INSTALLATION INSTRUCTIONS

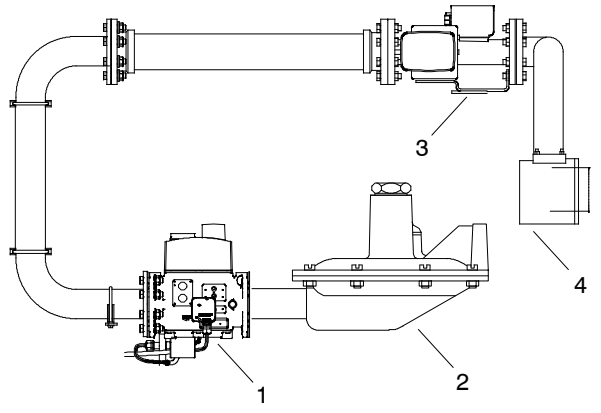
Original Issue Date: **8/17**
Model: **1300REZCK**
Market: **Industrial**
Subject: **Fuel Valve Kit GM101012-KP1**

Introduction

The following instructions cover the installation of the fuel valve, the attachment of the proof-of-closure switch, and the attachment of the high and low fuel pressure switches to the fuel valve.

The fuel valve houses two fuel solenoid shutoff valves. When energized, these fuel solenoid shutoff valves open to allow fuel to flow to the engine.

The fuel valve controls the fuel flow to the electronic-controlled pressure regulator (EPR), sometimes referred to as a fuel control valve, and the ratio of fuel to air under varying load and speed conditions. The engine-mounted EPR reduces the fuel pressure as fuel passes to the fuel mixer. Because the fuel mixer receives fuel in a gaseous state, it does not have to vaporize the fuel.



1. Fuel valve (fuel solenoid shutoff valves)
2. Primary regulator (supplied by gas supplier or customer)
3. Electronic-controlled pressure regulator (EPR)
4. Fuel mixer

Figure 1 Fuel Regulator and Valve, Typical

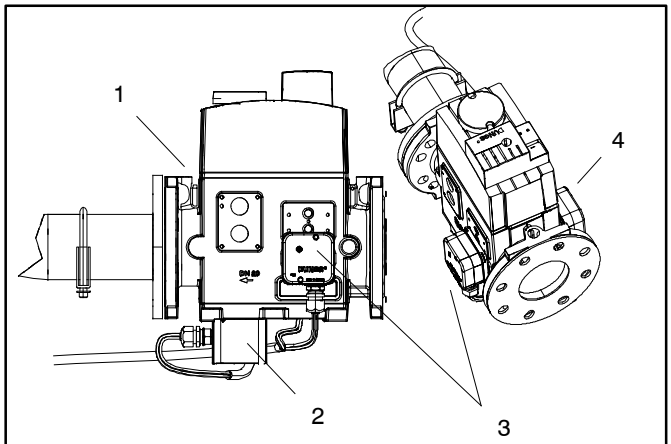
The high and low fuel pressure switches attach to two ports on the fuel valve. See Figure 2. These fuel pressure switches monitor the outlet fuel pressure of the fuel valve. To reset the switches, see step 6.

The proof-of-closure switch installs on the bottom of the Fuel Valve and indicates valve position. See Figure 2. If the proof-of-closure switch does not sense that the fuel valve has closed when required, the controller issues a shutdown alarm, **SD FuelVlvFail2Cl**. If the proof-of-closure switch does not sense that the fuel valve has opened when required, the controller issues a warning alarm, **WRN FuelVlvFail2Op**.

Note: A failure-to-close fault, SD FuelVlvFail2Cl, may indicate unexpected presence of gas in the engine side of the fuel delivery system. Failure to close prevents the generator set from running.

Note: A Failure-to-open fault, WRN FuelVlvFail2Op, may indicate lack of fuel supply to the engine. If the engine is running in spite of a Fail-to-Open fault, the problem is likely with the proof-of-closure switch operation or a broken wire between the switch and the controller.

Carefully read and follow all safety precautions and instructions before performing any work on the generator set.



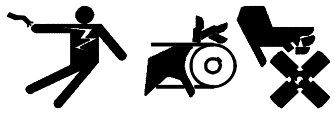
1. Fuel valve
2. Proof-of-closure switch
3. High fuel pressure switch
4. Low fuel pressure switch

Figure 2 Fuel Valve Details

Safety Precautions

Observe the following safety precautions while installing the kit.

⚠ WARNING

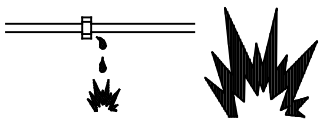


Accidental starting.
Can cause severe injury or death.

Disconnect the battery cables before working on the generator set. Remove the negative (-) lead first when disconnecting the battery. Reconnect the negative (-) lead last when reconnecting the battery.

Disabling the generator set. Accidental starting can cause severe injury or death. Before working on the generator set or equipment connected to the set, disable the generator set as follows: (1) If the controller is not already in the MAN (manual) mode, press the Controller Mode button and then press the MAN mode button. (2) If the generator set is running, press and hold the Manual-Stop button for at least 2 seconds to stop the generator set. (3) Press the Controller Mode button and then press the controller Off mode button. (4) Disconnect the power to the battery charger, if equipped. (5) Remove the battery cables, negative (-) lead first. Reconnect the negative (-) lead last when reconnecting the battery. Follow these precautions to prevent the starting of the generator set by the remote start/stop switch.

⚠ WARNING



Explosive fuel vapors.
Can cause severe injury or death.

Use extreme care when handling, storing, and using fuels.

The fuel system. Explosive fuel vapors can cause severe injury or death. Vaporized fuels are highly explosive. Use extreme care when handling and storing fuels. Store fuels in a well-ventilated area away from spark-producing equipment and out of the reach of children. Never add fuel to the tank while the engine is running because spilled fuel may ignite on contact with hot parts or from sparks. Do not smoke or permit flames or sparks to occur near sources of spilled fuel or fuel vapors. Keep the fuel lines and connections tight and in good condition. Do not replace flexible fuel lines with rigid lines. Use flexible sections to avoid fuel line breakage caused by vibration. Do not operate the generator set in the presence of fuel leaks, fuel accumulation, or sparks. Repair fuel systems before resuming generator set operation.

Gas fuel leaks. Explosive fuel vapors can cause severe injury or death. Fuel leakage can cause an explosion. Check the LPG vapor or natural gas fuel system for leakage by using a soap and water solution with the fuel system test pressurized to 6-8 ounces per square inch (10-14 inches water column). Do not use a soap solution containing either ammonia or chlorine because both prevent bubble formation. A successful test depends on the ability of the solution to bubble.

Installation Procedure

The location of the fuel piping and the fuel valve may vary depending upon the installation site and application requirements. When locating the fuel valve, take the length of the wiring harness into account. The wiring harness connections for the high and low fuel pressure switches as well as the proof-of-closure switch and power connections must be able to reach the fuel valve location.

1. Remove the Generator Set from Service

1.1 Read and follow the safety precautions.

1.2 Before working on the generator set or connected equipment, disable the generator set. Refer to the safety precautions for preventing accidental starts and disabling the generator set.

1.2.1 Place the generator set controller into **OFF** mode.

1.2.2 Disconnect the power to the battery charger.

1.2.3 Remove the battery cables negative (–) lead first to disable the generator set. Read and follow the precautions to avoid accidental starts.

1.2.4 Disconnect the generator set from the load by opening the line circuit breaker.

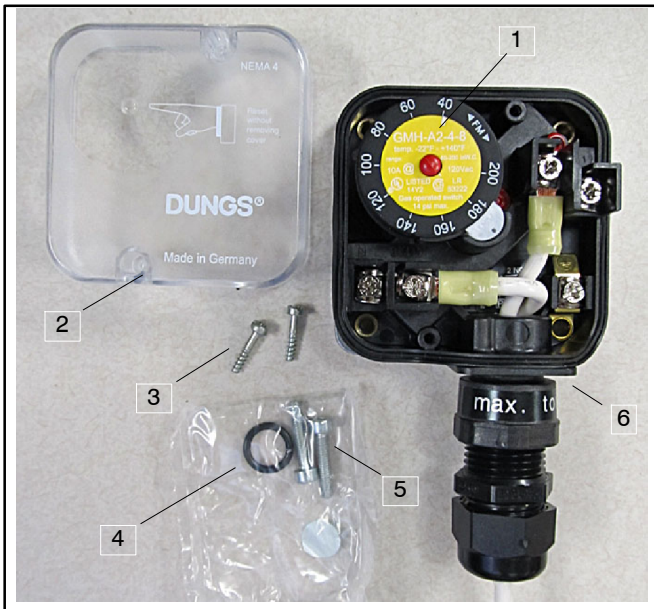
1.3 Shut off the fuel supply.

2. Install the Pressure Switch

Use the following procedure to install the high and low fuel pressure switches and the proof-of-closure switch onto the fuel valve. Due to hard to reach locations, installing the switches prior to the fuel valve installation is typically best practice.

2.1 Since the switches look very similar, use the switch model number located on the dial for identification.

- CPI 400 = Proof-of-closure switch
- GMH-A2 = High fuel pressure switch
- GML-A2 = Low fuel pressure switch

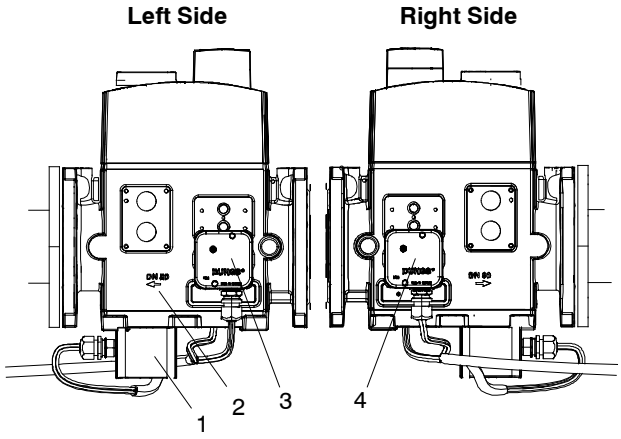


1. Dial
2. Cover
3. Cover screws
4. O-ring
5. Mounting screws
6. Switch

Figure 3 Switch Components

2.2 Use Figure 4 to locate and position the high and low fuel pressure switches and the proof-of-closure switch.

Note: The position and orientation of each switch is critical to proper function.



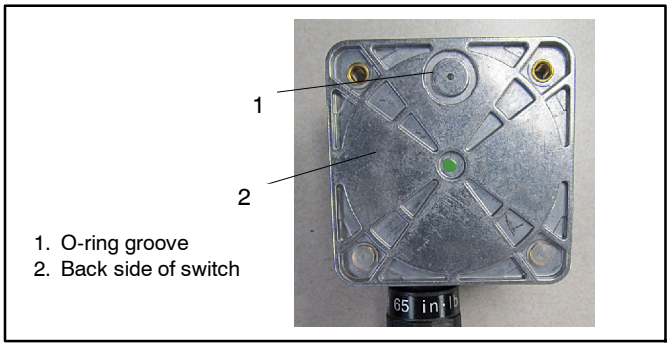
1. Proof-of-closure switch
2. Flow direction arrow
3. High fuel pressure switch
4. Low fuel pressure switch

Figure 4 Switch Locations

2.3 Use a 3 mm hex wrench to remove the G 1/8 ports.

2.4 Place the O–ring in the groove on the back of each switch. See Figure 5.

Note: Make sure that the O-ring and the groove are clean and free of notches or debris.



1. O-ring groove
2. Back side of switch

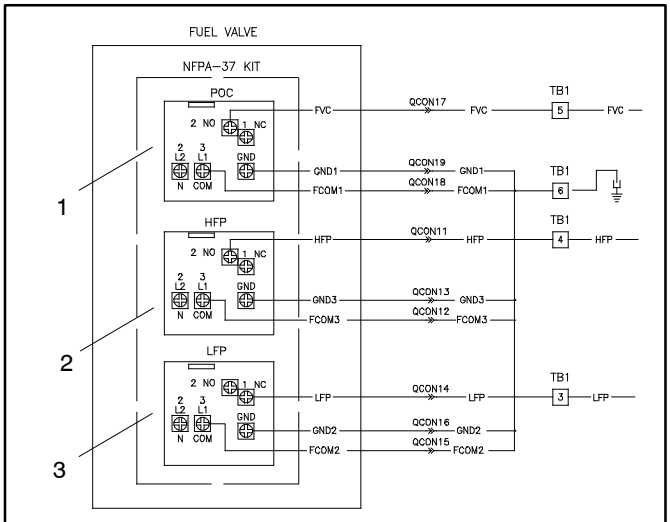
Figure 5 Backside of the Switch

2.5 Position each switch on the fuel valve and secure with the two socket head screws. See Figure 3. Do not exceed 2.5 Nm (22 in. lbs.).

Note: Ensure that the O-ring remains in the groove while mounting.

2.6 Position a plastic cover on each switch and secure with two screws.

2.7 The wiring harness is connected to the switches at the factory. If needed however, use Figure 6 to connect the wiring harness quick connections to the switches.



1. Proof-of-closure switch
2. High fuel pressure switch
3. Low fuel pressure switch

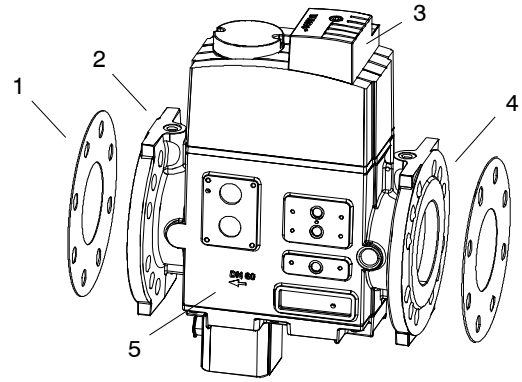
Figure 6 Switch Wiring Harness Connections

3. Install the Fuel Valve

3.1 Position the fuel valve with the gas flow matching the direction indicated by the arrows on the casting and position the solenoid vertically. See Figure 7.

3.2 Place a gasket on the fuel valve outlet flange and align the flange with the piping connected to the generator set. See Figure 7.

Note: The fuel valve flange size is DN80.



1. Gasket
2. Outlet flange, DN80
3. Solenoid
4. Inlet flange, DN80
5. Flow indication arrow

Figure 7 Fuel Valve Orientation

3.3 Insert the fuel valve mounting bolts. Tighten the bolts in a star pattern to ensure uniform tightness. Do not overtighten the bolts. Use the maximum torque value in Figure 8.

Bolt Size	Maximum Torque, Nm (in. lbs.)
M16 (DIN 939)	50 (443)

Figure 8 Maximum Bolt Torque

3.4 Place a gasket on the fuel valve inlet flange and align the fuel supply piping to the flange. See Figure 7.

Note: Ensure that a primary fuel regulator (supplied by the gas supplier or customer) is installed up steam of the fuel valve. See Figure 1.

3.5 Insert the fuel valve mounting bolts. Tighten the bolts in a star pattern to ensure uniform tightness. Do not overtighten the bolts. Use the maximum torque value in Figure 8.

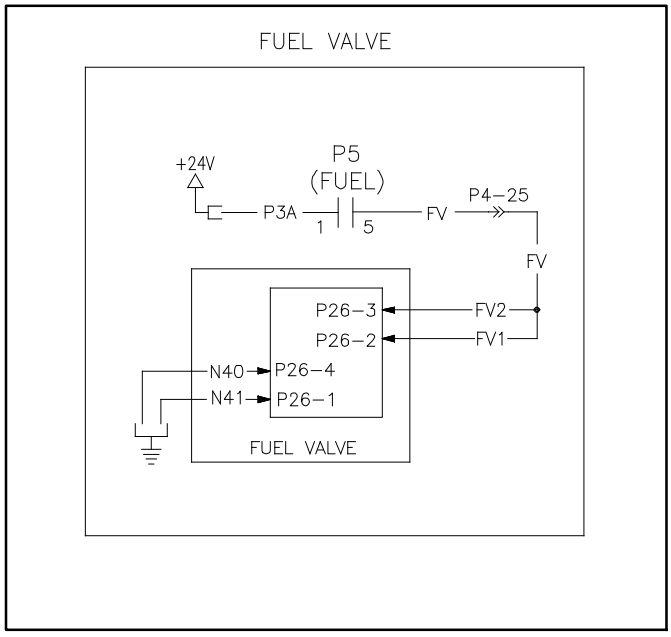
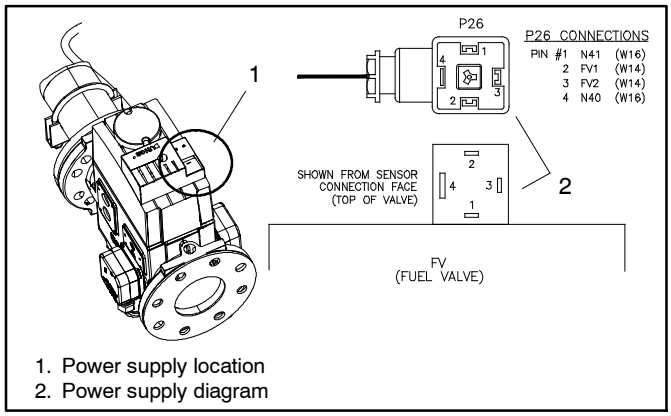


Figure 9 Power Supply Connections

3.6 Check primary fuel regulator outlet pressure (line pressure). Ensure that the fuel pressure is between 8–15 kPA (32–60 in. H_2O).

3.7 Connect the generator set wiring harness leads to the power supply on the fuel valve. See Figure 10.



1. Power supply location
2. Power supply diagram

Figure 10 Power Supply Location

3.8 Perform a leak test. See step 4.

4. Test the Fuel Valve for Leaks

Use the following methods to test for fuel leaks and to verify that the valve creates a good seal.

This procedure tests the external sealing and valve seat sealing capabilities of the fuel valve.

This test is required on the initial system start up and should be repeated annually at a minimum. Perform the test more often depending on the application, environmental parameters, and the requirements of the authority having jurisdiction.

Required Equipment:

- Test nipples installed in the downstream pressure tap port of each fuel solenoid shutoff valves to make the required 1/4 in. hose connection in step 4.
- A transparent glass of water filled at least 25 mm (1 in.) from the bottom.
- A proper leak test tube. An aluminum or copper 1/4 in. rigid tube with a 45° cut at the end that is then connected to a 1/4 in. flexible hose of some convenient length provides a more accurate leakage measurement. However, a 45° cut at the end of the 1/4 in. flexible hose will suffice, but it will not likely be as accurate as the rigid tube.
- For detecting external leakages, an all purpose liquid leak detector solution is required.

4.1 With the upstream ball valve open, the downstream ball valve (if applicable) closed, and both fuel solenoid shutoff valves energized, apply an all-purpose liquid leak detector solution to the external leakage test areas indicated in Figure 11, to any accessories mounted to the safety valve, and to all gas piping and gas components downstream of the equipment isolation valve, and the inlet and outlet gas piping of the fuel solenoid shutoff valves. The presence of bubbles indicates a leak, which needs to be rectified before proceeding.

Note: Generator sets, depending upon application, may not have a down stream ball valve.

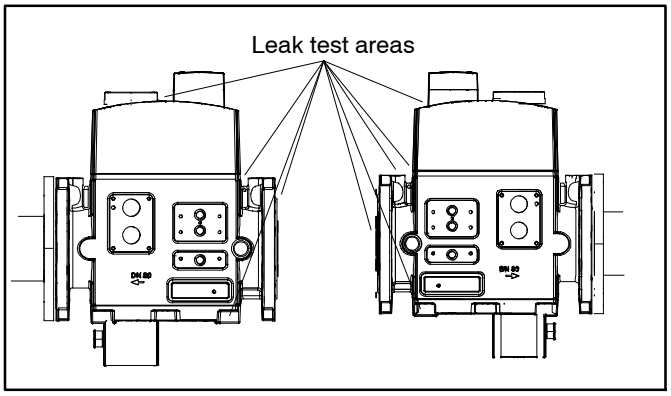


Figure 11 External Leakage Test Areas

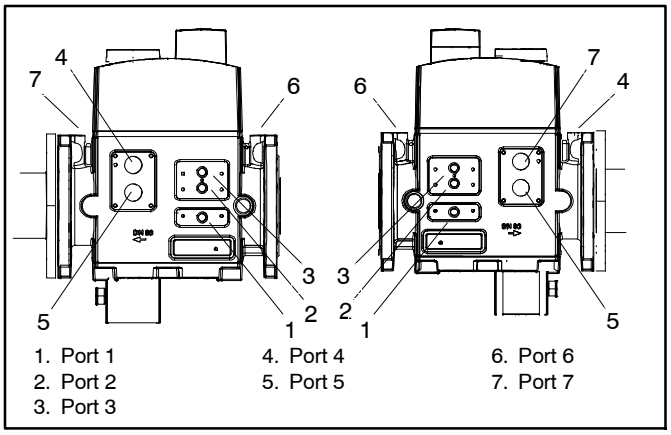


Figure 12 Port Locations

4.2 Next, de-energize the fuel valve and verify that both fuel solenoid shutoff valves are closed.

4.3 Close the upstream and downstream (if applicable) manual ball valve.

4.4 Using a screwdriver, slowly open the valve 1 test nipple (port 3 or port 4) by turning it counterclockwise to depressurize the volume between the two valves, and connect the 1/4 in. flexible hose to the test nipple. See Figure 12.

4.5 Slowly open the upstream manual ball valve, and then provide for some time to allow potential leakage to charge the test chamber before measuring the valve seat leakage.

4.6 Immerse the 1/4 in. tube vertically 13 mm (1/2 in.) below the water surface. If bubbles emerge from the 1/4 in. tube and after the leakage rate has stabilized, count the number of bubbles appearing during a 10 second period. See Figure 13.

Important: If leakage values are exceeded, replace the valve. See Figure 14.

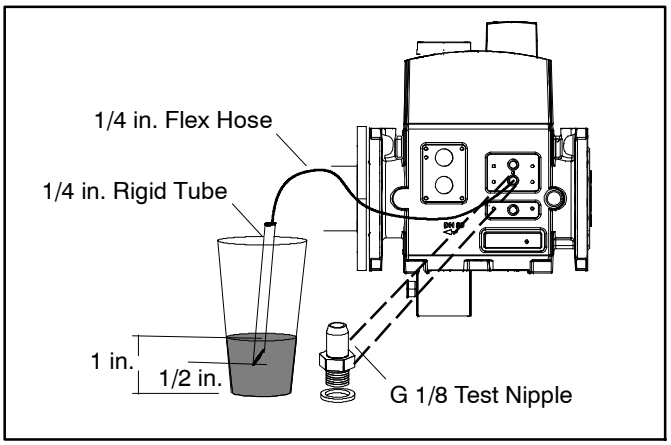


Figure 13 Leak Test

Allowable Valve Seat Leakage*, up to 48 kPA (7 PSI) inlet	Number of Bubbles in 10 s
790 cc/hr (.028 cfh)	17

* Allowable valve seat leakage is based on air and test conditions per UL 429 Section 29 (Air or inert gas at a pressure of 1/4 psig and also at a pressure of one and one-half times maximum operating pressure differential, but not less than 1/2 psig. This test shall be applied with the valve installed in its intended position). The volume of bubble is defined in Table 2 of FCI 70–2–1998.

Figure 14 Allowable Valve Seat Leakage

4.7 Repeat the same procedure for valve 2 (port 5), except that valve 1 needs to be opened. (Energize only terminal 2 on the DIN connector to open valve 1). See Figure 12.

4.8 If a downstream manual ball valve is installed, verify that the ball valve is closed, and both fuel solenoid shutoff valves are de-energized.

4.9 Remove the flexible hose, and close all test nipples.

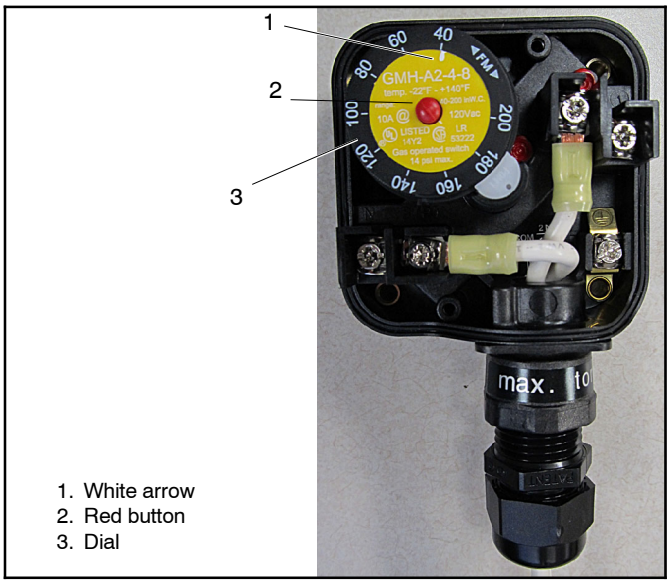
4.10 With the upstream manual ball valve open, energize both fuel solenoid shutoff valves.

4.11 Use an all-purpose liquid leak detector solution to leak test all test nipples to ensure that there are no leaks.

4.12 If no leakage is detected, de–energize all fuel solenoid shutoff valves, and open the downstream manual ball valve (if applicable).

5. Adjust the High or Low Fuel Pressure Switches

The fuel pressure switches are set at the factory. If needed however, use the following procedure to verify the settings and to calibrate the switches.



1. White arrow
2. Red button
3. Dial

Figure 15 High and Low Pressure Switch Adjustments

5.1 Remove the clear cover from the switch.

5.2 Turn the dial until the desired trip pressure is opposite the white arrow (mark) on the yellow dial face. See Figure 15 and Figure 16.

Note: The yellow dial face displays increments in inches of water column.

Switches	Settings
High Pressure (GMH-A2)	150 mbar (60 in. W. C.)
Low Pressure (GML-A2)	50 mbar (20 in. W. C.)

Figure 16 Fuel Pressure Switch Settings

5.3 After adjusting the set point for normal operation verify that the gas pressure switch operates as intended.

5.4 Use an accurate pressure gauge connected upstream from the switch to measure the actual pressure.

5.5 Replace the clear cover

6. Resetting the High or Low Fuel Pressure Switches

The high and low fuel pressure switches must be reset manually. On the **high fuel pressure switch** when the fuel pressure rises above the dial setting, the normally open, **NO**, contacts close and send a shutdown alarm, **SD HighFuelPress**, through the controller. On the **low fuel pressure switch** when the fuel pressure falls below the dial setting, the normally closed, **NC,** contacts close and send a warning alarm, **WRN Low Fuel Press**, through the controller. Neither of the switches will return to their former position automatically.

6.1 To reset the high or low pressure switch, wait until the pressure returns to the normal operating level. Then, press and release the clear cover over the red reset button. See Figure 15.

Note: Removing the cover is not necessary when pressing the red button.

6.2 Reset the fault on the controller.

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