

MAINTENANCE AND TROUBLESHOOTING



CHAPTER 6

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Maintenance and Inspection

Modern AC drives are based on solid state electronics technology. Preventive maintenance is required to operate the AC drive in its optimal condition, and to ensure a long life. It is recommended that a qualified technician perform a regular inspection of the AC drive. Some items should be checked once a month, and some items should be checked annually. Before the inspection, always turn off the AC Input Power to the unit. Wait at least 10 minutes after all display lamps have turned off, and then confirm that the capacitors have fully discharged by measuring the voltage between B1 and Frame Ground using a multimeter set to measure DC voltage.



WARNING! Disconnect AC power and ensure that the internal capacitors have fully discharged before inspecting the AC drive!

Monthly Inspection

Check the following items at least once a month.

1. Make sure the motors are operating as expected.
2. Make sure the installation environment is normal.
3. Make sure the cooling system is operating as expected.
4. Check for irregular vibrations or sounds during operation.
5. Make sure the motors are not overheating during operation.
6. Check the input voltage of the AC drive and make sure the voltage is within the operating range. Check the voltage with a voltmeter.

Annual Inspection

Check the following items once a year.

1. Tighten and reinforce the screws of the AC drive if necessary. They may loosen due to vibration or changing temperatures.
2. Make sure the conductors and insulators are not corroded and/or damaged.
3. Check the resistance of the insulation with Megaohmmeter.
4. Check the capacitors and relays, and replace if necessary.
5. Clean off any dust and dirt with a vacuum cleaner. Pay special attention to cleaning the ventilation ports and PCBs. Always keep these areas clean. Accumulation of dust and dirt in these areas can cause unforeseen failures.

If the AC drive is not used for a long period of time, turn the power on at least once every two years and confirm that it still functions properly. To confirm functionality, disconnect the motor and energize the AC drive for 5 hours or more before attempting to run a motor with it.

Troubleshooting

Fault Messages

The AC drive has a comprehensive fault diagnostic system that includes several different alarms and fault messages. Once a fault is detected, the corresponding protective functions will be activated. The fault messages are then displayed on the digital keypad LCD display. The six most recent faults can be read on the digital keypad display by viewing parameters P06.31 to P06.36.



NOTE: Faults can be cleared by a reset from the keypad or input terminal.

Fault Messages	
Fault Name/Description	Corrective Actions
<p>OVER-CURRENT</p> <p>The AC drive detects an abnormal increase in current.</p>	<ol style="list-style-type: none"> 1. Check whether the motor's horsepower is equal to or less than the AC drive output power. 2. Check the wiring connections between the AC drive and motor for possible short circuits. 3. Increase the Acceleration time (P 1.01 or P 1.05). 4. Check for possible excessive loading conditions at the motor. 5. If there are any abnormal conditions when operating the AC drive after short-circuit is removed, or fault does not clear, call ADC Support for assistance.
<p>OVER-VOLTAGE</p> <p>The AC drive detects that the DC bus voltage has exceeded its maximum allowable value.</p>	<ol style="list-style-type: none"> 1. Check whether the input voltage falls within the rated AC drive input voltage. 2. Check for possible voltage transients. 3. Bus over-voltage may also be caused by motor regeneration. Either increase the decel time or add an optional braking resistor. 4. Check whether the required braking power is within the specified limits. 5. Check braking resistor on drives under 20HP and dynamic brake unit & braking resistor on drives 20HP and above.
<p>OVER-TEMPERATURE</p> <p>The AC drive temperature sensor detects excessive heat.</p>	<ol style="list-style-type: none"> 1. Ensure that the ambient temperature falls within the specified temperature range. 2. Make sure that the ventilation holes are not obstructed. 3. Remove any foreign objects on the heat sinks and check for possible dirty heat sink fins. 4. Provide enough spacing for adequate ventilation.
<p>UNDER-VOLTAGE</p> <p>The AC drive detects that the DC bus voltage has fallen below its minimum allowable value.</p>	<p>Check whether the input voltage falls within the rated AC drive input voltage.</p>
<p>OVERLOAD</p> <p>The AC drive detects excessive drive output current.</p>	<ol style="list-style-type: none"> 1. Check whether the motor is overloaded. 2. Reduce torque compensation setting as set in P 2.03. 3. Increase the AC drive's output capacity. <p>Note: The AC drive can withstand up to 150% of the rated current for a maximum of 60 seconds.</p>

Fault Messages	
Fault Name/Description	Corrective Actions
<p>THERMAL OVERLOAD</p> <p>Parameter settings (P 6.07 to P 6.09) An external condition has occurred to cause an internal electronic or motor thermal overload fault</p>	<p>If P 6.07 is set to '1' to enable during steady state:</p> <ol style="list-style-type: none"> 1. Check for possible motor overload. 2. Check electronic thermal overload relay setting (P 6.00).. 3. Increase motor capacity. 4. Reduce the current level so that the AC drive output current does not exceed the value set by the Motor Rated Current P 0.01.
<p>OVER-TORQUE</p> <p>Parameter settings (P 6.07 to P 6.09) An external condition has occurred to cause an over-torque fault.</p>	<p>If P 6.07 is set to '2' to enable detection during accel/decel:</p> <ol style="list-style-type: none"> 1. Reduce the motor overload. 2. Adjust the over-torque detection setting to an appropriate level.
<p>OVER-CURRENT ACC</p> <p>Over-current during acceleration:</p> <ol style="list-style-type: none"> 1. Short-circuit at motor output. 2. Torque boost too high. 3. Acceleration time too short. 4. AC drive output capacity is too small. 	<ol style="list-style-type: none"> 1. Check for possible poor insulation at the output line. 2. Decrease the torque boost setting in P 2.02. 3. Increase the acceleration time P 1.01 and P 1.05. 4. Replace the AC drive with one that has a higher output capacity.
<p>OVER-CURRENT DEC</p> <p>Over-current during deceleration:</p> <ol style="list-style-type: none"> 1. Short-circuit at motor output. 2. Deceleration time too short. 3. AC drive output capacity is too small. 	<ol style="list-style-type: none"> 1. Check for possible poor insulation at the output line. 2. Increase the deceleration time P 1.02 and P 1.06. 3. Replace the AC drive with one that has a higher output capacity.
<p>OVER-CURRENT STD</p> <p>Over-current during steady state operation</p> <ol style="list-style-type: none"> 1. Short-circuit at motor output. 2. Sudden increase in motor loading. 3. AC drive output capacity is too small. 	<ol style="list-style-type: none"> 1. Check for possible poor insulation at the output line. 2. Check for possible motor stall. 3. Replace the AC drive with one that has a higher output capacity.
<p>CPU FAILURE 1</p> <p>Internal memory IC cannot be programmed</p>	<ol style="list-style-type: none"> 1. Switch off power supply. 2. Check whether the input voltage falls within the AC drive's rated input voltage. 3. Switch the AC drive back on. If fault does not clear, contact ADC Support for assistance.
<p>CPU FAILURE 2</p> <p>Internal memory IC cannot be read.</p>	<ol style="list-style-type: none"> 1. Reset drive to factory defaults P 9.08 to 99. 2. Switch off power supply 3. Switch the AC drive back on. If fault does not clear, contact ADC Support for assistance.
<p>CPU FAILURE 3</p> <p>Internal memory IC failed to receive output status</p>	<ol style="list-style-type: none"> 1. Check all connections at L1, L2 and L3. 2. Verify correct voltage at L1, L2,L3. 3. Contact ADC Support for assistance.

Fault Messages	
Fault Name/Description	Corrective Actions
<div style="border: 1px solid black; padding: 5px; text-align: center;">HARDWARE FAILURE</div> <p>Hardware protection failure</p>	<ol style="list-style-type: none"> 1. Check all connections at L1, L2 and L3. 2. Verify correct voltage at L1, L2,L3. 3. Contact ADC Support for assistance.
<div style="border: 1px solid black; padding: 5px; text-align: center;">MOM POWER LOSS</div> <p>Input power has been lost</p>	<p>Check line power to drive</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;">EXTERNAL FAULT</div> <p>The external terminal EF-CM goes from OFF to ON</p>	<p>When external terminal EF-CM is closed, the output will be turned off (under Normally Open. External Fault.).</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;">AUTO RAMP FAULT</div> <p>Auto accel/decel failure</p>	<p>Refer to Over-current or Over-voltage error</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;">GROUND FAULT</div> <p>1. Possible unbalanced load 2. Possible current leakage</p>	<ol style="list-style-type: none"> 1. Check the motor for possible insulation damage. 2. Check for possible poor insulation at the output line.
<div style="border: 1px solid black; padding: 5px; text-align: center;">EXT. BASE-BLOCK</div> <p>AC drive output is turned off.</p>	<ol style="list-style-type: none"> 1. When the external input terminal (base-block) is active, the AC drive output will be turned off. 2. Disable this connection and the AC drive will begin to work again.
<div style="border: 1px solid black; padding: 5px; text-align: center;">INPUT POWER LOSS</div> <p>One phase of the input power is lost</p>	<ol style="list-style-type: none"> 1. Check for possible poor connection on the input power line. 2. Check for possible loss of phase on input power line.
<div style="border: 1px solid black; padding: 5px; text-align: center;">OUTPUT SHORTED</div> <p>IGBT Short Circuit</p>	<p>Contact ADC Support for assistance.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;">PID FBACK LOSS</div> <p>1. If P 7.27 = 0, (<i>warn and AC drive stop</i>), PID feedback loss recorded. 2. If P 7.27 = 1, (<i>warn and continue operation</i>), PID feedback loss not recorded.</p>	<p>PID Warning: PID Feedback Loss - The 4-20mA PID signal has been lost. The corrective action can be set with the PID Feedback Loss parameter (P 7.27). The available settings are: 00 - Warn and AC Drive Stop 01 - Warn and Continue The default setting is 00.</p>

Fault Messages	
Fault Name/Description	Corrective Actions
<p>ENCODER LOSS</p> <p>1. If P 10.05 = 1 or 2 (<i>warn and AC drive stop</i>), Encoder feedback loss would be recorded.</p> <p>2. If P 10.05 = 0 (<i>warn and continue operation</i>), Encoder feedback loss would not be recorded.</p>	<ol style="list-style-type: none"> 1. Verify that the encoder board has power 2. Check to be sure it is not mis-wired 3. Check for incorrect voltage or encoder set-up 4. Check both the mechanical and electrical integrity of the encoder.
<p>ENC SIGNAL ERROR</p> <p>Encoder A/B phase signal is in error when the control mode is from the encoder</p>	<ol style="list-style-type: none"> 1. Verify power to the encoder feedback card 2. Verify encoder and feedback card wiring 3. Check encoder feedback card dip switch settings and encoder voltage requirements

Warning Messages: Serial Communication and Keypad Errors

There are several Warning Messages that a *DURAPULSE* AC Drive may give. The *DURAPULSE* AC Drive allows you to decide its response to these messages. The descriptions of the Warning Messages are listed below.

Warning Messages	
Error Name	Description
<div style="border: 1px solid black; width: 150px; height: 30px; margin-bottom: 5px;"></div> No display shown on the keypad	1. The Keypad LCD display has failed. 2. Check input power 3. Make sure the keypad is tightly connected to the drive.
<div style="border: 1px solid black; padding: 2px;">Invalid Cmd Code</div>	Invalid Command Code when communicating
<div style="border: 1px solid black; padding: 2px;">Invalid Address</div>	Invalid Address when communicating
<div style="border: 1px solid black; padding: 2px;">Invalid Data</div>	Invalid Data when communicating
<div style="border: 1px solid black; padding: 2px;">Slave Comm Fault</div>	Slave Comm Fault device failure
<div style="border: 1px solid black; padding: 2px;">Comm Time-Out</div>	Communication Time Out
<div style="border: 1px solid black; padding: 2px;">Drive Error</div>	Drive model doesn't match keypad
<div style="border: 1px solid black; padding: 2px;">EEPROM Fault</div>	When the copy function is enabled (P 9.40), there is a Read/Write EEPROM Fault

Warning Messages	
Error Name	Description
Rating Mismatch	Data range doesn't match
Group# Overflow	When the copy function is enabled (P 9.40), keypad's group number data is more than the drive's.
No Space	When the copy function is enabled (P 9.40),EEPROM data block in the keypad is full.
Delete Failure	When the copy function is enabled (P 9.40), delete EEPROM block fails.
No Data	When the copy function is enabled (P 9.40), EEPROM data block is null.
R1 Detect Error Failure to detect motor resistance during Auto-tune procedure	<ol style="list-style-type: none"> 1. Check to make sure the motor is connected to the drive correctly. 2. Check line power to drive 3. STOP key was pressed during Auto-Tune procedure
No Load Error Failure to detect any motor load during Auto-tune procedure	<ol style="list-style-type: none"> 1. Check to make sure the motor is connected to the drive correctly. 2. Check line power to drive 3. STOP key was pressed during Auto-Tune procedure
Copy Error-COMMS Communications error during Copy Keypad function	<ol style="list-style-type: none"> 1. Check connection between the keypad and drive and make sure it is not loose 2. Check communications protocol for correct settings
Copy Error-Data Data error during Copy Keypad function	<ol style="list-style-type: none"> 1. Check connection between the keypad and drive and make sure it is not loose 2. Check communications protocol for correct settings

Warning Messages	
Error Name	Description
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 5px;">Overheat Warning</div> <p>The AC drive temperature has exceeded 85% of the Over-temperature condition.</p>	<ol style="list-style-type: none"> 1. Ensure that the ambient temperature falls within the specified temperature range. 2. Make sure that the ventilation holes are not obstructed. 3. Remove any foreign objects on the heat sinks and check for possible dirty heat sink fins. 4. Provide enough spacing for adequate ventilation.
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 5px;">Write Failure</div>	<p>When the copy function is enabled (P 9.40), Write to EEPROM fails.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 5px;">Parameter Locked</div>	<p>Parameters have been locked: read only - cannot be set/cannot write.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 5px;">--- ERR ---</div>	<p>Error: The configuration is not accepted, or the parameter is locked.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 5px;">Value Accepted</div>	<p>Value Accepted.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 5px;">Error: Duplicate Function</div>	<p>This occurs when attempting to set two mutually exclusive parameters to the same value. This is most commonly seen when P4.00 and P4.13 are both set to the same value. (Firmware version 1.04 or higher only.)</p>