



Installation Instructions

KIT
PC. No. 103837

VL-1 LOAD SENSING VALVE MAINTENANCE KIT

Note: All circled items are contained in this kit

KIT CONTENTS		
Item	Description	Quantity
7	Packing ring	1
8	O-Ring	2
10	Retainer	1
11	Washer	1
12	Spring	1
13	Inlet valve	1
14	Diaphragm washer	1
16 & 17	Garter spring & diaphragm assembly	1
19	O-Ring	1
20	Retainer	1
25	O-Ring	1
28	O-Ring	1
31	O-Ring	1
32	O-Ring	1
41	Exhaust diaphragm	1
42	Wear ring	1
-	Tube of Lubricant	1

IMPORTANT
THE FOLLOWING COMPONENTS CONTAINED IN THIS KIT WILL NOT BE USED TO SERVICE THE VL-1 LOAD SENSING VALVE.

-	Vent Valve	1
-	Packing Ring	2

IMPORTANT! PLEASE READ AND FOLLOW THESE INSTRUCTIONS TO AVOID PERSONAL INJURY OR DEATH:

When working on or around a vehicle, the following general precautions should be observed at all times.

1. Park the vehicle on a level surface, apply the parking brakes, and always block the wheels.
2. Stop the engine when working around the vehicle.
3. If the vehicle is equipped with air brakes, make certain to drain the air pressure from all reservoirs before beginning ANY work on the vehicle.
4. Following the vehicle manufacturer's recommended procedures, deactivate the electrical system in manner that removes all electrical power from the vehicle.
5. When working in the engine compartment the engine should be shut off. Where circumstances require that the engine be in operation, **EXTREME CAUTION** should be used to prevent personal injury resulting from contact with moving, rotating, leaking, heated, or electrically charged components.
6. Never connect or disconnect a hose or line containing pressure; it may whip. Never remove a component or plug unless you are certain all system pressure has been depleted.
7. Never exceed recommended pressures and always wear safety glasses.
8. Do not attempt to install, remove, disassemble or assemble a component until you have read and thoroughly understand the recommended procedures. Use only the proper tools and observe all precautions pertaining to use of those tools.
9. Use only genuine Bendix replacement parts, components, and kits. Replacement hardware, tubing, hose, fittings, etc. should be of equivalent size, type, and strength as original equipment and be designed specifically for such applications and systems.
10. Components with stripped threads or damaged parts should be replaced rather than repaired. Repairs requiring machining or welding should not be attempted unless specifically approved and stated by the vehicle or component manufacturer.
11. Prior to returning the vehicle to service, make certain all components and systems are restored to their proper operating condition.

IMPORTANT! PLEASE READ:

This kit contains sub kit SK2639/1. The instruction sheet packaged with the sub kit **MUST BE DISREGARDED** when servicing the VL-1 Load Sensing.

VALVE REMOVAL

1. Park and hold the vehicle on a level surface by means other than the air brakes.
2. Drain air pressure from **all** reservoirs.
3. **Identify** and mark all air lines leading to valve and then disconnect them.
4. Remove the valve mounting hardware and remove the valve.

VALVE DISASSEMBLY

General

Before disassembly, mark the relationship of all valve body parts and the position of the mounting bracket. This procedure will facilitate ease of reassembly.

1. Remove the four Phillips head screws (3), washers (1) and the two clips (2) from the covers (5 & 27).
2. Remove the balance tube (4) by **carefully** pulling ends from covers (5 & 27). NOTE: DO NOT REMOVE FILTER ELEMENT (36).
3. Remove and discard O-Rings (8) from covers (5 & 27). Remove the three mounting studs (43) and lockwashers (44). NOTE: Loosen cap screws (38).
4. Remove the four cap screws (33), and lockwashers (34) that secure cover (5) to body section (35) and separate cover (5) from body section (35).
5. Separate cover (5) from piston assembly (6).
6. Remove and discard packing ring (7), garter spring (16), diaphragm (17) and diaphragm washer (14) from piston (6).
7. Separate piston guide (15) from piston (6).
8. Remove and discard retainer (10), washer (11), spring (12) and inlet valve (13) from piston (6).
9. Pull valve stem (21) out of body section (35). Remove and discard O-Ring (19) from valve stem (21).
10. Remove and discard retainer (20) from body section (35) and lift out guide (18).
11. Remove the four cap screws (38) and lockwashers (37) that secure cover (27) to body section (23) and separate cover (27) from body section (23), and mounting bracket (45). NOTE: Do not remove plug in control port if valve is so equipped.
12. Remove spring (24) and shims (29) from piston (26).
13. Carefully pull piston (26) out of cover (27) and NOTE whether O-Ring (28) is in place. If O-Ring (28) is **not** installed on the piston, discard the new O-Ring (28) included in this kit.
14. Remove and discard O-Ring (25 & 32) and wear ring (42) and O-Ring (28), if applicable, from piston (26). If shims (22) are present, **DO NOT** remove.
15. Carefully pull piston (30) out of cover (27). Remove and discard O-Ring (31) from piston (30).
NOTE: It is not necessary to remove the two cap screws that secure body sections (23 & 35) together.
16. Remove Phillips screw (39), diaphragm washer (40) and diaphragm (41). Discard diaphragm (41).

CLEANING & LUBRICATING

1. Wash all **metal** parts in mineral spirits and thoroughly dry.
NOTE: Pay particular attention to the balance tube and exhaust passages in the valve body sections and cover.
2. Wipe piston (6), piston guide (15) and valve stem (21) with a clean cloth to ensure their smooth action.
3. Lightly lubricate all O-Rings and O-Ring grooves and their sliding surfaces. Lubricate the packing ring and its sliding surface. Use the lubricant included in this kit.

IMPORTANT: DO NOT LUBRICATE THE FOLLOWING COMPONENTS:

- DIAPHRAGM - Item 17
- DIAPHRAGM WASHER - Item 14
- PISTON GUIDE - Item 15
- PISTON - Item 6

ASSEMBLY

NOTE: During assembly, refer to scribe marks of components of body made before disassembly.

1. Install O-Ring (31) on piston (30) and fit into cover (27). Slide piston (26) into cover (27) and install shims (29) and spring (24).
2. Carefully install cover (27) and mounting bracket (45) on body section (23) according to marks made prior to disassembly. Secure cover (27) and mounting bracket (45) to body section (23) using the four cap screws (38) and lockwashers (37). Torque cap screws to 9 lb. foot (12 Nm).
3. Install mounting studs (43) and lockwashers (44). Torque to 10 lb. foot (13.3 Nm).
4. Install guide (18) in body section (35) and secure by installing retainer (20). Make certain retainer is fully seated in its groove.
5. Install O-Ring (19) on valve stem (21) and install valve stem in body section (35).
6. Install inlet valve (13), spring (12) and washer (11) in piston (6) and secure with retainer (10). Make certain retainer is completely seated in its piston groove.
7. Install the packing ring (7) on piston (6) so that the open portion of the "V" of the packing ring faces the same opening into which the inlet valve (13) was installed.
8. Install the piston guide (15) on the piston (6) so that as the fins of the piston (6) slide into the guide (15), a flat surface can be formed on one side of the mated parts.
9. Install the diaphragm washer (14) and diaphragm and garter spring (16 & 17) on the piston (6). The diaphragm should conform to the underside of the piston guide (15).
10. Carefully slide the assembled piston (6) into cover (5). Position the cover (5) on body section (35) as marked prior to disassembly. Use care in mating these parts, and make certain the diaphragm is properly seated on the piston guide (15) and in body section (35).
11. Secure cover (5) to body section (35) using the four cap screws (33) and lockwashers (34). Torque to 9 lb. foot (12 Nm).

12. Install diaphragm (41), diaphragm washer (40), and Phillips screw (39).
 13. Install O-Rings (8) into covers (5 & 27). Lightly lubricate the exterior of the ends of balance tube (4) and carefully install balance tube into covers (5 & 27). Make certain not to damage O-Rings (8) in covers.
 14. Secure the balance tube by installing two clips (2), and four Phillips screws (3) and lockwashers (1) in covers (5 & 27). Torque to 3.75 lbs. foot (5 Nm).
6. Apply 125 p.s.i. (8.6 BAR) air pressure to the control port(s) of the VL-1 four times and hold the fourth application. Apply 100 p.s.i. (6.9 BAR) air pressure to the supply port and read 100 p.s.i. (6.9 BAR plus or minus 5 p.s.i. at the delivery port.
 7. If the VL-1 functions as described, proceed to the leakage test without removing the air gauges and air supply lines. If the VL-1 fails to function as described, it is recommended that it be replaced at the nearest Bendix parts outlet.

OPERATING & LEAKAGE TESTS

Operating Tests

For convenience it is recommended that the VL-1 load sensing valve be bench tested rather than vehicle tested. In order to test the VL-1 correctly it will be necessary to use three accurate test gauges and have a means of precisely adjusting air pressure to 100 p.s.i. (6.9 BAR) and 125 p.s.i. (8.6 BAR).

1. Connect an accurate test gauge and an adjustable air pressure source to the supply port of the VL-1.
2. Connect an accurate test gauge to one of the two delivery ports of the VL-1 and plug the other delivery port(s).
3. Connect an accurate test gauge and an adjustable air pressure source to both of the VL-1 control ports. This can be accomplished by branching or "T"ing a single air line to both control ports of the valve. NOTE: If one of the VL-1 control ports had a plug installed when the valve was removed from the vehicle, do not remove the plug, do not branch the adjustable air supply.
4. Apply 100 p.s.i. (6.9 BAR) air pressure to the supply port of the VL-1 four times and on the fourth application read 40 p.s.i. (2.76 BAR) plus or minus 5 p.s.i. at the gauge installed at the delivery port.
5. Release the air pressure applied to the supply port and note that air pressure is exhausted from the delivery port. Apply 50 p.s.i. (3.45 BAR) to the control port(s) and reapply 100 p.s.i. (6.9 BAR) to the supply port. Pressure read at the delivery port must be greater than the pressure read in Step 4 but less than 95 p.s.i. (6.55 BAR).

Leakage Tests

1. Apply 100 p.s.i. (6.9 BAR) to the supply port and 125 p.s.i. to the control port(s) of the VL-1.
2. Apply a soap solution to the following areas of the VL-1 and note the permitted leakage:
 - A. Balance tube (4) as it enters covers (5 & 27). Leakage at either location not to exceed a 1" (25.4 mm) bubble in 7 seconds.
 - B. Filter (36) under clip (2). Leakage should not exceed a 1" (25.4 mm) in 7 seconds.
 - C. Exhaust port. Leakage not to exceed a 1" (25.4 mm) bubble in 5 seconds.
3. If the leakage is excessive, it is recommended that the VL-1 be replaced at the nearest Bendix parts outlet.
4. Remove all air gauges, air supply lines and any plugs installed for test purposes. Proceed to reinstallation instructions.

VALVE REINSTALLATION

1. Reinstall the VL-1 on the vehicle using the original mounting hardware.
2. Connect the air lines to the VL-1 according to their identification marks made during removal.
3. The vehicle may now be placed in service.

