Maintenance and Troubleshooting

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Maintenance and Inspection

*Sure*Servo™ AC servo drives are based on solid state electronics technology. Preventive maintenance is required to make sure the drive functions properly and has a long life. We recommend that periodic maintenance and inspection of the servo drive be performed by a qualified technician. Always turn off the AC input power to the unit before any maintenance and inspection.

WARNING: AC input power must be disconnected before performing any maintenance. Do not connect or disconnect wires or connectors to the servo drive or motor while power is applied to the circuit. Make sure that the internal capacitors have fully discharged (wait for the Charge LED to go off) before performing the maintenance and inspection! Maintenance must be performed by a qualified technician only.

WARNING: A charge with hazardous voltages may still remain in the DC-link capacitor even if the power has been turned off. To avoid personal injury, do not remove the cover of the AC servo drive. There are no user serviceable parts inside the drive.

Basic Inspection

Servo Drive Basic Inspection	
Item	***Inspection Content***
General Inspection	Periodically inspect the mounting screws for the servo drive, motor shaft, terminal block, and the connection to mechanical system. Tighten screws as necessary; they may loosen due to vibration and temperature variation.
	Make sure that oil, water, metallic particles, or any foreign objects do not fall inside the servo drive, motor, control panel, or ventilation slots and holes.
	Make sure that the servo drive control panel has been installed correctly, and that it is free from airborne dust, harmful gases, or liquids.
	Make sure that all wiring instructions and recommendations are followed to prevent damage to the drive and/or motor.
Inspection before operation (Control power not applied)	Make sure that all wiring terminals are correctly insulated.
	Make sure that all wiring is correct to prevent damage and/or malfunction.
	Visually check to make sure that there are no unused screws, metal strips, or any conductive or flammable materials inside the drive.
	To avoid electric shock, be sure to connect the servo drive ground terminal to the control panel ground terminal. Before making any connection, wait 10 minutes for internal capacitors to discharge after power is disconnected.
	Never put flammable objects on servo drive or close to the external regenerative resistor.
	If the electromagnetic brake is being used, make sure that it is correctly wired.
	If required, use an appropriate electrical filter to eliminate noise to the servo drive.
	Make sure that the external applied voltage to the drive is correct and matched to the controller.
	Make sure that the cables are not damaged, stressed excessively, or loaded heavily. When the motor is not running, check the cables and connections for damage, fraying, or over extension.
Inspection during operation (Control power applied)	Check for abnormal vibrations and sounds during operation. If the servo motor is vibrating or there are unusual noises while the motor is running, shut the motor down. Disconnect input power before troubleshooting the motor.
	Make sure that all user-defined parameters are set correctly.
	Reset parameters when the servo drive is off to prevent servo system malfunction.
	Check the power indicators and LED display for abnormal conditions.

Maintenance

- *Use and store servo system in a clean, dry, and normal-temperature environment.*
- *Periodically clean the surfaces and panel of servo drive and motor.*
- *Periodically check the resistance of the insulation with Meg-ohmmeter. The insulation resistance should measure at least 100 Meg-Ohms at 500 VDC and should be tested with a power cable connector properly connected to the motor.*
- *Periodically check the DC BUS filter capacitors and precharge relays after the warranty period, and replace if necessary.*
- *Periodically check the conductors or insulators for corrosion and/or damage.*
- *Do not disassemble or damage any mechanical part when performing maintenance.*
- *Periodically clean off any dust and dirt with a vacuum cleaner, especially the ventilation ports and printed circuit boards. Always keep these areas clean; accumulation of dust and dirt can cause overheating and component failures.*

WARNING: To prevent serious injury or equipment damage, inspection and replacement of board-level components should be performed by qualified repair technicians experienced in board-level maintenance and repair.

Expected Life of Replacement Components

DC BUS Filter Capacitor

DC BUS filter capacitor life varies according to ambient temperature and operating conditions. Excessive ripple currents will shorten capacitor life. The expected life is ten years when properly used in a clean, dry, air-conditioned environment.

Precharge Relay

The contacts will wear due to switching current; the common expected relay life is 100,000 operations.

Cooling fan (SVA-2100 and SVA-2300 Models Only)

The cooling fan should be checked periodically for adequate air flow, which is essential to prevent damage to the power stage. Replace fan immediately if it is vibrating or making unusual noises.

Troubleshooting

Fault & Warning Message Table

Once a fault or error is detected, the corresponding protective fault functions will be activated and the fault messages will be displayed.

Fault/Warning Messages			
Display	***Fault/Warning Name***	***TYPE***	***Fault/Warning Description***
ALE01	Overcurrent	Fault	Main circuit current is higher than 1.5 multiple of motor's instantaneous maximum current value.
ALE02	Overvoltage	Fault	Main circuit voltage has exceeded its maximum allowable value. (Main circuit voltage is higher than specification.)
ALE03	Undervoltage	Fault	Main circuit voltage has fallen below its minimum value. (Main circuit voltage is lower than specification.)
ALE04	Motor overheated	Fault	The motor's operating temperature is higher than the upper-limit of the specification.
ALE05	Regeneration error	Fault	Regeneration control operation is in error.
ALE06	Overload	Fault	Servo motor and drive are overloaded.
ALE07	Overspeed	Fault	Motor's control speed exceeds the limit set in P1-55.
ALE08	Abnormal pulse control command	Fault	Input frequency of pulse command exceeds the limit of its allowable set value.
ALE09	Excessive deviation	Fault	Position control deviation value exceeds the limit of its allowable set value.
ALE10	Watch dog execution time out	Fault	Watch dog execution time out.
ALE11	Encoder position detector error	Fault	Pulse signal is in error.
ALE12	Internal Components Require Calibration	Fault	Internal Components Require Calibration
ALE13	External Fault stop	Fault	Fault stop switch is activated.
ALE14	Reverse limit error	Fault	DI setting 22 reverse limit switch is activated.
ALE15	Forward limit error	Fault	DI setting 23 forward limit switch is activated.
ALE16	IGBT temperature error	Fault	IGBT is overheated.
ALE17	Memory error	Fault	EE-PROM write-in and read-out is in error.
ALE18	DSP communication error	Fault	DSP communication is in error.
ALE19	Serial communication error	Fault	RS232/422/485 communication is in error.
ALE20	Serial communication time out	Fault	RS232/422/485 communication time out.
ALE21	Command write-in error	Fault	Control command write-in error.
ALE22	Input power phase loss	Fault	One phase of the input power is lost.
ALE23	At Overload Output Warning Threshold	Warn	Motor overload exceeds the time % set in P1-56.
ALE98 ALE99	Internal Handshake Error	Fault	Communication hand-shaking error between internal hardware chips

Fault Message Potential Causes and Corrective Actions

Fault Message Potential Causes and Corrective Actions		
Potential Causes	***Checking Method***	***Corrective Actions***
	ALE01: Overcurrent	
Short-circuit at drive output	Check the wiring connections between drive and motor, and check cables for shorts.	Repair short-circuit.
Motor wiring error	Make sure the connections between the motor and drive are correct.	Follow the wiring steps in the user manual to reconnect wiring.
Control parameter setting error	Check if the set value exceeds the factory default setting.	Change the setting back to factory default, reset, and adjust the parameter setting again.
Control command setting error	Check if the control input command is unstable (fluctuating too much).	Make sure that input command frequency is stable and activate filter function.
IGBT error	Heat sink overheated.	Call Technical Support: 770-844-4200
	ALE02: Overvoltage	
The main circuit voltage has exceeded its maximum allowable value (incorrect power input).	Use voltmeter to check whether the input voltage falls within the rated input voltage.	Use correct power supply.
	ALE03: Undervoltage	
The main circuit voltage has fallen below its minimum value.	Check for proper input voltage wiring.	Correct input wiring as needed.
No input voltage at main circuit.	Use voltmeter to check whether input voltage at main circuit is normal.	Check input power supply, including switches and fuses.
Input power error (Incorrect power input)	Use voltmeter to check whether the input voltage is within the specified limit.	Use correct power supply.
	ALE04: Motor Overheated	
Servo system is overloaded.	Use thermometer to check the motor temperature (motor external temperature should not be above 158°F), and check if servo system is overloaded.	Re-size the capacity of motor and drive or reduce system demands (decrease speed, increase accel/decel time).
	ALE05: Regeneration Error	
Regenerative resistor is not connected.	Check the regenerative resistor wiring connections.	Connect regenerative resistor as needed.
Parameter setting error	Confirm the parameter setting and specifications of regenerative resistor.	Correctly reset parameter again.
	ALE06: Overload	
The drive has exceeded its rated load during continuous operation.	Check for drive overloading.	Increase motor capacity or reduce load.
Control system parameter setting is incorrect.	Check for mechanical vibration.	Adjust gain value of control circuit.
	Accel/decel time setting is too fast.	Increase accel/decel time setting.
Motor and encoder wiring error.	Check the wiring of U, V, W and encoder.	Make sure all motor wiring is correct.
	ALE07: Overspeed	
Speed input command is not stable (too much fluctuation).	Use signal detector to detect if input signal is abnormal.	Make sure that input command frequency is stable and activate filter function.
Over-speed parameter setting is defective.	Check if over-speed parameter setting value is too low.	Correctly set over-speed parameter setting.
	ALE08: Abnormal Pulse Control Command	
Pulse command frequency is higher than rated input frequency.	Use pulse frequency detector to measure input frequency.	Correctly set the input pulse frequency.
Incorrect pulse stream for quadrature input.	Use oscilloscope to view incoming pulse stream.	Correct incoming pulse stream.

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Fault Message Potential Causes and Corrective Actions (continued)		
Potential Causes	**Checking Method**	**Corrective Actions**
ALE09: Excessive Deviation		
Maximum deviation parameter setting is too small.	Check the maximum deviation parameter setting.	Increase parameter setting value.
Gain value is too small.	Check if the setting value is correct.	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-size the motor capacity.
Profile is too demanding.	Increase Accel/Decel times to see if ramp is too steep.	Increase Accel/Decel or resize motor capacity.
One or more Position Velocity parameter is set greater than the Maximum Velocity Limit parameter.	Check whether the value of any P2-36 ~ P2-43 is greater than the value of P1-55.	Set all of the Position Velocity parameters less than or equal to the Maximum Velocity LImit.
ALE10: Watch Dog Execution Time Out		
Watchdog execution error.	Check and reset the power supply.	If there are any abnormal conditions after resetting the power supply, call Technical Support: 770-844-4200
ALE11: Encoder Position Dectector Error		
Encoder wiring error.	Check to make sure the wiring is correct and that all connections are tight; refer to the wiring information in this user manual.	Correct any wiring errors.
Encoder is damaged.	Using oscilloscope, check encoder for damage.	Repair or replace motor.
ALE12: Internal Components Require Calibration		
Erroneous values written to any reserved parameters P4-10 ~ P4-18	Do not write to P4-10 ~ P4-18. Check Modbus comm program for writes to those parameters.	Remove any writes to P4-10 ~ P4-18 from program. Restore drive to default configuration.
Internal component calibration	Restore to default configuration.	If the error does not clear after restoring the drive to default settings, contact Technical Support: 770-844-4200
ALE13: External Fault Stop		
Fault stop input is activated.	Check if fault stop switch is On or Off.	Clear and reset fault input.
ALE14: Reverse Limit Error		
Reverse limit switch is activated.	Check if reverse limit switch is On or Off.	Move load in forward direction to deactivate limit switch, and reset fault.
Servo system is not stable.	Check the value of control parameter setting and load inertia.	Modify parameter setting and re-size motor capacity.
ALE15: Forward Limit Error		
Forward limit switch is activated	Check if forward limit switch is On or Off.	Move load in reverse direction to deactivate limit switch, and reset fault.
Servo system is not stable.	Check the value of control parameter setting and load inertia.	Modify parameter setting and re-size motor capacity.
ALE16: IGBT Temperature Error		
The drive has exceeded its rated load during continuous operation.	Check for an overload, or if the motor current is too high.	Increase motor capacity or reduce load.
Short-circuit at drive output	Check the drive input wiring.	Make sure it is wired correctly.
ALE17: Memory Error		
Data error in EEPROM read-out / write-in.	Restore to default configuration. Reset parameter or power supply. Then set P2-30 = 5 to avoid writing to EEPROM too often.	If the error does not clear after resetting the parameter or power supply, contact Technical Support: 770-844-4200.
EEPROM is damaged.		
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Fault Message Potential Causes and Corrective Actions (continued)		
Potential Causes	**Checking Method**	**Corrective Actions**
ALE18: DSP Communication Error		
Control power error.	Check and reset control power.	If the error does not clear after resetting the power supply, contact Technical Support: 770-844-4200.
Hardware malfunction.		
ALE19: Serial Communication Error		
Communication parameter setting is not correct.	Check communication parameter setting.	Set parameter setting to correct value.
Communication address is not correct.	Check communication address.	Set communication address to correct value.
Communication setting value is not correct.	Check read-out and write-in value.	Set communication setting to correct value.
ALE20: Serial Communication Time Out		
Set value in time out parameter is not correct.	Check the time out parameter setting.	Set parameter to correct value.
Not receiving communication command.	Check whether communication cable is loose or broken	Tighten or repair communication cable.
ALE21: Command Write-in Error		
P3-07 Comm Response Delay Time is set too short.	Check setting value of P3-07.	Set parameter to appropriate value, or disable it by setting it to 0.
Control power supply error.	Check and reset control power supply.	If the error does not clear after resetting the power supply, contact Technical Support: 770-844-4200.
ALE22: Input Power Phase Loss		
Input power error.	Check for poor input power line connection, or for possible loss of phase on input power line.	Correctly connect three-phase power.
ALE98: Internal Handshake Error		
Control power error.	Check and reset control power.	If the error does not clear after resetting the power supply, contact Technical Support: 770-844-4200.
Hardware malfunction.		
ALE99: Internal Handshake Error		
Control power error.	Check and reset control power.	If the error does not clear after resetting the power supply, contact Technical Support: 770-844-4200.
Hardware malfunction.		

Warning Message Potential Causes and Corrective Actions

Warning Message Potential Causes and Corrective Actions		
Potential Causes	**Checking Method**	**Corrective Actions**
ALE23 (Warning): At Overload Output Warning Threshold		
Overload time exceeds the Overload Output Warning Treshold.	Check value of P1-56 overload time.	This ALE is a warning, rather than a fault. It does not have to be cleared.

Clearing Faults

Clearing Faults		
Display	***Fault Name***	***How to Clear Fault***
ALE05	Regeneration error	Turn Alarm Reset (DI signal) ON to clear the fault.
ALE06	Overload	Turn Alarm Reset (DI signal) ON to clear the fault.
ALE07	Overspeed	Turn Alarm Reset (DI signal) ON to clear the fault.
ALE08	Abnormal pulse control command	Turn Alarm Reset (DI signal) ON to clear the fault.
ALE09	Excessive deviation	Turn Alarm Reset (DI signal) ON to clear the fault.
ALE10	Watch dog execution time out	This fault information cannot be cleared.
ALE11	Position detector error	This fault condition can be removed (or reset) only by cycling control power to the servo drive.
ALE12	Internal components require calibration	Restore to default configuration.
ALE13	External fault stop	This fault information can be removed automatically by resetting Fault Stop Input (DI signal).
ALE14	Forward limit error	Move load in forward direction to deactivate limit switch. Turn Alarm Reset (DI signal) ON or turn off the servo drive to clear the fault.
ALE15	Reverse limit error	Move load in forward direction to deactivate limit switch. Turn Alarm Reset (DI signal) ON or turn off the servo drive to clear the fault.
ALE16	IGBT temperature error	Turn Alarm Reset (DI signal) ON to clear the fault.
ALE17	Memory error	Turn Alarm Reset (DI signal) ON to clear the fault.
ALE18	DSP communication error	Turn Alarm Reset (DI signal) ON to clear the fault.
ALE19	Serial communication error	Turn Alarm Reset (DI signal) ON to clear the fault.
ALE20	Serial communication time out	Turn Alarm Reset (DI signal) ON to clear the fault.
ALE21	Command write-in error	Turn Alarm Reset (DI signal) ON to clear the fault.
ALE22	Input power phase loss	Turn Alarm Reset (DI signal) ON to clear the fault.
ALE23	At overload output warning threshold	This ALE is a warning rather than a fault, and therefore does not have to be cleared.
ALE98 ALE99	Internal handshake error	Reset the power supply.
*For drive firmware v2.10 and higher, active faults can be **reset** from the keypad.* *Press and hold the UP and DOWN Arrow Keys simultaneously for two seconds to clear the fault.*		