Manual | Form 4

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Installation and Usage Instructions

Form 4
with Low Force Display (LFD)™ Print Engine

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DISCLAIMER

Formlabs has made every effort to make these instructions as clear, complete, and correct as possible. The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation, and testing of the products with respect to the relevant specific application or use thereof. Neither Formlabs nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information that is contained herein. Notify us if you have any suggestions for improvements or amendments or have found errors in this publication.

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support.formlabs.com

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DOCUMENT REVISIONS

Date	Version	Document changes
Apr 2024	REV 01	Initial publication

1.   Preface

Congratulations on purchasing the Form 4. On behalf of the Formlabs team, we thank you for your purchase. The Form 4 is a large-format Low Force Display (LFD)™ 3D printer. The Form 4 fabricates fully-supported parts by converting a 3D object into 2D slices that can be cured layer by layer with 405 nm light. This manual explains how to set up, use, and properly maintain the Form 4, as well as provides design guidance for optimizing print results. The manual is intended for anyone who is installing, operating, maintaining, or otherwise interacting with the Form 4. Supervise young or inexperienced users to ensure enjoyable and safe operation.

1.1   Read and retain instructions

Read and understand this manual and its safety instructions before using the Form 4. Failure to do so can result in serious injury or death. Keep all safety information and instructions for future reference and provide them to subsequent users of the product.

Follow all the instructions. This will avoid fire, explosions, electric shocks, or other hazards that may result in damage to property and/or severe or fatal injuries.

The Form 4 shall only be used by persons who have fully read and understand the contents of this manual. Ensure that each person who uses the Form 4 has read these warnings and instructions and follows them. Formlabs is not liable for cases of material damage or personal injury caused by incorrect handling or non-compliance with the safety instructions. In such cases, the warranty will be voided.

1.2   Obtaining documentation and information

Visit **formlabs.com** to:

- Access your Formlabs store (formlabs.com/store) and Dashboard accounts (formlabs.com/dashboard).
- Find certified service providers in your region (formlabs.com/company/partners).
- Access the Terms of Service (formlabs.com/terms-of-service) and the Privacy Policy (formlabs.com/privacy-policy).

Visit **support.formlabs.com** to:

- Access the latest version of all Formlabs product documentation.
- Contact Formlabs Support to request documentation, usage instructions, repair guides, and technical information.
- Submit any comments or feedback regarding what is good and what can be improved. Formlabs values comments from its users.
- Request additional training.

1.2.1   Support and service

Retain a record of the original purchase to request warranty services. Service options depend on the status of the specific product's warranty. Include the serial name of the product when contacting Formlabs Support or a certified service provider for product support.

Instead of a serial number, Formlabs products have a serial name, which is a unique identifier to track the history of manufacturing, sales, and repair, and to distinguish usage when connected to a network. The serial name is on the back panel of the machine in the format **Form4-AdjectiveAnimal**.

Service providers of Formlabs products also provide support and service. To the extent that Formlabs or a certified service provider offers other or extended warranties, the terms of the separate offer may apply. For products purchased from certified service providers, contact the original service provider for assistance before contacting Formlabs Support.

For any support or service requests, including product information, technical assistance, or assistance with instructions, contact Formlabs Support:

support.formlabs.com	**USA** Formlabs, Inc. 35 Medford St. Somerville, MA, USA, 02143	**USA** Formlabs, Inc. 220 E Buffalo St. Milwaukee, WI, USA 53202
	Germany Formlabs GmbH Nalepastrasse 18 12459 Berlin, Germany	**Hungary** Formlabs Andrássy út 9 1061 Budapest, Hungary
	Japan 1F Kitashinagawa 369 Building 3 Chome-6-9 Kitashinagawa Shinagawa City Tokyo 140-0001, Japan	**Taiwan** No. 282號21號之9, Shizheng North 2nd Rd, Xitun District Taichung City, Taiwan 407

1.2.2 **Warranty**

This product is protected under warranty. Formlabs offers a warranty for all Formlabs branded hardware. Unless otherwise expressly stated, the **Terms of Service**, including the **Warranty**, constitute the entire agreement between you and Formlabs with respect to the **Service** and any product you purchase from Formlabs and supersedes all prior or contemporaneous communications, proposals, and agreements, whether electronic, oral, or written, between you and Formlabs. Read the warranty for more details on the Formlabs warranty for your region:

US	**formlabs.com/terms-of-service**
EU (EN)	**formlabs.com/eu/terms-of-service**
EU (DE)	**formlabs.com/de/terms-of-service**
EU (FR)	**formlabs.com/fr/terms-of-service**
EU (ES)	**formlabs.com/es/terms-of-service**
EU (IT)	**formlabs.com/it/terms-of-service**

2.   Introduction

2.1   Intended use

The Form 4 is a commercial, precision tool intended for use in the additive manufacture of end-user supplied designs from photopolymer resin. The final performance characteristics of cured photopolymer resin may vary according to your compliance with the instructions for use, application, operating conditions, material combined with, end use, or other factors.

NOTICE

In some cases, the additive manufacturing process may inherently result in variable performance characteristics between manufacturing runs or within a specific part. Such variances may not be apparent and may result in unexpected defects in additively fabricated parts.

WARNING

You shall independently verify the suitability of additive manufacturing, stereolithography (SLA), the Form 4, and any specific designs or materials employed for the application and intended purpose before use. In no event shall Formlabs be liable for any loss, death, or bodily injury that you suffer, or that you cause to any third party, in connection with your use of Formlabs products. To the fullest extent legally permitted Formlabs EXPRESSLY DISCLAIMS ANY IMPLIED OR EXPLICIT WARRANTY OF FITNESS for a particular usage, the particular nature and circumstances of said usage being unforeseen and unforeseeable to Formlabs.

WARNING

Formlabs provides tools and materials that may be used in many applications, but makes no claims as to the safety or effectiveness of any specific devices made using Formlabs products. Certain Formlabs products, such as those commonly known in the industry as "biocompatible" materials, have been engineered to comply with relevant industry standards. The specific standards and most relevant technical specifications may be identified within the technical data sheets and have been tested according to relevant testing protocols for those standards and specifications. Biocompatible materials are a speciality product, developed for use by medical professionals, and should be used in accordance with the instructions for use.

WARNING

Do not modify. The Form 4 is intended for use as-is. Modifying the machine without explicit approval and directions from Formlabs will invalidate the warranty, and could potentially ruin the machine and cause you bodily harm.

2.2   Technical specifications

Printer	Form 4
Technology	Masked Stereolithography (MSLA)
Print Engine	Low Force Display™(LFD)

|	
Minimum dimensions for convenient access (W × D × H)	40.7 × 47.8 × 84.4 cm	16.0 × 18.8 × 33.2 in
Printer dimensions (W × D × H)	39.8 × 36.7 × 55.4 cm	15.7 × 14.5 × 21.9 in
Printer weight	18.3 kg	40.4 lb
Build volume (W × D × H)	200 × 125 × 210 mm	7.9 × 4.9 × 8.3 in Parts taller than 190 mm (7.5 in) require that the resin tank be removed with the build platform and the wash basket be removed from Form Wash
Layer thickness (Axis resolution)	25–300 microns	0.001–0.012 in
XY resolution	50 micron pixel size with pretuned anti-aliasing	0.002 in
Optical power intensity	16 mW/cm² delivered to the print plane
Optical wavelength	405 nm
Resin cartridges	1
Resin dispensing system	Automated
Biocompatible materials	No (available on Form 4B)
Supports	Auto-generated, Light-touch removal
Operating environment	18–28 °C	64–82 °F Low ambient humidity
Operating temperature	Auto-heats resin to 25–45 °C (77–113 °F), depending on material
Temperature control	Direct resin heating
Power requirements	100–240 VAC Maximum 4.8 A 50/60 Hz 480 W
Connectivity	**Wi-Fi:** 2.4, 5 GHz **Ethernet:** 1000 Mbit **USB:** 2.0
Wi-Fi connectivity	**Protocol:** IEEE 802.11 b/g/n **Frequency:** 2.4 GHz, 5 GHz **Supported security:** WPA/WPA2
Ethernet connectivity	RJ-45 Ethernet (10BASE-T/100BASE-TX/1000BASE-T) LAN Port Connect with a shielded Ethernet cable (not included): minimum Cat5, or Cat5e or Cat6 for 1000BASE-T.
USB connectivity	USB C port with a USB C-A cable
Printer control	Interactive touchscreen
Alerts	Touchscreen alerts SMS/email via Dashboard Speaker for audio alerts
Camera	Integrated camera 2592 × 1944 resolution (5 MP)
Print preparation	PreForm desktop software
File type	STL, OBJ, or 3MF

2.3 Product elements
2.3.1 Form 4
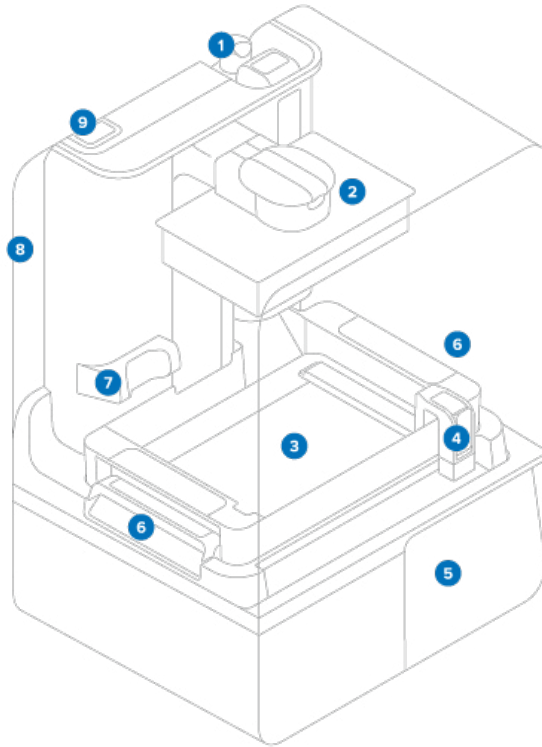
1. **Resin cartridge:** A container that holds the resin before dispensing into the resin tank. Shake resin cartridges periodically to keep resin well mixed.
2. **Build platform:** The aluminum base provides a surface for prints to attach to.
3. **Resin tank:** Resin is dispensed out of the resin cartridge into the resin tank. During a print, light passes up through the bottom of the resin tank and cures resin onto the build platform to form a printed part.
4. **Mixer:** A mixer improves print consistency by clearing the build area and circulating the resin.
5. **Touchscreen:** The LCD capacitive touch user interface displays print information, settings, and error messages.
6. **Tank latch:** Two tank latches secure the resin tank in place for printing.
7. **Camera:** An integrated camera for post-print photos, timelapses, and remote monitoring.
8. **Cover:** The printer cover, made of metal and a strong, orange-tinted material, blocks exposure to the curing light and protects the resin from curing due to ambient light.
9. **Tool caddy:** The tool caddy contains parallelism shims, a 2.5 mm hex key, and a 4mm hex key to be used for printer maintenance. See **2.3.3 Included accessories** for more information.

2.3.2 Rear ports
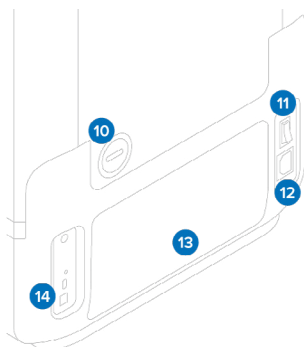
10 Optional fume exhaust port: A removable air plug provides access to the print cavity for active air handling.

11 Power switch: For powering the printer on and off.

12 Power port: For connecting the printer to mains power.

13 Rear mesh filter: Magnetically attaches to the rear of the printer to prevent dust from reaching the internal cooling fans.

14 USB and Ethernet ports: For connecting the printer to a computer or network.

2.3.3 Included accessories
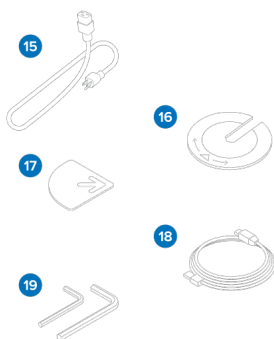
15 Power cable: Compatible with Form 4 generation printers.

16 Leveling disc: Slide the leveling disc included around one of the leveling feet and rotate to raise or lower the printer.

17 Parallelism shims: For adjusting and aligning the build platform, if necessary. Included in the tool caddy.

18 USB cable: USB C-to-A cable for connecting the printer to a computer.

19 Hex keys: 2.5 mm and 4 mm right-angle hex keys for printer maintenance and repair. Included in the tool caddy.

2.3.4 Form 4 Finish Kit
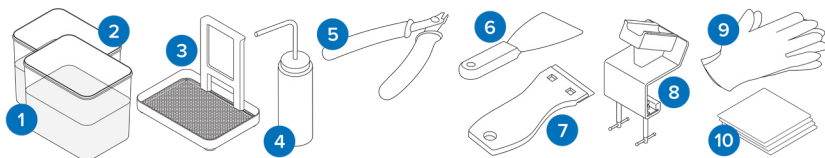
1 Rinse buckets: Two plastic buckets to be partially filled with solvent.

2 Rinse bucket lids: Two plastic lids to cover the rinse buckets.

3 Rinse basket: Use to transfer parts from one bucket to the next. The basket can rest on the edge of the rinse bucket to allow parts to drip.

4 Rinse bottle: Remove resin trapped in cavities and internal channels of prints. Use clean solvent. Formlabs recommends isopropyl alcohol.

5 Flush cutters: Snip to separate prints from their supports. Cut with the flat side on the prints' surface for minimal support marks.

6 Metal scraper: For cleaning the build platform print surface and removing prints from the

build platform. Do not use the metal scraper to clean the resin tank interior.

7 **Plastic tank scraper:** For inspecting and cleaning the resin tank interior. Do not press into the tank film with the corners of the tool.

8 **Build platform jig:** Provides a place to secure the build platform as you work on removing your printed part.

9 **Non-reactive nitrile gloves:** Wear gloves when handling liquid resin, resin-coated surfaces, or solvent. Wash skin with plenty of soap and water.

10 **PEC*PADs:** Disposable lint-free, non-woven microfiber cloths for cleaning the printer's optical components.

2.4 Understanding the display

The Form 4's display includes a touchscreen and speaker for audio notifications. The touchscreen displays print information (job name, time remaining, layers printed), settings, and error messages.

The touchscreen serves as the user interface for the printer. The audio notifications indicate the printer's state. Refer to messages on the printer's touchscreen to understand the meaning of the audio notifications. For detailed guidance and visual assistance, visit **support.formlabs.com**.

- Tap the printer icon in the left sidebar to access the printer status screen. Information about the inserted consumables, such as resin types, resin cartridge levels, and resin tank temperature appear here.
- Tap the collapsed menu icon in the left sidebar to access the **Queue** screen. A list of print jobs that have been uploaded to the printer appears here.
- Tap the wrench icon in the left sidebar to access the **Maintenance** screen. Maintenance procedures can be accessed here.
- Tap the gear icon in the left sidebar to access the **Settings** screen. Network connectivity, printer management settings, and other options can be accessed here.

3. Safety

⚠️ **WARNING**

Read and understand this manual and its safety instructions before using the Form 4. Failure to do so can result in serious injury or death.

Supervise young or inexperienced users to ensure enjoyable and safe operation.
The instructions contain warnings and safety information, as explained below:

⚠️ **DANGER** **DANGER** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

⚠️ **WARNING** **WARNING** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

⚠️ **CAUTION** **CAUTION** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

🛈 **NOTICE** **NOTICE** indicates information considered important, but not hazard-related.

⬦ **ENVIRONMENTAL HAZARD:** Uncured photopolymer resin is classified as hazardous to aquatic life.

△ **DANGER:** Isopropyl alcohol is a flammable chemical.

3.1 Component and subsystem safety
3.1.1 General

⚠️ **CAUTION**

UV light source: The backlight emits UV light. Do not look directly into the backlight when it is powered on.

🛈 **NOTICE**

Do not lift or reposition the Form 4:
• By the cover or any other movable part of the printer.
• When the printer is connected to a power source.
• When the printer is connected to an Ethernet or USB cable.

The Form 4 requires an operating environment that is low in ambient humidity and static electricity. Due to the sensitive nature of its components and the printing mediums, system reliability and print quality may fluctuate if the ambient temperature and moisture are outside the recommended ranges. Refer to section 4.1 Location and environ**s** for the recommended operating environs.

3.1.2 Sharp tools

Cutting hazard: Using sharp tools on slippery surfaces (such as a resin-coated build platform) can result in sudden movement. Orient sharp tools away from yourself, especially when cutting or scraping.

The accessories include sharp tools such as: flush cutters and a plastic tank scraper.

3.1.3 Resin

Poison hazard: Never ingest resin in liquid or solid form. If swallowed, immediately call a poison center or medical professional. Contact Chemtrec at +1 800 424 9300 for global 24-hour emergency assistance.

Refer to the safety data sheet (SDS) and local authorities for guidance on disposing of resin and solvent. Liquid resin (whether pure liquid, dissolved in solvent, or partially cured) may be classified as hazardous waste in your region and shall be disposed of with care.

ENVIRONMENTAL HAZARD:
Uncured photopolymer resin is classified as hazardous to aquatic life.

Consult the safety data sheet (SDS) as the primary source of information to understand safety and handling of Formlabs materials. Respect Formlabs resin like any household chemical. Follow standard chemical safety procedures and Formlabs resin handling instructions. In general, Formlabs resin is not approved for use with food, drink, or medical applications on the human body. However, Formlabs resins for biocompatible applications are biologically safe for specific types and lengths of exposure to the human body. Refer to the safety data sheet (SDS) for each specific resin as well as **support.formlabs.com** for more detail.

3.1.4 Radio interference

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to CFR Title 47, Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause

harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at their own expense.

Changes or modifications to this product not authorized by Formlabs could void the electromagnetic compatibility (EMC) and wireless compliance and negate your authority to operate the product.

This product has demonstrated EMC compliance under conditions that included the use of compliant peripheral devices and shielded cables between system components. It is important that you use compliant peripheral devices and shielded cables between system components to reduce the possibility of causing interference to radios, televisions, and other electronic devices.

3.1.5 **Isopropyl alcohol (IPA)**

DANGER

Fire hazard: Isopropyl alcohol is a flammable chemical. Keep away from ignition sources, including open flames, sparks or concentrated sources of heat.

NOTICE

Formlabs does not manufacture isopropyl alcohol. Consult the chemical manufacturer or supplier for detailed safety information. Carefully follow the safety instructions provided with the isopropyl alcohol that you purchase. Isopropyl alcohol can be flammable, even explosive, and should be kept away from heat, fire, or sparks. Any containers holding isopropyl alcohol should be kept closed or covered when not in use. We also recommend that you wear protective gloves and have good ventilation when working with isopropyl alcohol.

3.1.6 **Tripropylene glycol monomethyl ether (TPM)**

NOTICE

Formlabs does not manufacture tripropylene glycol monomethyl ether. Consult the chemical manufacturer or supplier for detailed safety information. Carefully follow the safety instructions provided with the tripropylene glycol monomethyl ether you purchase. We also recommend that you wear protective gloves when working with tripropylene glycol monomethyl ether.

3.2 Personal protective equipment (PPE)

Safe operation of the Form 4 can be achieved by implementing the following equipment:
- Non-reactive nitrile gloves
- Safety glasses

WARNING

Skin irritant: Resin and solvent may cause skin irritation or an allergic skin reaction. Wear gloves when handling liquid resin, resin-coated surfaces, or solvent. Wash skin with plenty of soap and water.

3.3   Specifications of tools to be used

The Form 4 shall only be used with supplied accessories and additional tools recommended by Formlabs. Third-party accessories and materials may cause damage. Refer to sections **3.2 Personal protective equipment (PPE)** and **6.1. Tools and supplies** for more information. **Purchase additional supplies:**

- **Cotton swabs**
  - For cleaning small resin spills.
- **Soap and water or glass cleaner**
  - For cleaning the printer's cover, outer shells, and display.
- **Isopropyl alcohol (IPA), 90% or higher**
  - Recommend washing solvent for rinsing prints.
  - For cleaning the printer's optical components and build platform.
  - For cleaning the work surface and tools.
- **Lithium grease for ball bearings**
  - For lubricating the Z-axis screw.
- **Low-fiber paper towels**
  - For cleaning the work surface and tools.
  - For protecting sensitive components.
  - For wiping residue grease, resin, or solvent.
- **Non-abrasive microfiber cloth**
  - For cleaning the printer's cover, outer shells, and display.
- **PEC*PADs**
  - Disposable lint-free, non-woven microfiber cloths for cleaning the printer's optical components. Do not reuse a PEC*PAD; dispose of after each use.
- **Rubber bulb air blower**
  - For removing dust from the Light Processing Unit (LPU) texture.
- **Tripropylene glycol monomethyl ether (TPM)**
  - Alternative washing solvent to isopropyl alcohol for rinsing prints.

3.4   Sensitive components

The Form 4 has multiple sensitive components that are vulnerable to permanent damage if not periodically inspected and properly maintained. Using any tools, cleaning agents, or methods not mentioned in this manual may result in permanent damage to these components. Follow the maintenance instructions outlined in this manual and on **support.formlabs.com** when servicing the following components or any other internal component of the machine. For detailed guidance and visual assistance, visit **support.formlabs.com**.

- **Backlight and Light Processing Unit (LPU) modules**
  These interchangeable assemblies contain the 405 nm LEDs and masking display that control which areas of resin are exposed to light during each layer. Refer to section 8

Disassembly and repair for more information.

- **LPU release texture**

  The texture on the top of the LPU reduces forces on the printed parts, resin tank, and printer between layers. Maintain a clean LPU to prevent print failures and damage to the resin tank. Refer to section **6.6.5 Cleaning the LPU release texture** for more information.

- **Platform lock**

  A lever that is part of the locking mechanism that secures the build platform. Contact Formlabs Support or a certified service provider before adjusting the platform lock, as improper adjustment can lead to damage to the machine.

- **Z-axis lead screw**

  The Z-axis lead screw is a threaded rod that controls the vertical motion of the build platform mount. Keep the lead screw clean and well-lubricated so that the build platform mount can move smoothly and accurately. To inspect and lubricate the lead screw, refer to section **6.5.5 Maintaining the Z-axis screw**.

3.5   Emergency and exceptional situations

Formlabs has made every effort to provide updated safety data sheets (SDS) for every resin product, in accordance with the latest government guidelines. Always consult the safety data sheet (SDS) as the primary source of information to understand safety and handling of Formlabs materials and required accessories.

3.5.1   Isopropyl alcohol (IPA)

⚠️ **DANGER**

Fire hazard: When handling isopropyl alcohol, always consult the safety data sheet (SDS) from the isopropyl alcohol supplier as the primary source of information. Handle isopropyl alcohol with gloves in a well-ventilated area. Keep away from heat, sparks, and open flame. Isopropyl alcohol evaporates rapidly, so keep the rinse tub and bottles closed whenever possible.

3.5.2   Resin

⚠️ **WARNING**

Poison hazard: Never ingest resin in liquid or solid form. If swallowed, immediately call a poison center or medical professional. Contact Chemtrec at +1 800 424 9300 for global 24-hour emergency assistance.

🛈 **NOTICE**

Promptly clean and inspect the printer after a resin spill to minimize any cosmetic or functional damage to the printer. If you have experienced an accidental resin spill, document the problem with photos and clean the printer as best as possible. Contact Formlabs Support or a certified service provider as soon as possible.

4.   Preparation and setup

4.1   Location and environs

Prepare a space to install and operate the Form 4 and house the necessary accessories and consumables.

- Choose a location separate from any machinery or tooling that generates dust or sparks, such as wood or metal working equipment.
- Ensure that the workspace meets the following requirements:
  ◦ Dry, indoor location
  ◦ Low ambient humidity
  ◦ Temperature of 18–28 °C (64–82 °F)
  ◦ Mains supply voltage fluctuations ≤ 10%
  ◦ Position the device so that it is easy to operate the power switch of the unit.
  ◦ Dedicate a power outlet and circuit to the device capable of delivering 4.8 A of current at 100–240 VAC, 50/60 Hz.
- Reserve the following minimum dimensions for the most convenient access:
  ◦ **Form 4:** 40.7 × 47.8 × 84.4 cm (16.04 × 18.8 × 33.2 in)
  ◦ **Form 4 Finish Kit:** 55 × 85 × 90 cm (21.7 × 33.5 × 35.4 in)
  ◦ **Additional space for other post-processing tools** (e.g., Form Wash, Form Cure, or Formlabs-approved third-party devices)
- **Purchase additional supplies:**
  ◦ Isopropyl alcohol (90% or higher) and/or tripropylene glycol monomethyl ether
  ◦ Low-fiber paper towels
  ◦ Non-abrasive microfiber cloth
  ◦ Non-reactive nitrile gloves
  ◦ PEC*PADs
  ◦ Safety glasses

4.2   Networking

For uploading prints to the Form 4 and remotely monitoring the printer, ensure that the Form 4 maintains a constant connection to a secure network. Refer to section **4.6 Connecting the printer to a network** for more information. For detailed guidance and visual assistance, visit **support.formlabs.com**.

4.3   Unboxing the printer

Prior to unboxing the printer, prepare a suitable workspace according to section 4.1 Location and environs. For detailed guidance and visual assistance, visit **support.formlabs.com**.

4.3.1   Form 4 package

The standard Form 4 package ships with multiple boxes: the Form 4 printer, Form 4 Finish Kit, resin tank, resin cartridge, and build platform. Additional resin cartridges and accessory boxes ship separately from the Form 4's packaging.

	Printer	Finish Kit	Resin cartridge	Resin tank	Build platform	Mixer
Shipping dimensions	52.3 × 55 × 71.4 cm (20.6 × 21.7 × 28.1 in)	48.0 × 32.0 × 28.0 cm (18.9 × 12.6 × 11.0 in)	8.9 × 10.2 × 28.6 cm (3.5 × 4.0 × 11.3 in)	41.3 × 40.0 × 8.7 cm (16.3 × 15.7 × 3.4 in)	24.0 × 15.0 × 10.0 cm (9.4 × 6.2 × 3.9 in)	28.0 × 12.5 × 3.9 cm (11 × 4.9 × 1.5 in)
Shipping weight	22.6 kg (50 lb)	3.4 kg (7.5 lb)	1.5 kg (3.3 lb)	0.9 kg (1.9 lb)	1 kg (2.2 lb)	0.1 kg (0.2 lb)

4.3.2 Unboxing the Form 4
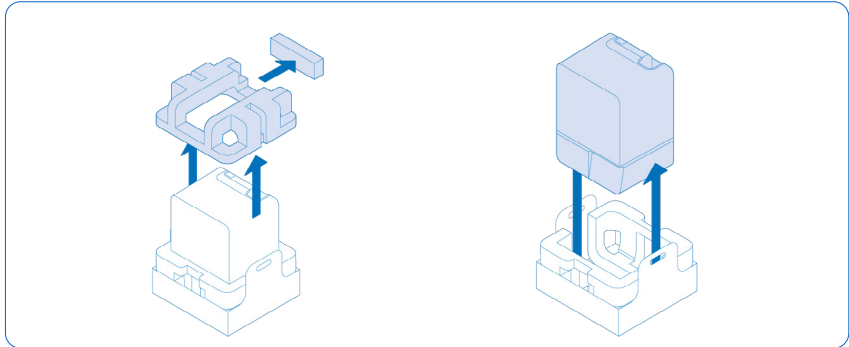
The custom packaging the Form 4 arrives in is specially designed to protect the machine during shipping. During unboxing, inspect the product for any damage or missing items. In the case of damage or missing items, contact Formlabs Support or a certified service provider.

To unbox the printer:

1. Position the Form 4's packaging near the designated location, leaving enough room for two people to comfortably maneuver throughout the area. Stand the Form 4's packaging upright to ensure it is level.
2. Cut the shipping straps securing the printer box.
3. Lift the outer box off the printer.
4. Remove the power cable and accessories box from on top of the printer.
5. Remove the top protective foam from the printer.
6. With the printer still in the lower box, lift the lower box by its handles and place it on your work surface.
7. Lift the printer out of its packaging.
8. Lift the printer by its base and place the printer on a flat, leveled surface.
9. Remove the microfiber shipping cover from the printer.
10. Remove any additional wrapping and packaging from outside of the printer before connecting the machine to power.

> **NOTICE**
>
> Save the Form 4's packaging including any inserts for transporting the machine. Original packaging is required for warranty service and designed to be kept and reused for transportation or shipping.

4.4   Serial name

The serial name is a unique identifier used to track the history of manufacturing, sales, and repair. The serial name for the Form 4 is located on a sticker next to the A/C input on the back panel in the format **Form4-AdjectiveAnimal**. The serial name is also available on the printer's touchscreen.

To access the serial name the printer's touchscreen:

1. Tap the printer icon on the **Home** screen. The printer status screen appears.
2. The serial name is listed in the top-left corner.

4.5   Installing the printer
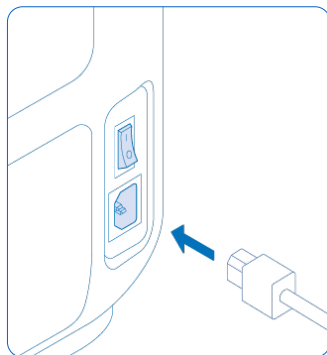
After selecting a location for the Form 4, connect the power supply and turn on the printer. Depending on your internet setup, you may need to connect an Ethernet cable to establish an internet connection on the printer.

4.5.1 **Connecting the cables**

Connect the power cable to the printer and to the power supply. Files can be uploaded via Wi-Fi, Ethernet, or USB. For USB, connect the printer to a nearby computer. For Ethernet, connect the printer to your LAN. Refer to section **4.6. Connecting the printer to a network** for more information.

4.5.2   **Turning on the printer**
To turn on the printer:

1. Plug the included power cable into the power port on the back of the machine and connect the power cable to a power outlet.
2. Flip the power switch to the **ON (I)** position.
3. The printer initiates.

To put the printer into sleep mode or turn off completely, refer to section **5.6.5 Turning off the printer.**

4.6   Connecting the printer to a network
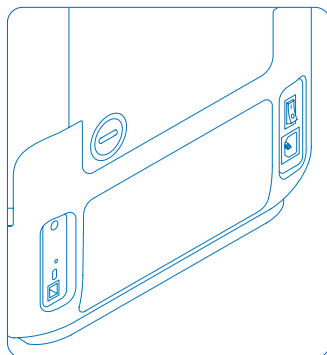
Connect the Form 4 to a secure network via Wi-Fi, Ethernet, or USB, providing it internet access for remote printing, remote troubleshooting, and sending diagnostic logs. The Form 4 can connect directly to a computer with a USB cable. For detailed guidance and visual assistance, visit **support. formlabs.com**.

For remote uploading and monitoring, the Form 4 supports both wired (Ethernet) and wireless (Wi-Fi) connections. Connect PreForm print preparation software to the same local-area network (LAN) as the printer in order to send a print job.

For a Windows operating system, after installing PreForm, check to ensure that Bonjour is properly installed. Bonjour is third-party software that is required to connect over Wi-Fi or Ethernet. Visit **support.apple.com** for assistance with Bonjour. The USB connection can still be used while the Form 4 is connected to a LAN.

When the Form 4 is connected to a LAN, its current status and print progress can be monitored with Dashboard: **formlabs.com/dashboard**.

4.6.1 Connecting with Wi-Fi

The Form 4's built-in Wi-Fi (IEEE 802.11 b/g/n) supports WPA/WPA2 security. Use the printer's touchscreen to configure a wireless network connection.

To connect with Wi-Fi:

1. Tap the gear icon on the **Home** screen. The **Settings** screen appears.
2. Tap **Connectivity > Wi-Fi**. The **Wi-Fi** screen appears.
3. Toggle **Use Wi-Fi** to **ON**. The toggle turns blue.
4. Tap the desired wireless network.
5. If prompted, enter your network password and tap the checkmark to confirm.

4.6.2 Connecting with Ethernet

The rear of the unit is equipped with a RJ-45 Ethernet (10BASE-T/100BASE-TX/1000BASE-T) 1000 Mbit LAN Port. Use a shielded Ethernet cable (not included): minimum Cat5, or Cat5e or Cat6 for 1000BASE-T.

To connect with Ethernet:

1. Plug one end of the Ethernet cable into the Ethernet port on the back of the machine
2. Connect the other end of the Ethernet cable to your LAN.

4.6.3 Connecting with a manual IP configuration

When connected to an active Ethernet connection or available Wi-Fi network, the Form 4 can be configured with a static IP address. Use the printer's touchscreen to configure a manual IP connection.

To connect with Wi-Fi or Ethernet using a manual IP configuration:

1. With an established Ethernet or available Wi-Fi connection, tap the gear icon on the **Home** screen. The **Settings** screen appears.
2. Tap **Connectivity**. The **Connectivity** screen appears.
   ◦ For Wi-Fi networks, tap Wi-Fi, then the desired wireless network. The Wi-Fi screen appears.
   ◦ For Ethernet connections, tap Ethernet. The Manual IP Settings screen appears.
3. Toggle **Use Manual IP** to **ON**. The toggle turns blue.
4. Enter the appropriate **IP Address**, **Subnet Mask**, **Default Gateway**, and **Name Server**.

4.6.4 Connecting with USB

Use a USB cable to connect a computer directly to the printer.

To connect with USB:

1. Plug one end of the USB cable into the USB-C port on the back of the machine.
2. Connect the other end of the USB cable to a computer's USB port.

4.7 Leveling the printer

The Form 4 must be completely level before printing can begin. If prompted, use the leveling disc to raise or lower each foot of the printer.

It is important that the printer sits level so resin does not overflow from the resin tank during printing. All four leveling feet must rest on a solid surface to ensure optimal print accuracy.

To level the printer:

1. Connect the printer to power. If necessary, the printer's touchscreen prompts use of the leveling disc.
   - The initial printer setup includes the leveling procedure.
2. Follow the on-screen instructions to adjust the feet under the printer.
3. Insert the round leveling disc under the designated corner. Push until the leveling disc clicks onto the leveling foot.
4. Rotate the leveling disc clockwise to raise and counter-clockwise to lower the height of the printer.
   - The printer ships with each leveling foot fully retracted. The height of the feet can only be raised during the initial printer setup.
5. Adjust the feet until the printer's touchscreen indicates the printer is level.
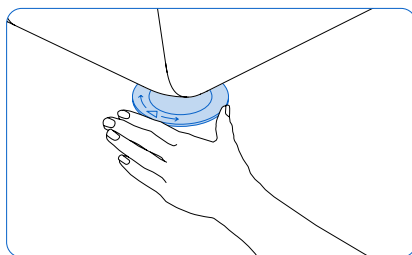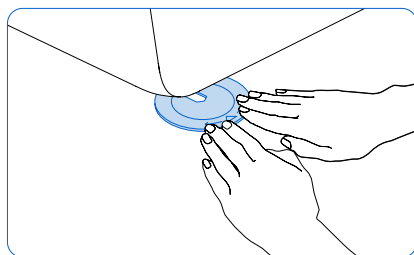
4.8   Inserting the resin tank and mixer

Resin is dispensed out of the resin cartridge into the resin tank. During a print, light shines upward through the bottom of the resin tank and cures resin onto the build platform to form a printed part. A mixer improves print consistency by clearing the build area and circulating the resin.

WARNING

Skin irritant: Resin and solvent may cause skin irritation or an allergic skin reaction. Wear gloves when handling liquid resin, resin-coated surfaces, or solvent. Wash skin with plenty of soap and water.

NOTICE

Spill hazard: Resin may spill over the tank walls if the resin tank tilts more than 5–10 degrees. Hold the resin tank level with two hands. To inspect and clean the resin tank's underside, empty the resin tank and/or take care to avoid spilling resin outside the resin tank.

4.8.1 **Inserting the resin tank**
To insert the resin tank:
1. Open the printer cover.
2. Remove all packaging from the resin tank before inserting it into the printer.
3. Remove the resin tank lid and set it aside.
4. Lift the resin tank with one hand on each side.

NOTICE
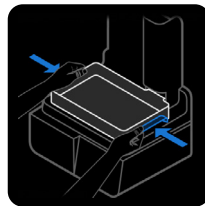
Avoid contaminating the resin tank's underside with fingerprints or liquid resin.

5. With the tank spout facing away from you, place the resin tank flat between the blue latches in the middle of the printer.
6. Press down on the sides of the resin tank with your thumbs. Latch the tank into place by closing the two latch handles on the sides. The printer detects its insertion and displays a message on the touchscreen.
7. If you have not done so already, remove the resin tank lid and set it aside.

4.8.2 **Inserting the mixer**
To insert the mixer:
1. Open the printer cover.
2. Orient the mixer with its flat body facing away from you. Open the latch on the mixer.
3. Insert the mixer into the mixer mount and place the flat body into the tank.
4. Lock the mixer into place by closing the latch.
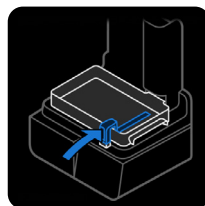
4.9 Inserting the build platform

The build platform is the surface onto which parts are printed. It is secured in place on the build platform mount during a print with the platform lock.

To insert the build platform:
1. Lift the build platform latch.
2. Align the build platform with the build platform mount and push into place. The printer detects its insertion and displays a message on the touchscreen.
3. Lower the build platform latch to secure the build platform.
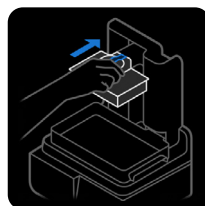
4.10 Inserting the resin cartridge

Resin cartridges hold liquid resin before it is dispensed into the resin tank.

To insert the resin cartridge:
1. Close the printer cover.
2. Shake the resin cartridge before each print to ensure the resin is mixed thoroughly. Shake each resin cartridge approximately every two weeks during storage to keep resin well mixed for the best print quality.

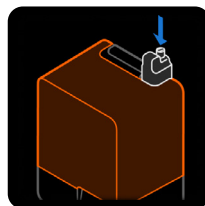3. Lower the resin cartridge until the top of the cartridge is level with the top of the printer. The cartridge sits loosely inside the cartridge slot. This ensures the load cell can accurately measure cartridge resin levels.
4. Press the vent cap open, so that the resin tank fills correctly.

4.11   Installing the Form 4 Finish Kit

The Form 4 comes with a finishing kit that includes a variety of post-processing tools. After printing, use the tools to remove prints from the build platform, wash prints in solvent, and remove supports.

4.11.1   Installing the rinse bucket
To fill the rinse bucket with solvent:
1. Select your wash solvent.
2. Place the rinse bucket on a flat, clean surface. If you are using a flammable solvent, keep the rinse bucket away from any ignition sources.
3. Carefully pour solvent into the rinse bucket. The minimum amount of solvent required depends on the volume of the printed parts to be cleaned.

Ensure that you have sufficient solvent (isopropyl alcohol or tripropylene glycol monomethyl ether) to wash your prints. For more information about solvent handling, visit **support.formlabs.com**.

4.11.2   Installing the build platform jig

The build platform jig is designed to stabilize the build platform for the secure removal of prints. Secure the build platform jig to the edge of your work surface by tightening the jig screw clamps underneath the work surface. Ensure that there is enough space in front of the jig for the build platform.

Slide the build platform onto the mount on the top of the jig to secure it in place while removing your printed parts.

Resin-coated surfaces can be slippery. Point sharp tools away from yourself when separating printed parts from the build platform.
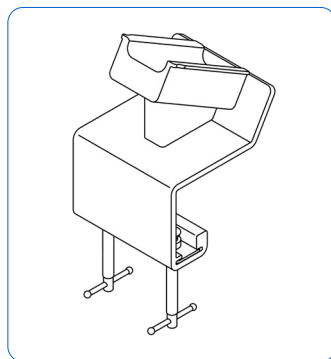
4.12   Transporting the printer

Refer to the section **4.3 Form 4 package** for product weight and dimensions. Keep the packaging for transportation or shipping. For detailed guidance and visual assistance, visit **support.formlabs.com**.

The printer's complete packaging kit consists of:

- 1 outer box, cardboard
- 1 carrier tray, cardboard
- 1 carrier tray insert, foam

- 1 top protective insert, foam
- 1 shipping cover, microfiber cloth
- 3 or 4 internal edge supports, cardboard (depending on manufacture date of printer)

4.12.1 Preparing the printer for transportation

To prepare the printer:

1. Always remove the build platform, resin tank, mixer, and resin cartridge before moving or packaging the printer.
2. Wipe residual resin from the build platform and store the platform away from sunlight.

> **NOTICE**
>
> Do not ship the printer with any resin inside. Resin left inside the machine can leak during transit, which may result in additional fees or void the warranty.
> Do not ship the printer with the resin tank, resin cartridge, or build platform inserted into the printer. Consumables left inside the machine can become loose during transit and damage sensitive components, which may result in additional fees or void the warranty.

3. Store the resin tank with its lid in place.
4. Store the resin cartridge with the vent cap pressed closed and the valve cover installed.

> **NOTICE**
>
> When shipping a printer to Formlabs or a certified service provider for replacement or repair, the build platform, resin tank, resin cartridge, power and USB cables, and other accessories should not be shipped and will not be returned after service. Original packaging is required for warranty service. Contact Formlabs Support or a certified service provider for unique guidance on shipping requirements.

4.12.2 Packaging the printer

To package the printer:

1. If the printer's outer cardboard carton has been flattened, start by re-assembling the box and securely taping its top opening. Use reinforced packing tape or tape all box seams to ensure that your printer is not damaged during shipping.
2. Insert the bottom foam inserts into the lower box.
3. Insert one edge support into each of the internal corners of the lower box. Depending on the date of manufacture of your printer, you may have three or four edge supports.
4. Slip the microfiber shipping cover over the printer. Ensure that the shipping cover sits flat against the faces of the machine.
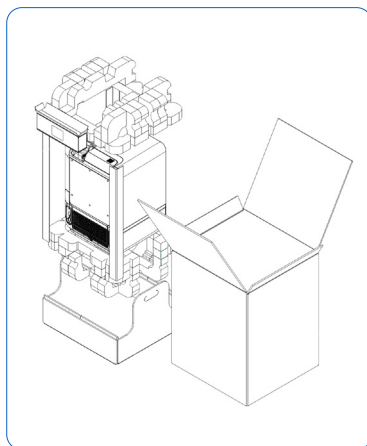
5. Place the upright printer into the lower box. The bottom foam inserts are shaped to match the contours of the printer. Ensure that the printer sits snugly in the foam inserts.
6. Place the upper foam on top of the printer. The foam should fit exactly around the top of the printer's cover.
7. Lower the outer box onto the printer and lower box, making sure that the printer and foam packaging fit entirely within the box. Orient the outer box and lower box so the hand holes match up when packaged.
8. Seal the edges of all box openings with adhesive packing tape. Use reinforced packing tape and tape all box seams, across all open corners, and from each side across the bottom to ensure that your printer is not damaged during shipping.

5.   Printing

5.1   Operational environment

The operating temperature for the Form 4 is 18–28 °C (64–82 °F), with low ambient humidity. For optimal printing, do not exceed this range.

5.2   Designing for SLA

A successful 3D print starts with a well-designed model. Follow these best practices to optimize designs and reduce print failures. For detailed guidance and visual assistance, visit **support. formlabs.com**.

5.2.1   **Printing specifications**

Parameter	Unit
Build volume (W × D × H)	200 × 125 × 210 mm 7.9 × 4.9 × 8.3 in Parts taller than 190 mm (7.5 in) require that the resin tank be removed with the build platform and the wash basket be removed from Form Wash
Layer thickness	25–300 microns 0.001–0.012 in

5.2.2   **Feature design guidelines**

Consult Design specifications for 3D models (Form 4 generation) for a list of the minimum feature requirements you can expect from Form 4 generation printers.

5.3   Setting up a print

Form 4 print jobs can be set up using PreForm, Formlabs' print preparation software. To start, open OBJ, STL, or 3MF files in PreForm, orient and layout multiple models into a complete build, then upload the print job to the printer. For detailed guidance and visual assistance, visit **support.formlabs.com**.

5.3.1   **Downloading or updating PreForm**

Visit the PreForm product webpage to download the latest version: **formlabs.com/software**. Learn how to use PreForm from the tutorials available in the software. Click **Help > Show Onboarding Tutorial** from PreForm's menu bar.

5.3.2   **Preparing the file for printing**

Use PreForm software to process STL, OBJ, or 3MF files. Prepare, save, and upload FORM files to the printer.

5.3.2.1   **Adding a model**

Import multiple part files into PreForm to print multiple parts on a single build platform.

To add a model:

1. In the menu bar, click **File > Open**. The **Open File** window opens.
2. Select at least one file.
3. Click **Open**. The selected models appear in PreForm.

5.3.2.2   **Orienting a model**

Orienting a model within the build volume consists of two components: moving a model and

rotating a model. Position a model to prevent suction cups and reduce minima.

To move a model to a different location:

1. Select the model in PreForm. Manipulators are overlaid on the model.
2. To move:
   - Click-and-drag the Move manipulator to a new location on the build platform.
   - Click-and-drag the selected model to a new location on the build platform.

To rotate a model along the X-, Y-, and Z-axes:

1. Select the model in PreForm. Manipulators are overlaid on the model.
2. Click **Orientation**. A dialogue box opens.
3. To rotate:
   - Click-and-drag along the central manipulator to spin the model freely.
   - Click-and-drag on a ring to move the model along that axis.
   - Enter a specific angle into an axis field.
   - Click on an axis arrow.
   - Hover the pointer over an axis field and use the scroll wheel.

5.3.2.3 **Supporting a model**

Supports reinforce overhangs and other delicate features for maximum printability. They should be removed after the print is complete. Supports can be auto-generated en masse or individually placed by hand.

To auto-generate supports:

1. Select the model in PreForm.
2. Click **Supports**. A dialog box opens.
3. Click **Auto-Generate All**. Supports are added to all models on the build platform.

To manually add and edit supports:

1. Select the model in PreForm. Manipulators are overlaid on the model.
2. Click **Supports**. A dialog box opens.
3. Click **Edit...**. The model turns gray and supports are shown as white touchpoints.
4. Click on the under-supported areas in red to add a support. White touchpoints appear where clicked.
5. Click **Apply**. Supports are regenerated and remaining under-supported areas are highlighted in red.
6. Repeat until the model is fully supported.

5.3.2.4 **Uploading a print**

After orienting and supporting your model(s), and saving your FORM file, upload your print job to the printer. Both the printer and the computer running PreForm must be connected via USB or on the same network in order to upload a print job. Refer to section **4.6 Connecting the printer to a network** for more information. Once transferred, print jobs must be confirmed on the printer's touchscreen to begin. Refer to section **5.4.2 Starting a print** for more information.

To upload a print job from PreForm to the printer:

1. Click the orange printer icon on the **Home** screen. The **Print** window opens.
2. Click the **Select Printer** arrow to select a printer. The **Printer List** window opens.
3. Click the name of a printer you wish to select. The **Printer Details** window opens.
   - If the printer does not automatically appear in the Printer List, click Add to manually enter the printer's IP address.

4. Click **Select**. The **Job Setup** window opens.
5. Click **Apply**. The selected printer appears in the **Job Info** dialog box.
6. Enter or update the **Job Name**.
7. Click **Print Now** to start the print immediately if the printer is ready or **Add to Queue** to add the print to the printer's queue. Once the progress bar fills and the **Print** window closes, the upload is complete.

5.4 Preparing the printer for printing

Before a print job can begin, the Form 4 must be set up to match the correct material settings. Insert the resin tank, build platform, and resin cartridge. Confirm the print job on the printer's touchscreen and wait for the print chamber inside the Form 4 to preheat. For detailed guidance and visual assistance, visit **support.formlabs.com**.

5.4.1 Automatic consumables checks

The Form 4 checks the following before each print:

- **Accessories:** Sensors check for the proper installation of the build platform, resin tank, and resin cartridge.
- **Temperature:** The printer heats the resin to its optimal temperature before starting the print.
- **Resin:** Resin flows from the resin cartridge into the resin tank when the cartridge dispense arm squeezes the bite valve of the resin cartridge open. The Form 4 regulates the volume of resin in the resin tank through a sensor called the LevelSense, which is located above the rear left-hand corner of the resin tank. The printer begins to fill the resin tank once a print starts and maintains the level of resin in the resin tank during the print. Printing begins automatically when LevelSense detects the proper amount of resin in the resin tank.
- **Debris:** The mixer and sensors check for debris left on the build platform.

5.4.2 Readying your printer to start a print

Before the printer can start a print, confirm that the build platform is clean and ready to use and that the mixer is secured in place. To ready your printer to start a print:

1. On the touchscreen, tap the printer icon on the sidebar.
2. Tap the check mark next to the **Build Platform** and **Tank** status items to confirm that they are ready to be used.
3. The status in the top bar changes to **Ready**.
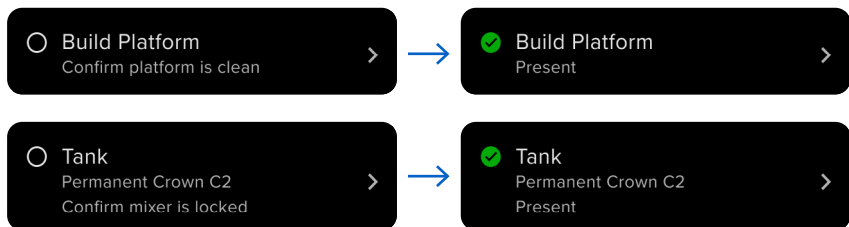
5.4.3 Starting a print

Once a print job is uploaded to the Form 4, the printer's touchscreen displays the next print job in the queue. To start the print, tap **Print** on the printer's touchscreen.

If the file is not the next print job in the queue, tap the collapsed menu icon from **Home** to access the **Queue** screen.

To start a print on the printer's touchscreen:

1. Tap the print job on the **Home** screen, or from **Queue**. The print job screen appears.
2. Tap **Print** to confirm. A new screen appears.
3. Follow the prompts on the touchscreen to check the resin tank and cartridge are inserted correctly, then tap **Confirm**. The print starts once the resin in the resin tank has reached its optimal temperature.

5.4.4   **Stopping a print**

To stop a print in progress, tap **Pause > Abort** on the printer's touchscreen.

> ⚠️ **CAUTION**
>
> **Moving parts.** Do not open the printer cover until the printer's touchscreen indicates the print is complete. Moving parts present crushing and tangling hazards.

5.5   Finishing and post-processing a print

Finishing and post-processing includes all steps after printing. Bring a 3D model from a digital file to a functional print with the following steps. For detailed guidance and visual assistance, visit **support.formlabs.com**.

> ⚠️ **WARNING**
>
> **Skin irritant:** Resin and solvent may cause skin irritation or an allergic skin reaction. Wear gloves when handling liquid resin, resin-coated surfaces, or solvent. Wash skin with plenty of soap and water.

To finish and post-process a print:

1. Put on a new, clean pair of nitrile gloves.
2. When the print is complete, open the printer cover and lift up the platform lock.
3. Use both hands to grip the handles and remove the build platform from the printer.
4. Close the printer cover.
5. Wash the print in the Form Wash, Form Wash (2nd Generation), Form Wash L, Form 4 Finish Kit, or a Formlabs-approved third-party large-format ultrasonic cleaner. Formlabs products, such as the Form Wash L, can be used with either isopropyl alcohol or tripropylene glycol monomethyl ether as a washing solvent.

> ⚠️ **DANGER**
>
> **Fire hazard:** Isopropyl alcohol is a flammable chemical. Keep away from ignition sources, including open flames, sparks, or concentrated sources of heat.

6. Remove the solvent from the print.
   - If your solvent evaporates readily (e.g., isopropyl alcohol), allow at least 30 minutes for the solvent to fully evaporate after washing.
   - If your solvent does not evaporate readily (e.g., tripropylene glycol monomethyl ether), wash the prints with water to remove excess solvent.
7. Dry your prints. Ensure all prints are fully dry and free of excess solvent, resin, and other liquids before post-curing.
8. Post-cure your print with the Form Cure, Form Cure L, or a Formlabs-approved third-party large-format SLA post-curing unit to achieve a part's full mechanical properties.
9. Post-process your print by removing supports, sanding down blemishes, and adding paint.

5.6   **Managing the printer**

During and between prints, you can track your printer's usage, manage print jobs, and prepare for future print jobs. For detailed guidance and visual assistance, visit **support.formlabs.com**.

5.6.1   **Connecting the printer to Dashboard**

Dashboard (**formlabs.com/dashboard**) allows individuals and teams to remotely monitor Formlabs printers, track material usage, and explore past and future Formlabs purchases. Register the Form 4 to Dashboard through the printer's touchscreen. Once the printer is registered to Dashboard and Dashboard logging is enabled on the printer, the Form 4 sends data to Dashboard as long as the printer's Wi-Fi or Ethernet connections are able to access the internet.

5.6.2   **Starting an uploaded print**

To start an uploaded print job on the printer's touchscreen:

1. Confirm the resin tank, build platform, and resin cartridge have been inserted into the printer.
2. Tap the print job from **Queue**.

Refer to section **5.4.2 Starting a print** for more information.

5.6.3   **Deleting an uploaded print**

To delete an uploaded print job on the printer's touchscreen:

1. Tap the print job from **Queue**.
2. Tap **Delete**. If prompted, tap **Delete** again to confirm.

5.6.4   **Changing resin types between prints**

When changing resin types, always change both the resin tank and resin cartridge. Remove the resin cartridge before removing the resin tank to prevent the bite valves from dripping resin into the printer cavity. Refer to sections **6.7.3 Replacing the resin tank** and **6.6.3 Replacing the resin cartridge** for more information.

5.6.5   **Checking and maintaining the resin temperature**

The Form 4 heats resin to a set temperature before starting a print. View the resin's current temperature on the printer's touchscreen.

The resin is heated by resistive heaters located beneath the resin tank. The Form 4 automatically preheats and maintains a consistent print chamber temperature before and between prints.

5.6.6   **Turning off the printer**

The Form 4 is designed to be left powered on when not in use. Depending on your printer's firmware version, there is an option, accessible through the printer's touchscreen, that places the printer into sleep mode immediately or after a set period of inactivity.

Tap the printer's touchscreen, insert or remove consumables, or otherwise interact with the printer to wake it from sleep mode. For detailed guidance and visual assistance, visit **support.formlabs.com**.

Turn off the machine completely when moving or storing the printer, and to conserve power.

To turn off the printer completely:

1. Press the power switch on the back of the machine, next to the power cord.
2. The printer turns off.

6.   Maintenance

Formlabs provides instructions to advise in installing, operating, and maintaining the machine. It shall only be maintained by a qualified and trained person. Unauthorized disassembly or repair procedures may damage the machine.

There are two groups of maintenance procedures: regular, which should be done after every print, and intermittent maintenance, which only needs to be done occasionally. Please keep a log detailing when each intermittent maintenance procedure was last performed. For detailed guidance and visual assistance, visit **support.formlabs.com**.

⚠️ **WARNING**

Formlabs provides instructions to advise skilled and unskilled persons in installing, operating, and maintaining the Form 4. The Form 4 shall only be maintained by a qualified and trained person.

- Do not open the machine and/or investigate internal components unless under the guidance of Formlabs or a certified service provider. Contact Formlabs Support or a certified service provider for any additional guidance.
- Unauthorized disassembly or repair procedures may damage the machine and void the warranty.
- Wear personal protective equipment (PPE) when performing maintenance tasks. Use tools only as described.
- Disconnect the machine from its power source before maintenance. Moving parts present crushing and tangling hazards.

6.1   Tools and supplies

Only use tools, chemicals, or procedures to maintain the Form 4 that are outlined in this manual, by prompts on the printer's touchscreen, and **support.formlabs.com**.

Do not use any tools, chemicals, or unapproved procedures with the Form 4 unless otherwise instructed to do so by Formlabs Support or a certified service provider.

- **Cleaning sheet**
  - For cleaning the interior of the resin tank.
- **Cotton swabs**
  - For cleaning small resin spills.
- **General purpose cleaner (e.g., glass cleaner) and/or soapy water**
  - For cleaning the printer's cover, outer shells, and display.
- **Isopropyl alcohol (IPA), 90% or higher**
  - For cleaning the printer's optical components and build platform.
  - For cleaning the work surface and tools.
- **Lithium grease for ball bearings**
  - For lubricating the Z-axis screw.
- **Low-fiber paper towels**
  - For cleaning the work surface and tools.
  - For protecting sensitive components.
  - For wiping residue grease, resin, or solvent.

- **Non-abrasive microfiber cloth**
  - For cleaning the printer's cover, outer shells, and display.
- **PEC*PADs**
  - For cleaning the printer's optical components.
- **Rubber bulb air blower**
  - For removing dust from the Light Processing Unit (LPU).
- **Plastic tank scraper**
  - For inspecting and cleaning the interior of the resin tank.

6.2 Inspecting and maintaining the printer

Inspect and maintain your printer and consumables to ensure that your printer continues to function properly and produce high print quality. For detailed guidance and visual assistance, visit **support.formlabs.com**.

6.2.1 Before each use

Inspect	Refer to	Section
Installation environment	Operational environment	4.1
Build platform	Cleaning the build platform	6.3.1
Resin cartridge bite valves	Inspecting the bite valves	6.3.2
Resin resin tank interior	Inspecting the resin tank	6.7.1

6.2.2 Before switching resin types

Inspect	Refer to	Section
Mixer	Cleaning the mixer	6.4.1

6.2.3 Periodic maintenance

Inspect	Refer to	Section
Cover	Inspecting the cover	6.5.1
Display	Inspecting the display	6.5.2
Drip catcher	Inspecting the drip catcher	6.5.3
Shells	Inspecting the shells	6.5.4
Z-axis screw	Maintaining the Z-axis screw	6.5.5

6.3 Tasks between uses

Perform the following maintenance tasks between each print. For detailed guidance and visual assistance, visit **support.formlabs.com**.

⚠️ **WARNING**

Skin irritant: Resin and solvent may cause skin irritation or an allergic skin reaction. Wear gloves when handling liquid resin, resin-coated surfaces, or solvent. Wash skin with plenty of soap and water.

6.3.1 **Cleaning the build platform**

The build platform is the aluminum base that provides a surface for prints to attach to. Over time, the build platform develops scratches from part removal, which can assist with print adherence. Avoid exposing a resin-covered build platform to light directly after a print completes. Liquid resin cures in ambient light, and resin left on the surface of a build platform renders it unusable.

Required supplies

Isopropyl alcohol
Low-fiber paper towels
Non-reactive nitrile gloves

When switching to a different resin type between prints or storing the build platform for future use, clean the surface and edges of the build platform with isopropyl alcohol and low-fiber paper towels. If you are starting a new print immediately using the same resin type, there is no need to remove liquid resin.

6.3.2 **Inspecting the bite valve**

The bite valve is located on the underside of each resin cartridge. This flexible seal regulates resin dispensing. Resin flows out of the opening in the center of the bite valve when the cartridge dispense arm squeezes the bite valve open. When switching to a different resin cartridge, inspect the bite valve for any cured resin or damage.

6.3.3 **Inspecting the resin tank interior**

Refer to section **6.7.1 Inspecting the resin tank**.

6.4 **Tasks before switching resin types**

Perform the following maintenance tasks whenever you switch resin types. For detailed guidance and visual assistance, visit **support.formlabs.com**.

6.4.1 **Cleaning the mixer**

The mixer improves print consistency by clearing the build area and circulating the resin. If you are running multiple prints with the same resin type, you do not need to clean the mixer between prints. If you are switching resin types, clean the mixer between uses to prevent contamination.

To clean the mixer:

1. Unlatch and remove the mixer from the printer.
2. Clean the mixer with a solvent such as IPA or TPM. Either:
   ◦ Wipe the mixer with a clean paper towel wetted with solvent.
   ◦ Clean the mixer with the Form Wash, Form Wash L, or other automated cleaning unit.
3. Allow the mixer to dry fully before reinserting it into the printer. If you cleaned the mixer with a solvent that does not readily evaporate, such as TPM, you may need to manually dry the mixer.

If the mixer is visibly damaged, is leaving debris in the resin tank, or is causing the resin in the resin tank to become discolored, replace the mixer.

6.5 **Periodic maintenance**

Perform the following maintenance tasks periodically or as needed. For detailed guidance and visual assistance, visit **support.formlabs.com**.

6.5.1 **Inspecting the cover**

Visually inspect the cover for traces of resin, cracks, or other damage. Clean the cover with a non-abrasive microfiber cloth and soapy water or a general purpose cleaner, such as glass cleaner. In the case of a crack that allows light to pass through the cover, install a new cover. Refer to section **8 Disassembly and repair** for more information.

6.5.2 **Inspecting the display**

Visually inspect the display for any traces of resin. the display with a non-abrasive microfiber cloth and general purpose cleaner, such as glass cleaner.

6.5.3 **Inspecting the drip catcher**

Visually inspect the drip catcher for any traces of resin. Clean the drip catcher with isopropyl alcohol and low-fiber paper towels.

⚠️ **WARNING**

Moving parts. Disconnect the machine from its power source. Moving parts present crushing and tangling hazards.

⚠️ **WARNING**

Skin irritant: Resin and solvent may cause skin irritation or an allergic skin reaction. Wear gloves when handling liquid resin, resin-coated surfaces, or solvent. Wash skin with plenty of soap and water.

Required supplies

Isopropyl alcohol
Low-fiber paper towels
Non-reactive nitrile gloves

To inspect and clean the drip catcher:

1. Put on a new, clean pair of nitrile gloves.
2. Disconnect the printer from its power source.
3. Remove the build platform, resin tank, and resin cartridge to access the drip catcher, which is the area below the tank spout or under the cartridge dispense arm.
4. Visually inspect the drip catcher.
5. Clean any traces of resin or contamination with isopropyl alcohol and low-fiber paper towels.

6.5.4 **Inspecting the shells**

Visually inspect the rear, front and side shells for traces of resin or other damage. Clean any traces of resin or contamination with soapy water and low-fiber paper towels.

6.5.5 **Maintaining the Z-axis screw**

The build platform mount rides along the Z-axis lead screw. The screw must be lubricated for the build platform mount to move smoothly and quietly.

⚠️ **WARNING**

Moving parts. Disconnect the machine from its power source. Moving parts present crushing and tangling hazards.

6.5.5.1 **Inspecting the Z-axis screw**

Visually inspect the Z-axis screw to ensure that the build platform mount moves smoothly and that there is no debris built up in the screw threads.

Required supplies

Microfiber cloth or low-fiber paper towels
Lithium grease for ball bearings
Non-reactive nitrile gloves

To inspect the Z-axis screw:

1. Put on a new, clean pair of nitrile gloves.
2. Rotate the Z-axis screw. Depending on your printer's firmware version, there is a maintenance option, accessible through the printer's touchscreen, that moves the build platform mount along its screw. For detailed guidance and visual assistance, visit **support.formlabs.com**.
3. As the build platform mount moves up and down, listen, look, and feel to check for areas that emit noise or where the build platform mount sticks or moves less smoothly.
4. Visually inspect the lead screw to ensure that no debris or foreign objects obstruct the lead screw or path of motion.
5. Visually inspect the lead screw to ensure that lubricant covers the full length of the screw threads.
6. In the case that the screw is missing lubricant or if the Z-axis emits intermittent noises when printing, lubricate the lead screw using the instructions below.

6.5.5.2 **Lubricating the Z-axis screw**

To lubricate the Z-axis screw:

1. Put on a new, clean pair of nitrile gloves.
2. Disconnect the printer from its power source.
3. Remove the build platform and resin tank.
4. Place a clean low-fiber paper towel over the LPU.
5. Remove old and dirty grease from the screw using a paper towel.
6. Apply a light layer of lithium grease specifically intended for use with ball bearings evenly along the screw. Apply the lubricant directly from the container or by dabbing lubricant onto the screw with a gloved hand.
7. Rotate the screw. Depending on your printer's firmware version, there is a maintenance option, accessible through the printer's touchscreen, that moves the build platform mount along its screw. For detailed guidance and visual assistance, visit **support.formlabs.com**.
8. As the build platform mount moves up and down, listen, look, and feel to check for areas that emit noise or where the build platform mount sticks or moves less smoothly.
9. Wipe the screw with a microfiber cloth or low-fiber paper towel to remove excess lubricant.

6.6   Planned maintenance

Perform the following maintenance tasks at the frequency specified in the table below. For detailed guidance and visual assistance, visit **support.formlabs.com**.

Maintenance tasks shall be done according to the following plan:

Task	Frequency	Refer to	Section
Updating the firmware	When PreForm indicates a new firmware version is available.	Updating the firmware	**6.6.1**

Task	Frequency	Refer to	Section
Filtering the resin	When a cleaning sheet does not sufficiently remove particles from the resin tank.	Filtering the resin	**6.6.2**
Replacing the resin cartridge	When the resin cartridge is empty, after 1 liter of printing.	Replacing the resin cartridge	**6.6.3**
Cleaning the rear mesh filter	When the printer indicates that the rear mesh filter should be cleaned. When the printer indicates that the heater or resin has exceeded its target temperature.	Cleaning the rear mesh filter	**6.6.4**
Cleaning the LPU release texture	When the LPU release texture is smudged or contaminated.	Cleaning the LPU release texture	**6.6.5**
Replacing the resin tank	When wear on the bottom of the resin tank begins to affect print quality. When the printer indicates that the resin tank has reached the end of its usable lifetime.	Replacing the resin tank	**6.7.3**
Lubricating the Z-axis screw	Every 12 months, if the build platform mount does not move smoothly, or emit intermittent noises when printing.	Maintaining the Z-axis screw	**6.5.5**

6.6.1   **Updating the firmware**

Formlabs regularly releases updated firmware to fix bugs and improve functionality. Review the PreForm and firmware release notes to learn more about the improvements that come with each version's release. For detailed guidance and visual assistance, visit **support.formlabs. com**.

6.6.2   **Filtering the resin**

Filter resin to remove contamination and very small particulates of partially cured resin. For detailed guidance and visual assistance, visit **support.formlabs.com**.

⚠️ **WARNING**

> **Skin irritant:** Resin and solvent may cause skin irritation or an allergic skin reaction. Wear gloves when handling liquid resin, resin-coated surfaces, or solvent. Wash skin with plenty of soap and water.

Required supplies

Non-reactive nitrile gloves
Opaque container suitable for storing resin
Paint or oil filters ("fine" or 190 micron mesh size)

To filter the resin:

1. Put on a new, clean pair of nitrile gloves.
2. Suspend the paint or oil filter (with a "fine" or 190 micron mesh size) above an opaque container suitable for storing resin. Use a ring stand to reduce the risk of spilling resin.
3. Remove the resin tank and mixer. Place the mixer aside on a protected surface.
4. Hold the edge of the resin tank, taking care not to touch the resin tank's underside.
5. Tilt the resin tank with the tank spout aligned directly above the filter.
6. Pour the resin through the filter, into the opaque plastic container.

7. Gently scrape the interior of the resin tank with the plastic tank scraper to pull resin toward the tank spout.
8. Once all resin passes through the filter, pour the resin back into the resin tank.
9. To dispose of the used filter, refer to section **9.1 Disposal of resin and accessories.**

6.6.3 Replacing the resin cartridge

Replace the resin cartridge to change materials between prints or when a resin cartridge is empty.

To replace the resin cartridge:

1. Press the vent cap closed.
2. Hold the resin cartridge by its handles.
3. Lift the resin cartridge out of the printer.
4. Store or dispose of the resin cartridge. For detailed guidance and visual assistance, visit **support.formlabs.com**.
5. To install a new resin cartridge, refer to section **4.10 Inserting the resin cartridge.**

NOTICE

Store the resin cartridges upright with the valve covers installed to protect storage surfaces from resin.

6.6.4 Cleaning the rear mesh filter

The rear mesh filter is located at the back of the printer. It magnetically attaches to the printer and covers the LPU air intake. A clean dust filter ensures that the LPU and resin do not overheat. For detailed guidance and visual assistance, visit **support.formlabs.com**.

Required supplies

Vacuum

To clean the rear mesh filter:

1. If necessary, move the printer to be able to access the back of the machine.
2. Locate the rear mesh filter positioned next to the power switch.
3. Remove the rear mesh filter from the printer.
4. Vacuum the rear mesh filter until it is clean and free from dust or debris.
   ◦ If the rear mesh filter cannot be cleaned, replace the dust filter.
5. Reattach the rear mesh filter to the printer, ensuring that it is aligned with the air intake vents.

6.6.5 Cleaning the LPU release texture

The texture on the top of the LPU reduces forces on the printed parts, resin tank, and printer between layers. Maintain a clean LPU to prevent print failures and damage to the resin tank. For detailed guidance and visual assistance, visit **support.formlabs.com**.

WARNING

Skin irritant: Resin and solvent may cause skin irritation or an allergic skin reaction. Wear gloves when handling liquid resin, resin-coated surfaces, or solvent. Wash skin with plenty of soap and water.

Required supplies

Isopropyl alcohol
Non-reactive nitrile gloves
Non-abrasive wipes
Rubber bulb air blower

To clean the release texture:

1. Put on a new, clean pair of nitrile gloves.
2. Grip the top of a non-abrasive wipe with a gloved hand. Soak the bottom half of the wipe with clean isopropyl alcohol.
3. Drag the isopropyl alcohol soaked wipe slowly across the surface of the LPU. It should take 20–30 seconds to traverse the width of the LPU.
   - Do not contact the release texture with your hand or apply pressure to the wipe.
   - For debris and resin near the edge of the LPU, always drag the wipe towards the edge of the LPU to avoid spreading the contaminant.
4. Wait for the isopropyl alcohol on the release texture to dry.
5. Repeat this process several times until the contaminant has been removed.

6.7   Maintaining the resin tank

The resin tank is the primary container for holding resin after it is dispensed from the resin cartridge. Resin is cured onto the build platform when the light from the backlight passes through the bottom of the resin tank. Be sure to handle and maintain the resin tank properly between each print. For detailed guidance and visual assistance, visit **support.formlabs.com**.

> ⚠️ **WARNING**
>
> **Skin irritant:** Resin and solvent may cause skin irritation or an allergic skin reaction. Wear gloves when handling liquid resin, resin-coated surfaces, or solvent. Wash skin with plenty of soap and water.

> ⓘ **NOTICE**
>
> **Spill hazard:** Resin may spill over the tank walls if the resin tank tilts more than 5–10 degrees. Hold the resin tank level with two hands. To inspect and clean the resin tank's underside, empty the resin tank and/or take care to avoid spilling resin outside the resin tank.

> ⓘ **NOTICE**
>
> Sharp and metal tools can damage the resin tank and affect print quality, leading to print failures and/or a resin spill. Do not use sharp or metal tools like the removal tool or flush cutters to inspect or clean the resin tank.

6.7.1   Inspecting the resin tank

For the best results, inspect resin tanks regularly and, if necessary, clean them. Dirty optical surfaces and damage to the resin tank may cause print failures.

Required supplies

Non-reactive nitrile gloves
Plastic tank scraper

To inspect the resin tank interior:

1. Put on a new, clean pair of nitrile gloves.
2. Use the plastic tank scraper to inspect the resin and the resin tank interior. Refer to section **7.3 Cleaning after a failed print**, steps 1–3.
3. Check for the following issues that may lead to print failures or any excessive wear that requires switching to a new resin tank:
   ◦ Cured resin on the bottom of the tank
   ◦ Debris or failed prints in the resin
   ◦ Cuts or gouges in the bottom of the tank
4. If necessary, follow cleaning instructions to remove cured resin, failed prints, debris, and settled pigment in the resin tank.
   ◦ For moderate wear or scratches on the bottom of the tank, use the Layout tool in PreForm to move the model outside the worn or scratched area.
   ◦ In the case of excessive wear or scratches on the bottom of the tank, switch to a new resin tank. Refer to section **6.7.3 Replacing the resin tank.**

To inspect the resin tank exterior:

1. Put on a new, clean pair of nitrile gloves.
2. Visually inspect the resin tank exterior for fingerprints, dust, contamination, and scratches, which cause the light from the backlight to diffuse and lead to print failures or inaccuracies.
3. If necessary, use the cleaning instructions to remove any fingerprints, dust, or contamination on the bottom of the resin tank.
   ◦ For moderate wear or scratches on the bottom of the resin tank, use the Layout tool in PreForm to move the model outside the worn or scratched area.
   ◦ In the case of excessive wear or scratches on the bottom of the resin tank, switch to a new resin tank. Refer to section **6.7.3 Replacing the resin tank.**

To inspect the tank frame:

1. Put on a new, clean pair of nitrile gloves.
2. Visually inspect the tank frame for contamination or resin. Resin on the tank frame may result in print failures and/or damage to the release texture. If the release texture is contaminated, refer to section **6.6.5 Cleaning the release texture.**

6.7.2   **Cleaning the resin tank**

Keep the resin tank clean and free of cured resin and other debris to ensure print quality and extend the lifetime of the printer.

Required supplies

Resin tank interior	Resin tank exterior	Tank frame
• Cleaning sheet • Non-reactive nitrile gloves • Plastic tank scraper • Isopropyl alcohol • PEC*PADs	• Isopropyl alcohol • Non-reactive nitrile gloves • PEC*PADs	• Low-fiber paper towels • Non-reactive nitrile gloves

To clean the resin tank interior:

- **Print failures:**
  - Refer to section **7.3 Cleaning after a failed print.**
  - Clean the resin tank interior using a cleaning sheet or manually with the plastic tank scraper.
- **Debris or contamination in the resin:**
  - Refer to section **6.6.2 Filtering the resin.**
  - Clean, debris-free resin helps avoid print failures, which may damage the resin tank.
- **Settled pigment in the resin:**
  - Resin pigment can settle onto the interior of the resin tank. To supplement the mixer's function, slide the plastic tank scraper against the bottom of the resin tank to remove settled pigment.

To clean the resin tank exterior:

1. Put on a new, clean pair of nitrile gloves.
2. Empty the liquid resin from the resin tank into an opaque container.
3. Apply a small amount of clean isopropyl alcohol to a PEC*PAD.
4. Wipe the resin tank exterior to remove contamination or resin.

To clean the tank frame:

1. Put on a new, clean pair of nitrile gloves.
2. Wipe the tank frame with a low-fiber paper towel to remove contamination or resin.

6.7.3   **Replacing the resin tank**

Replace the resin tank to change materials between prints or when a resin tank is damaged or needs to be cleaned.

To replace the resin tank:

1. Put on a new, clean pair of nitrile gloves.
2. Remove the build platform from the printer.
3. Unlatch and remove the mixer.
4. Unlatch the resin tank latches.
5. Hold the side walls of the resin tank.
6. Lift the resin tank out of the printer.
7. Place the lid on the resin tank.
8. To install a new resin tank, refer to section **4.8 Inserting the resin tank and mixer.**

To dispose of the old resin tank, refer to section **9.1 Disposal of resin and accessories.**

7.   Troubleshooting

7.1   Collecting diagnostic logs

The Form 4 maintains diagnostic logs to provide detailed information about the machine that may expedite issue investigation. After experiencing any error or unusual behavior on the Form 4, include the diagnostic logs with other relevant observations and details when contacting Formlabs Support or a certified service provider. The options for sharing diagnostic logs vary depending on the machine's connection type. For detailed guidance and visual assistance, visit **support.formlabs.com**.

7.2   Performing a factory reset

On some occasions, a factory reset may correct unusual printer behavior. Unusual behavior may include unknown error messages, incomplete firmware updates, an unresponsive touchscreen, or trouble connecting to PreForm. For detailed guidance and visual assistance, visit **support.formlabs.com**.

> ⚠ **NOTICE**
>
> Do not perform a factory reset immediately before contacting Formlabs Support or a certified service provider. The stored diagnostic information may be helpful to Formlabs Support or a certified service provider to assist with troubleshooting. A factory reset erases diagnostic information and custom settings, including uploaded print jobs and networked connections.

7.3   Cleaning after a failed print

Occasionally, a print may fail to complete. A failed print may leave small, partially-cured pieces of resin floating in the resin tank or hard cured resin stuck to the interior of the resin tank. Inspect the resin tank after every print. Remove debris after a failed print. For detailed guidance and visual assistance, visit **support.formlabs.com**.

> ⚠ **WARNING**
>
> **Skin irritant:** Resin and solvent may cause skin irritation or an allergic skin reaction. Wear gloves when handling liquid resin, resin-coated surfaces, or solvent. Wash skin with plenty of soap and water.

> ⚠ **NOTICE**
>
> Sharp and metal tools can damage the resin tank and affect print quality, leading to print failures and/or a resin spill. Do not use sharp or metal tools like the removal tool or flush cutters to inspect or clean the resin tank.

7.3.1   7.3.1 Removing cured resin with the cleaning sheet

Formlabs Low Force Display (LFD)™ printers can print a cleaning sheet, which is a thin, flat printed part that binds loose debris together. The cleaning sheet adheres to the resin tank for removal using the plastic tank scraper. Print a cleaning sheet after a failed print to more easily remove cured resin and other debris.

Required supplies

Non-reactive nitrile gloves
Paper towels
Plastic tank scraper

To remove cured resin with the cleaning sheet:
1. Put on a new, clean pair of nitrile gloves.
2. Tap the wrench icon on the **Home** screen. The **Maintenance** menu appears.
3. Tap **Cleaning Sheet**. The **Print Cleaning Sheet** screen appears.
4. Tap **Clean**. The cleaning sheet begins printing.
5. Once the cleaning sheet is complete:
   ◦ Remove the build platform and resin cartridge from the printer.
   ◦ Remove the mixer and resin tank from the printer. Place the resin tank on a clean, flat surface.
6. Prepare several paper towels nearby to collect cured and uncured resin.
7. To remove the cleaning sheet:
   ◦ Slide the edge of the plastic tank scraper under the edge of the cleaning sheet.
   ◦ Pry with moderate pressure. Slide or pry from different angles or increase pressure to detach the cleaning sheet from the resin tank. Do not press directly into the resin tank with the edge of the tank scraper.
   ◦ Lift the cleaning sheet out of the resin tank.
   ◦ Rest the cleaning sheet on paper towels.
8. To dispose of the cleaning sheet, refer to section **9.1 Disposal of resin and accessories.**
9. Clean the plastic tank scraper and work surface.

7.3.2 **Removing cured resin manually**

The Form 4 comes with a plastic tank scraper, which can be used to remove cured resin from the interior of the resin tank without damaging it. Remove individual pieces of cured resin from the resin tank with the plastic tank scraper.

Required supplies

Non-reactive nitrile gloves
Paper towels
Plastic tank scraper

To manually remove cured resin:
1. Put on a new, clean pair of nitrile gloves.
2. Remove the build platform and resin cartridge from the printer.
3. Remove the mixer and resin tank from the printer. Place the resin tank on a clean, flat surface.
4. Prepare several paper towels nearby to collect cured and uncured resin.
5. Rest the edge of the plastic tank scraper on the interior of the resin tank. Skim the surface. Search for obstructions that indicate cured resin stuck to the resin tank.

6. To remove cured resin:
   - ◦ Slide the edge of the plastic tank scraper under the edge of the cured resin.
   - ◦ Pry with moderate pressure. Slide or pry from different angles or increase pressure to detach the cleaning sheet from the resin tank. Do not press directly into the resin tank with the edge of the tank scraper.
   - ◦ Lift the cured resin out of the resin tank.
   - ◦ Rest the cured resin on paper towels.
7. To dispose of cured resin, refer to section **9.1 Disposal of resin and accessories.**
8. Clean the plastic tank scraper and work surface.

7.3.3 **Cleaning the plastic tank scraper**

Clean the plastic tank scraper after each use to remove excess liquid resin and prevent contamination.

Required supplies

Wiping	Washing
• Isopropyl alcohol • Low-fiber paper towels • Non-reactive nitrile gloves	• Form Wash or Form 4 Finish Kit • Isopropyl alcohol • Non-reactive nitrile gloves

To wipe the plastic tank scraper:
1. Put on a new, clean pair of nitrile gloves.
2. Apply clean isopropyl alcohol to a clean low-fiber paper towel.
3. Wipe the surface of the plastic tank scraper to remove resin.
4. Allow the plastic tank scraper to air dry after wiping.

To wash the plastic tank scraper:
1. Put on a new, clean pair of nitrile gloves.
2. Rest the plastic tank scraper in the wash basket of the Form Wash or rinse bucket of the Form 4 Finish Kit.
3. Wash the plastic tank scraper for five minutes. Increase the wash time for heavily-used solvent.
4. Allow the plastic tank scraper to air dry after washing.

7.4   Troubleshooting errors or abnormal activity

In the case of errors, abnormal activity, or print failures with the Form 4, reference the following errors, causes, and proposed solutions. Complete the initial troubleshooting steps and carefully document all results. For detailed guidance and visual assistance, visit **support.formlabs.com**.

7.4.1 **Resolving abnormal functions during print setup**

Error	Cause	Solution
The bite valve does not dispense resin.	• The silicone material has sealed itself. • Resin may cure over the bite valve opening.	1. Press the vent cap closed and remove the resin cartridge from the printer. 2. Turn the cartridge upside down to inspect the bite valve. 3. Squeeze the bite valve a few times to open up the seal and enable resin flow. 4. If squeezing the bite valve does not enable resin flow, carefully use the tip of a pair of tweezers to push through the opening to enable resin flow. 5. If the bite valve seal remains closed after troubleshooting, contact Formlabs Support or a certified service provider for additional help. Submit photos of the bite valve seal with your request.
The orange **Upload Print** icon is not available in PreForm.	The printer may not be properly connected to the same LAN.	• Check for other open instances of PreForm. • Save any files before restarting PreForm. • Disconnect your printer from the LAN and reconnect to establish a proper connection.
Error messages • Error 6.3: Cartridge missing • Error 6.8 or Error 6.9: Tank missing	The printer cannot sense the inserted resin tank and/or cartridge.	6. Fully remove the resin tank and/or cartridge. 7. Reinsert the resin tank and/or cartridge.

7.4.2 **Resolving print failures and errors**

Print failures can manifest in different ways and originate from different causes. Check the model configuration in PreForm, the cleanliness of the optical surfaces, and the machine's operating condition according to section **6 Maintenance**, including the proposed solutions below.

If print failures persist after following these steps, contact Formlabs Support or a certified service provider for additional guidance. In order to introduce a known good variable to isolate any printing issues, run a Formlabs test print, for which the file is available on **support.formlabs.com**. Provide clear, focused photographs of the test print to help diagnose the issue.

Error	Cause	Solution
Delamination • Peeling or separation between printed layers OR • Pieces of cured parts float in the resin tank	• Model orientation, layout, and/or support issues • A print that has been paused for a long time • An older resin tank • A loose build platform • Contaminated optical surfaces	• Check the model in PreForm • Check for pauses in printing • Check the resin tank for debris or damage • Check the cleanliness of optical surfaces • Check the stability of the build platform
Non-adherence • Prints partially attached to the build platform OR • Prints completely non-existent on the build platform	• Printing without supports • The first layer of the part on the build platform is too small to withstand peel forces • Debris/damage in resin tank • Contaminated optical surfaces • Build platform height requires adjustment	• Print with a base and supports • Check that the first layer's surface area is sufficiently large • Check the resin tank for debris or damage • Check the cleanliness of optical surfaces • Check the build platform height • Use the **Align Build Platform** calibration tool on the touchscreen to adjust the parallelism of the build platform. Tap **Settings > Tools > Align Build Platform** and follow the on-screen instructions.
Overcompression The base printed onto the build platform is thinner than expected and/or very difficult to remove.	The initial layers fail to cure properly, due to insufficient space between the build platform and the resin tank.	• Increase the base height in PreForm's advanced settings • Check the build platform height • Use the **Align Build Platform** calibration tool on the touchscreen to adjust the parallelism of the build platform. Tap **Settings > Tools > Align Build Platform** and follow the on-screen instructions.
Poor surface finish • Cured or partially cured resin forms thin, shelf-like structures that hang horizontally from a print OR • A rough, uneven, or bumpy surface texture forms on one or both sides of an otherwise successful print	Diffused light spreads the cure area beyond the appropriate limits for each layer outline, due to: • Expired resin • Debris/damage in the resin tank • Contaminated optical surfaces • Restricted resin flow due to improper model orientation or overly dense supports	• Check the resin's shelf life • Check the resin tank for debris or damage • Check the cleanliness of optical surfaces • Check for restricted resin flow

Error	Cause	Solution
Undeveloped feature A void of missing material forms within a print and widens as the print builds away from the build platform.	• Debris/damage in resin tank • Model orientation, layout, and/or support issue • Contaminated optical surfaces	• Check the resin tank for debris or damage • Check the model in PreForm • Check the cleanliness of optical surfaces • Check the function of the Backlight Unit and LPU. Tap **Settings > Tools > Inspect optics** and follow the on-screen instructions. A properly-functioning Backlight Unit and LPU will be uniformly lit or uniformly dark during the test.
Holes or lines Models have linear cuts or holes.	Obstructions in the optical path block the backlight from curing resin in a specific part of the model.	• Check the resin tank's underside for debris or damage • Check the cleanliness of optical surfaces

8.   Disassembly and repair

WARNING

All steps that involve opening the machine and/or investigating internal components should be done by skilled persons under the guidance of Formlabs Support or a certified service provider.

Contact Formlabs Support or a certified service provider to receive repair instructions and authorization, including how to disassemble or remove the shells.

Task	Frequency
Replacing the Light Processing unit	• When the LPU has visible damage or defects. • When the LPU no longer masks the light from the Backlight Unit correctly. • When advised by Formlabs Support or a certified service provider.
Replacing the Backlight Unit	• When the backlight has visible bright or dark spots. • When advised by Formlabs Support or a certified service provider.
Replacing the touchscreen	When the touchscreen becomes inoperable or does not respond to touch inputs.
Replacing the cover	When advised by Formlabs Support or a certified service provider.

9. Recycling and disposal

9.1 Disposal of resin and accessories

⚠️ **WARNING**

Skin irritant: Resin and solvent may cause skin irritation or an allergic skin reaction. Wear gloves when handling liquid resin, resin-coated surfaces, or solvent. Wash skin with plenty of soap and water.

9.1.1 Liquid resin

To dispose of pure resin (resin that has not been cured or dissolved in solvent), add this waste to your chemical waste stream.

⚠️ **CAUTION**

Environmental hazard: Refer to the safety data sheet (SDS) and local authorities for guidance on disposing of resin and solvent. Liquid resin (whether pure liquid, dissolved in solvent, or partially cured) may be classified as hazardous waste in your region and shall be disposed of with care.

If you do not have a chemical waste stream:

1. Put on a new, clean pair of nitrile gloves.
2. Pour a small amount of resin into a labeled container suitable for storing resin.
3. Leave the container outside, exposed to sunlight to cure for 1–10 days. Expose resin to 405 nm light and heat for the most effective curing. The liquid resin cures to solid material when exposed to light and heat.
4. Dispose of the fully cured resin and container in the household waste.

9.1.2 Cured resin or cleaned prints

Dispose of cleaned prints and cured (hardened) resin in the household waste. Cleaned prints and cured resin cannot be recycled.

9.1.3 Empty resin cartridges

In the United States, empty resin cartridges are considered RCRA empty by EPA standards and can be disposed of as household waste. Regulations that control waste are often regional and vary by jurisdiction. Check with applicable local agencies to ensure that you are disposing of empty resin cartridges properly.

OPTIONAL: Triple rinse resin cartridges with clean solvent to remove traces of excess resin from the resin cartridge interior. Add the resulting used solvent to your chemical waste stream in accordance with all applicable regulations.

9.1.4 Resin tanks

Dispose of a resin tank when it is damaged, has reached the end of its lifetime, or is otherwise unsuitable for use.

To dispose of a resin tank:

1. Put on a new, clean pair of nitrile gloves.
2. Remove the build platform from the printer.
3. Lift the lever securing the mixer.
4. Remove the mixer from the mixer mount and set it aside.

5. Open the two latch handles securing the resin tank in the printer.
6. Lift the resin tank out of the printer.
7. Transfer or dispose of the remaining resin.
   - Pour the resin from the old resin tank to a new resin tank or another container.
   - If there is debris or cured parts in the resin, filter the resin before transferring it to a new resin tank. Refer to section **6.6.2 Filtering the resin** for more information.

> **!**
> **NOTICE**
>
> Pouring resin back into the original resin cartridge may risk contaminating the resin cartridge with cured resin pieces or debris, which can cause print failures.

8. Use a paper towel to wipe any remaining resin off the old resin tank.
9. Place the old resin tank in sunlight (a window sill is fine) or UV light to cure excess resin, and dispose of properly once cured.

9.2   Disposal of solvent

Safe and appropriate disposal methods of used solvent vary by location.

To safely dispose of used solvent:

1. Consult the safety data sheet (SDS) from the solvent supplier as the primary source of information.
2. Research the approved methods of disposal for your area. This will most likely involve hiring a waste disposal service. For smaller amounts, check with a hazardous disposal service to see if they have any suggestions for removal.
3. Inform your waste disposal service that your bottle contains solvent with small amounts of methacrylated monomers and oligomers (unpolymerized plastic resin) and trace amounts of photoinitiator. Have a copy of the Formlabs resin safety data sheet (SDS) on hand in case the disposal service attendant needs more information.

9.3   Recycling of solvent

For large volumes of solvent, consider using a solvent recycling system, which offers a cost-effective and more environmentally responsible alternative to paying for waste solvent disposal services. Solvent recycling systems use distillation and fractionation processes to remove solutes from waste solvents, making it possible to reuse the solvent to wash prints. The recycled solvent may still have small amounts of monomers in it. Recycling solvent reduces waste disposal costs, emissions that are required to produce solvents, and the cost of purchasing solvent.

9.4   Disposal of electronic components

The symbol on the product, the accessories, or packaging indicates that this device shall not be treated as nor disposed of with household waste. When you decide to dispose of this product, do so in accordance with environmental laws and guidelines. Dispose of the device via a collection point for the recycling of waste electrical and electronic equipment. By disposing of the device in the proper manner, you help to avoid possible hazards for the environment and public health that could otherwise be caused by improper treatment of waste equipment. The recycling of materials contributes to the conservation of natural resources. Therefore do not dispose of your old electrical and electronic equipment with the unsorted municipal waste.

9.5   Disposal of packaging waste

The packaging is made of cardboard and plastic-based materials. Dispose of packaging through waste and recycling facilities. By disposing of the packaging waste in the proper manner, you help avoid possible hazards for the environment and public health.

⊙
NOTICE

Save the Form 4's packaging including any inserts for transporting the machine. Original packaging is required for warranty service and designed to be kept and reused for transportation or shipping.

10. Index

11. Glossary

Term	Meaning
Backlight Unit	A set of 405 nm LEDs emit light upwards through lenses, the Light Processing Unit, and the bottom of the resin tank to cure liquid resin.
Bite valve	A flexible, rubber seal that regulates resin dispensing. Resin flows out when the cartridge dispense arm squeezes the bite valve open.
Build platform–see also, platform lock	The aluminum base provides a surface for prints to attach to. Over time, the build platform develops scratches from part removal, which can assist with print adherence.
Build platform mount	The metal arm that the build platform slides onto.
Build platform jig	Stabilize the build platform for the secure removal of prints. Secure the build platform jig to the edge of your work surface by tightening the jig screw clamps underneath the work surface.
Build platform latch	A lever that is part of the locking mechanism that secures the build platform. Contact Formlabs Support or a certified service provider before adjusting the platform lock, as improper adjustment can damage the machine.
Build platform sensor	Each Form 4 build platform has an RFID sticker. The printer senses the RFID sticker to detect when the build platform is properly installed.
Cartridge dispense arm	Plastic hooks press against the bite valve to dispense resin out of the resin cartridge into the resin tank.
Cartridge RFID sticker	Each resin cartridge has an RFID sticker attached to the cartridge skirt. The printer reads the RFID sticker to detect the unique cartridge ID and resin type.
Cleaning sheet	A thin, flat printed part that binds loose resin and other debris together in the resin tank for removal and disposal.
Cover	The printer lid, made of a strong, orange-tinted material, blocks exposure to the curing light and protects the resin from curing due to ambient light.
Display assembly	The display assembly contains the touchscreen and the display circuit board. A ribbon cable connects the display assembly to the motherboard.
Display cable	A flat, flexible cable connects the display assembly to the motherboard.
Display PCB	This circuit board, separated from the main motherboard, controls the touchscreen.
Ethernet port	The Form 4 can connect to a network via Ethernet. The port is connected to the motherboard and can be accessed from the back of the machine.

Term	Meaning
Fans	Cooling fans pull warm air away from electronic components: the backlight, the LCD, and the power supply
Flush cutters	Snip to separate prints from their supports. Cut with the flat side on the prints' surface for minimal support marks.
Heater	The resin in the resin tank is heated by resistive heaters located below the resin tank.
Interlock magnets	The interlock sensor detects these magnets to determine when the cover is closed. This safety mechanism triggers the **Cover Open** message on the touchscreen and disables the backlight when the cover is open.
Leveling disc	Slide the leveling disc included around one of the leveling feet and rotate to raise or lower the printer.
Leveling feet	Each corner of the printer is supported by a rubber foot that is threaded into the bottom of the machine. When prompted by the touchscreen, use the leveling disc to raise or lower each foot to ensure that the printer is acceptably level.
LevelSense	An ultrasonic sensor, located above the rear left-hand corner of the resin tank detects the amount of resin in the resin tank.
Low Force Display (LFD)™ Print Engine	An advanced form of stereolithography (SLA) to cure solid isotropic parts from liquid resin.
Light Processing Unit (LPU)	The LPU blocks the 405 nm light from the backlight to selectively expose and cure each layer of a print.
LPU release texture	The texture on the top of the LPU reduces forces on the printed parts, resin tank, and printer between layers.
Mixer	The mixer improves print consistency by clearing the build area and circulating the resin. The mixer moves via a belt that runs across the front of the printer.
Motherboard	The main circuitry through which all systems in the printer communicate.
PEC*PAD	Disposable lint-free, non-woven microfiber cloths for cleaning the printer's optical components. Do not reuse a PEC*PAD; dispose of after each use.
Plastic tank scraper	Use the plastic tank scraper to inspect the resin tank and remove cured resin from the tank film.
Power supply	The Form 4 utilizes a 100–240 VAC power supply. The internal power supply converts line power to DC power for the printer.
Resin cartridge	A container that holds the resin before dispensing into the resin tank. Shake resin cartridges periodically to keep resin well mixed.
Resin tank	Resin is dispensed out of the resin cartridge into the resin tank. During a print, light passes upwards through the bottom of the resin tank and cures resin onto the build platform to form a printed part. Only use approved materials and procedures to clean the resin tank.

Term	Meaning
Resin tank RFID sticker	Each resin tank has an RFID sticker attached to the back wall of the tank frame. The printer reads the RFID sticker to detect the unique tank ID and current resin type.
Rinse basket	Place prints in the rinse basket, place the rinse basket into the rinse bucket, and agitate to clean.
Rinse bottle	Remove resin trapped in cavities and internal channels of prints. Use clean solvent. Formlabs recommends isopropyl alcohol.
Rinse bucket	Fill the rinse bucket with solvent before washing prints. The rinse bucket includes a ground wire to prevent static discharge. Formlabs recommends isopropyl alcohol or tripropylene glycol monomethyl ether.
Shell	Five protective external casings protect the printer's internal components: **Right shell:** metal casing for the right side of the printer **Left shell:** metal casing for the left side of the printer. **Rear shell:** metal casing for the back face of the printer. **Cover:** printer lid, made of an orange-tinted material; hinged to the top of the printer. **Front shell:** metal casing that covers the bottom of the front face of the printer (below the cover); also includes the display assembly.
Solvent pump	Fill and empty the rinse bucket.
Status light	Two interior lights (vertical strips along the left and right walls) and an illuminated logo (on the front panel) that pulse to indicate the printer is active, a print has completed, or the printer has encountered an error.
Tank carrier	The tank carrier holds the resin tank in place during printing.
Tank lid	Each resin tank includes a lid for storing and protecting the resin tank when not in use.
Tank handles	Handles on each side of the resin tank allow for easy insertion, removal, and carrying of the resin tank. Use the tank handles to avoid touching the resin tank's underside, as fingerprints leave smudges that obstruct the optical path.
Tank spout	A spout at the right of the resin tank sits underneath the cartridge dispense hole and receives resin from the resin cartridge.
Touchscreen	The LCD capacitive touch user interface displays print information, settings, and error messages.
USB port	The Form 4 can connect to a computer via USB. The port is connected to the motherboard and can be accessed from the back of the machine.
Vent cap	The lid at the top of the cartridge allows for air interchange, enabling proper resin dispensing. Press the vent cap open prior to printing.

Term	Meaning
Wi-Fi antenna	The internal Wi-Fi antenna enables the Form 4's wireless connectivity.
Z-axis lead screw	The Z-axis lead screw is a threaded rod that controls the vertical motion of the build platform mount.
Z-tower	This vertical tower at the back of the machine provides support for many components of the Form 4. The build platform is raised and lowered along the Z-axis, inside the Z-tower.

13. Product compliance

The Form 4 complies with the following electrical and photobiological safety standards:

Electrical

- UL 62368-1:2019 Ed.3+R:22Oct2021
- CSA C22.2#62368-1:2019 Ed.3+U1
- IEC 62368-1:2018
- EN IEC 62368-1:2020+A11:2020
- AS/NZS 62368.1:2022
- J62368-1 (2023)

Machinery

- EN 60204-1:2018

Photobiological

- IEC 62471:2006

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