CHAPTER 6

MAINTENANCE AND TROUBLESHOOTING

In This Chapter...

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. We recommend 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 yearly.

If the drive is stored or is otherwise unused for more than a year, the drive's internal DC link capacitors should be recharged before use. Otherwise, the capacitors may be damaged when the drive starts to operate. We recommend recharging the capacitors of any unused drive at least once per year.

WARNING! Disconnect AC power and ensure that the internal capacitors have fully discharged before inspecting the AC drive!
Wait at least two minutes after all display lamps have turned off.

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 annually.

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 or damaged.
3. Check the resistance of the insulation with a megohmmeter.
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.
6. Recharge the capacitors of any drive that is in storage or is otherwise unused.

Recharge Capacitors (for unused drives)

Recharge the DC link before using any drive that has not been operated within a year:

1. Disconnect the motor from the drive.
2. Apply input power to the drive for 2 hours.

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**
OVER-CURRENT The AC drive detects an abnormal increase in current.	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.
OVER-VOLTAGE The AC drive detects that the DC bus voltage has exceeded its maximum allowable value.	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.
OVER-TEMPERATURE The AC drive temperature sensor detects excessive heat.	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.
UNDER-VOLTAGE The AC drive detects that the DC bus voltage has fallen below its minimum allowable value.	Check whether the input voltage falls within the rated AC drive input voltage.
OVERLOAD The AC drive detects excessive drive output current.	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. **Note: The AC drive can withstand up to 150% of the rated current for a maximum of 60 seconds.**

Fault Messages	
Fault Name/Description	**Corrective Actions**
THERMAL OVERLOAD Parameter settings (P 6.07 to P 6.09) An external condition has occurred to cause an internal electronic or motor thermal overload fault	If P 6.07 is set to '1' to enable during steady state: 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.
OVER-TORQUE Parameter settings (P 6.07 to P 6.09) An external condition has occurred to cause an over-torque fault.	If P 6.07 is set to '2' to enable detection during accel/decel: 1. Reduce the motor overload. 2. Adjust the over-torque detection setting to an appropriate level.
OVER-CURRENT ACC Over-current during acceleration: 1. Short-circuit at motor output. 2. Torque boost too high. 3. Acceleration time too short. 4. AC drive output capacity is too small.	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.
OVER-CURRENT DEC Over-current during deceleration: 1. Short-circuit at motor output. 2. Deceleration time too short. 3. AC drive output capacity is too small.	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.
OVER-CURRENT STD Over-current during steady state operation 1. Short-circuit at motor output. 2. Sudden increase in motor loading. 3. AC drive output capacity is too small.	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.
CPU FAILURE 1 Internal memory IC cannot be programmed	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.
CPU FAILURE 2 Internal memory IC cannot be read.	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.
CPU FAILURE 3 Internal memory IC failed to receive output status	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**
HARDWARE FAILURE Hardware protection failure	1. Check all connections at L1, L2 and L3. 2. Verify correct voltage at L1, L2,L3. 3. Contact ADC Support for assistance.
MOM POWER LOSS Input power has been lost	Check line power to drive
EXTERNAL FAULT The external terminal EF-CM goes from OFF to ON	When external terminal EF-CM is closed, the output will be turned off (under Normally Open. External Fault.).
AUTO RAMP FAULT Auto accel/decel failure	Refer to Over-current or Over-voltage error
GROUND FAULT 1. Possible unbalanced load 2. Possible current leakage	1. Check the motor for possible insulation damage. 2. Check for possible poor insulation at the output line.
EXT. BASE-BLOCK AC drive output is turned off.	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.
INPUT POWER LOSS One phase of the input power is lost	1. Check for possible poor connection on the input power line. 2. Check for possible loss of phase on input power line.
OUTPUT SHORTED IGBT Short Circuit	Contact ADC Support for assistance.
PID FBACK LOSS 1. If P 7.27 = 0, (*warn and AC drive stop),* PID feedback loss recorded. 2. If P 7.27 = 1, (*warn and continue operation)*, PID feedback loss not recorded.	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.

Fault Messages	
Fault Name/Description	**Corrective Actions**
ENCODER LOSS 1. If P 10.05 = 1 or 2 (*warn and AC drive stop*), Encoder feedback loss would be recorded. 2. If P 10.05 = 0 (*warn and continue operation*), Encoder feedback loss would not be recorded.	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.
ENC SIGNAL ERROR Encoder A/B phase signal is in error when the control mode is from the encoder	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**
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.
Invalid Cmd Code	Invalid Command Code when communicating
Invalid Address	Invalid Address when communicating
Invalid Data	Invalid Data when communicating
Slave Comm Fault	Slave Comm Fault device failure
Comm Time-Out	Communication Time Out
Drive Error	Drive model doesn't match keypad
EEPROM Fault	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	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	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	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	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**
Overheat Warning The AC drive temperature has exceeded 85% of the Over-temperature condition.	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.
Write Failure	When the copy function is enabled (P 9.40),Write to EEPROM fails.
Parameter Locked	Parameters have been locked: read only - cannot be set/cannot write.
--- ERR ---	Error: The configuration is not accepted, or the parameter is locked.
Value Accepted	Value Accepted.
Error: Duplicate Function	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.)

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