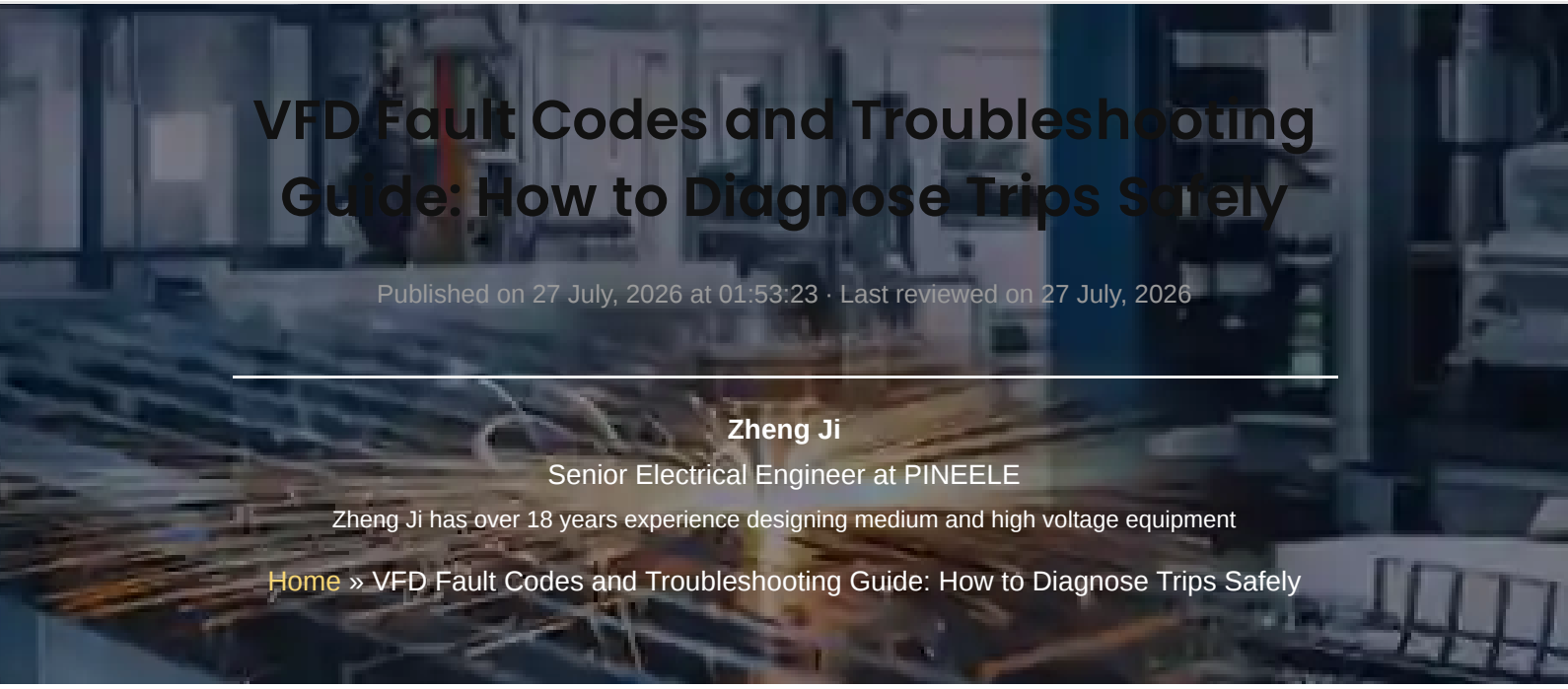

VFD Fault Codes and Troubleshooting Guide: How to Diagnose Trips Safely

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A VFD trip does not always mean the drive is damaged. In many cases, the fault comes from the motor, cable, power supply, load, cooling condition, wiring, or parameter settings. Replacing the drive without finding the real cause can result in the same fault appearing again.

For industrial buyers and maintenance teams, VFD fault codes are valuable clues. They help identify whether the system is experiencing overcurrent, overvoltage, undervoltage, overload, overheating, phase loss, ground fault, communication error, or another condition. The code itself is only the starting point. The real diagnosis requires checking what was happening when the fault occurred.

This guide explains common VFD faults, what usually causes them, and how to organize a safe troubleshooting process. It is written for engineers, contractors, maintenance staff, and purchasing teams who need to decide whether the issue is a setting problem, installation problem, motor problem, or replacement requirement.

Important safety note: VFDs contain high voltage and stored energy in the DC bus. Troubleshooting should be performed by qualified personnel. Always follow the drive manual, site lockout procedures, and local electrical safety requirements.

Why VFD Fault Codes Matter

Modern VFDs monitor electrical and thermal conditions continuously. When the drive detects a condition outside its allowed range, it trips to protect the motor, drive, or process. The displayed code helps maintenance staff identify the category of fault.

However, the same fault code can have several causes. For example, an overcurrent trip may be caused by a short acceleration time, overloaded machine, incorrect motor data, damaged cable, ground fault, or mechanical jam. A fault code tells you where to begin, not where to stop.

Good troubleshooting starts with evidence:

- What is the exact fault code?
- When did it happen?
- Was the motor starting, accelerating, running, decelerating, or stopping?

- Was the load normal or heavier than usual?
- Did the fault appear after installation, maintenance, parameter changes, or a power disturbance?
- Is the fault repeatable or random?
- Does the drive trip with the motor disconnected?

The answers help separate drive problems from system problems.

Common VFD Fault Types

FAULT TYPE	COMMON CAUSES	WHAT TO CHECK FIRST
Overcurrent	Heavy load, short acceleration time, mechanical jam, motor cable issue, wrong parameters	Load, motor current, ramp time, motor data, cable insulation
Overvoltage	Fast deceleration, regenerative load, high input voltage	Deceleration time, braking resistor, supply voltage
Undervoltage	Weak power supply, voltage dip, loose input connection	Input voltage, fuses, terminals, upstream supply
Overload	Motor overload, undersized drive, high duty cycle	Running current, load torque, drive rating
Overheating	Poor ventilation, dust, blocked fan, high ambient temperature	Panel cooling, heat sink, fan, cabinet temperature
Ground fault	Damaged motor insulation, cable damage, moisture	Motor cable, motor insulation, grounding
Input phase loss	Missing supply phase, blown fuse, loose terminal	Supply voltage, fuses, contactors, terminals
Output phase loss	Motor cable or connection problem	Motor terminals, cable continuity, motor winding
Communication fault	PLC issue, wrong protocol, loose communication cable	Network cable, settings, PLC status
Parameter error	Incorrect settings or incompatible command source	Motor data, control mode, command source, reset settings

Overcurrent Faults

Overcurrent is one of the most common VFD trips. It can occur during acceleration, constant-speed operation, or deceleration.

If the trip happens during acceleration, the acceleration time may be too short for the load. The motor demands high torque, the current rises quickly, and the drive trips. This is common with high-inertia loads, conveyors, crushers, mixers, and machines that start under load.

If the trip happens during normal running, check the mechanical load. A pump may be blocked, a conveyor may be overloaded, a fan may have bearing problems, or a machine may be jammed. The drive may be healthy while the motor is drawing too much current because the machine is overloaded.

If the trip happens immediately after start, check motor wiring, short circuits, ground faults, and parameter settings. Incorrect motor rated current, voltage, frequency, or control mode can cause unstable operation.

Practical checks include:

- Compare running current with motor rated current.
- Inspect the load for mechanical blockage.
- Confirm motor nameplate parameters in the drive.
- Increase acceleration time if the application allows it.
- Inspect motor cable and terminals.
- Check whether the drive rating matches the motor and load type.

Overvoltage Faults

Overvoltage often appears during deceleration. When a motor slows down a high-inertia load, the motor can regenerate energy back into the VFD DC bus. If the bus voltage rises too high, the drive trips.

Common causes include:

- Deceleration time set too short.
- High-inertia load.
- Load driving the motor, such as hoists or downhill conveyors.
- High input supply voltage.
- Braking resistor not installed or incorrectly selected where required.

Possible corrective actions include increasing deceleration time, using a braking resistor if supported by the drive, reviewing the braking unit, or changing the stopping method. The correct solution depends on the machine and drive model.

For pumps and fans, a longer deceleration time may be enough. For hoists, centrifuges, and high-inertia machines, engineering review is important.

Undervoltage Faults

Undervoltage faults occur when the VFD input or DC bus voltage drops below the allowable range. This can happen because of weak supply capacity, voltage dips, loose terminals, undersized cables, or upstream switching events.

If the fault appears when a large motor starts elsewhere in the plant, the problem may be site power quality. If it appears randomly, inspect input terminals, fuses, circuit breakers, and power supply stability.

A voltage stabilizer, transformer review, or supply upgrade may be required in some facilities. Do not simply reset the drive repeatedly without checking the power source.

Overload Faults

An overload fault means the motor or drive has been operating above its allowed load level for too long. This is different from a sudden overcurrent fault. It is often related to sustained high current.

Check whether the machine is overloaded, whether the motor is correctly sized, whether the VFD is selected for heavy-duty or normal-duty operation, and whether the ambient temperature is too high.

For pump and fan applications, check valve position, clogged filters, blocked pipes, or abnormal flow conditions. For conveyors, check belt tension, material load, bearings, and gearbox condition.

Overheating Faults

Heat is a major reason for VFD problems. A drive installed in a closed cabinet without enough airflow may trip even if the electrical selection is correct.

Common overheating causes include:

- High ambient temperature.
- Blocked cooling fan.
- Dust on the heat sink.
- Cabinet too small.
- Multiple drives in one panel without enough ventilation.
- Drive installed near a heat source.
- Overload current for long periods.

Inspect cabinet temperature, fan operation, air filters, heat sink cleanliness, and panel ventilation. In hot countries or outdoor installations, cabinet cooling may be necessary.

Ground Faults and Cable Problems

Ground faults may be caused by damaged motor insulation, damaged cable, water ingress, loose wiring, or incorrect grounding. VFD output cables experience high-frequency switching effects, especially over long distances. Poor cable selection or routing can contribute to trips and interference.

Important notes:

- Do not insulation-test through the VFD output terminals.
- Disconnect motor and cable from the drive before insulation testing, following the manual.
- Check for moisture in motor terminal boxes.
- Inspect cable damage, shielding, and grounding.
- Review cable distance and whether output reactors or filters are needed.

If the ground fault returns after replacing the drive, the real issue may be in the motor or cable.

Phase Loss Faults

Input phase loss may appear if one supply phase is missing, a fuse is blown, or a terminal is loose. Output phase loss may appear if the motor connection is open, a cable is damaged, or the motor winding has a problem.

For input phase loss, check supply voltage phase-to-phase, fuses, breakers, contactors, and input terminals. For output phase loss, check motor terminals, cable continuity, and motor winding condition.

Communication and Control Faults

In automated systems, a VFD may communicate with a PLC, HMI, or building management system. Communication faults can be caused by wrong baud rate, incorrect address, loose cable, electrical noise, wrong protocol, or PLC program issues.

Control command problems can also look like drive failure. If the VFD does not start, confirm whether the command source is keypad, terminal, analog input, communication, or PLC. Many after-sales cases come from incorrect command source settings.

A Practical Troubleshooting Process

Use this process before replacing the VFD:

1. Record the exact fault code and drive model.
2. Record when the fault occurs: start, run, deceleration, stop, or random.
3. Check the motor nameplate and VFD motor parameters.
4. Measure input voltage and confirm supply stability.
5. Inspect motor cable, terminals, and grounding.
6. Check the mechanical load for blockage or overload.
7. Inspect panel cooling, fan, dust, and ambient temperature.
8. Review acceleration and deceleration time.
9. Check whether the drive rating matches motor current and load duty.
10. Contact the supplier with fault code, photos, and operating details.

Common Mistakes to Avoid

The first mistake is resetting the fault repeatedly without diagnosis. Repeated reset attempts can make a serious problem worse.

The second mistake is replacing the VFD before checking the motor and cable. A damaged motor cable can destroy a new drive.

The third mistake is ignoring the mechanical load. Many overcurrent and overload faults come from the machine, not the drive.

The fourth mistake is installing the VFD in a hot or dusty cabinet and blaming the product when it overheats.

The fifth mistake is copying parameters from another machine without checking motor data and load requirements.

Information to Send for Technical Support

When asking ZHENGXI Electric or any supplier for support, provide:

- VFD model and power rating.
- Fault code shown on the display.
- Motor nameplate photo.

- Input voltage and motor voltage.
- Application and load type.
- When the trip occurs.
- Wiring photos.
- Cable distance between VFD and motor.
- Parameter changes made recently.
- Installation environment and cabinet photo.

This helps technical support identify the likely cause faster.

FAQ

What causes a VFD to trip?

Common causes include overcurrent, overvoltage, undervoltage, overload, overheating, ground faults, phase loss, wiring problems, incorrect parameters, and mechanical load problems.

Can I reset a VFD fault immediately?

Do not reset repeatedly without diagnosis. Record the fault code and check the cause first, especially for overcurrent, ground fault, or overheating faults.

How do I know if the VFD is bad?

A failed VFD is possible, but many trips are caused by motor, cable, load, power supply, cooling, or parameter problems. Check the system before replacing the drive.

What causes VFD overcurrent during startup?

Common causes include short acceleration time, heavy starting load, incorrect motor parameters, mechanical jam, or an undersized drive.

Why does a VFD trip during deceleration?

Fast deceleration or regenerative load can raise the DC bus voltage and cause an overvoltage fault. Increasing deceleration time or using braking components may be required.

What information should I send for support?

Send the fault code, drive model, motor nameplate, wiring photos, application, cable distance, and a description of when the trip occurs.

Summary

VFD fault codes are useful diagnostic clues, but they should be interpreted with the full system in mind. The problem may come from the drive, motor, cable, power supply, cooling, parameters, or mechanical load.

A safe and structured troubleshooting process reduces downtime and prevents unnecessary replacement. Record the fault code, check the operating condition, inspect the motor and wiring, review parameters, and contact the supplier with complete information.