Chapter 9 Troubleshooting

If a fault is detected on the servo drive or motor a corresponding fault code will be shown on the drive's LED display. Fault codes can also be transmitted via communication, see P0-01 and P4-00 ~ P4-04 for display on controller or HMI.

9.1 Fault Messages Table

Servo Drive Fault Messages

Fault Messages		
Display	**Fault Name**	**Fault Description**
AL001	Overcurrent	Main circuit current is higher than 1.5 multiple of motor's instantaneous maximum current value.
AL002	Overvoltage	Main circuit voltage has exceeded its maximum allowable value.
AL003	Undervoltage	Main circuit voltage is below its minimum specified value.
AL004	Motor error	The motor does not match the drive. They are not correctly matched for size (power rating).
AL005	Regeneration error	Regeneration control operation is in error.
AL006	Overload	Servo motor and drive is overload.
AL007	Overspeed	Motor's control speed exceeds the limit of normal speed.
AL008	Abnormal pulse control command	Input frequency of pulse command exceeds the limit of its allowable setting value.
AL009	Excessive deviation	Position control deviation value exceeds the limit of its allowable setting value.
AL010	Reserved	Reserve
AL011	Encoder error	Pulse signal is in error.
AL012	Adjustment error	Adjusted value exceeds the limit of its allowable setting value when perform electrical adjustment.
AL013	Emergency stop activated	Emergency stop switch is activated.
AL014	Reverse limit switch error	Reverse limit switch is activated.
AL015	Forward limit switch error	Forward limit switch is activated.
AL016	IGBT temperature error	The temperature of IGBT is over high.
AL017	Memory error	EE-PROM write-in and read-out is in error.

Fault Messages		
Display	**Fault Name**	**Fault Description**
AL018	Encoder output error	The encoder output exceeds the rated output frequency.
AL019	Serial communication error	RS232/485 communication is in error.
AL020	Serial communication time out	RS232/485 communication time out.
AL021	Reserved	Reserve
AL022	Input power phase loss	One phase of the input power is loss.
AL023	Pre-overload warning	To warn that the servo motor and drive is going to overload. This alarm will display before ALM06. When the servo motor reach the setting value of P1-56, the motor will send a warning to the drive. After the drive has detected the warning, the DO signal OLW will be activated and this fault message will display.
AL024	Encoder initial magnetic field error	The magnetic field of the encoder U, V, W signal is in error.
AL025	Encoder internal error	The internal memory of the encoder is in error. An internal counter error is detected.
AL026	Encoder data error	An encoder data error is detected for three times.
	Motor internal error	The setting value of the encoder is in error.
	Motor internal error	The encoder U, V, W signals are in error.
	Motor internal error	The internal address of the encoder is in error.
AL030	Motor protection error	In order to protect the motor, this alarm will be activated when the setting value of P1-57 is reached after a period of time set by P1-58.
AL031	U,V,W, GND wiring error	The wiring connections of U, V, W (for servo motor output) and GND (for grounding) are in error.
	Motor temperature error	Motor is working under temperature over 105°C (221°F).
	Excessive encoder output error	The encoder output errors or output pulses exceed hardware tolerance.
	Motor temperature warning	The temperature of motor is over 85°C (185°F).
AL099	DSP firmware upgrade	EE-PROM is not reset after the firmware version is upgraded. This fault can be cleared after setting P2-08 to 30 first, and then setting P2-08 to 28 next and restarting the ervo drive.

NOTE

1) If there is any unknown fault code that is not listed on the above table, please inform the distributor or contact with Delta for assistance.

9.2 Potential Cause and Corrective Actions

Servo Drive Fault Messages

AL001 : Overcurrent

Potential Cause	Checking Method	Corrective Actions
Short-circuit at drive output (U, V, W)	1. Check the wiring connections between drive and motor. 2. Check if the wire is short-circuited.	Repair the short-circuited and avoid metal conductor being exposed.
Motor wiring error	Check if the wiring steps are all correct when connecting motor to drive.	Follow the wiring steps in the user manual to reconnect wiring.
IGBT error	Heat sink overheated	Please contact your distributor for assistance or contact with Delta.
Control parameter setting error	Check if the setting value exceeds the factory default setting.	Set the setting back to factory default setting and then reset and adjust the parameter setting again.
Control command setting error	Check if the control input command is unstable (too much fluctuation).	1. Ensure that input command frequency is stable (too much fluctuation). 2. Activate filter function.

AL002 : Overvoltage

Potential Cause	Checking Method	Corrective Actions
The main circuit voltage has exceeded its maximum allowable value.	Use voltmeter to check whether the input voltage falls within the rated input voltage.	Use correct power supply or stabilizing power.
Input power error (Incorrect power input)	Use voltmeter to check whether the input voltage is within the specified limit.	Use correct power supply or stabilizing power.

AL003 : Undervoltage

Potential Cause	Checking Method	Corrective Actions
The main circuit voltage is below its minimum specified value.	Check whether the wiring of main circuit input voltage is normal.	Reconfirm voltage wiring.
No input voltage at main circuit.	Use voltmeter to check whether input voltage at main circuit is normal.	Reconfirm power switch.
Input power error (Incorrect power input)	Use voltmeter to check whether the input voltage is within the specified limit.	Use correct power supply or serial stabilizing power.

AL004 : Motor error

Potential Cause	Checking Method	Corrective Actions
Encoder is damage.	Check Encoder for the damage.	Repair or replace the motor.
Encoder is loose.	Examine the Encoder connector.	Install the motor again.
The type of the servo motor is incorrect.	Check if the servo drive and servo motor are not correctly matched for size (power rating).	Replace the motor.

AL005 : Regeneration error

Potential Cause	Checking Method	Corrective Actions
Regenerative resistor is not connected.	Check the wiring connection of regenerative resistor.	Reconnect regenerative resistor.
Regenerative switch transistor fault	Check if regenerative switch transistor is short-circuited.	Please contact your distributor for assistance or contact with Delta.
Parameter setting is in error	Confirm the parameter setting and specifications of regenerative resistor.	Correctly reset parameter again.

AL006 : Overload

Potential Cause	Checking Method	Corrective Actions
The drive has exceeded its rated load during continuous operation.	Check if the drive is overloaded.	Increase motor capacity or reduce load.
Control system parameter setting is incorrect.	Check if there is mechanical vibration	Adjust gain value of control circuit.
	Accel/Decel time setting is too fast.	Decrease Accel/Decel time setting.
The wiring of drive and encoder is in error.	Check the wiring of U, V, W and encoder.	Ensure all wiring is correct.

AL007 : Overspeed

Potential Cause	Checking Method	Corrective Actions
Speed input command is not stable (too much fluctuation).	Use signal detector to detect if input signal is abnormal.	Ensure that input command frequency is stable (not fluctuate too much) and activate filter function (P1-06, P1-07 and P1-08).
Over-speed parameter setting is defective.	Check if over-speed parameter setting value is too low.	Correctly set over-speed parameter setting (P2-34).

AL008 : Abnormal pulse control command

Potential Cause	Checking Method	Corrective Actions
Pulse command frequency is higher than rated input frequency.	Use pulse frequency detector to measure input frequency.	Correctly set the input pulse frequency.

AL009 : Excessive deviation

Potential Cause	Checking Method	Corrective Actions
Maximum deviation parameter setting is too small.	Check the maximum deviation parameter setting and observe the position error value when the motor is running.	Increases the parameter setting value of P2-35.
Gain value is too small.	Check for proper gain value.	Correctly adjust gain value.
Torque limit is too low.	Check torque limit value.	Correctly adjust torque limit value.
There is an overload.	Check for overload condition.	Reduce external applied load or re-estimate the motor capacity.

AL010: Reserved

AL011 : Encoder error (Position detector fault)

Potential Cause	Checking Method	Corrective Actions
The wiring of encoder is in error.	1. Check if all wiring is correct. 2. Check if the users conduct the wiring by the wiring information in the user manual.	Ensure all wiring is correct.
Encoder is loose	Examine the encoder connector.	Install the motor again.
The wiring of encoder is defective.	Check if all connections are tight.	Conduct the wiring again.
Encoder is damage	Check the encoder for the damage.	Repair or replace the motor.

AL012 : Adjustment error

Potential Cause	Checking Method	Corrective Actions
The setting value of drift adjustment has exceeded its maximum allowable value.	1. Remove CN1 wiring. 2. Execute the drift adjustment again. (Set P2-08 to 20 first, and then set P4-10 to 5.)	If the error does not clear after executing the drift adjustment again, please contact your distributor for assistance or contact with Delta.

AL013 : Emergency stop activated

Potential Cause	Checking Method	Corrective Actions
Emergency stop switch is activated.	Check if emergency stop switch is On or Off.	Activate emergency stop switch.

AL014 : Reverse (CWL) limit switch error

Potential Cause	Checking Method	Corrective Actions
Reverse limit switch is activated.	Check if reverse limit switch is On or Off.	Activate reverse limit switch.
Servo system is not stable.	Check the value of control parameter setting and load inertia.	Modify parameter setting and re-estimate motor capacity.

AL015 : Forward (CCWL) limit switch error

Potential Cause	Checking Method	Corrective Actions
Forward limit switch is activated.	Check if forward limit switch is On or Off.	Activate forward limit switch.
Servo system is not stable.	Check the value of control parameter setting and load inertia.	Modify parameter setting and re-estimate motor capacity.

AL016 : IGBT temperature error

Potential Cause	Checking Method	Corrective Actions
The drive has exceeded its rated load during continuous operation.	Check if there is overload or the motor current is too high.	Increase motor capacity or reduce load.
Short-circuit at drive output.	Check the drive input wiring.	Ensure all wiring is correct.

AL017: Memory error

Potential Cause	Checking Method	Corrective Actions
Parameter data error when writing into EE-PROM.	Examine the parameter settings. Please do the following steps: 1. Press SHIFT key on the drive keypad, and examine the parameter shown on LED display. 2. If E320A is displayed (in hexadecimal format), it indicates it is parameter P2-10. Please examine the parameter settings of P2-10. 3. If E3610 is displayed (in hexadecimal format), it indicates it is parameter P6-16. Please examine the parameter settings of P6-16.	1. If this fault occurs when power is applied to the drive, it indicates that the setting value of one parameter has exceeded the specified range. Correct the setting value of the parameter to clear the fault and restart the servo drive. 2. If this fault occurs during normal operation, it indicates that the error occurs when writing data into EE-PROM. Turn ARST (DI signal) ON to clear the fault or restart the servo drive.
The setting value of hidden parameter is in error.	Press SHIFT key on the drive keypad and examine if E100X is displayed on LED display.	If this fault occurs when resetting the parameter settings, it indicates that the servo drive type is not set correctly. Correctly set the servo drive type again.

Potential Cause	Checking Method	Corrective Actions
Data in EE-PROM is damaged.	Press SHIFT key on the drive keypad and examine if E0001 is displayed on LED display.	If this fault occurs when power is applied to the drive, it indicates that the data in EE-RPM is damaged or there is no data in EE-PROM. Please contact your distributor for assistance or contact with Delta.

AL018 : Encoder output error

Potential Cause	Checking Method	Corrective Actions
Encoder itself or the wiring of encoder is in error.	Check if the recent fault records (P4-00 ~ P4-05) display on the drive keypad in accordance with the fault codes AL011, AL024, AL025 and AL026.	Perform the corrective actions as described in AL011, AL024, AL025 and AL026.
The output frequency for pulse output may exceed the limit of its allowable setting value.	Check if the following conditions occur: Condition 1: Motor speed is above the value set by P1-76. Condition 2: $\frac{\text{Motor Speed}}{60} \times P1-46 \times 4 > 19.8 \times 10^6$	Correctly set P1-76 and P1-46. 1. Ensure that the motor speed is below the value set by P1-76. 2. $\frac{\text{Motor Speed}}{60} \times P1-46 \times 4 < 19.8 \times 10^6$

AL019 : Serial communication error

Potential Cause	Checking Method	Corrective Actions
Communication parameter setting is defective.	Check the communication parameter setting.	Correctly set parameter setting.
Communication address is incorrect.	Check the communication address.	Correctly set communication address.
Communication value is incorrect.	Check the communication value.	Correctly set communication value.

AL020 : Serial communication time out

Potential Cause	Checking Method	Corrective Actions
Setting value in time out parameter is not correct.	Check communication time out parameter setting.	Correctly set P3-07.
Not receiving communication command for a long time.	Check whether communication cable is loose or broken.	Tighten the communication cable, make sure the communication cable is not damaged and ensure all wiring is correct.

AL021 : Reserved

AL022 : Input power phase loss

Potential Cause	Checking Method	Corrective Actions
Control power supply is in error.	Check the power cable and connections of R, S, and T. Check whether the power cable is loose or the possible loss of phase on input power.	If the fault does not clear even when the three-phase power is connected correctly, please contact your distributor for assistance or contact with Delta.

AL023 : Pre-overload warning

Potential Cause	Checking Method	Corrective Actions
The drive is going to overload.	1. Check the load condition of the servo motor and drive. 2. Check the setting value of P1-56. Check whether the setting value of P1-56 is too small.	1. Please refer to the correction actions of ALE06. 2. Increase the setting value of P1-56 or set P1-56 to 100 and above.

AL024: Encoder initial magnetic field error

Potential Cause	Checking Method	Corrective Actions
The magnetic field of the encoder U, V, W signal is in error.	1. Check if the servo motor is properly grounded. 2. Check if the encoder signal cables are placed in separate conduits from the cables connected to R, S, T and U, V, W terminals to prevent the interference. 3. Check if the shielded cables are used when performing encoder wiring.	If the error does not clear after each checking is done, please contact your distributor for assistance or contact with Delta.

AL025: Encoder internal error

Potential Cause	Checking Method	Corrective Actions
The internal memory of the encoder is in error. An encoder counter error occurs.	1. Check if the servo motor is properly grounded. 2. Check if the encoder signal cables are placed in separate conduits from the cables connected to R, S, T and U, V, W terminals to prevent the interference. 3. Check if the shielded cables are used when performing encoder wiring.	1. Please connect the grounding (green color) of U, V, W terminal to the heat sink of the servo drive. 2. Ensure that the encoder signal cables are placed in separate conduits from the cables connected to R, S, T and U, V, W terminals to prevent the interference. 3. Please use shielded cables for Encoder wiring. 4. If the error does not clear after all the above actions are done, please contact your distributor for assistance or contact with Delta.

AL026: Encoder data error

Potential Cause	Checking Method	Corrective Actions
An encoder data error occurs for three times.	1. Check if the servo motor is properly grounded. 2. Check if the encoder signal cables are placed in separate conduits from the cables connected to R, S, T and U, V, W terminals to prevent the interference. 3. Check if the shielded cables are used when performing encoder wiring.	1. Please connect the grounding (green color) of U, V, W terminal to the heat sink of the servo drive. 2. Ensure that the encoder signal cables are placed in separate conduits from the cables connected to R, S, T and U, V, W terminals to prevent the interference. 3. Please use shielded cables for Encoder wiring. 4. If the error does not clear after all the above actions are done, please contact your distributor for assistance or contact with Delta.

[redacted]: Motor internal error

Potential Cause	Checking Method	Corrective Actions
The setting value of the encoder is in error.	1. Check if the servo motor is properly grounded. 2. Check if the encoder signal cables are placed in separate conduits from the cables connected to R, S, T and U, V, W terminals to prevent the interference. 3. Check if the shielded cables are used when performing encoder wiring.	1. Please connect the grounding (green color) of U, V, W terminal to the heat sink of the servo drive. 2. Ensure that the encoder signal cables are placed in separate conduits from the cables connected to R, S, T and U, V, W terminals to prevent the interference. 3. Please use shielded cables for Encoder wiring. 4. If the error does not clear after all the above actions are done, please contact your distributor for assistance or contact with Delta.

[redacted]: Motor internal error

Potential Cause	Checking Method	Corrective Actions
The encoder U, V, W signals are in error.	1. Check if the servo motor is properly grounded. 2. Check if the encoder signal cables are placed in separate conduits from the cables connected to R, S, T and U, V, W terminals to prevent the interference. 3. Check if the shielded cables are used	1. Please connect the grounding (green color) of U, V, W terminal to the heat sink of the servo drive. 2. Ensure that the encoder signal cables are placed in separate conduits from the cables connected to R, S, T and U, V, W terminals to

	when performing encoder wiring.	prevent the interference. 3. Please use shielded cables for Encoder wiring. 4. If the error does not clear after all the above actions are done, please contact your distributor for assistance or contact with Delta.

[redacted] : Motor internal error

Potential Cause	Checking Method	Corrective Actions
The internal address of the encoder is in error.	1. Check if the servo motor is properly grounded. 2. Check if the encoder signal cables are placed in separate conduits from the cables connected to R, S, T and U, V, W terminals to prevent the interference. 3. Check if the shielded cables are used when performing encoder wiring.	1. Please connect the grounding (green color) of U, V, W terminal to the heat sink of the servo drive. 2. Ensure that the encoder signal cables are placed in separate conduits from the cables connected to R, S, T and U, V, W terminals to prevent the interference. 3. Please use shielded cables for Encoder wiring. 4. If the error does not clear after all the above actions are done, please contact your distributor for assistance or contact with Delta.

AL030 : Motor protection error

Potential Cause	Checking Method	Corrective Actions
The setting value of parameter P1-57 is reached after a period of time set by parameter P1-58.	1. Check if P1-57 is enabled. 2. Check if the setting values of P1-57 and P1-58 are both too small.	1. Set P1-57 to 0. 2. Correctly set P1-57 and P1-58. Please note that the over-low setting may results in malfunction, but over-high setting may let the motor protection function not operate.

AL031: U, V, W, GND wiring error

Potential Cause	Checking Method	Corrective Actions
The wiring connections of U, V, W (for servo motor output) and GND (for grounding) are in error.	Check if wiring connections of U, V, and W are not correct.	Follow the wiring steps in the user manual to reconnect the wiring and ground the servo drive and motor properly.
The ground connection is loose or not conducting properly.	Check if the ground connection is loose and ensure the ground is conducting properly.	

[redacted]: Motor temperature error

Potential Cause	Checking Method	Corrective Actions
Motor is working under temperature over 105°C (221°F).	Check if the environment temperature is too high.	Try to reduce environment temperature.

[redacted]: Excessive encoder output error

Potential Cause	Checking Method	Corrective Actions
Encoder error causes abnormal encoder output.	Exam error records (P4-00~P4-05) to check if encoder errors occurred. (AL011, AL024, AL025, AL026)	Please refer to AL011, AL024, AL025, AL026 and take corrective actions.
Output pulses exceed hardware tolerance.	Check if conditions below occur, P1-76 < Motor rotation speed, or, $\frac{\text{Motor rotation speed}}{60} \times P1-46 \times 4 > 19.8 \times 10$	Correctly set P1-76 and P1-46: P1-76 > Motor rotation speed, and, $\frac{\text{Motor rotation speed}}{60} \times P1-46 \times 4 > 19.8 \times 10^6$

[redacted]: Motor temperature warning

Potential Cause	Checking Method	Corrective Actions
Motor is working under temperature over 85°C (185°F).	Check if the environment temperature is too high.	Try to reduce environment temperature.

AL099: DSP firmware upgrade

Potential Cause	Checking Method	Corrective Actions
EE-PROM is not reset after the firmware version is upgraded.	Check if EE-PROM is reset after the firmware version is upgraded.	Set P2-08 to 30 first, and then 28 next, and restart the servo drive.

9.3 Clearing Faults

Display	Fault Name	Clearing Method
	Overcurrent	Turn ARST (DI signal) ON to clear the fault or restart the servo drive.
	Overvoltage	Turn ARST (DI signal) ON to clear the fault or restart the servo drive.
	Undervoltage	This fault message can be removed automatically after the voltage has returned within its specification.
	Motor error	This fault message can be removed by restarting the servo drive.
	Regeneration error	Turn ARST (DI signal) ON to clear the fault or restart the servo drive.
	Overload	Turn ARST (DI signal) ON to clear the fault or restart the servo drive.
	Overspeed	Turn ARST (DI signal) ON to clear the fault or restart the servo drive.
	Abnormal pulse control command	Turn ARST (DI signal) ON to clear the fault or restart the servo drive.
	Excessive deviation	Turn ARST (DI signal) ON to clear the fault or restart the servo drive.
	Reserved	This fault message cannot be cleared.
	Encoder error	This fault message can be removed by restarting the servo drive.
	Adjustment error	This fault message can be removed after the wiring of CN1 connector (I/O signal connector) is removed and auto adjustment function is executed.
	Emergency stop activated	This fault message can be removed automatically by turning off EMGS (DI signal).
	Reverse limit switch error	Turn ARST (DI signal) ON to clear the fault. This fault message can be removed when the servo drive is Off (Servo Off)
	Forward limit switch error	Turn ARST (DI signal) ON to clear the fault. This fault message can be removed when the servo drive is Off (Servo Off)
	IGBT temperature error	Turn ARST (DI signal) ON to clear the fault or restart the servo drive.
	Memory error	Turn ARST (DI signal) ON to clear the fault or restart the servo drive.
	Encoder output error	Turn ARST (DI signal) ON to clear the fault.

Display	Fault Name	Clearing Method
	Serial communication error	Turn ARST (DI signal) ON to clear the fault. This fault message can also be removed automatically after the communication is normal.
	Serial communication time out	Turn ARST (DI signal) ON to clear the fault or restart the servo drive.
	Reserved	This fault message cannot be cleared.
	Input power phase loss	Turn ARST (DI signal) ON to clear the fault. This fault message can be removed automatically after input power phase lost problem is solved.
	Pre-overload warning	Turn ARST (DI signal) ON to clear the fault or restart the servo drive.
	Encoder initial magnetic field error	This fault message can be removed by restarting the servo drive.
	Encoder internal error	This fault message can be removed by restarting the servo drive.
	Encoder data error	This fault message can be removed by restarting the servo drive.
	Motor internal error	This fault message can be removed by restarting the servo drive.
	Motor internal error	This fault message can be removed by restarting the servo drive.
	Motor internal error	This fault message can be removed by restarting the servo drive.
	Motor protection error	Turn ARST (DI signal) ON to clear the fault.
	U,V,W, GND wiring error	This fault message can be removed by restarting the servo drive.
	Motor temperature error	This fault message can be removed by restarting the servo drive.
	Excessive encoder output error	Turn ARST (DI signal) ON to clear the fault.
	Motor temperature warning	This fault message can be removed after temperature drops to normal degree.
	DSP firmware upgrade	This fault message can be removed after setting P2-08 to 30 first, and then 28 next and restarting the servo drive.