Troubleshooting

This chapter provides information to guide you in troubleshooting the PowerFlex 520-series drive. Included is a listing and description of drive faults with possible solutions, when applicable.

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ATTENTION: Risk of injury or equipment damage exists. Drive does not contain user-serviceable components. Do not disassemble drive chassis.

Drive Status

The condition or state of your drive is constantly monitored. Any changes will be indicated through the integral LCD display.

See Display and Control Keys on page 58 for information on drive status indicators and controls.

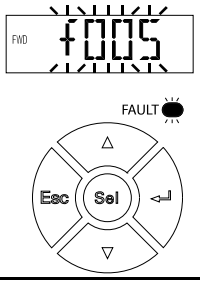
Faults

A fault is a condition that stops the drive. There are two fault types.

Fault Types

Type	Fault Description	
1	Auto-Reset/Run	When this type of fault occurs, and A541 [Auto Rstrt Tries] is set to a value greater than "0," a user-configurable timer, A542 [Auto Rstrt Delay], begins. When the timer reaches zero, the drive attempts to automatically reset the fault. If the condition that caused the fault is no longer present, the fault will be reset and the drive will be restarted.
2	Non-Resettable	This type of fault may require drive or motor repair, or is caused by wiring or programming errors. The cause of the fault must be corrected before the fault can be cleared.

Fault Indication

Condition	Display
Drive is indicating a fault. The integral LCD display provides visual notification of a fault condition by displaying the following. • Flashing fault number • Flashing fault indicator (LED) Press the Esc key to regain control of the display.	

Manually Clearing Faults

Step	Key(s)
1. Press Esc to acknowledge the fault. The fault information will be removed so that you can use the integral keypad. Access b007 [Fault 1 Code] to view the most recent fault information. 2. Address the condition that caused the fault. The cause must be corrected before the fault can be cleared. See Fault Types, Descriptions and Actions on page 147. 3. After corrective action has been taken, clear the fault by one of these methods. • Press Stop if P045 [Stop Mode] is set to a value between "0" and "3". • Cycle drive power. • Set A551 [Fault Clear] to 1 "Reset Fault" or 2 "Clear Buffer". • Cycle digital input if t062, t063, t065...t068 [DigIn TermBlk xx] is set to 13 "Clear Fault".	

Automatically Clearing Faults

Option/Step	
Clear a Type 1 fault and restart the drive. 1. Set A541 [Auto Rstrt Tries] to a value other than "0". 2. Set A542 [Auto Rstrt Delay] to a value other than "0". **Clear an OverVoltage, UnderVoltage or Heatsink OvrTmp fault without restarting the drive.** 1. Set A541 [Auto Rstrt Tries] to a value other than "0". 2. Set A542 [Auto Rstrt Delay] to "0".	

ATTENTION: Equipment damage and/or personal injury may result if these parameters are used in an inappropriate application. Do not use this function without considering applicable local, national and international codes, standards, regulations or industry guidelines.

Auto Restart (Reset/Run)

The Auto Restart feature provides the ability for the drive to automatically perform a fault reset followed by a start attempt without user or application intervention. This allows remote or "unattended" operation. Only certain faults are allowed to be reset. Certain faults (Type 2) that indicate possible drive component malfunction are not resettable. Fault types are listed in the table Fault Types on page 145. See Fault Descriptions on page 147 for more information.

Use caution when enabling this feature, since the drive will attempt to issue its own start command based on user selected programming.

Fault Descriptions

Fault Types, Descriptions and Actions

No.	Fault	Type[2]	Description	Action
F000	No Fault	–	No fault present.	–
F002	Auxiliary Input	1	External trip (Auxiliary) input.	• Check remote wiring. • Verify communications programming for intentional fault.
F003	Power Loss	2	Single phase operation detected with excessive load.	• Monitor the incoming AC line for low voltage or line power interruption. • Check input fuses. • Reduce load.
F004	UnderVoltage	1	DC bus voltage fell below the minimum value.	Monitor the incoming AC line for low voltage or line power interruption.
F005	OverVoltage	1	DC bus voltage exceeded maximum value.	Monitor the AC line for high line voltage or transient conditions. Bus overvoltage can also be caused by motor regeneration. Extend the decel time or install dynamic brake option.
F006	Motor Stalled	1	Drive is unable to accelerate or decelerate motor.	• Increase P041, A442, A444, A446 [Accel Time x] or reduce load so drive output current does not exceed the current set by parameter A484, A485 [Current Limit x] for too long. • Check for overhauling load.
F007	Motor Overload	1	Internal electronic overload trip.	• An excessive motor load exists. Reduce load so drive output current does not exceed the current set by parameter P033 [Motor OL Current]. • Verify A530 [Boost Select] setting.
F008	Heatsink OvrTmp	1	Heatsink/Power Module temperature exceeds a predefined value.	• Check for blocked or dirty heat sink fins. Verify that ambient temperature has not exceeded the rated ambient temperature. • Check fan.
F009	CC OvrTmp	1	Control module temperature exceeds a predefined value.	• Check product ambient temperature. • Check for airflow obstruction. • Check for dirt or debris. • Check fan.
F012	HW OverCurrent	2	The drive output current has exceeded the hardware current limit.	Check programming. Check for excess load, improper A530 [Boost Select] setting, DC brake volts set too high or other causes of excess current.
F013	Ground Fault	1[3]	A current path to earth ground has been detected at one or more of the drive output terminals.	Check the motor and external wiring to the drive output terminals for a grounded condition.

Fault Types, Descriptions and Actions

No.	Fault	Type[2]	Description	Action
F015[1]	Load Loss	2	The output torque current is below the value programmed in A490 [Load Loss Level] for a time period greater than the time programmed in A491 [Load Loss Time].	• Verify connections between motor and load. • Verify level and time requirements
F021	Output Ph Loss	1	Output Phase Loss (if enabled). Configure with A557 [Out Phas Loss En].	• Verify motor wiring. • Verify motor.
F029	Analog In Loss	1	An analog input is configured to fault on signal loss. A signal loss has occurred. Configure with t094 [Anlg In V Loss] or t097 [Anlg In mA Loss].	• Check for broken/loose connections at inputs. • Check parameters.
F033	Auto Rstrt Tries	2	Drive unsuccessfully attempted to reset a fault and resume running for the programmed number of A541 [Auto Rstrt Tries].	Correct the cause of the fault and manually clear.
F038	Phase U to Gnd	2	A phase to ground fault has been detected between the drive and motor in this phase.	• Check the wiring between the drive and motor. • Check motor for grounded phase. • Replace drive if fault cannot be cleared.
F039	Phase V to Gnd			
F040	Phase W to Gnd			
F041	Phase UV Short	2	Excessive current has been detected between these two output terminals.	• Check the motor and drive output terminal wiring for a shorted condition. • Replace drive if fault cannot be cleared.
F042	Phase UW Short			
F043	Phase VW Short			
F048	Params Defaulted	1	The drive was commanded to write default values to EEPROM.	• Clear the fault or cycle power to the drive. • Program the drive parameters as needed.
F059[1]	Safety Open	1	Both of the safety inputs (Safety 1, Safety 2) are not enabled. Configure with t105 [Safety Open En].	• Check safety input signals. If not using safety, verify and tighten jumper for I/O terminals S1, S2 and S+.
F063	SW OverCurrent	1	Programmed A486, A488 [Shear Pinx Level] has been exceeded for a time period greater than the time programmed in A487, A489 [Shear Pin x Time].	• Verify connections between motor and load. • Verify level and time requirements.
F064	Drive Overload	2	Drive overload rating has been exceeded.	Reduce load or extend Accel Time.
F070	Power Unit	2	Failure has been detected in the drive power section.	• Check maximum ambient temperature has not been exceeded. • Cycle power. • Replace drive if fault cannot be cleared.
F071	DSI Net Loss	2	Control over the Modbus or DSI communication link has been interrupted.	• Cycle power. • Check communications cabling. • Check Modbus or DSI setting. • Check Modbus or DSI status.
F072	Opt Net Loss	2	Control over the network option card's remote network has been interrupted.	• Cycle power. • Check communications cabling. • Check network adapter setting. • Check external network status.
F073[1]	EN Net Loss	2	Control through the embedded EtherNet/IP adapter has been interrupted.	• Cycle power. • Check communications cabling. • Check EtherNet/IP setting. • Check external network status.
F080	Autotune Failure	2	The autotune function was either cancelled by the user or failed.	Restart procedure.

Fault Types, Descriptions and Actions

No.	Fault	Type[2]	Description	Action
F081	DSI Comm Loss	2	Communications between the drive and the Modbus or DSI master device have been interrupted.	• Cycle power. • Check communications cabling. • Check Modbus or DSI setting. • Check Modbus or DSI status. • Modify using C125 [Comm Loss Action]. • Connecting I/O terminals C1 and C2 to ground may improve noise immunity. • Replace wiring, Modbus master device, or control module.
F082	Opt Comm Loss	2	Communications between the drive and the network option card have been interrupted.	• Cycle power. • Reinstall option card in drive. • Modify using C125 [Comm Loss Action]. • Replace wiring, port expander, option card, or control module.
F083[1]	EN Comm Loss	2	Internal communications between the drive and the embedded EtherNet/IP adapter have been interrupted.	• Cycle power. • Check EtherNet/IP setting. • Check drive's Ethernet settings and diagnostic parameters. • Modify using C125 [Comm Loss Action]. • Replace wiring, Ethernet switch, or control module.
F091[1]	Encoder Loss	2	Requires differential encoder. One of the 2 encoder channel signals is missing.	• Check Wiring. • If P047, P049, P051 [Speed Referencex] = 16 "Positioning" and A535 [Motor Fdbk Type] = 5 "Quad Check", swap the Encoder channel inputs or swap any two motor leads. • Replace encoder.
F094	Function Loss	2	"Freeze-Fire" (Function Loss) input is inactive, input to the programmed terminal is open.	Close input to the terminal and cycle power.
F100	Parameter Chksum	2	Drive parameter non-volatile storage is corrupted.	Set P053 [Reset To Defalts] to 2 "Factory Rset".
F101	External Storage	2	External non-volatile storage has failed.	Set P053 [Reset To Defalts] to 2 "Factory Rset".
F105	C Connect Err	2	Control module was disconnected while drive was powered.	Clear fault and verify all parameter settings. Do not remove or install the control module while power is applied.
F106	Incompat C-P	2	The PowerFlex 525 control module does not support power modules with 0.25 HP power rating.	• Change to a different power module. • Change to a PowerFlex 523 control module.
F107	Replaced C-P	2	The control module could not recognize the power module. Hardware failure.	• Change to a different power module. • Replace control module if changing power module does not work.
F109	Mismatch C-P	2	The control module was mounted to a different drive type power module.	Set P053 [Reset To Defalts] to 3 "Power Reset".
F110	Keypad Membrane	2	Keypad membrane failure / disconnected.	• Cycle power. • Replace control module if fault cannot be cleared.
F111[1]	Safety Hardware	2	Safety input enable hardware malfunction. One of the safety inputs is not enabled.	• Check safety input signals. If not using safety, verify and tighten jumper for I/O terminals S1, S2 and S+. • Replace control module if fault cannot be cleared.
F114	uC Failure	2	Microprocessor failure.	• Cycle power. • Replace control module if fault cannot be cleared.

Fault Types, Descriptions and Actions

No.	Fault	Type[2]	Description	Action
F122	I/O Board Fail	2	Failure has been detected in the drive control and I/O section.	• Cycle power. • Replace drive or control module if fault cannot be cleared.
F125	Flash Update Req	2	The firmware in the drive is corrupt, mismatched, or incompatible with the hardware.	Perform a firmware flash update operation to attempt to load a valid set of firmware.
F126	NonRecoverablErr	2	A non-recoverable firmware or hardware error was detected. The drive was automatically stopped and reset.	• Clear fault or cycle power to the drive. • Replace drive or control module if fault cannot be cleared.
F127	DSIFlashUpdatReq	2	A critical problem with the firmware was detected and the drive is running using backup firmware that only supports DSI communications.	Perform a firmware flash update operation using DSI communications to attempt to load a valid set of firmware.

(1) This fault is not applicable to PowerFlex 523 drives.
(2) See Fault Types for more information.
(3) This fault may be cleared by the auto-restart routine and will be attempted only once. It ignores the value set in parameter A541 [Auto Rstrt Tries].

Common Symptoms and Corrective Actions

The drive is designed to start from the keypad when shipped. For a basic test of drive operation:

1. Remove all user I/O wire.
2. Verify safety terminals (S1, S2 and S+) jumper is in place and tightened.
3. Verify wire jumper is in place between I/O terminals 01 and 11.
4. Verify that the three jumpers are in their proper default positions on the control board. See PowerFlex 525 Control I/O Wiring Block Diagram on page 39 for more information.
5. Reset default parameter values by setting P053 [Reset Defalts] to 2 “Factory Rset”.
6. If safe to do so for your application, press Start on drive keypad. Drive will run according to the speed potentiometer.

Motor does not Start.

Cause(s)	Indication	Corrective Action
No output voltage to the motor.	None	Check the power circuit. • Check the supply voltage. • Check all fuses and disconnects. Check the motor. • Verify that the motor is connected properly. Check the control input signals. • Verify that a Start signal is present. If 2-Wire control is used, verify that either the Run Forward or Run Reverse signal is active, but not both. • Verify that I/O Terminal 01 is active. • Verify that P046, P048, P050 [Start Source x] matches your configuration. • Verify that A544 [Reverse Disable] is not prohibiting movement. • Verify that safety inputs (Safety 1 and Safety 2) are active.
Improper boost setting at initial start-up.	None	Set A530 [Boost Select] to 2 "35.0, VT".
Drive is Faulted	Flashing red status light	Clear fault. • Press Stop if P045 [Stop Mode] is set to a value between "0" and "3". • Cycle drive power. • Set A551 [Fault Clear] to 1 "Reset Fault" or 2 "Clear Buffer". • Cycle digital input if t062, t063, t065...t068 [DigIn TermBlk xx] is set to 13 "Clear Fault".
Incorrect programming. • P046, P048, P050 [Start Source x] is set incorrectly.	None	Check setting for b012 [Control Source].
Incorrect input wiring. See page 42 for wiring examples. • 2 wire control requires Run Forward, Run Reverse or Jog input. • 3 wire control requires Start and Stop inputs • Stop input is always required.	None	• Wire inputs correctly and/or install jumper. • If the PowerFlex 525 Safe-Torque-Off function is used, verify that inputs are active. • If 2-wire or 3-wire mode is used, verify that t062 [DigIn TermBlk 02] and t063 [DigIn TermBlk 03] are set properly.
Incorrect Sink/Source jumper setting.	None	Set switch to match wiring scheme.

Drive does not Start from Start or Run Inputs wired to the terminal block.

Cause(s)	Indication	Corrective Action
Drive is Faulted	Flashing red status light	Clear fault. • Press Stop if P045 [Stop Mode] is set to a value between "0" and "3". • Cycle drive power. • Set A551 [Fault Clear] to 1 "Reset Fault" or 2 "Clear Buffer". • Cycle digital input if t062, t063, t065...t068 [DigIn TermBlk xx] is set to 13 "Clear Fault".
Incorrect programming. • P046, P048, P050 [Start Source x] is set incorrectly. • t062, t063 [DigIn TermBlk 02/03] is set incorrectly.	None	Check parameter settings.
Incorrect input wiring. See page 42 for wiring examples. • 2 wire control requires Run Forward, Run Reverse or Jog input. • 3 wire control requires Start and Stop inputs • Stop input is always required.	None	• Wire inputs correctly and/or install jumper. • If the PowerFlex 525 Safe-Torque-Off function is used, verify that inputs are active.
Incorrect Sink/Source jumper setting.	None	Set switch to match wiring scheme.

Drive does not respond to changes in speed command.

Cause(s)	Indication	Corrective Action
No value is coming from the source of the command.	The drive "Run" indicator is lit and output is 0 Hz.	• Check b012 [Control Source] for correct source. • If the source is an analog input, check wiring and use a meter to check for presence of signal. • Check b002 [Commanded Freq] to verify correct command.
Incorrect reference source is being selected by remote device or digital inputs.	None	• Check b012 [Control Source] for correct source. • Check b014 [Dig In Status] to see if inputs are selecting an alternate source. Verify settings for t062, t063, t065-t068 [DigIn TermBlk xx]. • Check P047, P049, P051 [Speed Referencex] for the source of the speed reference. Reprogram as necessary. • Review the Speed Reference Control chart on page 46. • Verify communications if used.

Motor and/or drive will not accelerate to commanded speed.

Cause(s)	Indication	Corrective Action
Acceleration time is excessive.	None	Reprogram P041, A442, A444, A446 [Accel Time x].
Excess load or short acceleration times force the drive into current limit, slowing or stopping acceleration.	None	• Compare b003 [Output Current] with A484, A485 [Current Limit x]. • Remove excess load or reprogram P041, A442, A444, A446 [Accel Time x]. • Check for improper A530 [Boost Select] setting.
Speed command source or value is not as expected.	None	• Verify b002 [Commanded Freq]. • Check b012 [Control Source] for the proper Speed Command.
Programming is preventing the drive output from exceeding limiting values.	None	• Check P044 [Maximum Freq] to ensure that speed is not limited by programming. • Verify programming of A572 [Speed Ratio].
Torque performance does not match motor characteristics.	None	• Set motor nameplate full load amps in parameter P034 [Motor NP FLA]. • Perform P040 [Autotune] "Static Tune" or "Rotate Tune" procedure. • Set P039 [Torque Perf Mode] to 0 "V/Hz".

Motor operation is unstable.

Cause(s)	Indication	Corrective Action
Motor data was incorrectly entered.	None	1. Correctly enter motor nameplate data into P031, P032 and P033. 2. Enable A547 [Compensation]. 3. Use A530 [Boost Select] to reduce boost level.

Drive will not reverse motor direction.

Cause(s)	Indication	Corrective Action
Reverse is disabled.	None	Check A544 [Reverse Disable].
Digital input is not selected for reversing control.	None	Check [DigIn TermBlk xx] (See page 82). Choose correct input and program for reversing mode.
Digital input is incorrectly wired.	None	Check input wiring (See page 42).
Motor wiring is improperly phased for reverse.	None	Switch two motor leads.

Drive does not power up.

Cause(s)	Indication	Corrective Action
No input power to drive.	None	• Check the power circuit. • Check the supply voltage. • Check all fuses and disconnects.
Control module is not connected properly to power module.	None	1. Remove power. 2. Verify that the control module is properly and fully installed on the power module. 3. Reapply power.

Motor is rotating at zero Hz or slip frequency is not correct.

Cause(s)	Indication	Corrective Action
Incorrect speed calculation.	Improper speed.	• Verify P032 [Motor NP Hertz]. • Reduce boost with A530 [Boost Select]. • Set P036 [Motor NP RPM] to motor synchronous speed.