

USER MANUAL

FOR ORIGINAL PRUSA CURING AND WASHING MACHINE



PRUSA
RESEARCH
by JOSEF PRUSA

V1.02  ENG

ORIGINAL INSTRUCTIONS

ORIGINAL INSTRUCTIONS: Basic info

Please always refer to the <http://www.prusa3d.com/drivers/> for an updated version of this handbook (PDF download).

Translated versions of the handbook are available at:

- **Czech:** www.prusa3d.cz/ovladace/
- **French:** www.prusa3d.fr/drivers/
- **German:** www.prusa3d.de/treiber/
- **Polish:** <https://www.prusa3d.pl/sterowniki/>
- **Italian:** www.prusa3d.it/driver/
- **Spanish:** www.prusa3d.es/drivers-y-manuales/



Important notice, tip, hint or information that helps you print with ease.



Read carefully! This part of the text has the greatest importance - either for user safety or for proper device service.

Product details

- **Title:** Original Prusa CW1S / Original Prusa Curing and Washing Machine
- **Manufacturer:** Prusa Research a.s., Partyzánská 188/7A, Prague, 170 00, Czech Republic
- **Contact e-mail:** info@prusa3d.com
- **EEE group:** 3 (IT and/or telecommunication equipment)
- **Device use:** indoor only
- **Power supply:** Input 100-240VAC, 50/60Hz, 2.0A. Output: 24V, 6.67A, 160W Max.
- **Working temperature range:** 16 °C - 38 °C, indoor use only
- **Working humidity:** 85 % or less



Curing and Washing Machine weight (gross / net): 7.8 kg / 6.8 kg. The serial number is located on the back of the machine and also on the packaging.

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About the author

Josef Prusa (born Feb 23rd, 1990) became interested in the 3D printing phenomenon before joining Prague's University of Economics in 2009. At first, it was a hobby, a new technology open to changes and improvements. This hobby soon became a passion and Josef grew into one of the leading developers of Adrien Bowyer's international, open source, RepRap project. Today, you can see the Prusa design in different versions all around the world - it is one of the most popular printers, so knowledge about the 3D printing technology significantly increased among the public.

Jo's work on self-replicating printers (you can print the other printer parts with your printer) continues, and the latest model, the Prusa i3 MK3S, is currently on the market. It's an improved version of the original 3D printer's third iteration. Prusa Research keeps expanding into new territories and the Original Prusa CW1S you just purchased is just one of the examples.

Josef Prusa also organizes workshops for the public and participates in professional conferences dedicated to the popularization of 3D printing. For example, he lectured at the TEDx conference in Prague and Vienna, at World Maker Faire in New York, Maker Faire in Rome and at the Open Hardware Summit hosted by MIT. Josef also teaches Arduino at Charles University and was a lecturer at the Academy of Arts in Prague.

In his own words, he imagines 3D printers will be available in every home in the not-too-distant future. "If anything is needed, you can simply print it. In this field, you just push the boundaries every day... We're glad you're part of it with us!"



Josef Prusa

Safety instructions

Please be very cautious during any interaction with the machine. The CW1S is an electrical device with moving parts and UV light emission.

1. The device is for indoor use only. Do not expose the CW1S to rain or snow. Always keep the machine in a dry environment at a minimum distance of 30 cm from other objects. Make sure none of the vents/fan outlets are blocked. This device is not meant to be used outside.
2. Always place the machine on a stable surface, where it cannot fall or tip over.
3. The CW1S has an external power supply, which should be connected to a household power outlet 230 VAC, 50 Hz or 110 VAC / 60 Hz. Never connect the machine to a different power supply; it may cause a malfunction or damage to the device.
4. Place the external power adapter and the power cord so you cannot stumble over it, step on it, or otherwise expose it to any potential damage. Also make sure that the power cord is not mechanically or otherwise damaged. If so, stop using the damaged power cord immediately and replace it.
5. When you disconnect the power cord from the socket, pull the plug rather than the cord to reduce the risk of damage to the plug or to the AC outlet.
6. Never disassemble the external power supply; it does not contain any parts that could be repaired by an unskilled worker. All repairs must be performed by a qualified technician.
7. Do not reach inside the device while it is still in operation.
8. Prevent children from unsupervised access to the device even when it's not running.
9. Do not leave the device unattended while it's still turned on!
10. Do not use this device if it is disassembled or it has parts missing
11. Never look directly into the UV light.
12. Keep in mind that resins and isopropyl alcohol are liquids which produce odors. Make sure the device is set in a ventilated place.
13. Wear gloves and consider using a respirator and protective goggles when handling resins and isopropyl alcohol
14. Some people may be allergic to resins - either to skin contact or even the vapors. If you experience any kind of discomfort when working with resins (like itching), stop immediately and seek medical attention
15. Never leave the tank containing isopropyl alcohol in the CW1S when the machine is off. IPA is a volatile flammable substance and the concentration of its vapors in the device's chamber could be potentially dangerous. If you left the tank with IPA in the CW1S, open the CW1S' lid for several minutes before you turn the device on.

1. Introduction

The Original Prusa Curing and Washing Machine (CW1S) is an **all-in-one device** designed for quick and easy post-processing of objects printed from liquid resins. It can also preheat resins to working temperatures.

Objects printed from liquid resin are usually a bit soft and sticky. To clean them and give them optimal surface properties, **the objects need to be washed, dried and cured**. This process involves washing the object in isopropyl alcohol, drying using hot air and curing using UV light. The Original Prusa Curing and Washing Machine (CW1S) can take care of all these actions in 10 minutes. However, some caution needs to be exercised when handling liquid resins and isopropyl alcohol. Please read this handbook carefully.

Any time you handle resins (even 3D prints with traces of liquid resin) or isopropyl alcohol, wear protective gloves! Resins and IPA have distinctive odors - consider wearing a simple respirator in case you find the odors irritating. The Original Prusa CW1S should be placed in a well-ventilated area!

2. Package contents and Quick-start info

The Curing and Washing Machine comes with a number of additional tools that will help you cure and wash your printed models quickly and easily.

The package contains:

- Stainless steel liquid container (gastro pan)
- Magnetic propeller
- Metal basket - for small object washing
- Metal container lid with a print platform attaching mechanism
- External power supply unit (not pictured)
- Spare protective FEP films for CW1S platform
- Gloves

Recommended accessories (not included):

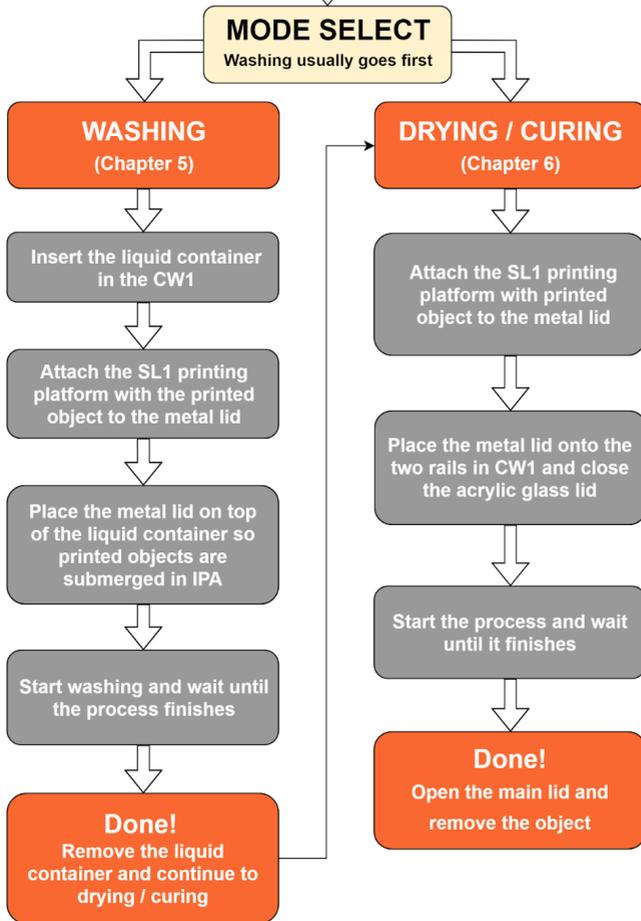
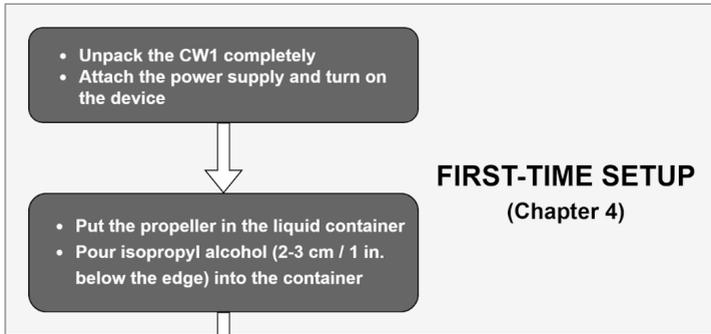
- Protective Glasses
- Plastic tablecloth



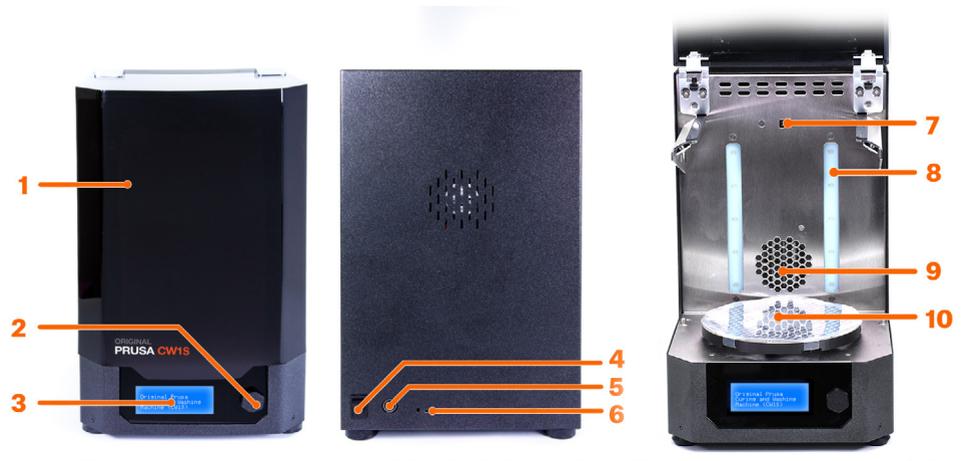
Isopropyl alcohol is not included in the package! Please buy a container with at least 92% isopropyl alcohol from your local hardware store / online shop. The tank in the CW1S can hold 4 liters (approx 1 gallon) of liquid.



IPA is volatile and flammable - exercise caution when handling this material.



3. Curing and Washing Machine - device info



1. **Lid** - cover made of opaque acrylic. Used to block UV light and contain heat during drying. It should be closed during drying/curing, but kept open during washing!
2. **Control knob** - used to control and configure the machine. Turn left/right to scroll through menus, press to confirm. Long press can execute additional actions (see this handbook for more information)
3. **LCD screen**- displays the menu and allows for easy configuration and control of the device.
4. **Power switch** - main power switch for the device.
5. **External adapter connector** - used to connect the external adapter. Make sure the plug is correctly inserted.
6. **RESET switch and MicroUSB port** - used for updating the CW1S' firmware. The reset button needs to be pressed with an allen key or similar tool
7. **Liquid container proximity sensor** - a proximity sensor used to detect whether the liquid container is inserted or not. Depending on the status (present / not present), the CW1S changes its operating modes automatically.
8. **UV LED panel** - the UV LED panel is used to cure models printed from liquid resins: this hardens a rather soft surface into a solid one.
9. **Heater outlet** - after you wash an object in isopropyl alcohol, it should be dried before proceeding. The heater outlet increases the temperature inside the CW1S' chamber, which accelerates the drying process.
10. **Rotating platform** - for drying and curing objects detached from the printing platform. The rotating platform is magnetic, so it also spins the propeller inside the liquid container during the washing process.

4. First-time setup

4.1. Unpacking and placement

After you open the box, remove the accessories case first (1), then remove the top foam (2). Grab the box using the two handles on the side and pull it up (3). Open the cardboard locks (4) and remove the foam protectors along with the protective wrap (5). Finally, take the unpacked CW1S and place it on a stable surface (6).



Open the CW1S' acrylic lid, remove the top foam protector (1), then slide down the lower foam protector (2) and pull the liquid container along with the protector towards you (3). Remove the plastic wrap from the tank and take out the metal basket.



To ensure **safe and optimal work experience**, the CW1S should to be placed in a location that meets the following conditions:

- Place the machine in a **horizontally stable position** - the best place is a workbench. A good practice is to put a plastic tablecloth under the machine in case a resin / IPA spill occurs.
- The **external power supply** should be placed in such a manner that will prevent anyone from tripping over the cable, or damaging it.
- Do not place the device next to a source of water or into a wet environment

4.2. Starting the device

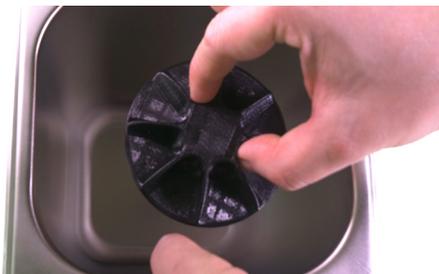
Connect the **external power supply to the CW1S** and plug it into the power source. To disconnect the cable, push the connector's cover away from the CW1S to unlock the connector, then pull it out. Turn the device on by using the **mechanical switch next to the power supply connector**.



Once you turn the CW1S on, the display in the front will light up. **The knob** next to the display is the **main control device**. Rotate it left or right to select items on the screen and push it to confirm the selection / change options.

4.3. Preparing the liquid container

Before you start the washing process, you need to prepare the isopropyl alcohol bath.



Prepare the **stainless steel tank** and the **magnetic propeller**. Place the magnetic propeller into the tank so it lays flat on the bottom. Blades must point upwards.

Carefully pour isopropyl alcohol into the tank. The surface should be about 2-3 cm (about 1 in.) below the edge of the tank.

5. Washing

Place the liquid container with the propeller and isopropyl alcohol into the CW1S so it **rests on the two guiding rails**. There is a sensor in the back that can detect the presence of the tank. You can tell whether the tank has been correctly placed when the text on the display changes to **Washing**. If the tank is not present, the text will change to **Drying / Curing**.



5.1. Washing an object attached to the platform

We recommend washing the printed object while it's still **attached to the printing platform**. However, if you don't have the Original Prusa SL1S, or if the initial washing did not remove some resin (e.g. under dense supports), you can use **the metal basket** to wash the object by itself.



Isopropyl alcohol is a volatile flammable liquid, don't leave the lid closed when the liquid container is in the CW1S!

Washing an object attached to the SL1S printing platform

After a print finishes, open the acrylic lid of the SL1S and **place a protective tray around the resin tank**. Use a plastic spatula or paper towels to wipe resin from the top of the printing platform. Release the black knob and remove the printing platform - wear gloves!

Carefully move the printing platform to the CW1S. Take the **metal lid** with the attaching mechanism and **push the button at the top** with your thumb - this will unlock the mechanism. Slide the printing platform onto the hexagon-shaped adapter and release the button.



Now **place the lid on top of the liquid container** so the print is **submerged** in isopropyl alcohol. This is the recommended procedure, because both the platform and the object are washed. If the object is too large for the tank, remove it from the platform and wash it twice - first in "normal" orientation, then rotate it upside down and wash it again.

Select **Washing** on the display and the machine will wash the object for **3 minutes** (default value). You can change the washing time by either rotating the knob during the process or by selecting Run-time option before the print. **We do not recommend washing objects in isopropyl alcohol for more than 10 minutes** - tiny cracks may appear on the surface of printed objects (even after more than 24 hours), which is the result of a long exposure to IPA.



If you print a very tall object (e.g. maximum print volume of the SL1S), it's possible the object will collide with the propeller at the bottom of the tank. Consider detaching the object from the printing platform and washing it using the metal basket. Wash the printing platform separately.

Washing small objects / objects removed from the printing platform

After a print finishes, open the lid of the SL1S and place a protective tray around the resin tank. Use a plastic spatula or paper towels to clean the top of the printing platform. Release the black knob and remove the printing platform - wear gloves!



Use a metal spatula to remove the printed object from the printing platform. You can also consider removing the supports at this point.

Place the object in the metal basket and insert it into the liquid container. Place the liquid container into the CW1S so it rests on the guiding rails.

Select **Washing** on the display and the machine will wash the object for a pre-defined amount of time. You can change the washing time by either **rotating the knob** during the process or by selecting **Run-time option** before the print. We do not recommend washing objects in isopropyl alcohol for more than 10 minutes - tiny cracks may appear on the surface of printed objects (even after more than 24 hours), which is the result of a long exposure to IPA.



If you printed a **large object that doesn't fit the container**, wash it in two stages: first, submerge it in IPA as usual and run the washing process. Then, take the object out, rotate it upside down and put it in IPA again to wash the part that wasn't submerged in the first run.

5.2. After washing

Wearing protective gloves, remove the object from the tank and remove the tank itself as well. You can now dry and cure the model.

6. Drying and curing

After you wash the object in isopropyl alcohol, we recommend **rinsing it briefly under running water** to remove the remnants of isopropyl alcohol. Then, dry it with a paper towel. Remove the tank from the CW1S and place the object on the rotating platform. Don't place it in the center, instead, place it near the edge of the platform. Another option is to insert the whole printing platform with the object still attached.

Close the lid. The CW1S will recognize that the tank has been removed and offer Drying and Curing modes on the LCD screen. **Always keep the lid closed** - there's a safety switch in the lid that will stop the process in case you open the lid. **Select 'Start drying/curing' on the LCD screen.**

The drying and curing times are set to **3 minutes** each. It's a default value that works well for a majority of 3D printed objects. In case you would still find the object a bit sticky, you can **re-run the process** until you reach the optimal result. You can set the run-times either via the Run-time menu or during the process itself by rotating the knob.



Please note that resins with long exposure times also require longer exposure times during post-processing. Increase the curing time manually when post-processing objects printed from resins that require more time (e.g. 15-20 seconds) per layer.

Once these actions finish, the CW1S will let you know with a beep (default settings, the sound notification can be disabled).

7. Preheating resins

The properties of various resins are often affected by the ambient temperature. **With lower temperatures, resins may become more viscous.** Using resins in such state might result in a print failure. Some resins are even required to be preheated as per the manufacturer's instructions.

You can use the **Resin preheat function to preheat a bottle of resin** - please check the instructions and/or technical data sheets that came with your resin to learn what is the optimal working temperature for the material of your choice. Select the required temperature in *LCD Menu - Settings - Temperatures - Resin preheat temperature*. Open the lid, remove the tank, insert a bottle with resin, close the lid and **select Resin preheat**. The procedure takes 10 minutes, however, the **runtime can be adjusted on the fly by rotating the knob**. You can also set a new default runtime value in *LCD Menu - Run-time - Resin preheat time*.

8. Menu structure

- **Run Selected Mode** (hold the knob for quick mode selection)
- **Run-Time**
 - Curing run-time
 - Drying run-time
 - Washing run-time
- **Rotation speed**
 - Curing speed
 - Washing speed
- **Settings**
 - Sound settings
 - Sound response
 - Finish beep
 - Information
 - Advanced Settings
 - Run mode
 - Preheat
 - Preheat disabled
 - Target temp
 - Unit system



Press and hold the knob in the main menu to access the Run mode menu quickly



When any of the main modes is running, you can display a menu with more actions (e.g. Pause or Cancel) by shortly pressing the knob. Long press cancels or skips any ongoing actions.



Default values for time and rotation speeds are factory tested and work well in a majority of scenarios. Washing printed objects in IPA for more than 10 minutes is not recommended. Rotate the knob during washing/drying/curing to increase or decrease the run-time.

9. CWIS Maintenance

To ensure that the CWIS remains in proper working order, keep the device clean and never leave the tank with isopropyl alcohol inside of the device when the machine is off / not being used. Clean any resin drops or stains immediately, before they solidify.

9.1. FEP film protection

The rotating platform is protected by an easily replaceable FEP film. You can replace it by unhooking the old FEP film and installing a new one - there are spare FEP films in the package. The FEP film ensures that the rotating platform will be always in top shape.

9.2. Spilled isopropyl alcohol

The CW1S is designed to **withstand a moderate IPA spill** - the liquid will pour through the device. It's a good practice to **keep a plastic tablecloth under the device** in case of spillage.

In case a spill occurs and the liquid pours into the CW1S, **disconnect the machine from the power supply**, wipe off any remaining IPA from the device's surface and wait for a couple of hours (e.g. 2-3) until the isopropyl alcohol evaporates completely from the inside. The machine has a hole in the bottom plate through which the IPA will pour out. High-quality isopropyl alcohol will not damage the electronics inside the device.

9.3. Used IPA - Recycling / disposing

Please note that isopropyl alcohol is a consumable and it will become saturated with resin over time, which is normal. Only when you notice that the washing performance is decreased, consider exchanging the IPA in the CW1S tank - this usually happens after several months of use, depending on the frequency of usage.

See your country's laws regarding safe and appropriate disposal methods of IPA in your location - usually, it should be treated as a hazardous liquid, because it will also contain photoinitiators, polymers and oligomers from the resin. You can usually find places for disposing of dangerous liquids near gas stations or fire stations.



Never pour IPA mixed with resin into sinks / drains / sewers!

10. Firmware update

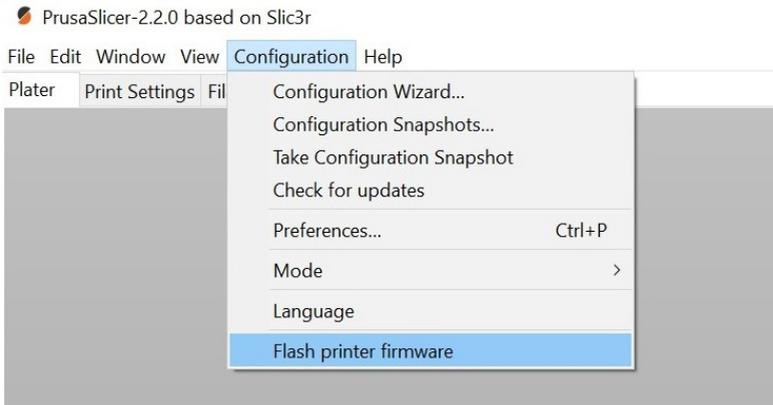
The firmware in the CW1S can be updated via PrusaSlicer. You can check for new versions of the firmware at <https://prusa3d.com/drivers>.



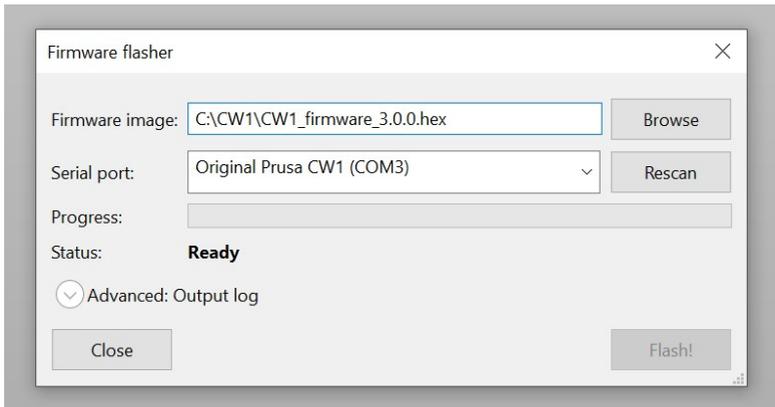
Drivers are not required on Linux or macOS X. Linux and macOS X users should download PrusaSlicer from github (github.com/prusa3d).

Connect the CW1S to your PC with a microUSB cable. If the device is not automatically recognized by Windows operating system, you need to install the drivers first. Download the Apps and drivers from <https://prusa3d.com/drivers>, run the installer and choose the CW1S Drivers item in the list.

In PrusaSlicer, select Configuration -> Flash printer firmware



Click Flash! and wait until the process is finished.



Disconnect the microUSB cable and restart the CW1S.

11. Troubleshooting

11.1. The liquid container is inserted, but the Washing mode is not available

Make sure the liquid container is inserted correctly. It should sit on top of the two guiding rails and it should be as close to the back plate of the CW1S as possible. You can check the proximity sensor's functionality by covering it with your finger. If the on-screen option changes from Start Drying/Curing to Start Washing, then it works correctly. If it doesn't, please contact tech support or refer to the Helpdocs section at help.prusa3d.com.

11.2. Cured prints have white residue on the surface

This happens when you start curing a model that still has a combination of liquid resin and isopropyl alcohol on its surface. Apply warm water onto the object and rub the excess material off. You can also use a small brush. To prevent residue from accumulating, you can wash the object in water AFTER you wash it in isopropyl alcohol.

11.3. The device is not turning on

Make sure the external adapter is properly connected and that the main switch on the rear side of the device is switched to "1". The external adapter has a status LED - check whether it lights up. If it doesn't, double check the power cable. If there are no problems with the cables, contact our tech support.

11.4. Loud noises during washing in IPA

This happens usually when the washed object collides with the propeller in the liquid container. Try removing the printed object and run the washing process with an empty container.

11.5. Isopropyl alcohol spilled into the CW1S

See chapter 8.1 - Spilled isopropyl alcohol for instructions on how to deal with an IPA spill.

12. F.A.Q. - Frequently Asked Questions

Q: Is it necessary to dry a freshly washed object before putting it in the CW1S?

A: No, few drops of IPA are perfectly fine and they will evaporate quickly. However, leftover IPA combined with liquid resin may create white stains on dried/cured objects. See chapter 9.2 Cured prints have white residue on the surface.

Q: How often do I need to replace the IPA in the container?

A: This depends on frequency of washing, but from our experience, the IPA loses its washing properties after around 2 months of frequent use

Q: Can I wash an object multiple times?

A: Yes, but the total time should not exceed 10 minutes. Tiny cracks may appear on objects that were washed for too long (even after 24 hours).

Q: Why does the CW1S use IPA bath with a propeller instead of ultrasonic washing?

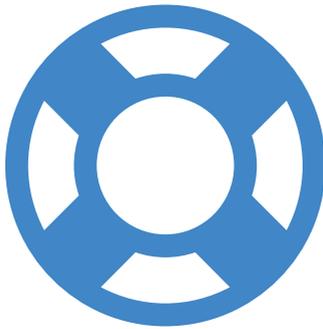
A: Our method has the same efficiency as ultrasonic washing and it's less aggressive when washing small objects or objects with tiny details

Q: Can I cure an object multiple times?

A: Yes, extended exposure to UV light is not a problem

Q: Can I cure the resin/IPA mixture in the liquid container?

A: This procedure has no effect and won't separate the IPA from resin



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