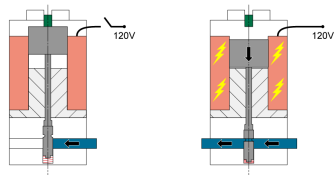





Solenoid - Troubleshooting Guide

Solenoid - Troubleshooting Guide

Introduction



SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Machines with I/O PCB 34-3490A/B Alarm 131 TOOL NOT CLAMP intermittening generated on machines with a digital SMC solenoid.	There is a small delay when the solenoid is commanded off, thus causing the alarm to be generated.	Order service kits 93-3451 & 93-3452 and follow the Low Load Solenoid Valve Kit - Installation procedure.
Machines with I/O PCB 34-3490A/B Alarm 126 GEARBOX FAULT intermittently generated on machines built with a digital SMC gearbox solenoid	There is a small delay when the solenoid is commanded, thus causing the alarm to generate.	Order service kits 93-3450 & 93-3452 and follow the Low Load Solenoid Valve Kit - Installation procedure.
Machines with I/O PCB 34-3490A/B There is a delay when the grippers on an APL are commanded to rotate or clamp/unclamp.	There is a small delay when the digital SMC solenoid is commanded.	
EMC Brand Solenoid's The solenoid vibrates when acuated.	The plastic nut on the side is loose.	Tighten the nut [1] on the side.  EMC-solenoid.png

Solenoid Valve Troubleshooting

- Make sure the machine receives the correct air pressure and flow. Make sure the shut off valve is completely open. Many solenoids will not shift correctly without correct air pressure and back pressure. Test the solenoid in the system. Do not expect the solenoid to operate correctly if the outlets are not connected to the system.
- Turrets on ST model lathes, TRPs, and Side-Mount Tool Changer Pockets have specific troubleshooting steps. Refer to the following troubleshooting guides for more information:
 - [TOOL RELEASE PISTON - TROUBLESHOOTING GUIDE](#)
 - [SIDE MOUNT \(SMTC\) - VF/VM/UMC/EC - CAROUSEL AND POCKET - TROUBLESHOOTING GUIDE](#)
 - [TSC-300/1K - TROUBLESHOOTING GUIDE](#)
- If you command the solenoid to open or close without the correct air pressure, the solenoid can go into an intermediate state that may not correct itself when the machine has correct air pressure. To move

the solenoid out of the intermediate state, close the air valve and power off the machine.

Note: Do not use the machine before the air supply to the machine is correct.

- A clogged exhaust muffler can prevent the solenoid to operate correctly. Remove the exhaust mufflers from the solenoid and test the solenoid again.
- Turn on the machine and use the control to activate the solenoid. You can write a simple program in MDI mode to command the electrical output to the solenoid.
- Go to the I/O tab on the diagnostics screen on the control. Make sure the state of the output changes when it is commanded. If the state does not change, troubleshoot and fix the problem before you continue.
- Listen for a clicking or buzzing noise from the coil area of the solenoid. The coil area of the solenoid is the black plastic area on most solenoids. You can also feel the clicking if you place your finger on the solenoid. If there is not a clicking sound when the solenoid is commanded, make sure the solenoid valve is connected correctly and that the electrical supply is correct. Inspect the solenoid cables to make sure they are not damaged. Make sure the solenoid receives the correct voltage. The measured voltage must be 120 VAC.

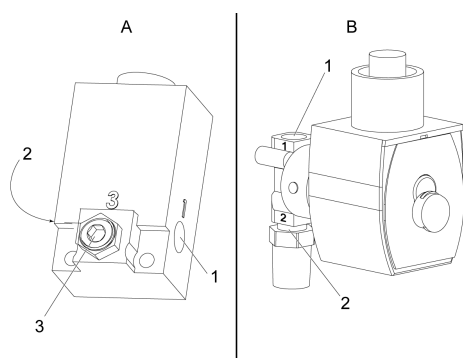
Note: Use a voltage detector or a multimeter with needle-tipped probes to measure the voltage. Always measure the voltage from the back of the connector. Always measure the voltage with the solenoid connected.

If the solenoid still does not operate correctly, disconnect the solenoid from the machine and connect it to a known electrical source. If the solenoid operates correctly, the machine has an electrical problem. Do not replace the solenoid. If the solenoid receives the correct voltage and does not operate correctly, check the solenoid coil for continuity. If there is no continuity, replace the solenoid. If the coil has continuity, go to the correct section for your solenoid.

- If there is coolant leaking from any solenoid, the problem is the TSC check valve in the spindle head.

Many symptoms can be caused by contamination or debris in the solenoid. If the solenoid leaks after you tested it for correct air and power, manually activate it with a 2 mm allen key. Cycle the valve to release any contamination or debris that may have been stuck in the valve. If the solenoid still does not operate correctly, remove the solenoid and inspect the ports for contamination or debris. Clean the solenoid with compressed air while cycling it. Some solenoids (i.e. Asco) have the capability to be disassembled in the field. See the **Cleaning ASCO, SMC or FESTO Brand Solenoids** section in this document. Replace the solenoid if the ports are covered in contamination or debris that cannot be removed.

2-PORT SOLENOIDS

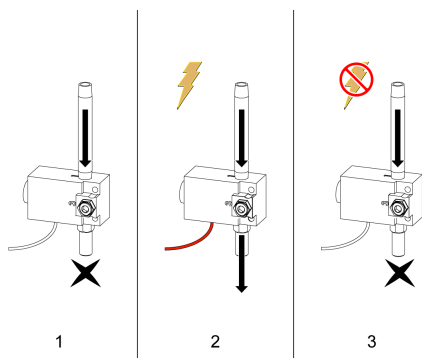


A: MAC, SMC, and Festo Brand

1. **Port 1** is usually the input port.
2. **Port 2** is usually the outlet port.
3. **Port 3** can have a plug to make this a 2-port solenoid. This is the configuration for some air-purge solenoids.

B: ASCO Brand

1. **Port 1** is usually the input port.
2. **Port 2** is usually the outlet port.



1. When the solenoid is de-energized, the air flow stops at port 1.
2. When the solenoid is energized, the air flows through port 1 and out through port 2.
3. If the power fails, air flow stops. The solenoid goes back to its de-energized position.

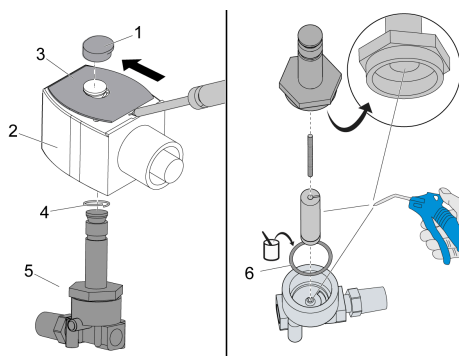
The air-purge solenoid is energized on a timed cycle. If too much contamination collects inside the solenoid, leaks from the outlet port can occur. You can manually energize some brands of solenoids. This has no effect on the time cycle.

ASCO or SMC brand 2-Port solenoid valves are most commonly used for the air system purge. These solenoids are also used in the Coolant Refill and TAB options.

Note: MAC 3-Port poppet style solenoid valves are also used for the air system purge. There is a plug on port number 3 when MAC 3-way poppet style solenoid valves are used. If there is a leak from one of the ports on a MAC 3-Port poppet style solenoid valve, push the manual activation button multiple times to clear out any debris in the solenoid. If this does not work, remove the solenoid and clean it with compressed air while cycling the solenoid. If a MAC purge solenoid replacement is necessary, do not substitute a different MAC solenoid. Use the approved replacement solenoid.

If these solenoids leak air when the solenoid is not activated, it is likely that debris holds the plunger in an open position. Follow this procedures to clean the 2-Port air purge solenoid valve:

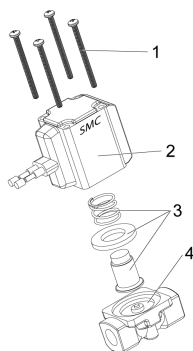
Cleaning ASCO, SMC and FESTO Brand Solenoids



ASCO air purge solenoid:

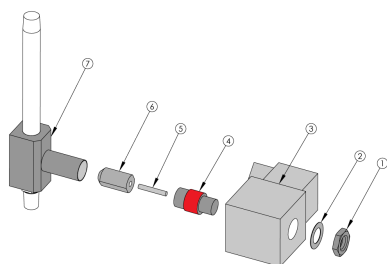
- Remove the red cap [1].
- Push the solenoid coil assembly [2] down to compress the spring inside.
- Remove the specification plate [3] by sliding off.
- Remove the split spring [4] and valve subassembly [5] from the coil assembly [2].
- Disassemble the valve subassembly [5].
- Clean the parts with compressed air. Be sure to remove all debris from inside the valve.

- Apply a thin coat of silicone grease to the body gasket [6].
- Assemble the components in the opposite order they were removed.
- Open the primary air valve. Make sure there are no leaks.



SMC air purge solenoid:

- Remove the four screws [1].
- Remove the solenoid coil assembly [2].
- Clean the internal solenoid parts [3] with compressed air. Be sure to remove all debris from inside the valve [4].
- Apply a thin coat of silicone grease to the rubber seals.
- Assemble the components in the opposite order they were removed.



FESTO air purge solenoid:

- Remove the nut [1].
- Remove the washer [2].
- Remove the solenoid coil [3]. Note the orientation of the coil.
- Remove the plug nut [4].

NOTE: Hold the outside diameter (pictured RED) of the plug nut in the vice with the aluminum jaws to prevent the damage.

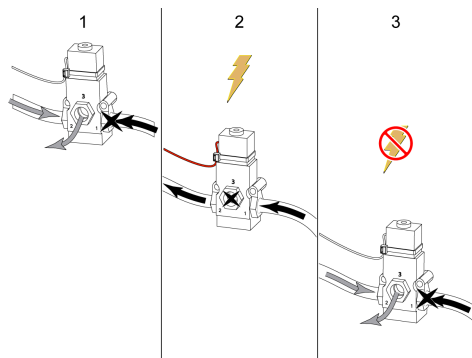
- Remove the spring [5].
- Remove the valve poppet [6].
- Use the compressed air to clean the valve body [7] valve poppet and the spring.
- Clean the old thread sealant off the plug nut threads and apply fresh sealant.
- Assemble the solenoid in the reverse order.

3-PORT SOLENOIDS

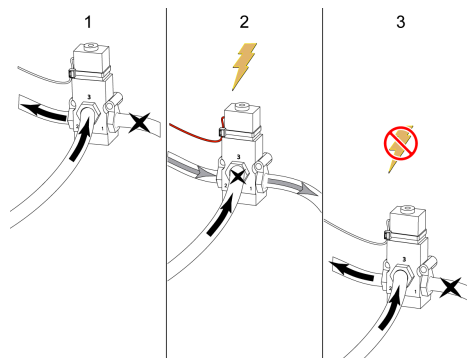
3-Port poppet style solenoid valves are the most common solenoid valves used on Haas machines. These illustrations show how a normally-closed MAC 3-Port poppet style solenoid valve operates:

Black arrows illustrate air pressure from the air supply. Grey arrows illustrate exhaust flow from the machine.

Solenoid Operation : Normally-Closed Application



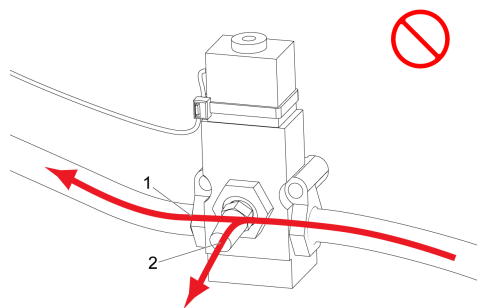
Solenoid Operation : Normally-Open Application



3-Port Solenoid Troubleshooting

Disconnect the output hose from port number 2 on the solenoid valve. Activate the solenoid. If air exits from the output port number 2, the solenoid is operating correctly. Do not replace the solenoid. Continue to troubleshoot the solenoid if air does not exit output port number 2 when it is activated. With the output hose disconnected, use the manual activation button on the top of the solenoid valve to manually activate the solenoid:

- Disconnect the solenoid from the electrical connector.
- Check for air that escapes from the ports.
- Push the manual activation button multiple times. Air should only exit from the output port number 2.
- If there is not a blast of air from the output port number 2 when you push the manual activation button, verify there is air pressure at port 1. If there is pressure at port 1, the solenoid is damaged. If there is a blast of air from the output port number 2, debris was removed from the valve by repeated manual activation, or there is an electrical problem with the machine or the solenoid. If the machine has an electrical problem, find the cause of the problem. If the solenoid has an electrical problem, replace it.



Make sure the solenoid valve does not have leaks:

Feel and listen to the exhaust port [2] of the solenoid.

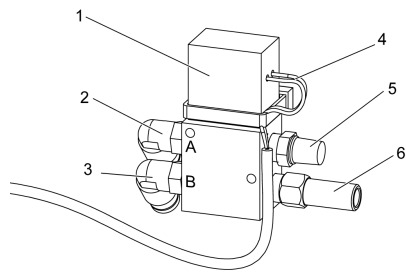
If there is a constant air releasing from the exhaust port, the internal piston is stuck and releases air through the exhaust port [2] and outlet port [1].

Note: There must never be a constant stream of air from the exhaust port.

Stop the air supply to the solenoid and remove the solenoid. Use compressed air to thoroughly clean the solenoid.

Install the solenoid. If the problem continues, replace the solenoid.

4-PORT, TWO-OUTLET SOLENOIDS

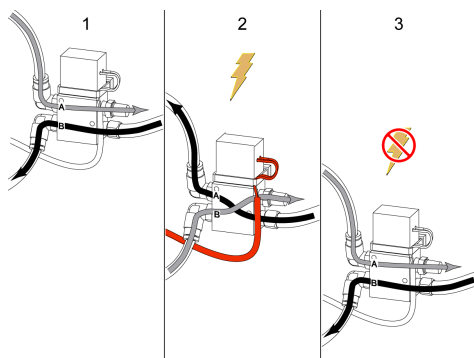
**4-Port, Single Coil Solenoid**

1. Solenoid coil
2. Port A
3. Port B
4. Electrical cable
5. Exhaust port
6. Input port

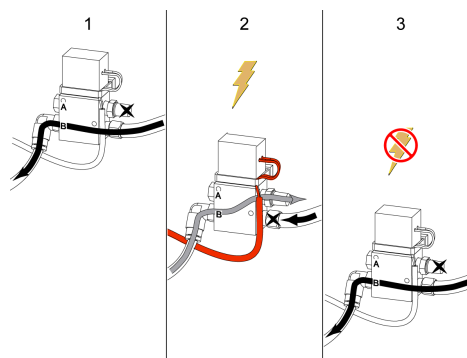
4-Port Solenoid Operation

Black arrows illustrate air pressure from the air supply. Grey arrows illustrate exhaust flow from the machine.

4-Port Solenoid - Double Acting

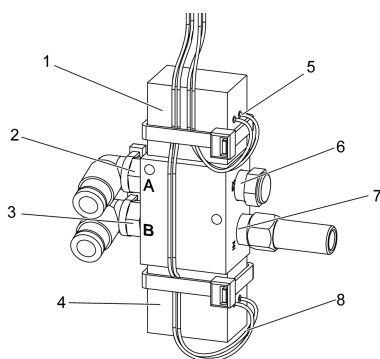


4-Port Solenoid :Normally-Open Function



In this application, a plug is in one of the ports. This lets the solenoid operate as a 3-Port, normally-open solenoid. Haas machines use these solenoids as an alternative to a 3-port solenoid in some applications.

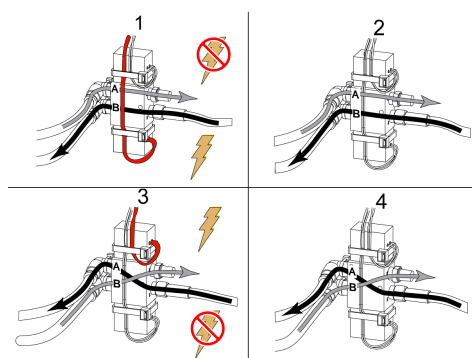
Note: A plug is in port A.



4-Port, Dual Coil Solenoid

1. Low-gear coil
2. Low-gear port
3. High-gear port
4. High-gear coil
5. Low-gear cable
6. Exhaust port
7. Input port
8. High-gear cable

Note: Low-gear and High-gear coils are never energized at the same time. The only function of these solenoids is to change gears on the Haas transmissions.



4-Port, Dual Coil Solenoid Operation

Black arrows illustrate air pressure from the air supply. Grey arrows illustrate exhaust flow from the machine.

Note: EC-400 PP machines use a 4- or 5-port solenoid to lift the H-Frame. Do not replace the solenoid with another 4- or 5-port solenoid. The configuration for the pallet lift system was upgraded. Use service kit 93-2248 to replace the solenoid.

4-Port Solenoid Valve Troubleshooting

Make sure the incoming air pressure and flow are correct. Feel and listen to the exhaust port of the solenoid. If there is constant air releasing from the exhaust port, disconnect the non-pressurized line between the cylinder and the solenoid. If the air continues to flow through the exhaust port and/or the non-pressurized line port on the solenoid follow these steps:

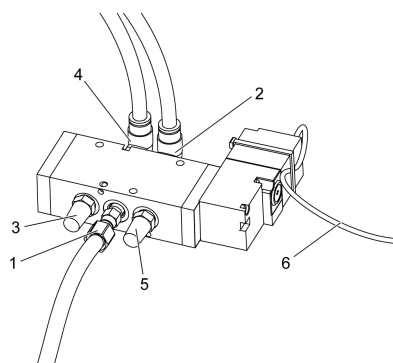
1. Disconnect the air supply from the machine and release all the air pressure from the machine.
2. If the solenoid is powered on, power it off.

3. Reconnect the air to the machine.
4. Command the solenoid to activate. If the solenoid continues to leak, disconnect the air supply and release the air pressure with the solenoid still energized. If the solenoid continues to leak, continue troubleshooting the solenoid.

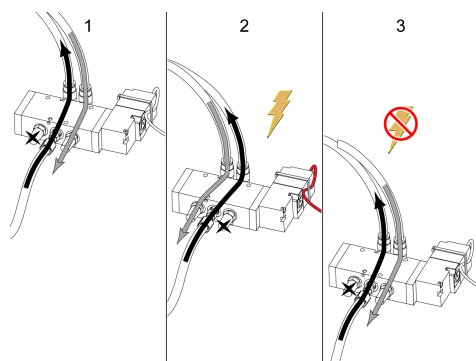
Remove the air supply to the machine and remove the solenoid. Use compressed air to thoroughly clean the solenoid. Install the solenoid and check for leaks. If the solenoid continues to leak, follow these steps.

1. With no power to the solenoid, remove the unpressurized hose that runs between the solenoid and the cylinder.
2. The *solenoid* has a leak if air is released out of the exhaust.
3. The *cylinder* has a leak if air is released out of the cylinder return hose.
4. Repeat the test while the solenoid is energized. The other hose between the cylinder and solenoid is now pressurized.

5-PORT SOLENOIDS

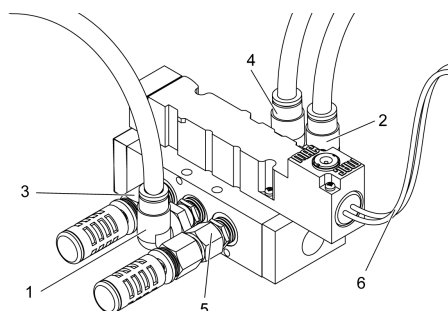


1. Input port
2. Port 2
3. Exhaust port 3
4. Port 4
5. Exhaust port 5
6. Electrical cable

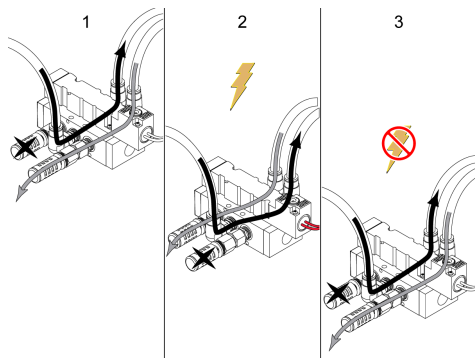


5-Port Solenoid Operation

Black arrows illustrate air pressure from the air supply. Grey arrows illustrate exhaust flow from the machine.



1. Input port
2. Clamp port
3. Exhaust port 3
4. Unclamp port
5. Exhaust port 5
6. Electrical cable



4-Way Solenoid - Turret Clamp / Unclamp Solenoid Operation

Black arrows illustrate air pressure from the air supply. Grey arrows illustrate exhaust flow from the machine.

4-Way Solenoid Valve Troubleshooting

The steps to troubleshoot a 5-port solenoid valve are the same as a 4-port solenoid valve.