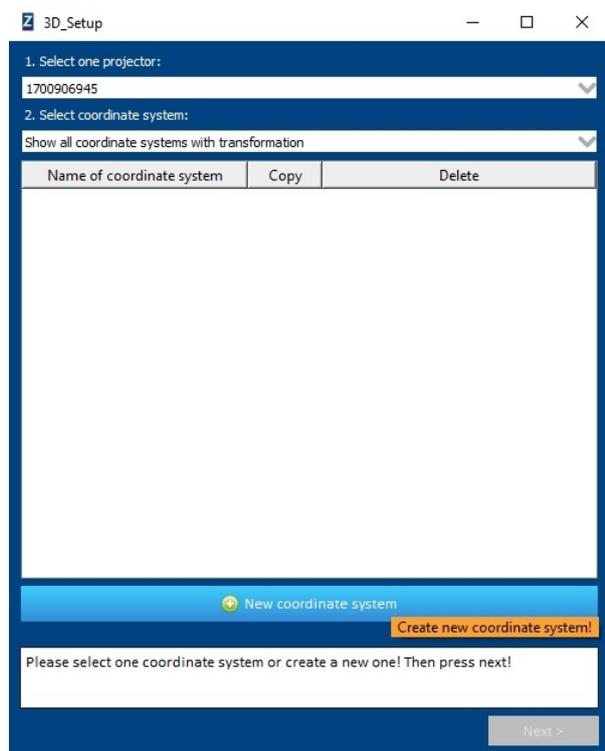
place the setup object on which you want to project within the displayed maximum projection area. Try to center the displayed cross on the object. If this area is not sufficient for the setup area or the object, either increase the distance between the projector and the projection area or use a second projector.

As long as the dialog is active, the maximum field of the projector is also projected. When the **Stop Projection** button is pressed or the dialog is closed, the projection turns off. To restart the projection, open the dialog again and select a projector from the list.

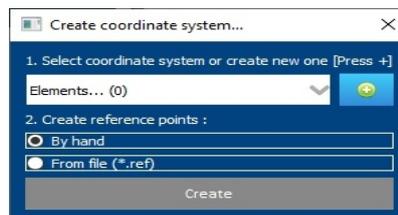


3. Step: Generate coordinate system

Select the projector for which you want to generate the coordinate system from the drop-down list under **1. Select Projector**. Click the **New Coordinate System** button.



A dialog windows for generating a new coordinate system opens. Click on the button .



Enter the name of the coordinate system (here: **precast_small**).

Click **OK** to accept the entered name for the coordinate system.

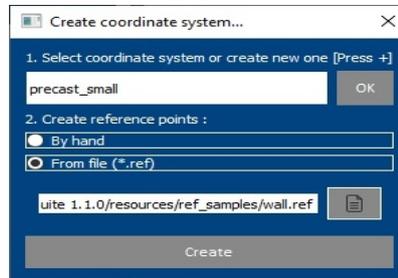
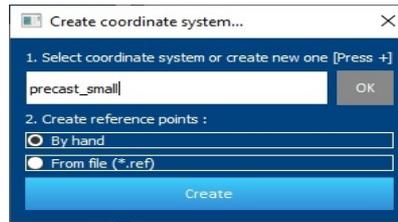
Under **2. Create reference points**, select whether these are

(a) made by hand; or

b) are to be loaded from a *.ref file.

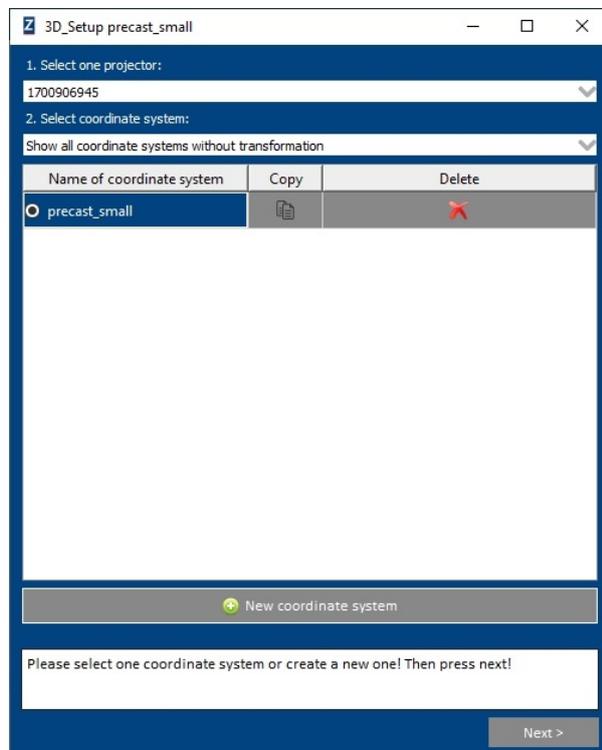
You can learn more about creating reference files in the chapter [Projector Setup from File](#) in the [Advanced features](#) section.

Then click on the **Create** button.



The coordinate system has been generated and now appears in the list.

Click the **Next** button to start the setup.

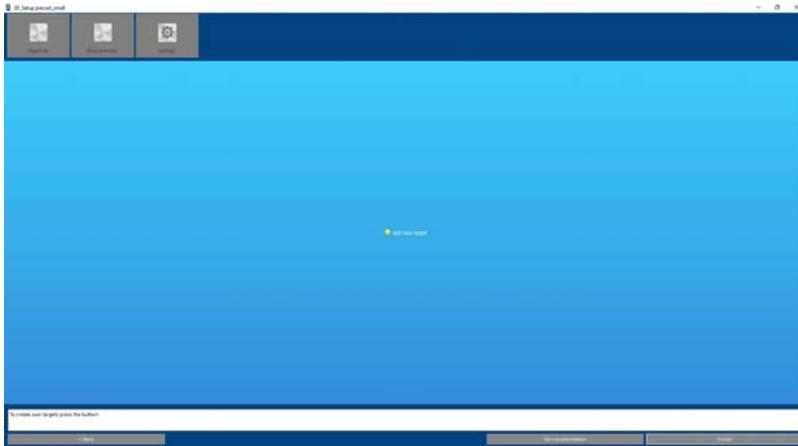


Running the projector setup

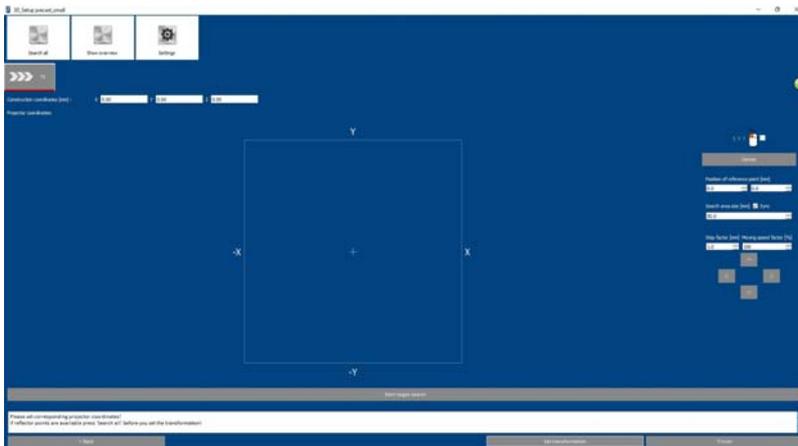
After you have generated the coordinate system, you can continue to define the reference points. The reference points are used to define the projection area as well as to give the projector a coordinate system with its dimensions into which the projector can project. Note that there will be differences in the setup process if you have not attached any reflector points. However, the differences in the procedure are explained in the given place and are highlighted. Now follow the instructions.

Step 1: Generating a Reference point

Click on the button in the middle of the dialog window to add the first reference point.



The laser projector first projects a cross surrounded by a square  in the middle of the opposite projection surface. A square appears on the ZLP-Manager user interface with a small cross in the middle. At the upper left, the button labeled T1 appears  and represents the first reference point. As many reference points as desired can be created. For an optimal and exact result it is recommended to define at least 4 to 6 reference points. Each reference point has a designation from T1 to Tx.

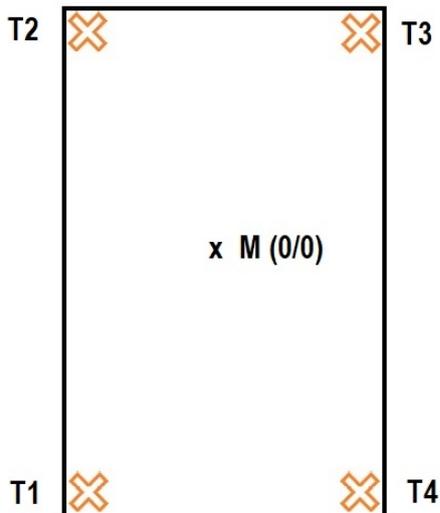


Step 2: Insert construction coordinates

Under **Construction coordinates**, enter the x, y and z coordinates of your first reference point T1 in millimeters. Start the mapping in any corner.



In this example, the first reference point T1 is in the lower left corner of a rectangle. The center point M carries the x/y coordinates (0/0). For the reference points T1 to T4, the following x/y construction coordinates are given as examples in the adjacent sketch:



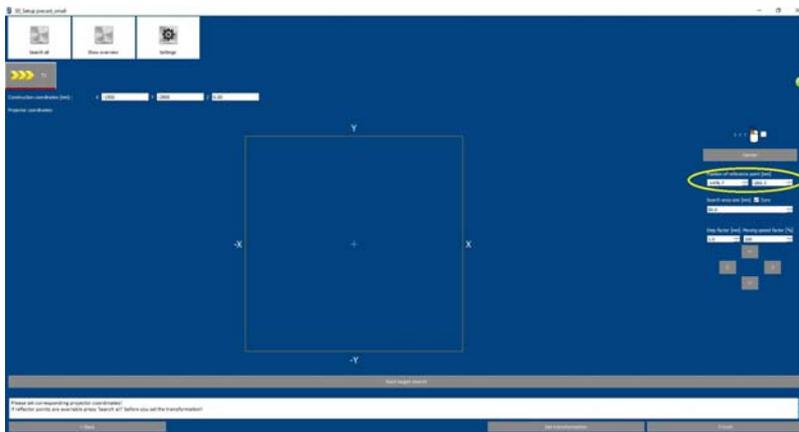
T1 (-1500/-2900)
 T2 (-1500/2900)
 T3 (1500/2900)
 T4 (1500/-2900)

Step 3: Move the reference point to the corresponding position and assign coordinates

Click with the left mouse button in the middle of the square displayed on the user interface and keep the mouse button pressed.

The edges of the square turn orange.

The three arrows of the reference point button T1 turn yellow. This indicates that you can start setting up the first reference point.



Look at the cross  on your projection surface projected by the laser projector and move the mouse. Hold down the left mouse button and move the projection cross as close as possible to the position of your first reference point T1. The square size corresponds to the search area size. The reference point must therefore be within the projected square, otherwise it will not be found during later scanning. The size of the search range can be set in the [Search range size \[mm\]](#) field in the right dialog area.

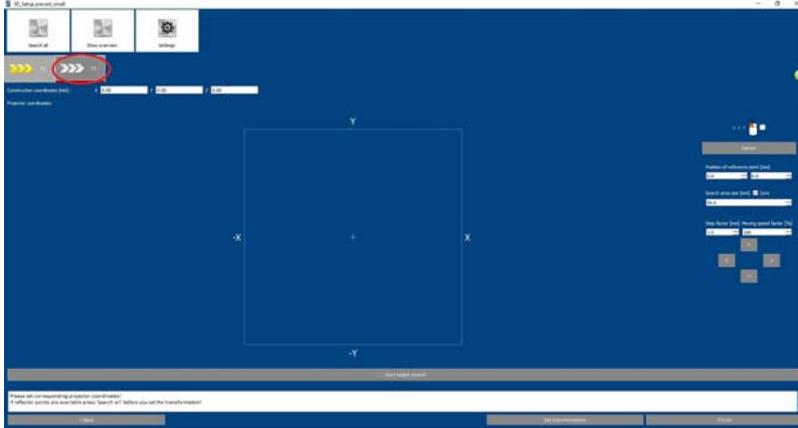
If you do not use reflectors, you must center the laser cross on the reference point.

Release the left mouse button after placement. The user interface on the right now displays the position of the reference point in millimeters (compare the orange marking in the adjacent figure). This is the position in the factory calibration plane. The distance to which this information refers is specified under [Settings](#) → [Projector Height](#). If the setup plane is exactly this distance from the projector, the millimeters are accurate. See the [Setup settings](#) chapter for more information on the setup dialog.

Step 4: Create additional reference points, move them to the appropriate position and assign them

Press the green plus sign on the right side of the ZLP-Manager user interface again. A new tab will be created for the second reference point T2. Click the T2 tab to select it. Enter the construction coordinates of the second reference point.

Left-click the center of the square displayed in the user interface and hold down the mouse button. The edges of the square and the three arrows of the reference point button T2 turn orange.



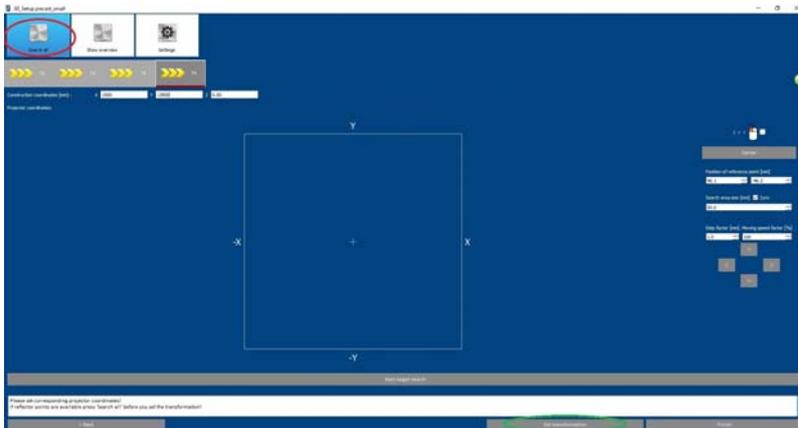
Look at the cross  projected by the laser projector on your projection surface and move the mouse. Hold down the left mouse button and move the projection cross as close as possible to the position of your second reference point T2.

If you do not use reflectors, you must center the laser cross on the second reference point. Release the left mouse button. Proceed in the same way to create all other reference points.

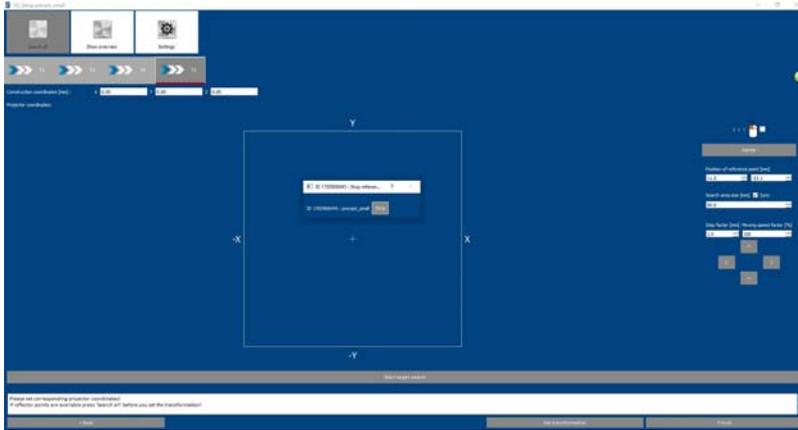
Step 5: Automatic reference point search

When you have finished setting up all reference points, click on the **Search all** button (red marking in the adjacent figure).

However, if you do not use reflectors, no point search is possible. Instead, click on the **Set transformation** button (see green mark in the adjacent figure) and go directly to [Step 6](#).



The laser projector now begins scanning and locating the mounted reflector points. You can recognize the scanning process by the changing blue-white color gradient of the reference points. Make sure that the laser beam is **not interrupted** during the scanning process, e.g. by passing personnel. The meaning of the color codes can be found further down in the text under [Point search - Visualization](#).

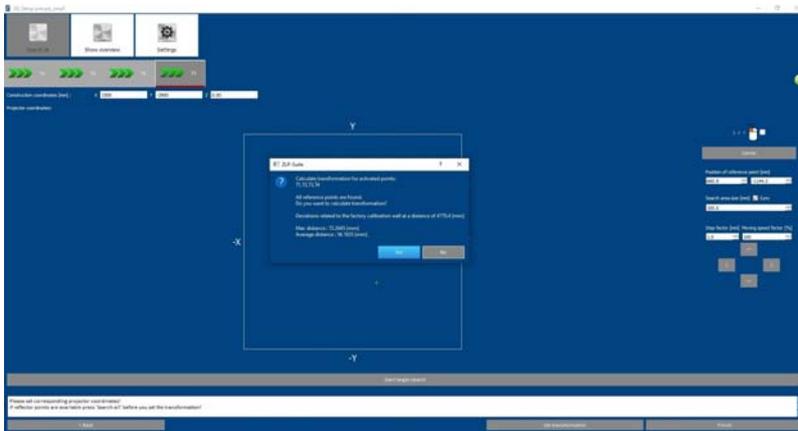


Step 6: Set Transformation

If all points have been found, the tab buttons T1 to T4 appear green. A cross **+** is projected over each reference point and a dialog window opens in which you can confirm the transformation by clicking the **Yes** button if you do not want to make any further changes to the reference point coordinates.

When the transformation is calculated, the construction coordinates are transformed into the projector coordinates. The calculation is performed either automatically, if at least 4 reference points were found during the point search, or by pressing the **Set transformation** button. As soon as the transformation could be calculated successfully, double bordered crosses are projected on the projection surface above the reference points **+**.

In addition, you can see any deviations from the factory-created coordinate system (FCW) in a dialog box that opens (see adjacent figure).



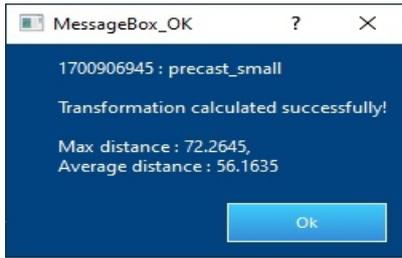
The results should always be checked to identify inaccuracies. The smaller the deviation, the more accurate the projection.

Two values are displayed: **Max. Deviation and Average Deviation in [mm]**.

If both values are < 1 mm, the transformation is very accurate.

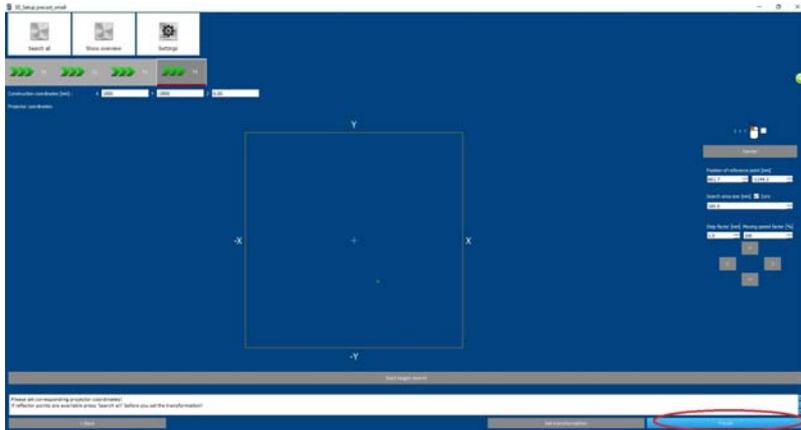
Both values > 1 mm: Transformation could be inaccurate! The larger the value, the more the projection deviates.

Both values > 100 mm or with e^{\dots} . Transformation shows too big deviations. Please check the reference points! Large deviations usually indicate that the reference points have not been placed correctly and/or that the distance between the projector and the projection surface is too short.



Click **Ok** to close the message window.

You have now successfully set up your projector. Click **Finish** to save all coordinates and values and complete the setup. Do not close the window using the close icon, otherwise all your entries will not be saved.



You can have the reference points automatically scanned and/or displayed by the projector at any time. The necessary information can be found in the [Reference point search](#) chapter of the Advanced features section of this manual.

To simplify and speed up the setup process, the Projector Setup dialog provides additional setup options, which are explained in the chapter [Projector setup - Additional Features](#).

Point search - Visualization

The three arrows on each tab visualize the progress and the result of the point search.

Visualization



Description

Point search started - Is visualized by a color change of the three arrows behind the individual tabs. The change takes place until the point search has been completed.



Modify parameters such as design coordinates or projector coordinates.



Result Point search: Point was found!



Result Point search: Point found but at a different position than before (shifted by at least 1 mm)!

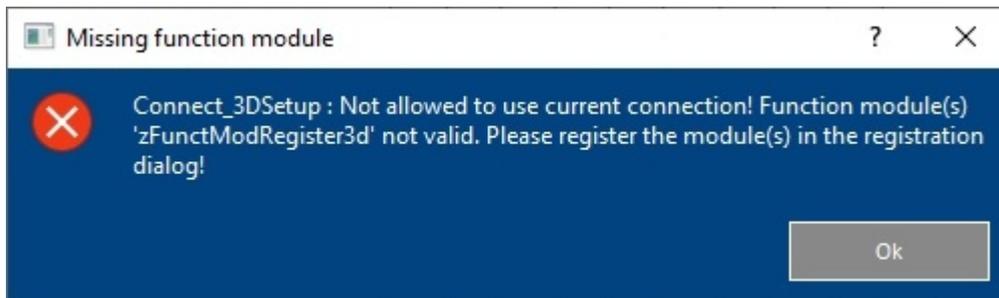


Result Point search: Point was not found!

4.5.3 Help in case of problems

3D Setup cannot be started

If you try to open the 3D setup dialog and receive this error message,



then the validity of the setup module `zFunctModRegister3d` has expired. In this case you have to renew the software registration.

Reference point not found

1. check search area size and search position
2. check reflector position
3. check reflective foil
4. check influence of stray light and reduce if possible
5. check focusing
6. reduce search threshold parameters step by step

Reference point is not found reliably

1. check search area size and search position
2. reduce search threshold parameter

Reference point is not found on the right position

1. reduce the influence of ambient light. To check whether the influence of ambient light is too strong, the reference point search can be performed at a location without a reflector point. If a point is also detected here, the entire object reflects too much light back to the projector.
2. increase search threshold parameter step by step

Point search takes too long

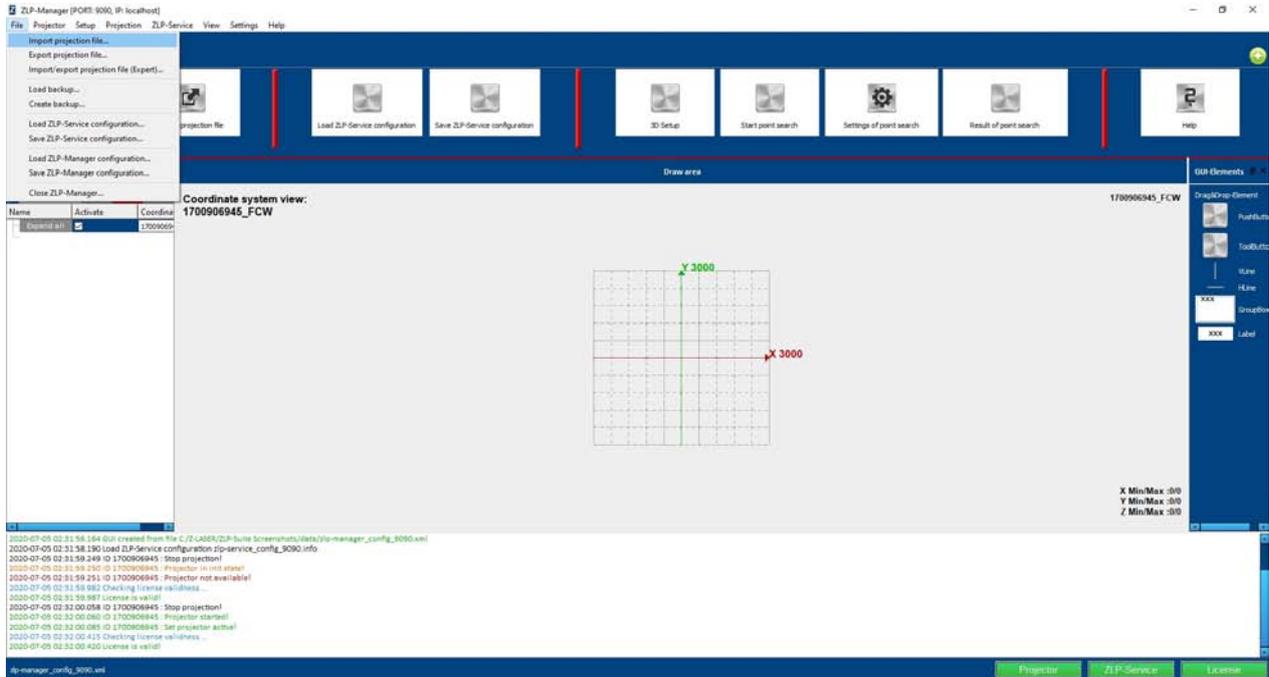
1. reduce search area size
2. increase feed rate (search step width Y) step by step

4.6 Projecting with the projector

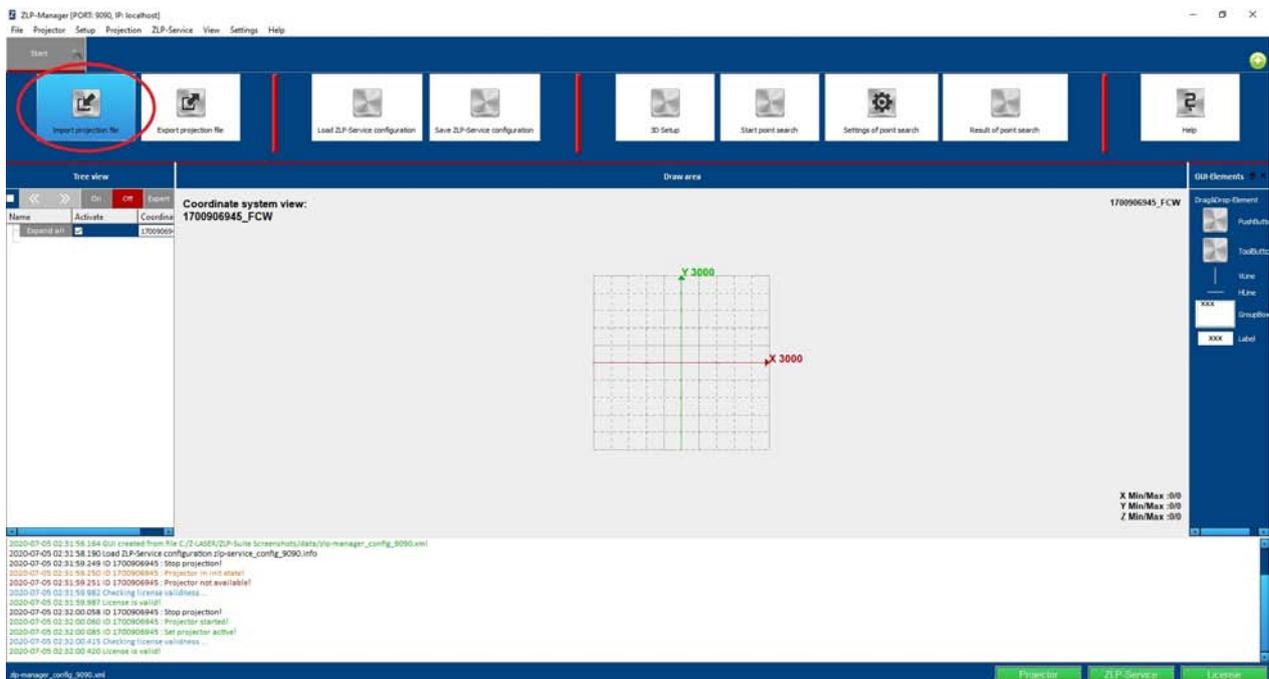
Now make your first steps in laser projection. Switch on your laser projector and start the ZLP-Manager. Follow the instructions.

4.6.1 Import data

The import can either be done by the menu entry **File** → **Import projection file...**

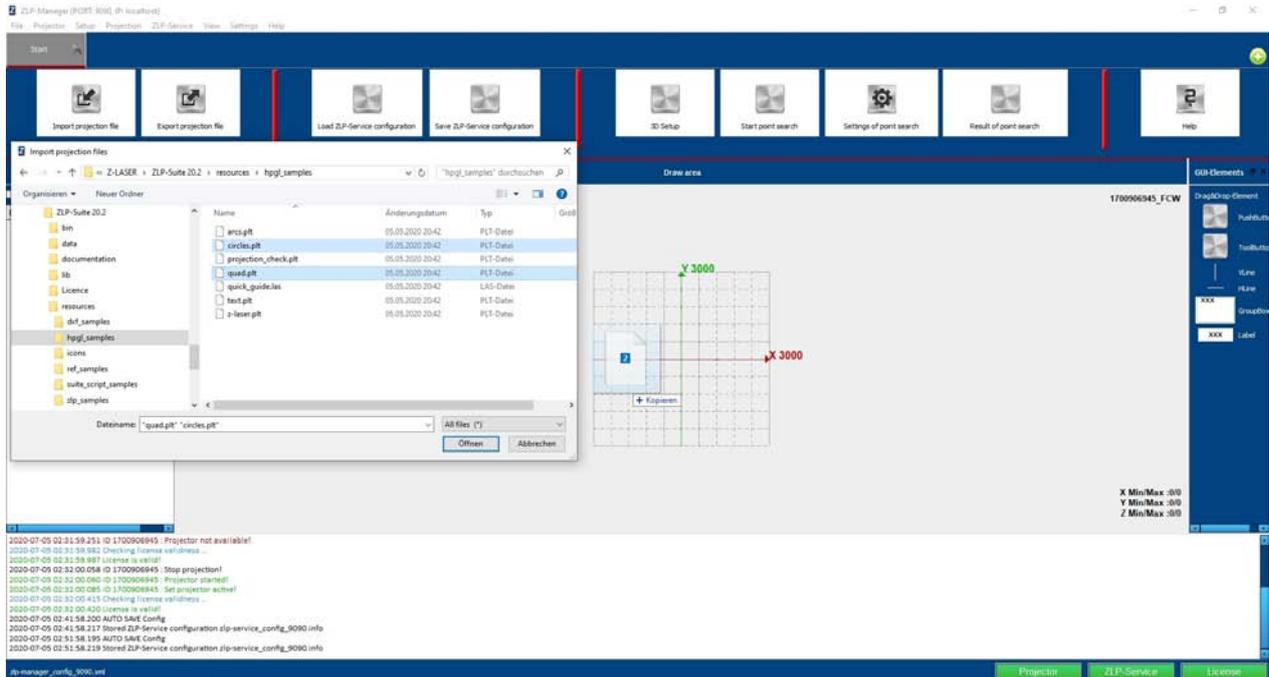


or by pushing the button **Import projection file** in the ribbon bar.



It is also possible to import the data using **Drag&Drop**. Simply open the file browser, select the files you

want to project (hold down the **CTRL** key to select several files) and drag them into the drawing area. When you drag the files, a square is displayed with the number of selected files in the middle. Release the mouse button and a small window will appear in the background indicating that the data is being loaded.



4.6.2 Activate, Project and Delete Polylines

Assign the loaded polylines to a coordinate system. Polylines can only be projected if they have been assigned to a coordinate system.

Activate polylines

To activate the polylines, place the cross in the **Activate** column.

Name	Activate
Expand all	<input type="checkbox"/>
▼ quad.plt	<input checked="" type="checkbox"/>
Polyline1	<input checked="" type="checkbox"/>
Polyline2	<input type="checkbox"/>
Polyline3	<input type="checkbox"/>
▼ circles.plt	<input checked="" type="checkbox"/>
Circle1	<input checked="" type="checkbox"/>
Circle2	<input type="checkbox"/>
Circle3	<input type="checkbox"/>
Circle4	<input type="checkbox"/>
Circle5	<input checked="" type="checkbox"/>
Polyline1	<input type="checkbox"/>
Polyline2	<input checked="" type="checkbox"/>

Start projection

To start the projection, press the **On** button. The button changes to green.



Delete polylines

Select the polyline you want to delete from the tree view and press the Del key on your keyboard. To remove an entire group, select the group name. Once the group name is highlighted in grey, press the Del key.

4.6.3 Test projection

You can now perform a test projection.

Step 1: Connect the projector to the ZLP-Manager if it is not automatically connected at startup. Proceed as described in the chapter [Projector detection](#).

Step 2: First select the default coordinate system of your projector in the [tree view](#). It has the serial number of your projector in the front part of the file name. You can recognize the [Standard coordinate system](#) by the extension *_FCW. The extension FCW stands for factory calibration wall.

No data can be projected without selecting a coordinate system.

Step 3: Import a test file into the ZLP-Manager. Open the file `Quad.plt`, which can be found in the directory selection under the path `C:\Z-LASER\ZLP-Suite <version>\resources\hpgl_samples`.

Click on the button **Import Projection File** in the blue ribbon of the ZLP-Manager surface.

An Explorer window opens.

Select the ZLP-Suite directory and then the `resources` folder.

Open the directory `hpgl_samples`.

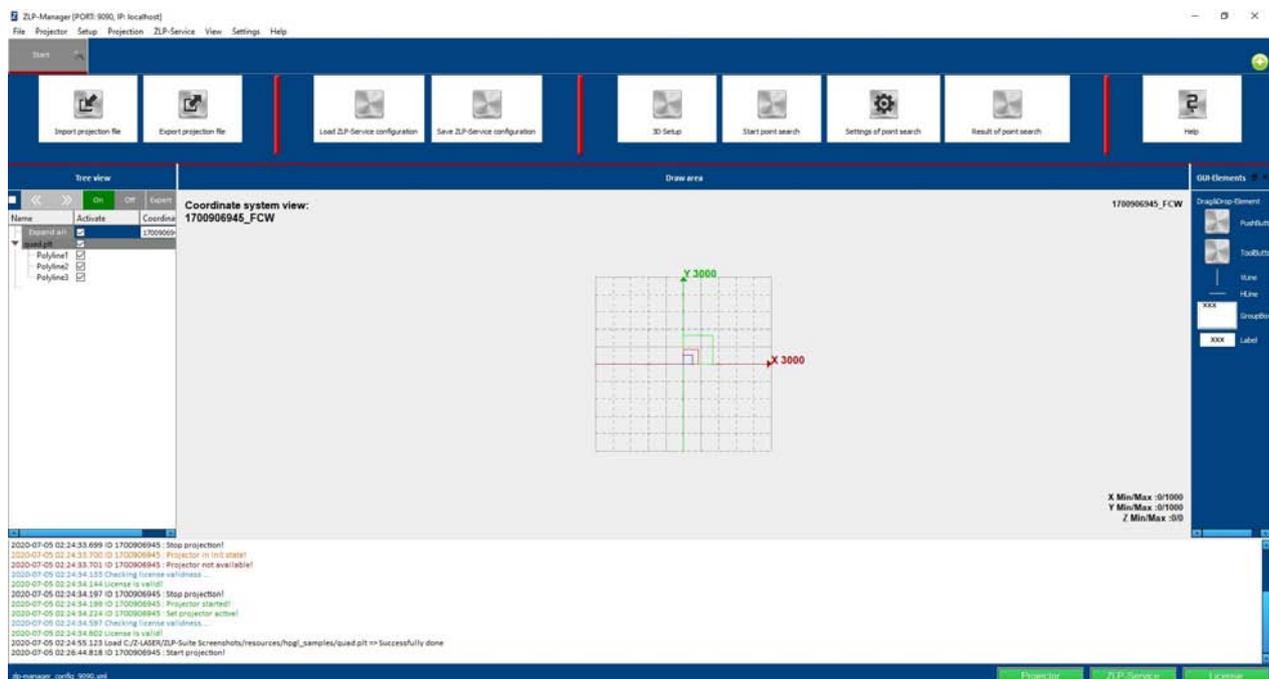
Now select the plot file `Quad.plt`.

Click **Open** in the dialog window.

The file is loaded into the tree view.

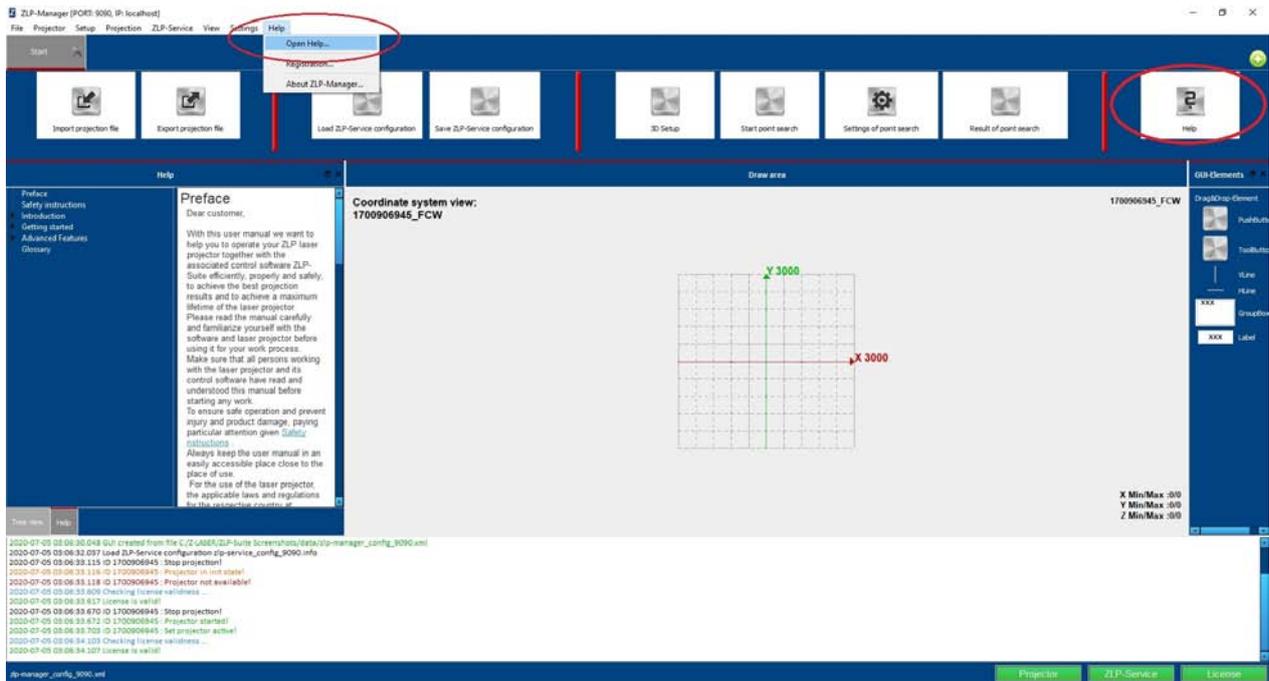
Step 4: Click the button **On** in the tree view.

The projector now projects three nested squares onto the opposite projection surface. These squares are also displayed in the drawing area.



4.7 Help menu

The help menu can be opened either by the menu entry **Help** → **Open Help** or by pushing the **Help** button in the ribbon bar.



The **Help** DockWidget is automatically opened on the left hand side over the tree view DockWidget. For more information on using this help menu, see the [Dock_Help](#) chapter.

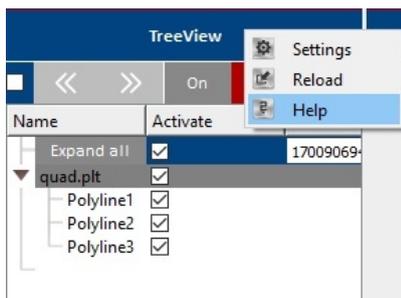
4.7.1 Dock_Help

The DockWidget **Dock_Help** shows information regarding handling with the ZLP-Suite. There is a help entry for each docking window (DockWidget) or control element (GUIWidget). All you have to do is open the respective context menu and click **Help**.

GUIWidget



DockWidget

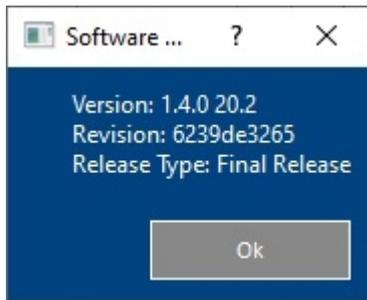


The help menu opens and the help text of the element is displayed. If no help text is available, the information **No Help found!** is displayed.

4.7.2 Software version

In the help menu entry **About ZLP-Manager...** you can get information about the ZLP-Suite software. These include:

- the revision number
- the release version
- the release type



This information is required for Z-LASER service technicians, for example.

5. Advanced Features

5.1 Customizing the User interface

The design of the ZLP-Manager user interface, called **GUI** (= **G**raphical **U**ser **I**nterface) in the following, can be customized. For example, new tabs can be created, new buttons (= Buttons/GUIWidgets) can be generated or different docking windows (= DockWidgets) can be added. When closing the software, all changes are saved in the configuration file `zlp_manager_config_9090.xml`, which are immediately reloaded when the ZLP-Manager is restarted. The file name consists of `zlp_manager_config_PORT_IPADDRESS`. A separate configuration file is created for each instance. The file is located in the installation directory in the `data` folder. If the file is deleted, the default view is loaded after restarting the ZLP-Manager. Different views can be stored in separate files.

GUI Structure

Basic information on the various windows, rows, bars and views can be found in the chapter [Structure of the User Interface](#).



Mainwindow

All docking windows (= DockWidgets) are placed within this window. Each of these windows contains special functions, which are described in more detail below.

Ribbon Bar

The RibbonBar is a menu ribbon in which functions are presented clearly and structured. This ribbon bar can be edited (see chapter [Customizing the Ribbon bar](#)). The window is permanently visible and cannot be moved or deleted.

Multi Dock

This area is freely configurable by the user. Here you can create different DockWidgets (see chapter [Creating DockWidgets](#)). These can be freely placed in areas 2 and 3 (above or next to each other) and can also be completely detached from the main window. However, Ribbon Bar, Activity Log window and Central Draw Area cannot be overlaid by this window.

Central Area (Central Draw Area)

In the central draw area there is a coordinate system in which the loaded projection files are displayed. In this area you can interact with your mouse and keyboard. The area is permanently visible and cannot be moved or deleted. However, the display can be adjusted individually (see chapter [Customizing the Draw Area](#)).

Activity Log Window

Information and notes on the individual steps are displayed according to the runtime. Depending on the type of message (status, warning, error), it is highlighted in color (see chapter [Activity log window](#)). The status is saved in a log file in the program path under `log_(current date).txt`. This log file can be sent to the ZLP-

Service in case of errors in order to be able to trace the operating process. The window is permanently visible and cannot be moved or deleted.

StatusBar Projector (status display)

The status bar or status display for the projector contains several elements.

License Status Display: Opens the registration dialog where the currently active license is displayed or a new license can be loaded.

Projector Status Display: Displays the connection status of the projectors. Pressing the button opens a window in which all available projectors are displayed and a projector search can be performed.

ZLP-Service Status Display : Displays the connection status to the ZLP-Service. Pressing the button automatically starts the connection to the ZLP-Service or restarts it.

For more information, refer to the [Status bar](#) chapter.

5.1.1 Creating DockWidgets / Docking windows

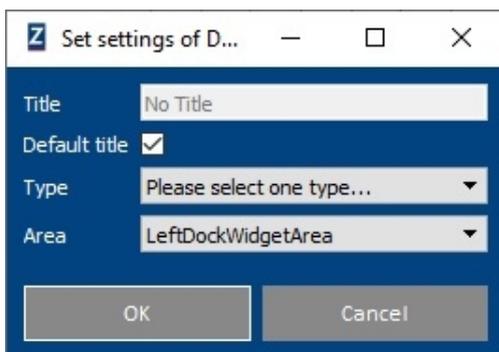
A DockWidget is a window that can be docked to various locations within the main window. This is why it is often referred to as a docking window. In addition, it can be overlaid by the same window types, placed next to each other and detached from the main window.

Create DockWidget

Open the menu item **View → Create Dock Widget...**



2. The DockWidget settings dialog for the new docking window opens. Make the desired adjustments.

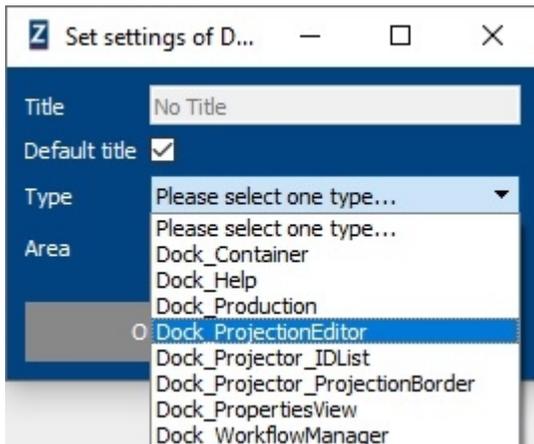


Parameter	Function
Title	The title is displayed in the window title bar. It can be set dynamically at runtime. If the language is changed, a separate title can also be defined for each language entry.
Default title	If the checkbox is set, a suitable title is automatically generated, which describes the associated parameter type. An automatic title can be defined for all available languages. If the type is changed, the check mark must be activated again to create an automatic title for this type in the

active language.

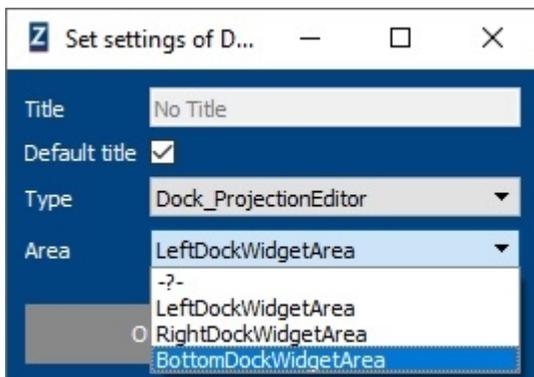
Type	Selection creates a docking window according to several predefined types.
Area	Area in which the docking window is placed. Can only be set when creating a new one. The area is updated as soon as the window is docked elsewhere with the mouse.

Select the desired window type from the drop-down menu.



A detailed description of the individual types can be found in the following chapter [DockWidget-Types](#).

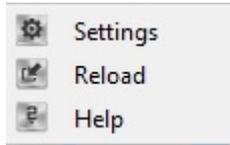
4. Select the area where you want the DockWidget to be placed.



5. Press **OK** to create the DockWidget. Each DockWidget can only be created once. If you want to make changes to the created DockWidget, reopen the settings dialog from the context menu.

DockWidget - context menu

The context menu is opened by right-clicking on the docking window and contains all functions of the DockWidget, which are described below.



Parameter	Function
Settings	Opens the DockWidget settings dialog.
Reload	Reloads the contents of the DockWidgets and updates the view.
Help	Opens the Dock_Help docking window and displays information about the respective DockWidget.

5.1.1.1 DockWidget-Types

Here you can find a description of all currently available DockWidget elements:

Type	Function	Link
Dock_Container	Creates an empty window in which GUIWidget elements from the DockWidget Dock_GUIType can be placed by using Drag&Drop.	Creating a Dock_Container Widget
Dock_GUIType	Creates a window with a table containing all important GUI widget elements.	GUI-Elements Creating GUIWidgets / Control Elements Customizing the Ribbon Bar
Dock_Help	Creates a window in which the help text for the individual GUI elements is displayed.	Help_menu Dock_Help
Dock_ProjectionEditor	Creates a window that can be used to create predefined projection elements.	Projection Editor
Dock_Projector_IDList	Creates a window that lists all available projectors. You can search for projectors in the network depending on their IP or IP range. This window is also accessible via the status bar via the projector button.	Projector IDList Dialog
Dock_Projector_ProjectionBorder	Creates a window in which you can split the projection area between two or more projectors. Can also be accessed via the menu bar under Setup .	Clipping planes
Dock_PropertiesView	Creates a window in which the properties of projection elements	Properties View

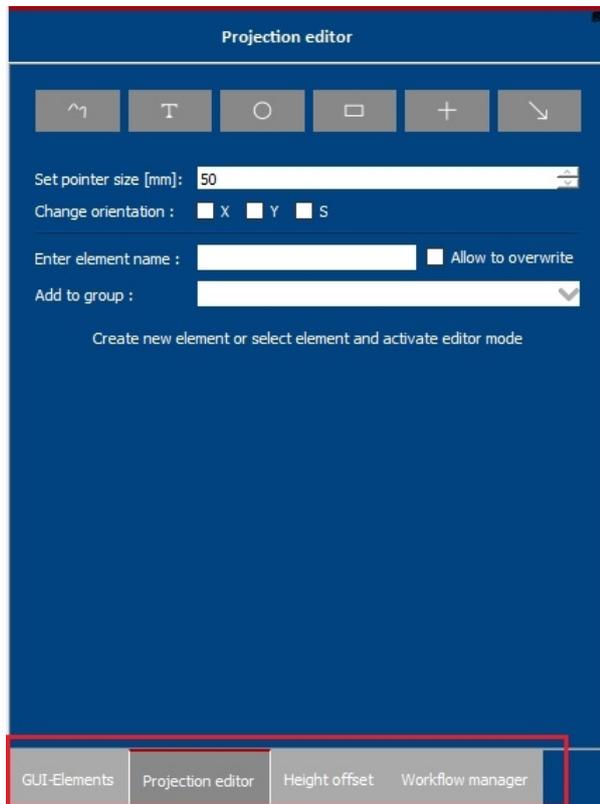
	can be read and edited.	
Dock_WorkflowManager	Creates a window in which different workflows can be generated.	Workflow Manager
Dock_TreeView	Creates a window with a tree structure containing the projection elements. This window is automatically created when the ZLP-Manager is started. The Dock_DrawArea is strongly linked to this DockWidget. Each change (e.g. delete/select elements) is updated in both views.	Tree view Projecting with the projector (Expert mode)
Dock_DrawArea	Creates a window containing the 2D/3D representation of the loaded projection elements. Depending on the mode, projection elements can be activated, moved or deleted individually or in groups. The window is available in the Central-Area by default and can only be used once.	Draw Area and coordinate system information Customizing the Draw Area
Dock_Status	Creates a window that displays the status information of the program flow. When starting the ZLP-Manager the window is displayed by default in the lower main window area.	Activity log window
Dock_RibbonBar	Creates the ribbon at the top of the main window. Any number of tabs can be created in which GUI widget elements can be placed by runtime. This DockWidget is created automatically every time the ZLP-Manager is started.	Customizing the Ribbon Bar
Dock_Height_Offset	Creates a window that enables adjusting an offset for the actual projection file.	Height offset

5.1.1.2 Arrangement possibilities of DockWidgets

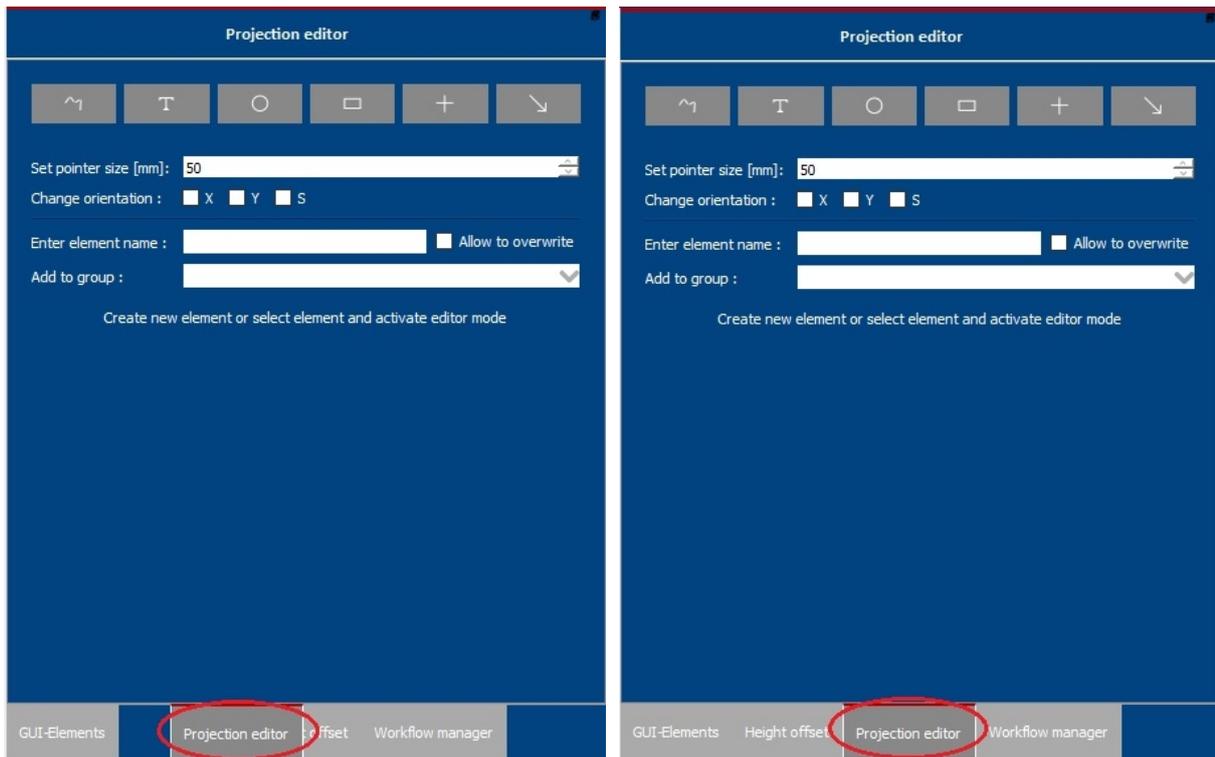
Multiple docking windows (DockWidgets) may be arranged **overlapping, horizontally, vertically or freely** within the ZLP Manager. DockWidgets can only be created in one of the three designated DockWidget areas. Check out the chapter [Creating DockWidgets / Docking windows](#) to learn, how to create a DockWidget, . To find out what types of DockWidgets exist, click [here](#).

Overlapping arrangement

When arranged overlapping, the DockWidgets overlay each other in a hidden manner. Click on the corresponding DockWidgets name in the list of names (red rectangle in the image below) to bring the window to the front. The name field of the active DockWidgets appears dark grey with a red bar at its top.

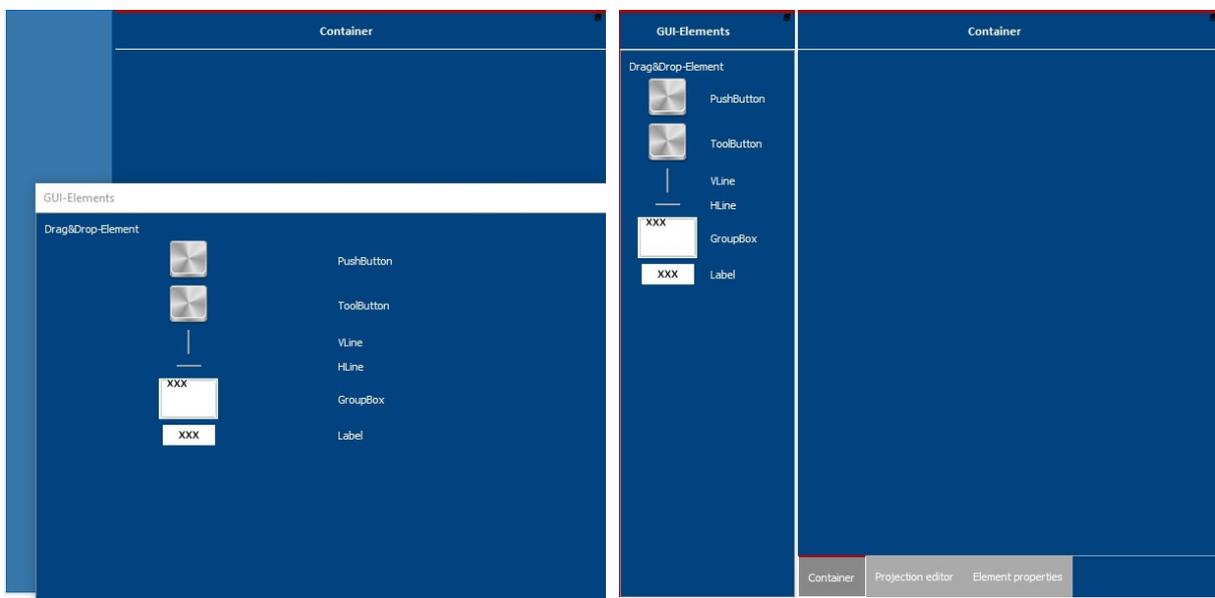


Within the DockWidgets arrangement, the order of the docking windows can be changed as desired. To do this, left-click the title box of the docking window you want to move and then drag it to the appropriate position in the title bar while holding down the left mouse button. When doing so, the title box will be released from the title bar (recognizable by the free blue space behind the title box) and docked again at the appropriate position. At the same time, all other title boxes slide automatically to the position of the previously detached box. To complete dragging function and inserting the title box at its new position, just release the left mouse button.

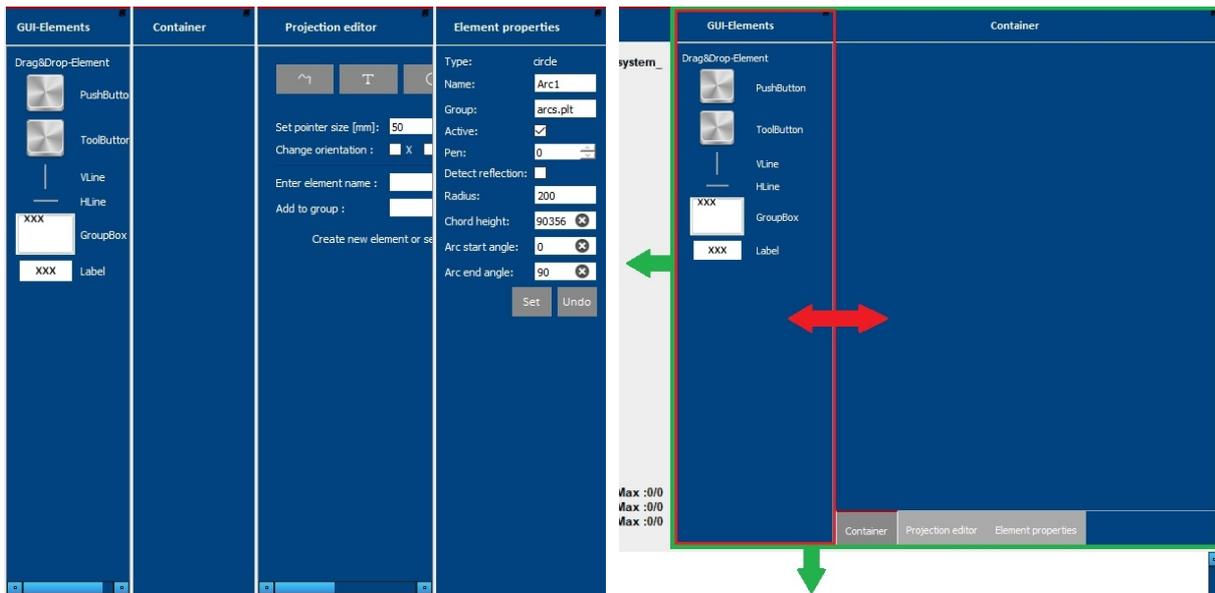


Horizontal arrangement

When arranging the DockWidgets horizontally, they are aligned next to each other in a row. Just grab the title bar of the DockWidget with your left mouse button and drag it diagonally downwards until the docking window releases out of its group and a **free blue column** becomes visible **behind** it. Release the left mouse button for the DockWidget becomes snatched into this free blue space.

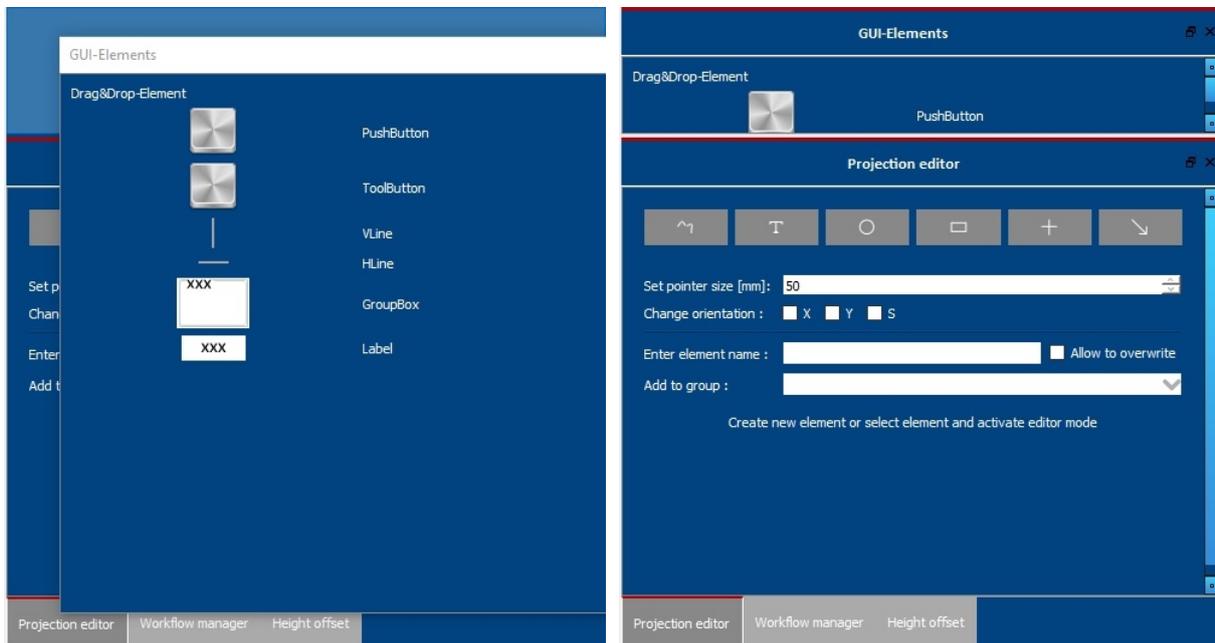


You can align as many DockWidget as you like next to each other. If necessary, adjust the size of the widget area (green rectangle in the image below) by dragging its borders (green arrows). You can vary the width of each docking window (red rectangle) by dragging the outer edge to the left or right (red arrows).

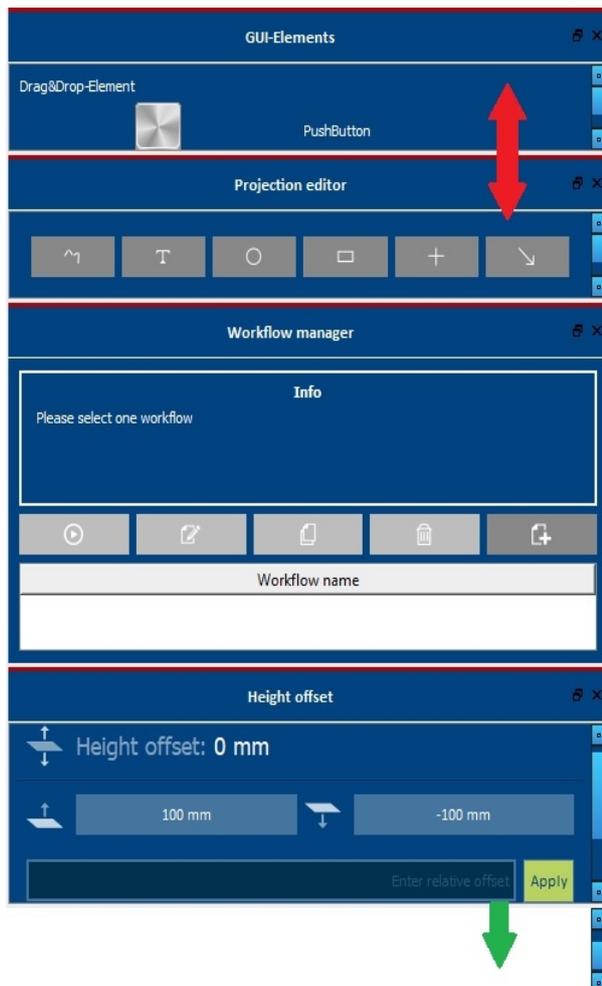


Vertical arrangement

When arranging the DockWidgets vertically, they become aligned in a row one below the other. Just grab the title bar with your left mouse button and drag the DockWidget to the lower right. When doing so, the docking window becomes released out of its group which you can recognize by the blue space behind it. Release the left mouse button when the **horizontal blue space behind the window** gets visible for the DockWidget becomes snatched into this free blue space. This procedure can be applied to any docking window.



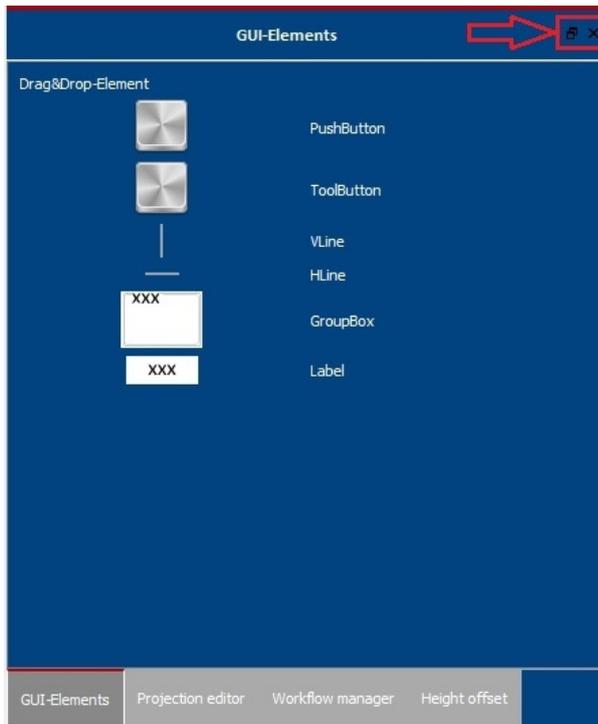
The widget height can be changed up to some extent. To do this, drag the top red widget border up to increase the widget size, or down, to decrease the widget size (red arrows in the image below). You may have to enlarge the widget area completely by dragging the lower edge of the widget area downwards with your mouse (green arrow).



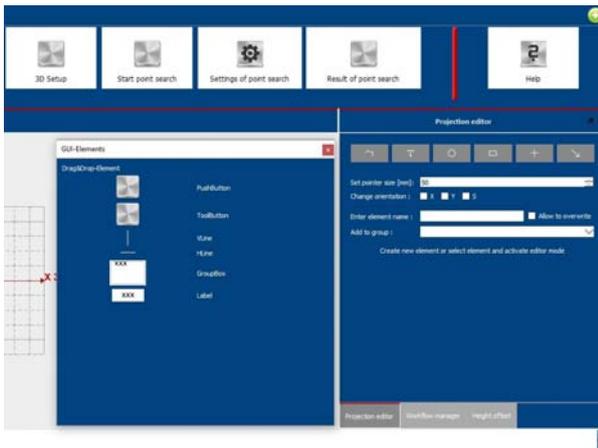
Free arrangement

When freely arranged, the DockWidgets can be completely undocked from their docking area and placed at any position within the ZLP-Manager.

To detach a docking window from its docking area, either left-click the window title and drag it to the desired position. Alternatively, you can click the double-window icon in the title bar to release the DockWidget from its docking area.

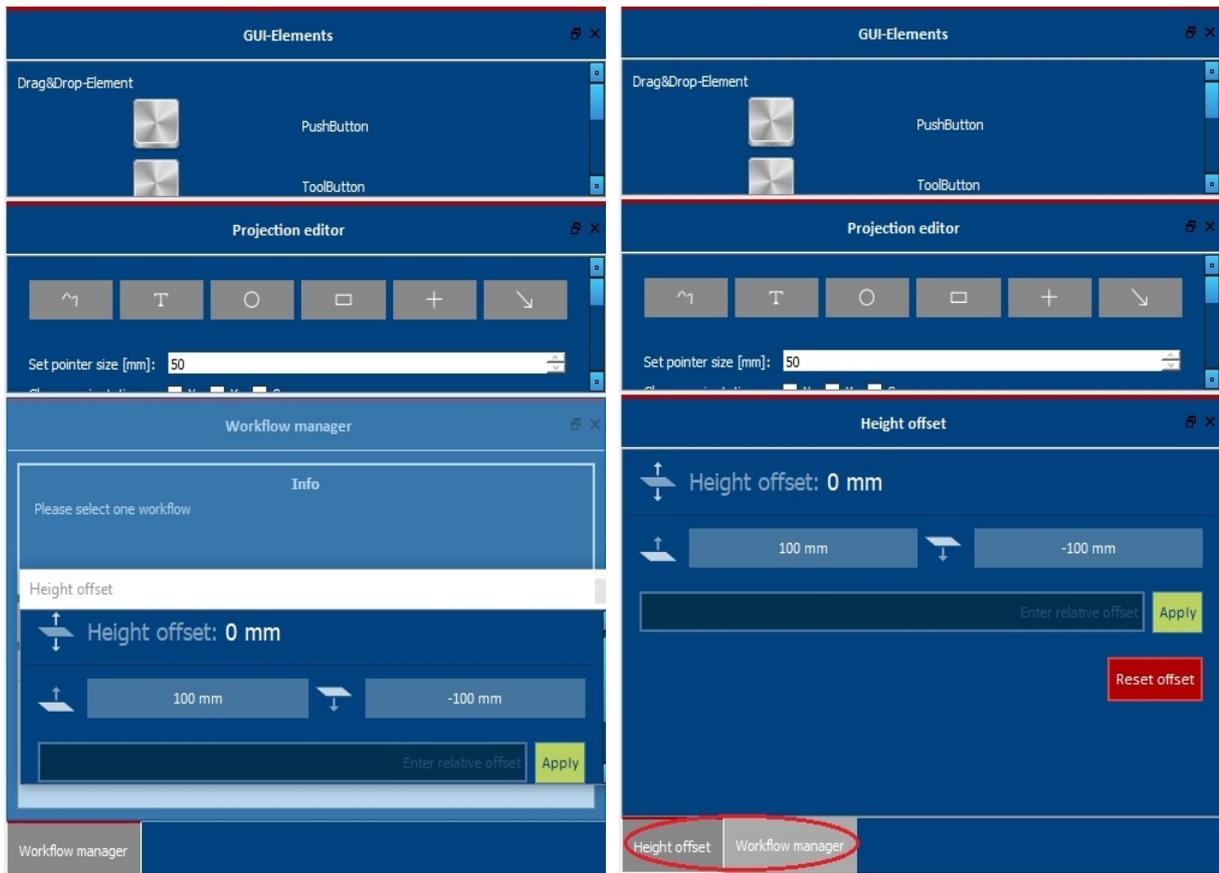


The title bar of the DockWidgets will change its color to white after successful undocking. You can resize the window by dragging the four side borders with the left mouse button.

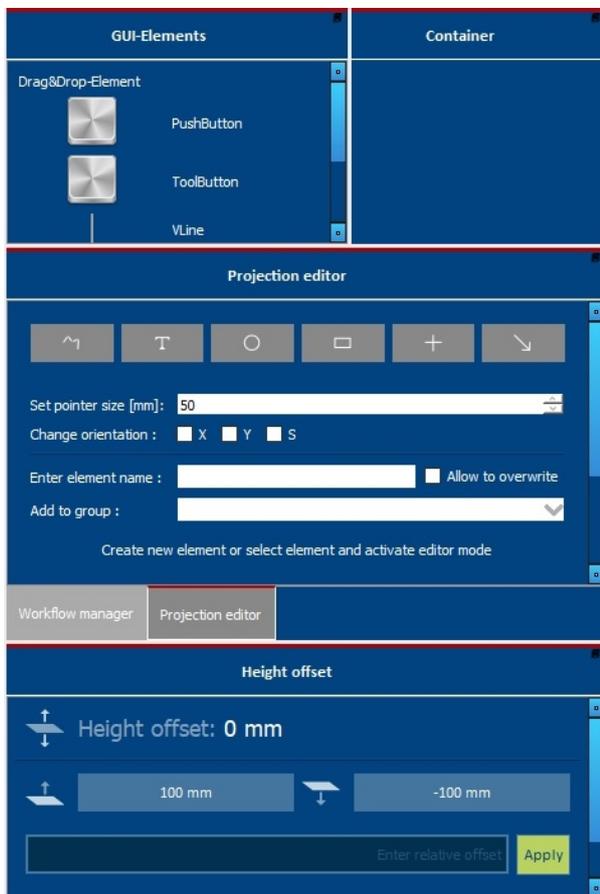


Resetting the arrangements

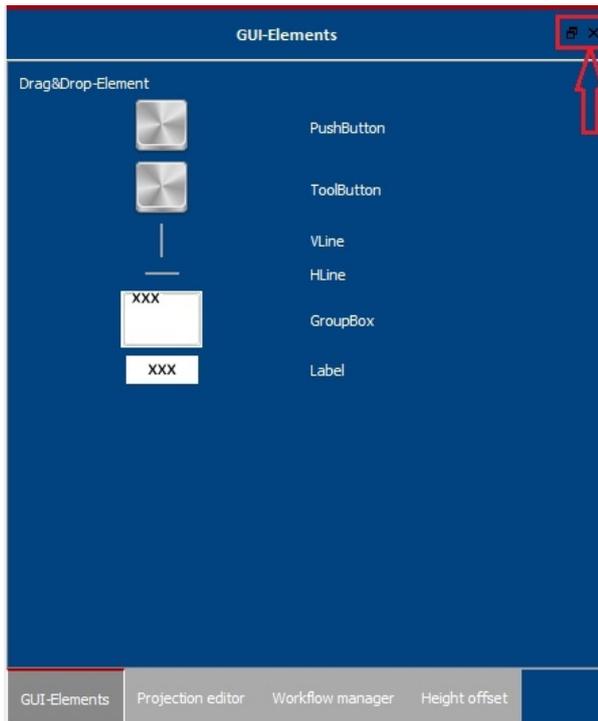
To undo the widget arrangements and return them to their overlapping default arrangement, grab the window title of the corresponding widget while holding down the left mouse button and drag it over another widget in the widget area until the docking window in the background appears light blue. Release the left mouse button; the widget automatically snaps into the desired position and hides the window behind it. The window titles reappear in the name bar, allowing you to toggle between the windows.



All arrangement functions can be combined as required.



To close a DockWidget, just click on the small black cross in the upper right corner of the title bar of the window to be closed.



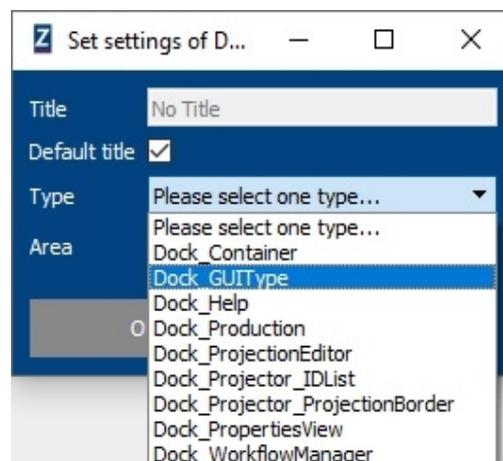
5.1.2 Creating GUIWidgets / Control elements

A GUI widget is a control element or button that allows the user to interact with to perform a function on the Graphical User Interface (GUI) or a projector function. These controls can be created dynamically at runtime. The **Dock_GUIType** window lists all available types. These controls can be placed within a ribbon bar or an empty docking window (**container**) by using drag&drop. Due to the individual design possibilities of the individual elements, interfaces can be created for each user or operating sequence. Thus only relevant functions are visible. Description texts, element size and individual icons can be defined. These settings can be adapted or changed at any time via the context menu of the element.

To create a GUIWidget, the DockWidget **Dock_GUIType** is required. By default, this is located on the right side of the user interface. If the DockWidget is not available, it can be created from the menu bar using the entry **View** → **Create Dock Widget...**

To do this, select **Dock_GUIType** under **Type** and place it in the desired area.

See the chapter [Creating DockWidgets](#) for more information.



The GUI elements window contains various widget elements that can now be placed in the

Ribbon Bar or in a container (empty docking window) by **drag&drop**.

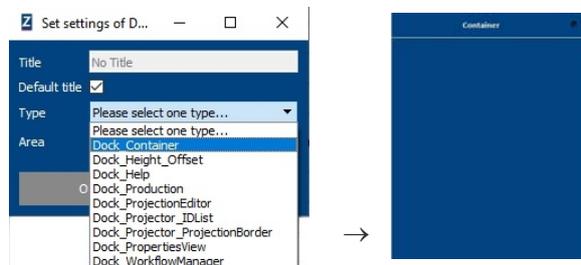


Creating a `Dock_Container` Widget

A container can be used as an empty menu and thus serves as an extension of the function bar (`Dock_RibbonBar`). Several containers can be created, which, like all `DockWidgets`, can be freely placed. All available GUI elements of the `GUIType` docking window can be positioned inside the container. The window content is stored in the default configuration file of the ZLP-Manager when you exit the software.

Open the menu entry **View → Create Dock Widget...**

Choose the type `Dock_Container`, specify the area in which the docking window should be placed, adjust the title if necessary, and click **OK**.



Creating a `Dock_RibbonBar` Widget

Click the plus sign on the right side of the tab bar to create a menu ribbon. Change the name by double-clicking on the newly created grey tab field with the cross.



Placing GUI-Elements

1. Move the mouse over one of the Drag&Drop elements in the `Dock_GUIType` (a small hand appears). For an overview of the GUI elements, see chapter [GUI Elements](#).
2. Press and hold the left mouse button.
3. Drag the element to the desired position. Elements can only be placed inside the Ribbon bar or in a container.

Dock_Container



Dock_RibbonBar



Currently two different buttons can be created:

PushButton

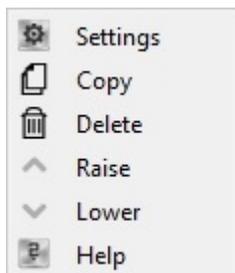


ToolButton



Open the context menu

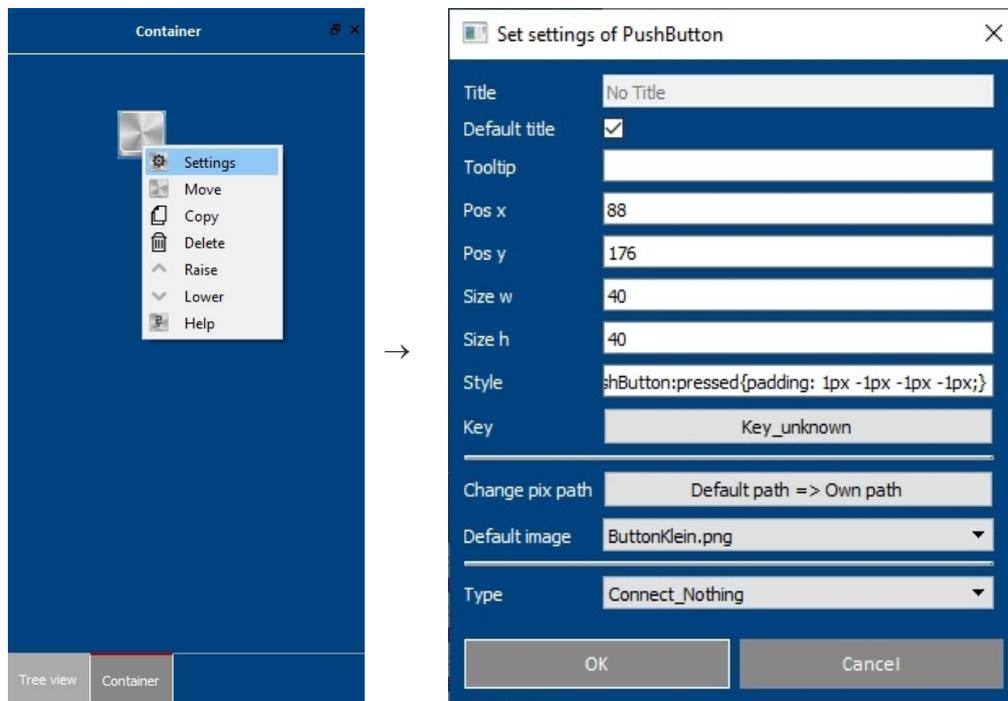
The context menu is opened by right-clicking on the created tool or push button. The context menu contains functions for moving, copying and general settings.



Entry	Function
Settings	Opens the settings dialog window.
Copy	Copies all properties of the GUI widget whose context menu has been opened. If multiple elements are selected, the others are automatically deselected. Right-clicking and pasting inside a container (Dock_Container, Dock_RibbonBar) creates the last copied widget with all settings at the mouse position.
Delete	Removes all selected GUIWidgets.
Raise	Sets the GUIWidget to a higher level.
Lower	Sets the GUIWidget to a lower level.
Help	Opens the Dock_Help widget, which displays a help text for the current GUIWidget connection.

Settings Dialog Window

Select the [Settings](#) entry from the context menu. The settings dialog opens.



You can now make the following settings for the created button:

Parameter	Function
Title	The title is displayed in the window title bar. It can be set dynamically at

runtime. If the language is changed, a separate title can also be defined for each language entry.

Default title If the check mark is set, a suitable title is automatically generated that rewrites the associated connection parameters. An automatic title can be defined for all available languages. If the connection is changed, the check mark must be activated again to create an automatic title for this connection in the active language.

ToolTip Further information about this button can be entered here. If the user moves the mouse over the element, this information is displayed in an orange box.

Position x, Position y Adjusts the X and Y position of the element. The position refers to the upper left corner of the element within the container. The zero position of the container is also in the upper left corner.

Size w, Size h Settings of the width and height of the element.

Style Currently used CSS style.

Assign a shortcut key to access the function of the **Connection** parameter from the keyboard. As long as the title **Key_unknown** is visible on the button, no key has been assigned yet. Click in the line and the following info appears:

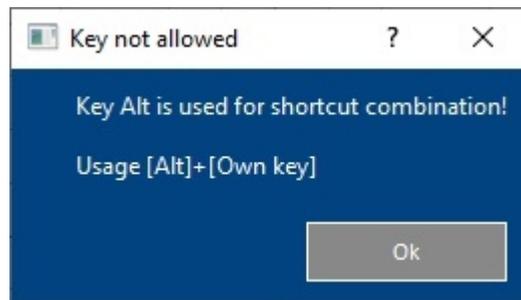


Press a key and it will be set as the new title for the button:



If the key is not allowed the following error message appears and you need to change the key:

Key



Click **OK**. The Message **Key_unknown** will disappear. Click to change the key.



To run the shortcut from your keyboard just push **[ALT] + [defined key]**.

Change pix path

Switches between the default image path of the ZLP-Manager and the icon image path in the installation directory under `resources/icons`

Default image All images in the first level of the image path are displayed for selection. If you select one of the images, a preview is displayed. If you want to use your own images, you can copy them to the installation path under `resources/icons`.

Type Overview of all possible connections. Further information can be found in chapter [Button connections overview](#).

Press **OK** to accept the changes.

5.1.2.1 Customizing the Ribbon Bar

The RibbonBar is located at the top of the screen. It contains all functions the user needs to operate the ZLP-Manager. In the further course of this chapter you will learn how the menu ribbon can be individually adapted and extended.



Function description

- The ribbon bar cannot be closed
- Individually expandable
 - Set, move, group and design buttons
 - Create/edit new tabs

5.1.2.2 Generating and editing tabs

1. Generating tab



A new tab can be created using the button  on the right side of the menu bar.

Any number of tabs can be generated and the resulting menu bar can be filled with different buttons and symbols. A newly created tab is initially indicated by a grey area with a silver cross and the name Tab1, Tab2,... etc. The name can be changed at any time.



2. Edit tab

A double click on the tab allows you to change the name. The background color changes to white and the text can be edited.



By pressing the Enter key, the change is accepted.

5.1.2.3 Button connections overview

After creating Push or Tool buttons you can select different connections in the settings dialog. The following table lists all available push button and tool button connections and their possible connections:

Connection	Function	Link
Connect_3DSetup	Opens the projector setup dialog.	Projector Setup
Connect_ActivateMultiColor	Activates the multicolor feature.	Multicolor projection
Connect_ActivatePen	Allows you to assign pen colors Pen Number - Set a pen number to change the color of the polyline. [0 = White] [1 = Green] [2 = Red] [3 = Blue] [4 = Yellow]	Assign and project pen colors
Connect_ChangeLanguage	Opens the language settings dialog.	Language settings
Connect_ChangeProjectorConnection	Projector IP - Input of a projector IP address.	Changing projector connection
Connect_ChangeServiceConnection	Opens the connection dialog of the ZLP-Service.	Changing ZLP-Service connection
Connect_CoordinateStartPos	Rotates the drawing area view back to its origin.	Customizing the Draw Area
Connect_CreateDockWidget	Opens the dialog to create a new Dock Widget.	Creating DockWidgets / Docking Windows
Connect_DeactivateMultiColor	Deactivates the multicolor feature.	Multicolor projection
Connect_DisconnectProjector	Disconnects the currently connected projector.	Disconnect projector
Connect_Dock_Projector_IDList	Opens the projector dialog	Projector IDList dialog
Connect_Dock_Projector_ProjectionBorder	Opens the clipping planes dialog	Clipping planes
Connect_Dock_Registration	Opens the registration dialog	Software registration
Connect_DrawArea_2DView_XY	Rotates the drawing area view to XY view.	Customizing the Draw Area
Connect_DrawArea_HidePlane	Hides the clipping planes in the coordinate system of the drawing area.	Clipping planes

Connect_DrawArea_ShowPlane	<p>Displays the clipping planes in the coordinate system of the drawing area. Clipping planes</p>
Connect_ExportProjectionData	<p>Opens a file browser to export all projection files loaded in the ZLP-Service. Data export</p>
Connect_Help	<p>Opens the DockWidget Dock_Help. If the DockWidget has not yet been called, it is recreated and the DockWidget help function Dock_Help is displayed. If the DockWidget already exists, it is moved to the foreground in the view. Dock Help</p>
Connect_ImportProjectionData	<p>Opens a file browser to import projection data. The data is automatically assigned to the active coordinate system in the tree view. A group corresponding to the file name is also created. The projection data are in turn child elements of this group. Data import</p>
Connect_Info	<p>Opens a dialog in which the current revision number, the release version and the release type of the currently used ZLP-Suite are stored. Software version</p>
Connect_LoadGUI	<p>A file dialog is opened in which a ZLP-Manager configuration file (*.xml) can be selected. Load and save ZLP configuration files</p>
Connect_LoadScript	<p>Press the button to execute the currently loaded script. ZLP-Manager-Scripts</p>
Connect_OpenBackupDialog	<p>Opens the system backup dialog System backup</p>
Connect_ReConnectToService	<p>Restarts the connection to the current ZLP-Service. The current configuration is reloaded and all ZLP-Manager dialogs are updated.</p>
Connect_RefPoint_ProjectAllTargets	<p>Projects all reference points for all projectors of one or more coordinate systems. If no coordinate system has yet been set via the Settings menu, the Settings point search</p>

	<p>dialog opens automatically. The button must then be pressed again to display the reference points.</p>	
Connect_RefPointSearchAll_Settings	<p>Opens a dialog to activate the coordinate systems to be used for the reference point search.</p>	Reference point search
Connect_RefPointSearchAll_ShowResult	<p>Opens a dialog in which the result of the last point search is displayed.</p>	Result reference point search
Connect_ResetConfiguration	<p>Resets the ZLP-Service configuration.</p>	Reset ZLP-Service configuration
Connect_SaveGUI	<p>Allows to save the current ZLP-Manager GUI configuration</p>	Load and save ZLP-Manager configuration files
Connect_Service_LoadConfig	<p>Loads a ZLP-Service configuration file.</p>	Load and save ZLP-Service configuration files
Connect_Service_SaveConfig	<p>Saves a ZLP-Service configuration file</p>	Load and save ZLP-Service configuration files
Connect_SetActiveModeForRC	<p>Sets the remote control mode. Address - select one of 20 remote addresses Mode - set one of 4 remote control modes</p>	Setting the remote control mode using a button
Connect_SetIPRange	<p>Opens the projector search dialog.</p>	Set IP Range
Connect_ShowMaximized	<p>Maximizes the main window of the ZLP-Manager.</p>	Maximize main window of ZLP-Manager
Connect_StartEXE	<p>Starts an external program. Program path - Path to the executable file. Program Arguments - Entering Arguments Separated by Spaces</p>	Starting an external program via ZLP-Manager
Connect_StartProjection	<p>Starts the projection of the loaded projection files.</p>	Start and stop projection
Connect_StartRefPointSearchAll	<p>Starts the reference point search for the selected coordinate system.</p>	Reference point search
Connect_StopProjection	<p>Stops the projection of the</p>	Start and stop projection

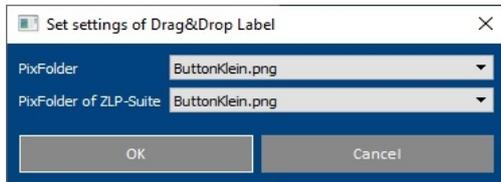
loaded projection files.

Connect_ZIO

Opens the ZLP Import Export [ZLP Import Export Tool](#) window.

5.1.2.4 Changing the default icon for GUI Elements

Right clicking one of the two buttons (Push or Tool button) inside the `Dock_GUIType` window opens the settings dialog to change the default icon.

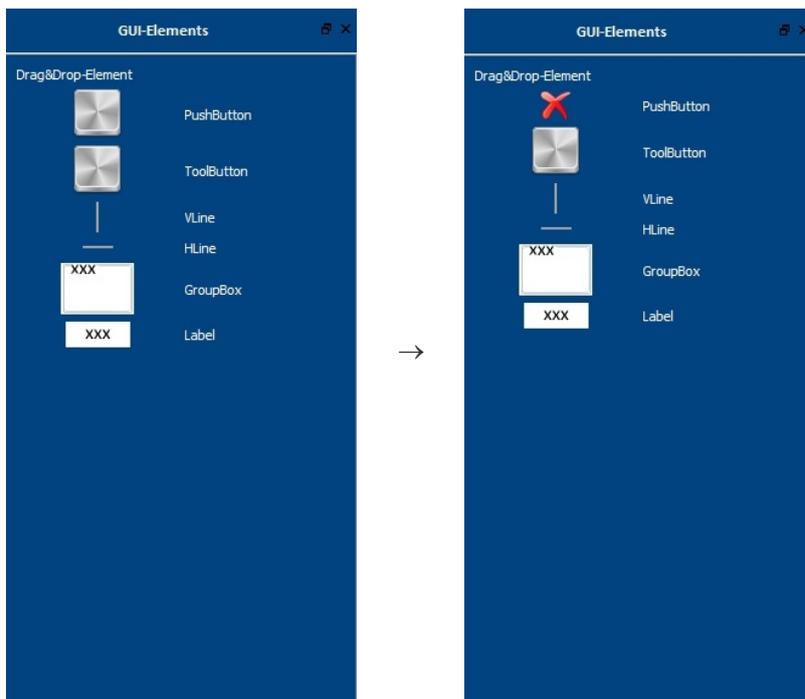


In this dialog a new icon can be defined as standard icon. Each time the element is created, the default icon is set. However, this state is only maintained until the ZLP-Manager is restarted or the `Dock_GUIType` window is closed. The icon can only be loaded from two paths: the default image path (`icons` folder in the `resources` directory) or the image path of the ZLP-Manager (**Pix folder of the ZLP-Manager**). This ensures that the images are still available when the installation path of the ZLP-Manager is copied to another computer. If you want to use your own images, you can copy them as `JPG` and `PNG` files into the `icons` folder.

Once a selection has been made, click **OK**.

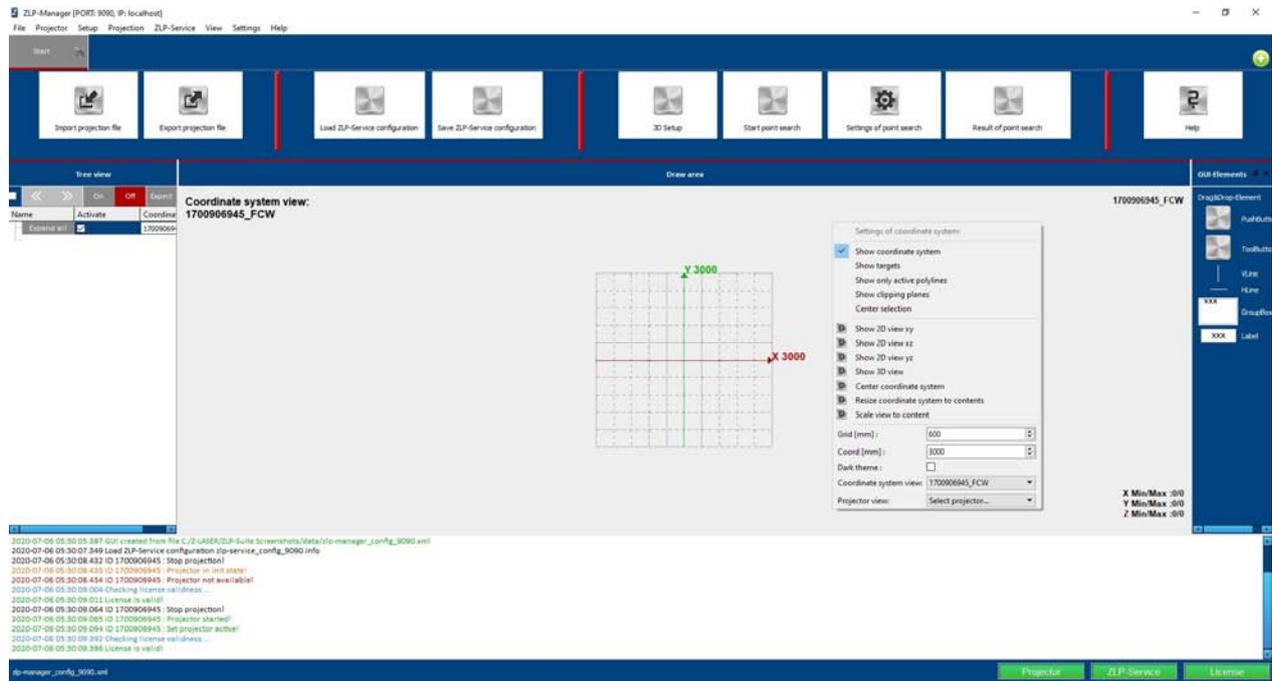


The selected icon is taken over in the window view.

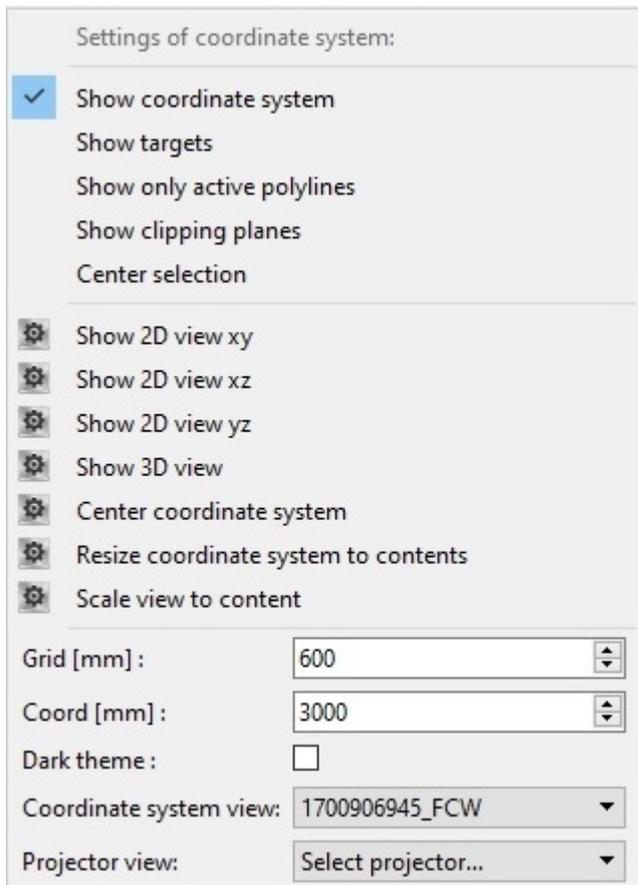


5.1.3 Customizing the Draw Area

You can customize the drawing area to suit your needs using several selectable features. Call the context menu for this by right-clicking in the drawing area.



Below you will find a list with all menu items for customizing the drawing area, its function and setting options.



Context menu - settings

Menu entry

Function

Display

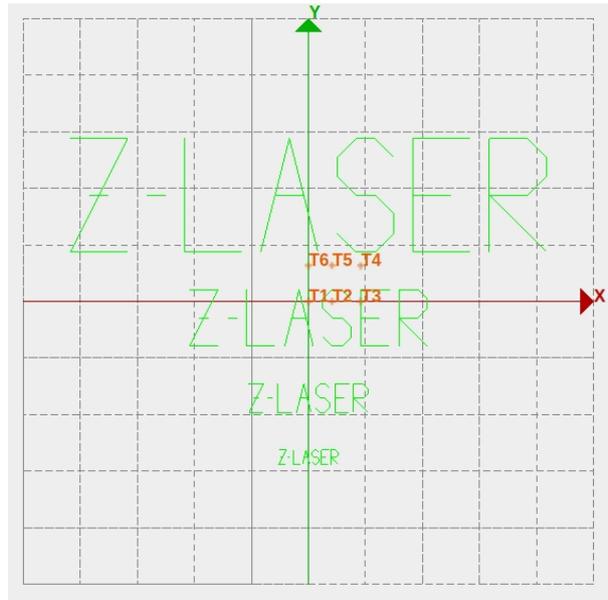
Show coordinate system

Shows/hides the coordinate system in the drawing area



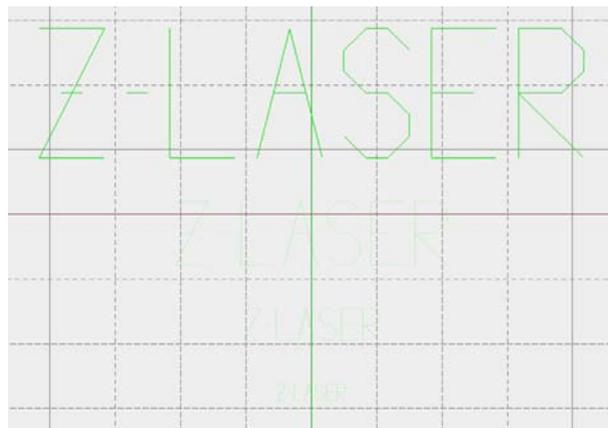
Show targets

Shows / hides the reference points used during setup



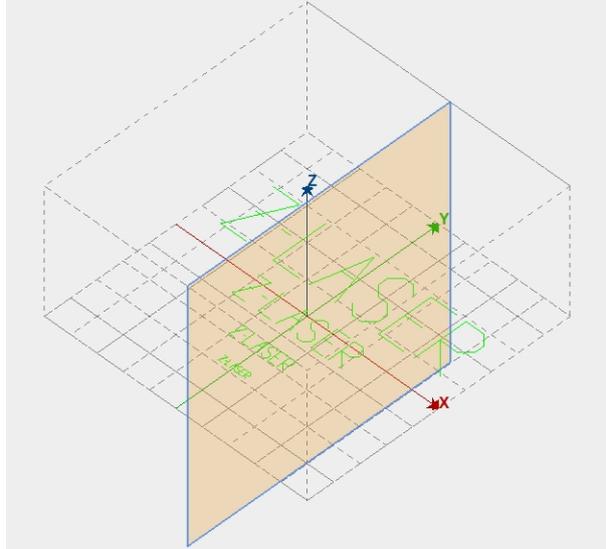
Show only active polylines

If the checkmark is set, only the activated polylines from the data tree Dock_TreeView will be displayed. If the checkmark is deactivated, the active polylines are marked in color and the inactive ones are displayed bleached



Show clipping planes

Shows all clipping planes if created.



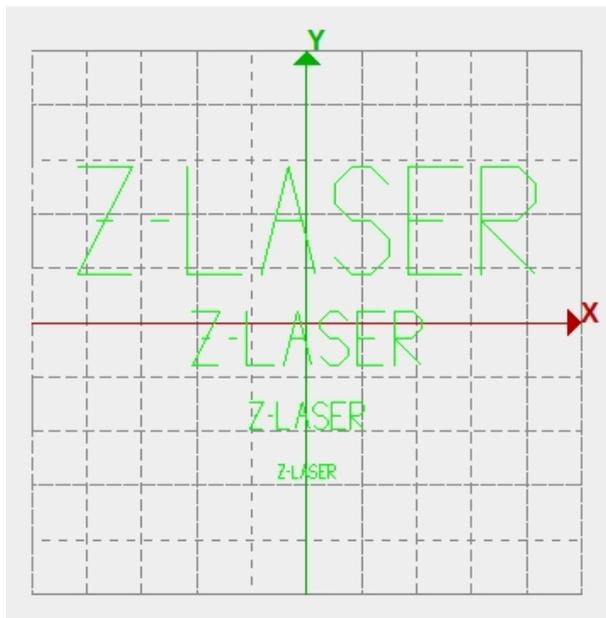
Center selection

If the check mark is set and one or more polylines are selected, the view is centered on the center of the selected elements. The scroll wheel can be zoomed directly into the center. The selection can also be made via the tree



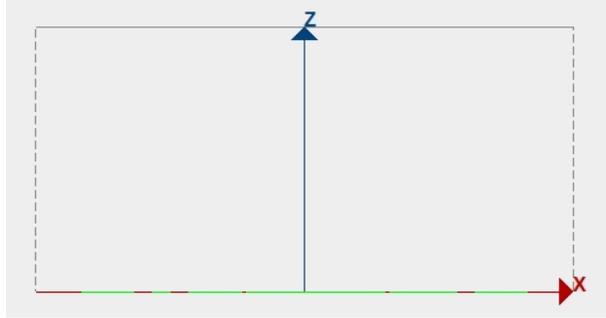
Show 2D view xy

Changes the view. X & Y axes are displayed



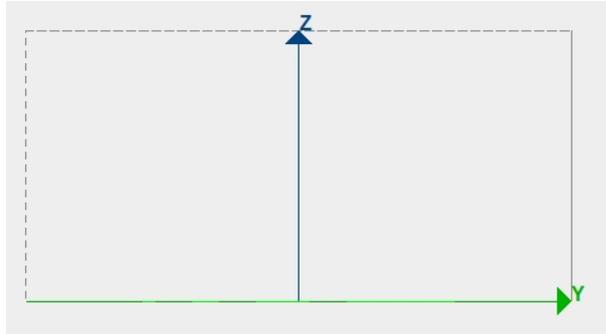
Show 2D view xz

Changes the view. X & Z axes are displayed



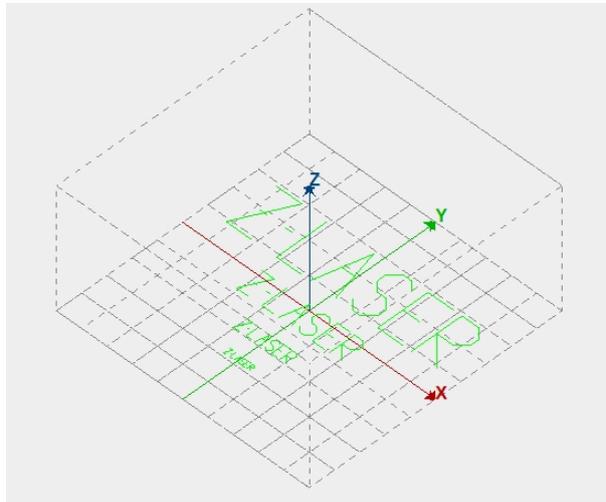
Show 2D view yz

Changes the view. Y & Z axes are displayed



Show 3D view

Changes the view X & Y & Z axes are displayed



Center coordinate system

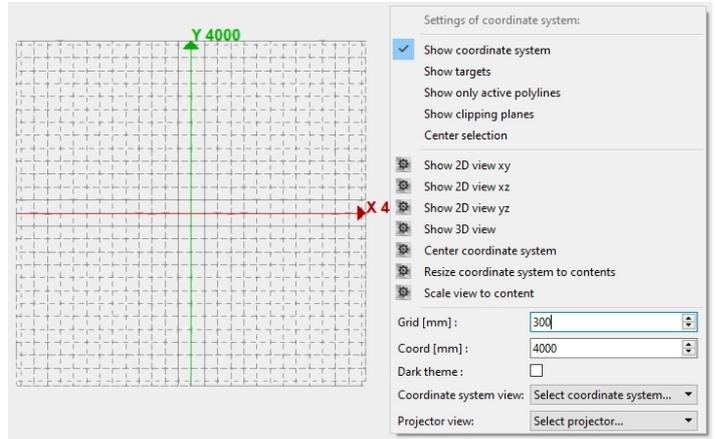
Moves the coordinate system back to center.

Resize coordinate system to contents

The coordinate system is adapted to the maximum extent of the projection elements.

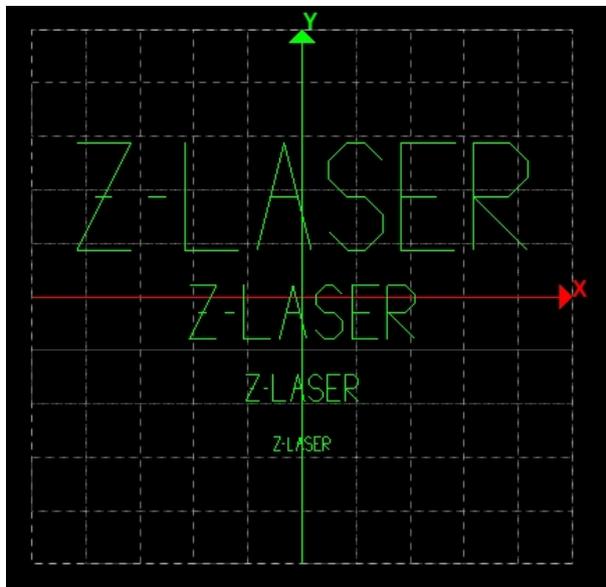
Scale view to content
Centers the view to the center of all available polylines and adjust the view so that all elements can be displayed simultaneously.

Grid (mm):
Changes the visible grid.



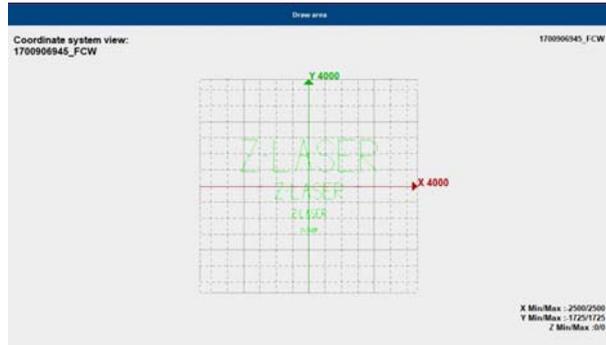
Coord [mm]
Changes the min / max extent of the coordinate system. The minimum value is 1000.

Dark theme
Changes the appearance of the coordinate system to a dark design.



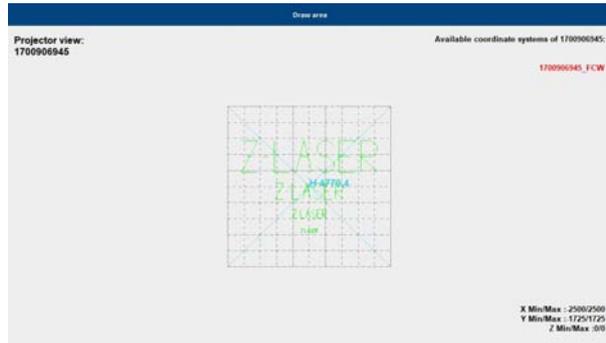
Coordinate system view...

Switches between the available coordinate systems. Only the polylines that have been assigned to this coordinate system are displayed.



Projector view...

Switches between the projector coordinate systems. Displays all coordinate systems and associated reference points created during setup in the projector coordinate system. To switch from this view back to the coordinate system view of the active coordinate system, press a line above it on the same entry in the ComboBox.



Mouse and Keyboard Functions

Function

Description

Rotate coordinate system view

Move the mouse into the drawing area and place it in the empty space. Press and hold the mouse wheel and move the mouse. The view revolves around the zero point. The view can also be rotated using the cursor keys on your keyboard.
 Arrow left: clockwise rotation
 Arrow right: turn counterclockwise
 Arrow up: turn to the front
 Arrow down: turn backwards

Mirror coordinate axes

Button X: Mirroring on the Y-axis
 Button Y: Mirroring on the X-axis

Move coordinate system

Move the mouse inside the drawing area and place it in the empty space. Press and hold the right mouse button and move the mouse to relocate the coordinate system (a cross appears).

Get point information

Press the key combination [CTRL] + [C]. The message Copy Mode appears at the bottom left of the character area. Move the mouse to any

position in the drawing area and the x- and y-coordinates of the current position of the mouse pointer will be displayed. The mode can be terminated by double-clicking.

Select polyline

Move the mouse over the desired polyline and press the left mouse button . To select all visible polylines simultaneously, press [CTRL] + [A].

Open polyline context menu

Move the mouse over the desired polyline and press the right mouse button. If the polyline was previously selected, the context menu can also be opened if the mouse was not placed on the polyline.

Activating/deactivating a polyline

Open the context menu of the polyline and activate/deactivate the **Activate** entry.

Activating/deactivating several polylines

Select the desired polylines and press the right mouse button to open the context menu. Click on the corresponding entry.

Select several polylines

Multiple polylines can be selected by pressing the **CTRL key + left mouse button** or by dragging a selection rectangle (RubberRect).

Create a RubberRect

A RubberRect is created by pressing and moving the left mouse button. All polylines within the RubberRect are selected.

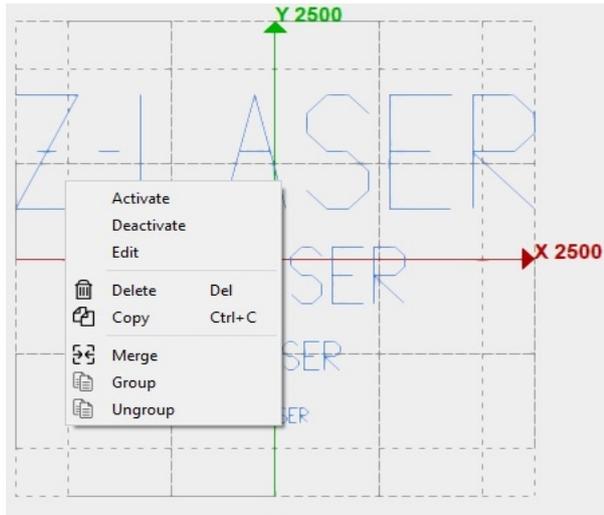
Delete polylines

Press the Del key on your keyboard to delete a polyline from the view.

Polyline functions

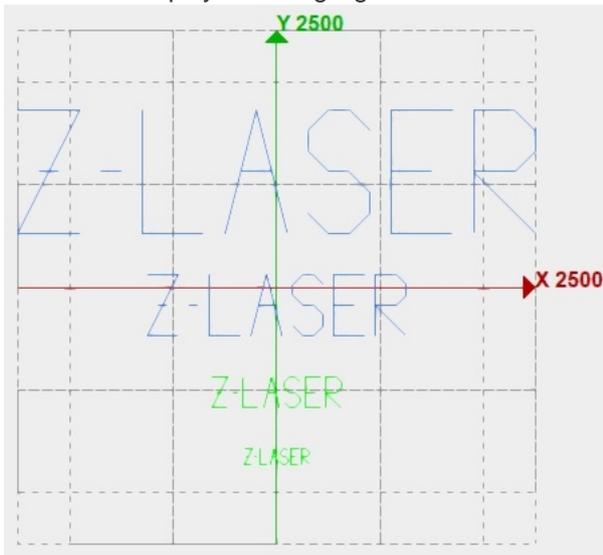
Context menu

The context menu contains the name of the polyline and the function to activate/deactivate the polyline. Each activate/deactivate has an immediate effect on the display.

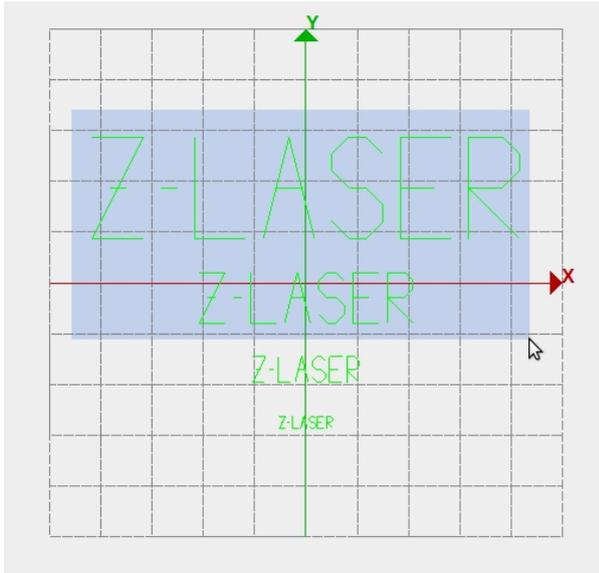


Selection

Each selected polyline is highlighted in blue.

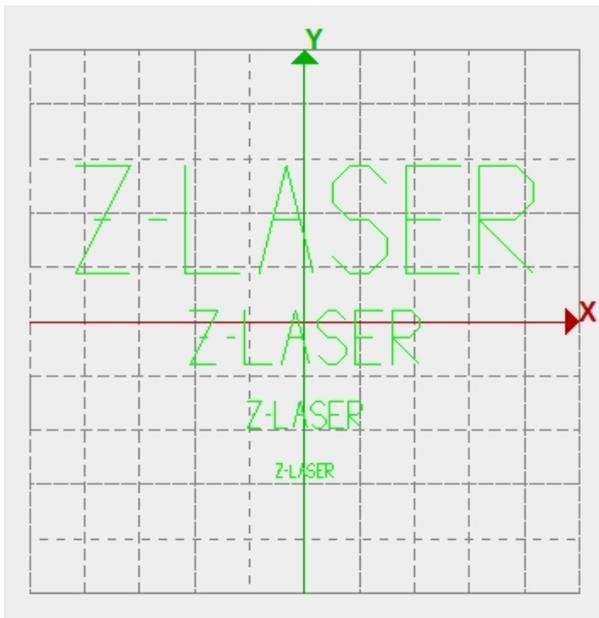


With the selection rectangle (RubberRect) several polylines can be selected simultaneously.



Reset view to start position

A button with the connection `Connect_CoordinateStartPos` rotates the view back to its start position with XY orientation.



5.1.4 Maximize main window of ZLP Suite

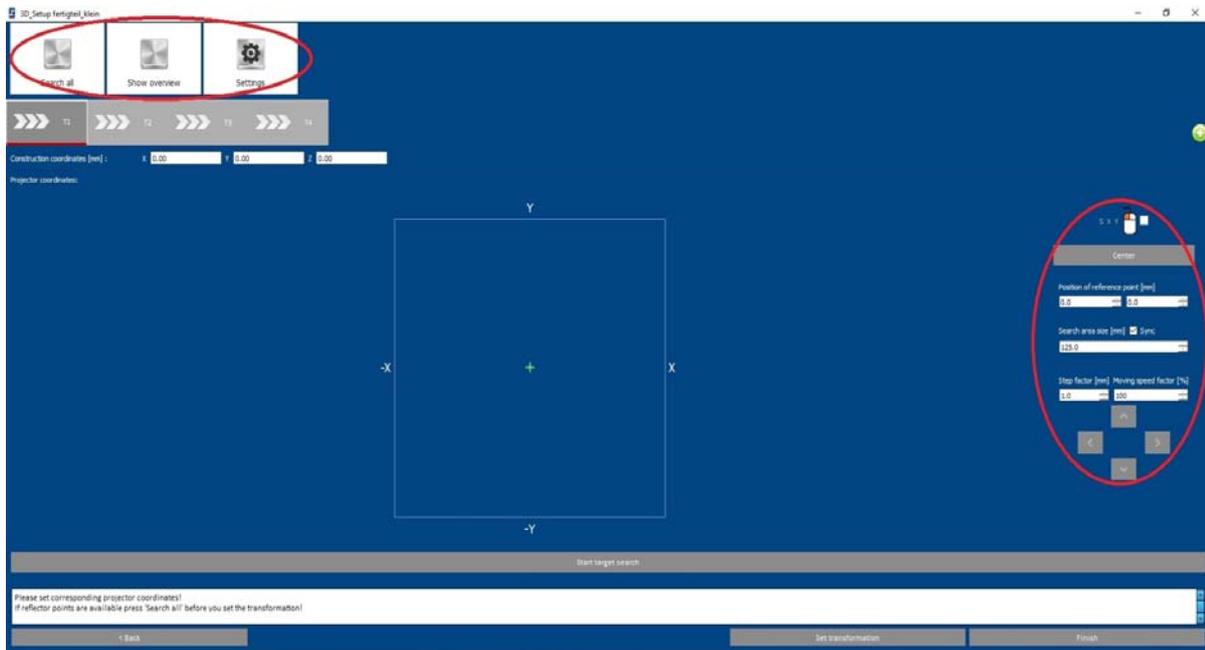
Create a button with the connection `Connect_ShowMaximized`. This button can be used to maximize the view of the user interface at any time.

5.2 Projector setup - Additional Features

5.2.1 Setup settings

To simplify and speed up the setup process (see chapter [Projector setup](#)), the Projector Setup dialog provides several additional settings, which are explained below.

There are several buttons at the top left and several input options at the right of the setup dialog (see red marking in the figure below).



Settings by buttons

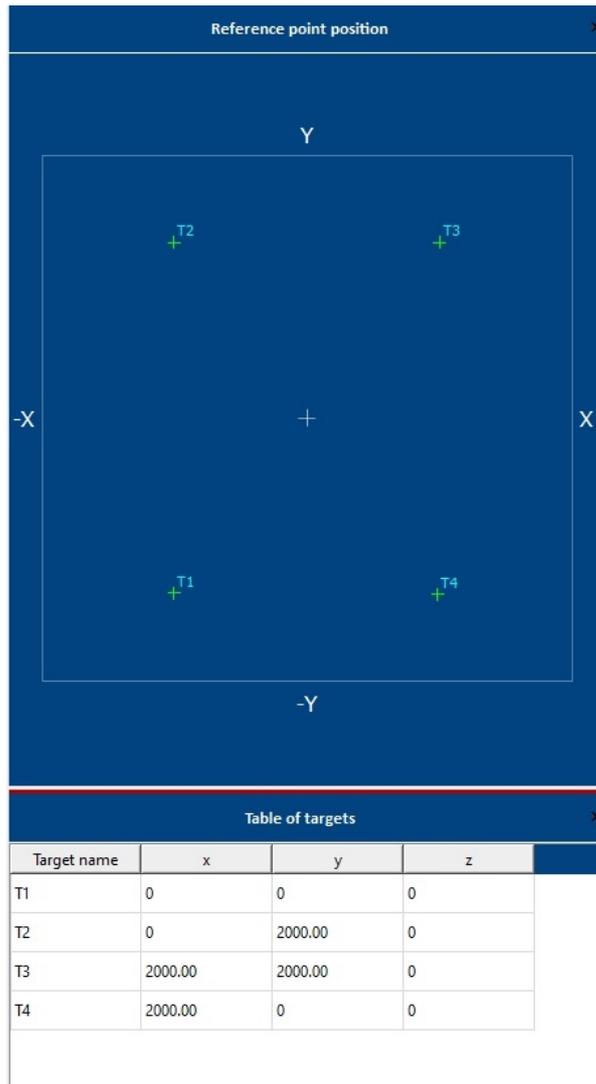


Search all

Starts the point search for all reference points starting with the first reference point in Tab1. After successful point search the transformation can be calculated.

Show overview

Displays an overview of all reference points to each other and all coordinates of the reference points in a table. The coordinates can be edited directly in the table.



Settings

Opens a window with the following setting options:



Please refer to the table below for an overview of the individual parameters.

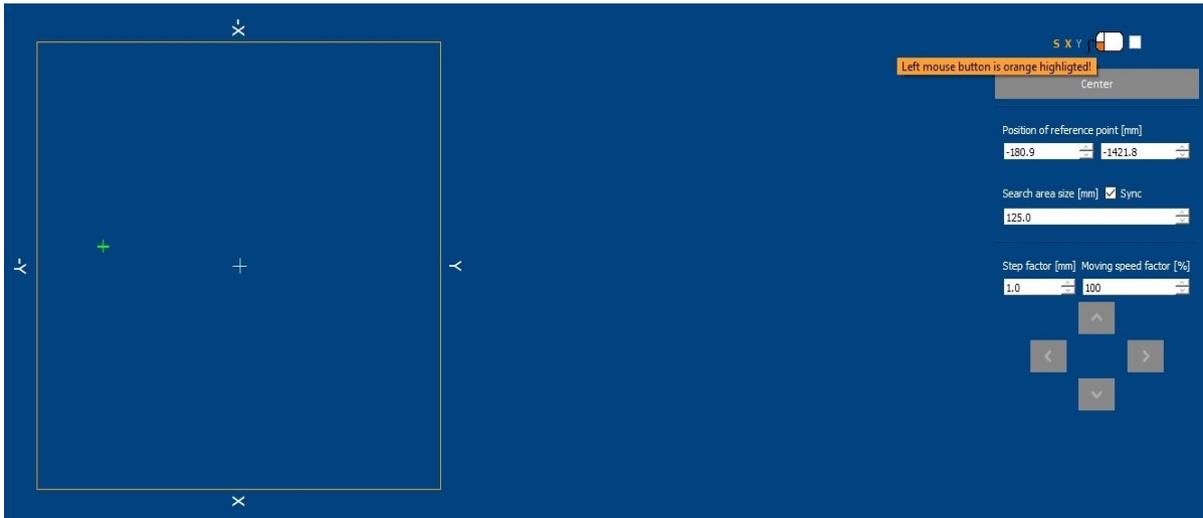
Parameter	Description	Range of values	Default value
Projector height [mm]	Projector height during factory calibration.		
Projection time [ms]	Display duration of the point result for a total point search. The next point is only searched after this time has elapsed.	[1 - 10000]	500 ms
Allow to remove targets	Places an X in front of each tab of a reference point. Press the X to remove the point. For the rest of the setup, deactivate the setting to prevent accidental deletion.		
Search step X,Y [Inc]	This parameter defines the step size of the respective search direction in increments. Smaller values result in a slower point search.	X,Y [1 - 255]	X = 50 Y = 1

Search threshold	This parameter defines the threshold value for the reflection detection hardware.	[1 - 100]	5
Search Tick time [µs]	This parameter sets the timer value for the point search in µs.		40 µs
Max Retries	Total number of attempts to automatically restart an unsuccessful points search. Once this number of attempts has been reached, no further point searches are performed, i.e. the point search is terminated without success. In order to completely suppress an automatically started repetition of the search, the value 0 must be set.	[0 - 20]	5
Rescale trials	Number of attempts to restart an unsuccessful points search and at the same time increase the search area by the factor defined by the parameter rescale factor -> Automatic rescaling	[0 - 10]	3
Rescale factor	Factor for automatic rescaling in percent. For each further rescaling attempt, the last search size is increased by this factor.	[0 - 50]	20
Reduce threshold trials	Number of attempts to restart an unsuccessful point search and at the same time reduce the detection threshold of the reflector detection by the factor defined by the parameter reduce threshold factor . -> Automatic threshold adjustment. The automatic threshold adjustment always takes place after a complete run of the automatic rescaling attempts!	[0 - 50]	3
Reduce threshold factor	Factor for the automatic threshold adjustment in percent. The last threshold is reduced by this factor for each further attempt at threshold adjustment.	[4 - 50]	20

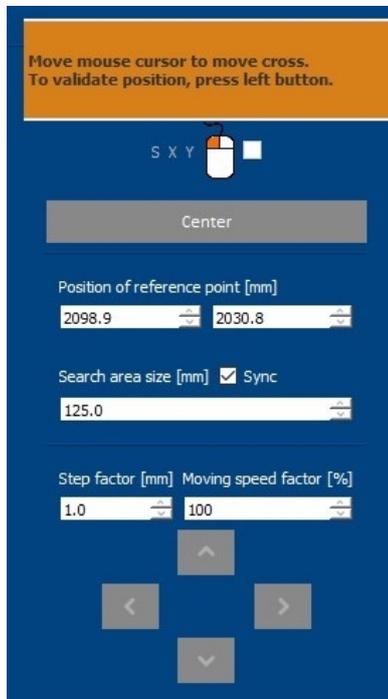
Validation factor	<p>Center range in percent within the search window (related to the center point) within a found point must be located to be evaluated as "valid". A found point can now be</p> <ul style="list-style-type: none"> • within this range: the found point is "valid" and the point search is successfully completed. • outside this range: the found point is first "invalid"; a new search is started centered around the position of the found point; the found point must then be within the "valid range" - it is thus valid - and the point search is successfully completed. <p>This parameter only affects detected points and is intended to ensure that a point is not located in the border area (or on the edge) of the search area. A value of 100 % deactivates this function, i.e. every point found is considered valid.</p>	[50 - 100]	80
-------------------	---	------------	----

Reference point search settings

Depending on the position of the projector, the direction of movement of the laser crosshair does not match the mouse movement. The three letters SXY allow the projector coordinate system (projection area) to be rotated optically. Pressing the letters or the corresponding keyboard keys (s, x, y) changes the orientation. S - Swab (swap the X and Y axes) , X - (mirror to X axis), Y - (mirror to Y axis). Once a letter is activated, it turns orange, the mouse icon changes and the projection area displayed adjusts the axis labels.



It is also possible to move the laser search cross without holding down the left mouse button by first pressing the **M** key on your keyboard. An orange background is displayed on your user interface (see illustration opposite). At the same time, the checkbox next to the mouse symbol is activated with a check mark. Move the laser search cross to the position of the reference point by simply moving the mouse back and forth and confirm the position by pressing the left mouse button. As soon as the left mouse button is pressed, the check mark in the control box disappears.



To return the laser crosshair to its starting position, press the **Center** button.



Under **Position of reference point** the current x- and y-position of the laser search cross is given in millimeters. Note that all entered values refer to the Default coordinate system of the factory calibration and match the dimensions on the projection surface only if the distance between the projector and the projection surface is



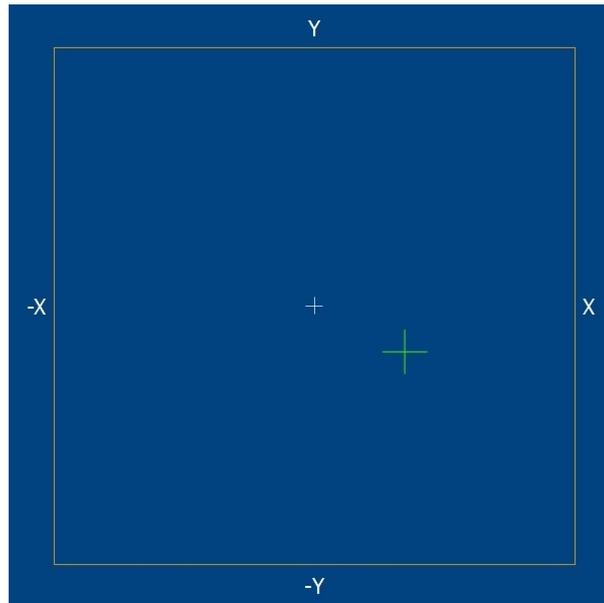
equal to the distance of the specified Projector height at the factory calibration. You can also enter the values manually. The laser search cross automatically jumps to the specified position.

With the help of the **search area size** you determine the size of the laser search cross within which the reference point is to be searched. You can enter the values either via the keyboard, via the arrow keys of the input field or simply by turning the mouse wheel. Note that the size specified in the input mask differs from the actually projected size of the laser search cross. The input value always refers to the Default coordinate system. The larger the value, the larger the green cross on the user interface and also the projected laser search cross.

If the search range is to be the same for all reference points, activate the check box **Sync**. If the search range is to be different for each reference point, no check mark may be set. Instead, the search range size is set individually for each point.



Search area size [mm] Sync
125.0



If you use the arrow keys of your keyboard or the user interface to move the laser search cross, you can use the **step size** to determine the distance in millimeters between two key steps. The higher the value, the greater the step width between two steps.



Step factor [mm]
1.0

With the **moving speed factor** you can determine the speed of your mouse pointer to navigate the laser search cross. The higher the value, the more sensitive the mouse is to movement, the faster the laser cross can be moved back and forth. The smaller the value, the less sensitive the mouse pointer is to movement, the slower the laser cross can be maneuvered. A value of 100% means that the laser cross moves as fast as the mouse. The smaller the percentage, the slower the cross moves. Pressing and holding the left mouse button takes the value



Moving speed factor [%]
100

that was entered. Pressing and holding the right mouse button automatically switches to 10%. If the right mouse button is released, the previously set value is set.

The laser search cross can be controlled using both the arrow keys on the keyboard and the arrow keys on the user interface. Note the adjustable step size explained above.



5.2.2 Projector Setup from File

Reference files contain the designation for the individual reference points, followed by the x, y and z coordinates.

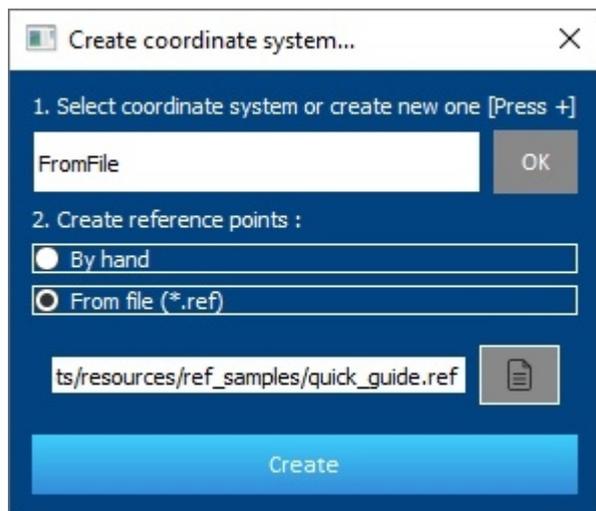
```

1 T1 0.0, 0.0, 0.0;
2 T2 250.0, 0.0, 0.0;
3 T3 550.0, 0.0, 0.0;
4 T4 550.0, 380.0, 0.0;
5 T5 250.0, 380.0, 0.0;
6 T6 0.0, 380.0, 0.0;

```

Reference files have the extension .ref.

Create a coordinate system and select the entry From file (*.ref) under 2. Create reference points. In addition, set the path to the corresponding reference file and click Create.

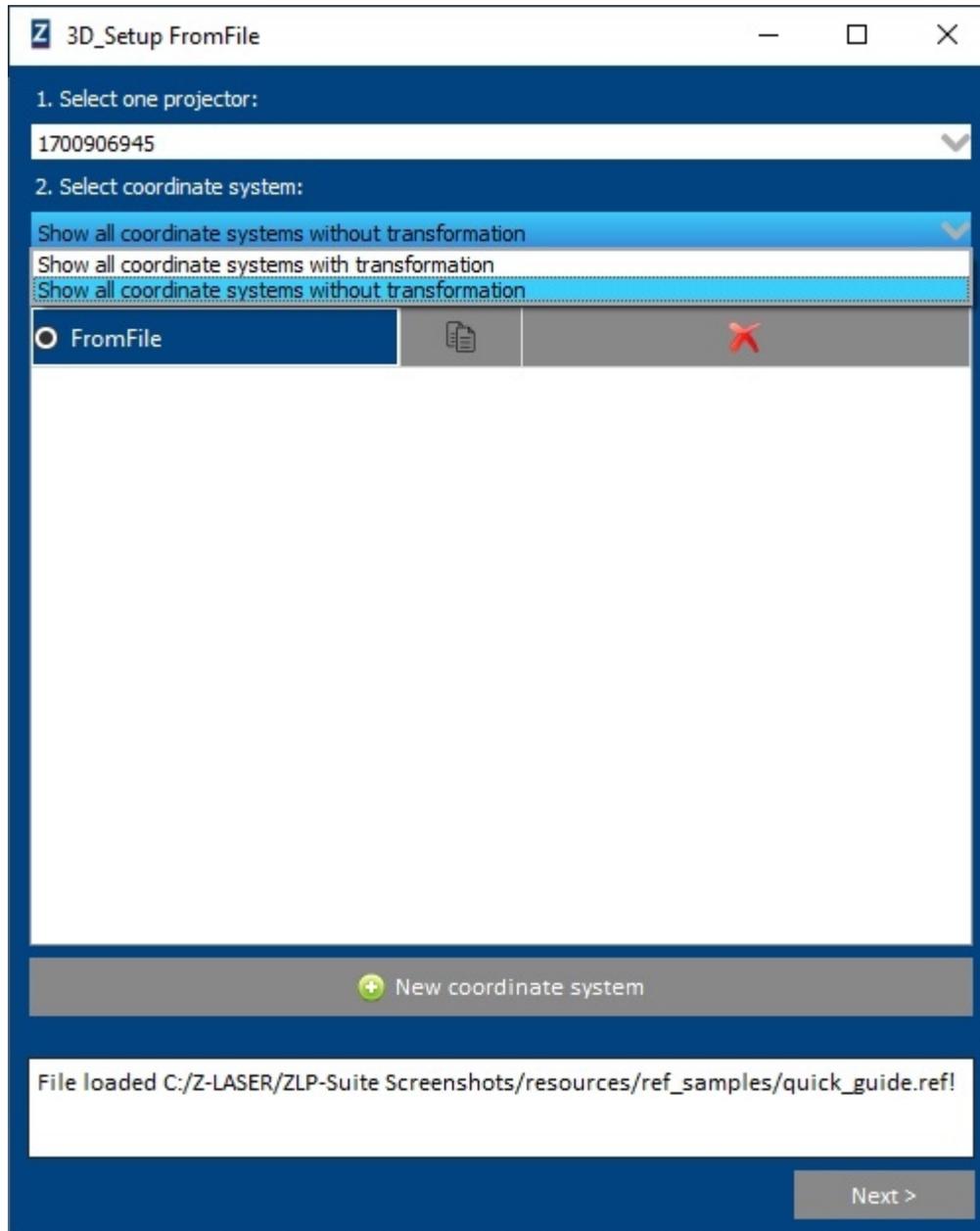


The reference file is loaded and all points and designations of the reference points are copied from the file. Each reference point from the reference file is displayed as a tab in the setup dialog. The first reference point in the series is active and the cross is projected. Now move each reference point to its corresponding position and finally carry out the reference point search. Calculate the transformation.

5.2.3 Changing Projector Setup

To change an existing setup, open the projector setup dialog and select the coordinate system you want to

change. Depending on whether you have already set a transformation or not, the coordinate system is listed under the corresponding [Show all coordinate systems with transformation](#) or [Show all coordinate systems without transformation](#) drop-down list box.

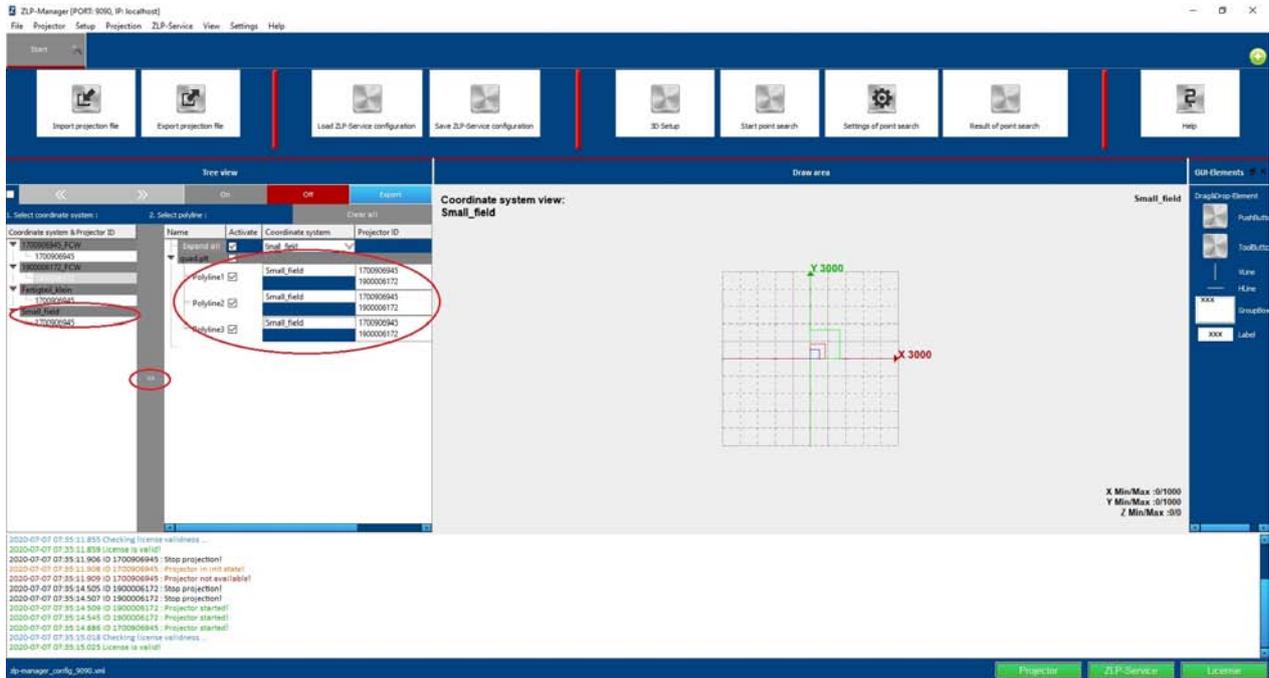


Make the desired changes and click [Set Transformation](#) to complete.

5.2.4 Set up multiple projectors on one coordinate system

It is possible to set up several projectors on one coordinate system. This is necessary if, for example, projection areas overlap or if the multi-colour capability of the projectors is to be activated. To do this, proceed as follows:

1. Open the 3D setup dialog and create a coordinate system for the first projector. Perform the setup steps and then have a transformation matrix calculated.
2. Open the 3D setup dialog again and create the same coordinate system for the second projector. If necessary, use the same ref file as in the first coordinate system. Perform the setup steps. Calculate the transformation.
3. Load a projection file.
4. Select the newly created coordinate system with the two projector IDs in the expert view and click on the [Assign arrows >>](#). The loaded projection file will be assigned the corresponding coordinate system.



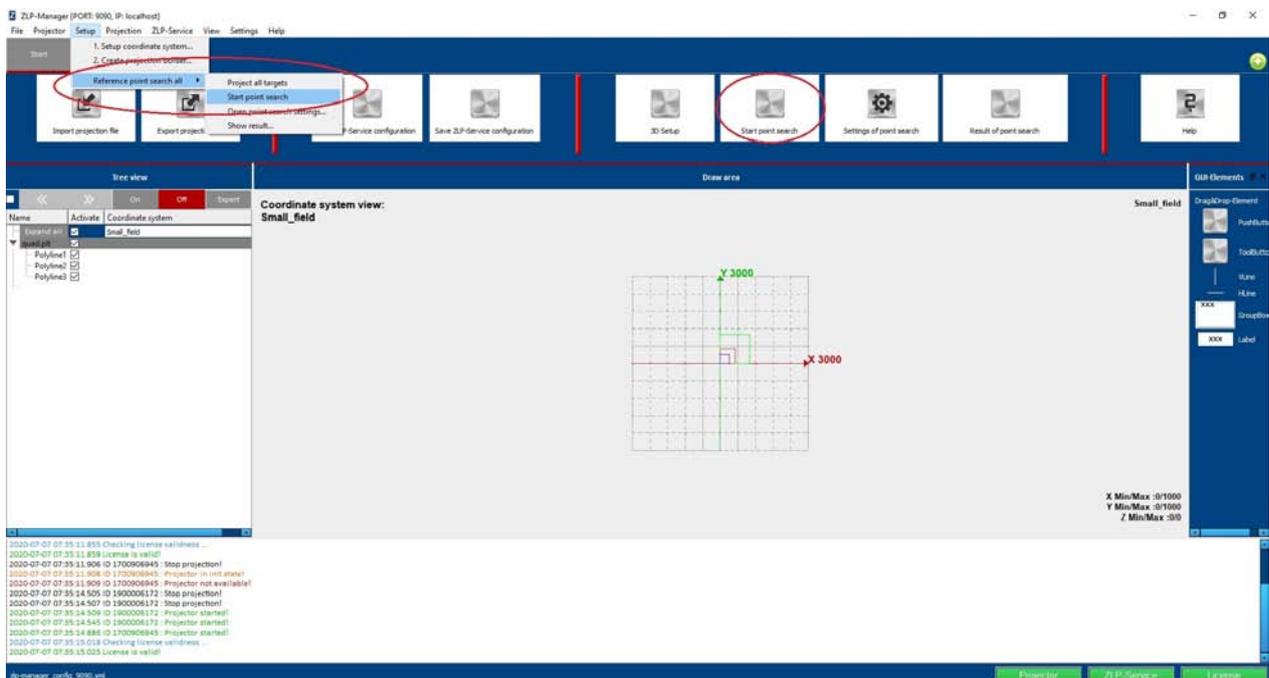
- Now start the projection by clicking the on button ⇒ the projection will be displayed by both projectors at the same time. If you are using a green and a red projector, the projection will appear yellow due to the color overlap.

5.3 Reference point search

The point search can only be used if reflectors or reflector points (so-called cat's eyes) are used. These help the projector to automatically find the reference points by reflecting the laser beam. Once you have set up the projector, you can scan the reference points at the touch of a button. However, if there are no reflector points on the setup object at the position of the reference points, the point search will fail.

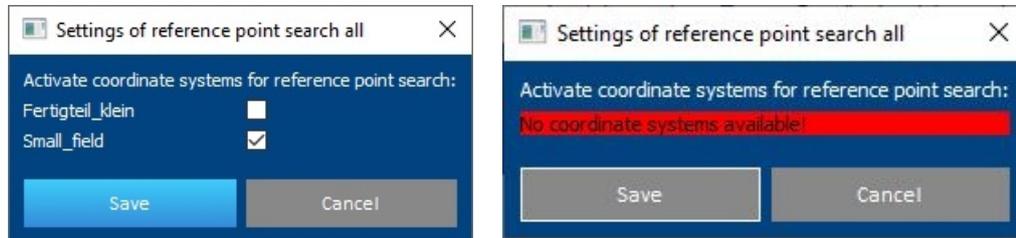
- There are two options for starting the point search:

Either via the menu entry **Setup → Reference point search all → Start Point Search** or via the ribbon bar button **Start point search**.

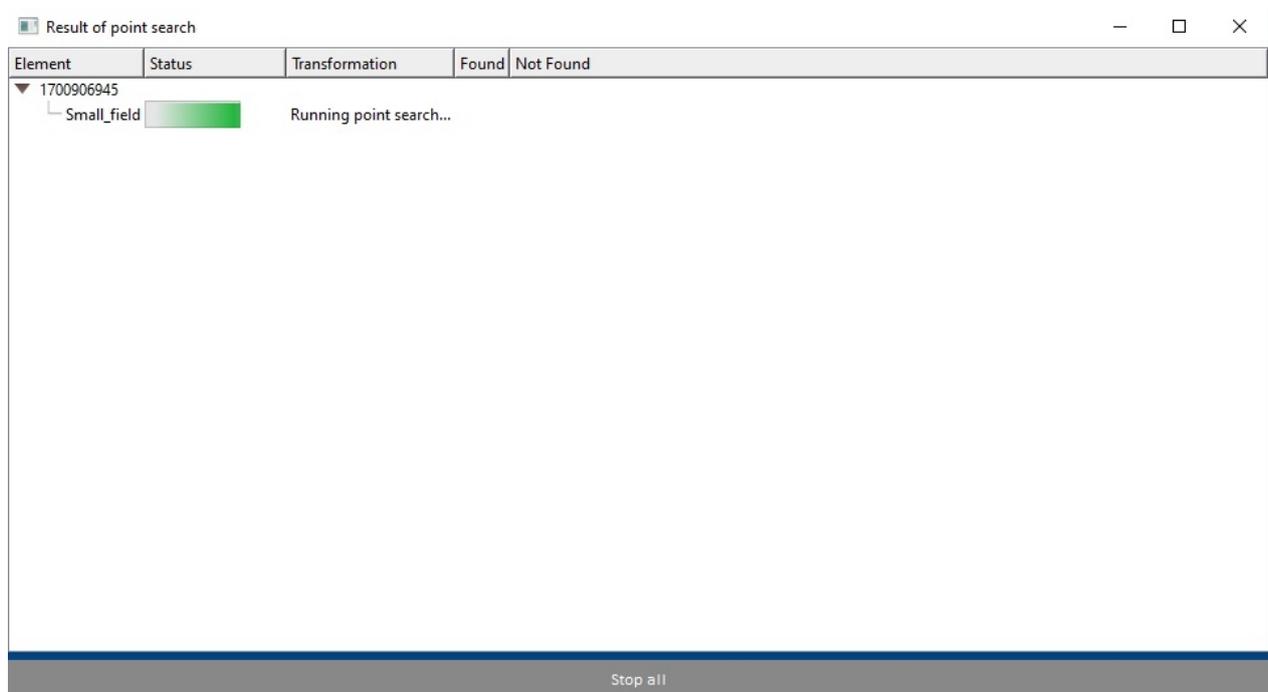


2. The dialog windows **Settings of Reference point search all** opens.

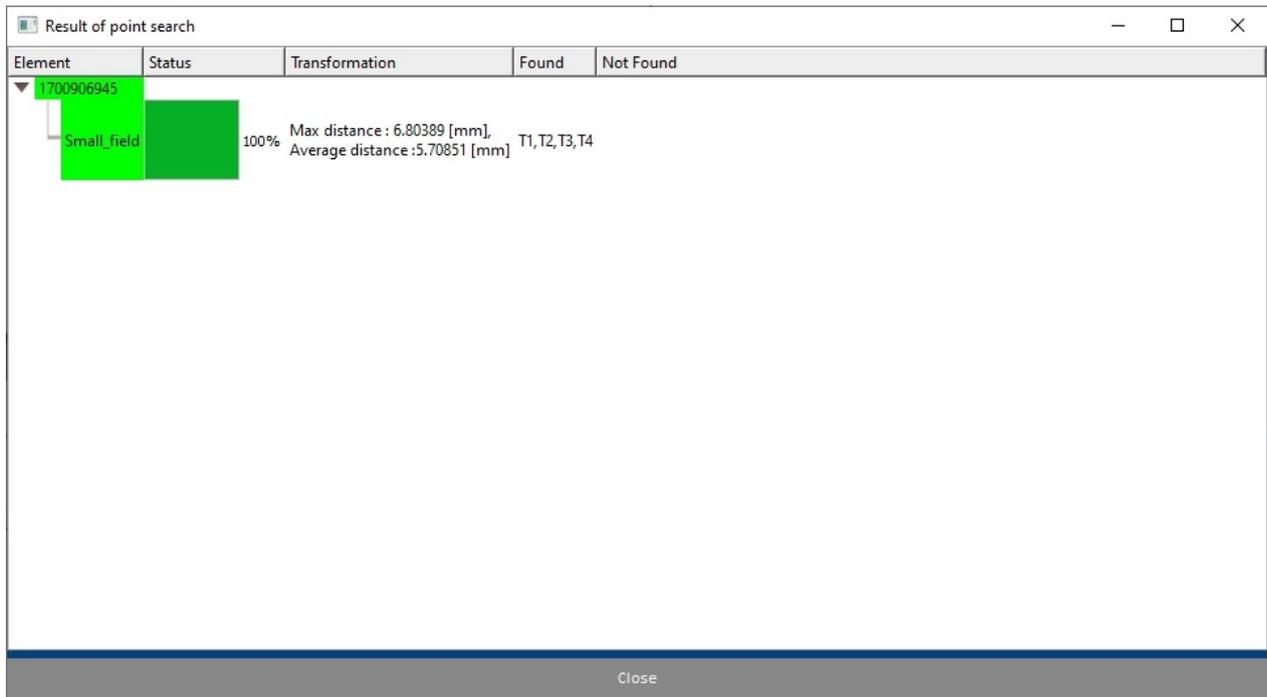
Select a coordinate system to be used for the point search and click Save. If no coordinate system is available, check that the projector is connected to the ZLP-Manager and that no setup has already been performed.



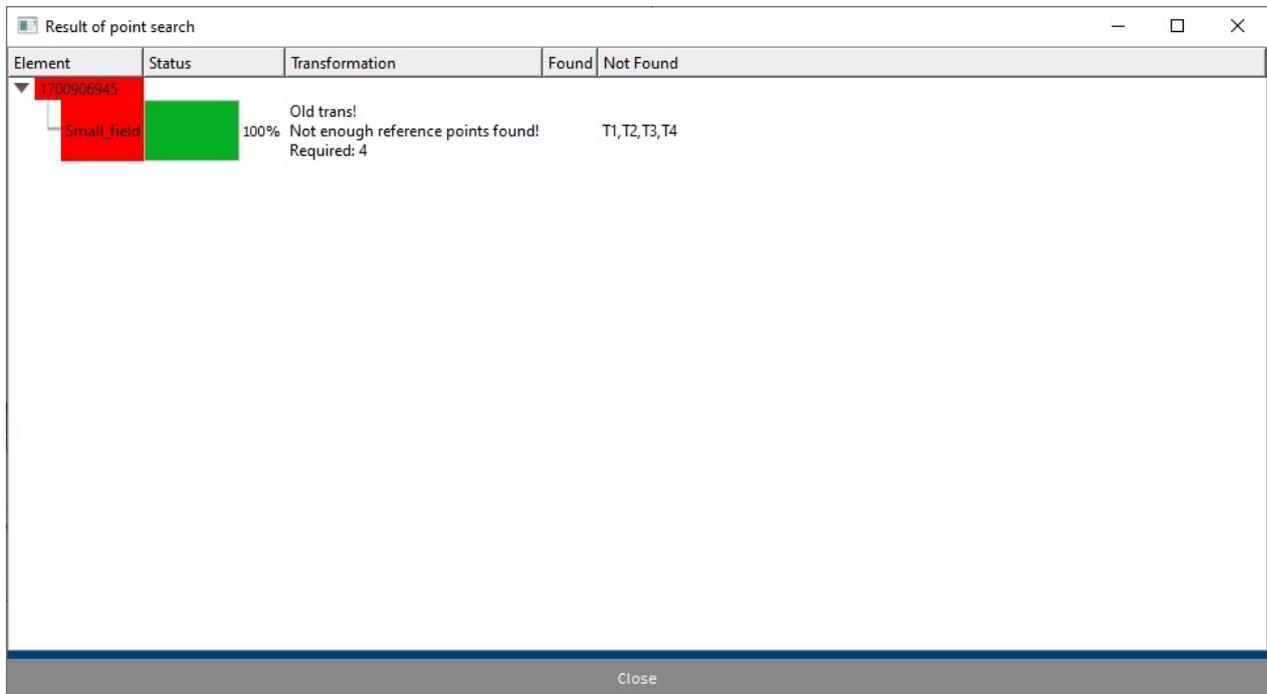
3. Click the **Start point search** button again. The laser projector will now begin scanning the set reflector points. The progress of the search is displayed in the **Result of point search** dialog box.



4. If the reflector point has been successfully found, the laser projector projects a cross over the point. At the same time a successful point search appears green in the dialog window. In addition, the result of the new transformation calculation is displayed.



5. If the point search was not successful, a square is projected at the corresponding position. At the same time, the dialog window of the ZLP-Manager informs about the result of the point search. An erroneous or unfeasible point search is marked in red. An overview of the meaning of the individual columns of the dialog box can be found in the chapter [Result reference point search](#).



5.3.1 Result reference point search

The dialog box provides information:

Column caption

Element

Information

Specifies the ProjectorID and the available coordinate systems. Green = All projectors and coordinate systems were found; no error occurred during the reference point

	search. Red = Projector / coordinate system is not available; point search failed.
Status	Provides information about the connection status of the projector. Green = Projector connected. If the projector could not be found or started, an error message appears.
Transformation	Informs about the transformation result. Error messages during the points search are listed here.
Found	Lists the reference points found.
Not found	Lists the reference points not found.

The result can be displayed at any time via the menu item **Setup → Reference point search all → Show result...** or via the ribbon bar button **Result of point search**.

5.3.2 Show reference points

Sometimes it is necessary to have the position of the reference points displayed by the projector. This is especially the case if you are using a movable setup object and want to reposition it at the appropriate position. To do so, proceed as described below:

1. Open the Setup menu entry **Setup → Reference point search all → Project all targets** or press the button with the `Connect_RefPoint_ProjectAllTargets` connection. The reference points are displayed.
2. Position the setup object until the projected crosses match the reference points.
3. If the position has been met exactly, you can immediately project again. As a precaution, however, a point search should be performed once again to increase the accuracy of the projection.

5.4 Import & export of projection files

In the ZLP-Manager there are different dialogs for the import and export of projection data, which are described in the following chapters.

5.4.1 Supported file formats

All supported formats are described below. Example files for the corresponding file type can be found in the installation directory under [resources/projection_samples](#).

5.4.1.1 HPGL

The Hewlett Packard Graphics Language (HPGL) is a description language for controlling pen plotters.

File Extensions

`.plt`, `.las`, `.hpgl`, `.hgl` (large or small)

Naming

Names are defined using the `ZN` command. A group is separated from the name by a `/`. If this command is not specified, a default name is generated for each element. This name is composed of the element type + index e.g. Polyline1, Circle1, Text1.

Supported Commands

// Standard HPGL commands:

```
IN
SP <int pen>
PA [x1,y1],[x2,y2], ...
PR [x1,y1],[x2,y2], ...
PU [x1,y1],[x2,y2], ...
PD [x1,y1],[x2,y2], ...
```

```

CI <double Radius> [double angle resolution in degrees] (default 5)
AA <middle x> <middle y> <arc angle> [Angle resolution]
DT<character>, [mode]
SI [Width], <Height>
DI [run, rise]
LB<text><termination character>

```

// Z-laser commands:

```

ZN Name
ZN Group/Group/Name
ZC Comment

```

5.4.1.2 DXF

The CAD data format `DXF` can be read and written using the DXF import/export plug-in.

- File extension: `.dxf` (large and small)
- The DXF parser currently only reads the ENTITIES section. The BLOCKS sections are not evaluated.

Naming

Group names are defined by the layer name. If the layer does not have a name, the index is used as the name. DXF elements have no name. For each element therefore an automatically generated name is used, which results from the type and an ascending number per layer e.g. ARC1, CIRCLE1.

Supported Element Types

The following element types from the ENTITIES section can be imported:

- LINE: Start and end point (3D)
- POLYLINE: single point list (3D), flags: closed
- LWPOLYLINE: single point list (2D), Flages: closed
- ARC: Circular arc
- CIRCLE: circle
- TEXT: Text with position (3D), text content, text height, text angle

All other element types and elements in the BLOCKS section are currently not supported.

5.4.1.3 ZLP

This is the internal Z-LASER format. `ZLP` files cannot be created manually because they are stored as binary files and therefore cannot be read. A file can only be created using the export function.

5.4.1.4 REF

`REF` files contain coordinates of reference points which are used to set the laser projectors to a specific coordinate system. Therefore, it is currently only possible to load the files in the ZLP-Manager via the 3D setup dialog, since a coordinate system and the projector ID are specified there, which are automatically assigned to the generated element.

In Simple or Expert Import it is also possible to load a reference file, but there are no functions available to perform further processing steps.

Format

A reference file contains reference points. These are created as follows:

```
<point name> x,y,z;
```

In the 3D setup dialog, a separate tab is created for each reference point.

5.4.2 Data import

Import (Simple)

The projection data is loaded into a group that corresponds to the file name and is automatically assigned to the active coordinate system in the tree view. This allows the data to be projected directly after import. The import can be started either via the menu bar (**File → Import projection file**) or via a corresponding button connection. It is also possible to import the data using Drag&Drop. Simply open a file browser, select files and drag them into the drawing area. The data is then automatically assigned to the active coordinate system.

Button Connection: `Connect_ImportProjectionData`

Import (Expert)

Opens the expert dialog for importing and exporting. This corresponds to the program z-io-gui (see chapter [ZLP Import Export Tool](#)).

The file import can also be carried out directly via button connections.

Button Connection: `Connect_ZIO`

5.4.3 Data export

Export (Simple)

All projection elements in the tree are written to the set output format. To export only a part of the data, the rest must be deleted from the tree. If, for example, you have created your own projection elements, it makes sense to save the data directly to a file after creating it and then delete it from the tree again before creating new projection elements.

Connection button: `Connect_ExportProjectionData`

When exporting, all elements present in the ZLP-Service are currently saved as a point list. Additional properties/attributes such as pens or the type are lost. The only way to save all properties is to save the ZLP-Service configuration file. In addition to the projection data, the complete system status is also saved in this file.

Export (Expert)

Opens the expert dialog for importing and exporting. This corresponds to the program z-io-gui (see chapter [ZLP Import Export Tool](#)).

Connection button: `Connect_ZIO`

5.4.4 Data exchange via z-io

Import/Export (Expert)

Via the button with the connection `Connect_ZIO` the expert dialog for importing and exporting data opens.

z-io

Command line program for importing and exporting projection data to the ZLP-Service.

Commands

The description of the commands can be displayed via the zio help using the `--help` command.

Some of the commands are described below:

Command	Description
<code>--help</code>	Shows help
<code>--ip arg (= localhost)</code>	IP-adress of ZLP-Service
<code>--port arg (= 9090)</code>	Port number of ZLP-Service

<code>--import arg</code>	Directory of the importing file
<code>--export arg</code>	Directory for the exported file
<code>--scale arg</code>	Scales the projection data during import (scaling factor > 0.0)
<code>--shift arg</code>	Assigns a shift in x, y and z direction during import.
<code>--coordinate-system arg</code>	The loaded file is assigned the specified coordinate system. The coordinate system does not have to exist in the ZLP-Service. Via the 3D setup dialog the coordinate system can also be created later. Thus this function can also be used for data preparation.
<code>--group arg</code>	Groups imported data
<code>--list-plugins</code>	Creates the file <code>zio_plugins.txt</code> in the bin directory. This file contains all available import/export plugins and is required by the z-io-gui.
<code>--list-coordinate-systems</code>	All available coordinate systems are retrieved, displayed in the command prompt and written to the file <code>zio_coordinate_systems.txt</code> in the bin directory. This file is needed for example by the z-io-gui to display the list of coordinate systems.
<code>--verbose</code>	Activates the Info Log messages. Otherwise only warnings and errors are displayed.
<code>--replace</code>	Existing elements with the same name are replaced by new ones.
<code>--project</code>	Starts the projection after the import.
<code>--clear</code>	Deletes all existing projection elements before import.

5.4.5 Starting an external program via the ZLP-Manager

To start an external program directly via the ZLP-Manager, create a button with the connection `Connect_StartEXE`. This is a direct link to an executable file on the system.

Set external program

To set the executable file, right-click the button and select Settings.

Open the file browser via the [Set path of executable...](#) button and navigate to an executable file. The program path is set as button name.

In addition, transfer parameters can be entered if required.

5.4.6 ZLP Import Export Tool

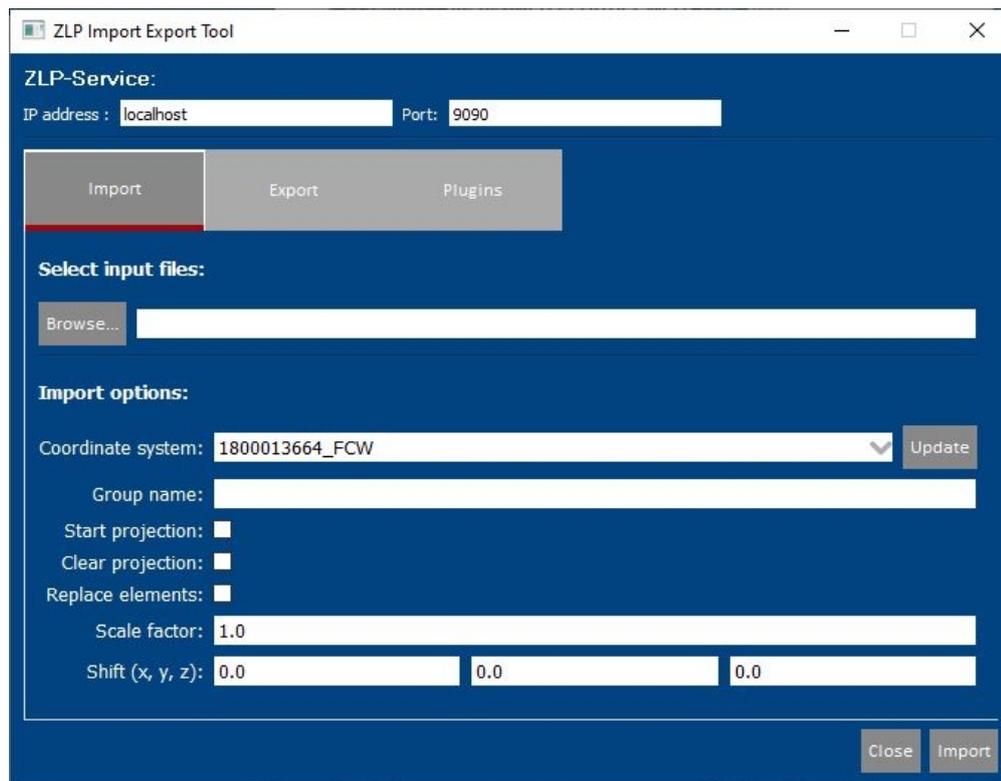
Opens the expert dialog for import and export. This provides all functions of the command line program z-io to import or export projection data. This can be used to address any ZLP-Service instance. By default, the ZLP-Service instance to which the ZLP-Manager is currently connected is active. If an error occurs during import or export, an error message appears.

Service connection

To establish a connection to another ZLP-Service instance, the connection parameters under **Service connection**: must be changed. A ZLP-Service instance check only takes place during import/export. If the instance does not exist, an error message is issued and the operation is terminated.

Import

Opens a file browser to export all projection files loaded in the ZLP-Service.



Multiple files can be imported at the same time. If an error occurs during import, an error message appears. If more than one file was loaded, a table is displayed in which the error messages related to the corresponding file are displayed. By double-clicking on the name of the file in the list, it can also be opened.

File browser

Browse... -> Opens a file browser to load projection data. It can be filtered by all supported formats.

Options

Option	Description
Coordinate system	Select one of the available coordinate systems. The projection data can then be displayed directly in this coordinate system.
Group name	Define a group name. Creates a group to which all polylines of the selected projection data are moved during import.

Start projection	Starts the projection after successful import
Clear projection	Deletes the projection of all previously displayed elements.
Replace elements	Removes all projection elements from ZLP-Service before new ones are loaded
Scale factor	Scales the loaded projection elements by the respective factor
Shift (x,y,z)	Moves the projection elements in x, y or z direction by the specified values in mm.

Export

Opens a file browser to export all projection files loaded in the ZLP-Service.

Output formats

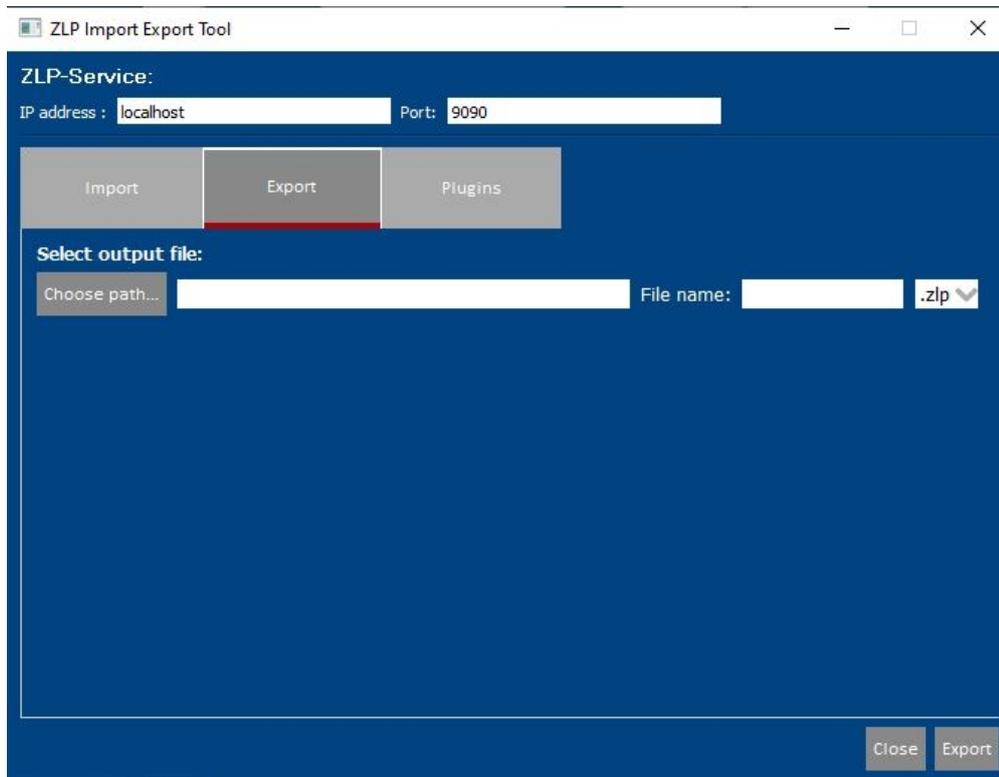
Two formats can currently be selected in the file browser: zlp and dxf. If one of the two extensions is entered, it will be used, even if another filter is active.

*.zlp

This is the internal Z-Laser format.

*.dxf

The CAD data format DXF can be read and written using the DXF import/export plug-in. Further information can be found in the chapter [DXF](#) and [ZLP](#).



Filename

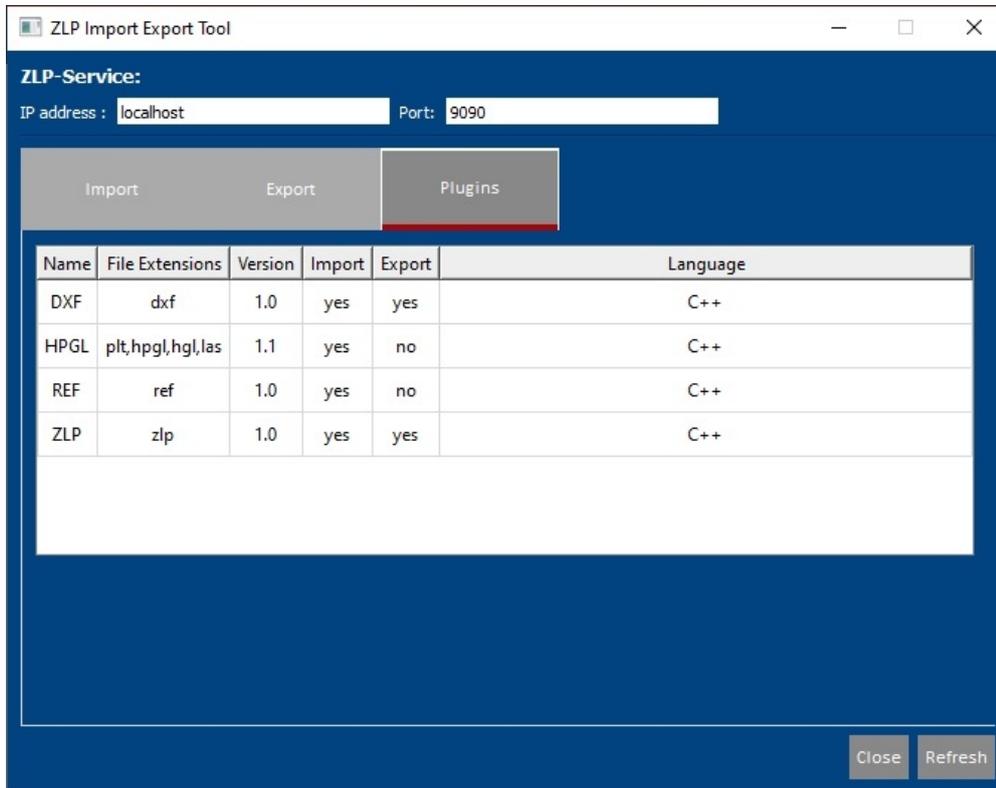
Choose path...

Opens a file browser. Navigate to a folder in which the file is to be saved.

File Name

Entering a file name and selecting the file extension

Plugins



ZLP-Service:
 IP address : localhost Port: 9090

Import Export **Plugins**

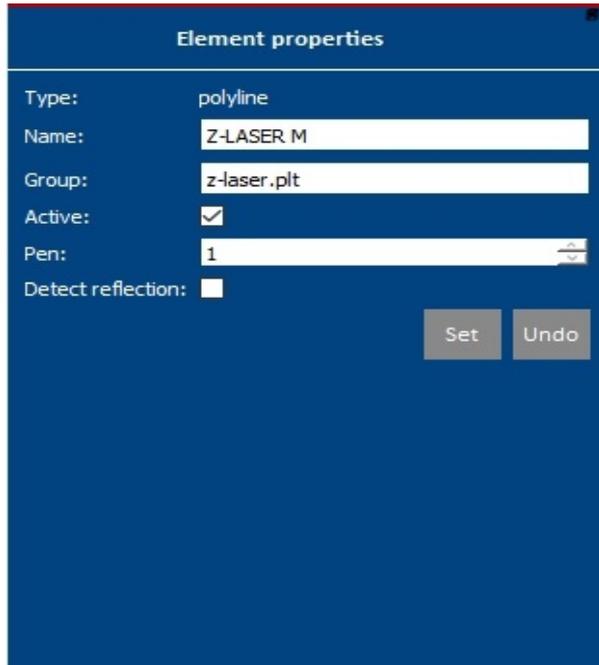
Name	File Extensions	Version	Import	Export	Language
DXF	dxf	1.0	yes	yes	C++
HPGL	plt,hpgl,hgl,las	1.1	yes	no	C++
REF	ref	1.0	yes	no	C++
ZLP	zlp	1.0	yes	yes	C++

Close Refresh

Table with an overview of all available plugins. Further information regarding plugins and SDK applications can be found in a separate documentation.

5.4.7 Properties View

The DockWidget [Properties View](#) allows the user to read and edit the properties of projection elements. To do this, the [Dock_PropertiesView](#) docking window must be opened (see chapters [Creating DockWidgets / Docking windows](#)).



Display properties

Once a projection element is selected in the Tree View or 3D View, its properties are displayed in the Properties View. Different properties are displayed for each type of projection element (polyline, text, circle, etc.). Usually, however, the view contains only a selection of all properties of the respective element.

Edit Properties

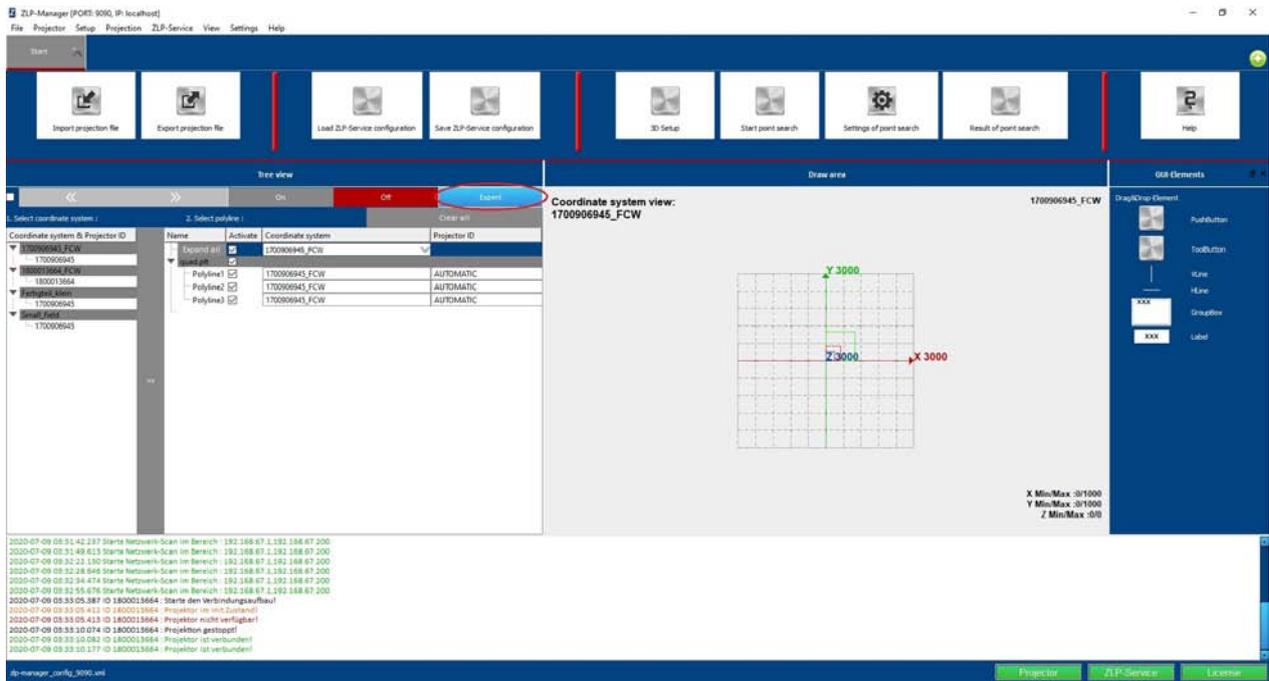
If the user has the right to change projection data or if the user administration is switched off, the properties of projection elements can be edited within the properties view. Otherwise, only read access is possible. Rules for the permissible values are stored for the individual properties. Illegal entries are prevented or automatically undone. For example, no special characters are allowed in the name of the projection element. Changed values are confirmed by pressing the **Set** button.

If the projection is activated in the tree view, all changes to the properties of the projection elements lead to an immediate adjustment of the current projection.

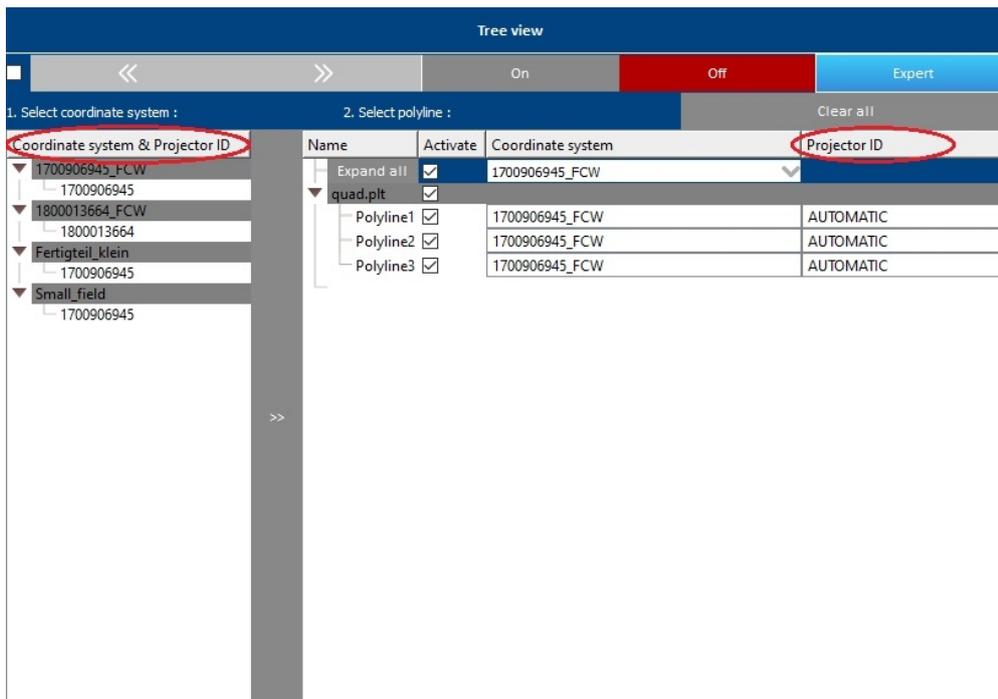
Name:	Change the name of the individual polylines here.
Group:	Lets you change the group name.
Active:	If elements are activated via the checkbox, they can be projected immediately. Otherwise, the projection must first be activated via the tree view.
Pen:	Assignment of pen color
Recognize reflection:	If this feature is activated, the element is registered as a reflection element in the ZLP-Service. This is relevant, for example, for intervention control. That the reflection can be detected, the element must be projected onto a reflective foil.

5.5 Projecting with the Projector (Expert Mode)

The expert mode is opened by pressing the **Expert** button in the tree structure.



The tree view on the left is extended by the column **Coordinate system & Projector ID**. Additionally, another column **Projector ID** is visible on the right side and the assigned coordinate systems of the polylines are displayed in the column **Coordinate System**.



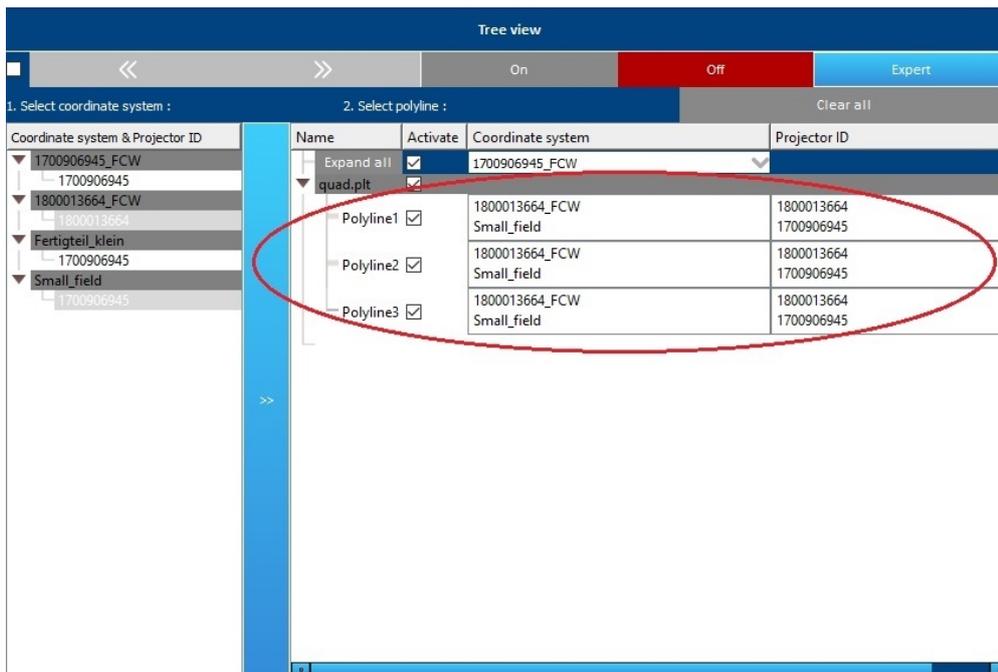
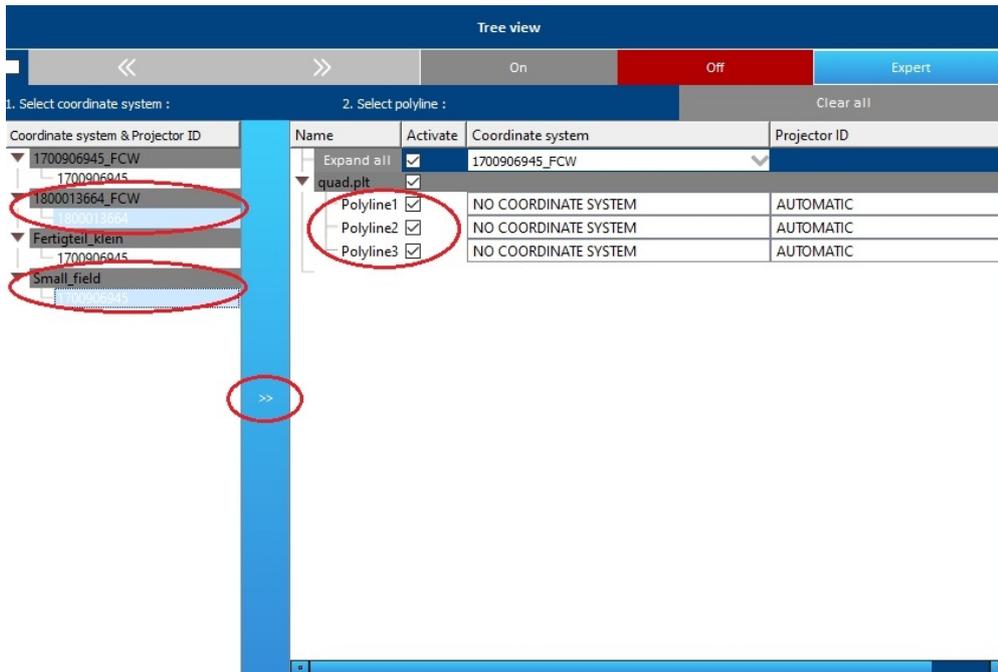
To assign a coordinate system to a polyline, the following steps must be performed:

Step 1: Select the coordinate system with the corresponding projector ID in the column **Coordinate System & Projector ID** on the left side.

Multiple selection is possible by **Ctrl + left mouse click**.

Step 2: In the **Activate** column, select the groups/elements or individual polylines that you want to assign to the coordinate system.

Step 3: Press the grey button >> (located between steps 1 and 2) => The coordinate systems and projectors are assigned to the polylines and appear in the **Coordinate system column** together with the projector ID.



If you only want to assign specific projectors from a coordinate system to a specific polyline, you can either manually delete all other projectors from the **ProjectorID** column (select Projector ID and press DEL key) or press the **Remove all** button (remove Projector ID and coordinate system assignment). To add selected projectors, select only the projectors to be used in step 1 and perform step 3 again.

Tree view

On Off Expert

1. Select coordinate system : 2. Select polyline : Clear all

Coordinate system & Projector ID	Name	Activate	Coordinate system	Projector ID
1700906945_FCW	Expand all	<input type="checkbox"/>	1700906945_FCW	
1700906945	quad.plt	<input type="checkbox"/>		
1800013664_FCW	Polyline1	<input type="checkbox"/>	1700906945_FCW	1700906945
1800013664	Polyline2	<input type="checkbox"/>	1800013664_FCW	1800013664
Fertigteil_klein	Polyline3	<input checked="" type="checkbox"/>	Small_field	1700906945
1700906945				
Small_field				
1700906945				

If the projectors are only deleted from the **projector ID** column, the value **AUTOMATIC** is displayed. Thus **all** projectors assigned to the coordinate system are automatically used.

Tree view

On Off Expert

1. Select coordinate system : 2. Select polyline : Clear all

Coordinate system & Projector ID	Name	Activate	Coordinate system	Projector ID
1700906945_FCW	Expand all	<input type="checkbox"/>	1700906945_FCW	
1700906945	quad.plt	<input type="checkbox"/>		
1800013664_FCW	Polyline1	<input type="checkbox"/>	1700906945_FCW	1700906945
1800013664	Polyline2	<input type="checkbox"/>	1800013664_FCW	1800013664
Fertigteil_klein	Polyline3	<input checked="" type="checkbox"/>	Small_field	AUTOMATIC
1700906945				
Small_field				
1700906945				

5.5.1 Further functions of the tree view

The tree view is divided into two sections.

1. Function bar

The elements allow interaction with the polylines such as switching through the elements, starting the projection or assigning new coordinate systems.



Description of the function bar from left to right:

Checkbox + Arrow keys: The checkbox activates the switching through of the polylines in the tree structure, activates the arrow keys and switches the projection on. It always starts with the top polyline in the tree, unless a polyline has been manually activated before.

As long as the toggle mode is activated, only one polyline is selected at a time. The arrow keys can be used to toggle between the polylines in the tree. The active polyline is highlighted, all other polylines are not editable.

On + Off: Enables the projection to be turned on and off.

Expert: Opens expert mode for further applications

2. Tree structure

Overview of all loaded projection files. Each file is added to the tree as a group (grey element name). Only group elements can be deleted. Each element can be activated and/or deleted separately.

Name	Activate	Coordinate system
Expand all	<input checked="" type="checkbox"/>	1700906945_FCW
arcs.plt	<input checked="" type="checkbox"/>	
Arc1	<input checked="" type="checkbox"/>	
Arc2	<input checked="" type="checkbox"/>	
Arc3	<input checked="" type="checkbox"/>	
Polyline1	<input checked="" type="checkbox"/>	
Polyline2	<input checked="" type="checkbox"/>	
Polyline3	<input checked="" type="checkbox"/>	
quad.plt	<input checked="" type="checkbox"/>	
Polyline1	<input checked="" type="checkbox"/>	
Polyline2	<input checked="" type="checkbox"/>	
Polyline3	<input checked="" type="checkbox"/>	

The function bar of the first line of the tree structure has a global effect on all polylines in the tree.

Name	Description	Function of the first line
Name	Contains all loaded projection files. All groups and subgroups of the projection elements are displayed.	Expand all unfolds all subgroups
Activate	Activates the polylines in the column. Only active elements are projected when the On button is pressed. (Assignment polyline ->	Activates all elements in the tree

coordinate system required)

Coordinate system

The assigned coordinate systems are visible in expert mode.

ComboBox contains all coordinate systems that have been created. If new polylines are loaded, they are automatically assigned to the active coordinate system.

3. Operation

Selection of elements

- [CTRL] + A -> Selects all available elements in the tree
- Left click -> Selects only one element and cancels the selection of the previous elements.
- [CTRL] + left click -> Multiselection. Selects all elements to be selected.
- [SHIFT] + left click -> Multiselection from/to. Selects the elements from the first selected element to the last selected element.

Removing elements

- Select elements and press [DEL]. **Attention! When removing, the elements are removed directly from the ZLP-Service and can only be restored if a file exists.**

Activating elements

- The checkbox activates the desired elements. To activate all elements, check the checkbox in the first line.

Expert mode

The expert mode is opened by pressing the Expert button. The tree view on the left is extended by the **Coordinate System & ProjectorID** column. Additionally, another column **ProjectorID** becomes visible on the right side and the assigned coordinate systems of the polylines are displayed in the column **Coordinate system**. Further information about the assignment of the coordinate system and the projector ID can be found in the chapter [Projecting with the Projector \(Expert mode\)](#).

Coordinate system & Projector ID	Name	Activate	Coordinate system	Projector ID
1700906945_FCW	Expand all	<input checked="" type="checkbox"/>	1700906945_FCW	
1700906945				
1800013664_FCW				
1800013664				
Fertigteil_klein				
1700906945				
Small_field				
1700906945				
	arcs.pit	<input checked="" type="checkbox"/>		
	Arc1	<input checked="" type="checkbox"/>	1800013664_FCW	1800013664
	Arc2	<input checked="" type="checkbox"/>	1800013664_FCW	1800013664
	Arc3	<input checked="" type="checkbox"/>	1800013664_FCW	1800013664
	Polyline1	<input checked="" type="checkbox"/>	1800013664_FCW	1800013664
	Polyline2	<input checked="" type="checkbox"/>	1800013664_FCW	1800013664
	Polyline3	<input checked="" type="checkbox"/>	1800013664_FCW	1800013664
	quad.pit	<input checked="" type="checkbox"/>		
	Polyline1	<input checked="" type="checkbox"/>	1700906945_FCW	1700906945
	Polyline2	<input checked="" type="checkbox"/>	1800013664_FCW	1800013664
	Polyline3	<input checked="" type="checkbox"/>	Small_field	1700906945

5.5.2 Multicolor projection

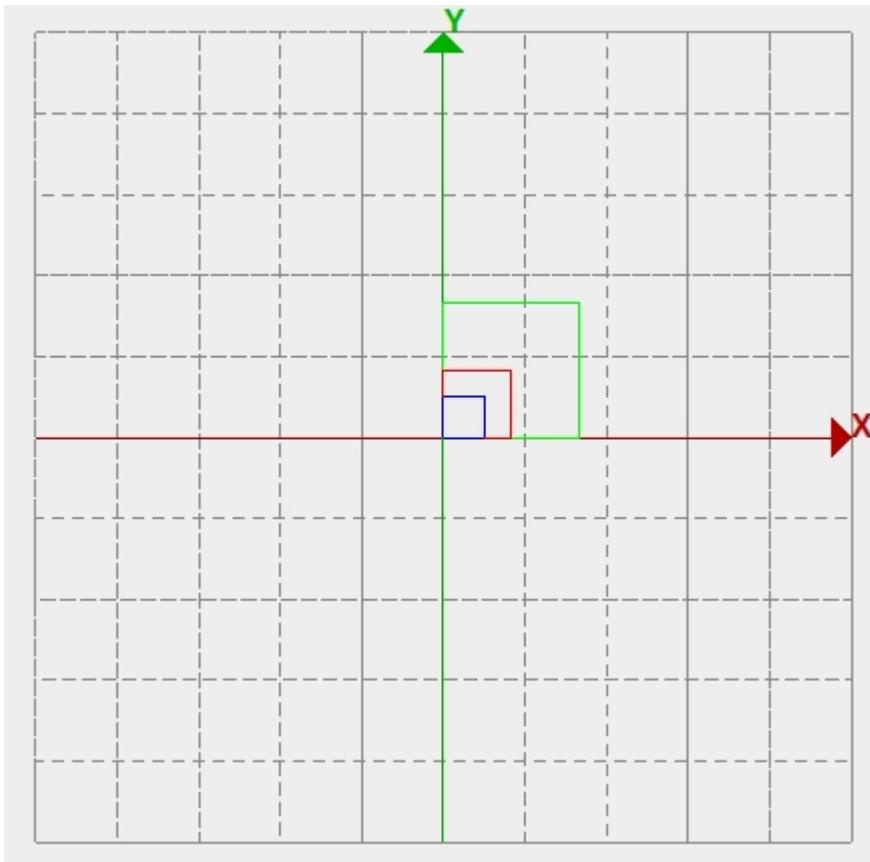
Multicolor can be enabled for all connected projectors. Multicolor means that pen colors are set and interpreted for each polyline. For the description of pen colors, see [Assign and project pen colors](#).

Single color projector

If multicolor is enabled for a projector with only one source (red or green or blue), the projector can only project polylines with only one color, SP2. SP2 in this case is equivalent to **projection on**. All other pen colors are not interpreted. Thus, in the following example only the red square would be projected for all source colors. In order to project all polylines independently of their pen color, multicolor must be deactivated for the projector.

Multicolor projector

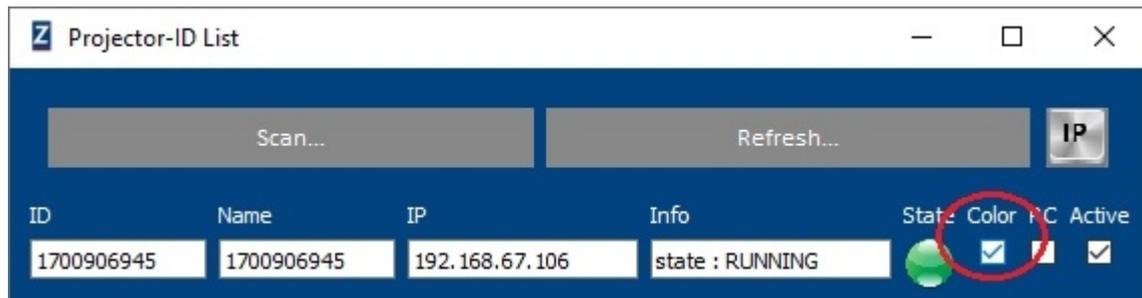
If multicolor is enabled for a multicolor projector with two sources (red and green), the pen color also affects the projection of the polylines.



For the above example with the three squares the green and the red square would be projected. The blue one is not shown. If now the pen color for the blue polyline would be changed to yellow (SP4), the third square would also be displayed in yellow (overlapping of red + green).

Activate/deactivate multicolor for a projector

To enable multicolor, open the Projector ID List dialog and check the **Color** box or press a button with the `Connect_ActivateMultiColor` connection. To deactivate, remove the cross from the checkbox or press a button with the connection `Connect_DeactivateMultiColor`.



5.5.3 Assign and project pen colors

Pen colors overview (default settings)

As long as the color values have not been changed, the following assignments apply:

Pen color	Color value
SP1	green
SP2	red
SP3	blue
SP4	yellow

Example Assign pen color

To assign a pen color to a polyline, the pen color label can be added before each polyline entry.

```

Quad.plt x
1 SP1;
2 PU;
3 PA 0,0
4 pd
5 pa 1000, 0, 1000, 1000, 0, 1000, 0 ,0
6 SP2;
7 PA 0,0
8 pd
9 pa 500, 0, 500, 500, 0, 500, 0 ,0
10 SP3;
11 PA 0,0
12 pd
13 pa 300, 0, 300, 300, 0, 300, 0 ,0

```

In the ZLP-Manager, the squares are then visualized as follows:

Set Projector

To change the projector, right-click the [ChangeProjectorConnection](#) button and select [Settings](#).

Type	Connect_ChangeProjectorConnection
Projector ID	Please enter projector ID

Under [Projector ID](#), enter the projector ID of an available projector. The projector ID can be viewed in the projector dialog.

5.6.2 Disconnect projector

The button with the connection [Connect_DisconnectProjector](#) disconnects the connection to the specified projector.

Set projector

To change the projector, right-click the button and select [Settings](#).

Under [Projector ID](#), enter the projector ID of an available projector. The ID can be viewed in the Projector dialog.

Type	Connect_DisconnectProjector
Projector ID	Please enter projector ID

5.6.3 Projector IDList dialog

The Projector dialog shows a list of all available projectors. You can search for new projectors in the network, connect them or disconnect existing ones. Current information about the individual projectors is displayed and projector settings can be changed.

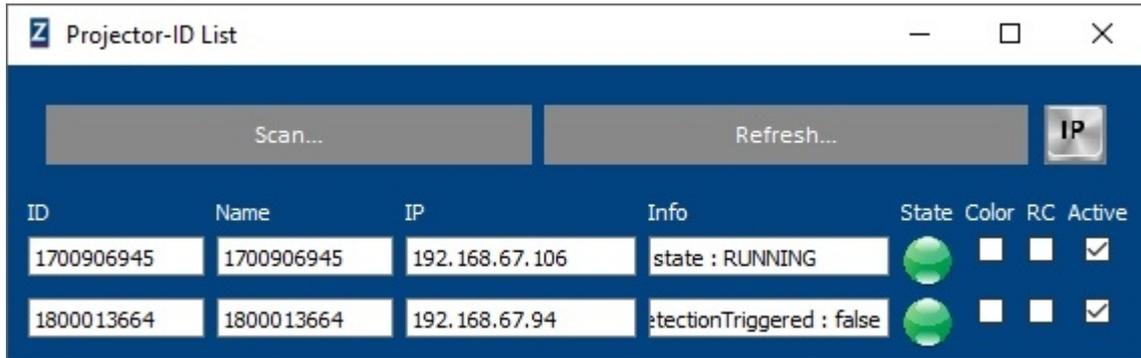
ID	Name	IP	Info	State	Color	RC	Active
1700906945	1700906945	192.168.67.106	state : RUNNING		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1800013664	-	192.168.67.94	state : INIT		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Functional description

The projector IDList dialog can be opened by pressing the projector button  at the bottom right of the status bar.

Alternatively, a button connection [Connect_Dock_Projector_IDList](#) or the Docking window [Dock_Projector_IDList](#) can be created permanently. You can find out how to create the docking window in the chapter [Creating DockWidgets](#).

The [Projector IDList dialog](#) provides an overview of all currently and previously connected projectors.



The following information is displayed:

Parameter	Function
ID	Serial number of the projector
Name	Own name that can be changed by the user. The projector ID is preset by default.
IP	IP address where the projector can be reached
Info	Projector information about temperature, connection etc. If the mouse pointer is moved over the field, a ToolTip appears with all last available information, as well as a time stamp to current events.
State	Connection status of the projector
Color	Use of pens as color grouping or activation of multicolor
RC	The checkbox allows you to activate the operation of the projector via a remote control.
Active	Connect the projector to the ZLP-Manager. If the checkbox is activated, the projector will be reconnected when the ZLP-Manager is restarted. If the checkbox is deactivated, the projector will not be reconnected automatically when the ZLP-Manager is restarted and will no longer be listed.

Scan

New projectors that have been added to the network can be scanned using the [Scan...](#) button. can be searched for. All found and available projectors will be automatically connected to the ZLP-Manager.

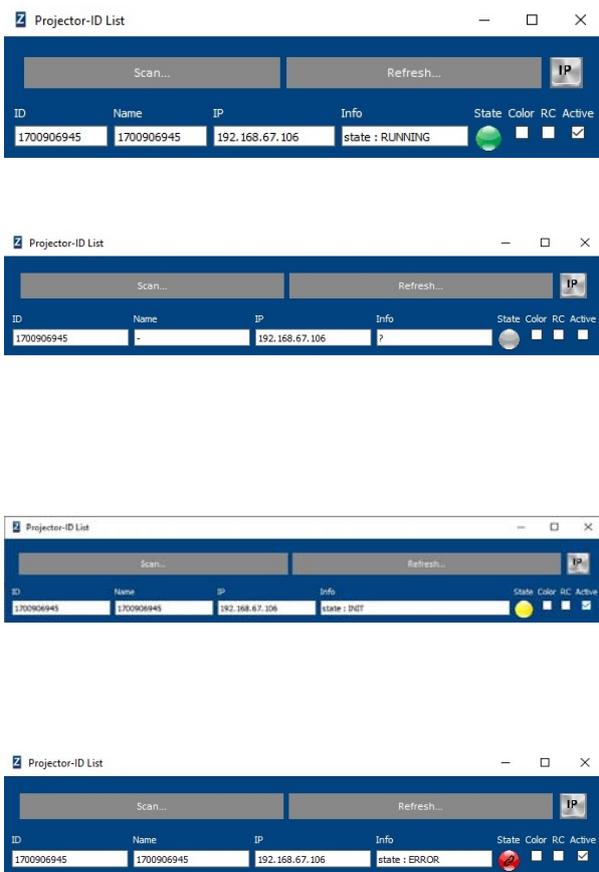
Refresh

If the dialog view is to be updated because, for example, the connection to a projector could not be established, this can be done via the [Refresh...](#) button.

Projector Connection status

Possible projector connection states during activation:

Symbol



Meaning

Projector is connected

Projector is disconnected/switched off

Automatic connection setup is started. This is triggered by activating the **Active** checkbox. Attempts to connect the projector. As soon as this is possible, the connection status is set to **Projector is connected**. An attempt is made to connect the projector until it has been released by the other instance. It will then be connected automatically. To prevent this from happening, the **Active** checkbox must be deactivated.

Projector is connected to another instance.

Global connection status in the status bar

The projector status for all listed projectors in the projector dialog is permanently visible in the status bar at the bottom right. However, the exact information is displayed in the Projector dialog.

Color



Meaning

All activated projectors in the list are connected.

At least one active projector from the list is not connected/accessible.

There was no search for a projector yet

5.7 Clipping planes

Projectors that are integrated together in a system often overlap in their projection area. To prevent the data from being projected simultaneously or incorrectly by both projectors, a separation plane can be created that determines how large the overlap area is and which areas should be projected by which projector. A clipping plane is used to virtually limit the projection area of one or more projectors. It should be noted here that, from the projector's point of view, the clipping plane can display the data either on the facing side, i.e. on the side of the projector, or on the opposite, not facing side. The user can thus specify that a certain projector should not project behind the parting plane. If he uses a second projector, its projection can be

restricted to the other side of the clipping plane. In this way, the user can clearly separate the projection areas of two laser projectors. Overlapping areas and the associated double projection are avoided. This allows the following objectives to be achieved:

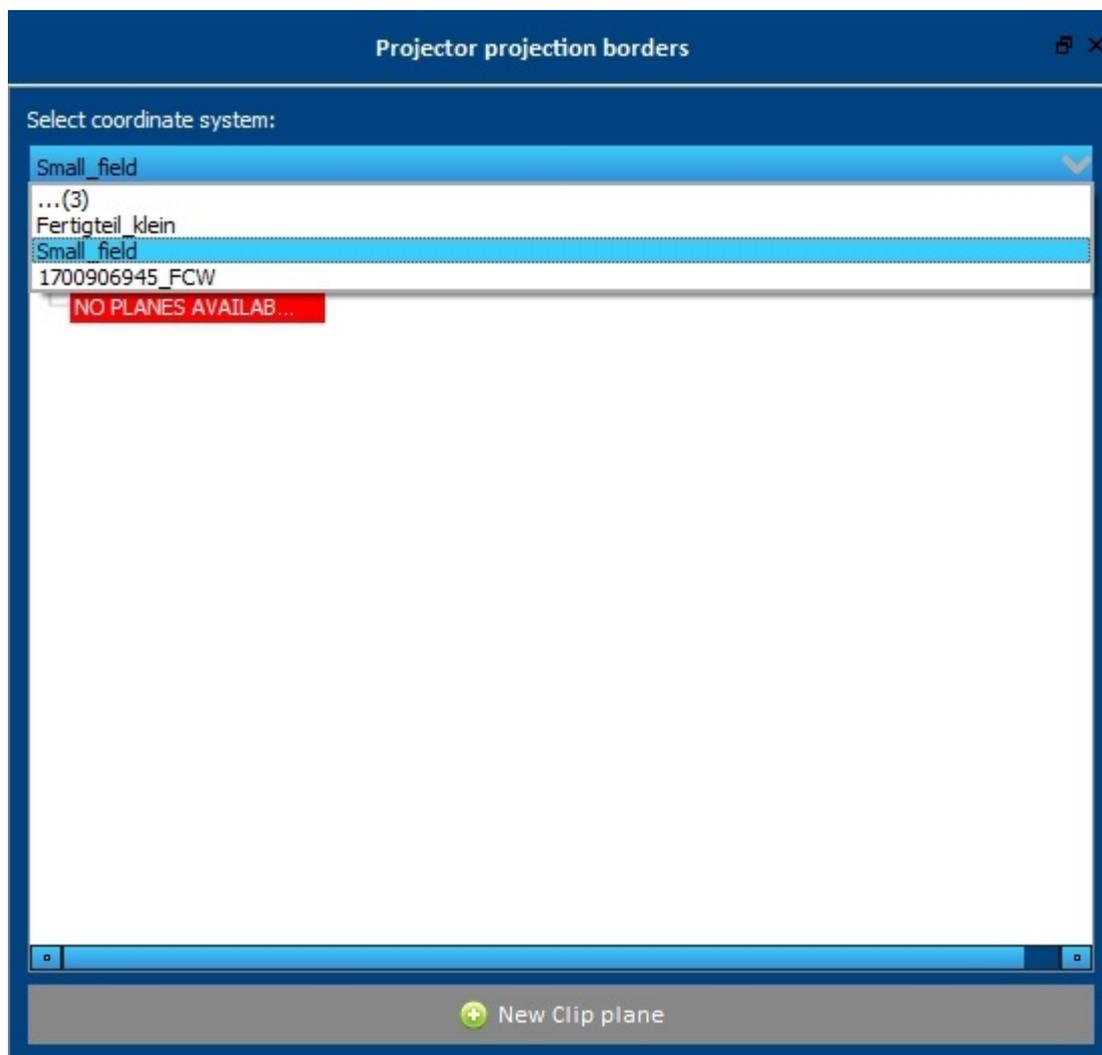
1. reduce flickering -> if many polylines are to be projected at the same time
2. illuminate strongly curved shapes evenly -> depending on the angle, several projectors must be used to be able to display all contours of the setup object

5.7.1 Create clipping planes

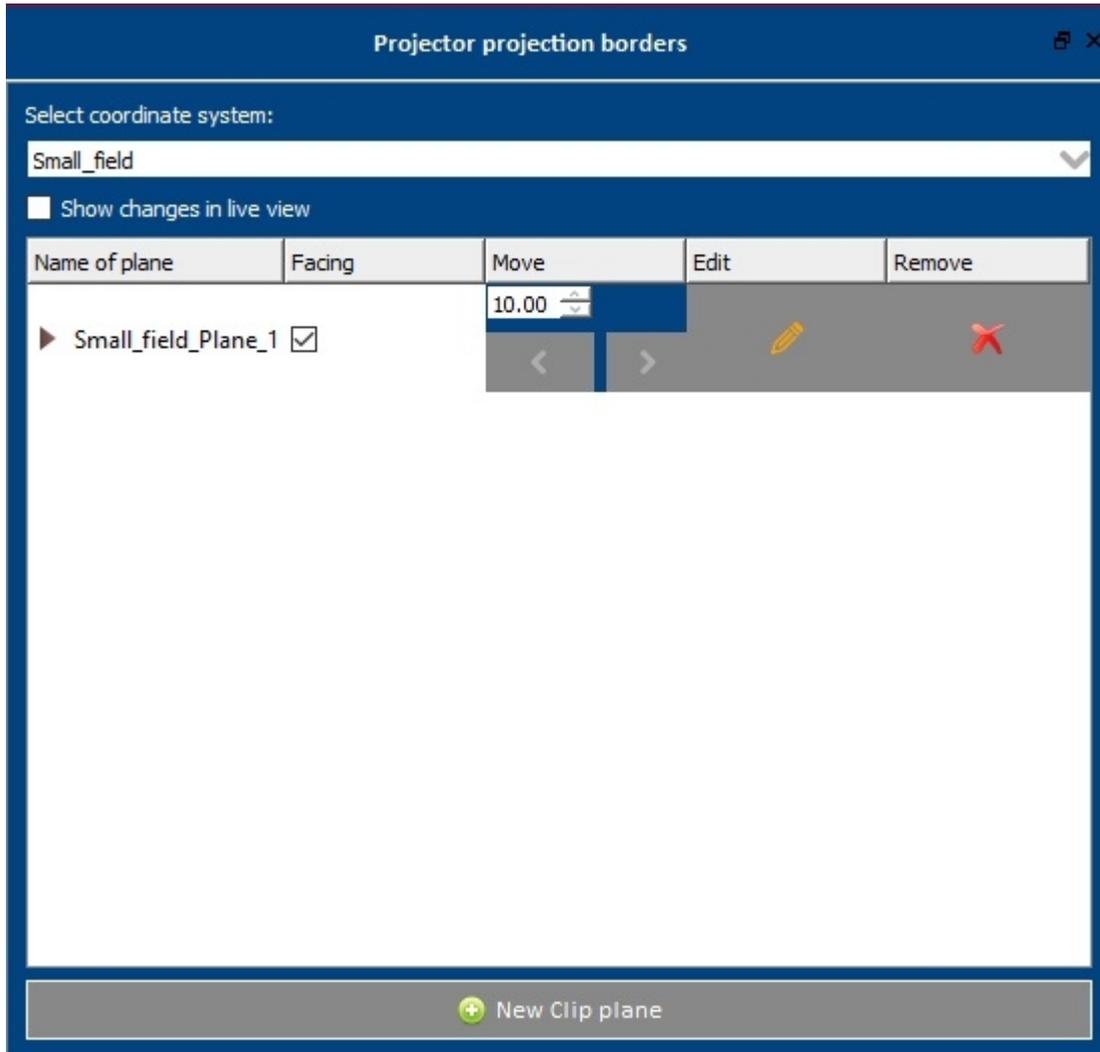
Several clipping planes or projection borders can be created for each coordinate system. The clipping plane does not have to be used for each projector.

To create a clipping plane, the **Dock_Projector_ProjectionBorder** docking window must first be created and then opened. More information can be found in the chapter [Creating DockWidgets](#).

1. Select a coordinate system from the list for which you want to create a projection border.



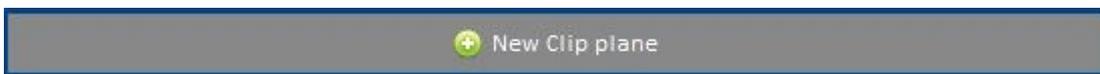
2. All clipping planes of this coordinate system created so far are displayed.



If no projection border has been created yet, the entry **NO PLANES AVAILABLE!** is displayed.

Name of plane	Facing	Move	Edit	Remove
NO PLANES AVAILABLE!				

3. To create a new clipping plane press the button **New Clip plane**.



4. The projection border dialog opens.

The clipping plane name is automatically generated in the form {Name of the coord}{Plane}{Number}. If an existing name is entered, the editor field is highlighted in red.

To create a new clipping plane you can either click Create directly or set the clipping plane settings in this dialog. Detailed information on the possible settings can be found in the chapter [Clipping planes settings](#).

Small_field : Create new plane

Small_field_Plane_1

	X	Y	Z
Position	0.00	0.00	0.00
Orientation	Parallel to y-Axis		
Normal vector [mm]	1.0	0.0	0.0

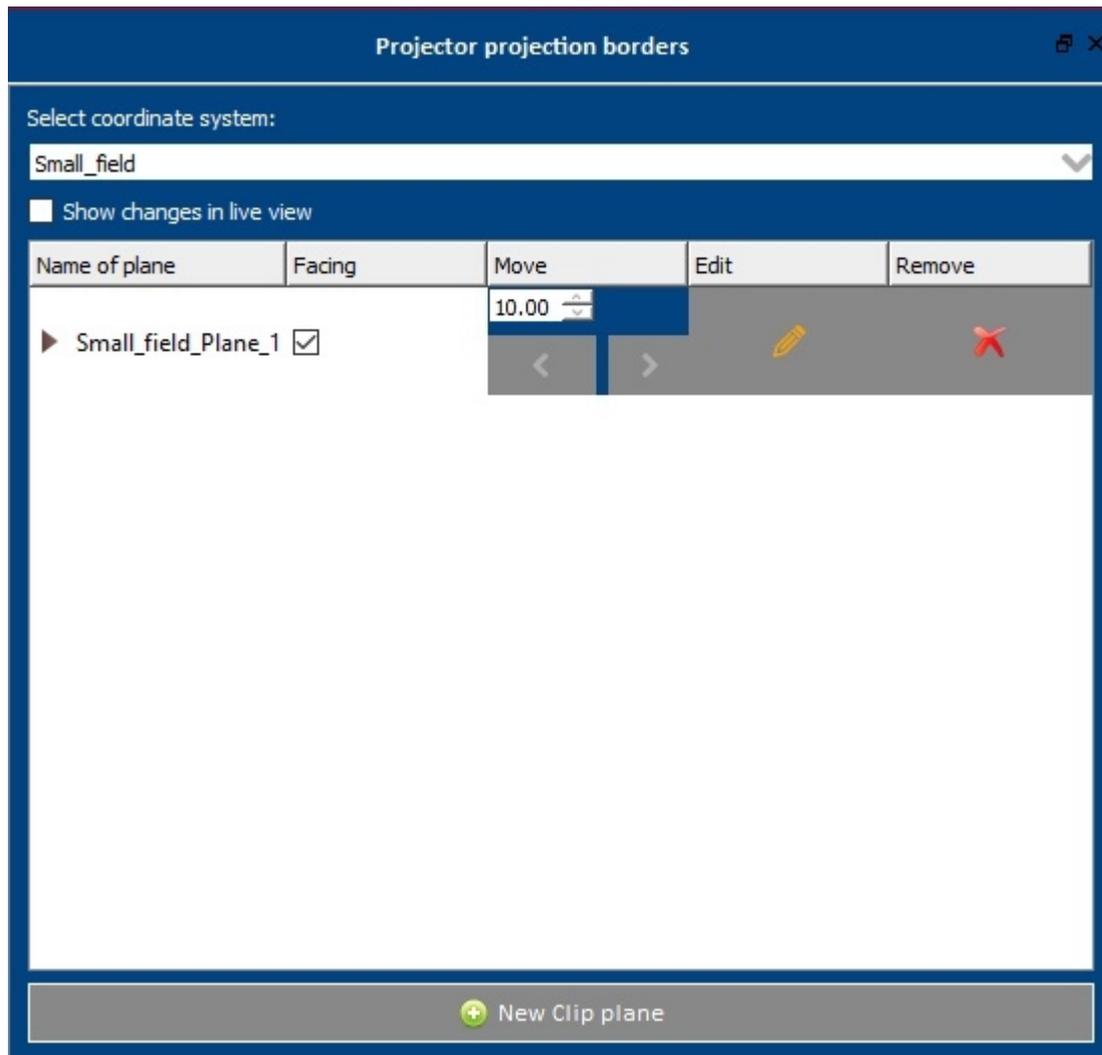
Projector selection

Facing

Projector ID	Facing
<input checked="" type="checkbox"/> 1700906945	<input checked="" type="checkbox"/>

Create Cancel

5. The new parting plane is added to the table. Settings are made either directly in the table, via the available functions in the column, or via the editing dialog. This dialog is opened by pressing the pencil icon in the [Edit](#) column. Further information on the editing options can be found in the chapter [Edit clipping planes](#).

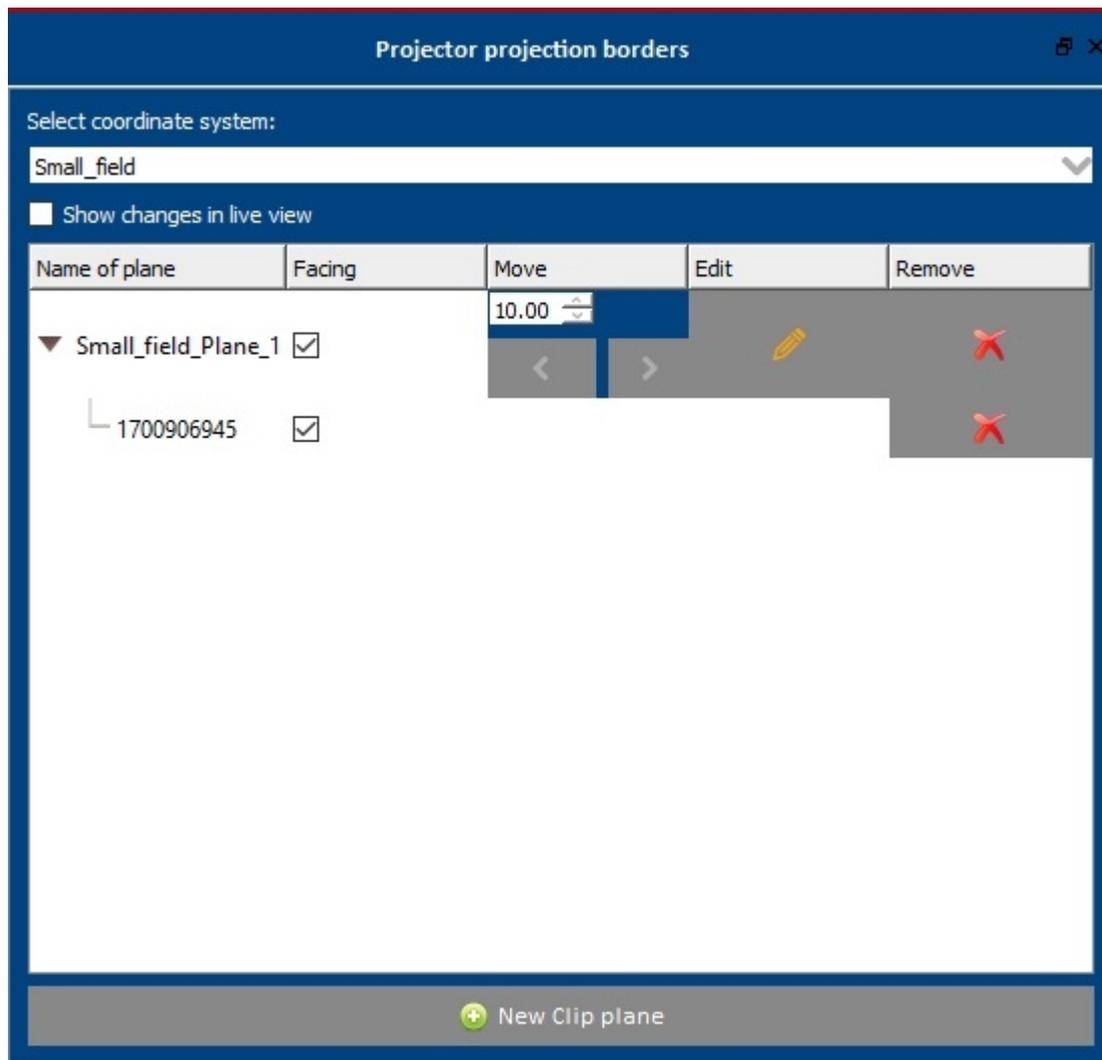


The parting lines are displayed as entries in a list and visualized in the drawing area. The active parting line is displayed as a blue line in the drawing area.

5.7.2 Edit clipping planes

In the Edit dialog window the following changes can be applied:

1. Choose coordinate system
2. Show changes in Live view
3. The name of the clipping plane and the assigned projectors
4. The influence of the clipping planes on the projectors (facing or facing away)
5. The position or shift of the clipping plane
6. Open the editing dialog
7. Deleting the clipping plane



Parameter

Select coordinate system

Show changes in live view

Description

Select one of the available coordinate systems in which a clipping plane should be generated. All clipping planes created so far are displayed in the table.

If the checkbox is activated, the projection is restarted for all active polylines with each change. This allows you to view the changes directly on the setup object. To activate additional polylines assigned to the active coordinate system, switch to [Dock_TreeView](#) and manually activate the desired polylines.

Columns

Name of plane

Designation of the projection borders. The name can be changed by double-clicking with the left mouse button. Confirm by pressing the Enter key. If the name already exists, the previous name is set again. The projectors assigned to the clipping plane

are displayed by pressing the **arrow down** button.

Facing

Sets the clipping planes for all projectors of the coordinate system to the facing side. If several projectors are used, a single assignment is possible. Further information can be found in the chapter [Possible partitioning of clipping planes](#).

Move

Moves the polylines in the direction of the normal vector. Press the arrow keys to move the clipping plane. The step size in millimeters can be set in the combo box above. If the checkbox **Show changes in live view** is activated, the projection is moved live immediately. Otherwise, you can follow the movement in the drawing area.

Edit

Opens the editing dialog in which all settings can be changed. Further information can be found in the chapter [Clipping planes settings](#).

Remove

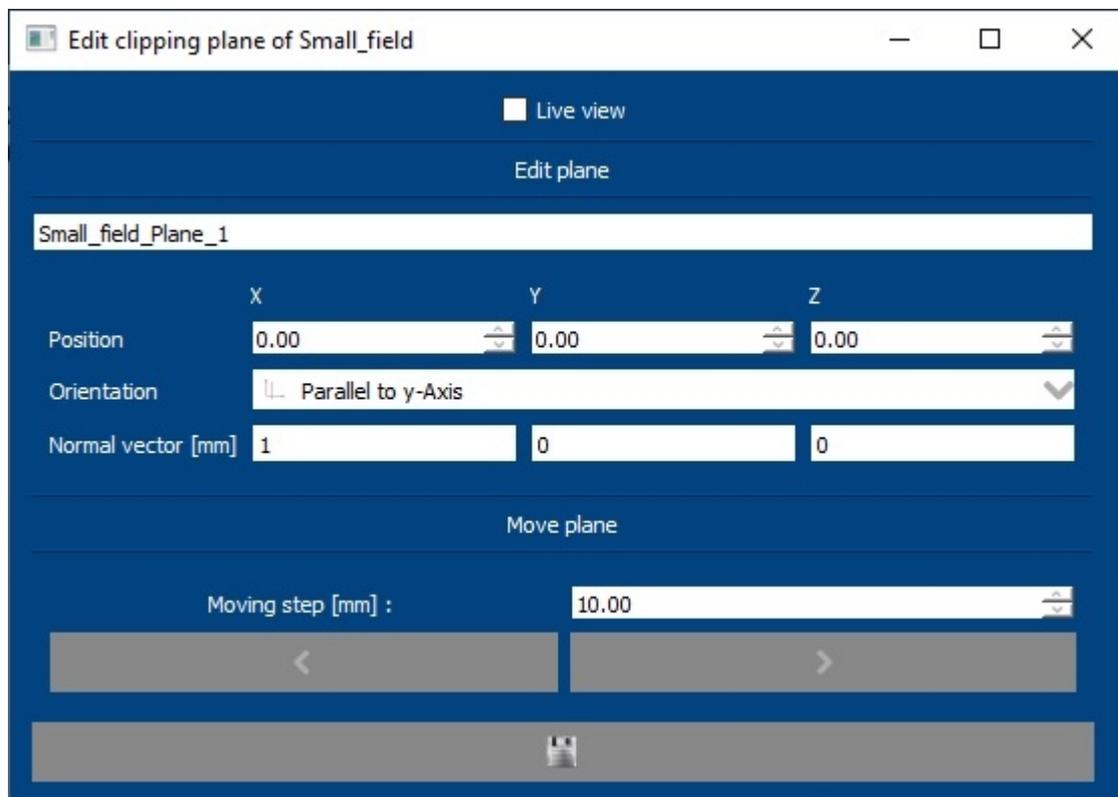
Removes the clipping planes. Further information can be found in the chapter [Remove clipping planes](#).

New clip plane

Opens a dialog to create a new parting plane.

5.7.3 Clipping planes settings

Position, Orientation and Normal vector



Parameter

Description

Checkbox Live view	Lets you track changes live on the projection
Name	Name of the clipping plane
Position X, Y, Z	Position of the clipping plane within the coordinate system in millimeters
Orientation	Places the plane directly on the X or Y axis. If the clipping plane is moved, it moves parallel to these axes.
Normal vector [mm]	The normal vector is the vector that is perpendicular to the plane. See the table below for setting options.
Moving step [mm], < and > buttons	Enables the movement of the clipping plane by the specified step size.
Floppy disk symbol	Saves the settings

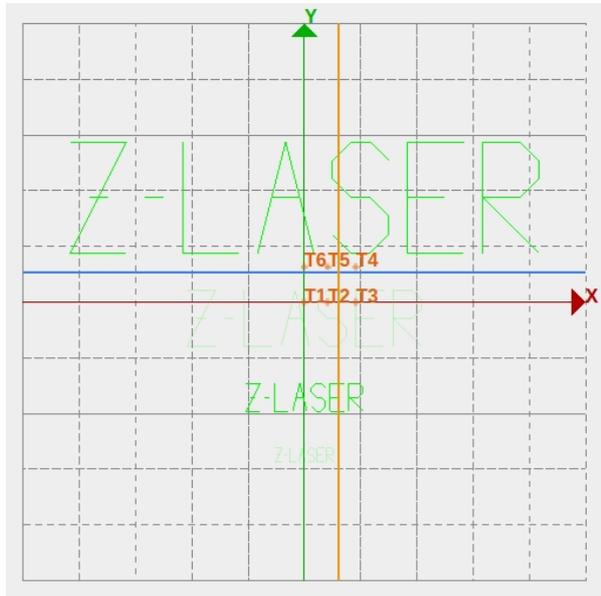
Setting variants for the normal vector

Adaptation of the x, y, z coordinates of the normal vector and the view in the drawing area

Variant	Plane	Value [x, y, z]	Good view within the drawing area	Rotation [0.01 mm Steps]	Optical rescaling [Factor>0]
[1]	x, y plane	[0,0,1]	yz-View	Rotation around X axis y = y[+-] 0.01	z*Factor
			xz-View	Rotation around Y-axis x = x[+-] 0.01	
[2]	y, z plane	[0,1,0]	yz-View	Rotation around X axis z = z[+-] 0.01	y*Factor
			xy-View	Rotation around Z axis x = x[+-] 0.01	
[3]	y, z plane	[1,0,0]	xz-View	Rotation around Y axis z = z[+-] 0.01	x*Factor
			xy-View	Rotation around Z axis y = y[+-] 0.01	

Display in drawing area

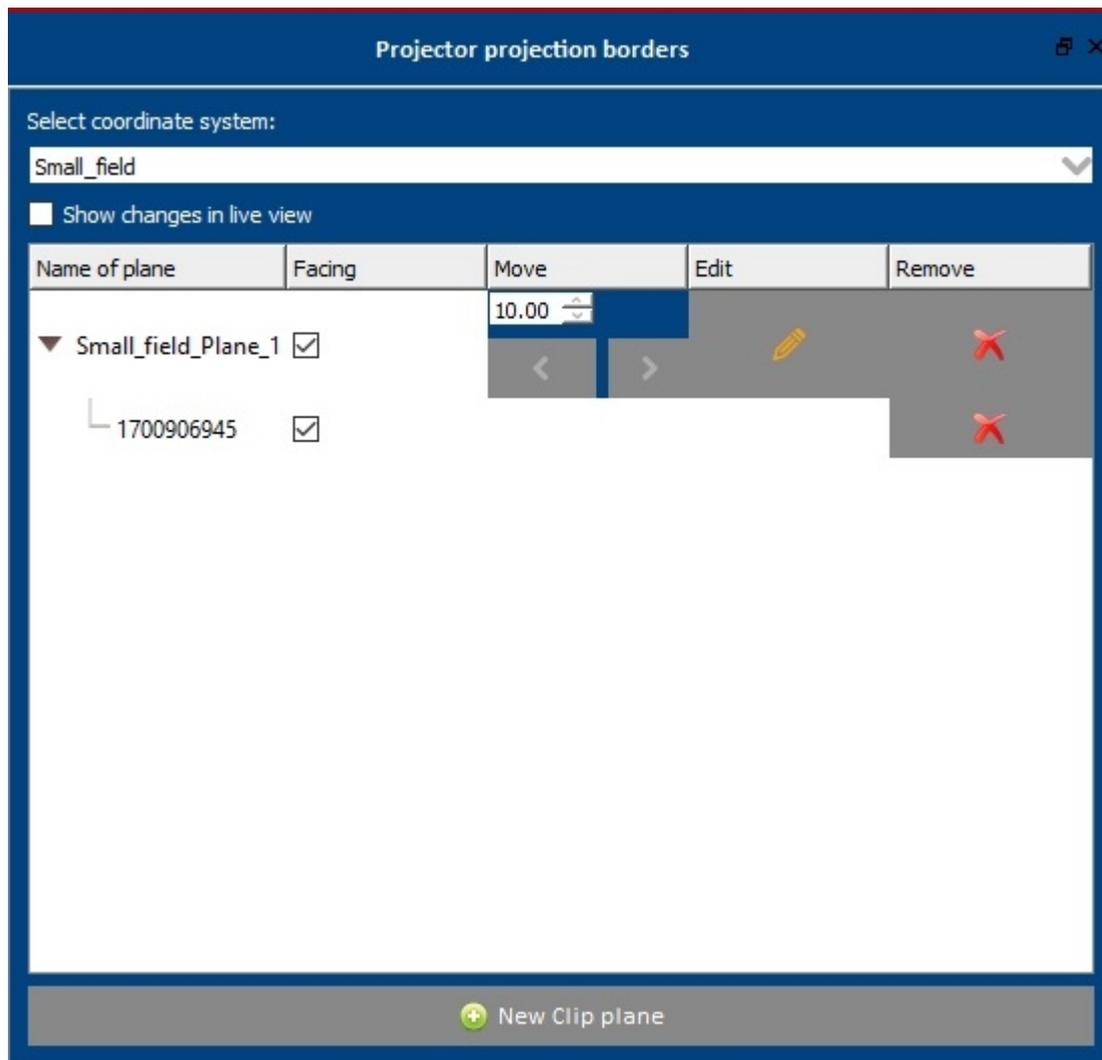
As soon as changes are made to a clipping plane, it is highlighted in blue. All others are orange.



5.7.4 Remove clipping planes

To remove a projection border assignment for one or more projectors, the projector must be deleted from the list. Once all assignments have been removed, the projector will project back to its maximum projection area.

To remove, click the red X in the **Remove** column. If you only want to delete the respective clipping plane for one or more individual projectors, click on the red X behind the corresponding projector(s). To globally delete the parting plane, click on the red X behind the parting plane name.



The clipping plane is removed from the list and also from the visualization. If the checkbox **Show changes in live view** is activated, the change is also visible directly in the projection.

5.7.5 Possible partitioning of clipping planes

Settings

The setting is made via the clipping planes dialog.



Projectors can be removed, moved or the projection areas (activated (x) = facing, deactivated () = facing away) can be set.

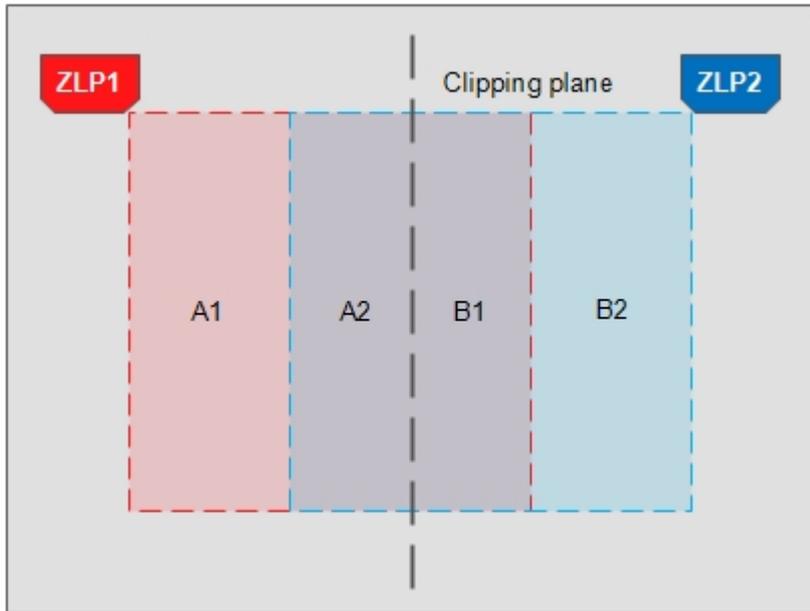
The changes can be displayed live for all activated projection data. The checkbox **Show changes in live view** must be activated for this.

In the following some examples for the possible division of 2, 3 and 4 projector systems are shown.

Projector systems

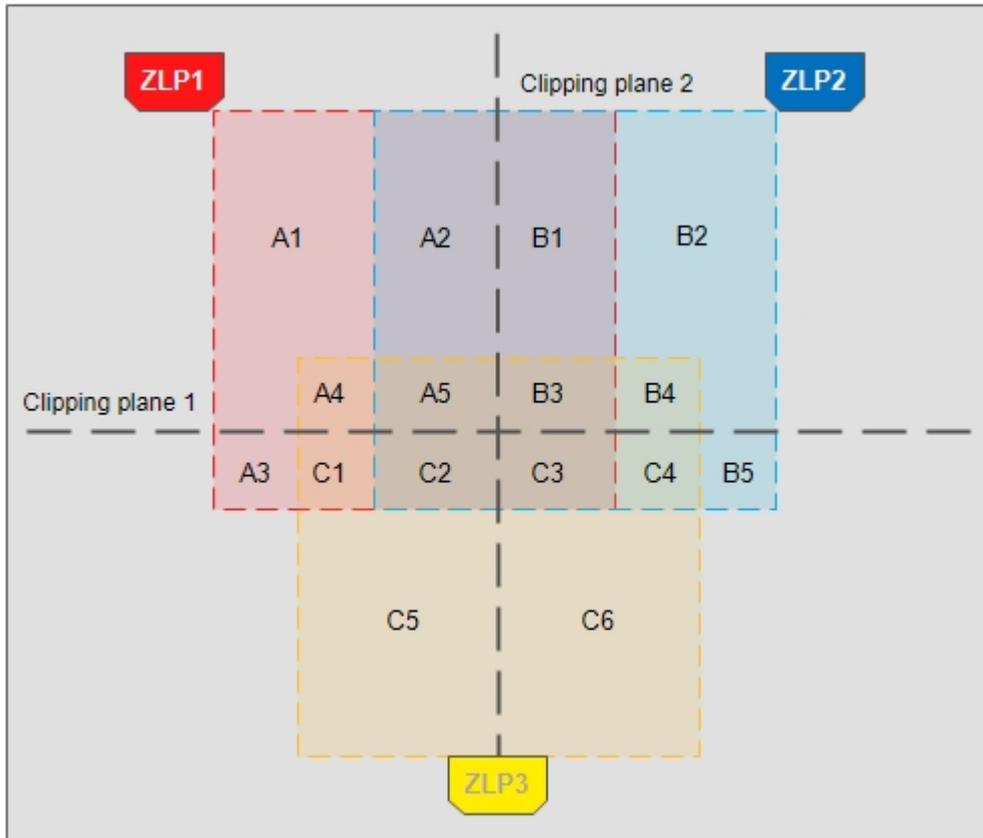
In the following, the projection areas of several projector systems with 1-2 clipping planes are shown. The projection borders are activated/deactivated for the projectors and shown what happens, if the tension state is changed. Basically, the clipping plane of a coordinate system does not have to be used for every projector. The projector ID can be removed from the clipping plane at any time.

2 Projectors



Projector	Facing	Clipping plane	Projection area
ZLP1	(x)	yes	A1 + A2
	()	yes	B1
	-	no	A1 + A2 + B1
ZLP2	(x)	yes	B1 + B2
	()	yes	A2
	-	no	A2 + B1 + B2

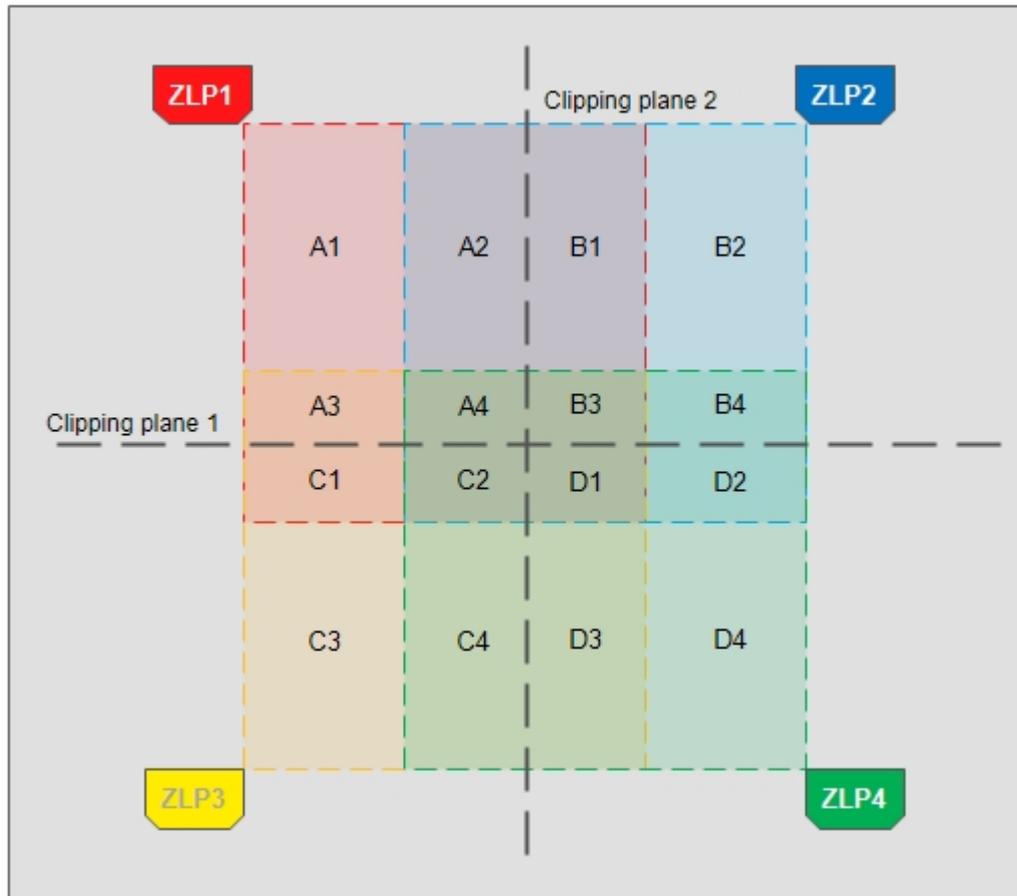
3 Projectors



Exemplary for ZLP3. This is a special case. Clipping plane 2 is located directly in the perpendicular point of the third projector. It is not exactly clear what is meant by facing and averted (see table index [1], [3], [4] and [6]). Therefore the live mode should be activated for testing and the option facing should be activated/deactivated. It is best, however, if in this case the separation plane 2 is shifted slightly (i.e. via the settings via the arrow keys in the direction of the normal vector), so that the assignment becomes clearer again. Otherwise, of course, you can also deactivate separation plane 2 if it is not needed.

Index	Projector	Facing	Clipping plane 1	Clipping plane 2	Projection area
1	ZLP3	(x)	yes	yes	C1 + C2 + C5 or C3 + C4 + C6
2		(x)	yes	no	C1 - C6 A4 + A5 + C1 + C2 + C5
3		(x)	no	yes	or B3 + B4 + C3 + C4 + C6
4		()	yes	yes	A4 + A5 or B3 + B4
5		()	yes	no	A3 + A4 + B3 + B4
6		()	no	yes	A3 + A4 + C1 + C2 + C5 or B3 + B4 + C3 + C4 + C6
7		-	no	no	A3 + A4 + B3 + B4 + C1 - C6

4 Projectors



The following distribution is equally applicable to all projectors. Therefore it is only listed as an example for the ZLP4.

Projector	Facing	Clipping plane 1	Clipping plane 2	Projection area
ZLP4	(x)	yes	yes	D1 until D4
	(x)	yes	no	C2 + C4 + D1 until D4
	(x)	no	yes	B3 + B3 + D1 until D4
	()	yes	yes	A4
	()	yes	no	A4 + B3 + B4
	()	no	yes	A4 + C2 + C4
	-	no	no	A4 + B3 + B4 + C2 + C4 + D1 until D4

5.8 Data backup

In the ZLP-Manager there are different possibilities to backup system relevant files. You can perform a complete system backup in which all system files can be backed up. You can also back up individual configuration files of the ZLP-Manager and the ZLP-Service.

5.8.1 System backup

The backup dialog allows you to back up and restore relevant files of the ZLP-Suite system. The dialog is accessible via the menu bar as well as via a button connection.

System relevant files such as configuration files, license files, workflows or user administration can be saved. Additionally there is the possibility to export individual files, such as own projection data,

descriptions or scripts.

The files are divided into three categories: - ZLP-Service (configuration files, license files) - ZLP-Manager (configuration files, user administration, workflows) - Customer (individual files)

This sorting is used in the respective dialogs and also mapped in the backup file.

Loading a backup file is always possible, even if no license file has been loaded yet. Thus the old state can be restored at any time during a new installation.

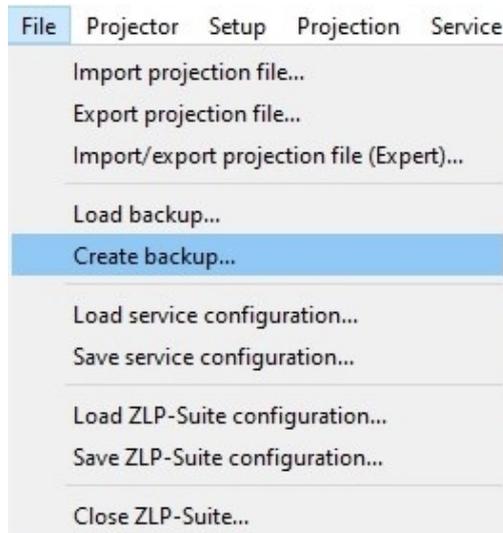
During system backup, a zip file with the extension (*.zpro) is generated in which all system-relevant files are saved. This includes ZLP-Manager and ZLP-Service configurations, workflows and user administration. In addition, users can add their own files.

Create backup button

Create a button and set the connection `Connect_OpenBackupDialog`. A ComboBox appears, in which the connection parameters and the respective mode of the dialog (**Export**, **Import**) are to be set. By default, **Import** is activated. The respective mode opens the dialog in the corresponding display.

Create Backup (Export)

1. Open the menu entry **File** → **Create backup...**



2. A dialog opens. All available system-relevant files are sorted into three tabs that correspond to the categories described above. Two backup options are currently available: **Full backup** and **Backup workflow**. **Full backup** is active by default.

2020-07-11_Full backup

Enter backup file info (optional)

Full backup

ZLP-Service

	Type	File
<input checked="" type="checkbox"/>	config	zlp-service_config_9090.info
<input checked="" type="checkbox"/>	license	C3D1D752F54038F94566791DD7C892EB462283E9.lic

Customer

ZLP-Manager

Export Cancel

Review the selected files and disable non-relevant files if necessary.

3. To add your own files, switch to the **Customer** tab. There you can load your own files via the button **Add own data** and add them to the backup file.

2020-07-11_Full backup

Enter backup file info (optional)

Full backup

ZLP-Service

Customer

	Type	File
+ Add own data		
<input checked="" type="checkbox"/>	file	C:/Z-LASER/ZLP-Suite 20.3/documentation/sdk/python/src/activate_projector.py
<input checked="" type="checkbox"/>	file	C:/Z-LASER/ZLP-Suite 20.3/resources/zlp_manager_script_samples/toggle_projection_ele...

ZLP-Service

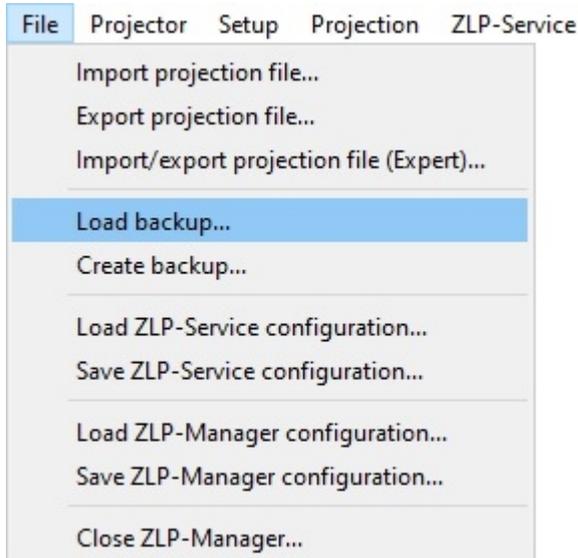
ZLP-Manager

Export Cancel

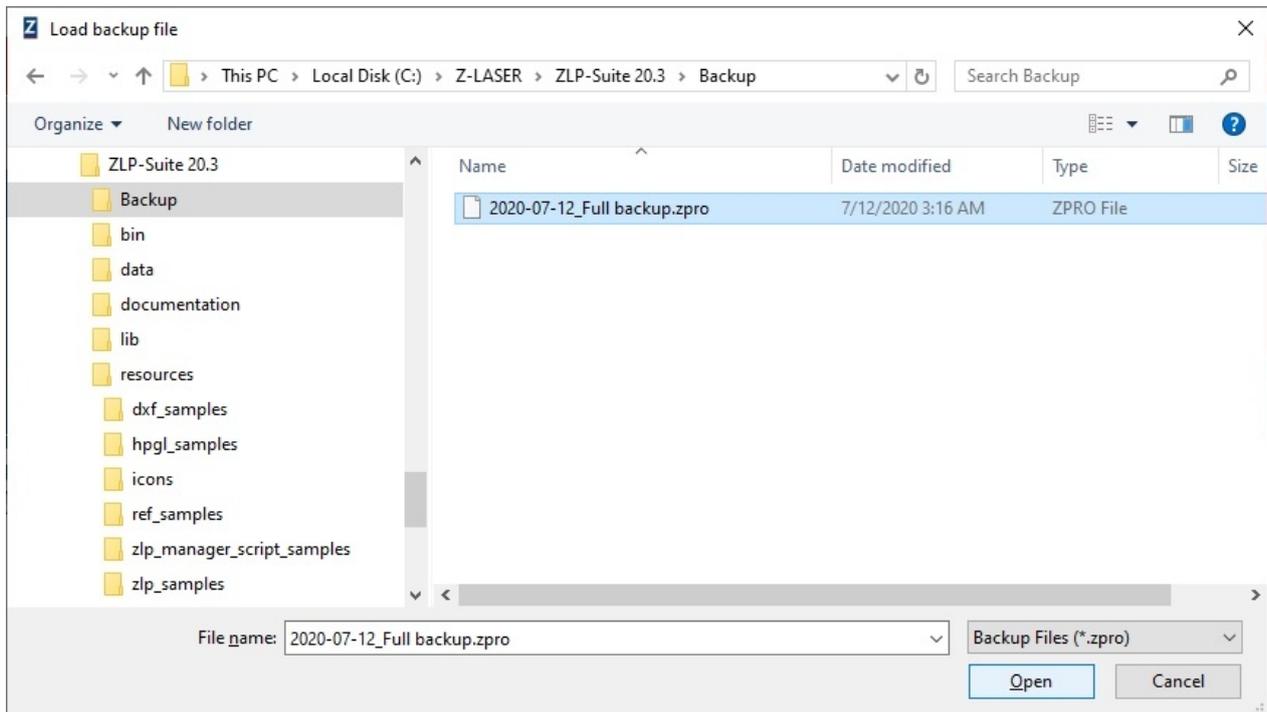
It is possible to delete your own files at any time by selecting them and pressing the **Del** key.

Load Backup (Import)

1. Open the menu entry **File** → **Load backup...**

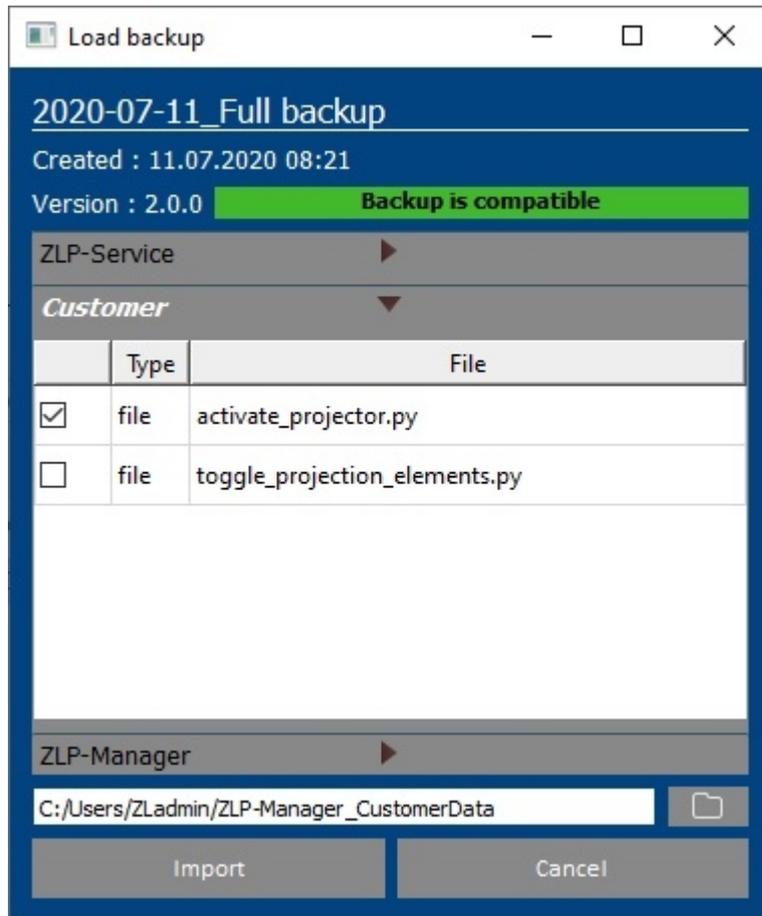


2. A file browser opens. Navigate to a backup file (*.zpro) and open it.



3. The file is read and all available files are displayed. All files are automatically activated for import. Deactivate the checkbox if you do not want to import a file. Moreover you will see a Info message whether the Backup file is compatible to your ZLP-Suite Version used.

4. If user data is available, you can specify a path where these files should be copied to.



By default, the files are copied to the user directory in the `ZLP-Manager_CustomerData` folder.

Description of system files

Each ZLP-Manager instance has multiple system files. These files are saved automatically on a regular basis, but can also be saved and loaded separately via the menu bar under [File](#).

ZLP-Manager configuration file

Filename extension: (*.xml)

Location: `data` folder in the installation directory

The file contains all elements that are used for the representation. It specifies which GUIWidgets and DockWidgets should be loaded at startup, which start language is selected or also which coordinate system was the last active one. In this file, the last state of the view is automatically displayed when exiting the ZLP-Manager.

ZLP-Service configuration file

Filename extension: (*.info)

Location: `data` folder in the installation directory

This is regularly saved every 10 minutes and is located in the `data` folder of the installation directory. It contains the following parameters:

- Recently connected projectors
- All projector settings
- Last facilities
- Last loaded projection data
- Last used license

License

Filename extension: (*.lic)

Location: `data folder` in the installation directory

Multiple projector or system licenses can be stored in the `data folder`.
The system always automatically selects the file that was last loaded by the user. This information is stored in the ZLP-Service configuration file.

User manager

Filename extension: (*.dat)

Location: `data folder` in the installation directory

The file contains all users and the respective rights that were set via the user administration.
The file only has an influence if the user administration has been activated and the ZLP-Manager is restarted.
The backup always takes place when the user administration is closed.

Workflows

Folder name: Name of the workflow.

Location: `data/workflows folder` in installation directory

A separate folder is created for each workflow.
The name of the folder name corresponds to the name of the workflow.
Within this folder there is a `workflow.xml` file, which contains the complete structure of the workflow.
Steps with the corresponding projection files, description texts and images are stored. These files are also copied directly into the folder of the workflow.

5.8.2 Load and save ZLP-Manager configuration file

The ZLP-Manager and ZLP-Service configuration files are automatically generated and regularly backed up.
The following describes how these files can also be saved individually without performing the system backup.

Save ZLP-Manager Configuration

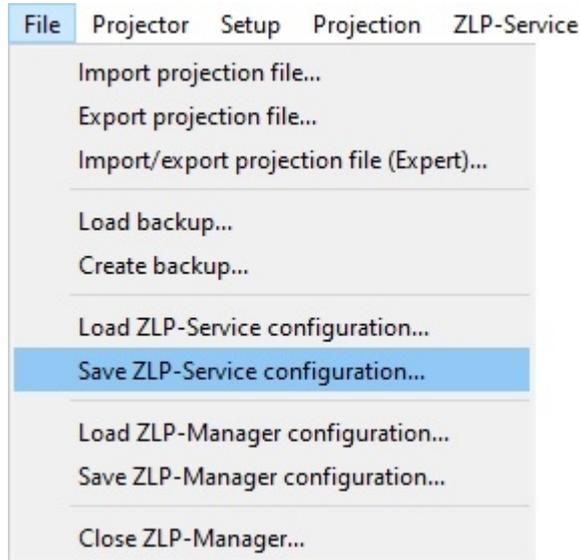
Changes to the ZLP-Manager display can only be made if the [Edit ZLP-Manager](#) permission has been activated for the logged in user. To assign the rights see chapter [User manager](#).
To save the file, select the entry **File → Save ZLP-Manager configuration...** from the menu bar. Do not overwrite the default configuration file in the `data folder`. This is overwritten regularly when the ZLP-Manager is closed and the intermediate status would therefore be lost.

Load ZLP-Manager Configuration

The file can now be loaded again via the menu bar under **File → Load ZLP-Manager configuration...**
The last loaded version is automatically saved in the standard file when exiting the ZLP-Manager.

5.8.3 Load and save ZLP-Service configuration file

To save the current ZLP-Service configuration, open the entry **ZLP-Service** → **Save ZLP-Service configuration...** in the menu bar.



Alternatively, you can also create a button with the connection `Connect_Service_SaveConfig`.

The file browser opens. Specify the name and directory for the file. All parameters that are required when restarting the ZLP-Manager are saved in this `INFO` file. This file is used as a backup file in order to be able to restore the last configurations with an unchanged hardware system structure.

Basically, the backup file `service_config_9090.info` is created or overwritten every 10 minutes and after each shutdown. The file is saved in the installation path in the `data` folder and automatically loaded when the ZLP-Manager is started. However, the manually created configuration file does NOT replace the automatically created `service_config_9090.info` file.

This means that it can be loaded manually either via the GUIWidget-connection

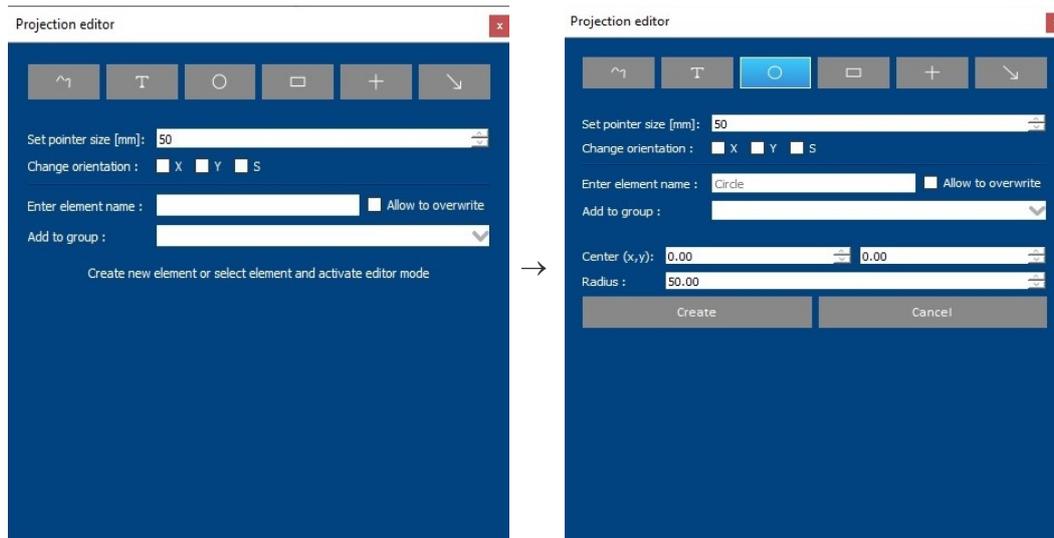
`Connect_Service_LoadConfig` or via the menu entry **ZLP-Service** → **Load ZLP-Service Configuration....**

5.9 Projection editor

With the projection editor, predefined projection elements can be created. These projection elements can be saved afterwards.

Open the Projection Editor by first creating the `Dock_ProjectionEditor` docking window. How to create a `DockWidget`, see the chapter [Creating DockWidgets](#).

The dialog is divided into two parts. - The upper part contains 6 basic elements (see table [Types of projection elements](#)) that can be created. In addition, the group assignment, the size of the mouse pointer and the orientation can be changed. - The lower part contains the properties of the elements, such as coordinates, text, height, width, angle, etc. These properties can be edited when a base element is to be created.



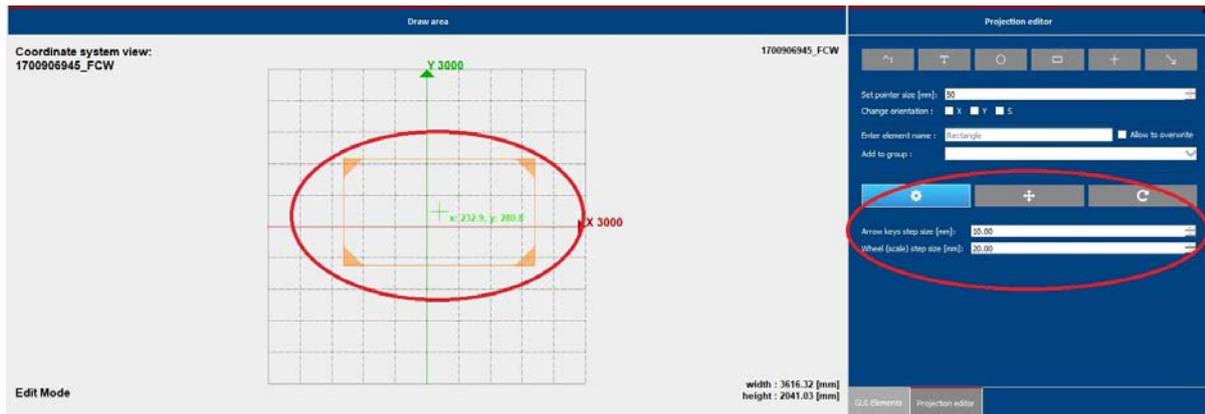
Types of projection elements

Element	Description
Polygon	Create your own contours by setting individual points with the mouse, which are always connected to their predecessor by a line.
Text	Creates a text element with a predefined font. The starting point is the upper left corner of the title block. The coordinates, the text, the height and the rotation angle are optional.
Circle	Creates a circle with any center coordinates and any radius.
Rectangle	Creates a rectangle with arbitrary start and end point coordinates.
Cross	Creates a cross with any center coordinates and any width.
Arrow	Creates an arrow with arbitrary start and end point coordinates. The start point is the end of the arrow, the end point is the arrowhead.

Creating a projection element

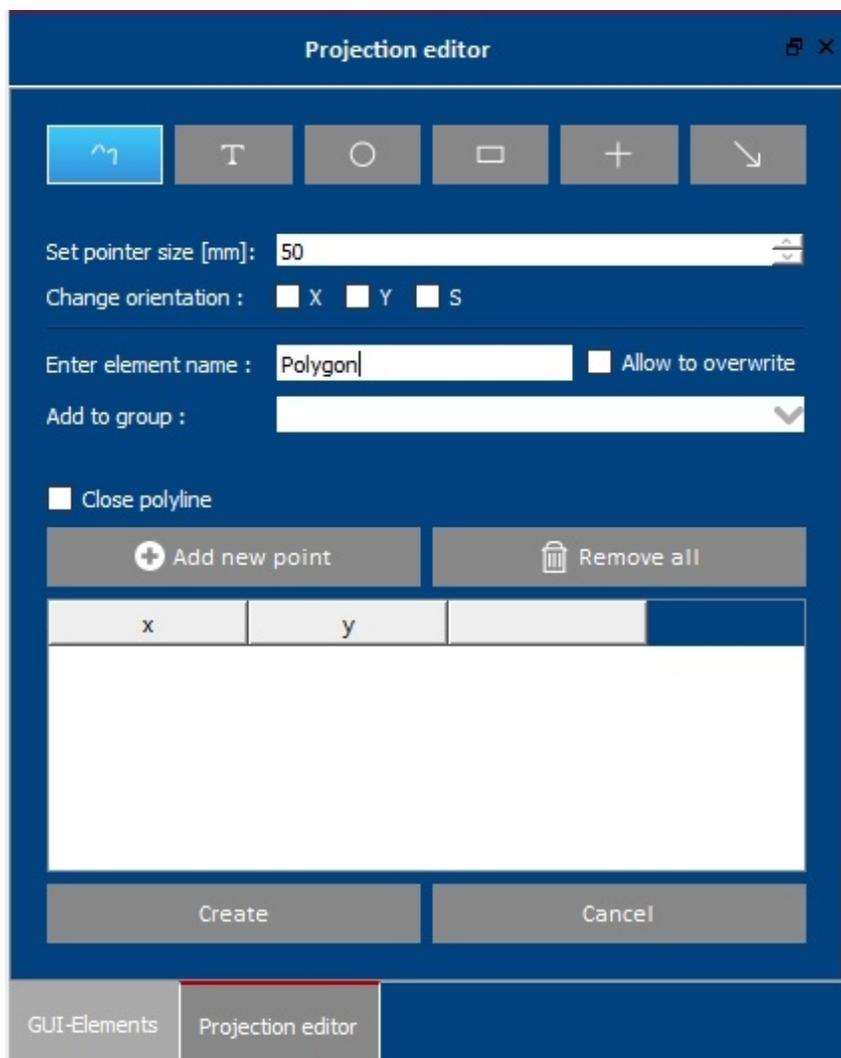
Each element is created in a different way. Once an element has been created, it is automatically set to edit mode. This is indicated by :

- a) an orange frame around the object in the drawing area
- b) an extended menu opening in the projection editor



In the editing mode itself, you can change the scaling, position (displacement), step size of the displacement, and rotation of the element.

1. Select one of the 6 basic elements (e.g. polygon) and enter an element name (e.g. polyline course). If the element name may be overwritten, activate the **Allow to overwrite** check box.



2. If projection files have already been loaded, select a group to which the element should be added (e.g. quad.plt). Alternatively, you can create your own group by selecting the empty entry and then entering the group name yourself (e.g. freehand polygon).

Projection editor

~ T O □ + ↘

Set pointer size [mm]: 50

Change orientation : X Y S

Enter element name : Polygon Allow to overwrite

Add to group :
circles.plt
quad.plt

Close polyline

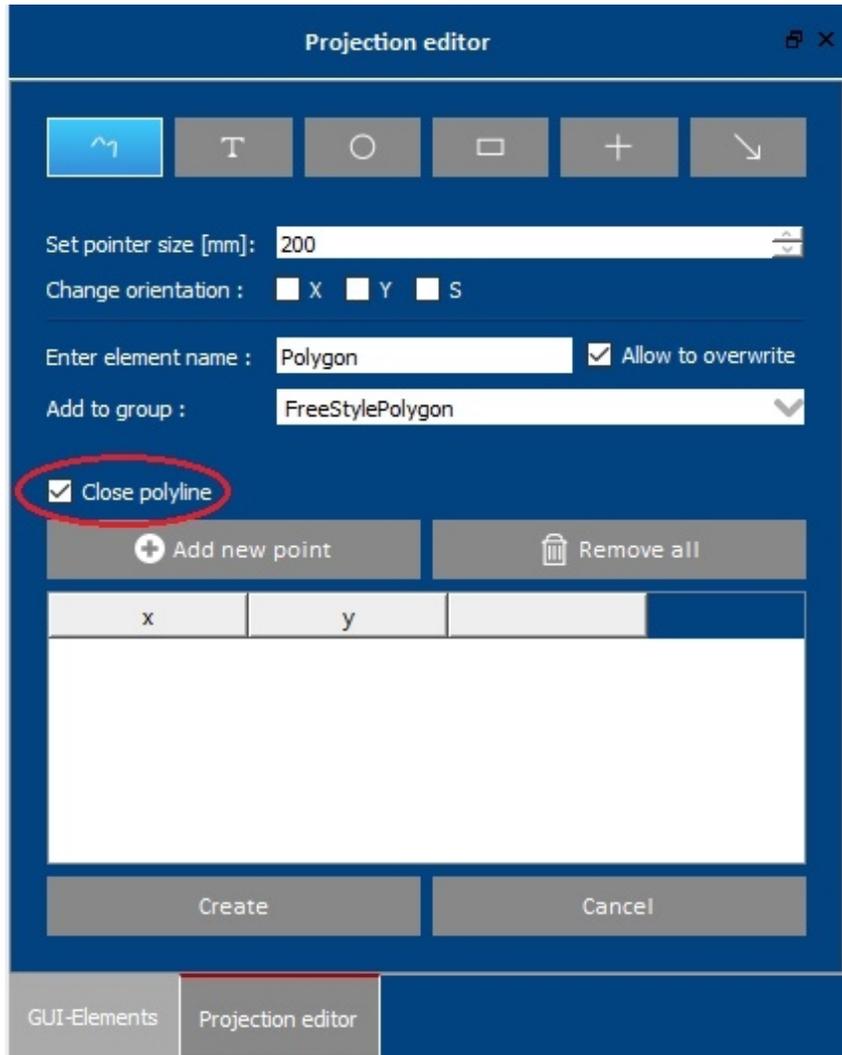
+ Add new point Remove all

x	y	

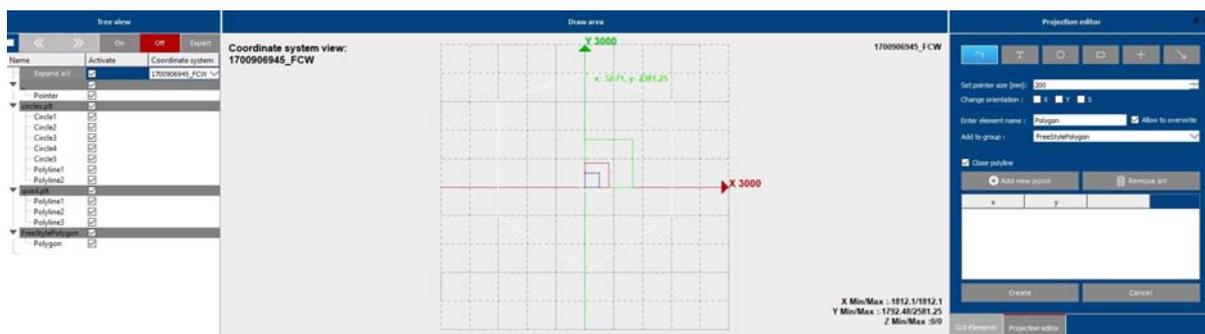
Create Cancel

GUI-Elements Projection editor

3. If the polygon should be connected to the start point at the end of the end point and the polygon thus closed, activate the checkbox **Close polyline**.

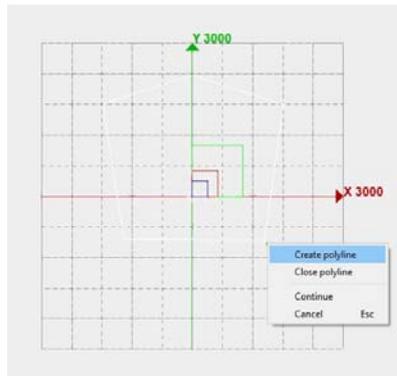


4. Move the mouse to the central drawing area. The mouse pointer is symbolized by a cross. Adjust the size of the mouse pointer if necessary.

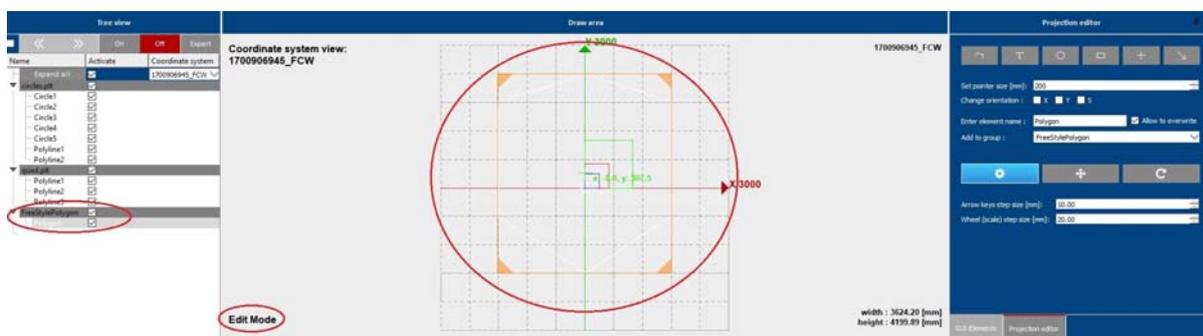


5. Click with the left mouse button on any point where your figure should begin or where the origin of your figure should be. To set further points, simply click on the desired locations. The points are automatically connected one after the other.

6. When you have finished creating the element, press the right mouse button and select **Create polyline**.



7. The created polygon switches to the Edit mode with an orange border. At the same time, it is inserted under the name set to the corresponding position in the tree view. If necessary, adjust the size and position of the created element.



Orientation

The orientation of the coordinate axes can be adjusted. This is especially necessary if the mouse pointer does not move in the corresponding direction. The x and y axes can be reversed and both axes can be exchanged.

Polyline

- First select a coordinate system in which the polygon is to be created.
- To create your own polygon course, move the mouse pointer to the desired starting point and press the left mouse button to set the first point.
- A small cross is displayed. The size of the mouse pointer can be enlarged or reduced at any time in the **Set pointer size** field.
- All other points are created in the same way and connected to the previous point with a line.
- To end the creation, press the right mouse button and select **Create Polyline**.

Text

- A text element is drawn like a rectangle from the top left corner to the bottom right corner.
- Move the mouse pointer to a position, press and hold the left mouse button and move the mouse from the starting point to the bottom right.
- The height of the text is changed by moving the mouse up and down.
- As soon as the left button is released, the creation is finished.

Circle

- A circle is drawn from the center point.
- Move the mouse pointer to a position where the center of the element is to be located.
- Press and hold the left mouse button and move the mouse down to the right.
- The diagonal of the extended rectangle corresponds to the radius of the circle.

- As soon as the left button is released, the creation is finished.

Rectangle

- The rectangle can be drawn in all directions
- Move the mouse pointer to a position, press and hold the left mouse button and move the mouse from the starting point to a diagonally opposite corner.
- As soon as the left button is released, the creation is finished.

Cross

- A cross is drawn from the center of the image
- Move the mouse pointer to a position where the center of the element is to be located.
- Press and hold the left mouse button and move the mouse down to the right.
- The vertical side length of the rectangle corresponds to the length of the half cross line.
- As soon as the left button is released, the creation is finished.

Arrow

- The starting point of the arrow is the end of the arrow, the end point is the arrowhead.
- Move the mouse pointer to a position where you want the end of the arrow to be located
- Press and hold the left mouse button and move in the direction in which you want the arrow to point.
- The size of the arrowhead corresponds to approx. 1/5 of the total length.
- As soon as the left button is released, the creation is finished.

Settings - Creating projection element

All settings are optional. All changes are applied directly.

Select group



The combo box lists all available groups created in the data tree. By default, an empty group is active, so the element appears at the top level. To create a new group, select the empty entry and edit it. This does not change the active group, but automatically creates a new group element as soon as a projection element is created. The group assignment can be changed at any time via the PropertiesView.

Set mouse pointer size



If the size of the mouse pointer is too small, you can change the size here. The default value is 50 [mm].

Change orientation



If the mouse movement from your own perspective does not correspond to the movement of the displayed mouse pointer, the orientation of the coordinate system in 2D space can be changed. There are 3 settings available for this:

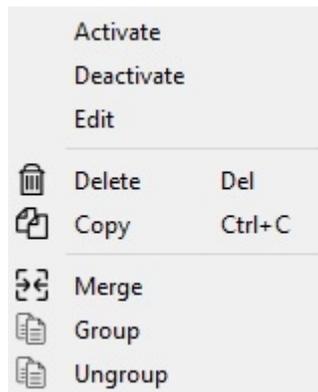
X -> Invert X-axis
 Y -> Invert Y axis
 S -> Replace XY axis

Each change also affects the display of the coordinate system in the drawing area. The orientation can also be changed by pressing the keys of the same name.

Editing within the drawing area

Any element located in the drawing area can be edited if the right to edit data is enabled. Select the desired element, open the context menu with a right-click and select the **Edit** entry to switch to edit mode. The element now appears with an orange border and can be moved and scaled.

Context menu



Parameter

Activate

Deactivate

Edit

Delete

Copy

Merge

Group

Ungroup

Function

Activates the respective element in the tree view.

Deactivates the respective element in the tree view.

Changes to edit mode.

Deletes all selected elements.

Copies all selected elements (can be placed elsewhere via the **Paste** context menu).

Only active if more than one element has been selected. Merges the selected elements to a multipolyline. Element name and coordinate system can still be set.

Adds the item to the selected group.

Removes all groups and subgroups of the selected elements.

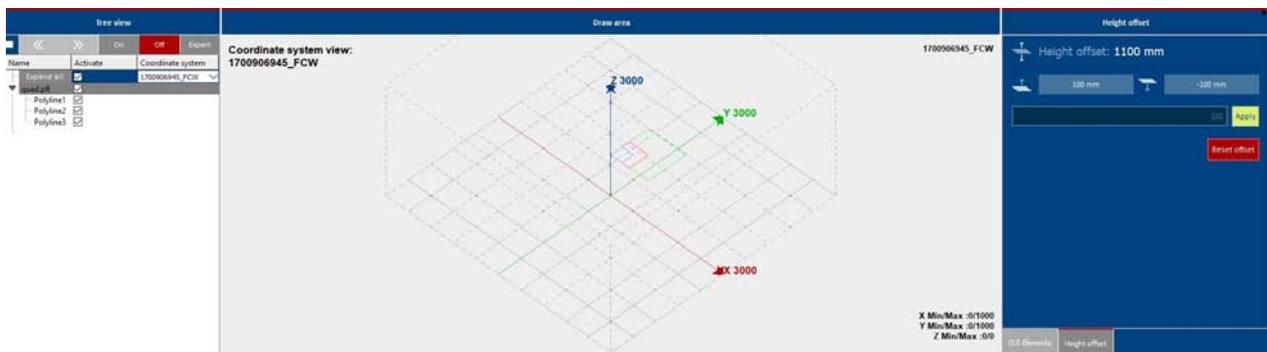
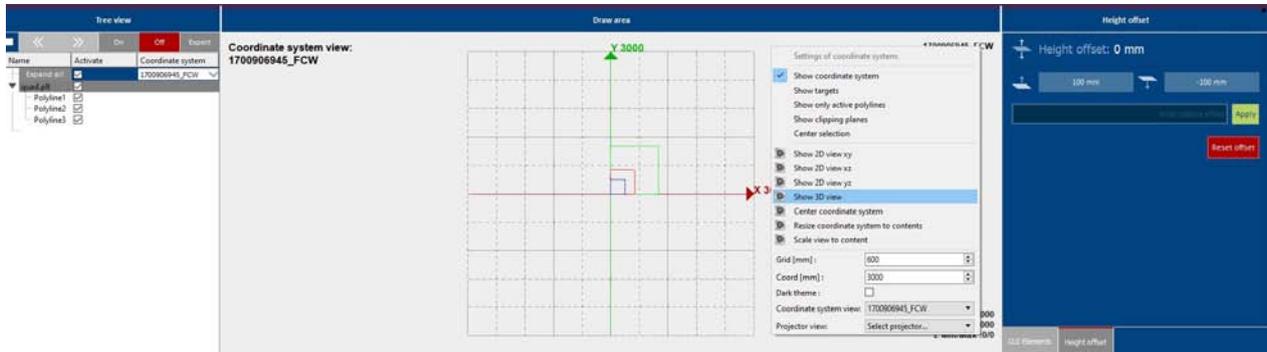
5.10 Height offset

By using the DockWidget **Height Offset**, it is possible to adjust a projection by any desired height value along its z axis. The offset is displayed live in the drawing area, and also applied directly to the projection. Open the DockWidget by first creating the **Dock_Height_Offset** docking window. How to create a

DockWidget, see the chapter [Creating DockWidgets](#).

Select a coordinate system in the tree view widget where you want to project in. After that load any projection file.

To visualize the height offset in the drawing area view, select the **3D view** from the context menu.



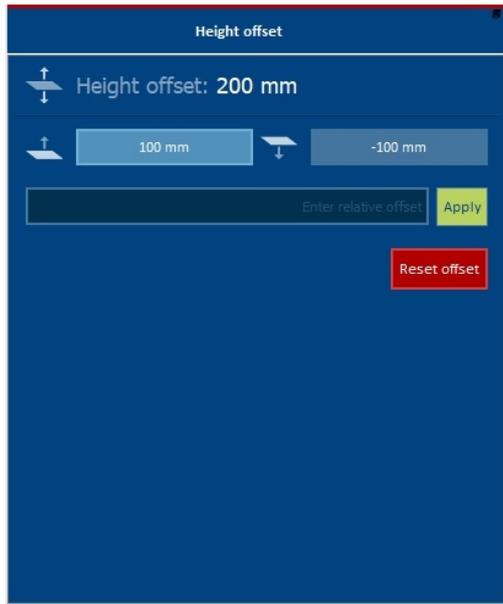
Offset possibilities

You can shift the projection relatively up and down with the DockWidget **Height offset**. Therefore you can use the following buttons:

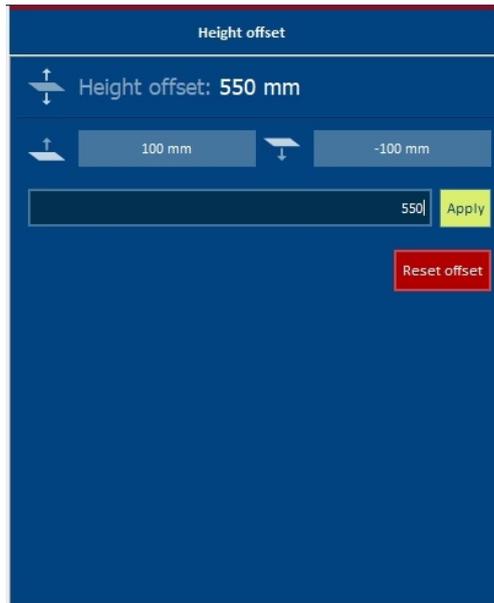
1. **+100 mm** for a positive offset of 100 mm made step by step.
2. **-100 mm** for a negative offset of 100 mm made step by step.

These buttons both can be pressed as often as needed and in any desired order. The actual Offset value is shown beneath the widget title.

The Offset can be reset to zero point by pushing the button **Reset offset**.



You can insert any value within the field **Enter relative offset**. To apply the offset value click the green button **Apply**. There can be inserted any values as often as needed. Additionally the buttons +/- 100 mm can be pressed. The offset values are summed up or subtracted. The Offset can be reset to zero point by pushing the red button **Reset offset**.

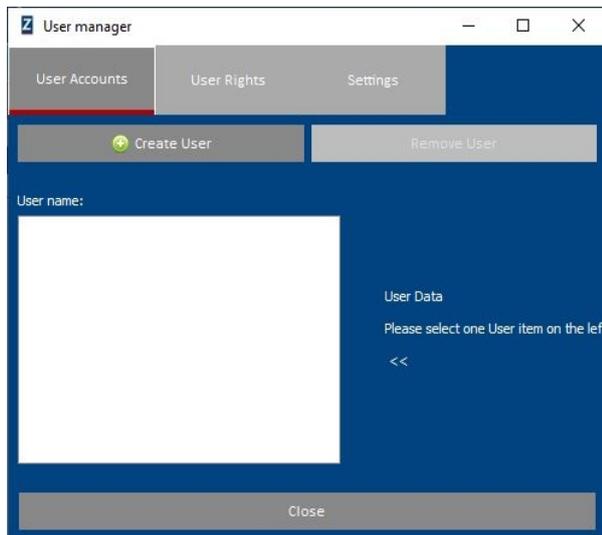


5.11 User manager

By using the user manager it is possible to assign a rights group to individual users in order to restrict the functionality of the ZLP-Manager. If the ZLP-Manager is started for the first time, the user manager is automatically deactivated and the ZLP-Manager starts in the mode in which all functions are unlocked. The user manager can be opened via the menu bar under **Settings**.

If the user manager is activated, a user must be logged in each time the ZLP-Manager is started, unless a user has not yet been created. In this case, **NO USER** is automatically displayed as logged in user. All functions are released for this default user.

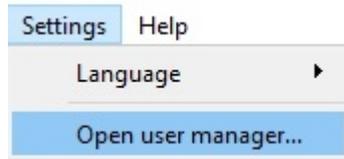
5.11.1 User Manager - Settings and View



The user administration can be opened via the menu bar and via the user login button. However, only if the logged-in user has been assigned the **Open User Manager** permission. Otherwise, the user must be changed.

Menu tab

1. Open the menu entry **Settings**
2. Click **Open user manager...**



Login button

1. Click on the registration button. A context menu opens.
2. Click on [Open user manager...](#)



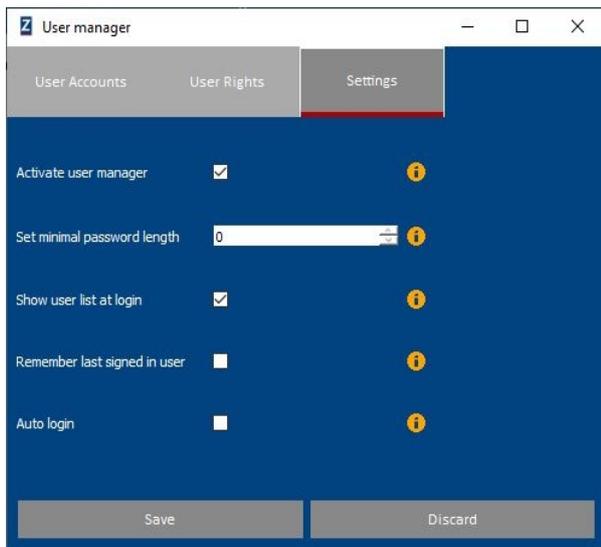
User Manger View

The user administration consists of three tabs:



Tab	Description
User Accounts	Contains all user data that can be assigned to a user account. On the left side, all created logon names of the user accounts are listed. If a user is selected, all user data are listed on the right in a table. The user data can be edited by double-clicking on the respective entry. (see chapter User Account).
User Rights	New rights groups can be created, duplicated or removed. On the left side all created groups are listed. If a group is selected, all group rights on the right side are listed in a table. The rights can be set by double-clicking on the respective table entry. (see chapter User Right groups).
Settings	Contains all settings that can be set for user management. (see User Manager Settings).

User Manager Settings



Setting	Description	Function is immediately available?
Activate user manager	Enables/disables user manager when restarting the ZLP-Manager.	No - restart required
Set minimal password length	If the number = 0, no password must be entered. If the number is > 0, a password of this length must be entered for all newly created users. The change has no effect on old passwords.	Yes
Show user list at login	If the selection box is activated, a selection box is displayed in the login dialog in which all available users are listed. If the selection box is deactivated, an empty input field is displayed in which the user must be entered manually.	Yes - As soon as the user is changed the next time
Remember last signed in user	If the ZLP-Manager is restarted, the last logged in user is set as active user in the login dialog. Only the password has to be entered.	No - restart required
Auto login	If the setting is activated, an input mask appears in which a user and a password can be entered. If the ZLP-Suite is restarted and the login data is	No - restart required

correct, the ZLP-Suite starts automatically with all properties of the user.

5.11.2 User Account

User accounts can only be edited by users for whom the **Open User Manager** permission is allowed.

Create new user account

First possibility:

1. Open the user manager
2. Switch to the tab **User data**
3. Click on **Create new user account...** A new user will be created and selected automatically
4. Enter all user data
5. Press **Save**

Second possibility:

1. Open the context menu of the logon button.
2. Click on **Create new user account...** The user manager is opened automatically and the new user is selected.
3. Enter all user data
4. Press **Save**

Delete user account

1. Open the user manager
2. Switch to the tab **User data**
3. Select the user to be removed
4. Press **Remove User**
5. Press **Save**

Note: If the logged-in user has been deleted, it is automatically logged out and no user is logged in anymore. The login button does NOT display a USER. The user can be changed via the context menu of the login button.

User Login button

The login button appears at the top right of the menu bar as soon as the user administration has been activated. If a user is logged in, the name of the user appears as the button label. Clicking the button opens a context menu with the following options:



Choice	Function	Always available?
Change User...	Opens the login dialog to log in a new user.	Yes
Create new user account...	Opens the user manager and	No - only if Open user manager

creates a new user directly. This new user is automatically set as the selected user.

has been allowed in the Settings tab

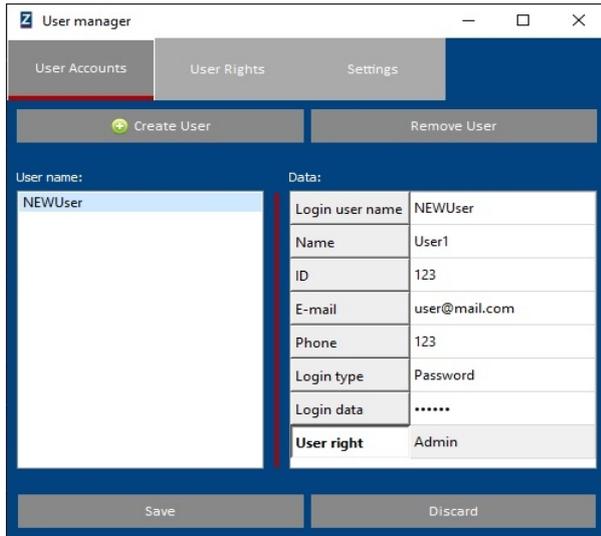
Open user manager...

Opens the user manager. Only visible if the **Open user manager** permission has been assigned.

No - only if **Open user manager** has been allowed in the Settings tab

User - User Accounts

The user data can be found in the first tab of the user manager.



Parameter	Description	Input required?	Note Input
Login user name	Name required for login	Yes - login name is required for login	No spaces allowed - default name NEWuser is automatically created when creating a new user
Name	Correct name of the user	No	-
ID	Identification of the user	No	Currently only numbers allowed
E-Mail	E-mail address of the user	No	-
Phone	Phone number of the user	No	-
Login Type	Contains a selection box with different login procedures. Currently only the login	No	checkbox

	procedure with password is supported. This is activated by the type Login_PW. The corresponding password is entered in the Access data parameter.		
Login data	Currently only password input possible. Must be entered in the login dialog.	Yes - if a password length > 0 has been set under Settings and it is a newly created user	-
User right	Assign a group that contains the rights of the current user. This parameter must be set.	Yes	checkbox

5.11.3 User Right Groups

User right groups can only be edited by users who have activated the [Open user manager](#) permission.

Create Group

1. Open the user manger
2. Switch to the [User rights](#) tab
3. Press [Create Group](#) A new rights group will be created and automatically selected.
4. Set all rights
5. Press Save

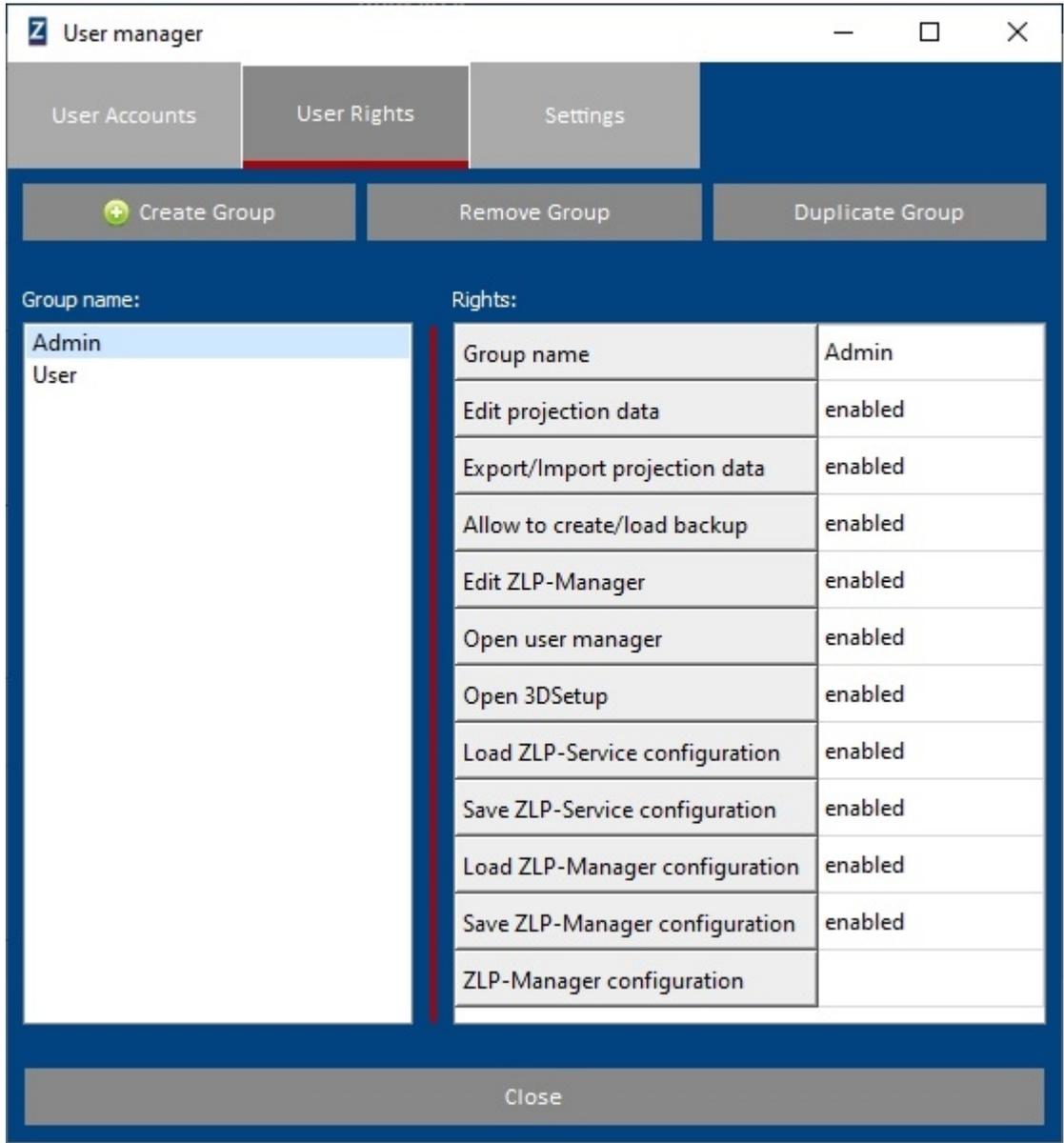
Remove Group

1. Open the user manger
2. Switch to the [User rights](#) tab
3. Select the group you want to remove
4. Press [Remove group](#) The group will be removed from the list and the following group will be selected automatically
5. Press Save

Duplicate Group

1. Open the user manger
2. Switch to the [User rights](#) tab
3. Select the group to be duplicated.
4. Press [Duplicate group](#) A group with the same name + (index) is created and automatically selected.
5. Press Save

Available rights



Right parameter	Description	Input required?	Note Input
Group name	Name of the user right Group	Yes - group rights name is required for assignment	No blanks allowed - default name NEW group is created automatically when creating a new group
Edit projection data	It is possible for the user to delete projection files from the tree and assign coordinate systems.	No	Default on disabled
Export/Import projection data	User can import and export projection data	No	Default on disabled

Allow to create/load backup	A backup (*.zpro) can be loaded	No	Default on disabled
Edit ZLP-Manager	The user can change the ZLP-Manager. This includes creating, deleting and editing buttons and DockWidgets.	No	Default on disabled
Open User manager	The user is allowed to open the user administration in order to create and delete new users and rights groups.	No	Default on disabled
Open 3DSetup	The user is allowed to open the setup dialog to set the projectors to the workspace.	No	Default on disabled
Load ZLP-Service configuration	The user is allowed to load the ZLP-Service configuration	No	Default on disabled
Save ZLP-Service configuration	The user is allowed to save the ZLP-Service configuration	No	Default on disabled
Load ZLP-Manager configuration	The user is allowed to load the ZLP-Manager configuration	No	Default on disabled
Save ZLP-Manager configuration	The user is allowed to save the ZLP-Manager configuration	No	Default on disabled
ZLP-Manager configuration	The view of the ZLP-Manager is replaced by loading the specified configuration file when a user changes. If no file is selected, the last view is used.	No	Opens a file browser to load the ZLP-Manager configuration file

5.12 Process support

Use the WorkflowManager of the ZLP-Manager to support your work processes. In the following chapter you will learn everything about its application possibilities.

5.12.1 WorkflowManager

Different workflows can be generated via the WorkflowManager. The manager contains a list of all available workflows. Each workflow has its own folder (folder name = name of the workflow) which is located in the data directory under `data/workflows`.

This folder contains a configuration file called `workflow.xml`, in which the steps of the workflow are stored. Different data (projection, description and image data) can be assigned to each step and copied directly into the folder. As soon as a workflow is started, the ZLP-Manager displays the assigned data for each step. This means that all relevant information is located in one central location and does not have to be additionally available in printed form, for example. Since the complete structure of the workflow including all data is located in the same folder, it can easily be transferred to other ZLP-Suite systems.

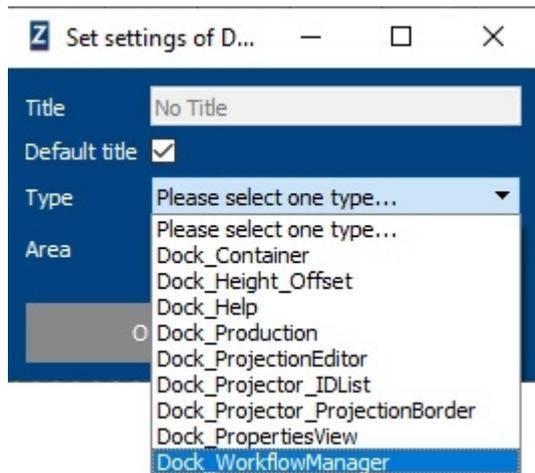
Open WorkflowManager

First create the Dock_WorkflowManager docking window.

To do this, open the menu item **View → Create DockWidget...**

In the settings dialog, select the **Dock_WorkflowManager** type and the area in which you want to place the

window.



Click on **OK**.

WorkflowManager Dialog

The WorkflowManager has a menu bar that can be used to create, copy, or delete workflows. In addition, there are functions for starting or editing a workflow. The manager displays the folder structure under `data/workflows`. If a workflow is selected from the list, the name and description of the workflow appear at the top of the info field.

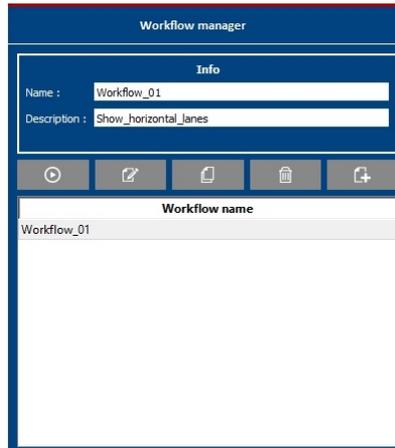
Step 1: Create Workflow

Press the **Create workflow** button. A new workflow is added to the end of the list. By default, this is named **Workflow_01**. In addition, a folder with the name of the workflow is created in the `data/workflows/` directory containing the standard configuration file `workflow.xml`. This contains a standard text for the description of the workflow. If the right to edit data exists, the workflow is automatically in editor mode, otherwise only a label is displayed. Any number of workflows can be generated, which are structured numerically by default (Workflow_01, Workflow_02, etc.).



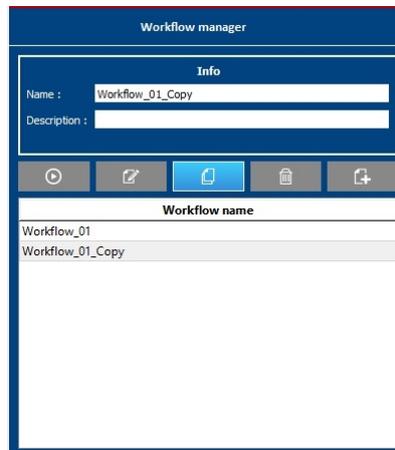
Step 2: Rename Workflow and Change Description

Select the created workflow. If the right to edit data exists, the info box is automatically in editor mode and the name and description can be changed. Note that umlauts and special characters cannot be used. The list name and folder name are automatically adjusted. The change is directly applied to the `workflow.xml` file.



Step 3: Copy or Delete Workflow

Select a workflow and press the **Copy Workflow** button. A copy of the workflow is generated and a new entry named `xxx_Copy` is added to the list. The complete contents of the folder of the selected workflow are stored in the new folder of the copy.



To remove a workflow, select the appropriate workflow and press the **Delete Workflow** button. The workflow will be removed from the list and the associated folder will be deleted from the `data/workflows` directory.



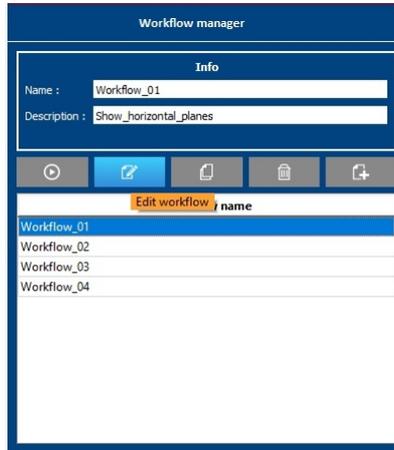
Workflow-Player

For the workflow player, each workflow can also be assigned individual work steps with projection files, descriptions and images. Within the Workflow Player, all work steps are displayed in a list. There are two modes: the editor mode and the player mode. The modes can only be activated after a workflow has been selected from the list in the WorkflowManager. The "Back" button at the top left of the window can be used to exit the mode and return to the WorkflowManager.

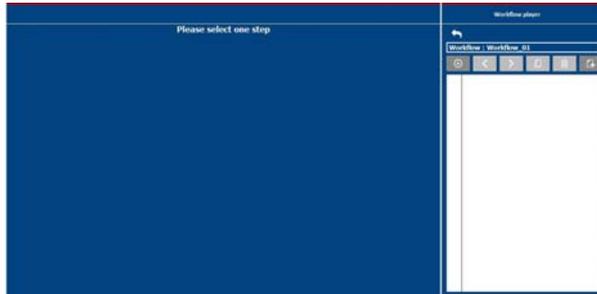
a) Editor-Mode

In the editor mode, various functions are available for editing the individual steps via the menu bar or by direct interaction with the list.

To open the Workflow Player's edit mode, first select the appropriate workflow and click on the button **Edit workflow**.

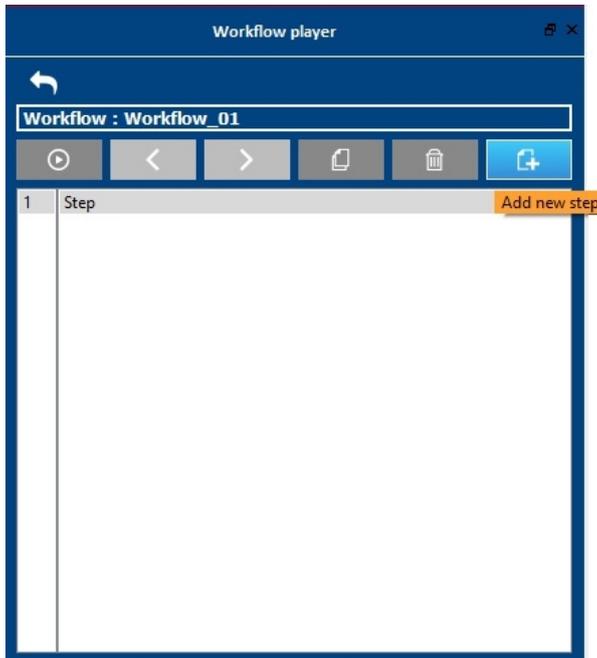


The workflow player opens. At the same time, the view of the drawing area changes.



1. Create steps

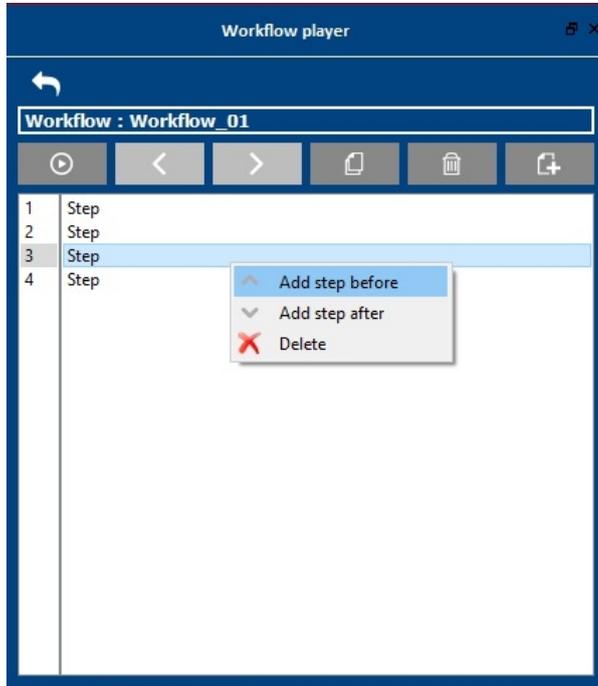
Press the **Add New Step** button. A new step will be created or, if steps already exist, added to the end of the list.



At the same time, the view of the main window changes. Three windows with the names **Projection File**, **Description**, **Image** appear. The window sizes can be adjusted by moving the blue vertical lines.

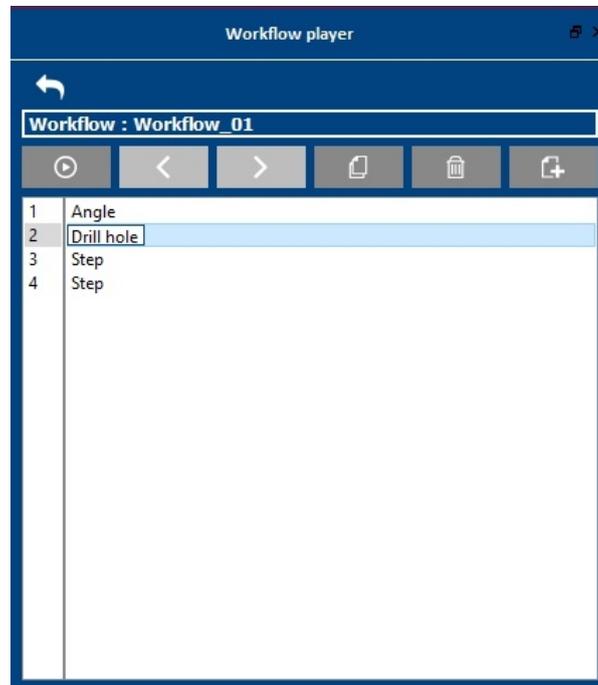


To insert a step before or after an existing step, first select the corresponding step in the list and open the context menu by pressing the right mouse button. Select **Add step before/after** to create a new step at the respective position.



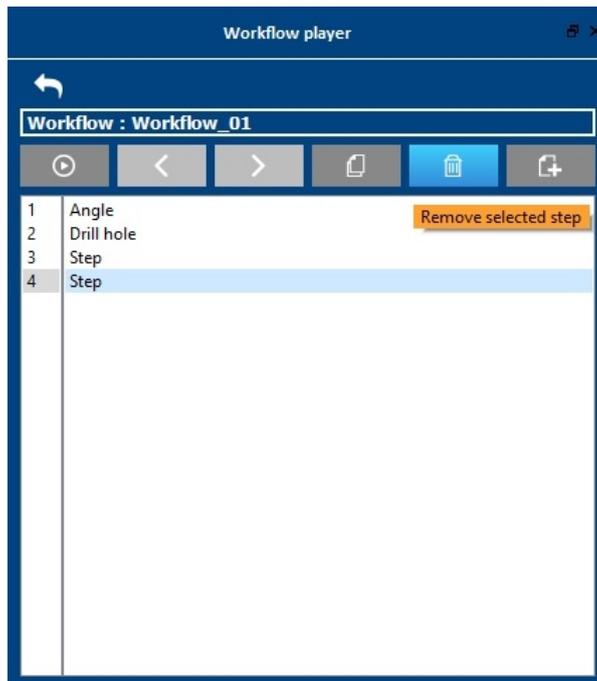
2. Rename steps

You can edit the name by double-clicking the step in the list that you want to rename. Confirm the change by pressing the **Enter** key.

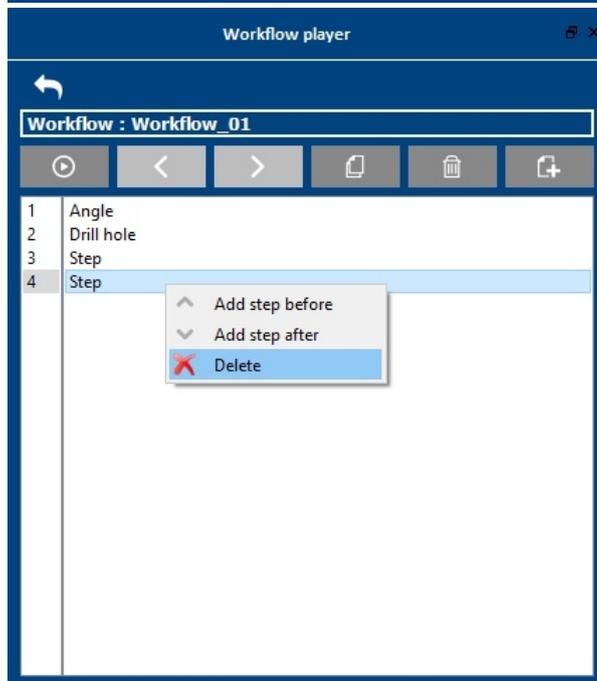


3. Delete steps

Select the appropriate step from the list. Either click the **Remove Selected Step** button or right-click the step to open the context menu. Click **Delete**.

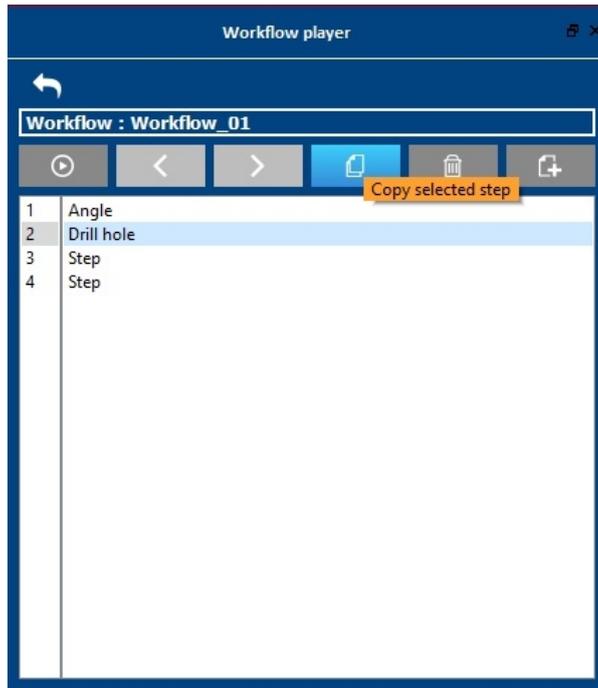


or



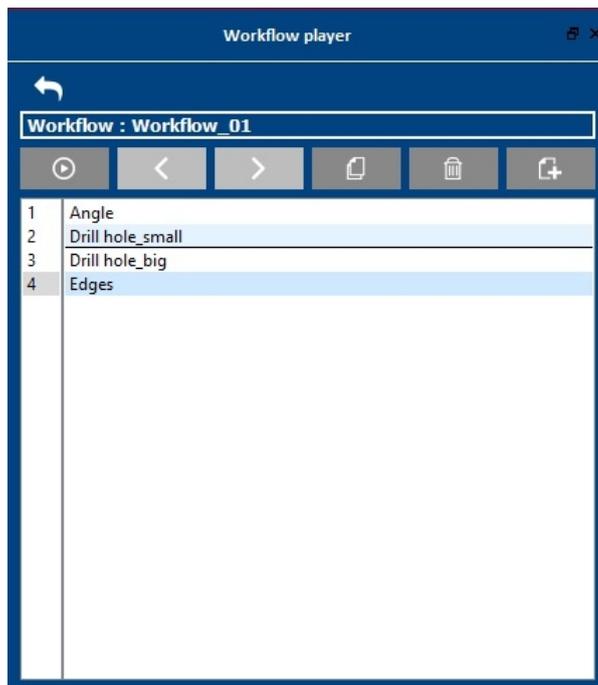
4. Copying Steps

Select the step you want to copy from the list. Press the **Copy selected step** button. The copied step is added to the end of the list and selected automatically.



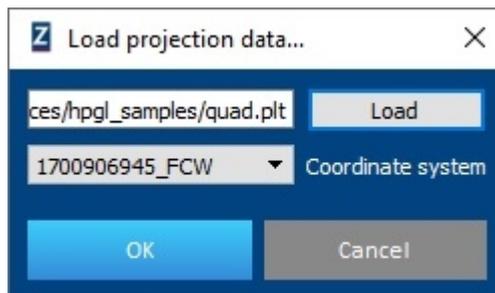
5. Move step

Select a step from the list. Press and hold the left mouse button. Use Drag&Drop to move the step to the required position.



6. Assign data to steps

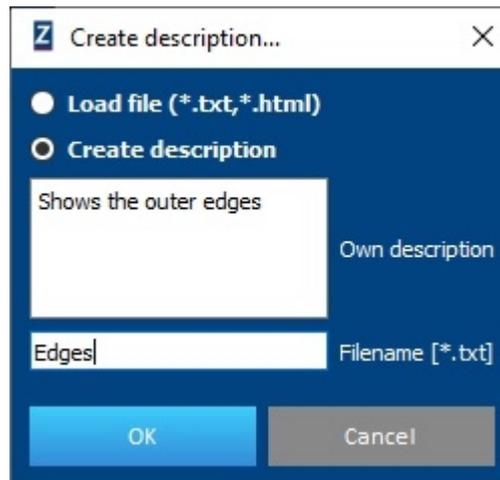
Select a step. In the Drawing Area view, click the **Projection File** window. In the dialog box that opens, select the projection file that you want to save for the step.



To assign a projection file, the laser projector must be connected to the ZLP-Manager. Also assign a

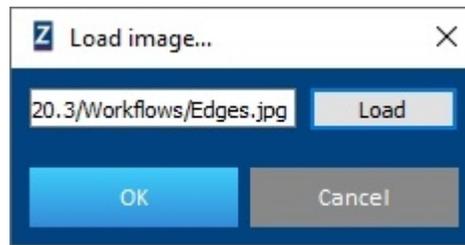
coordinate system to the projection file.

In the Drawing Area view, click the Description window. In the dialog box that opens, upload either a `text` or `HTML` file that contains the description text, or create a description yourself.



This can then be stored under a self-selected file name as a text file. Click OK. The text file can be found in the `data` folder under `workflows\step_1\Edges.txt`.

In the Drawing Area view, click the Image window. The `Load Image...` dialog box appears. Click the `Load` button. An Explorer window opens.

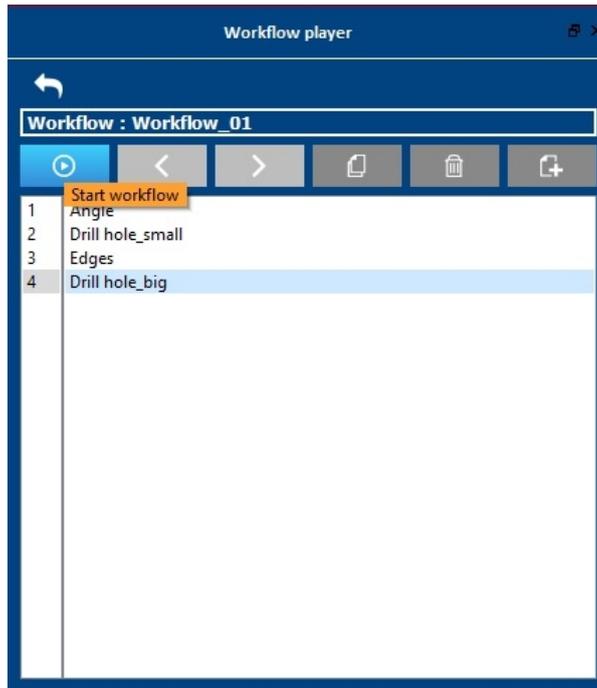


Select an image file and click OK. The image file is loaded into the Image Panel. If you want to replace an existing image file with an image file of the same name, a message will appear telling you that the file already exists and asking you if you want to replace or rename it.

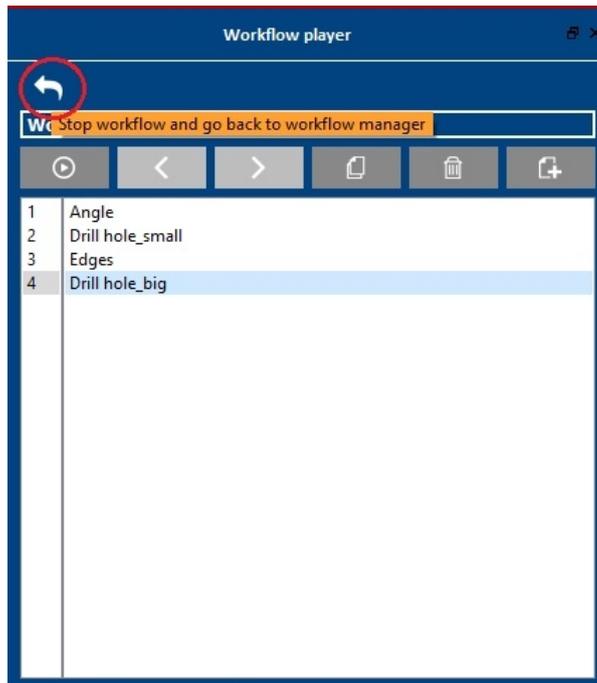
In the central window of the ZLP-Manager all assigned data are now displayed in the corresponding window. Above the windows a button for projection file, description and image is displayed. By clicking on the respective button, the data can be edited. In addition, a `Delete` button appears to remove the data. In Player mode, only those visualization windows will be displayed that have been assigned data.

7. Projection of a workflow

To project a workflow, press the **Start Workflow** button. This starts either at the first or at the preselected work step. Only those steps to which data has been assigned are projected. Use the arrow keys to navigate between the steps. To stop the projection, click on the **Stop workflow** button.

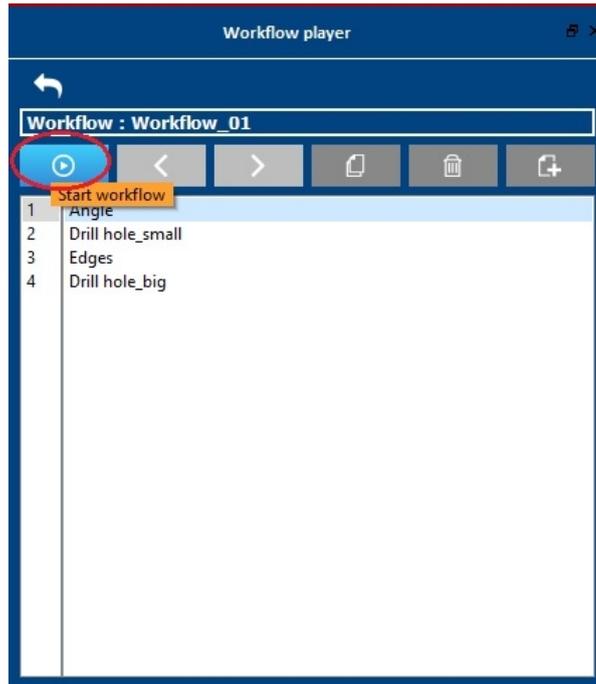


Exit the workflow player by clicking the **Back arrow** sign. If not all steps have been assigned data, a warning message appears asking if you want to exit the player anyway.

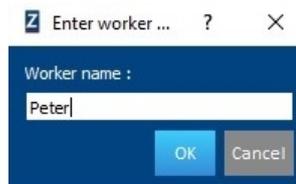


b) Player-Mode

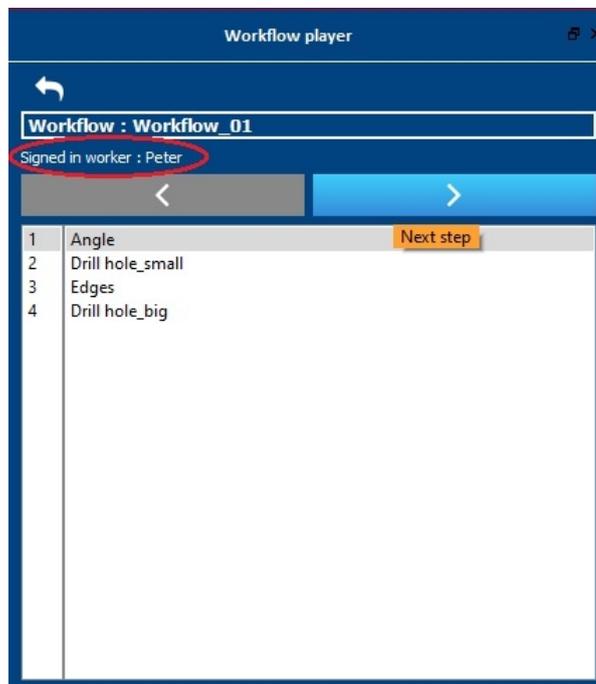
Start the player mode of the WorkflowManager by clicking on the [playback](#) symbol.



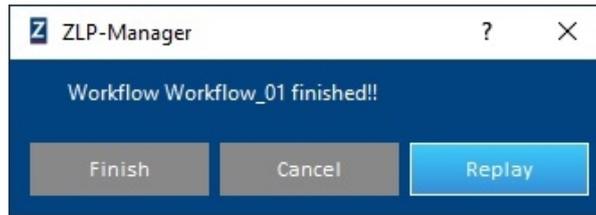
In player mode, one worker is always responsible for the workflow. If the user administration is active, the logged-on user is set directly as active worker, otherwise a dialog window appears first, in which the employee name must be entered.



The name of the registered worker is displayed above the menu bar. As soon as the view changes, the first step in the list is automatically activated and the data is displayed. You can switch between the steps using the arrow keys in the menu bar or by pressing the arrow keys on the keyboard.



As soon as the last projection file and thus the end of the selected workflow has been reached, the adjacent message appears. Select whether you want to replay the workflow or exit the Player mode.



Log-File

As soon as you start the player mode, a log file with date stamp is automatically created and stored in the folder of the respective workflow under `/log`. This file contains the name and description of the workflow, the user name, and the time when the workflow was executed. Each selected step as well as multiple steps are logged in the log file with step ID and start time. As long as the player mode is active, all steps are continuously recorded in the same log file. However, if the player mode has been left in the meantime and called again at a later time, a new log file is created.

```

2020-07-12_08-19-34.log
1  <?xml version="1.0" encoding="UTF-8"?>
2  <workflow-log>
3  <info>
4      <workflowName>Workflow_01</workflowName>
5      <description></description>
6  </info>
7  <worker>
8      <name>Peter</name>
9  </worker>
10 <run>
11     <start>08:19:34</start>
12     <step>
13         <ID>1</ID>
14         <start>08:19:34</start>
15     </step>
16     <step>
17         <ID>2</ID>
18         <start>08:19:37</start>
19     </step>
20     <step>
21         <ID>3</ID>
22         <start>08:19:38</start>
23     </step>
24     <step>
25         <ID>4</ID>
26         <start>08:19:40</start>
27     </step>
28     <end>08:22:29</end>
29 </run>
30 <run>
31     <start>08:22:29</start>
32     <step>
33         <ID>1</ID>
34         <start>08:22:29</start>
35     </step>
36     <step>
37         <ID>2</ID>
38         <start>08:22:32</start>
39     </step>
40     <step>
41         <ID>3</ID>
42         <start>08:22:33</start>
43     </step>
44     <step>
45         <ID>4</ID>
46         <start>08:22:34</start>
47     </step>
48     <end>08:22:37</end>
49 </run>
50 </workflow-log>
51
  
```

5.13 Remote Control

The ZLP system can be controlled with one or more remote controls. The requirement is that at least one laser projector can receive signals from an infrared remote control.

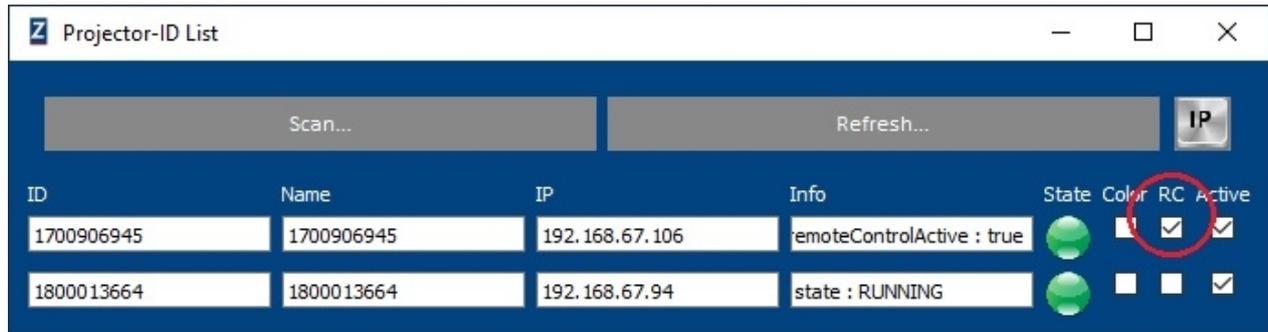
General information

All laser projectors have an infrared receiver. If they register a remote control signal, it is forwarded to the ZLP-Service where it is processed. The desired action is executed then.

Configure reception

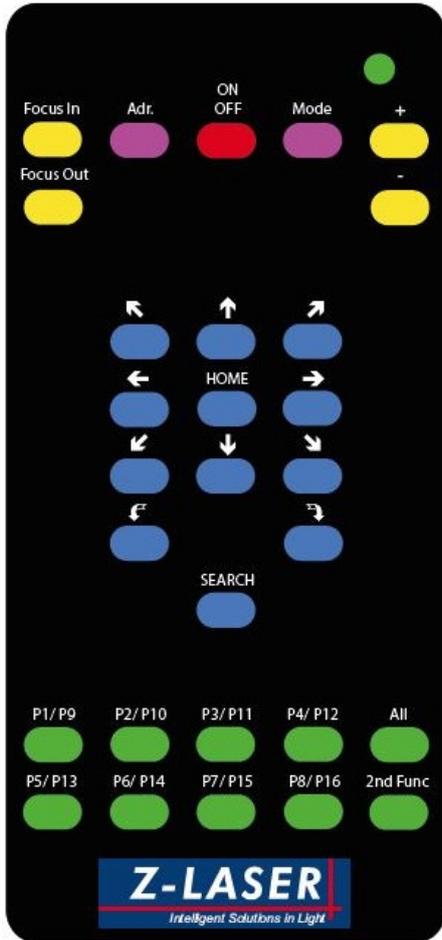
In the projector dialog of the ZLP-Manager the status of the infrared receiver of each projector can be queried and changed via the RC checkbox.

Check the RC box to enable remote control reception.



Remote Control Buttons

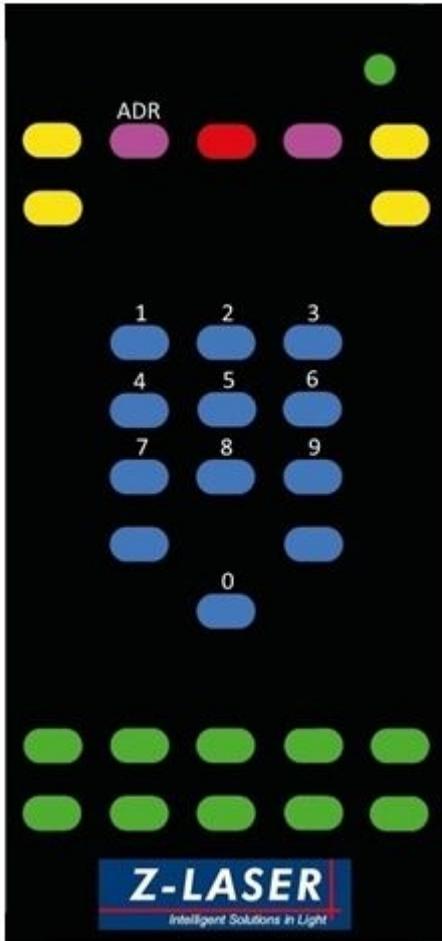
The remote control has 29 buttons. These have different functions depending on the activated FB mode. The [2nd Func] key at the bottom right can also be used to activate the second function of a key. The keys [Adr.], [Mode] and [2nd Func] are excluded from this. Keys can be pressed once or permanently (e.g. [←-]+) to trigger an action. The remote control has a status light. This lights up as soon as a command has been sent.



Remote control address

Each remote control has its own address. This makes it possible to work simultaneously with several remote controls on the same ZLP system. Each user must give his own address to his remote control. If desired, it is also possible to work with several remote controls at the same address. The ZLP system then processes all commands as if they had been sent from one and the same remote control. If several independent ZLP systems are located within sight, different FB addresses should be set for each system.

If the remote control is used for the first time or if the batteries have been changed, it has the default address 00. To assign a valid address in the range from 01 to 31, press the following keys one after the other: [Adr.][Number][Number][Adr.]. The status light of the remote control lights up once at the end. The blue keys serve as a numeric keypad.



Modes

The remote control can be operated in different modes. Each mode defines its own functions for the FB keys.

You can activate a mode by pressing the [Mode] key first and then one of the green selection keys [P1-16]. A total of 16 different modes are possible. The ZLP system is delivered with a certain number of preset modes.

Projection Mode [Mode][P1]

The projection mode supports the user when working with projection data. It is activated using [Mode][P1]. The following functions are available:

Key	Function
[ON/OFF]	Turn projection on or off
[Arrow up]	Display next projection element
[Arrow down]	Display previous projection element
[Arrow right]	Display all projection elements of next group
[Arrow left]	Display all projection elements of previous group

[Rotate right]	Show first projection element of next group
[Rotate left]	Show first projection element of previous group
[HOME]	Display/deactivate info text field with name of current projection element. An info text field must have been created first, for example, in info field mode.
[2nd Func][HOME]	Reset motion detector
[SEARCH]	All projectors update their setup for all coordinate systems

Procedure:

Load one or more projection files in the ZLP-Manager and deactivate all elements. Specify a coordinate system in the tree view. If you are working with multiple projectors, you must specify the appropriate projector and coordinate system for each projection element in the expert tree view. **Be sure to turn off the projection in the Tree View to avoid projection overload.** Switch into the projection mode with [Mode][P1]. Start toggling the projection elements with the [↑] or [↓] keys. Use the [←] or [→] key to move to the next or previous group of elements. Stop the projection by pressing the OFF button.

Setup Mode [Mode][P2]

Setup mode helps the user to set up a projector to a specific coordinate system. The setup mode must be used together with the setup dialog in the ZLP-Manager. The setup mode is activated via [Mode][P2]. The following functions are available:

Key	Function
[ON/OFF]	Turn projection on or off
[Rotate right]	Select next reference point
[Rotate left]	Select previous reference point
[+]	Enlarge search area
[-]	Reduce search area
[2nd Func][+]	Double step size
[2nd Func][-]	Half step size
[Arrow keys]	Move search area
[HOME]	Reset search area to start position
[2nd Func][HOME]	Reset motion detector
[SEARCH]	Search for selected reference point

Procedure:

Start the 3D setup dialog of the ZLP-Manager and create a coordinate system. Define as many reference points as you need. Activate the setup mode of your remote control by pressing the [Mode][P2] keys. Press the [Rotate Right] key and select the first reference point. The projector projects a bordered cross. Use the [Arrow] keys to move the cross to the appropriate position of your reference point. By pressing the [2nd Func][+] or [2nd Func][-] keys you can double or half the step size of the shift. Enter the X, Y and Z coordinates of the reference point manually in the setup dialog box. Press [SEARCH] on your remote control to start the scan and let the laser projector search for the selected reference point at the assigned location. **Afterwards, do not press the arrow keys again, as this may subsequently falsify the determined position.** As soon as the reference point has been recognized, its position data are automatically transferred to the dialog window and the reference point display changes from grey to green. Press the [Rotate right] key to switch to the next reference point. Use the remote control to position and measure all other reference points. Finally, click on **Set transformation** in the setup dialog.

Info field Mode [Mode][P3]

In the Info field mode, the user can configure an info text field. This is generated in the group "_" and has the name **Info-1** for the remote control with the address 01. The displayed text is **Info 1 @ serial number_coordinate system**. The info text field is used, for example, in projection mode to display the name of the current projection element. The info field mode is activated via [Mode][P3]. The following functions are available:

Key	Function
[+]	Increase text size
[-]	Reduce text size
[2nd Func][+]	Double step size for shifting
[2nd Func][-]	Half step size for shifting
[Arrow keys]	The info text field can be moved and/or rotated in 40° steps
[HOME]	Reset info text field to starting position (coordinate origin)
[SEARCH]	Display/create or deactivate info text field
[P1-P16]	Assign coordinate system. The text content changes accordingly. If the coordinate system is not supported, nothing is displayed.

Procedure:

To create an info text field, switch to info field mode with [Mode][P3] and then press [SEARCH]. The info text field is immediately projected. Use the green keys [P1-P16] to select the coordinate system into which the info text field should be projected. Then adjust the size and orientation with the arrow keys. Finally, the finished info text field is deactivated by pressing [SEARCH] again.

Clipping Mode [Mode][P4]

In the Clipping mode, you can define one or more selection rectangles that limit or crop the projection to a specific area. This gives you a much more stable projection in that area. Clipping mode is activated via [Mode][P4]. The following functions are available:

Key	Function
[ON/OFF]	Turn projection on or off
[Focus In]	Create selection rectangle
[Focus Out]	Delete selection rectangle
[+/-]	Toggle selection rectangles
[2nd Func][+]	Double step size
[2nd Func][-]	Half step size
[Arrow keys]	Change position
[2nd Func][Arrow keys]	Change size
[HOME]	Activate/Deactivate Clipping
[SEARCH]	Show border on/off
[2nd Func][SEARCH]	Display name in info field on/off
[P1-P16]	Assign coordinate system

Procedure:

Open a projection file in the ZLP-Manager. To create a selection rectangle, press [Mode][P4] to switch into clipping mode, then press [Focus In]. A selection rectangle is now projected. Use the green [P] keys to assign a coordinate system to the selection rectangle. Then adjust the size with [2nd Func][arrow keys] and the position with [arrow keys]. Finally, clipping is activated by pressing [Home]. The border of the rectangle can be switched on and off with [SEARCH].

In most situations it is sufficient to define only one selection rectangle and position it at the point where you want to work. However, it is also possible to create several selection rectangles and use them simultaneously. For more rectangles press the [Focus In] button again and adjust the size and position of the rectangles. To switch through the selection rectangles, press the [HOME] and [+/-] keys alternately. Creating several selection rectangles is useful if several people work independently in the projection area and each use their own selection rectangle. However, you can also place a selection rectangle permanently above an info field and move another one to the respective working position. To do this, switch to info field mode and create an info field in the same coordinate system. Rotate, move and resize/enlarge the info field as desired and switch it off again after adjustment. Switch back to clipping mode. Activate the info field and switch through the rectangles. The name of the active rectangle is displayed. If clipping is activated, the info field will also be cropped.

5.13.1 Setting the remote control mode using a button

The active remote control mode can be set. This also makes it possible to activate only one remote control.

Setting the remote control mode

To set the mode, right-click the `Connect_SetActiveModeForRC` button and select **Settings**.

Typ	Connect_SetActiveModeForRC
Adresse	Please select RC address
Modus	RC_Mode1

Under **Address**, select one of 30 remote controls.

Under **Mode**, select a remote mode.

5.14 ZLP-Manager Scripts

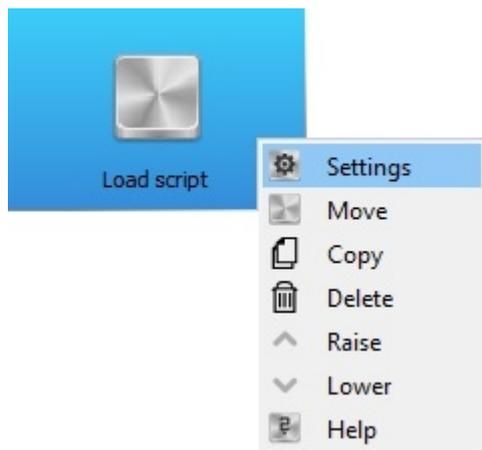
The ZLP-Manager scripts are Python scripts that can be started via the ZLP-Manager. These scripts access the thrift interface of the ZLP-Service. The scripts serve as an extension of the ZLP-Manager basic functionality, for example to implement automatic processes that are currently not covered.

Note that admin rights must exist for all script operations in order to execute them. If necessary, adjust the rights as described in the [User manager](#) chapter. If you use the ZLP-Manager without user administration, no further settings are necessary.

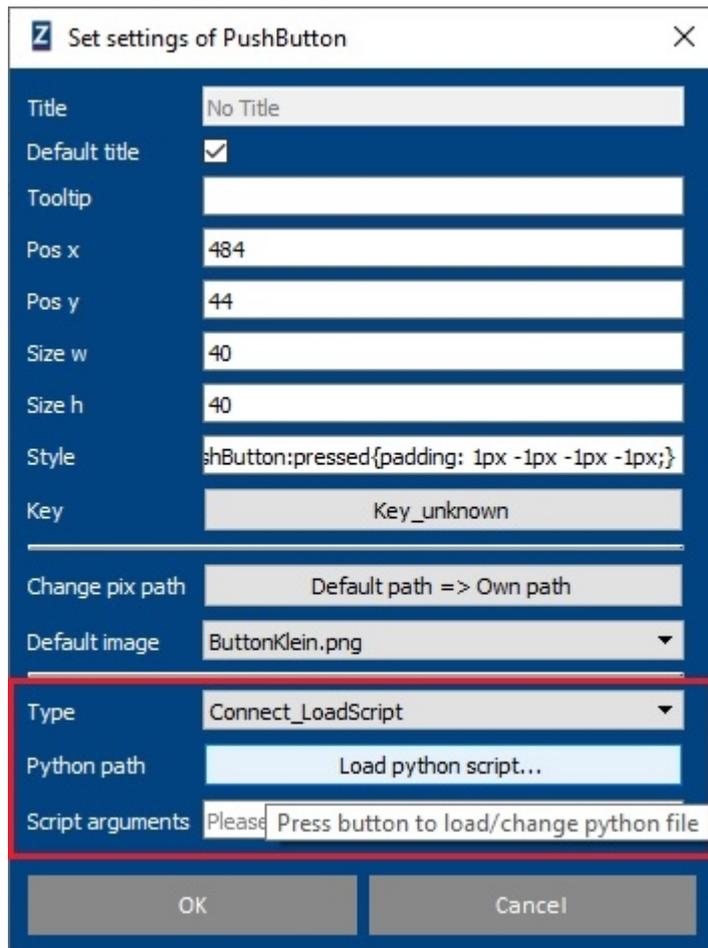
5.14.1 Load Script

To load a script in the ZLP-Manager, a control element (GUIWidget) of type `Connect_LoadScript` must first be created (see chapter [Creating GUIWidgets / Control elements](#)). This is assigned a Python script, which can be started by pressing the button.

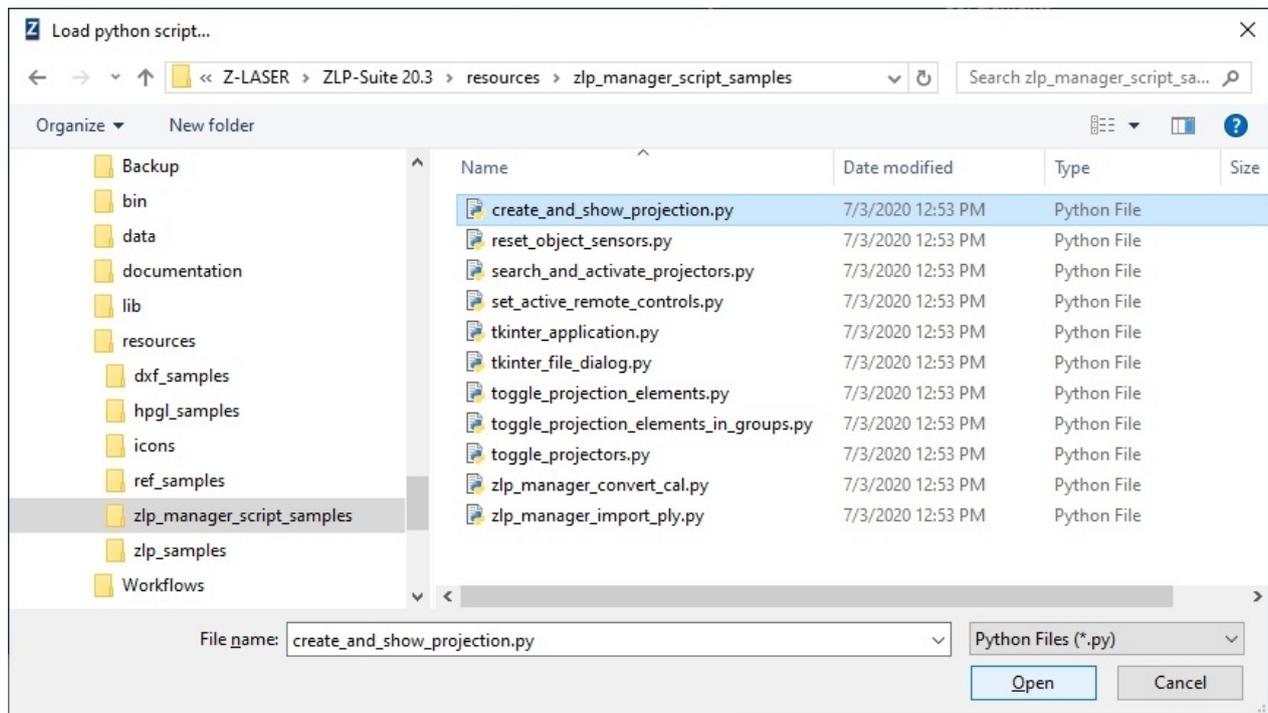
1. Click with the right mouse button on the button and open the **Settings** entry.



2. Press the **Load Python Script...** button to open the file browser.

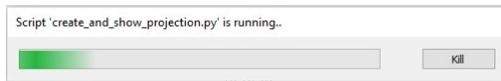


3. In the file browser, select the script you want to use and click **Open**.



4. Enter a name for the button in the **Title** field.

5. If the loaded script has transfer parameters, these can be entered in the dialog under Script Arguments.
6. Click **OK** to apply the settings.
7. Open the script by pressing the created button. As long as the script is running, a process bar with the label **Script > ScriptName > running >** is visible and no further interaction with the ZLP-Manager can be made.



8. Once the script is finished, the following output may appear in the status bar depending on the state:

State	Output	Status window
Crash (RED)	script crashed + < error output >	
Script could not be loaded (ORANGE)	The Python script could not be loaded! + <Error output> + <Instruction>	2020-07-12 08:46:02.767 Connect_LoadScript: Could not load python script! Script path is empty. Please set connection parameter: Python path:
Script failed (RED)	script failed + < console output > + < error output(syntaxerror, exception) >	2020-07-12 08:49:35.325 Script 'C:/Z-LASER/ZLP-Suite 20.3/documentation/sdk/python/src/bouncing_ball.py' is running. 2020-07-12 08:49:36.058 Script stopped. 2020-07-12 08:49:36.060 Script failed! 2020-07-12 08:49:36.081 Script process output: usage: bouncing_ball.py [-h] [-w WIDTH] [-he HEIGHT] [-rad RAD] [-dx DIRX] [-dy DIRY] [-o OFFX] [-o OFFY] [-r REFRESH] [-svc SERVICE_IP] [-port PORTNUMBER] [-t TARGET_IP] [-c COORDINATE] bouncing_ball.py: error: unrecognized arguments: localhost 9090
Normally finished (GREEN)	< console output >	2020-07-12 08:42:37.998 Script stopped.. 2020-07-12 08:42:37.999 Script process output: 2020-07-12 08:42:37.719 zlp INFO: Connecting to ZLP-Service at localhost:9090 2020-07-12 08:42:38.001 Script process output: ['1700906945_FCW'] 2020-07-12 08:42:38.552 ID 1700906945 : Start projection!

5.14.2 Create Script

To create a script, it is recommended to use a text editor or a Python IDE that supports the development of scripts (e.g. [PyCharm](#)). The ZLP-Manager scripts examples or the examples from the Python SDK can be used as templates for your own ZLP-Manager scripts.

ZLP-Manager scripts are always executed by the internal Python interpreter of the ZLP-Manager. This has only a limited range of functions and cannot be extended by additional modules.

If generating a script which has to be loaded via the external Python interpreter, the modul `zlp.py` must be imported additionally. Further information you will get by the SDK documentation.

Examples

The examples can be found in the installation directory under `resources/zlp_manager_script_samples`.

create_and_show_projection.py

- Two script arguments can be used to set the circle radius and the text of the text element.
- All available coordinate systems are called up and one of them is set as default coordinate system for all following projection elements.
- A polyline (5 segments in form of a 2), a circle and the text Z-LASER are projected.
- The three newly added elements are also displayed in the ZLP-Manager.
- The circle is created as top-level element, the polyline is created under `my_group/my_polyline`, the

text is created under `my_group/text_group/my_text`.

- The projection is started.

search_and_activate_projectors.py

- A search for projectors is performed.
- All found projectors are activated.

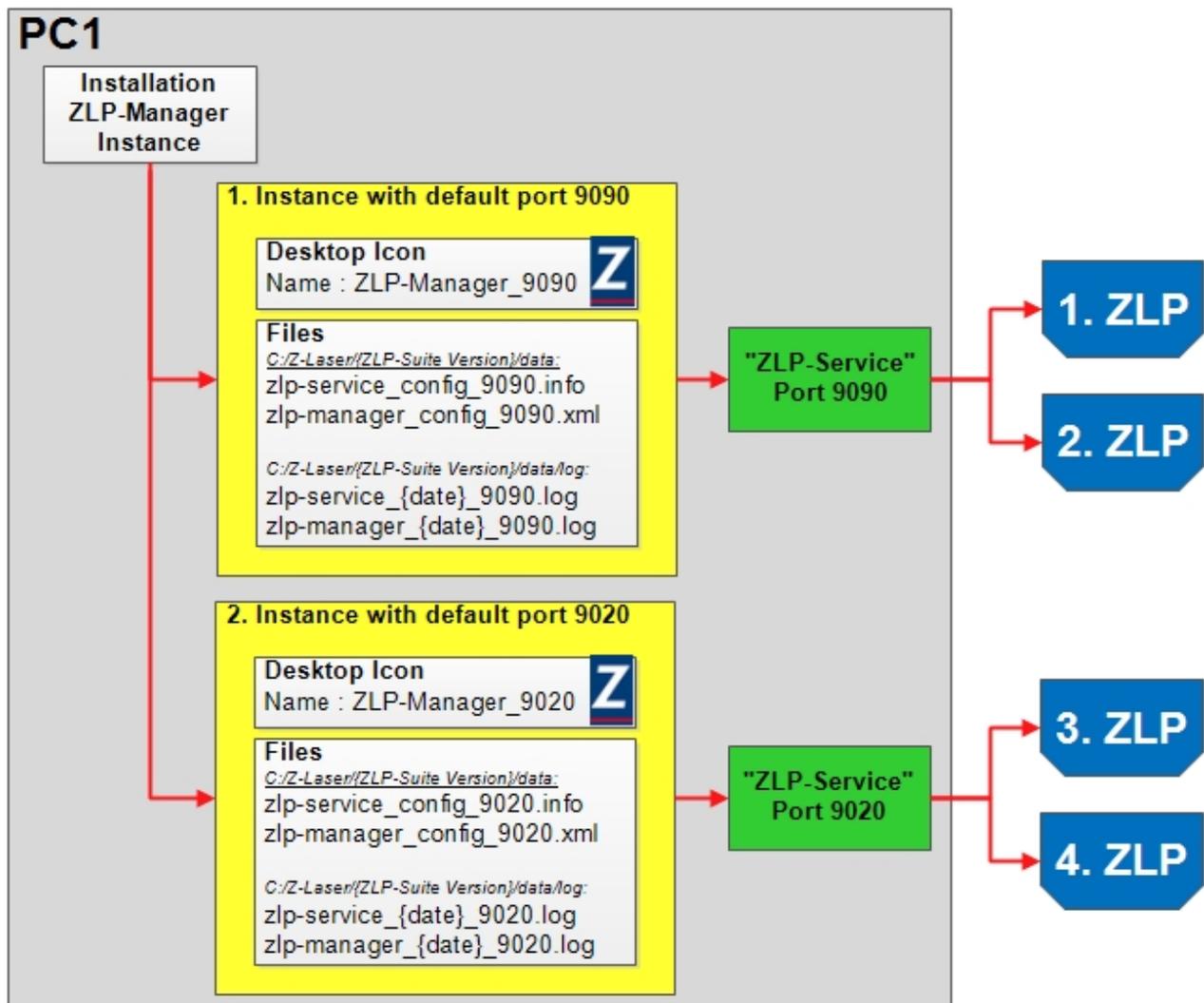
toggle_projectors.py

- The last loaded projection is switched on and off.

5.15 ZLP-Service connection

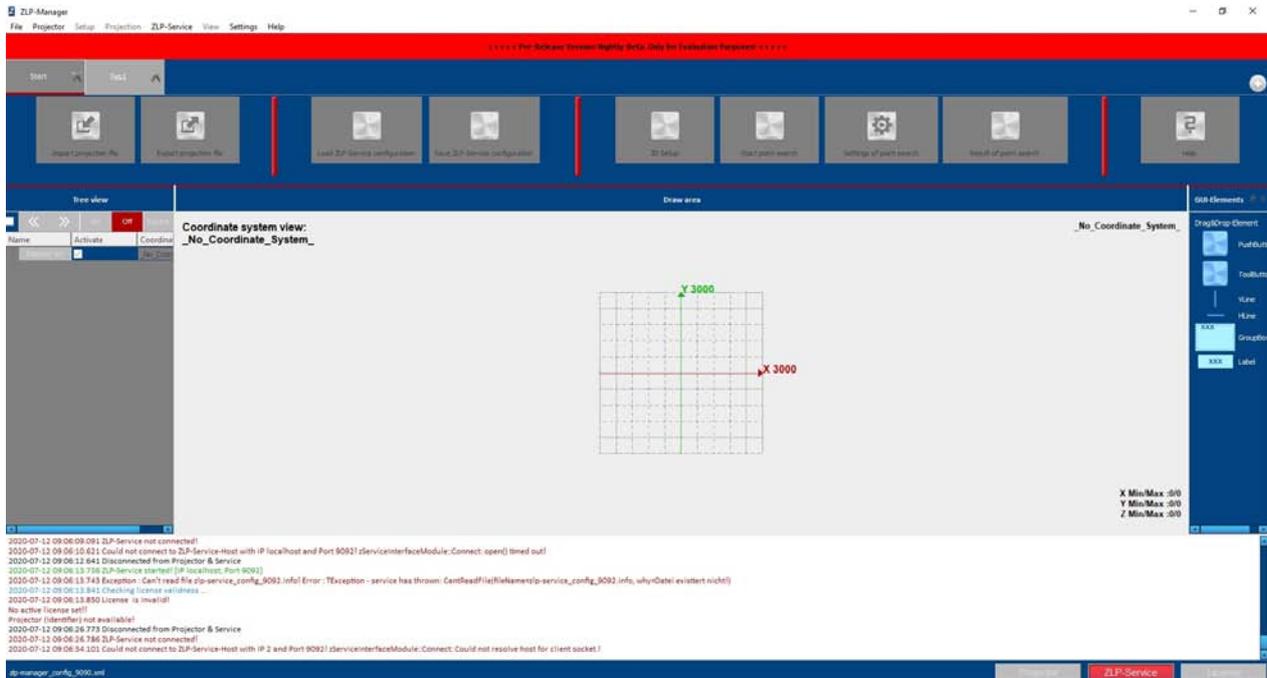
5.15.1 ZLP-Service

For projector communication, each ZLP-Manager instance must be connected to a so-called **ZLP-Service**. A ZLP-Manager instance can only connect to one ZLP-Service at a time. The connection is established automatically. The distinction between which ZLP-Service the current instance should connect to is defined by the port number. When creating a new instance, a new port number must always be entered, which is also used for naming the desktop icon (see chapter [Creating Desktop Icon](#)). Up to 16 projectors can be operated simultaneously per instance and port.



5.15.2 Running the ZLP-Service

The ZLP-Service is a service that runs in the background and is required for projector communication. A ZLP-Manager can only connect to one ZLP-Service instance. The distinction between which instance the ZLP-Manager connects to is made via an IP address and a port. By default, the IP address localhost (PC on which the ZLP-Manager is running) and port 9090 are used when the ZLP-Manager is started for the first time. The connection status of the ZLP-Service is displayed in the status bar of the ZLP-Manager. If the ZLP-Service could not be started when calling the ZLP-Manager, the status indicators in the user interface window for the projector and license remain grayed out, the status indicator for the ZLP-Service lights up red (see red marking in the following figure).



Automatically connect ZLP-Service

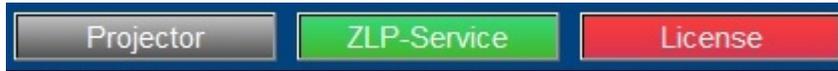
When the ZLP-Manager is called, it first tries to connect to the default parameters; i.e. IP: localhost Port: 9090. This refers to a ZLP-Service running locally on the same computer as the ZLP-Manager. If no ZLP-Service is available, the ZLP-Manager itself tries to start a ZLP-Service instance with the last used parameters. If this also does not work, the dialog [Connect to ZLP-Service](#) opens.



In this case, check the port number, IP address, and whether the ZLP-Service is already being used by another instance. If necessary, create a new instance.

Connect ZLP-Service manually

The ZLP-Service button is located in the status bar so that you can also start the connection setup manually.



The IP address and the port that was last set are used. After pressing the button, the ZLP-Manager tries to perform all steps described under [Automatically connect ZLP-Service](#) in order to establish a connection with the ZLP-Service. The dialog [Connect to ZLP-Service](#) is displayed only if the ZLP-Service was still connected before the manual connection attempt for the ZLP-Manager (but in reality it is no longer so, because the ZLP-Service does not give any feedback if the connection was disconnected). Otherwise, the ZLP-Service settings dialog appears.

If the ZLP-Service window was inadvertently closed during a session, it opens again automatically after a certain time or as soon as a function is called. Alternatively, the service window can also be opened again manually by clicking on the menu bar of the ZLP-Manager and selecting the entry [ZLP-Service → Reconnect](#).

5.15.3 ZLP-Service state

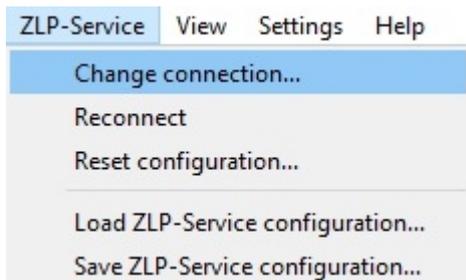
The connection status of the ZLP-Service is displayed in the status bar at the bottom right.

Button-Color	State	Meaning
	ZLP-Service is connected	The ZLP-Service is connected to the current ZLP-Manager. The tooltip and window title of the main window indicate which IP address and which port are currently being used.
	ZLP-Service is not connected	No ZLP-Service could connect to the specified IP address and port.
	ZLP-Service is connected. Version numbers are different.	The ZLP-Service is connected to the current ZLP-Manager, but the version numbers do not match. A warning and the different version numbers are displayed in the status output and in the ToolTip. In the ToolTip there is also a note that, due to the different versions, the range of functions may be limited and thus lead to unexpected behavior.

ZLP-Service connected! [PORT: 9090, IP: localhost]
 WARNING Version mismatch : 1.4.1 != 2.0.0 (ZLP-Manager != ZLP-Service) !!
 Limited functionality! This can cause unexpected behavior!

5.15.4 Changing ZLP-Service connection

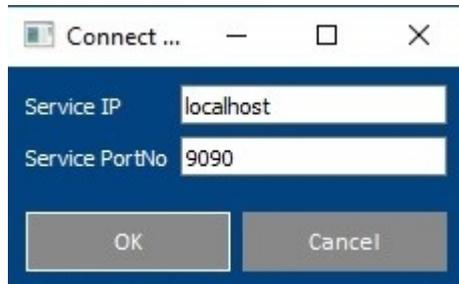
To change the connection parameters of the ZLP-Service, open the entry [ZLP-Service → Change connection...](#) in the menu bar.



The [Connect to ZLP-Service](#) dialog box opens. Alternatively, you can call the dialog via a button connection

`Connect_ChangeServiceConnection` (only executable in admin mode).

In the settings dialog you can now change the connection parameters to the ZLP-Service. Enter the IP address and the port number of another ZLP-Service instance. This instance can also be located on another computer in the network.



Parameter

Function

ZLP-Service IP

IP address in x.x.x.x format (e.g. 192.168.100.20)

ZLP-Service PortNo

Port between 9000-10000 . Needed to distinguish multiple ZLP-Service instances on a system

5.15.5 ZLP-Service Version Numbers

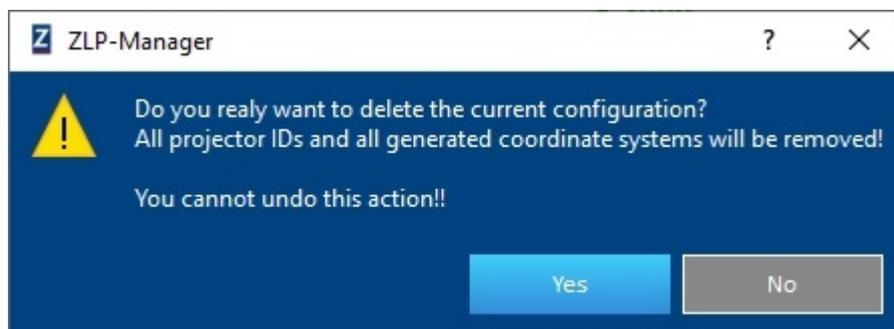
1. x.x.x e.g. 20.3 (format [MajorRelease](#) or [MinorRelease](#) or [MaintenanceRelease](#))
2. unknown -> Version number does not exist
3. not available -> current ZLP-Service instance does NOT have the function to read the version number. For example, this could be an old ZLP-Service that has not yet been updated. Usually occurs when the ZLP-Service is running on another computer.

5.15.6 Reset ZLP-Service configuration

If the ZLP-Service configuration is reset, all data on setup, projector connections, projector settings, loaded polylines, etc. will be deleted. This empties the ZLP-Service and resets it to its initial state. The display of the ZLP-Manager is updated directly. Reset the ZLP-Service configuration especially if a new configuration, for example a new projector system or a new production process, is to be set up.

To do this, call up the [ZLP-Service](#) entry in the menu bar and choose the entry [Reset configuration](#). A dialog box appears in which you must confirm the reset with [Yes](#).

Please note that the process cannot be undone and all configurations made will be irrevocably deleted as soon as you click the Yes button.



The reset is also possible by using a button with the connection `Connect_ResetConfiguration`.

If the currently active configuration is to be reused at a later time, the configuration file must first be saved before resetting. Select the menu item [ZLP-Service](#) → [Save Service Configuration](#) and save the `INFO` file in

any directory under any name.

Alternatively, you can also use a button with the connection `Connect_Service_SaveConfig`.

6. Glossary

Explanation of important terms in the field of software development for laser projectors.

Setup

The projector must be set up so that a projection element can be correctly projected into the local object coordinate system (e.g. trough, workbench, form). For multi-projector systems, this must be done individually with each projector.

During setup, the transformation parameters between the object coordinate system and the projector coordinate system are determined. This is done by measuring reference points that have coordinates in both systems.

Group

A group is the name for an HPGL file that contains one or more projection elements. Changes to the group always affect the associated projection elements.

Header position

Position of the projection center (projector head) in the coordinate system of the plant calibration level.

Calibration table

Value table which contains the corresponding galvo coordinates for 61 x 61 coordinates of the factory calibration plane. The calibration table is used for the transformation from the factory calibration plane to the galvo coordinate system by means of cubic or linear interpolation.

Calibration

Calibration is the term used to describe the assembly activities that are used to adjust the laser projector to meet the desired specifications. This includes the determination of the calibration table at the factory calibration level.

Master Projector

A master projector is a projector for which a projector license is available. Up to 15 additional projectors can be connected to the system as long as the master projector is active and connected (not switched off). The projector license is only valid if the connection to the master projector can be maintained. If the projector is disconnected from the network or switched off, the license is invalid and the ZLP-Manager can no longer be used.

Projection element

A projection element is a polyline belonging to a group. Each element can accept local changes.

Registration file

A registry file contains all entries that were set during registration.

The registration file is stored in the bin folder in the installation directory after the registration has been completed.

The name of the registry file is composed as follows: `register_{identifier}.txt`

Reference point

A reference point is a reflector point with known coordinates in the object coordinate system. It is primarily used for setup, but can also be used as a drift compensation point or placement point.

A reference point is visible in the projection area during setup. Afterwards it can be hidden or completely removed.

Reference object

A reference object is an object of the Reference object ZLP-Service class. This class serves as memory for the loaded reference points.

Clipping plane

A clipping plane is a virtual, three-dimensional surface placed in the projection area by the user. It is used to limit the projection area of one or more projectors. For example, the user can specify that a particular projector should not project behind the clipping plane. If he uses a second projector, its projection can be limited to the other side of the parting plane. In this way, the user can clearly separate the projection areas of two laser projectors. Overlapping areas and the associated double projection are avoided.

Factory calibration wall

6m x 6m calibration wall in production. Here the head position and the calibration table are determined for each projector.

Widget

A widget is a control or operating element that allows interaction with the graphical user interface. In the ZLP-Manager, these are mainly buttons in the form of silver buttons, possibly with symbols, which can be arranged in the ribbon bar.