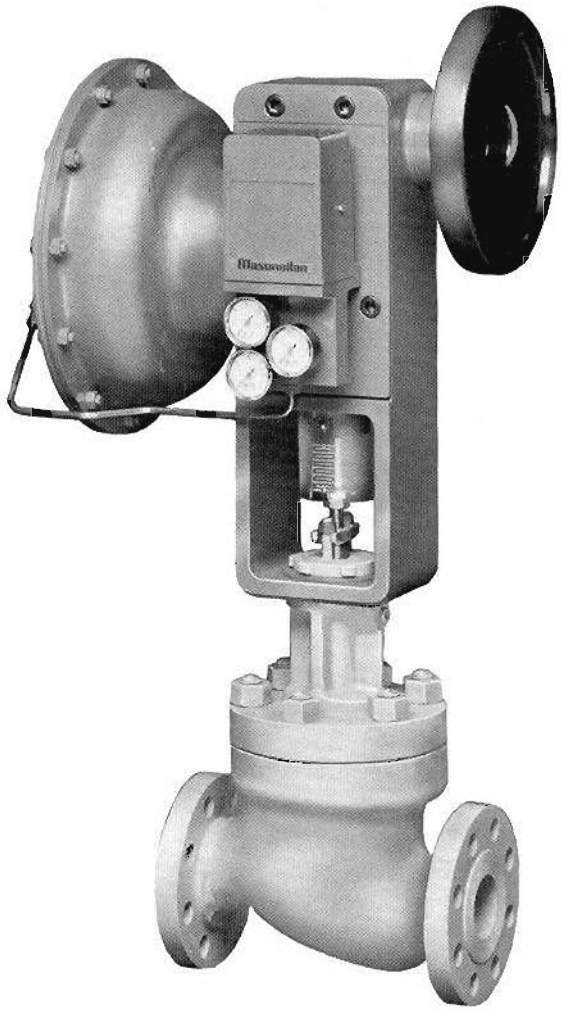
Instruction No. EH3020E
Rev. A 11/86

Masoneilan 41400, 41500, 41600 Series Control Valve Instructions

Ratings: ANSI Class 150 through 1500
Sizes: 2" through 6"



DRESSER VALVE DIVISION

General

These instructions apply to Masoneilan 41400, 41500 and 41600 Series Control Valves, sizes 2" through 6" and ratings from ANSI Class 150 through 1500.

When performing maintenance on these valves, always use Masoneilan replacement parts. They can be ordered through local Masoneilan offices or representatives, or directly from factory parts service department.

Service

Masoneilan Service Engineers are available for assistance with special start-up or maintenance problems. Contact the nearest Masoneilan sales office or representative.

Training

Masoneilan conducts training schools at its Avon, Massachusetts plant. Arrangements for attending the school can be made by contacting the nearest Masoneilan office or representative.

Warning: This equipment should not be installed, maintained or operated without reading, understanding and following these instructions. Otherwise personal injury or damage to equipment may result.

Installation

1. Before installing the valve in the pipeline, thoroughly clean the line of all dirt, welding chips, scale, oil, grease and other foreign material.
2. To check the valve without interrupting the process, provide a hand-operated stop valve on each side of the 41400, 41500 or 41600 Series valve with a hand-operated throttling valve mounted in a bypass line.
3. Install valve so that the controlled fluid will flow through the valve body in the direction indicated.

Pilot Caution

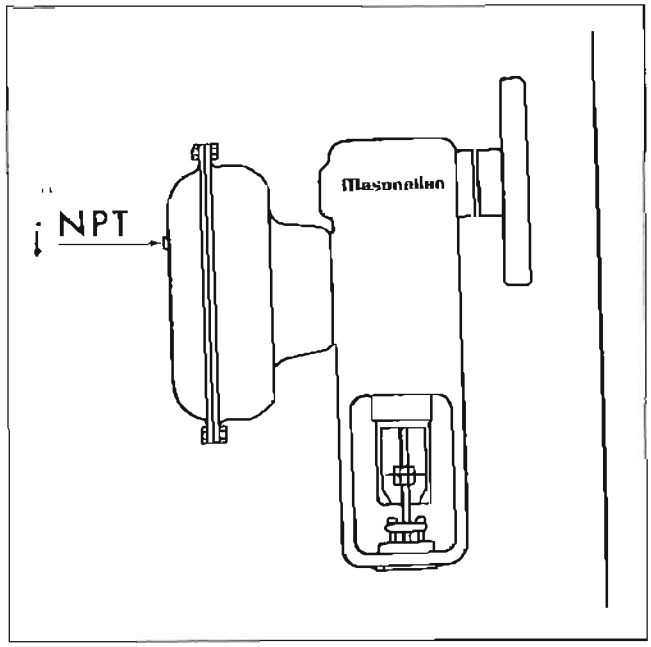
CAUTION: To bring the 41400 Series control valve on line after isolation and depressurization, Masoneilan recommends the valve be in the fully open position (unless service conditions prevent), and the upstream isolation valve be opened first to pressurize the control valve in the proper direction.

4. In case of a heat-insulated installation, insulate the valve body only.

Warning: Do *not* use air pressure greater than specified on serial plate.

Spring-diaphragm Actuators Connect actuating air pressure line to the ¼" NPT opening in the upper diaphragm case.

Use ¼" O.D. tubing or equivalent for all air lines. If air line exceeds 25 ft. in length or if the valve is equipped with volume boosters, ⅜" tubing is preferred. Air lines must not leak.



Maintenance

Caution: Before disassembly or maintenance, the valve and actuator must be free of all pressures.

Actuator Removal
Air-to-Extend

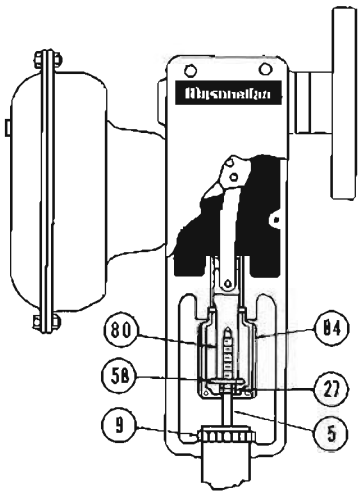
1. Shut off the air supply pressure and disconnect the air tubing to the actuator.
2. Remove the dust cover (84), loosen the locknuts (27) on the plug stem (5), and unscrew the valve stem from the actuator stem (80).
3. Secure actuator using a suitable hoist. Remove drive nut (9) and lift actuator from valve.

Air-to-Retract

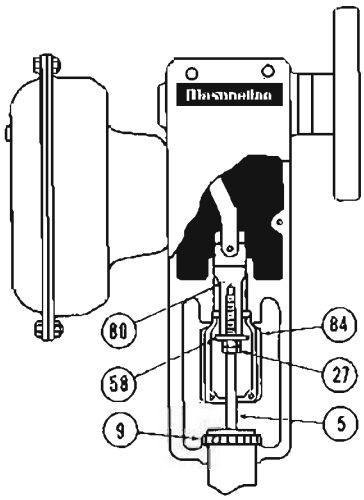
1. Apply sufficient air pressure to the diaphragm to lift the plug off the seat to its full stroke. (The handwheel may also be used.)
2. Remove the dust cover (84), loosen the locknuts (27) on the plug stem (5) and unscrew the valve stem from the actuator stem (80).
3. Secure actuator using a suitable hoist. Remove drive nut (9) and lift actuator from the valve.

Actuator Replacement
Air-to-Extend

1. Replace actuator on body assembly.
2. Replace drive nut (9).
3. Make plug stem adjustment (see page 8).
4. Connect air lines, accessories and install dust cover.



Air-to-Retract



Air-to-Extend

Air-to-Retract

1. Before replacing the actuator, the stem must be retracted by using either air pressure or operating the handwheel.
2. Replace actuator on body assembly.
3. Replace drive nut (9).
4. Make plug stem adjustment (see page 8).
5. Connect air lines, accessories and install dust cover.

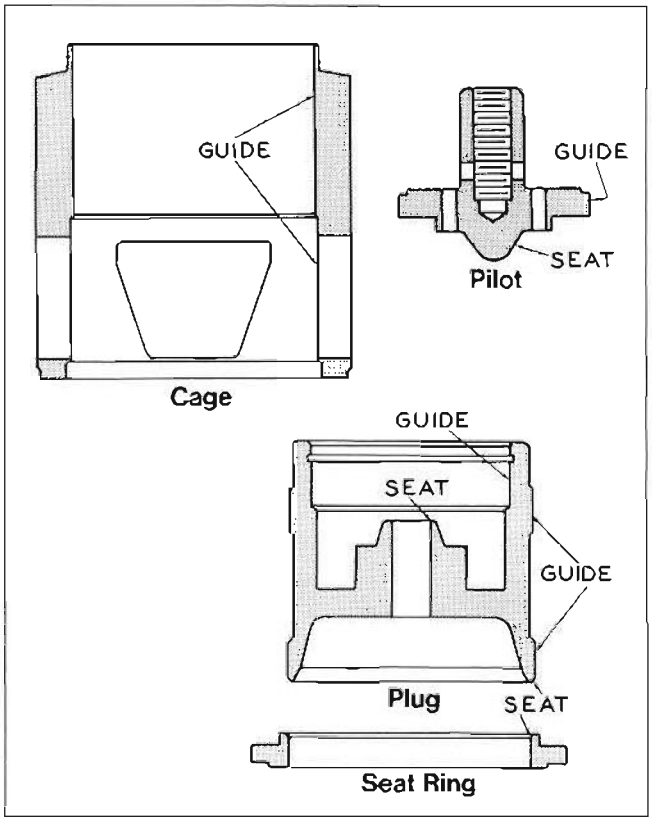
Valve Body Disassembly/Assembly

Warning: Disassemble valve only when pipe line pressure is zero.

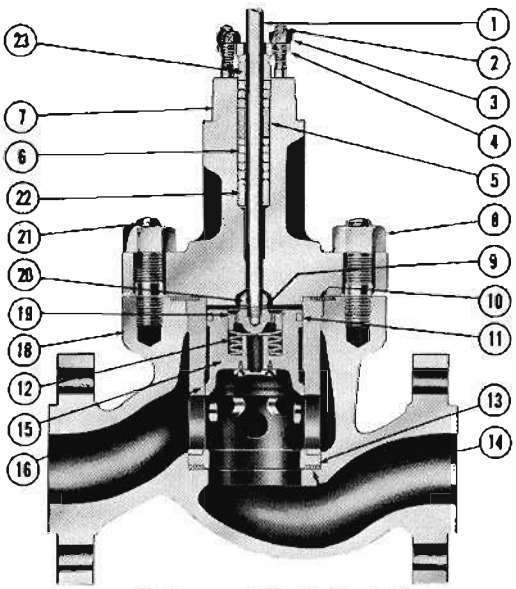
1. Loosen packing flange (4) and remove bonnet (7). The cage, plug and stem assembly should be held in place to avoid trim damage.

Note: New gaskets should be installed each time the valve is disassembled for maintenance. If new gaskets are not available, great care must be taken to preserve the old gaskets for re-use.

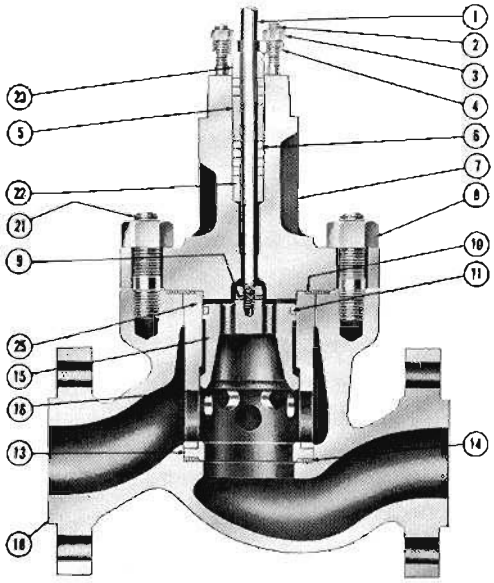
2. Remove plug (15), cage (16) and flat spring (17) from body by pulling upward on the plug stem (1). (Flat spring is used in the 6" size only.)
3. Remove plug from cage by lifting cage over top of the plug stem. If the valve is furnished with a graphite piston ring, care should be taken when removing the plug from the cage that the ring is not damaged. Inspect piston ring (11) and replace if it shows signs of wear (see Instruction No. 12 below).
4. Reach inside valve body and lift out seat ring (13). Inspect all guiding and seat surfaces on the plug, cage and seat ring for excessive wear or damage. If repairs are necessary, refer to page 5.
5. Remove body and seat ring gaskets (10, 14) and clean the mating surfaces.
6. Remove packing flange (4), packing follower (23), packing (6), packing spacer (5) and guide bushing (22).
7. Inspect inside diameter of guide bushing (22). If it is excessively worn or if it shows scratches or grooves, it should be replaced.
8. Apply thin film of plastic lead seal No. 2 or equivalent to gasket and gasket mating surfaces.



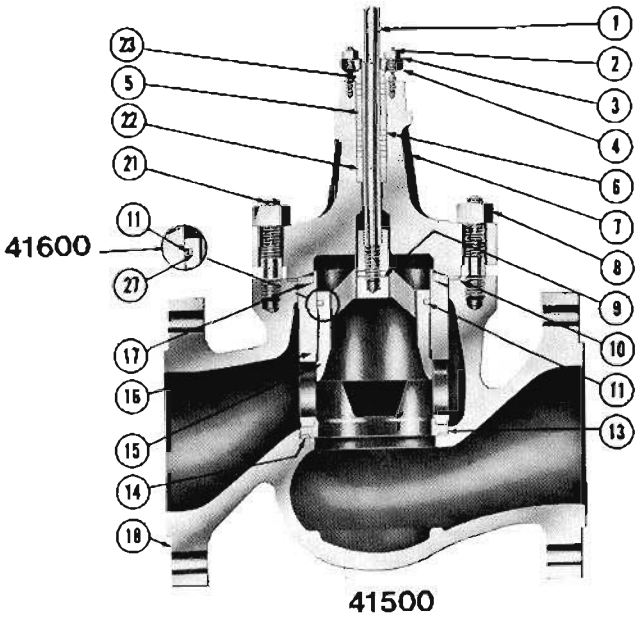
9. Place seat ring gasket (4) in position.
10. Place seat ring (13) on seat ring gasket.



Balanced Tight Shutoff
Plug Construction
41400 Series



Balanced Plug Construction
2"-3"-4"
41500 or 41600 Series



41500

Balanced Plug Construction
6"
41500 or 41600 Series

PARTS REFERENCE

Ref. No.	Part Name	Ref. No.	Part Name	Ref. No.	Part Name
1	Valve Plug Stem	9	Plug Stem Pin	17	Flat Spring
2	Packing Flange Bolt	10	Body Gasket	18	Body
3	Packing Flange Nut	11	Piston Ring	19	Retaining Ring
4	Packing Flange	12	Spring	20	Auxiliary Plug
5	Packing Spacer (Lantern Ring)	13	Seat Ring	21	Valve Body Bolt
6	Packing	14	Seat Ring Gasket	22	Guide Bushing
7	Bonnet	15	Valve Plug	23	Packing Follower
8	Valve Body Nut	16	Cage	27	Back Up Ring

11. Place piston ring (11) on valve plug. Slide cage over top of plug-and-stem subassembly. Do not damage piston ring (11). A ring compressor is recommended for this operation. If a graphite piston ring is used, the following installation procedure should be followed.

    For Valve Size 6"

    New graphite piston rings are furnished as a complete ring and must be broken into two approximately equal pieces. Using a sharp knife, score the graphite ring in two places approximately 180 deg. apart. Hold each side of the ring securely and strike it across the edge of a table or bench forcing it to break at the scribe marks.

    Install the backup ring (27) on the plug and then the two graphite pieces taking care to match the separated ends together again. Note that the separations should be positioned approximately 90 deg. from the separation in the backup ring.

    Gently squeeze the two graphite pieces until the ends meet. Use a small piece of acetate film tape (such as Scotch brand #810 Magic Transparent Tape) over the separations to hold the ends together. To facilitate easy removal, use only enough tape needed to hold the ring ends together.

    Slide the cage over the plug and stem subassembly taking care not to damage the piston rings. Where graphite rings have been installed, dissolve the tape used to secure the ends by applying a small quantity of acetone to the top of the plug and stroking 3 or 4 times. Remove the dissolved tape residue from the cylinder walls with a clean rag dipped in acetone.

    For Valve Sizes 2" through 4"

    New graphite piston rings are furnished as a complete ring and must be broken at one point before installation. Using a sharp knife, score the graphite rings in one location. Hold each side of the ring around the score mark between thumbs and forefingers and bend the ring to break at the scribe mark.

    Install the Grafoil backup ring (27) on the plug and then the three graphite rings. Note that the breaks should be positioned approximately 120 deg. from each other.

Place the plug cap onto the plug and stem subassembly and install the hex head screws and tab washers finger tight, being sure the pre-bent leg of the tab washers are properly oriented to engage the balance hole(s).

Slide the cage over the plug and stem subassembly taking care not to damage the graphite rings.

Evenly tighten the hex head screws until the plug cap contacts the plug evenly all around. Continue tightening the screws to a torque of 100 in.lbs. for 1/4-20 bolts and 50 in.lbs. for #10-24 bolts.

Once the screws are tightened do not remove the plug from the cage. If the plug is removed from the cage, the plug and plug cap must be reassembled with a new Grafoil backup ring. To prevent the screws from backing out, with a screwdriver bend one tab washer leg up against a hex head flat on each screw.

12. Lower plug and cage into body until they rest squarely on the seat ring (13). Do *not* damage seat ring.
13. Place flat spring (17) in position. (Used in 6" size only.)
14. Place body gasket (10) in position.
15. Carefully lower valve bonnet (7) over plug stem (1) until it rests firmly in position.
16. Lubricate stud threads and bearing surfaces of the body nuts (8), with Molykote G or Graphikote No. 143.
17. Evenly tighten bonnet nuts in sequence to the required torque as shown on page 7.
18. Slide guide bushing (22) over top of plug stem, dropping it to the bottom of the packing box.
19. Install five rings of packing. Place packing spacer (5) on top of packing rings and then fill the remainder of the packing box with packing rings.
20. Install packing follower (23), flange (4), and nuts (3). Packing flange nuts should be finger-tightened at this time.

Note: When installing a new plug assembly or, a new pilot, the stem must be pinned in place. (See paragraph on Plug Stem Pinning, page 6).

Trim Maintenance

Any trim part which is scored or otherwise damaged on the guiding surfaces, to the extent that it could interfere with proper valve action, should be replaced.

Seat Repair

Minor scratches or nicks, in the seating surfaces of either the plug or seat ring, should be repaired in the following manner:

6" Sizes

1. In the 41400 Series plug, install two ¼"-20 UNC x 2.25 long capscrews through the holes provided in the auxiliary plug (20), engaging the capscrews in the holes provided in the plug (15).
2. Tighten capscrews simultaneously or alternately, one turn at a time, until the retaining ring (19) can be removed. Then loosen capscrews in same manner until auxiliary plug can be removed.

2" and 4" Sizes

1. On the 41400 Series plug, pressure must be applied on the auxiliary plug to compress the spring (12).
2. The retaining ring (19) can now be removed, thus allowing separation of the auxiliary plug and spring from the valve plug.

2" and 6" Sizes

If the auxiliary plug tip or guide shows damage, the auxiliary plug must be replaced. If other seating surfaces on the valve plug or seat ring show signs of minor damage, they should be turned on a lathe to remove the damaged areas. However, no more than 0.015" of material should be removed and the seat angle shown must be held.

Packing Box

For smooth valve operation, the packing should be compressed just enough to effect a seal. Tightness of

the packing box is maintained by the packing compression alone.

This procedure may be repeated each time leakage occurs until all available compression is used up.

To add packing, *take the valve out of service*, then back off the packing follower and flange. Insert one or two rings of split-ring packing.

Note: In an emergency, string packing may be inserted without removing the old packing.

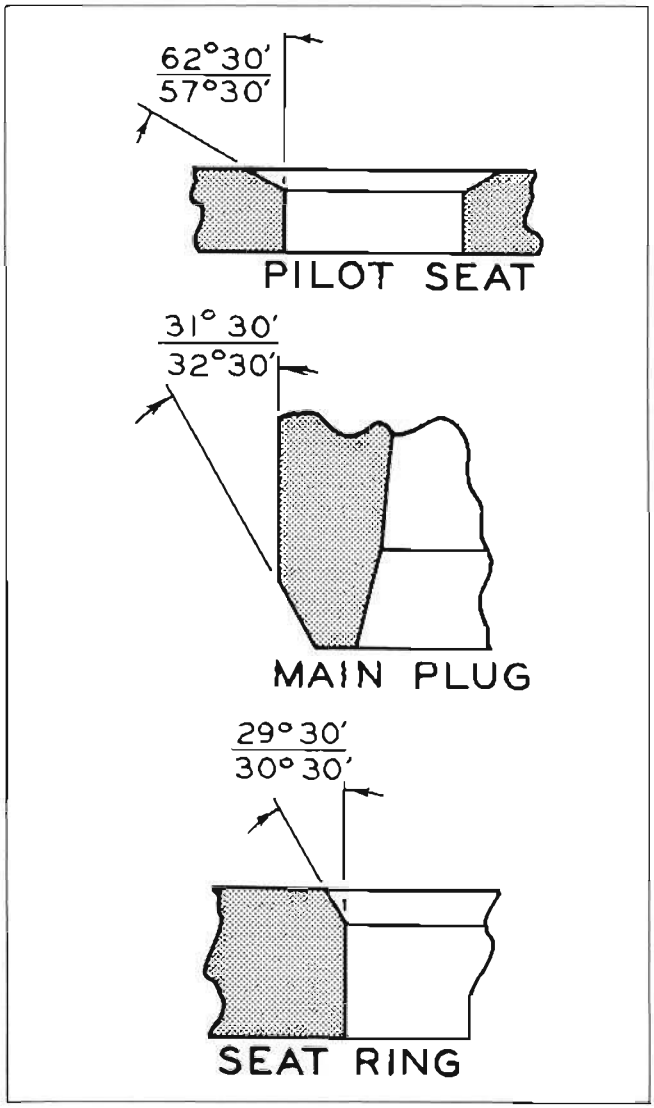
Lubrication

Standard packing does not require lubrication. For special applications, where different types of packing are used, lubrication may be used. Consult the factory or an authorized factory service representative when lubrication is required.

Grinding The Seat Ring

After the auxiliary plug, plug or seat ring seats have been turned, they must be ground as follows:

1. Auxiliary plug lapping. Apply a good grade of fine grinding compound at several spots equally spaced on the periphery of the seating surface of the plug.
2. Place auxiliary plug, with stem attached, in the seated position without assembling the pilot spring.



3. To facilitate lapping, screw a rod with T-handle on top of the valve stem and secure with a locknut. Or, as an alternative, drill a hole through a small flat piece of steel and fasten it to the plug stem with two locknuts
4. Lap by rotating the plug in short oscillating strokes. After 8 to 10 strokes, lift plug and turn 90°. Repeat the lapping operation.

Note: Intermittent lifting is important to keep the plug and seat concentric during lapping. The lapping operation should be repeated four times before removing the auxiliary plug. If there is a dull gray ring around the entire seat, the lapping is complete. The gray area must be as thin as possible. Do not lap to cover the complete seat area width. This will destroy the effectiveness of the seat. If the ring is not continuous, repeat the entire lapping operation until the ring is continuous. Remove all the compound when the lapping operation has been completed.

Main Seat Lapping

Lapping the main seat is accomplished in basically the same manner as lapping the auxiliary plug. However, the trim including the gaskets should be assembled in the body. The bonnet, with the guide bushing in it, should be temporarily placed in position to act as an alignment fixture for the lapping operation. Otherwise, the lapping procedure is identical.

Plug Stem Pinning

If a plug and plug stem must be assembled, always use a new stem. Using the old stem with the original pinhole may seriously impair the assembly's strength.

Caution: When pinning, seating surfaces and plug guide must *not* be damaged.

The old pin may usually be removed by driving it out with a punch. If necessary to drill it out, use a drill somewhat smaller than the pin. Then drive out the remainder of the pin.

When drilling, the plug should be placed with the guide section resting on a clean V-block.

Caution: Do not mar the guide section of the plug by gripping it in the jaws of a vise.

The stem must be screwed solidly into the plug before starting to drill. This can be checked by measuring the depth of thread in the plug and making a reference mark on the stem at that distance from the end of the stem.

When properly assembled, the reference mark should be flush with the end of the guide section. The stem can then be redrilled through the old hole in the guide section of the plug, using first a pilot drill of suitable size followed by a reamer to bring the hole to required size.

After all burrs and sharp corners are removed, a small amount of grease should be applied before inserting

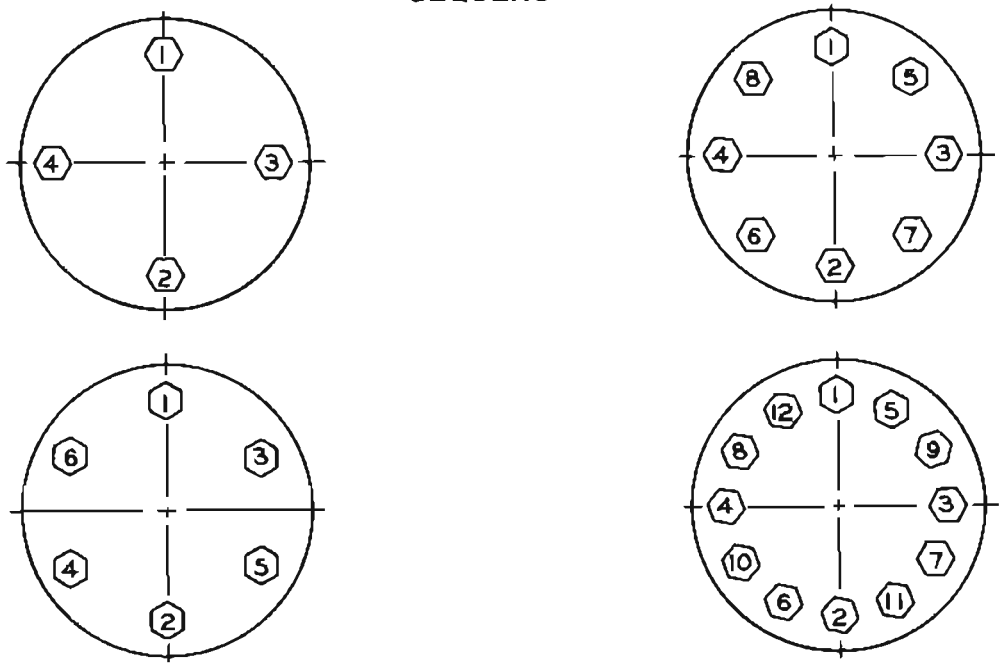
the pin. The hole diameter should allow the pilot end of the pin to slip in about ⅛" to 3/16" by hand. The pin must be driven the rest of the way.

Make sure pin is recessed about 1/16" below plug guide surface. After plug has been pinned, it should be placed in a lathe to see if it is running "true." Place the stem in a chuck. If plug is not true, tap it with a plastic or rubber mallet to straighten.

TORQUE REQUIREMENTS

Size (In.)	ANSI Class	Stud Size	Torque (ft./lbs.)
2	300-600	3/4-10	75
2	900-2500	7/8-9	110
3	300-600	3/4-10	75
3	900-1500	1 1/4-8	360
4	300-600	7/8-9	110
4	900-1500	1 1/2-8	680
6	150-600	1-8	170
6	900-1500	1 3/4-8	1100

TIGHTENING SEQUENCE



Plug Stem Adjustment

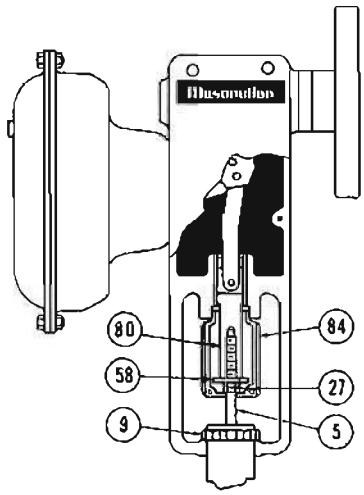
Air-to-Extend Actuator

1. Separate the plug stem (5) from the actuator stem (80).
2. Push plug stem down until plug seats. With *no* air pressure on the actuator diaphragm, position locknuts (27) and indicator disc (58) on plug stem so that the distance from the face of the indicator disc to the bottom of the actuator stem (80) is equal to the required valve stroke for the 41500 and 41600 Series control valves and to the required valve stroke *minus* the auxiliary plug stroke for the 41400 Series control valve. See Auxiliary Plug Stroke Table.
3. Stroke valve fully by applying sufficient air to actuator. Check actual stroke. If not correct, make further adjustments between plug stem and actuator stem.

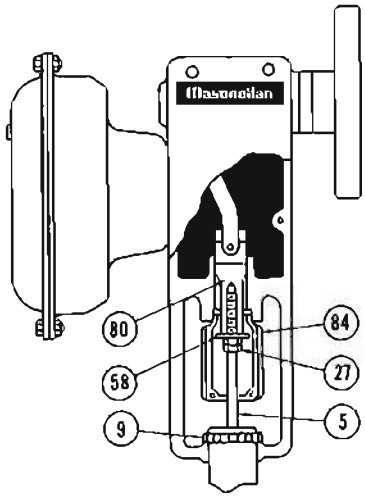
Air-to-Retract Actuator

1. Apply sufficient air pressure to retract actuator stem to its maximum stroke.
2. Adjust locknuts (27) and indicator disc (58) by screwing onto plug stem (5) as far as possible. Tighten locknuts (27).
3. Screw plug stem (5) into actuator stem (80) as far as possible.
4. Release air pressure from actuator.
5. Unscrew plug stem (5) from actuator stem (80) until plug contacts seat.
6. Apply sufficient air pressure to actuator to raise plug approximately ¼".
7. Turn plug stem (5) one full turn out of actuator stem for 41500 and 41600 Series control valves and one full turn plus the auxiliary plug stroke for the 41400 Series control valve.
8. Loosen locknuts (27) and run them up until the indicator disc (58) contacts the actuator stem (80).
9. Release air pressure from actuator and adjust travel indicator (81).

Valve Size (in.)	ANSI Class	Auxiliary Plug Stroke
2	150-600	.083/.106
2	900-2500	.083/.106
3	150-1500	.086/.119
4	150-1500	.086/.119
6	150-1500	.100/.200



Air-to-Retract



Air-to-Extend

Facilities: Brazil, Canada, France, Germany, Italy, Japan, Mexico, Netherlands, Singapore, Spain, United Kingdom, United States

DRESSER VALVE DIVISION

Dresser Equipment Group, Inc.
85 Bodwell Street
Avon, MA 02322-1190
Phone: 508-586-4600
Fax: 508-427-8971

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