PLANMECA

Planmeca Creo™ C5

EN

user's manual

30018643

The manufacturer, assembler and importer are responsible for the safety, reliability and performance of the unit only if:

- installation, calibration, modification and repairs are carried out by qualified authorised personnel
- electrical installations are carried out according to the appropriate requirements such as IEC 60364
- equipment is used according to the operating instructions.

Planmeca pursues a policy of continual product development. Although every effort is made to produce up-to-date product documentation this publication should not be regarded as an infallible guide to current specifications. We reserve the right to make changes without prior notice.

Publication number 30018643 Revision 10

Released 5 May 2022

Table of contents

1 Introduction

This manual describes how to use the Planmeca Creo C5 3D printer.

NOTE

This manual is valid for the following software versions:

- **Planmeca Creo C5 software version 1.7.0.5.R or later**
- **Planmeca Creo C5 Studio software version 3.0.11 or later.**

1.1 Indications for use

The Planmeca Creo C5 3D printer has been designed specifically to print parts for the dental industry. It is designed to be used within a dental clinic by users that have completed the appropriate training course.

The printer works by building the dental parts in successive thin layers. Each layer is created by exposing a photo-polymer (resin) to UV light. This causes the resin to polymerise (cure) into a solid where it is exposed to the light. After one layer has been cured the build platform moves up the thickness of the next layer and the process is repeated until the part is complete.

NOTE

Depending on your current configuration the parts illustrated may appear different from yours. The instructions apply, however, for all configurations.

2 Associated documentation

This device is delivered with the following documentation:

- *Planmeca Creo C5 user's manual*

  Describes the Planmeca Creo C5 3D printer and its different parts as well as instructs how to operate and clean the printer.

- *Planmeca Creo C5 Studio user's manual*

  Describes how to prepare printing projects to be printed with Planmeca Creo C5 3D printer.

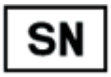
- *Planmeca Creo C5 installation quick guide*

The document *Directions for use* is delivered with each resin package.

3 Symbols on product labels

A Class 2 laser is considered to be safe because the blink reflex (glare aversion response to bright lights) will limit the exposure to no more than 0.25 seconds. It only applies to visible-light lasers (400–700 nm).

Class 2 lasers are limited to 1 mW continuous wave, or more if the emission time is less than 0.25 seconds or if the light is not spatially coherent. Intentional suppression of the blink reflex could lead to eye injury. Some laser pointers and measuring instruments are class 2.



Serial number (Standard ISO 7000)

Manufacturer (Standard ISO 7000).

Date of manufacture (Standard ISO 7000).

European conformity

Non-ionizing electromagnetic radiation

Separate collection for electrical and electronic equipment according to Directive 2002/96/EC (WEEE).

Refer to instruction manual/booklet (Standard ISO 7010).

SGS listing marking according to US and Canadian standards (ANSI/AAMI ES60601-1 and CAN/CSA C22.2 No. 60601- 1).

4 Registering your product

About this task

Before you start using your device, you must register it to activate the warranty.

Steps

1. Enter the registration website by either:
   - reading the QR code on the package box with a QR code reader to enter the registration website, or
   - navigating to the registration website http://www.planmeca.com/register/ in your Internet browser.
2. Follow the instructions on the website.

5 For your safety

Read these instructions carefully. Keep this document for future reference. Follow all warnings and instructions marked on the Planmeca Creo C5 3D printer.

CAUTION

Do not use under the following conditions:

- **In hot, cold or humid environments.**
- **In areas susceptible to excessive dust and dirt.**
- **Near any appliance that generates a strong magnetic field.**
- **Locations with an ambient temperature above 25ºC.**

5.1 Connecting and disconnecting printer

Observe the following guidelines when connecting and disconnecting power to the printer:

- Install the printer before connecting the power cord to the AC power outlet.
- Unplug the power cord before moving the printer.

5.2 Caution for accessibility

Ensure that the power outlet you plug the power cord into is easily accessible and located as close to the printer as possible. If you need to disconnect power to the printer, unplug the power cord from the electrical outlet.

CAUTION

Do not use the printer near water.

CAUTION

Do not place the printer on an unstable cart, stand or table. If the printer falls, it could cause injury and or damage.

CAUTION

Do not place the printer on any surface that is not rated to withstand the printer's weight.

CAUTION

Slots and openings are provided for ventilation to ensure reliable operation of the printer and to protect it from overheating. These openings must not be blocked or covered. The openings should never be blocked by placing the printer on a soft surface or too close to a wall.

CAUTION

Do not place the printer near or over a radiator or heat register, or in a built-in installation unless proper ventilation is provided.

CAUTION

Never push objects of any kind into this printer through cabinet slots as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind onto or into the printer.

CAUTION

To avoid damage of internal components, do not place the printer on a vibrating surface.

CAUTION

Using electrical power

- Operate the printer only from the type of power indicated on the marking label. If you are not sure of the type of power available, consult your dealer or local power company.
- Do not allow anything to rest on the power cord. Do not locate the printer where people will walk on the cord.
- If an extension cord is used with the printer, make sure that the total ampere rating of the equipment plugged into the extension cord does not exceed the extension cord ampere rating. Also, make sure that the total rating of all products plugged into the wall outlet does not exceed the fuse rating.
- Do not overload a power outlet, strip or receptacle by plugging in too many devices. The overall system load must not exceed 80 % of the branch circuit rating. If power strips are used, the load should not exceed 80 % of the power strip's input rating.
- The printer's AC adapter is equipped with a three-wire grounded plug. The plug only fits in a grounded power outlet. Make sure the power outlet is properly grounded before inserting the AC adapter plug. Do not insert the plug into a non-grounded power outlet. Contact your electrician for details.

CAUTION

The grounding pin is a safety feature. Using a power outlet that is not properly grounded may result in electric shock and/or injury.

NOTE

The grounding pin also provides good protection from unexpected noise produced by other nearby electrical devices that may interfere with the performance of the printer.

Use the printer only with the supplied power supply cord set. If you need to replace the power cord set, make sure that the new power cord meets the following requirements: detachable type, UL listed / CSA certified, VDE approved or its equivalent.

5.3 Caution for servicing

CAUTION

Do not attempt to service the printer yourself, as opening or removing covers may expose you to dangerous voltage points or other risks. Refer all servicing to qualified service personnel. Unplug this printer from the wall outlet and refer servicing to qualified service personnel when:

- **the power cord or plug is damaged, cut or frayed**
- **liquid was spilled into the printer**
- **the printer is exposed to rain or water**
- **the printer is dropped or the case is damaged**
- **the printer exhibits a distinct change in performance, indicating a need for service**
- **the printer exhibits strange noises or odours**
- **the printer does not operate normally after following the operating instructions.**

CAUTION

For safety reasons, do not use non-compliant parts when adding or changing components. Consult your local dealer for purchase options.

CAUTION

Your device and its enhancements may contain small parts. Keep them out of the reach of small children.

NOTE

Adjust only those controls that are covered by the operating instructions, since improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the printer to normal condition.

5.4 Additional safety information

- Always wear suitable nitrile gloves and eye protection when handling printer resins and parts that have not been post-cured.
- Have a flat stable surface ready to place the basin before removal from the printer.
- Have a suitable resin proof container ready to place the platform before removal from the printer.
- Do not look into the printer's LCD when printing. The bright UV light may hurt your eyes.
- **Do not** place the printer in the following environments:
  - Non air-conditioned space
  - Space that is poorly ventilated or confined. At least 50 cm side clearance from walls and free flow of air around the printer are necessary.
  - Locations where temperatures may become excessively high.
  - Locations where excessive humidity, dust, or cigarette smoke may contaminate optical components and shorten the lifespan.
  - Locations near fire alarms.

  - Locations with an ambient temperature above 25ºC.
  - Locations where the altitudes are higher than 2000 meters.
- Unplug immediately if there is something wrong with your printer. Do not operate if smoke, strange noise or odour comes out of the printer. It might cause fire or electric shock. In this case, unplug immediately and contact your local dealer.
- Do not keep using the printer if you break or drop it. In this case contact your local dealer for inspection.
- When switching the printer off, please ensure the printer has five minutes cooling before disconnecting power.
- Do not frequently turn off the main power abruptly or unplug the printer during operation. The best way is to wait for five minutes before turning main power off.
- Ensure that the ventilation slots are clean and unobstructed. The printer’s internal temperature can rise and cause damage if ventilation slots are dirty or obstructed.
- Do not attempt to disassemble the printer. There are dangerous high voltages inside which may hurt you. The only user serviceable parts are the build platform and basin. Refer servicing only to suitable qualified professional service personnel.
- Do not stand the printer on any side except its feet. It may cause the printer to fall over, causing injury and or damage.
- Ensure the surface the printer is set up on supports the printer’s weight.

6 Radio and television interference

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, can cause harmful interference to radio communications. There is no guarantee, however, that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, try to correct the interference in the following ways:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult your local dealer or an experienced radio or television technician for help.

The following booklet, prepared by the FCC, also includes useful information: *How to Identify and Resolve Radio-TV Interference Problems*. The booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402.

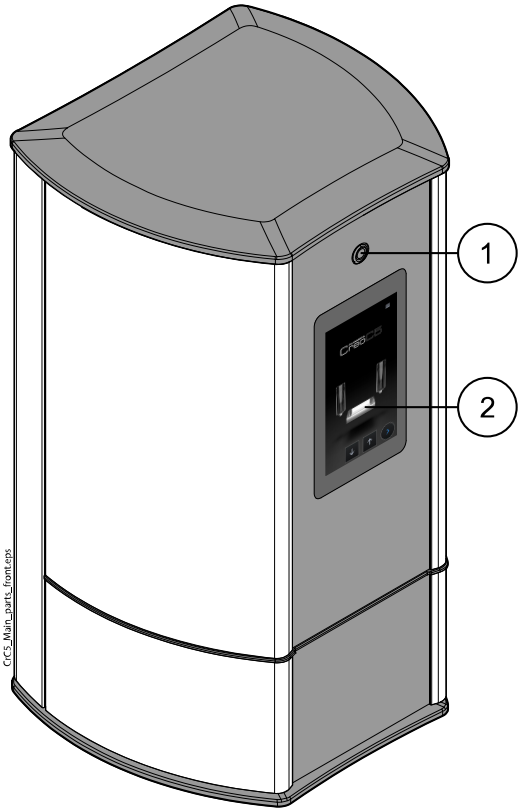
Changes and modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under FCC rules.

7 Training

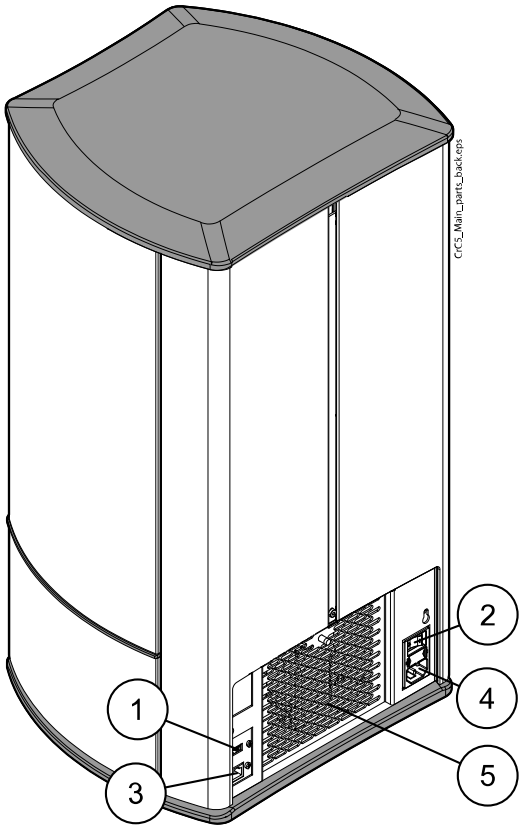
Only fully-trained operators should operate the Planmeca Creo C5 3D printer. The printer is designed to be used within a dental clinic by users that have completed the appropriate training course.

A hands-on user's training is given in connection with the installation of this device.

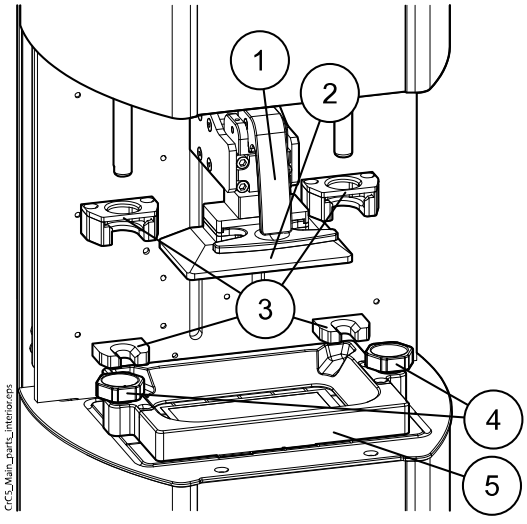
8 Main parts



1 Stand by switch
2 Touch screen control panel

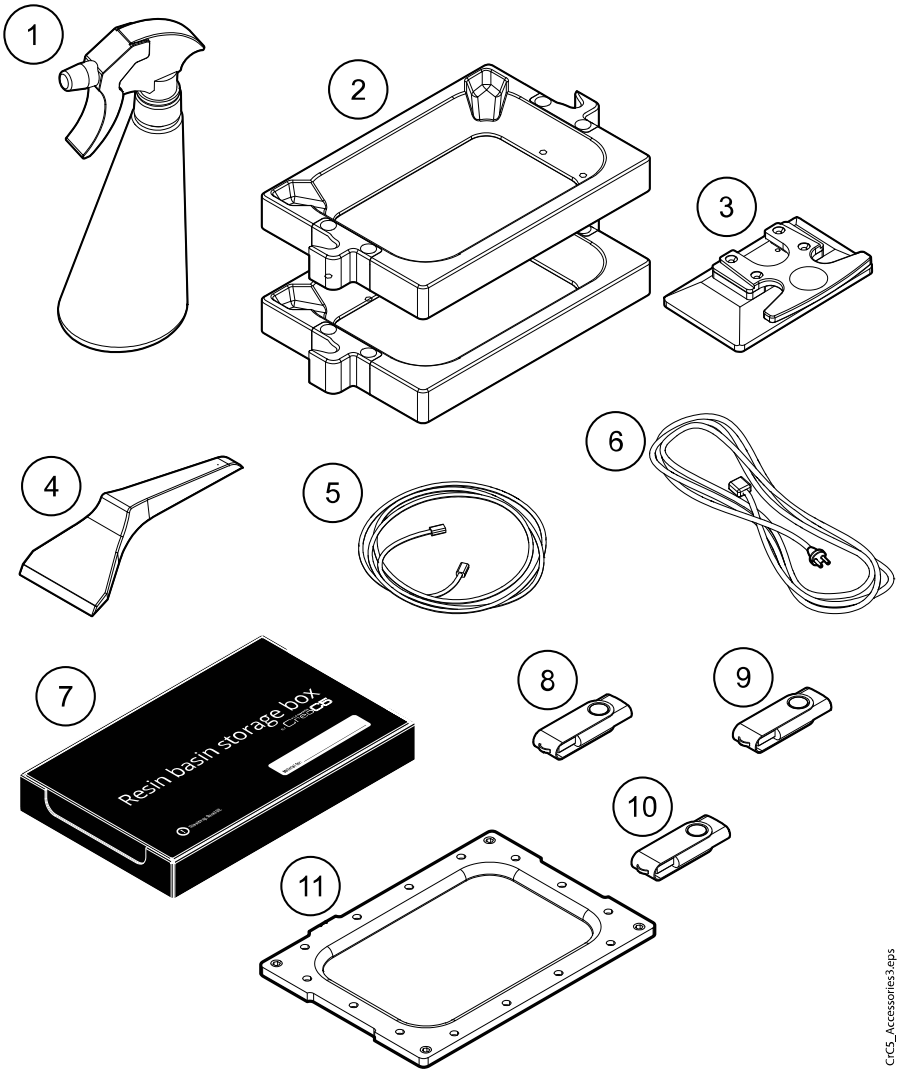


1 USB interface
2 On/Off switch
3 Ethernet interface
4 Power socket
5 Filter



1 Build platform release lever
2 Build platform
3 Resin capsule holders
4 Basin attachment knobs
5 Basin

8.1 Printer accessories



1 Spray bottle	2 Basin x 2	3 Build platform
4 Scraper	5 Ethernet cable	6 Power cord
7 Basin storage box	8 Creo C5 manuals USB flash drive	9 Creo C5 software USB flash drive
10 Creo C5 Studio software licence USB flash drive	11 Spare basin membrane	

9 Resin handling

CAUTION

Do not place the printer or any resin-touching components, for example the basin or build platform, in areas of strong sunlight.

CAUTION

Always wear suitable nitrile gloves and eye protection when handling printer resins and parts that have not been post-cured.

CAUTION

Use of the printer involves the use of sharp tools. Using these tools on the resin covered build platform can lead to sudden movement. Always use the removal scraper away from yourself and your hands.

NOTE

Ensure adequate ventilation when working with resins.

As sunlight has a high UV content, uncured resin should be kept away from strong sunlight. Artificial light also contains a UV component and as such resin should be kept in its original container with the cap on. Keep the basin in the printer with the lid closed or in its UV protected storage box. When not used for printing, clean all parts from uncured resin.

Before using any resin ensure that:

- The operator is familiar with the specific safety requirements for that resin.
- The working area is clean and free from any hazards that could lead to a spill.
- The working area has a tray large enough to hold the build platform and any printed parts.
- There is an adequate supply of absorbent towels to remove any spills should they occur.

Have a suitable resin proof container where to place the build platform before removal from the printer.

The slots on the corners of the basin on are intended for pouring out the excess resin.

CAUTION

Handle the basin membrane with care for not to scratch or otherwise harm it. On how to replace the basin membrane see section "Replacing basin membrane" on page 45 .

9.1 Precautions

- Only use approved resins with the Planmeca Creo C5 Printer as listed in section "Approved resins" on page 15.
- Always wear nitrile gloves, covered arms and legs, and eye protection.
- Ensure all use of resin is undertaken in a well ventilated area.
- Ensure a spill kit is available.
- Ensure a suitable container is available to place the build platform and printed parts in.

- Ensure that a supply of isopropyl alcohol (IPA) (96%) or ethanol (96%) is available for cleaning the build platform and printed parts.

9.2 Approved resins

NOTE

Read the document *Directions for use* delivered with each resin package before using any of the listed resins.

Only the following resins are approved for use with the Planmeca Creo C5 3D printer.

- FotoDent model
- FotoDent model2
- FotoDent guide
- FotoDent setup (dental model material)
- FotoDent gingiva
- FotoDent IBT
- FotoDent tray
- FotoDent denture
- KeySplint Soft
- KeySplint Hard
- KeyModel Ultra grey
- KeyModel Ultra ivory

When using 30cc resin capsules, only capsules supplied by Planmeca and labelled with Planmeca's QR codes can be used.

9.2.1 FotoDent model

FotoDent model material is a 3D printing material suited for printing dental models. The FotoDent model material produces accurate and detailed dental models that work perfectly as a base for dental technical work.

The following table lists the FotoDent model material properties.

Characteristics	
Colour	Beige opaque
Density	approx. 1.1 - 1.2 g/cm^3
Viscosity (23°C / 73°F)	0.8 - 1.3 Pa s
Flexural strength	60 - 70 MPa
Flexural modulus	2.3 - 2.5 GPa

Composition	
1	(Meth)acrylates
2	Initiators
3	Pigments

Cured material	
Flexural modulus	≥ 1750 MPa
Flexural strength	≥ 85 MPa

Cured material	
Elongation at break	11 - 15 %

9.2.2 FotoDent model2

FotoDent model2 material is a 3D printing material suited for printing dental models. The FotoDent model2 material produces accurate and detailed dental models that work perfectly as a base for dental technical work.

The following table lists the FotoDent model2 material properties.

Characteristics	
Colour	Beige opaque
Density	approx. 1.1 g/cm^3
Viscosity (23°C / 73°F)	0.8 - 1.2 Pa s

Composition	
1	(Meth)acrylates
2	Photoinitiators
3	Inhibitors
4	Pigments

Cured material	
Flexural modulus	≥ 1.900 MPa
Flexural strength	≥ 85 MPa
Elongation at break	≥ 8 %

9.2.3 FotoDent guide

FotoDent guide material is 3D printing material suited for printing surgical guides. The FotoDent guide material has CE medical approval.

The following table lists material properties.

Characteristics	
Colour	Blue transparent
Density	1.1 - 1.2 g/cm^3
Viscosity (23°C / 73°F)	0.65 - 1.05 Pa s

Composition	
1	Methacrylates
2	Initiators
3	Inhibitors
4	Dyes

Cured material	
Flexural modulus	≥ 1700 MPa
Flexural strength	≥ 75 MPa
Elongation at break	10 - 15 %
Hardness	80 - 85 Shore D

9.2.4 FotoDent setup

FotoDent setup material is a 3D printing material suited for creating orthodontic set-up models. The FotoDent setup material has medical CE approval.

The following table lists the material properties.

Characteristics	
Colour	Maize yellow
Density	approx. 0.9 - 1.0 g/cm^3
Viscosity (23°C / 73°F)	1.0 - 1.5 Pa s

Composition	
1	Methacrylates
2	Urethane acrylates
3	Initiators
4	Pigments
5	Fumed silica

Cured material	
Flexural modulus	≥ 2000 MPa
Flexural strength	≥ 95 MPa
Elongation at break	≥ 5 %
Hardness	approx. 80 - 85 Shore D

9.2.5 FotoDent gingiva

FotoDent gingiva material is a 3D printing material suited for manufacturing dental gingiva masks.

The following table lists the material properties.

Characteristics	
Colour	pink
Density	approx. 1.1 g/cm^3
Viscosity (23°C / 73°F)	approx. 2 Pa s

Composition	
1	Methacrylate
2	Urethane acrylate
3	Initiators
4	Pigments
5	Pyrogenic silicic acid

Cured material	
Tensile strength	> 2.5 MPa
Tensile strain	> 40 %
Shore A hardness (23°C / 73°F)	approx. 70

9.2.6 FotoDent tray

FotoDent tray material is a 3D printing material suited for manufacturing dental impression trays. The FotoDent tray material has CE medical approval.

The following table lists the material properties.

Characteristics	
Colour	green
Density	approx. 1.1 g/cm^3
Viscosity (23°C / 73°F)	approx. 1 Pa s

Composition	
1	Methacrylates
2	Urethane acrylates
3	Pigments
4	Fumed silica

Cured material	
Flexural modulus	≥ 2000 MPa
Flexural strength	≥ 75 MPa
Elongation at break	> 5 %

9.2.7 FotoDent IBT

FotoDent IBT material is a 3D printing material suited for manufacturing dental indirect bonding trays. The FotoDent IBT material has CE medical approval.

The following table lists the material properties.

Characteristics	
Colour	clear transparent
Density	approx. 1.05 g/cm^3
Viscosity (23°C / 73°F)	0.7 ± 0.2 Pa s

Composition	
1	Acrylates
2	Methacrylates
3	Photoinitiators
4	Urethan(meth)acrylates
5	Dyes

Cured material	
Shore A hardness (23°C / 73°F)	approx. 90
Shore A hardness (37°C / 98°F)	approx. 80
Tensile strain (ISO 527)	≥ 45 %

9.2.8 FotoDent denture

FotoDent denture material is a 3D printing material designed for manufacturing individual denture bases. The following table lists the FotoDent denture material properties.

Characteristics	
Colours	pink transparent
	pink opaque
Density	approx. 1.0 - 1.2 g/cm^2
Viscosity	0.4 - 0.6 Pa s

Composition	
1	Methacrylates
2	Urethanacrylates
3	Initiators
4	Pigments
5	Fumed silica

Cured material	
Flexural modulus	≥ 2000 MPa
Flexural strength	≥ 80 MPa
Hardness	≥ 80 Shore D

9.2.9 KeySplint Soft

KeySplint Soft material is 3D printing material suited for printing splints, night guards and bleaching trays.

Characteristics	
Colour	Clear
Density	1.01 - 1.11 g/cm^3
Viscosity	Kinematic: 600 to 1200 mm^2/s (600 to 1200 cSt)

Composition	
1	Methacrylate Monomers
2	Photo Initiators

Cured material	
Ultimate flexural strength	2.6 - 4.4 MPa
Flexural modulus	135 - 200 MPa
Shore D hardness (ASTM D2240)	80 - 85 MPa

9.2.10 KeySplint Hard

KeySplint Hard material is 3D printing material suited for printing rigid splints and night guards.

Characteristics	
Colour	Clear, violet

Characteristics	
Density	1.01 - 1.11 g/cm^3
Viscosity	Kinematic: 600 to 1200 mm^2/s (600 to 1200 cSt)

Composition	
1	Methacrylate Monomers
2	Photo Initiators
3	Stabilizer

Cured material	
Ultimate flexural strength	60 - 65 MPa
Flexural modulus	1510 - 1600 MPa
Shore D hardness (ASTM D2240)	89D

9.2.11 KeyModel Ultra grey

KeyModel Ultra grey material is designed for 3D printing of dental and orthodontic models.

Characteristics	
Colour	Grey
Density	1.09-1.22 g/cm^3
Viscosity	450 - 675 cP @25C

Composition	
1	Acrylate Monomers
2	Photo Initiators
3	Urethane Oligomer

Cured material	
Max. flexural strength (ASTM D790)	> 70 MPa
Maximum tensile strength (ASTM D638)	> 50 MPa
Flexural modulus (ASTM D790)	> 1940 MPa
Elongation at break (ASTM D638)	5%

9.2.12 KeyModel Ultra ivory

KeyModel Ultra ivory material is designed for 3D printing of dental and orthodontic models.

Characteristics	
Colour	Ivory
Density	1.00-1.15 g/cm^3
Viscosity	415 - 615 cP@25C

Composition	
1	Acrylate Monomers

Composition	
2	Photo Initiators
3	Urethane Oligomer

Cured material	
Max. flexural strength (ASTM D790)	> 70 MPa
Maximum tensile strength (ASTM D638)	> 50 MPa
Flexural modulus (ASTM D790)	> 1940 MPa
Elongation at break (ASTM D638)	5%

9.2.13 Resin handling notes

Each resin type has specific directions for use. For more information refer to the instructions delivered with each resin package.

To ensure an even mix of pigment, shake the resin capsule or bottle well before starting to use it.

Immediately clean up any spills of resin using IPA (96%) or ethanol (96%) to prevent the resin from curing on the surfaces and making it more difficult to clean.

Only remove the basin from the printer after the platform has been removed as drips from the platform can damage the LCD screen causing permanent damage.

If necessary, after removing the print from the platform, clean the platform of uncured resin using IPA (96%) or ethanol (96%). Use only solvents that leave no residue. If available, use an ultrasonic tank or steam-cleaner.

NOTE

Planmeca recommends that you clean the basin and build platform daily for optimal printing result.

If you use an IPA (96%) or ethanol (96%) bath to wash the build platform, uncured resin in suspension in the IPA (96%) or ethanol (96%) can semi-cure into a gelatinous substance. Dispose of this waste responsibly.

Dry the build platform thoroughly to ensure that no IPA (96%) or ethanol (96%) is left on the surfaces as any residue can interfere with the print.

Do not sand the build platform or treat its surfaces in any way that will affect the adherence of the print.

10 LCD panel handling

CAUTION

IMPORTANT! The LCD panel under the resin basin and above the printer's light source have to be handled with utmost care! Note that the panel is not covered by any protective glass in order to achieve the highest standard of printing accuracy. When handling the LCD panel:

- **Avoid touching the panel.**
- **Always check resin left in the basin for cured particles after printing. If necessary filter the resin or use the resin basin cleaning function as described in section "Filtering resin from impurities" on page 37 before the next print. The checking is important as the cured particles may damage the panel if caught between the platform and the panel during printing.**
- **To avoid uncured resin dropping on the panel surface, always remove the platform before removing the basin after printing. If necessary, clean the panel surface by gently wiping it with a microfiber cloth.**

NOTE

In MSLA printers, the LCD-panel used to form individual layer images is subjected to heat, strong UV or near-UV light and mechanical strain. These circumstances result in normal wear and tear of the panel which needs to be changed periodically. The LCD panel assembly is under limited warranty.

11 Printing with Planmeca Creo C5

11.1 Preparations before printing

11.1.1 Attaching basin

Before you begin

CAUTION

The basin bottom film is very easily damaged using scraper, tools or fingernails.

About this task

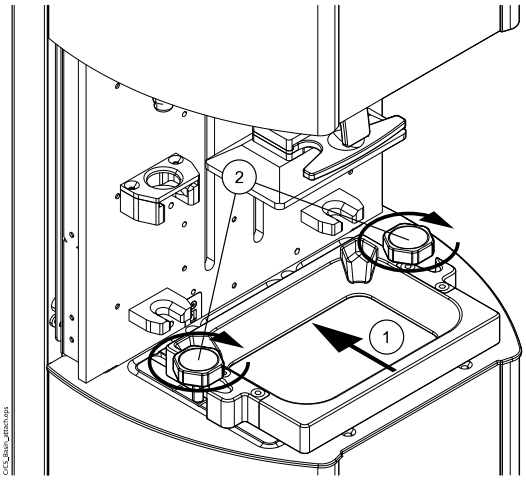
Follow these instructions to attach the basin.

Steps

1. Turn on the printer and open the lid by touching this button.
2. Place the basin to the back of the printer.
3. Gently tighten the screws on both sides of the basin to secure it in place.

NOTE

Ensure that the basin is securely fastened in place. A poorly secured basin may cause failed prints.



4. Attach the build platform.

11.1.2 Attaching resin capsules

About this task

NOTE

Planmeca Creo C5 has an automatic material fill function with a capsule system. Do not pour materials directly in to the basin, only add capsules to the machine when asked.

NOTE

Always add capsules to the machine with the 3D printing material chosen for the print job. The material is chosen in the print job configuration in Planmeca Creo C5 Studio software.

NOTE

To protect your hands and eyes (the resin can cause reactions over time), and to avoid getting oil from skin onto sensitive surfaces, wear nitrile gloves at all times.

NOTE

In Planmeca Creo C5 Studio, when you generate a print job disregard the “resin required” amount. This refers only to the total resin cured into the print itself, not to the amount required inside the basin for a successful print. The Creo C5 will inform the user if and when it needs more material.

NOTE

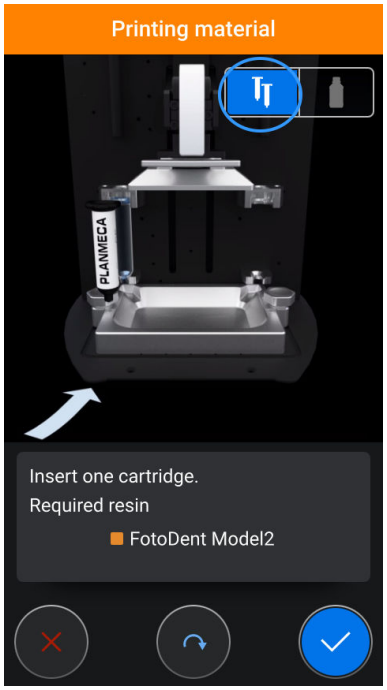
Clean the build platform and basin well before you change to a different 3D printing material. See section "Cleaning after printing" on page 34.

NOTE

Any spills should be cleaned immediately with isopropyl alcohol (IPA) (96%) or ethanol (96%), if left they will cure making cleaning more difficult.

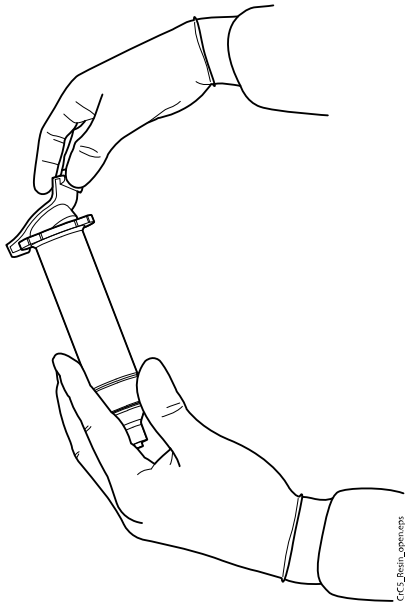
Steps

1. Select the capsule icon on the screen.

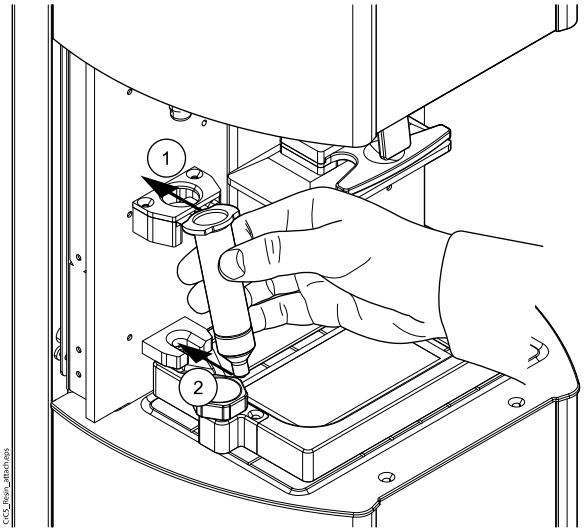


2. Shake the resin capsule for 5 minutes before use. This mixes the pigment properly and ensures even spread of colour.

3. Remove the top and bottom caps of the resin capsule.



4. Attach the resin capsule to the 3D printer's capsule holder by pushing first the upper part of the capsule in place and then the lower part.



11.1.3 Adding resin from bottle

Before you begin

NOTE

Check the bottle label before pouring resin into the basin.

Always use the 3D printing material chosen for the print job. The material is chosen in the print job configuration in Planmeca Creo C5 Studio software.

NOTE

Any spills should be cleaned immediately with isopropyl alcohol (IPA) (96%) or ethanol (96%), if left they will cure making cleaning more difficult.

NOTE

To protect your hands and eyes (the resin can cause reactions over time), and to avoid getting oil from skin onto sensitive surfaces, wear nitrile gloves at all times.

NOTE

In Planmeca Creo C5 Studio, when you generate a print job disregard the “resin required” amount. This refers only to the total resin cured into the print itself, not to the amount required inside the basin for a successful print. The Creo C5 will inform the user if and when it needs more material.

NOTE

Clean the build platform and basin well before you change to a different 3D printing material. See section "Cleaning after printing" on page 34.

About this task

Follow these instructions to use 3D printing material from a bottle.

Steps

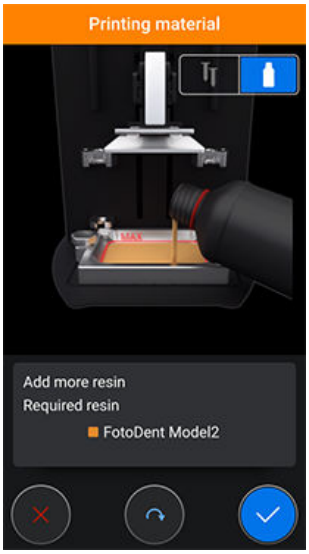
1. Select the bottle icon on the screen.

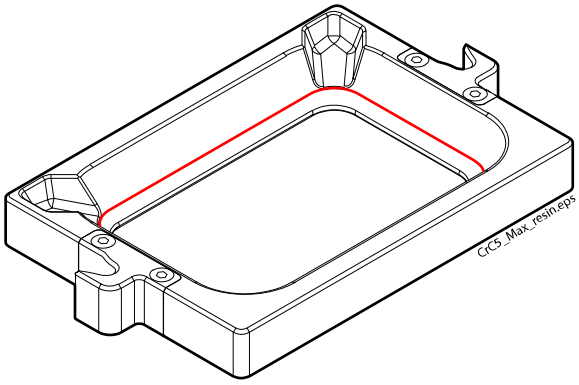
2. Shake the resin bottle well before use.

   This mixes the pigment properly and ensures even spread of colour.
3. Remove the bottle cap.
4. Pour resin up to the level indicated in the screen.

NOTE

Always observe the indicated maximum level to prevent overfilling the basin.





11.2 Printing

Before you begin

CAUTION

Do not block the slots and openings on the printer provided for ventilation.

Before you can start printing with the Planmeca Creo C5, the print job file must be stored either in the configured network drive or in a USB flash attached to the printer's USB port.

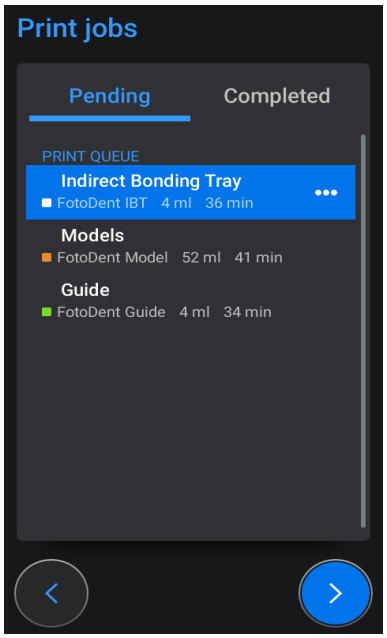
TIP

By touching the basin icon on the display, you can view the approximate amount of the resin available, as well as some other statistics of the basin usage.

Steps

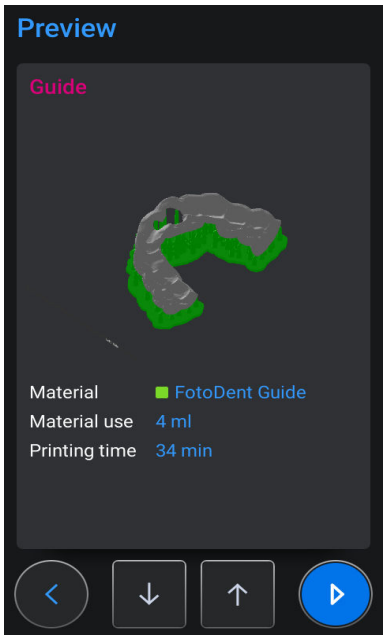
1. Touch the next icon.

2. Select the printing job from the **Pending** list.



3. Continue by touching the next icon.

A preview of the completed printout with estimated printing time, the amount of material required and the used material are displayed.



NOTE

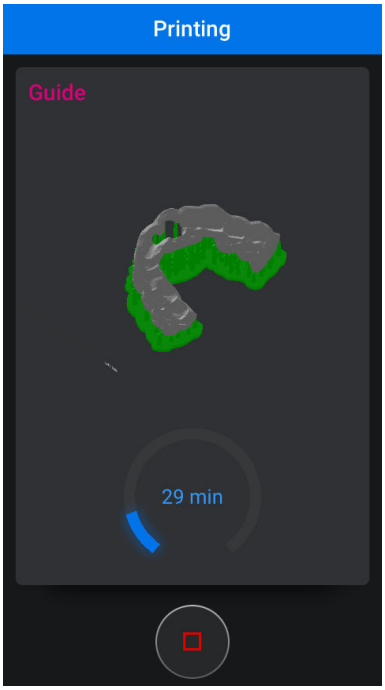
The amount of resin should be the print job estimation plus 20 ml. The amount of resin in the basin is measured automatically.

NOTE

If there is not enough resin to print the job you are prompted to add resin in the printer. After adding resin, continue printing.

4. Start printing by touching this button.

   The estimated time left for printing is displayed.



5. Wait until the print job is completed.

TIP

All previously printed projects (also the unfinished ones) are saved under Completed tab and can be printed again by selecting them on the list.

12 After printing

CAUTION

If the printing fails, before doing anything else, see section "Filtering resin from impurities" on page 37 and for detailed information on how to proceed.

If printing fails it is important to filter the liquid left in the basin and clean it before the next use as the cured particles left in the basin or mixed into the resin could damage the display during printing.

12.1 Removing build platform from printer

Before you begin

NOTE

To avoid getting resin inside the printer, always remove the build platform before removing the basin.

NOTE

Use gloves when removing the platform.

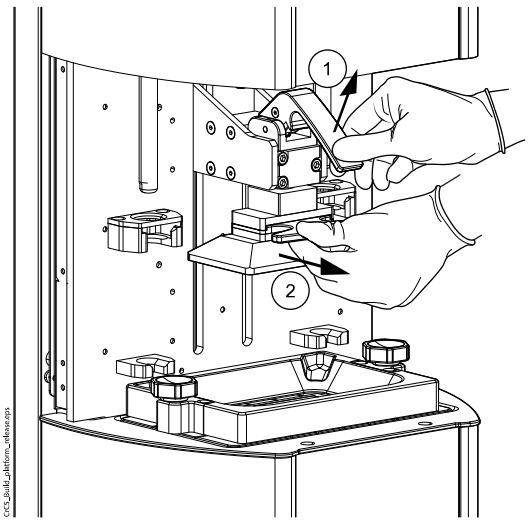
About this task

Follow these instructions to remove the build platform from printer.

Steps

1. Open the lid of the printer by touching this button.

2. Remove the platform by lifting the handle (1) and pulling out the platform (2).



3. Close the printer cover by touching this button to prevent UV light from curing the resin in the basin.

12.2 Removing prints from build platform and post-processing

About this task

The prints should be removed using the scraper provided.

CAUTION

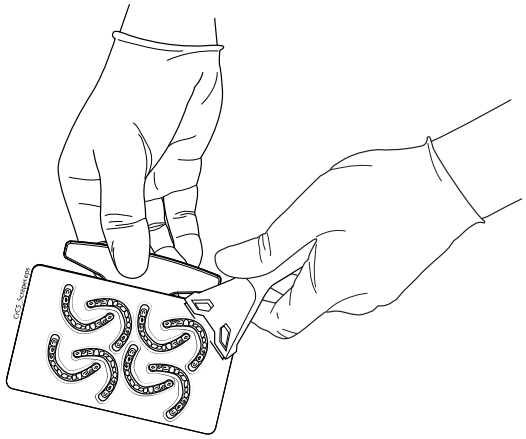
Be careful with not to damage yourself or the platform surface with the scraper when removing the print from the platform.

NOTE

Trying to remove the print from one corner only can cause the print to break.

Steps

1. Place the platform long edge down on a flat surface covered with an absorbent cloth to catch any resin.
2. Work the scraper gently under one corner of the print. Repeat with all the corners. Rotate the platform if required.



3. Be gentle when using the scraper around the edges, and bit by bit separate the print from the platform.

TIP

To make part removal easier and reduce the chance of platform damage, use the scraper at the shallowest angle possible.

4. Once the print is free of the build platform it needs to be post-processed. The prints need to be cleaned from uncured resin and cured in a UV curing unit before use.

5. Clean prints from uncured printing material (see material handling instructions for further information).

   5.a. **Main wash** - Place printed parts in ultrasonic bath (96% isopropanol), see manufacturer's material-specific cleaning instructions included in the delivery.

   5.b. **Final rinse** – Move printed parts to new clean alcohol and let rinse in ultrasonic cleaner. Let printed parts dry completely.

6. Place dry and clean prints in UV light curing box. The final curing gives the material its final properties. Follow carefully material-specific instructions.

7. Remove any support structures and if necessary, finish the print using conventional dental methods and instruments.

   For more post-processing instructions, see the resin’s own instructions.

12.3 Storing resin materials after printing

You can store resin in the basin either by leaving it in the printer with the printer lid closed or placing the basin in the resin basin storage box.

Keep away from any light sources and avoid dusty areas when storing the resin. Resin can be stored in the basin for up to 4 weeks, depending on the material used and the amount of prints already done with the stored batch of resin.

NOTE

Always stir the resin carefully before printing if the resin has been sitting for more than a couple of hours.

Resin can also be filtered back into the resin container, see section "Filtering resin from impurities" on page 37.

13 Cleaning after printing

If a print fails small fragments of cured resin that are difficult for the eye to detect can remain in the basin and on the build platform. It is extremely important to filter the remaining resin and clean the basin and platform of all residue as it may cause failed prints or damage the basin's LCD panel during the next print. With nitrile gloves on use your finger to peel off the hardened layer from the basin bottom.

13.1 Cleaning build platform

About this task

NOTE

Dry the build platform thoroughly to ensure that no IPA / ethanol (96 %) remains on the surfaces, as this can interfere with the print.

NOTE

The build platform should be cleaned every time you finish printing.

Steps

1. Using IPA / ethanol (96 %) clean the build platform every time you have finished printing.
2. Clean the platform with a steam cleaner. Otherwise rinse thoroughly in IPA / ethanol (96 %) bath.

13.2 Removing and emptying basin

About this task

CAUTION

The basin should only be removed from the printer after the build platform has been removed, otherwise drips from the build platform can damage the LCD panel causing permanent damage.

CAUTION

The basin membrane film can be easily damaged using scraper, tools or fingernails.

CAUTION

Do not remove cured resin from basin using scraper. Peel off any cured material gently by hand.

CAUTION

Do not autoclave the basin as it will damage the basin membrane film.

CAUTION

Always use a microfibre cloth to wipe and dry the basin membrane. Do not use paper towels.

Steps

1. Make sure you have a flat, stable surface ready onto which place the basin before removing it from the printer.
2. Loosen the basin retaining screws.
3. Lift out the basin.

   TIP

   Uncured resin can either be left in the basin inside the printer or stored in the black storage box with the basin.

   For instructions on how to store the surplus resin, see section "Resin handling notes" on page 21.
4. Empty the basin.

13.3 Cleaning basin using basin cleaning function

About this task

The basin cleaning function is used to cure a layer of resin (the size of the LCD panel) into the bottom of the basin. The possible cured particles and other impurities will merge into the cured layer and can be removed by peeling off the plate from the bottom.

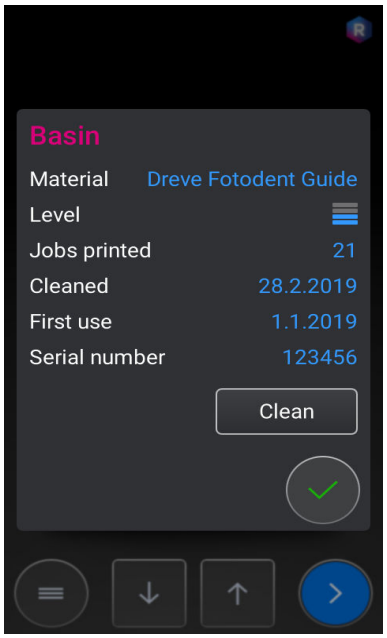
NOTE

This method works only for cured particles in the bottom of the basin. Avoid stirring the liquid right before using the basin cleaning function. If resin has been stirred, wait for a few minutes to allow for the cured particles to sink to the bottom of the basin before using the cleaning function.

Steps

1. Touch the resin basin icon in the main view.

2. Touch the **Clean** button to start the cleaning.

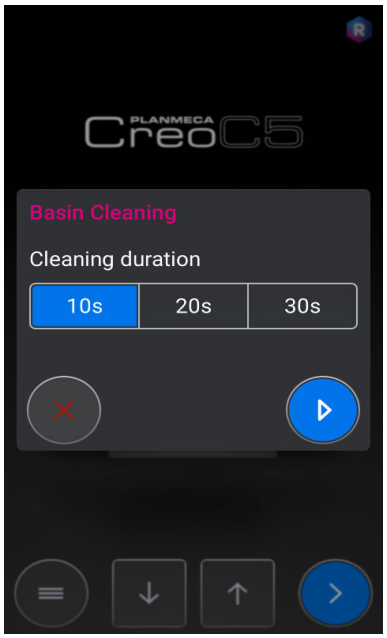


3. Select the desired duration for cleaning.

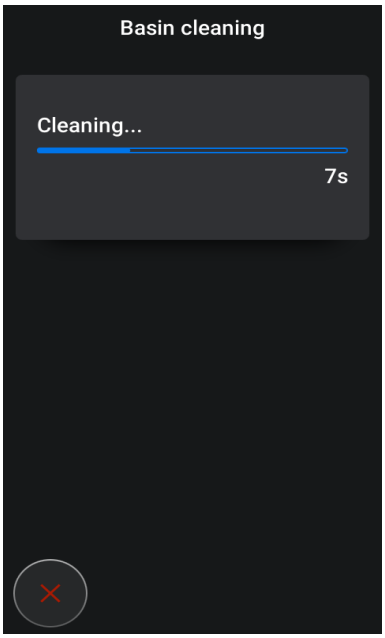
   The recommended durations are:

   - 10 s: Setup, Gingiva
   - 20 s: Model, Guide, Tray, IBT, Denture

   (30 s cycle can be used for thicker resin layer.)



The remaining cleaning time is shown on the screen.



4. Remove the cured layer by gently peeling it off using your fingers.
5. When done touch the green icon (Done).

13.4 Filtering resin from impurities

Before you begin

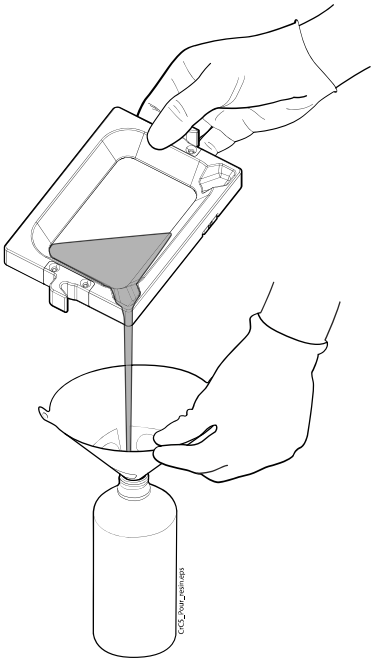
NOTE

Make sure that the build platform is cleaned or removed before removing the basin.

About this task

Steps

1. Move the build platform up and allow the uncured resin to drip into the basin.
2. Remove the basin and drain the uncured resin through a funnel and filter back into the resin container. Uncured resin can be reused as long as it is thoroughly filtered.



3. Clean the basin and build platform with isopropyl alcohol (IPA) (96%) or ethanol (96%) and a soft cloth.

TIP

You can re-use the filtered resin for a new print job. For instructions, see section "Printing with Planmeca Creo C5" on page 23.

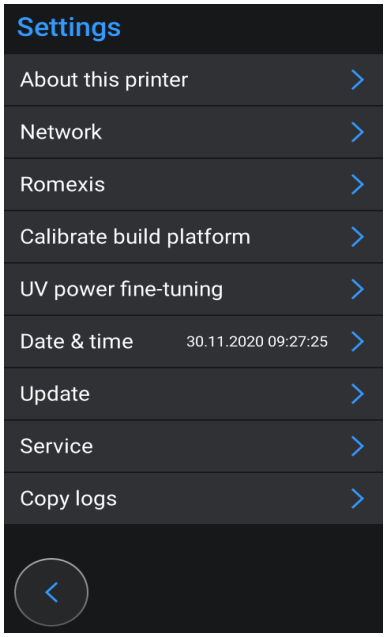
14 Settings

To access the printer settings, touch the settings button.

Settings

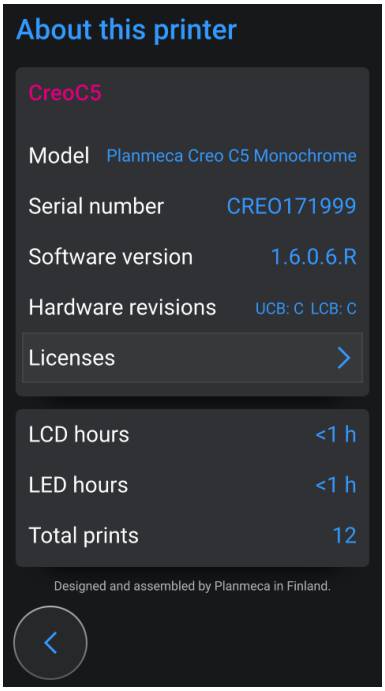
NOTE

All the menus items may not be visible.



About this printer

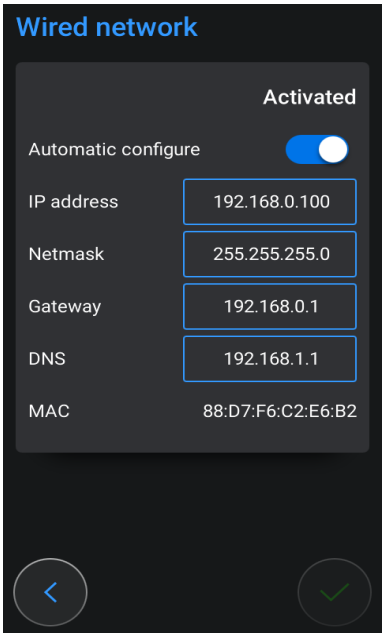
In this menu the model, the current software and hardware versions, licenses and the serial number of the printer are displayed.



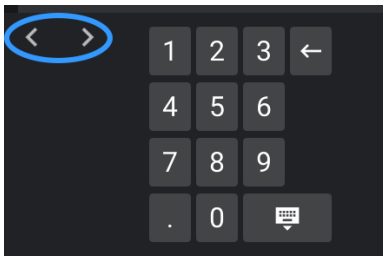
Network

In this menu you can view the settings of the currently wired network.

To set the IP address manually, inactivate setting **Automatic configure**.

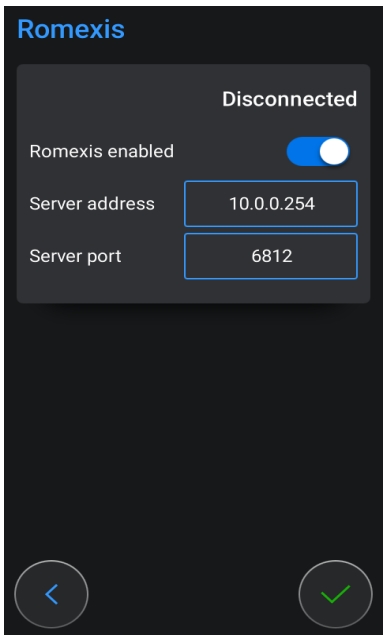


You can move within some fields by using the arrow buttons.



Romexis

In this menu you can view the Romexis settings. For more information on connecting the printer to Planmeca Romexis Clinic Management module, contact your local dealer.



Calibrate build platform

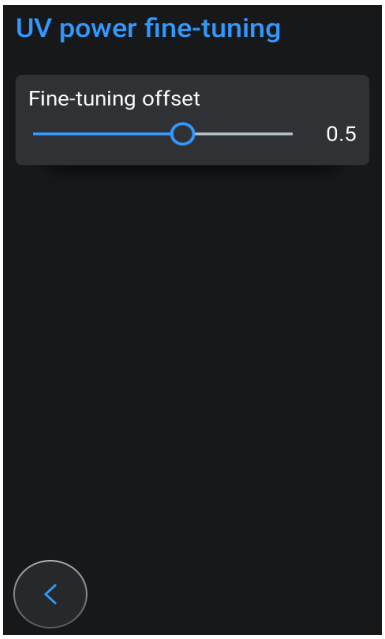
For detailed instructions, see section "Calibrating build platform" on page 48.

UV power tuning

Printing power (the irradiance or energy level to which the resin is exposed during printing) can be fine-tuned slightly up or down from the factory settings. Use this adjustment carefully as it directly affects printing outcome. Increase in power increases resin polymerization but can result in oversized prints. Comparably, less power might improve print accuracy but can cause failed prints due to insufficient curing.

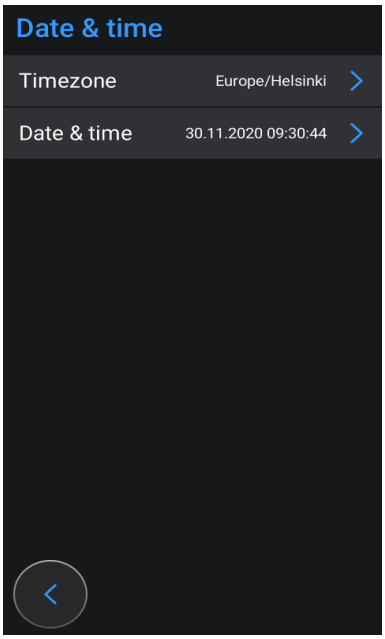
Fine-tune the offset value by moving the slider with your finger.

Return to main view by touching the arrow button on the lower left corner.



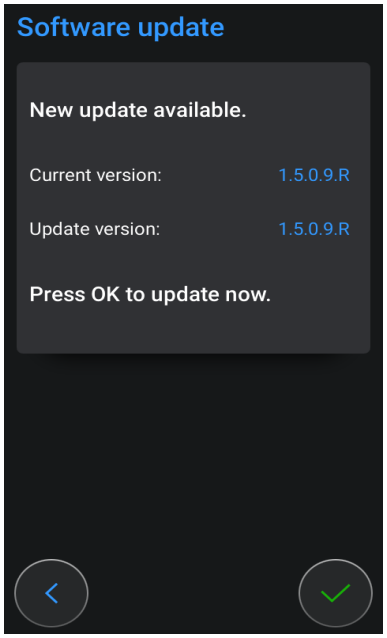
Date & time

View and modify the timezone, date and time settings.



Update

View the current printer software version, the current and available software version (on the USB flash drive) and update the software. For more information on update, contact your local dealer.



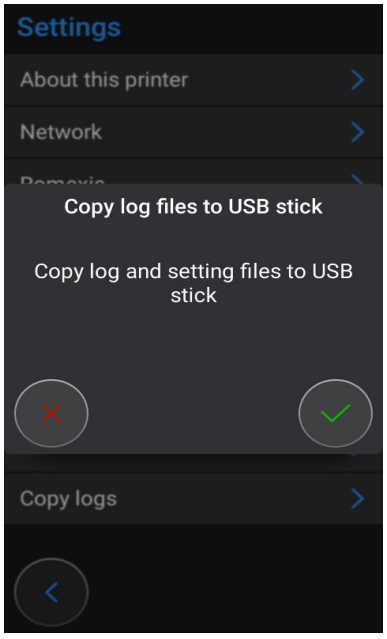
Service

NOTE

The service settings and tasks are intended for qualified service personnel only.

Copy logs

The logs can be copied for troubleshooting purposes, for example. You can copy the log files and printer settings to a USB flash drive connected to the printer's USB port.



15 Preventive maintenance

Keep all parts that are in contact with resin clean and free from uncured material.

On a weekly basis, check the cleanliness of the printer's LCD panel and the filter.

NOTE

Check the air filter weekly and change if necessary. Do NOT wash or reuse filters.

For detailed information on handling the LCD panel, see section "LCD panel handling" on page 22.

When necessary, clean the parts with pressurized air or replace them.

16 Servicing

16.1 Cleaning outside surfaces of printer

About this task

CAUTION
Do not use liquid cleaners or aerosol cleaners.

CAUTION
Do not use abrasive cleaners, waxes or solvents to clean the printer.

CAUTION
Clean any spills immediately with isopropyl alcohol (IPA) (96%) or ethanol (96%). If left, they will cure, making cleaning more difficult.

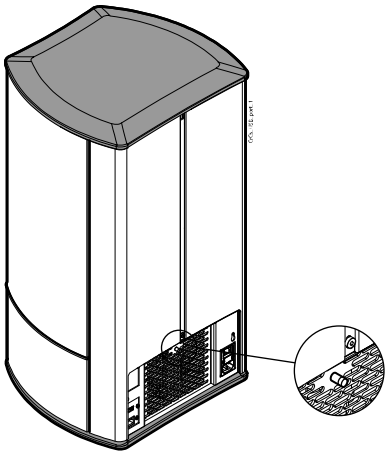
Steps

1. Before cleaning, turn off the printer and unplug it from the wall outlet.
2. Use a soft cloth moistened with mild detergent to clean the outside surfaces of the printer.
3. If the printer is not being used for a long period of time, disconnect the power plug from the AC outlet.

16.2 Checking filter

Steps

1. Open the filter cover by pulling on the knob on top.



2. Check the filter and replace if necessary.

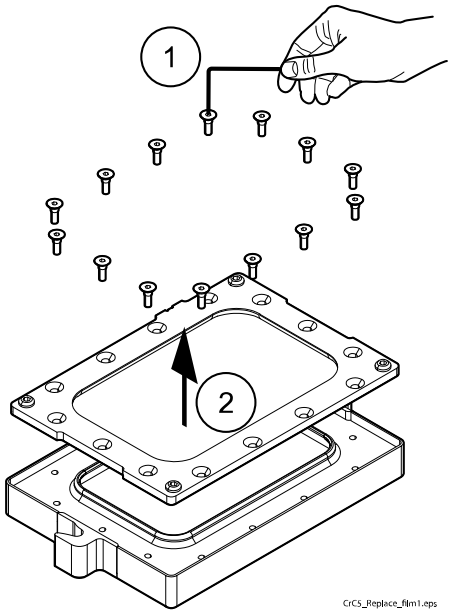
16.3 Replacing basin membrane

About this task

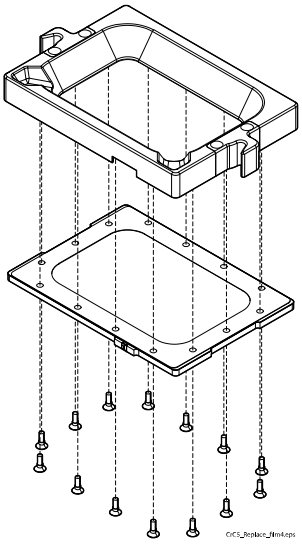
The basin membrane needs to be replaced if leakage is detected or if membrane is very worn or stretched. Small scratches are unavoidable and should not affect printing.

Steps

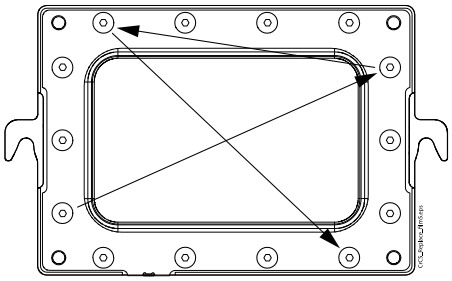
1. Detach the attachment screws and push off the current frame.



2. Clean the basin frame well from the material residues and then place the new film frame onto the basin and place the screws on the screw holes.



3. Start tightening the opposite and crosswise screws of the frame bit by bit.



17 Troubleshooting and further assistance

17.1 Checking serial number

Check your printer's serial number from the *Settings* or from the label on the back of the printer. This helps your local dealer to provide you with assistance.

17.2 Prints fail to attach to build platform

Possible cause	Solution
Build platform set too high	Verify that the build platform is calibrated correctly, see section "Calibrating build platform" on page 48.
Build platform is not clean	Check that the build platform is completely clean and free of contamination, especially oils. Handling the build platform without gloves can leave traces of oil.
Not enough resin in the basin	Check that the resin is filled to the top of the build platform at minimum, plus the volume needed for the printed part.
Part base smaller than largest cross section	If you print a cone with the point to the build platform, for example, the print can detach when the force between the basin and the printed part becomes greater than the force holding the part to the build platform. • Change the orientation of the part. • Ifyou cannot change the orientation of the part, add supports to the part where the cross section starts to increase.
Resin-contaminated build platform or basin	If you use the build platform or basin with multiple different resin-types, the print can fail to attach to the build platform. Use only the appropriate resin for the build platform and basin pair.

17.3 Print cannot be removed from build platform

Possible cause	Solution
Resin contaminated platform or basin	If the build platform or basin has been used with multiple different resin-types, the print can adhere very strongly to the build platform. Use only the appropriate resin for the build platform and basin pair.

17.4 Print is misshapen or incorrect

Possible cause	Solution
Basin not secured	A loose basin can cause a variety of artefacts in the print. Alternatively, a loose basin can allow one print to complete successfully, but cause failure in the next print job. Tighten the basin fixing screws. Check that the basin still pivots.
Resin-contaminated build platform or basin	If the build platform or basin has been used with multiple different resin-types, the print can deform due to resin coagulating, over-curing or under-curing. Over-curing and under-curing can both happen within the same print. Use only the appropriate resin for the build platform and basin pair.
Parts with angled walls	Non-solid parts with angled walls can cause the print to be "levered" off the build platform. Add supports to the angled face.
Resin not stirred before starting new print job	Stir the resin well before starting a new print job.

17.5 Calibrating build platform

About this task

If suspected that the build platform is not properly calibrated, the calibration can be performed easily according to the following instructions. For more information, consult your local dealer.

NOTE

If the LCD panel has been replaced, build platform calibration must be performed.

Steps

1. Drive the printer lid up.

   In the printer control panel, touch the **UP** button.
2. Set the printer accessories as follows.

   Attach:

   - build platform
   - clean empty basin

   Remove:

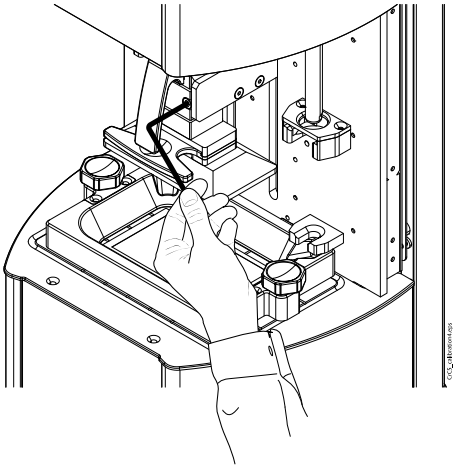
   - resin capsules

3. From the printer's main view, touch the **Settings** button.

4. In the **Settings** menu, touch the **Calibrate build platform** option.

   Instructions for the build platform calibration procedure is shown also on the printer's screen.

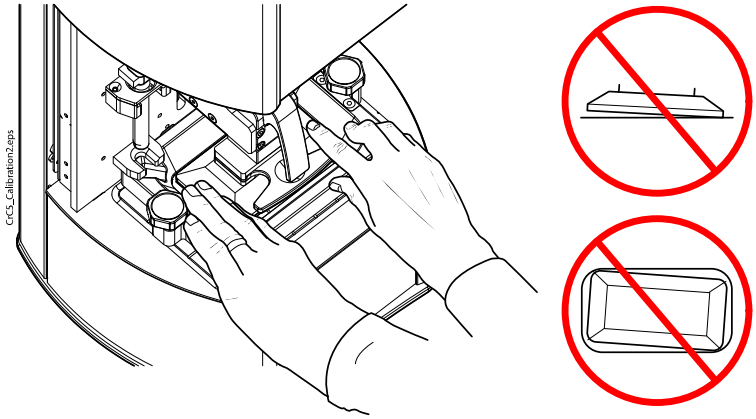
5. Loosen slightly the most right build platform attachment screw with 5 mm Allen key.



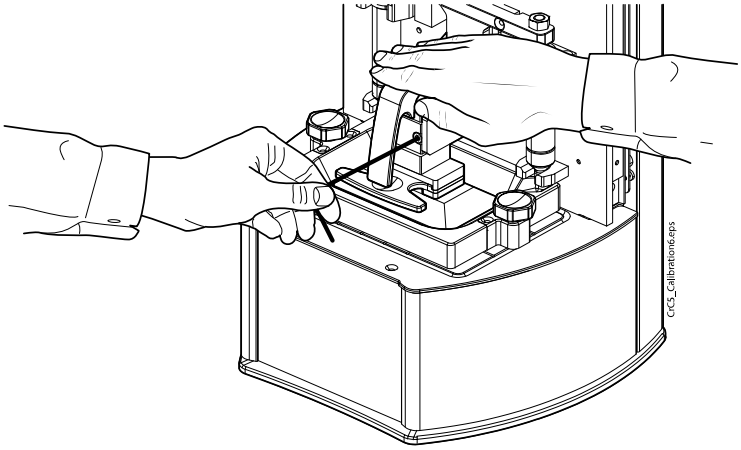
6. Touch the **Down** button to drive the build platform down to touch the basin.

   Note, you must touch continuously the **Down** button to move the build platform down.

7. Ensure that the build platform rests evenly and straight on the basin.



8. Press the build platform firmly against the basin and tighten the build platform attachment screw with 5 mm Allen key.

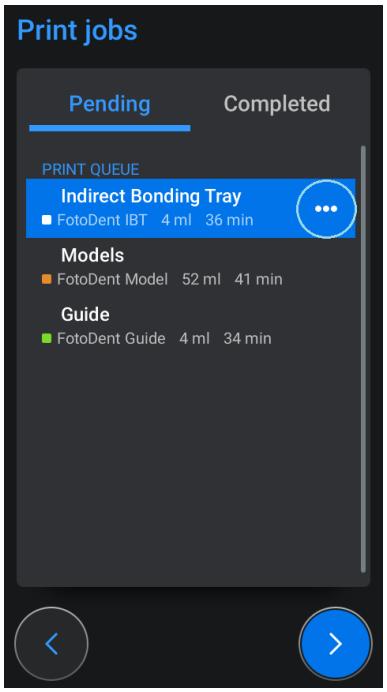


9. Touch the **Ready** button to complete and close the calibration mode.

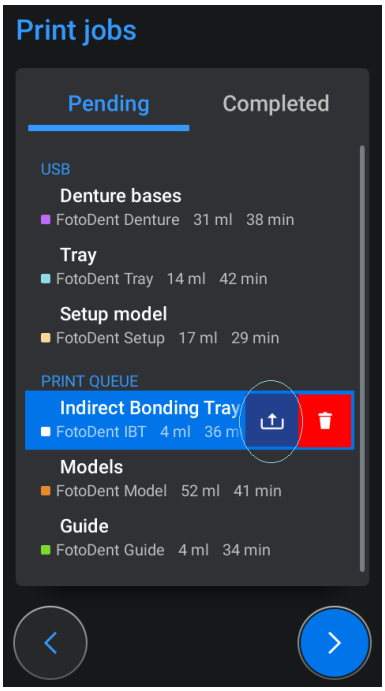
17.6 Importing and exporting print jobs

Exporting from printer to USB flash drive

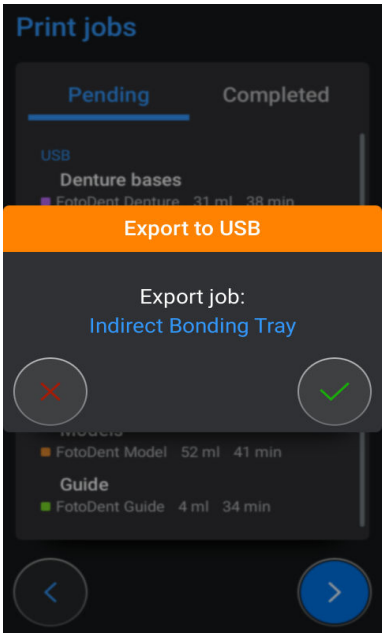
1. Touch the three dots next to the print job name.



2. Touch the download icon to save the print job to USB memory.

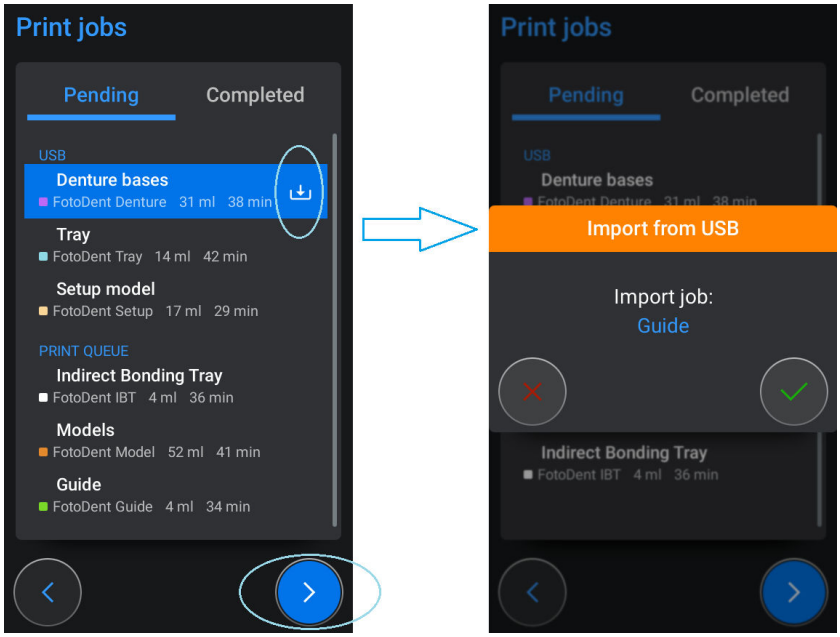


3. Touch the green icon to confirm.



Importing from USB flash drive to printer

Touch the download button next to the job you want to save and confirm the import by clicking the green button (Done).



18 Technical specifications

Print technology	Monochrome Liquid Crystal Display (MC-LCD)
Resolution (XY)	50 µm
Layer thickness	25 -100 µm
Light source	LED
Build volume / print area	128 mm x 78 mm x 100 mm (5.0 in. x 3.1 in. x 4.0 in.)
Power	100 - 240 V~ 50/60 Hz 400 W
To ensure proper device operation, the supply voltage characteristics shall be in accordance to EN 50160.	
Fuses	4A/250V fast acting, high breaking capacity Schurter 0001.1010 or Bussmann S501-4-R
Weight	32 kg (70.6 lbs)
Dimensions	
Diameter	30 cm (11.8 in.)
Height, lid closed	50 cm (19.7 in.)
Height, lid open	90 cm (35.4 in.)
Minimum required clearances	Top: 5 cm (2 in.) Front: 5 cm (2 in.) Sides: 5 cm (2 in.) Rear: 5 cm (2 in.)
Transportation conditions	
Temperatures	-20°C to +60°C (-4°F to +140°F)
Relative humidity	5% RH to 95% RH; non-condensing humidity
Air pressure	700 hPa to 1060 hPa (10 psi to 15 psi)
Storage conditions	
Temperatures	-5°C to +60°C (+23°F to +140°F)
Relative humidity	5% RH to 95% RH; non-condensing humidity
Air pressure	700 hPa to 1060 hPa (10 psi to 15 psi)
If the unit has been stored at temperatures below +10 °C (+50 °F) for more than a few hours, time must be allowed for the unit to reach room temperature in the original packing before connecting the unit to the mains voltage.	
Operating conditions	
Temperatures	+15°C to +25°C (+59°F to +77°F)
Relative humidity	5% RH to 95% RH; non-condensing humidity
Air pressure	800 hPa to 1060 hPa (12 psi to 15 psi)
Altitude	< 2000 m (less than 1.25 miles)

19 Disposal of device

Do not throw this electronic device into the trash when discarding. To minimise pollution and ensure utmost protection of the global environment, please recycle. For more information, please see the Waste from Electrical and Electronics Equipment (WEEE) regulations.

The approved printing resins in their fully cured form are not environmentally harmful and may be disposed with regular plastic waste. Residual waste material in its liquid state should be delivered to a collection point for waste material.

PLANMECA

Planmeca Oy | Asentajankatu 6 | 00880 Helsinki | Finland

tel. +358 20 7795 500 | fax +358 20 7795 555 | sales@planmeca.com | www.planmeca.com