

K-100 桌面级 SLS 3D 打印机

用户手册

Desktop SLS (Selective Laser Sintering) 3D Printer — User Manual

项目 <i>Item</i>	内容 <i>Content</i>
型号 <i>Model</i>	K-100
工艺 <i>Process</i>	选择性激光烧结 SLS 1 类激光产品 <i>Class 1 Laser Product</i>
切片软件 <i>Slicer</i>	CREA Builder SLS (SLC 格式)
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惠州市科锐智能科技有限公司

Huizhou CREA Intelligent Technology Co., Ltd.

Loopzizo.com

CREA K-100 Desktop SLS 3D Printer — User Manual

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本手册用于指导 CREA K-100 桌面级选择性激光烧结（SLS）3D 打印机的安装、操作、维护与故障处理。请在首次使用前完整阅读本手册，尤其是「安全须知」章节，并妥善保存本手册以备日后查阅。

This manual guides you through the installation, operation, maintenance and troubleshooting of the CREA K-100 Desktop Selective Laser Sintering (SLS) 3D printer. Please read this manual in full before first use — especially the Safety Instructions — and keep it for future reference.

本手册采用中英双语对照编排：中文在上，英文在下。当两种语言版本的表述存在歧义时，以中文版本为准。

This manual is presented bilingually: Chinese first, English second. Where the two versions differ in wording, **the Chinese version prevails**.

符号约定 Symbol Conventions

符号 Symbol	含义 Meaning	说明 Description
 危险 DANGER	可能导致人身伤害	May cause personal injury. 必须严格遵守，不得省略。 Must be strictly followed; never skipped.
 警告 WARNING	可能导致设备损坏或数据丢失	May cause equipment damage or data loss. 需按步骤执行。 Follow the steps exactly.

 提示 NOTE	操作建议与技巧	<i>Operating tips. 可帮助您获得更好的打印效果。 Helps you achieve better results.</i>
 待补充 TBD	本版尚未确认的信息	<i>Information not yet confirmed in this version. 请以随机附件或官方通知为准。 Refer to the supplied documentation or official notice.</i>

 提示 / NOTE: 凡标注 **【待补充: ...】** / **[TBD: ...]** 的内容, 为本手册编写时尚未从产品资料中确认的细节, 请以随机附带文档或官方客服通知为准。后续版本将补齐。

 NOTE: Items marked **【待补充: ...】** / **[TBD: ...]** are details not yet confirmed from the product documentation at the time of writing. Please refer to the documentation supplied with your machine or contact official support. Later versions will complete them.

1. 安全须知 Safety Instructions

 警告 / WARNING: 本章内容关系到人身安全与设备寿命。在未完整阅读并理解本章之前, 请勿通电、勿装粉、勿启动激光。

1.1 激光安全 Laser Safety

K-100 为 **1 类激光产品 (Class 1 Laser Product)**。1 类激光产品在正常运行条件下不会产生有害的激光辐射, 但该结论仅在设备的所有防护罩、仓门与安全联锁装置完好且闭合时成立。

The K-100 is a **Class 1 Laser Product**. Under normal operating conditions a Class 1 laser product does not emit hazardous laser radiation — **but this holds only when all covers, chamber doors and safety interlocks are intact and closed.**

1. **严禁**在拆除防护罩的情况下运行任何打印任务。
2. **严禁**在成型仓仓门开启状态下启动激光。
3. **严禁**旁路、短接或改装任何安全联锁开关。
4. 设备周边应保持整洁并保留激光警示标识, **不得遮挡、撕除或涂改**。
5. 观测窗口为**专用滤光材质**, 破损后必须由原厂更换, **不得以普通玻璃或亚克力替代**。

6. 若设备出现异常（异响、异味、激光功率异常、联锁报警），立即按下急停或切断总电源，并联系售后服务。

⚠ 危险 / DANGER: 任何涉及光学腔体、激光模块的维修，**必须**由厂家授权的服务人员按服务手册执行。用户自行拆装将导致保修失效，并可能造成不可逆的眼部损伤。

1. *Never run a print job with any protective cover removed.*
2. *Never start the laser while the build chamber door is open.*
3. *Never bypass, short-circuit or modify any safety interlock.*
4. *Keep the area around the machine tidy and keep all laser warning labels visible, intact and unaltered.*
5. *The observation window uses **optically filtered material**. If damaged it must be replaced with an original part — **never substitute ordinary glass or acrylic.***
6. *If the machine behaves abnormally (unusual noise, odour, abnormal laser power, interlock alarm), press E-stop or cut mains power immediately and contact support.*

⚠ DANGER: Any service touching the optical cavity or laser module **must** be performed by factory-authorized personnel following the service manual. User disassembly voids the warranty and may cause irreversible eye injury.

1.2 粉末作业安全 Powder Handling Safety

K-100 使用 PA11、PA12、TPU 等聚合物粉末。粉末的**细微颗粒与可燃粉尘**特性要求作业时遵守以下规范：

The K-100 uses polymer powders such as PA11, PA12 and TPU. Because these powders are **fine particulates** and **combustible dust**, the following rules apply:

风险 Risk	防护要求 Protection
粉尘吸入 Dust inhalation	清粉、筛分、回收时必须佩戴 N95 及以上等级防尘口罩。Wear an N95 (or higher) respirator

	when clearing, sieving or reclaiming powder.
皮肤接触 Skin contact	佩戴 丁腈手套 ；长期接触可能导致皮肤干燥或过敏。Wear nitrile gloves ; prolonged contact may cause dryness or irritation.
眼部 Eye contact	处理细粉或使用压缩空气吹扫时佩戴 护目镜 。Wear safety goggles when handling fine powder or using compressed air.
静电 Static electricity	使用防静电工具与接地工位；避免在湿度低于 40% 的环境中大幅摩擦粉末。Use ESD-safe tools and a grounded workstation ; avoid vigorous powder friction below 40% RH .
通风 Ventilation	清粉工位应具备 局部排风 或良好自然通风。The powder-handling station should have local exhaust or adequate natural ventilation.
火险 Fire hazard	粉末属 可燃粉尘 ， 严禁明火 、 严禁吸烟 ； 禁止使用普通吸尘器吸粉 ，应使用防爆型设备或湿式清理。Powder is combustible dust . No open flame , no smoking. Do not use an ordinary vacuum cleaner — use explosion-proof equipment or wet cleaning.

⚠ 警告 / WARNING: 请勿将废弃粉末倒入下水道或普通生活垃圾。废粉应按当地环保法规交由合规机构处置。Do not dispose of waste powder down drains or in regular refuse. Dispose of it through a licensed facility in accordance with local environmental regulations.

1.3 电气安全 Electrical Safety

- 电源要求: **220VAC / AC110V, 50Hz**（请对照机身铭牌确认您的机型电压）。
Power supply: **220VAC / AC110V, 50Hz** (check the nameplate on your machine).
- 必须使用**可靠接地的三孔插座**，接地线不得拆除。Use a **properly earthed three-pin outlet**; never remove the earth conductor.
- 请勿与空调、大功率加热设备共用同一回路，避免电压波动影响激光功率稳定性。Do not share a circuit with air conditioners or high-power heaters; voltage fluctuation affects laser power stability.

- 清洁设备前请先切断电源；**严禁**在通电状态下用湿布擦拭机身内部。 *Cut power before cleaning; never wipe the interior with a wet cloth while powered.*

1.4 使用环境 Operating Environment

项目 Item	要求 Requirement
环境温度 Ambient temperature	15–29 °C ; 温度波动应尽量小。 <i>Temperature fluctuation should be minimised.</i>
相对湿度 Relative humidity	< 80% （建议 40%–60% 以获得最佳铺粉效果） (40%–60% recommended for best powder spreading)
场地 Floor	水平、坚固、无振动的地面或承重台面。 <i>Level, rigid, vibration-free floor or bench.</i>
空间 Clearance	四周预留散热与操作空间 $\geq 30\text{cm}$ 。【待补充：官方最小间距要求】 $\geq 30\text{cm}$ for airflow and access. [TBD: official minimum clearance]
环境 Environment	避免粉尘、腐蚀性气体、强电磁干扰与阳光直射。 <i>Avoid dust, corrosive gas, strong EMI and direct sunlight.</i>

⚠ 警告 / WARNING: 在低于 15°C 或高于 29°C 的环境中打印，会导致零件尺寸偏差、层间结合力下降甚至打印失败。请在空调环境下使用。 *Printing below 15°C or above 29°C causes dimensional deviation, weak interlayer bonding, or failed builds. Operate in a climate-controlled room.*

2. 产品认识 Getting to Know Your K-100

本章介绍 K-100 的产品定位、主要部件与技术规格，帮助您在开箱后快速建立对设备的整体认识。 This chapter introduces the product positioning, main components and technical specifications of the K-100, so you can build a clear picture of the machine right after unboxing.

2.1 产品简介 Product Overview

CREA K-100 是一台面向桌面场景的**选择性激光烧结（SLS）3D 打印机**。与熔融沉积（FDM）工艺不同，SLS 通过激光在粉末床上逐层烧结成型，**零件在粉末中获得支撑**，因此：

The CREA K-100 is a **Selective Laser Sintering (SLS) 3D printer** designed for desktop use. Unlike Fused Deposition Modelling (FDM), SLS fuses powder layer by layer with a laser, and the surrounding powder supports the part. Consequently:

- 无需打印支撑结构，省去拆支撑与支撑痕处理。 *No support structures are required — no support removal, no support marks.*
- 适合复杂内腔、悬垂结构、批量小件、互锁装配件。 *Ideal for complex internal cavities, overhangs, small-batch production and interlocking assemblies.*
- 成型件具有各向同性的力学表现，强度接近注塑件。 *Parts exhibit near-isotropic mechanical behaviour, approaching injection-moulded strength.*

2.2 主要部件识别 Main Components

<image: p1_0.png>K-100 整机外观 / K-100 Overview

图 1 K-100 整机外观 Figure 1 K-100 exterior

【待补充：机身各部件的正式编号与名称（如 1 成型仓门 / 2 触控屏 / 3 供粉仓 / 4 废粉抽屉 / 5 急停按钮 等），待确认后替换为标注图】

位置 Position	部件 Component	功能 Function				
上部 Upper	成型仓门 Build chamber door	观察并按需打开取件；开启时联锁切断激光 Opens for part retrieval; interlocked to disable the laser		上部 Upper	观测窗口 Observation window	滤光窗口，可在不中断打印的情况下观察铺粉与烧结 Filtered window; observe powder spreading and sintering without

						interrupting the build
中部 Middle	供粉仓 Powder feeding hopper	容量 3KG Capacity 3KG				
中部 Middle	铺粉机构 Recoater	将粉末从供粉仓送至成型仓并刮平 Delivers and levels powder into the build chamber				
下部 Lower	废粉收集 Waste powder collector	收集清粉与溢粉 Collects cleared and overflow powder				
前面板 Front	操作面板 / 触控屏 Control panel / Touchscreen	【待补充： 屏幕尺寸、 界面语言】 [TBD: screen size, UI languages]				
侧面 Side	内存卡 / U 盘接口 SD / TF / USB port	导入切片文件， 支持离线传输 Import slice files; fully offline				
机身 Body	急停按钮 Emergency stop	紧急情况下 切断运动与 激光 Cuts motion and laser in an emergency				

2.3 技术规格 Technical Specifications

项目 Item	参数 Specification
成型工艺 Process	选择性激光烧结 SLS 1 类激光产品 Class 1 Laser Product
激光源 Laser source	5W 450nm 二极管激光, 功率可变 / 5W 450nm diode, variable power
成型仓尺寸 Build chamber	140mm x 140mm x 140mm
最大成型尺寸 Max. part size	130mm x 130mm x 130mm
打印层厚 Layer thickness	Z 轴 0.1mm; X、Y 轴 0.05mm
最快速度 Max. speed	Z 轴方向 15mm/小时 / 15 mm/h in the Z axis
冷却时间 (整缸) Cooling time (full cylinder)	≤ 6 小时 / ≤ 6 hours
材料兼容性 Materials	PA11、PA12、TPU
支撑结构 Support structure	无支撑 / No support
供粉仓容量 Hopper capacity	3KG
连接方式 Connectivity	SD 卡、TF 卡、U 盘 (离线) / SD card, TF card, USB drive (offline)
切片软件 Slicing software	CREA Builder SLS (支持 SLC 格式) / CREA Builder SLS (SLC format)
电源要求 Power supply	220VAC / AC110V, 50Hz
整机尺寸 Machine dimensions	40cm x 42cm x 82cm (宽 x 深 x 高) / 40 x 42 x 82 cm (W x D x H)
工作环境 Operating environment	15-29℃, 湿度 < 80%
保修与服务 Warranty	含一年保修服务 / 1-year warranty included

[i] 提示 / NOTE: 以上参数为出厂标称值。实际打印时间随零件体积、填充密度、材料与摆放方式变化。The parameters above are nominal factory values. Actual build time varies with part volume, packing density, material and orientation.

3. 开箱与安装 Unboxing and Installation

本章按「清点附件 → 就位 → 通电 → 自检预热 → 装软件」的顺序，带您完成设备的首次安装。请逐步骤执行，不要跳步。This chapter walks you through first-time installation in order: check the accessories, position the machine, power it on, run self-check and preheating, then install the software. Follow each step in sequence — do not skip.

3.1 开箱检查 Unpacking Checklist

⚠ 警告 / WARNING: K-100 整机重量较大，请两人以上协作搬运，务必使用机身底部的搬运受力点，严禁抓握仓门、把手或线缆起吊。

The K-100 is heavy. **Always lift with two or more people**, using the designated lifting points on the base. **Never lift by the chamber door, handles or cables.**

1. 在平整场地拆开外包装，保留原包装材料以备运输。 *Open the packaging on a level surface; keep the packing materials for future transport.*
2. 逐项核对随机附件清单（下表）。 *Check the supplied accessories against the list below.*
3. 检查机身外观、观测窗口、仓门与线缆有无运输损伤。 *Inspect the body, observation window, chamber door and cables for shipping damage.*
4. 若发现缺件或损伤，**请勿通电**，保留包装并立即联系售后。 *If anything is missing or damaged, do not power on; keep the packaging and contact support.*

序号 No.	附件 Accessory	数量 Qty	状态 Status
1	K-100 主机 K-100 main unit	1	✓
2	电源线 Power cord	1	✓
3	快速入门指南 Quick Start Guide	1	✓
4	保修卡 Warranty card	1	✓
5	随机工具（清洁刷等）	1 套 / 1 set	✓

	Tools (cleaning brush, etc.)		
6	初始耗材 Initial powder	不随附耗材 / Not supplied	—
7	软件安装包 Software package	官网下载 www.loopzizo.com / Download from the official website	✓
8	防尘口罩、手套等防护用品 PPE (mask, gloves)	不随附 / Not supplied	—

3.2 安装步骤 Installation Steps

步骤 1 | 就位 Positioning

1. 将设备放置于符合 §1.4 环境要求的水平台面或地面上。Place the machine on a level surface or floor meeting §1.4 requirements.
2. 四周预留 $\geq 30\text{cm}$ 散热与操作空间。Leave $\geq 30\text{cm}$ clearance on all sides.
3. 调整机身水平（可使用机身底部调节脚/水平仪）。Level the machine (adjustable feet / spirit level).
4. 完成标志 / Done when: 机身无晃动，水平泡居中。The machine does not wobble; the bubble is centred.

步骤 2 | 通电 Power-on

1. 确认电源电压与机身铭牌一致。Confirm the mains voltage matches the nameplate.
2. 连接电源线至接地良好的三孔插座。Connect to a properly earthed three-pin outlet.
3. 打开总电源开关，设备进入自检。Switch on; the machine runs self-check.
4. 完成标志 / Done when: 屏幕点亮，自检无报警。Screen lights up; no self-check alarm.

步骤 3 | 初始自检与预热 Initial Self-check and Preheating

1. 开机预热 30 分钟：通电后先让设备完成预热，使粉床与烧结区温度趋于稳定。
*
Preheat for 30 minutes after power-on so the powder bed and sintering zone reach thermal stability.*
2. 空跑一遍 Z 轴运动流程：完整执行一次 Z 轴升降流程，确认运动机构顺畅、无卡滞、无异常噪音。
*
Run the Z-axis motion routine once end-to-end; confirm smooth travel, no binding and no abnormal noise.*
3. 确认温控与运动机构正常后，方可进入装粉与打印流程。
*
Proceed to powder loading and printing only after temperature control and motion are confirmed normal.*

 **提示 / NOTE:** 首次开机建议空跑一次预热与冷却流程（不装粉），以确认温控与运动机构正常。
On first power-up, run a dry heat-up / cool-down cycle (no powder) to verify temperature control and motion.

步骤 4 | 软件安装 Software Installation

1. 从官网 www.loopzizo.com 下载 CREA Builder SLS 安装包。
Download the CREA Builder SLS installer from the official website www.loopzizo.com.
2. 在电脑上完成安装（详见《CREA Builder SLS 软件说明书》）。
Install it on your PC (see the dedicated CREA Builder SLS Software Manual).

4. 操作前准备 Preparations Before Printing

正式打印前的准备分为三件事：装粉、确认材料、预热设备。这三步做扎实，能显著提高首件成功率。Preparation before printing comes down to three things: loading powder, confirming the material, and preheating the machine. Getting these right markedly improves first-part success.

4.1 粉末准备与装粉 Powder Preparation and Loading

目的 / Purpose: 在成型仓与供粉仓中建立平整、均匀的粉床，为逐层烧结提供基础。To establish a level, uniform powder bed in the hopper and build chamber as the basis for layer-by-layer sintering.

前置条件 / Prerequisites: 设备已通电并完成自检；已佩戴 N95 口罩、丁腈手套与护目镜；环境温湿度达标。Machine powered and self-checked; N95 mask, nitrile gloves and goggles worn; ambient conditions compliant.

1. 打开供粉仓盖，确认仓内干燥清洁、无异物。Open the hopper lid; confirm it is dry, clean and free of debris.
2. 使用原厂/认证粉末，缓慢倒入，避免扬尘。Pour certified powder slowly to avoid dusting.
3. 装至**建议料位**（供粉仓总容量 3KG；仓内**无料位刻线**，请按经验料位装填，保持粉量充足）。Fill to the **recommended level** (total capacity 3KG; the hopper has no level markings — fill to the practical level and keep enough powder available).
4. 闭合仓盖并锁紧。Close and latch the lid.
5. 在操作面板上执行**铺粉/粉床初始化**流程。Run the recoat / powder-bed initialisation routine.
6. **完成标志 / Done when:** 粉床表面平整、无凹坑、无结块。The powder bed is flat, free of pits and lumps.

⚠ 警告 / WARNING: 严禁混用不同材料或不同批次的粉末，除非经过充分筛分与兼容性验证。混合粉末会导致烧结温度曲线失配、零件强度不一致。Never mix different materials or batches without thorough sieving and compatibility verification. Mixed powder causes mismatched sintering curves and inconsistent part strength.

4.2 材料说明 Materials

材料 Material	特点 Characteristics	典型应用 Typical Applications
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PA12	综合性能均衡，韧性好，吸水率低，最常用 <i>Balanced properties, good toughness, low moisture uptake; the most common choice</i>	功能原型、结构件、卡扣、齿轮 <i>Functional prototypes, structural parts, clips, gears</i>
PA11	韧性更优，抗冲击与耐低温性能好 <i>Higher toughness, better impact and low-temperature performance</i>	承力件、铰链、护具、运动部件 <i>Load-bearing parts, hinges, protective gear, moving parts</i>
TPU	柔性、可回弹，适合弹性结构 <i>Flexible and resilient; for elastic structures</i>	缓冲垫、密封件、可穿戴件 <i>Cushions, seals, wearable parts</i>

[i] 提示 / NOTE: 粉末易吸潮。开封后应密封保存于干燥环境，长期存放建议使用干燥柜。建议在使用前按材料要求进行干燥处理。【待补充：官方推荐的干燥温度与时长】 *Powder is hygroscopic. Keep it sealed and dry after opening; a desiccator is recommended for long storage. Drying before use is advised — [TBD: official drying temperature and duration].*

4.3 设备预热 Preheating

【待补充：预热的目标温度、升温速率、保温时长与操作路径】

[i] 提示 / NOTE: 预热的目的在于缩小粉床与烧结区之间的温差，从而降低零件翘曲与尺寸偏差。充分的预热是 SLS 打印成功率的关键前置条件之一。 *Preheating narrows the temperature gap between the powder bed and the sintering zone, reducing warpage and dimensional deviation. Adequate preheating is one of the key prerequisites for a successful SLS build.*

5. 打印全流程 Complete Printing Workflow

整个打印过程分为 **6 个阶段**。下图展示从建模到取件的完整闭环：

The complete workflow has **6 stages**, forming a closed loop from modelling to part retrieval:

建模 → 切片 → 传输 → 打印 → 冷却 → 取件清粉 **Model → Slice → Transfer → Print → Cool → Retrieve & Clean**

阶段 1 | 建模与导出 Stage 1 — Modelling and Export

1. 在任意 CAD 软件中完成三维建模。Model your part in any CAD software.
2. 导出为 STL 格式（建议使用二进制 STL 以减小体积）。Export as STL (binary STL recommended for smaller files).
3. 检查模型水密性（无破面、无反向法线、无零厚度面）。Verify the mesh is watertight (no holes, no inverted normals, no zero-thickness faces).

格式 Format	支持 Support	说明 Note
STL	✓ 推荐 Recommended	通用网格格式，兼容性最好 Most compatible mesh format
【待补充：其它导入格式，如 OBJ / 3MF / STEP】	🔗	[TBD: other import formats]

阶段 2 | 切片 Stage 2 — Slicing

使用自研切片软件 **CREA Builder SLS** 完成切片，输出 **SLC 格式** 文件。

Slice with the in-house **CREA Builder SLS** software and output **SLC format** files.

1. 导入 STL 模型。Import the STL model.
2. 设置层厚（Z 轴 0.1mm）、摆放方向、零件间距与排布。Set layer thickness (Z 0.1 mm), orientation, part spacing and nesting.
3. 执行切片并预览逐层路径，确认无异常空层。Slice and preview the layer paths.
4. 导出 SLC 文件至 SD 卡 / TF 卡 / U 盘。Export the SLC file to an SD card, TF card or USB drive.

🔗 待补充 / TBD: CREA Builder SLS 的参数面板、参数含义与推荐参数组合，详见《CREA Builder SLS 软件说明书》。For the parameter panels, parameter meanings and recommended profiles of CREA Builder SLS, see the dedicated CREA Builder SLS Software Manual.

阶段 3 | 文件传输 Stage 3 — File Transfer

1. 将存储介质插入机身接口。 *Insert the storage medium into the machine port.*
2. 在操作面板上浏览并选择目标文件。 *Browse and select the target file on the control panel.*
3. 确认文件信息（零件数量、预估层数、【待补充：预估时长】）。 *Confirm file information (part count, estimated layers, [TBD: estimated duration]).*

i 提示 / NOTE: K-100 采用**离线传输**方式，无需联网、无需注册账号、不上传任何模型数据。这对处理涉密或客户保密模型尤为重要。 *The K-100 transfers files fully offline — no network, no account, no model upload. This matters when handling confidential or client-restricted models.*

阶段 4 | 启动打印 Stage 4 — Starting the Build

⚠ 警告 / WARNING: 启动前**必须**确认仓门已关闭并锁紧、安全联锁指示正常。 *Before starting, confirm the chamber door is closed and latched and the interlock indicator is normal.*

1. 确认粉床平整、料位充足。 *Confirm the powder bed is level and the powder level is sufficient.*
2. 关闭仓门并锁紧。 *Close and latch the chamber door.*
3. 在面板上启动打印任务。 *Start the job from the panel.*
4. 观察前 3–5 层的铺粉与烧结状态。 *Observe the first 3–5 layers of recoating and sintering.*
5. 完成标志 / **Done when:** 铺粉均匀、无缺粉、无拖痕、烧结区亮度正常。 *Powder spread is even, no starvation, no drag marks, normal sinter brightness.*

⚠ 警告 / WARNING: 打印过程中**严禁**打开仓门。如需中止，请使用面板上的暂停/中止功能，等待激光停止后再按规程处理。 *Never open the chamber door during a build. To stop, use Pause/Abort and wait until the laser has stopped before proceeding.*

阶段 5 | 冷却 Stage 5 — Cooling

打印完成后，**整缸须在仓内自然冷却**，标称冷却时间 ≤ 6 小时。

After the build completes, **the whole cylinder must cool inside the chamber**. Nominal cooling time is ≤ 6 hours.

1. 打印结束后**不要立即取件**，保持仓门关闭。 *Do not retrieve parts immediately; keep the door closed.*
2. 等待冷却流程完成（面板提示冷却完成后即可取件）。 *Wait for the cooling cycle to complete (retrieve parts once the panel indicates completion).*
3. 完成标志 / **Done when**: 面板提示冷却完成。当缸内温度接近室温时取件质量最佳。 *The panel indicates cooling complete. Best results are obtained when the cylinder is near room temperature.*

⚠ **警告 / WARNING**: 半热状态取件会导致**零件翘曲、尺寸超差、缸体热应力损伤**，并有**烫伤**风险。
Retrieving parts while warm causes warpage, out-of-tolerance dimensions and thermal stress damage to the cylinder, and risks burns.

阶段 6 | 取件与清粉 Stage 6 — Retrieval and Powder Removal

前置条件: 已佩戴 N95 口罩、丁腈手套与护目镜；清粉区通风良好。 N95 mask, nitrile gloves and goggles worn; the powder area is well ventilated.

1. 打开仓门，将**整个成型缸/粉饼连同零件**取出，置于清粉工位。 *Open the door; remove the entire build cylinder / powder cake with the parts to the powder-handling station.*
2. 使用**软毛刷**逐层剥离零件周围粉末。 *Brush away surrounding powder with a soft brush.*
3. 精细部位可用**低压压缩空气**吹扫，注意控制气压避免损伤细节。 *Use low-pressure compressed air for fine features; keep the pressure low.*
4. 逐件分离，去除浮粉。 *Separate the parts and remove loose powder.*

5. 将清出的粉末收集至**废粉容器**，待筛分回用。 *Collect cleared powder into the waste container for sieving and reuse.*
6. 清洁成型仓与铺粉机构，归位。 *Clean the build chamber and recoater, then restore position.*

⚠ 警告 / WARNING: 禁止使用普通家用/工业吸尘器吸粉——粉末粉尘存在燃爆风险，应使用防爆型吸尘设备或湿式清理。 *Do not use an ordinary vacuum cleaner — powder dust carries an explosion risk. Use explosion-proof equipment or wet cleaning.*

5.1 打印示意 Print Flow Diagram

阶段 Stage	关键动作 Key Action	完成标志 Completion Criterion	预计耗时 Est. Duration
1 建模 Modelling	建模并导出 STL	模型水密、无破面 Watertight mesh	依模型而定 Depends
2 切片 Slicing	CREA Builder SLS 切片，导出 SLC	逐层预览无异常 Layer preview clean	依模型而定 Depends
3 传输 Transfer	U 盘 /SD 卡导入	面板识别文件 File recognised	< 1 分钟 min
4 打印 Printing	预热 + 逐层烧结	全程无报警 No alarms	按 Z 轴 15mm/h 估算 At 15 mm/h (Z)
5 冷却 Cooling	整缸仓内冷却	面板提示冷却完成 Cooling complete	≤ 6 小时
6 取件清粉 Retrieval	破包、清粉、回收	零件表面无浮粉 No loose powder	30-90 分钟 mins

[i] 提示 / NOTE: 打印耗时可根据 Z 轴速度 15mm/h 粗估。例如 Z 向高度 130mm 的零件，理论最短打印时间约为 $130 \div 15 \approx 8.7$ 小时（不含预热与冷却）。 *A rough estimate of print time follows from the Z-axis rate of 15 mm/h. For a 130 mm-tall part, the theoretical minimum is about $130 \div 15 \approx 8.7$ hours (excluding preheat and cooling).*

6. 后处理与粉末管理 Post-Processing and Powder Management

打印完成并不等于交付完成。本章说明零件的后处理方式，以及粉末的筛分、掺配与环保处置——粉末管理直接决定长期打印成本与零件强度稳定性。A finished build is not a finished part. This chapter covers part post-processing plus powder sieving, blending and disposal — powder management directly determines your long-term cost per part and the consistency of part strength.

6.1 零件后处理 Part Post-Processing

SLS 零件表面呈微磨砂质感，可按需进行以下处理：

As-sintered SLS parts have a lightly **matte** texture. Optional finishing steps:

工艺 Process	效果 Effect	说明 Note
喷砂 Sandblasting	表面均匀化、去除残留浮粉 Even surface, removes residual powder	最常用、成本最低 Most common, lowest cost
滚抛 / 振动抛光 Tumbling	提升光滑度，适合批量小件 Improves smoothness; suits small batches	会轻微圆化棱角 Slightly rounds edges
染色 Dyeing	着色（黑、灰、彩色等） Colourising (black, grey, other)	【待补充：是否支持及推荐工艺】 [TBD: supported?]
表面密封 / 浸渗 Sealing / infiltration	提升致密度、便于后续喷涂 Improves density, prepares for painting	常用浸渗剂需固化 Common infiltrants require curing

6.2 粉末筛分与回收 Powder Sieving and Reuse

⚠ 警告 / WARNING: 必须先筛分再回用。未筛分的粉末含有烧结结块，会堵塞铺粉辊并导致打印失败。Always sieve before reuse. Unsifted powder contains sintered agglomerates that clog the recoater and fail builds.

1. 将收集的粉末通过筛分设备过滤。Pass the collected powder through a sieving device.

2. 去除结块、异物与烧结残渣。 *Remove agglomerates, debris and sintered residue.*
3. 按 **新粉 : 旧粉 = 3 : 7** 的混合比例回用。 *Reuse at a new-to-reclaimed ratio of 3 : 7.*
4. 密封保存于干燥环境，标注批次与日期。 *Store sealed and dry, labelled with batch and date.*

项目 Item	建议 Recommendation
筛分周期 Sieving interval	每次打印后 After every build
新旧粉比例 New/reclaimed ratio	新粉 : 旧粉 = 3 : 7 / 3 : 7 (virgin : reclaimed)
粉末寿命 Powder lifetime	9 次以内（不超过 9 次热循环） / Within 9 cycles (max. 9 thermal cycles)
存储 Storage	密封、避光、干燥；标注批次 Sealed, dark, dry; labelled by batch

6.3 废粉与环保 Waste Powder and Environment

- 废粉应收集于**密闭容器**，标注废弃粉末。 *Collect waste powder in sealed containers, clearly labelled.*
- 按当地**危险废物或工业固废**法规处置，不得混入生活垃圾或排入下水道。 *Dispose of it as hazardous or industrial solid waste per local regulations; never mix with household refuse or discharge to drains.*
- 打印区域应定期**湿式清扫**，避免粉尘积聚。 *Wet-clean the print area periodically to prevent dust accumulation.*

7. 维护保养 Maintenance

⚠ 警告 / WARNING: 进行任何维护前，请**切断电源**并等待设备完全停止。 *Before any*

maintenance, cut power and wait until the machine has fully stopped.

7.1 日常保养 Daily Care

频次 Frequency	项目 Item	操作 Method
每次打印后 After each build	清粉 Clean powder	清扫成型仓与铺粉机构，清空废粉收集 Sweep the chamber and recoater; empty the waste collector
每次打印后 After each build	擦拭 Wipe	用无绒布擦拭仓门内侧、观测窗、玻璃口 Use a lint-free cloth on the door interior, window and glass port
每日 Daily	环境检查 Environment	记录温湿度，确认在 $15-29^{\circ}\text{C}$ / $<80\%$ 内 Log temperature and humidity; verify $15-29^{\circ}\text{C}$ / $<80\%$
每日 Daily	外观巡检 Visual check	检查线缆、气管、仓门密封条 Check cables, tubing and door gasket

7.2 周期性维护 Periodic Maintenance

周期 Interval	项目 Item	说明 Note
每周 Weekly	铺粉辊检查 Recoater inspection	检查磨损、粘粉、划痕；必要时清洁 Check for wear, powder adhesion and scratches; clean if needed
每周 Weekly	滤芯外观 Filter visual check	检查是否堵塞或破损 Check for clogging or damage
每月 Monthly	滤芯清洁 / 更换 Filter clean/replace	【待补充：官方滤芯型号与更换周期】 [TBD: official filter part number and interval]
每月 Monthly	传动机构 Lubrication	【待补充：需润滑点与润滑剂规格】 [TBD: lubrication points and spec]

每季度 Quarterly	精度校验 Accuracy check	打印标准测试件，校验 X/Y/Z 尺寸精度 Print a test artefact; verify X/Y/Z dimensional accuracy
每 6-12 个月 Every 6-12 months	光学窗口清洁 Optical window cleaning	必须由授权服务人员执行 Authorised service personnel only

7.3 易损件与耗材 Consumables and Spare Parts

【待补充：易损件清单（铺粉辊、密封条、滤芯、加热元件等）的正式名称、编号、建议库存与更换周期】

序号 No.	项目 Item	编号 P/N	建议更换周期 Interval
1	滚动轴 Recoater roller	X01	6 个月 / 6 months
2	仓门密封条 Door gasket	02	6 个月 / 6 months
3	滤芯 Filter	【待补充】	【待补充】
4	观测窗口 Observation window	【待补充】	破损时更换 On damage

8. 故障排除 Troubleshooting

提示 / NOTE: 下表列出常见现象与处理方式。若按建议处理 1-2 次后仍未解决，请停止使用并联系售后，不要反复尝试或自行拆机。The table below lists common symptoms and remedies. If the problem persists after one or two attempts, stop using the machine and contact support — do not repeatedly retry or disassemble it yourself.

现象 Symptom	可能原因 Possible Cause	处理方式 Remedy
开机无反应 No response on power-on	电源未接通 / 电压不符 / 保险丝熔断	检查插座与铭牌电压；更换保险丝；若无反应请联系售后 Check outlet and nameplate voltage; replace fuse; contact support if unresolved

无法启动激光 <i>Laser will not start</i>	仓门未锁紧 / 联锁报警 / 急停被按下	确认仓门闭合、复位急停、查看报警代码 <i>Verify the door is latched, release E-stop, read the alarm code</i>
铺粉不均、有缺粉 <i>Uneven powder spreading</i>	粉量不足 / 粉末结块 / 铺粉辊磨损或粘粉	补充粉末、筛分粉末、清洁或更换铺粉辊 <i>Refill, sieve the powder, clean or replace the recoater</i>
零件翘曲、开裂 <i>Warped or cracked parts</i>	预热不充分 / 冷却过快 / 粉床温差大	延长预热、保持仓门关闭完成冷却、检查环境温度 <i>Extend preheat, keep the door closed through cooling, check ambient temperature</i>
尺寸超差 <i>Dimensional deviation</i>	层厚设置不当 / 材料收缩补偿未设 / 环境温度波动	核对切片参数与收缩补偿、稳定环境温度 <i>Verify slice parameters and shrinkage compensation; stabilise ambient temperature</i>
零件强度不足 <i>Weak parts</i>	新旧粉比例过高 / 激光功率偏低 / 层间结合不良	提高新粉比例、检查激光功率、复核层厚与扫描参数 <i>Increase new-powder ratio, check laser power, review layer thickness and scan parameters</i>
层间错位 <i>Layer offset</i>	铺粉机构异常 / 传动松动 / 粉床塌陷	检查铺粉机构与传动、重新平整粉床 <i>Check the recoater and drive; re-level the powder bed</i>
打印中断 <i>Build interrupted</i>	文件错误 / 供电波动 / 过热保护	重新切片导出、检查供电回路、待设备降温后重启 <i>Re-slice and re-export; check the power circuit; let the machine cool and restart</i>
观测窗口模糊 <i>Cloudy observation window</i>	粉尘附着 / 窗口老化	断电后用无绒布清洁；如内部起雾请联系售后 <i>Clean with a lint-free cloth after power-off; contact support if internal fogging occurs</i>
异味 / 异响 <i>Odour or unusual noise</i>	过热 / 机构干涉 / 材料异常	立即停止并切断电源 ，联系售后 Stop and cut power

		<i>immediately ; contact support</i>
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9. 保修与服务 Warranty and Support

本章说明保修范围与免责情形，并提供技术支持渠道与报修前的准备清单。建议在购机后立即记录序列号与购机日期。This chapter covers warranty coverage and exclusions, plus technical support channels and a checklist to prepare before contacting support. We recommend recording the serial number and purchase date right after purchase.

9.1 保修政策 Warranty Policy

- K-100 整机含一年保修服务。The K-100 includes a 1-year warranty.
- 保修期自购机发票日期起算。The warranty starts from the invoice date.
- 保修范围与免责情形详见随机保修卡。See the supplied warranty card for coverage and exclusions.

不在保修范围内的情形 / Not covered by warranty:

1. 人为损坏、跌落、进液、非授权拆装。Damage from misuse, dropping, liquid ingress, or unauthorised disassembly.
2. 使用非原厂或非认证耗材（粉末、滤芯、易损件）导致的故障。Failures caused by non-original or uncertified consumables.
3. 未按本手册规定使用（如超出温湿度范围、违规改装联锁）。Use outside this manual's instructions (e.g. ambient conditions exceeded, interlock modification).
4. 不可抗力（自然灾害、电网异常等）。Force majeure.

9.2 技术支持 Technical Support

渠道 Channel	信息 Information
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品牌 <i>Brand</i>	CREA LoopZizo
公司 <i>Company</i>	惠州市科锐智能科技有限公司 / Huizhou CREA Intelligent Technology Co., Ltd.
官网 <i>Website</i>	Loopzizo.com
地址 <i>Address</i>	广东省惠州市惠阳区淡水街道凯盛大厦 201-1 / Room 201-1, Kaisheng Building, Danshui Street, Huiyang District, Huizhou City, Guangdong Province, China
客服企业微信 <i>Service WeChat</i>	见封面二维码 / See the QR code on the cover
售后电话 <i>Support hotline</i>	【待补充】 [TBD]
售后邮箱 <i>Support email</i>	【待补充】 [TBD]

<image: p1_1.png>客服企业微信 / Service WeChat QR

图 2 客服企业微信二维码 Figure 2 Service WeChat QR code

9.3 报修前请准备 Before Contacting Support

为加快处理速度，请提前准备以下信息：

To speed up resolution, please have the following ready:

1. 机身序列号（SN）与购机日期。 *Serial number (SN) and purchase date.*
2. 故障现象的清晰描述与发生时间。 *A clear description of the fault and when it occurred.*
3. 面板上显示的报警代码（如有）。 *Any alarm code shown on the panel.*
4. 现场照片或短视频（如铺粉异常、零件缺陷）。 *Photos or a short video (e.g. recoating issues, part defects).*
5. 所用材料类型、批次与切片参数。 *Material type, batch and slice parameters used.*

10. 附录 Appendix

附录汇总规格速查表、术语对照、常见问题与版本记录，便于日常快速查阅。The appendix collects the quick specification reference, glossary, FAQ and revision history for day-to-day reference.

10.1 规格速查 Quick Specification Reference

项目 Item	参数 Specification
型号 Model	K-100
工艺 Process	SLS Class 1 Laser Product
激光源 Laser	5W 450nm diode, variable power
成型仓 Build chamber	140 × 140 × 140 mm
最大零件 Max. part	130 × 130 × 130 mm
层厚 Layer thickness	Z 0.1 mm X/Y 0.05 mm
最大速度 Max. speed	15 mm/h (Z)
冷却时间 Cooling time	≤ 6 h (整缸 full cylinder)
材料 Materials	PA11 / PA12 / TPU
支撑 Support	无 None
供粉仓 Hopper	3 KG
连接 Connectivity	SD / TF / USB (离线 offline)
切片软件 Slicer	CREA Builder SLS (SLC 格式)
电源 Power	220VAC / AC110V, 50Hz
整机尺寸 Dimensions	40 × 42 × 82 cm (W × D × H)
环境 Environment	15–29 °C, RH < 80%
保修 Warranty	1 年 year

10.2 术语表 Glossary

中文 Chinese	English	说明 Description
选择性激光烧结	Selective Laser Sintering (SLS)	以激光逐层烧结粉末成型的增材制造工艺 An additive process that fuses powder layer by layer with a laser
成型仓	Build Chamber	零件成型所在的空间 The volume where the part is built
成型缸	Build Cylinder	承载粉床并逐层下降的机构 Holds the powder bed and indexes down layer by layer
供粉仓	Powder Feeding Hopper	储存并供应粉末的容器 Stores and supplies powder
铺粉机构	Recoater	将粉末铺平至成型仓的机构 Spreads and levels powder into the chamber
粉床	Powder Bed	由粉末构成的成型基底 The powder substrate
层厚	Layer Thickness	每层粉末的厚度 Thickness of each powder layer
切片	Slicing	将三维模型离散为逐层路径的过程 Discretising a 3D model into layer paths
SLC	SLC (Slice)	SLS 工艺常用的切片文件格式 A common slice file format for SLS
破包	Cake Break-out / De-caking	从粉饼中取出零件的过程 Separating parts from the powder cake
筛分	Sieving	过滤回收粉末以去除结块 Filtering reclaimed powder to remove agglomerates
新粉 / 旧粉比	New-to-Reclaimed Ratio	回用粉末中新粉所占比例 The proportion of virgin powder

		<i>in a blend</i>
联锁	<i>Interlock</i>	安全开关，开门时切断激光 <i>A safety switch that disables the laser when opened</i>
急停	<i>Emergency Stop</i>	紧急切断运动与激光的按钮 <i>Button that cuts motion and laser in an emergency</i>

10.3 常见问题 FAQ

Q1: SLS 与 FDM 相比有什么优势？ Q1: What advantages does SLS have over FDM?

SLS 无需支撑结构，可直接成型复杂内腔与互锁结构，零件力学性能接近各向同性，且可整缸批量排布、一次成型多个零件。FDM 在细节表现与表面粗糙度上更有优势，但需支撑、层间强度存在方向性。

SLS needs no support structures, directly produces complex cavities and interlocking geometry, yields near-isotropic mechanical properties, and allows many parts to be nested and built in one cylinder. FDM offers finer feature detail and surface finish but requires supports and has directional interlayer strength.

Q2: 为什么必须等待整缸冷却？ Q2: Why must the whole cylinder cool down?

半热状态下取出零件会因内外温差产生收缩不均，导致翘曲与尺寸超差；同时高温缸体存在烫伤风险。标称冷却时间 ≤ 6 小时。

Removing parts while warm causes uneven shrinkage from thermal gradients, leading to warpage and out-of-tolerance dimensions; the hot cylinder also poses a burn risk.

Nominal cooling time is ≤ 6 hours.

Q3: 粉末可以无限次回收吗？ Q3: Can powder be reclaimed indefinitely?

不可以。粉末经历多次热循环后分子量下降、流动性变差，零件强度会衰减。**每次打印后须筛分，并按 新粉：旧粉 = 3：7 掺配使用；粉末寿命为 9 次以内，达到上限后应整体更换新粉。**

No. After repeated thermal cycles the powder's molecular weight and flowability degrade, weakening the parts. **Sieve after every build** and blend at a **new-to-reclaimed ratio of 3 : 7. Powder lifetime is within 9 cycles**; replace the batch entirely once the limit is reached.

Q4: 打印时断电会怎样？ Q4: What happens if power fails during a build?

打印会中断。恢复供电后请按面板提示处理；通常需要重新执行冷却流程后再取件，不建议直接继续烧结。供电不稳的场地建议配置稳压电源或 UPS。

The build is interrupted. After power returns, follow the panel prompts; usually you must run a cooling cycle before retrieving parts, and resuming the build directly is not recommended. In unstable grids, use a voltage regulator or UPS.

Q5: 软件在哪里下载？需要付费或联网吗？ Q5: Where do I download the software? Is it paid or online?

请从官网 www.loopzizo.com 下载 **CREA Builder SLS** 安装包，无需付费、无需加密狗。打印文件通过 SD 卡 / TF 卡 / U 盘离线传输，无需联网。具体功能范围详见《CREA Builder SLS 软件说明书》。

Download the **CREA Builder SLS** installer from the official website www.loopzizo.com — free of charge, no dongle required. Print files transfer offline via SD card, TF card or USB drive. For feature scope, see the dedicated *CREA Builder SLS Software Manual*.

Q6: 可以打印金属或陶瓷吗？ Q6: Can it print metal or ceramic?

不能。K-100 的材料兼容性为 **PA11、PA12、TPU** 三种聚合物粉末。

No. K-100 supports three polymer powders: **PA11, PA12 and TPU**.

10.4 版本记录 Revision History

版本 Version	日期 Date	变更 Changes
V1.1	2026-10	按客户反馈更新：明确初始耗材不随附、防护用品不随附；软件安装包改为官网下载（ www.loopzizo.com ）；补充开机预热 30 分钟与 Z 轴空跑流程；明确新旧粉比例 3 : 7 与粉末寿命 9 次以内；补全易损件编号与更换周期。 Updated per customer feedback: initial powder and PPE not supplied; software download moved to the official website (www.loopzizo.com); added the 30-minute preheat and Z-axis dry-run procedure; specified the 3 : 7 new-to-reclaimed ratio and a 9-cycle

		<i>powder lifetime; completed spare-part P/Ns and intervals.</i>
V1.0	2026-10	首次发布；参数取自 K-100 产 品宣传册，未确认项已标注占位 <i>First release; specifications from the K-100 brochure; unconfirmed items marked as TBD</i>

惠州市科锐智能科技有限公司 · Huizhou CREA Intelligent Technology Co., Ltd.

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