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› BIQU BIGTREETECH SKR 3 Motherboard and Smart Filament Runout Sensor V2.0 User Manual

BIQU SKR 3, SFS V2.0

BIQU BIGTREETECH SKR 3 Motherboard and Smart Filament Runout Sensor V2.0 User Manual

Model: SKR 3, SFS V2.0

INTRODUCTION

This manual provides detailed instructions for the installation, operation, maintenance, and troubleshooting of the BIQU BIGTREETECH SKR 3 Motherboard and the Smart Filament Runout Sensor V2.0. These components are designed to enhance the functionality and reliability of 3D printers, supporting various firmware and driver configurations.

BIGTREETECH SKR 3 MOTHERBOARD

The BIGTREETECH SKR 3 is an advanced 32-bit mainboard for 3D printers, offering improved processing power and connectivity.

The highlight of rebirth SKR 3 mainboard



Powerful 32-bit processor



Optimized heat dissipation



Robust power system



DIY friendly



Enhanced safety



Flexible connectivity

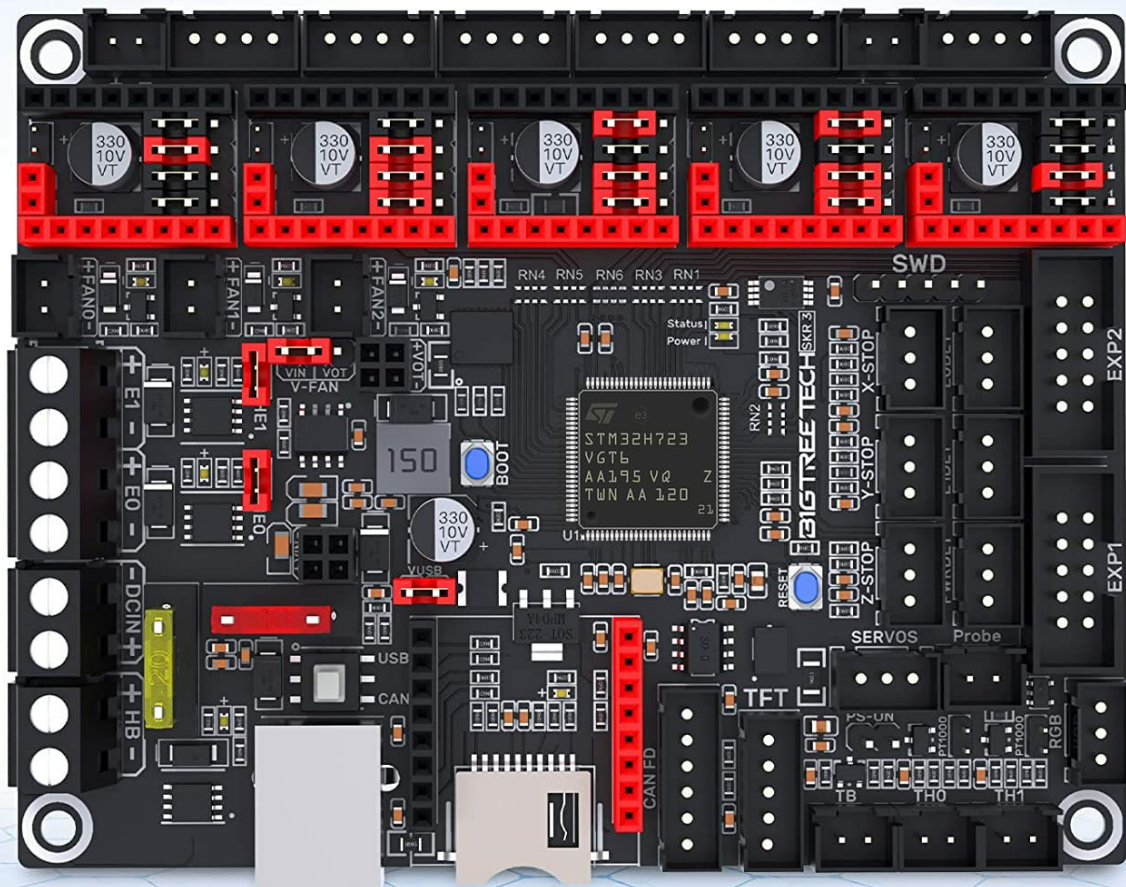
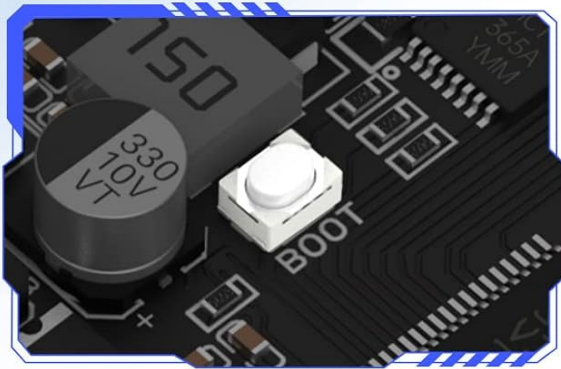


Image: Overview of the BIGTREETECH SKR 3 Motherboard, highlighting its various ports and components.

Key Features

- **Processor:** 32-bit 550MHz ARM Cortex-M7 series STM32H723VGT6, offering increased running speed and printing accuracy.
- **Power System:** Equipped with TPS5450-5A power chip, supporting DC12/24V input and 5A (peak 6A) output current. Suitable for powering Raspberry Pi.
- **Firmware Programming:** Features BOOT0 for DFU mode firmware programming.
- **WiFi Module Support:** Compatible with ESP-12S, ESP-07S, ESP32 for RRF firmware debugging.
- **Peripheral Support:** Supports BLTouch, resume printing, RGB lights, blocking detection, and shutdown after printing.
- **Display Compatibility:** Compatible with TFT35 E3 V3.0, TFT35 V3.0, TFT28 V3.0, and 12864 LCD displays.
- **Stepper Driver Compatibility:** Supports TMC2209, TMC2208, TMC5150, DRV8825 stepper motor drivers.
- **Upgraded Thermistor:** Supports PT1000 without an external module.

DIY- friendly



Onboard BOOT0 makes it easy to enter DFU mode to flash the firmware

Upgraded **thermistor** supports PT1000 without external module



Universal **WIFI modular port** allow DIY users to use RRF firmware

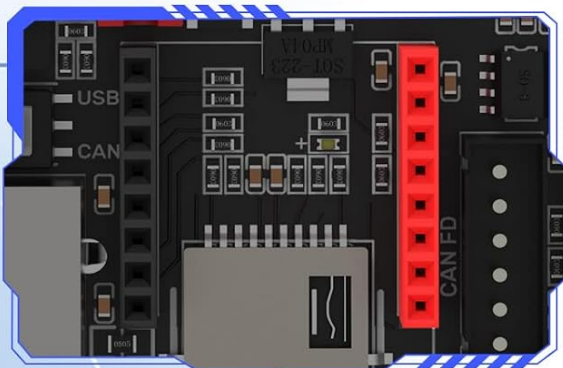


Image: Details of the SKR 3's DIY-friendly interfaces, including the BOOT0 button, upgraded thermistor support, and universal WIFI modular port.

Robust Power System

Select high quality power MOS tube



output current peak

6A



Input voltage

DC12V-24V



perfect raspberry pi

power supply

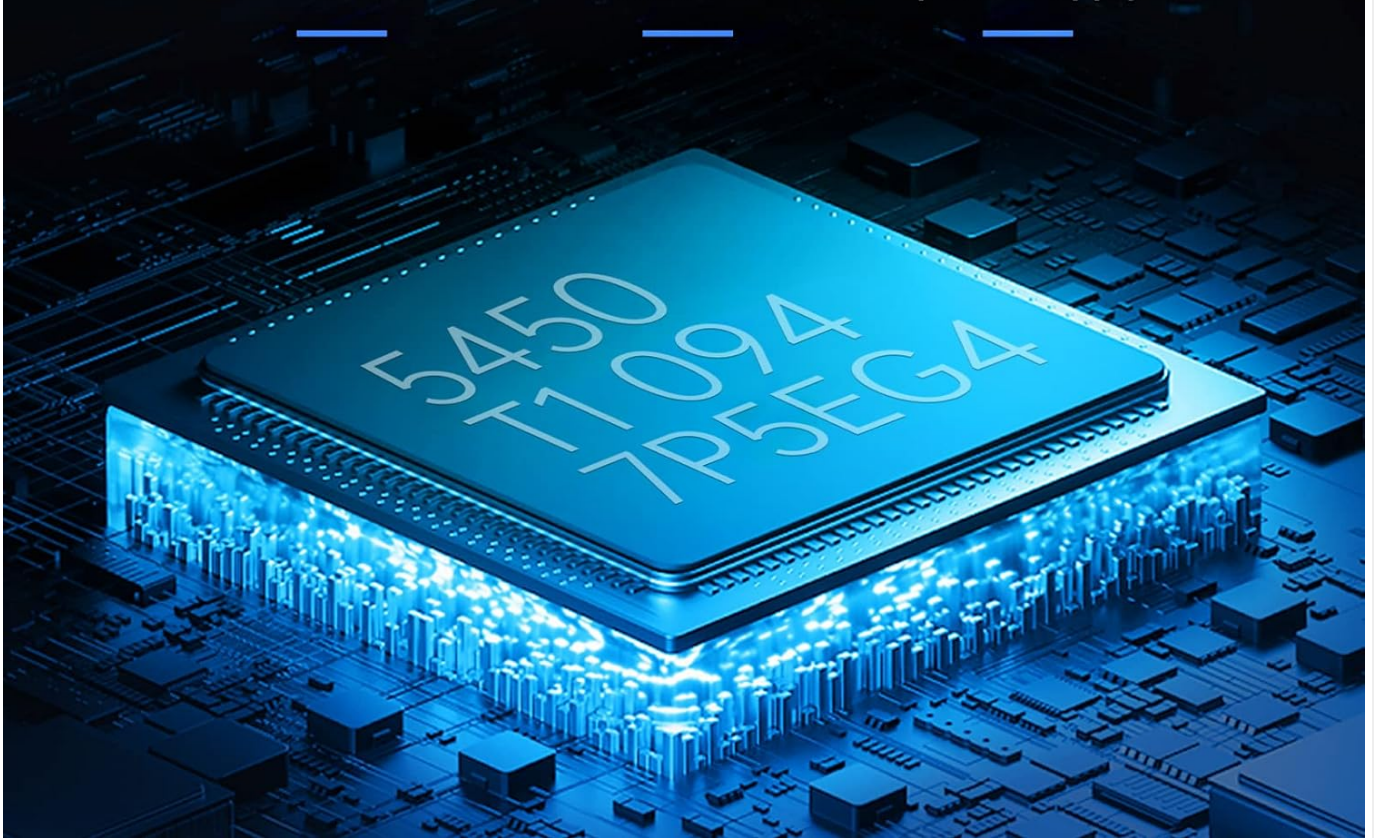


Image: Illustration of the SKR 3's robust power system, highlighting the TPS5450-5A power chip and its input/output capabilities.

Deliver Unprecedented Performance

Running speed: **+30%**

Heat dissipation capacity: **+30%**

Power consumption: **-40%**

Printing accuracy: **+40%**

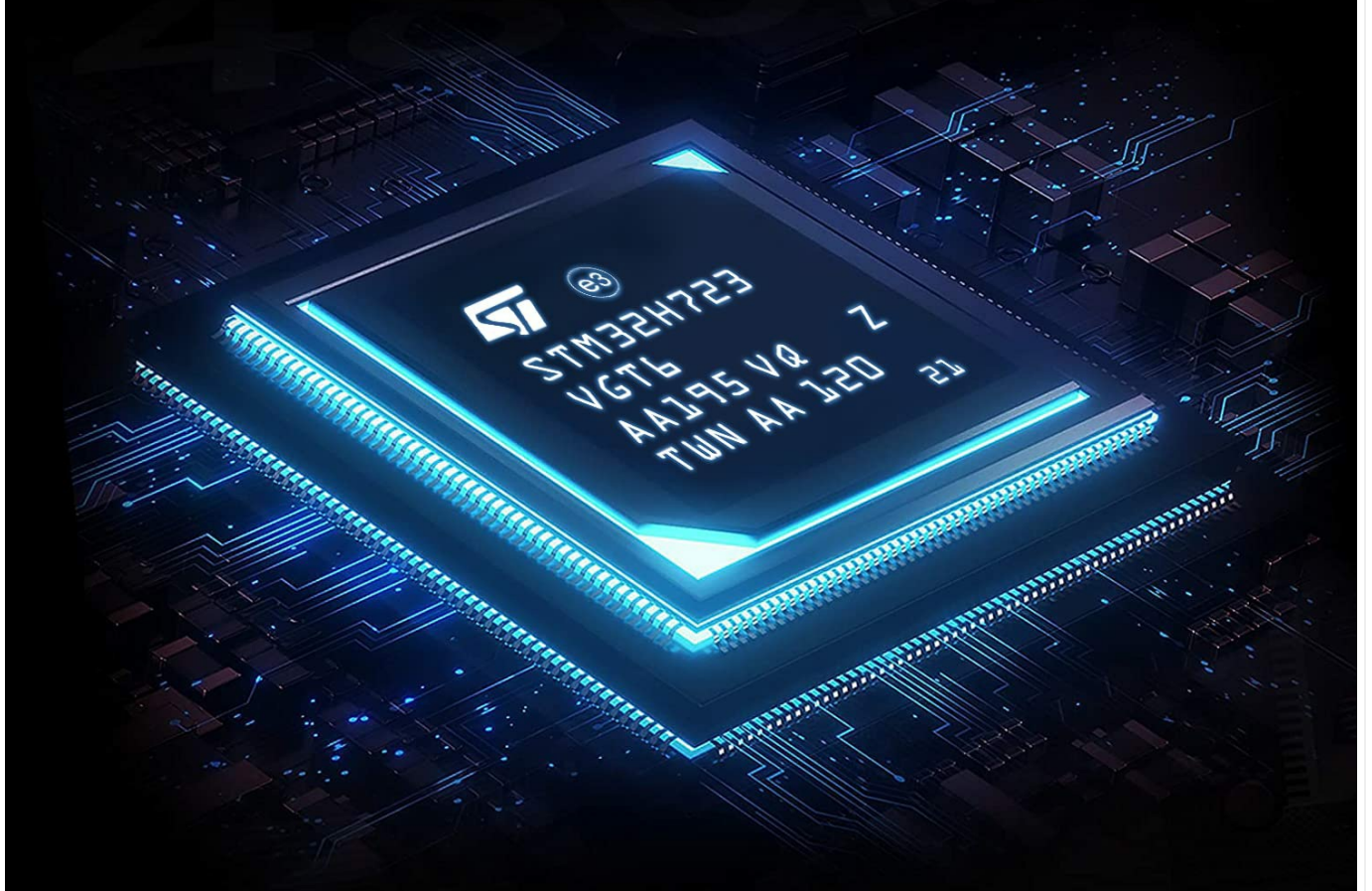


Image: Visual representation of the performance improvements of the SKR 3, including increased running speed and printing accuracy.

SMART FILAMENT RUNOUT SENSOR V2.0

The BIGTREE TECH SFS V2.0 is an intelligent filament sensor designed to detect various filament issues beyond simple runout, preventing print failures.

More than Just Filament Runout Detection

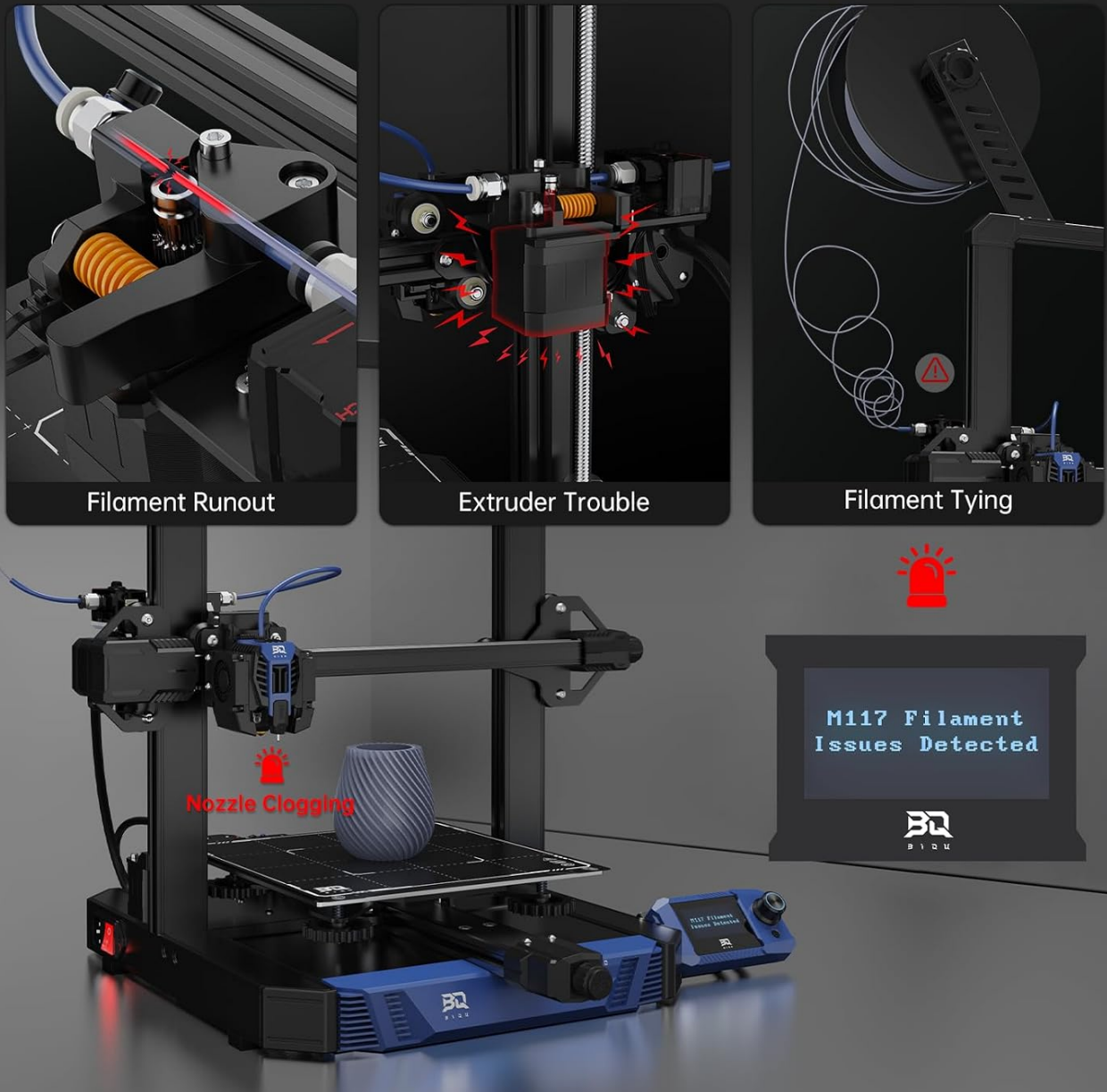


Image: Depiction of the SFS V2.0 detecting various filament issues such as runout, extruder trouble, filament tying, and nozzle clogging.

Detection Capabilities

- **Filament Runout:** Detects when filament has completely run out.
- **Filament Breakage:** Identifies breaks in the filament path.
- **Filament Clogging:** Detects blockages preventing filament extrusion.
- **Filament Tying:** Recognizes knots or tangles in the filament.
- **Extruder Malfunction:** Monitors for abnormal extruder operation.

Upon detecting an issue, the SFS V2.0 sends error alerts to the screen and automatically pauses printing to prevent material and energy waste.

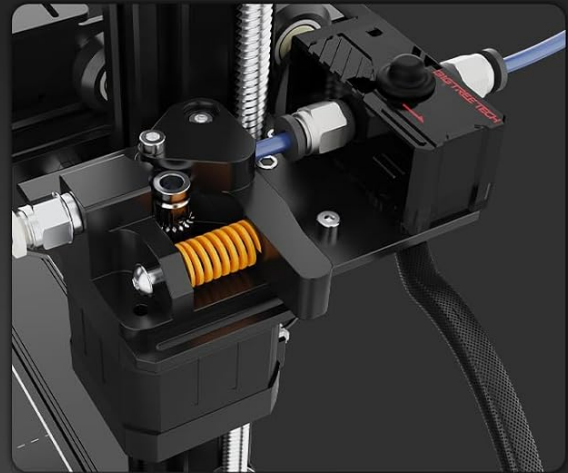
Compatibility and Design

- **Extruder Types:** Can be mounted on both Bowden and direct drive extruders.
- **Motherboard Compatibility:** Supports any motherboard with available I/O ports (Endstop, filament detection, BL

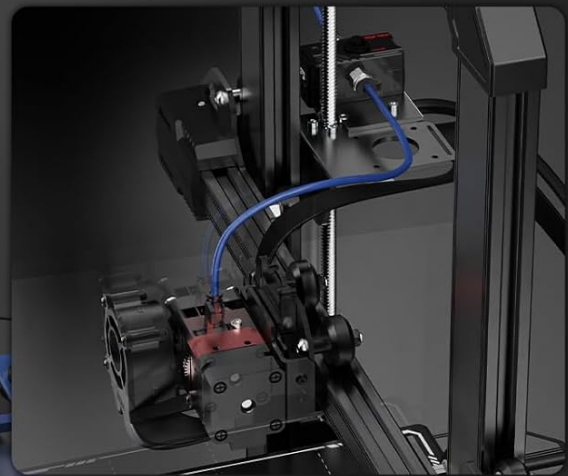
touch, induction sensor, etc.), including SKR MINI E3 V3.0, SKR3, SKR 3 EZ, SKrat, Manta E3EZ, and Octopus Pro.

- **Firmware Compatibility:** Compatible with Klipper, Marlin, and RepRap firmwares.
- **Bi-directional Feeding:** Designed for quicker installation and flexible positioning to optimize space utilization.
- **High Precision:** Utilizes a highly precise photoelectric sensor for accurate detection.

Supports Bowden / Direct-Drive Extruders



✓ Bowden



✓ Direct-Drive

Image: Illustration showing the compatibility of the SFS V2.0 with both Bowden and direct-drive extruder setups.

Bi-directional Filament Feeding

Enable quicker installation and flexible positioning to maximize your space utilization.



Image: Comparison of SFS V2.0's bi-directional filament feeding design with a previous version, highlighting improved flexibility.

Highly Precise Photoelectric Sensor

Theoretical Detection Length: 2.88mm

2.88



Image: Detailed view of the highly precise photoelectric sensor within the SFS V2.0, indicating its theoretical detection length.

SETUP

SKR 3 Motherboard Installation

1. **Power Disconnection:** Ensure the 3D printer is powered off and disconnected from the main power supply before beginning installation.
2. **Mounting:** Securely mount the SKR 3 motherboard in the designated control board enclosure of your 3D printer. Ensure proper alignment with mounting holes.
3. **Wiring Stepper Drivers:** Install stepper motor drivers (e.g., TMC2209) into their respective sockets on the SKR 3, paying attention to correct orientation.
4. **Connecting Peripherals:** Connect stepper motors, endstops, hotend, heated bed, fans, and display to their corresponding ports on the motherboard. Refer to the wiring diagram provided by BIGTREETECH for specific pinouts.

5. **Power Connection:** Connect the DC12/24V power supply to the SKR 3 power input terminals.
6. **Firmware Flashing:** Prepare the appropriate firmware (Marlin, Klipper, or RepRap) for your printer configuration. Load the firmware onto an SD card and insert it into the SKR 3. Power on the board to flash the firmware. Alternatively, use DFU mode via the BOOT0 button and USB for flashing.

Smart Filament Runout Sensor V2.0 Installation

1. **Mounting:** Choose a suitable location for the SFS V2.0 sensor. It can be mounted before the extruder (Bowden setup) or directly on the extruder (direct drive setup). Ensure the filament path is smooth and unobstructed.
2. **Filament Path:** Guide the filament through the sensor's input and output ports. The bi-directional design allows for flexible orientation.
3. **Wiring:** Connect the SFS V2.0 to an available I/O port on your motherboard (e.g., an endstop port or a dedicated filament detection port). Refer to the sensor's wiring diagram and your motherboard's pinout for correct connections.
4. **Firmware Configuration:** Modify your printer's firmware to enable filament runout detection and configure the correct pin for the SFS V2.0. This typically involves uncommenting specific lines in Configuration.h for Marlin or configuring the printer.cfg for Klipper.

OPERATING INSTRUCTIONS

SKR 3 Motherboard Operation

1. **Power On:** After successful installation and firmware flashing, connect the printer to power and turn it on.
2. **Initial Test:** Verify that the display is working, stepper motors respond to commands, and heaters function correctly.
3. **Calibration:** Perform necessary printer calibrations, including PID tuning for hotend and heated bed, E-steps calibration, and Z-offset adjustment.
4. **Printing:** Load your G-code file via SD card or USB, and initiate a print. Monitor the print for any anomalies.

Smart Filament Runout Sensor V2.0 Operation

1. **Filament Loading:** Load filament through the SFS V2.0 sensor into the extruder as usual. The sensor will detect the presence of filament.
2. **During Printing:** The sensor continuously monitors the filament path. If any of the detected issues (runout, breakage, clogging, tying, extruder malfunction) occur, the sensor will trigger a pause command to the motherboard.
3. **Error Notification:** An error message will typically appear on the printer's display, indicating the detected issue.
4. **Resuming Print:** Address the filament issue (e.g., replace filament, clear clog). Once resolved, use the printer's interface to resume the print.

MAINTENANCE

- **Regular Cleaning:** Periodically clean the SKR 3 motherboard and SFS V2.0 sensor to remove dust and debris. Use compressed air or a soft brush. Ensure power is disconnected before cleaning.
- **Firmware Updates:** Check the official BIGTREETECH website for the latest firmware versions for the SKR 3. Updating firmware can provide new features, bug fixes, and performance improvements.
- **Wiring Inspection:** Regularly inspect all wiring connections to ensure they are secure and free from damage.
- **Sensor Path Check:** Ensure the filament path through the SFS V2.0 remains clear and free of obstructions.

TROUBLESHOOTING

SKR 3 Motherboard Issues

- **Board Not Powering On:** Verify power supply connections and voltage. Check for any short circuits.
- **Display Not Working:** Ensure the display cable is correctly connected and the display type is configured in the firmware.
- **Stepper Motors Not Moving:** Check stepper driver installation and orientation. Verify motor wiring and firmware configuration for drivers and motor directions.
- **Firmware Flashing Failure:** Ensure the SD card is correctly formatted (FAT32) and the firmware file is named correctly (e.g., firmware.bin). Try flashing via DFU mode if SD card method fails.

Smart Filament Runout Sensor V2.0 Issues

- **Sensor Not Detecting Filament:** Check wiring to the motherboard. Verify firmware configuration for the sensor's pin. Ensure filament is passing through the sensor correctly.
- **False Positives (Sensor Triggering Without Issue):** Inspect the filament path for any friction or resistance that might be misinterpreted as a jam. Ensure the sensor is clean. Adjust sensitivity in firmware if applicable.
- **Sensor Not Pausing Print:** Confirm that the sensor is correctly enabled in firmware and the pause command is configured. Check the connection to the motherboard's I/O port.

SPECIFICATIONS

Feature	Detail
Brand	BIQU
Model	SKR 3 Motherboard, Smart Filament Runout Sensor V2.0
Motherboard Processor	STM32H723VGT6 (ARM Cortex-M7, 32-bit, 550MHz)
Motherboard Input Voltage	DC 12-24V
Motherboard Output Current	5A (peak 6A)
Display Type (Compatible)	LCD (TFT35 E3 V3.0, TFT35 V3.0, TFT28 V3.0, 12864 LCD)
Filament Sensor Detection Types	Runout, Breakage, Clogging, Tying, Extruder Malfunction
Filament Sensor Principle	Photoelectric
Firmware Compatibility	Klipper, Marlin, RepRap
ASIN	B0CGJ7V3CX

WARRANTY AND SUPPORT

For warranty information, technical support, and additional resources, please refer to the official BIQU website or contact their customer service directly. Keep your purchase receipt for warranty claims.
Official BIQU Website: <https://www.biqu.equipment/>

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Question

Example: How do I reset this device or fix this error?

Details

Model number, symptoms, what you tried, or the section of the manual you are using.

Submit question

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