

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

SV16 TEMPERATURE/PRESSURE BALANCING MIXING VALVE



SV16
US PATENTS - US 10,474,170 B2 & US D697,591



SV16-LVR
US PATENT - US 10,474,170 B2

FOR TECHNICAL ASSISTANCE
1-(847)-604-4773



NOTES TO THE INSTALLER:

- 1. Please leave this documentation with the owner of the fixture when finished.**
- 2. Please read this entire booklet before beginning the installation.**
- 3. Check your installation for compliance with plumbing and other applicable codes.**



WARNING:

Thoroughly read all installation instructions and product safety information before beginning the installation of this product.

FAILURE TO READ AND FOLLOW PROPER INSTALLATION AND MAINTENANCE INSTRUCTIONS MAY RESULT IN PRODUCT FAILURE WHICH CAN CAUSE PROPERTY DAMAGE, PERSONAL INJURY AND/OR DEATH.

CONTROLS® is not responsible for damages resulting from improper installation and/or maintenance. Installation of this valve shall be in accordance with *Uniform Plumbing Code*.

TO ENSURE ACCURATE AND RELIABLE OPERATION OF THIS PRODUCT, IT IS ESSENTIAL TO:

- Properly design the system to minimize pressure and temperature variations.
- Implement an annual maintenance program to ensure proper operation and temperature setting of valve(s).
- This valve is factory preset however, it can be adjusted. It is the responsibility of the installer and or facility maintenance personal to make sure valve outlet temperature does not exceed 115°F (46°C) after installation, maintenance or repair.

SUPPLIES REQUIRED:

(Not provided by CONTROLS®)

1. Wall anchors, screws, nuts and washers as required.
2. Teflon tape for sealing water connections.
3. Allen wrenches for lever handle and bonnet set screws.
4. Copper pipe adapters as required.
5. Snap-ring pliers with pins less than 0.03"



IMPORTANT

- Flush supply lines of all foreign material such as pipe dope, chips or solder prior to connecting to mixing valve.
- To ensure proper installation, review the manual thoroughly to verify rough-ins before beginning any work.
- Installation and field adjustment are the responsibility of the installer.
- Maximum water pressure is 125 PSI (8.62 bars). Maximum inlet hot water temperature is 180°F (82°C). Temperature adjustment range is 85°F-115°F (29°C-46°C). Valve assembly must be drained prior to being subjected to freezing temperatures. Valve includes integral check-stops.

PRESSURE DROP PSID (kPa)	Cv	5 (34)	10 (69)	15 (103)	20 (138)	30 (207)	45 (310)	60 (414)
FLOW RATE GPM (LPM)	0.6	1.3 (5)	1.9 (7.1)	2.3 (8.7)	2.7 (10)	3.3 (12.4)	4 (15.1)	4.6 (17.5)

ROUGH-IN DIMENSIONS:

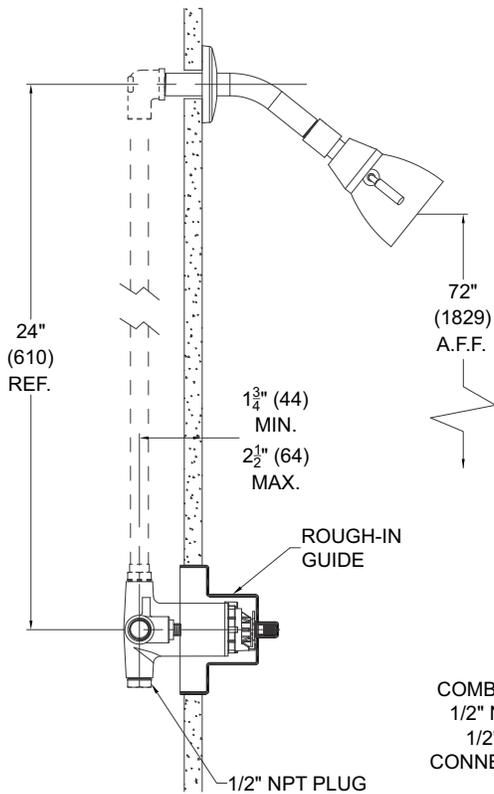


FIGURE 1

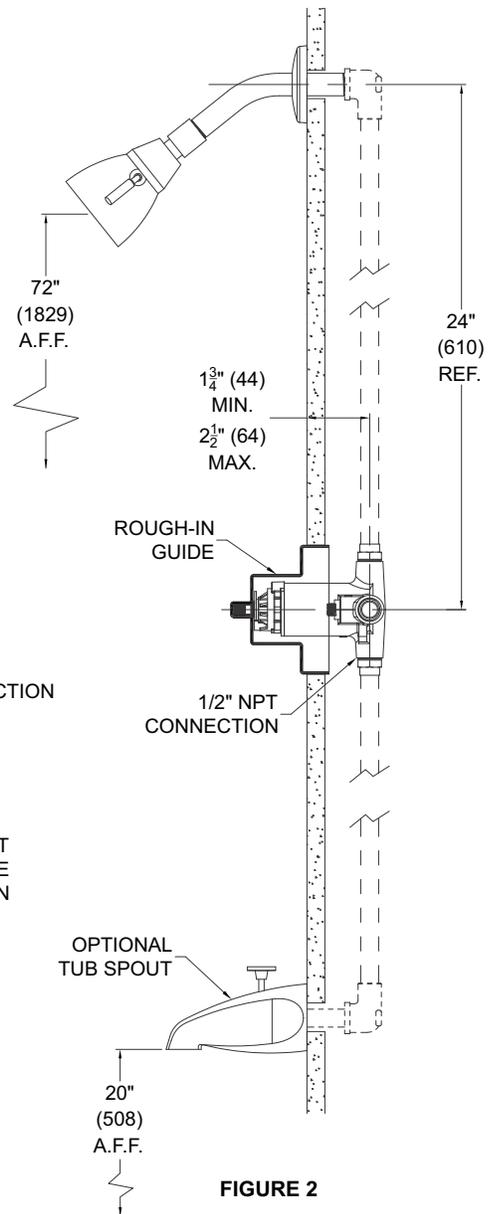
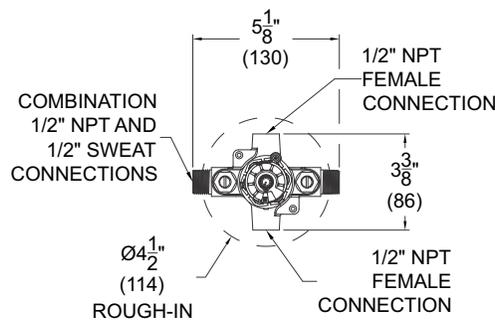


FIGURE 2

Patent Pending

SPECIFICATIONS:

Connections: Combination 1/2" NPT and 1/2" sweat Inlet Connections

Riser Connection: 1/2" NPT

Flow Rate: 4 GPM (15 LPM) @ 45 PSI (310 kPa) Differential

Hot Water Supply Temp.: 110°F-180°F (43°C-82°C)

Cold Water Supply Temp.: 35°F-80°F (1.7°C-27°C)

Approach Temperature*: 5°F (2.8°C) Above Set Point

Maximum Operating Pressure: 125 PSI (862 kPa)

Temperature Ranges*: 85°F-115°F (29°C-46°C)

Minimum Flow: 1.25 GPM (4.7 LPM)

*Please refer to **ASSE 1016-2011** for other test conditions which may or may not equal installed conditions.

NOTE:
ALL DIMENSIONS ARE IN INCHES (MM).

! IMPORTANT

Excessive overheating of valve during soldering may damage the cartridge and checkstops. Do not heat valve any higher than needed to flow solder. If a higher temperature method is being used, **all internal components must be removed**. See figures 8 for cartridge removal and 9 and 10 for temperature limit setting.

INSTALLATION:

1. With installation guide **1** on the valve, position shower valve **2** so that center of inlet ports are $2" \pm 3/8"$ (51mm \pm 9.5mm) from finished wall ensuring the outlet port marked "T" is facing down.

NOTE:

After the valve has been piped and before starting finished wall, the rough-in guide will insure proper size opening in finished wall for valve, access to checkstops and for repairs.

2. Make up connections to the appropriate inlet ports, marked "H" and "C". Inlet connections are combination 1/2" NPT and 1/2" sweat.
3. Valve is set-up for standard inlets. If reversed inlets are required for back-to-back installation, see "**Back-To-Back Installation**" page **5**.
4. For **shower only installation**, see Figure **1** on page **3**. Pipe directly from top outlet port to showerhead and leave plug in bottom port. Outlet port connection is 1/2" NPT female.
5. For **tub and shower installation**, see Figure **2** on page **3**. Remove plug and pipe directly from bottom outlet port to diverter tub spout and top outlet port to showerhead. Outlet ports connections are 1/2" NPT female. Valve is designed to be used without the use of a twinell.
6. Remove rough-in guide **1**.
7. Prior to installing valve trim, check for proper operation of valve, on/off, flow and high temperature limit. If temperature is not satisfactory, refer to **TEMPERATURE ADJUSTMENT** page **6** step **4**.
8. Prior to installing valve trim, attach escutcheon gasket **4** to the back of escutcheon **5** and gaskets **3** and **4** to the back of escutcheon **6** by removing adhesive protection film and attaching as shown in Figure **4** and **5**.

NOTE: Ensure that outer gasket **4** gap is positioned facing towards bottom of escutcheon **5** (See NOTE).

- 9A. **SV16 Valve Trim Installation:** Figure **6**
 - a. Remove adhesive protective film from foam gasket **7** and wrap around valve body as shown.
 - b. Place escutcheon with gaskets **5** over valve and against finished wall and secure with screws **8**.
 - c. Push handle **9** onto valve stem and secure with screw **10** using provided Allen Wrench **11**.

NOTE: If handle **10** does not sit properly in escutcheon, remove stem insert **12** and rotate so it sits on upper or lower ledge. Detail "**A**".



FRONT OF
INSTALLATION
GUIDE

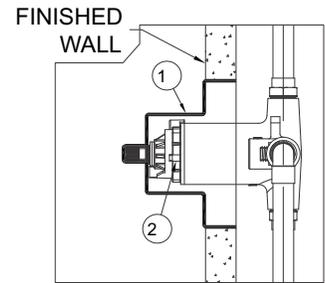


FIGURE 3

NOTE: Position gasket **4** opening gap as shown and align directly with bottom of escutcheon **5** (Position at 6 o'clock)

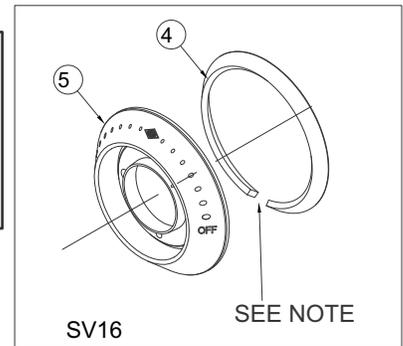


FIGURE 4

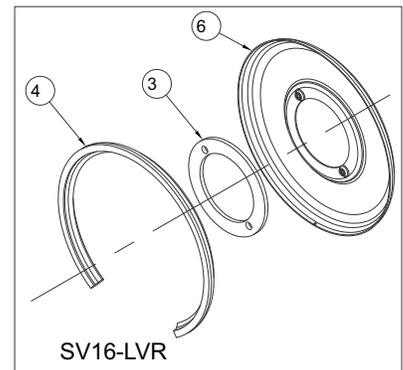
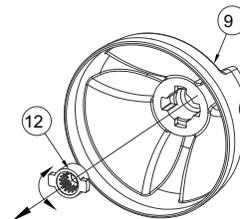


FIGURE 5



DETAIL "A"

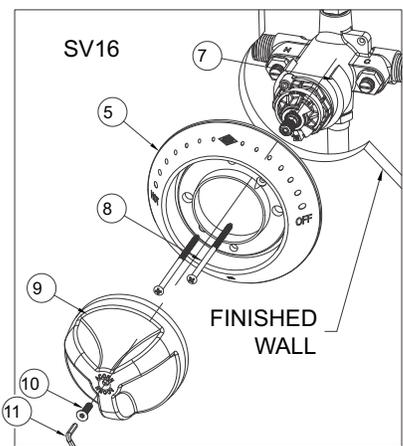


FIGURE 6

VALVE TRIM INSTALLATION CONTINUES:

- 9B. **SV16-LVR Valve Trim Installation:** Figure 7.
- Slide valve sleeve **13** over valve body.
 - Place escutcheon with gaskets **6** over valve sleeve **13** and against finished wall and secure with screws **8**.
 - Push handle **14** onto valve stem and secure with set screw **15**.

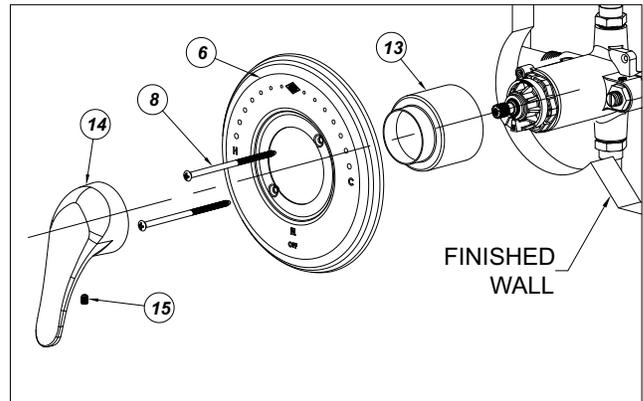
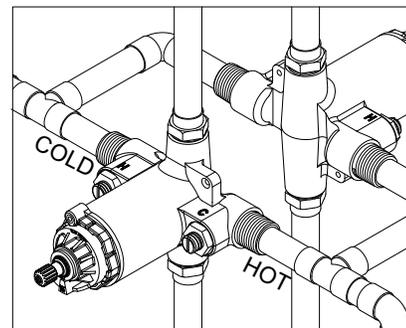


FIGURE 7

BACK-TO-BACK INSTALLATION:

- For 2" x 6" wall construction, position shower valve so that center of inlet ports are 2-1/8" ± 3/8" (54mm ± 9.5mm) from finished wall, ensuring the outlet port marked "T" is facing down.
- For 2" x 4" wall construction position, shower valve so that center of inlet ports are 1-3/8" ± 1/4" (35mm ± 6mm) from finished wall, ensuring the outlet port marked "T" is facing down.
- Make up connections to the appropriate inlet ports, marked "H" and "C" on one valve and reverse on the other, cold supply to "H" and hot supply to "C". Inlet connections are combination 1/2" NPT and 1/2" sweat. Refer to page 6 for cartridge removal and reversal.
- To continue installations, follow steps 4-9A on page 4 or 9B on page 5.

BACK TO BACK DETAIL



VIEW FROM REVERSED SIDE

! IMPORTANT

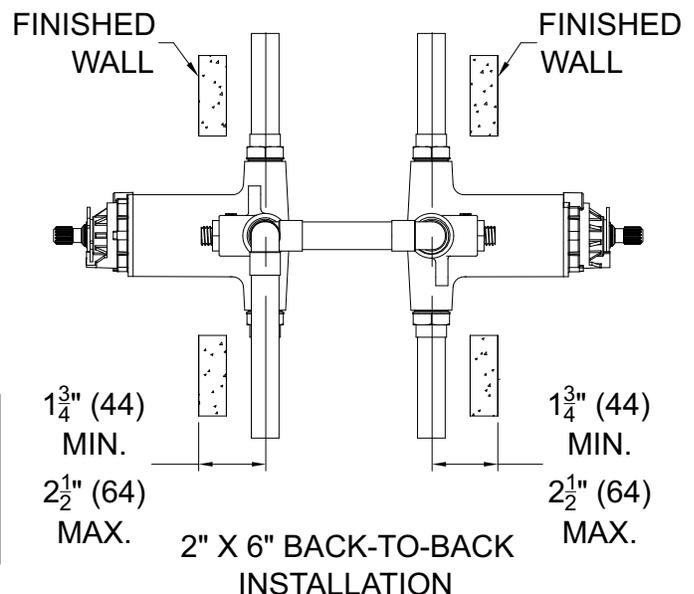
To avoid confusion, Hot and Cold inlets need to be re-identified for future maintenance.

! IMPORTANT

Excessive overheating of valve during soldering may damage the cartridge and checkstops. Do not heat valve any higher than needed to flow solder. If a higher temperature method is being used **all internal components must be removed**. See figures 8 for cartridge removal and 10 for temperature limit setting.

! IMPORTANT

Upon completion of installation check all points of connection for leakage.



CARTRIDGE REMOVAL:

1. Bonnet Removal: Figure 8.

- a. Close Checkstops **16**.
- b. Using snap-ring pliers with pins less than 0.03", by others, remove snap-ring **17**.
- c. Remove both temperature limit washers **18**.
- d. Loosen 1/16" hex set screw **19**.
- e. Unscrew bonnet **20**.
- f. Remove external valve stem **21**
- g. Pull cartridge **22** out.

2. Cartridge Reversal and Reassembly:

- a. Inspect valve cartridge **22** ensuring that 'D' shaped grooves have cartridge screen O-rings **23** in them and that stainless steel screens **24** are seated. See **Figure 8**.
- b. Insert cartridge **22** into valve body. Ensure the 'H' (see detail) on the side of cartridge housing is on the cold water supply side of valve casting. Take note of the rib on the bottom of cartridge **22** (between the screens) and the slot in the bottom of valve body are aligned. This is so when the cartridge is installed, it seats in the valve casting and cartridge will not rotate. See **Figures 9 and 10**.
- c. With valve stem O-ring **25** assembled onto valve stem **21**, slide valve stem **21** onto cartridge stem while holding in place. See **Figure 11**.
- d. Inspect valve bonnet set screw **19** and ensure it is in the backed out position. Slide bonnet O-ring **26** over threaded area on bonnet **20** and seat in groove. See **Figure 11**. **NOTE:** For optional Lever Handle, slide O-ring **26** into groove on the top of bonnet **20**.
- e. Thread valve bonnet **20** into valve casting turning clockwise. Apply pressure on top of stem while screwing valve bonnet **20** into place. This will keep cartridge from slipping out of slot while bonnet is threaded into place. Tighten valve bonnet **20** onto valve body firmly (180 In-Lbs). Tighten set screw **19** with 1/16" Allen wrench firmly (75 In Oz). This will prevent valve bonnet **20** from coming loose during use. See **Figure 11**.

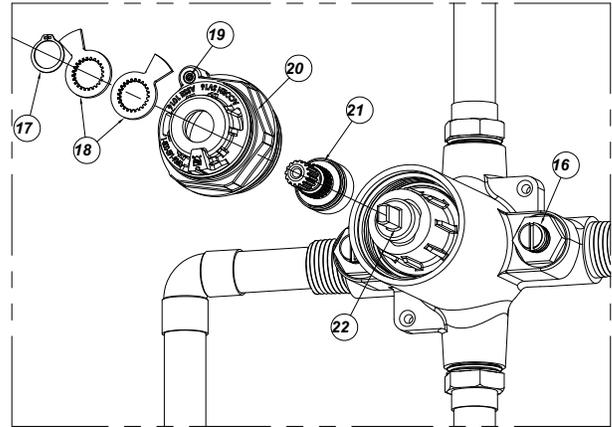


FIGURE 8

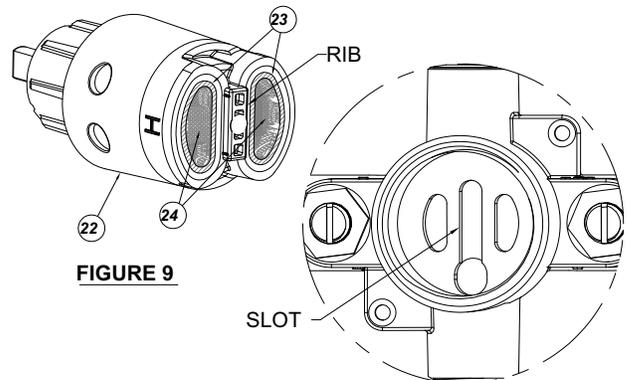


FIGURE 9

FIGURE 10

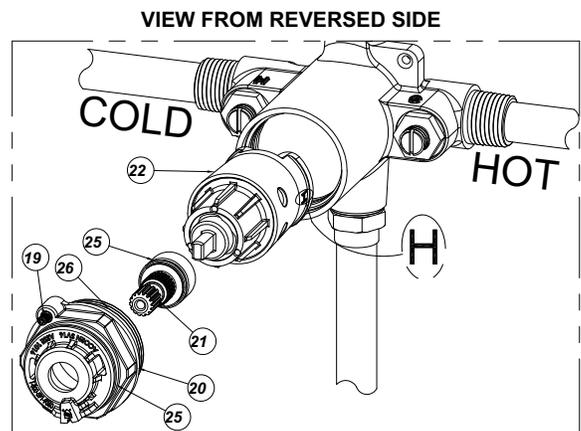


FIGURE 11

OFF POSITION SETTING:

1. Turn on hot and cold water supply. Open both check stop assemblies by turning check adjustment screw **16** counterclockwise until screw tops out. Check for leaks around bonnet and stop assemblies at this time.
2. Using handle, rotate valve stem **21** clockwise two full turns. Continue to slowly turn handle clockwise until water flow stops. Then continue to rotate handle clockwise an additional 90 Deg. (1/4 turn) then stop. Turn back counterclockwise slowly until the water flow completely stops.
3. With the flow of water now shut off, place the first temperature stop washer **18** on the valve stem **21** keyed on the counterclockwise side as close to the bonnet stop as possible. See **Figure 12**.
4. Once temperature stop washer **18** is installed, slightly open valve by turning stem with handle counterclockwise and then back clockwise until first temperature stop washer **18** hits stop on valve bonnet. At this time, ensure that water is shut off completely to showerhead.
5. If not, rotate stop one tooth either way and repeat step 4 until the water flow is shut off and the temperature stop washer **18** is against the valve bonnet stop.

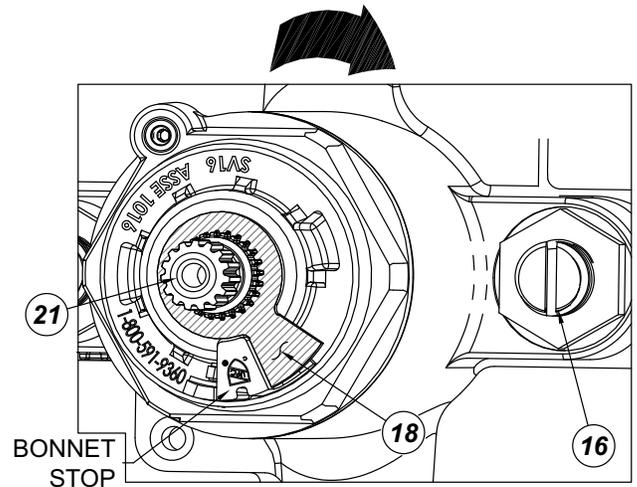


FIGURE 12

HIGH LIMIT TEMPERATURE SETTING:

1. Rotate external stem **21** with handle counter-clockwise measuring water temperature with a thermometer until the high limit temperature is reached. (*Recommend 105° to 110 °F*)
2. Place the second temperature stop washer **18** on the valve stem **21** keyed on the clockwise side as close to the valve bonnet stop as possible. Rotate counterclockwise until it is fully against bonnet stop (full hot). See **Figure 13**.
3. At full hot, use thermometer to verify required high limit temperature is reached.
4. With valve in the “ON” position and water running install the retaining ring **17** with snap ring pliers. Confirm snap ring is inserted properly on groove of stem. (When water is running, the external stem **21** is pushed outward increasing the exposure of the snap ring groove.) See **Figure 14**.

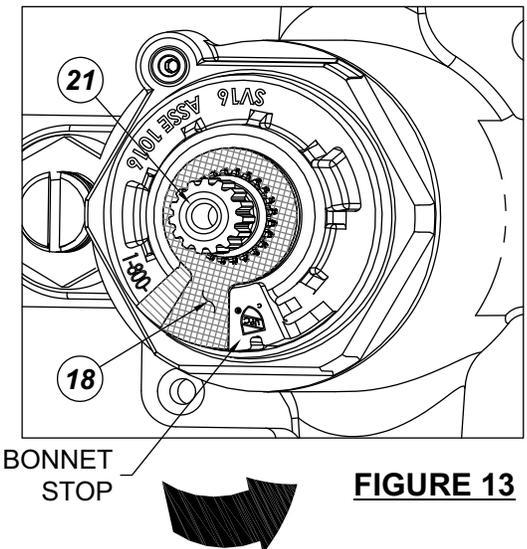


FIGURE 13

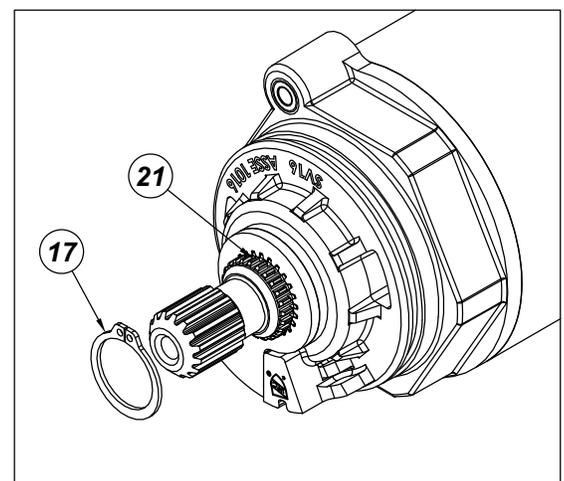
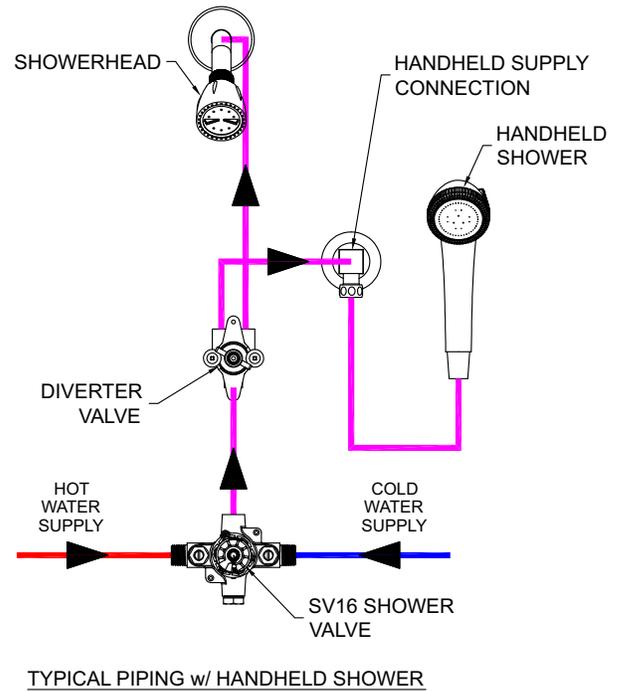
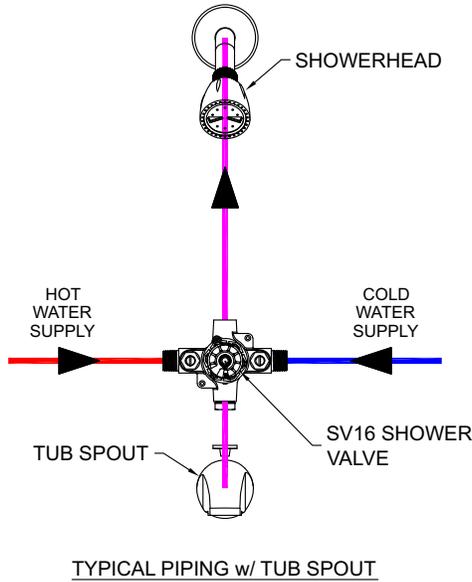


FIGURE 14



IMPORTANT

Upon completion of installation check all points of connection for leakage.



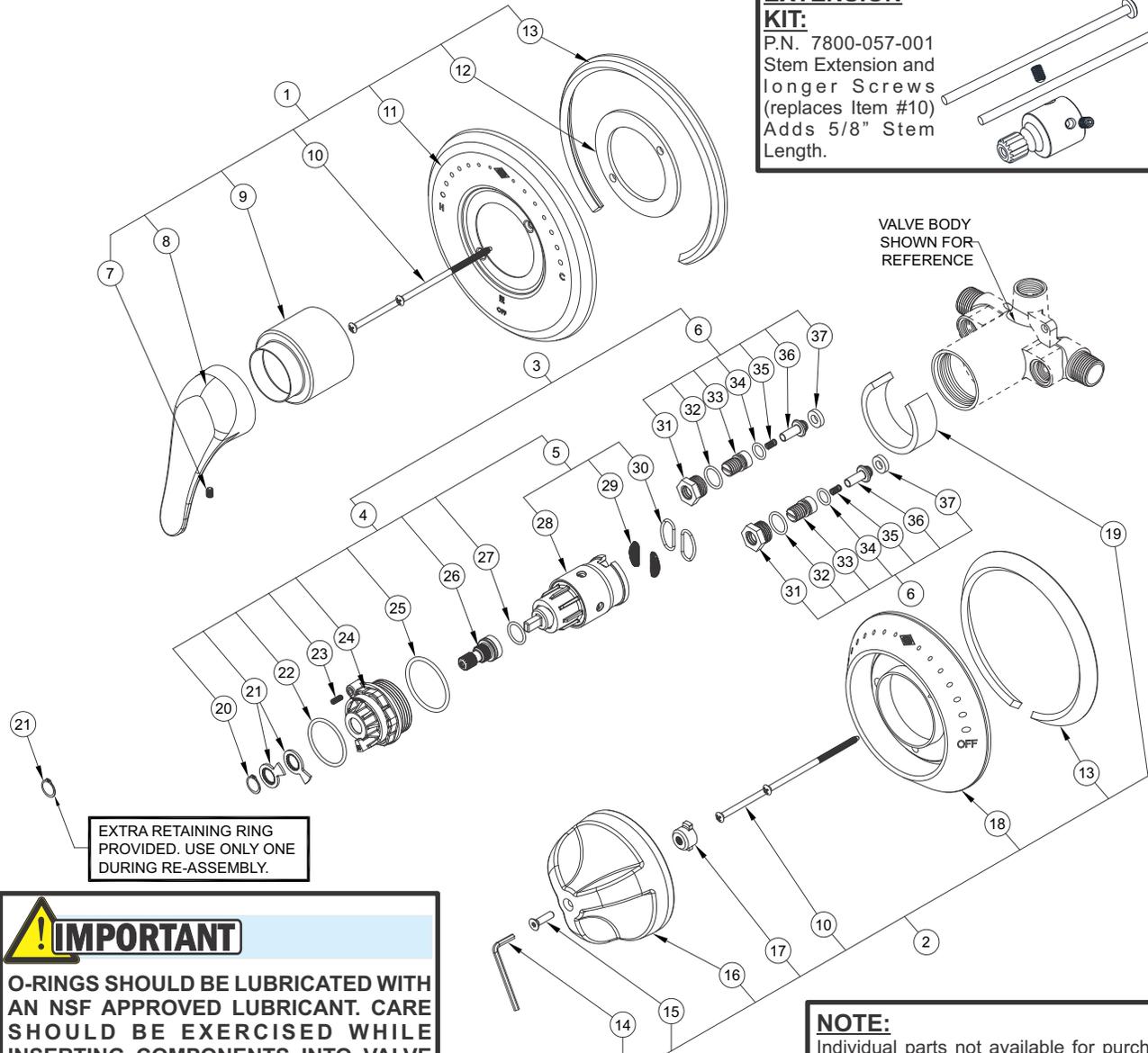
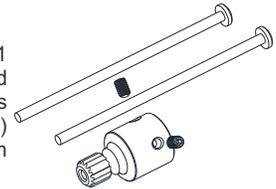
TROUBLESHOOTING:

PROBLEM	CAUSE	SOLUTION
1. SET POINT DIFFICULT TO SET OR CANNOT BE REACHED	<ul style="list-style-type: none"> SUPPLY TEMPS NOT WITHIN SPECIFIED LIMITS HOT AND COLD SUPPLIES ARE REVERSED 	<ul style="list-style-type: none"> CHECK DIFFERENTIAL TEMPERATURE BETWEEN SUPPLIES AND OUTLET REINSTALL VALVE WITH SUPPLIES CONNECTED TO MARKED INLETS
2. DOES NOT MAINTAIN OUTLET TEMPERATURE OR CHANGES OVER TIME	<ul style="list-style-type: none"> FLUCUATION IN SUPPLY PRESSURES FILTERS BLOCKED WITH DEBRIS 	<ul style="list-style-type: none"> CHECK DIFFERENTIAL TEMPERATURE BETWEEN SUPPLIES AND OUTLET CLEAN FILTERS
3. DISCHARGE TEMPERATURE TOO HOT OR TOO COLD	<ul style="list-style-type: none"> VALVE NOT ADJUSTED PROPERLY 	<ul style="list-style-type: none"> READJUST VALVE TEMPERATURE PER INSTALLATION INSTRUCTIONS
4. NO FLOW FROM VALVE	<ul style="list-style-type: none"> HOT OR COLD SUPPLY FAILURE OR SHUTOFFS CLOSED CHECK FILTERS BLOCKED WITH DEBRIS 	<ul style="list-style-type: none"> OPEN SHUTOFFS OR RESTORE HOT AND COLD SUPPLIES CLEAN FILTERS

REPAIR PARTS:

STEM EXTENSION KIT:

P.N. 7800-057-001
Stem Extension and longer Screws (replaces Item #10)
Adds 5/8" Stem Length.



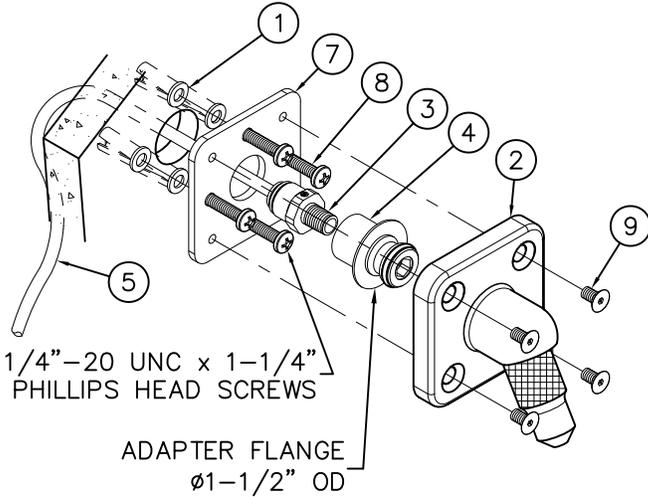
EXTRA RETAINING RING PROVIDED. USE ONLY ONE DURING RE-ASSEMBLY.

IMPORTANT
O-RINGS SHOULD BE LUBRICATED WITH AN NSF APPROVED LUBRICANT. CARE SHOULD BE EXERCISED WHILE INSERTING COMPONENTS INTO VALVE BODY DURING RE-ASSEMBLY.

NOTE:
Individual parts not available for purchase, sold in Repair Kits only. Parts called out for reference only.

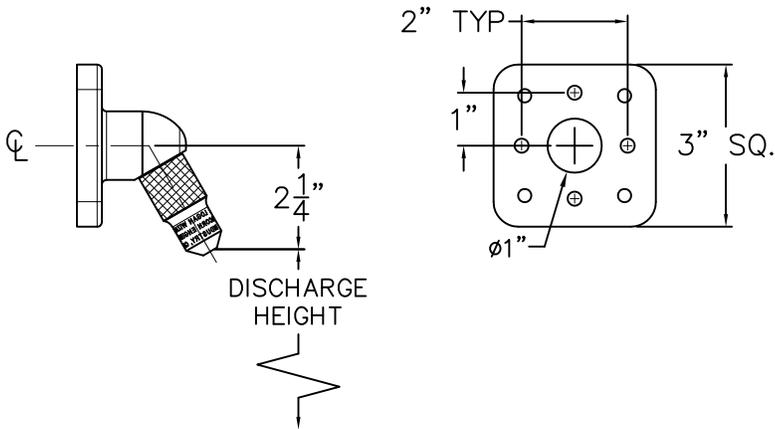
ITEM	KIT NUMBER	DESCRIPTION	ITEM	KIT NUMBER	DESCRIPTION
1	7800-503-001	TRIM REPLACEMENT, LEVER HANDLE	4	7800-502-001	CARTRIDGE & BONNET REPLACEMENT
2	7800-186-001	TRIM REPLACEMENT, LIGATURE RESISTANT	5	7800-175-001	CARTRIDGE REPLACEMENT
3	7800-500-001	COMPLETE REBUILD KIT	6	7800-504-001	CHECK-STOP REBUILD KIT

ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION
7	CUP POINT SET SCREW	18	LIGATURE RESISTANT ESCUTCHEON	29	STAINLESS STEEL SCREENS (x2)
8	LEVER HANDLE	19	SLEEVE GASKET (SV16 ONLY)	30	CARTRIDGE SCREEN O-RINGS (x2)
9	VALVE SLEEVE	20	RETAINING RING (x2)	31	CHECK CAP (x2)
10	OVAL HEAD SCREWS (x2)	21	TEMPERATURE STOP RINGS (x2)	32	CHECK CAP O-RING (x2)
11	ESCUTCHEON, LEVER HANDLE	22	EXTERNAL BONNET O-RING	33	CHECK ADJUST SCREW (x2)
12	TRIM PLATE CENTER GASKET	23	SET SCREW	34	CHECK ADJUST SCREW O-RING (x2)
13	ESCUTCHEON GASKET	24	VALVE BONNET	35	CHECK SPRING (x2)
14	5/32" CENTER REJECT ALLEN WRENCH	25	BONNET O-RING	36	CHECK PLUNGER (x2)
15	LIGATURE RESISTANT HANDLE SCREW	26	VALVE STEM	37	CHECK SEAL (x2)
16	LIGATURE RESISTANT HANDLE	27	VALVE STEM O-RING	38	
17	STEM INSERT	28	CARTRIDGE		

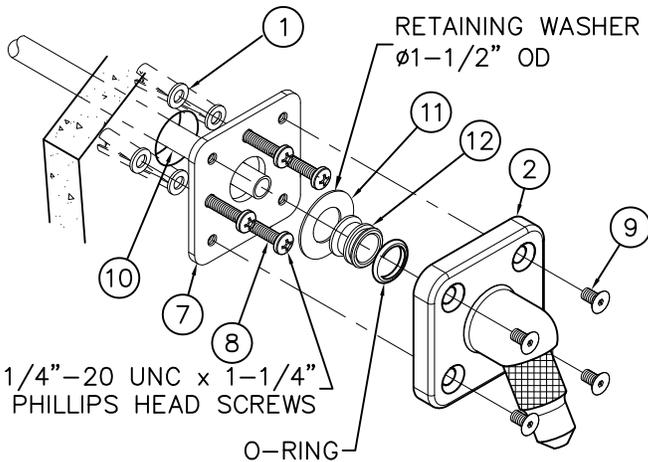


SHOWERHEAD HAVING -A ANCHOR PLATE OPTION FOR ZENITH WITH 3/8" PE TUBING RISER CONNECTION

PRIOR TO MAKING UP CONNECTIONS TO VALVE ASSEMBLY, FLUSH SUPPLY LINES THOROUGHLY. INSTALL WALL ANCHORS ① BY OTHERS USING -A ANCHOR PLATE ⑦ AS A TEMPLATE. ASSEMBLE 3/8" O.D. x 1/4" NPT PUSH-IN FITTING ③ TO O-RING ADAPTER ④. AFTER PULLING 3/8" OD PE TUBING ⑤ THRU WALL AND ANCHOR PLATE ⑦ OPENINGS, PUSH INTO FITTING ③ AND PULL TO LOCK. SECURE ANCHOR PLATE ⑦ TO WALL WITH SCREWS ⑧ PROVIDED. PUSH O-RING ADAPTER ASSEMBLY INTO SHOWERHEAD ②. INSTALL ASSEMBLY TO ANCHOR PLATE ⑦ USING SCREWS ⑨ PROVIDED.



REFERENCE DRAWINGS	
ASSEMBLIES	NUMBER
SHOWERHEAD	9970-105-004
NOZZLE	9970-101-004
ANCHOR PLATE	9970-150-003



SHOWERHEAD HAVING -A ANCHOR PLATE OPTION FOR ZENITH WITH 1/2" NCT RISER CONNECTION

PRIOR TO MAKING UP CONNECTIONS TO VALVE ASSEMBLY, FLUSH SUPPLY LINES THOROUGHLY. USE ANCHOR PLATE ⑦ AS A TEMPLATE AND INSTALL WALL ANCHORS ① BY OTHERS. INSTALL 1/2" NCT SHOWER RISER ⑩ BY OTHERS THRU WALL, ANCHOR PLATE ⑦ AND STUB-OUT EXTENDED 1" FROM BEYOND WALL. PLACE RETAINING WASHER ⑪ AND O-RING ADAPTER ⑫ OVER STUB-OUT ⑩ AND POSITION AGAINST ANCHOR PLATE ⑦. REMOVE O-RING BEFORE SOLDERING O-RING ADAPTER ⑫ TO STUB-OUT ⑩. REINSTALL O-RING AND INSTALL SHOWERHEAD ② TO ANCHOR PLATE ⑦ USING SCREWS ⑨ PROVIDED.

ACORN ENGINEERING COMPANY
P.O. BOX 3527 Industry, CA 91744
15125 Proctor Ave Industry, CA 91746
(626) 336-4561 FAX (626) 961-2200

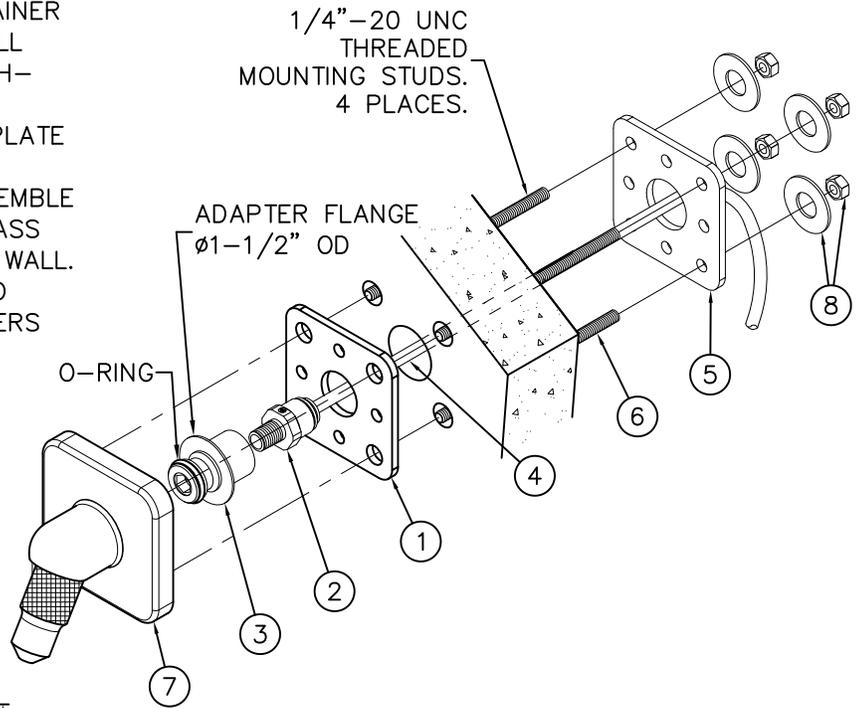
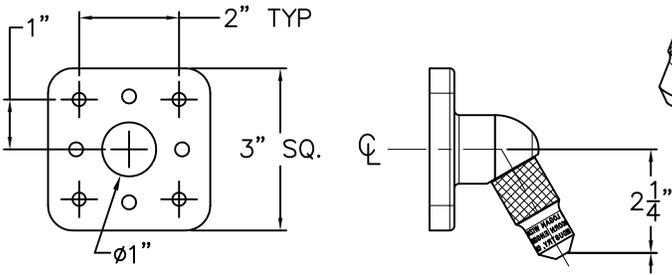
TITLE INSTALLATION OF FLANGED BRACKET SHOWERHEADS w/ -A ANCHOR PLATE		
MANUFACTURE DATE JULY 1975 TO PRESENT	DATE ISSUED 09/29/04	DRAWING NUMBER 9900-320-003
	DATE REVISED 01/27/14	



**SHOWERHEAD HAVING -B BACK PLATE OPTION
FOR ZENITH WITH 3/8" PE TUBING RISER
CONNECTION**

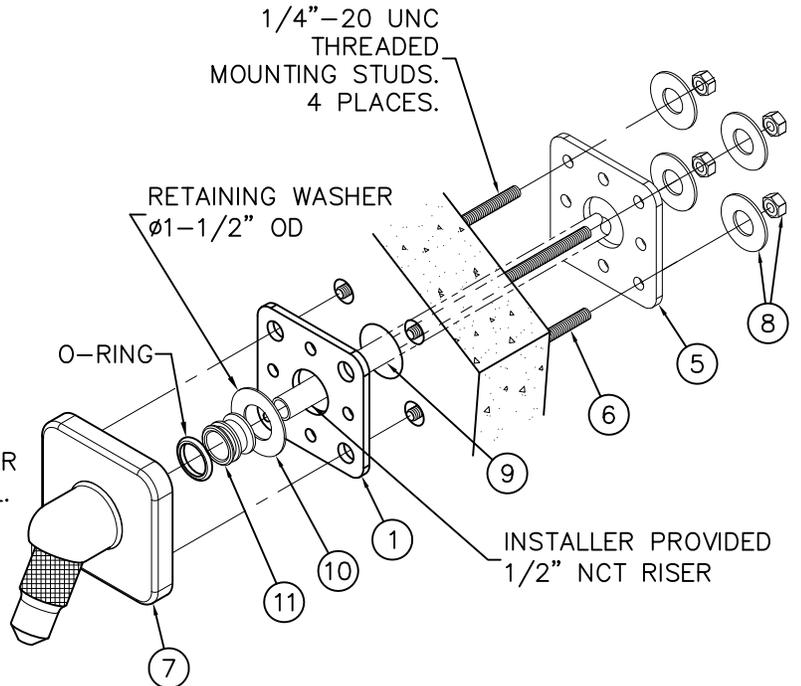
FLUSH SUPPLY LINES THOROUGHLY PRIOR TO MAKING UP CONNECTIONS TO VALVE ASSEMBLY. USE RETAINER PLATE ① AS A TEMPLATE TO CREATE THRU WALL OPENINGS. ASSEMBLE 3/8" O.D. x 1/4" NPT PUSH-IN FITTING ② TO O-RING ADAPTER ③. AFTER PASSING 3/8" O.D. PE TUBING ④ THRU BACK PLATE ⑤, WALL AND RETAINER PLATE ① OPENINGS, PUSH INTO FITTING ② AND PULL TO LOCK. ASSEMBLE MOUNTING STUDS ⑥ TO SHOWERHEAD ⑦ & PASS THRU RETAINER PLATE ① AND THEN THRU THE WALL. FROM CHASE SIDE, INSTALL BACK PLATE ⑤ AND SECURE WHOLE ASSEMBLY WITH NUTS AND WASHERS ⑧.

REFERENCE DRAWINGS	
ASSEMBLIES	NUMBER
NOZZLE	9970-101-004
WALL PLATES	9970-151-003



**SHOWERHEAD HAVING -B BACK PLATE OPTION
FOR ZENITH WITH 1/2" NCT RISER CONNECTION**

FLUSH SUPPLY LINES THOROUGHLY PRIOR TO MAKING UP CONNECTIONS TO VALVE ASSEMBLY. USE RETAINER PLATE ① AS A TEMPLATE TO CREATE THRU WALL OPENINGS. PASS 1/2" NCT RISER ⑨ THRU BACK PLATE ⑤, WALL & RETAINER PLATE ① EXTENDING 1" BEYOND THE RETAINER PLATE. PASS RETAINING WASHER ⑩ THRU RISER STUB OUT. SLIDE O-RING ADAPTER ⑪ ONTO STUB OUT AND AGAINST RETAINING WASHER ⑩. REMOVE O-RING AND SOLDER ADAPTER ⑪ TO RISER. INSTALL O-RING WHEN COOL. ASSEMBLE MOUNTING STUDS ⑥ TO SHOWER HEAD ⑦ & PASS THRU RETAINER PLATE ① AND THEN THRU WALL. FROM CHASE SIDE, INSTALL BACK PLATE ⑤ AND SECURE ASSEMBLY WITH NUTS AND WASHERS ⑧ PROVIDED.



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INSTALLATION OF FLANGED BRACKET SHOWERHEADS w/ -B BACK PLATE

MANUFACTURE DATE

**JULY 1977
TO PRESENT**

DATE ISSUED

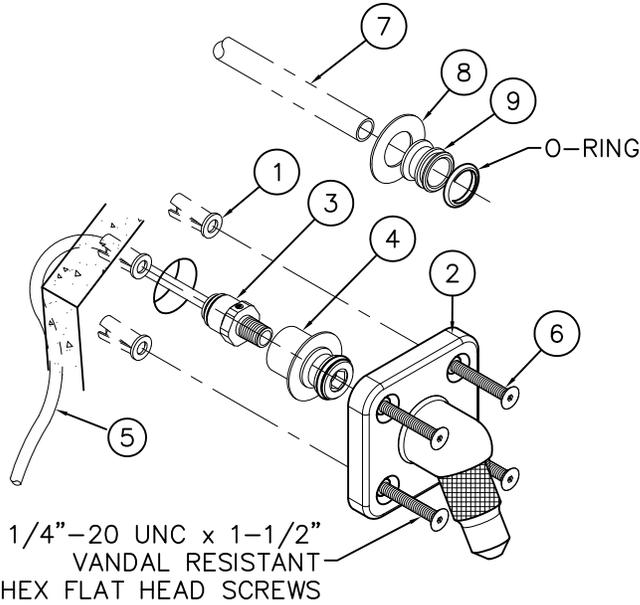
09/29/04

DATE REVISED

01/27/14

DRAWING NUMBER

9900-321-002



ZENITH SHOWERHEAD w/ 3/8" PE TUBING OR 1/2" NCT RISER BY OTHERS

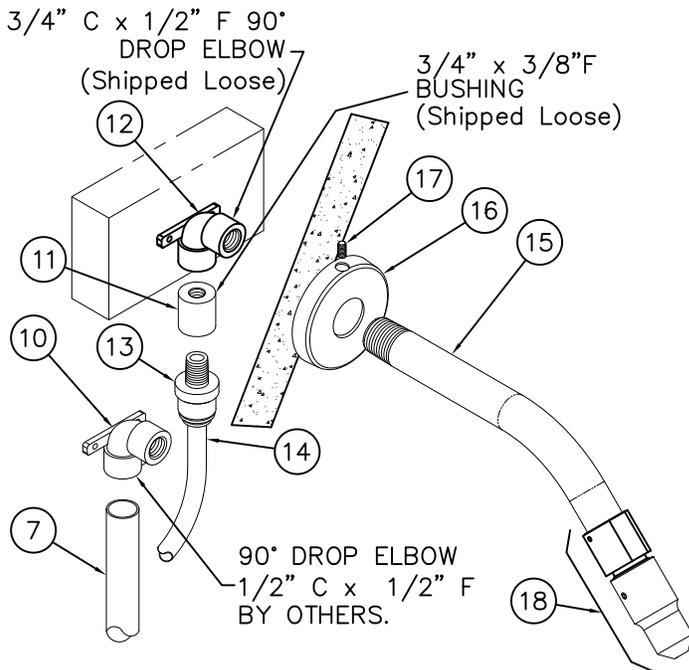
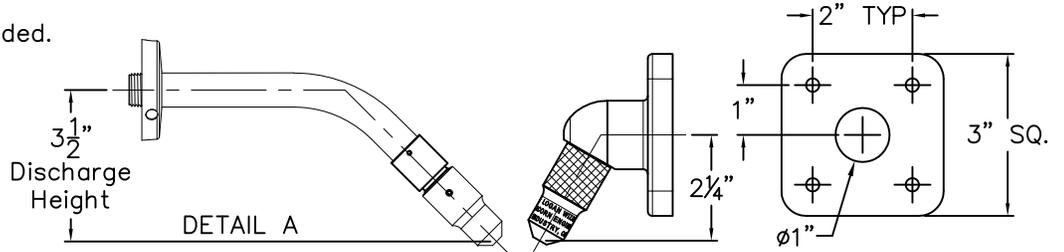
PRIOR TO MAKING UP CONNECTIONS TO VALVE ASSEMBLY, FLUSH SUPPLY LINES THOROUGHLY. INSTALL WALL ANCHORS ① BY OTHERS USING SHOWERHEAD BASE ② AS A TEMPLATE.

FOR 3/8" PE TUBING RISER: ASSEMBLE 3/8" OD x 1/4" NPT PUSH-IN FITTING ③ TO O-RING ADAPTER ④. AFTER PULLING 3/8" OD PE TUBING ⑤ THRU WALL OPENING PUSH INTO FITTING ③ AND PULL TO LOCK. PUSH O-RING ADAPTER ASSEMBLY INTO SHOWERHEAD ②. INSTALL ASSEMBLY TO WALL USING SCREWS ⑥ PROVIDED.

FOR 1/2" NCT RISER: STUB-OUT 1/2" NCT RISER ⑦ BY OTHERS EXTENDED 1" BEYOND WALL. INSTALL RETAINING WASHER ⑧ AND O-RING ADAPTER ⑨ OVER STUB-OUT ⑦ AND POSITION AGAINST WALL. REMOVE O-RING BEFORE SOLDERING O-RING ADAPTER ⑨ TO STUB-OUT ⑦. REINSTALL O-RING AND POSITION SHOWERHEAD ② OVER ADAPTER ASSEMBLY. SECURE USING SCREWS ⑥ PROVIDED.

NOTE: Use Of Teflon Tape On All Threaded Connections Is Recommended.

REFERENCE DRAWINGS	
ASSEMBLIES	NUMBER
NOZZLE	9970-101-004
SHOWERHEAD	9970-105-004
BENT ARM	9970-100-003



ZENITH -BA BENT ARM OPTION w/ 3/8" OD PE TUBING OR w/ 1/2" NCT RISER BY OTHERS

PRIOR TO MAKING UP CONNECTIONS TO VALVE ASSEMBLY, FLUSH SUPPLY LINES THOROUGHLY.

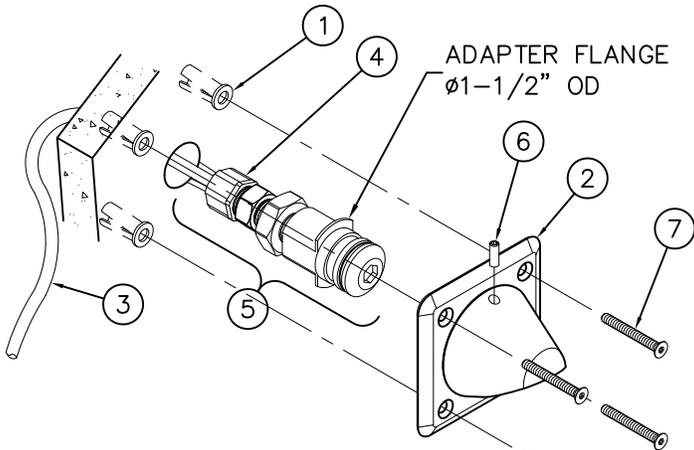
FOR 1/2" NCT RISER: BRING UP 1/2" NCT RISER ⑦ BY OTHERS, FROM VALVE AND CONNECT TO 1/2" C x 1/2" F ELBOW ⑩ BY OTHERS. SECURE ELBOW ⑩ AT DERIVED HEIGHT (SEE DETAIL A).

FOR 3/8" PE TUBING: SWEAT 3/4" x 3/8" F BUSHING ⑪ TO 3/4" C x 3/8" F ELBOW ⑫. LET COOL PRIOR TO CONNECTING 3/8" OD x 3/8" NPT PUSH-IN FITTING ⑬. BRING UP 3/8" OD TUBING RISER ⑭ FROM VALVE AND PUSH INTO FITTING ⑬ AND PULL TO LOCK. SECURE ELBOW ASSEMBLY ⑫ AT THE DERIVED HEIGHT (SEE DETAIL A).

BOTH RISER TYPES: PASS THREADED END OF BENT ARM ⑮ ASSEMBLY THRU LOOSE ESCUTCHEON ⑯ AND CONNECT TO THE FIXED ELBOW ASSEMBLY ⑫. POSITION ESCUTCHEON ⑯ AGAINST FINISHED WALL AND SECURE USING THE SET SCREW ⑰ PROVIDED. CONNECT THE NOZZLE ASSEMBLY ⑱.

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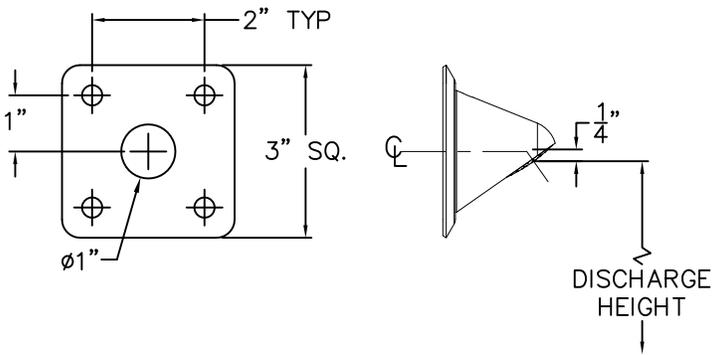
TITLE FLANGED BRACKET SHOWERHEAD & -BA BENT ARM		
MANUFACTURE DATE JULY 1977 TO PRESENT	DATE ISSUED 11/01/06	DRAWING NUMBER 9900-322-001
	DATE REVISED 01/28/14	



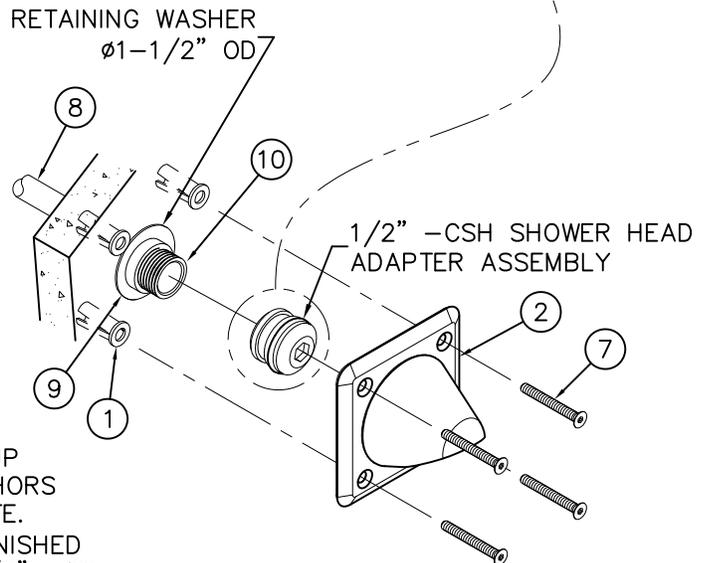
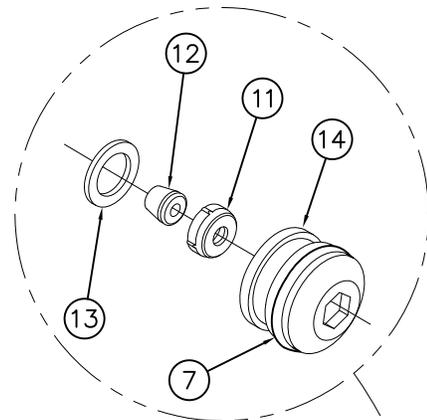
-CSH CONICAL SHOWERHEAD OPTION FOR ZENITH w/ 3/8" PE TUBING RISER CONNECTION

PRIOR TO MAKING UP CONNECTIONS TO VALVE ASSEMBLY, FLUSH SUPPLY LINES THOROUGHLY. INSTALL WALL ANCHORS ① BY OTHERS USING -CSH PLATE ② AS A TEMPLATE. AFTER PASSING 3/8" PE TUBING ③ THRU WALL OPENING MAKE UP CONNECTION TO 3/8" TUBE x 3/8" NPT COMPRESSION FITTING ④ AND PUSH ADAPTER ASSEMBLY ⑤ INTO CSH ASSEMBLY. TIGHTEN SET SCREW ⑥ ON -CSH. SECURE MOUNTING PLATE TO WALL USING SCREWS ⑦ PROVIDED.

VANDAL RESISTANT #10-32 UN x 1-1/2" LONG FLAT HEAD SCREWS WITH CENTER REJECT PIN



REFERENCE DRAWINGS	
ASSEMBLIES	NUMBER
SHOWERHEAD	9970-009-001



-CSH CONICAL SHOWERHEAD OPTION FOR ZENITH WITH 1/2" NCT RISER CONNECTION

FLUSH SUPPLY LINES THOROUGHLY, PRIOR TO MAKING UP CONNECTIONS TO VALVE ASSEMBLY. INSTALL WALL ANCHORS ① BY OTHERS USING -CSH PLATE ② AS A TEMPLATE. EXTEND 1/2" NCT RISER ⑧ BY OTHERS 1" BEYOND FINISHED WALL. THREAD RETAINING WASHER ⑨, AND SOLDER 1/2" NCT x BSP ADAPTER ⑩ ONTO RISER. ASSEMBLE FLOW CONTROL RETAINER ⑪, FLOW CONTROL ⑫ AND NEOPRENE WASHER ⑬ ONTO SHOWER HEAD ADAPTER ⑭. TIGHTEN ASSEMBLY ONTO ADAPTER ⑩ & SECURE -CSH USING SCREWS ⑦ PROVIDED.



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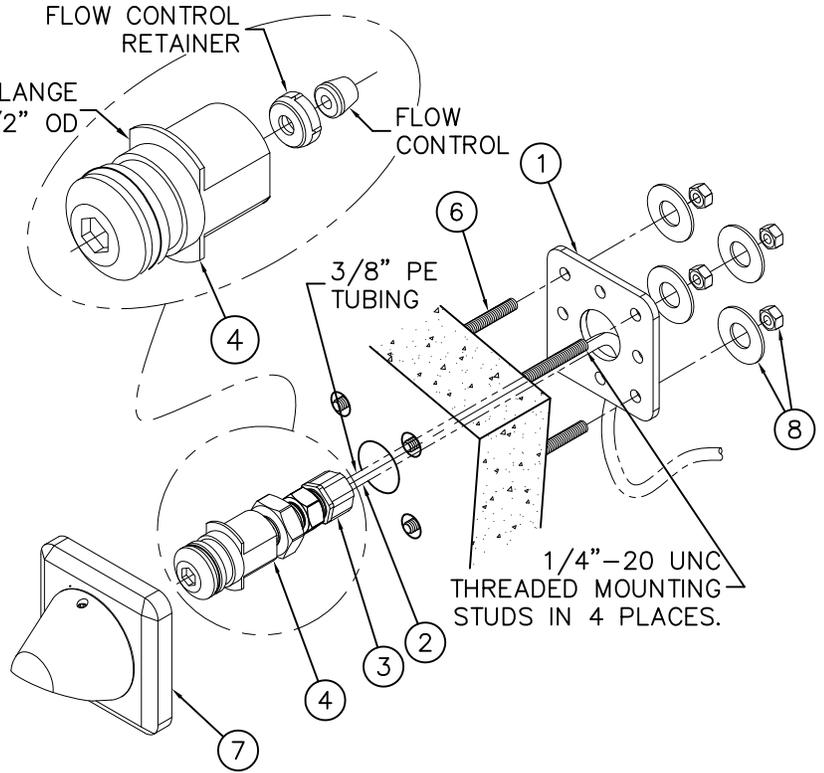
TITLE ZENITH CONICAL SHOWER HEAD		
MANUFACTURE DATE JULY 1998 TO PRESENT	DATE ISSUED 03/16/11	DRAWING NUMBER 9900-323-001
	DATE REVISED 01/27/14	



REFERENCE DRAWINGS	
ASSEMBLIES	NUMBER
SHOWERHEAD	9970-009-001

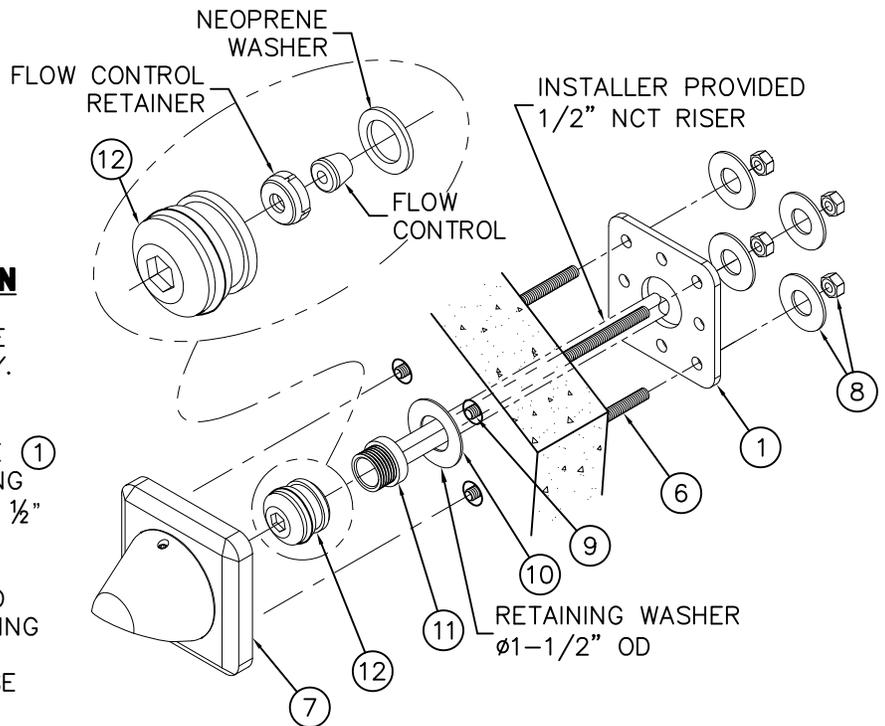
-CSH CONICAL SHOWERHEAD OPTION WITH -B BACK PLATE OPTION FOR ZENITH WITH 3/8" PE TUBE RISER CONNECTION

PRIOR TO MAKING UP CONNECTIONS TO VALVE ASSEMBLY, FLUSH SUPPLY LINES THOROUGHLY. USE BACK PLATE ① AS A TEMPLATE TO CREATE THRU WALL OPENINGS. PASS 3/8" PE TUBING ② THRU BACK PLATE ① AND MAKE UP CONNECTION TO 3/8" NPT COMPRESSION FITTING ③. PUSH ADAPTER ASSEMBLY ④ INTO -CSH ASSEMBLY. TIGHTEN SET SCREW ⑤ ON -CSH. ASSEMBLE MOUNTING STUDS ⑥ TO SHOWER FLANGE ⑦ AND SLIDE THRU THE WALL OPENINGS. FROM CHASE SIDE, SECURE ASSEMBLY WITH NUTS AND WASHERS ⑧ PROVIDED.



-CSH CONICAL SHOWERHEAD OPTION WITH -B BACK PLATE OPTION FOR ZENITH WITH 1/2" NCT RISER CONNECTION

PRIOR TO MAKING UP CONNECTIONS TO VALVE ASSEMBLY, FLUSH SUPPLY LINES THOROUGHLY. USE BACK PLATE ① AS A TEMPLATE TO CREATE THRU WALL OPENINGS. PASS 1/2" NCT SHOWER HEAD RISER ⑨ THRU BACK PLATE ① AND EXTEND 1" BEYOND WALL. PASS RETAINING WASHER ⑩ ONTO RISER STUB OUT. SLIDE 1/2" BSP X 1/2" NCT BRASS ADAPTER ⑪ ONTO RISER AND SOLDER. ASSEMBLE THE O-RING ADAPTER ⑫ AS SHOWN AND TIGHTEN ONTO THE BRASS ADAPTER ⑪. ASSEMBLE MOUNTING STUDS ⑥ TO THE SHOWER FLANGE ⑦ AND SLIDE THRU THE WALL OPENINGS. FROM CHASE SIDE, SECURE ASSEMBLY WITH NUTS AND WASHERS ⑧ PROVIDED.



<p>ACORN ENGINEERING COMPANY P.O. BOX 3527 Industry, CA 91744 15125 Proctor Ave Industry, CA 91746 (626) 336-4561 FAX (626) 961-2200</p>	<p>TITLE ZENITH CONICAL SHOWER HEAD W/-B BACK PLATE</p>		
	<p>MANUFACTURE DATE</p> <p>JULY 1998</p> <p>TO PRESENT</p>	<p>DATE ISSUED</p> <p>09/15/11</p>	<p>DRAWING NUMBER</p> <p>9900-324-001</p>
		<p>DATE REVISED</p> <p>01/28/14</p>	

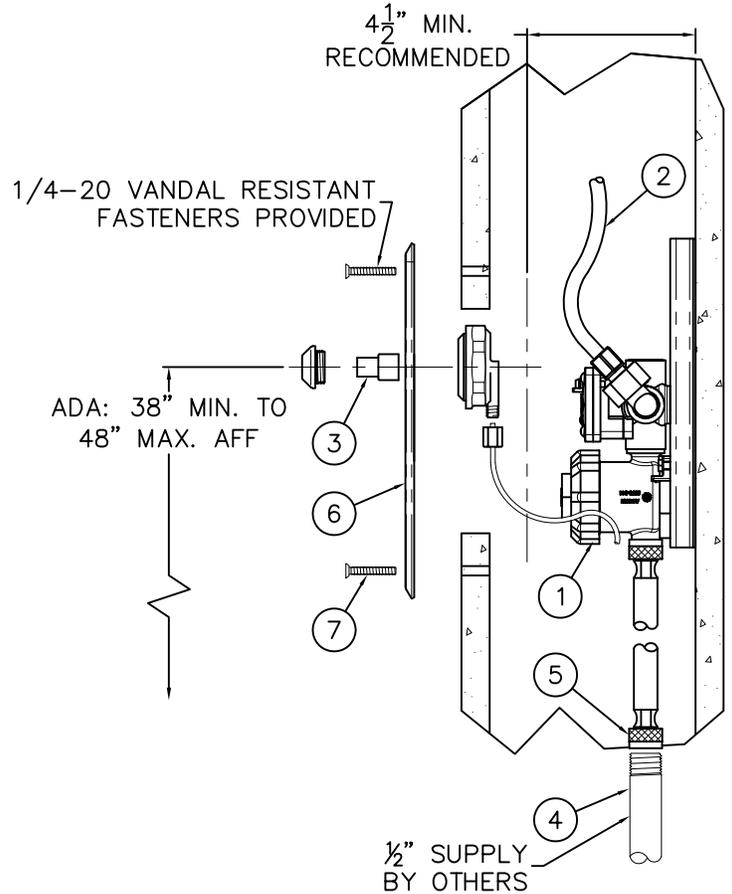
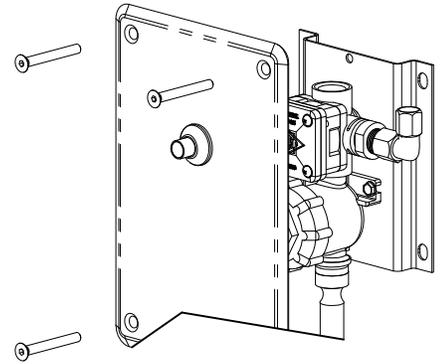
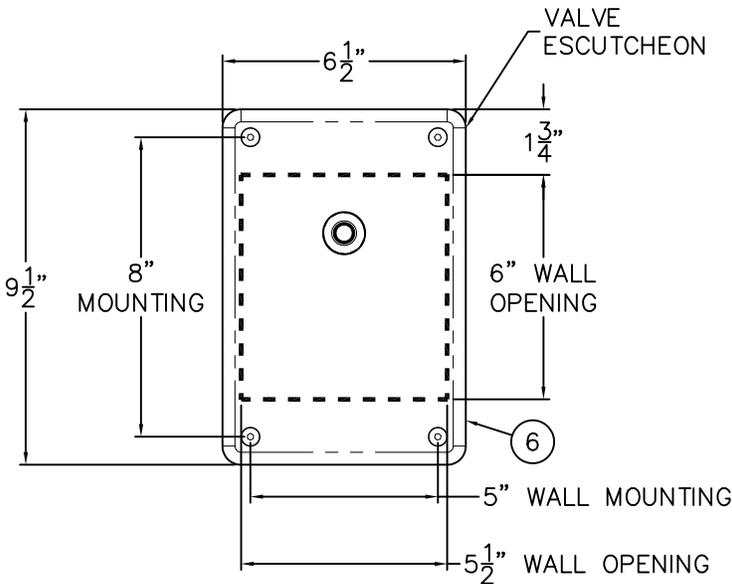


REFERENCE DRAWINGS

AIR-CONTROL CONNECT | 9900-006-003

NOTE:

- 1- AIR-CONTROL VALVE IS INTENDED TO BE SUPPLIED WITH WATER FROM A CERTIFIED TEMPERING VALVE PROVIDED BY OTHERS.
- 2- FOR -MV METERING VALVE IN RISER OPTION, METERING VALVE INLET IS TO BE SUPPLIED FROM THE CONTROL VALVE.



INSTALLATION INSTRUCTIONS:

- A-DETERMINE LOCATION OF VALVE (1) AND INSTALL SUPPORT FRAMING IF REQUIRED.
- B-MOUNT AIR-CONTROL VALVE (1) AND MAKE UP CONNECTIONS TO VALVE RISER (2) OUTLET AND SHOWER HEAD. NOTE: VALVE MAY BE REMOTELY LOCATED UP TO 10 FEET FROM PUSHBUTTON (3) OR SHOWER HEAD.
- D-AFTER THOROUGHLY FLUSHING SUPPLY LINE (4), CONNECT SUPPLY TO 1/2" NPS FLEX HOSE VALVE INLET (5). NOTE: SUPPLY INLET WILL ACCOMMODATE 1/2" NPT MALE ADAPTER.

- E-MOUNT PUSHBUTTON TO VALVE ESCUCHEON (6) AND MAKE UP CONNECTIONS TO 1/8" OD AIR LINE AND VALVE METERING MOTOR.
- F-MOUNT VALVE ESCUCHEON (6) OVER OPENING WITH INSTALLER PROVIDED WALL ANCHORS & FASTENERS PROVIDED (7). SEAL VALVE ESCUCHEON AND WALL WITH INSTALLER PROVIDED SEALANT.

REFER TO ADA GUIDELINES FOR COMPLETE INSTALLATION REQUIREMENTS.

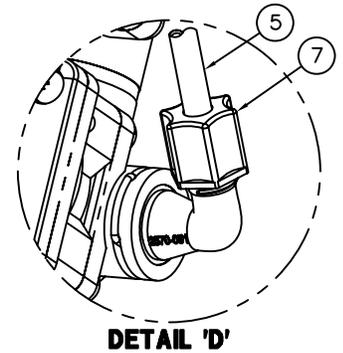
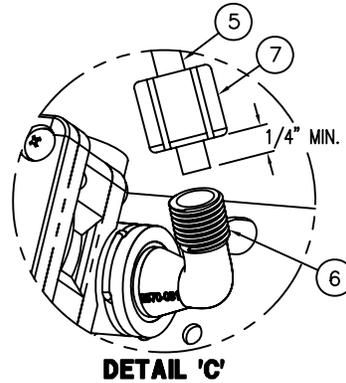
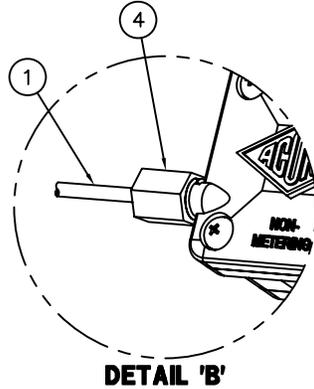
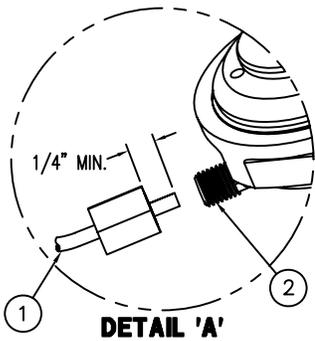


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TITLE ZENITH SINGLE TEMP AIR-CONTROL METERING VALVE, #516, #536 / -MV		
MANUFACTURE DATE SEPTEMBER 1995 TO PRESENT	DATE ISSUED 06/20/97	DRAWING NUMBER 9900-302-002
	DATE REVISED 02/20/14	

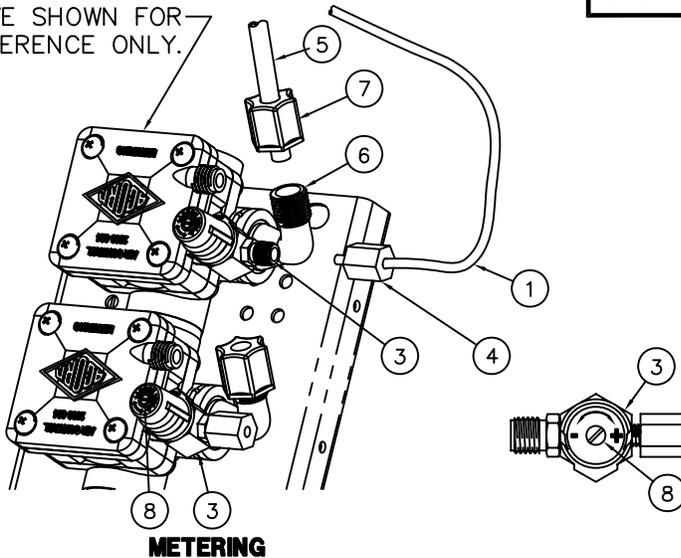


SIDE OUTLET SHOWN



NOTE: PENAL-WARE & ECO-RAIN SHOWER FIXTURES USE 1/4" O.D. RISER TUBING WHILE OTHER SHOWER-WARE FIXTURES USE 3/8" O.D. TUBING.

AIR-CONTROL 03M-MA2 VALVE SHOWN FOR REFERENCE ONLY.



REFERENCE DRAWINGS	
REPAIR PARTS	DRAWING
VALVE BODY	9955-006-003
CHECKSTOP	9956-040-003
PUSHBUTTON/ESCUTCHEON	9957-300-001
METERING SERVOMOTOR	9955-000-003

NOTE:
 • ALL TUBING SHOULD BE CUT SQUARE AND BE FREE OF BURRS OR DEFORMITIES TO ENSURE A WATER TIGHT CONNECTION.
 • EXTEND TUBING AT LEAST 1/4" BEYOND FERRULE NUT AND INSERT TUBING INTO CONNECTION OPENING BEFORE TIGHTENING.
 • TUBING SHOULD BE FREE OF KINKS TO ENSURE PROPER OPERATION.
 • MAXIMUM RECOMMENDED WORKING WATER PRESSURE IS 100 PSI; TEMPERATURE IS 130° F; OUTLET TEMPERATURE IS RECOMMENDED AT A MAXIMUM OF 105° F.
 WARNING:
 PRIOR TO MAKING INSTALLATION, SUPPLY LINES MUST BE FLUSHED OF ALL FOREIGN MATERIAL SUCH AS PIPE DOPE, CHIPS, SOLDER, ETC. VALVE MUST BE DRAINED PRIOR TO BEING SUBJECTED TO FREEZING TEMPERATURES. MAXIMUM RECOMMENDED OUTLET WATER TEMPERATURE IS 105° F.

TIMING IS ADJUSTABLE FROM 5 TO 60 SECONDS AND IS ACCOMPLISHED BY ROTATING TIMING SCREW (8). TURNING THE TIMING SCREW CLOCKWISE INCREASES METERING TIME WHILE TURNING THE SCREW COUNTERCLOCKWISE DECREASES METERING TIME.

INSTALLATION INSTRUCTIONS:

- A- MOUNT FIXTURE IN ACCORDANCE TO MANUFACTURER'S INSTALLATION INSTRUCTIONS.
- B- ASSEMBLE PUSHBUTTONS AND OR SHOWER NOZZLES TO FIXTURE IF REQUIRED.
- C- CONNECT 1/8" O.D. POLYETHYLENE AIR LINE (1) TO PUSHBUTTON (2) AND VALVE TIMER ASSEMBLY (3). SEE DETAILS 'A' & 'B'. HAND TIGHTEN FERRULE NUT (4) PROVIDED.

- D- CONNECT SHOWER RISER (5) TO VALVE ASSEMBLY ELBOW (6). SEE DETAIL 'C' AND 'D'. HAND TIGHTEN FERRULE NUT (7) PROVIDED.
- E- AFTER THOROUGHLY FLUSHING SUPPLY LINES, MAKE UP CONNECTIONS TO VALVE ASSEMBLY INLET(S) 1/2" NPT OR 1/2" NPS FLEX HOSE AS REQUIRED.



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TITLE HAND OPERATED, AIR-CONTROL VALVE SHOWER CONNECTIONS		
MANUFACTURE DATE	DATE ISSUED	DRAWING NUMBER
OCTOBER 2010 TO PRESENT	10/28/10	9900-006-003
	DATE REVISED	