



Sigma 5 - Axis Servo Motor and Cables - How it Works and Troubleshooting Guide

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Translation Available



How it Works



The servo motors in Haas machines are closed-loop servomechanisms. They move and hold the axes in the positions requested by the program. Each servo motor has an embedded encoder unit which provides position and speed feedback to the control (Maincon or Mocon). The control uses the encoder feedback to ensure accuracy in executing a program.

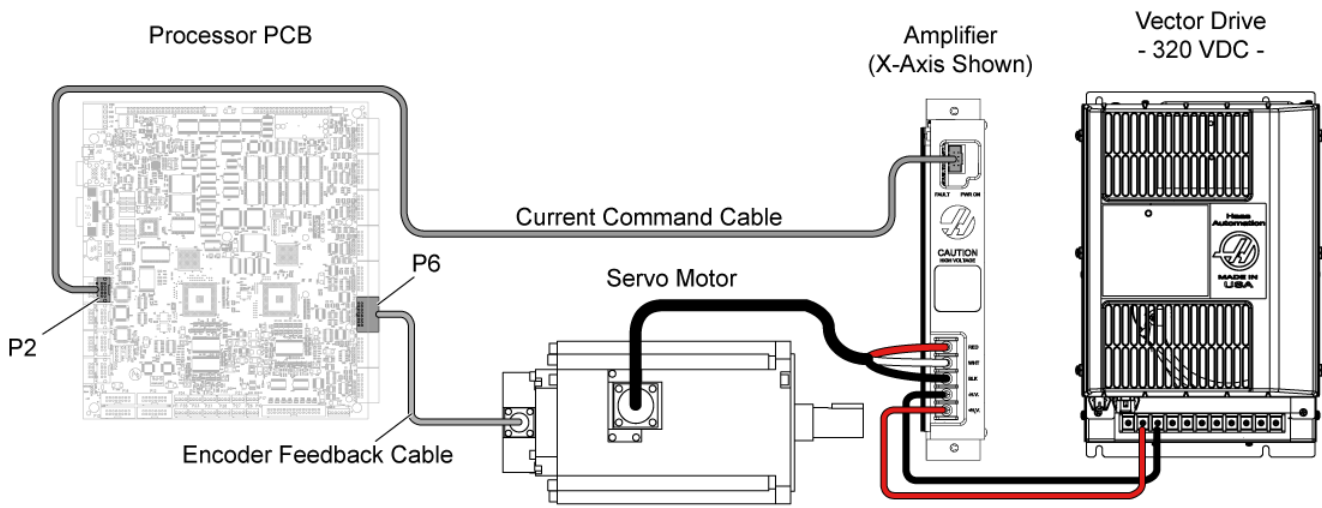
Sigma 5 servo motors use serial data communications to exchange information with the control. The serial data communication allows the control and the encoder to exchange input and feedback at a very high speed, which enhances accuracy and control.

Servo motors that are used on the Z Axis in mills or the X Axis in lathes are equipped with an electromechanical brake to hold the axis in place. The brake engages automatically, and requires

voltage from the I/O PCB to disengage. Although there are different sized motors for specific applications, each motor has an ID plate to identify it.

The illustration shows a Yaskawa motor. The troubleshooting process for motors made by other manufacturers is the same.

Press **[POWER OFF]**. Set the main circuit breaker to the OFF position. Wait until the high voltage LED on the vector drive is completely off before disconnecting any cables.



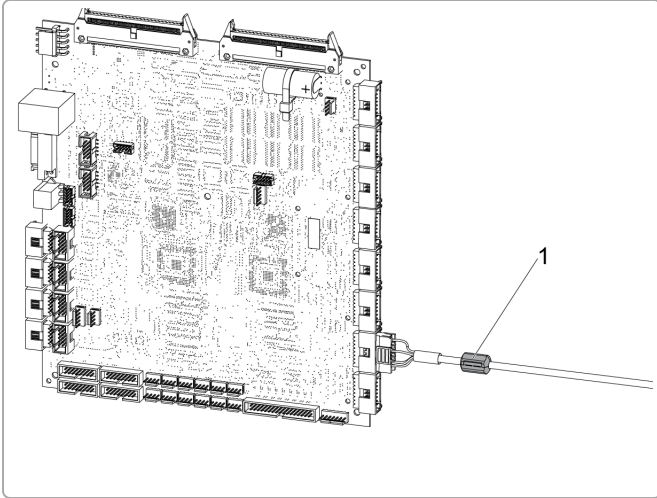
Symptom	Probable Cause	Corrective Action	Section
Alarms 828-839 AXIS SERIAL DATA COMMUNICATION FAULT.	Encoder signals are affected by noise from high power cables.	Install a ferrite filter (P/N: 64-1252) and reroute the encoder cable away from high power cables.	1
	Cables are not connected correctly.	Reseat the connector at the Maincon and the motor.	2
Non-Resettable CHC Alarms 828-839 AXIS SERIAL DATA COMMUNICATION FAULT. NGC Alarms 1-11.9930 SERIAL ENCODER COMMUNICATION FAULT.	Cables are not connected correctly.	Reseat the connector at the Maincon and the motor.	2
	The firmware is incompatible.	The firmware needs to be updated to version 1.09 or higher.	3
Alarms 161-164 AXIS DRIVE FAULT and Alarm 993 AMPLIFIER SHORT CIRCUIT.	Faulty power cable.	Inspect the cables and connectors.	4
	Faulty servo amplifier.	Check the corresponding amplifier assembly.	5
	Faulty servo motor.	Check the corresponding servo motor.	6
Alarm 103-105 POSITIONING ERROR or Alarm 270, 709 SERVO ERROR TOO LARGE during a zero return.	Bad connection at the I/O PCB brake connectors.	Examine the connection at the motor and at the I/O PCB	7

Section 1

Symptom: Alarms **828-839** AXIS SERIAL DATA COMMUNICATION FAULT.

Probable Cause: Encoder signals are affected by noise from high power cables.

Corrective Action:



Symptom: Intermittent Alarms **828-839** AXIS SERIAL DATA COMMUNICATION FAULT.

Possible Cause: Noise from high power cables is affecting the encoder signals.

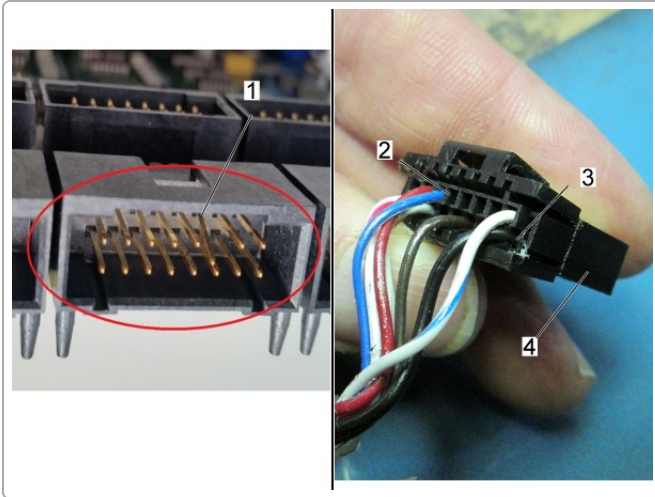
Corrective Action:

Install a ferrite filter (P/N: 64-1252) [1].

Make sure that the encoder cable is separated from high power spindle/axis/pump cables by 1" whenever possible.



Section 2



Symptom: Alarms **828-839** AXIS SERIAL DATA COMMUNICATION FAULT. Non-Resettable Alarms **828-839** AXIS SERIAL DATA COMMUNICATION FAULT.

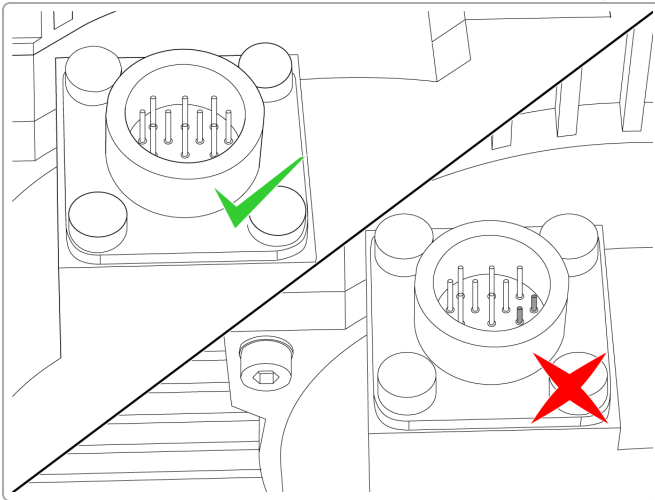
Probable Cause: Cables are not connected correctly.

Corrective Action:

Reseat the connector at the Maincon and the motor.

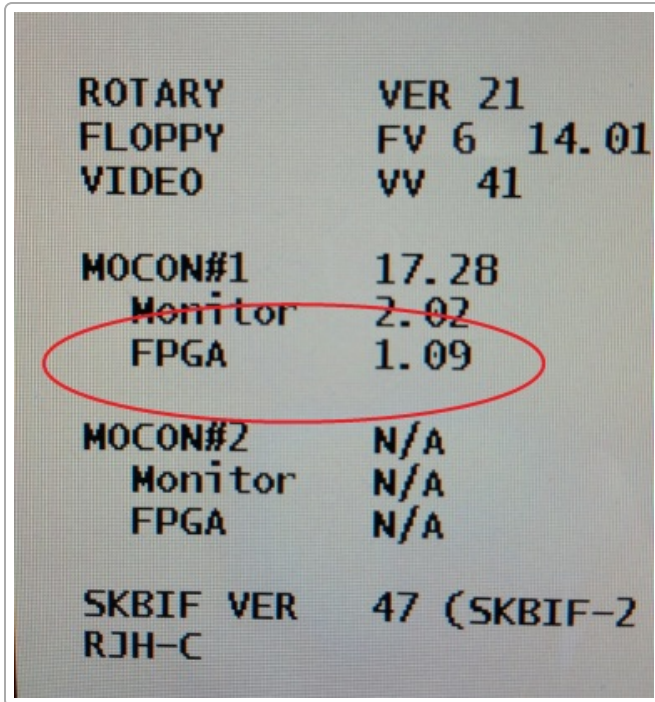
Inspect the encoder connectors and pins [1]. Make sure that they are connected correctly and securely.

The encoder cable connector [4] has two housings [2,3] for the cable pins. The two housings go into the connector.



If the pins have been pushed into the motor, you must replace the motor and cable together.

Section 3



Symptom: Alarms **828-839** AXIS SERIAL DATA COMMUNICATION FAULT. Non-Resettable Alarms **828-839** AXIS SERIAL DATA COMMUNICATION FAULT.

Probable Cause: The CHC firmware is incompatible.

Corrective Action:

Incompatible firmware will not correctly communicate between the encoders and the Maincon.

The firmware needs to be updated to version 1.09 or higher.

The firmware must be updated by a Certified Service Technician.

Section 4

Symptom: Alarms **161-164** AXIS DRIVE FAULT and Alarm **993** AMPLIFIER SHORT CIRCUIT.

Probable Cause: Faulty power cable.

Corrective Action:

Press **[POWER OFF]**. Set the main circuit breaker to the OFF position. Wait until the high voltage LED on the vector drive is completely off.

Examine the cables and connectors.

Make sure the cable connections at the corresponding amplifier are tight. Inspect the connector at the motor. Look for loose connections or contamination.

Examine the cable. Look for signs of damage or stiffness.

Disconnect the power cable from the amplifier and motor. Perform a resistance check from leg to leg, and from leg to ground. Make sure each reading results in an open connection. Check each leg from end-to-end for continuity. If there is an open connection, there is a problem with the cable.

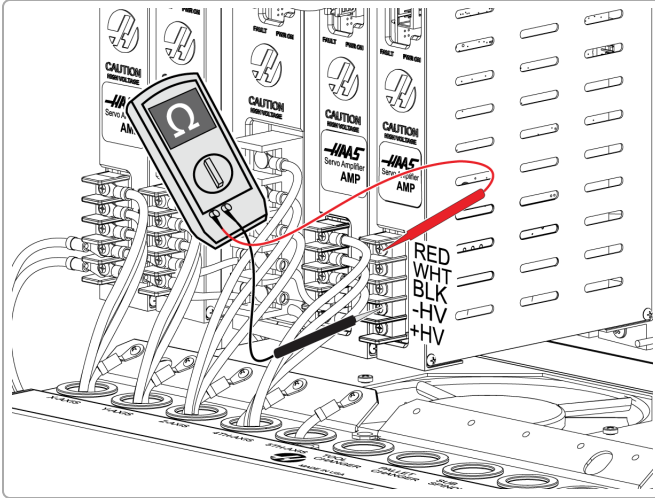
These alarms may also be caused by a faulty amplifier or servo motor. Go to [Servo Amplifier - How it Works and Troubleshooting Guide](#) to troubleshoot the amplifier.

Section 5

Symptom: Alarms **161-164** AXIS DRIVE FAULT and Alarm **993** AMPLIFIER SHORT CIRCUIT.

Probable Cause: Faulty servo amplifier.

Corrective Action:



Check the cables for a short: Make sure the axis servo motor cables are not contaminated or pinched. Contaminated or pinched cables can cause a short. Replace the cables if necessary.

Check the amplifier for a short. Power off the machine. Disconnect the cables for the axis servo motor at the amplifier that generates the alarm. Take the following resistance readings:

- Terminal -HV to RED, WHT, and BLK terminals
- Terminal +HV to RED, WHT, and BLK terminals

A short circuit in any of these measurements is an indication of a defective amplifier.

Go to [Servo Amplifier - How it Works and Troubleshooting Guide](#)

to troubleshoot the amplifier.

Section 6



Symptom: Alarms **161-164** AXIS DRIVE FAULT and Alarm **993** AMPLIFIER SHORT CIRCUIT.

Probable Cause: Faulty servo motor.

Corrective Action:

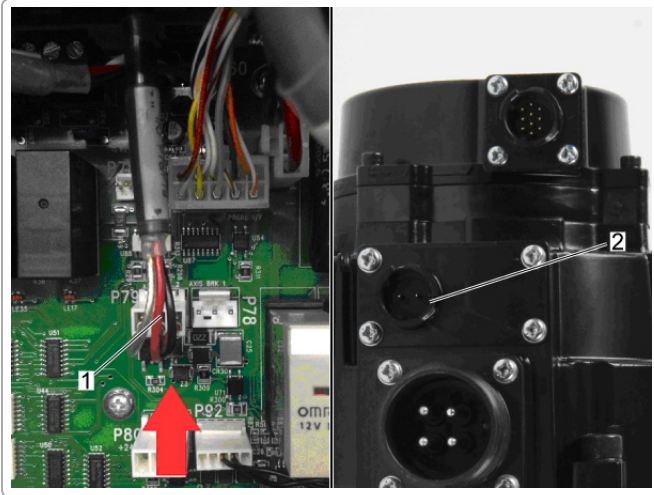
Examine the servo motor.

Make sure the motor's connectors are not contaminated.

Disconnect and inspect the power cable connector at the motor. Make sure there is no coolant contamination. Coolant contamination can cause this alarm and damage the amplifier. Measure the resistance from the pins labeled A, B and C at the motor connector to chassis ground.

- The reading should be OPEN.
- If there is not open resistance, the servo motor is at fault.

Section 7



Symptom: Alarm **103-105** POSITIONING ERROR or Alarm **270, 709** SERVO ERROR TOO LARGE during a zero return.

Probable Cause: Bad connection at the I/O PCB brake connectors.

Corrective Action:

Examine the connection at the I/O PCB connectors P79 or P78 [1]. Reseat the connection.

Use needle tip probes to measure the voltage across the red and black cables.

Press **[EMERGENCY STOP]**. There should be no voltage.

Press **[RESET]** to clear the alarms. The voltage should be

between 20-30 VDC.

Examine the connection at the motor's brake [2] and power connectors [3] for contamination. Reseat the connections.

If no voltage is present, go to [I/O PCB - How it Works and Troubleshooting Guide \(Classic Haas Control\)](#) to troubleshoot the I/O PCB.