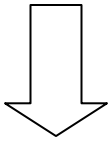
Kinetix 6000 Troubleshooting

1. Check Drive Status - Refer to Table Below



IAM/AM Seven-Segment Status LED	Status	Do This
Actively cycling (phase 0)	The drive is looking for a closed SERCOS ring. Wait for phase 1 or take corrective action until you reach phase 1.	Check fiber-optic connections.
Displaying a fixed 1 (phase 1)	The drive is looking for active nodes. Wait for phase 2 or take corrective action until you reach phase 2.	Check node addressing.
Displaying a fixed 2 (phase 2)	The drive is configuring nodes for communication. Wait for phase 3 or take corrective action until you reach phase 3.	Check program motor and drive configuration against installed hardware.
Displaying a fixed 3 (phase 3)	The drive is configuring device specific parameters. Wait for phase 4 or take corrective action until you reach phase 4.	Check motor catalog number against selection. (1)
Displaying a fixed 4 (phase 4)	The drive is configured and active.	
Flashing an E followed by two numbers	**Drive is faulted.**	**Go to Error Codes on page 2.**

(1) You can get diagnostic information from the module by highlighting the module name in RSLogix 5000 software. A Pseudo Key Failure often indicates that the motor selection does not match the motor installed.

Interpreting Status Indicators

Refer to these troubleshooting tables to identify faults, potential causes, and the appropriate actions to resolve the fault. If the fault persists after attempting to troubleshoot the system, please contact your Rockwell Automation sales representative for further assistance.

Error Codes

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

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

Seven-segment Status Indicator Error Codes

Error Code	Fault Message RSLogix (HIM)	Problem or Symptom	Potential Cause	Possible Resolution
		Power (PWR) indicator not ON	No AC power or auxiliary logic power.	Verify AC control power is applied to the Kinetix 6000 system.
			Internal power supply malfunction.	Call your Rockwell Automation sales representative to return module for repair.
		Motor jumps when first enabled	Motor wiring error.	□ Check motor wiring. □ Run Hookup test in RSLogix 5000 software.
			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.
E00	**BusUndervoltage Fault** (Blown fuse)	A blown fuse was detected on the inverter PCB	Blown fuse.	Call your Rockwell Automation sales representative to return module for repair.
E04	**MotorOvertemp Fault** (Motor Overtemp)	Motor thermal switch tripped	□ High motor ambient temperature and/or □ Excessive current	□ Operate within (not above) the continuous torque rating for the ambient temperature 40 °C (104 °F) maximum. □ Lower ambient temperature, increase motor cooling.
			Motor wiring error.	Check motor wiring at MF connector on the IAM/AM module.
			Incorrect motor selection.	Verify the proper motor has been selected.

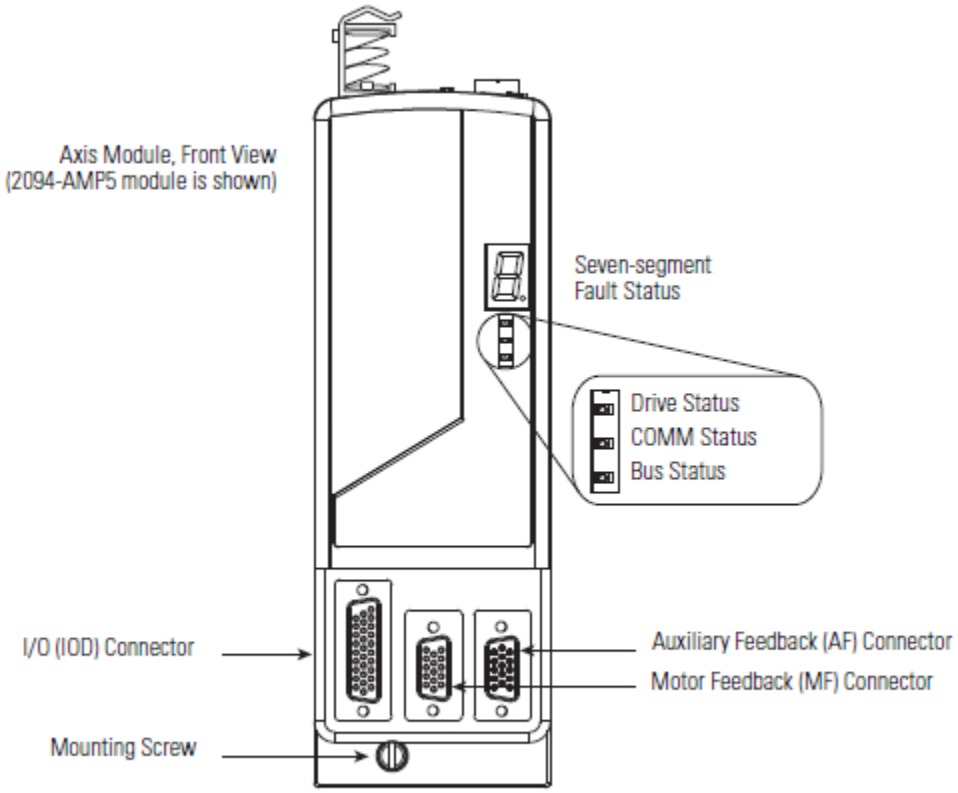
Error Code	Fault Message RSLogix (HIM)	Problem or Symptom	Potential Cause	Possible Resolution
E05	**DriveOvercurrent Fault** (Power Fault)	Self-protection of the Intelligent Power Module (IPM) is indicating a major power related fault condition.	Motor cables shorted.	Verify continuity of motor power 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.
			Kinetix 6000 drive temperature too high.	□ Check for clogged vents or defective fan. □ Make sure cooling is not restricted by insufficient space around the unit.
			Operation above continuous power rating and/or product environmental ratings.	□ Verify ambient temperature is not too high. □ Operate within the continuous power rating. □ Reduce acceleration rates.
			Kinetix 6000 drive has a short circuit, overcurrent, or failed component.	Remove all power and motor connections, and preform 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.
E06	**HardOvertravel Fault** (+/- Hard Overtravel)	Axis moved beyond the physical travel limits in the positive/negative direction.	Dedicated overtravel input is inactive.	□ Check wiring. □ Verify motion profile. □ Verify axis configuration in software.
E07	**MotFeedbackFault** (Motor Feedback Loss)	The feedback wiring is open, shorted, or missing.		□ Check motor encoder wiring. □ Run Hookup test in RSLogix 5000 software.
E09	**BusUndervoltage Fault** (Bus Undervoltage)	With three-phase power present, the DC bus voltage is below limits.	□ DC bus voltage for 460V system is below 275V □ DC bus voltage for 230V system is below 137V	□ 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.
		DC bus voltage fell below the undervoltage limit while an axis on the follower power rail was enabled.		Disable follower axis before removing power.
E10	**DriveOvervoltage Fault** (Bus Overvoltage)	The DC bus voltage is above limits.	Excessive regeneration of power. When the motor is driven by an external mechanical power source, it may regenerate too much peak energy through the drive power supply. The system faults to save itself from an overload.	□ Change the deceleration or motion profile. □ Use a larger system (motor and Kinetix 6000 drive). □ Install shunt module.
			□ DC bus voltage for 460V system is over 820V □ DC bus voltage for 230V system is over 410V	Verify input is within specifications.
E11	**MotFeedbackFault** (Illegal Hall State)	State of Hall feedback inputs is incorrect.	Improper connections.	□ Verify the Hall wiring at the MF connector on the IAM/AM module. □ Verify 5V power supply to the encoder.

Error Code	Fault Message RSLogix (HIM)	Problem or Symptom	Potential Cause	Possible Resolution
E16	**Softovertravel Fault** (+/- Software Overtravel)	Axis position exceeded maximum software setting.		□ Verify motion profile. □ Verify overtravel settings are appropriate.
E18	**OverSpeedFault** (Overspeed Fault)	Motor speed has exceeded 150% of maximum rated speed. The 100% trip point is dictated by the lesser of the user velocity limits or the motor rated base speed.		□ Check cables for noise. □ Check tuning.
E19	**PositionErrorFault** (Follow Error)	Position error limit was exceeded.		□ Increase the feed forward gain. □ Increase following error limit or time. □ Check position loop tuning. □ Verify sizing of system. □ Verify mechanical integrity of system within specification limits.
E20	**MotFeedbackFault** (Mtr Fdbk AQB)	Motor Encoder State Error	The motor encoder encountered an illegal transition.	□ Use shielded cables with twisted pair wires. □ Route the feedback away from potential noise sources. □ Check the system grounds. □ Replace the motor/encoder.
E21	**AuxFeedbackFault** (Aux Feedback Comm)	Communication was not established with an intelligent encoder.		Verify auxiliary encoder wiring.
E30	**MotFeedbackFault** (Motor Feedback Comm)	Communication was not established with an intelligent encoder.		□ Verify motor selection. □ Verify the motor supports automatic identification. □ Verify motor encoder wiring.
E34	**GroundShortFault** (Ground Fault)	Excessive ground current in the converter was detected.	Wiring error.	□ Check motor power wiring. □ Check input 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 clears, then a wiring error or motor internal problem exists. If fault remains, call your sales representative.
			Grounded control power terminal (applies to 230V systems only)	□ Remove ground from control power input. □ Source control power from three-phase input power (refer to page 194). □ Add isolation transformer for control power.
E35	**DriveUndervoltage Fault** (Pre-charge Fault)	Converter pre-charge cycle failed.	Low AC input voltage.	Check input AC voltage on all phases.
			Internal malfunction.	Call your sales representative.
E36	**DriveOvertemp Fault** (System Overtemperature)	Converter thermal switch tripped.	Excessive heat exists in the power circuitry.	□ Reduce acceleration rates. □ Reduce duty cycle (ON/OFF) of commanded motion. □ Increase time permitted for motion. □ Use larger IAM converter module. □ Check for clogged vents or defective fan. □ Make sure cooling is not restricted by insufficient space around the unit.

Error Code	Fault Message RSLogix (HIM)	Problem or Symptom	Potential Cause	Possible Resolution
E37	**PowerPhaseLoss Fault** (Phase Loss Flt)	• One or more phases of the input AC power is missing. • Axis was enabled when main (three-phase) power was removed. • common-bus follower axis was enabled when DC bus power was removed.		• Check input AC voltage on all phases. • Disable axis before removing power.
E38	**SERCOSFault** (SERCOS Ring Flt)	The SERCOS ring is not active after being active and operational.	Cable disconnected.	Check that fiber-optic cable is present and connected properly.
E39	**DriveHardFault** (Self Sense Flt)	Self-sensing Commutation Startup Error	Motion required for self-sensing startup commutation was obstructed.	• 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.
E43	**DriveEnableInput Fault** (Drive Enable Flt)	Missing Drive Enable Input Signal	• 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.	• Disable the Drive Enable Input fault. • Verify that Drive Enable hardware input is active whenever the drive is enabled through software.
E49	**DriveHardFault** (Safe-off HW Flt)	Safe-off function mismatch. Drive will not allow motion.	• Loose wiring at SO connector. • Cable/header not seated properly in SO connector. • Safe-off circuit missing +24V DC.	• Verify wire terminations, cable/header connections, and +24V. • Reset error and run proof test. • If error persists, return the drive to Rockwell Automation.
E50	**SERCOSFault** (SERCOS Same ADDR)	Duplicate node address detected on SERCOS ring.		Verify that each SERCOS drive is assigned a unique node address.
E54	**DriveHardFault** (Ifbk HW Fault)	Current feedback hardware fault detected.		Replace the module
E60	**DriveHardFault** (Unknown Axis)	Illegal ID bits detected		Replace the module
E61	**AuxFeedbackFault** (Aux Fdbk AQB)	Auxiliary Encoder State Error	The auxiliary encoder encountered an illegal transition.	• Use shielded cables with twisted pair wires. • Route the feedback away from potential noise sources. • Check the system grounds. • Replace the motor/encoder.
E62	**AuxFeedbackFault** (Aux Fdbk Loss)	The feedback wiring is open, shorted, or missing.		Check the motor feedback cable connectors/wiring to the IAM/AM module and servo motor.
E63	**AuxFeedbackNoise** (Aux Fdbk Noise)	Noise on auxiliary feedback cable.	Recommended grounding, per installation instructions, has not been followed.	• Verify grounding. • Route feedback cable away from noise sources. • Refer to System Design for Control of Electrical Noise Reference Manual, publication GMC-RM001.
E64	**MotorFeedbackNoise** (Mtr Fdbk Noise)	Noise on motor feedback cable.		
E65	**No Fault Message (condition indicated by on-screen message)** (Hookup Fault)	Hookup procedure failed	Motor or feedback device malfunction.	• Check motor power/feedback wiring. • Refer to on-screen message for resolution.

Error Code	Fault Message RSLogix (HIM)	Problem or Symptom	Potential Cause	Possible Resolution
E66	**No Fault Message (condition indicated by on-screen message)** (Atune Flt)	Autotune procedure failed	Motor or feedback device malfunction.	□ Check motor power/feedback wiring. □ Refer to on-screen message for resolution. □ Perform Hookup in RSLogix 5000 software. □ Consult RSLogix 5000 help screen.
E67	**DriveHardFault** (Task init)	Operating system failed	Software initialization fault detected due to hardware failure.	□ Cycle power. □ If fault persists, replace module.
E68	**DriveHardFault** (SCANport Comm)	DPI communication failed	The DPI device or cable is faulty.	Check DPI connections.
E69	**DriveHardFault** (Objects Init)	Non-volatile memory is corrupt due to control board hardware failure.		Load default parameters, save to non-volatile memory, and recycle power or reset the drive.
E70	**DriveHardFault** (NV Mem Init)	Non-volatile memory is corrupt due to control board software error.		Load default parameters, save to non-volatile memory, and recycle power or reset the drive.
E71	**DriveHardFault** (Memory Init)	RAM or Flash memory validation failure		□ Cycle power. □ If fault persists, replace module.
E72	**DriveOvertemp Fault** (Drive Overtemp)	Inverter thermal switch tripped	The IAM or an AM module fan failed.	Replace the failed module.
			The cabinet ambient temperature is above rating.	Check the cabinet temperature.
			The machine duty cycle requires an RMS current exceeding the continuous rating of the controller.	Change the command profile to reduce speed or increase time.
			The airflow access to the Kinetix 6000 system is limited or blocked.	Check airflow and re-route cables away from the Kinetix 6000 system.
E73	**Communicate** (Backplane Comm)	Power rail CAN communications failed.		Check module for proper mount.
		Power rail connection shorted or open.		Check power rail and module for foreign objects.
E74	**DriveOvercurrent Fault** (Bus OverCurrent)	DC link current exceeds rating.	Motor or transmission malfunction.	□ Check for proper motor sizing. □ Check/replace transmission device. □ Check/replace motor.
			IAM module not sized properly.	□ Check for proper IAM module sizing. □ Install larger kW rated IAM module.
E75	**DriveOvervoltage Fault** (Shunt Time Out)	The IAM/AM module, or shunt module has exceeded its shunt resistor continuous rating.		□ Use a properly sized shunt or modify duty cycle of the application. □ System uses internal shunt and requires external shunt for additional capacity.
E76	**DriveHardFault** (CAN Init)	DPI hardware initialization fault detected.	Control board hardware failure.	□ Reset System. □ If fault persists, replace system module.
E77	**DriveHardFault** (Module Mismatch)	Either 230V AM module is installed on power rail with 460V IAM module, or 460V AM module is installed on power rail with 230V IAM module.		Replace mismatched module.
E78	**DriveHardFault** (SERCOS Init)	Control hardware fault detected.		□ Cycle power. □ If fault persists, replace module.

Error Code	Fault Message RSLogix (HIM)	Problem or Symptom	Potential Cause	Possible Resolution
E79	**DriveOvervoltage Fault** (Shunt Module Flt)	Over-temperature fault indicator on Bulletin 2094 shunt module is steady red.		Refer to Temperature Fault Status Indicator on page 154.
		Shunt-fault indicator on Bulletin 2094 shunt module is steady red.		Refer to Shunt Fault Status Indicator on page 154.
		Bulletin 2094 shunt module is missing from power rail.		□ Install missing module on power rail. □ Fill empty slot with slot-filler module.
E80	**DriveHardFault** (CPLD Flt)	Control hardware fault detected.		Replace module.
E81	**DriveHardFault** (Common Bus Flt)	Follower IAM module detected AC input power being applied.		Remove AC input power connections from follower IAM module.
E90	**DriveHardFault** (Pre-charge Timeout Flt)	Pre-charge resistor power exceeds the resistor rating.		Wait for resistor to cool.
All others	RESERVED			Call your local Rockwell Automation sales representative.



IAM/AM Module Status Indicators

Drive Status Indicator

Drive Status Indicator	Status	Potential Cause	Possible Resolution
Off	Normal, no faults	N/A	N/A
Steady Red	Drive faulted	Seven-segment status indicator displays error code	Refer to seven-segment error code and Error Codes troubleshooting on page 146.

Comm Status Indicator

Comm Status Indicator	Status	Potential Cause	Possible Resolution
Steady Green	Communication ready	No faults or failures.	N/A
Flashing Green	Establishing communication	System is still in the process of establishing SERCOS communication.	Wait for steady green indicator.
		Node address setting on the drive module does not match SERCOS controller configuration.	Verify proper node switch setting.
Off	No communication (1)	Loose fiber-optic connection.	Verify proper fiber-optic cable connections.
		Broken fiber-optic cable.	Replace fiber-optic cable.
		Receive fiber-optic cable connected to SERCOS transmit connector and vice versa.	Check proper SERCOS fiber-optic cable connections.

(1) Refer to Fiber-optic Cable Installation and Handling Instructions, publication 2090-IN010, for more information.

Bus Status Indicator

Bus Status Indicator	Status	Condition
Steady Green	Bus power is present, axis enabled. No faults or failures.	Normal when: □ 24V is applied to Hardware Enable Input (IOD-2). □ MSO instruction is commanded in RSLogix 5000 software.
Flashing Green	Bus power is present, axis disabled. No faults or failures.	Normal when: □ 24V is not applied to Hardware Enable Input (IOD-2). □ MSO instruction is not commanded in RSLogix 5000 software.
Off	Bus power not present.	□ Normal when bus power is not applied. □ Fault exists, refer to seven segment error code and Error Codes section beginning on page 146.
	Bus power is present in follower IAM.	□ Follower IAM module is not configured as CommonBus Follow in RSLogix 5000 software. □ After DC bus voltage is applied, a 2.5 second delay before the indicator begins flashing green is normal operation to provide common-bus leader module time to complete pre-charge.

Troubleshooting General System Problems

Use the tables below for troubleshooting general system faults.

Condition	Potential Cause	Possible Resolution
Axis or system is unstable.	The position feedback device is incorrect or open.	Check wiring.
	Unintentionally in torque mode.	Check to see what primary operation mode was programmed.
	Motor tuning limits are set too high.	Run Tune in RSLogix 5000 software.
	Position loop gain or position controller accel/decel rate is improperly set.	Run Tune in RSLogix 5000 software.
	Improper grounding or shielding techniques are causing noise to be transmitted into the position feedback or velocity command lines, causing erratic axis movement.	Check wiring and ground.
	Motor Select limit is incorrectly set (servo motor is not matched to axis module).	□ Check setups. □ Run Tune in RSLogix 5000 software.
	Mechanical resonance	Notch filter or output filter may be required (refer to Axis Properties dialog, Output tab in RSLogix 5000 software).
You cannot obtain the motor acceleration/deceleration that you want.	Torque Limit limits are set too low.	Verify that current limits are set properly.
	Incorrect motor selected in configuration.	Select the correct motor and run Tune in RSLogix 5000 software again.
	The system inertia is excessive.	□ Check motor size vs. application need. □ Review servo system sizing.
	The system friction torque is excessive.	Check motor size vs. application need.
	Available current is insufficient to supply the correct accel/decel rate.	□ Check motor size vs. application need. □ Review servo system sizing.
	Acceleration limit is incorrect.	Verify limit settings and correct them, as necessary.
	Velocity Limit limits are incorrect.	Verify limit settings and correct them, as necessary.
Motor does not respond to a velocity command.	The axis cannot be enabled for 1.5 seconds after disabling.	Disable the axis, wait for 1.5 seconds, and enable the axis.
	Enable signal has not been applied or the enable wiring is incorrect.	□ Check the controller. □ Check the wiring.
	The motor wiring is open.	Check the wiring.
	The motor thermal switch has tripped.	□ Check for a fault. □ Check the wiring.
	The motor has malfunctioned.	Repair or replace the motor.
	The coupling between motor and machine has broken (i.e., the motor moves, but the load/machine doesn't).	Check and correct the mechanics.
	Primary operation mode is set incorrectly.	Check and properly set the limit.
	Velocity or current limits are set incorrectly.	Check and properly set the limits.

Condition	Potential Cause	Possible Resolution
Presence of noise on command or motor feedback signal wires.	Recommended grounding per installation instructions have not been followed.	□ Verify grounding. □ Route wire away from noise sources. □ Refer to System Design for Control of Electrical Noise, publication GMC-RM001.
	Line frequency may be present.	□ Verify grounding. □ Route wire away from noise sources.
	Variable frequency may be velocity feedback ripple or a disturbance caused by gear teeth or ballscrew balls etc. The frequency may be a multiple of the motor power transmission components or ballscrew speeds resulting in velocity disturbance.	□ Decouple the motor for verification. □ Check and improve mechanical performance, for example, the gearbox or ballscrew mechanism.
No rotation	The motor connections are loose or open.	Check motor wiring and connections.
	Foreign matter is lodged in the motor.	Remove foreign matter.
	The motor load is excessive.	Verify the servo system sizing.
	The bearings are worn.	Return the motor for repair.
	The motor brake is engaged (if supplied).	□ Check brake wiring and function. □ Return the motor for repair.
	The motor is not connect to the load.	Check coupling.
Motor overheating	The duty cycle is excessive.	Change the command profile to reduce accel/decel or increase time.
	The rotor is partially demagnetized causing excessive motor current.	Return the motor for repair.
Abnormal noise	Motor tuning limits are set too high.	Run Tune in RSLogix 5000 software.
	Loose parts are present in the motor.	□ Remove the loose parts. □ Return motor for repair. □ Replace motor.
	Through bolts or coupling is loose.	Tighten bolts.
	The bearings are worn.	Return motor for repair.
	Mechanical resonance	Notch filter may be required (refer to Axis Properties dialog, Output tab in RSLogix 5000 software).
Erratic operation - Motor locks into position, runs without control or with reduced torque.	Motor power phases U and V, U and W, or V and W reversed.	Check and correct motor power wiring.
	Sine, Cosine or Rotor leads are reversed in the feedback cable connector.	Check and correct motor feedback wiring.
	Sine, Cosine, Rotor lead sets of resolver feedback are reversed.	Check and correct motor feedback wiring.