

System drawings shown in this bulletin are for illustration purposes only. Refrigeration systems should only be serviced by a qualified technician. Always observe proper safety procedures when servicing a refrigeration system. For more information see the latest revision of Phillips Safety Bulletin SGRV.

GENERAL INFORMATION

Pressure Rating: 300 psig (21 bar, gauge)

Maximum Operating Pressure Differential: **275AF:** 20 psi (1.4 bar)
275AP/APF: 250 psi (17 bar)

Temperature Rating: -20°F to 240°F
(-29°C to 116°C)

The 275AP/APF valves are high-side float valves which act as pilot mechanisms for separate pilot-operated valves, such as the Phillips 700H. The 275AP valve is used for ammonia applications and the 275APF is used for halocarbon applications.

The 275AF valves are low-side float valves that control compressor crankcase oil level.

All the valves in this family open on a drop in liquid level and throttle flow with a "needle and seat" mechanism. A 1/2" FPT connection serves as an outlet connection for the 275AP/APF; the same connection serves as an inlet for the 275AF.

INSTALLATION INSTRUCTIONS

The 275AF/AP/APF valves are available without a chamber (Figure 1), with a cast iron chamber (Figure 2) or with a welded steel chamber (Figure 3). An optional mounting flange is available for mounting the valve without a chamber (Figure 4).

The valve should always be oriented such that the 1/2" FPT connection is toward the top of the valve and the front face is vertical. This will ensure that the float moves appropriately with changes in liquid level.

The 275AP and APF valves are used as pilot float valves to control a 700H series valve. The piping arrangement in Figure 5 shows a number of important details:

- The float level should be at least 18 in. above the 700H valve.
- The pilot line MUST be either 3/8" OD copper tubing (halocarbon applications) or 1/4" nominal pipe (halocarbon or ammonia).
- The pilot line should include a shut-off valve, pressure gauge and gauge valve for troubleshooting. (See Troubleshooting section, later in this bulletin.)

Figure 1: 275AP/APF/AF Valve without Chamber

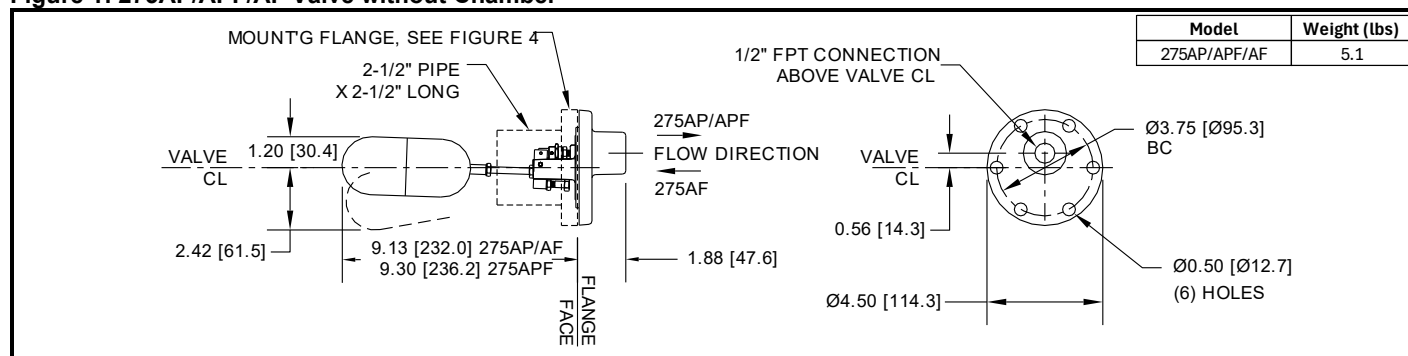


Figure 2: 275AP/APF/AF Valve with Cast Iron Chamber

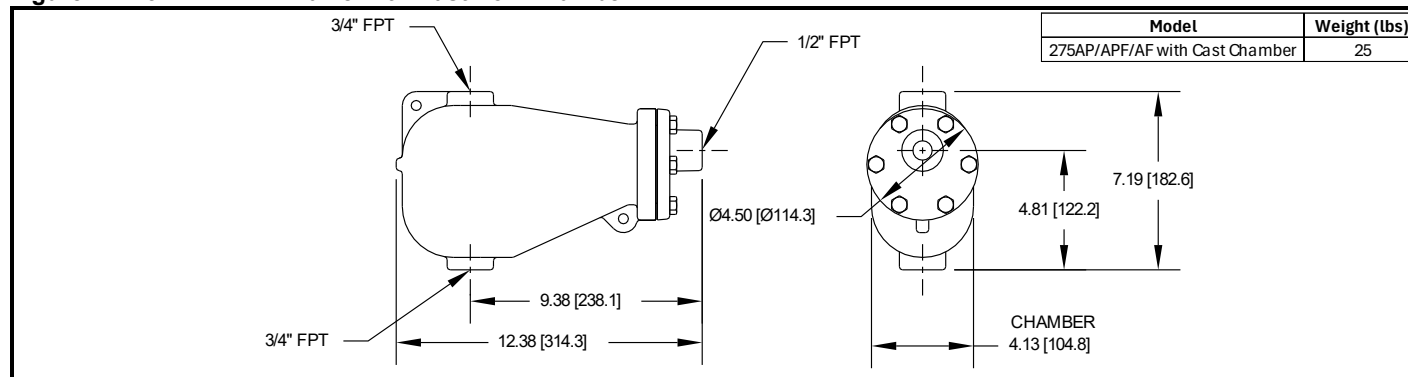


Figure 3: 275AP/APF/AF Valve with Steel Chamber

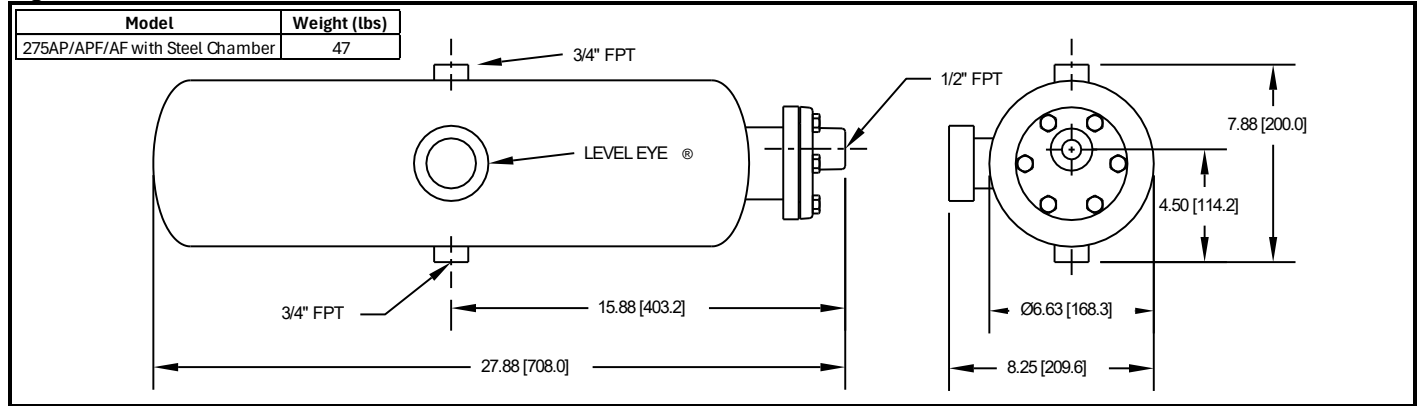


Figure 4: Optional Mounting Flange

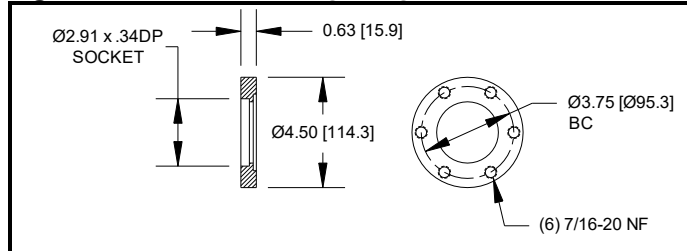


Figure 5: 275AP/APF Piloting 700H Valve

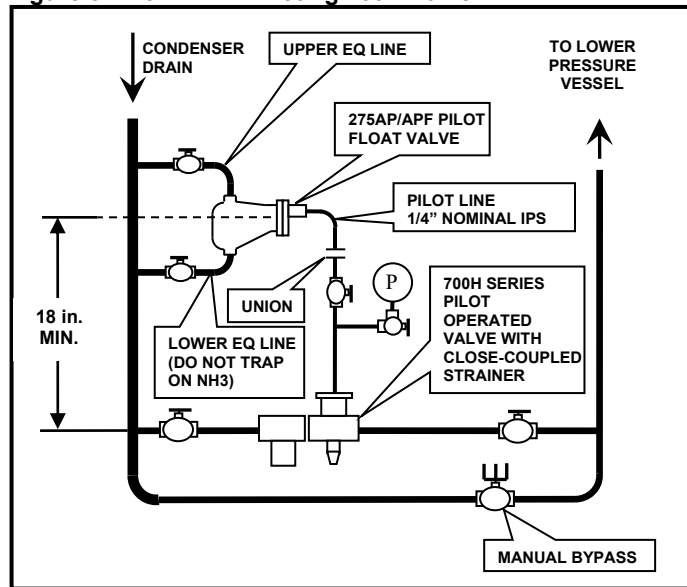
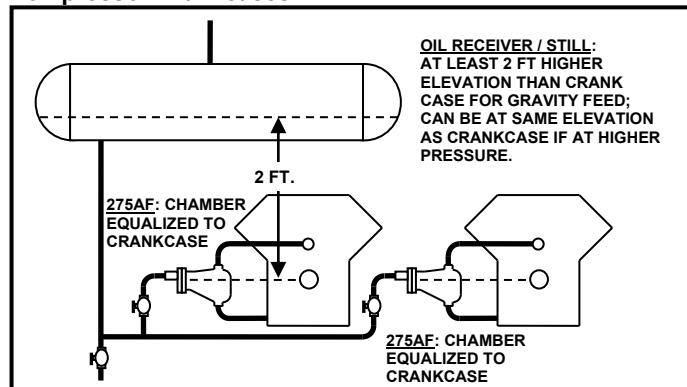


Figure 6: 275AF Maintaining Oil Levels in Multiple Compressor Crankcases



The 275AF valves may be used to maintain the oil level in one or more compressor crankcases (Figure 6). Note that if the oil reservoir level is less than 2 feet above the crankcase level, it should be pressurized 5 to 20 psi (0.3 to 1.4 bar) higher than the crankcase.

REPLACEMENT PARTS

Basic replacement parts are illustrated in Figure 7 and listed in Table 1.

When contacting Phillips for replacement parts, have the complete valve model and serial number (shown on the valve nameplate illustrated below) available to ensure you receive the correct components. For example: "275APF-BZA" is a complete valve model, and "990123" or "E-12345" are complete serial numbers.



SERVICE INSTRUCTIONS

Lever pin / float block removal and replacement: If it is necessary to remove the lever pin (411) and float block (230Z) during servicing, first cut one end of the pin flush with the valve body. Then either pull the pin out with pliers or carefully drive it out with a punch. Retain the spacers (11S) for re-assembly. After re-assembly, peen the lever pin to retain in place and check for free movement of valve components.

Needle and seat replacement: The needle and seat bushing are lapped in the factory to create a matched set. If either the needle or seat bushing show signs of wear or damage, both parts must be replaced. To inspect or replace the needle and seat perform the following steps.

1. Remove the lever pin and float block as described above.
2. Remove the old seat bushing and install a new one using PTFE tape or other pipe sealant on the threads.
3. Remove the old needle from the adjusting nut (204E), lock washer (55), and lock nut (224). Reassemble the nut and washer loosely on the new needle.
4. Insert the new needle into the new bushing. Install the float block / float assembly (without spacers) loosely in the valve body with the lever pin. **DO NOT PEEN THE LEVER PIN AT THIS TIME.**

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Figure 7: 275AF/AP/APF Valve Assemblies

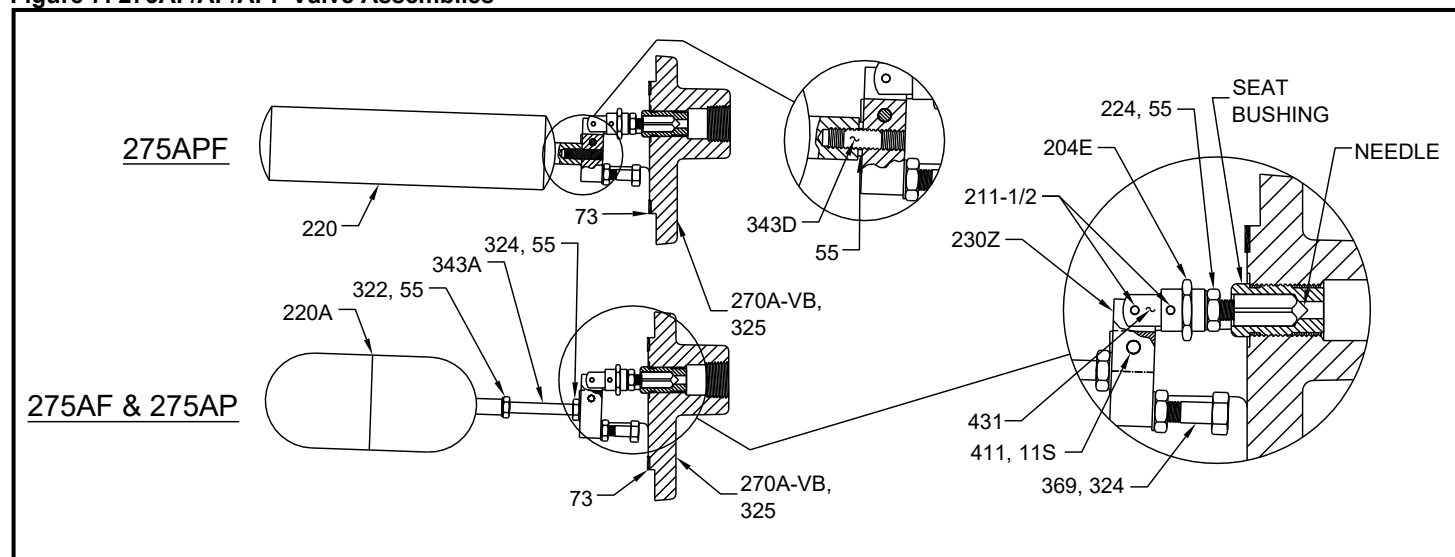


Table 1: Replacement Parts

Description	Part No.
Chamber, Cast Iron (Not shown)	299A
Chamber, Steel (Not shown)	B-10985
Valve Body	270A-VB
Gasket*	73
Cap Screw (6)	325
Float Ball, 275AF/275AP	220A
Float Ball, 275APF	220
Float Rod, 275AF/275AP	343A
Float Rod, 275APF	343D
Float Block	230Z
Float Nut	322
Nut (275APF - Qty 1, 275AF/275AP - Qty 2)	224
Lock Washer (275APF - Qty 3, 275AF/275AP - Qty 4)	55
Adjusting Bolt	369
Link	431
Lever Pin	411
Spacer	11S
Roll Pin	211-1/2
Adjusting Nut	204E
Needle/Seat Bushing & Aluminum Crush Washer* (Must be replaced as matched set)	262403S-1/16
	262403S-5/64
	262403S-3/32
	262A403A-1/8
	262A403A-3/16
Mounting Flange (Not shown)	298A
*Spare Parts Kit (Includes Gasket and Needle and Seat Bushing)	K275AP1 (1/16", 5/64", 3/32" orifice)
	K275AP2 (1/8", 3/16" orifice)

SERVICE INSTRUCTIONS (Needle & seat replacement, cont'd)

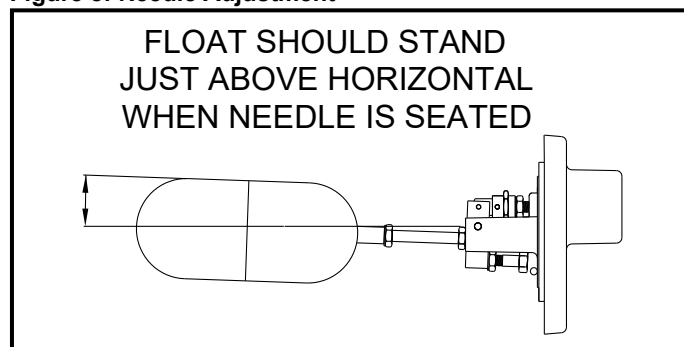
- Secure the valve body so the float is approximately horizontal. Turn the needle in or out of the adjusting nut until the float is horizontal when the needle is seated in the bushing.
- Then screw the needle ½-turn into the adjusting nut so the float is slightly above horizontal when the needle is seated in 275AP-SB25-01

the bushing (Figure 8). Tighten the lock nut to secure needle position.

7. Remove the lever pin and pull the needle from the bushing. Reassemble the float block to the valve body using the lever pin and spacers (11S) to ensure the float block (230Z) is centered on the link (431).

8. Peen the lever pin to retain in place and check for free movement of the mechanism.

Figure 8: Needle Adjustment

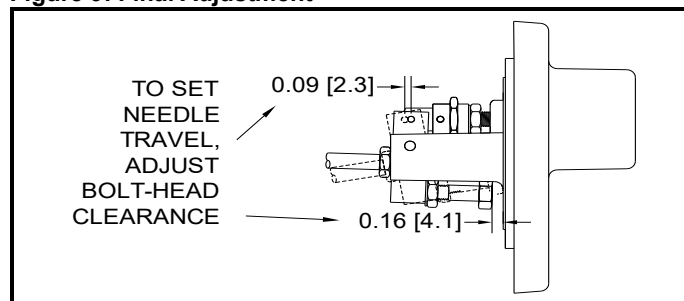


9. With the needle fully seated in the bushing, check to make sure there is approximately 0.16" (4mm) clearance between the adjusting bolt head (369) and the valve body. A #20 drill bit may be used to check this clearance. (See Figure 9.) Setting the bolt head clearance ensures 0.09" (2mm) of needle travel when the float drops due to low liquid level.

10. Be sure the lock nut (324) is tightened against the float block and the entire mechanism pivots smoothly before re-installing the valve.

11. Reinstall the valve using cap screws (325), tightening in a star pattern to 45 ft-lb for even gasket compression.

Figure 9: Final Adjustment



TROUBLESHOOTING

Whether it is operating as a 275AP/APF high-side float (Figure 5) or as a 275AF low-side float (Figure 6), the valve opens when the liquid level drops. The operation of the 275AF will be covered first, because understanding its possible malfunctions serve as a foundation for troubleshooting the 275AP/APF pilot float valve.

Float Valve Only (275AF)

Problem: Valve does not close fully at a high liquid level.

Causes/Solutions:

Float rod bent or interference with float movement: If the valve was supplied without a chamber (299A), the float rod (343A, not on 275APF valves) may have been bent in shipping. It is also possible that the valve was installed in a non-standard chamber that does not allow full float movement. CAREFULLY bending the float rod a small amount may correct this problem.

Jammed or worn linkage parts: Examine float and needle movement. Verify that parts move freely and without excessive play. Check for excessive float block (230Z) and/or lever pin (411) wear. Remove any debris, replace worn or damaged parts.

Needle/seat damage or debris present: Remove lever pin and float assembly. Be careful not to disturb the setting of the needle and the adjusting nuts. Examine needle and seat bushing for damage and debris. A worn or damaged needle/seat should always be replaced with a matched set from the factory.

Hole in float ball: Liquid refrigerant leaking into the float will prevent it from rising properly with changes in liquid level. Warming the float will cause any refrigerant inside it to vaporize. Observe any vapor leakage from the float to confirm a leak. To replace a defective float, unscrew the float. (Be careful not to disturb the positions of the nuts (322, 324).) Install new float snugly, again without disturbing the nut positions.

Problem: Valve does not open at low liquid level.

Cause/Solution:

Jammed needle or worn linkage parts: Inspect valve as described above. Repair or replace parts as needed.

Pilot Float Valve with 700H Valve (275AP/APF)

Figure 9 shows schematically how the 275AP/APF and 700H valves operate together. This is very similar to the arrangement shown in Figure 6.

As the liquid level rises in the chamber, the float rises and the needle shuts off flow to 700H. The pressure above the 700H piston drops and the piston rises due to pressure underneath, opening the valve port and allowing flow. Conversely, as the liquid level drops, the 275AP opens and pressure above the piston rises, closing the 700H port with spring-assist.

Match the condenser condition (liquid high or low) with pressure gauge reading (condensing or downstream pressure) and note the possible causes given in Table 2.

Figure 9: Schematic of 275AP/700H Operation

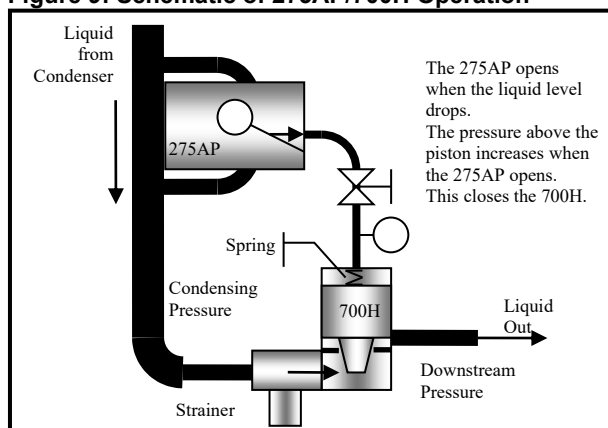


Table 2: Troubleshooting The 275AP & 700H

		(2) Pressure Gauge reads:	
		Approximately Downstream Pressure	Approximately Condensing Pressure
(1) Condenser Liquid Level is:	Too High	The pressure indicates that the 275AP is closed (as it should be). Therefore, the 700H may be closed due to a malfunction. Check if the 700H is stuck partially or completely closed by dirt/debris, or if the strainer is blocked. Other possibilities: Operating conditions may have changed so that (1) The 700H cannot open fully due to too strong spring, or (2) the 700H metering plug does not have sufficient capacity. Contact Phillips to resolve these issues.	The pressure indicates the 275AP is open (it is supposed to be closed). Therefore, the 700H is being signaled to close. Check if 275AP float is stuck in low position, or if dirt/debris is keeping the needle from seating.
	Too Low	The pressure indicates the 275AP is closed (it is supposed to be open). Therefore, the 700H is being signaled to open. Check if the 275AP is stuck in the closed position. See "Float Valve Only: valve does not open" Troubleshooting Tips, above, to resolve the problem.	The pressure level indicates the 275AP is open (as it should be). Therefore, the 700H is open due to malfunction. Check if the 700H is stuck partially or completely open by dirt/debris, or the spring may have broken. Other possibilities: (1) The 700H piston or body may have worn, permitting blow-by that prevents the pressure above piston from rising sufficiently to close the valve. (2) Operating conditions may have changed so that the 275AP does not have sufficient capacity to close the 700H. Contact Phillips to resolve these issues.

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