



Installation and Maintenance

ARMSTRONG NO. 1-LD LIQUID DRAINER

This bulletin should be used by experienced personnel as a guide to the installation of Armstrong No. 1-LD Liquid Drainers and their repair parts. Selection or installation of equipment should always be accompanied by competent technical assistance. We encourage you to contact Armstrong or its local representative if further information is required.

The maximum operating pressure of the 1-LD liquid drainer depends on the drainer's orifice size and the specific gravity of the liquid being drained. Table 1 shows the maximum operating pressure for various conditions. **DO NOT EXCEED THE MAXIMUM OPERATING PRESSURE.**

The vessel design limitations of the 1-LD liquid drainer are 300 psig at 200°F.

TABLE 1

Specific Gravity	1.06	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.66	0.66	0.50
Orifice (in)	Maximum Operating Pressure, psi @ 100°F.										
$\frac{1}{8}$	108	97	87	77	67	57	46	36	26	16	5
$\frac{7}{64}$	143	130	116	103	89	75	62	48	35	21	7
#38	167	151	136	120	104	88	72	56	40	24	9
$\frac{5}{64}$	300	289	259	228	198	168	137	107	77	47	16

Note: If specific gravity falls between those shown above, use the next lower gravity. For example, if specific gravity is 0.73, use 0.70 gravity data.

Note: Ball float drainers are **not** recommended where heavy oil, sludge, or considerable dirt are encountered in the piping **system**. Dirt can prevent the valve from seating tightly. Cold oil can prevent drainers from opening. Armstrong inverted bucket BVSW traps are ideal where these conditions exist.

INSTALLATION PROCEDURES

1. Pipe Fitting: Follow good piping practices. Clean the pipes carefully after they have been cut and threaded. Before connecting the drainer to the **system**, blowdown the line at full pressure to clear the pipes of dirt, pipe

- cuttings, and other foreign objects. Use pipe dope or teflon sparingly and on male threads only. Leave the end thread exposed to avoid introducing sealant into the system.
2. Install a strainer ahead of the drainer inlet if there is a chance that scale and sediment can be carried to the drainer.
 3. A blowdown valves is recommended.
 4. Armstrong recommends that you install shut-off valves and unions in the inlet and outlet piping so the drainer can be isolated for examination or servicing.

NOTE: Be certain the drainer is installed properly, with the CAP AT THE BOTTOM. Fig. 1, 3, 4, 5 show typical installations of the 1-LD.

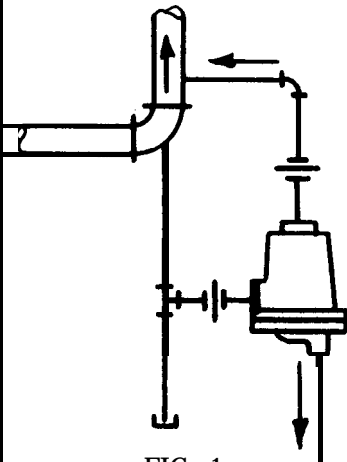


FIG. 1

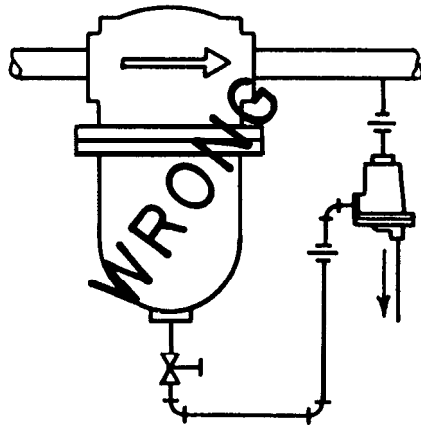


FIG. 2

Do not install the No. 1-LD above the drip point. Liquid will collect in the unit being drained and may interfere with its operation.

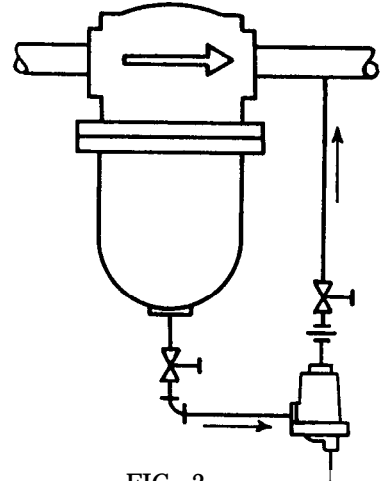


FIG. 3

No. 1-LD with vent line to downstream side of air separator to assure positive and fast flow of water to the drainer.

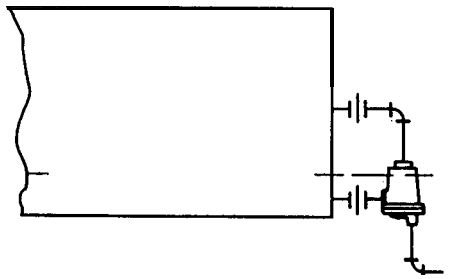


FIG. 4

No. 1-Lb installed at side of receiver, close to floor. Water will rise to broken line before drainer opens. If high water level is objectionable, raise the receiver, or dig a pit so top of drainer can be at the same level as the bottom of drain line.

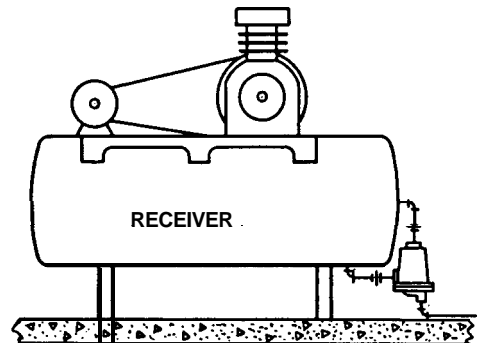


FIG. 5

How No. 1-LD may be used where lack of lead room will not allow the drainer to be installed below the point drained. If the drainer is mounted any higher than shown here, water will collect in the bottom of the receiver.



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5. Install the drainer below the drain point and close to the unit being drained or as directed by the equipment manufacturer. DO NOT INSTALL THE DRAINER ABOVE THE DRIP POINT. LIQUID MAY COLLECT IN THE UNIT DRAINED AND MAY INTERFERE WITH ITS OPERATION. See Figure 2.
6. Make inlet piping as short as possible with a minimum of elbows and other restrictions.
7. Back venting is usually required for positive and fast flow of liquid to the drainer and to achieve rated flow.
 - a) Pressure vessels should be vented back to any convenient point above the liquid level. Use a full-ported valve in the back-vent line. Remember that the pressure in the equipment being drained is the same as the pressure in the drainer. Only the difference in liquid level produces flow to the drainer.
 - b) Drainers installed on separators and drip points should be vented to the downstream side of the piece of equipment. (As shown in Figure 3.)
 - c) On very light loads back venting is not always necessary. If a vent line is not installed, use at least a 3/4" connection between the vessel and the drainer.

MAINTENANCE

A regular schedule should be set up for testing liquid drainers. A drainer's size and operating pressure determine how often it should be checked. On normal industrial applications, drainers should be checked as follows:

High Pressure Drainers - 250 psig and up. Test daily to weekly.

Medium Pressure Drainers - 60 to 250 psig. Test Weekly to monthly

Low Pressure Drainers - 1 to 60 psig. Test monthly to annually.

Large drainers on high capacity jobs should be tested more frequently.

Drainers on gas and other critical applications should be checked at the same time valves and other line equipment are inspected. Your own experience will determine the required testing schedule.

Drainers on instrument air lines should be checked daily.

TROUBLESHOOTING

- A. Drainer Does Not Discharge.
 1. An insufficient amount of liquid is coming to the drainer to permit it to discharge. Continue operation.
 2. The drainer may be filled with dirt or sludge. Remove the cap from the drainer. Thoroughly clean the drainer cap and mechanism. Install a strainer with a blowdown valve in the inlet piping ahead of the drainer.



3. The differential pressure across the drainer may be too high. Check the inlet and the outlet pressures. If the difference **exceeds** the maximum pressure stamped on the drainer, the mechanism **will not** open. Reduce the differential pressure if possible, or replace the mechanism with one that is properly sized for the existing operating pressure. Also check the specific gravity of the liquid.
4. The valve seat may be worn. As the seat becomes worn, the seating area enlarges, lowering the maximum operating pressure of the drainer. Replace the whole mechanism except the float.
5. The valves in the inlet or outlet lines may be closed. Open the valves.
6. The strainer may be clogged. Clean the strainer screen.
7. The float may be leaking or collapsed. Replace the float.

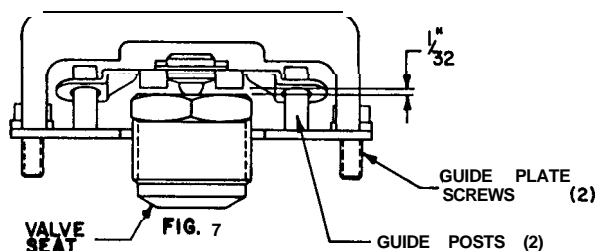
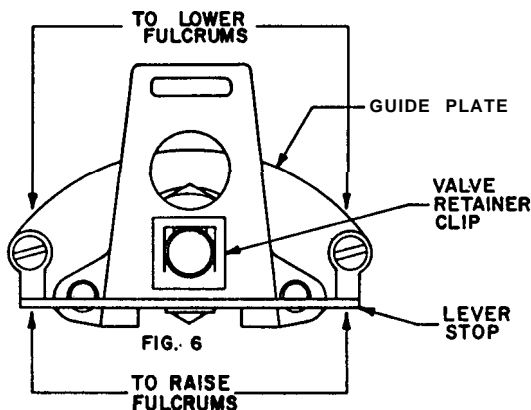
B. Drainer Discharges Liquid Continuously.

1. If the drainer discharges a full stream of liquid continuously and the vessel fills full of liquid --
 - a. The drainer may be too small for the job. Replace the drainer with one correctly sized.
 - b. Abnormally high amounts of liquid may be coming to the drainer. Either remedy the cause of the large amount of liquid or replace the drainer with one that has a larger capacity and can handle peak loads.

c. Drainer Blows Gas Through.

1. Dirt or scale may be lodged on the valve or seat. Remove the cap and clean the drainer, the valve, and the seat. Check the freeness of the mechanism.
2. The valve may be worn or the seat may be wire-drawn. Remove the cap and replace the mechanism.

In the event of any unusual maintenance or operational difficulty, consult your Armstrong Representative, or the Armstrong Machine Works Application Engineering Department.



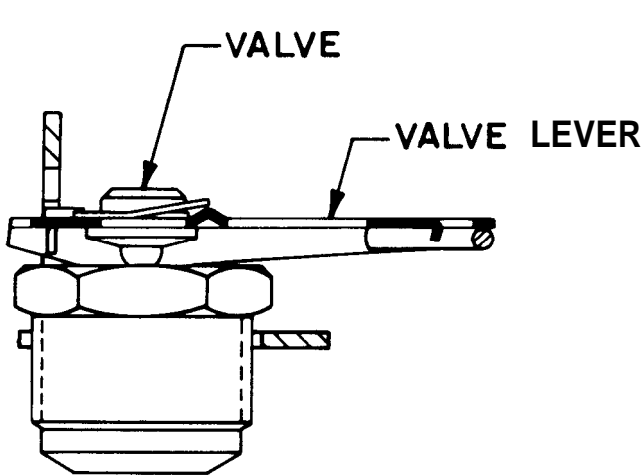


FIG. 8

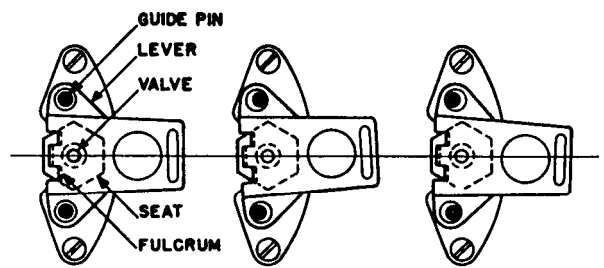


Fig. 9

Fig. 10

Fig. 11

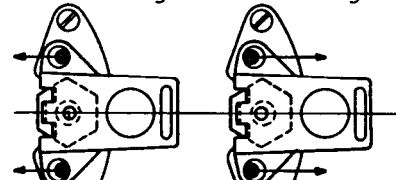


Fig. 12

Fig. 13

REPLACEMENT OF 1-LD LIQUID DRAINER VALVE AND SEAT

REFER TO FIGS. 6, 7, 8

1. Remove the cap from the 1-LD and place it in a vise with the mechanism up.
2. Remove the float, lever, and guide pin assembly by removing the two guide plate screws.
3. Unscrew the valve seat.
4. Clean all dirt, pipe scale, etc. from the drainer cap, especially the threaded holes. MAKE SURE THE SEATING AREA OF THE DRAINER IS CLEAN BEFORE SCREWING THE VALVE SEAT INTO POSITION.
5. Screw the new valve seat into position. DO NOT use pipe dope or lubricant on the valve seat threads. The seal is made, not by the threads, but by **metal to metal** contact at the ground end of the valve seat.
6. To mount the guide pin assembly, the following parts must be installed in the following order: guideplate, lever, and lever stop. Place the guideplate on the cap so that the two screw holes are aligned over the tapped holes in the cap. The guideplate is installed on the side of the seat away from the gasket surface. Place the lever over the two pins on the guideplate. Then place the lever stop on the guideplate and aligned over the two screw holes. Tighten the whole assembly to the cap.

NOTE: THE LEVER STOP SHOULD BE IN A LINE OVER THE PINS ON THE GUIDEPLATE. IF THE LEVER STOP IS INSTALLED BACKWARDS, THE DRAINER WILL NOT FUNCTION PROPERLY. SEE FIGURE 6.

7. There must be some clearance at all points between the lever and the lever stop. If the lever stop touches the lever on either side, tap the lever stop lightly in the appropriate direction so that the condition is corrected. See Figure 7.



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- a. With the valve seated and the lever in the fully closed position, there should be approximately $1/32$ " clearance between the valve seat and the fulcrums on the lever. See Figure 7, 8. If the fulcrums touch the seat, they can be raised by lightly tapping the base of the lever stop towards the center of the cap. If there is too much space between the fulcrums and the seat, lower the fulcrums by lightly tapping the base of the lever stop away from the center of the cap. See Figure 6.
9. Check the alignment of the guide pins. With the valve lever held all the way down and the valve seated, the guide pins should be central in the guide pin holes. When correctly aligned, the lever will move sideways the same distance to the right as to the left. Should the guide pins be out of line, they should be straightened so that they will be central in the guide pin holes. For example, the guide pins in Figures 12 and 13 have been bent and should be **tapped** lightly with a hammer or similar tool to force them in the direction of the arrows. If the pins are too far apart or too close together, a similar procedure should be followed to position them centrally.
10. Hook the float on the valve lever and remove the cap from the vise. The drainer is now ready for assembly.



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