Quality Petroleum Equipment Solutions for Over 30 Years

LDT-890\AF
Leak Detector Tester

280.44 Methods of Release Detection For Piping

"Each method of release detection for piping used to meet the requirements of 280.41 must be conducted in accordance with the following:"

Vaporless Manufacturing, Inc.

Automatic Line Leak Detectors

- "Methods which alert the operator to the presence of a leak by restricting or shutting off the flow of regulated substances through piping or triggering an audible or visual alarm."
- "May be used only if they detect leaks of 3 gallons per hour at 10 psi line pressure within one hour."
- "An annual test of the operation of the leak detector must be conducted in accordance with the manufacturer's requirements."

Vaporless Manufacturing, Inc.

Vaporless' requirements for Annual & Post-Installation Testing of Catastrophic Line Leak Detection for MLLDs & ELLDs are met using either the Vaporless Leak Detector Tester (LDT-890, LDT-890\AF) or the Tanknology TLDT-5000.

Testers must pass the Certification Test for the appropriate equipment, Vmi LDT-890(\AF) or the Tanknology TLDT-5000, and recertify every two years. The LDT-890(\AF) must be recalibrated every two years.

Vaporless Manufacturing, Inc.

This test and equipment is specific to Vmi MLLDs and ELLDs and is also applicable to any mechanical or electronic catastrophic line leak detection system insofar as manufacturer guidelines do not exclude this method or equipment for generating catastrophic leaks.

Vmi
Vaporless
Manufacturing, Inc.

Vmi does not recognize the Red Jacket FX Tester, any fixed orifice tester, or any tester not built and sold by a line leak detector manufacturer as acceptable test equipment:

For generating catastrophic (3 GPH@10 PSI) line leaks or for being used to perform annual testing of Vaporless MLLDs or ELLDs. Reasons include:

1. **The inability to compensate for the viscosity of the fuel being tested.**
2. **The inability of the operator to verify the flow (leak) rate at 10 PSI as per EPA Regulations.**
3. **No factory quality control and recalibration services.**

Vmi Vaporless Manufacturing, Inc.

Catastrophic Line Leak Detection is Performed By:

- Mechanical line leak detectors
- Electronic line leak detection

Importance of Field Generated Leak Testing

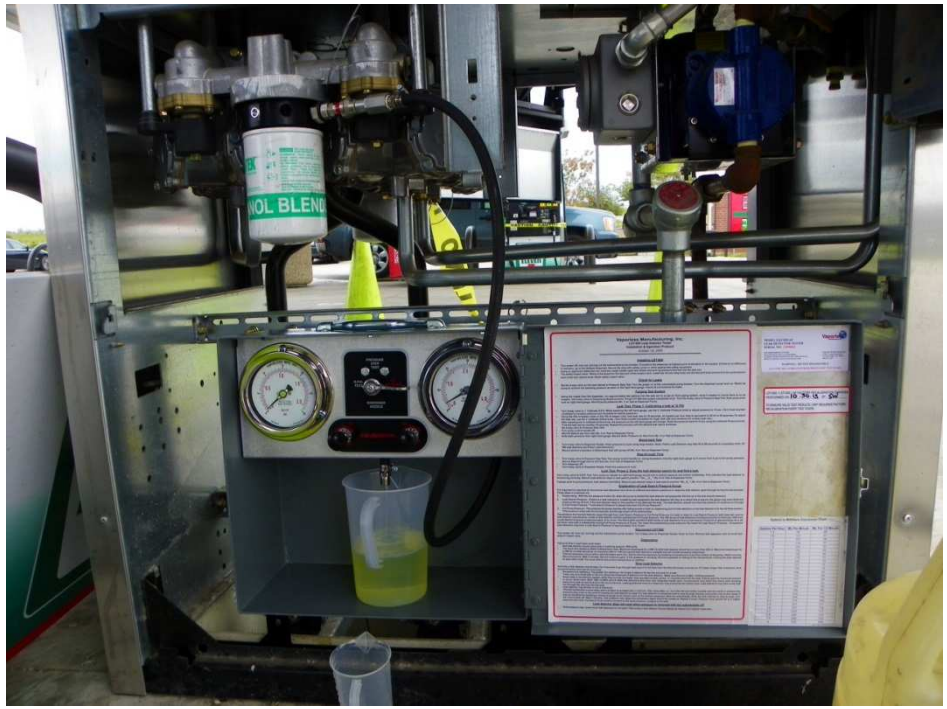
- The leak detector (mechanical or electronic) may be installed
- The wires may be attached
- The light may be on
- Will the equipment <u>detect a catastrophic leak in this line?</u>

Vaporless Manufacturing, Inc.

Start With an Inspection of the Submersible Pump

- Is the line leak detection equipment installed and programmed correctly?
- Is it mechanical or electronic?
- No leaks or weeps.

Test Equipment



Must be installed in the piping at the dispenser Safety Port, TAP, or impact valve to ensure the line variables are included in the test. The highest dispenser should be chosen. If elevation is level, the furthest dispenser from the pump should be chosen.

Vmi LDT-890 + LDT-890\AF Leak Detector Tester

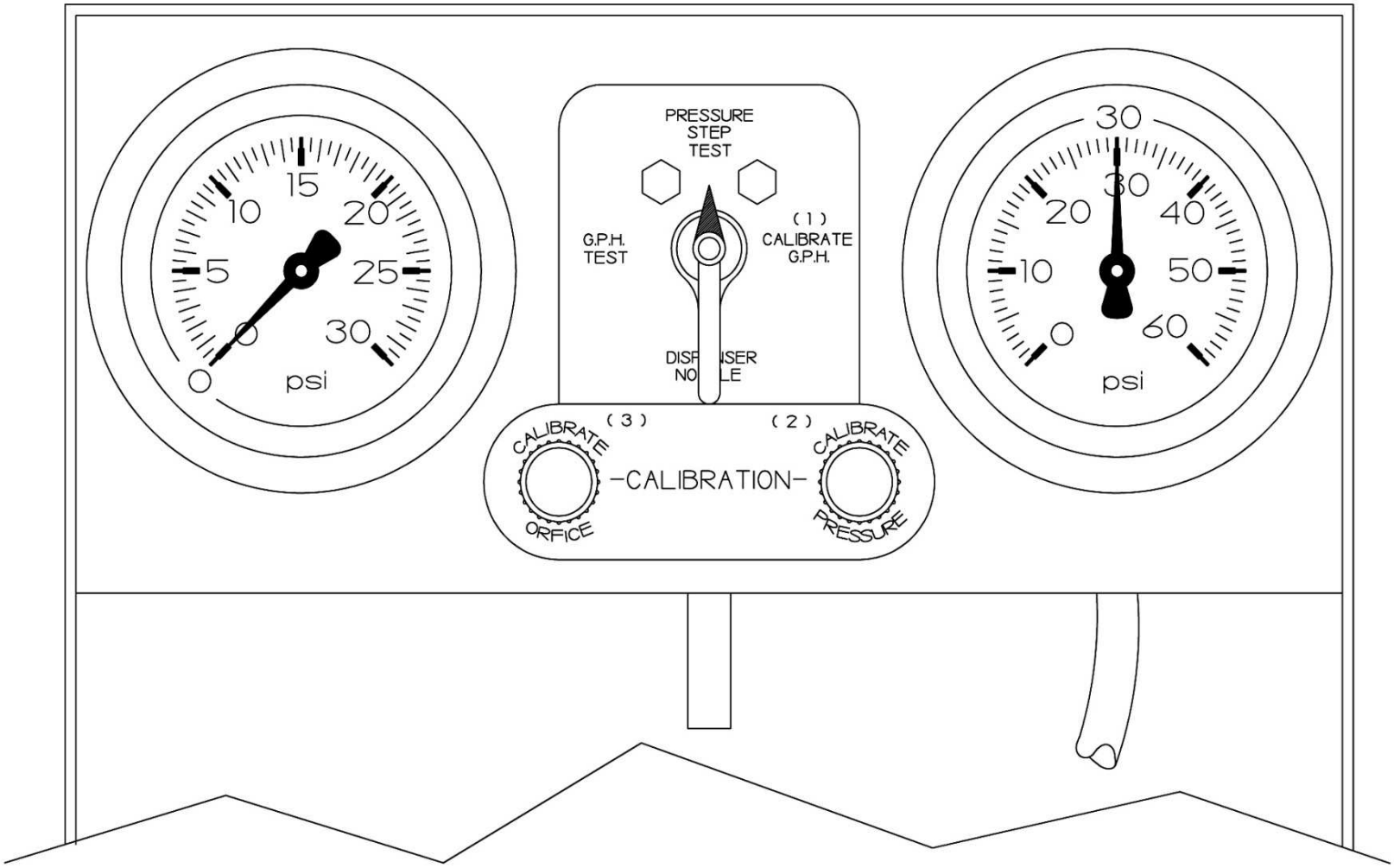
Calibration of 3 gph @10 psi

If a Mechanical Leak Detector is Present:

- Start with the submersible running.
- Leak detector is open: line pressure should be full submersible working pressure (14~40 psi).

Vaporless Manufacturing, Inc.

Full Pump Pressure



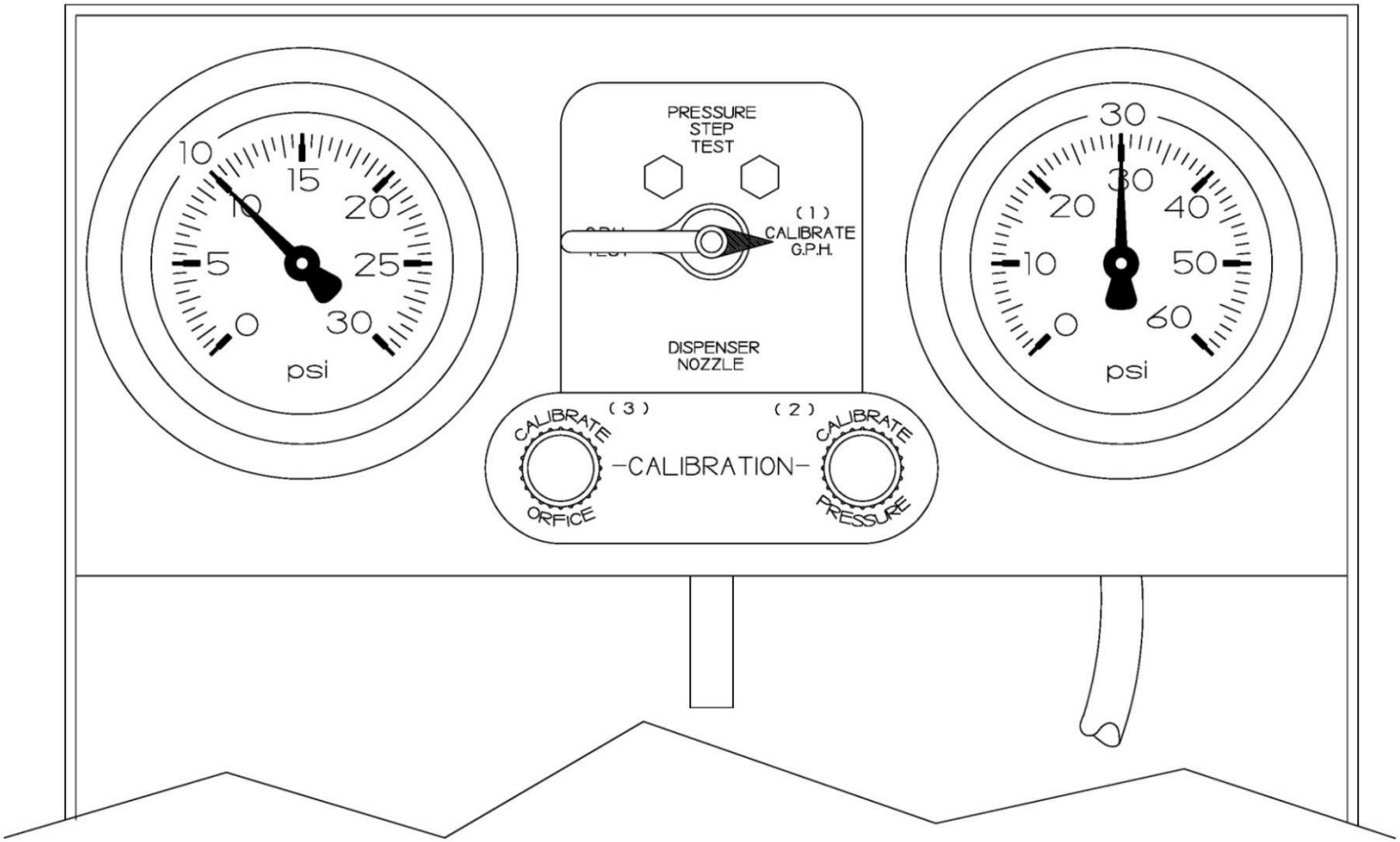
Vaporless
Manufacturing, Inc.

Calibration Verification

1. Turn 4 way valve to “Calibrate GPH.”
2. Adjust “Calibrate Pressure.”
   The line pressure is reduced to 10 psi to confirm an orifice of 3 gph @ 10 psi leak (Left side Gauge).
3. Measure In A Calibrated Beaker.
   - 95 milliliters in 30 seconds
   - 189 milliliters in 60 seconds

Vaporless Manufacturing, Inc.

Calibrate leak rate @ 10 psi



Measure in a Calibrated Beaker @ 10 psi to Insure Leak Rate Compensates for:

- Pump Pressure
- Viscosity changes in fuels due to:
  - Temperature differences
  - Fuel stock differences
  - Fuel grade differences
  - Fuel type differences – Bio vs. non-Bio fuels
- Accuracy of Fuel Flow Orifice

Vmi Vaporless Manufacturing, Inc.

Increase or Decrease Flow to Meet 3 gph @ 10 psi

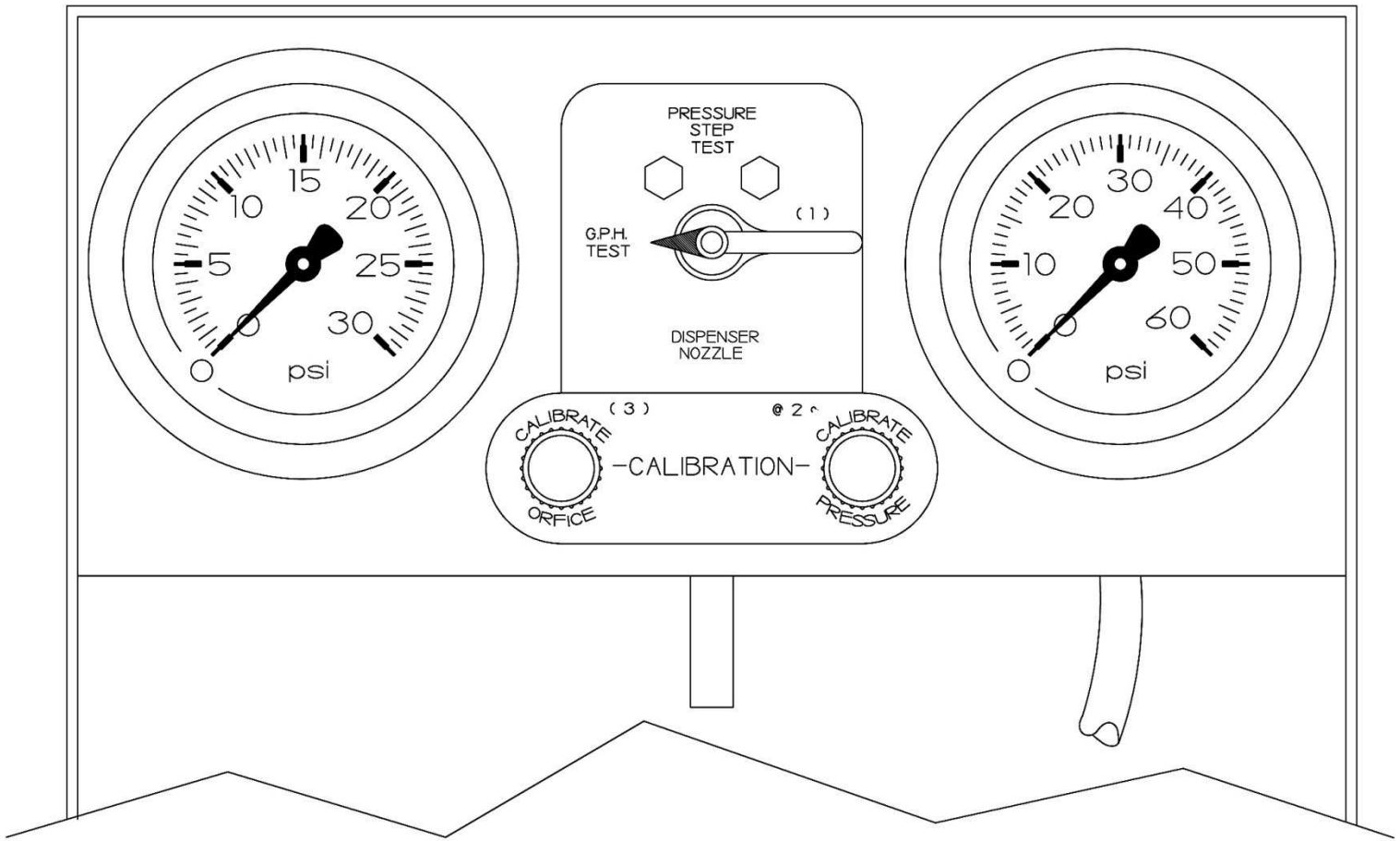
1. First Adjust Orifice Knob - more or less fuel.
2. Then Adjust Pressure Knob back to 10 psi.

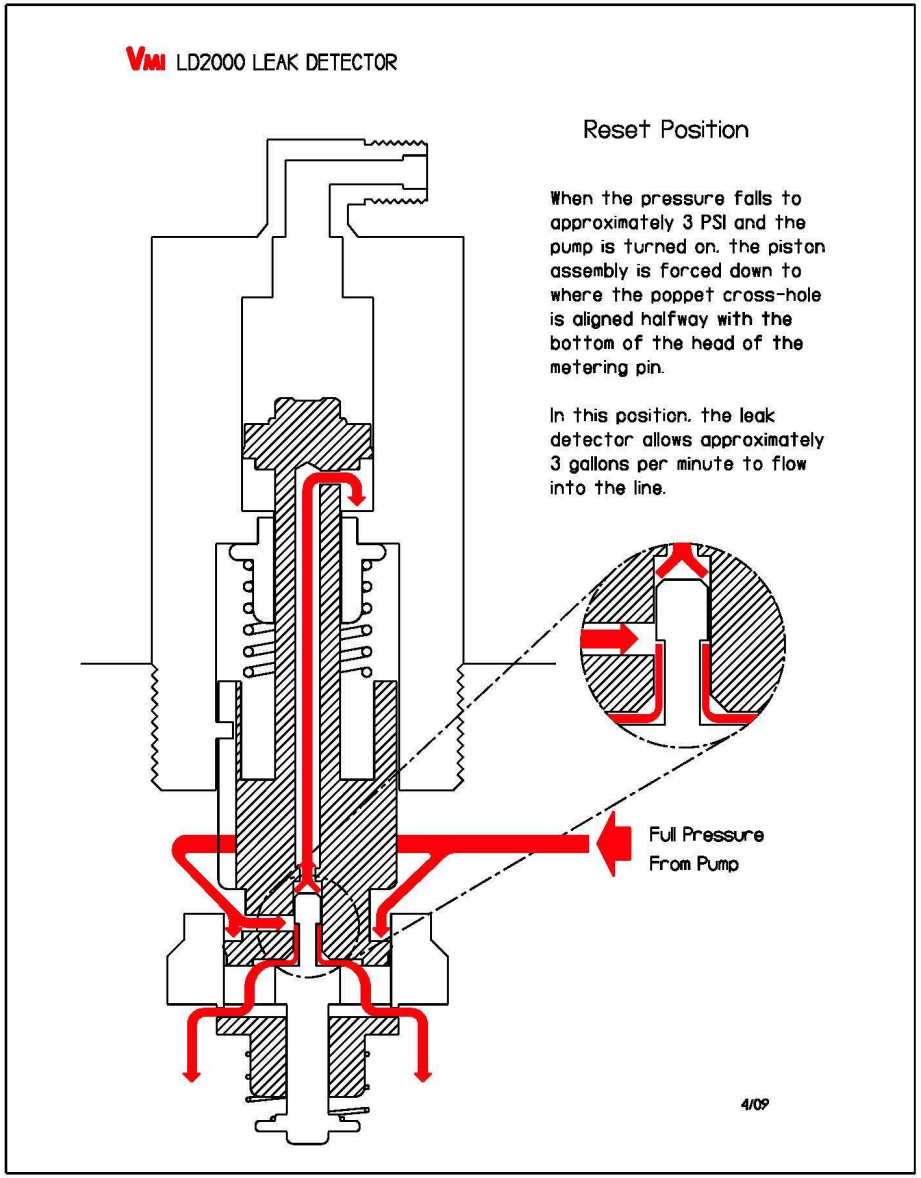
Begin Mechanical Line Leak Detector Test

1. Bleed line pressure to 0.
2. Turn 4 way valve to “G.P.H Test” on LDT-890(\AF) to open calibrated leak.
3. Turn on submersible.

Vaporless Manufacturing, Inc.

Start Test


PRESSURE
STEP
TEST
G.P.H.
TEST
(1)
DISPENSER
NOZZLE
(3)
CALIBRATE
ORFICE
-CALIBRATION-
CALIBRATE
PRESSURE
0
5
10
15
20
25
30
psi
0
10
20
30
40
50
60
psi



Vaporless Manufacturing, Inc.

Watch Pressure Gauge (Right Side Gauge)

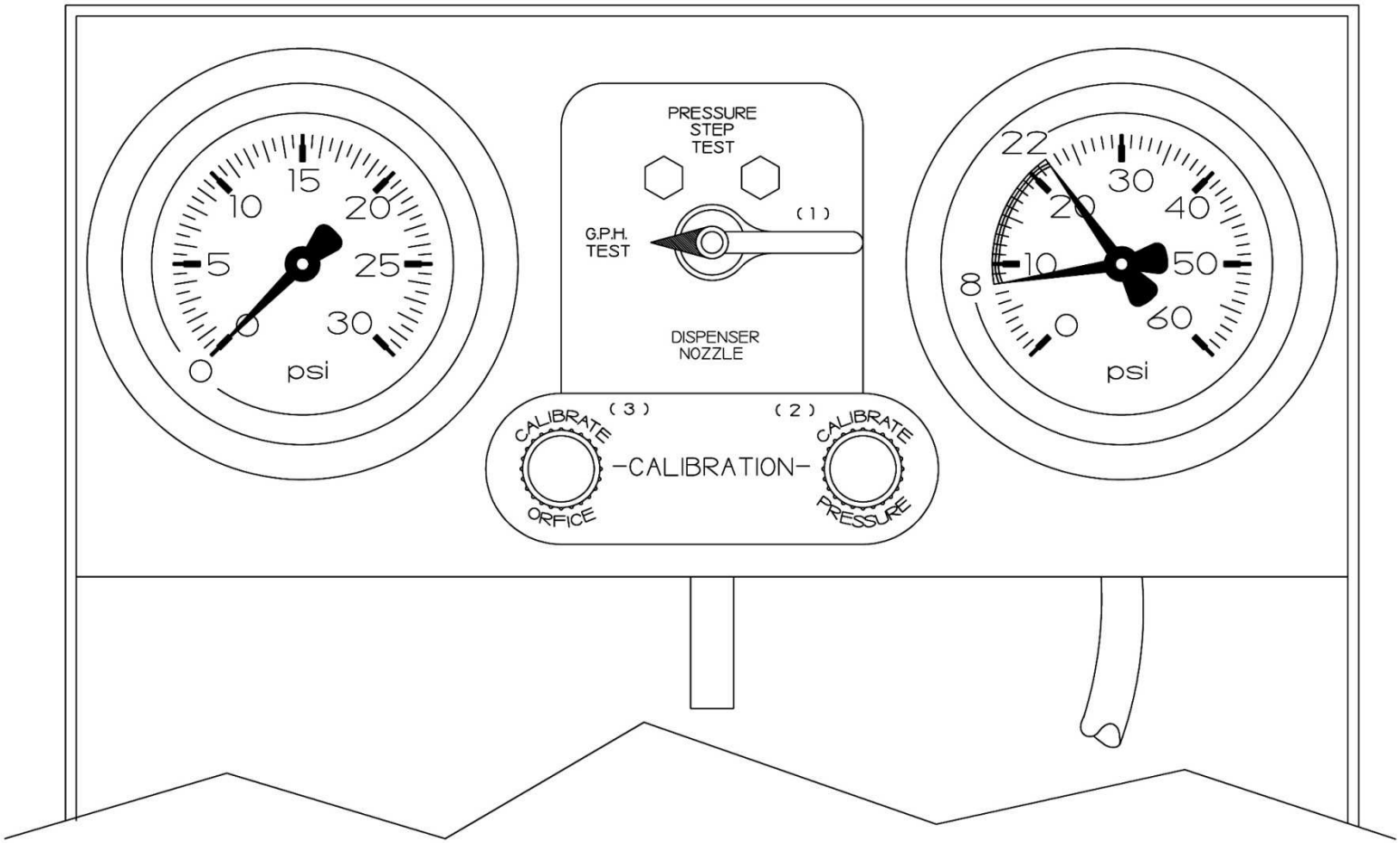
A leak detector goes through 3 positions.

1. **0 PSI - Reset for Leak Search.**
2. **8 – 25 PSI - Leak Search/Tripped.**
3. **14 – 40 PSI - Full Flow (pump pressure).**

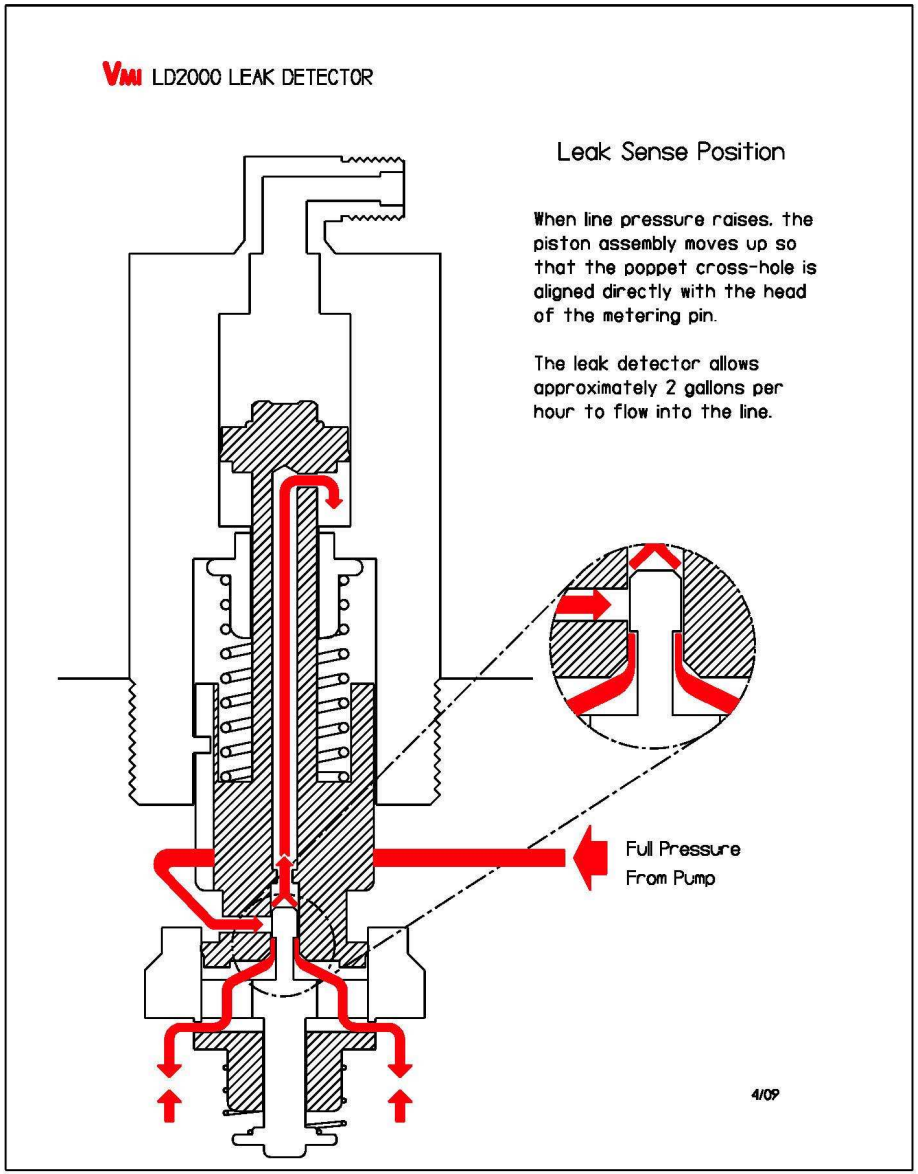
Leak Detector should stay in the "leak search range."

Vaporless Manufacturing, Inc.

Leak Search Position

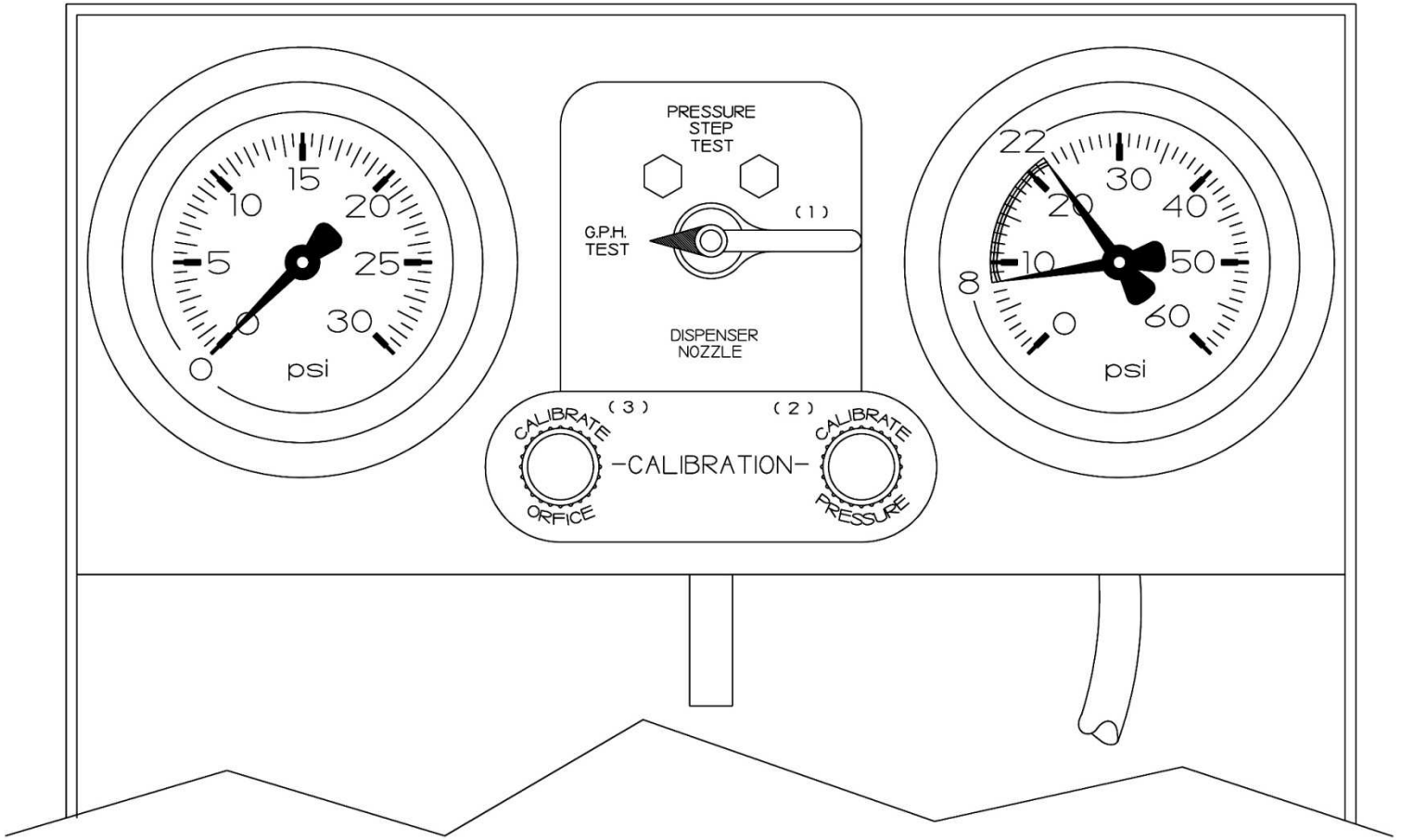


Vaporless Manufacturing, Inc.



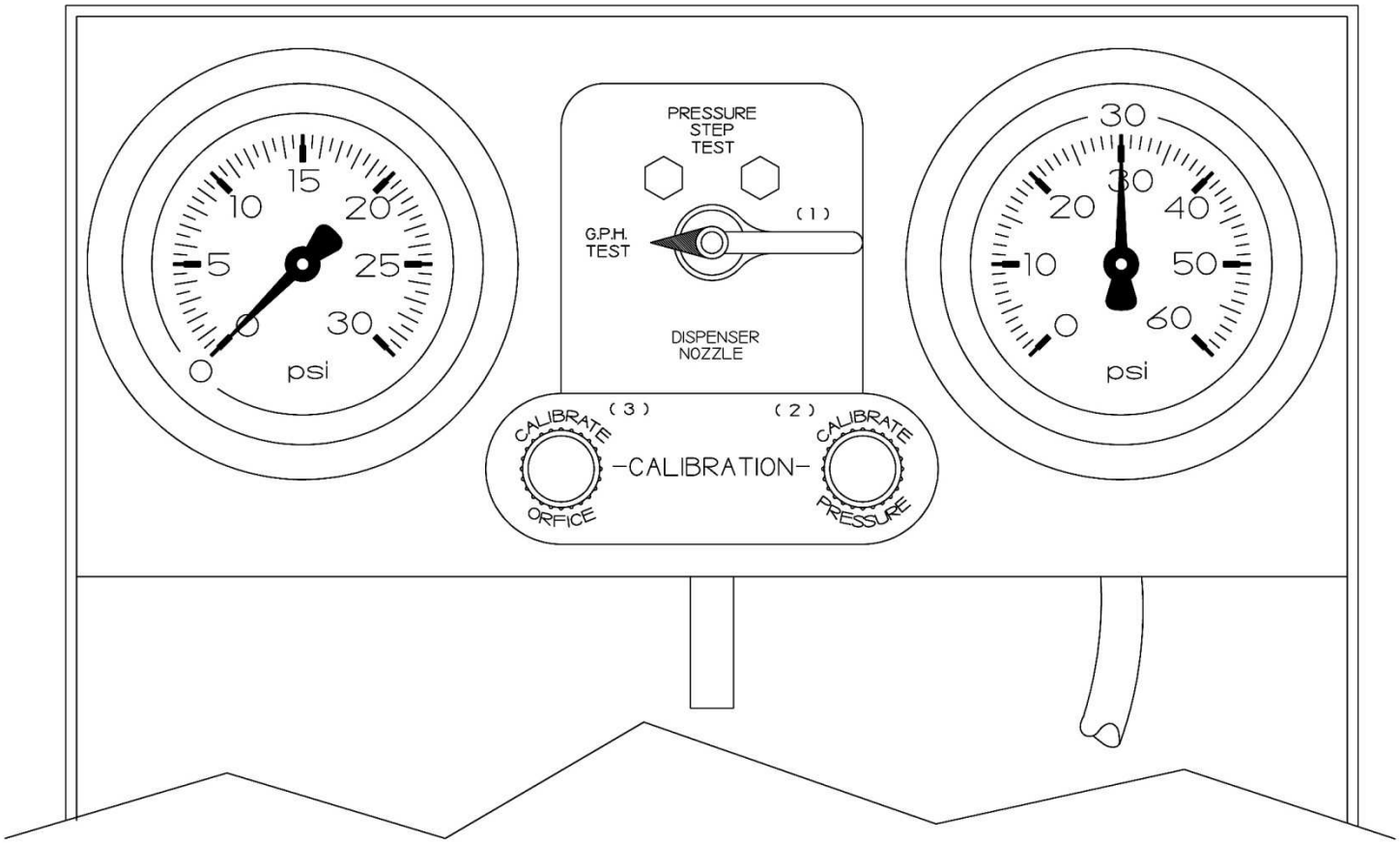
Vaporless Manufacturing, Inc.

If the Mechanical Line Leak Detector stays in “leak search range,” the leak detector has passed.

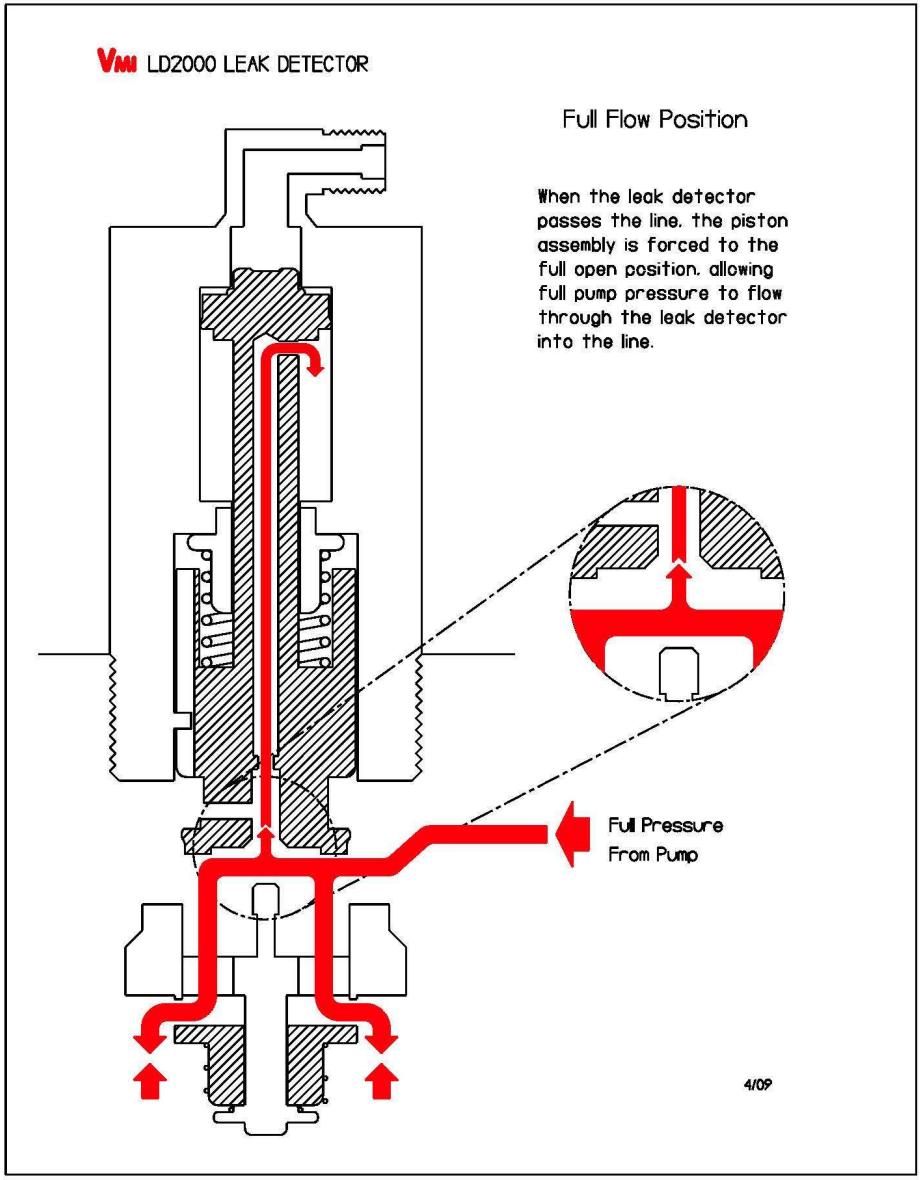


Vaporless Manufacturing, Inc.

If the Mechanical Line Leak Detector does not stay in "leak search," the leak detector has failed.



Vaporless Manufacturing, Inc.



Vaporless Manufacturing, Inc.

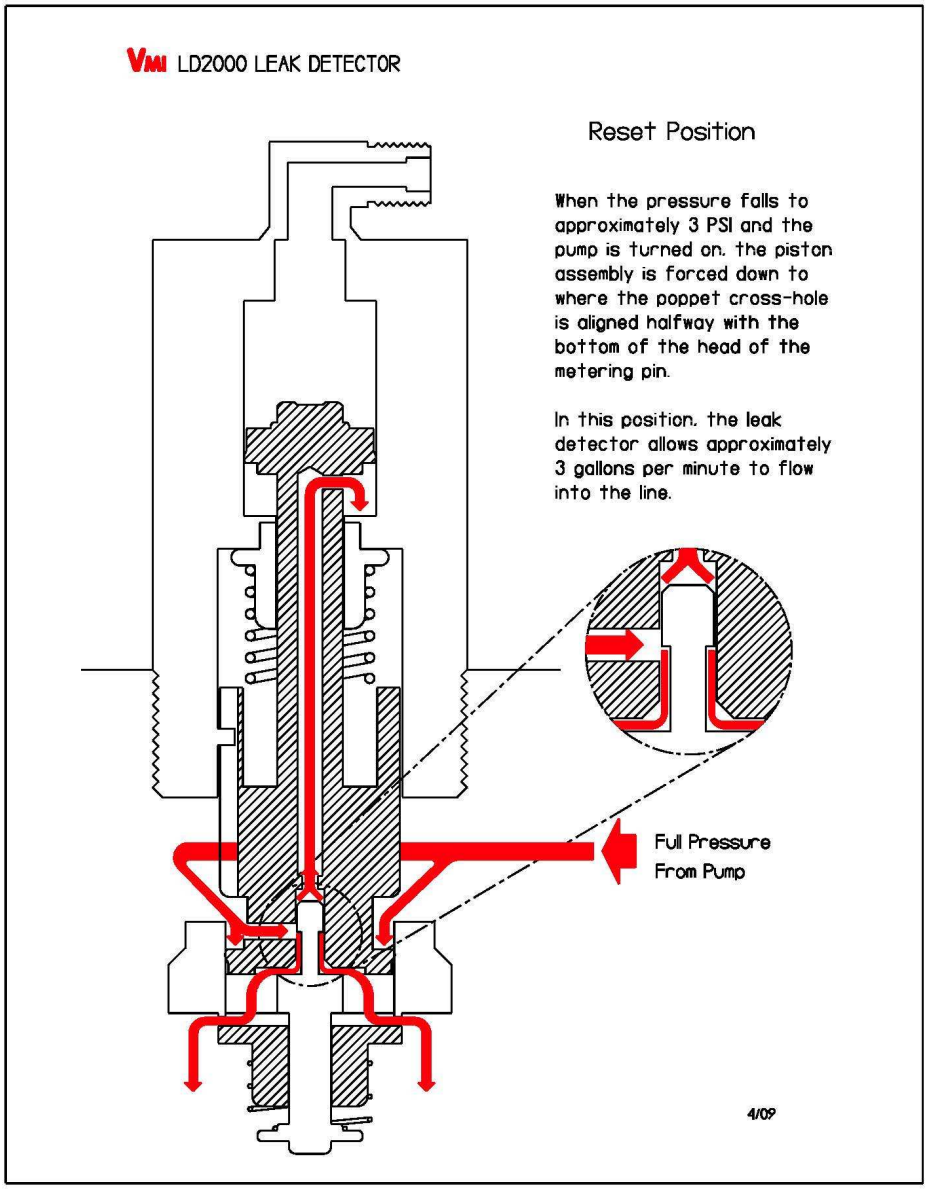
How many positions do mechanical line leak detectors go through?

Vaporless Manufacturing, Inc.

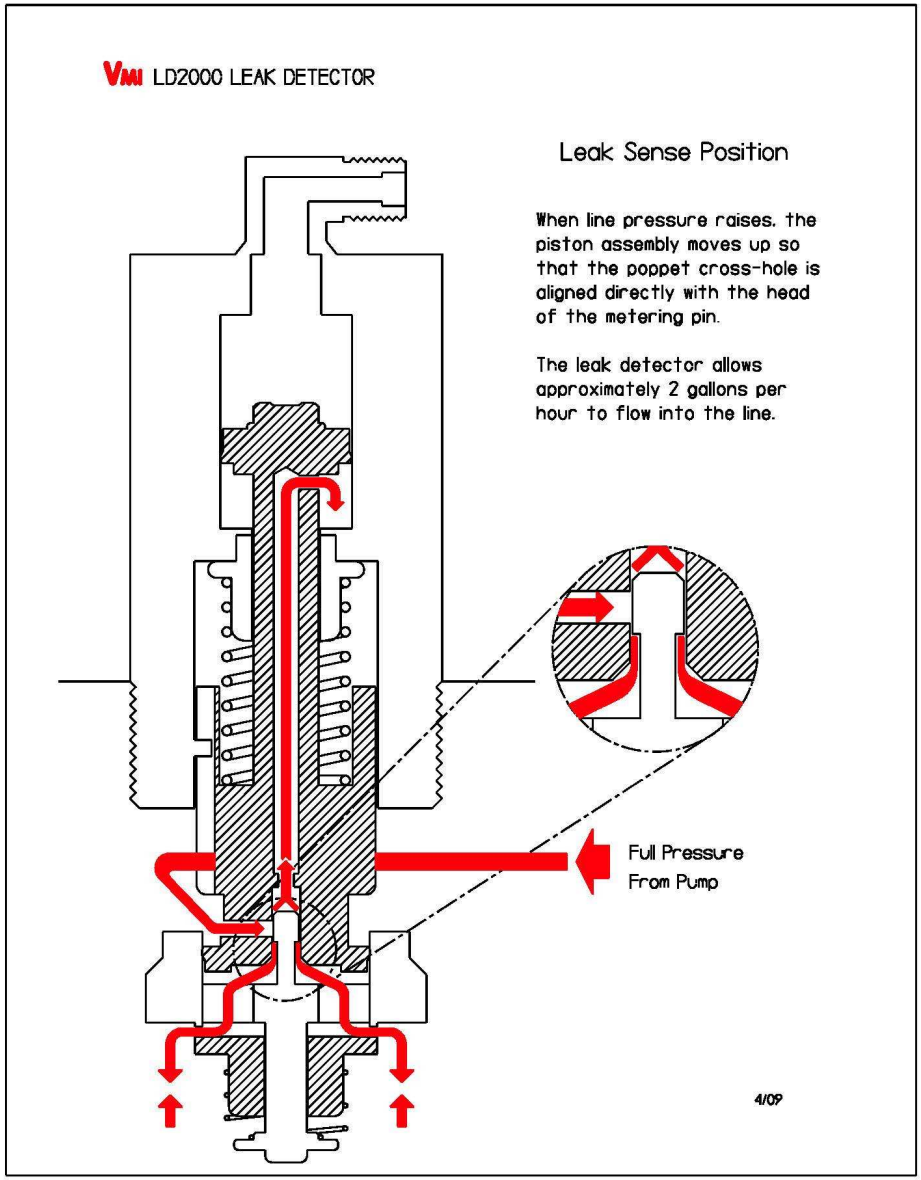
A Leak Detector Goes Through 3 Positions.

- 0 PSI - Reset for Leak Search
- 8 – 25 PSI - Leak Search/Tripped.
- 14 – 40 PSI - Full Flow (pump pressure).

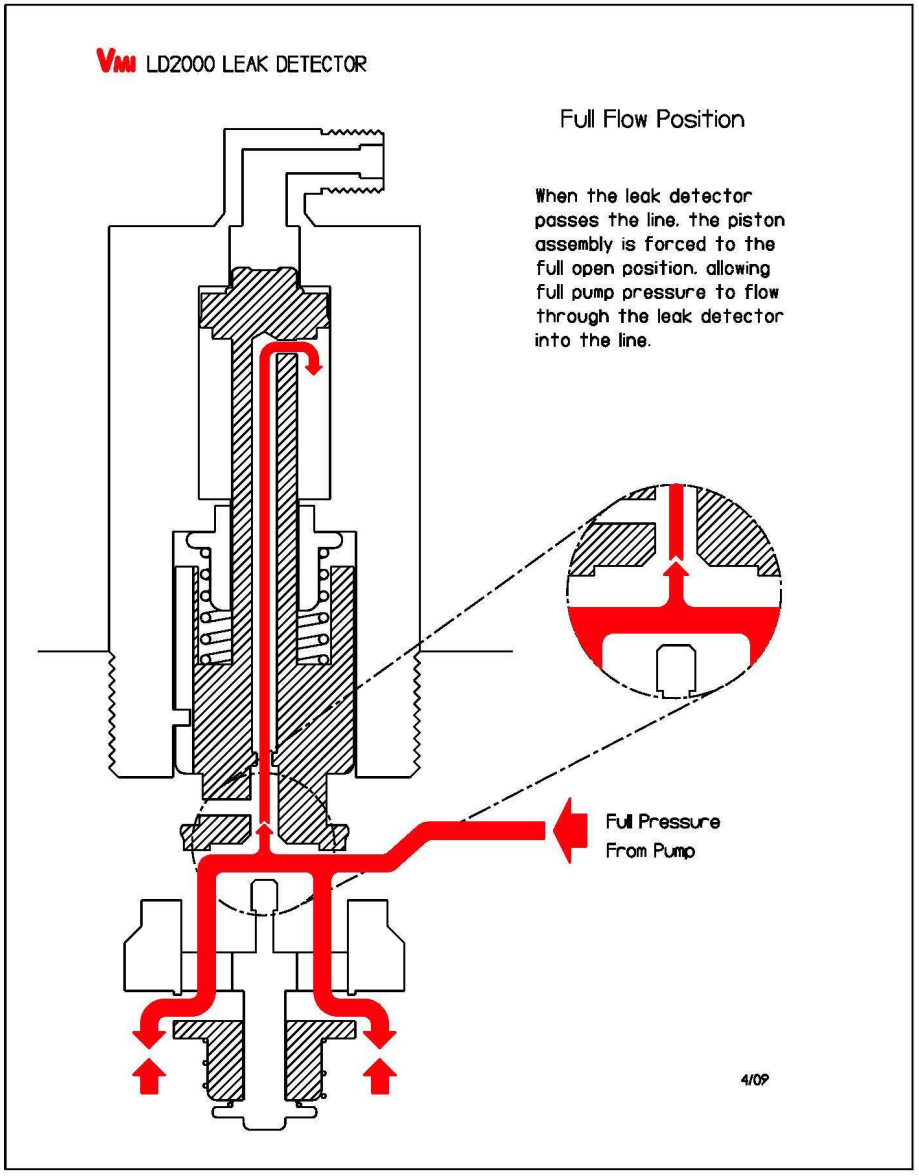
Vaporless Manufacturing, Inc.



Vaporless Manufacturing, Inc.

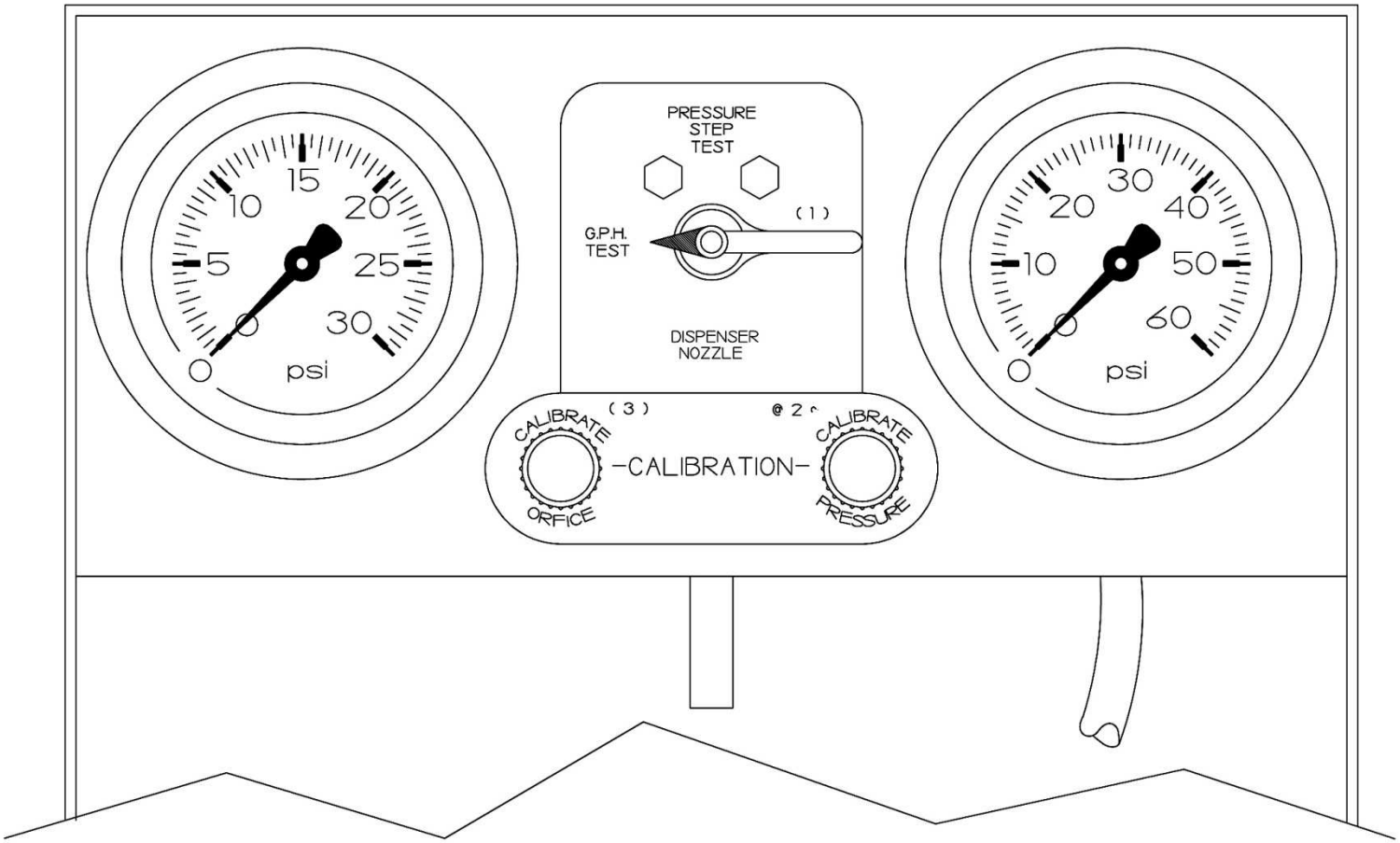


Vaporless Manufacturing, Inc.



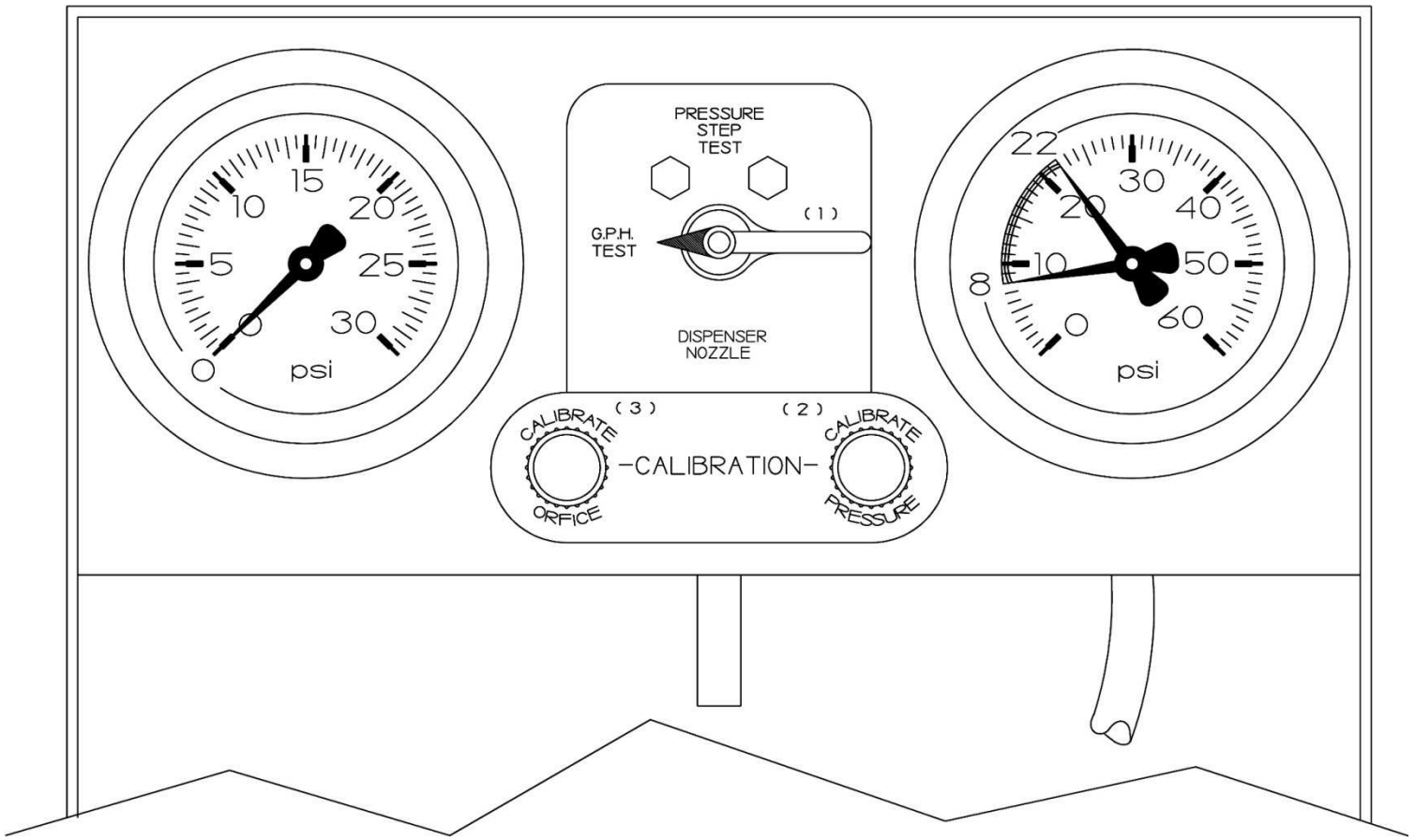
Vaporless Manufacturing, Inc.

Leak Introduced, Pump Off



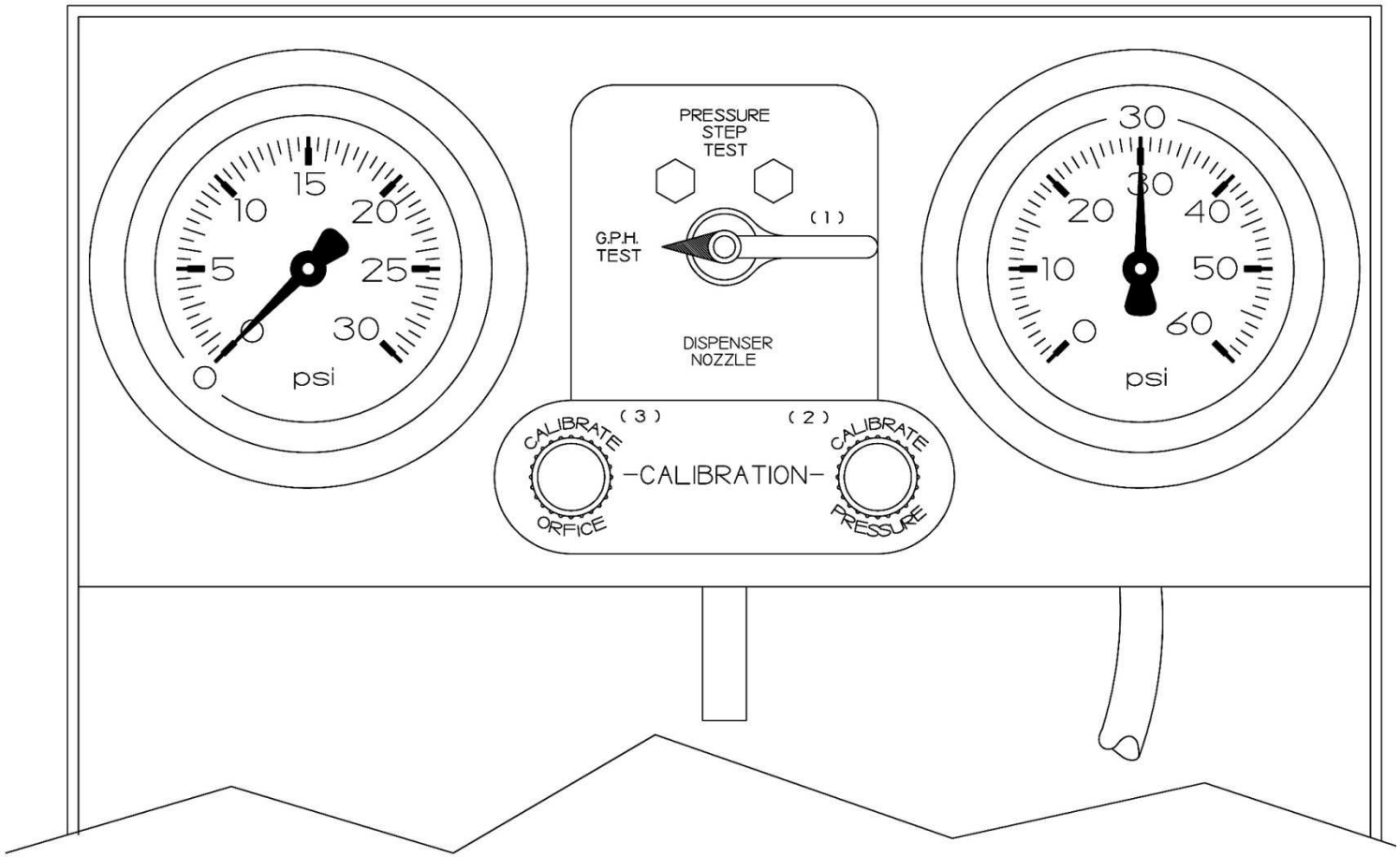
Vaporless Manufacturing, Inc.

Leak Introduced, Pump On, MLLD In Leak Search Range.



Vaporless Manufacturing, Inc.

Leak Introduced, Pump On, Failed Leak Test



Vaporless Manufacturing, Inc.

How Long Should a Leak Detector Stay in Leak Search When a Test is Being Performed?

- Forever
- Must be tested for at least 30 seconds beyond the length of time the leak detector takes to step through if there is no test being performed.

Vaporless Manufacturing, Inc.

In The Event a Vmi MLLD Fails, The Cause of Failure Must be Determined

- Is the leak detector going from 0 PSI to full flow without a pause?
  - What is the height difference from leak detector to test port (total head)
  - Total head over 8 ft. makes leak detector reset difficult to impossible

Vaporless Manufacturing, Inc.

(2) In The Event a Vmi MLLD Fails

- Is the leak detector pausing at leak search, then stepping through?
  - What is the Bleed-back (line resiliency measurement)? High Bleed-back (anything over 250 ml. for 2” MLLDs, 350 ml. for 3” MLLDs) may cause a MLLD to be “bumped” out of leak sense mode.
  - Try adjusting Vmi leak detectors first
  - Vmi has a leak detector certified for this type of problem, the LD-2000\E and LD-3000\E
- High Bleed-back also causes ELLDs to lose sensitivity

Vaporless Manufacturing, Inc.

(3) In The Event A Vmi MLLD Fails Adjustment of Vmi MLLDs

- The Vmi Leak Detector may be adjusted to slow down the flow into the line. This reduces the hydraulic hammer that opens the leak detector in high bleed-back lines.
- Retest after each adjustment to the MLLD.
- If the MLLD will not adjust to meet 3 GPH @ 10 PSI, contact the factory with test information for consultation.
- Adjustment instructions also on web site.

Vmi Vaporless Manufacturing, Inc.

Adjustment of VMI Leak Detector

March 28th, 2005

Certain piping conditions may affect the ability of any leak detector to find a leak. They include high head pressures and high bleed-backs. High bleed-back may occur due to dips in the lines, stubbing for future dispensers, long pipe runs, and extremely flexible pipe.

Bleed-back can be interpreted as energy coming back on the leak detector and trying to force the leak detector open. When a leak detector initially is installed and the line pressure is zero psi, the leak detector is in the reset position. When the pump starts, the leak detector allows approximately 1.5 gallon per minute to pass through. In this position, the line is being filled with product and the pressure in the line is slowly rising.

With the line filled with product, the pump still running, the line starts to expand as a balloon might. The expansion of the line is creating energy that is being forced back onto the leak detector piston.

Naturally, steel pipe has less expansion than fiberglass pipe, and much less expansion than flexible pipe.

Air pockets in the line also raise the bleed-back level, so every effort should be made to eliminate those air pockets by purging the line.

If a VMI leak detector fails to find a 3 GPH leak, the leak detector is not staying at the leak sense position, but instead is going through to full flow.

If, when testing the leak detector, the pressure gauge shows a starting pressure of 0 psi and continues to pump operating pressure without hesitating at leak search pressure, the piston assembly may not have completely reset. If this occurs 2 times in a row; you should (1) turn the pump off, (2) bleed the line pressure to 0 psi, (3) remove the vent line, (4) push the piston assembly down. Turn the pump on and re-test the leak detector to assure it finds a leak. Perform at least 2 additional tests to ensure the leak detector is resetting on its own.

If, when testing the leak detector, it hesitates at leak search pressure but does not hold in leak search position, an adjustment to the piston assembly may be made. The purpose is to make the leak detector more sensitive to a leak.

To adjust the leak detector first remove the vent line and fitting from the top of the 99 LD-2000 or LD-2200 leak detector (99 LD-3000 remove the cap). You will now be looking at the top of the piston assembly.

Vmi
Vaporless
Manufacturing, Inc.

With a 7/16-inch socket (99 LD-3000 requires a 5/8-inch socket), turn the nut no more than 3 seconds as if looking at an analog clock dial face in a clock-wise direction. (NEVER TURN COUNTER CLOCK-WISE!)

Re-test the leak detector and note step through time and bleed-back.

If a 3 GPH leak is not detected, perform another adjustment and re-test.

You may have to perform this adjustment several times before the leak detector slows down and detects the leak.

To explain what is occurring during the adjustment you should know that the piston assembly consists of a piston, hollow shaft, spring, and metering poppet. While turning the retaining nut of this assembly, you are turning the whole assembly. The metering poppet is what contacts the metering pin of the leak detector while in the reset position and the leak search position.

The metering pin will never move. By changing the position of the metering poppet to the pin, the flow rate will change when adjusting. This also changes the step through time of the leak detector.

By adjusting to find a 3 GPH leak, we are reducing flow into the line to make the leak detector more sensitive to finding a leak.

You may notice that when performing the adjustment, the step through time may start to speed up. The slowest position may be 180 degrees from the fastest position. If the time is speeding up, continue the adjustment and you will see the leak detector start to slow down.

Always test for a 3 GPH leak after each adjustment. Always adjust in a clock-wise direction.

If this is the first time you have attempted to adjust a Vmi leak detector, we ask that you call (800 367-0185) for Vaporless technical assistance.

Vmi
Vaporless
Manufacturing, Inc.

Common Causes of MLLD Failure to Detect a Leak

- Deep Burial
- High Bleed-back
- Several causes including:
  - Length of line
  - Type of line
  - Number of Flex connectors
  - Line with high spots
  - Line stub
- Excessive Pump Pressure
- Extreme Thermal Expansion
- Defective MLLD

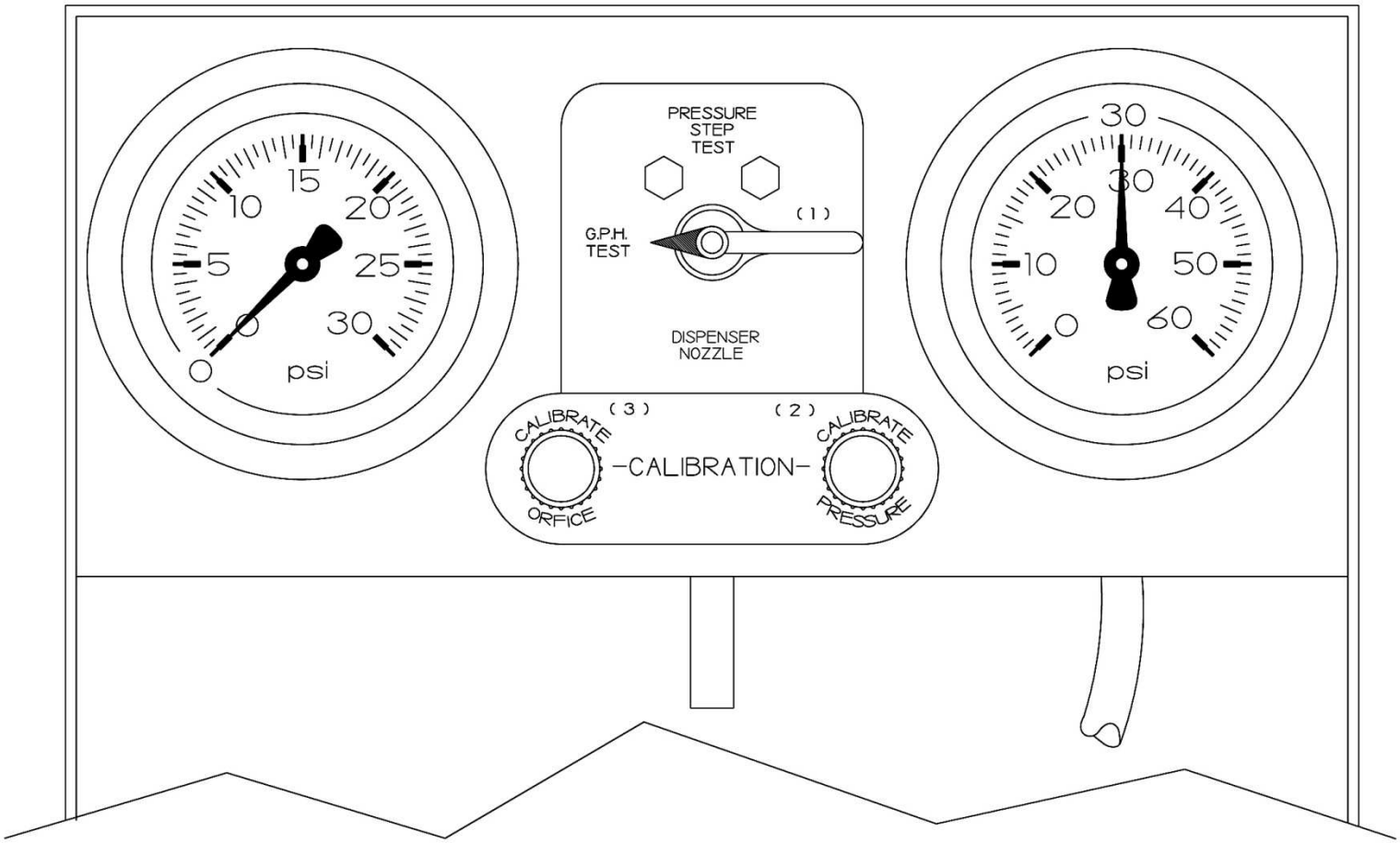
Vmi Vaporless Manufacturing, Inc.

Electronic Line Leak Test

- Calibrate a 3 gph @ 10 psi leak as previously described, at the dispenser.
- Turn 4 way valve to “G.P.H Test.”
- LDT-890(\AF) - Opens calibrated leak. With the calibrated leak in the line (submersible still running) and leak “open,” turn off the dispenser authorization (hang up nozzle).

Vaporless Manufacturing, Inc.

Start of Electronic Line Test



Vaporless Manufacturing, Inc.

Electronic Line Test

- Electronic line leak detection system should detect leak, issue the appropriate alarm and/or shut off the submersible.
- Time will vary by manufacturer and pipe system.
- Authorization of any dispenser during an electronic line test will abort the test.

Vaporless Manufacturing, Inc.

Questioning Equipment Function and/or Testing

- When equipment functions different from expectations is it rejected? Call Factory.
- Is the equipment meeting criteria: 3rd party certification, 3rd party description, manufacturer's explanation, other manufacturer's concerns, additional reports.

Vaporless Manufacturing, Inc.

LDT- 890 Test Form & VMI Warranty Checklist

October 1st, 2006

Test Information

Date:_____ Test Company:_____
Telephone:_____ Contact:_____
Site I.D:_____ Address:_____
City:_____ State:_____ Zip:_____
Type of Test Equipment: _____

Submersible Pump Identification

MFG:_____ Model No:_____
Serial No:_____

Leak Detector Identification

MFG:_____ Model No:_____
Serial No:_____

Replacement Leak Detector Identification

MFG:_____ Model No:_____
Serial No:_____

Line Conditions

1. Type of Pipe:_____ 2. Diameter of Pipe:_____ 3. Length of Pipe: _____
4. Burial Depth of Leak Detector:_____ 5. Kind of Fuel:_____6. Date of Last Line Test:_____

Test Conditions

1. Operating Pump Pressure:_____ 2. Gallon per hour test rate:_____ @ 10 psi
3. Static Line Pressure (Pump Off):_____ 4. Bleedback Test (Pump Off):_____ml.
5. Step-through time to full flow_____seconds (0 psi. to full pump pressure, no leak)
6. Leak detector stays in Leak Search Position with a 3 GPH leak - Yes:_____PASS No:_____ FAIL
7. Was the leak detector adjusted – Yes: _____ No: _____
(See Website - www.vaporless.com - Technical Bulletin 032805)

Symptoms

1. Won't find 3 GPH leak:_____ 2. Stays in Slow Flow:_____
3. Other:_____

********** If This Unit Is Returned Under Warranty Please Complete The Following **********

Vaporless RGA#:_____ Return By (Company):_____
Telephone:_____ Contact:_____
Customer Control #:_____ Address:_____
City:_____ State:_____ Zip:_____

Vaporless Manufacturing, Inc.

Review Vmi literature online: www.vaporless.com

- Leak Detector Installation
- Catastrophic Line Leak Detection Testing Using the LDT-890(\AF)
- Equipment Specifications
- Online Certification Testing for installers and testers
- More!

Vmi Vaporless Manufacturing, Inc.