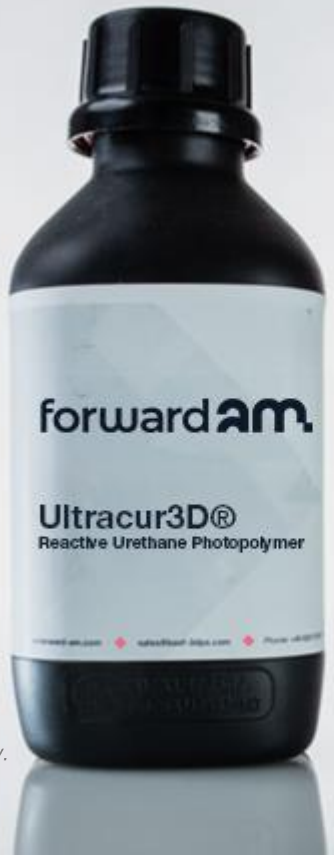
Ultracur3D® RG 9400 B FR

User Guideline



Note: Packaging shown is a mock-up; actual design may vary as updates are underway.

Introduction

The following user guideline is for professionals who use: Ultracur3D® RG 9400 B FR.
The safety data given in this publication is for information purposes only and does not constitute a legally binding Material Safety Data Sheet (MSDS). The relevant MSDS can be obtained upon request from your supplier or you may contact Forward AM directly at sales@forward-am.com.
For more information, please refer to the country specific MSDS for advice.

Are you looking for an updated User Guideline version? Check out the latest online version here.

Storage conditions and disposal considerations

Keep container tightly closed in a room temperature, well-ventilated place. Keep container dry. If material is not being used, fill it back through a filter in the corresponding material bottle. The filter prevents cured pieces or failed prints from going back into the bottle. Ultracur3D® RG 9400 B FR must be disposed of in accordance with local regulations.
For more information, please refer to the country specific MSDS for advice.

Intended use

Ultracur3D® RG 9400 B FR is a technical material based on (meth-)acrylate resin for suggested LCD and DLP systems. Working wavelength: 385 nm or 405 nm. Below, you can find some suggested 3D printers and printing parameters. For more information contact Forward AM directly at sales@forward-am.com.

Examples of suitable 3D-Printers and settings

	Wavelength	Power	Curing time	Voxel depth
MiiCraft Ultra 125	405 nm	4 mW / cm²	3.5 s	100 µm
MiiCraft Ultra 125 Y	385 nm	4 mW / cm²	2.5 s	100 µm
Phrozen Sonic Mini 8k	405 nm	1.75 mW / cm²	8 s	100 µm
Rapidshape i30+®	385 nm	2 mW / cm²	3 s	100 µm
Stratasys Origin One	385 nm	5 mW / cm²	3 s	100 µm

If you cannot find your printer in the table or using the 3D Printing and Post Processing Settings Navigator you can use the values below as starting parameters. These are only approximations, different 3D printers may require different curing times and further optimization, but these values should be a good starting point.

The given values are all for printing at a layer thickness / voxel depth of 100 µm. If you need starting parameters for a different layer thickness, please contact us.

	405 nm Wavelength 3D Printer			
Power*	5 mW / cm²	4 mW / cm²	3 mW / cm²	2 mW / cm²
Suggested curing time	3.5 s	4.4 s	5.8 s	8.75 s

	385 nm Wavelength 3D Printer			
Power*	5 mW / cm²	4 mW / cm²	3 mW / cm²	2 mW / cm²
Suggested curing time	3.5 s	4.4 s	5.8 s	8.75 s

* Power measured directly on the glass

Preheating

Ultracur3D® RG 9400 B FR will slowly form crystals and solidify after longer periods of storage, especially if kept at colder temperatures. Therefore, a preheating of the material is required before starting any prints.

- Step 1: Preheat the material for 5 hours at 60°C (140°F).
- Step 2: Check if there are any crystals or lumps present. If there are, continue preheating.
- Step 3: Shake the bottle/canister to be sure everything is mixed well.
- Step 4: Pour it slowly into the vat and wait a couple of minutes, until a smooth, bubble-free surface is obtained before starting the print job.

Printing process

If the material is kept/used at room temperature (23°C / ca. 73°C), it will stay fully liquid for about 2 days. After this, small crystals may start forming again, so a new preheating step will be required before starting another print.

The 3D printer examples and settings stated above are only for general guidance. The fully optimized settings should always be determined by the users themselves, according to their specific needs. Please always refer to the user manual of the employed 3D printer for instructions on printer settings and handling.

Remove the parts carefully from the build platform with a suitable tool, for more information, refer to the user manual of the used 3D printer.

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Cleaning and post curing process

Ultracur3D® RG 9400 B FR can be cleaned with a Glycol Ether based solvent like Ultracur3D® Cleaner and 2-propanol, please refer to the following cleaning procedure.

Option 1: Cleaning with Ultracur3D® Cleaner and 2-propanol (IPA) in an Ultrasonic bath

- Step 1: Place the parts in a container filled with Ultracur3D® Cleaner and place this container in an Ultrasonic bath filled with water for 3 minutes. The cleaning time can vary depending on the complexity of the printed geometry.
- Step 2: Rinse the parts with 2-propanol for a few seconds. Fine structures or holes may be better cleaned by using 2-propanol and a syringe or by separate brushing. Next, place the parts in a container filled with 2-propanol and place this container in an Ultrasonic bath filled with water for 3 minutes.
- Step 3: Blow dry the parts with pressurized air or nitrogen, until the parts are clean.
- Step 4: Place the parts into a warming cabinet at 40°C for 30 minutes to dry off any remaining cleaning solvent.

Option 2: Cleaning with 2-propanol in a washer with magnetic stirrer

- Step 1: Place the parts in a washer with magnetic stirrer with 2-propanol for 3-4 minutes. The recommended cleaning time depends on the exact washer type and printed geometry, but should be kept as short as possible in order to have the best final part performance.
- Step 2: Rinse the parts with 2-propanol for a few seconds. Fine structures or holes may be better cleaned by using 2-propanol and a syringe or by separate brushing.
- Step 3: Blow dry the parts with compressed air/nitrogen, until the parts are clean.

Remark: whichever cleaning method is applied, the exposure to the cleaning solvent should be kept as short as possible, maximum 5-6 minutes in total or preferably even shorter. Longer cleaning may lead to cracking in the final parts and also to a decrease in mechanical performance.

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Example of post curing procedures

Ultracur3D® RG 9400 B FR parts require adequate post-curing to achieve the optimal mechanical properties. After each post-curing cycle, the parts need to be flipped to achieve an even curing. After post-curing, remove any support structures and smoothen the surface if required. Ultracur3D® RG 9400 B FR can be post-cured using regular UV post-curing. Optionally, after UV post-curing, an additional thermal treatment can be done to improve the HDT. Refer to the procedures below for optimal post-curing.

	UV lamp	Power in mW / cm²	Duration of post-curing	Notes
Dymax ECE 2000 flood	Hg Metal Halide Bulb (broad spectrum)	Ca. 140 mW / cm² at 405 nm	2 x 900 seconds	Shelf height K
OtoFlash G 171	Flash-bulbs (broad spectrum)	Ca. 3.5 mW / cm² at 405 nm	2 x 9000 flashes	With Nitrogen

Example of additional thermal treatment after UV post curing (Optional!)

		Thermal Oven
Ramp up phase	2 hours	30 °C to 150 °C (ca. 86 °F to 302 °F)
Holding phase	3 hours	150 °C (ca. 302 °F)
Ramp down phase	2 hours	150 °C to 30 °C (ca. 302 °F to 86 °F)

These proceedings are only general guidelines. In the end, the user has to determine the optimum post-curing procedure based on their specific requirements and the equipment used.

Frequently asked questions and other tips and tricks

1. **My parts warp, what should I do?**

- Depending on your post curing unit Ultracur3D® RG 9400 B FR can get quite warm while post curing. In case of warping, it's recommended to post cure slowly with more pauses between the intervals.

2. **Why do my parts have surface defects (e.g. small holes)?**

- Make sure all bubbles are gone before starting a print job.
- Check your material vat/ foil if there are any defects.
- Depending on the machine and geometry reduce the printing speed and increasing the lift distance will give the material a chance to flow properly.

3. **Why do my parts have lines?**

- Make sure to not print too fast and give the material some time to flow.
- Try to orient your part differently on your platform
- If this issue is also seen with other resins it might be a hardware problem.

4. **The resin arrived as a solid block or had lumps inside the bottle, what should I do?**

- Ultracur3D® RG 9400 B FR will slowly form crystals and solidify after longer periods of storage, especially if kept at colder temperatures. Therefore, a preheating of the material is required before starting any prints.

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