

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)

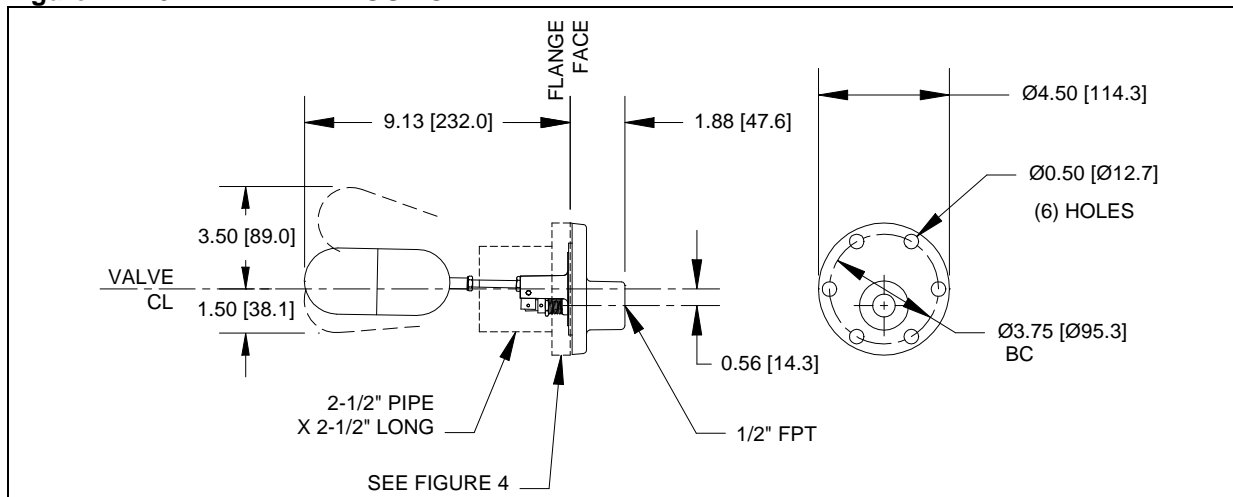
The 270A series valves are low-capacity, high-side float valves. These valves open on a rise in liquid level and throttle flow with a "needle and seat" mechanism. The valves are available with or without a

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.

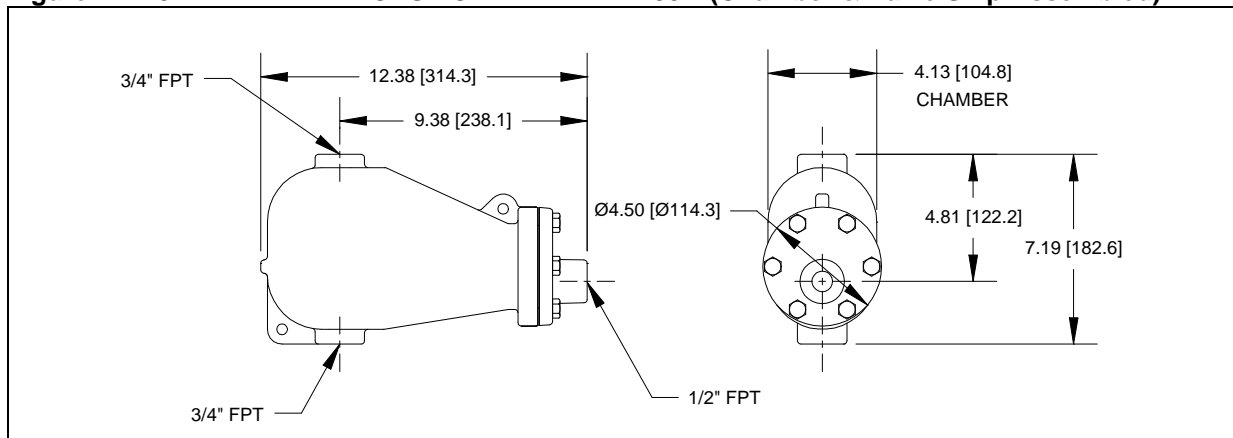
### INSTALLATION INSTRUCTIONS

The 270A valves are available without a chamber (Figure 1), with a cast ductile 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).

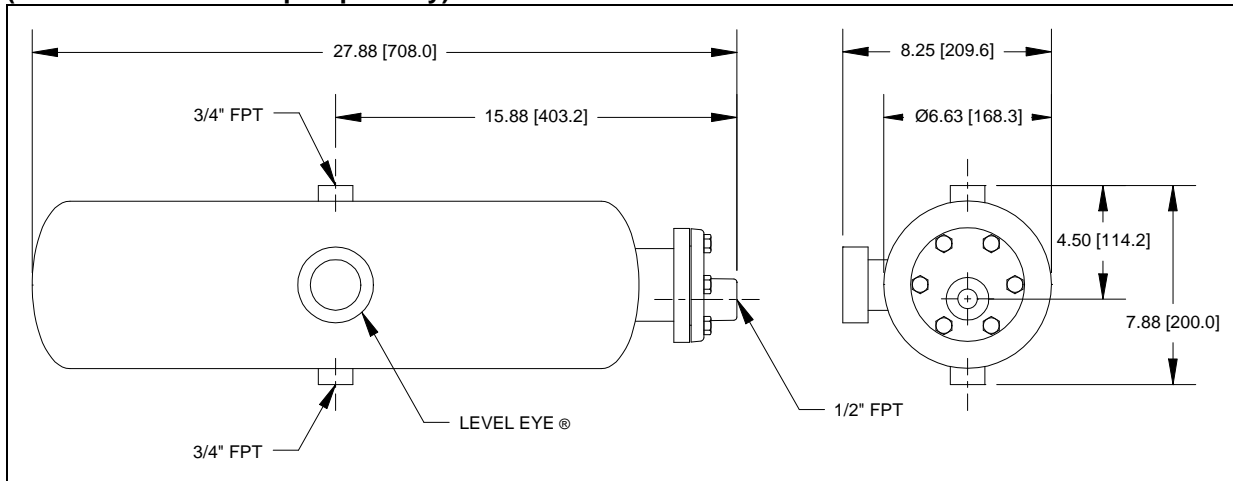
**Figure 1: 270A VALVE WITHOUT CHAMBER**



**Figure 2: 270A VALVE WITH CAST CHAMBER PN 299A (Chamber & Valve Ship Assembled)**



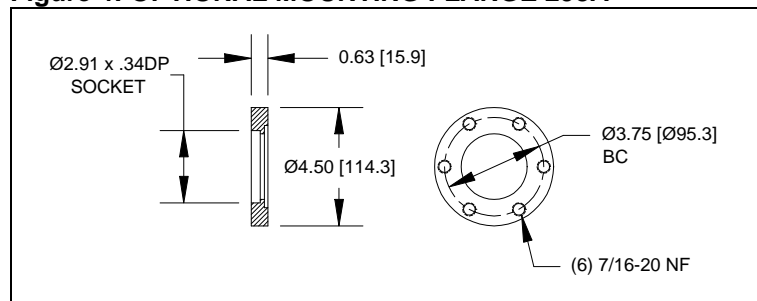
**Figure 3: 270A VALVE WITH WELDED STEEL CHAMBER PN B-10985  
(Chamber & Valve Ship Separately)**



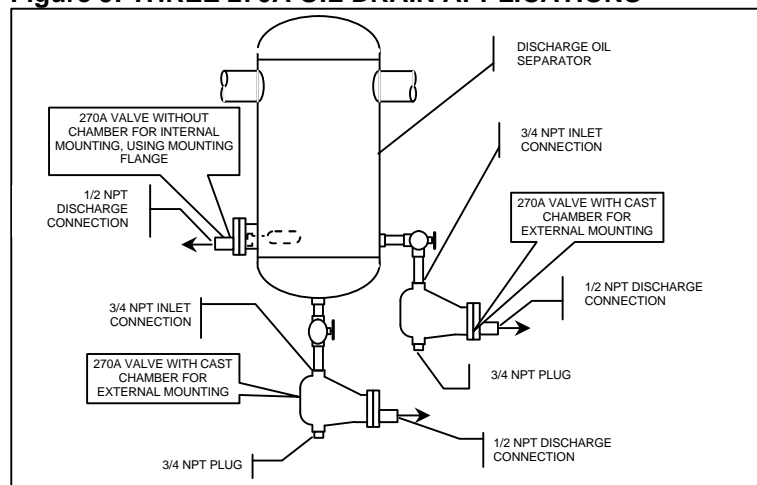
The valve should always be oriented such that the 1/2" FPT outlet connection is toward the bottom of the valve and the front face is vertical to ensure that it opens and closes appropriately with changes in liquid level it

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 (Fig.5).

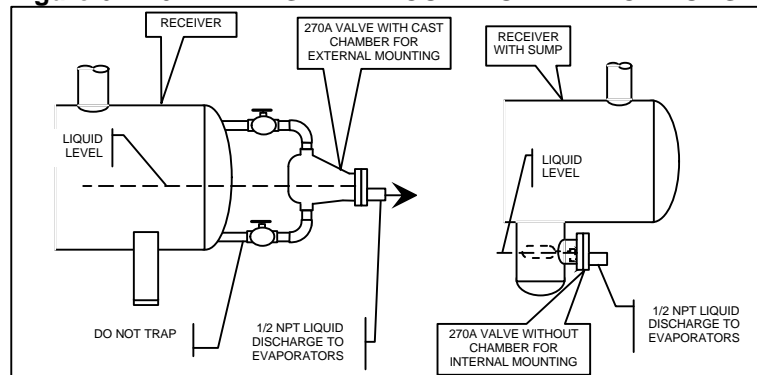
**Figure 4: OPTIONAL MOUNTING FLANGE 298A**



**Figure 5: THREE 270A OIL DRAIN APPLICATIONS**



**Figure 6: 270A REFRIGERANT CONTROL APPLICATIONS**

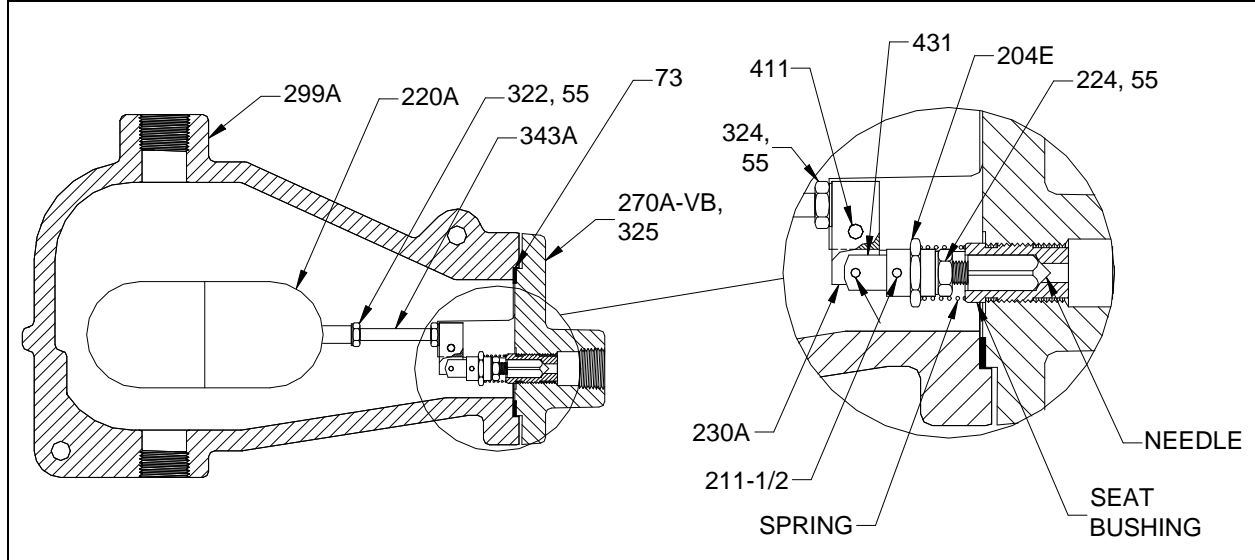


## REPLACEMENT PARTS

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: VALVE ASSEMBLY (SHOWN WITH CAST CHAMBER)**



**Table 1: REPLACEMENT PARTS**

Description (Quantity = 1, unless otherwise noted.)	Part Number	Description (Quantity = 1, unless otherwise noted.)	Part Number	Description (Quantity = 1, unless otherwise noted.)	Part Number
CHAMBER, CAST (OPTIONAL)	299A	NUT, FLOAT	322	SPACER (QTY. AS REQ'D, SPECIFY THICKNESS)	11S (1/8, 5/32, 3/16, 7/32)
CHAMBER, STEEL (OPTIONAL)	B-10985	NUT, FLOAT BLOCK	324	ROLL PIN (2 REQ'D)	211 - ½
VALVE BODY	270A-VB	LOCK WASHER (3 REQ'D)	55	ADJUSTING NUT	204E
GASKET	73			LOCK NUT	224
CAP SCREW (6 REQ'D)	325	FLOAT BLOCK	230A	NEEDLE	SEE TABLE 2
FLOAT	220A	LINK	431	SEAT BUSHING	
FLOAT ROD	343A	LEVER PIN	411	SPRING	

**Table 2: NEEDLE, SEAT & SPRING SELECTION**

NEEDLE & SEAT BUSHING		SPRING	
CODE	Part Number	270A (AMMONIA)	270AF (HALOCARBON)
A	262403S-1/16	SPRING 265E	NO SPRING
B	262403S-5/64	SPRING 265E	NO SPRING
C	262403S-3/32 (Oil Drain)	SPRING 265E (Ammonia or Oil)	NO SPRING
F	262A263A-1/8	SPRING 265C	NO SPRING
I	262A263A-3/16	SPRING 265C	NO SPRING

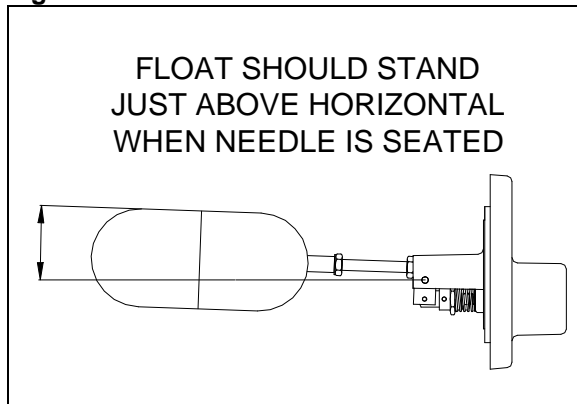
## **SERVICE INSTRUCTIONS**

**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.

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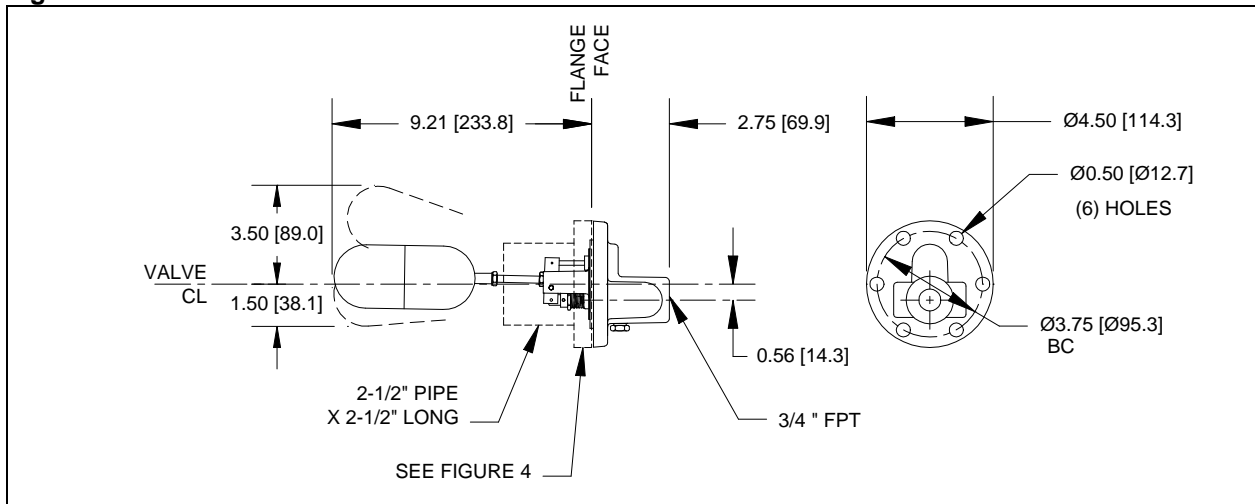
The 270AX and AY series valves are high-capacity, high-side float valves. These valves open on a rise in liquid level and throttle flow with a "needle and seat"

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).

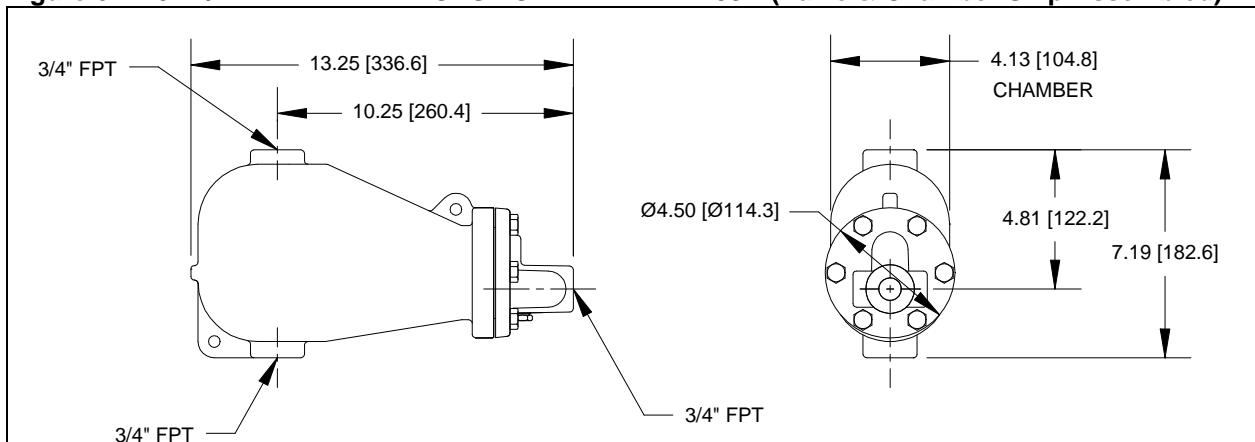
### INSTALLATION INSTRUCTIONS

The 270AX/AY valves are available without a chamber (Figure 1), with a cast ductile 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).

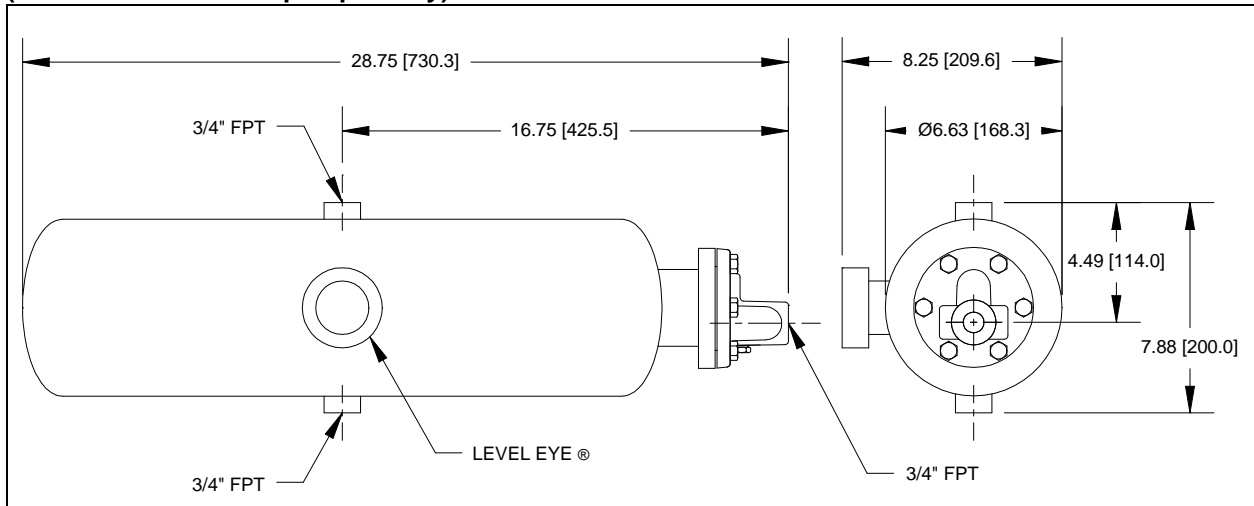
**Figure 5: 270AX/AY VALVE WITHOUT CHAMBER**



**Figure 6: 270AX/AY VALVE WITH CAST CHAMBER PN 299A (Valve & Chamber Ship Assembled)**



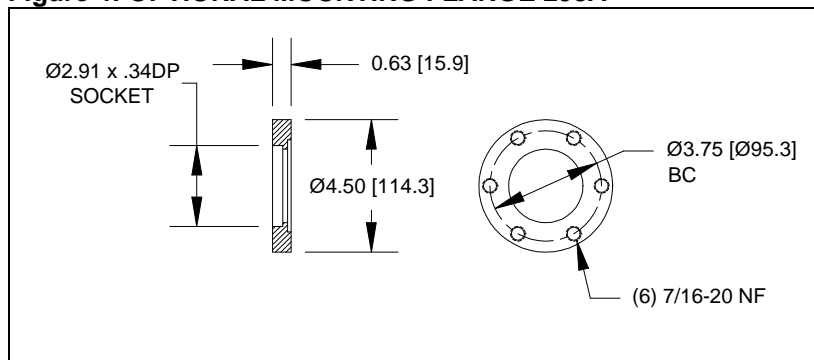
**Figure 7: 270AX/AY VALVE WITH STEEL CHAMBER PN B-10985  
(Valve & Chamber Ship Separately)**



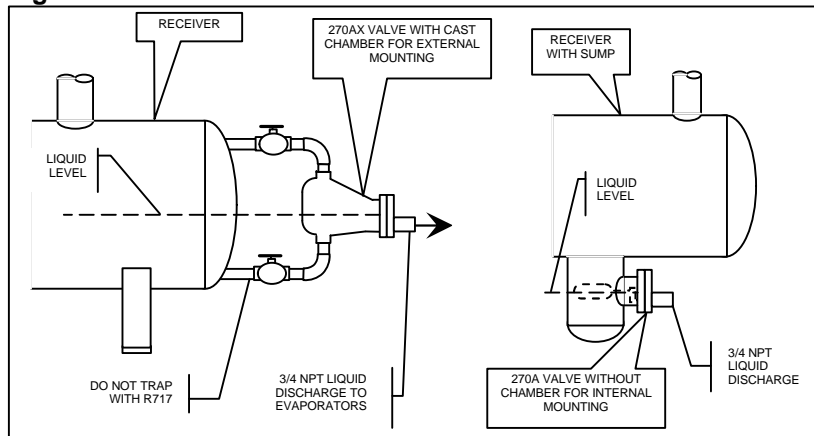
The valve should always be oriented such that the 3/4" FPT outlet connection is toward the bottom of the valve and the front face is vertical. This will ensure that the float moves appropriately with changes in liquid level.

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 298A**



**Figure 5: 270AX/AY REFRIGERANT CONTROL APPLICATIONS**

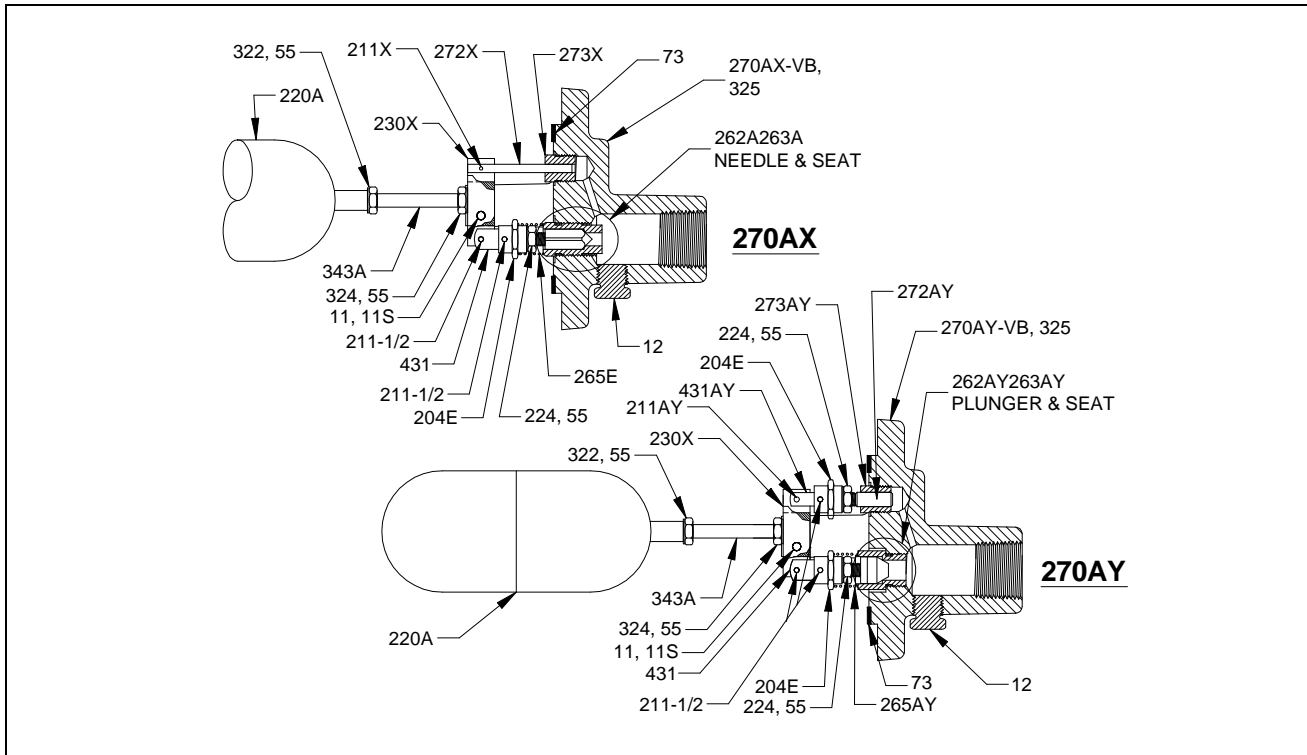


## REPLACEMENT PARTS

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: 270AX, AY VALVE ASSEMBLIES**



**Table 3: 270AX & AY REPLACEMENT PARTS**

Description	Part Number (Quantity = 1, unless otherwise noted.)	
	<b>270AX</b>	<b>270AY</b>
CHAMBER, CAST (OPTIONAL)	299A	299A
CHAMBER, STEEL (OPTIONAL)	B-10985	B-10985
VALVE BODY	270AX-VB	270AY-VB
CAP SCREW	325 (6 REQ'D)	325 (6 REQ'D)
GASKET	73	73
PIPE PLUG	12	12
FLOAT	220A	220A
FLOAT ROD	343A	343A
NUT, FLOAT	322	322
NUT, FLOAT BLOCK	324	324
LOCK WASHER	55 (3 REQ'D)	55 (4 REQ'D)
LEVER PIN	11	11

Description	Part Number (Quantity = 1, unless otherwise noted.)	
	<b>270AX</b>	<b>270AY</b>
SPACER (THK: 1/8, 5/32, 3/16, 7/32)	11S (QTY AS REQ'D, SPECIFY THICKNESS)	
LINK	431	431 (1 REQ'D)
		431AY (1 REQ'D)
ROLL PIN	211 - 1/2 (2 REQ'D)	211 - 1/2 (3 REQ'D)
	211X (1 REQ'D)	211AY (1 REQ'D)
ADJUSTING NUT	204E	204E (2 REQ'D)
LOCK NUT	224	224 (2 REQ'D)
ROD (PISTON)	272X	272AY
BOSS	273X	273AY
SPRING (NO SPRING FOR 270AXF OR 270AYF HALOCARBON)	265E	265AY
NEEDLE/PLUNGER & SEAT BUSHING	262A263A (13/64)	262AY263AY (3/8)

## SERVICE INSTRUCTIONS

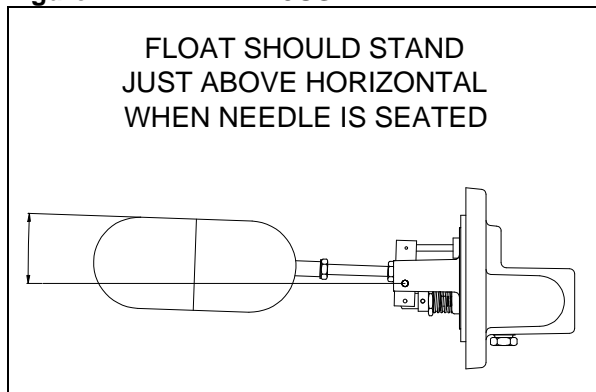
**Lever pin / float block removal and replacement:** If it is necessary to remove the lever pin (11) during servicing, first cut one end of the pin flush with the casting. Then either pull the pin out with pliers, or carefully drive it out with a punch. Retain the spacers (11S) for re-assembly. The rod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

10. Remove the lever pin and float block as described above. Retain the spring for final assembly.
11. Remove the old seat bushing and install a new one using PTFE tape or other pipe sealant on the threads.
12. Remove the old needle from the adjusting nut (204E), lock washer (55), and lock nut (224). Reassemble these parts loosely on the new needle.
13. 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.**
14. 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.
15. 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**



16. 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).

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

18. 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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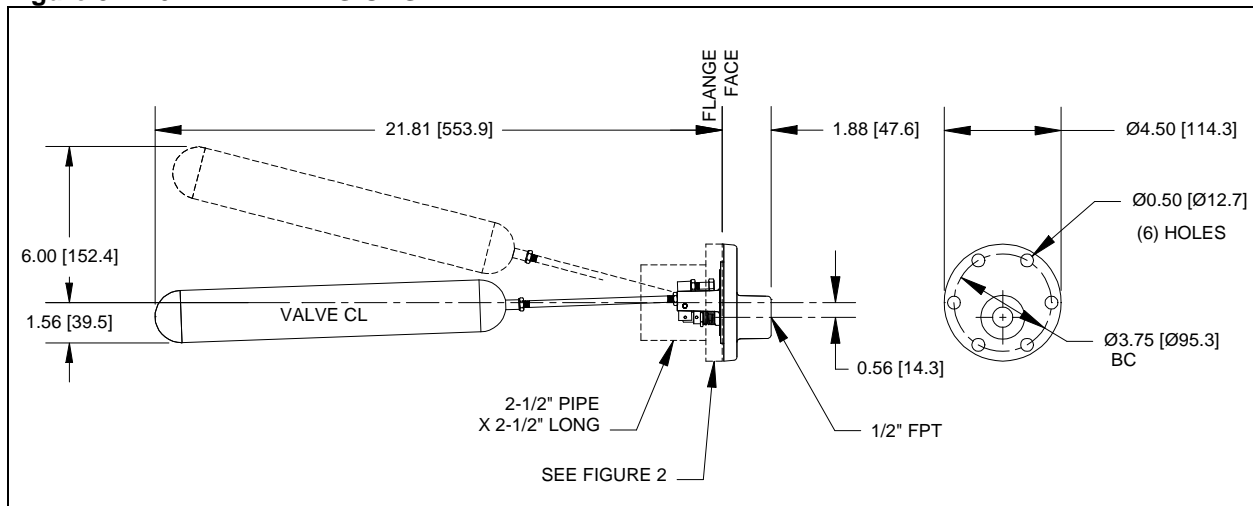
**Pressure Rating:** 300 psig (21 bar, gauge)

**Maximum Operating Pressure Differential:** 250 psi (17 bar)

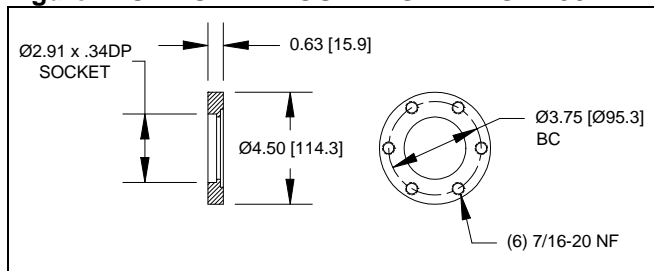
**Temperature Rating:** -20°F to 240°F  
(-29°C to 116°C)

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 298A**

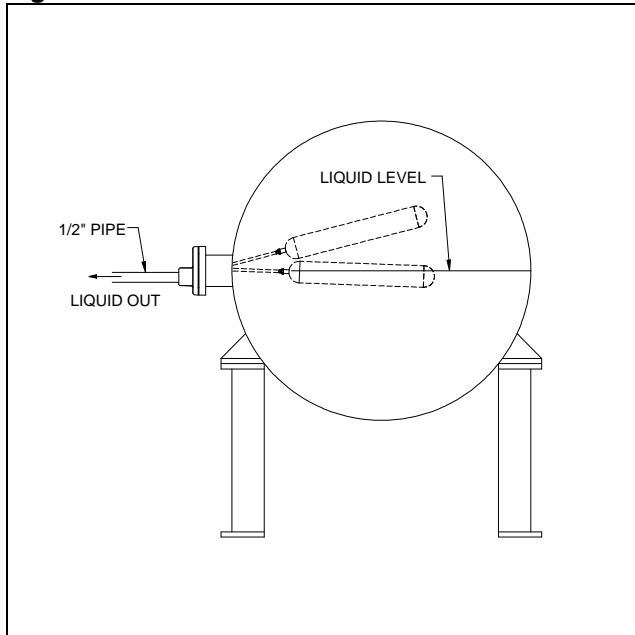


### INSTALLATION INSTRUCTIONS

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**

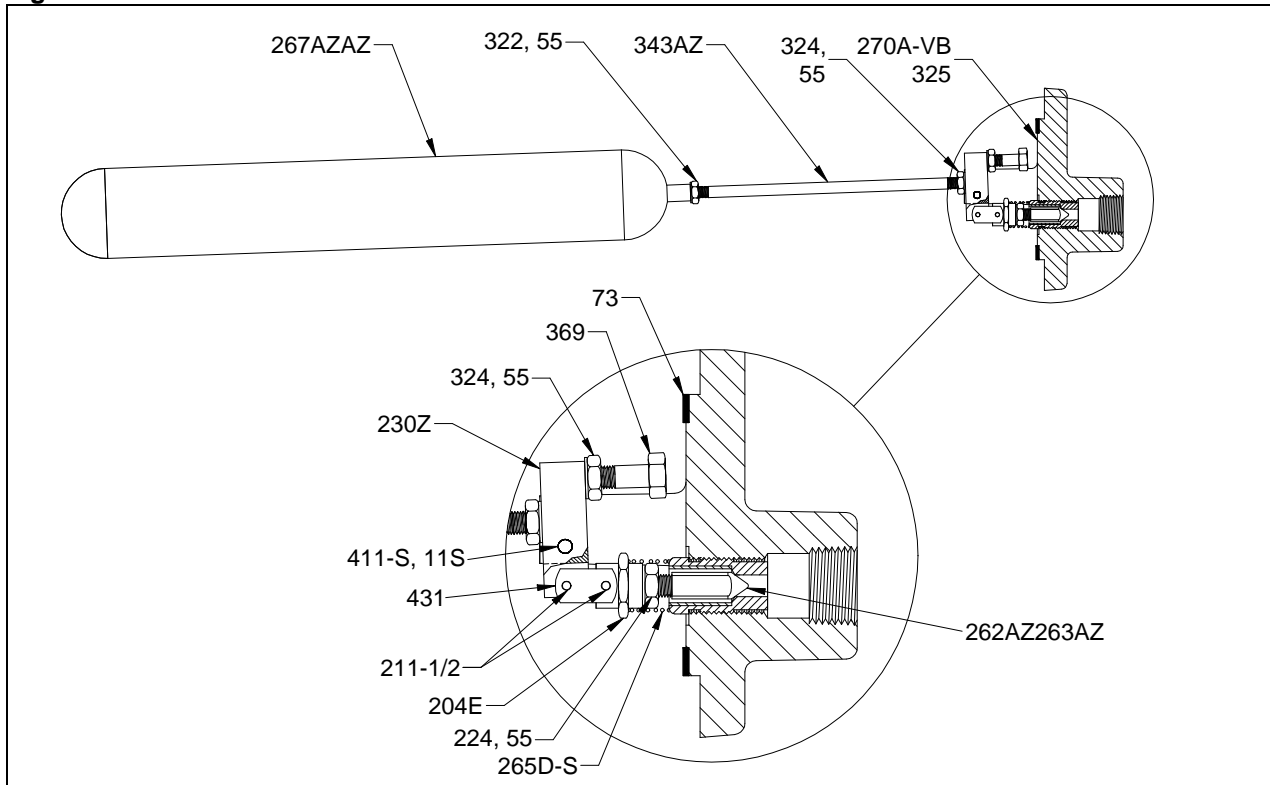
Basic replacement parts are illustrated in Figure 4 below and listed in Table 1.

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: 270AZAZ REPLACEMENT PARTS**

Description (Quantity = 1, unless otherwise noted.)	Part Number
VALVE BODY (PLATED)	270A-VB
GASKET	73
CAP SCREW (PLATED, 6 REQ'D)	325
FLOAT (SS)	267AZAZ
FLOAT ROD (PLATED)	343AZ
NUT, FL. BALL (PLATED)	322
NUT (PLATED, 2 REQ'D)	324
LOCK WASHER (PLATED, 4 REQ'D)	55
FLOAT BLOCK (PLATED)	230Z
LEVER PIN (SS)	411-S
SPACER (QTY. AS REQ'D, SPECIFY THICKNESS)	11S (1/8, 5/32, 3/16, 7/32)
LINK	431
ROLL PIN	211-1/2
ADJUSTING NUT (PLATED)	204E
LOCK NUT (PLATED, 2 REQ'D)	224
SPRING (SS)	265D-S
NEEDLE & SEAT (SS)	262AZ263AZ (.234)
STOP BOLT (PLATED)	369

**Figure 4: 270AZAZ VALVE ASSEMBLY**



## 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:

19. Remove the lever pin and float block as described above. Retain the spring for final assembly.

20. Remove the old seat bushing and install a new one using PTFE tape or a hardening pipe sealant on the threads.

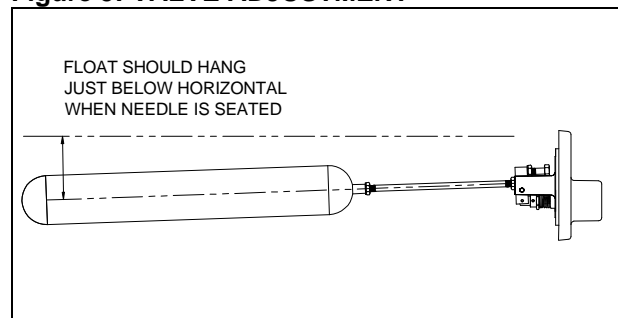
21. Remove the old needle from the adjusting nut (204E), lock washer (55), and lock nut (224). Reassemble these parts loosely onto the new needle.

22. 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.**

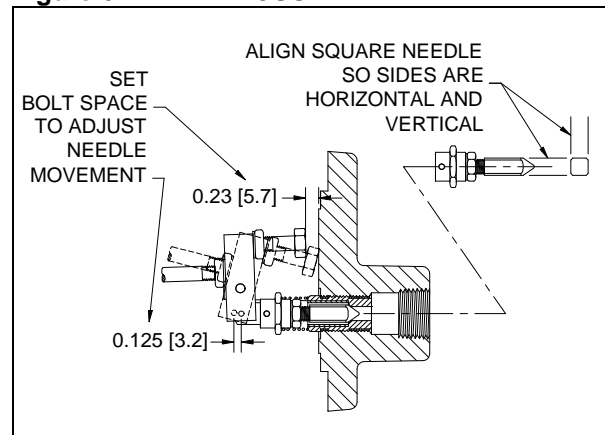
23. Secure the valve body so the float rod is approximately horizontal. (Do not damage the gasket surface on the valve body.) Turn the needle in or out of the adjusting nut until the float is horizontal when the needle is seated in the bushing.

24. Then screw the needle 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**



25. 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.

26. 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).

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

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

29. Adjust the stop bolt (369) so that the 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 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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