DISPOSAL INSTRUCTIONS
Do not throw this electronic device into the waste when discarding. To minimize pollution and ensure utmost protection of the global environment, please recycle or return to Photocentric for recycling.
Contents

1. EU Declaration of Conformity 1
2. General Information 2
3. Safety Information 3
4. Box Contents 4
5. Installation 5-7
  5.1 Printer Set-Up 5
  5.2 Connecting to a Network 6-7
  5.3 Photocentric Studio Setup 7
6. Printing 7-11
7. Cleaning Prints 11
8. Finishing Prints 12
9. Maintenance 12-18
  9.1 Replacing the Resin Vat Film and Gasket 12-14
  9.2 Print Platform and Resin Vat Re-Calibration 14-18
  9.3 General Maintenance 18
1. EU DECLARATION OF CONFORMITY

1. Product model / product:
   - Product: 3D Printer
   - Model / type: Liquid Crystal Dental

2. Manufacturer:
   - Photocentric Ltd
   - Address: Cambridge House, Oxney Road, Peterborough, PE1 5YW

3. This declaration of conformity is issued under the sole responsibility of the manufacturer.

4. Object of the declaration:
   - Product: Liquid Crystal Dental 3D Printer for manufacturing plastic parts by curing layers of photopolymer resin, using UV light controlled by an LCD screen.
   - Screen: 4K, 14"
   - Build volume: 309 mm x 174 mm x 200 mm
   - Wavelength: 405 nm

5. The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:
   - 2014/35/EU Low Voltage Directive (LVD)
   - 2014/30/EU Electromagnetic Compatibility (EMC) Directive
   - 2011/65/EU Restriction of Hazardous Substances (RoHS 2) Directive

6. References to the relevant harmonised standards used or references to the other technical specifications in relation to which conformity is declared:

7. The technical file is available from the manufacturer at the address above.

8. Additional information:
   - Signed for and on behalf of: Photocentric Ltd
   - Place of issue: Peterborough
   - Date of issue: 13th January 2020
   - Name: Paul Holt
   - Position: Managing Director
   - Signature:

2. GENERAL INFORMATION

Liquid Crystal Dental is an innovative 3D printer, designed and manufactured in the UK by Photocentric Ltd. It uses UV light to cure photopolymer resin and build up objects layer by layer. The shape of each layer is controlled by an LCD screen.

Liquid Crystal Dental has been designed specifically for the dental industry. It is a powerful tool for dental laboratories, practices and hospitals. 3D printing is now an integral step in many digital dentistry procedures.

**MANUFACTURER**
**PHOTOCENTRIC**

**MODEL**
**LC DENTAL**

**BUILD SIZE**
309 x 174 x 200mm

**SOFTWARE**
DEV_DE_1.1.0

**FILE STORAGE**
25Gb CAPACITY

**RESOLUTION**
3840 x 2160px

**BACKLIGHT**
405 UV

**PIXEL PITCH**
80 MICROMETER

For further information, please visit our website: https://photocentricgroup.com/3d/

On our website you can find:
- Software downloads
- Comprehensive instructional videos
- Fully updated user manuals
- An online shop, for consumables, ancillary equipment and spares
- Contact details for our customer support team
3. SAFETY INFORMATION

Read this Liquid Crystal Dental User Manual carefully and retain it for future reference.
- Take note of all warnings displayed on the 3D printer.
- Follow all instructions displayed on the 3D printer.
- Liquid Crystal Dental weighs 40 kg. At least two people are required to lift it safely.
- Operate the 3D printer on a flat and stable surface that can safely support the weight.
- Position the 3D printer at a height that allows a comfortable posture during operation.
- Keep the 3D printer and photopolymer resin out of the reach of children.
- Liquid Crystal Dental requires a mains power supply with a voltage of 100 VAC - 240 VAC and a frequency of 50 Hz - 60 Hz.
- Liquid Crystal Dental has a maximum power consumption of 700 W. It will draw a maximum current of 3.0 A when connected to a 240 VAC supply, or 7.0 A when connected to a 100 VAC supply.
- Only connect Liquid Crystal Dental to the mains socket using the power cable supplied.
- Ensure that the total current draw of all items connected to the mains circuit does not exceed the capacity of the fuse or circuit breaker.
- Always plug the power cable into the mains socket and the 3D printer before switching on the power at the mains socket.
- Always switch off the power at the mains socket before unplugging the power cable from either the 3D printer or the mains socket.
- Do not place anything on top of, or resting against, the power cable.
- Do not position the power cable such that it causes a trip hazard, or is likely to be stepped on.
- Do not operate Liquid Crystal Dental outdoors.
- Liquid Crystal Dental should be operated in direct light from the sun or any UV light source.
- Liquid Crystal Dental should be operated in an ambient temperature of 15 °C - 25 °C.
- Liquid Crystal Dental should be operated in a well ventilated room.

- Do not operate Liquid Crystal Dental with the hood open as you may be exposed to crush hazards, harmful UV light or other hazards.
- Photopolymer resin is an irritant. Always wear gloves and safety glasses when handling photopolymer resin.
- Do not operate Liquid Crystal Dental if you display signs of sensitivity after exposure to photopolymer resin, such as skin or eye irritation.
- Do not allow photo polymer resin or any other liquid to get inside the casing of the 3D printer.
- Clean up any spills immediately.
- In case of malfunction, switch off the power at the mains socket and disconnect the 3D printer immediately.
- Do not disassemble Liquid Crystal Dental as you may be exposed to electric shock hazards, harmful UV light or other hazards.
- All repairs should be carried out by trained service personnel.
- Discontinue 3D printer operation and contact your supplier if:
  o The power cable or plug is damaged.
  o Liquid has got inside the casing of the 3D printer.
  o The 3D printer has been dropped.
  o The 3D printer shows signs of damage.
  o The 3D printer does not operate correctly after following the instructions provided in this user manual.
- Dispose of waste photopolymer resin responsibly. Do not put photopolymer resin down the drain. Resin can be cured using any UV light source. Fully cured resin can be disposed of with normal waste.
- Dispose of Liquid Crystal Dental responsibly. Please recycle where possible or return to Photocentric for recycling.

RECOMMENDED ADDITIONAL ITEMS
Safety Glasses
Paper Towel
Sink & Hot Water
Soap / Detergent
Cleaning Solvent
(eg Isopropyl Alcohol)
Resin
(see website for details) *
Photocentric Resin Cleaner *
Photocentric Wash 15 *
Photocentric Cure M *
Liquid Crystal Dental Vat Film and Gasket Pack *
Liquid Crystal Dental Resin Vat *
Liquid Crystal Dental Print Platform *
* Available from Photocentric

4. BOX CONTENTS
Print Platform
16 GB USB Flash Drive
Resin Vat
2x Vat Film
5mm Allen Key
3mm Allen Key
2x Vat Gaskets
PZ1 Screwdriver
PZ2 Screwdriver
Soft Spatula
1kg Sample Resin
Spray Bottle
Funnel
5x Paper Resin Filters
2x Gloves
Scaper
Power Cable
Vat Cleaning Tool
Wi-Fi Dongle
Platform Hanger
Silicone Mat
5 INSTALLATION

5.1 INSTALLATION SETUP
When choosing a location for your Liquid Crystal Dental, allow enough height for the hood to be opened fully. (All dimensions are in millimetres.)

Allow a minimum of 150 mm at the rear of the printer for the hood, power cable and network cable. Allow a minimum of 150 mm at the sides of the printer for proper ventilation and easy access to the power switch. If you are using more than one Liquid Crystal Dental, allow around 200 mm between machines for proper ventilation.

Liquid Crystal Dental requires a mains power supply with a voltage of 100 VAC - 240 VAC and a frequency of 50 Hz - 60 Hz. It has a power consumption of 700 W. It will draw a current of 3.0 A when connected to a 240 VAC supply, or 7.0 A when connected to a 100 VAC supply. Only connect Liquid Crystal Dental to the mains socket using the power cable supplied. Always plug the power cable into the mains socket and the printer before switching on the power at the mains socket. Similarly, always switch off the power at the mains socket before unplugging the power cable from either the printer or the mains socket. The printer power socket is on the back of the machine, at the right side. The power switch is immediately above the power socket.

Liquid Crystal Dental has a USB socket and an RJ45 network socket on the back. Plug a Wi-Fi dongle (provided) into the USB port if you would like to access your printer via a Wi-Fi network connection. Plug a network cable (eg CAT6) into the RJ45 socket if you would like to access your printer via a wired network connection.

5.2 CONNECTING TO A NETWORK
Once your Liquid Crystal Dental is switched on, if you have plugged in a network cable or Wi-Fi dongle, you can connect it to a network. This will allow you to upload print files and monitor print jobs from your desk. These instructions will guide you through setting up the connection and uploading a print file.

1. On the ‘MAIN’ screen, select ‘NETWORK’
2. Select your preferred network from the list
3. Select ‘CONNECT’
4. Select the text frame labelled ‘PASSWORD’, an on-screen keyboard will appear
5. Enter the password for your chosen network, you can display the password characters by selecting the lock icon to the right of the text frame
6. Select ‘CONNECT’ and wait for the connection to be established
7. Select ‘MAIN’
8. The Wi-Fi icon at the top left of the ‘MAIN’ screen should now be green, and an IP address should be displayed next to it
9. Open a web browser on your PC
10. Type the printer’s IP address into the address bar
11. Select ‘Upload’
12. Select ‘Browse…’
13. Locate the print file on your PC, the name of the file will appear to the right of the ‘Browse…’ button
14. Select ‘Upload File’, a progress bar will appear

NOTE:
See section 5.3 for guidance on preparing a print file.

15. The print file will now be uploaded to your Liquid Crystal Dental.
6 PRINTING

15. Once complete, the ‘Print Files’ list will be updated to include the new file.

16. Return to your printer, on the ‘MAIN’ screen, select ‘PRINT FILES’.

17. The new file will appear in the list, ready for you to print.

5.3 PHOTOCENTRIC STUDIO SETUP

A 16 GB USB flash drive is supplied with your Liquid Crystal Dental. On this drive you can find a license number for Photocentric Studio. This allows you to activate a perpetual license for up to two PCs. Photocentric Studio can be downloaded from this webpage: https://photocentricgroup.com/studio-support/

On this page, you can also find guidance on the following:
- Installing the software
- Getting started
- Adding supports
- Slicing your print
- Updating the software

The minimum system requirements for Photocentric Studio are as follows:
- Operating System: Windows 7, 8 or 10
- 2.0 GHz processor with two cores, four cores recommended
- GPU capable of opening opengl version 3.0 or higher
- .net framework version 4.0
- 64 bit system: 2 GB of RAM, 4 GB recommended
- 32 bit system: 1 GB of RAM, 2 GB recommended
- Run the software on macOS by using a virtual workstation with Windows installed.

1. Ensure that your Liquid Crystal Dental is positioned on a stable, level surface where it will not be subject to movement or vibrations during the printing process.

2. Ensure that the print platform is completely clean and dry, failure to do so may result in damage to your vat film or a failed print.

3. Load the print platform into the printer, you should feel a positive click as the platform engages.

4. Tighten the turn knob firmly to lock the print platform in place.

5. Ensure that the resin vat is completely clean and dry, failure to do so may result in damage to your vat film or a failed print.

6. Check the vat film for signs of damage or wear, if you have any doubt about the condition of the vat film, refer to section 9.1.

NOTE: Printing with a damaged vat may result in a resin leak which may cause your print to fail, and may cause permanent damage to your printer.

7. Load the resin vat into the printer, you should feel a positive click as the vat engages.

8. Select the correct resin for the file you wish to print.

NOTE: The correct resin for a print job is determined by the selection made when the model was sliced in Photocentric Studio. Always use the correct resin or the print settings will be unsuitable and the print is likely to fail. If you would like to try a different resin, re-slice the model in Photocentric Studio and make the appropriate selection.

9. Check the volume of resin required for the file you wish to print (Photocentric Studio will provide this figure), add an extra 300 ml to ensure a good resin supply at the end of the print.

10. Pour the resin into the vat, for smaller files top up to a minimum of 1 litre.

NOTE: You can ensure your printer is level at this point by pouring a small amount of resin into the vat and checking that it sits in an even layer over the vat film.

11. Close the printer hood, the icon in the top right of the touchscreen should show a green closed door.

12. On the ‘MAIN’ screen, select ‘PRINT FILES’.
13. Select the file you would like to print from the list.

14. If you need to transfer a new print file to your Liquid Crystal Dental, copy it onto the USB flash drive, then plug the drive into the USB port on the front of the machine.


16. Once the correct print file is highlighted, select ‘PRINT’.

17. A pop-up will ask for confirmation, select the green check mark.

18. Your Liquid Crystal Dental will start the printing process.

19. At any time during the printing process, you can cancel or pause the print by making the relevant selection, you will be asked for confirmation in both cases.

20. The touchscreen will display information about the progress of your print, the ‘TIME REMAINING’ estimate will be more accurate after the first few layers are complete.

21. Liquid Crystal Dental does not need monitoring or supervision during the printing process, you do not need to be present when the print is due to finish.

22. Leaving a finished print inside the printer for a time will allow excess resin to drip back into the vat.

23. When you are ready to clean your print, open the hood.

24. Loosen the turn knob to free the print platform.

25. Grip the handles of the print platform securely and gently pull it towards you to remove it.

26. Clean the print (see section 7).

27. Rinse the print thoroughly in hot water to remove any residual cleaning product.

28. Use the scraper provided to remove the printed parts from the platform.

29. Finish your printed parts (see section 8).

30. Take the resin bottle that you used earlier when filling the vat, remove the cap.

31. Set up a funnel and filter in the neck of the bottle.

32. Carefully remove the resin vat from the printer.

33. Tilt the vat towards one corner and pour the left-over resin through the filter and back into the bottle, be careful not to allow the filter paper to overflow.

34. Once most of the resin has poured away, use the vat cleaning tool to guide remaining resin towards the corner of the vat.

35. Clean off any resin drips on the outside of the vat with paper towel.

36. Place the vat on a suitable clean smooth surface (eg the silicone mat from the top of your Liquid Crystal Dental).

37. Use paper towel to soak up the last of the resin in the vat.

38. Use a small amount of a suitable cleaning solvent such as IPA, along with paper towel, to clean the vat film and vat walls, dry them thoroughly.
39. Check for any fragments of cured resin remaining on the vat film, dislodge them carefully with the soft spatula provided, any loose pieces can be removed using a small piece of sticky tape.

40. Give the outside of the vat a final clean and check the film for signs of damage or wear, if you have any doubt about the condition of the vat film, refer to section 9.1

NOTE: Printing with a damaged vat may result in a resin leak which may cause your print to fail, and may cause permanent damage to your printer.

41. Check the screen of your Liquid Crystal Dental for any sign of resin contamination or damage.

42. If resin is present, clean it up thoroughly with paper towel, this is a sign that the film on your resin vat most likely needs replacing.

NOTE: If you believe your printer's screen may be damaged, contact your supplier or visit the support pages of the Photocentric website.

43. Store the resin vat inside the printer when not in use.

44. Check your print platform for any fragments of cured resin left behind when the prints were removed, dislodge them carefully with the scraper provided.

45. If any Photocentric Resin Cleaner is left on the print platform, clean it off with a suitable solvent such as IPA, dry it thoroughly.

NOTE: A residue of Photocentric Resin Cleaner on the print platform may prevent the next print from adhering properly.

NOTE: If you have a supply of compressed air available, this can help with cleaning and drying the print platform. Always wear safety glasses and take the proper precautions when using compressed air.

46. Store the print platform inside the printer when not in use.

7 CLEANING PRINTS

All prints produced using Liquid Crystal Dental will need to be cleaned in order to remove any remaining liquid resin.

We recommend using Photocentric Wash 15, and Photocentric Resin Cleaner, to clean your prints.

NOTE: Wear gloves and safety glasses when working with Photocentric Resin Cleaner.

Photocentric Wash 15 and Photocentric Resin Cleaner can be purchased on this webpage: https://photocentricgroup.com/wash/
The user manual for Wash 15 can be downloaded from this webpage: https://photocentricgroup.com/wash-support/
Here you can also browse guidance on the following:
- Using your wash unit
- Adjusting settings
- Maintenance
- Safety compliance
- Warranty

8 FINISHING PRINTS

All parts produced using Liquid Crystal Dental will need to be finished using UV light and heat to fully cure the resin and achieve the correct material properties.

We recommend Using your wash unit to finish your printed parts.

NOTE: Wear gloves when handling printed parts prior to finishing. There may still be traces of liquid resin or cleaning product on the surface. Handle the parts with care. The resin is still in its green state and vulnerable to damage.

Photocentric Cure M can be purchased on this webpage: https://photocentricgroup.com/cure/
The user manual for Cure M can be downloaded from this webpage: https://photocentricgroup.com/curem-support/
Here you can also browse guidance on the following:
- Using your cure unit
- Programs
- Maintenance
- Environmental Operating Conditions

9 MAINTENANCE

9.1 REPLACING THE RESIN VAT FILM AND GASKET

NOTE: In normal operation, you should replace the resin vat film and gasket after approximately 50 hours of printing. You should immediately replace the film and gasket if you detect any sign of leaking resin or any visible damage.

NOTE: Replacing the vat film and gasket will take approximately 40 minutes if the correct procedure is followed and the correct tools are used. It is important to clean the vat body thoroughly to avoid fragments of cured resin or other contaminants damaging the newly fitted film.

You will need:
- Silicone Mat
- Paper Towel
- Cleaning Solvent (e.g. Isopropyl Alcohol)
- PZ1 Screwdriver
- PZ2 Screwdriver
- Vat Film
- Vat Gasket

1. Find a clean, flat surface to work on.
2. Use the silicone mat from the top of the printer to cover the surface and protect the vat from damage.
3. Clean the silicone mat thoroughly to avoid a resin leak when the vat is turned over.

NOTE: In normal operation, you should replace the resin vat film and gasket after approximately 50 hours of printing. You should immediately replace the film and gasket if you detect any sign of leaking resin or any visible damage.

NOTE: Replacing the vat film and gasket will take approximately 40 minutes if the correct procedure is followed and the correct tools are used. It is important to clean the vat body thoroughly to avoid fragments of cured resin or other contaminants damaging the newly fitted film.

You will need:
- Silicone Mat
- Paper Towel
- Cleaning Solvent (e.g. Isopropyl Alcohol)
- PZ1 Screwdriver
- PZ2 Screwdriver
- Vat Film
- Vat Gasket

1. Find a clean, flat surface to work on.
2. Use the silicone mat from the top of the printer to cover the surface and protect the vat from damage.
3. Clean the silicone mat thoroughly to avoid a resin leak when the vat is turned over.
4. Turn over the vat

5. Remove the large screws using the PZ2 screwdriver, keep them to one side

6. Lift off the vat ring assembly

7. Lift off the vat gasket and dispose of it

8. Clean the vat body thoroughly, ensuring that no cured resin or other contamination is present on the surfaces that will contact the new film

9. Remove the small screws using the PZ1 screwdriver, keep them to one side

10. Lift off the top vat ring

11. Lift off the vat film and dispose of it

12. Clean both vat rings thoroughly

13. Ensure the silicone mat is clean

14. Lay the bottom ring down with the countersinks facing upwards

15. Take a new piece of vat film from the pack and lay it centrally over the ring

16. Place the top ring onto the film with the countersinks facing upwards

17. Secure the two rings together using the small screws

18. Carefully pierce holes for the large screws using the tip of the PZ1 screwdriver

19. Take a new vat gasket from the pack and lay it onto the vat body, aligning the holes

20. Place the vat ring assembly onto the vat with the countersinks facing upwards

21. Secure the vat ring assembly to the vat body using the large screws

**NOTE**

The screws should pierce the film as you begin to tighten them. The film must be kept flat at all times. It should not be under tension but there must be no creases. There should be excess film on all sides of the rings.

22. Carefully cut away the excess film

23. Check that the vat ring assembly sits flat against the vat body with no visible gaps

24. Check that no damage has been caused to the new film during the assembly process

25. Your vat is ready to use.

**NOTE**

You can gently tap on the vat film with a fingertip (not a fingernail) to check the tension. There should be a high-pitched, resonant sound like a small drum. If the film feels loose, the vat will not function properly.

### 9.2 PRINT PLATFORM AND RESIN VAT RE-CALIBRATION

**NOTE:** The print platform in your Liquid Crystal Dental has been calibrated at the factory. This ensures that the bottom surface of the print platform is parallel with the LCD screen. The resin vat has also been calibrated such that the print platform, vat film and LCD screen are all in direct contact when the z axis reaches the bottom of its travel. The print platform and resin vat should remain in their set positions for the life of your printer. However, in some circumstances, the set positions may be lost. For example, if the print platform is dropped or any of the relevant bolts are loosened. The following procedure allows you to reset the print platform and resin vat to their proper positions.

You will need: 3 mm Hex Key
5 mm Hex Key

1. Ensure that the vat and print platform are completely clean, failure to do so could result in damage to your vat film or inaccurate print platform homing leading to print failures
2. Load the vat and print platform into the printer in the normal way, tighten the turn knob that secures the print platform.

3. Turn on the printer and wait for the touchscreen to display the ‘MAIN’ screen.

4. Select ‘MAINTAIN’.

5. Select ‘RE-CALIBRATE’.

6. Select ‘PLATFORM’.

7. Remove the print platform and vat from the printer, ensure that the screen is clean.

8. Close the printer hood and select ‘START’, the z axis will move to the top of its travel.

9. Once the printer has stopped moving, open the hood.

10. Take the weight of the print arm in one hand and use the 3 mm hex key to loosen the two bolts shown.

11. Lower the print arm until the bolts hit the bottom of their slots, select ‘NEXT’.

12. Return the print platform to the printer and tighten the turn knob firmly.

13. Use the 5 mm hex key to loosen the bolt shown, it should be easy to tilt the print platform from side to side.

14. Select ‘NEXT’.

15. Place the calibration film (provided) over the screen.

16. Close the printer hood and select ‘NEXT’, the z axis will move to the bottom of its travel.

17. Ensure the print platform is sitting square in the machine, use the screen as a visual reference.

18. Select ‘NEXT’.

19. Whilst maintaining a light downward pressure on the print arm, finger-tighten the bolt shown.

20. Keeping pressure on the print arm, use the 5 mm hex key to tighten the bolt.

NOTE: Make sure the print platform is approximately horizontal before proceeding. Failure to do so could result in damage to the screen.

NOTE: The calibration film represents the resin vat film during the platform calibration process. A spare vat film can be used in its place.
21. Select ‘NEXT’

22. Keeping pressure on the print arm, use the 3 mm hex key to tighten the two bolts shown

23. Visually check that the print platform is in full contact with the screen

24. Close the printer hood and select ‘NEXT’, the z axis will move to the top of its travel

25. Remove the calibration film and select ‘FINISH’

26. Select ‘RE-CALIBRATE’, then select ‘VAT’

27. Ensure the resin vat is clean

28. Use the 3 mm hex key to loosen the two bolts shown, it should be possible to manually move the vat lifter up and down

29. Close the printer hood and select ‘START’, the vat lift system will move to the bottom of its travel

30. Load the resin vat into the printer, you should feel a positive click as the vat engages

31. Press on the sides of the vat to ensure its seated against the screen, select ‘NEXT’

32. Use the 3 mm hex key to tighten the two bolts shown

33. Select ‘FINISH’

34. Your Liquid Crystal Dental is ready to print

9.3 GENERAL MAINTENANCE

The main air intake for Liquid Crystal Dental’s cooling system is on the base of the printer. Over time, dust will accumulate on the air filter. Excessive dust will reduce the air flow and could cause the printer to overheat. This will eventually trigger the thermal cut-out and cause a print failure. The LCD screen may also be permanently damaged.

Clean the fan filter at least once a month if the printer is in regular use. For printers in constant use or in dusty environments, clean the fan filter every two weeks. The filter is magnetic and can be pulled away from the base plate and replaced without tools. To get access, you will need to elevate the front of the machine. Always make sure the vat is empty and the hood is closed before lifting or moving Liquid Crystal Dental. Ask another person to help you and observe proper lifting practice.

The printer weighs 40 kg. Liquid Crystal Dental will perform at its best if it is kept clean at all times. Wipe up any resin spillages or drips immediately. Keep your gloves clean. Keep the outside of resin bottles clean. Keep all tools clean. Clean the resin vat and print platform between prints. Only open and close the printer hood with clean hands or clean gloves. Allow plenty of space to work with your printer.

For further information, please visit our website: https://photocentricgroup.com/3d/