

**UNLOADING VALVE
SERVICE AND MAINTENANCE
TROUBLE SHOOTING CHART**

TROUBLE	PROBABLE CAUSE	REMEDY
Valve will not build pressure	1. Dirt or foreign material in valve	Flush valve as instructed or disassemble and clean
	2. Valve cap position relative to body is incorrect.	Re-position cap according to instructions
	3. Poppet (Code 18) stuck in valve body	Remove poppet and inspect for foreign material or nicks
	4. Seat Assembly, Control Head and Unloading Piston (Code 7) stuck	Remove and clean; if damaged, replace piston and/or seat if necessary
	5. Differential Piston (Code 17) stuck in poppet	Remove differential piston and inspect for foreign material or nicks
	6. Small holes in valve cap are plugged	Clean out with fine wire or air stream
Valve builds low pressure only or is not responsive to pressure adjustment	1. Poppet (Code 18) stuck in valve body	Remove poppet and inspect for foreign material or nicks
	2. Differential piston (Code 17) stuck in poppet	Remove differential piston and inspect for foreign material or nicks
	3. Valve seat assembly (Code 19) and cone (Code 11) are eroded	Replace seat and/or cone. See "caution" note before re-setting pressure.
	4. Small holes in valve cap are plugged	Clean out with fine wire or air stream
	5. Clearance between valve seat assembly (code 19) and cap is excessive	Replace seat and/or valve cap if necessary. See "caution" note.
	6. "O" Ring (Code 10) is damaged	Replace "O" Ring
Failure to unload or repeat unloading	Unloading Piston Seat Assembly is stuck in Control Head Seat (Code 7)	Remove and clean; if damaged, replace piston and/or seat if necessary.
Valve fails to build maximum pressure after prolonged usage	1. Spring (Code 12) has taken a permanent seat	Replace spring
	2. Cone (Code 11) and/or valve seat (Code 19) is eroded	Replace damaged parts. See "caution" note before re-setting pressure.
Pressure setting is very erratic	1. Differential piston (Code 17) does not move freely in poppet (Code 18)	Remove and clean. Inspect for nicks or damage. Differential piston must move freely in poppet.
	2. Cone (Code 11) and/or valve seat (Code 7) is eroded	Replace damaged parts. See "caution" note before re-setting pressure.

CAUTION: Whenever any of the following parts are replaced, it may be necessary to maximum pressure stop

1. Adjusting Screw	Code 5	5. Spring	Code 12
2. Lock Nut	Code 4	6. Cone	Code 11
3. Cap	Code 15	7. Valve Cap	Code 3
4. Guide	Code 14	8. Valve Seat	Code 7

Reference: See Valve Print Page listed below for parts breakdown listing

<u>GFP #</u>	<u>Model #</u>	<u>GFP #</u>	<u>Model #</u>
092305	VU321103	092302	VU321150
092309	VU321105	092301	VU323150
092304	VU323105		

UNLOADING VALVE

APPLICATION

The function of an unloading valve is to direct hydraulic fluid from a pump into a hydraulic circuit until an adjustable maximum pressure is reached. The unloading valve will then discharge the pump output to tank at very low pressure.

An unloading valve can be used in high/low circuits or accumulator circuits.

Basically the high/low circuit consists of two pumps which feed into a common line. One pump delivers hydraulic fluid at high pressure and relatively low volume. The second pump delivers hydraulic fluid at low pressure and relatively high volume.

The hydraulic fluid from the low-pressure pump is directed through the unloading valve and a check valve where it joins the hydraulic fluid from the high-pressure pumps. (A check valve is required to prevent reverse flow through the unloading valve). A pilot line, connected between the high pressure circuit and the unloading pressure inlet port in the valve cap (marked "P" on Valve Print Page), serves to keep the unloading valve. (The high-pressure circuit is controlled by its own relief valve or other device).

INSTALLATION

Install the unloading valve in the hydraulic circuit as indicated by circuit design and specifications.

This valve is furnished in, two styles. (1) Threaded body style. (2) Subplate mounted style. See Valve Print Page.

The threaded body style is used for "in-the-line" installations since it can act as a tee in the line. It may also be used for "off-the-line" installations by connecting one pressure port of the unloading valve to a tee in the line and plugging the second pressure port. The tank port is always connected to the oil reservoir. The subplate-mounted style consists of an unloading valve body designed to mount on a subplate.

The subplate is drilled and tapped to provide oil passages to the valve body and to furnish a means of connecting the hydraulic lines to the valve. This arrangement will permit the removal of the valve body without disturbing the hydraulic lines. The pressure port must always be tied off the line when installed in the hydraulic circuit. The tank port must always be connected to the oil reservoir.

The discharge from the tank port of the unloading valve should enter the oil reservoir below operating oil level and directed away from the pump intake lines. The return line from the tank port of the unloading valve should be piped directly to the oil reservoir with as few bends as possible in order to minimize back pressure on the tank port.

The cap on the threaded body unloading valve may be installed in one of two positions, 90° part. This provides for convenient accessibility to the adjustment screw. (If cap position is changed, it is important that one of the two small pressure ports in the valve body lines up with a mating hole in the cap.) See Valve Print Page (Code 8). The cap on the subplate unloading valve cannot be rotated. It must be installed in the position shown on Valve Print Page.

Check model number stamped on valve cap. The model number, adjustable pressure range and maximum working pressure for this valve is tabulated on Valve Print Page. Do not install an unloading valve in the hydraulic system where the pressures are not compatible with the specifications for a particular valve model. A gauge connection port is provided on the side of the threaded body style-unloading valve. A tee should be provided in the pressure line for gauge installation when the subplate style-unloading valve is used. Do not remove plug from port "d".

PRESSURE ADJUSTMENT

The pressure adjustment control is located on the cap of the unloading valve. To adjust pressure, first loosen knurled lock nut. Turn adjusting screw clockwise to increase pressure or counter clockwise to decrease pressure.

Turn adjusting screw slowly since there is a lag in pressure change until hydraulic balance is established within the valve. After pressure has been set, tighten lock nut securely. CAUTION: Make certain that system hydraulic pressure is at zero before removing plug to install pressure gauge. This precaution should be observed whenever the valve is serviced.

THE ADJUSTING SCREW KNOB IS EQUIPPED WITH A SMALL ALLEN SCREW. THIS SCREW IS SET AT THE FACTORY TO LIMIT MAXIMUM PRESSURE TO THE RATING OF THE VALVE. DO NOT ADJUST OR REMOVE THE ALLEN SCREW.

If the unloading valve is used as a component in a unit as shipped from factory, the Allen Screw in the adjusting screw knob will be set to unload at the maximum pressure permissible in the hydraulic circuit which the unloading valve controls.

Should foreign material lodge on the seat of the control valve or plunger, it may be possible to flush the offending material from the valve seat. To do this, first release the knurled lock nut and turn adjusting screw counter clockwise until it feels free of spring load. Then start the pump and allow oil to circulate through the valve and back to the oil reservoir. Re-set the adjusting screw for the proper pressure and tighten lock collar. (Keep high-pressure pump unloaded.)

Aeration of the oil in the reservoir can cause faulty valve operation. Aeration can be caused by improper return of oil to the reservoir. Locate return lines to direct flow of oil away from pump intake lines and below oil operating level.

Air leaks in the pump suction line will cause faulty pump operation, which, in turn, will effect the operation of the unloading valve. This condition will result in noisy operation and fluttering of the pressure. Replace faulty fittings, couplings or pipe. If the foregoing procedures do not remedy the trouble, the valve must be disassembled. Refer to Valve Print Page.

1. Remove pilot line & take out unloading valve piston. Code 7
2. Remove control head seat. Code 7
3. Remove all parts of pressure adjustment. Code 4,5,11-16
4. Remove four cap screws. Code 1
5. Remove valve cap. Code 3
6. Remove all parts from valve body. Code 9, 10, 17-19; If valve body is not readily accessible for inspection or requires washing, it should be removed from circuit.
7. Wash all parts thoroughly with a good solvent.
8. Inspect Valve seats for nicks, foreign matter or erosion.
9. Inspect internal parts and small oil passages for any possible obstructions.
10. Differential piston (Code 17) must move freely in plunger (Code 18).
11. Inspect "O" Rings for damage.

Replace any damaged or excessively worn parts. Do not attempt to repair valve body seat. Return to factory.

Refer to Valve Print page when assembling the valve. Wipe parts clean with a hand or use an air stream. (Do not use a cloth since it will leave a deposit of lint which can have an adverse effect on the valve characteristics.) Blow out all oil passages with compressed air. Handle parts carefully to avoid scratches or burns on mating parts which might make assembly difficult or even impossible.

Control head seat (Code 7) is fitted into the cap with a very close tolerance. It may require considerable force to assemble. Before assembly, apply a lubricant such as "lubriplate" to the O.D. of this part. Tighten control head seat securely against valve cap. Cap screws (Code 1) should be tightened with approximately 70 ft. lbs. of torque.

CAUTION: After assembly, the pressure setting must be checked with a reliable pressure gauge. It may be necessary to re-set the Allen Screw in the adjustment screw knob so that maximum working pressure cannot be exceeded. With lock collar (Code 4) screwed against valve cap and adjusting screw (Code 5), set for the correct maximum pressure, adjust Allen Screw until it bears against lock collar. Re-seal Allen Screw to prevent tampering by unauthorized personnel.