

# 3D PRINTER ERROR CODES

*How they appear, what they usually mean, and what to check first*

A school-friendly troubleshooting resource for common classroom and maker-space printers

## Overview

Different printers display faults in different ways. Older Marlin-based machines may show short warnings such as "Err: MINTEMP" or "THERMAL RUNAWAY", while newer classroom printers often show numbered codes or detailed touch-screen prompts. Although the wording changes, most printer faults still fall into the same core groups: temperature sensor faults, heater faults, homing or leveling problems, extrusion and filament path faults, fan faults, or control-board communication problems.

This guide is written to help teachers, lab staff and school technicians identify the message on-screen, understand the likely cause, and decide whether the printer can be reset, needs inspection, or should be removed from use until repaired.

*Prepared from current manufacturer and firmware support documentation. Exact wording can vary by printer model, language pack and firmware version.*

## Safety first

If the printer reports MAXTEMP, thermal runaway, overheating, smoke, a burning smell, repeated unexplained resets, or a heater that rises without control, stop the print immediately, power the machine down safely, and do not continue printing until the fault is inspected.

## 1. How to use this guide

Start with the message exactly as it appears on the screen. Then work in this order: identify the error family, inspect the most likely simple causes, and only then move to parts replacement.

- Record the exact message, code number and whether it appeared during preheat, homing, leveling, loading filament or mid-print.
- Check whether the fault is repeatable. A one-off glitch may clear; an intermittent fault usually returns under movement, heat or fan load.
- Inspect the obvious first: loose plugs, damaged wires, a poorly seated hotend or nozzle module, debris on the bed, a missing build plate, tangled filament, or a fan that is not spinning.
- If the same error reappears after a careful restart, remove the printer from class use until the cause is found.

## 2. Quick cross-platform error map

The table below translates the most common messages into plain language. Use it as a first-pass guide before moving to the detailed sections.

Typical message on screen	What it usually means	First things to check	Common ecosystems
MINTEMP / Nozzle temp below minimum	Temperature sensor reads too low or open circuit; machine may also be too cold.	Thermistor cable, plug seating, damaged harness, very cold room, recently moved loom.	Marlin, Prusa, FlashForge
MAXTEMP / Temperature too high	Sensor short, wrong reading, or heater control fault.	Thermistor short, crushed cable, loose sensor touching heater block, heater stuck on.	Marlin, Prusa, UltiMaker, Bambu
Heating failed / not heating as expected	Hotend or bed is warming too slowly.	Heater wire, cartridge or ceramic heater, loose plug, wrong voltage, damaged hotend/nozzle module.	Marlin, Creality, FlashForge, UltiMaker
THERMAL RUNAWAY	Temperature drifted away from target for too long after heating had stabilised.	Thermistor security, heater health, fan blowing onto hotend, silicone sock missing, cold drafts.	Marlin, Prusa, Creality
Bed not heating as expected	Heat bed is not reaching target temperature.	Bed cable, bed fuse, bed heater, bed thermistor, control board output.	Creality, FlashForge, Bambu
X / Y / Z homing failed	Axis cannot find or clear its home sensor normally.	Obstruction, belt issue, endstop, cable, bent rail, plate or cable interfering with travel.	Creality, Bambu, FlashForge, Prusa
Auto leveling failed / sensor error	Probe or bed sensor cannot measure correctly.	Dirty nozzle, debris on bed, warped sheet, sensor cable, missing plate, loose printhead.	UltiMaker, Bambu, Prusa, Creality

Typical message on screen	What it usually means	First things to check	Common ecosystems
Filament runout / load failed / extrusion overloaded	Filament path is blocked, slipping, empty or not feeding correctly.	Spool tangle, broken filament, clogged nozzle, extruder gear debris, AMS/feeder path.	Bambu, Prusa MMU, MakerBot, FlashForge
Fan abnormal / cooling fan slow	Cooling fan is stalled, obstructed or disconnected.	Fan blade obstruction, connector, fan cable, debris, failing fan.	Bambu, many enclosed printers
Communication / host / MCU interrupted	Printer electronics lost contact with a module.	Ribbon cable, extruder cable, board plug, vibration-related intermittent break, board fault.	FlashForge, Bambu, others

### 3. Temperature and sensor errors

Most urgent 3D printer faults are temperature-related. They usually point to one of four things: the printer cannot read the temperature correctly, the heater cannot add enough heat, the heater is heating when it should not, or the printer cannot hold temperature once printing starts.

#### 3.1 MINTEMP / sensor reading too low

What you may see: "Err: MINTEMP", "MINTEMP BED", "Mintemp error", "Nozzle temperature below minimum temperature".

This usually means the printer believes the hotend or bed is colder than the safe minimum. In practice, that often means an open-circuit thermistor, a loose plug, a broken cable, or a sensor that is intermittently disconnecting when the head moves.

- Inspect the thermistor wire near the hotend first; this is where repeated flexing often causes failure.
- Check that the thermistor plug is fully seated on the board and not offset by one pin.
- Gently move the cable loom with power off; if the fault appears only while the printer moves, suspect an intermittent break.
- Consider ambient conditions. Very cold rooms or direct drafts can contribute to low-temperature faults on some printers.

**When replacement becomes likely:** Likely replacement if repeated: thermistor, complete hotend/nozzle heating assembly, or damaged cable harness.

#### 3.2 MAXTEMP / sensor reading too high

What you may see: "Err: MAXTEMP", "MAXTEMP BED", "Print core max temp", "temperature is abnormal".

This usually means the printer sees a temperature above the safe limit. The most common causes are a shorted thermistor, damaged insulation, a sensor touching the heater block incorrectly, or a heater control fault that keeps driving heat.

- Do not continue printing until the cause is identified.
- Check for crushed, pinched or melted thermistor wires.
- Inspect whether the sensor has loosened from the block or nozzle module.
- On modular hotends and quick-swap nozzles, reseal the assembly carefully and make sure it is fully inserted.

**When replacement becomes likely:** Likely replacement if repeated: thermistor, hotend module, print core, control board or MOSFET.

### 3.3 Heating failed / not heating as expected

What you may see: "Heating failed", "Extruder not heating as expected", "Extruder T0 not heating as expected", "Bed not heating as expected".

The printer asked a heater to warm up, but temperature rose too slowly or not at all. That points to a weak or failed heater, a loose connection, incorrect mains/PSU conditions, a damaged ceramic heater or cartridge, or a complete hotend/nozzle module failure.

- Watch whether temperature rises at all. No rise usually suggests heater or wiring failure.
- Check heater cartridge or ceramic heater connections.
- Inspect the hotend/nozzle assembly for cracks, poor seating or physical damage.
- For bed-heating faults, inspect bed cable strain points and any bed fuse or mains connector area.

**When replacement becomes likely:** Likely replacement if repeated: heater cartridge, ceramic heater, nozzle/heating assembly, heated bed, or mainboard output.

### 3.4 Thermal runaway

What you may see: "THERMAL RUNAWAY", "Thermal runaway", "Hotend thermal runaway", "Bed thermal runaway", or Creality key 2507.

This occurs when the printer reached or approached target temperature, but later drifted too far away for too long. Common causes include a loose thermistor, failing heater, aggressive part cooling directed at the heater block, a missing silicone sock, cold drafts, or PID values that are no longer suitable after hardware changes.

- Check the silicone sock is present and fitted correctly.
- Check whether the hotend fan or part-cooling fan is blowing directly onto the heater block.
- Inspect heater and thermistor wires for movement-related faults.
- If hardware has been changed, confirm the correct hotend/nozzle assembly and firmware profile are being used.

**When replacement becomes likely:** Likely replacement if repeated: thermistor, heater, hotend assembly, fan, or cable loom.

## 4. Homing, motion and leveling errors

These errors are often safer and easier to diagnose than temperature faults because they usually involve physical movement, sensors or obstructions rather than active heating.

### 4.1 X / Y / Z homing failed

What you may see: "X-axis homing error", "Y-axis homing error", "Z homing failed", "Homing error X/Y/Z", or an endstop-related message.

The printer could not reach, release or confirm its home position correctly. This may be caused by debris, a belt issue, a cable snag, a failed endstop or hall sensor, excessive resistance on a rail, or the bed or plate physically interfering with the move.

- Remove any loose print scraps from rails, corners and bed edges.
- Check belts for damage, slack or obvious skipping.
- Confirm the build plate is installed correctly and nothing is protruding above it.
- Inspect endstop or sensor cables and look for plugs that may have loosened during transport or use.

## 4.2 Auto leveling failed / print head sensor error / active leveling error

What you may see: "Bed leveling failed", "Print head sensor error", "Active leveling errors", or a sensor performance warning.

Automatic leveling can fail when the nozzle tip is dirty, the plate is not installed correctly, the bed surface is contaminated, the sensor is dirty or damaged, or the print head is loose and not repeatable.

- Clean the nozzle tip before leveling.
- Clean the print surface and confirm the correct build sheet is fitted and fully seated.
- Inspect the print head for movement or looseness.
- Re-run leveling only after debris and mechanical issues have been ruled out.

## 4.3 Foreign object on plate / plate not detected / false Z trigger

What you may see: messages about a foreign object on the plate, external disturbance, or a homing retry prompt.

These messages mean the printer believes something is interfering with nozzle-to-bed travel, or that the bed sensor detected abnormal resistance during Z homing.

- Remove purge blobs, failed-print fragments and tools from the plate.
- Check cable routing at the rear of the bed on printers where bed cables can become tensioned.
- Confirm the plate type selected in software matches the plate actually installed.
- If the printer is enclosed, ensure nothing inside the chamber touches the moving bed.

## 5. Extrusion, filament path and cooling fan errors

A printer can look mechanically healthy but still stop because material cannot move through the system. These faults are especially common in busy school environments where multiple users load different materials, unload early, or leave partial tangles on spools.

### 5.1 Filament load failed / unload failed / runout / extrusion motor overloaded

What you may see: "Load failed", "Unload failed", "Filament runout", "Extrusion motor overloaded", or a feeder/AMS prompt.

The printer either cannot move filament into the hotend, cannot remove it cleanly, or believes material is absent. Causes include tangled filament, swollen or brittle filament, incorrect temperature, debris in the extruder gears, or a partial nozzle clog.

- Check the spool first. A tangle can imitate much more serious faults.
- Inspect the filament end; a bent, mushroomed or stringy tip can block reloading.
- Unload and trim the filament cleanly before trying again.
- Check that the print temperature matches the material in use.

### 5.2 Nozzle clog / under-extrusion / no filament coming out

What you may see: clog warnings, extrusion stopping, clicking, grinding, or poor flow with no formal code.

This is usually a process fault rather than a board fault. Causes include low temperature, heat creep, moisture, debris in the nozzle, a blocked throat, printing too close to the bed on the first layer, or a worn extruder gear.

- Perform a normal unclogging routine approved for the printer.
- Inspect whether the hotend cooling fan is working; poor cooling can create heat creep and jams.
- Check first-layer height because a nozzle pressed too close to the plate can trigger apparent clogging.
- Avoid forcing hard carbon fibre or glow materials through non-hardened nozzles for long periods.

### 5.3 Hotend cooling fan abnormal / fan running slowly

What you may see: "Hotend cooling fan abnormal", "fan running slowly", temperature instability after the fan starts, or repeated clogging.

When the hotend cooling fan slows or stops, heat can travel upward into the filament path. The result may be heat creep, jams, soft filament, or secondary thermal faults.

- Check whether the fan spins freely by hand when power is off.
- Remove stringing or dust from the blades and shroud.
- Inspect the fan connector and cable.
- Replace noisy, intermittent or slow fans promptly rather than waiting for repeat jams.

## 6. Communication, board and restart faults

Some printers stop not because a heater or motor failed, but because one board could not communicate with another.

### 6.1 MCU interrupted / host error / board communication fault

What you may see: "Communication with MCU interrupted", "Host error. Please restart!", or board-to-module communication warnings.

These messages usually point to an extruder cable, ribbon cable, breakout board connection or board fault. In classroom use they can be intermittent because movement or vibration changes the cable position.

- Inspect all removable head and toolhead cables.
- Look for partially seated plugs, bent pins or strain near moving joints.
- If the fault appears only mid-print, gently inspect the moving loom for fatigue or cracking after powering down.
- Do not repeatedly reboot to hide an intermittent electronics fault.

### 6.2 Power panic / power loss recovery / random reset

What you may see: a power panic message, resume-after-loss prompt, or unexplained reboot.

These events can be caused by mains interruption, loose power connections, overloaded power strips, failing PSUs or internal connectors that open briefly under movement or heat.

- Check the wall outlet, switchboard, surge board and power cable first.
- Confirm the printer is not sharing a poor-quality power board with high-load classroom equipment.
- Inspect the PSU inlet and any mains-side connectors only if you are trained and the printer is safely isolated.
- Treat repeated unexplained resets as an electrical fault, not a normal software issue.

## 7. Brand and firmware examples

The same fault class is often presented differently depending on firmware and printer ecosystem. Use the examples below to recognise the message style you are seeing. These are representative examples, not an exhaustive list.

Ecosystem	Common example text on screen	What it points to	Good first checks
Marlin-based printers (many Ender-style and school open-frame printers)	"Err: MINTEMP"; "Err: MAXTEMP"; "Heating failed"; "THERMAL RUNAWAY"; "Printer halted. Please reset"	Thermistor open/short, heater weakness, or runaway protection event.	Hotend and bed sensor wires, heater cartridge, drafts, silicone sock, fan direction.

Ecosystem	Common example text on screen	What it points to	Good first checks
Prusa	"MINTEMP" / "MINTEMP BED"; "MAXTEMP"; "Bed preheat error"; "Hotend thermal runaway"; homing error X/Y/Z	Temperature sensing, preheat faults, thermal stability or motion/homing faults.	Thermistor and heater leads, correct assembly, ambient temperature, path obstructions.
Creality (K1 / K1C / V3 / K2 family)	"Error key: 2507" thermal runaway; "2564" nozzle not heating as expected; "2565" heated bed not heating as expected; foreign object or homing prompts	Runaway, hotend heating, bed heating, plate interference or homing fault.	Hotend board wiring, bed wiring, plate cleanliness, Z homing path, sensor cables.
Bambu Lab	HMS nozzle temperature abnormal; HMS heatbed temperature abnormal; Z homing failed; hotend cooling fan slow	Sensor open/short, heater issue, board communication, bed signal fault, fan fault or Z-axis interference.	Connector seating, hotend/heater assembly, bed cable tension, fan operation, chamber obstructions.
FlashForge	E0006 nozzle temp below minimum; E0007 extruder T0 not heating as expected; E0009 heated bed not heating as expected; E0012/E0013 homing errors	Nozzle thermocouple fault, heater fault, heated bed fault, or X/Y homing issue.	Nozzle assembly, extruder board cable, bed cable, hall sensor path and moving cables.
MakerBot Sketch / UltiMaker	"Extruder Temperature error"; ER28 print core max temp; ER31 print core heater error; ER37 print head sensor error; ER43 flow sensor error	Extruder seating or heater fault, over-temperature, print head sensor or flow sensing issue.	Reseat the extruder or print core, inspect sensor/fan condition, clean nozzle, confirm proper installation.
Raise3D (pro-grade school labs)	Model-specific heating, endstop or nozzle-related prompts; exact wording varies by series	Usually the same root classes as above: heating, endstop, leveling or extrusion faults.	Check hotend condition, endstop boards, leveling state, nozzle jam and cable integrity.

## 8. Reset, repair or replace?

The table below is designed for school settings where printers need to stay reliable and safe. It separates faults that may clear after a careful restart from faults that usually justify parts inspection or replacement.

Message type	A careful one-time restart may be reasonable when...	Move toward repair or replacement when...
Single unexpected MINTEMP after moving the printer	The room is very cold or the loom was disturbed and the fault disappears after inspection.	The error returns during homing, preheat or head movement; visible cable damage or intermittent readings are present.

Message type	A careful one-time restart may be reasonable when...	Move toward repair or replacement when...
Heating failed / not heating as expected	A plug had visibly come loose and temperature behaviour is now normal under observation.	Temperature rises slowly, stalls, oscillates badly, or the same fault returns on the next heat cycle.
Thermal runaway	Only after a known draft event or obvious missing silicone sock, corrected before retry.	Any repeated runaway event, drifting temperature, heater block issue, or unexplained mid-print heating instability.
Homing or leveling error	A print scrap, blob or misplaced plate was clearly blocking the procedure and is removed.	The axis still grinds, the sensor never triggers, or the same leveling fault persists on a clean machine.
Extrusion or load fault	There was a simple spool tangle or malformed filament tip and feed is now smooth.	The printer keeps clogging, clicking, grinding, or showing overload even with correct material and temperature.
Communication / MCU fault	Rarely. Only after an obvious loose removable cable is found and secured.	The same message appears again, especially during movement or heating; this usually needs cable or board attention.

## 9. School technician checklist

Before returning any printer to classroom use after an error, confirm the following:

- The exact error has been recorded and explained, not merely cleared.
- The nozzle, bed and motion system complete a normal heat and home cycle without repeat faults.
- Fans spin correctly and wiring is supported so it will not flex sharply during printing.
- The build plate is clean, seated correctly and matched to the profile in the slicer.
- A short supervised test print has completed successfully.
- Students have not been left to retry a fault that could involve heater or wiring failure.

## 10. Preventing common error-code faults

- Keep nozzle and thermistor looms supported so they bend gradually rather than at one sharp point.
- Do not pull filament out cold or half-softened; always unload at the correct temperature.
- Clean purge blobs and scraps from the bed before every lesson.
- Replace noisy or intermittent hotend cooling fans early.
- Avoid leaving printers in strong drafts, unheated rooms or under direct air-conditioning.
- After changing a hotend, nozzle module, print core or sensor, verify the part is fully seated and the firmware/profile matches the hardware.

## 11. Reference base for this guide

This resource was prepared from manufacturer support and firmware documentation current in March 2026.

Representative reference groups include:

- Marlin docs: MINTEMP, MAXTEMP, heating failed and thermal runaway.
- Prusa KB: MINTEMP, MAXTEMP, preheat, homing and thermal-runaway articles.
- Bambu Lab Wiki: HMS nozzle, bed, Z-homing and fan-fault references.
- Creality Wiki: 2507, 2564, 2565, foreign-object and homing-fault articles.
- FlashForge Wiki: Adventurer and Guider codes E0006, E0007, E0009, E0012 and E0013.
- UltiMaker / MakerBot support: Sketch temperature error, ER28, ER31, ER37 and ER43.
- Raise3D support: endstop, jam, hotend and series-manual fault references.