

General Troubleshooting

Refer to the *Error Codes* section below to identify problems, potential causes, and appropriate actions to resolve the problems. If problems persist after attempting to troubleshoot the system, please contact your Allen-Bradley representative for further assistance. To determine if your Ultra3000 drive has an error, refer to the table below.

If the Logic Power LED is ON and the Status LED display on your:	Is:	Then:
2098-DSD-xxx, -xxxX, -HVxxx, or -HVxxxX drive	Actively cycling segments in a full circle	Your Ultra3000 drive is ready.
2098-DSD-xxx-DN, -xxxX-DN, -HVxxx-DN, -HVxxxX-DN drive		Your Ultra3000 drive is ready.
2098-DSD-xxx-SE or -HVxxx-SE drive	Displaying a fixed 4	Your Ultra3000 drive is ready.
All drives	Flashing E followed by two numbers	Your Ultra3000 drive has an error. Proceed to the section <i>Error Codes</i> below.
	Flashing L	Your Ultra3000 drive is in an Overtravel condition and motion restrictions are in effect.

Error Codes

The following list of problematic symptoms (no error code shown) and problems with assigned error codes is designed to help you resolve problems.

When a fault is detected, the seven-segment LED will display an E followed by the flashing of the two-digit error code, one digit at a time. This is repeated until the problem is cleared.

Error Code	Problem or Symptom	Possible Cause(s)	Action/Solution
	Power (PWR) indicator not ON	No AC power or auxiliary logic power.	Verify AC power or auxiliary +5V logic power is applied to the Ultra3000.
		Internal power supply malfunction.	Call your Allen-Bradley representative.
	Power (PWR) indicator is ON, but seven segment Status LED display is OFF. Note: This applies to 2098-DSD-005, -010, and -020 Ultra3000 models only.	Externally applied +5V auxiliary power supply voltage is too low.	Verify that the external +5V auxiliary power supply (as measured at the drive terminals) reads between 5.10V and 5.25V.
	Motor jumps when first enabled	Motor wiring error.	Check motor wiring.
		Incorrect motor chosen.	Verify the proper motor is selected.
	Digital I/O not working correctly	I/O power supply disconnected.	Verify connections and I/O power source.
E01	Non-Volatile Memory Endurance Exceeded	Range of motion and number of home position definitions during the product life exceeds the maximum allowed (applies only to systems with absolute feedback).	This is an unrecoverable fault, the drive must be sent back to the factory.
E02	Velocity Exceeds Position Rollover /2	The velocity command or feedback exceeds half the machine cycle length per millisecond (applies only when the machine cycle position rollover is enabled).	Increase machine cycle size or reduce velocity profile. This error only applies to firmware versions prior to 1.10.

Error Code	Problem or Symptom	Possible Cause(s)	Action/Solution
E03	Absolute Feedback Range Exceeded	The motor position exceeds +/- 2047 revolutions from the home position (applies only to systems with absolute feedback).	<ul style="list-style-type: none"> Decrease application range of motion. Upgrade firmware.
E04	Motor Overtemperature	Motor thermostat trips due to: <ul style="list-style-type: none"> High motor ambient temperature and/or Excessive current 	<ul style="list-style-type: none"> Operate within (not above) the continuous torque rating for the ambient temperature (40°C maximum). Lower ambient temperature, increase motor cooling.
		Motor wiring error.	Check motor wiring.
		Incorrect motor selection.	Verify the proper motor has been selected.
E05	IPM Fault	Motor cables shorted.	Verify continuity of motor power cable and connector.
		Motor winding shorted internally.	Disconnect motor power cables from the motor. If the motor is difficult to turn by hand, it may need to be replaced.
		Ultra3000 temperature too high.	<ul style="list-style-type: none"> Check for clogged vents or defective fan. Ensure cooling is not restricted by insufficient space around the unit.
		Operation above continuous power rating.	<ul style="list-style-type: none"> Verify ambient temperature is not too high. Operate within the continuous power rating. Reduce acceleration rates.
		Ultra3000 has a bad IPM output, short circuit, or overcurrent.	Remove all power and motor connections, and perform a continuity check from the DC bus to the U, V, and W motor outputs. If a continuity exists, check for wire fibers between terminals, or send drive in for repair.
		An attempt was made to enable the drive without waiting at least 1.0 second after applying the main AC power. Note: This applies to 2098-DSD-005, -010, and -020 Ultra3000 models only (when using an external +5V auxiliary power supply).	Wait at least 1.0 second after the main AC is applied before enabling the drive.
E06	Hardware Overtravel (SERCOS only)	Dedicated overtravel input is inactive.	<ul style="list-style-type: none"> Check wiring. Verify motion profile.
E07	RESERVED		Call your local Allen-Bradley representative.
E08	RESERVED		
E09	Bus Undervoltage	Low AC line/AC power input.	<ul style="list-style-type: none"> Verify voltage level of the incoming AC power. Check AC power source for glitches or line drop. Install an uninterruptible power supply (UPS) on your AC input.

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E10	Bus Overvoltage	Excessive regeneration of power. When the motor is driven by an external mechanical power source, it may regenerate too much peak energy through the Ultra3000's power supply. The system faults to save itself from an overload.	<ul style="list-style-type: none"> Change the deceleration or motion profile. Use a larger system (motor and Ultra3000). Use a resistive shunt. If a shunt is connected, verify the wiring is correct and shunt fuse is not blown.
		Excessive AC input voltage.	Verify input is within specifications.
E11	IllegalHall State	Incorrect phasing.	Check the Hall phasing.
		Bad connections.	<ul style="list-style-type: none"> Verify the Hall wiring. Verify 5V power supply to the encoder.
E12	Home Search Failed	Home sensor and/or marker is outside the overtravel limits.	<ul style="list-style-type: none"> Check wiring. Reposition the overtravel limits or sensor.
E13	Home Position In Limit	Home sensor, marker, or final home position exceeds a hardware overtravel limit.	<ul style="list-style-type: none"> Reposition the overtravel limits or home sensor. Adjust the final home position.
E14	SERCOS Hardware Fault (SERCOS drives only)	A fault was detected with the operation of the drive's internal SERCOS hardware.	Contact your local Allen-Bradley representative.
	DeviceNet Communications Network problem (DeviceNet drives only)	DeviceNet communications network is broken	Troubleshoot DeviceNet communications.
E15	Excessive Electrical Cycle Length	Electrical cycle length exceeds maximum lines per electrical cycle	Replace the linear motor/encoder.
E16	Software Overtravel (SERCOS only)	Programmed overtravel limit has been exceeded.	<ul style="list-style-type: none"> Verify motion profile. Verify overtravel settings are appropriate.
E17	User-Specified Current Fault	User-Specified average current level has been exceeded.	Increase to a less restrictive setting.
E18	Overspeed Fault	Motor speed has exceeded 125% of maximum rated speed.	<ul style="list-style-type: none"> Check cables for noise. Check tuning.
E19	Excess Position Error	Position error limit was exceeded.	<ul style="list-style-type: none"> Increase the feedforward gain. Increase following error limit or time. Check position loop tuning.

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E20	Motor Encoder State Error	The motor encoder encountered an illegal transition.	<ul style="list-style-type: none"> • Replace the motor/encoder. • Use shielded cables with twisted pair wires. • Route the feedback away from potential noise sources. • Check the system grounds. • Verify that the unbuffered encoder signals are not subjected to EMI in the CN1 cable. Remove these signals from the CN1 cable if they are not being used. • Verify that the motor has a high-frequency bond to the drive's enclosure panel. • Verify that any stage connected to the motor shaft (for example using a ball screw) has a high-frequency bond to the machine frame and the drive's enclosure panel.
		Bad encoder.	Replace motor/encoder.
E21	Auxiliary Encoder state error	The auxiliary encoder encountered an illegal transition.	<ul style="list-style-type: none"> • Use shielded cables with twisted pair wires. • Route the encoder cable away from potential noise sources. • Bad encoder - replace encoder. • Check the ground connections.
		Setup time violation for Step/Direction or CW/CCW input.	Check timing of Step/Direction or CW/CCW inputs to determine if setup time requirements are being met.
E22	Motor Thermal Protection Fault	The internal filter protecting the motor from overheating has tripped.	<ul style="list-style-type: none"> • Reduce acceleration rates. • Reduce duty cycle (ON/OFF) of commanded motion. • Increase time permitted for motion. • Use larger Ultra3000 and motor. • Check tuning.
E23	IPM Thermal Protection Fault	The internal filter protecting the drive from over heating has tripped.	<ul style="list-style-type: none"> • Reduce acceleration rates. • Reduce duty cycle (ON/OFF) of commanded motion. • Increase time permitted for motion. • Use larger Ultra3000 and motor. • Check tuning.
E24	Excess Velocity Error	Velocity error limit was exceeded.	<ul style="list-style-type: none"> • Increase time or size of allowable error. • Reduce acceleration. • Check tuning.
E25	Sensor Not Assigned	Homing or registration motion was attempted without a sensor assigned.	Assign a sensor to a digital input.
E26	User-Specified Velocity Fault	User specified velocity level was exceeded.	Increase to a less restrictive setting.
E27	Axis Not Homed	Absolute positioning was attempted without homing.	Verify homing sequence.

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E28	Motor Parameter Error	Parameter loaded from smart encoder or received from SERCOS controller is incompatible with the drive.	<ul style="list-style-type: none"> Select a different motor through the SERCOS controller. Select a different motor.
E29	Encoder Output Frequency Exceeded	Encoder output frequency exceeds the maximum user specified value. This only applies when the encoder output is synthesized by the drive.	<ul style="list-style-type: none"> Increase the encoder output maximum frequency parameter. Decrease the encoder interpolation parameter. Increase the encoder output divider parameter.
E30	Encoder Communication Fault	Communication was not established with an intelligent encoder.	<ul style="list-style-type: none"> Verify motor selection. Verify the motor supports automatic identification. Verify motor encoder wiring.
E31	Encoder Data	Encoder data is corrupted.	Replace the motor/encoder.
E32	Sine/Cosine Encoder Frequency Limit Exceeded	Maximum frequency of the sine/cosine circuitry has been exceeded.	<ul style="list-style-type: none"> Decrease velocity. Use encoder with lower resolution (before interpolation).
E33	Absolute Position Exceeds Position Rollover	<p>Motion is commanded to a position outside the position rollover range.</p> <ul style="list-style-type: none"> An absolute index is initiated that specifies a position outside the position rollover range. A homing cycle is initiated with the home position outside the position rollover range. A define home is initiated with the home position outside the position rollover range. A preset position is initiated that specifies a position outside the position rollover range. 	Set motion command to a position within the position rollover range.
E34	Ground Fault	Wiring error.	Check motor power wiring.
		Motor internal ground short.	Replace motor.
		Internal malfunction.	Disconnect motor power cable from drive and enable drive with current limit set to 0. If fault remains, call your A-B representative. If fault clears, then a wiring error or motor internal problem exists.
E35	Precharge Fault	Low AC input voltage.	Check input AC voltage on all phases.
		Internal malfunction.	Call your A-B representative.
E36	Power Circuitry Overtemperature	Excessive heat exists in the power circuitry.	<ul style="list-style-type: none"> Reduce acceleration rates. Reduce duty cycle (ON/OFF) of commanded motion. Increase time permitted for motion. Use larger Ultra3000 and motor. Check tuning.
E37	AC Line Loss	One or more phases of the input AC power is missing.	Check input AC voltage on all phases.
E38	RESERVED		Call your local Allen-Bradley representative.

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E39	Self-sensing Commutation Startup Error	Motion required for self-sensing startup commutation was obstructed.	<ul style="list-style-type: none"> Verify that there are no impediments to motion at startup, such as hard limits. Increase self-sensing current if high friction or load conditions exist. Check motor or encoder wiring using wiring diagnostics.
E40	230V Shunt Protection Fault	Ineffective shunt resistor	<ul style="list-style-type: none"> Verify that the shunt resistor (internal or external) is connected. If an external shunt resistor is connected, verify that the shunt fuse is not blown. If a non Allen-Bradley external shunt resistor is used, verify that the resistance value is within specifications. Verify that the motor is not being driven mechanically, causing the motor to behave as a generator.
		Excessive regeneration	
E41	460V Shunt Protection Fault	Ineffective shunt resistor	<ul style="list-style-type: none"> If a non Allen-Bradley external shunt resistor is used, verify that the resistance value is within specifications. Verify that the motor is not being driven mechanically, causing the motor to behave as a generator.
		Excessive regeneration	
E42	Motor Keying Error (SERCOS drives only)	The motor physically connected to the drive differs from the motor specified in the user program.	Select the correct motor in the user program.
E43	Drive Enable Input (SERCOS drives only)	<ul style="list-style-type: none"> An attempt was made to enable the axis through software while the Drive Enable hardware input was inactive. The Drive Enable input transitioned from active to inactive while the axis was enabled. 	<ul style="list-style-type: none"> Disable the Drive Enable Input fault. Verify that Drive Enable hardware input is active whenever the drive is enabled through software.
E50	Duplicate Node Fault (SERCOS drives only)	Duplicate node address detected on SERCOS ring.	Verify that each SERCOS drive is assigned a unique node address.
All others	RESERVED		Call your local Allen-Bradley representative.