

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: 250 psi (17 bar)

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

The 270A Series valves are low-capacity, high-side float valves. These valves open on a rise in liquid level and throttle flow with a "needle and seat" mechanism. The valves are available with or without a

float chamber and may be installed on ammonia or halocarbon systems (270A or 270AF, respectively). Used primarily as oil drain valves, they can also be used as low capacity control valves to meter refrigerant from higher to lower pressure.

INSTALLATION INSTRUCTIONS

The 270A valves are available without a chamber (Figure 1), with a cast iron chamber (Figure 2) or with a welded steel chamber (Figure 3). Two different, optional mounting flanges are available for mounting the valve without a chamber (Figure 4).

Figure 1: 270A Valve without Chamber

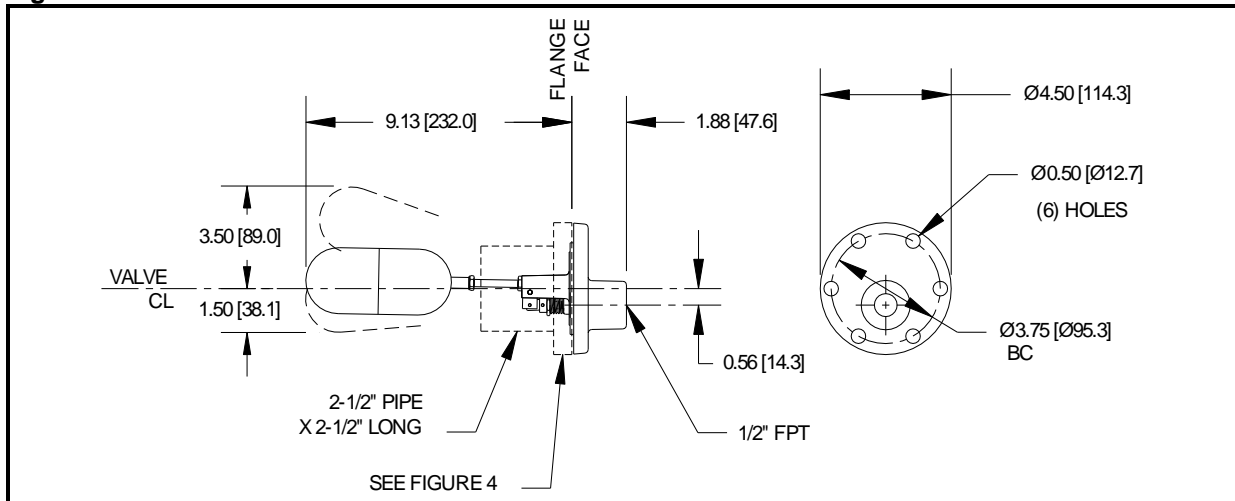


Figure 2: 270A Valve with Cast Iron Chamber

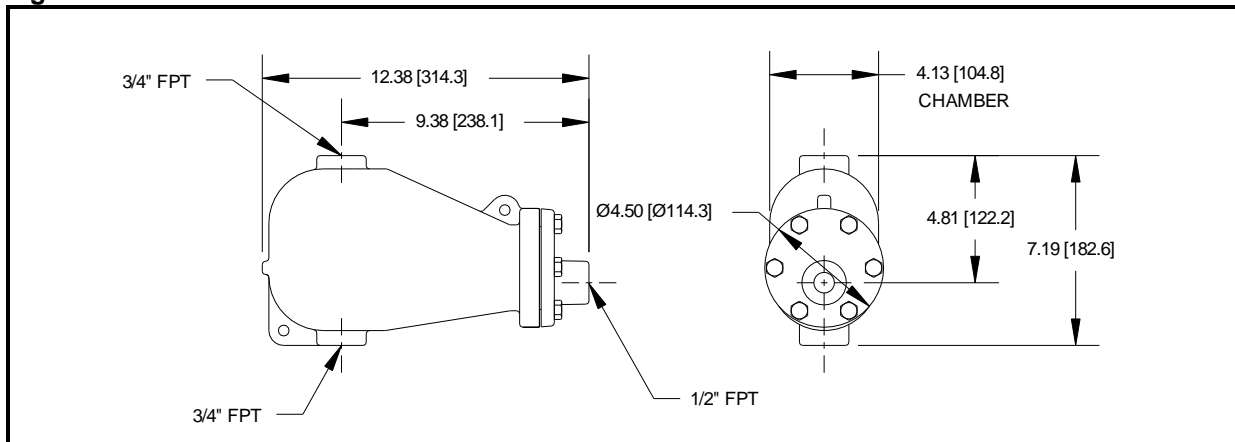


Figure 3: 270A Valve with Welded Steel Chamber

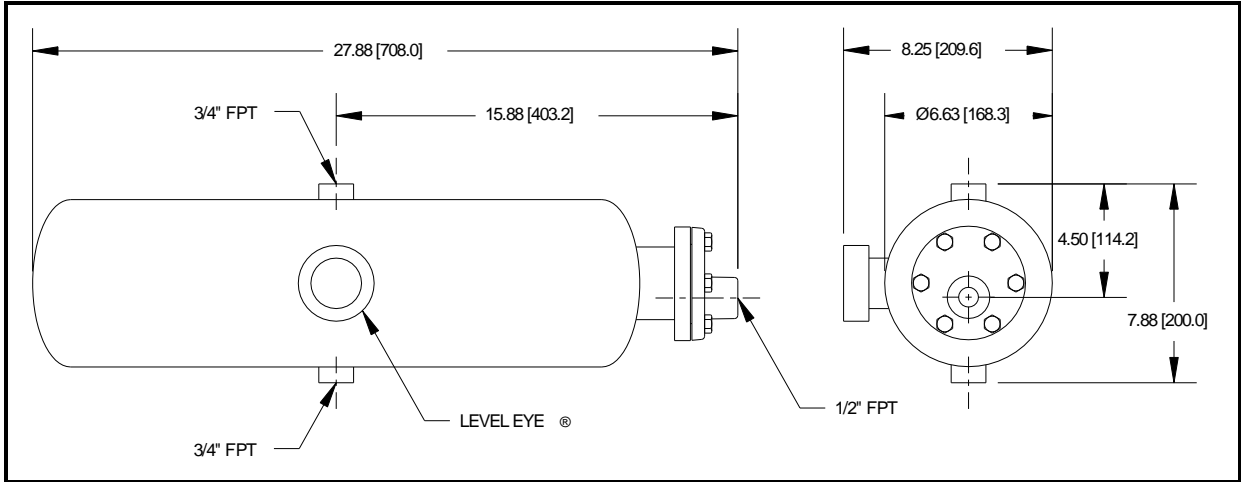
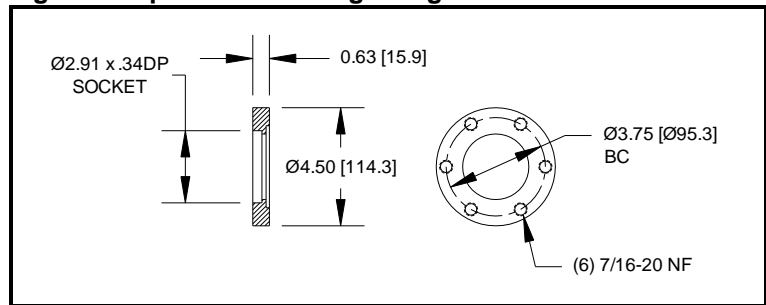


Figure 4: Optional Mounting Flange



The valve should always be oriented such that the 1/2" FPT outlet connection is toward the bottom of the valve and the front face is vertical to ensure that it opens and closes appropriately with changes in liquid level it

Typical installation examples are shown for oil drain and refrigerant feed applications (Figures 5 & 6, respectively). If the valve was supplied without a chamber (to be mounted directly on a vessel) allow sufficient space inside the vessel for full float movement. If the valve was supplied with the cast or welded chamber, the 3/4" FPT inlet port on the top of the chamber should be connected to the liquid supply. Note that a 3/4" NPT plug should be installed in the lower chamber port if that port is not used (Figure 5).

Figure 5: Three 270A Oil Drain Applications

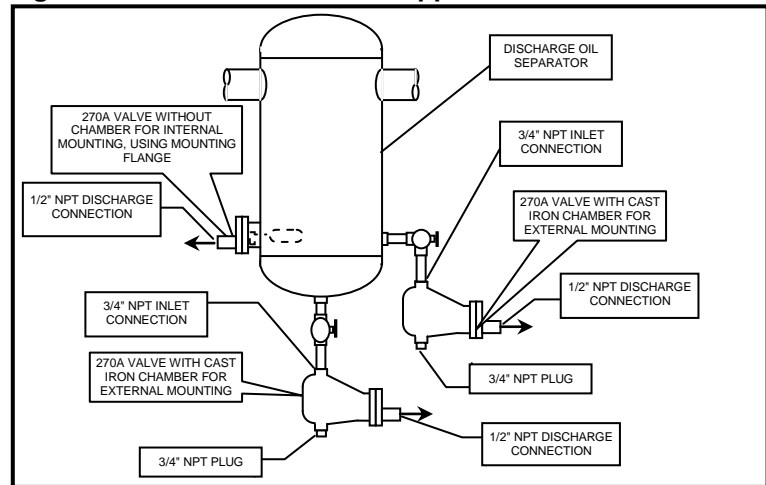
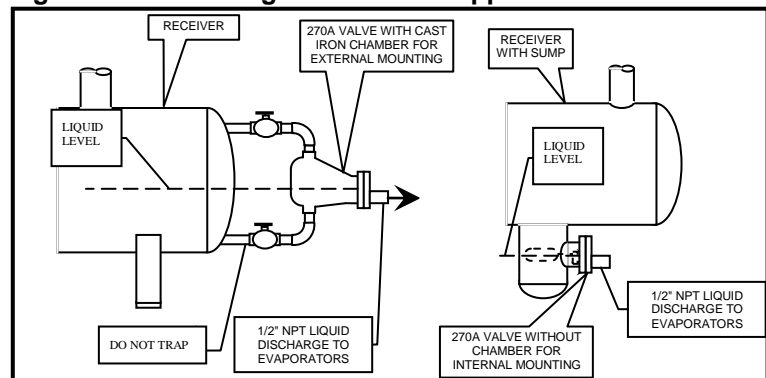


Figure 6: 270A Refrigerant Control Applications



REPLACEMENT PARTS

Basic replacement parts are illustrated in Figure 7 and listed in Table 1. The needle and seat should always be replaced as a matched set (see Table 2). Springs for ammonia and oil drain applications are also listed in Table 2. Halocarbon valves (270AF) do not require a spring.

When contacting Phillips for replacement parts, have the complete valve model and serial number (shown on the valve nameplate) available to ensure you receive the correct components. For example: "270AF-AZA" is a complete valve model, and "990105" is a complete serial number.

Figure 7: Replacement Parts

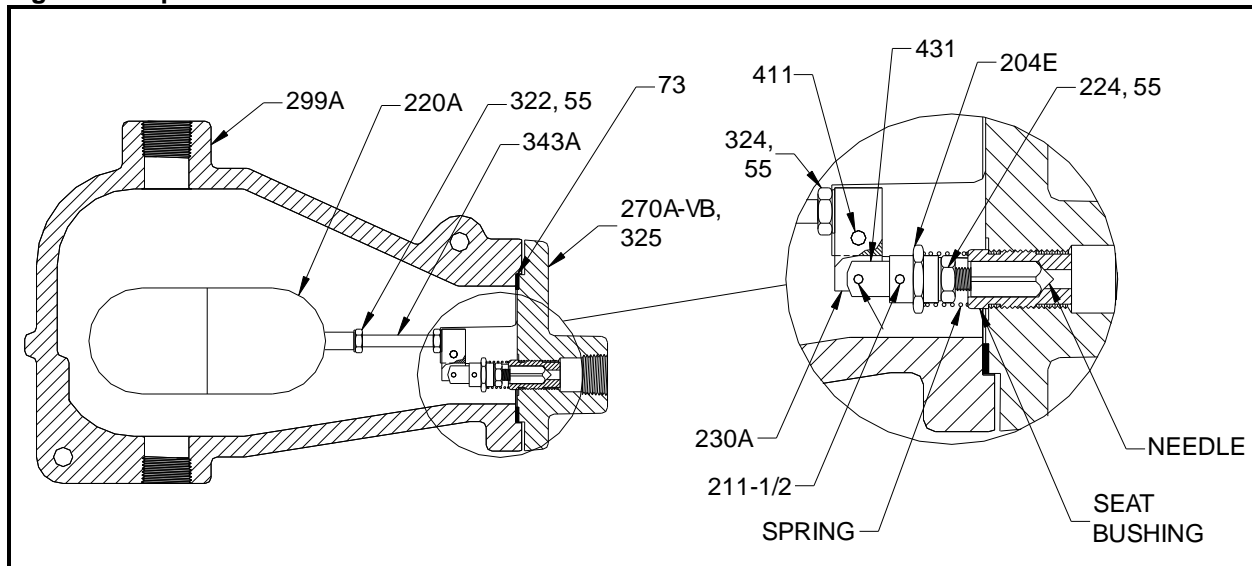


Table 1: Replacement Parts

Description	Part Number	Description	Part Number	Description	Part Number
Chamber, Cast Iron	299A	Float Nut	322	Spacer	11S
Chamber, Steel (not shown)	B-10985	Float Block Nut	324	Spring	See Table 2
Valve Body	270A-VB	Lock Washer (3)	55	Seat Bushing & Aluminum Crush Washer*	
Gasket*	73	Roll Pin (2)	211-1/2	Needle*	*Spare Parts Kit (Includes needle, seat bushing & gasket) Specify orifice size when ordering
Cap Screw (6)	325	Float Block	230A		
Float Ball	220A	Link	431		
Float Rod	343A	Lever Pin	411		
Lock Nut	224	Adjusting Nut	204E		K270A1 (1/16, 5/64, 3/32 orifice)
					K270A2 (1/8, 3/16 orifice)

Table 2: Needle, Seat, & Spring Selection

Needle & Seat Bushing w/ Crush Washer		Spring	
Orifice Size (in.)	Part Number	270A (R-717)	270AF (Halocarbons)
1/16	262403S-1/16	265E	No Spring Required
5/64	262403S-5/64	265E	
3/32	262403S-3/32	265E	
1/8	262A263A-1/8	265C	
3/16	262A263A-3/16	265C	

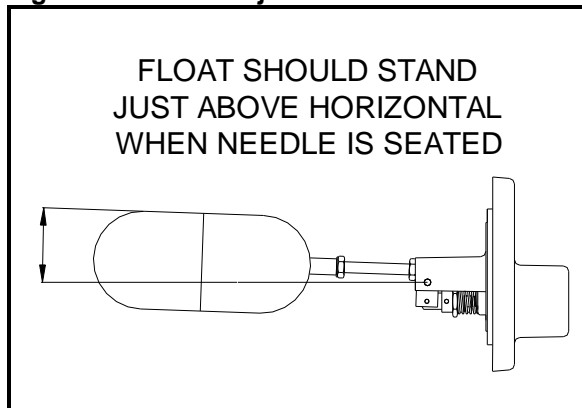
SERVICE INSTRUCTIONS

Lever pin / float block removal and replacement: If it is necessary to remove the lever pin (411) during servicing, first cut one end of the pin flush with the casting. 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:

1. Remove the lever pin and float block as described above. Retain the spring for final assembly.
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 these parts loosely on the new needle.
4. Install the float block / float assembly (without the spring or spacers) loosely in the valve body with the lever pin. **DO NOT PEEN THE LEVER PIN AT THIS TIME.**
5. Secure the valve body so the float rod is approximately horizontal. (Do not damage the gasket surface.) Turn the needle in or out of the adjusting nut until the float is horizontal when the needle is seated in the bushing.

Figure 8: Needle Adjustment



6. Then unscrew the needle ½-turn from the adjusting nut so the float is slightly above horizontal when the needle is seated in the bushing (Figure 8). Tighten the lock nut to secure needle position.

7. Remove the lever pin and pull the needle from the bushing. Replace the spring on the adjusting nut and reassemble the float block to the valve body using the lever pin and spacers to ensure the float block (230A) is centered on the link (431).
8. Check to be sure the float is still slightly above horizontal when the needle is seated, and that entire mechanism pivots freely.
9. Peen the lever pin to retain in place and check again for free movement of the mechanism.

TROUBLESHOOTING

Problem: Valve does not close fully at low liquid level.

Causes/Solutions:

High side refrigeration valves are more susceptible to needle/seat leakage than oil drain valves because oil (being more viscous) helps to create a positive seal between the needle and seat. In addition, the high velocities and “flashing” that occur when saturated liquid refrigerant passes to a lower pressure result in wear known as “wire drawing”.

Needle/seat wear Remove lever pin (411) and float ball assembly. Examine needle (403S/263A) and seat bushing (262/262A) for wear. Replace parts as described in service instructions.

Jammed or worn linkage parts: Examine float and needle movement, verify that parts move freely. Check for excessive float block (230A) and/or lever pin (411) wear. Remove any debris, replace worn or damaged parts.

Problem: Valve does not open with rise in liquid level.

Causes/Solutions:

Jammed needle or worn linkage parts: The needle may be sufficiently worn to become jammed in bushing. Examine float and needle movement. All parts should move freely, without excessive play. Remove any debris, replace worn or damaged parts.

Hole in float: 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, secure the float rod (343A) in a vise and unscrew the float (220A) WITHOUT DISTURBING THE SETTING OF THE NUTS (322, 324). Install new float snugly, again without disturbing the nut positions.

VALVES • VESSELS • SYSTEMS • CONTROLS

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GENERAL INFORMATION

Pressure Rating: 300 psig (21 bar, gauge)

Maximum Operating Pressure Differential: 250 psi (17 bar)

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

The 270AX and AY Series valves are high-capacity, high-side float valves. These valves open on a rise in liquid level and throttle flow with a "needle and seat"

mechanism. They are balanced port valves that utilize a small "balancing piston" to achieve a higher flow capacity than the 270A valves. The 270AX/AY valves may be installed on ammonia or halocarbon systems (270AX/AY or 270AXF/AYF, respectively).

INSTALLATION INSTRUCTIONS

The 270AX/AY 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).

Figure 5: 270AX/AY Valve without Chamber

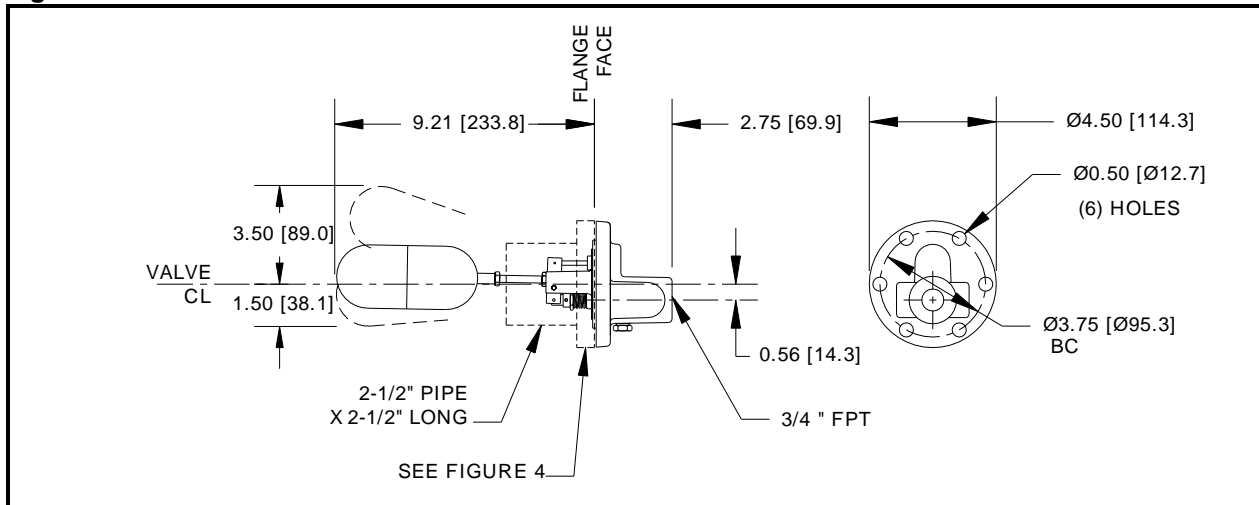


Figure 6: 270AX/AY Valve with Cast Iron Chamber

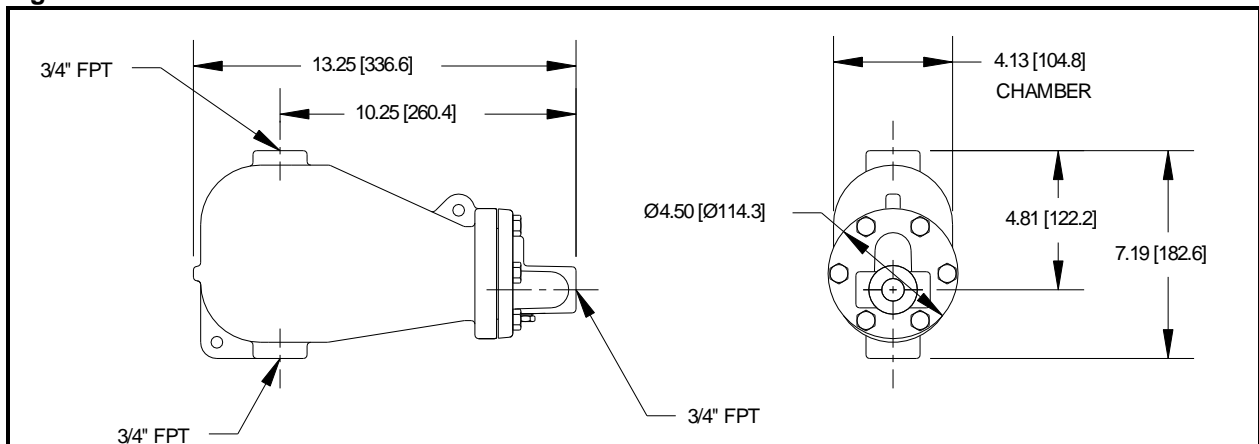
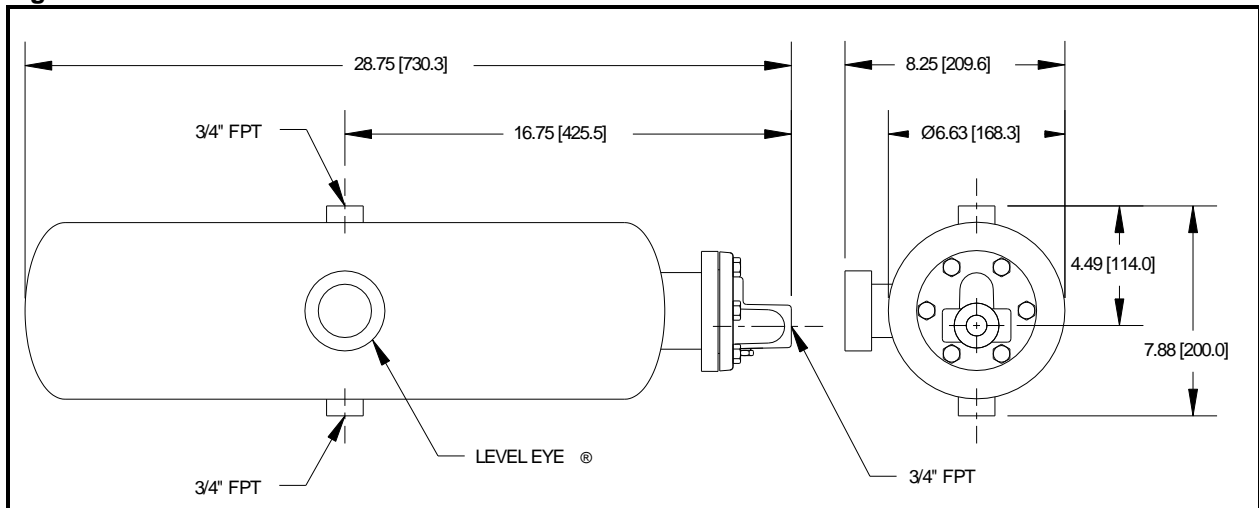


Figure 7: 270AX/AY Valve with Welded Steel Chamber



The valve should always be oriented such that the 3/4" FPT outlet connection is toward the bottom of the valve and the front face is vertical. This will ensure that the float moves appropriately with changes in liquid level.

Typical installation examples are shown for refrigerant feed applications in Figure 5. If the valve was supplied without a chamber (to be mounted directly on a vessel) allow sufficient space inside the vessel for full float movement.

Figure 4: Optional Mounting Flange

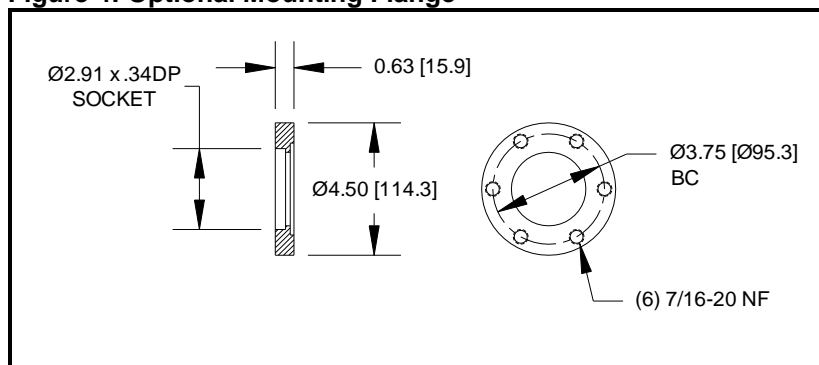
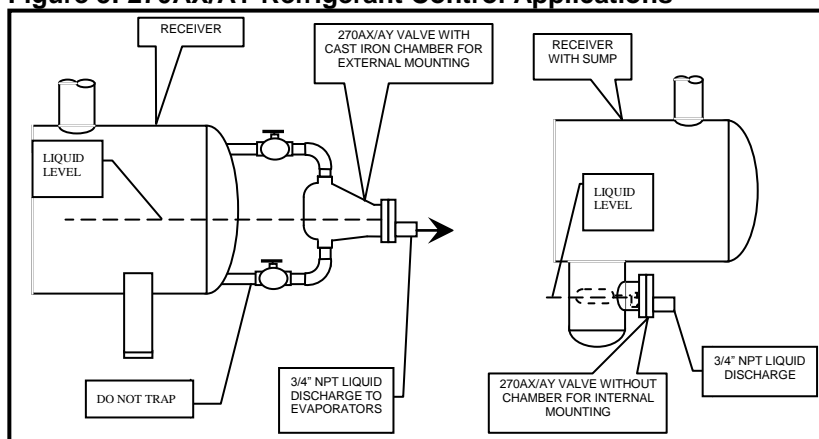


Figure 5: 270AX/AY Refrigerant Control Applications



REPLACEMENT PARTS

Basic replacement parts are illustrated in Figure 6 below and listed in Table 1.

When contacting Phillips for replacement parts, have the complete valve model and serial number (shown on the valve nameplate) available to ensure you receive the correct components. For example: "270AXF-JZA" is a complete valve model, and "990105" is a complete serial number.

Figure 6: Replacement Parts

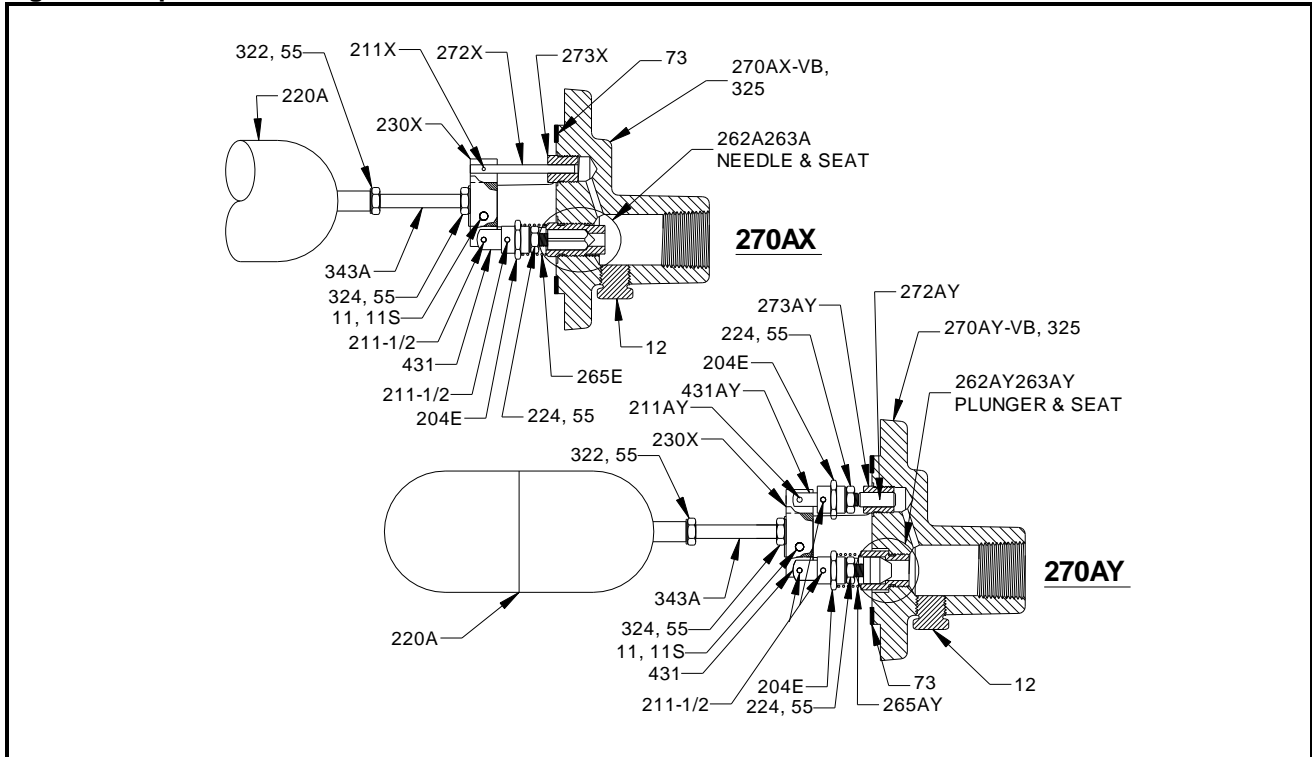


Table 3: Replacement Parts

Description	Part Number	
	270AX	270AY
Chamber, Cast Iron (Not shown)	299A	299A
Chamber, Steel (Not shown)	B-10985	B-10985
Valve Body	270AX-VB	270AY-VB
Cap Screw	325 (6)	325 (6)
Gasket*	73	73
Pipe Plug, Hex Head	12	12
Float Ball	220A	220A
Lever Pin	11	11
Float Nut	322	322
Float Block Nut	324	324
Lock Washer	55 (3)	55 (4)
Float Rod	343A	343A
Boss	273X	273AY

Description	Part Number	
	270AX	270AY
Spacer	11S	11S
Link	431	431
		431AY
Roll Pin	211-1/2 (2)	211-1/2 (3)
	211X	211AY
Adjusting Nut	204E	204E
Lock Nut	224	224 (2)
Piston Rod	272X	272AY
Needle/Plunger/Aluminum Crush Washer (270AX Only) & Seat Bushing*	262A263A	262AY263AY
Spring (No spring for 270AXF or 270AYF)	265E	265AY
*Spare Parts Kit (Includes Seat/Needle/Plunger & Gasket)	K270AX	K270AY

SERVICE INSTRUCTIONS

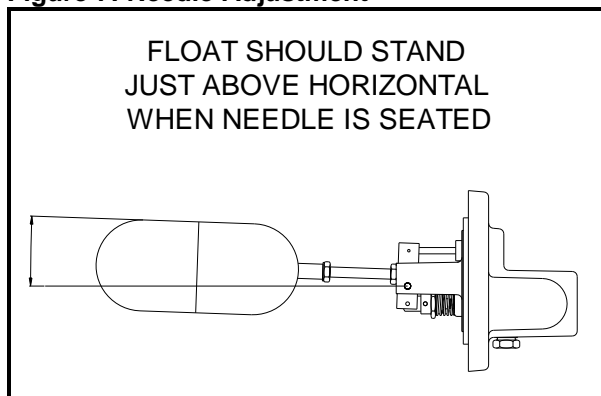
Lever pin / float block removal and replacement: If it is necessary to remove the lever pin (11) during servicing, first cut one end of the pin flush with the casting. Then either pull the pin out with pliers, or carefully drive it out with a punch. Retain the spacers (11S) for re-assembly. The rod (272X/272AY) should slide freely from the boss (273X/273AY). 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 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:

1. Remove the lever pin and float block as described above. Retain the spring for final assembly.
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 these parts loosely on the new needle.
4. Re-insert the rod (272X/272AY) into the boss and install the float block / float assembly (without the spring or spacers) loosely in the valve body with the lever pin.
DO NOT PEEN THE LEVER PIN AT THIS TIME.
5. Secure the valve body so the float rod is approximately horizontal. (Do not damage the gasket surface.) Turn the needle in or out of the adjusting nut until the float is horizontal when the needle is seated in the bushing.
6. Then unscrew the needle ½-turn from the adjusting nut so the float is slightly above horizontal when the needle is seated in the bushing. (See Figure 7) Tighten the lock nut to secure needle position.

Figure 7: Needle Adjustment



7. Remove the lever pin, pull the needle from the bushing and the rod from the boss. Replace the spring on the adjusting nut, re-insert the rod and needle, and reassemble the float block to the valve body using the lever pin and spacers to ensure the float block is centered on the link (431).

8. Check to be sure the float is still slightly above horizontal when the needle is seated, and that entire mechanism pivots freely.

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

TROUBLESHOOTING

Problem: Valve does not close fully at low liquid level.

Causes/Solutions:

High side refrigeration valves are susceptible to needle/seat leakage because the high velocities and “flashing” that occur when saturated liquid refrigerant passes to a lower pressure result in wear known as “wire drawing”.

Needle/seat wear: Remove lever pin (11) and float assembly. Examine needle and seat bushing (262A263A / 262AY263AY) for wear. Replace parts as described in service instructions.

Jammed or worn linkage parts: Examine float and needle movement, verify that parts move freely. Check for excessive float block (230X) and/or lever pin (11) wear. Remove any debris, replace worn or damaged parts.

Problem: Valve does not open with rise in liquid level.

Causes/Solutions:

Jammed needle or worn linkage parts: The needle may be sufficiently worn to become jammed in bushing. Examine float and needle movement. All parts should move freely, without excessive play. Remove any debris, replace worn or damaged parts.

Hole in float ball: Liquid refrigerant leaking into the float will prevent it from rising properly with changes in liquid level. Warming the float ball will cause any refrigerant inside it to vaporize. Observe any vapor leakage from the float to confirm a leak. To replace a defective float ball, secure the float rod (343A) in a vise and unscrew the float ball (220A) WITHOUT DISTURBING THE SETTING OF THE NUTS (322, 324). Install new float snugly, again without disturbing the nut positions.

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GENERAL INFORMATION

Pressure Rating: 300 psig (21 bar, gauge)

Maximum Operating Pressure Differential: 250 psi (17 bar)

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

The 270AZAZ is a high-side float valve that opens on a rise in liquid level and throttles flow with a “needle and seat” mechanism. It differs from other valves in the 270 valve line in that it is constructed of all plated or stainless steel materials and has an elongated float. The longer float provides more buoyancy to allow the valve to be used with lighter fluids, such as petrochemicals, but still permits the valve to be installed through a 2-1/2” nominal pipe. The valve also features needle movement within a PTFE sleeve to ensure smooth response.

Figure 8: 270AZAZ Dimensions

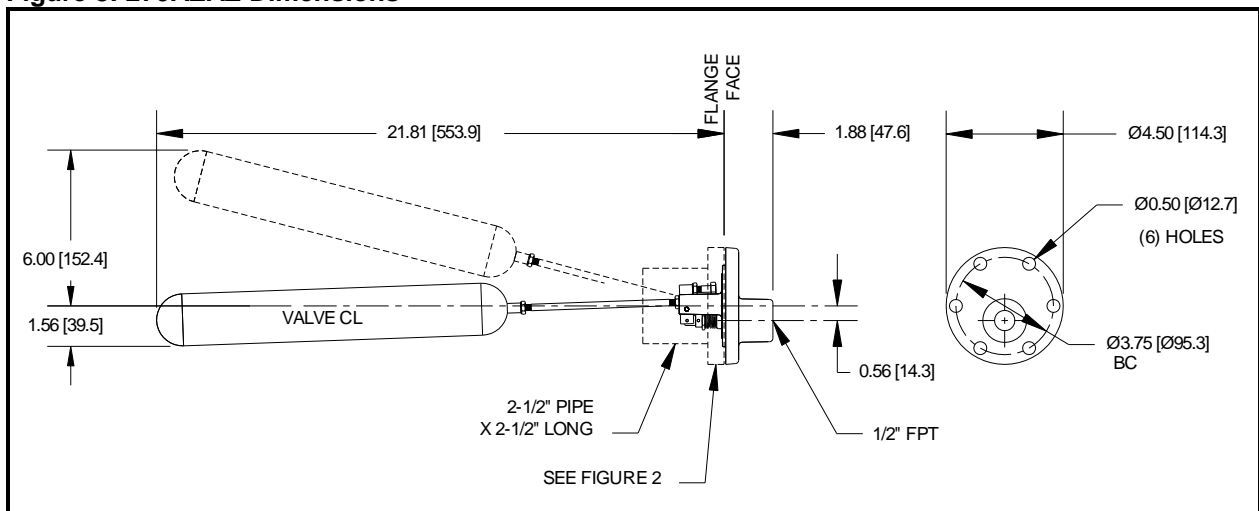
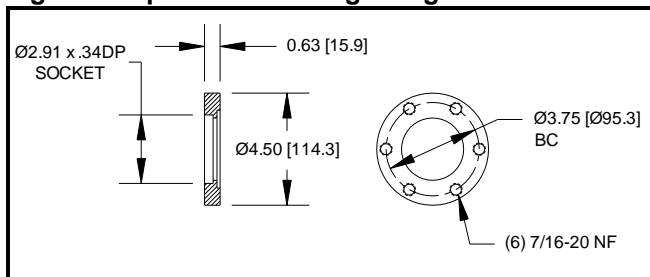


Figure 2: Optional Mounting Flange

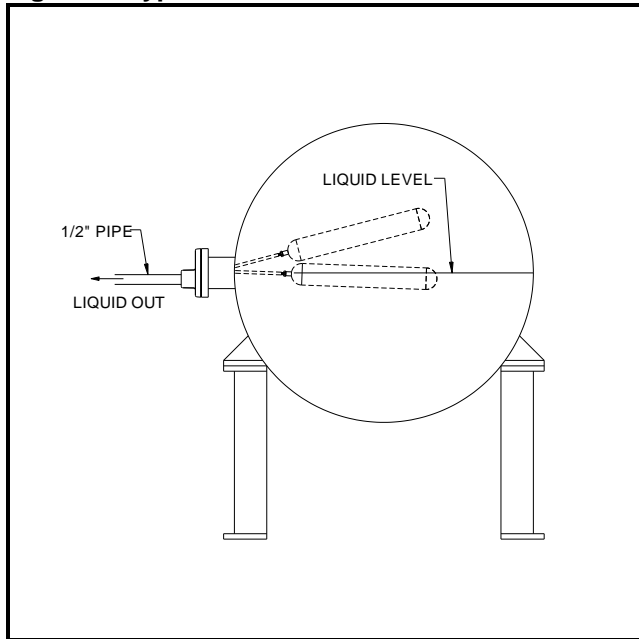


INSTALLATION INSTRUCTIONS

The 270AZAZ is available with an optional flange for installation directly on a vessel. Dimensional drawings of the valve and flange are shown in Figures 1 & 2.

The valve should always be installed such that the 1/2” FPT outlet connection is toward the bottom of the valve and the front face is vertical. This will ensure that the float moves appropriately with changes in liquid level. A typical installation is shown in Figure 3, below. Always ensure that there is sufficient space within the vessel to allow for full float movement.

Figure 3: Typical Installation



REPLACEMENT PARTS

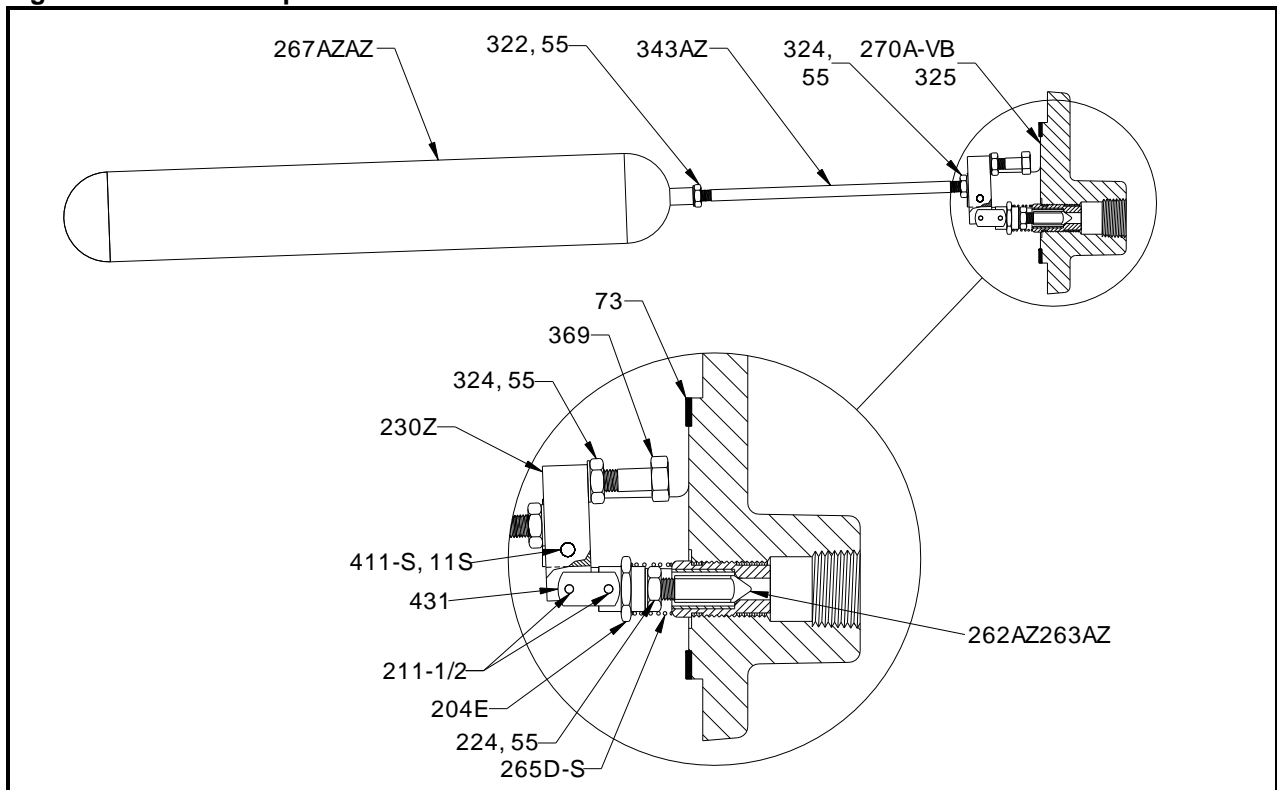
Basic replacement parts are illustrated in Figure 4 below and listed in Table 1.

When contacting Phillips for replacement parts, have the complete valve model and serial number (shown on the valve nameplate) available to ensure you receive the correct components.

Table 4: Replacement Parts

Description	Part Number
Valve Body	270A-VB
Gasket*	73
Cap Screw (6)	325
Float Ball	267AZAZ
Float Rod	343AZ
Spring	265D-S
Float Block	230Z
Float Nut	322
Nut	324
Lock Washer	55
Adjusting Bolt	369
Link	431
Lock Nut	224
Spacer	11S
Roll Pin	211-1/2
Adjusting Nut	204E
Needle/Seat Bushing & Aluminum Crush Washer* (Must Be Replaced As Matched Set)	262AZ263AZ
*Spare Parts Kit (Includes Seat/Needle & Gasket)	K270AZ

Figure 4: 270AZAZ Replacement Parts



SERVICE INSTRUCTIONS

Lever pin / float block removal, replacement: If it is necessary to remove the lever pin (411-S) during servicing, first cut one end of the pin flush with the casting. 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:

1. Remove the lever pin and float block as described above. Retain the spring for final assembly.
2. Remove the old seat bushing and install a new one using PTFE tape or a hardening pipe sealant on the threads.
3. Remove the old needle from the adjusting nut (204E), lock washer (55), and lock nut (224). Reassemble these parts loosely onto the new needle.
4. Install the float block / float assembly (without the spacers or spring) loosely in the valve body with the lever pin. **DO NOT PEEN THE LEVER PIN AT THIS TIME.**
5. Secure the valve body so the float rod is approximately horizontal. (Do not damage the gasket surface on the valve body.) Turn the needle in or out of the adjusting nut until the float is horizontal when the needle is seated in the bushing.
6. Then screw the needle $\frac{1}{2}$ -turn into the adjusting nut so the float is slightly below horizontal when the needle is seated in the bushing. (See Figure 5.)

Figure 5: Valve Adjustment

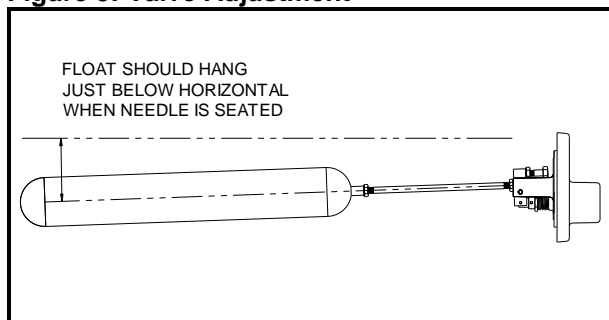
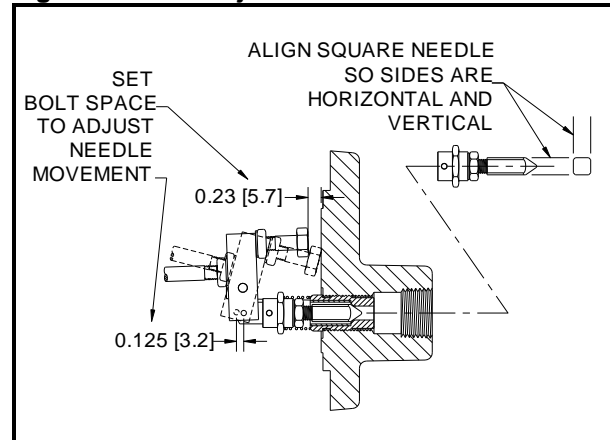


Figure 6: Final Adjustment



7. Make a slight adjustment to the needle so the square sides of the needle are aligned horizontally and vertically (Figure 6) (The flat sides of the needle will be aligned with the slot in the adjusting nut.) Tighten the lock nut to secure needle position.
8. Remove the lever pin and pull the needle from the bushing. Replace the spring on the adjusting nut and reassemble the float block to the valve body using the lever pin and spacers to ensure the float block (230Z) is centered on the link (431).
9. Check to be sure the float is still slightly below horizontal when the needle is seated, and that entire mechanism pivots freely.
10. Peen the lever pin to retain in place and check again for free movement of the mechanism.
11. Adjust the stop bolt (369) so that there is approximately 0.23" [6mm] between the bolt head and the valve body when the needle is seated. (See Figure 6.) Tighten the lock nut (324). This will assure that the total needle movement is limited to approximately $\frac{1}{8}$ " [3mm] when the float rises and the valve opens.

TROUBLESHOOTING

Problem: Valve does not close fully at low liquid level.

Causes/Solutions:

High side valves operating at large pressure drops are susceptible to needle/seat leakage because the high velocities and “flashing” that occur when saturated liquid passes to a lower pressure result in wear known as “wire drawing”.

Needle/seat wear: Remove lever pin (411-S) and float assembly. Examine needle (263AZ) and seat bushing (262AZ) for wear. Replace parts as described above in Service Instructions.

Jammed or worn linkage parts: Examine float and needle movement, verify that parts move freely. Check for excessive float block (230Z) and/or lever pin (411-S) wear. Remove any debris, replace worn or damaged parts.

Hole in float ball: Liquid refrigerant leaking into the float ball will prevent it from responding properly to changes in liquid level. Warming the float ball will cause any refrigerant in the valve to vaporize. Observe any vapor leakage from the float. To replace a defective float ball, secure the float rod (343AZ) in a vise and unscrew the float (267AZAZ) WITHOUT DISTURBING THE SETTING OF THE NUTS (322, 324). Install new float ball without disturbing the nut positions.

Problem: Valve does not open with rise in liquid level.

Causes/Solutions:

Jammed needle or worn linkage parts: Examine float and needle movement, verify that parts move freely. (Needle may be sufficiently worn to become jammed in bushing.) Remove any debris, replace worn or damaged parts.

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