

Instruction Manual

Original Instructions

D4K PRO



Version 1.3

Keep for further reference!

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1 Identification

1.1 Identification Data

Manufacturer:	EnvisionTEC GmbH
Product:	
Type:	
Serial number:	
Order number:	
Year of manufacture:	
Customer:	
Inventory number:	
Site:	

1.2 Manufacturer

EnvisionTEC GmbH
Brüsseler Straße 51
45968 Gladbeck
Germany

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

1.3 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.

1.4 Registered Trademarks

EnvisionTEC®, D4K® and Perfactory® are registered trademarks of EnvisionTEC GmbH, Germany.

1.5 History of Changes

Date	Changes	Version
Jul-2019	Document creation	1.0
Oct-2020	<ul style="list-style-type: none"> Images update: front page, <i>About Printer</i> tab Updated <i>Starter Kit</i> section Updated <i>Positioning the Printer</i> section 	1.1

Date	Changes	Version
Oct- 2020	<ul style="list-style-type: none"> • Figure update <i>Build platform</i> section • Figure update <i>Check the D4K Pro Is Ready to Print</i> section • Added <i>Load a job from Envision One RP</i> section • Added <i>Maintaining the D4K Pro Material</i> section • Added <i>Cleaning the Touch Screen</i> section • Added <i>Creasing the Z-slide</i> section • Updated <i>Power requirements</i> section • Updated <i>Environmental Conditions for Printers</i> section • Updated <i>Storage Conditions for Photopolymers</i> section • Updated <i>Starter Kit</i> section • Updated <i>Positioning the Printer</i> section • Updated <i>Plug & Play</i> section • Updated <i>Install the Build Platform</i> section • Updated <i>Software Update</i> section • Updated <i>Software Recovery</i> section • Updated <i>Fill in the Photopolymer</i> section • Updated <i>Create the Print Job in Envision One RP</i> section • Updated <i>Start the Print</i> section • Updated <i>Remove the Build Platform from the Printer</i> section • Updated <i>Remove Parts from the Build Platform</i> section • Updated <i>Cleaning the Build Platform</i> section • Updated <i>Cleaning the Material tray</i> section 	1.2
February-2021	<ul style="list-style-type: none"> • Added <i>Mask Generation</i> section • Added <i>Additional Information</i> section • Updated <i>About Printer</i> section • Updated <i>Starter Kit</i> section • Updated <i>Troubleshooting</i> section 	1.3

2 User Information



NOTICE

This User Manual has been created for **version 3.0** of *D4K Pro Control Software*. If some information is not covered in this Manual, please let us know by contacting *Customer Service*.

2.1 Functional Description

The D4K® printer builds 3D models by curing liquid photopolymers through a projector system.

During the build process, the model is built layer by layer. A mechanical system moves the build platform up so that the cured material sticks to the build platform or to the previous layer.

Before starting the build process, certain calibration functions need to be carried out, which are performed at the factory.

The photopolymer is then directly poured into the material tray. The job is transferred to the printer through Envision One RP® software or via USB drive. The build process can be started.

After the build process has finished, the built parts are removed from the build platform using a scalpel or scraper and treated according to the corresponding cookbook.

2.2 Purpose of the Document

This instruction manual:

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



NOTICE

The operation of the Envision One RP Software is described in the *Envision One RP Software Manual*.

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 printer and during the operation. Keep the hardware documentation in close proximity of the printer, so that the operator can access it at all times.

2.3 Target Group

This instruction manual is intended for:

- the customer (company operating the printer) 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.

2.4 Locations in the Instruction Manual

All the directions and locations in this instruction manual are always seen from the working position of the operator.

2.5 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>
Software user interface items, menu paths, file names, and product names are in bold.	input field Printer 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 click individually or together are in angle brackets.	<Ctrl>+<S>
User input is displayed in a different font.	ipconfig -all

2.6 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 printer handling.

2.6.1 Specific Risk Signs



Electrical danger



Hand crushing



UV radiation



Hot surface

2.6.2 Mandatory Action Signs



Use protective hand wear



Use protective goggles



Use protective clothing

3 General Safety Instructions

3.1 Intended Use

The printers of the D4K® line are designed to produce small, premium components requiring a high level of precision. The printers work with industrial UV LEDs as light source.

It is the printer owner's responsibility to ensure that the printer 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 printer must not be exceeded.

3.2 Reasonably Foreseeable Misuse



IMPORTANT

The printer may only be used for the intended purposes.

The printer may only be operated if in a flawless state in terms of technical safety.

Only then the operational safety of the printer is guaranteed!

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

Reasonably foreseeable misuse is e.g.:

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

For any damage resulting from misuse:

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

Modifications or Changes

Unauthorized modifications or changes will result in the warranty being null and void.

Therefore, do not make any alterations or complements to the printer 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.

3.3 Risks in Handling the Printer

Operating the printer may cause risks

- to the health and safety of the operator or third persons;
- to the printer 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 printer operation.



IMPORTANT!

This instruction manual must always be kept where the printer 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.
-

3.4 Residual Risks

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

Mechanical hazards

- Risk of hand crushing caused by automatically moving printer parts.

- The printer may only be operated if the protecting devices are working properly.
- The printer 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 printer calibrated by trained and authorized service personnel only.
- Printer overturning during transportation can cause injury.
- Do not try to move the printer yourself.
- Have the printer transported by trained personnel only.
- Risk of injury caused by improper handling of the build platform.
- Before taking the build platform out, make sure that all persons are clear of the danger zone.
- Avoid unnecessary movements. Avoid non-ergonomic joint positions.
- Risk for the operator to slip, stumble or fall. Keep the floor of the printer 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 printer yourself. Have the printer set up by trained and authorized service personnel only.

UV radiation hazard



WARNING!

Never look directly into the projectors beam!

Looking into the projector with unprotected eyes may cause injury.

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. Wear 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:

Thermal hazards



WARNING!

ONLY AUTHORIZED, TRAINED PERSONEL MAY TOUCH THE LIGHT SOURCE!

Touching the hot light source might result in severe burns:

- Use heat-resistant protective gloves!

Hazards caused by insufficient stability

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

3.5 Risks when handling photopolymers



WARNING!

The use of the photopolymers intended for the printer 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.
Read the relevant Material Safety Data Sheets supplied with the photopolymers before use.

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.



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.

3.6 Obligations of the Printer Owner

The printer has been produced for commercial use. Therefore:

- 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;
- observe all environmental regulations when disposing any of the components or consumables;
- make sure that the Material Safety Data Sheets for the materials used are observed and kept in proximity to the printer.

3.7 Obligations of the Personnel

Before starting to work, anyone involved in working with/on the printer is obliged:

- to comply with the basic workplace safety instructions and accident prevention regulations.
- to read and follow the safety information chapter and the safety instructions in this instruction manual.

If you still have queries, please contact the manufacturer. See section *Identification* under *Manufacturer*.

3.8 Personnel 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

3.9 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, dust mask during post-processing.

3.10 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.

3.10.1 Shutdown in Case of an Emergency

In case of an emergency, press and hold the power button for 3 seconds to immediately shut down the printer.

3.10.2 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, follow the instructions given in the respective Material Safety Data Sheet.

4 Technical Data

4.1 Mechanical Data

	D4K®
Printing Area (mm)	148 x 83.4 x 120
W x D x H (cm)	50 x 57 x 59
XY Resolution	54.6 µm
Z-layer Resolution	5 µm to 200 µm
Wavelength (LED)	385 nm
UI & Connectivity	Touch screen / Ethernet, USB Adapter: 100~240V AC, 1.5A, 50Hz/60Hz

4.2 Power Requirements

We strongly recommend you use an uninterruptible power supply to protect your printer. All electrical requirements must be met to ensure the most stable setup:

- D4K Pro – 19V DC / 4.73A
 - With adapter (included) – 100~240V AC, 1.5A, 50Hz/60Hz.
1. Plug the printer into a separate surge protector or battery backup.
 2. If your electrical line is prone to spikes and dips, you will need to use a UPS battery backup system for the printer with a switch changing time of less than 1 millisecond.
 3. Do not plug any additional equipment into the power circuit.
 4. Ensure there is a sufficient clean electrical socket that fluctuates no more than +/-3% (EU: +/-5%) from its baseline.

WARNING!

Risk of injury! Risk of damage to the printer!

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 printer!



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 printer, ground the printer before start working with it!

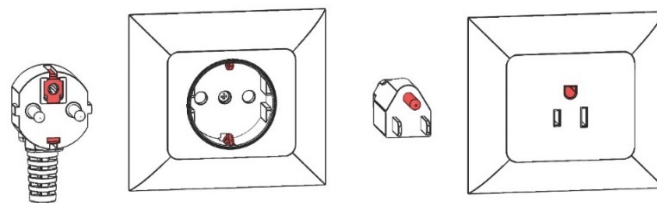


Figure 1: Grounded plug and outlet for Europe / Grounded plug and outlet for the US

4.3 Network Requirements

- **139, 445 ports:** are used to access the shared network folder (job, logs, update) on the printer. Also, they are used to upload jobs to the printer via network.
- **5900 port:** VNC server for printer remote control (see *Connect to the Printer via VNC Clients*)
- **2504 port:** is used for connection between the D4K Control Software and Envision One RP.
- **22 (ssh) and 443 (https):** are used for getting the software update.

4.4 Intended Environmental Conditions

4.4.1 Environmental Conditions for Printers

- Ensure that the room temperature does not fall below 23°C or exceed 28°C. Generally, the ideal working temperature is around 23°C or 73 °F.
- Humidity is not to exceed 60%.
- Do not set up the printer 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 printer to direct sunlight or any other UV radiation.
- The room must be temperature controlled to ensure the correct operation of the printer.
- Air conditioning units should be at least three meters away from the printer with no airflow pointing directly at the printer.
- Do not place the printer near to any door way, avoid temperature drops.
- Room must allow heat generated from the system to dissipate at 0.03 m³/min airflow.
- Keep the printer away from water sources such as sinks, tubs, wash stations, etc.
- Do not place the printer near polishing stations. Protect the printer's internal components from dust.

4.4.2 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 material tray, the printer door should always be closed. If you don't need the material tray for a longer time, pack the material tray and store it under the same conditions as mentioned above.



NOTICE

Follow the temperature instructions for each material that is being used. These instructions can be found:

- On the label of the material bottle
 - Extended instructions are located in the material handling guide on the provided USB-drive in the Starter Kit of the printer.
-



NOTICE

More specific storage conditions for photopolymers can be found in the appropriate cookbooks or Instruction of Use provided by manufacturer or distributor.

5 Printer Delivery

5.1 Unpacking the Printer

The D4K Pro will arrive in cardboard packaging with a series of accessories boxes. The boxes will all be on top of a pallet. Deliver them to the final site using a fork lift or a pallet jack. Alternatively, the boxes can be removed from the pallet and gently placed on a dolly.

- **Crate:** D4K Pro, Starter Kit
- **Optional Boxes:** PCA 2000 (parts-curing apparatus), PWA 2000 (parts washing apparatus), and battery backup if purchased.

Before opening the box, make sure that no visible damage can be observed or any sensors are broken. If these are present, please inform the office immediately.

If everything is in good condition, open the box and carefully lift out the printer, then place it feet down on the designated space.

5.2 Starter Kit



NOTICE

Depending on the country of origin, the contents of the Starter kit may vary.

The delivered starter kit includes:

- Build platform
- Cone-shaped paint filters
- Digital calipers
- Ethernet cable
- Glass scraper
- Paint scraper
- Power supply cord with adaptor
- Spare material tray
- Rubber spatula
- USB drive
- X-Acto knife
- 3mm allen key

5.3 Positioning the Printer



IMPORTANT

Risk of damage to the printer!

Incorrect positioning of the printer can cause damage to the printer and and/or to the built parts. Please, follow the guidelines!

In order to obtain the best possible results, take the following factors into account when positioning the printer:

- The D4K Pro needs to be installed on a sturdy surface that can comfortably hold over 123.5 pounds (56 kg).
- The printer requires a minimum amount of space for operation, maintenance, and heat dissipation.
- A minimum of 8 inches/20 cm of clearance is required at the rear of the printer to prevent it from overheating.
- A minimum of 12 inches/30 cm clearance is required at the left side of the printer to gain access to the main power, USB, and Ethernet plugs
- A minimum of 36 inches / 91 cm of clearance is required above the table-top.
- 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 electrical sockets near the printer location (at least two).
- Keep workspace clear of any potential source of fire at all times.
- Any heat generated from printer must be allowed and able to dissipate.

6 Printer Components

This chapter contains a comprehensive overview of the construction and the function of the printer. It should be read when actually at the printer in order to get familiar with the printer in an optimal way.

6.1 Construction of the Printer

Figures below give an overview of the most important printer components and show their position on the printer.

6.1.1 Front View

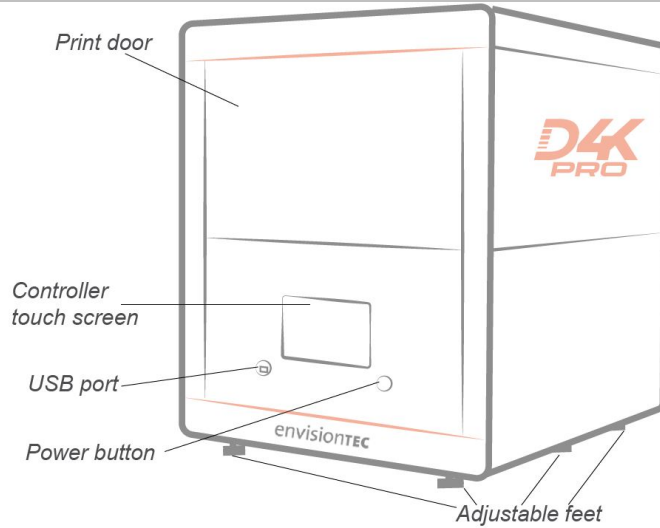


Figure 2: Front view of the printer

6.1.2 Print area

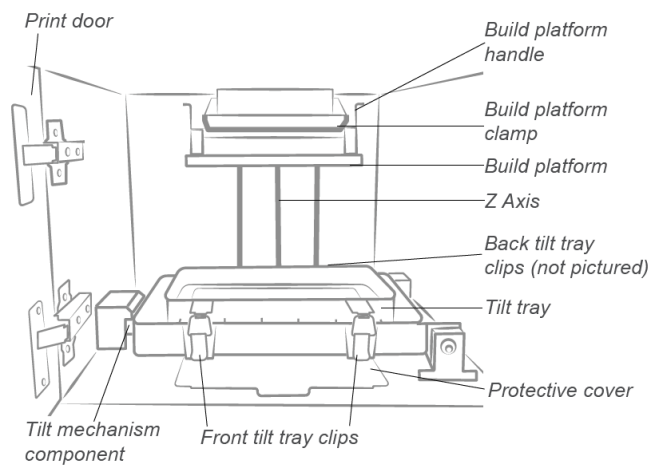


Figure 3: Print area

6.2 Main Printer Components

6.2.1 Material tray

Also known as Tilting material tray, or Tilt tray. It comprises of two main parts - a film and a frame. Below the tilt tray assembly is a glass plate. The glass plate stays in position in the printer, below the tilt tray, at all times. Below the glass plate is the protective cover. The protective cover keeps the printer's internal components clean. The protective cover extends out in front of the tilt tray and is visible during normal operation.

For more information, refer to the *Install the Tilting Material Tray* and *Cleaning the Material Tray* sections of this User Manual.

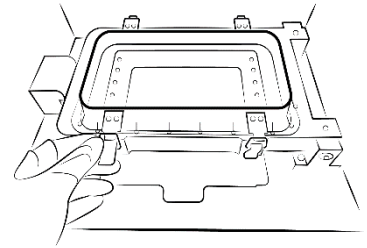


Figure 4: D4K Pro tilting material tray

6.2.2 Build platform

Also known as Build Plate, Build tray, Printbed, it is the surface of the D4K Pro printer on which the 3D printed part is formed.

For more information, refer to the *Install the Build Platform* and *Cleaning the Build Platform* sections of this User Manual.

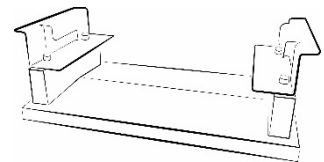


Figure 5: D4K Pro build platform

6.2.3 RFID Tag Reader

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

It also does not allow usage of a material that doesn't match the buildstyle or RFID tag.

Place the RFID card that comes with your material into the clips on the reader, where it is read and processed by the printer to ensure accuracy.

7 Hardware Setup

7.1 Connect the Printer

7.1.1 Plug & Play

Step-by-step:

1. Connect the DC power supply to the printer.
2. Connect the DC power supply to the AC power cable.
3. Plug the power cable into a battery backup, surge protector, or its own outlet.
4. Connect the Ethernet cable to the printer, if applicable.

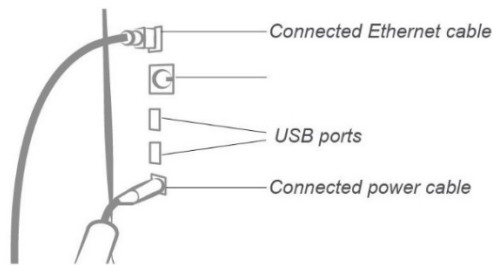


Figure 6: I/O



NOTICE

There are two USB ports on the back of the printer. There is a USB drive that comes with the printer which includes information on printer operation and setup. We recommend you save a backup copy of the data on your USB drive in a separate place, such as cloud-based storage, external hard drive, a backup computer, etc.

7.1.2 Switch the Printer On



WARNING!

Risk of injury!
Risk of injury from crushing caused by moving printer parts.
The printer may only be operated by instructed and specially trained personnel.
The printer may only be operated if the protecting devices are working properly.

To switch the printer on, press the power button on the front of the printer and hold it for two seconds.

→ The button illuminates and the screen switches on.

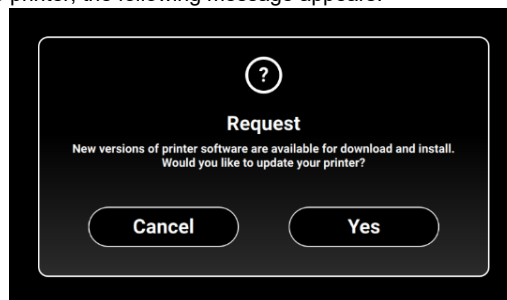
→ After a booting sequence, controller software is opened automatically.



IMPORTANT

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 printer!

If there is an available update for the printer, the following message appears:



- To update the printer, tap [Yes].
- To discard the update message, tap [Cancel].

7.1.3 Connect the Parts Washing Apparatus

The PWA 2000 is the recommended parts washing apparatus for the D4K Pro printer. To set up the PCA 2000, check the corresponding *Technical Guide* provided with your PWA 2000 if ordered.

7.1.4 Connect the Parts Curing Apparatus

The PCA 2000 is the recommended parts curing apparatus for the D4K Pro printer. To set up the PCA 2000, check the corresponding *Technical Guide* provided with your PCA 2000 if ordered.

7.2 Install the Build Platform

To attach the build platform, proceed as follows:

1. Open the protection door.
2. Slide the build platform onto the receptor held on the Z slide.
3. Tighten down the build platform clamp to secure the build platform.
4. Check that the build platform is secured in position.

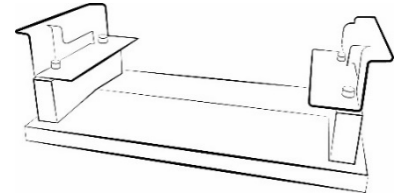


Figure 7: D4K Pro build platform



IMPORTANT

Make sure the build platform is tightened down securely before building. Failure to do so will cause the build platform to be uneven and can cause build failures.

7.3 Install the Tilting Material tray

To insert the material tray:

1. Open the printer door.
2. Release the front and back tilt tray clips.
3. Note the tilt tray is labeled “front”: this label must be towards you when the tilt tray is in the printer.
4. Note the glass plate, ensure all corners are completely flat and in position.
5. Lower the tilt tray into position and secure with all four clips.

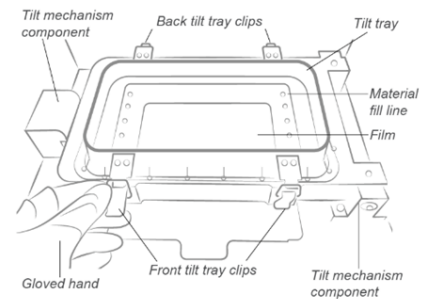


Figure 8: Material tray inside view



IMPORTANT

Pushing the clamping handles down is very important. If they are not locked properly, the material will splash inside the printer!

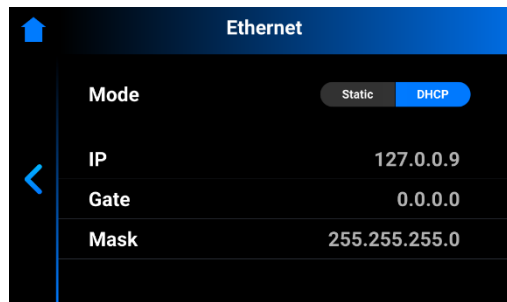
Double check if the clamping handles are closed tightly before starting a build process!

7.4 Set the Network

To connect the printer to your network, proceed as follows:

1. Plug the Ethernet cable into the network connector located on the back of the printer.
2. Connect the Ethernet cable to your network.

3. On the main screen of Control Software, tap **Settings | Ethernet**.



There are two types of Connection: static and dynamic.

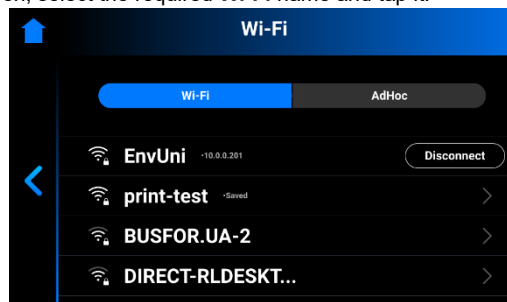
Dynamic connection or **DHCP** – printer gets the dynamic IP address. All the fields are greyed out.

To set the **Static** connection, all the fields need to be filled manually.

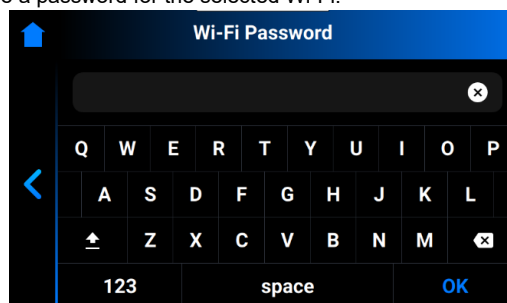
7.5 Set the WI-FI

To set Wi-Fi on the printer, proceed with the following steps:

1. Enter the **WI-FI** tab by tapping **Settings | Wi-Fi** on the screen of the Control Software.
2. On the left part of the screen, select the required **Wi-Fi** name and tap it.



3. Tap **[Connect]**.
4. In the **Password** field, type a password for the selected Wi-Fi.



5. Tap **[OK]**.



NOTICE

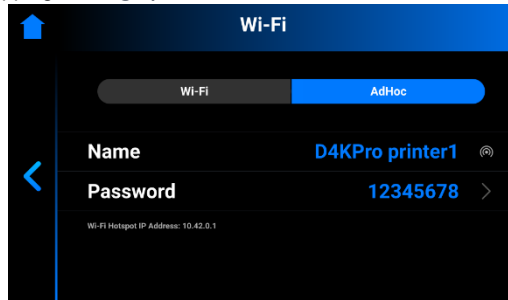
The list of available Wi-Fis refreshes automatically each time you enter the Wi-Fi tab.

7.6 Set the Ad Hoc

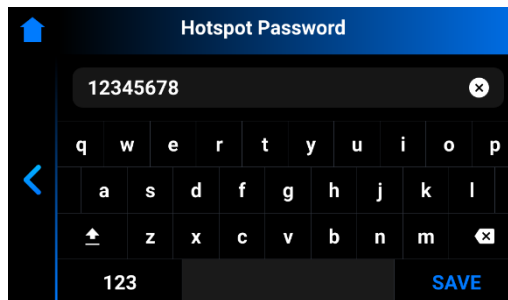
AdHoc is a type of on-demand device-to-device network. In ad hoc mode, you can set up a wireless connection directly to another computer or printer without having to connect to a Wi-Fi access point or router. It allows for loading the jobs to the printer that has no Internet connection.

To set the Ad Hoc, proceed with the following steps:

1. Enter the AdHoc tab by tapping **Settings | AdHoc** on the screen of the Control Software.



2. The **Name** field, which is the printer's name, is set automatically.
3. To set a password to the AdHoc, tap **Password**.
→ The following screen appears.



4. Create and type the password into the **Hotspot Password** field, and confirm with **OK**.



NOTICE

Your password must be at least 8 characters long and must not contain the space.

7.7 Connect to the Printer via VNC Clients



WARNING!

Risk of injury!

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

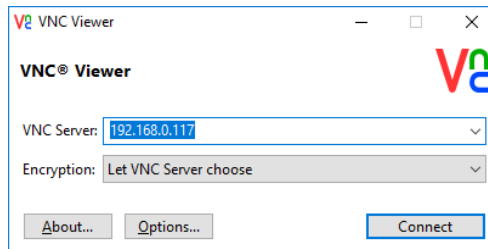
- Use the remote printer control with great attention.
- Do not use the remote printer control without an operator being next to printer.
- The printer owner is responsible for any unsafe operation of the printer using the remote printer control.

7.7.1 Supported Clients for Windows

VNC Viewer

Step-by-step:

1. Download the VNC Viewer and open it.
2. Put the IP address in the VNC Server box.

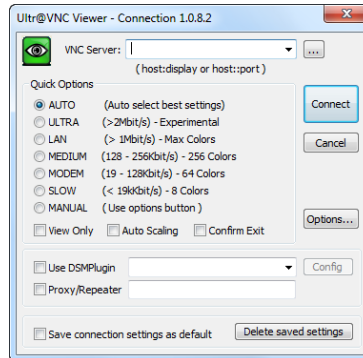


3. Tap [Connect].
→ The control screen appears.
4. Proceed working on the printer.

UltraVNC Viewer

Step-by-step:

1. Start the UltraVNC Viewer.
2. Put the IP address into the **VNC Server** box.



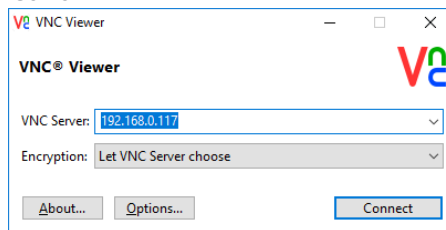
3. Tap **[Connect]**.
→ The control screen appears.
4. Proceed working on the printer.

7.7.2 Supported Clients for Linux

VNC-Viewer

Step-by-step:

1. Download the VNC Viewer and open it.
2. Put the IP address in the **VNC Server** box.



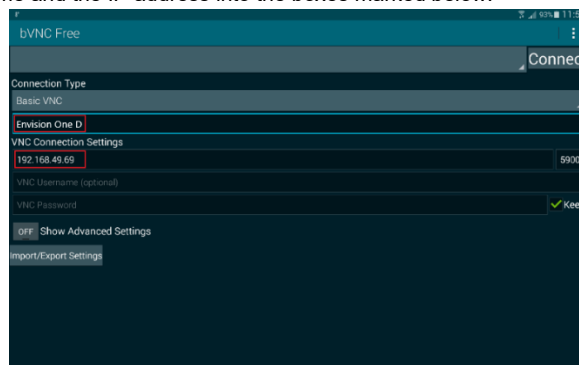
3. Tap **[Connect]**.
→ The control screen appears.
4. Proceed working on the printer.

7.7.3 Supported Clients for Android

bVNC Free

Step-by-step:

1. Put the connection name and the IP address into the boxes marked below.

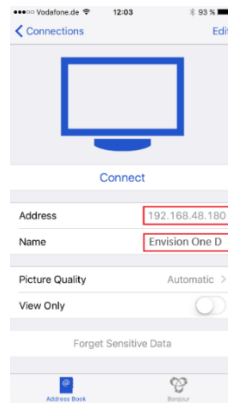


2. Tap **[Connect]**.
→ The control screen appears.
→ Proceed working on the printer.

7.7.4 Supported Clients for iOS

VNC Viewer

Put the IP address and the connection name into the highlighted boxes.



→ The control screen appears.

→ Proceed working on the printer.

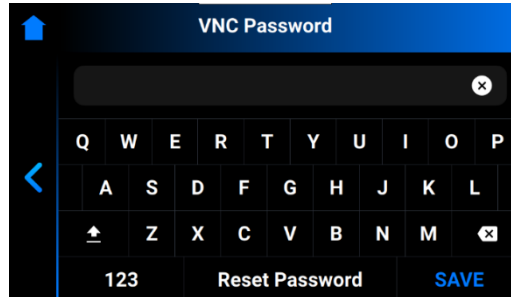
7.8 Set and Reset a Password for the VNC client



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, tap the **VNC Password** tab on the screen of the Control Soft after entering service mode. In the same dialog screen, you can reset an already set password.



Set a Password

To set a password, take the following steps:

1. Enter your password in the **Password** field.
2. Tap **[SAVE]**.
3. Restart the printer to apply new settings.

Reset a Password

To reset a set password, take the following steps:

1. Tap **[Reset Password]**.
2. Enter your new password in the **Password** field.
3. Tap **[SAVE]**.
4. Restart the printer to apply new settings.

8 Software Presentation

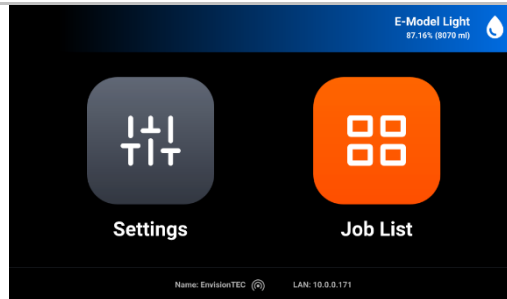


IMPORTANT

Risk of software malfunction of the printer!

Do not change any system settings of the printer!

D4K Pro Control Software

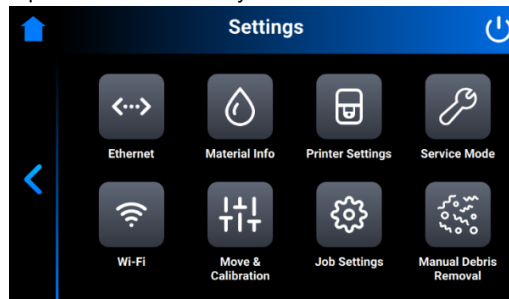


In Control Software, there are two main menus: **Settings Menu** and **Job List Menu**.

Settings Menu

The **Settings** Menu:

- allows the user to change settings of the printer build parameter or the printer itself,
- gives further information about the printer or the LAN connection,
- allows the user to switch the printer off electronically.



To exit the Settings Menu, tap the  icon on the left part of the screen.

To enter the main screen, tap the  icon on top-left corner of the screen.

8.1 Ethernet Tab

This tab allows for setting the Network on D4K Pro printer.

Tap **Settings | Ethernet** to open the tab.

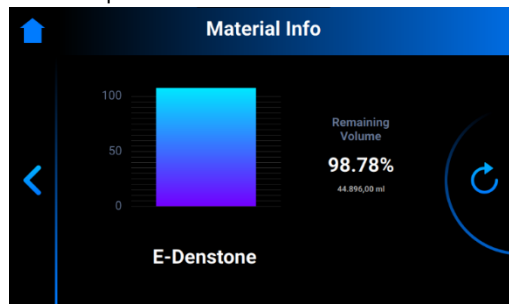
For detailed information, see the *Set the Network* section of this User Manual.


8.2 Material Info Tab


The **Material Info** tab provides information about:

- the type of material used on the printer;
- the amount of the material left on the material tag.

Tap **Settings** | **Information** | **Material Info** to open the tab.



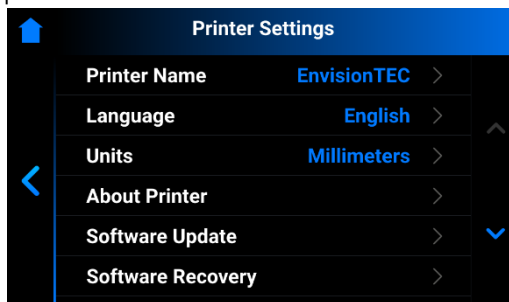
Tap the  icon to update the data from the RFID Tag Reader. To change the material tag, proceed as follows:

1. Remove the material tag from the Tag Reader.
2. Put the new material tag on the Tag Reader.
3. Tap the  icon.
→ The material information will be updated based on your new material tag.

8.3 Printer Settings Tab

The **Printer Settings** tab provides information about the printer, allows for changing the printer name, selecting units of measurement and updating the software version.

Tap **Settings** | **Printer Settings** to open the tab.



8.3.1 Printer Name

This option allows for changing the name of a printer.

1. Tap **Settings** | **Printer Settings** | **Printer Name**.



2. Enter the required name of the printer into the corresponding field using the keyboard on the screen.



NOTICE

Printer name **may contain**: letters from a to z; digits from 0 to 9; a hyphen (-).

Printer name **may not contain**: spaces; special characters or begin with a number or a hyphen.

3. Tap **OK**.
→ The printer name is changed.

8.3.2 About Printer

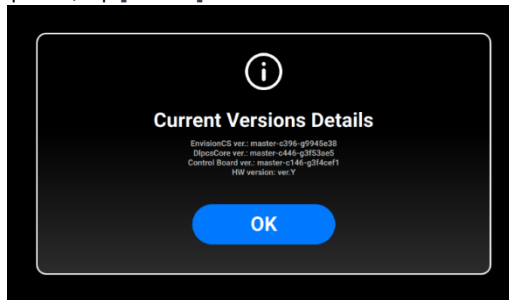
The **About Printer** tab provides information about the printer.

Tap **Settings** | **Printer Settings** | **About Printer** to open the tab.



- **Printer Name:** the name of the printer;
- **S/N:** printer serial number;
- **Control Software:** the version of control software set on the printer;
- **LED Operational Time:** the time of LED operation;
- **RAM Usage:** the volume of the occupied memory (as percentage of the total volume);
- **Storage Usage:** the volume of the occupied storage (as percentage of the total storage).

For more in-depth information on the printer, tap **[Details]**.



- **D4KCS ver.:** the version of control software set on the printer;
- **DlpcsCore ver.:** the version of the DLPCS Core;
- **Control Board ver.:** the version of control board;
- **HW version:** the version of firmware set on the printer.

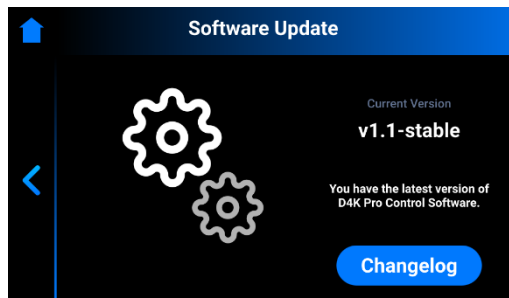
To return to **About Printer** tab, tap **[OK]**.

8.3.3 Software Update

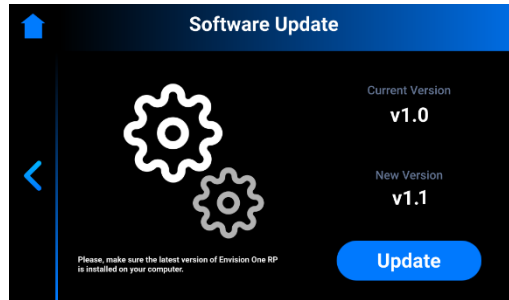
The **Software Update** tab provides information about the current versions of software and the new versions of software if they are available.

Tap **Settings** | **Printer Settings** | **Software Update** to open the tab.

If the latest versions of software are installed on the printer, the **[Changelog]** button is available. It allows to check the detailed information about the current versions of software.



If there are any software updates, the **[Update]** button is available.

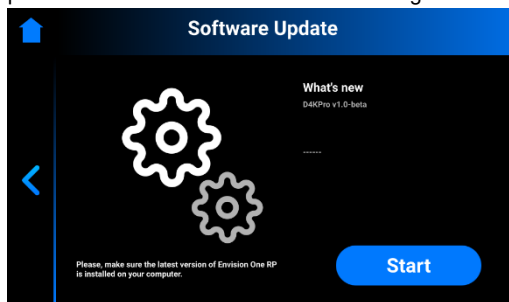


IMPORTANT
Risk of damage to the printer!
 Do not turn the printer off during update!

To update the Software version:

1. Tap [Update].

→ The following screen appears. It shows information about the changes in the new software versions.



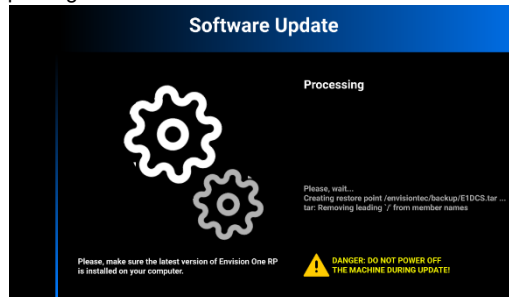
2. Tap [Start].

→ The following message appears.

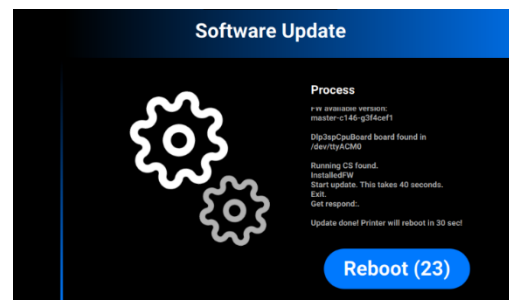
→ The **Experience Improvement** message appears asking if you allow the data collection to improve the experience with our product.

3. Tap [OK] to allow data collection or [Skip] to skip this step. (For more information, see the *Usage Analytics*).

→ The process of printer updating starts.



→ After successful printer update, the following screen appears.



4. To apply changes, reboot the printer. It will reboot automatically in 30 seconds. To reboot the printer manually, tap [Reboot].

8.3.4 Software Recovery

The **Software Recovery** tab allows to recover the previous version of Control Software if for some reason the current version of Control Software isn't working for you.

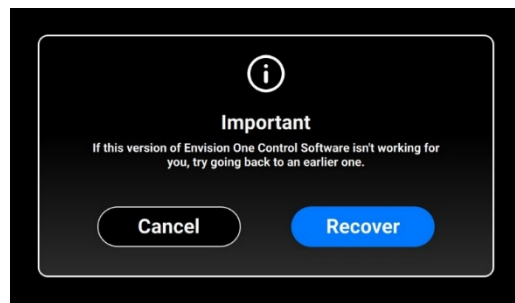
1. Tap **Settings | Printer Settings | Software Recovery** to open the tab.

→ The following screen appears.



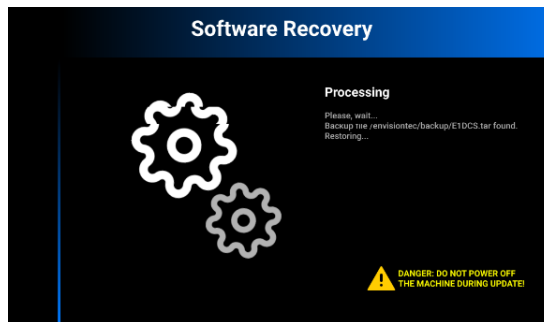
2. Tap **[Recover]** to get back to the previous version of Control Software.

→ The following message appears.



3. Tap **[Recover]** to confirm the Software recovery.

→ The process of software recovery starts.



→ After successful software recovery, the screen with the **[Reboot]** button appears.

4. To apply changes, reboot the printer. It will reboot automatically in 30 seconds. To reboot the printer manually, tap **[Reboot]**.

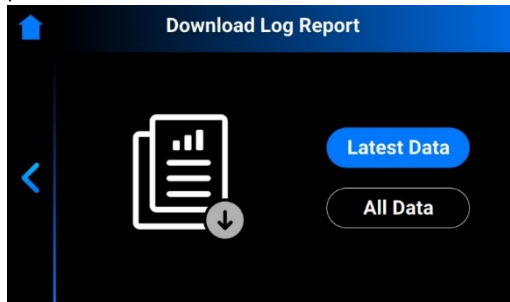
8.3.5 Download Log Report

The **Download Log Report** tab allows to download the log report with all the printer information to the USB-drive.

Prerequisite:

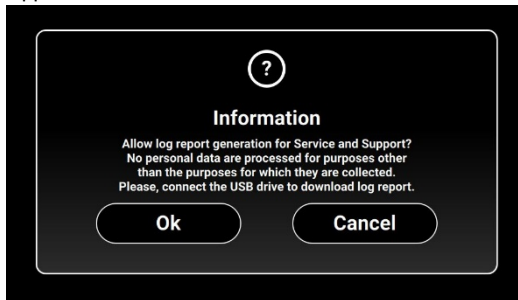
- USB-drive has been connected to the printer.
1. Tap **Settings | Printer Settings | Download Log Report** to open the tab.

→ The following screen appears.



2. Tap **[Latest Data]** to download the latest information of the printer; or **[All Data]** to download the report containing all information received during printer operation.

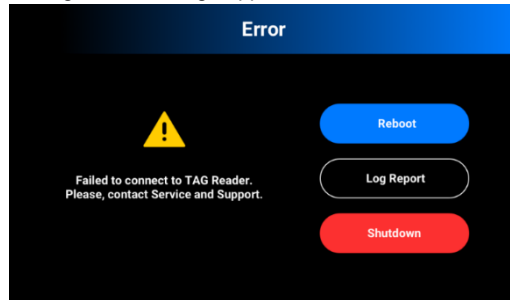
→ The following message appears.



3. Make sure the USB-drive is connected to the printer and tap **[Ok]**.

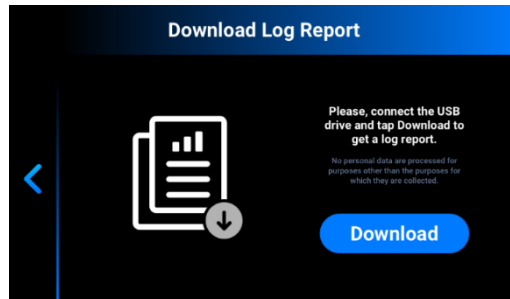
→ The report has been downloaded successfully to the USB-drive.

If some hardware issue has occurred on the printer, you can download the log report with all printer information to the USB-drive and send it to Service and Support, thus speeding up the process of addressing the issue. In case such issue is detected, the following Error message appears.



1. Tap **[Log Report]**.

→ The following message appears.



2. Make sure the USB-drive is connected to the printer and tap **[Download]**.

→ The report has been downloaded successfully to the USB-drive.

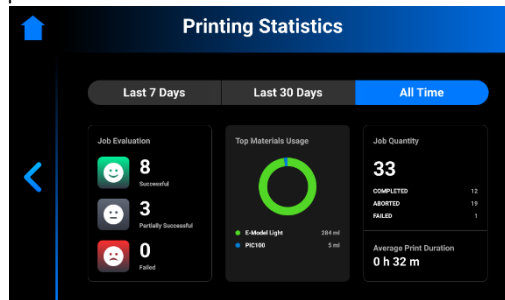
To **send the log report to Service and Support**, proceed as follows:

1. Open the USB-drive folder.
2. Find the file with the similar name: snapshot_2019-09-26T14-01.zip.
3. Send it to your personal Service and Support manager.

8.3.6 Printing Statistics

This tab allows you to check printer usage data for the last 7 days, last 30 days or all the time your printer has operated. Tap **Settings** | **Printer Settings** | **Printing Statistics**.

→ The following screen appears.



The following information is shown:

- **Job evaluation data:** this parameter shows the quality of finished jobs (successful, partially successful and failed)
- **Materials usage:** this parameter shows the names and volume of the used materials
- **Job quantity:** this parameter shows the quantity of completed, aborted and failed jobs
- **Average print duration:** this parameter shows the average duration of the job in hours

8.3.7 Units

The **Units** tab allows for selecting the units of measurement for the motion parameters.

1. Tap **Settings** | **Printer Settings** | **Units**.



2. Select **Inches** or **Millimeters** by tapping the corresponding field.

→ The units of measurement are changed.

8.3.8 Usage Analytics

Collecting statistics and sending it automatically will help **EnvisionTEC** improve our products.

1. Tap **Settings** | **Printer Settings**.
2. Check the **Usage Analytics** check-box if you give consent to collection and usage of customer data.

8.4 Service Mode Tab

The Service Mode is intended for **technicians and distributors only** who carry out the calibration of the **D4K Pro®** printers.

8.5 Wi-Fi Tab

The Wi-Fi tab allows for setting the Wi-Fi connection on the printer.

Tap **Settings** | **Wi-Fi** to open the tab.

For detailed information, see the section *Set the Wi-Fi*.

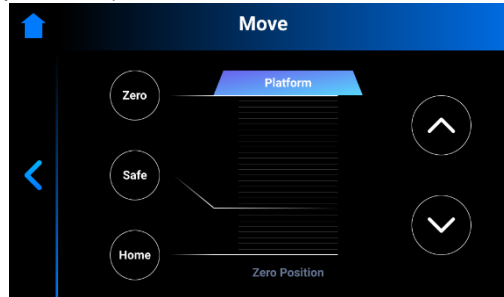
8.6 Move & Calibration Tab

The **Move & Calibration** tab is used for moving the build platform and calibration of Home position.

8.6.1 Move

This tab allows for moving the build platform along the Z-axis.

Tap **Settings | Move & Calibration | Move** to open the tab.



Tap the **up** and **down arrow** icons to move the platform up and down correspondingly.

- **Zero position** is the highest position of the build platform along the Z-axis.
- **Home position** is the start position of the build platform for printing.
- **Safe position** is the safe position of the build platform between Zero position and Home position for *Calibrate the Home Position*.

8.6.2 Home Calibration

Tap **Settings | Move & Calibration | Home Calibration** to open the tab.

For detailed information, see the section *Calibrate the Home Position* of this User Manual.

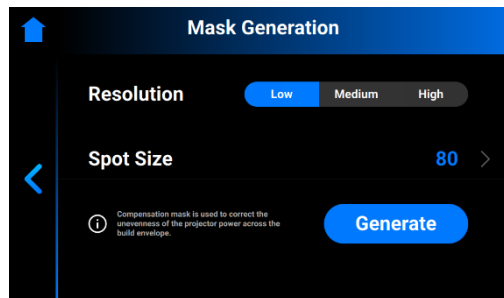
8.6.3 Mask Generation

Required equipment:

- USB Light sensor
- UV protection glasses

Step-by-step:

1. Insert the empty material tray to the material tray holder.
2. On the main screen, tap **Settings | Move & Calibration | Mask Generation**.
→ The following message appears.



3. Select a resolution (Low, Medium or High) in the **Resolution** field.



NOTICE

Resolution defines the number of measurements that need to be done. The higher the resolution, the more measurements are needed.

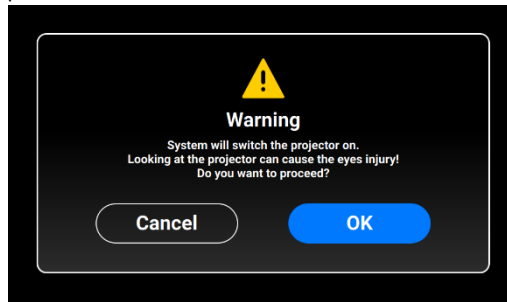


NOTICE

The spot size is set automatically based on the printer type and build envelope size.

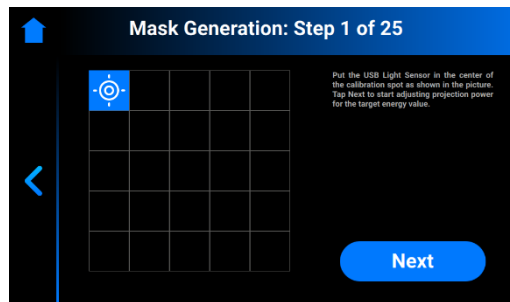
4. Tap **Generate**.

→ The following screen appears.



5. Make sure you have the UV protection glasses on and tap **[OK]** to proceed.
6. Connect your USB Light Sensor to the printer via USB cable.

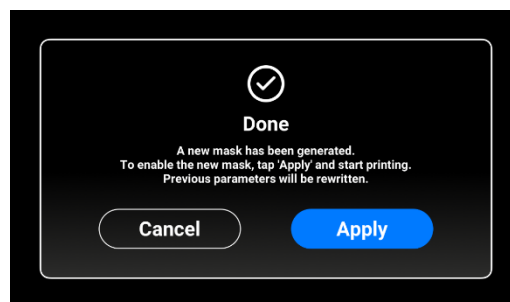
→ The following screen appears.



NOTICE

Each box on the screen shown above corresponds to a spot of light that is projected onto the calibration plate. You can tap the required box to adjust its projection power or just tap **[Next]** to move to the next box.

7. Place the USB light sensor in the center of the light spot that is projected and tap **[Next]** to start adjustment of projection power.
 - The **Next** button becomes **Pause** button.
 - The projection power is being adjusted.
 - The red **Pause** button becomes active, allowing to pause the adjustment of the current box.
8. Repeat step 7 for each of the remaining boxes.
 - The following screen appears.

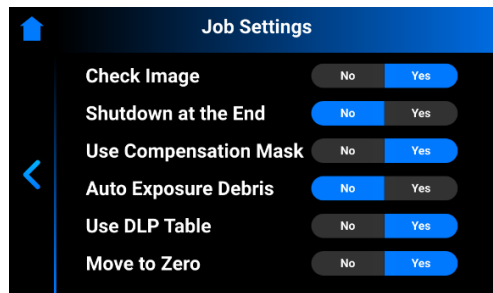


9. Tap **[Apply]** to save the newly generated mask and proceed working with the printer.
 - The newly generated mask has been saved.

8.7 Job Settings Tab

This tab allows the user to check or change the printer settings.

Tap **Settings | Job settings** to open the tab.



The following settings are available:

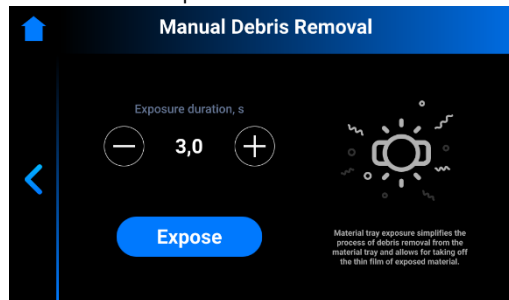
- **Check Image:** function of image verification.
 - [Yes] - all layers of the job are checked before starting the job.
 - [No] - the layers are not checked before starting the job.
- **Shutdown at the End:** shutdown of the printer when the job is finished.
 - [Yes] - the printer turns off automatically after completion of the job.
 - [No] - the printer does not turn off after completion of the job.
- **Use Compensation Mask:** function of mask application.
 - [Yes] - the mask is applied to the projected image.
 - [No] - the mask is not applied to the projected image.
- **Auto Exposure Debris:** function of automatic exposure of the material tray to make cleaning the material tray easier.
 - [Yes] - the material tray is automatically exposed after the job has failed.
 - [No] - the material tray is not exposed automatically when the job has failed. In this case, you can manually perform the material tray exposure after the completion of the build process.
- **Use DLP Table:** function of DLP table application.
 - [Yes] - the DLP table is used.
 - [No] - the DLP table is not used.

8.7.1 Manual Debris Removal

This tab allows you to simplify the process of cleaning the material tray.

If for some reason you need to remove debris from the material tray, proceed as follows:

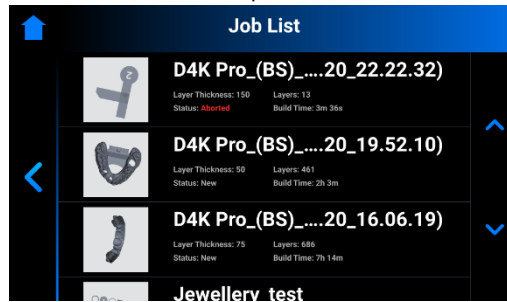
1. Tap **Settings | Manual Debris Removal** to open the tab.



2. Set the required exposure time using the **plus** and **minus** icons.
3. Tap **[Expose]**.
 - The whole material tray area has been exposed.
4. Remove debris from the material tray by simply taking off the thin film of exposed material.
5. Proceed following the step-by-step for *Filtering Material*, if needed.

Job List Menu

Tap [Job List] on the main screen of the Control Software to open the tab.



Now you can scroll through the list to view different jobs. There is the following information on job statistics:

- **Layer thickness** – the thickness of one layer in μm ;
- **Layers** – the number of layers for the job;
- **Print time** – the estimated time when the job will be finished. This calculation is approximate and is updated dynamically after each exposure.
- **Status** – the state of the job at a current time. It can be:
 - **New** – if the job has not been printed yet
 - **Complete** – if the job has been printed successfully
 - **Failed** – if the job has corrupted, or failed due to material mismatch
 - **Aborted** – if the job has been aborted manually or cancelled due to hardware issues (projector/board does not respond, etc.)
 - **Invalid** – if a problem is detected when transferring the job file from Envision One RP® to D4K Pro Control Software

8.8 Envision One RP®

The **Envision One RP®** software is used to place 3D models on the build platform, create supports, generate build jobs and transfer jobs to the printer.

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

- Envision One RP® Software
- Buildstyles for the printer (.bsx)

You will find information on how to install and operate the Envision One RP® in the *Envision One RP® User Guide* provided with your printer.

9 Calibration

The printer is completely calibrated and tested during fabrication. However, the calibration needs to be carried out by the printer owner to guarantee the uniformly accurate build results, if:

- a) the printed parts are not adhering to the build platform, especially in one corner or half of the build platform;
- b) the current material tray is replaced with a new material tray.

9.1 Home Position Calibration



IMPORTANT

Always remove the platform before taking the material tray out of the printer!

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

Equipment:

- Digital calipers
- Scraper
- Material
- RFID material tag
- Post-processing materials
- *Home Position Calibration Cubes.stl* file

To check, modify, or fine-tune the printer's parallelism and home position, a *Home Position Calibration Cubes.stl* file is printed. The printer must be powered on for the duration of the home position calibration.




NOTICE

Parallelism is achieved when the platform and material tray are aligned with each other. Home position is the lowest point of the build platform along Z-axis, it is the start position of the build platform for printing.

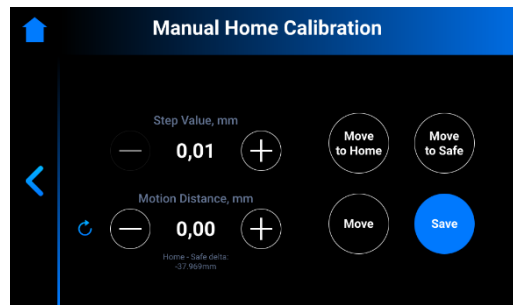


NOTICE

Home Position Calibration Cubes.stl is a file made of nine blocks, each block is five millimeters high. This file is located on the USB-drive that is shipped with every D4K printer. The file is also available to download by contacting EnvisionTEC support, or an authorized distributor.

1. Download the .stl file to the computer where the Envision One RP software is installed.
2. Open the Envision One RP software and select a buildstyle. See the *Envision One RP® User Guide* provided with the printer for details.
3. Import the .stl file into the Envision One RP software.
4. Print the *Home Position Calibration Cubes.stl* file. See *Start Job* for details.
5. Once the print has completed, check if there are nine cubes on the platform.
6. If any of the cubes are missing, tap the  icon and remove any cured particles that settled to the bottom of the material tray. See *Manual Debris Removal* for details.
7. Gently remove the calibration models from the build platform using the scraper that came in the starter kit.
8. Clean and cure the models. See *Finish a Print* for details.
9. Clean the build platform. See *Cleaning the Build Platform* for details.
10. Clean the material tray. See *Cleaning the Material Tray* for details.
11. Take a close look at each printed model. There is a small number printed on each model.
12. Measure the height of each model and write down the values.
 - a) If all the models are within +/- 100 microns, the printer is paralleled, and no further actions need to be taken at this time.
 - b) If all the models are within 4.90 and 5.10 mm, the printer's home position is correct, and no further actions need to be taken.
 - c) If there is a deviation of more than 100µ in at least one of the nine models, the home position is not set correctly. In that case, move to the next step.
13. Install the empty material tray with no material in it on the printer.


14. Install the cleaned build platform on the printer.
15. Tap **Settings | Move & Calibration | Home Calibration** in D4K Pro Control Software.



16. Set the value of a step by tapping the - and + icons of **Step Value**. This is the increment used for the **Motion Distance**. The Step Value increments can be set to 0.01, 0.10, 1.00, and 10.00.
17. Set a motion distance of the platform by tapping the - and + icons of **Motion Distance**. This is the total distance the platform moves.



NOTICE

The positive values move the platform up; the negative values move the platform down.
Tapping the  icon resets the motion distance value to zero.

18. Reference the values in **Step 12** to determine the new home position. The adjustment should be made based on the average height of the calibration blocks.
 - a) If the average height measurement is below 4.90 mm, move the platform up tapping **[Move]** the required number of steps.
 - b) If the average height measurement is above 5.10 mm move the platform down tapping **[Move]** the required number of steps.
19. Tap **[Save]**.
 - The build platform holder starts moving up to the top of the Z-axis.
 - The new home position is set.

9.1.1 Verify Home Position Calibration

1. Once the calibration is done, print the **Home Position Calibration Cubes.stl** job file again.
2. Following the instructions in **Step 12 of Calibrate the Home Position**, measure the heights of the calibration cubes again.
 - If all of the blocks are within +/- 100 microns, then the printer is parallel, and no further actions needs to be taken.
 - If all the blocks are within 4.90 and 5.10 mm, the printer's home position is correct, and no further actions need to be taken.
 - If the blocks are still out of tolerance, refer back to **Step 15** to recalibrate the home position. Repeat until all calibration cubes are within tolerance.



NOTICE

In some rare occasions, the proper values for home position calibration cannot be reached. In this case, contact *Customer Service*.

9.2 Use the Grey Mask

The Grey Mask is the Compensation Mask for the D4K® printer. It is set in the factory.
To enable the Grey Mask on your printer, proceed as follows:

1. Tap **Settings | Job Settings** on the screen of the Control Software.
2. Make sure the **[Yes]** checkbox is enabled in the **Use Compensation Mask** field.

10 Start a Print

The next subsections describe the main functions to build a job.



WARNING!

Risk of injury!

Risk of injury from crushing caused by automatically moving printer parts.

- The printer may only be operated by instructed and specially trained personnel.
- Make sure that all persons are clear of the danger zone.
- The printer may only be operated if the protecting devices are working properly.



WARNING!

Risk of injury!

Risk to health due to photopolymers.

- Do not use other materials than the photopolymers delivered by EnvisionTEC®.
- Observe the relevant Material Safety Data Sheets supplied with the photopolymers.
- Use the appropriate personal protective equipment.
- 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.



NOTICE

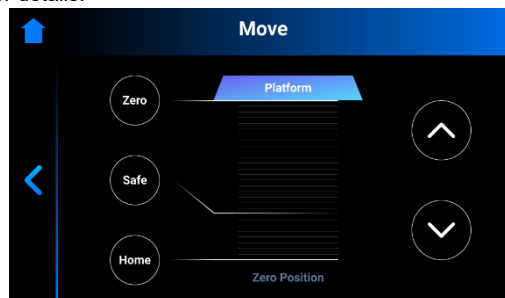
The execution of job preparatory activities, including date and performing operator, shall be documented for reasons of traceability.

10.1 Check Z-axis

First, make sure the printer has its Z-axis slide activated:

1. Tap **Settings | Move & Calibration | Move** on the main screen.
2. Tap the **up** and **down arrow icons** and make sure the building platform moves along the Z-axis. If the build platform does not move up, the reason could be that it has already reached its highest point.

Refer to the *Move Tab* description for details.



10.2 Fill in the Photopolymer

Prerequisites:

The printer has been calibrated. At least the **Home Position** has been carried out.



IMPORTANT!

Risk of damage to the printer!

Never fill the material tray over the top of the material tray ramp as it will result in material spilling out and into the printer.



IMPORTANT

Use a different tilt tray for each kind of material to avoid contamination. If not possible, clean the tilt tray carefully and thoroughly.



IMPORTANT

Use the appropriate personal protective equipment!

Step by Step:

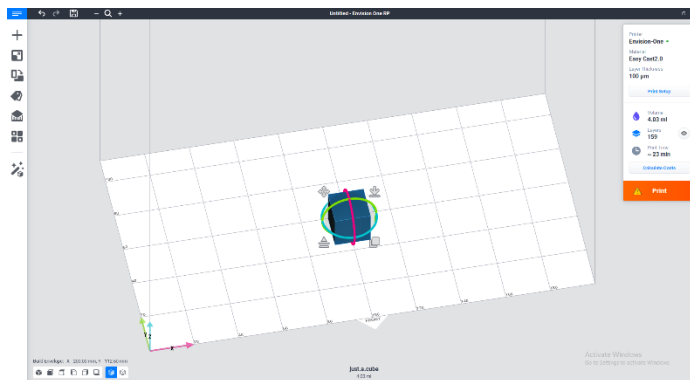
1. Open the printer door.

2. A material tag is attached to the material bottle. Remove the material tag and place the material tag on the material tag reader.
3. Shake the material bottle well.
4. Open the material bottle and pour the material slowly into the material tray.
5. Mix the material thoroughly with the spatula.
6. Close the printer door to protect the material from ambient light.

10.3 Create the Print Job in Envision One RP

1. Open Envision One RP Software.
2. Select the printer, material, and layer thickness.
3. Add a model.
4. Orient a model and add supports as needed, or use the Magic Print feature.
5. Save the build job to a USB or transfer directly to the printer.

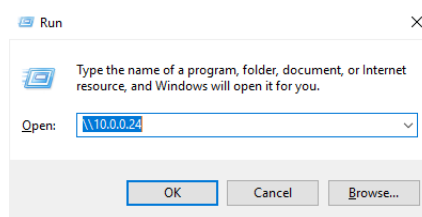
For more detailed information, refer to the *Envision One RP User Guide* provided with your printer.



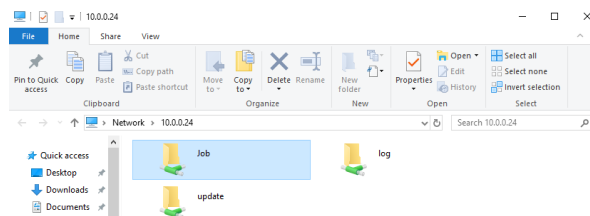
10.4 Load a Job File

To load a job to the printer:

1. Enter **Run** into the Windows search field or use **<Windows> + <R>** hotkey on your computer keyboard.
→ The Run window opens.



2. Enter the IP address of the printer, e. g.: **\\10.0.0.24**.
→ The Windows file explorer opens, showing the folders on the printer.



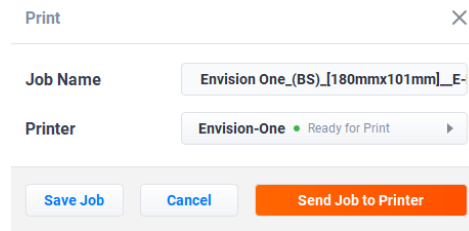
3. Open the **Job** folder.
4. Put the job files to the folder.
→ All the files from Job folder are now shown in the **Job List** tab.

10.4.1 Load a Job from Envision One RP

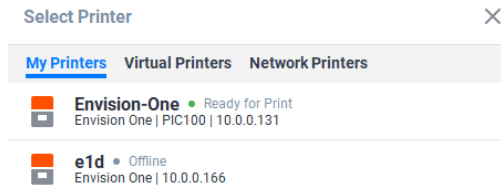
Open the **Envision One RP**.

Requirements: At least one open and selected 3D model.

1. Click the **Print** button in the **Print Menu**.
→ The following window appears:



2. Click the **Printer** field.
→ The following window appears:



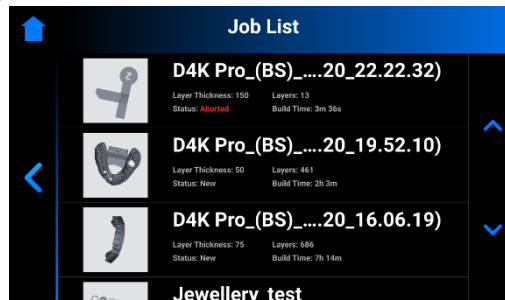
3. Select a printer to send your job to.
5. Click **Send Job to Printer**.
→ The job is sent to the selected printer.

10.4.2 Load a Job from USB Drive



You can load a job to your printer directly from USB drive.

Step-by-step:

1. Upload the required job to the USB drive.
2. Insert the USB drive with the uploaded job into the corresponding plug of the printer.
→ The job is automatically added to the **Job List**.



NOTICE

The  icon indicates that USB drive is connected to the printer.
The  icon in the Job list indicates that the job was added via USB drive.

10.5 Check the D4K Pro Is Ready to Print

Before beginning a print, **always check** the following things:

1. The printer door is closed.
2. The flat surface of the build platform is clean and free of all cured material, and the build platform clamp is secured in position.
3. The material tray is secured in position and the material tray clamping handles are tight and the material tray clips are fastened.
4. The material tray is filled to the fill line, and all material handling instructions are followed for the specific material used (mixing, temperature, etc.)
5. The material tag is on the material tag reader, and the tag matches the material in the tray and in the buildstyle.

10.6 Start the Print



IMPORTANT

Risk of damage to the printer!

Make sure the build platform is clean and the material tray 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 printer. If this is not the case, the job will not start.

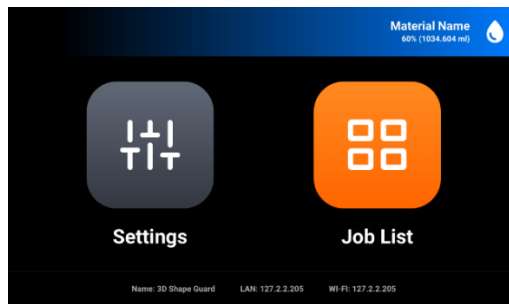


IMPORTANT

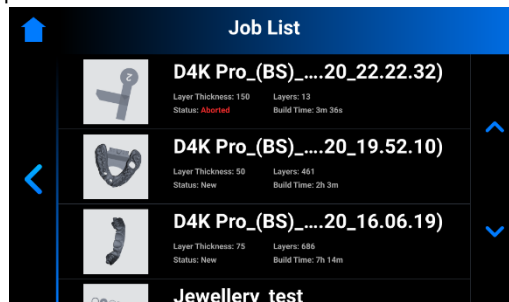
If you stop the job and move the build platform, unless it is done using the **[Pause Job]** button, your build will not line back up properly and will likely result in a failed build. Proceed with attention!

To start a job:

1. From the Home screen, select the Job List.



2. Select the job you want to print from the Job List.

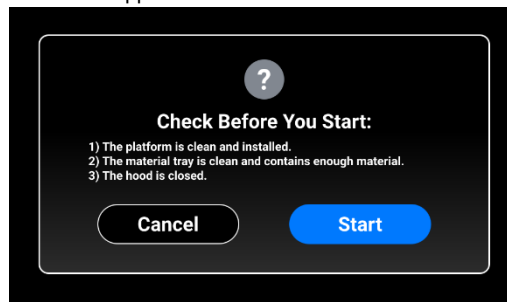


3. Select the job you want to print from the list of jobs by tapping it.
→ The following screen appears.



4. Tap the Play button to begin printing.

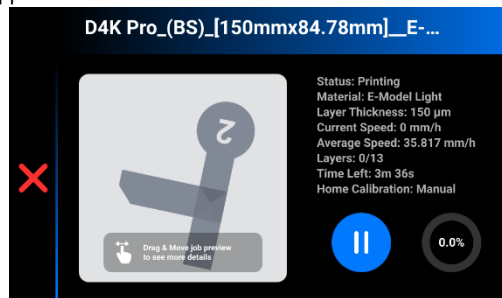
→ The following confirmation window appears.



5. Check the requested parameters and tap **[Start]**.

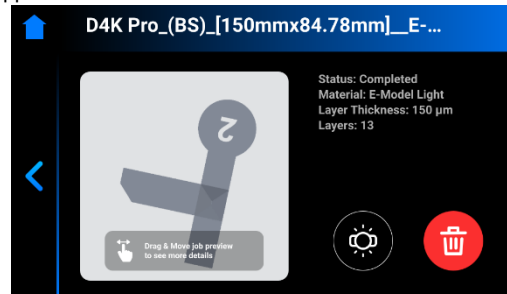
→ The job has started.


→ The following window appears.



→ The job has been printed successfully.

→ The following window appears.




If for some reason you want to remove the job from the material tray, tap the  icon and proceed by following a step-by-step for debris removal specified in *Abort Job*.

10.7 Options for the Job Stopping

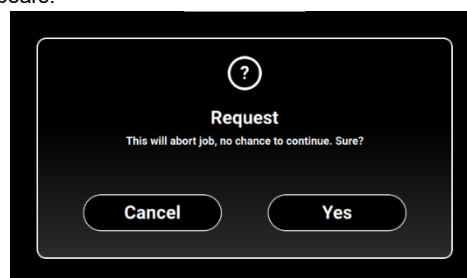
If for some reason you want to stop or abort the print, the following options are available:

- Abort Job
- Delete Job

10.7.1 Abort Job

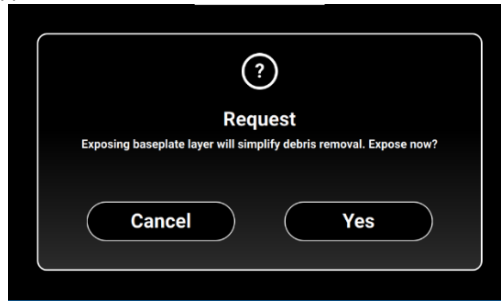
The job can be aborted by tapping the  icon in the job printing window.

→ The following window appears.



1. In the confirmation window, tap **[Yes]**.

- The job has been aborted.
- The following window appears.

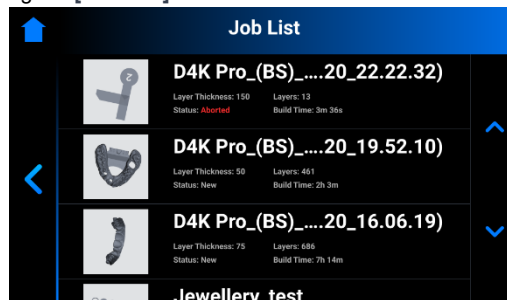


- If you do not want to simplify the process of cleaning the material tray, tap **[Cancel]**.
 - If you want to simplify the process of debris removal from the material tray, tap **[Yes]**.
 - The job has stopped.
 - The whole material tray area has been exposed.
2. Now, you can remove debris from the material tray by simply taking off the thin film of exposed material and following the procedure for *Filtering Material*.

10.7.2 Delete Job

To delete the job from the Job list:

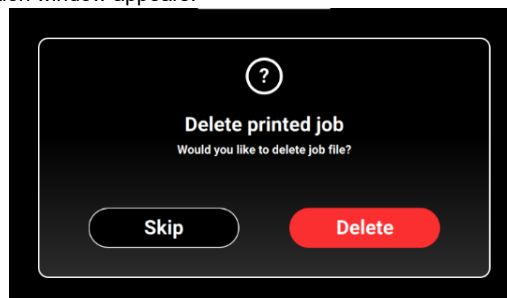
1. Enter the **Job List** by tapping the **[Job List]** on the main screen.



2. Select the job you want to delete from the list of jobs by tapping it.
 - The following screen appears.



3. Tap **Waste Bin** icon to delete a job file.
 - The following confirmation window appears.



4. Tap **[Delete]** to confirm a job file removal.

11 Finish a Print

11.1 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

11.2 Remove the Build Platform from the Printer

When a print job is successfully completed, the build platform will rise to the top of the Z-axis tower. The build platform with the printed part is ready to remove. Have a paper towel ready to catch potential drips of uncured material.

To remove the Build Platform from the Printer, proceed as follows:

1. Open the printer door.
2. Place one hand on the build platform handle.
3. Grasp the build platform clamp with the other hand and lift to release.
4. Lightly cradle the bottom of the build platform with the paper towel. This will help to prevent dripping while removing the build platform from the printer.
5. Pull the build platform towards yourself until it comes free from the printer.

11.3 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., always put on suitable protective clothing (gloves, protective goggles, etc.) before working with construction substances.



- Take utmost care to avoid getting any chemicals in your eyes or breathing the chemical vapors in.
- Always wash your hands thoroughly afterwards with soap and water only. Don't use Isopropyl alcohol to wash your hands if you come in contact with photopolymers.
- Take care not to spill any chemicals.

Once the job is complete, the built part will hang off of the build platform.

To remove the part, proceed as follows:

1. Place the build platform on its side in the processing zone. Watch the material so it doesn't leak into the build platform clamp screw cavity.
2. Use the scraper from the Starter Kit to gently detach models from the build platform. Angle your tool roughly 30 degrees from the platform and move the blade while applying a light amount of pressure.
3. If the model doesn't begin to separate easily, move to a different area, working your way around the model until it safely dislodges from the build platform.
4. Place each model on a paper towel to catch the excess material as it drips.

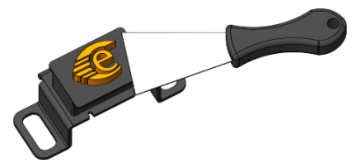


Figure 10: Separation of a model from the build platform



IMPORTANT

Note that the models appear to be glossy. This is because uncured materials covering the surface.

11.4 Reset the Printer After a Print

1. Once the models have been removed, use the glass scraper to remove any remnants of the printed job from the surface of the build platform.
2. Wipe the entire platform dry using a paper towel. The previous print job shouldn't be visible on the platform.
3. *Install the build platform* on the printer and tighten the build platform clamping handle.
4. Close the printer door.
→ The D4K Pro can now begin printing the next loaded print job.

11.5 Clean Parts and Remove Supports

The PWA 2000 Parts Washing Apparatus is the recommended washing unit for the D4K Pro. To get the information on how to clean a printed model with PWA 2000, check the corresponding *PWA 2000 Technical Guide* provided with your PWA 2000, if ordered.



REFERENCE

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

11.6 Cure the Printed Part

The PCA 2000 Parts Curing Apparatus is the recommended curing unit for the D4K Pro. To get the information on how to cure a printed model with PCA 2000, check the corresponding *PCA 2000 Technical Guide* provided with your PCA 2000, if ordered.



REFERENCE

For information on post curing of the parts, consult the cookbook or Instruction of Use provided by your manufacturer or distributor.

11.7 Finish Post-processing of a Printed Part

Finishing is the final step in post processing a printed model. With finishing, you can remove all traces of supports and polish models as needed, depending on the final part application.

1. Grind support bumps using a fine burr and rotary tool, or manually using sand paper.
2. Remove dust particles by quickly spraying the model(s) with 99% IPA in a spray bottle, and dry immediately with compressed air.

12 Service and Maintenance



WARNING!

Risk of injury!

Risk of injury from crushing caused by automatically moving printer parts.
Body parts may be crushed by movements of the build platform.

- The printer may only be operated if the protecting devices are working properly.



WARNING!

Risk of injury!

Risk of slipping, stumbling or falling of persons through loose cables, objects or liquids on the floor.

- Keep the printer area clean and dry.
- Make sure that no loose cables or objects are lying on the floor of the printer area.
- Place all printer cables carefully to prevent trip hazard.
- After repairing the printer, place cables back carefully to prevent trip hazard.
- Remove tools and other objects from the printer.
- Inform the personnel of residual risks.



CAUTION!

Risk of injury!

Residual risks caused by the ergonomics of the printer.

- Maintain a healthy posture.
- Instruct the personnel accordingly.

The following sections contain information on service and maintenance of the printer. A regular maintenance according to the maintenance plan is an essential precondition for an efficient use of the printer.

- Section *Operational Maintenance* describes the operational maintenance and how to carry out the maintenance tasks.
- Section *Auxiliary Materials and Consumables* gives an overview of all auxiliary materials and consumables.

12.1 Customer Service

EnvisionTEC GmbH
Brüsseler Str. 51
D-45968 Gladbeck
Germany

Phone: 49 2043 9875-0 (This phone number is available only during office hours).

E-mail: support@envisiontec.de

12.2 Operational Maintenance



IMPORTANT

Carry out the maintenance tasks according to the table below and the intervals specified therein.



NOTICE

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

The operational maintenance helps ensuring a smooth and efficient production process. The operating personnel can carry out these tasks after being trained accordingly.

Task	Maintenance Interval
Cleaning the build platform	Print-by-Print
Cleaning the material tray	Print-by-Print
Cleaning the printer casing	Print-by-Print
Cleaning the hard drive space	Weekly
Cleaning the PWA 2000 or Washing Containers	Weekly

Cleaning dust	Weekly
Power Cycling	Weekly
Cleaning the touch screen	Monthly
Checking the safety equipment	Daily and every time the printer is put into operation and every time the printer has been repaired (see <i>Check the Safety Equipment</i>).
Greasing the Z-axis slide	Annually

12.2.1 Cleaning the Build Platform



IMPORTANT

Risk of damage to the printer!

Use 99% IPA away from the material tray and thoroughly wipe all IPA completely from the build platform before installing it back onto the printer!

Time needed: Approximately two minutes

Maintenance frequency: Print-by-Print

Seeing the Signs:

- build platform becomes sticky
- when changing the material type

Step-by-step:

1. Clean the surface of the build platform using a clean paper towel.
2. Check every surface for material, buildup, or stickiness.
3. Clean the excessive buildup using a small amount of 99% IPA on a clean paper towel or Q-tip.

12.2.2 Cleaning the Material Tray



IMPORTANT

Risk of damage to the printer!

Always remove the platform before taking the material tray out of the printer! Failure to do so can result in material dripping on the projector causing failed builds and ruined equipment!



IMPORTANT

Always clean the material tray each time you need to change the material for printing parts on the printer!



IMPORTANT

Risk of damage to the printer!

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



IMPORTANT

Never use chemicals inside the material tray!

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

Step-by-step:

1. Check the film at the bottom of the material tray whenever the material is removed.
2. Look for pinholes, punctures, ripples, and other signs of stress. A slightly cloudy film is normal and will not affect the print quality.
3. Check the glass on the bottom of the tray for smears or fingerprints, which can affect print quality.
4. Wipe the glass on the bottom of the material tray with an ammonia-free glass cleaner when needed.



NOTICE

Some of the above-mentioned tasks depend to a great extent on the usage and the ambient conditions. The above-mentioned cycles are minimum values. In individual cases, different maintenance cycles may be required

12.2.3 Maintaining the D4K Pro Material

Time needed: Approximately five minutes to mix material, depending on the material + 15 minutes to empty and clean the material tray.

Maintenance frequency: Print-by-Print

Step-by-step:

1. Protect material in the material tray from ambient light by keeping the printer door closed.
2. Mix the material in the material tray before each print using the rubber spatula. To do this:
 - Lightly skim the spatula back and forth across the surface of the material in the tray taking care not to damage the film.
 - Mix the material until it's a completely uniform color.
3. Check the material for solids or debris. If found, filter the material. To do this:
 - Remove the material tray from the printer.
 - Set the funnel and cone-shaped paint filter on top of a separate opaque storage bottle.
 - Pour the material out by tipping a front corner of the tray, away from the vent holes.
 - Use the rubber spatula to assist in guiding the material into the filter.
 - When finished, dispose of the filter and clean the funnel with a dry paper towel.



IMPORTANT

For more specific information on handling a material, see the corresponding **Safety Data Sheet**

12.2.4 Cleaning the Printer Casing

Time needed: Approximately two minutes

Maintenance frequency: Print-by-Print

Overview: The printer's metal casing protects the internal components from damage. To avoid spilling material on the casing, always hold a paper towel under the build platform and the material tray while installing or removing. Once spilled, the material cures to the casing and it is difficult to remove it.

Step-by-step:

1. Wipe the spilled material as soon as it touches the printer before it cures.
2. Remove the majority of the spill with a dry paper towel first, then lightly spray a second paper towel with IPA and wipe away any residue.



IMPORTANT

If rubbed with too much pressure or for too long, the casing may become discolored.

12.2.5 Cleaning the Hard Drive Space

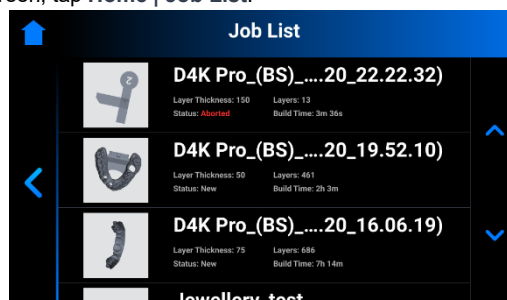
Time needed: approximately five minutes

Maintenance frequency: Weekly

Overview: The printer has an internal PC that is capable of storing a limited amount of data. It is a good practice to remove print job folders from the printer in order to free up space. When the majority of the hard drive space has been used, the printer may show error messages or respond slowly to touch screen commands.

Step-by-step:

1. Power the printer on.
2. On the D4K PRO touch screen, tap **Home | Job List**.



3. Select the print job folder name.
4. Tap the **Waste Bin** icon.
→ The unwanted print job folder is now erased from the printer.
5. Repeat these steps until all unwanted print job folders have been removed.

12.2.6 Cleaning the PWA 2000 / Washing Containers

Time needed: Approximately fifteen minutes

Maintenance frequency: Weekly

Overview: The PWA 2000 needs to be emptied when the bottom of the container is no longer visible. The 99% IPA will collect particles of uncured material over time. If using plastic washing containers instead of the PWA 2000, the dirty bath will need to be emptied when the bottom of the container is no longer visible.

Step-by-step:

Check your local protocol for safe handling of 99% IPA.

If using the PWA-2000:

1. Remove the washing compartment from the PWA 2000.
2. Pour the IPA from the pour spout into an IPA recycling container.
3. Wipe down the interior of the washing compartment with a clean paper towel.

If using plastic washing containers:

1. Remove the used IPA from the dirtier bath.
2. Wipe the container clean using a paper towel.

12.2.7 Cleaning Dust

Time needed: Approximately five minutes

Maintenance frequency: Weekly

Overview: Dust may accumulate on, near, or inside of the printer. Dust can build up on fans and vent holes. High levels of dust accumulation can cause the printer to overheat.



IMPORTANT

To protect the internal hardware, the printer automatically shuts down if it reaches the maximum internal temperature of 49 C/120 F.

Step-by-step:

1. Look around the vent holes on the left and right sides of the printer's casing for signs of buildup.
2. Listen to the fan for inconsistency, stress, or obstructions when the printer is powered on.
3. To remove dust, power down the printer, disconnect the power cable and then wipe the vents and fan with a microfiber cloth.
4. After the printer has been cleaned, look down through the safety glass under the material tray to make sure that there isn't any dust or debris on the lens.

12.2.8 Power Cycling

Time needed: Approximately five minutes

Maintenance frequency: Weekly

Overview: It is recommended to power cycle the printer under any of the following conditions:

- the printer is running slowly
- the printer was recently updated, or
- the printer has not been powered down in a week.

12.2.9 Cleaning the Touch Screen

Time needed: Approximately five minutes

Maintenance frequency: Monthly

Overview: Sticky spots on the touch screen can make it difficult to press buttons or navigate the interface effectively.

Step-by-step:

1. Spray the lens cleaner onto a clean paper towel.
2. Gently wipe the surface of the touch screen.



IMPORTANT

Always stand away from the printer when spraying to avoid contaminating the material and material tray.

12.2.10 Greasing the Z-slide

Time needed: Approximately one hour

Maintenance frequency: Annually

Overview: Inside the Z-axis tower is a long-threaded metal rail called the Z-slide. This rail is attached to a motor and moves inside the printer. The Z-slide needs to be greased annually using white lithium grease. This keeps the Z-slide free of dust and debris and allows it to operate smoothly.

Step-by-step:

1. Add a small amount of lithium grease to the tip of a clean Q-Tip.
2. Apply the grease by moving the Q-Tip starting near the top of the screw, moving down slowly.

12.2.11 Checking the Safety Equipment



IMPORTANT

All emergency stopping devices and protection doors must be checked one by one and separately. In case of defective safety equipment, shut the printer down immediately and secure it against being switched on again.

12.2.12 Filtering the Material

It is recommended to filter the material after each failed build. Use a paint strainer and run your material through it. The paper paint strainers are the most suitable, as they can be discarded after each use. Do not use a paint strainer that requires cleaning, as cleaning solutions can contaminate and ruin material.



Figure 11: Paint strainer

12.3 Auxiliary Materials and Consumables

Materials have varying shelf lives (between 6-12 months). You will likely use all of the material before it expires.

Consumables such as material trays and material can be ordered on the Contact Us page of the EnvisionTEC website. If your printer was purchased through a reseller or distributor, contact them directly for additional supplies.



12.4 Additional Information

You can always find more information about your D4K Pro printer and other EnvisionTEC products at our Support Center: printers setup procedures, Envision One RP Software tutorials, accessories, and much more! The newly created Support Center contains everything you need in one easy-to-use location.



Annex: Quick Start Guide

Prerequisite

- Your STL file has been exported from your CAD program.

Step-by-step:

1. Open the *.stl file in **Envision One RP®**. See the *Envision One RP® User Guide* provided with the printer for details.
2. Use automatic placement to place parts.
3. Generate supports.
4. Generate job in **Envision One RP®** and save it in to the folder.
5. Make sure that the printer is on and plugged into the network.
6. Locate the printer in the local network.
7. Copy job to printer.
8. Install the build platform in the printer. Refer to section *Install the Build Platform* for details.
9. Insert the material tray to the printer. Refer to section *Install the Tilting Material Tray* for details.
10. Fill the material tray with photopolymer.
11. Close the printer door.
12. Load job file. Check *Load Job File* section for details.
13. Start the job. Check *Start Job* section for details.

Annex: Troubleshooting



IMPORTANT

For each task, the safety warnings contained in this instruction manual must be observed.
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 tap the relevant buttons in the Control Software.	<ol style="list-style-type: none"> 1. Close the D4K software and unplug both the power supply and the USB from the back of the printer. 2. Wait for 10 seconds and reconnect. 3. If the problem still persists, call technical support.
The built model fell off the build platform or nothing substantial was built.	<ol style="list-style-type: none"> 1. Filter your material using a paint strainer to ensure there is no debris left from the failed job in it. 2. Wipe out and check your material tray to ensure it is still in good condition. 3. If your material tray or material is over 6 months, it may be time to order new ones. 4. If this is not the case and you still cannot get a good job 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.
Time out Reached message appears on the screen.	The projector cannot be initialized. In this case, restart the printer by shutting it down and then powering it on again.
Sporadic blurring on part.	<p>It is caused by contaminated material from alcohol or some other chemical.</p> <ol style="list-style-type: none"> 1. Pour the old material in separate container. Do not pour it back into new or unused material container. 2. Clean out the material tray completely with dry soft paper towels only, don't use any chemicals. 3. Clean the corners of the material tray with dry Q tips. 4. Replace with new material and rebuild parts. <p>To avoid future contamination:</p> <ul style="list-style-type: none"> • Do not place any chemical near material tray or resin. <p>Do not post clean the part near the material tray, and do not clean the build platform with any chemicals but only dry paper towels.</p>
Partial build failure	<p>This could be several things or a combination of the following:</p> <ul style="list-style-type: none"> • Damaged, scratches, hole or worn material tray will cause a build failure. • Weak supports. A weak or improperly placed support will cause a part feature not to build. Add additional supports to the failed area. <p>Boolean operation is not correct, 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 a one single entity.</p>
Build falling off the build platform	<ul style="list-style-type: none"> • Damaged, scratches, hole or worn material tray will cause this build failure. • Dirty optics: clean the glass between the material tray and projector. <p>Call customer service.</p>
Tag reader/DLP board/projector connection lost	<p>When the connection error appears:</p> <ol style="list-style-type: none"> 1. Reboot the printer. 2. Contact Service & Support. <ul style="list-style-type: none"> • <i>Send the log report</i> to Service & Support.
Error message: Job is too high. Please regenerate job in Envision One RP.	The job is too high for the printer's Z-axis. Regenerate the number of layers and/ or layer depth) of the job in Envision One RP.
Error message: Tilt parameters are incorrect. They can be changed in Envision One RP.	<p>Tilting parameters are not within the limit set in the buildstyle.</p> <ol style="list-style-type: none"> 1. Regenerate the job in Envision One RP. <p>If it does not help, contact Service & Support.</p>
Error 101	This can be caused by the wrong material usage. Contact Service & Support and provide the information on the material used.
Error message: <i>Job is too high.</i>	The job is too high for the printer's Z-axis. Regenerate the number of layers and/ or layer depth) of the job in Envision One RP.

Error message: <i>Control software is expired and the system cannot be updated.</i>	It means that your Envision One RP license is expired. Contact Service & Support to extend the Envision One RP license.