

Instruction Manual

Original Instructions

Micro Plus



Keep for further reference!

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Identification

Manufacturer address

EnvisionTEC GmbH
Brüsseler Straße 51
45968 Gladbeck
Germany

EnvisionTEC, Inc.
15162 S. Commerce Dr.
Dearborn, MI 48120
USA

Introduction

Purpose of this Manual

This instruction manual

- describes the working principle, operation and maintenance of the machine, and
- provides important information on safe and efficient handling of the machine.

Target Group

This instruction manual is intended for:

- the customer (company operating the machine) whose responsible employees have been trained by the manufacturer or the distributor,
- trained operators for operation, and
- persons with specialist technical training (mechanics/electrical engineering) for troubleshooting/fault elimination and maintenance.

An introduction to the Micro Plus technology

The Micro Plus 3D printer features a touchscreen and an embedded PC with Wi-Fi capability. By eliminating the need to connect the Micro Plus directly to a PC, users can enjoy a more stable stand-alone system and with the added convenience of the touchscreen, the necessary files for printing can be quickly and easily transferred from any network computer directly to the Micro Plus.

Materials available for the line include solutions for a wide range of applications, including jewelry, toy, medical, industrial design and engineering and more.

The Micro Plus line includes the following variations: the Micro Plus HD, the Micro Plus Advantage and the Micro Plus XL.

This document forms an elementary part of the system, includes important notes, tolerances for calibration tasks if applicable, and must be paid close attention to both when starting up the machine and during the operation. It is therefore a good idea to keep the hardware documentation in close proximity of the machine, so that the operator can access it at all times. The document is aimed at individuals who have received qualified instruction in operating the machine.

Warranty

This instruction manual must be read carefully before installing the product and putting it into operation.

We assume no liability for damage and malfunctions resulting from failure to comply with the instruction manual. Furthermore, no warranty can be provided for faults that are due to subjecting the goods to improper use or application above average strain, nor can any warranty be provided for wearing parts.

In case any material defects or errors occur despite correct usage, EnvisionTEC offers a warranty period limited to one year starting from the moment the customer is supplied with the goods for the machine and respective accessories. The obligation of EnvisionTEC is limited to repairing or replacing defective machine parts.

Under no circumstances will EnvisionTEC assume liability for the consequences or side effects of a violation of warranty conditions, even if this has been agreed to or expected, and even in case of fault or negligence on the part of the company.

EnvisionTEC expressly refrains from granting any other warranty claims in this respect. Neither representatives/dealers nor employees of the company are authorized to increase or alter the warranty claims.

Copyright

This instruction manual must be treated confidentially. It should only be used by authorized personnel. It may only be entrusted or made available to third parties with the prior written consent of EnvisionTEC GmbH, EnvisionTEC Inc. or authorized distributors.

All documents are protected within the sense of copyright law.

No part of this documentation may be reproduced, utilized or transmitted without specific prior consent. Infringements are an offence resulting in obligatory compensatory damages. All industrial rights reserved.


Trademarks

EnvisionTEC[®], Perfactory[®], and all related product names are registered trademarks of EnvisionTEC GmbH, Germany.

Typographic Conventions

This instruction manual uses different formatting elements and symbols. Their meaning is explained in this section.

Formatting Element	Example
Enumerations are indicated by a dot.	<ul style="list-style-type: none"> • Safety gloves • Safety goggles
Instructions with a defined order are numbered consecutively.	<ol style="list-style-type: none"> 1. Loosen the screws. 2. Remove the build platform 3. Clean the holding. 4. Install the build platform. 5. Tighten the screws.

Formatting Element	Example
Cross-references or document references are in italics and highlighted in gray.	see chapter <i>Maintenance</i> see <i>Perfactory Software Suite</i> manual
Software user interface items, menu paths, file names, and product names are in bold.	input field Machine name menu File Save as... file Config.xml Start 3SP Control .
Elements of a menu path are separated by a vertical bar.	About Help...
Buttons are marked with square brackets and bold letters.	[Save]
Keys that you want to press individually or together are in angle brackets.	<Ctrl>+<S>
User input are displayed in a different font.	<code>ipconfig -all</code>
Tips for operation are marked with an icon.	

History of Changes

Date	Changes	Version
2015-11-25	Document creation	1.0
2015-11-30	<ul style="list-style-type: none"> Removed computer requirements because external PC is no longer required 	1.1
2015-12-03	<ul style="list-style-type: none"> Added VNC clients for different operating systems 	1.2
2015-12-16	<ul style="list-style-type: none"> New photos 	1.3
2016-01-11	<ul style="list-style-type: none"> Added safety warning remote machine control 	1.4
2016-01-29	<ul style="list-style-type: none"> Home calibration description changed 	1.5
2016-03-04	<ul style="list-style-type: none"> Warning added: Do not disconnect from mains when machine is switched on. 	1.6
2016-03-22	<ul style="list-style-type: none"> Added description: How to transfer job to machine. 	1.7
2016-05-10	<ul style="list-style-type: none"> Added feeler gauge to starter kit list. 	1.8
2016-05-12	<ul style="list-style-type: none"> Added description: How to retrieve log files from the machine. 	1.9

Date	Changes	Version
2016-09-16	<ul style="list-style-type: none"> Added description: How to set a password for VNC client. Updated screenshots. 	1.10
2017-05-15	<ul style="list-style-type: none"> Added grounding warning message and images. 	1.11
2018-01-19	<ul style="list-style-type: none"> Added <i>Technical Data</i> of Micro Plus XL Added description of <i>M-Type</i> basement of the machine and how to <i>Calibrate the Home Position</i> Added basement kit to <i>Starter Kit</i>. 	2.0
2018-06-08	<ul style="list-style-type: none"> Updated description of <i>Start a Job</i> and <i>Quick Start Guide</i>: manual setting of the home position before starting the job is no longer necessary Added chapter <i>Storage Conditions for Photopolymers</i> Added note on using the <i>Basement</i> Added note on closed <i>Hood</i> during build jobs Added notes about <i>Filtering Material</i> before and after build jobs Added a note about the check if the used buildstyle matches the material tag before starting a job Added recommendations to document the execution of calibration and maintenance tasks Added <i>Typographic Conventions</i> Added notes how to <i>Verify the Calibration of the Home Position</i> Added notes how to <i>Check the Grey Mask</i> 	2.1

1 Health and Safety Notes



WARNING!

Risk of injury!

- Use the machine for the intended purposes only.
 - Do not carry out changes or modifications to the machine.
 - Follow the instructions in this manual.
 - Do not carry out tasks that must be executed by trained and authorized personnel only.
 - The machine may only be operated if the protecting devices are working properly.
-

This document forms an essential part of the system and must be paid close attention when starting up the system and during operation. Please make sure that every operator of the machine reads these instructions completely before handling the machine for the first time. For further reference during operation, this document should be kept in proximity to the machine and be available to the operating personnel at all times in order to prevent operating errors and to ensure smooth and trouble-free operation.

1.1 Safety Signs and Safety Regulations

Apart from the safety information given in these instructions, all safety signs on the product itself must constantly be observed. Furthermore, the machine owner is obligated to inform each operator about the local safety regulations valid at the operation site.

1.1.1 Representation of Safety Symbols

Safety instructions are indicated by a pictogram and a signal word. The signal word describes the severity of the risk.

Pictogram	Signal Word	Description
	DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	CAUTION	Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.
	NOTICE	Application hints and particularly useful information.
	IMPORTANT	Indicates an obligation to special behavior or an activity required for safe machine handling.

1.1.2 Specific Risk Signs

Electrical danger	Hand crushing	UV radiation	Hot surface

1.1.3 Mandatory Action Signs

Use protective hand wear	Use protective goggles	Use protective clothing

1.2 General Safety Instructions

1.2.1 Intended Use

The printers of the Micro Plus line is designed to produce small, premium components requiring a high level of precision. The machines work with industrial UV LEDs as light source.

It is the machine owner's responsibility to ensure that the machine is used for the intended purpose and within its limitations only.

This includes that the electrical requirements indicated in chapter *Technical Data* and on the rating plate of the machine must not be exceeded.

1.2.2 Reasonably Foreseeable Misuse



IMPORTANT

Improper use may cause hazards.

Any other use than that defined in section *Intended Use* or which goes beyond that use is considered misuse!

Reasonable foreseeable misuse is e.g.:

- Operating the machine with inappropriate materials
- Exceeding the technical values specified for normal operation
- Operating the machine with damaged machine parts or electric cables
- Unauthorized modifications and changes to the machine

For any damage resulting from misuse:

- The machine owner bears the sole responsibility.
- The manufacturer assumes no liability whatsoever.

1.2.3 Modifications or Changes

Unauthorized modifications or changes render all claims for liability and guarantees null and void.

Therefore, do not make any alterations or complements to the machine without previous consultation and written confirmation of the manufacturer.

Spare and wear parts as well as auxiliary materials

The use of spare and wear parts from third party manufacturers can lead to risks. Only use original parts or parts released by the manufacturer.

The manufacturer shall accept no liability for damage caused by the use of unreleased spare and wear parts or auxiliary materials not released by the manufacturer.

1.2.4 Risks in Handling the Machine

Operating the machine may cause risks

- to the health and safety of the operator or third persons;
- to the machine; and
- to other goods.

Knowledge of the safety information and user information of this instruction manual is a basic requirement for safe handling and fault-free machine operation.



IMPORTANT!

This instruction manual must always be kept where the machine is operated! This instruction manual must be easily accessible for operators and maintenance personnel.

Furthermore, observe:

- general and local regulations pertaining to accident prevention and environmental protection;
- the information contained in the supplied safety data sheets.

1.2.5 Residual Risks

The machine has been constructed according to the state-of-the art and the approved safety regulations. Nevertheless, the operation of the machine can cause especially the following risks to the health and safety of the operator or third persons.

Mechanical hazards

- Risk of injury from hand crushing caused by automatically moving machine parts inside the machine.
Always keep the hood closed when operating the machine. The machine may only be operated if the protecting devices are working properly.
- The machine may only be operated by instructed and specially trained personnel. Only execute the calibration tasks described in this user manual.

For the remaining tasks, have the machine calibrated by trained and authorized service personnel only.

- Risk of injury from crushing caused by machine overturning during transport.
Do not try to move the machine yourself.
Have the machine transported by trained personnel only.
- Risk of injury caused by improper handling of the build platform.
Only remove the build platform if you cannot clean it inside the machine.
Before taking out the build platform make sure that all persons are clear of the danger zone.
Avoid unnecessary movements. Avoid non-ergonomic joint positions.
- Risk of slipping, stumbling or falling of persons: Keep the floor of the machine area clear of loose cables, objects or liquids.

Electrical hazard

Improper use of conducting components can lead to severe injuries.

Make sure that all conducting components are in good order and condition!

The switch cabinet may be opened by trained and authorized service personnel only.

Particular hazards can be caused by:

- Incomplete covers or broken parts
- Improper assembly, incorrect wiring, defective parts etc.

Do not try to set up the machine yourself. Have the machine set up by trained and authorized service personnel only.

UV radiation hazard

Looking into the projector with unprotected eyes may cause damage to your eyes.

Use protective goggles!

Particular hazards can be caused by:

- Incomplete covers or broken parts;
- Improper assembly, incorrect wiring, defective parts etc.

UV radiation can damage the skin. Wearing safety gloves!

Hazardous substances

Risk to health from photopolymers:

- Use the appropriate personal protective equipment.
- Observe the relevant Material Safety Data Sheets supplied with the photopolymers.

Particular hazards can be caused by:

- Setting an inappropriate temperature:
The material may overheat. Overheated material may cause the release of toxic gases/vapors and burnings.
Do not change the resin temperature set by the service technician.

Thermal hazards

Touching the hot light source might result in severe burns:

- Use heat-resistant protective gloves!

Hazards caused by insufficient stability

- The machine must be positioned on a flat and even surface to prevent the machine from moving.
- Check the horizontal orientation of the machine at regular intervals. This can be done by use of a spirit level placed on the build platform.
- If the machine is not levelled any more, e. g. if it has suffered an impact, have the machine repositioned by trained and authorized service personnel.

1.2.6 Risks when handling photopolymers



WARNING!

Risk of injury!

The use of the photopolymers intended for the machine may cause risks to the health and safety of the operator or third persons.

In order to ensure a safe handling of the photopolymers, the following hazard and precautionary statements must be observed.

Hazard statements

- H302 Harmful if swallowed.
- H315 Causes skin irritation.
- H317 May cause an allergic skin reaction.
- H318 Causes serious eye damage.
- H319 Causes serious eye irritation.
- H332 Harmful if inhaled.
- H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
- H335 May cause respiratory irritation.
- H360f May damage the unborn child. Suspected of damaging fertility.

- H361f Suspected of damaging fertility.
- H373 May cause damage to organs through prolonged or repeated exposure.
- H412 Harmful to aquatic life with long lasting effects.
- H413 May cause long-lasting harmful effects to aquatic life.

Other hazards:

- Polymerization with heat evolution may occur in the presence of radical forming substances (e.g. peroxides), reducing substances, or heavy metal ions.
- People who suffer from skins problems, asthma, allergies, chronic or recurring respiratory illnesses must not be deployed in processes, which use this substance. Process vapors can irritate airways, skin and eyes.

Precautionary statements

- P101 If medical advice is needed, have product container or label at hand.
- P102 Keep out of reach of children.
- P201 Obtain special instructions before use.
- P261 Avoid breathing dust/fume/gas/mist/vapors/spray.
- P264 Wash thoroughly after handling.
- P270 Do not eat, drink or smoke when using this product.
- P271 Use only outdoors or in a well-ventilated area.
- P273 Avoid release to the environment.
- P280 Wear protective gloves/protective clothing/eye protection.
- P302+P352 If on skin: Wash with water and soap.
- P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P308+P313 If exposed or concerned: Get medical advice/attention.
- P404 Store in a closed container.
- P405 Store locked up.
- P501 Dispose of contents and container in accordance with local regulation.


IMPORTANT

Do not use other materials than the photopolymers delivered by EnvisionTEC.

Also make sure that the relevant Material Safety Data Sheets supplied with the photopolymers are observed.

Those components of the photopolymers delivered by EnvisionTEC that have been classified as hazardous do not have a threshold limit value (TLV). Therefore, it is not necessary to give concrete instructions concerning the TLV.

Please observe, however, the following hint concerning air change:



IMPORTANT

Make sure that the extraction is sufficient. EnvisionTEC recommends an air change of 25 m³/h per m² effective surface of the laboratory as described in EN 13779.

1.2.7 Interventions in Emergency Situations

An intervention in emergency situations includes individually or in combination:

- Shutdown in case of an emergency
- First aid measures and medical attendance

Shutdown in Case of an Emergency

In case of an emergency please press the power button to immediately shut down the machine.

First aid measures and medical attendance

Initiate the necessary first aid measures and seek medical attendance.

If a person has been exposed to the photopolymer, please follow the instructions given in the respective Material Safety Data Sheet.

1.3 Owners' Responsibilities

The machine has been produced for commercial use. Therefore, it lies within the owner's responsibility to ensure that all general safety regulations and codes of practice as well as the safety measures described in this manual are observed at all times. Apart from this, all environmental regulations must be observed when disposing of any of the components or consumables.

Also make sure that the Material Safety Data Sheets for the materials used are observed and kept in proximity to the machine.

1.4 Operators' Position

The machine may only be operated by one person. The operator stands in front of the machine, so that they can see the screen and reach the keyboard and mouse with their hand.

1.5 Personal Qualification

Activity \ Employees	Personnel specially trained for the activity	Trained operators	Instructed personnel with specialist training (mechanics/electrical engineering)
Transport	X	–	–
Set-Up	–	–	X
Basic calibration tasks	–	X	X
Advanced calibration tasks	–	–	X
Operation	–	X	X
Troubleshooting and fault elimination	–	X	X
Maintenance	–	X	X
Disposal/Recycling	X	–	–

Legend: X permitted, – not permitted

1.6 Personal Protective Equipment



IMPORTANT

When working with photopolymers, observe the instructions regarding personal protective equipment in the relevant Material Safety Data Sheets supplied.

For reasons of accident prevention, make sure that all operators wear suitable protective clothing:

- protective gloves
- safety boots
- laboratory coats
- safety goggles

2 Technical Data

2.1 Mechanical Data

	Micro Plus HD	Micro Plus Advantage	Micro Plus XL
Length	23.4cm (9.2 in.)	23.4cm (9.2 in.)	23.4cm (9.2 in.)
Width	24.1cm (9.5 in.)	24.1cm (9.5 in.)	24.1cm (9.5 in.)
Height	58.9cm (23.2 in.)	61.5cm (24.2 in.)	68,5cm (27 in.)
Weight	16kg (35 lbs)		
Build Envelope	45mm x 28mm x 100mm	65mm x 40mm x 100mm	120mm x 74mm x 85mm
X/Y Resolution	30µm	60µm	X: 82µm Y:105µm
Dynamic Z Resolution	25µm and 100µm (material dependent)		

2.2 Power Requirements

A clean single-phase 110 volt AC line at 3 amps with clean ground (directly from the earth of building or ground of) is recommended. For overseas use, the power supply is universal so it can handle voltages from 100 VAC and 250 VAC/ 50-60 Hz. Having the machine hooked up to a battery backup to ensure uninterrupted power supply is recommended. The battery backup should be rated to support two computers for 8 hours.



WARNING!

Risk of injury! Risk of damage to the machine!

Static control area! Failure to use the grounding devices may lead to damage or injuries!

- Connect ground wire before using!
- Only use the grounding adapters of the plug & socket type targeted for the country of intended use of the machine!

Grounding of electrical receptacles is an important safety feature that minimizes the risk of electric shock and protects electrical equipment from damage. For proper operation and in order not to disrupt the operation of the machine, it must be grounded before starting working with it!

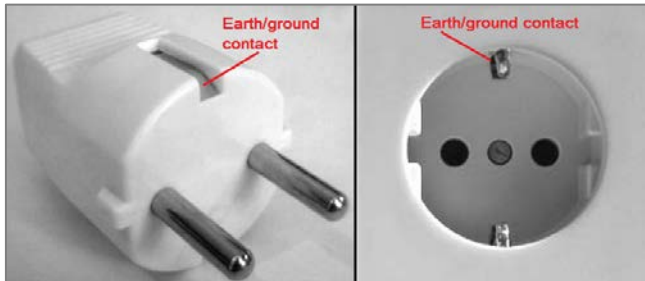


Figure 1: Grounded plug and outlet for Europe

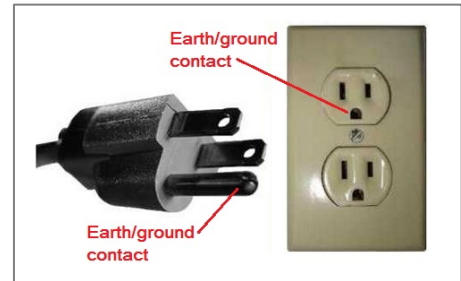


Figure 2: Grounded plug and outlet for the US

3 Intended Environmental Conditions

3.1 Environmental Conditions for Machines

- Ensure that the room temperature does not fall below 21°C or exceed 28°C. Generally, the ideal working temperature is around 23°C.
- Humidity is not to exceed 70%.
- Do not set up the machine in humid or dusty places or in places where it may come into contact with smoke or steam. That is very important for getting usable build results.
- Do not expose the machine to direct sunlight or any other UV radiation.
- The room must be temperature controlled to ensure the correct operation of the machine.
- Air conditioning units should be at least three meters away from the machine with no airflow pointing directly at the machine.
- Do not place the machine near to any door way, avoid temperature drops.
- Room must allow heat generated from the system to dissipate at 0.03 m³/min airflow.

3.2 Storage Conditions for Photopolymers

Photopolymers should be stored under the following conditions:

- at room temperature
- dry
- in closed bottles
- lightproof

If photopolymers are filled in the basement, the machine hood should always be closed. If you don't need the basement for a longer time, pack the basement and store it under the same conditions as mentioned above.



NOTICE

You can find more specific storage conditions for photopolymers in the appropriate cookbooks.

4 Unpacking and Positioning

4.1 Unpacking the Machine

Your new machine will come shipped packaged tightly in one box. Before opening the box check to make sure that no damage has been sustained or any sensors have been broken. If these are present please inform the office immediately.

If everything looks to be in good condition open the box and carefully lift out the machine and place it feet down on the designated space.

4.2 Positioning the Machine



IMPORTANT

Risk of damage to the machine!

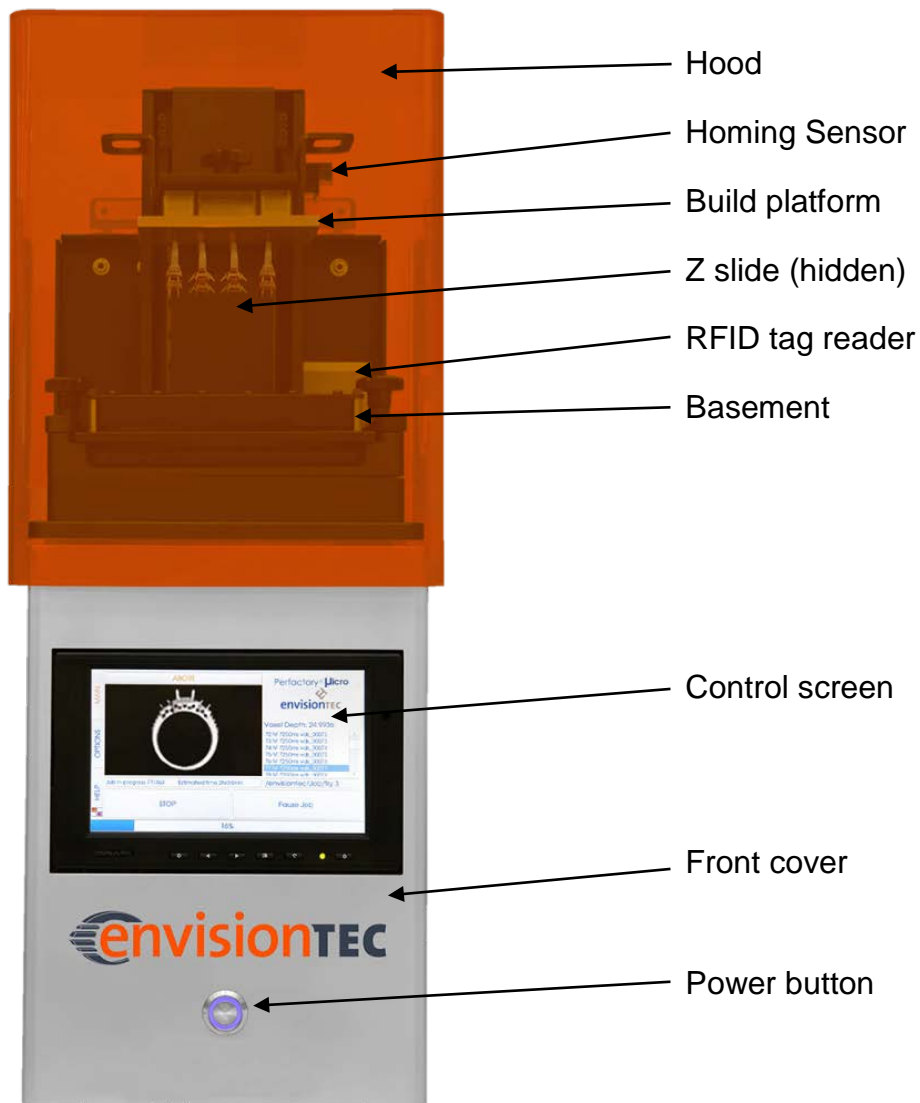
Incorrect positioning of the machine can cause damage to the machine and any parts built on the machine. Please follow the guidelines!

In order to obtain the best possible results, positioning for the machine should take the following factors into account:

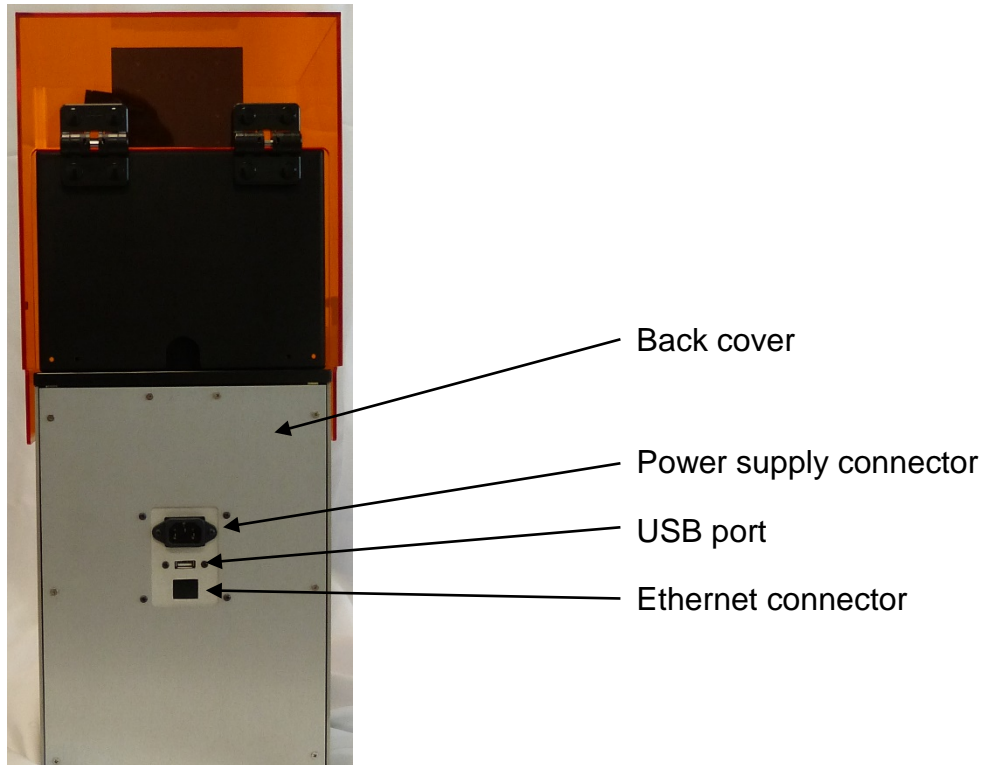
- Avoid installing the product in a place exposed to vibrations or impacts. Make sure the area it is placed on is a flat and even surface.
- Ensure you have sufficient clean electrical sockets near the machine location.
- A minimum 31cm of clearance is required at the rear of the machine to gain access to the main power plug and USB port.
- A minimum of 62cm of clearance is required on both sides to prevent overheating.

5 Construction of the Machine

5.1 Front View



5.2 Back View



5.3 Hood



IMPORTANT

The protection hood must always be closed, especially if a basement with material is inside the machine and during build jobs.

The hood of this machine does not have a locking mechanism and can be opened or closed by simply tilting it up or down.

5.4 RFID Tag Reader



IMPORTANT

Risk of damage to the machine!

Ensure that you put the material tag into the reader as shown in the image! Failure to do so can result in damage to the RFID tag and reader!

The software is written utilizing the very latest RFID technology (Radio Frequency Identification). This helps the user to keep track of the lifetime left on their material.

It also helps prevent accidents by not allowing usage of a material that doesn't match the build style or RFID tag. It functions by placing the RFID card that comes with your material into the clips on the reader where it is read and processed by the machine to ensure accuracy.



Figure 3: RFID Tag Reader and Tag

5.5 Basement



IMPORTANT

It is recommended to use a separate basement for each kind of material to avoid contamination.

If this is not possible the basement has to be cleaned carefully if the material has been changed.

5.5.1 Pre-Stretched Assembly (PSA)

The Pre-Stretched Assembly, or most commonly known as PSA, has been designed to work with the downward movement of the build platform.

The PSA consists of two metal frames with a special membrane stretched between them, which fits snugly over a piece of glass. Between the glass and the membrane we have a separation film which acts to stop the PSA from sticking to the glass. As the build platform moves up taking the exposed part away from the PSA, it pulls the membrane up finally releasing it and allowing the parts to separate. The build platform then moves back down and the next image in the sequence is projected; the cycle repeats itself.



Figure 4: PSA Basement

5.5.2 M-Type

The M-Type features optical glass coated in a film that is similar to a Mylar-type film and allows for easy separation of each exposure layer during the 3D printing build. The outer perimeter of the tray is a flexible silicone.



Figure 5: M-Type Basement

5.6 Calibration Plate



NOTICE

The calibration plate is only available with the M-Type basement.

The calibration plate consists of a carrier glass plate and a smaller calibration glass plate attached to this.

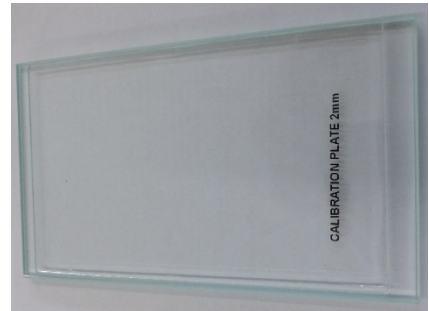


Figure 6: Calibration Plate

6 Software Training

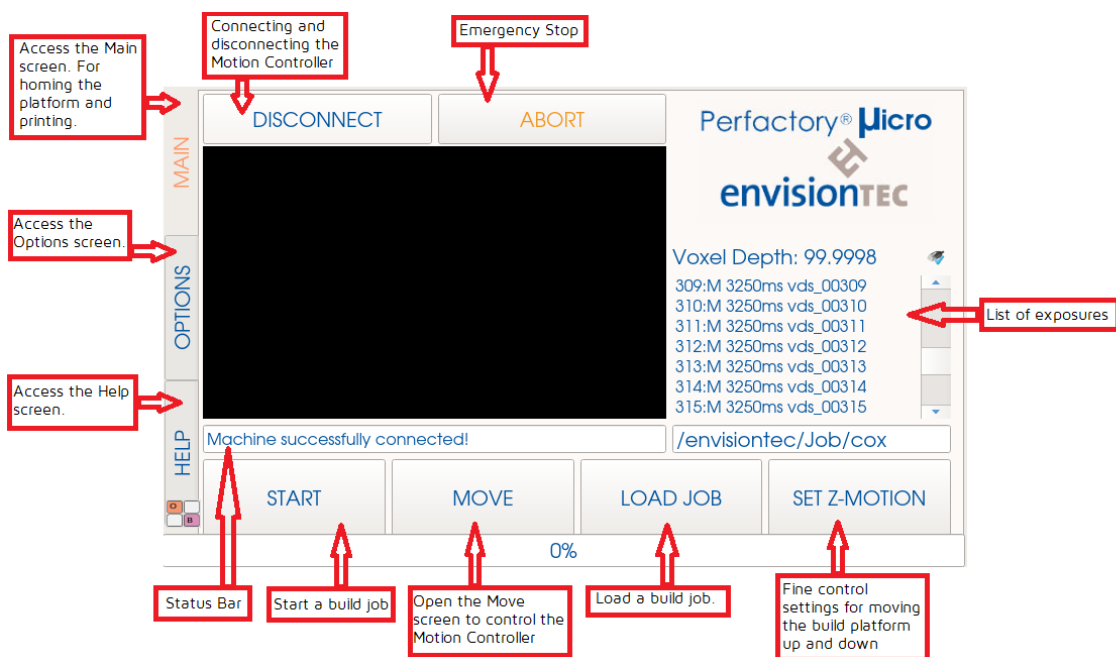


NOTICE

If there is anything not covered here that you need answers for, please contact customer support!

6.1 Micro Plus Controller Software

6.1.1 Main Tab

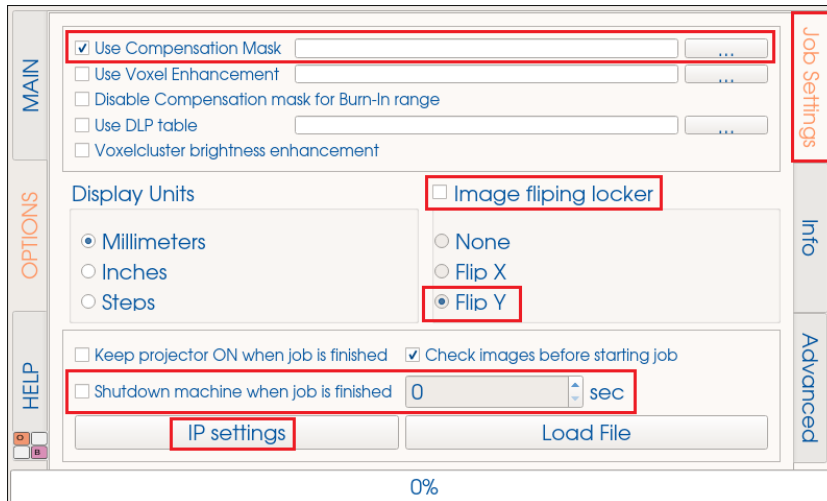


6.1.2 Options Tab

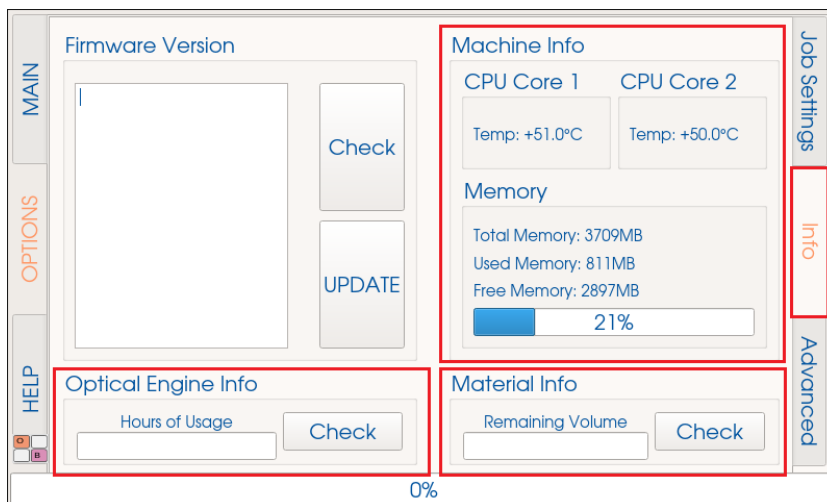
In the **Options** tab, there are three tabs

- Job Settings
- Info
- Advanced

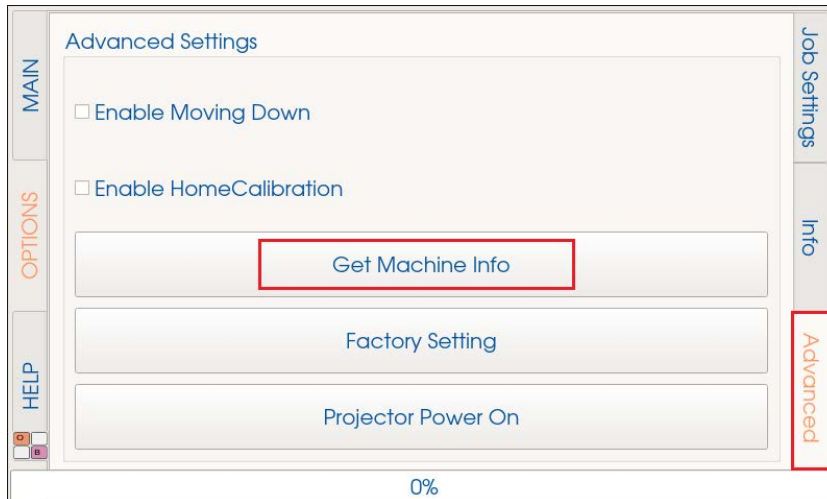
On the **Job settings** tab you can set your **Compensation Mask** and **IP Settings** (for internet), as well as **Shutdown Machine** when job is finished. Make sure that the **Image flipping locker** check box is always cleared and that the corresponding radio button for **Flip Y** is always selected as shown in the figure.



On the **Info** tab you can check the statistics of the machine. You can check how many hours are on the light engine and how much material is left on your material tag. You can also check the CPU cores' temperature and memory statistics.



The **Advanced** tab allows you, amongst other options, to turn on and off the **Home Calibration** function (see chapter *Calibrate the Home Position*) and get **Machine Info** by clicking the **[Get Machine Info]** button. The corresponding information is logged into the log file.



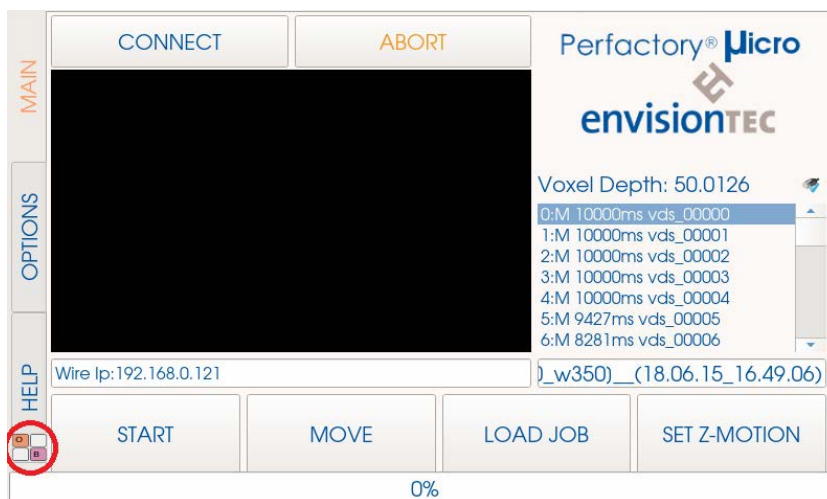
6.1.3 Help Tab

The **Help** tab is for service use only and allows access to unlocking service mode.

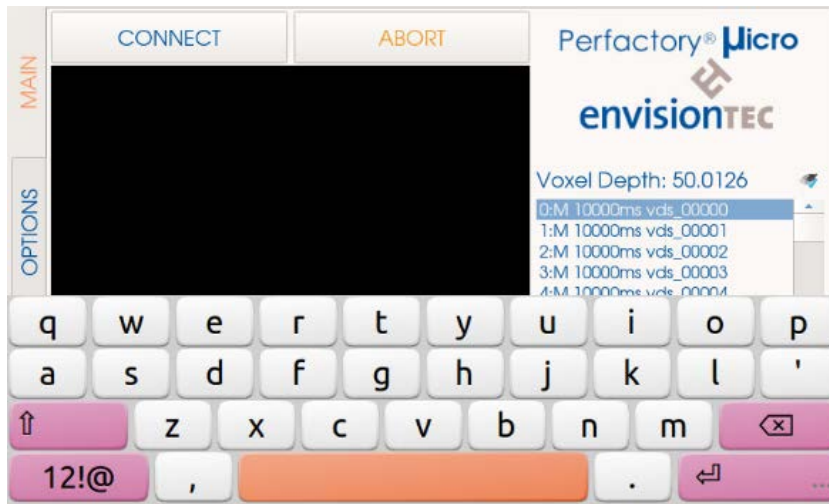
6.1.4 Virtual Keyboard

The machine provides a virtual keyboard that allows you to enter letters, numbers and symbols in a comfortable way.

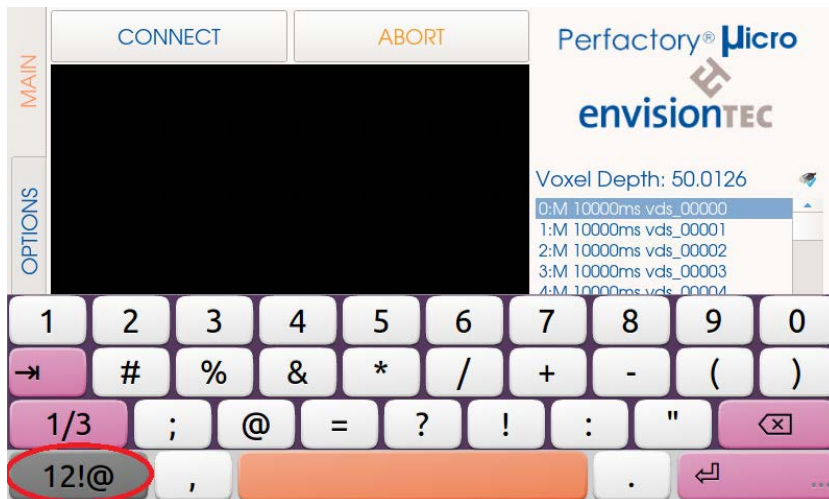
To activate the keyboard, press the **OB** virtual key button located in the bottom left corner:



The virtual keyboard appears. It now allows you to enter letters:

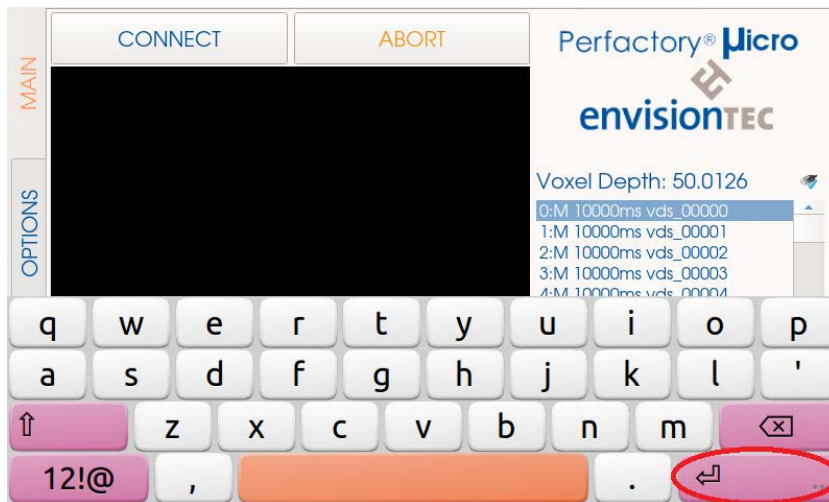


To change to numbers and symbols, press the **12!@** button:

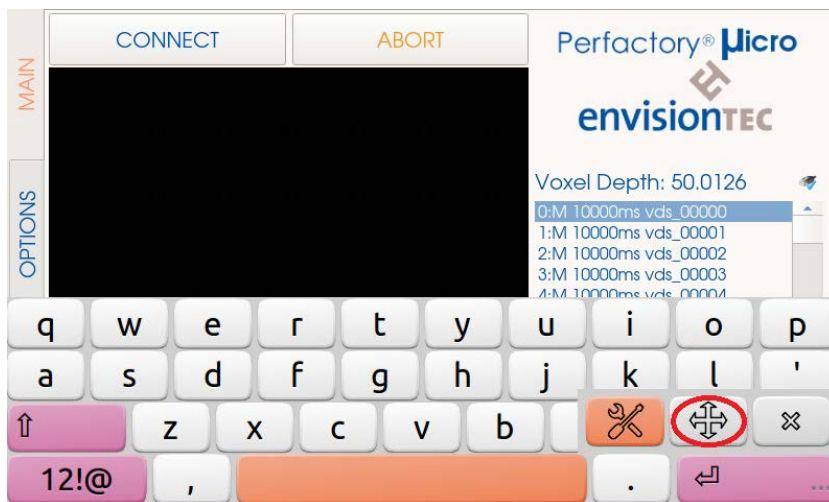


The virtual keyboard changes to numbers and symbols. Press the **12!@** button again to get back to letters.

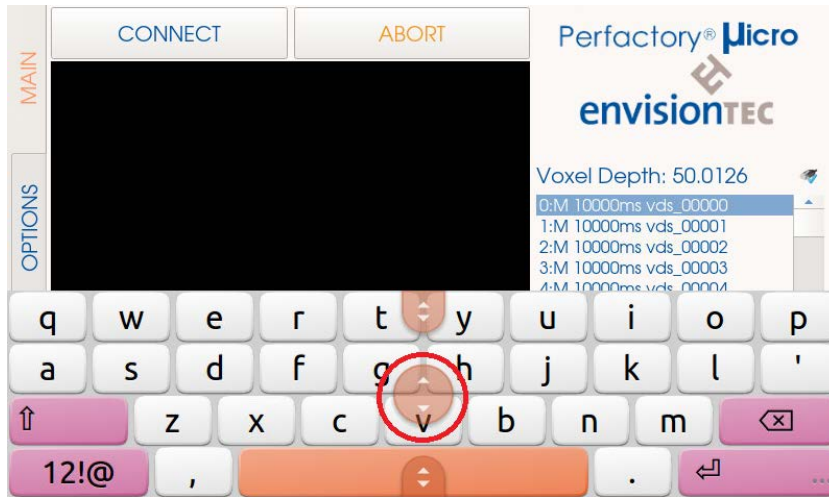
As the virtual keyboard always hides part of the screen, it has been designed to move upwards and downwards. To do this, press the enter button in the bottom right corner and hold it for one second.



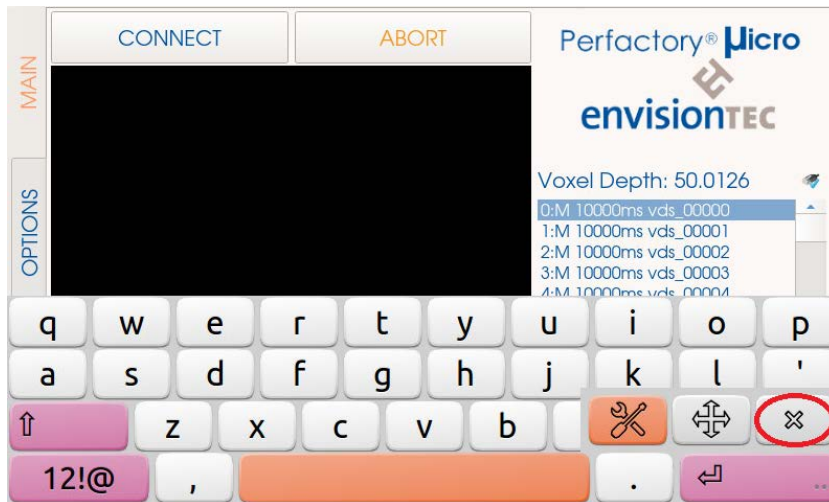
New buttons appear. Press the arrow button.



In the center of the virtual keyboard, a new button appears. Use it to drag the virtual keyboard upwards or downwards.



To hide the virtual keyboard again, first press the enter button in the bottom right corner and hold it for one second. New buttons appear. Press the x button. The virtual keyboard is hidden.



6.2 Perfactory Software Suite

You will find information on the Perfactory Software Suite in the *Perfactory Software Suite manual*.

6.3 Magics EnvisionTEC

You will find information on Magics EnvisionTEC in the *Magics EnvisionTEC manual*.

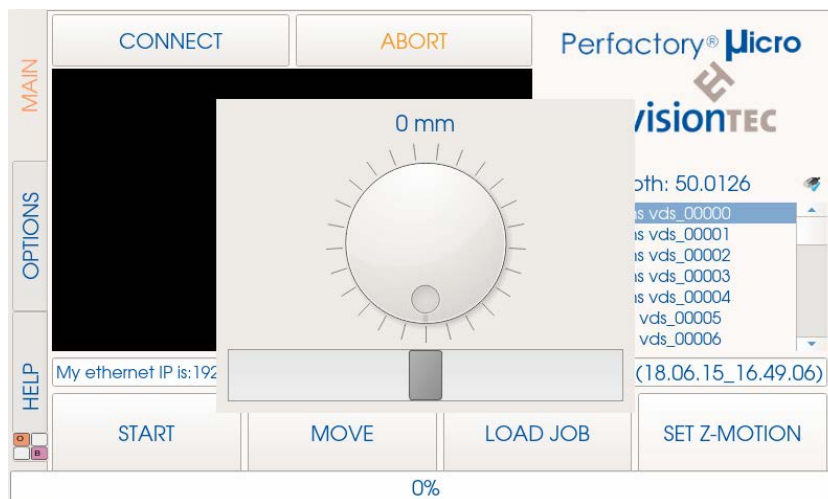
7 Main Functions

The next sections describe the main functions you are going to use. As there are no buttons on the machine to control it everything you are going to want to do is going to be within this controller program.

7.1 Prepare the Machine for a Job

First thing is to connect to the motion controller. By pressing the **[Connect]** button at the top of the **Main** tab you will tell the machine to activate its Z-axis slide.

You can check to make sure that this has been activated properly by clicking on the **[Move]** button in the **Main** tab pressing the **[Move down Fast]** and **[Move up Fast]** buttons and making sure the building platform moves along the Z-axis. You can also move the build platform up or down by a specific number of millimeters. You do this by using the **[Set Z Motion]** button on the **Main** tab. Use the slider bar at the bottom to set the whole number and the turn dial to set the decimal. Once you have the amount you want, press the **[Set Z Motion]** button again and press the new button **[Z-move by (your number) mm]**. When done, press the **[Reset Z-Motion]** button. If the build platform does not move up, the reason could be that it has already reached its highest point.



Next, take your basement and fill it with roughly half way (between 10mm and 12mm) of material. Before doing this, make sure your material has been properly mixed. Never fill the basement over half full as it will result in material spilling out and into the machine. Place the basement into the machine by loosening the knobs on either side and sliding it in. Tighten the knobs again once the basement is in place.

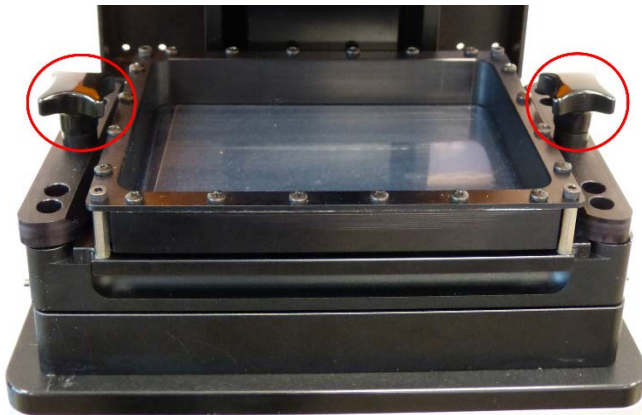


Figure 7: Basement screws



IMPORTANT

Risk of damage to the machine!

It is important to always remove the platform before taking the basement assembly out of the machine!

Failure to do so can result in material dripping down into the safety glass causing failed builds and ruined equipment!

7.2 Calibrate the Home Position

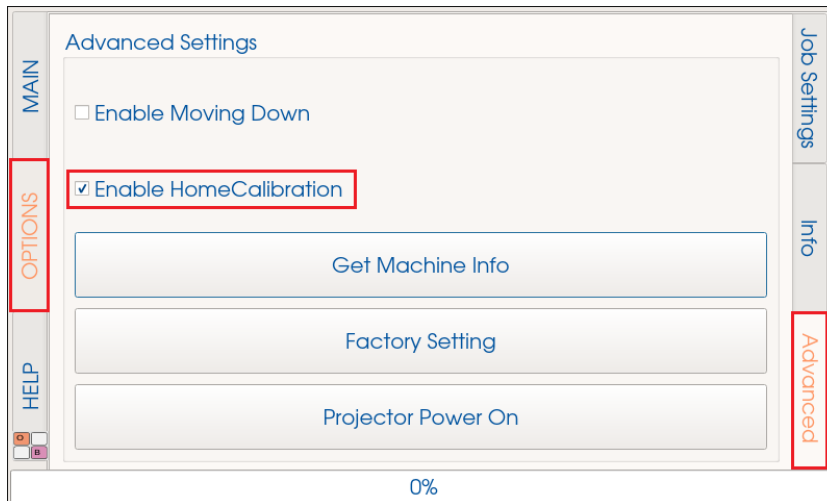


NOTICE

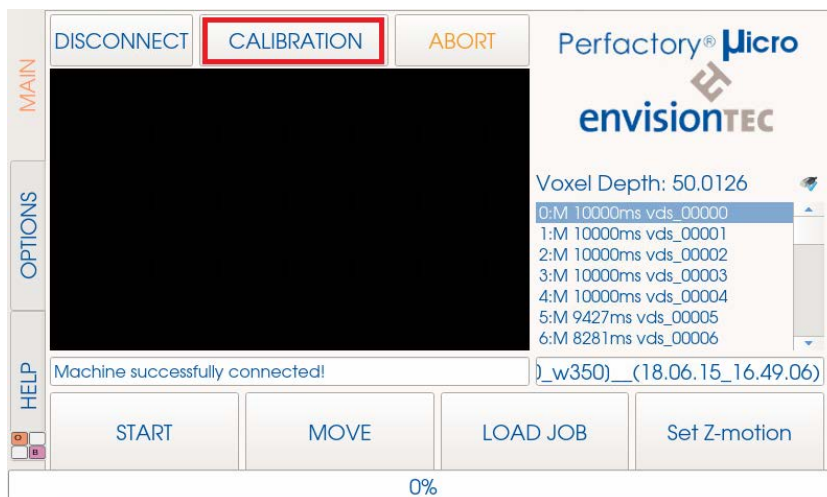
The machine is already calibrated at the factory, so calibration is usually not required.

However it is recommended to document the execution of the calibration, including date and performing operator.

Go to **Options | Advanced** and enable the **Enable HomeCalibration** checkbox.



Click the **Main | Connect** buttons. Once the machine is connected, click the **[Calibration]** button. The home calibration dialog is displayed.



At this time, remove the platform. Empty the basement and clean of all material.



IMPORTANT

It is important to always remove the platform before taking the basement out of the machine!

Failure to do so can result in material dripping down into or onto the machine causing failed builds and damaged equipment!

If you use the PSA basement



NOTICE

The next steps describe the calibration process for machines with the PSA basement.

Remove the PSA from the lower part of the basement. To do this, loosen the four screws at the corners on top of the PSA.

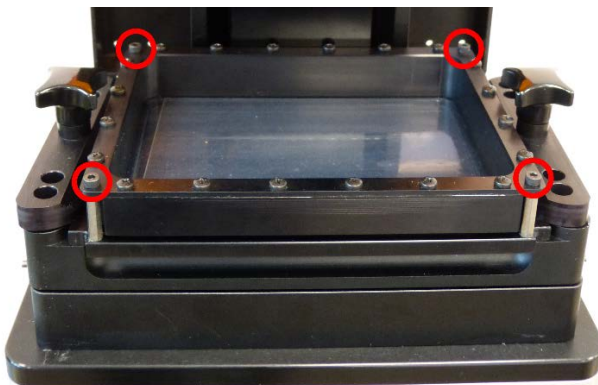
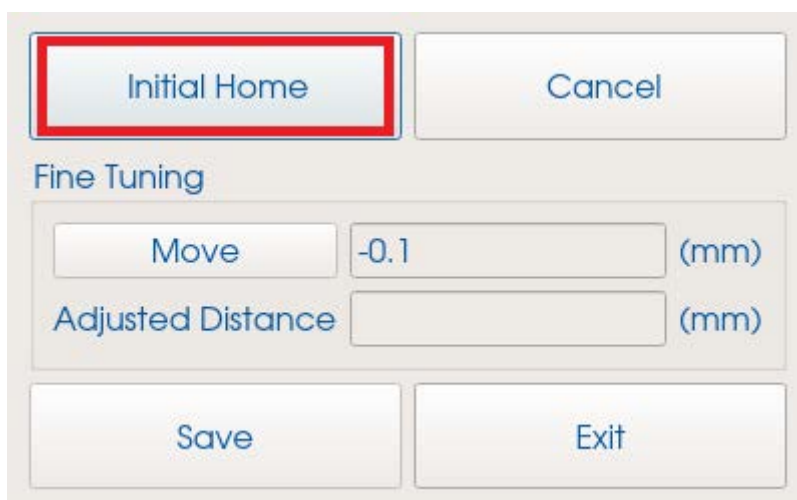


Figure 8: PSA screws

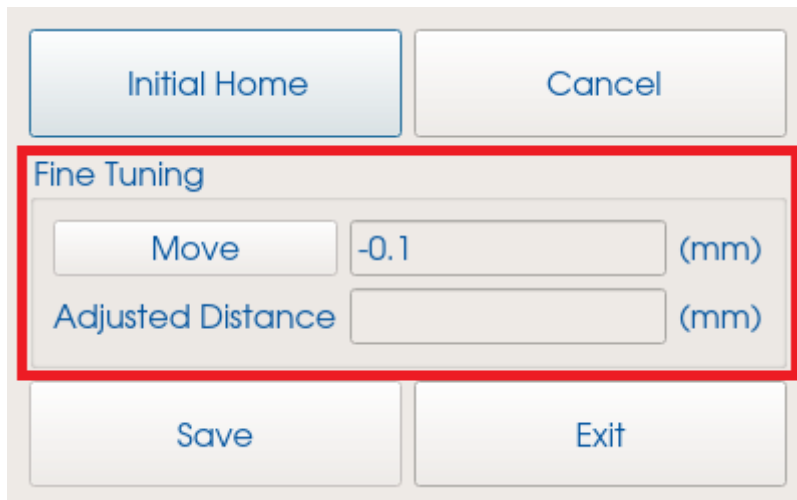
Then take off the PSA assembly so that only the glass plate remains on the machine. Put a sheet of paper on the glass plate to prevent the glass from being scratched.

In the home calibration dialog, click the **[Initial Home]** button.



The following warning message appears: “Initial home distance exceeded the safe distance! Safe distance will be used for initial homing!” This is a notification that the build platform will only be moved down to a safe distance from the glass plate to ensure no damage is done to the glass plate. Press **[OK]**.

Now the build platform will move down into position. Once the build platform has finished moving, you will use the **Fine Tuning** section of the screen to adjust the final position of the build platform. The maximum step size in this section is 10.0 mm.



It is best to start at -0.5 until it looks like the platform is just about to touch the glass plate. Switch to -0.1 until it is touching the basement lightly. Input -0.05 or -0.01 until the platform is snug against the glass plate. To check the tightness of the platform against the glass plate, insert a 0.15 mm feeler gauge between the build platform and the paper and slide it in and out at the four corners. The platform should be snug against the glass plate but not so tight that it is impossible to go in and out with the feeler gauge.

If one corner is too tight to get the feeler gauge between the build platform and the glass plate, you have to adjust the parallelism with the screws in the four corners of the basement holder.

In each of the four corners there are two screws for adjusting the parallelism: The outer screws (see figure, no. 3) push against the machine frame, the inner screws (see figure, no. 2) prevent the basement from coming up. Furthermore, there are four locking screws (see figure, no. 1) on the outside of the basement holder.

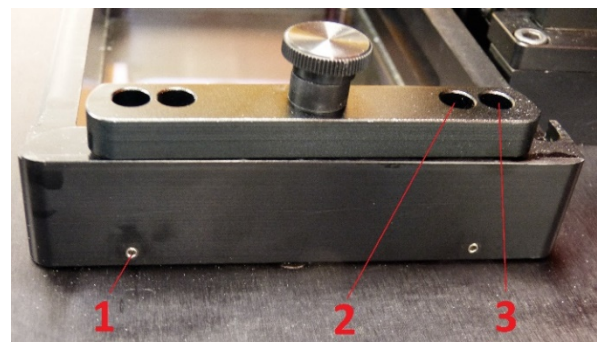


Figure 9: Screws for adjusting the parallelism

Start your adjustment with the unlocking of the four locking screws.

If you want to increase the gap between build platform and glass plate in one or more of the corners, you need to bring the glass plate down. To do this, first turn the outer screws counter-clockwise (e. g. ¼ turn) to move the glass plate down. Then turn the inner screws clockwise by the same amount of turns to tighten the glass plate.

If you want to decrease the gap between build platform and glass plate in one or more of the corners, you need to bring the glass plate up. To do this, first turn the inner screws counter-clockwise (e. g. ¼ turn) to loosen the glass plate. Then turn the outer screws clockwise by the same amount of turns to lift the glass plate up. Thus, you always turn the outer screws against the inner screws.

After increasing or decreasing the gap, check the gap again with the feeler gauge. If the gap is too big, move down the platform by another -0.01 steps until it fits. If a corner or side is again too tight, reply the procedure of increasing or decreasing the gap.

Always enter a negative number in the input field as we are bringing the build platform down. If you do accidentally bring the build platform down too far you will enter a positive number to move the platform up.

Once you have the platform where you want it, lock the outer screws with the headless screws on the outside of the basement holder, remove the feeler gauge and the sheet of paper.

After that please move the platform down for -0.05 mm and press the **[Save]** button.

The calibration of the home position is now completed.

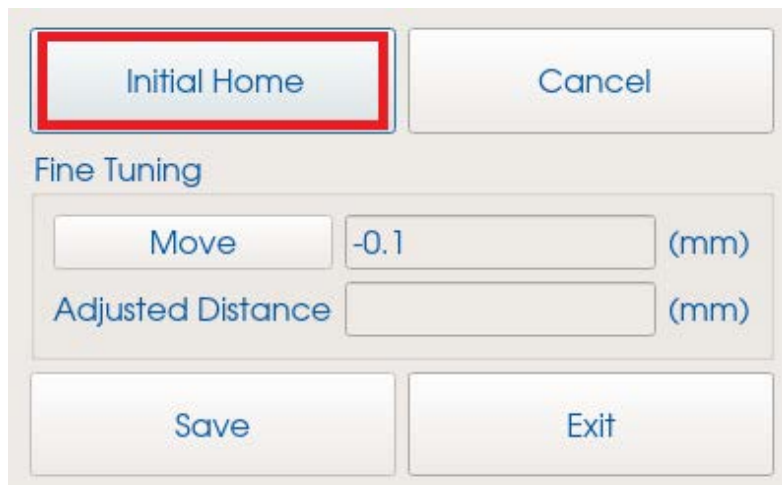
If you use the M-Type basement



NOTICE

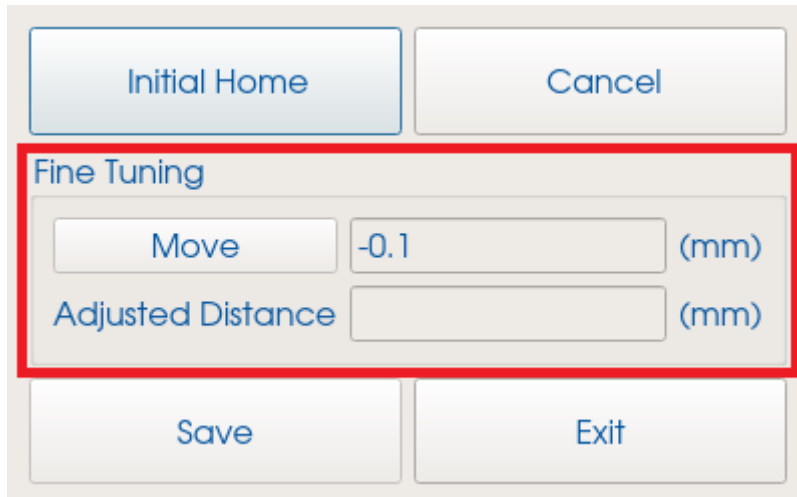
The next steps describe the calibration process for machines with the M-Type basement and calibration plate.

Insert the calibration plate in the machine. In the home calibration dialog, click the **[Initial Home]** button.



The following warning message appears: “Initial home distance exceeded the safe distance! Safe distance will be used for initial homing!” This is a notification that the build platform will only be moved down to a safe distance from the calibration plate to ensure no damage is done to it. Press **[OK]**.

Now the build platform will move down into position. Once the build platform has finished moving, you will use the **Fine Tuning** section of the screen to adjust the final position of the build platform. The maximum step size in this section is 10.0 mm.



It is best to start at -0.5 until it looks like the platform is just about to touch the calibration plate. Switch to -0.1 until it is touching the basement lightly. Input -0.05 or -0.01 until the platform is snug against the calibration plate. To check the tightness of the platform against the calibration plate, insert a 0.15 mm feeler gauge between the build platform and the calibration plate and slide it in and out at the four corners. The platform should be snug against the calibration plate but not so tight that it is impossible to go in and out with the feeler gauge.

If one corner is too tight to get the feeler gauge between the build platform and the calibration plate, you have to adjust the parallelism with the screws in the four corners of the basement holder.

In each of the four corners there are two screws for adjusting the parallelism: The outer screws (see figure, no. 3) push against the machine frame, the inner screws (see figure, no. 2) prevent the basement from coming up. Furthermore, there are four locking screws (see figure, no. 1) on the outside of the basement holder.

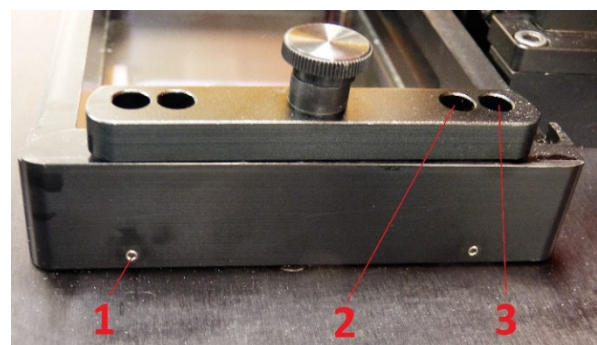


Figure 10: Screws for adjusting the parallelism

Start your adjustment with the unlocking of the four locking screws.

If you want to increase the gap between build platform and calibration plate in one or more of the corners, you need to bring the calibration plate down. To do this, first turn the outer screws counter-clockwise (e. g. $\frac{1}{4}$ turn) to move the calibration plate down. Then turn the inner screws clockwise by the same amount of turns to tighten the calibration plate.

If you want to decrease the gap between build platform and calibration plate in one or more of the corners, you need to bring the calibration plate up. To do this, first turn the inner screws counter-clockwise (e. g. $\frac{1}{4}$ turn) to loosen the calibration plate. Then turn the outer screws clockwise by the same amount of turns to lift the calibration plate up. Thus, you always turn the outer screws against the inner screws.

After increasing or decreasing the gap, check the gap again with the feeler gauge. If the gap is too big, move down the platform by another -0.01 steps until it fits. If a corner or side is again too tight, reply the procedure of increasing or decreasing the gap.

Always enter a negative number in the input field as we are bringing the build platform down. If you do accidentally bring the build platform down too far you will enter a positive number to move the build platform up.

Once you have the build platform positioned, lock the outer screws with the headless screws on the outside of the basement holder, and remove the feeler gauge and the sheet of paper.

After that please move the platform down for -0.2mm and press the **[Save]** button.

The calibration of the home position is now completed.

7.2.1 Verify the Calibration of the Home Position

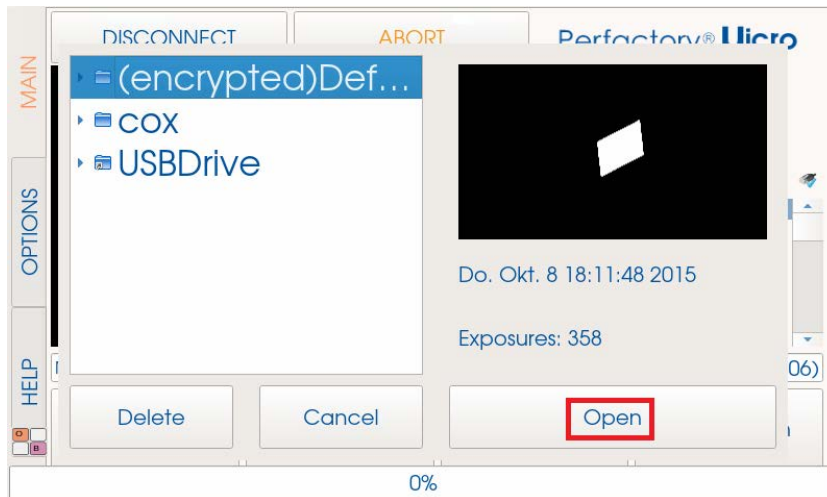
To check if the home position has been set correctly, the following steps are recommended:

1. When building the first job after setting the home position, add a flat additional structure to your model on all four corners of the build platform.
2. Build your model and the additional structures.
3. After completing the construction job, measure the thickness of the four additional structures.
4. Compare the thickness with the given thickness from the buildstyle.
 - If there is a deviation of more than 100μ in at least one of the four additional structures, the home position is not set correctly. In that case, repeat the procedure for setting the initial build position.
 - If the deviations of all four additional structures are smaller than 100μ , then the home position is set correctly.

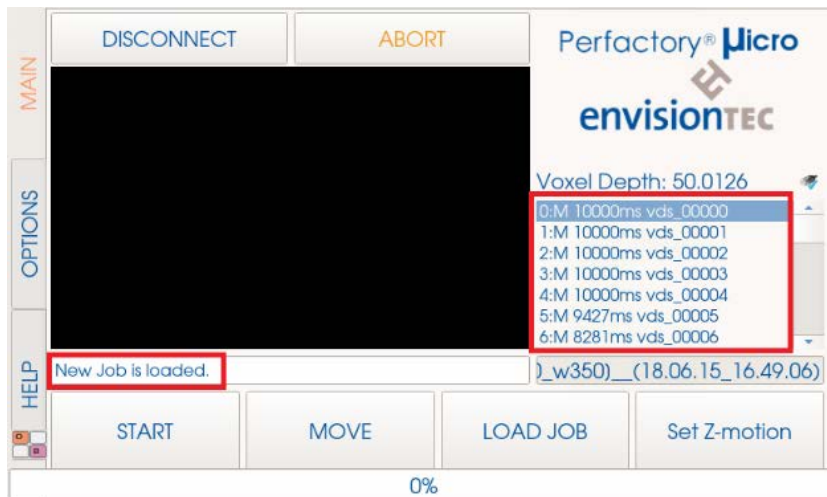
7.3 Load a Job File

Once the build platform is homed, you have to load a job file. To do this press the **[LOAD JOB]** button which is located directly under the black image rectangle.

This screen will be displayed then:



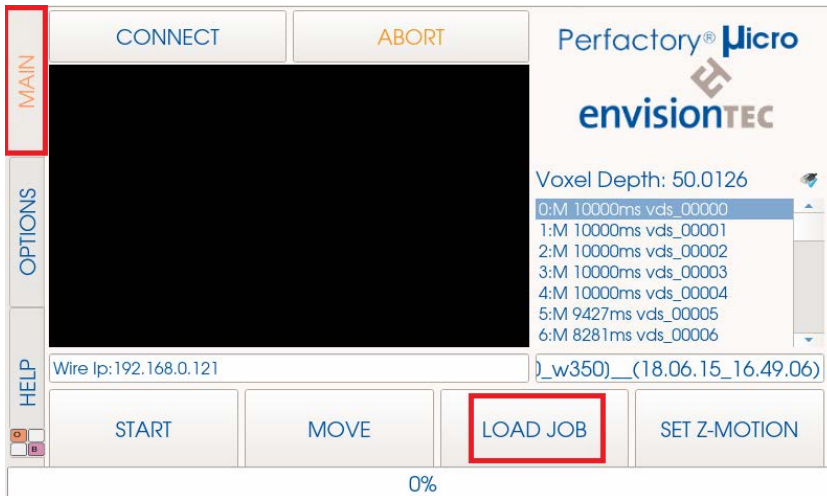
Then select the folder where the job file is saved. Once you've selected the folder, your controller screen will look like this:



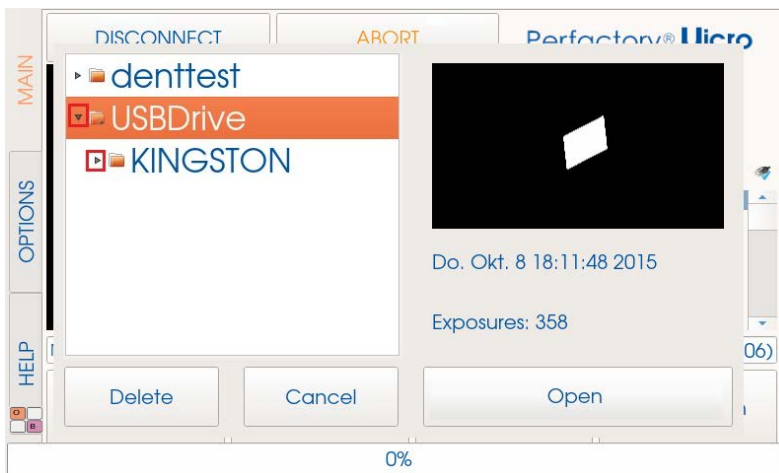
Now you can scroll through the list on the right to view the different exposure images. In the bottom left corner you can view the job statistics and see the progress of the build process. It also show the estimated time when the job will be finished. This calculation is an average that updates dynamically after each exposure. The average build process will take 30 minutes to one hour; depending on the Z layer thickness.

How to load a job directly from USB drive

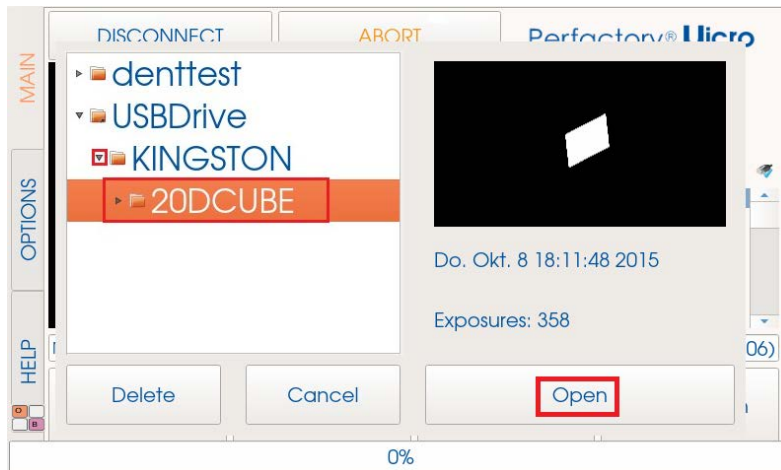
To load a job directly from USB drive select the **Main** tab, then click **[LOAD JOB]** button.



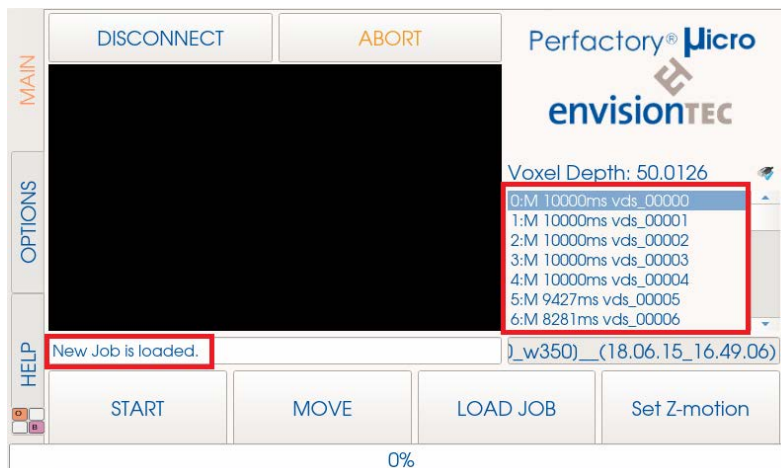
Select **USBDrive** and the USB drive containing the job files in the following screen.



After you have selected your USB drive, select the required job and click **[Open]**.



The following window will appear.



7.4 Start a Job



IMPORTANT

Risk of damage to the machine!

Make sure the build platform is clean and the basement is in place and has material in it before performing homing!

Failure to do so will result in failed builds and damage to the equipment!

**NOTICE**

Before starting a build job, it is checked if the used build style matches the material tag of the machine. If this is not the case, the job will not start.

To start a job, close the hood and press the **[START]** button on the **Main** tab. The build platform will move to its home position and the machine will start projecting the images.

If you need to pause the job for any reason you can press **[Pause Job]**. This will cause the build platform to come up a set distance.

**IMPORTANT**

Do not move the build platform on your own when in this mode!

When ready to begin the job again, press this button a second time. The label will change to **[Resume Job]**.

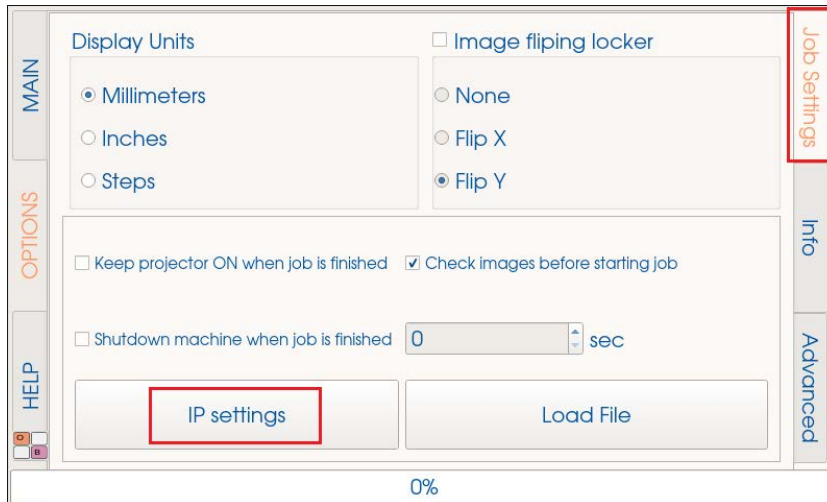
If you wish to stop a job you can press the **[STOP]** button.

**IMPORTANT**

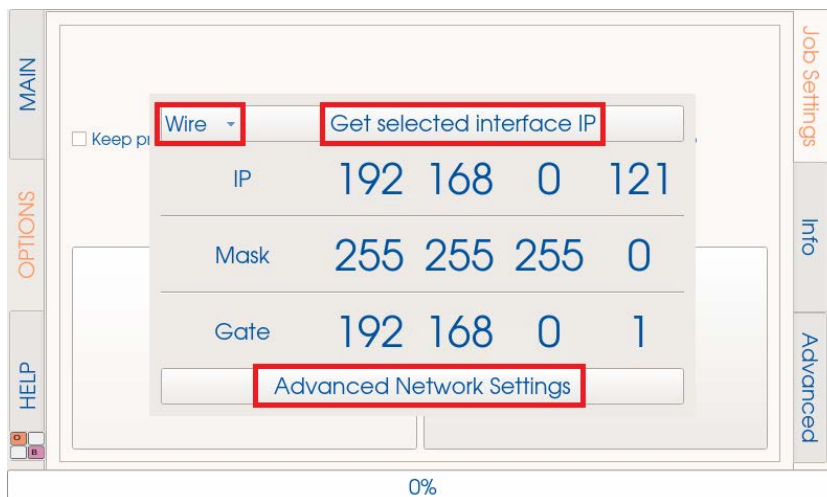
If you stop the job and move the build platform, unless it is done by using the **[Pause Job]** button, your build will not line back up properly and will likely result in a failed build. Please proceed with attention!

7.5 Set IP Address and Mask on your Machine

To set IP address and mask on your Micro Plus machine click **Options | Job Settings | IP Settings** as shown below.



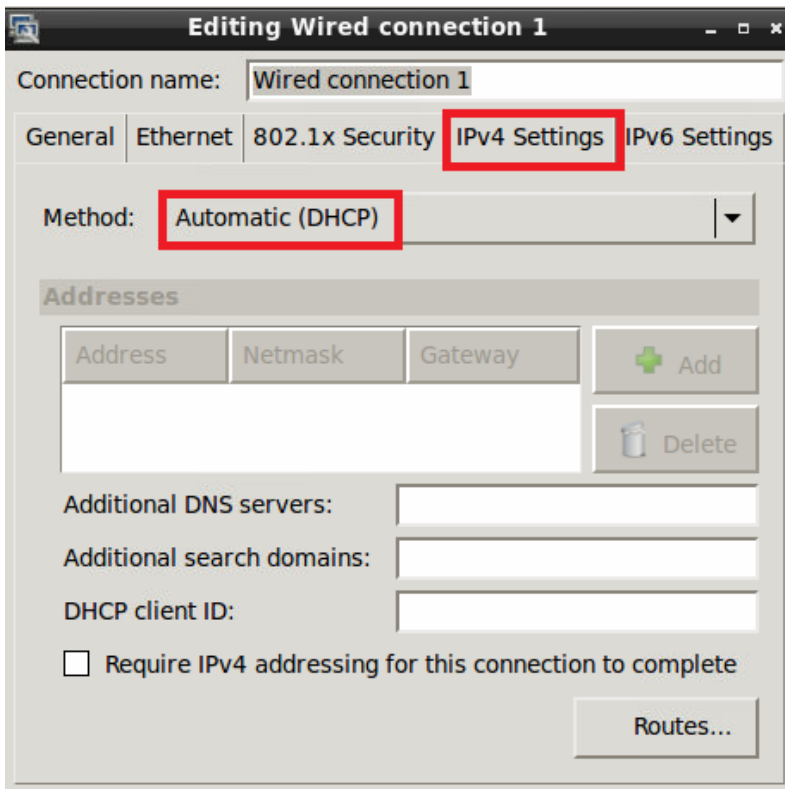
Get selected interface IP shows your current connection IP address. Select **Wire** or **Wi-Fi connection** which is on the left of the **Get selected interface IP** button and click **Advanced Network Settings**.



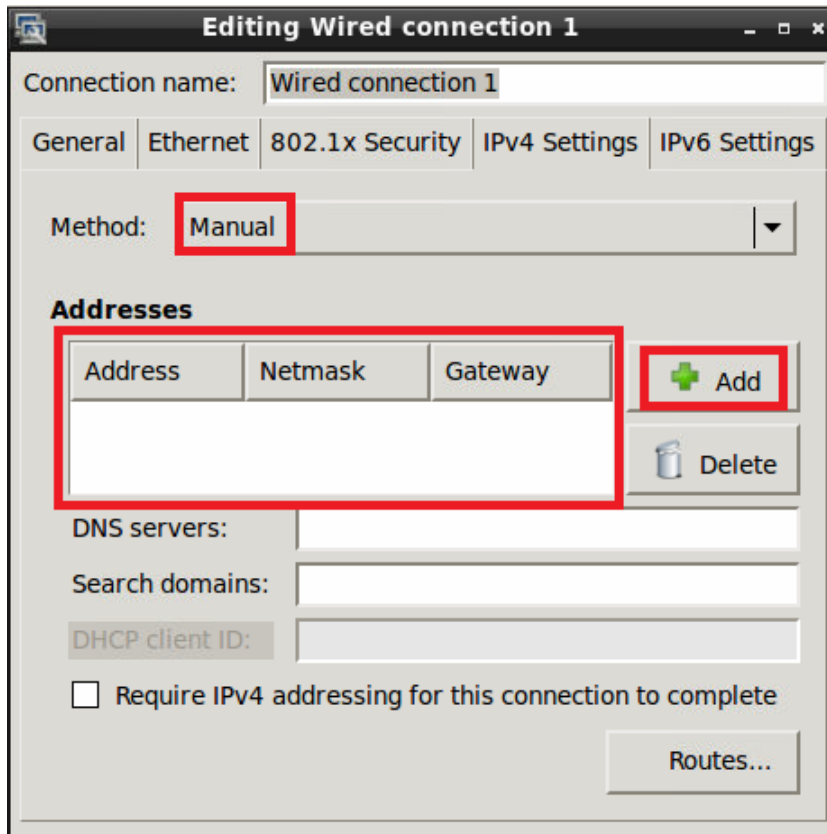
The following window will appear. Select **Wired connection** and press **[Edit...]** button.



The following window will appear. On the **IPv4 Settings** tab, select **Automatic (DHCP)** and press **[Save]**. That would be your dynamic address.



To put static address and set the mask, select **Manual** on the **IPv4 Settings** tab, click **[Add]**, and enter the required **Address**, **Netmask** and **Gateway**. Then press **[Save]**.



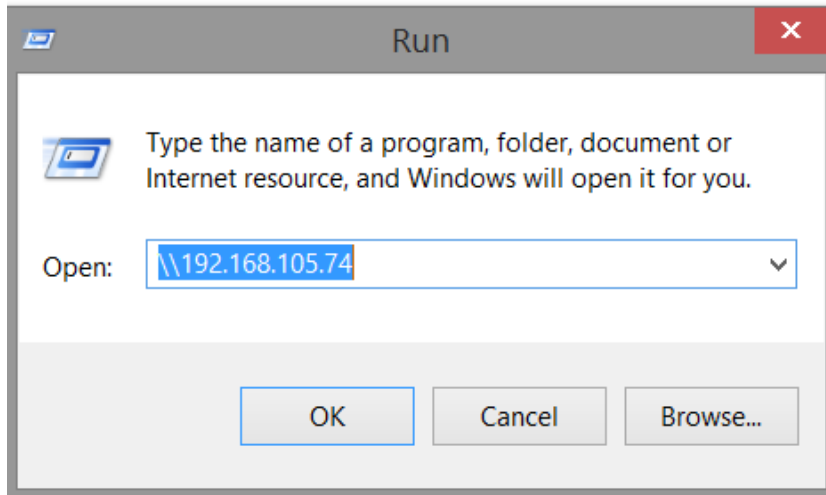
7.6 Retrieve Log Files from your Machine

Prerequisites

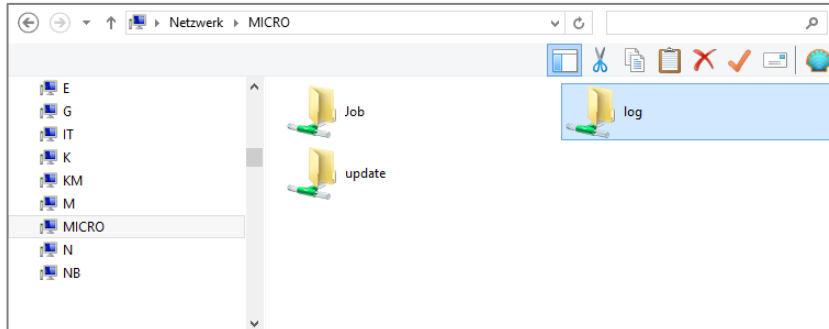
- The machine is already connected to the network, either by using an Ethernet cable or Wi-Fi.
- The computer you are using to retrieve the log files and the machine are in the same network.
- You know the IP address of the machine.

Step by Step

1. Enter **Run** into the Windows search field or press <Windows> + <R> key on your computer keyboard at the same time.
→ The **Run** window opens.



2. Enter the IP address of the machine, e. g.: \\192.168.105.74.
→ The Windows file explorer opens, showing the folders on the machine.



3. Open the **log** folder.
4. Select the requested log files.
5. Copy the log files to your computer.

8 Starter Kit

With your new machine you will receive one or two boxes with everything you need to run your machine.

The contents will be as follows:

- Micro Plus hardware manual
- Magics and Perfactory Software Suite
- software manuals
- 50mm scraper
- X-Acto knife with blade
- hex wrenches
- power supply cord, 230V, 1.8m
- 0.15mm feeler gauge, length 200mm
- SFTP patch cable, category 5e, black, 5m
- playing cards with company logo
- protective gloves, size XL, non-powdered
- basement kit: basement (PSA or M-Type with calibration plate), 0.5kg of material, 1kg material tag, two build styles

9 Material Preparation

9.1 Pre-processing of Material



WARNING!

Risk of injury! People could be injured!

As handling chemicals puts you at risk of coming into contact with corrosive chemicals, being burnt, inhaling poisonous vapors, etc., you should always put on suitable protective clothing (gloves, protective goggles, protective overalls etc.) before working with construction substances.

- Take utmost care to avoid getting any chemicals in your eyes or breathing in chemical vapors.
 - Always wash your hands thoroughly afterward.
 - Take care not to spill any chemicals.
-

Before starting the build process you will want to make sure your material is ready to be used. Most materials will need proper mixing before use as the different components will separate out in a short amount of time. Before opening a new bottle of material for the first time shake it vigorously to mix the material. You can also use a clean whisk or plastic stir stick to mix the material instead.

After mixing you may notice some bubbles in your material. This is normal and should not cause concern. During the build process the build platform comes down tightly against the basement, forcing all air out.

9.2 Filtering Material

There will be times you will need to filter your material. It is recommended to filter your material after each failed build (which will happen if incorrectly supported). If this occurs, purchase a paint strainer and run your material through it. The paper paint strainers are best as they can be discarded after each use.

It is not good to get a paint strainer that requires cleaning as cleaning solutions can contaminate and ruin material.



Figure 11: Strainer

9.3 Adding Material to Basement



IMPORTANT

Risk of damage to the machine!

It is crucial to always remove the platform before taking the basement assembly out of the machine! Failure to do so can result in material dripping down into or onto the projector causing failed builds and ruined equipment!

When you first get your basement and material, check to ensure that your basement is free of debris or blemishes, take your freshly mixed material and pour it in to the basement. Fill the basement to approximately $\frac{1}{4}$ but never more than half full.



IMPORTANT

Do not overfill material in the basement.

Overfilling may cause the material to be forced out of the basement when the platform is lowered, running into the machine and severely damaging the machine.

After several builds you will need to add more material to your basement. Follow the same guidelines for filling and be sure not to overfill. You can pour new material into your basement, but it is recommended not to pour material from your basement back into the fresh bottle as it can cause cross contamination.

It is important to never mix two materials. This can cause material loss and basement destruction as well as part failure. It is best to have a separate basement for each kind of material to avoid contamination.



IMPORTANT

Risk of damage to the machine!

Do not add or mix material while basement is in the machine!

This can cause material to leak into the machine and cause serious damage to the projector or other workings there in!

10 Putting into Operation

10.1 Connect the Machine

Once the Micro Plus is set in its final location, it is ready to be connected. Take the power supply cord and an Ethernet cable and plug them into the back of the machine in the proper connectors.

You can connect the machine to a network hub/switch/router or directly to a computer. When connecting directly to a computer, use a crossover cable. Plug the power supply into the clean outlet nearby. Plug the Ethernet cable into a network hub/switch/router or one of your computer's Ethernet slots respectively. If you are connecting to the computer wirelessly, the Ethernet cable is not needed.

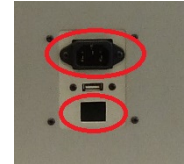


Figure 12:
Connectors



IMPORTANT

Risk of damage to the machine!

Do not disconnect the machine from mains while it is switched on!
Always use the power button to switch off the machine.



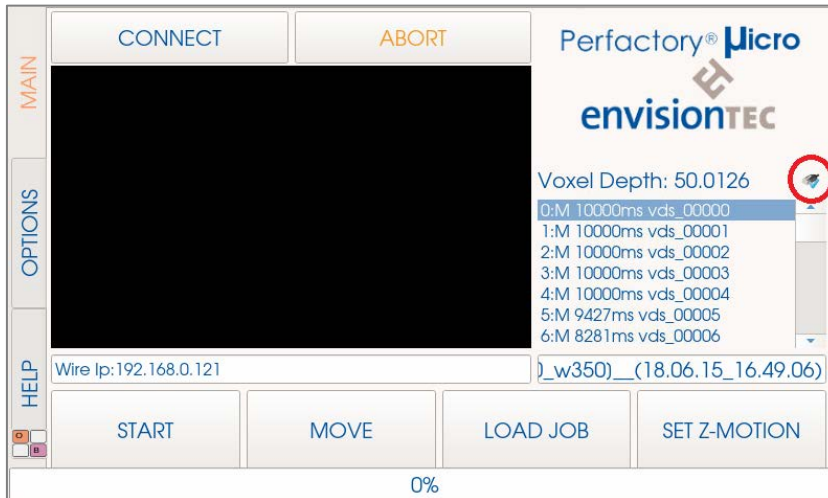
IMPORTANT

Risk of software malfunction of the machine!

Do not change any system settings of the machine!

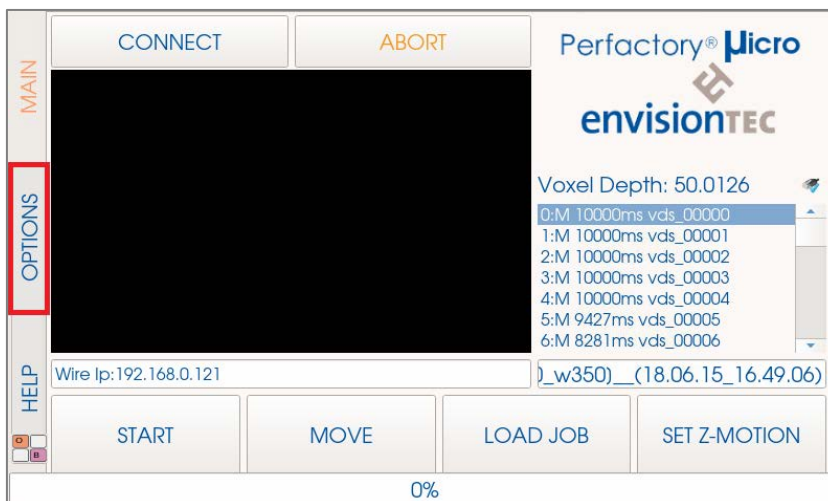
10.2 Wi-Fi Set on Micro Plus

The marked icon indicates that the machine is connected to the Ethernet:

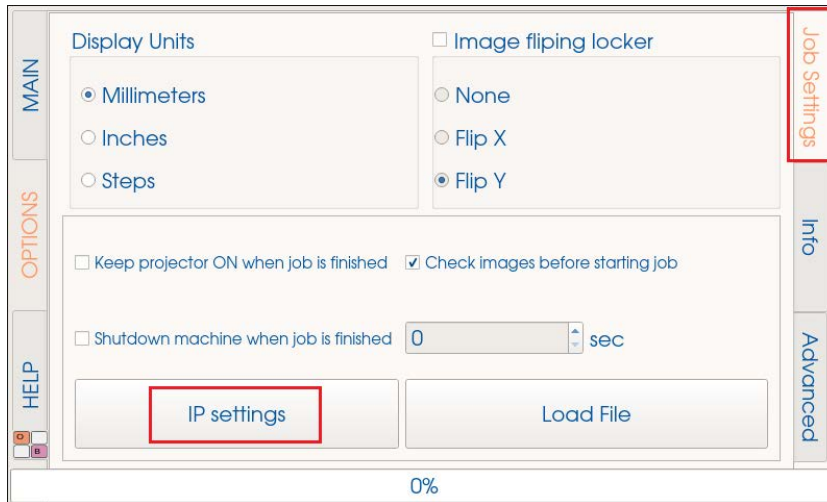


If you want to connect the machine via Wi-Fi, follow the next steps.

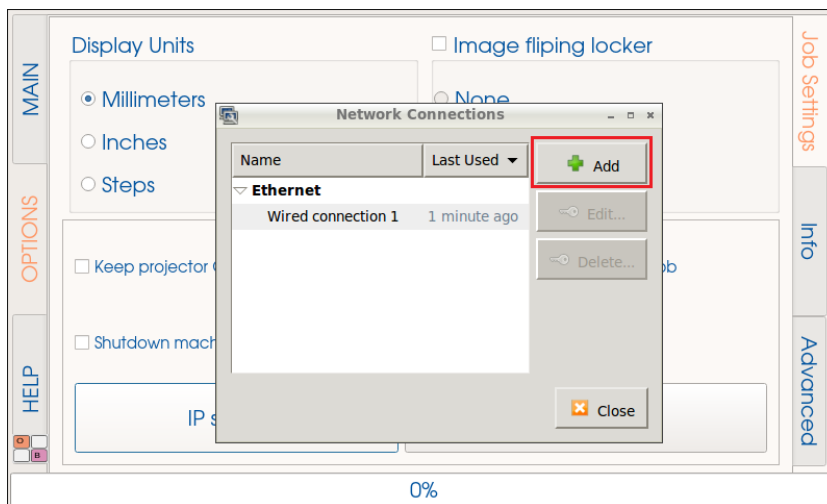
Enter the **Main** menu and select **Options** tab.



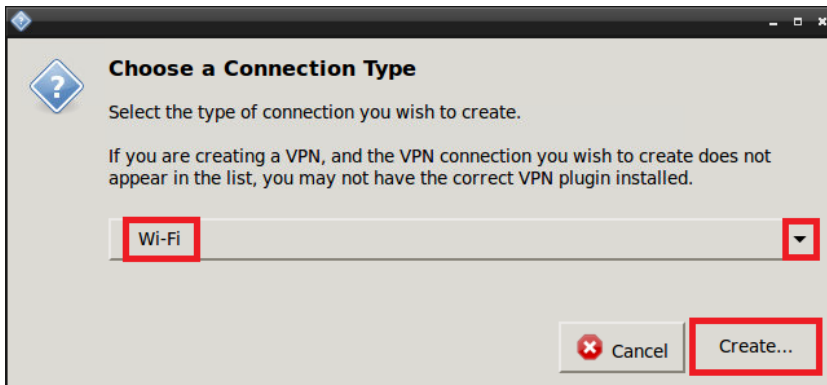
The following window will appear. Select **Job Settings** tab on the right, then press **[IP settings]**.



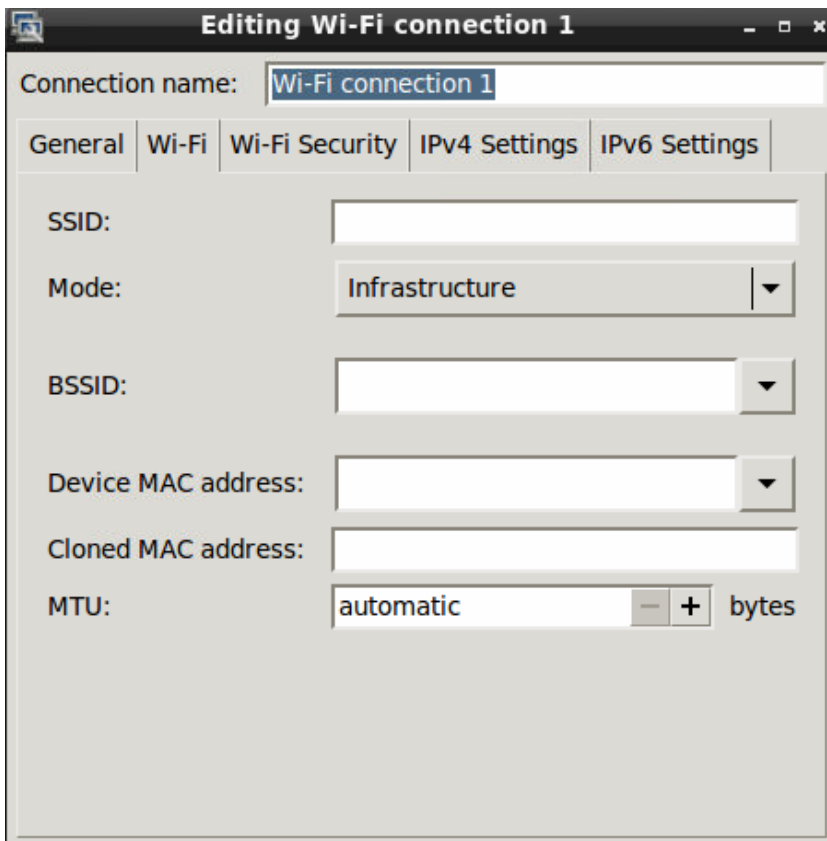
When the next screen appears, select **Advanced Network Settings**. In dialog **Network Connections** click **[Add]**.



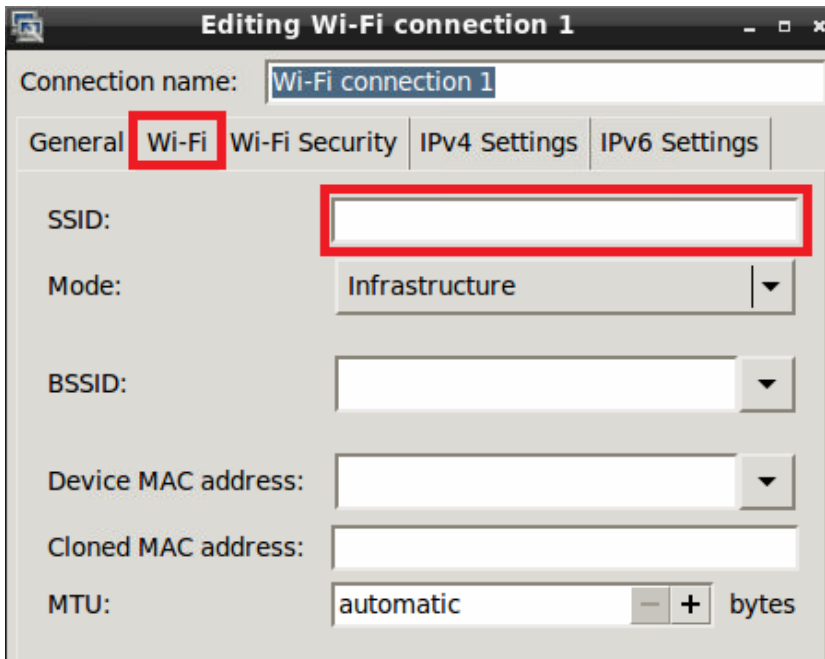
In the next screen **Choose a Connection Type** select **Wi-Fi** and click **[Create...]**.



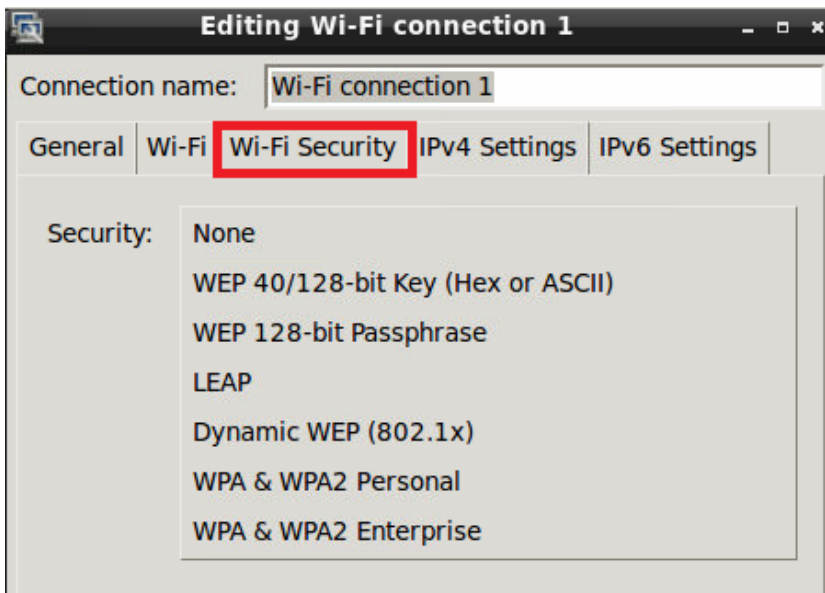
In the next dialog enter the connection name in field **Connection name**.



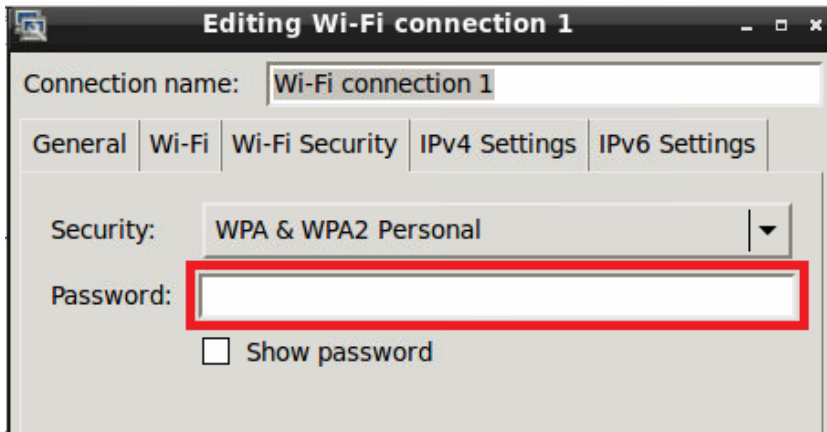
In **Wi-Fi** section put the name of your network into the **SSID** field.



In **Wi-Fi Security** section put your network encryption.



After you have selected your network encryption, enter the password in the relevant field and click **[Save]**.



If the setup is successful, a window similar to the following will appear. Click **[Close]**.

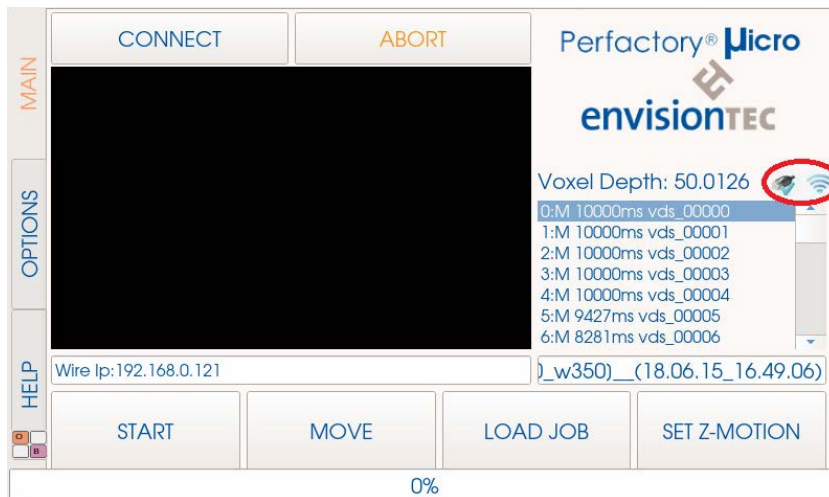


The marked icons now indicate that the machine is connected to the Ethernet and Wi-Fi.



NOTICE

The software will always give priority to the cable connection.



After setting up the Wi-Fi connection, take the following steps:

1. Disconnect the Ethernet cable.
2. Reboot the machine.
3. Under **Options | Job Settings | IP Settings**, check the Wi-Fi IP address.
4. Connect to the machine via VNC.

10.3 Set the Grey Mask



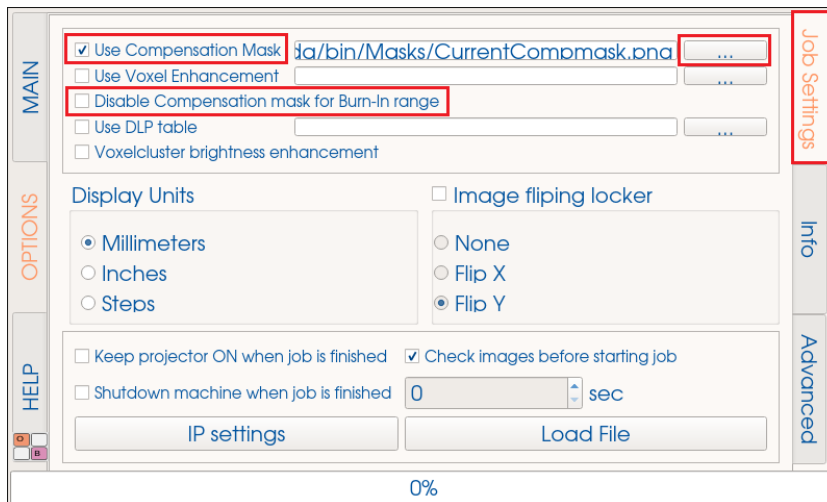
NOTICE

This function can only be used in service mode.

The grey mask is the compensation mask of the machine. It is set in the factory, so calibration is usually not necessary. In the case that it does actually become necessary (as a result of transportation, mechanical stress, etc.), contact your distributor or the EnvisionTEC service team.

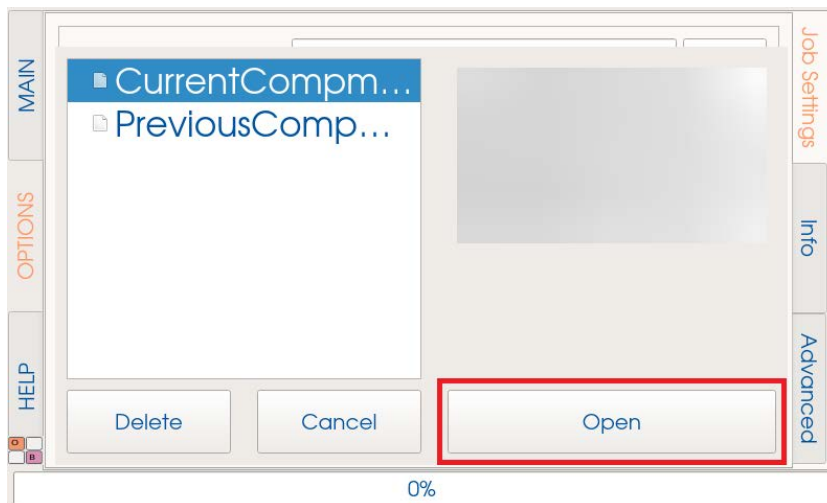
It is important to make sure that the controller software can find and read the compensation mask once the software set up on the new computer.

To do this, select the **Job Settings** tab on the control screen of the machine. In the **Job Settings** tab make sure that the checkbox **Disable Compensation mask for Burn-In range** is not checked. Also make sure that the checkbox **Use Compensation Mask** is checked.



To ensure the proper file is loaded, press the button in the **Use Compensation Mask** line.

The following window will appear:



You can select between **Current Compensation Mask** and **Previous Compensation Mask**. Select the corresponding file and press the **[Open]** button. The Grey Mask is now set.

10.4 Check the Grey Mask

To check the gray mask of your machine, follow the next steps:

1. Dismount the basement by loosening the screws in each of the four corners.
2. Separate the glass plate from the upper basement part and separation foil.
3. Insert the glass plate back into the machine.

4. Select the **Options | Job Settings** tab on the control screen of your machine.
5. Press [**Load Image**] and select the file **fullwhite.png**.
6. Load this file by pressing [**Open**].

At this time a full blank image will appear on the glass plate of the machine. Now you can check the values of the grey mask with a radiometer with **VIS** head.

Place the radiometer on the glass plate and measure the value in each corner and the center of the glass plate.

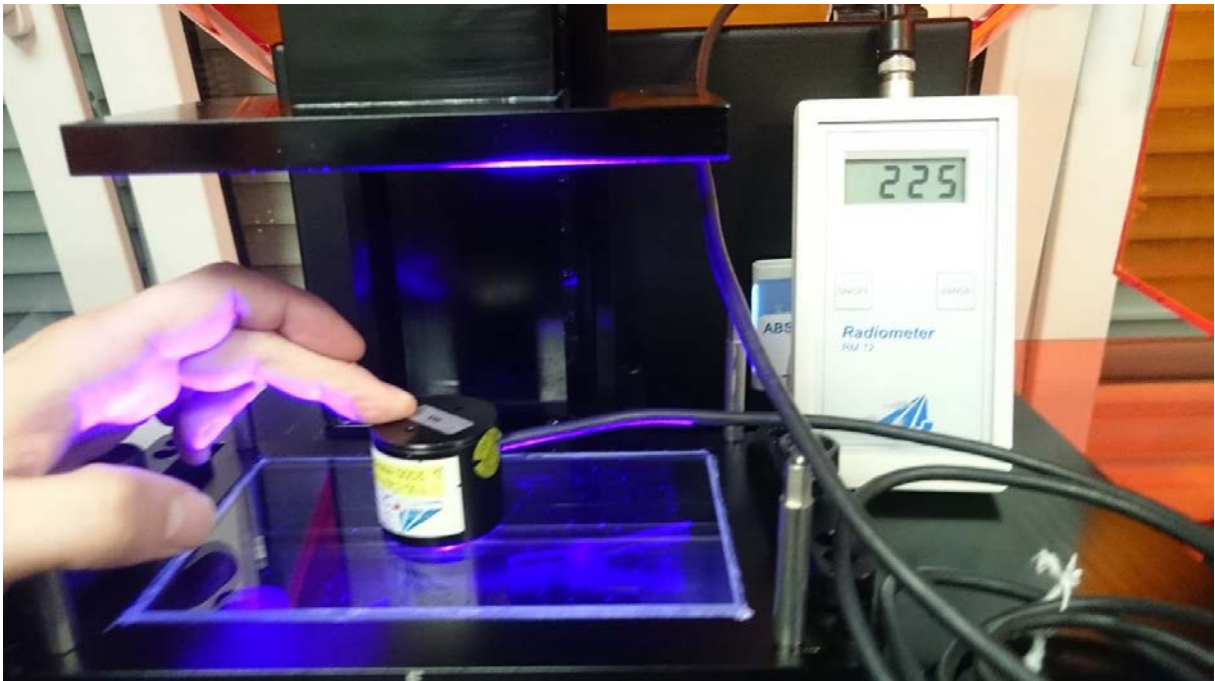


Figure 13: Checking the grey mask with a radiometer

The values and therefore the compensation mask should be $225\text{mW} \pm 5\%$.

If you have higher or lower values, you have to calibrate a new grey mask (only available in service mode).

10.5 Perfactory Software Suite

The modules of the Perfactory Software Suite are used to place 3D models on the build platform, create Perfactory supports, generate build jobs and transfer jobs to the machine.

With each machine we send a thumb drive containing the following program and data:

- Perfactory Software Suite
- Buildstyles for the machine (.bsx)

You will find information on how to install and operate the Perfactory Software Suite in the *Perfactory Software Suite manual*.



NOTICE

Please note that the Perfactory Software Suite does not allow for sending jobs directly to the machines.

Therefore, use the Perfactory Software Suite to create the job and store the job locally on your computer. Then locate the machine in your local network and copy the job to the machine. The job can then be started directly on the machine or via a VNC client.

10.6 Connect to the Machine via VNC Clients



WARNING!

Risk of injury!

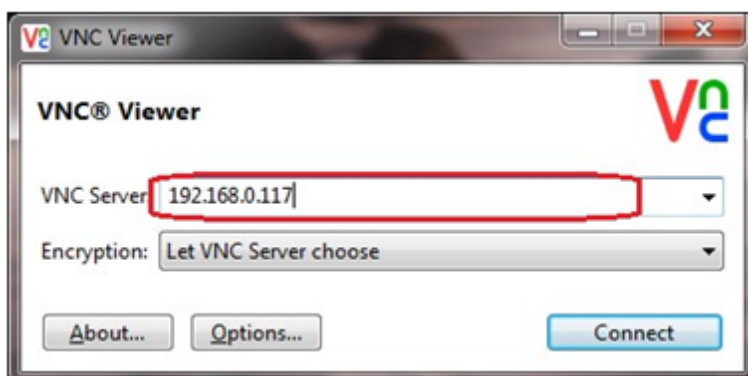
Improper use of the remote machine control over local network using VNC software may lead to damage or injuries.

- Use the remote machine control with great attention.
- Do not use the remote machine control without an operator being next to machine.
- The machine owner is responsible for any unsafe operation of the machine using the remote machine control.

10.6.1 Supported Clients for Windows

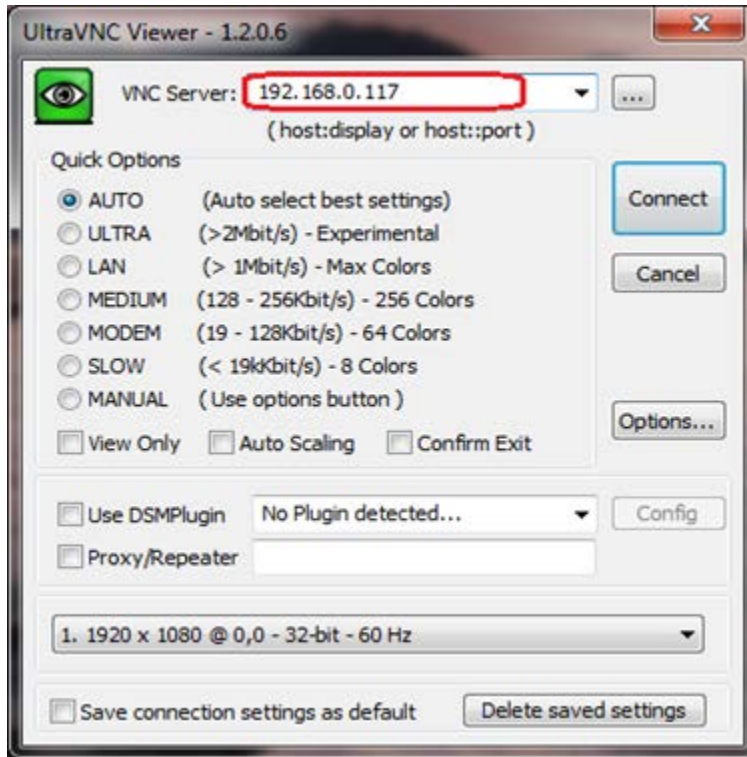
VNC Viewer

After downloading the VNC Viewer and opening it, put the IP address in the following box. Then click **[Connect]**. The control screen will appear and you can proceed with your work on the machine.



UltraVNC Viewer

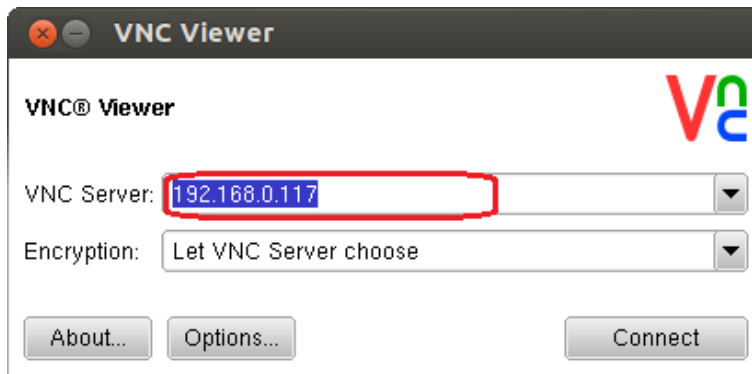
Start the UltraVNC Viewer and put the IP address into the highlighted box. Then click **[Connect]**. The control screen will appear and you can proceed with your work on the machine.



10.6.2 Supported Clients for Linux

VNC-Viewer

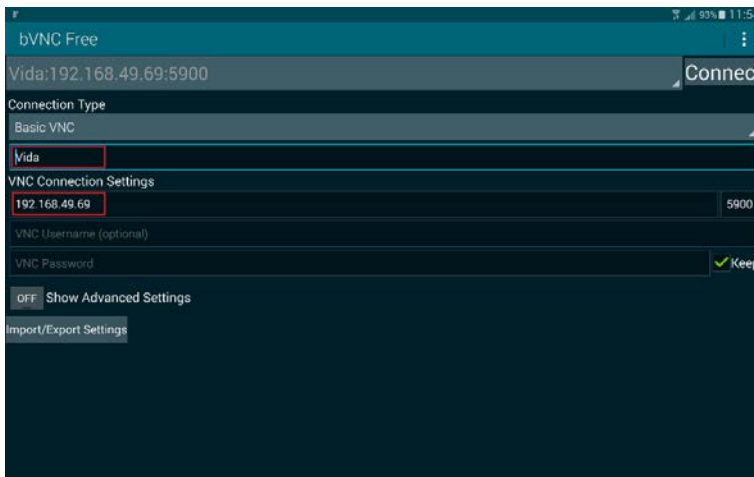
Put the IP address into the box marked below. Then click **[Connect]**. The control screen will appear and you can proceed with your work on the machine.



10.6.3 Supported Clients for Android

bVNC Free

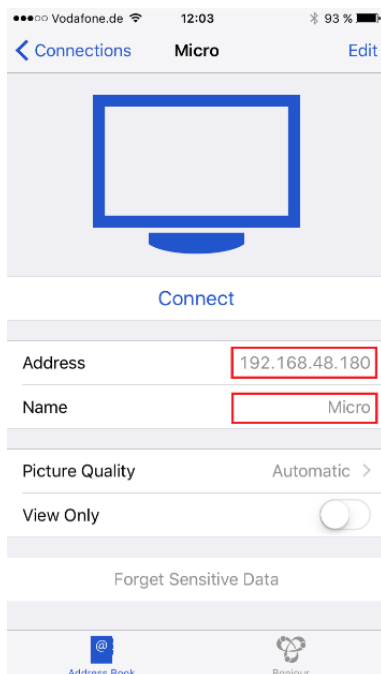
Put the connection name and the IP address into the boxes marked below. Then click **[Connect]**. The control screen will appear and you can proceed with your work on the machine.



10.6.4 Supported Clients for iOS

VNC Viewer

Put the IP address and the connection name into the highlighted boxes. The control screen will appear and you can proceed with your work on the machine.



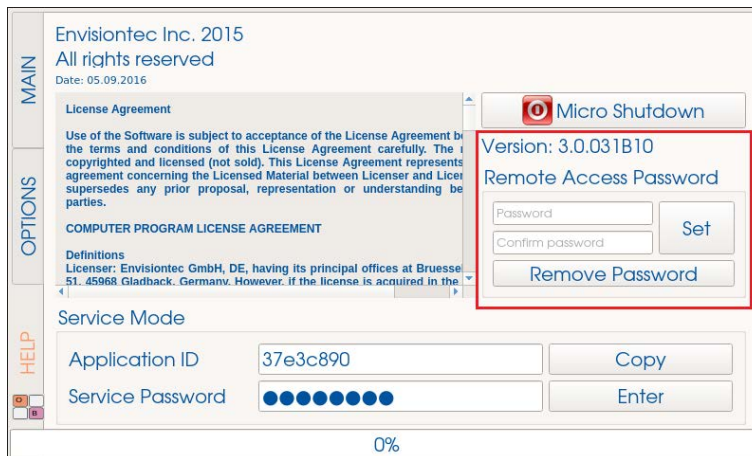
10.7 Set and Delete a Password for the VNC client



NOTICE

This function can only be used in service mode.

If necessary, it is possible to set a password for VNC client. To do this, touch the **Help** tab on the control screen of the Micro Plus. In the same dialog you can delete an already set password.



Setting a Password

To set a password, take the following steps:

1. Enter your password in the **Password** field.
2. Confirm your password in the **Confirm Password** field.
3. Press **[Set]**.
4. Press **[OK]** in the confirmation window.
5. Restart the machine to apply new settings.

Deleting a Password

To delete a set password, take the following steps:

1. Press **[Remove Password]**.
2. Press **[OK]** in the confirmation window.
3. Restart the machine to apply new settings.

11 Basic Procedures

11.1 Switching on the Machine

Make sure the Ethernet cable is plugged in (if you are connecting directly).

Press the power button on the front of the machine and hold it for one or two seconds. The button will illuminate and the screen will come on. It will go through a booting sequence and show a desktop like screen for about 20 seconds before automatically opening the controller software.



Figure 14: Power button



IMPORTANT

Make sure the projector had enough time to warm up the LED to achieve the required level of energy at the surface of the platform.

If the machine was switched off for a long time, switch on the projector at least 20 minutes before starting the print on it!



NOTICE

Do not try to touch or open anything on the screen before the Controller Software has finished booting! This can cause damage to the files on the machine!

11.2 Insert and Remove the Basement

To install or remove the basement you will need to loosen the two knobs on the right and left of the build area.

You will then slide the basement under the bars on the sides as far in as it will go. To finish, tighten the two knobs back down.

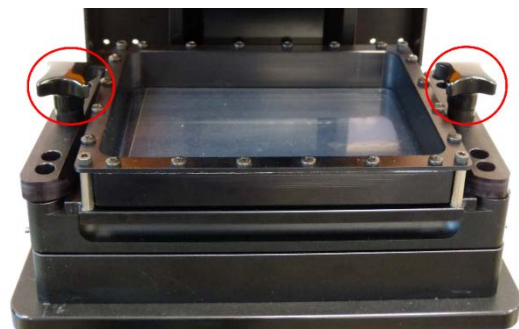


Figure 15: Basement screws

**NOTICE**

Tighten the two knobs is very important as if it is not done the material will splash all over the inside of the machine! Double check these are tight before starting a build process!

11.3 Changing the PSA

**NOTICE**

This process is only valid if you use the PSA basement!

**IMPORTANT****Risk of damage to the machine!**

It is crucial to always remove the platform before taking the basement assembly out of the machine! Failure to do so can result in material dripping down into or onto the projector causing failed builds and ruined equipment!

After approximately 60 to 100 build jobs you will need to change the top part (the PSA) of the basement assembly. To do this, you will need to first empty out the basement of any material. Use duct tape to create a funnel to pour the material into a separate light safe container.

**IMPORTANT****Risk of damage to the machine!**

Do not pour material from your basement into the bottle it came from! This can potentially contaminate the whole bottle of material and ruin it!



Figure 16: Preparation to remove material from basement

Take your time to get as much material out of the basement as possible. It is usually a good idea to strain your material at this time to ensure there is no cured material floating around in your good material. Use a business card or playing card to get as much material out as you can.



Figure 17: Remove material from basement

Finish cleaning the basement by wiping it out with a clean, dry paper towel.



IMPORTANT

Never use chemicals inside the PSA!

This will contaminate and ruin any material you put into the basement!



Figure 18: Clean the basement

Once the PSA is clean you can remove it from the bottom plate of the basement assembly. To do so you will need a 2mm Alan wrench. Use the wrench to loosen the screw located in each corner. There are four in total. Gently separate the two halves of the basement assembly.



Figure 19: Remove PSA from basement

The metal plate of the basement will look similar to the one on this figure:



Figure 20: Basement metal plate

Ensure that there is a square rectangular separation film sheet placed over the exposed glass. Make sure that the rough side points to the glass plate below! Put the new PSA on, screwing it into place with the four corner screws. Take your old PSA and repackage it with the packaging sent with the new PSA and ship back to your manufacturer or distributor.

11.4 Attach and Detach the Build Platform

To attach the build platform loosen the handle screw on top of the build platform (see *Figure 20*).

Then you will slide the build platform onto the receptor held on the Z slide (see *Figure 21*).

To finish, you will tighten down the screw handle on top of the build platform. It is very important to make sure this is tightened down securely before building. Failure to do so will cause the build platform to be uneven and can cause build failures.

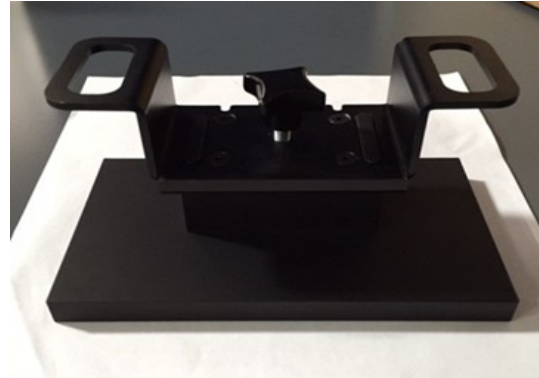


Figure 21: Build platform



Figure 22: Mounted build platform

12 Part Processing and Curing

12.1 Post Cleaning Supplies and Post Curing Equipment

Recommended list of cleaning supplies:

- spray bottle (optional)
- two beaker glasses or plastic containers with lid for holding the isopropyl alcohol
- isopropyl alcohol (99%) for cleaning extra material off of cured models
- soft artist or make-up brush
- X-Acto knife/surgical blade or small nail scissors for removing supports from models
- air compressor for blowing out extra material and alcohol that may be stuck on models
- paper towels
- post curing unit

12.2 Remove Parts from the Build Platform



WARNING!

Risk of injury! People could be injured!

As handling chemicals puts you at risk of coming into contact with corrosive chemicals, being burnt, inhaling poisonous vapors, etc., you should always put on suitable protective clothing (gloves, protective goggles, protective overalls etc.) before working with construction substances.

- Take utmost care to avoid getting any chemicals in your eyes or breathing in chemical vapors.
- Always wash your hands thoroughly afterward.
- Take care not to spill any chemicals.

Once your build is complete, the built part will hang off of the build platform. The build platform has moved to its uppermost position so you can easily remove the platform for part cleaning.



IMPORTANT

Close the hood after removing the build platform.

Once the build platform is removed, take a metal scraper and slide it under the build rectangle starting in a corner. Start gently as rough removal can damage delicate parts!

The built model should come off without much force. At this point you are ready to begin cleaning the parts.

Do not forget to clean the build platform also.



Figure 23: Separate model from build platform

12.3 Clean Parts and Remove Supports

For information on cleaning of the parts, consult the cookbook provided by your manufacturer or distributor.

12.4 Post Curing

After the parts have been cleaned, they will have to be post cured in a curing unit.

For information on post curing, have a look at the cookbook provided by your manufacturer or distributor.

12.5 Preparing for the Next Build Job

Before you are going to start the next build job, it is highly recommended that you check the basement if there are any cured parts are in the material. In this case filter the material to remove these parts.

Also clean the build platform before the next build job.

13 Service and Maintenance

13.1 Consumables

The following machine parts are considered as consumables

- PSA: Will need to be changed approximately every 60 to 100 build jobs. When the basement begins to look foggy, scratched up, or your builds are failing you will need to replace the basement. You can order more PSA basements from the EnvisionTEC office.
- M-Type basement: Will need to be changed approximately after 200-300 working hours (depending on usage and material).
- LED: When your LED requires changing you will need to contact technical support and ship your machine back to the office to get a new light engine installed.

Materials have varying shelf lives between 6 and 12 months. You will likely use all of the material before it expires. You can order more material from the EnvisionTEC office.

13.2 Maintenance



IMPORTANT

Risk of damage to the machine!

Never use anything that is hard or with sharp edges as this can damage the basement!

Do not mix the material while the basement is in the machine!
Always remove basement from machine before mixing!



NOTICE

The execution of maintenance activities, including date and performing operator, shall be documented due to traceability.

This machine is designed to be very low maintenance. You will need to maintain your material and basement as well as keep your machine dust-free.

It is recommended to remove the front panel once a quarter. Be careful not to tear the cables attached to the back. Remove any with a dry duster. Then clean the safety glass and the lens.

If you accidentally spill material on the machine, clean it immediately with a dry cloth. Alcohol is not recommended for use on any glass surfaces as it can leave streaks and block the light from the projector. Use glass cleaner instead.

It is best to designate a light safe area to keep your basements when not in use so the material in it doesn't cure. Before each build, mix the material in the basement using a business card or playing card. Mix thoroughly until it is a uniform color with no swirls.

Never use alcohol in the basement as this can contaminate the material and ruin the basement.

Annex 1: Troubleshooting



IMPORTANT

For each task, the safety warnings contained in this instruction manual must be observed.


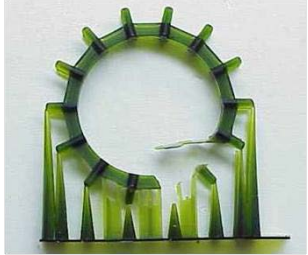



IMPORTANT

In case of any problem not listed in this troubleshooting chapter, contact your customer support.

Do not try to fix the problem without consulting the customer support first as it will void your warranty!

Problem	Remedy
My Z slide isn't moving when I press the relevant buttons in the controller.	Close the controller software and unplug both the power supply and the USB from the back of the machine. Wait 10 seconds and reconnect. Start the controller software and click the buttons for the motion control. If the problem still persists, call technical support.
The built model fell off the build platform or nothing substantial built.	First, filter your material using a paint strainer to ensure there is no debris left from the failed build in it. Wipe out and check your basement to ensure it is still in good condition. If your basement or material is over 6 months old then it may be time to order new ones. If this is not the case and you still cannot get a good build after straining or using fresh material; you may have an issue with your LED or the homing position of the build platform. Call technical support.
The build parts stick on the build platform but are cut horizontally.	The power supply has failed. There may have been an electrical problem during the building process. Check the log files for more information.
Sporadic feathering on parts:	This is contaminated material from alcohol or some other chemical. Pour old material in separate container. Do not pour back into new or unused material container. Completely clean out the basement with dry soft paper

Problem	Remedy
	<p>towels only. Don't use any chemicals. Clean the corners of the basement with dry Q tips. Replace with all new material and rebuild parts.</p> <p>To avoid future contamination do not have any chemical near basement or resin, do not post clean the part near the basement, and do not clean the build platform with any chemicals but only dry paper towels.</p>
<p>Partial build failure:</p> 	<p>This could be several things or a combination of the following:</p> <ul style="list-style-type: none"> • Damaged, scratches, hole or worn basement will cause a build failure. The basements (resin reservoir) are consumables and need to be replaced after 60 to 100 build jobs. Replace basement. • Weak supports. A weak or improperly placed support will cause a part feature not to build. Add additional supports to the failed area. • Small feature is not properly Boolean, attached or errors in file. A small feature is not completely attached to the main body of the part. In Magics or your CAD program check to ensure there is no gap, all small features are completely attached and the part is one single entity.
<p>Baseplate/ Build falling off build platform:</p> 	<ul style="list-style-type: none"> • Damaged, scratches, hole or worn basement will cause this build failure. • Dirty optics: completely clean machine optics. • Call customer service.

Annex 2: Quick Start Guide

Workflow

1. Export stl from your CAD program.
2. If you use **Magics**:
 - Import part into **Magics**.
 - Fix part using fix wizard.
 - Translate part into place.
 - Save part at this point.
 - Open the Generate Support module.
 - Support part as you wish.
 - Export supports to save them at this time.
 - Save part as inside of the SG Module if you wish to save a MAGICS File (part and supports saved together in one file – not used for building).
 - Exit Support Module.
 - If you use cones, save part at this time!
 - Unload part.
 - Repeat this process for all parts you wish to build.
 - Once all parts are supported and fixed: import all parts into **Perfactory RP**. Make sure to import stl file as well as _s support file.
3. If you use **Perfactory RP** only:
 - Open the stl file in **Perfactory RP**.
 - Use automatic placement to place parts and finish placing parts manually by using the control buttons.
 - Generate supports.
4. Generate job in **Perfactory RP** and save it in an own folder.
5. Make sure that the machine is plugged into the computer.
6. Locate the machine in the local network.
7. Copy job to machine.
8. Turn on the motion controller.
9. Place basement with material into machine.
10. Close the hood.
11. Load job file (folder that holds the png images).
12. Start job.

Perfactory Micro Plus controller software

1. Connect to the motion controller by pressing the **[Connect]** button. The status will change to connected.
2. Open the job folder (the one that contains all of the images for the build) by clicking the **[Load Job]** button.
3. Start the job by pressing the **[Start]** button.

