



ANDERSON GREENWOOD TYPE 9300H PILOT OPERATED PRESSURE RELIEF VALVE INSTALLATION AND MAINTENANCE INSTRUCTIONS

Before installation these instructions must be fully read and understood



GENERAL DESCRIPTION

WARNING

Failure to follow the installation, operation or maintenance instructions for a Emerson product could lead to serious injury or death from explosion or exposure to dangerous substances.

To reduce the risk:

- *Comply with all information on the product, in this manual, and in any local and national codes that apply to this product.*
- *Do not allow untrained personnel to work with this product.*
- *Use Emerson parts and work procedures specified in this manual.*

The protection and safety of equipment, property and personnel depends on the proper operation of the pressure relief valves described in this manual. All Emerson pressure relief valves should be kept in proper working condition in accordance with the manufacturer's written instructions. Periodic testing and maintenance by the user of this equipment is essential for reliable and safe valve operation.

All installation, maintenance, adjustment, repair and testing performed on pressure relief valves should be done by qualified technicians having the necessary skills and training adequate to perform such work. All applicable Codes and Standards, governing regulations and authorities should be adhered to when performing pressure relief valve repair. No repair, assembly, adjustment or testing performed by other than Emerson or its authorized assemblers and representatives shall be covered by the warranty extended by Emerson to its customers. The user should use only original, factory supplied OEM parts in any maintenance or repair activity involving this product.

WARNING

Personal injury or equipment damage caused by sudden release of pressure may result if the valve assembly is installed where service conditions could exceed the limits on the appropriate nameplates. Never use this equipment for any purpose other than its intended use.

This Manual is provided as a general guide for the repair and maintenance of the pressure relief valves described herein. It is not possible to describe all configurations or variations with such equipment. The user is advised to contact Emerson or its authorized assemblers and representatives for assistance in situations that are not adequately covered or described in this manual.

WARNING

Avoid personal injury from sudden release of process pressure. Before performing any maintenance operations:

- *Do not remove any component from the valve while the valve is still pressurized.*
- *Always wear protective gloves, clothing, and eyewear when performing any maintenance operations to avoid personal injury.*
- *Adhere to all safety standards and best practices for operating the equipment.*
- *Disconnect any operating lines providing a control signal to the pilot.*
- *Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure on both sides of the valve. Drain the process media from both sides of the valve.*
- *Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.*
- *The valve may contain process media that are pressurized, even when the valve has been removed from the process.*
- *Check with your process or safety engineer for any additional measures that must be taken to protect against process media.*

Before disassembling the pressure relief valve ensure that the valve has been decontaminated from any harmful gasses or fluids and that it is at a safe temperature range for handling.

Fluids can be trapped in the dome space of pilot operated pressure relief valves.

Before installation, the Installation and Operational Safety Instructions should be fully read and understood. These Instructions may be requested from the factory or are available at Emerson.com.

STORAGE AND HANDLING

Pressure/vacuum relief valve performance may be adversely affected if the valve is stored for an extended period without proper protection. Rough handling and dirt may damage, deform, or cause misalignment of valve parts and may alter the pressure setting and adversely affect valve performance and seat tightness. It is recommended that the valve be stored in the original shipping container in a warehouse or at a minimum on a dry surface with a protective covering until installation. Sealed inlet and outlet protectors should remain in place until the valve is ready to be installed in the system

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SAFETY PRECAUTIONS

WARNING

When the pressure relief valve is under pressure never place any part of your body near to the outlet/exhaust of the valve. Failure to follow these instructions may result in death or serious injury.

The escape of process media indicates that the valve has NOT been properly vent, or process pressure is trapped in the valve body nor pilot. Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

WARNING

Evaluate the functional and environmental conditions prior to installing a control valve. Install the control valve in a well-designed piping system. Failure to comply may result in death or serious injury from pipe failure.

Never attempt to remove the pressure relief valve from a system that is pressurized. Never make adjustments to or perform maintenance on the pressure relief valve while in service unless the valve is isolated from the system pressure. If not properly isolated from the system pressure, the pressure relief valve may inadvertently open resulting in serious injury. Remove the pressure relief valve prior to performing any pressure testing of the system. The safety of lives and property often depends on the proper operation of the pressure relief valve. The valve must be maintained according to appropriate instructions and must be periodically tested and reconditioned to ensure correct function.

The valve outlet and any separate drains should be piped or vented to a safe location. Always wear proper safety gear to protect hands, head, eyes, ears, etc. anytime you are near pressurized valves.

WARNING

Avoid personal injury from sudden release of process pressure. If the process media starts to escape from the valve or pilot, STOP IMMEDIATELY!

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1 INTRODUCTION

1.1 Description of valve

The Type 9300H POSRV employs the cushioned PTFE film seat, as well as protected PTFE diaphragms. The design allows these valves to be used in the pilot operated pressure relief mode and simultaneously provide vacuum relief, either via weight loading of the internals, or with a specific pilot control of the vacuum opening. The Type 9300H was designed with a studded inlet connection to reduce the inlet profile, and coupled with larger orifice areas, these valves provide flow capacities significantly greater than the Series 9300 valves. The Type 9300H is a full body valve to pipe away the discharge if required.

1.1.1 Pilot operated pressure relief valve with flowing modulating pilot

- 9390HP - Positive pressure relief valve
- 9390HC - Positive and negative pressure relief valve
- 9309HV - Negative pressure relief valve

WARNING

Personal injury or equipment damage caused by sudden release of pressure may result if the valve assembly is installed where service conditions could exceed the limits on the appropriate nameplates.

Never use this equipment for any purpose other than its intended use.

The Anderson Greenwood pilot operated 9300H POSRV opens with a modulating action with a proportional opening, whereby the valve opens just enough to satisfy the upset and maintain constant system pressure, yet still have the capability to reach full capacity within 10% overpressure. The 9390HC and 9390HV pilots have the same construction except for unavailability of check valves and the location of the connections for the sense line respectively. For either the 9390HP or 9390HC, the pilot controls only the positive pressure relief. In the 9390HC, vacuum relief is controlled by the weight

of the parts that move in the main valve when it opens. The pilot can optionally control the negative pressure relief on a deeper vacuum set relief applications. If pilot controls the negative pressure it is denoted by model number 9390HV.

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1.2 Service applicability

Refrigerated or cryogenic storage tanks (accurate low - pressure protection), natural gas transmission and distribution, blanketed vessels in the petrochemical, food, and electronics industries, ammonia, air blowers in the waste water treatment plants and marine (LNG and LPG).

1.3 Code applicability

The TYPE 9300H is designed to meet the requirements of the IMO-IGC (International Gas Carrier Code) and has Type Certification with:

- Lloyds register of shipping (LRS)
- American Bureau of Shipping (ABS)
- DNV GL
- Bureau Veritas (BV)

1.4 Conversion

WARNING

Use only genuine Anderson Greenwood replacement parts. Components that are not supplied by Emerson Automation Solutions should not, under any circumstances, be used in any Anderson Greenwood valve because they may void your warranty, might adversely affect the performance of the valve and could cause personal injury and property damage.

Valve conversions are defined as any change which affects critical parts and/or valve nameplate data, from that which was originally supplied by the manufacturer such as a change in set pressure. Conversions, when required by the owner/user, shall only be performed by the manufacturer, their appointed/authorized assembler or repair center in strict accordance with written instructions provided by the manufacturer. Communication with the manufacturer is critical when making any conversion to ensure the converted valve provides the same safe, reliable performance as the original valve supplied by the manufacturer.

For conversion information on the TYPE 9300H Pressure Relief Valves, contact the Service Department at:

Emerson
Phone: 1 (281) 274-4400
Fax: 1 (281) 274-6916
Emerson.com/FinalControl

1.5 Size/pressure ranges of Type 9300H

PRESSURE/VACUUM RELIEF VALVES

Materials	Stainless Steel
Main Valve Soft Goods	PFTE Diaphragm Seat and Seals
Pilot Soft Goods	Elastomer or All Teflon Soft Goods
Set Pressure Range	4" wc to 10 psig [10.0 mbarg to .690 barg]
Vacuum Range	-4" wc to -12 psig [-10.0 mbarg to -0.83 barg]
Process Temperature	-320°F to 200°F [-196°C to 93°C]
Size	2x3, 3x4, 4x6, 6x6 [8], 8x10, 10x12 & 12x16
Blowdown -	Fixed

1.6 Basic pilot types for the 9300H main valve

1.6.1

The Type 91 was designed for specific applications where fluorinated ethylene propylene diaphragms alone were not rugged enough and premium sealing was required for cryogenic fluids. Type 91 design includes Stainless Steel (SST), and PFTE diaphragms which provide extraordinary performance for hard to hold cryogenic fluids.

1.6.2 Type 93 Pilot

The Type 93 is a pilot designed with elastomer seats and seals, and construction materials in stainless steel (SS).

1.6.3 Type 93T Pilot

The Type 93T is a variation of the basic Type 93, designed specifically for cryogenic applications where elastomer seals are not satisfactory.

2 MAIN VALVE

WARNING

Avoid personal injury from sudden release of process pressure. Before performing any maintenance operations:

- Do not remove any component from the valve while the valve is still pressurized.
- Always wear protective gloves, clothing, and eyewear when performing any maintenance operations to avoid personal injury.
- Adhere to all safety standards and best practices for operating the equipment.
- Disconnect any operating lines providing a control signal to the pilot.
- Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure on both sides of the valve. Drain the process media from both sides of the valve.
- Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.
- The valve may contain process media that are pressurized, even when the valve has been removed from the process.
- Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

WARNING

Avoid personal injury from sudden release of process pressure. If the process media starts to escape from the valve or pilot, STOP IMMEDIATELY!

The escape of process media indicates that the valve has NOT been properly vented, or process pressure is trapped in the valve body nor pilot. Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

CAUTION

The control valve body and piping may be extremely hot or cold. Wear personal protective equipment appropriate to the situation when working with the control valve. Adhere to your company's safety standards and practices. Failure to comply may cause serious injury

2.1 General main valve maintenance

Prior to disassembly, it is recommended to stamp or mark the orientation of the pilot, and the orientation of the cap relative to the main valve body. This practice will ensure proper realignment and location of parts during reassembly.

To prevent mixing up parts it is recommended to repair the main valve and pilot in stages. For this reason, the main valve instructions are separate from the pilot instructions.

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2.2 9300H Main Valve disassembly

Refer to Figure (1), (2), (3), (4) and (7)

Disassembly Tooling

1. The removal of the cap and internals requires special disassembly tooling
2. A work bench and vise or special holding fixture will be required as a minimum. See Fig. 7.
3. Cap and internal assemblies on 10x12 & 12x16 valve sizes are heavy and will require a crane for removal and a method for setting the cap on its edge for de-mating of the cap, guide and internal stack assembly. A special stand can be designed, a modified shipping pallet or a vise with brass jaws can be used for this purpose.
4. A 1/4-20 all thread rod and an aluminum cross-bar with a threaded bushing (special tool available from Emerson)
5. 7/16, 1/2 & 9/16 inch sockets & air wrench
6. A crane is required for removing & lifting the Main Valve cap with Internal Stack Assembly on the 8x10, 10x12 and 12x16 valve sizes.
7. "Cap lifting lugs" and "main valve lifting lugs" are the same items – the angle iron lugs are dual purpose
8. Internal hex sockets and a ratchet
9. A 7/16" box end wrench is required to manually adjust the lifting-bushing to raise the internals with the all-thread.
10. 2-hook lift chain with adjustable spreader bar
11. Lifting eyes (2) to fit nozzle threads
 - a. 1/2-13 UNC for 6"x6", 6"x8", 8"x10", 10"x12
 - b. 3/4-10 UNC for 12"x16"

Cap/ Internals Disassembly Procedure

Reference Figure (1)

12. Remove the pilot exhaust piping (Figure 1) (670), if provided.
13. Remove Sensing (Inlet) pipe (660) not shown, U-bolts, and (5/16") Pilot mounting nuts (390) lock-washers (370) on the upper pilot mounting plate.
14. Remove pilot (650) and inlet pipe assembly (660) from main valve cap as a single unit and secure in a safe place for later rework or reassembly.
15. Do not lose or damage the O-rings (310) and (320) on the bottom of the pilot mounting plate.

Reference Figure (7)

16. Install the aluminum cross-bar tool (490) onto two of the exposed pilot mounting studs (380) and secure with two 5/16" nuts (390)
17. Install the all-thread rod (530), by hand, thread into the lift-bushing (520) while holding the lift bushing with a open end wrench
18. Screw the all-thread rod (530) all the way down until it engages the 1/4-20 lower thread

in the guide collar labeled in (Fig 2) (200) and bottoms out snugly to lock the all thread rod (530).

19. Using the 7/16" wrench, or optional through-hole socket/ratcheting device, engage the lifting-bushing (520) and rotate CW to raise the internal assembly until it stops against the upper travel stop.

WARNING

During installation or removal of a valve, always place the unit on a stable platform or surface that supports its assembled weight.

Failure to comply may allow the valve to roll, resulting in death, serious injury or equipment damage.

WARNING

The lifting instructions are for installation and removal of a Anderson Greenwood valve only and do not address lifting the valve while it is attached or bolted to piping.

Failure to follow these instructions may result in death, serious injury or equipment damage.

CAUTION

Do not insert the forks of a forklift into the bores when moving the valve. Inserting the forks may cause the valve to become unstable, resulting in serious injury or equipment damage.

CAUTION

Never allow the slings to come in contact with the pilot or tubing. Use a spreader bar on the sling to prevent contact. Failure to comply may cause equipment damage.

Reference Figure (8)

20. Remove lifting lugs (540) from the top body flange and install them on the remaining 2 of 4, 5/16-24UNC exposed studs (380). The lifting lugs should be installed symmetrically using the center holes. Use both lock-washer (270) and nuts (390) to tighten lifting lugs securely to the pilot lower mounting plate.
21. Remove all the Cap flange bolts (Fig 1) (360) and lock washers(Fig 1)(370)
22. Using a lifting device (local or portable crane) and appropriate two hook chain, hook the chain hooks into the lifting lugs (540) and tension the chain to prepare for lifting. (A crane capable of 300 lbs is required)
23. Raise the Cap with the Internals stack assembly carefully until the guide collar (Fig 2) (200) clears the upper body flange by several inches. Transfer the Cap (Fig 1) (110) and internal stack assembly to the designated location for disassembly.

Note: the cap is best serviced if oriented with the cap lower flange face vertical facing forward and the guide rod axis horizontal and facing forward, either held in a soft jaw vise or a special holding fixture made from a shipping

pallet or other platform. See Figure 7.

24. Clean the cap (Fig 1) (110) lower flange with iso-propyl alcohol to remove all grease residue.

Nozzle Disassembly

Reference Figure (3)

25. Use an internal hex socket and a ratchet for nozzle screw (130) removal to avoid damage to the raised seating surface.
26. Remove nozzle using lifting eyes (not provided) in tapped holes provided in nozzles. Thread sizes are as follows:
 - 1/2-13 UNC for 6"x6", 6"x8", 8"x10", 10"x12"
 - 3/4-10 UNC for 12"x16"
27. Remove the Teflon rope (300) from the groove in the body surface where the nozzle mounts

Internal Stack Removal from Cap

Refer to Figure (7)

28. Remove the (1/4") all-thread rod from the guide collar (Fig 2) (200) and the lift bushing (520) in the aluminum cross-bar (490).
29. Carefully slide the internals stack assembly directly off of the guide rod (Fig 1) (210) being careful not to side load or bend the guide rod (Fig 1) (210).

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Internal Stack Disassembly

Reference Figure [2]

30. Place the internals stack assembly in the vise upside down and clamp the wrench flats with jam nut (280) facing upwards so the internal stack can be disassembled.
31. In the following order remove the internal components from the Guide Collar (200)
 - Remove the Jam-Nut (280)
 - Remove the Split Lock-Washer (370)
 - Remove the Flat-Washer (410)
 - Remove one or more Protector Plate(s) (160) [as required on B.O.M.] – vacuum valves have (2) plates
 - Remove the Seat film (180)
 - Remove the white Seat Cushion (170)
 - Remove the NAS flat washer (260)
 - Remove the 0.010" Diaphragm Spacer (240) [~ 3" diameter]
 - Remove the main Pallet (Seat Plate) (140) --curved side upward
 - Remove the Diaphragm Slipper (190)
 - Remove the NAS Flat Washer (260)
 - Remove the 0.010" Teflon diaphragm spacer (240) [~3" diameter]
 - Remove the Diaphragm (250)
 - Remove the Diaphragm Slipper (190)
 - Remove the Blousing Plate (150), convex edge upward

MAIN VALVE PARTS TABLE 1

Item no.	Part description	Material
100	Body	SST SA351-CF8M
110	Cap	SST A240-316/316L
120	Nozzle	SST SA351-CF8M
130	Screw-socket head cap	SST SA193-B8M
140	Plate seat	SST A240-316/316L
150	Plate blousing	SST A240-316/316L
160	Plate protective	SST A240-316/316L
170	Seat cushion	Expanded PTFE
180	Seat film	PFA type LP
190	Diaphragm slipper	PFA type LP
200	Guide-collar	SST A479-316/316L
210	Rod-guide	SST A479-316/316L, SST 17-4 PH
220	1 mm Rope	Expanded PTFE
230	Hub-cap	SST A479-316/316L
240	Spacer diaphragm	PTFE
250	Diaphragm slipper	PFA type LP
260	Washer-flat	SST 316
270	Washer-lock	SST 316
280	Nut-jam	SST SA194-8M
290	O-ring as 568-SPL	PFA encapsuled solid silicone 85-90D
300	Tape x .06 thick	Expanded PTFE
310	O-ring as 568-242	PFA encapsuled solid silicone 85-90D
320	O-ring as 568-253	Nitrile 70D
340	Pilot upper mounting plate	SST A240-316L
350	Pilot lower mounting plate	SST A240-316L
360	Bolt-hex cap	SST SA193-B8M
370	Washer-lock	SST 316
380	Stud	SST SA193-B8M
390	Nut-hex	SST SA194-8M
400	Screw-hex cap	SST SA193-B8M
410	Washer flat	SST 316
430	Stud	SST SA193-B8M
440	Nut-hex	SST SA194-8M
450	Washer	Peek
460	Pilot Exhaust Piping/Fittings	SST 316
470	Pilot	See Pilot Parts (Sheet 15)

WARNING

Use only genuine Anderson Greenwood replacement parts. Components that are not supplied by Emerson Automation Solutions should not, under any circumstances, be used in any Anderson Greenwood valve because they may void your warranty, might adversely affect the performance of the valve and could cause personal injury and property damage.

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FIGURE 1
9300H Assembly

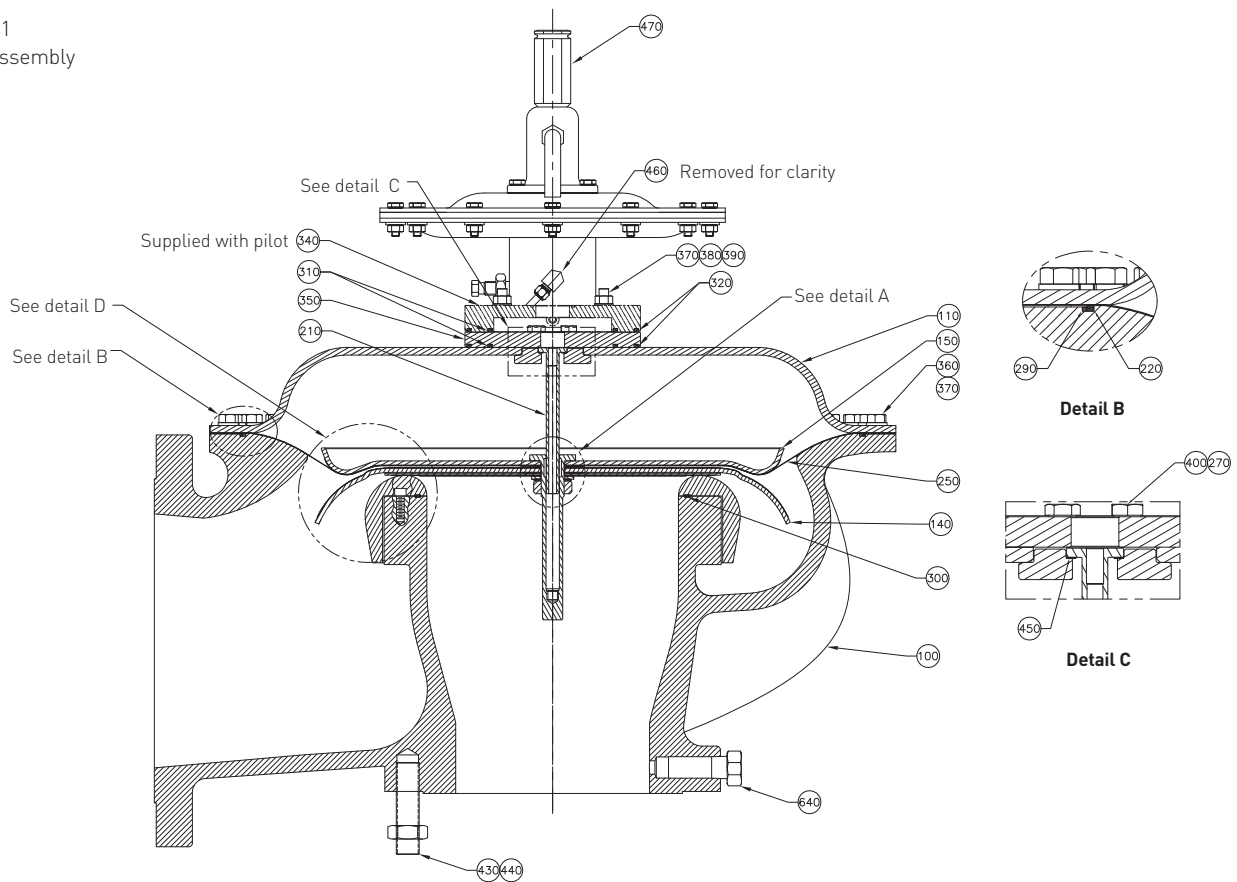
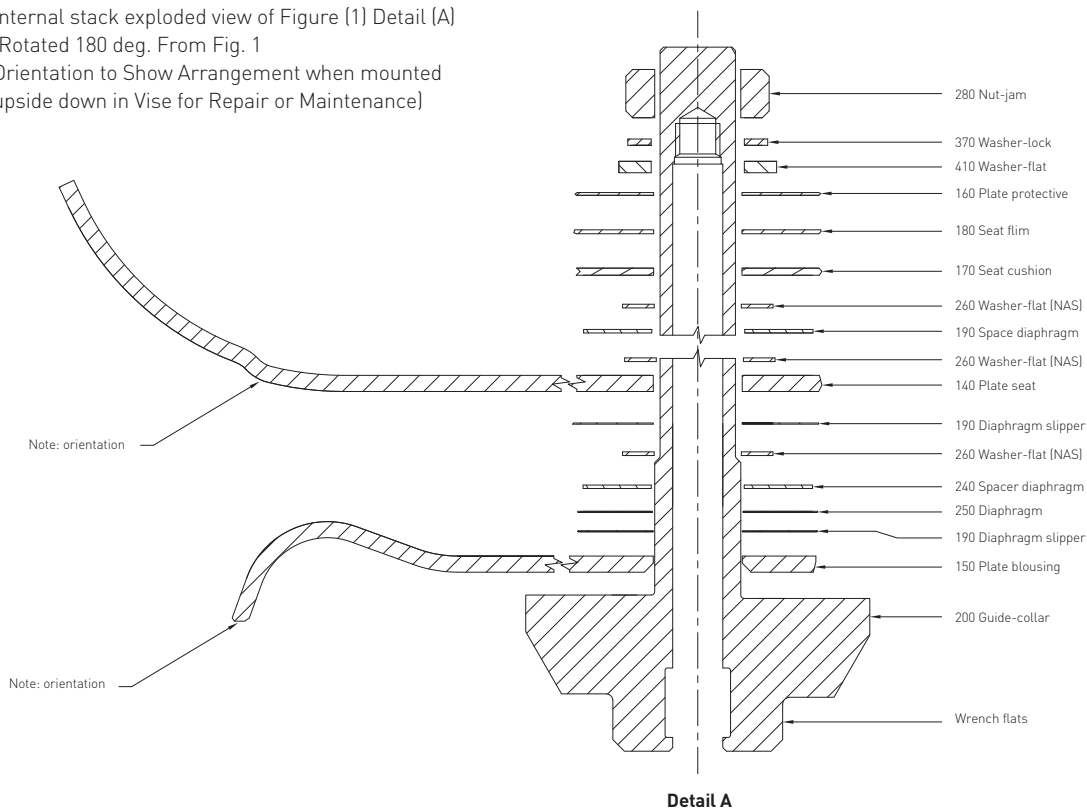


FIGURE 2
Internal stack exploded view of Figure (1) Detail (A)
[Rotated 180 deg. From Fig. 1
Orientation to Show Arrangement when mounted
upside down in Vise for Repair or Maintenance]



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FIGURE 3
Detail D from Figure 1

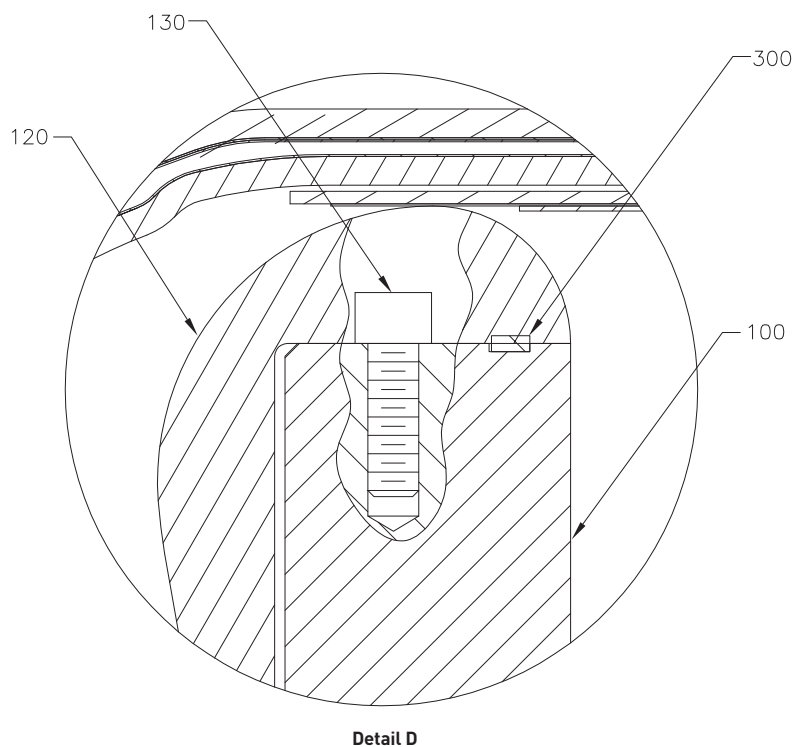
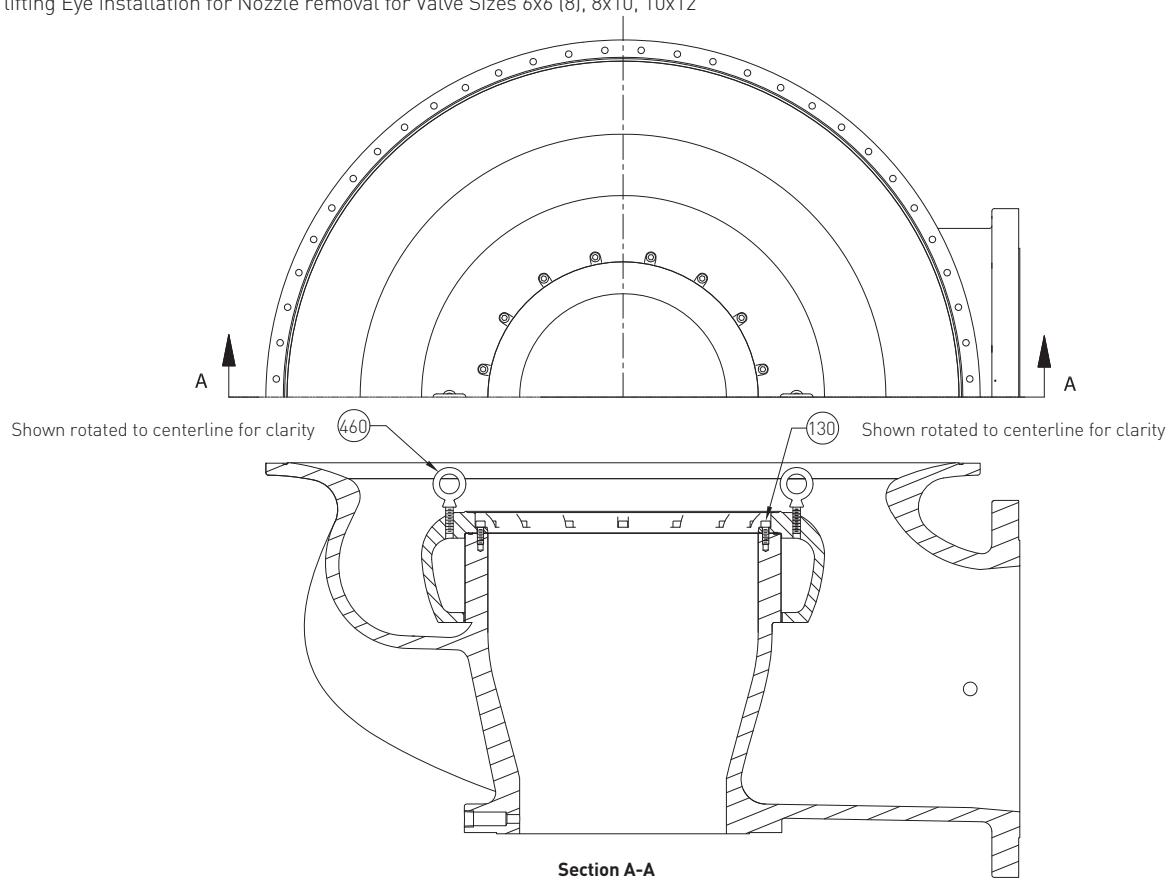


FIGURE 4
Nozzle lifting Eye installation for Nozzle removal for Valve Sizes 6x6 (8), 8x10, 10x12



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2.3 9300H Main valve assembly

WARNING

Failure to follow the installation, operation or maintenance instructions for a Emerson product could lead to serious injury or death from explosion or exposure to dangerous substances. To reduce the risk:

- Comply with all information on the product, in this manual, and in any local and national codes that apply to this product.
- Do not allow untrained personnel to work with this product.
- Use Emerson parts and work procedures specified in this manual.

Visual Inspection (Reference Figure 1)

1. This Assembly instruction assumes that all components of the valve are visually inspected, cleaned and ready for assembly or else additional pre-cleaning in assembly may be required.
2. Visually inspect the Cap (110) bottom flange face for excessive radial marks, scratches and burrs around the drilled holes. These must be addressed before assembly. If they exist it is a non-conformance. This is a sealing surface that requires flatness, random surface finish (no concentric or radial marks) and completely deburred bolt holes.
3. Visually inspect the top center convex surface of the cap (110), where the lower pilot mounting plate is installed. The surface must not be scratched or otherwise damaged so the O-rings (310, 320) in the bottom surface of the lower mounting plate can seal.
4. Visually inspect the body top flange O-ring groove. Small defects can be tolerated but obvious large defects will cause body O-ring leakage.
5. Check parts pick list to see that all components are available.

Assembly tooling

6. The installation of the cap and internals requires some special assembly tooling.
7. A work bench and vise will be required.
8. Caps and internals sub-assembly on the 10x12 & 12x16 valve sizes are heavy and will require a crane for installation and a method for setting the cap on its edge for mating of the cap, guide rod and the guide

collar internals assembly. A special stand can be designed or a shipping pallet or a vise with brass jaws is needed.

9. During cap installation, the internals stack assembly are held against the upper cap stop by a 1/4-20UNC all thread rod and an aluminum cross-bar with installed lift-bushing.
10. Fine tipped razor knives will be required for cutting out the diaphragm cap holes and trimming the diaphragm O. D.
11. A 1.0 inch diameter hole punch will be required to punch the diaphragm center-hole, if a raw sheet of PFA film is used.
12. 7/16, 1/2 & 9/16 inch sockets & speed wrench will be required.

CAUTION

Never allow the slings to come in contact with the pilot or tubing. Use a spreader bar on the sling to prevent contact. Failure to comply may cause equipment damage.

13. A crane and two hook chain and spreader bar is required for lifting the completed main valve.
14. Cap lifting lugs and main valve assembly lifting lugs are the same angle-iron components. They are used for both functions.
15. Internal hex socket wrenches and manual ratchet are preferred for nozzle screw installation.
16. A 7/16" box end wrench is required for manually raising and lowering the internal stack for diaphragm stroking.
17. Hand spring-clamps (Qty 4 to 6).

Nozzle Installation procedure

Reference Figure (5)

18. Select proper size of expanded PTFE tape (300) (1/8, 3/16 & 1/4) based on valve size and Bill of Material.
19. Install expanded PTFE rope (220) on the body groove for nozzle sealing and overlap the ends (two complete wraps min).
20. Use lifting eyes (Fig 4) (460), not supplied, in the two tapped holes provided in the nozzle (Fig 3)(120).
6x6(8) = .50-13UNC
8x10 = .50-13UNC
10x12 = .50-13UNC
12x16 = .75-10UNC
21. Install the socket-head cap screws (Fig 3) (130) using the internal hex socket tool and ratchet.

Prepare Body for Cap and Internals stack installation

22. Install the expanded PTFE (1 mm rope) (Fig 1) (220) in either the inside or outside bottom corner of the body O-ring groove
23. Place encapsulated (0.139) diameter cross-section O-ring (Fig 1) (290) into body upper flange groove. Some grease can be used

to help hold the O-ring in the groove. If the O-ring is slightly small then pre-stretch carefully before installation so that O-ring will lay flat in the groove without buckling or jumping-out to the inside of the groove.

Cap & guide rod sub-assembly

24. Rest the cap (Fig 6) (110) on its edge using special holding method (Fig 7), shipping pallet or a vise with brass or soft jaws so flange face is vertical so the internal stack assembly can slide onto the guide tube (Fig 6) (210) as shown in (Fig 7).
 25. Slide plastic washer (Fig 6) (450) on the guide tube (Fig 6) (210) and insert the tube with Peek washer (Fig 6) (450) into the center hole of the hub (Fig 6)(230) so that it is resting in the hub (Fig 6) (230) counterbore.
 26. Install the encapsulated O-ring (Fig 6) (310) into inner-most O-ring groove in the lower mounting plate (Fig 6) (350).
 27. Install the Nitrile O-ring (Fig 6) (320) into outer-most O-ring groove of the lower mounting plate (Fig 6) (350).
 28. Hold the hub (Fig 6) (230) with guide tube (Fig 6) (210) installed to concave side of the Cap (Fig 6) (110) center hole.
 29. Install lower mounting plate (Fig 6) (350) to the top convex surface of the cap (Fig 6) (110) with O-rings next to the cap (Fig 6) (110) and using (4) 5/16 -24 hex bolts (Fig 6) (400), and washers (270). Fasten the lower mounting plate (Fig 6) (350) to the hub (Fig 6) (230) and wrench tighten (12 ft-lb max.) only the (4) bolts (Fig 6) (400). (later after the cap installation these will be indexed and tightened to line up with the inlet pipe mounting).
- Note: This step is very important it is hard to undo if you forget !**
30. Install the (4) 5/16-24UNC Studs (Fig 6) (380) into the lower mounting plate. Wrench tighten (12 ft-lb max.) only and then back off 3 turns. Later these can be fully tightened once the lower mounting plate is indexed and the (4) hub bolts (Fig 6) (400) are tightened.

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Internals stack sub-assembly

Reference Fig (2)

31. Install the guide collar (200) up-side down and tighten the wrench flats in the vise.
32. In the following order stack the internal components on the guide collar (200).
33. Install the blousing plate (150) with the convex bulged rim upward.
34. Install a diaphragm slipper (190).
35. Install the diaphragm (250).
36. Install 0.010" Teflon Diaphragm Spacer (~3" diameter) (240).
37. Install the NAS flat washer (rounded edges down) (260).
38. Install diaphragm slipper (190).
39. Install the main seat plate with the concave side upward. (140).
40. Install flat NAS washer (rounded edge down) (260).
41. Install second 0.010" PTFE Washer (~ 3" diameter) (240).
42. Install flat NAS washer (rounded edges down) (260).
43. Install the white Expanded PTFE Seat Cushion (170).
44. Install the Seat film (as required on the B.O.M.) (180).
45. Install the one or more protector plates (160) as required on Bill of Materials (B.O.M.)
Note: if more than one the larger plate goes on first and then the smaller plate if they are a different outside diameters.
46. Install the standard flat washer (rounded edge down) (410).
47. Install the split lock-washer (370).
48. Install the Jam-nut with thread lock compound and tighten (280).

Mating internals stack sub-assembly to cap & guide rod sub-assembly

Reference Figure (7)

49. While the cap flange is still in the slightly past vertical position slide guide collar with stacked internals onto the guide tube and push the internals all the way back to the hub.
50. Install Aluminum cross bar (490) over the all thread rod (530) and align over two of the (5/16") mounting plate studs.
51. Install (5/16") washers and hex nuts.
52. Install the 1/4-20UNC all thread rod (530) through the crossbar lift bushing (500) and into the lower guide collar thread Fig 2 (200) until wrench tighten (12 ft-lb max.). Hold the lift bushing Fig. 7 (520) to keep it from rotating.
53. Place the main valve lifting lugs Fig 8 (540) on the remaining (2) lower mounting plate studs using the slotted hole and secure them with the other (2) 5/16 Hex-nuts. Use opposite slots on each side to maintain lifting symmetry.

Installing cap and internals stack sub-assemblies into body

Reference Figure (8)

CAUTION

Never allow the slings to come in contact with the pilot or tubing. Use a spreader bar on the sling to prevent contact. Failure to comply may cause equipment damage.

54. Using a double chain, attach the chain to lifting lugs (540) and carefully lift , remove the cap and internals sub-assembly from the holding device. (See illustration Fig. 7).
55. The cap flange face is now horizontal with gasket surface facing downward allowing the flat diaphragm Fig 1 (250) to hang downward.
56. Using rubber glove apply thin film of lubricant to the machined cap flange face (this is to protect the diaphragm during installation).
57. Using a crane, two hook chain in the central lifting lugs, center the cap sub-assembly over the valve body.
58. Lower the cap and internals assembly onto the valve body flange assuring that the diaphragm Fig 1 (250) perimeter is held taughtly outward from the four corners.
59. Check that the Teflon encapsulated body O-ring (Fig 1) (290) is in place before lowering the cap sub-assembly onto the body.
60. Carefully rotate the cap to further align the bolt holes and check for correct O-ring (Fig 2) (290) position again by looking through the bolt holes all around before resting the cap flange and diaphragm on the main valve.
61. Stretch the diaphragm (250) outward until taught all the way around.
62. Remove the crane and two hook chain.
63. Install the four hand grips about 90 degree apart to hold the cap and the body together with some low tension.
64. Using a 7/16" box end wrench slowly rotate the lift-bushing Fig (520) CCW allowing the internals assembly to drop as far as it will and then exerting some additional CCW torque until the main pallet to ensure seat engages the nozzle while pulling in the diaphragm (main seat closed position-cap will separate from the body approx. 1/16"-1/8").
65. Slowly rotate the wrench in the CW direction raise the internal assembly up against the upper stop and then CCW a second time down to the seat (after this step the diaphragm will be fully pulled in as far as it can be to the closed position-cap will separate from the body approx. 1/16"-1/8").
66. Using a small razor knife cut four holes in the diaphragm Fig1 (250) between the cap and body flange through the cap clearance holes approximately 90 degrees apart and install four cap hex bolts and washers Fig1 (360,370) to loosely hold the cap in the indexed position.

67. Using the razor knife or hole punch (5/16" dia) cut and remove remaining material in each of the bolt holes and install remaining cap bolts and washers Fig1 (360,370). Install the longer Hex bolts at the lifting lugs (540) locations on the side of the body, if applicable.
68. Remove the lifting lugs (540) from the lower mounting plate (350) and reinstall them on the machine surface on the bottom side of main valve flange as shown on Fig. 8.
Install the nut and lock washer(270,390) on the lower lifting lug face.
Note: these bolts are extra long and are extra strength.
69. Removing tooling (5/16" nuts/cross-bar/ threaded rod) from lower pilot mounting plate thread and store. Reduce tension in the lifting bushing Fig 7 (520) before removing all thread rod (Fig 7 (530)).
70. Index or rotate the lower pilot mounting plate Fig6 (350) by loosening bolts (400) one to two turns CCW ea. so that the mounting plate studs are approximately split on the outlet flange centerlines (set the pilot on the mounting plate to align the inlet pipe with the inlet pipe u-bolt and bracket). Once Pilot inlet pipe/Pilot is aligned, remove the pilot and tighten the four mounting plate bolts Fig 6 (400).
Note: Once tightened the lower mounting plate must not be able to rotate by hand.
71. Once tightened, re-Install the pilot and inlet tubing and secure the bracket U-bolts (not shown) and pilot mounting plate nuts and washers Fig1 (390, 370).

ANDERSON GREENWOOD TYPE 9300H POSRV

INSTALLATION AND MAINTENANCE INSTRUCTIONS

Teflon tape nozzle gasket installation instructions

1. The contact surfaces must be clean, free from grease, and dry
2. Remove the protective strip on the adhesive teflon rope
3. Press into the nozzle groove in the body and overlap as shown

FIGURE 5

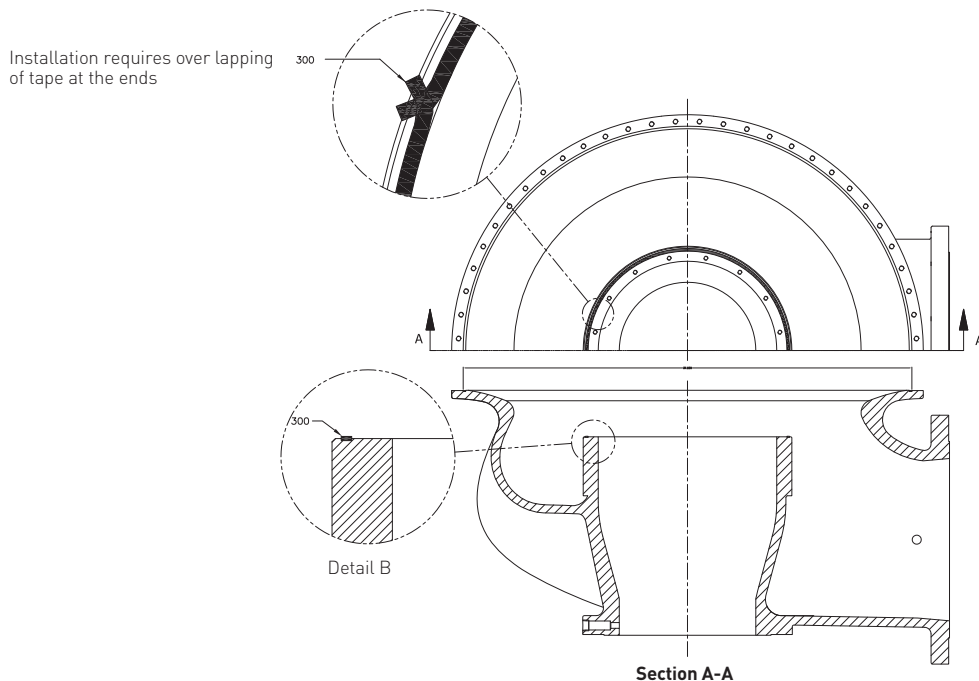
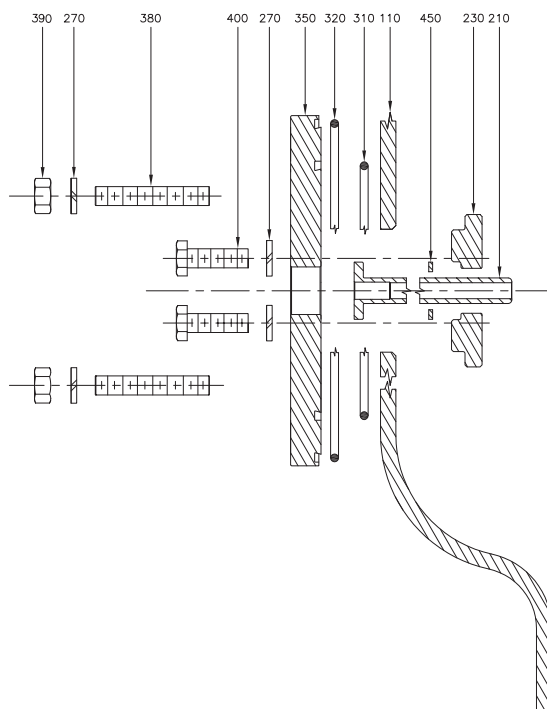


FIGURE 6

Cap- lower pilot mounting plate - hub - guide rod sub-assembly



PARTS LIST

Item no.	Part description	Material
110	Cap	SST A240 316/316L
210	Rod-guide	SST A479-316/316L, SST 17-4PH
230	Hub cap	SST A479-316
270	Washer	SST 316
310	O-ring as 568-242	PFA encapsuled solid silicone 85-90D
320	O-ring as 568-253	Nitrile 70D
350	Pilot lower mounting plate	SST A479-316L
380	Stud	SST SA193-B8M
390	Nut-hex	SST SA194-8M
400	Screw-hex head cap	SST SA193-B8M

WARNING

Use only genuine Anderson Greenwood replacement parts. Components that are not supplied by Emerson Automation Solutions should not, under any circumstances, be used in any Anderson Greenwood valve because they may void your warranty, might adversely affect the performance of the valve and could cause personal injury and property damage.

ANDERSON GREENWOOD TYPE 9300H POSRV

INSTALLATION AND MAINTENANCE INSTRUCTIONS

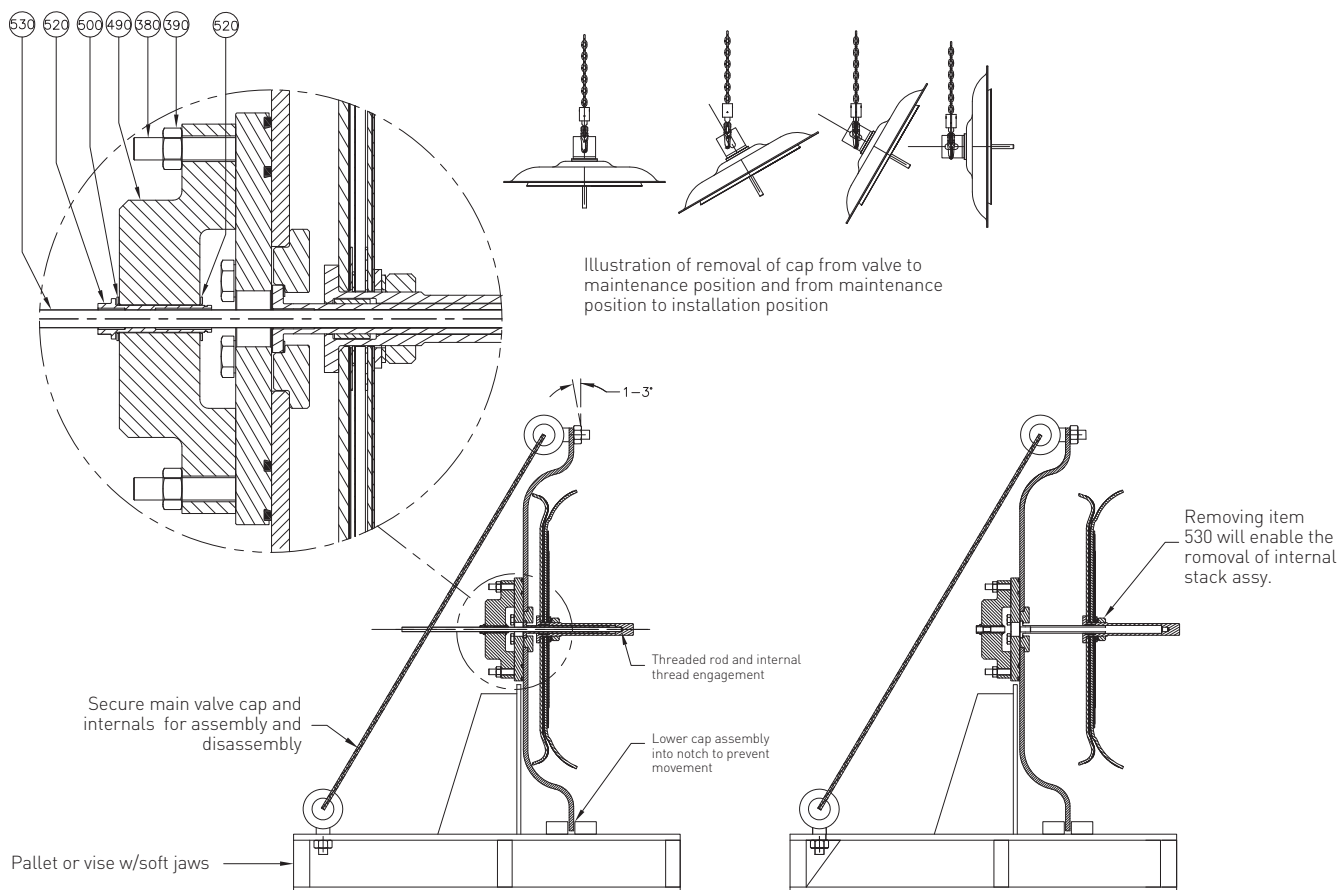
DIAPHRAGM INSTALLATION TOOL SET

Item no.	Part description	Material
380	Stud	SST SA193-B8M
390	Nut-hex	SST SA194-8M
490	Internals lifting tool	Aluminium T6
500	Washer (special)	SST 316
510	Retaining ring	SST 18-8
520	Lifting bushing	SST A240 316/316L
530	All Thread Rod	ASTM A36
540	Lifting lug	SST 316

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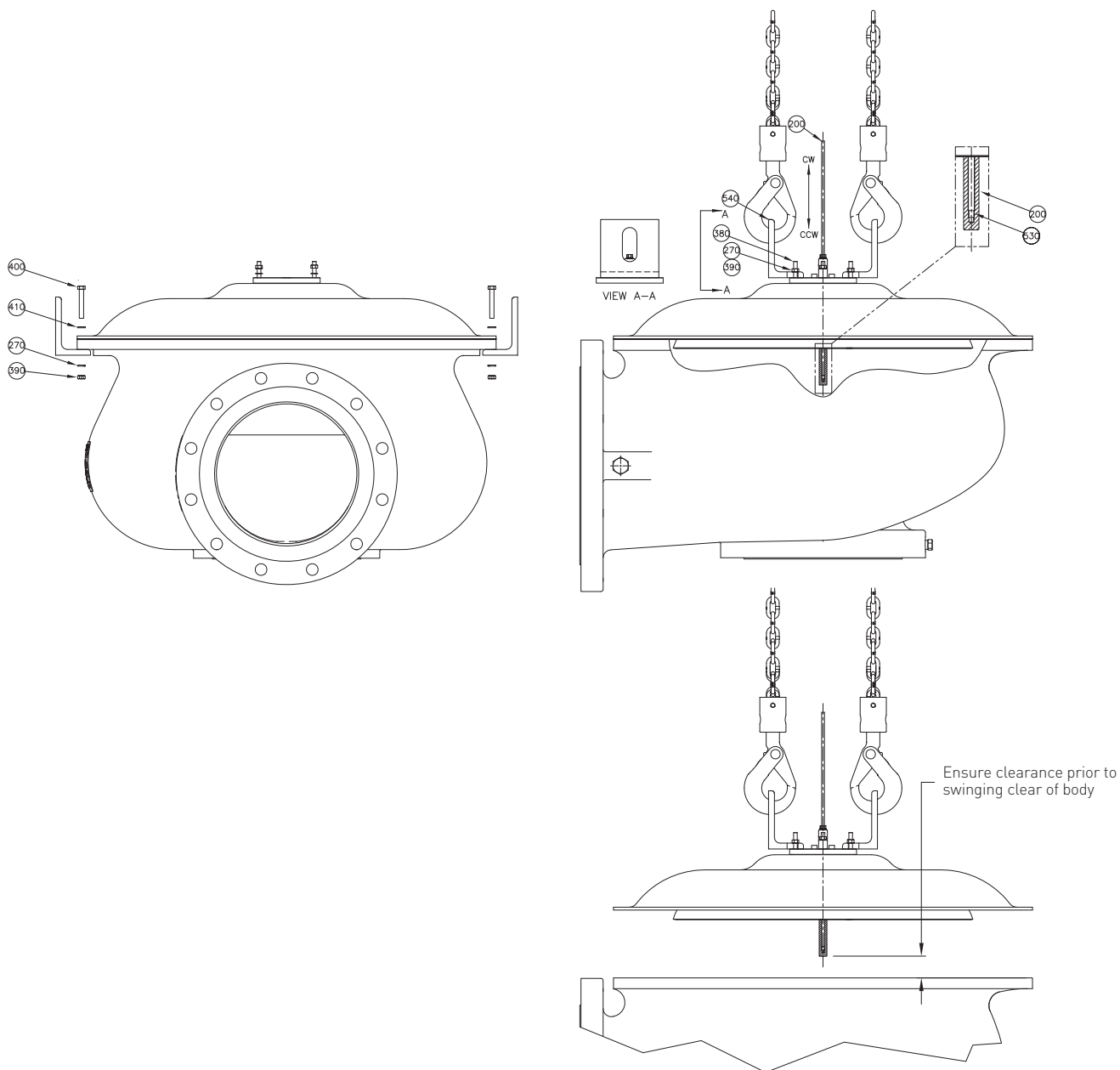
FIGURE 7
Diaphragm installation tool detail



ANDERSON GREENWOOD TYPE 9300H POSRV

INSTALLATION AND MAINTENANCE INSTRUCTIONS

FIGURE 8
Lifting lug installation for cap and internal assembly



Item no.	Part description	Material
270	Washer lock	SST A240 316/316L
380	Stud	SST SA193-B8M
440	Nut-hex	SST SA194-8M
540	Lifting lug	SST A240 316/316L

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ANDERSON GREENWOOD TYPE 9300H POSRV

INSTALLATION AND MAINTENANCE INSTRUCTIONS

3 PILOT DISASSEMBLY FOR FLOWING MODULATING PILOTS (TYPES 91, 93, AND 93T)

Reference Figures 9 thru 13

WARNING

Failure to follow the installation, operation or maintenance instructions for a Emerson product could lead to serious injury or death from explosion or exposure to dangerous substances. To reduce the risk:

- Comply with all information on the product, in this manual, and in any local and national codes that apply to this product.
- Do not allow untrained personnel to work with this product.
- Use Emerson parts and work procedures specified in this manual.

WARNING

Avoid personal injury from sudden release of process pressure. If the process media starts to escape from the valve or pilot, STOP IMMEDIATELY! The escape of process media indicates that the valve has NOT been properly vent, or process pressure is trapped in the valve body nor pilot. Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

The pilot disassembly instructions and soft goods vary between pilot types. Pay particular attention to orientation of parts and materials. The 93T pilot has all Teflon® soft goods including diaphragms, and its maximum set pressure is 15 psig. The 91 pilot has Teflon® soft goods with stainless steel (SS), Hastelloy®, and Teflon® diaphragms, and its set pressure ranges from 16 psig to 50 psig. The 93 pilot is different from the 93T and 91 pilot in that it uses elastomer seat, seals, and diaphragms.

1. Remove cap (760) and adjusting screw (790) and adjusting screw seal (720) for vacuum pilot. Remove bonnet bolts (770), seals (700) for vacuum pilot, bonnet (200), spring (840) and spring washer (820).
2. On Types 91 and 93T pilots, loosen boost tube fitting (310) on boost tube (320) at boost tube connector bolt (270). Refer to Detail B. Remove boost tube connector nut (300), washer (290), lower boost tube seal (590), seal retainer (280). Let these three parts slide down boost tube. Remove boost tube connector bolt (270), upper boost tube seal (590) and seal retainer (280).
3. On Type 93 pilot, loosen boost tube fitting (310) on boost tube (320) at boost tube connector bolt (270). Refer to Detail B. Remove boost tube connector nut (300), washer (290), lower boost tube seal (600) Let these three parts slide down boost tube. Remove boost tube connector bolt (270) and upper boost tube seal (590).
4. Remove case bolt nuts (260), washer (250) and bolts (240). Remove upper case (210).
5. On Types 91 and 93T pilot. Hold hex spacer (120) with a shortwell ¾" socket that has the ratchet area bored out and inserting another socket into the bored out hole, loosen.
6. Remove parts in the following order: hex spacer (120), sense plate (150), upper gasket (650), sense diaphragm case gasket (650), spindle gasket (680), sense spacer (140), boost plate (160), spacer ring (230), diaphragm gasket (620), boost diaphragm gasket (680) (See Figure 12, Detail A).
7. On Types 93 pilot, hold hex spacer (120) with a shortwell ¾" socket that has the ratchet area bored out and inserting another socket into the bored out hole, loosen.
8. Remove parts in the following order: hex spacer (120), sense plate (150), sense diaphragm (510), upper gasket (650), sense spacer (140), boost plate (160), spacer ring (230), diaphragm gasket (620), boost diaphragm gasket (510), boost spacer (130), check plate (560) and spindle seal (660). (See Figure 12, Detail A).
9. Remove boost tube (320) from body (100) and lower boost tube seal (590/600(93T)) from boost tube (320).
10. Remove spindle diaphragm (500) and gasket (690) for 93T pilot and spindle/disc assembly (550) from body (100).
11. Remove spindle diaphragm plate (170) and shim washer(s) (490) from spindle/seat assembly (550).
Note: shim washer(s) may not always be used in assembly (550).
12. Refer to Detail A. For the 93T pilot seat assembly, remove the retainer ring (430) and seat retainer (420) from the spindle/disc assembly (550). Remove the seat (570).
13. Remove blowdown bushing (390) and blowdown seal (630) from body (100).
Note: the blowdown screw retainer (380) is a loose fit on the blowdown adjustment screw (350). Be prepared to catch it when the bushing (390) is removed from the body (100).
14. Loosen the blowdown screw locknut (370) and remove the blowdown adjusting screw (350) and seal (630) from the bushing (390).
15. Remove the vent (800) from the body (100).
Note: it is not necessary to remove the filter screen (400) or nozzle (110) from the body (100).
16. Remove the upper mounting plate (930), bolt seals (610), plate seals (940) from body (100) by unthreading the body bolts (340).
17. Clean all parts and replace all soft goods. The spindle/seat assembly (550) is factory assembled and must be replaced as a unit. If the nozzle (110) is nicked or scratched, it should be replaced. To remove it, use a deep socket.

ANDERSON GREENWOOD TYPE 9300H POSRV

INSTALLATION AND MAINTENANCE INSTRUCTIONS

3.1 Pilot assembly for flowing modulating pilots Types 91, 93, and 93T

1. On Type 93 and Teflon® seat Types 91 and 93T pilots, if you removed the nozzle (110), reattach the nozzle (110) to the body (100), and replace the spindle seat assembly (550).
2. If you removed the filter screen (400), reattach the filter screen (400), and reattach the vent (800) to the body (100).
3. Reattach the blowdown seal (620), and blowdown adjusting screw (350) to the blowdown bushing (390), and tighten the blowdown nut (370).

Note: make sure the blowdown screw retainer (380) is on the blowdown adjustment screw (350).

4. Attach the bushing seal (630) and the blowdown bushing (390) to the body (100).
5. Place the shim washer(s) (490), if applicable, and spindle spacer (170) on the spindle seat assembly (550). Then place the spindle seat assembly (550) in the body (100).
6. Lay a straight edge across the body (100) and check the gap between the straight edge and the spindle spacer (170). Add or remove shim(s) (490) as required to make the top of the spindle spacer (170) even with the top of the body (100).
7. Align the small hole in the lower diaphragm case (220) with the hole in the spindle diaphragm (500). Then align the spindle diaphragm hole (500) with the hole in the body (100). Install the lower case (220), plate seals (940) from body (100) by unthreading the body bolts (340) onto the body (100) and tighten together.

Note: on the 91 and 93T pilots, there are gaskets (690) on each side of the spindle diaphragm (500) and a diaphragm case plate (180) that must be installed onto the lower case (220) using the spiral pin (410).

8. On Types 91 and 93T pilots, slide the hex nut (300), flat washer (290), seal retainer (280), and seal boost tube (590) on to the boost tube (320).

On Type 93 pilots, slide the hex nut (300), flat washer (290), and thread seal (600) on to the boost tube (320). Then attach the boost tube (320) to the body (100) with the connector (330).

9. On Types 91 and 93T pilots, install parts in the following order: spindle seal (660), boost spacer (130), diaphragm case gasket (640), boost diaphragm (510/520), diaphragm case gasket (larger I. D. hole) (640), spacer ring (230), boost plate (160), sense spacer (140), diaphragm case gasket (640), sense diaphragm (510), diaphragm gasket (smaller I.D. hole)(640), sense gasket (670), sense plate (150), hex spacer (120), spring disc (830), lock washer (780) and jam nut (750).

Note: be sure to align large hole in diaphragm(s) (510/520) and gaskets (all 640) with the boost tube hole (270).

10. On Type 93 pilot, install parts in the following order: spindle seal (660), check plate (rubber side down) (560), boost spacer (130), boost diaphragm (510), diaphragm gasket (650), spacer ring (230), boost plate (160), sense spacer (140), diaphragm gasket (650), sense diaphragm (510), sense plate (150), hex washer (120), spring disc (830), lock washer (780), and jam nut (750). Note: Be sure to align large hole in diaphragm(s) (510) and gaskets (ALL 650) with the boost tube (270) hole.
11. To tighten spindle (550) and diaphragm assembly, hold ¾" socket tool onto hex washer (120) stationary, and tighten the jam nut (750).
12. Install upper diaphragm case (210), case bolts (240), washers (250) and nuts (260), and tighten.
13. Install the upper boost tube seal (590) (Type 93 pilot), PTFE seal (590) and seal retainer (280) (Types 91 and 93T pilot), and boost tube connector/bolt (270) into the large hole of the diaphragm cases (210, 220). Slide the lower boost tube seal (600) (Type 93 pilot), PTFE seal (590) and seal retainer (280) (Types 91 and 93T pilot), washer (290), nut (300), and boost tube connector nut (310/480) up the boost tube (320) attach to the boost tube connector/bolt (270). Tighten boost tube fitting (310) on the boost tube (320) at the boost tube connector/bolt (270).
14. Install the spring (840), spring washer (820), bonnet assembly (200), and bonnet bolts (770), adjusting screw (790), locknut (190), and cap (760).

Note: for the vacuum pilot remember to replace bonnet bolt (700), bonnet gasket (580) and adjusting screw seal (720).

ANDERSON GREENWOOD TYPE 9300H POSRV

INSTALLATION AND MAINTENANCE INSTRUCTIONS

PILOT PARTS (FIGURES 9, 10, 11)

Item	Description	Item	Description
100	Body	600	Seal - thread
110	Nozzle	610	Seal - body bolt
120	Spacer - hex	620	Seal - blowdown
130	Spacer - boost	630	Seal - bushing
140	Spacer sense	640	Gasket - case
150	Sense plate	650	Gasket - diaphragm
160	Plate - boost	660	Seal - spindle
170	Spacer - spindle	670	Gasket - sense (93T only)
180	Plate - diaphragm case (93T only)	680	Gasket - spindle (93T only)
190	Pressure adjustment lock nut	690	Gasket - spindle diaphragm (only used if Item 500 is Teflon®)
200	Bonnet assembly (items 450 - 710 part of assembly)	700	Seal - bonnet bolt (93T only)
210	Diaphragm case upper	710	Seal - bonnet insert (part of Item 200 assembly vacuum only)
220	Diaphragm case lower	720	Seal adjustment screw (93T only)
230	Ring - spacer	730	Base - seat (93T only)
240	Case - bolt	740	Ball
250	Case Washer - lock	750	Nut - hex
260	Case Nut - hex	760	Cap
270	Connector - boost tube	770	Bolt - bonnet
280	Seal - retainer (93T only)	780	Washer - lock
290	Washer - flat	790	Pressure adjustment screw
300	Nut - hex	800	Vent - body (dependent on configuration of assembly)
310	Nut - connector	810	Vent - bonnet
320	Tube - boost	820	Washer - spring
330	Connector - straight	830	Disc spring
340	Bolt - body	840	Spring
350	Needle - blowdown adjustment	910	Name plate (not shown)
370	Blowdown nut	920	Screw - drive (not shown)
380	Blowdown retainer	940	O-ring - upper pilot mounting plate to body seal
390	Blowdown bushing	930	Upper Pilot Mounting Plate
400	Screen filter		
410	Pin - spiral (93T only)		
430	Ring - retainer (93T only)		
440	Nut - swage (93T only)		
450	Insert - bonnet (part of Item 200 assembly)		
460	Wire		
470	Seal - 1/2" dia		
480	Ferrule (not shown)		
490	Washer - shim (for stack height only)		
500	Diaphragm - spindle		
510	Diaphragm - sense/boost		
520	Diaphragm - sense (93T only)		
550	Spindle		
560	Plate - check		
570	Seat		
580	Gasket - bonnet		
590	Seal - boost tube		

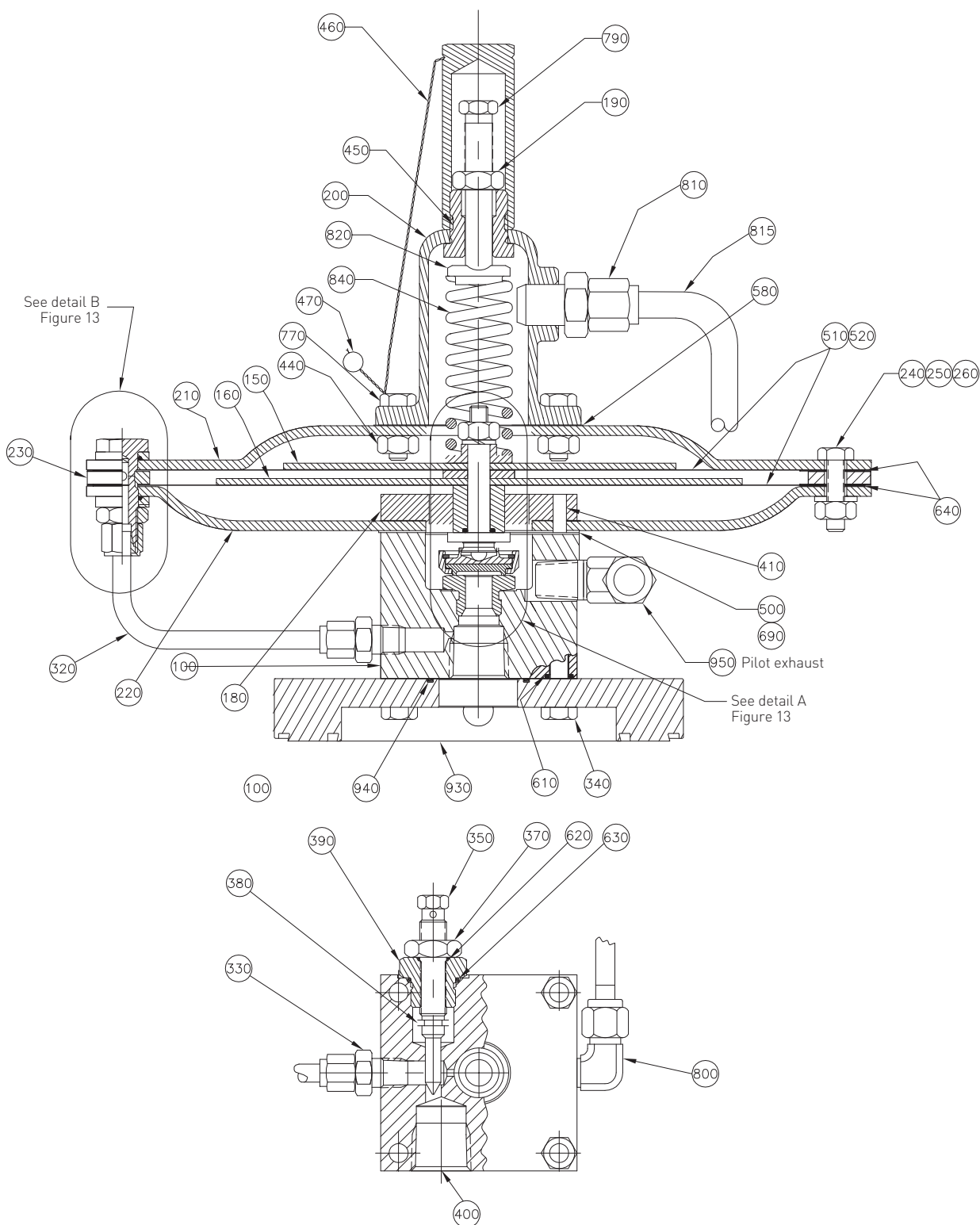
WARNING

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ANDERSON GREENWOOD TYPE 9300H POSRV

INSTALLATION AND MAINTENANCE INSTRUCTIONS

FIGURE 9
Types 93 and 93T pressure pilot (below 15 psig)

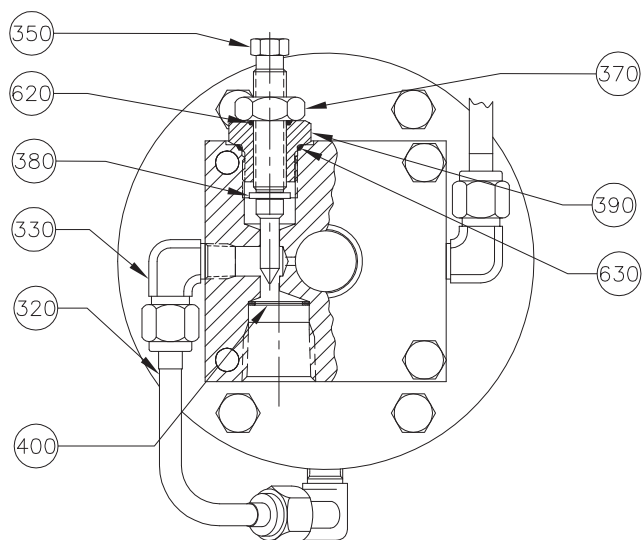
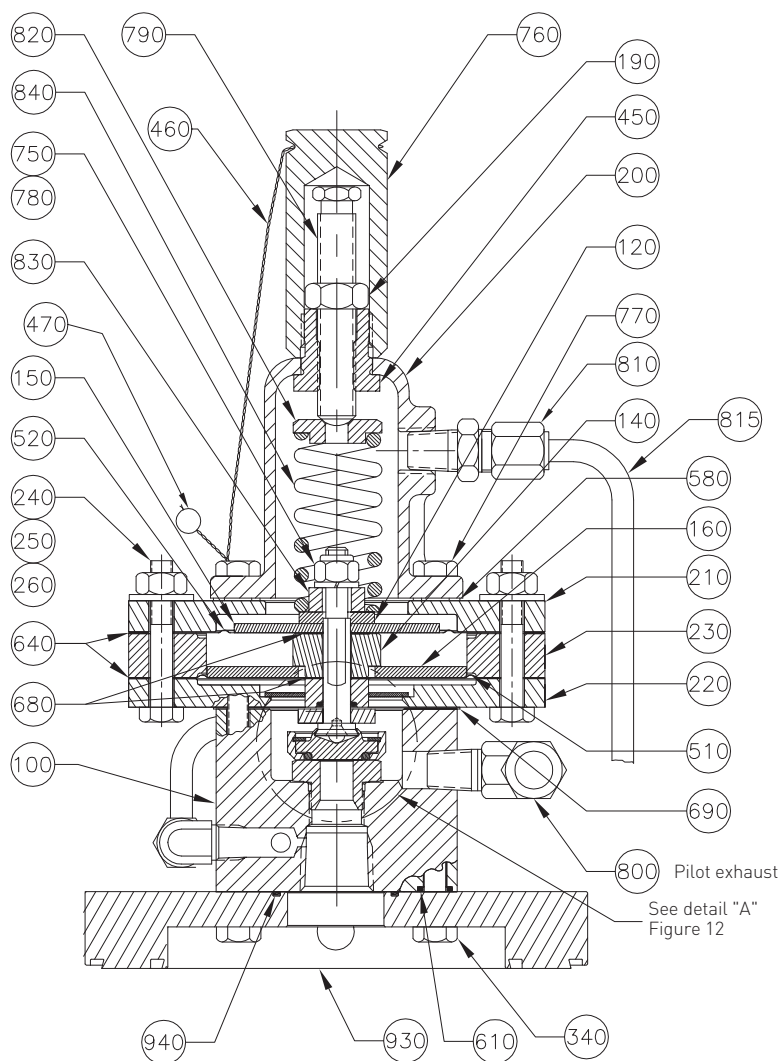


Item 930 not shown

ANDERSON GREENWOOD TYPE 9300H POSRV

INSTALLATION AND MAINTENANCE INSTRUCTIONS

FIGURE 10
Types 91 and 93 pressure pilot (above 15 psig)

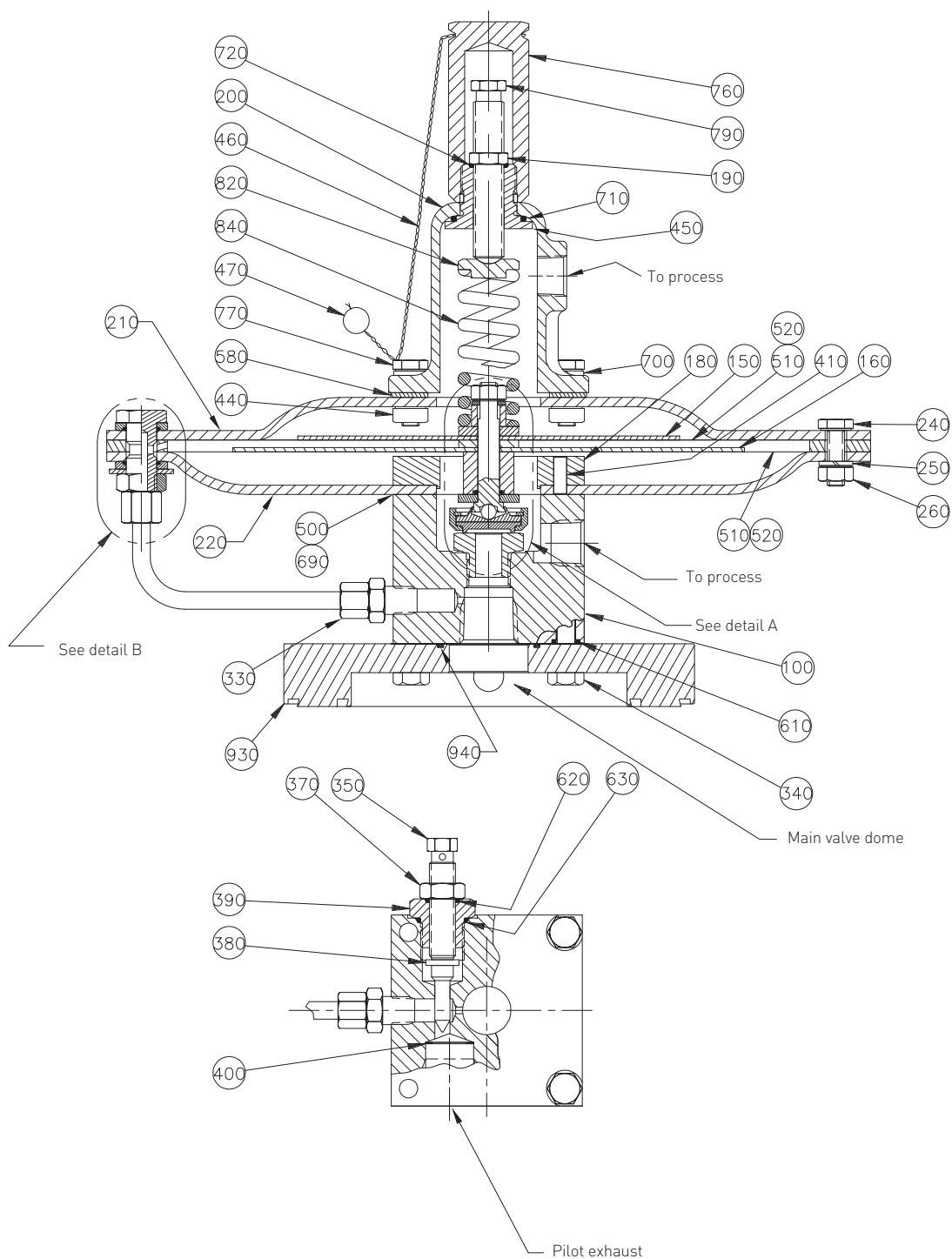


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ANDERSON GREENWOOD TYPE 9300H POSRV

INSTALLATION AND MAINTENANCE INSTRUCTIONS

FIGURE 11
Type 93 vacuum pilot

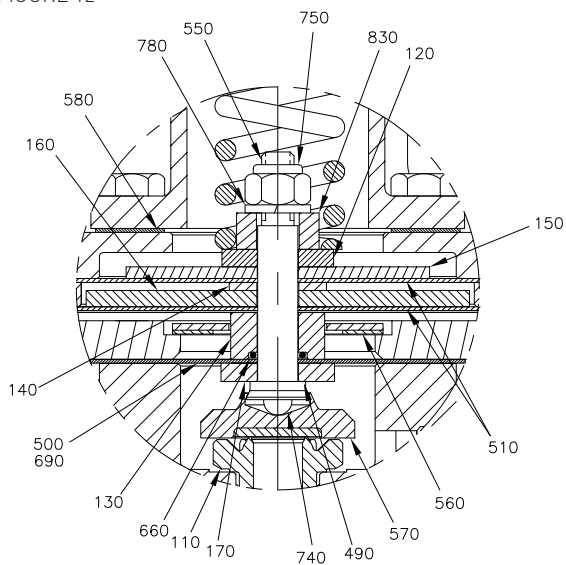


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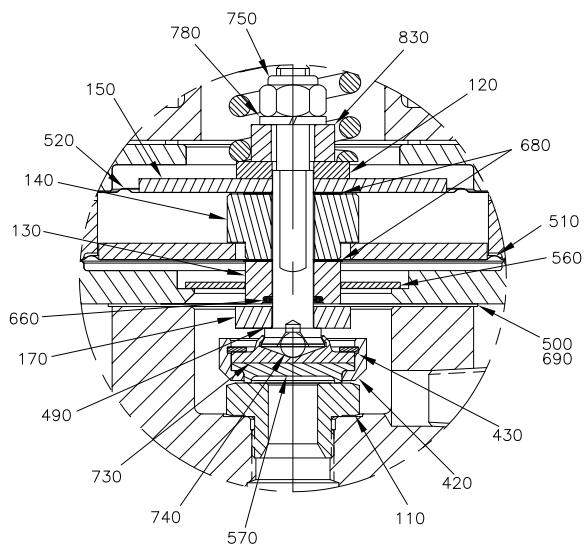
ANDERSON GREENWOOD TYPE 9300H POSRV

INSTALLATION AND MAINTENANCE INSTRUCTIONS

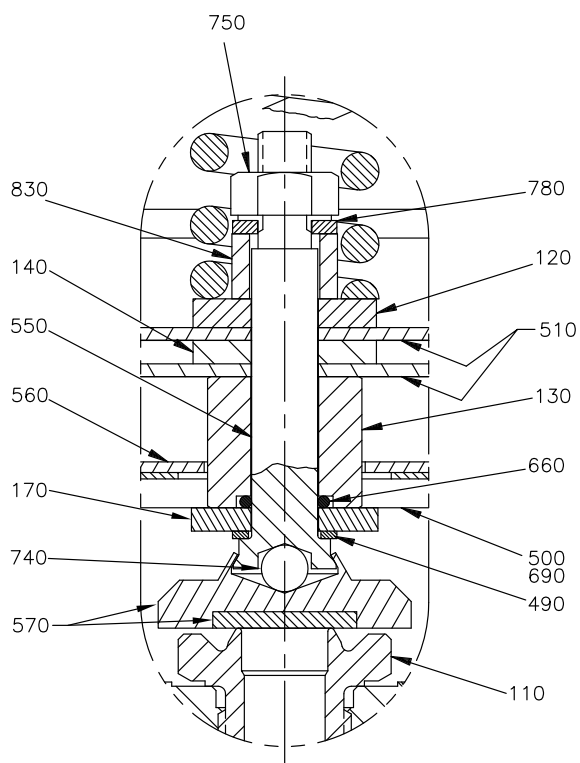
FIGURE 12



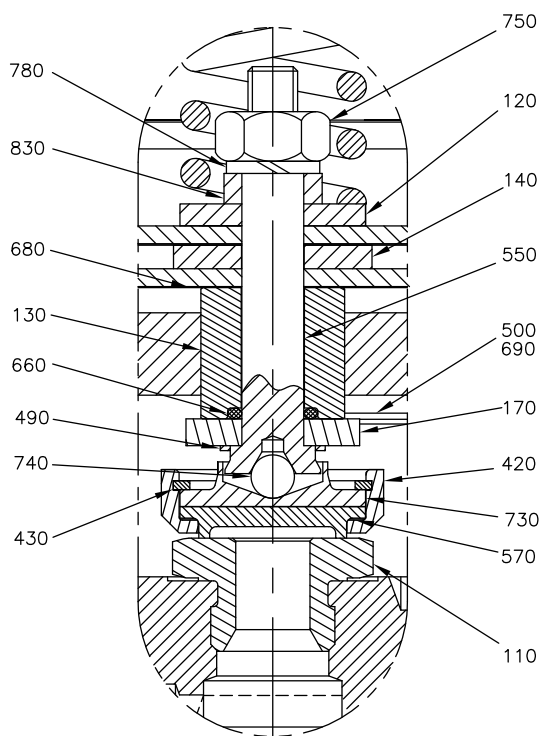
Detail A
Type 93 - pressure above 15 psig



Detail A
Type 91 - pressure above 15 psig



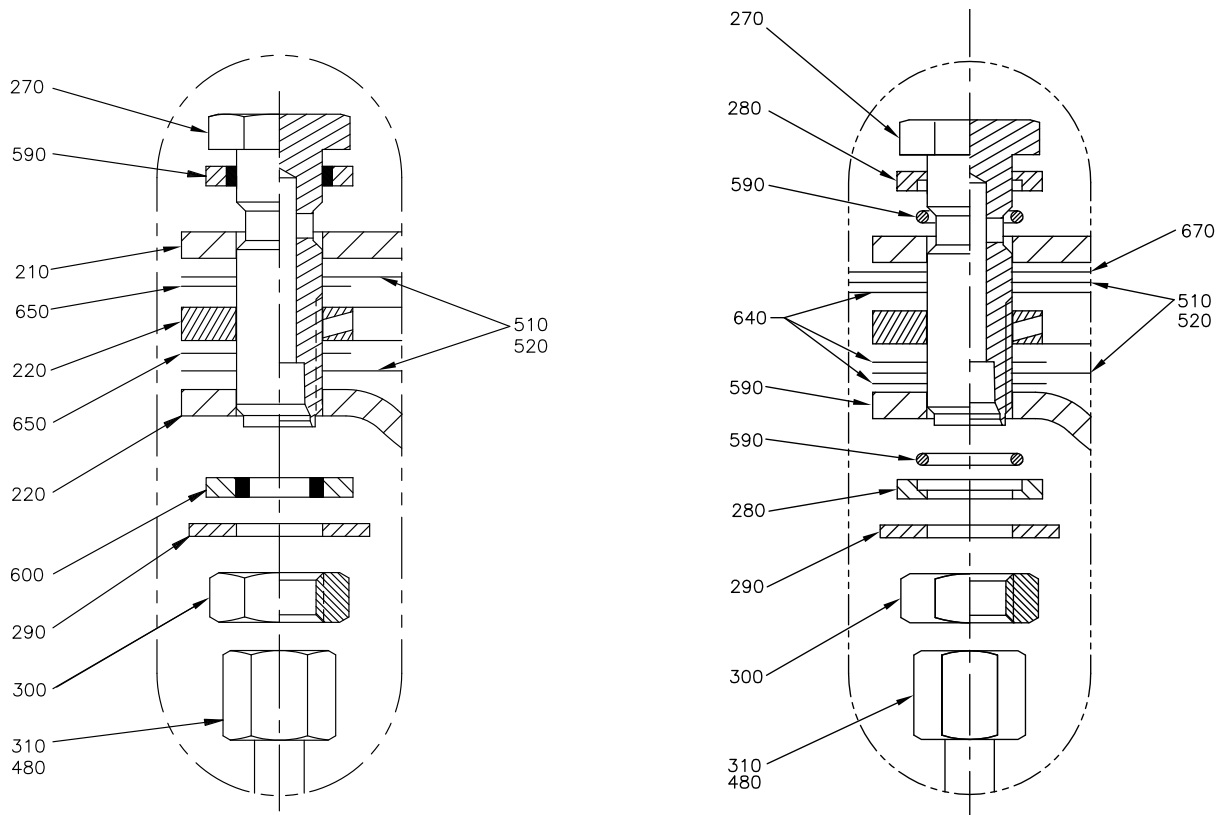
Detail A
Type 93 - pressure below 15 psig and vacuum



Detail A
Type 93T - pressure below 15 psig

ANDERSON GREENWOOD TYPE 9300H POSRV
 INSTALLATION AND MAINTENANCE INSTRUCTIONS

FIGURE 13



Detail B
 Type 93 pilot - pressure below 15 psig and vacuum

Detail B
 Type 93 pilot - pressure below 15 psig

ANDERSON GREENWOOD TYPE 9300H POSRV

INSTALLATION AND MAINTENANCE INSTRUCTIONS

3.2 Pilot adjustment for flowing modulating action pilots (TYPES 91, 93 AND 93T pilots)

The pilot may be set separate from the main valve provided there is access to a pilot test system similar to the one shown in Figure 14.

WARNING

Failure to follow the installation, operation or maintenance instructions for a Emerson product could lead to serious injury or death from explosion or exposure to dangerous substances.

To reduce the risk:

- Comply with all information on the product, in this manual, and in any local and national codes that apply to this product.
- Do not allow untrained personnel to work with this product.
- Use Emerson parts and work procedures specified in this manual.

WARNING

When the pressure relief valve is under pressure never place any part of your body near to the outlet/exhaust of the valve.

Failure to follow these instructions may result in death or serious injury.

3.2.1 Adjustment of set pressure

1. Install the pilot valve onto the pilot test system, and attach gage sensing lines to the supply and dome connections.
2. Remove the cap.
3. Screw the set pressure adjustment screw clockwise until it is screwed in 80% to 90% and set the adjustable needle valve all the way in then counterclockwise out the specific number of turns listed in the table below for different pilot configurations and pressures.
4. Increase the supply pressure to nameplate setting and slowly back out the set pressure adjustment screw until flow through the pilot exhaust begins.
5. Continue to back the set pressure adjustment screw out until the dome pressure is 50% of the supply pressure. When the dome pressure reaches 50% of the supply pressure read the supply gage pressure. If it is below set pressure, you will need to tighten down on the pressure screw, or back it off if you are high. Tighten the locknut once the desired set pressure is achieved.

Note: set pressure on a vacuum pilot is evidenced by a rapid change of the dome pressure (0 gage) to the supply pressure. A slow ramp speed is required in order to obtain true readings of set pressure.

6. Check the pilot exhaust vent for leakage. The pilot shall be bubble tight up to crack pressure shown in 3.2.3 Also, check upper pilot vent for leakage. There should be 0 leakage from the upper vent.

3.2.2 Reseat pressure

1. The blowdown adjusting screw is fixed as specified in 3.2.1 from the closed position.
3. Cycle the pilot valve a minimum of 5 times to assure that dome pressure reduction at set pressure is consistent. Increase the pressure very slowly in order to obtain an accurate reading of the cracking pressure and to expose any erratic performance.

Note: cracking pressure on vacuum pilots is that pressure at which the initial dome pressure change is noted.

5. After desired pilot action is set, verify pilot seat tightness. This is accomplished by checking the pilot exhaust vent for leakage. The pilot should be bubble tight up to crack pressure as shown in 3.2.3. Be aware of crack pressure changes between set pressure ranges.

Pilot type: 90 Low Pressure (Large Pilot Case)

Blowdown Adjustment: 4" WC to 16" WC

Turns: 2 Turns out

Blowdown Adjustment: Above 16" WC

Turns: 3 Turns out

Pilot Type: 90 High Pressure (Small Pilot Cases)

Blowdown Adjustment: Above 3.5 psig

Turns: 3 Turns out

Pilot Type: 90 Vacuum Pilot (Large Pilot Case)

Blowdown adjustment: 4" WC to -14.7" WC

Turns: 2 Turns out

3.2.3 ADJUSTMENT TOLERANCES

Pilot action	Set press.	Set press tolerances	Crack % set	Reseat % set
Modulating Action	4" WC to 7" WC	± .2" WC	75%	100%
Modulating Action	7" WC to 1.0 psig	± 3%	90%	100%
Modulating Action	1.0 psig to 10.0 psig	± 3%	95%	100%
Modulating Action	-4" WC to -7" WC	± .2" WC	75%	100%
Modulating Action	-7" WC to -1.0 psig	± 3%	90%	100%
Modulating Action	-1.0 psi to -57 psig	± 3%	95%	100%

ANDERSON GREENWOOD TYPE 9300H POSRV

INSTALLATION AND MAINTENANCE INSTRUCTIONS

4 FUNCTIONAL TESTING OF COMPLETE ASSEMBLY OF MAIN VALVE AND PILOT

WARNING

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- Do not allow untrained personnel to work with this product.
- Use Emerson parts and work procedures specified in this manual.

WARNING

Use only genuine Anderson Greenwood replacement parts. Components that are not supplied by Emerson Automation Solutions should not, under any circumstances, be used in any Anderson Greenwood valve because they may void your warranty, might adversely affect the performance of the valve and could cause personal injury and property damage.

WARNING

When the pressure relief valve is under pressure never place any part of your body near to the outlet/exhaust of the valve. Failure to follow these instructions may result in death or serious injury.

CAUTION

The control valve body and piping may be extremely hot or cold. Wear personal protective equipment appropriate to the situation when working with the control valve. Adhere to your company's safety standards and practices. Failure to comply may cause serious injury

4.1 General

Assemble the pilot to the main valve, and install remaining tubing and accessories. The complete valve assembly should be leak tested for internal and external leaks using a pressure equal to 30% and 90% of set.

4.1.1 Leakage check - pressure relief valves

Apply pressure to the inlet equal to 30% of the set pressure. Check for leakage at the main valve seat, no visible leakage shall occur. Hold time is 1 minute. Slowly increase the inlet pressure to 90% of the set pressure. Check for leakage at the cap seal, casting, pilot support pipe and supply tube and other applicable connections using leak test solution and at the main valve seat. No visible leakage shall occur for a hold time of 1 minute.

4.1.2 Leakage check - vacuum relief valves

Valves equipped with vacuum pilots shall be leak tested per 4.1.1 on positive pressure with the set pressure equal to the reciprocal of the vacuum set pressure. Valves with weighted diaphragms shall be tested for leakage at 50% of their weighted set.

4.1.3 Back flow preventers and/or field test

The use of some field test connection or back flow preventers necessitates the use of check valves. These valves shall be installed per the applicable assembly drawings and in the free flow direction shall open at less than .5" W.C. The check valves may be tested for forward flow either before or after assembly at the shops option. The output check valve of back flow preventers shall be checked for zero leakage per 4.1.1 paragraph 2.

4.2 Field test instructions for flowing modulating action pilots

4.2.1 General

An optional field test accessory is available for checking the positive set pressure without removing the valve from service. The field test accessory consists of a 3-way ball valve to allow the pilot to sense pressure from either the process or from the test gas source. A standard bottle of nitrogen equipped with a pressure regulator, block valve, pressure gage, and convenient length of high pressure flexible hose is recommended for testing. A set up similar to that shown in Figure 15 should be used. Such a test kit is available from Anderson Greenwood under the part number 04.4812.001 plus additional dash numbers for the pressure gages required.

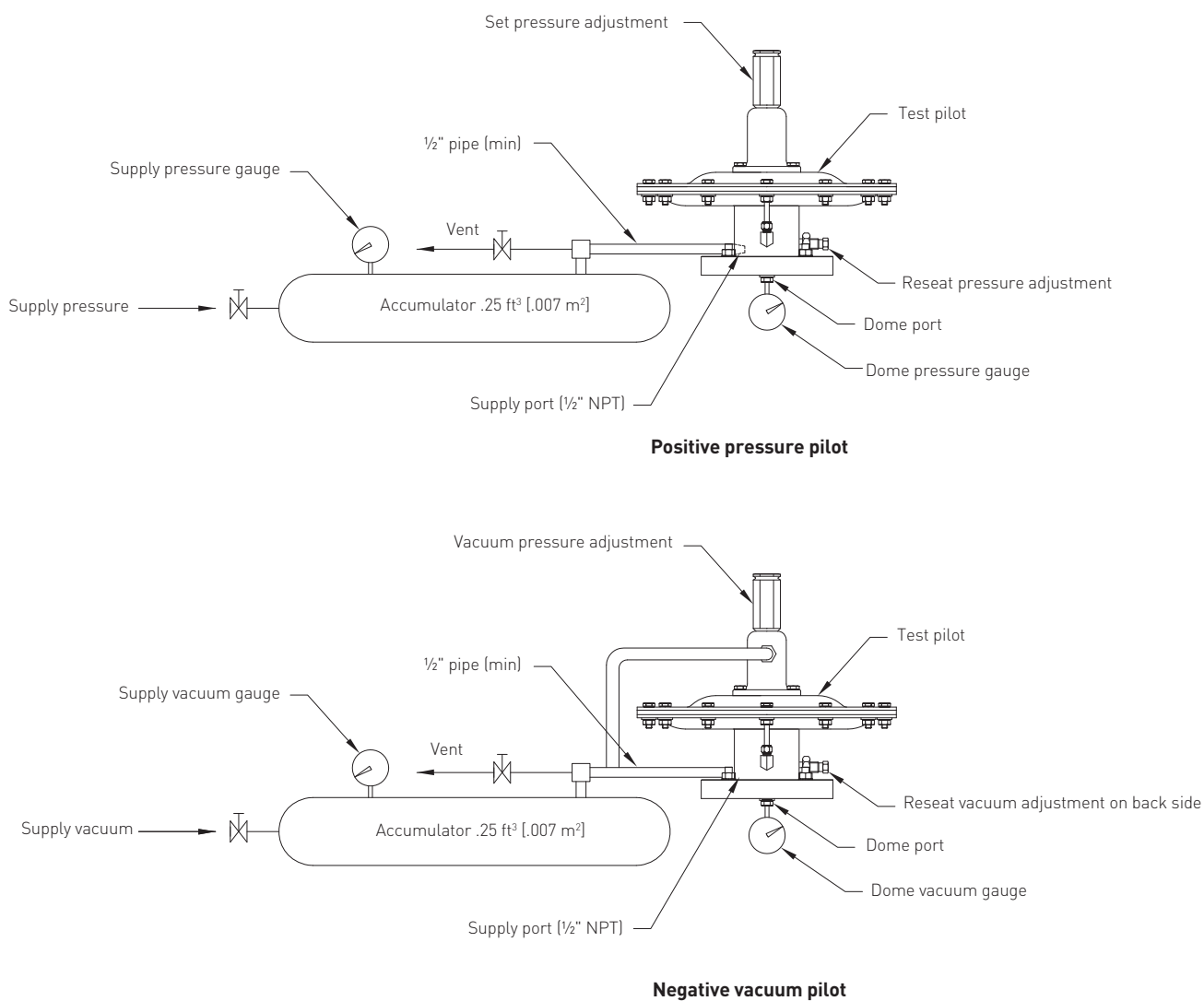
4.2.2 Field test procedure for flowing modulating pilots

1. Connect the gas bottle as shown in Figure 15.
2. Close vent valve "C".
3. Open block valve "B" to supply regulator.
Note: Regulator pressure should be set at 0.
4. Connect bubble tester bottle to pilot exhaust vent.
5. Increase pressure at field test port to slightly above tank pressure by slowly increasing regulated pressure.
6. Open field test valve "A" and slowly increase regulator pressure until bubbles are seen in the bottle. That pressure will be within 10% of the set pressure.
7. To remove the test set-up, close valves "A" and "B" and open valve "C".

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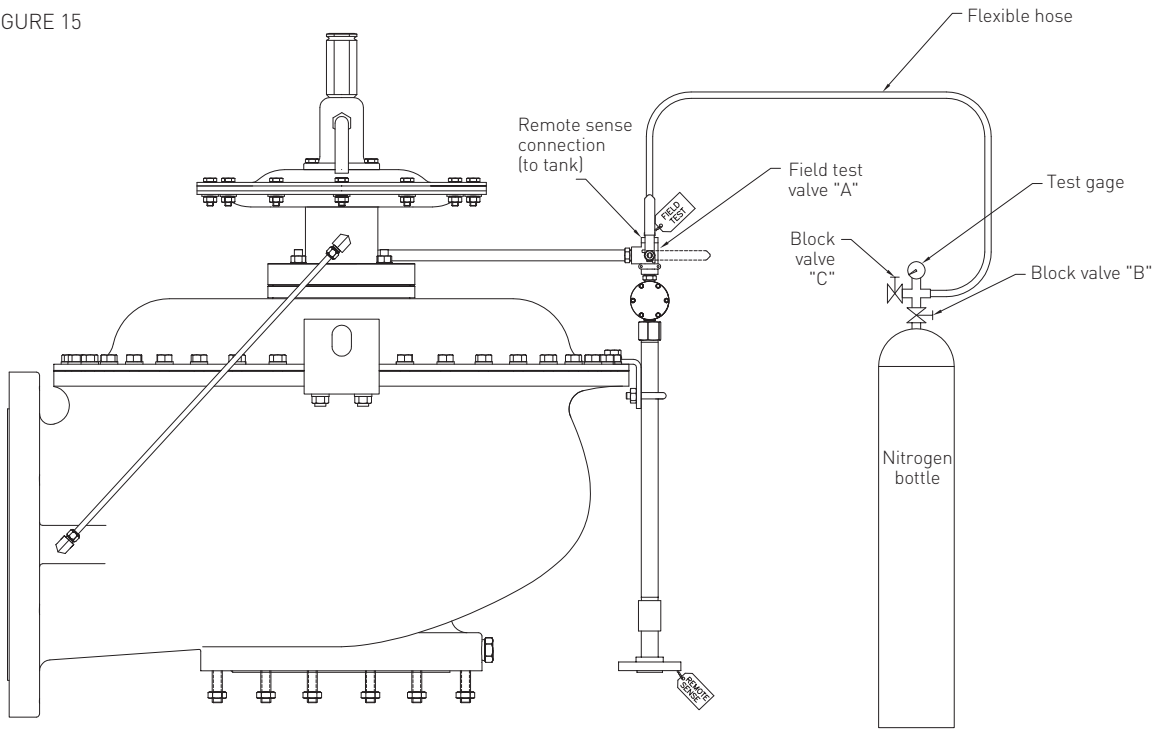
FIGURE 14



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FIGURE 15



5 STORAGE AND HANDLING

Because cleanliness is essential to the satisfactory operation and tightness of a 9300H pilot operated relief valve, precautions should be taken to keep out all foreign particles and materials. Valves should be closed off properly at both the valve inlet and outlet. Particular care should be taken to keep the valve inlet absolutely clean. Valves should preferably be stored indoors with the original factory installed protective measures left in place. This includes all desiccants, flange protectors, and factory seals. Valves should be placed on wooden pallets or other blocking materials to keep them off the floor or in a location where dirt and other forms of contamination are kept to a minimum. Valves should not be thrown in a pile or laid on the bare ground waiting for installation.

6 TROUBLE SHOOTING

Problem	Possible cause	Resolution
1. Valve opens below set.	1. Improper installation of sense line. 2. Plugged sense line. 3. Improper gauge accuracy and/or location.	1. Verify if sense line is installed properly. 2. Check sense line, inlet screen, and dipper tube for cleanliness. 3. Verify gauge accuracy for valve being tested and ensure location is at valve being tested.
2. Pilot leaks from upper vent.	1. Sense diaphragm failure.	1. Replace diaphragm.
3. Pilot leaks from lower vent.	2. Spindle lock nut loose.	2. Tighten spindle lock nut.
4. Main valve leaks.	1. Pilot seat leakage.	1. On the 93 pilot, replace spindle disc assembly. On the 93T and 91 pilots, replace seat. Inspect nozzle and relap if necessary.
	2. Nozzle over tightened.	2. Tighten nozzle per assembly instructions.
	1. Seat film damaged.	1. Replace seat film.
	2. Nozzle damaged.	2. Inspect nozzle and relap if necessary.
	3. Nozzle seal damaged, missing, or out of place.	3. Position nozzle seal per assembly instructions.
	5. Operating too close to set pressure. (above 96%)	5. Lower operating pressure.
	6. Possible main valve diaphragm pin-holes	6. Replace diaphragm.
7. Internals Stack assembly loose	7. Tighten Internal Stack assembly Jam Nut	

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7 MAIN VALVE SPARE PARTS AND REPAIR KITS

WARNING

Use only genuine Anderson Greenwood replacement parts. Components that are not supplied by Emerson Automation Solutions should not, under any circumstances, be used in any Anderson Greenwood valve because they may void your warranty, might adversely affect the performance of the valve and could cause personal injury and property damage.

Soft goods repair kits contain all the diaphragms, seals, and seats to a repair valve. To order a kit, specify the base number and select the last three digits from the following tables. To ensure the purchase of the correct repair kit, the order should specify the valve model and serial number. For chloride rich environments, the bolts in the main valve and pilot exposed to the environment should be replaced during routine maintenance or at least every 5 years.

7.1 TYPE 9300H MAIN VALVE DIAPHRAGM REPAIR KITS

Kit type	Internals	Materials	2"	3"	4"	6"	8"	10"	12"
Soft Goods	SST	PTFE	11407247	11451328	11451329	11407249	11451330	11407251	11407252
Bolt	SST Certs	SST	11407256	11451331	11451332	11407259	11451333	11407261	11407262
Bolt	SST Certs - RS BKT	SST	NA	11451334	11451336	11408970	11451337	11408972	11408974

8 PILOT SPARE PARTS AND REPAIR KITS

8.1 91 PILOT REPAIR KIT

Pilot type	Pressure	Kit type	Material	Pressure
91 Pilot	15 - 50 psig	Soft Goods	PTFE/Stainless	11407383

8.2 93T PILOT REPAIR KIT

Pilot type	Pressure	Kit type	Material	Pressure	Vacuum
93T Pilot	4"WC - 14.9 psig	Soft Goods	PTFE	11407375	11407380
93T Pilot Marine	4"WC - 14.9 psig	Bolt	SST	11407269	11407269

9 ACCESSORIES, OPTIONS, AND ACCESSORY REPAIR KIT

9.1 Accessories

- Field test connection
 - In-service verification of set pressure.
 - Simplifies the periodic testing of pressure relief valves.
- Backflow preventer
 - Prevents accidental reverse flow through pressure relief valve.

9.3 ACCESSORY REPAIR KIT

Accessory	Kit type	Material	Part number
Diaphragm Check	Soft Goods	PTFE	10028396
Diaphragm Check	Bolt	SST	10028477

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10 LUBRICANT AND SEALANTS FOR TYPE 9300H SERIES

(Only include lubricants referenced in the manual)

10.1 LUBRICANTS USED ON PILOT PARTS

Pilot parts	Description	Lubricant ⁽¹⁾
Pressure adjustment	Threads	Fluorolube LG 160 10025518
Screw and locknut		
Cap	lower surfaces between	Desco 600 10025781
(91 and 93T pilots)	cases and bodyseal ring	
Stainless steel case	Threads	Fluorolube LG 160 10025512
Bolts and nuts		
Pipe fittings and vents	Threads	PTFE Tape & Dow Corning 33 10025508

10.2 LUBRICANTS AND SEALANTS USED ON MAIN VALVE PARTS

Main valve parts	Description	Lubricant (1)	Sealant
Stainless on stainless bolts	Threads	Fluorolube LG 160 10025512	-
Screws, nuts, and fittings			
Diaphragms and Gaskets (91 and 93T)	lower surface between case and body seal Ring	DESCO 600 10025781	-
Seat Stack jam nut	Threads	-	Loctite
Pipe fittings and vents	Threads	PTFE Tape and Dow Corning 33 10025508	-

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