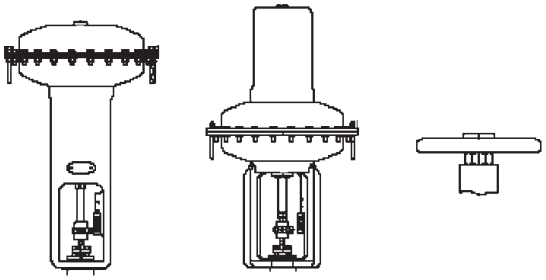
115 IOM



115
Diaphragm Actuators

INSTALLATION OPERATION & MAINTENANCE INSTRUCTIONS

TABLE OF CONTENTS

Overview ..... Cover
Actuator Specifications 2
Installation in Piping 3
Operation 4
Maintenance 4-29
- Parts Kits 5
- Changing Actuator Orientation 6
- Actuator Removal 6
- Removal & Installation Drawings 7-8

DISASSEMBLY/ASSEMBLY
- Direct Acting 9-10
- Direct Acting with Handwheel 11-13
- Direct Acting Drawings 14-15
- Reverse Acting 16-17
- Reverse Acting with Handwheel 18-21
- Reverse Acting Drawings 22-23

INSTALLATION
- Direct Acting on Direct Acting 2-Way Valve 24
- Direct Acting on Reverse Acting 2-Way Valve 25
- Direct Acting on 3-way Valve 26
- Reverse Acting on Direct Acting 2-Way Valve 27
- Reverse Acting on 3-way Valve 28

Drawing B60320000 29

115_IOM_RevA_1113

PRODUCT OVERVIEW

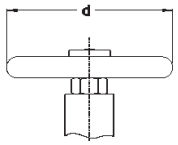
This document covers the installation, operation and maintenance of Industrial 115 Diaphragm Actuators installed on Series 1800, 2900, or 5800 Valves and Commercial 115 Diaphragm Actuators installed on Building Automation Control (HVAC/BAC) Valves. 115 actuators feature a powerful single or dual spring, rolling-diaphragm, low hysteresis design. The actuator is available direct acting (air-to-extend) and reverse acting (air-to-retract). Steel diaphragm chambers and a cast aluminum or ductile iron yoke with an acrylic enamel finish make this actuator durable, and rugged. A top-mounted handwheel is available for a manual override. Factory installed actuators have their spring range pre-set. Field installed actuators require the spring range be set during installation.

ACTUATOR SPECIFICATIONS

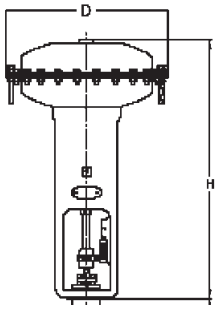
ACTION:
Direct: Industrial or Commercial Actuators **Reverse:** Industrial Actuators Only
EFFECTIVE AREA:
115 SQ IN
TRAVEL:
¾, 1-1/8, 1-1/4, 1-3/8, 1-1/2, 1-3/4, 2, 2-1/2, 3 IN
SPRINGS:
115 Single, 115XR Dual
MAX AIR SUPPLY:
40PSIG
AIR CONNECTIONS:
1/4 NPT
DIAPHRAGM:
Buna-N Fabric Reinforced
DIAPHRAGM CHAMBERS:
Steel
YOKE:
115 & 115XR Direct-Aluminum (Industrial or Commercial Actuators) or Ductile Iron (Industrial Actuators Only)
115 & 115XR Reverse-Ductile Iron (Industrial Actuators Only)
ACTUATOR SHAFT:
300 Series Stainless Steel
SHAFT SEAL:
115 & 115XR Direct-None
115 & 115XR Reverse-Nitrile
STEM CONNECTOR:
SPLIT/ BOLTED
FINISH:
Acrylic Enamel
AMBIENT TEMPERATURE:
-20 to 180°F
MOUNTING:
Vertical above (preferred) (See page 3 for details)
HANDWHEEL:
Optional Top-mounted only (Industrtial Actuators Only)
REVERSIBLE:
No
POSITION INDICATION:
Travel Indicator Pointer (On Stem Connector) Travel Scale (On Yoke) (See illustrations on page 7 & 8)

Size	Action	Spring Range (PSI)			
		Low	Full	High	Xtra-High
115	Direct	3-9	3-15	9-15	N/A
115	Reverse	3-9	3-15	9-15	N/A
115XR	Direct	N/A	N/A	N/A	See Note
115XR	Reverse	N/A	N/A	N/A	See Note

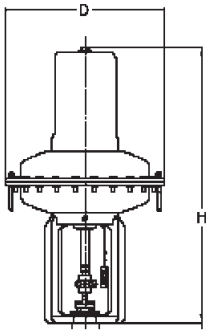
Note: The spring range of XR (eXtended Range) actuators varies with travel. These actuators require positioners or I/P's for modulating control



Top mounted Handwheel



Direct Acting Actuator



Reverse Acting Actuator

ACTUATOR DIMENSIONS & WEIGHTS

ACTUATOR	YOKE	D (IN) ACTUATOR	d (IN) HAND WHEEL	H MAX (IN)		WEIGHT (LB)	
				STD*	WITH HAND WHEEL	STD	WITH HAND WHEEL
115 Direct	ALUMINUM	16-3/4	10-1/8	28	37	84	CF
115 XR Direct	ALUMINUM	16-3/4	10-1/8	28	37	92	CF
115 Direct	IRON	16-3/4	10-1/8	28	37	105	CF
115 XR Direct	IRON	16-3/4	10-1/8	28	37	113	CF
115 Reverse	IRON	16-3/4	10-1/8	30	45-1/2	115	CF
115 XR Reverse	IRON	16-3/4	10-1/8	30	45-1/2	123	CF

* Includes 1-3/8 inch for air fitting on direct acting diaphragm actuators

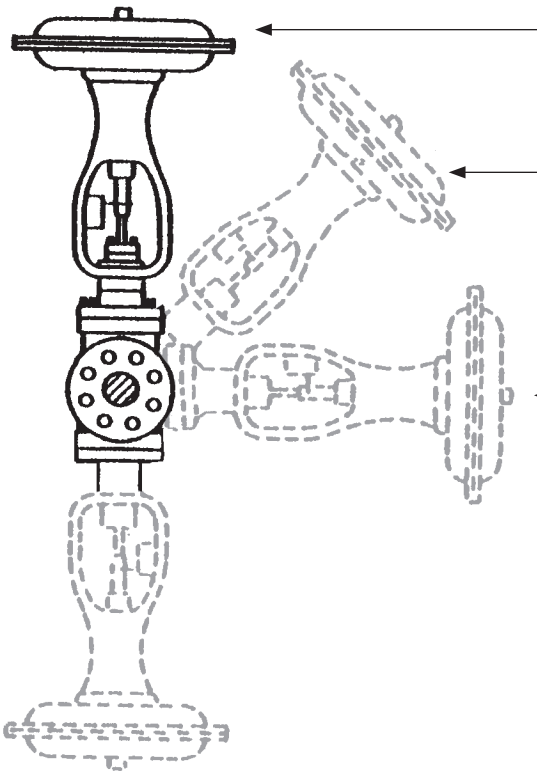
Exceeding the maximum air supply pressure of 40 PSIG may damage the actuator and valve and void the warranty. Rotating the valve stem while the plug is in contact with the seat will damage the seating surfaces and voids the warranty. Recommended actuator mounting is vertical above or below the valve.

Ambient temperature must be kept within the actuator's limits of –20 to 180F.

Do not insulate actuator.

See separate valve installation operation & maintenance manual for:

- Additional control valve roughing dimensions and weights
- Actuator removal clearance.
- Additional installation guidelines.



VERTICAL ABOVE PIPING IS CORRECT MOUNTING POSITION.

All other positions reduce service life of equipment.

NEXT BEST POSITION

45º from vertical above piping on either side.
Valve must have an 8 Bolt Flange.

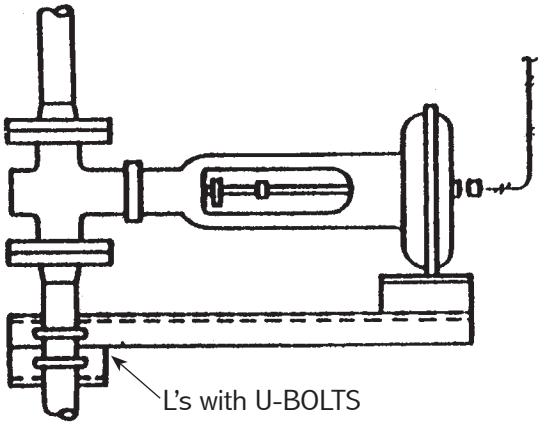
A non-vertical mounting position may be necessary to protect actuator in high temperature applications, but may reduce packing life.

WORST POSITION (Horizontal on either side).

VERTICAL BELOW PIPING

Position is suitable for gases, but **NOT** for liquids or steam.

Actuators mounted in any position other than vertical **MUST** be supported independent of the valve.



L's with U-BOLTS

Method for supporting actuator mounted in non-vertical position.

OPERATION

115 actuators feature a single-spring, rolling-diaphragm design. 115 XR actuators have dual springs. The start point can be adjusted after the actuator is installed on a valve. The actuator does not have an adjustable travel limit stop. The actuator is securely connected to the valve by a yoke locknut and a split stem connector. 115 & 115XR actuators are not field reversible.

Direct acting (air-to-extend) actuators provide air-to-close operation on direct acting 2-way (stem in to close) valves and fail open on loss of air supply. Direct acting actuators provide air-to-open operation on reverse acting 2-way (stem in to open) valves and fail closed on loss of air supply. On 3-way valves operation is air-to-close the lower port, and the upper port fails closed on loss of air supply. Direct acting actuators have a ¼ inch NPT air connection on the upper diaphragm chamber.

Reverse acting (air-to-retract) actuators provide air-to-open operation on direct acting 2-way (stem in to close) valves and fail closed on loss of air supply. On 3-way valves operation is air-to-close the upper port, and the lower port fails closed on loss of air supply. Reverse acting actuators have a ¼ inch NPT air connection on the lower diaphragm chamber.

CAUTION! Exceeding the maximum air supply pressure of 40 PSIG may damage the actuator and valve and void the warranty.

HANDWHEEL OPERATION (FOR ACTUATORS EQUIPPED WITH HANDWHEELS)

The 115 Actuator handwheel is used to manually operate the actuator on loss of air pressure to the diaphragm chamber. Its clutchless design features a large 10 inch diameter wheel, and heavy duty shaft for dependable operation. When air pressure is restored, the handwheel is returned to its standby position to return the actuator to normal operation.

For direct acting actuators the handwheel CANNOT be used to force the actuator stem to retract against air pressure. For reverse acting actuators the handwheel CANNOT be used to force the actuator stem to extend against air pressure.

TO OPERATE THE HANDWHEEL

Loosen large hex locknut at base of handwheel shaft. Thread hex locknut to top of shaft. Operate handwheel to desired position.

For direct acting actuators: Turn the handwheel clockwise (looking down on actuator) to extend the actuator stem. Thread hex locknut to base of shaft and tighten to bonnet to lock handwheel in place.

For reverse acting actuators: Turn the handwheel counterclockwise (looking down on actuator) to retract the actuator stem. Thread hex locknut to base of shaft and tighten to spring chamber to lock handwheel in place.

TO RETURN HANDWHEEL TO STAND-BY POSITION:

Loosen large hex locknut at base of handwheel shaft. Thread hex locknut to top of shaft.

For direct acting actuators: Turn the handwheel counterclockwise (looking down on actuator) to retract the stem until the handwheel shaft retaining ring reaches the stop in the bonnet. Thread hex locknut to base of shaft and tighten to bonnet to lock handwheel in place.

For reverse acting actuators: Turn the handwheel clockwise (looking down on actuator) to extend the stem until the hex locknut reaches the spring chamber.

MAINTENANCE

115 actuators are for the most part maintenance free when properly selected and installed. Rebuilding of the actuator should not be necessary under normal operating conditions. For best operation, maintain the ambient temperature within the limits of –20F to180F; maintain a clean dry oil-free air supply; maintain the stem free of deposits, dirt, and scratches. **CAUTION! Exceeding the maximum air supply pressure of 40 PSIG may damage the actuator and valve and void the warranty.** A worn or damaged diaphragm, gasket, o-ring, or shaft seal can cause poor response to the air signal, and increase hysteresis, by allowing air pressure to leak from the actuator. Should the actuator become worn or damaged, parts kits are available. Parts kits contain the most commonly needed repair parts. The actuator stem is not included in the parts kits and must be obtained separately. Inspect the actuator stem for damage before disassembling the actuator. If damaged, replace the actuator stem. To ensure getting the correct parts, please provide the valve's serial number.

PARTS KITS

Parts Kits (Contact factory with valve serial number)

SOFT GOODS KIT FOR DIRECT ACTING 115 OR 115XR ACTUATOR WITHOUT HANDWHEEL
KIT P/N K5D115DXXXX00
SEE ASSEMBLY DRAWING ON PAGE 14

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
2	1	DIAPHRAGM	13	2	STEM BEARINGS

Instructions for Kit P/N K5D115DXXXX00:
See Page 6 for Actuator Removal
Page 9 & 10 for Actuator Disassembly/Re-assembly
Page 24 thru 26 for Actuator Installation on Valve

SOFT GOODS KIT FOR DIRECT ACTING 115 OR 115XR ACTUATOR WITH HANDWHEEL
KIT P/N K5D115DXXXX01
SEE ASSEMBLY DRAWING ON PAGE 14 & 15

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
2	1	DIAPHRAGM	34	1	GASKET
13	2	STEM BEARINGS	38	1	THRUST BEARING
25	1	½-20 SELF LOCKING NUT	39	1	TUBE MEDIUM GREASE
31	1	SHAFT SEAL	40	1	TUBE O-RING LUBE

Instructions for Kit P/N K5D115DXXXX01:
See Page 6 for Actuator Removal
Page 11 thru 13 for Actuator Disassembly/Re-assembly
Page 24 thru 26 for Actuator Installation on Valve

SOFT GOODS KIT FOR REVERSE ACTING 115 OR 115XR ACTUATOR WITHOUT HANDWHEEL
KIT P/N K5D115RXXXX00
SEE ASSEMBLY DRAWING ON PAGE 22

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
9	22	3/8-16X1-3/8 HEX HEAD CAPSCREW	17	1	SHAFT SEAL
10	28	3/8-16 HEX NUT	18	2	RETAINING RING
11	1	DIAPHRAGM	26	2	3/8-16X4 FULL THD STUD
14	1	GASKET	32	1	TUBE AEROSHELL 6 GREASE
15	1	O-RING	35	1	TUBE ANTI-SEIZE LUBRICANT

Instructions for Kit P/N K5D115RXXXX00 See:
Page 6 for Actuator Removal
Page 16 &17 for Actuator Disassembly/Re-assembly
Page 27 & 28 for Actuator Installation on Valve

SOFT GOODS KIT FOR REVERSE ACTING 115 OR 115XR ACTUATOR WITH HANDWHEEL
KIT P/N K5D115RXXXX01
SEE ASSEMBLY DRAWING ON PAGE 22 & 23

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
9	22	3/8-16X1-3/8 HEX HEAD CAPSCREW	32	1	TUBE AEROSHELL 6 GREASE
10	28	3/8-16 HEX NUT	35	1	TUBE ANTI-SEIZE LUBRICANT
11	1	DIAPHRAGM	36	1	½-20 SELF LOCKING NUT
14	1	GASKET	42	2	COIL SPRING PIN
15	1	O-RING	48	1	ROLLER THRUST BEARING
17	1	SHAFT SEAL	56	1	RETAINING RING
18	2	RETAINING RING	57	1	HANDWHEEL SHAFT SEAL
26	2	3/8-16X4 FULL THD STUD			

Instructions for Kit P/N K5D115RXXXX01 See:
Page 6 for Actuator Removal
Page 18 thru 21 for Actuator Disassembly/Re-assembly
Page 27 & 28 for Actuator Installation on Valve

CHANGING THE ACTUATOR ORIENTATION

See Illustrations on page 7 and 8.

Looking down on the valve stem, the actuator can be rotated 360º to change its orientation with respect to the centerline of the valve. Changing the actuator's orientation changes the position of the travel scale, air connections, and accessories and may be necessary for clearance and accessibility in the piping.

1) Isolate valve body if already installed in piping.

2) Temporarily install a flexible air hose directly to the actuator air connection so the actuator may be turned freely in step 5.

3) Apply air pressure to actuator so plug is off seat(s) or travel stop in valve. The valve stem should never be turned while the plug is in contact with the seat otherwise the seating surfaces will be damaged.

4) Use a blunt chisel and hammer to loosen yoke locknut.

5) Rotate actuator to desired orientation. Rotating the actuator shaft will damage the diaphragm and voids the warranty.

6) Tighten yoke locknut securely. Use a blunt chisel and hammer for final tightening.

7) Disconnect temporary air connection and restore original air connection to the actuator air connection.

8) If isolated, return line pressure to valve and check operation.

ACTUATOR REMOVAL

See Illustrations on page 7 and 8.

1) Isolate valve body if already installed in piping.

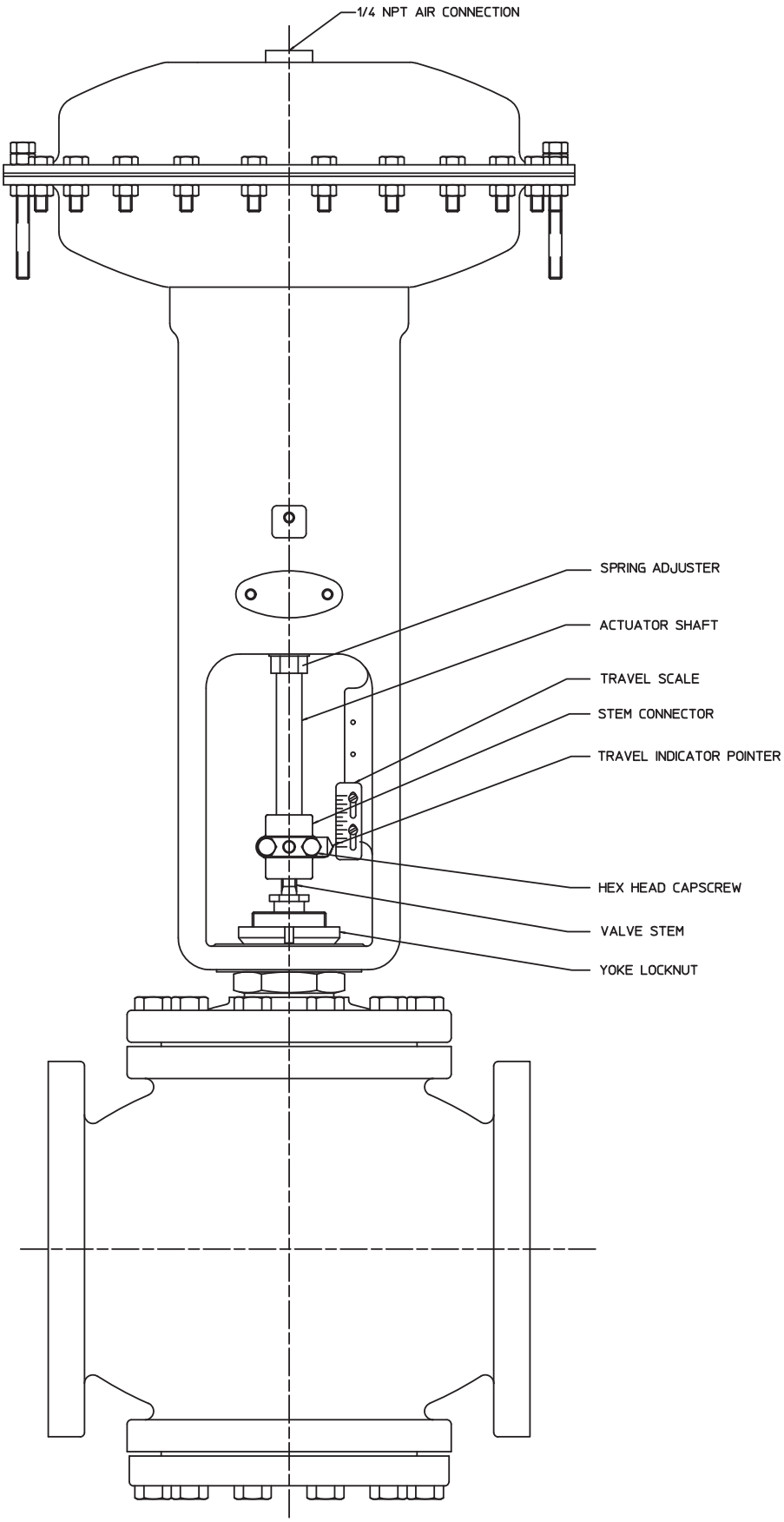
2) Apply air pressure to actuator so plug is off seat(s) or travel stop in valve.

3) Remove the hex head capscrews holding the two halves of the split stem connector together, then remove the travel indicator pointer and split stem connector.

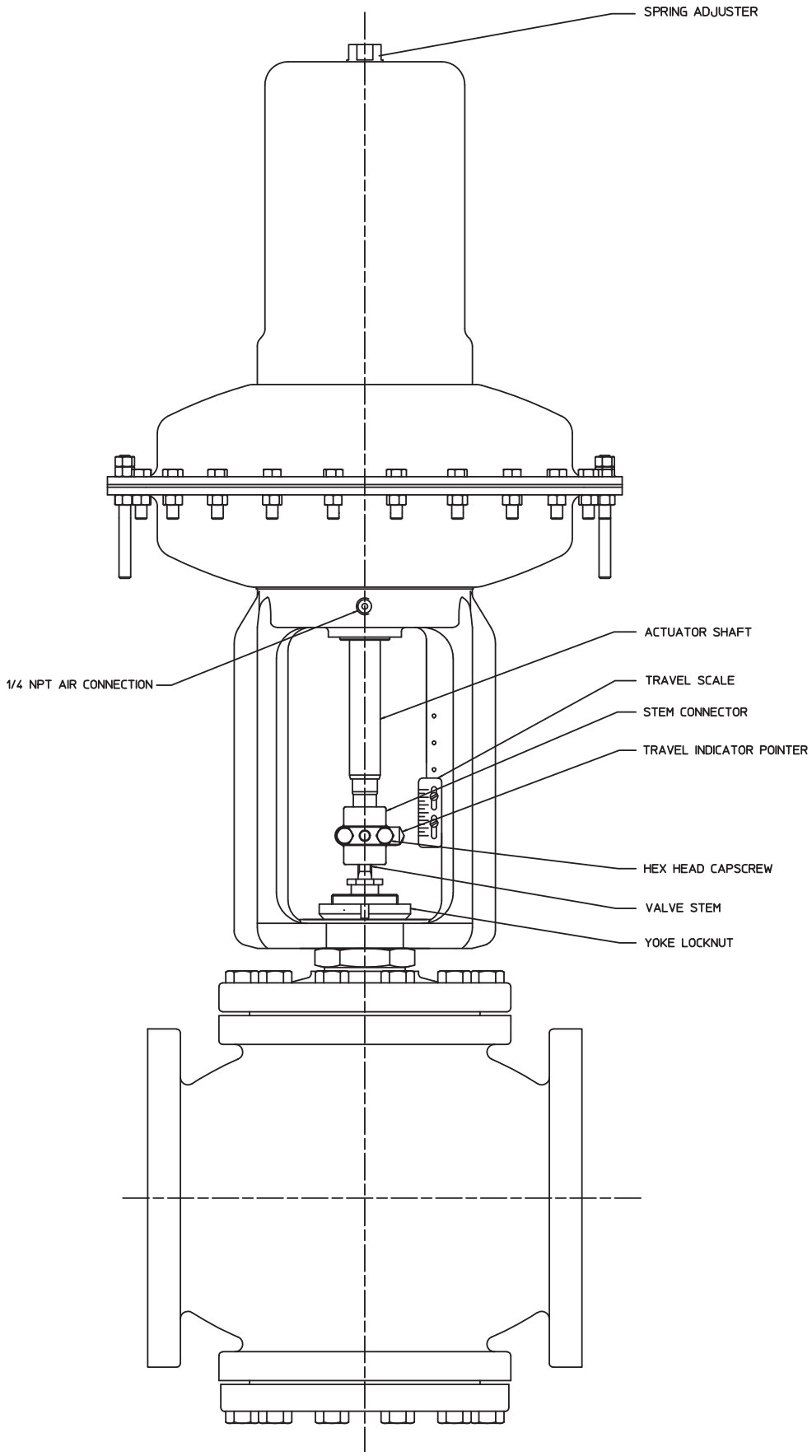
4) Remove yoke locknut from valve body assembly.

5) Disconnect air pressure and remove actuator from valve.

DIRECT ACTING



REVERSE ACTING



Direct Acting 115 Actuator Without Handwheel

1) Draw reference mark from bonnet (**Item 30**) onto upper diaphragm chamber (**Item 35**). Draw reference mark from upper diaphragm chamber onto lower diaphragm chamber (**Item 8**). Draw reference mark from lower diaphragm chamber onto yoke (**Item 14**). Remove actuator from valve. See separate actuator removal instructions.

2) There is significant preload on the spring in the actuator. Disassembling the actuator before removing the preload will release the spring force (preload) and may cause serious personal injury. Looking down on the actuator, begin removing the preload by turning the spring adjuster **(Item 11)** counterclockwise until spring seat **(Item 12)** reaches the stop on the spring adjuster and the adjuster can be turned no further. Turn the spring adjuster by using a wrench on the adjuster's flats. The flats are located where the actuator stem **(Item 10)** enters the yoke **(Item 14)**. After the spring seat reaches the stop on the spring adjuster there is still significant preload remaining on the spring.

3) Alternately loosen then remove the 3/8-16 x 1-3/8 hex head capscrews **(Item 5)** and their 3/8-16 hex nuts **(Item 6)** along the circumference of the diaphragm chambers.

4) The actuator uses two (2) 3/8-16 x 4 studs **(Item 19)** with six (6) 3/8-16 hex nuts **(Item 6)**. To remove the remaining preload alternately loosen the single hex nuts on the long threaded portion of the studs in small increments, approximately ¼ inch at a time, then remove the studs and hex nuts.

5) Remove the upper diaphragm chamber **(Item 1)**.

6) Remove the diaphragm **(Item 2)**. Inspect diaphragm and replace during reassembly if damaged or worn.

7) Remove the pressure plate **(Item 3)**, stem **(Item 10)**, and 3/4 - 10 hex jamnut **(Item 4)**, as an assembly from the lower diaphragm chamber **(Item 8)** and yoke assembly of the actuator.

8) Remove the spring **(Item 9)** from the actuator (For an XR actuator remove both the blue spring **(Item 23)** and the ½ orange ½ black spring **(Item 24)**.

9) Loosen the 3/4 - 10 hex jamnut on the stem. Remove the stem from the pressure plate. Remove the hex nut from the stem. Clean bearing surfaces on stem. Inspect stem, replace during reassembly if damaged or worn.

10) Remove the spring adjuster **(Item 11)**, spring seat **(Item 12)**, and stem bearings **(Item 13)** as an assembly from the lower diaphragm chamber and yoke assembly of the actuator.

11) Remove the spring seat from the spring adjuster and stem bearing assembly.

12) Remove stem bearings from spring adjuster. Replace with **new** stem bearings during reassembly. Clean spring adjuster bearing surfaces. Inspect spring adjuster, replace if damaged or worn.

13) Remove 3/8-16 x 1 hex head capscrews **(Item 7)** from lower diaphragm chamber, then remove lower diaphragm chamber from yoke.

Direct Acting 115 Actuator Without Handwheel

1) Place the lower diaphragm chamber **(Item 8)** on the yoke **(Item 14)** in the orientation shown on the drawing. Line up the holes in the lower diaphragm chamber with the holes in the yoke. Install the 3/8-16 x 1 hex head capscrews **(Item 7)** in the lower diaphragm chamber. Tighten the capscrews in an alternating pattern to 170 in lbs torque to secure the lower diaphragm chamber to the yoke.

2) Install **new** stem bearings **(Item 13)** in spring adjuster **(Item 11)**.

3) Install the spring seat **(Item 12)** on the spring adjuster. Orient the spring seat so the largest pilot diameter possible fits inside the ID of the spring **(Item 9)**, when the spring is installed in the actuator (For an XR actuator, orient the spring seat so the largest pilot diameter possible fits inside the ID of the ½ orange ½ black spring **(Item 24)**. Thread spring adjuster into spring seat until the spring seat reaches the stop at the other end of the adjuster.

4) Install spring seat and spring adjuster in the yoke as an assembly. The slotted ends of the spring seat must straddle the ribs inside the yoke.

5) Install spring(s) in actuator (For an XR actuator install both the blue spring **(Item 23)** and the ½ orange ½ black spring **(Item 24)**. Center ID of spring(s) over raised pilot on spring adjuster.

6) Install 3/4 - 10 hex jamnut **(Item 4)** on stem **(Item 10)** on end of stem threaded for the pressure plate **(Item 3)**. Thread jamnut to bottom of threads on stem.

7) Thread stem into pressure plate until the stem bottoms out in the pressure plate. Tighten the 3/4 - 10 hex jamnut to secure the stem to the pressure plate.

8) Apply a light coat of stem lube to the portion of the stem that will pass through the spring follower.

9) Install the pressure plate, stem, and 3/4 - 10 hex jamnut, as an assembly in the lower diaphragm chamber and yoke assembly of the actuator. Center ID of spring(s) under the raised pilot on the pressure plate. Be careful not to damage the stem bearings in the spring adjuster when reinserting the stem.

10) Install two (2) 3/8-16 hex nuts **(Item 6)** on both 3/8-16 x 4 studs **(Item 19)**. Thread both jamnuts on each stud to the same end until the first jamnut is flush with the end of the stud. Jam the nuts together and peen the end of the stud protruding through the first jamnut to secure the assembly. This step may have been already done for you.

11) Invert the upper diaphragm chamber **(Item 1)** and place on flat surface.

12) Invert the diaphragm **(Item 2)** and install in the upper diaphragm chamber. Watch orientation. Line up the holes in the diaphragm with the holes in the upper diaphragm chamber.

13) Install both 3/8-16 x 4 studs first through the upper diaphragm chamber and then through the diaphragm. Space the studs 12 holes apart.

14) Install the upper diaphragm chamber, diaphragm, and studs as an assembly on the lower diaphragm chamber. Insert the studs through correct holes in the lower diaphragm chamber so the studs are centered on each leg of the yoke.

15) Install a 3/8-16 hex nut on each of the studs. Tighten the hex nuts alternately in increments not exceeding ¼ inch until the upper and lower diaphragm chambers are approximately 1/16 inch apart.

16) Install the 3/8-16 x 1-3/8 hex head capscrews **(Item 5)** through the holes along the circumference of the upper diaphragm chamber and through the holes in the diaphragm and lower diaphragm chamber.

17) Install the remaining 3/8-16 hex nuts on the 3/8-16 x 1-3/8 hex head capscrews. Tighten the studs and all the capscrews along the circumference of the upper diaphragm chamber to 170 in lbs torque.

18) Apply air pressure to verify actuator strokes smoothly and check for air leaks.

19) Install actuator on valve. See separate instructions.

Direct Acting 115 Actuator With Handwheel

1) Draw reference mark from bonnet (**Item 30**) onto upper diaphragm chamber (**Item 35**). Draw reference mark from upper diaphragm chamber onto lower diaphragm chamber (**Item 8**). Draw reference mark from lower diaphragm chamber onto yoke (**Item 14**). Remove actuator from valve. See separate actuator removal instructions.

2) Loosen 1-14 locknut **(Item 29)**.

3) Operate handwheel **(Item 27)** until actuator stem **(Item 10)** is fully retracted.

4) There is significant preload on the spring in the actuator. Disassembling the actuator before removing the preload will release the spring force (preload) and may cause serious personal injury. Looking down on the actuator, begin removing the preload by turning the spring adjuster **(Item 11)** counterclockwise until spring seat **(Item 12)** reaches the stop on the spring adjuster **(Item 11)** and the adjuster can be turned no further. Turn the spring adjuster by using a wrench on the adjuster's flats. The flats are located where the actuator stem **(Item 10)** enters the yoke **(Item 14)**. After the spring seat reaches the stop on the spring adjuster there is still significant preload remaining on the spring.

5) Alternately loosen then remove the 3/8-16 x 1-3/8 hex head capscrews **(Item 5)** and their 3/8-16 hex nuts **(Item 6)** along the circumference of the diaphragm chambers.

6) The actuator uses two (2) 3/8-16 x 4 studs **(Item 19)** with six (6) 3/8-16 hex nuts **(Item 6)**. To remove the remaining preload alternately loosen the single hex nuts on the long threaded portion of the studs in small increments, approximately ¼ inch at a time, then remove the studs and hex nuts.

7) Remove the upper diaphragm chamber **(Item 35)** and handwheel as an assembly.

8) Remove the diaphragm **(Item 2)**. Inspect diaphragm and replace during reassembly if damaged or worn.

9) Remove the pressure plate **(Item 3)**, stem **(Item 10)**, and 3/4 - 10 hex jamnut **(Item 4)**, as an assembly from the lower diaphragm chamber **(Item 8)** and yoke assembly of the actuator.

10) Remove the spring **(Item 9)** from the actuator (For an XR actuator remove both the blue spring **(Item 23)** and the ½ orange ½ black spring **(Item 24)**.

11) Loosen the 3/4 - 10 hex jamnut on the stem. Remove the stem from the pressure plate. Remove the hex nut from the stem. Clean bearing surfaces on stem. Inspect stem, replace during reassembly if damaged or worn.

12) Remove the spring adjuster **(Item 11)**, spring seat **(Item 12)**, and stem bearings **(Item 13)** as an assembly from the lower diaphragm chamber and yoke assembly of the actuator.

13) Remove the spring seat from the spring adjuster and stem bearing assembly.

14) Remove stem bearings from spring adjuster. Replace with **new** stem bearings during reassembly. Clean spring adjuster bearing surfaces. Inspect spring adjuster, replace if damaged or worn.

15) Remove 3/8-16 x 1 hex head capscrews **(Item 36)** from the upper diaphragm chamber. Then remove upper diaphragm chamber from handwheel bonnet **(Item 30)**.

16) Remove gasket **(Item 34)** from handwheel bonnet. Clean gasket surfaces on handwheel bonnet and upper diaphragm chamber. Replace with **new** gasket during reassembly.

17) Remove ½ -20 self locking nut **(Item 25)** from handwheel shaft **(Item 28)**. Replace with **new** ½ -20 self locking nut during reassembly.

18) Remove washer **(Item 26)** from handwheel shaft.

19) Remove handwheel **(Item 27)** from handwheel shaft.

20) Remove 1-14 locknut **(Item 29)** from handwheel shaft.

21) Thread handwheel shaft out of bottom of handwheel bonnet.

22) Remove shaft seal **(Item 31)** from handwheel bonnet. Replace with **new** shaft seal during reassembly. Clean sealing and bearing surfaces in handwheel bonnet.

23) Remove the socket flat head capscrews **(Item 32)** from the retaining ring **(Item 33)**.

24) Remove handwheel pressure plate **(Item 37)** from handwheel shaft.

25) Remove thrust bearing **(Item 38)** from handwheel shaft. Clean sealing and bearing surfaces on handwheel shaft. Replace with **new** thrust bearing during reassembly. Inspect handwheel shaft, if worn or damaged replace with new handwheel shaft during reassembly.

26) Remove 3/8-16 x 1 hex head capscrews **(Item 36)** from lower diaphragm chamber, then remove lower diaphragm chamber from yoke.

Direct Acting 115 Actuator With Handwheel

1) Align mark drawn on lower diaphragm chamber during disassembly with mark drawn on yoke. Place the lower diaphragm chamber **(Item 8)** on the yoke **(Item 14)** in the orientation shown on the drawing. Line up the holes in the lower diaphragm chamber with the holes in the yoke. Install the 3/8-16 x 1 hex head capscrews **(Item 7)** in the lower diaphragm chamber. Tighten the capscrews in an alternating pattern to 170 in lbs torque to secure the lower diaphragm chamber to the yoke.

2) Install **new** stem bearings **(Item 13)** in spring adjuster **(Item 11)**. Watch orientation.

3) Install the spring seat **(Item 12)** on the spring adjuster. Orient the spring seat so the largest pilot diameter possible fits inside the ID of the spring **(Item 9)**, when the spring is installed in the actuator (For an XR actuator, orient the spring seat so the largest pilot diameter possible fits inside the ID of the ½ orange ½ black spring **(Item 24)**. Thread spring adjuster into spring seat until the spring seat reaches the stop at the other end of the adjuster.

4) Install spring seat and spring adjuster in the yoke as an assembly. The slotted ends of the spring seat must straddle the ribs inside the yoke.

5) Install spring(s) in actuator (For an XR actuator install both the blue spring **(Item 23)** and the ½ orange ½ black spring **(Item 24)**. Center ID of spring(s) over raised pilot on spring adjuster.

6) Install 3/4 - 10 hex jamnut **(Item 4)** on stem **(Item 10)** on end of stem threaded for the pressure plate **(Item 3)**. Thread jamnut to bottom of threads on stem.

7) Thread stem into pressure plate until the stem bottoms out in the pressure plate. Tighten the 3/4 - 10 hex jamnut to secure the stem to the pressure plate.

8) Apply a light coat of stem lube to the portion of the stem that will pass through the spring seat.

9) Install the pressure plate, stem, and 3/4 - 10 hex jamnut, as an assembly in the lower diaphragm chamber and yoke assembly of the actuator. Center ID of spring(s) under the raised pilot on the pressure plate. Be careful not to damage the stem bearings in the spring adjuster when reinserting the stem.

10) Apply light coat of medium grease **(Item 39)** to sealing and bearing surfaces of handwheel shaft **(Item 28)**.

11) Install retaining ring **(Item 33)** on handwheel shaft. Watch orientation.

12) Apply light coat of medium grease to thrust bearing **(Item 38)**. Install thrust bearing in handwheel pressure plate **(Item 37)**.

13) Install handwheel pressure plate on handwheel shaft.

14) Apply thread locking compound **(Item 41)** to threads of socket flat head capscrews **(Item 32)**. Install socket flat head capscrews in retaining ring and tighten to secure retaining ring to handwheel pressure plate.

15) Apply light coat of o-ring lubricant **(Item 40)** to **new** shaft seal **(Item 31)**. Install shaft seal in handwheel bonnet **(Item 30)**. Watch orientation.

Direct Acting 115 Actuator With Handwheel (Cont.)

16) Insert handwheel shaft into bottom of handwheel bonnet. Thread shaft into handwheel bonnet until fully extended through top of bonnet.

17) Install 1-14 locknut **(Item 29)** on handwheel shaft. Temporarily tighten 1-14 locknut against handwheel bonnet.

18) Install handwheel **(Item 27)** on handwheel shaft.

19) Install washer **(Item 26)** on handwheel shaft.

20) Install **new** ½ -20 self locking nut **(Item 25)** on handwheel shaft and tighten to 50 ft lbs torque.

21) Invert handwheel bonnet assembly and place on flat surface. Install gasket **(Item 34**) on handwheel bonnet. Line up holes in gasket with holes in handwheel bonnet.

22) Align mark drawn on bonnet during disassembly with mark drawn on upper diaphragm chamber. Install upper diaphragm chamber **(Item 35)** on handwheel bonnet. Watch orientation. Line up the holes in the upper diaphragm chamber with the holes in gasket and handwheel bonnet.

23) Apply thread locking compound **(Item 41)** to threads of the 3/8-16 x 1 hex head capscrews **(Item 36)**. Install the 3/8-16 x 1 hex head capscrews in the handwheel bonnet. Tighten the capscrews in an alternating pattern first to 30 in lbs, then 70 in lbs, 110 in lbs, and finally 150 in lbs torque.

24) Install two (2) 3/8-16 hex nuts **(Item 6)** on both 3/8-16 x 4 studs **(Item 19)**. Thread both jamnuts on each stud to the same end until the first jamnut is flush with the end of the stud. Jam the nuts together and peen the end of the stud protruding through the first jamnut to secure the assembly. This step may have been already done for you.

25) Invert the diaphragm **(Item 2)** and install in the upper diaphragm chamber. Watch orientation. Line up the holes in the diaphragm with the holes in the upper diaphragm chamber.

26) Install both 3/8-16 x 4 studs first through the upper diaphragm chamber and then through the diaphragm. Space the studs 12 holes apart.

27) Align mark drawn on upper diaphragm chamber during disassembly with mark drawn on lower diaphragm chamber. Install the handwheel assembly, upper diaphragm chamber, diaphragm, and studs as an assembly on the lower diaphragm chamber. Insert the studs through correct holes in the lower diaphragm chamber so the studs are centered on each leg of the yoke.

28) Install a 3/8-16 hex nut on each of the studs. Tighten the hex nuts alternately in increments not exceeding ¼ inch until the upper and lower diaphragm chambers are approximately 1/16 inch apart.

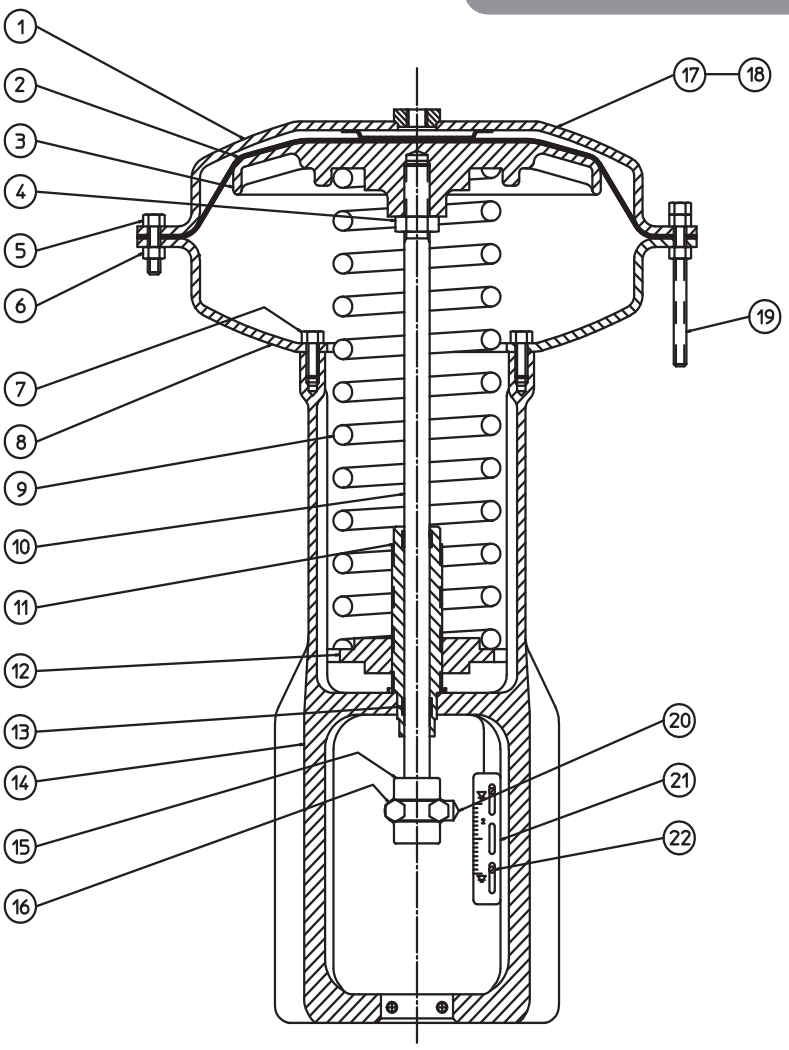
29) Install the 3/8-16 x 1-3/8 hex head capscrews **(Item 5)** through the holes along the circumference of the upper diaphragm chamber and through the holes in the diaphragm and lower diaphragm chamber.

30) Install the remaining 3/8-16 hex nuts on the 3/8-16 x 1-3/8 hex head capscrews. Tighten the studs and all the capscrews along the circumference of the upper diaphragm chamber to 170 in lbs torque.

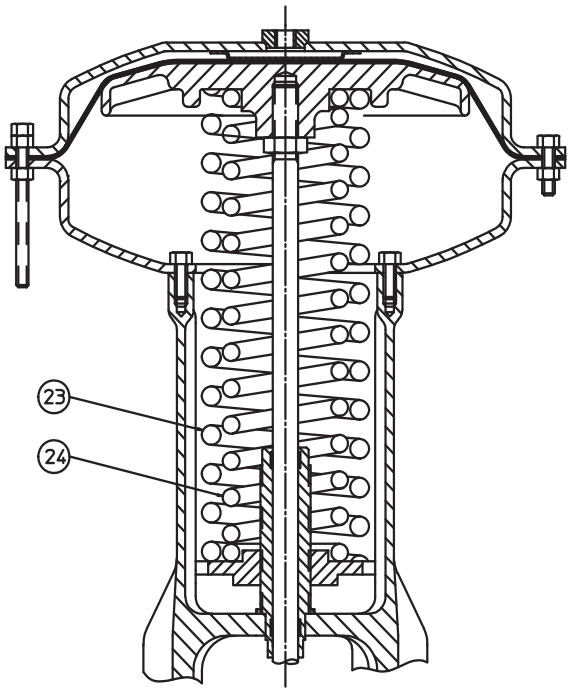
31) Apply air pressure to verify actuator strokes smoothly and check for air leaks.

32) Install actuator on valve. See separate instructions.

115 DIRECT ACTING



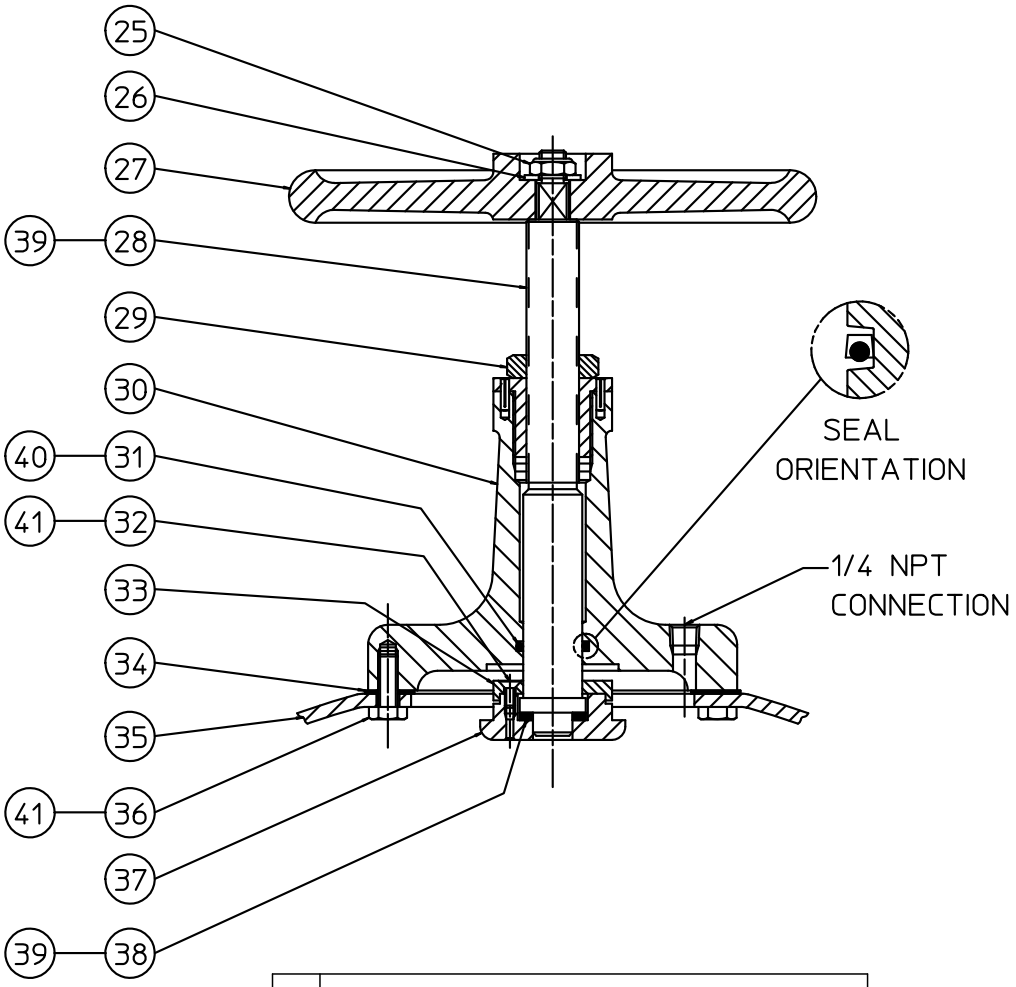
115



115XR

ITEM	DESCRIPTION
1	UPPER DIAPHRAGM CHAMBER
2	DIAPHRAGM
3	PRESSURE PLATE
4	3/4-10 HEX JAMNUT
5	3/8-16 x 1 3/8 LG HEX HD CAPSCREW
6	3/8-16 HEX NUT
7	3/8-16 x 1 LG HEX HD CAPSCREW
8	LOWER DIAPHRAGM CHAMBER
9	SPRING
10	ACTUATOR STEM
11	SPRING ADJUSTER
12	SPRING SEAT
13	STEM BEARING
14	YOKE
15	SPLIT STEM CONNECTOR
16	5/16-18 x 1 1/2 LG HEX HD CAPSCREW
17	WARNING LABEL "DO NOT EXCEED 100 PSIG"
18	WARNING LABEL "PRELOADED SPRING"
19	3/8-16 x 4 LG STUD
20	TRAVEL INDICATOR POINTER
21	TRAVEL SCALE
22	#6-32 x 1/4 SELF TAPPING SCREW
23	115XR SPRING BLUE
24	115XR SPRING ORANGE & BLACK

115 DIRECT ACTING HANDWHEEL



ITEM	DESCRIPTION
25	1/2-20 SELF LOCKING NUT
26	17/32 ID x 1 1/16 OD x 3/32 THK FLAT WASHER
27	ø10 INCH HANDWHEEL
28	HANDWHEEL SHAFT
29	1-14 LOCKNUT
30	HANDWHEEL BONNET & THREAD INSERT ASSY
31	SHAFT SEAL
32	#10-24 x 1/2 SOCKET FLAT HEAD CAPSCREW
33	RETAINING RING
34	GASKET
35	UPPER DIAPHRAGM CHAMBER
36	3/8-16 x 1 HEX HEAD CAPSCREW
37	PRESSURE PLATE
38	THRUST BEARING
39	MEDIUM GREASE
40	O-RING LUBRICANT
41	THREAD LOCKING COMPOUND

Reverse Acting 115 Actuator Without Handwheel

1) Remove actuator from valve. See separate actuator removal instructions.

2) There is significant preload on the spring in the actuator. Disassembling the actuator before removing the preload will release the spring force (preload) and may cause serious personal injury. Looking down on the actuator, begin removing the preload by turning the spring adjuster **(Item 2)** clockwise until spring seat **(Item 3)** reaches the stop on the spring adjuster and the adjuster can be turned no further. Turn the spring adjuster by using a wrench on the adjuster's flats. The flats are located where the spring adjuster exits the spring chamber. After the spring seat reaches the stop on the spring adjuster there is still significant preload remaining on the spring.

3) Alternately loosen then remove the 3/8-16 x 1-3/8 hex head capscrews **(Item 9)** and their 3/8-16 hex nuts **(Item 10)** along the circumference of the diaphragm chambers. Replace with **new** hex head capscrews and hex nuts during reassembly.

4) The actuator uses two (2) 3/8-16 x 4 studs **(Item 26)** with six (6) 3/8-16 hex nuts **(Item 10)** and two (2) washers **(Item 27)**. To remove the remaining preload alternately loosen the single hex nuts on the long threaded portion of the studs in small increments, approximately ¼ inch at a time, then remove the studs, hex nuts, and washers. Replace with **new** studs and hex nuts during reassembly.

5) Remove the upper diaphragm chamber **(Item 7)** and spring chamber **(Item 1)** as an assembly from the actuator.

6) Remove spring adjuster and spring seat as an assembly from the actuator.

7) Remove spring adjuster from spring seat.

8) Remove the spring **(Item 4)** from the actuator (For an XR actuator remove both the blue spring **(Item 33)** and the ½ orange ½ black spring **(Item 34)**.

9) Remove the ¾-10 hex jamnut **(Item 6)**, pressure plate **(Item 8)**, diaphragm **(Item 11)**, travel stop **(Item 12)**, and actuator stem **(Item 19)** as an assembly from the lower diaphragm chamber **(Item 7)** and yoke **(Item 20)** assembly of the actuator.

10) Remove the ¾-10 hex jamnut from the actuator stem. Use flats provided on actuator stem to hold it from turning. The remainder of the stem is a close tolerance fine finish bearing and sealing surface, take care to not mar the surfaces.

11) Remove pressure plate, diaphragm, and travel stop from the stem. Clean bearing and sealing surfaces on stem. Inspect diaphragm and stem, if damaged or worn replace with new diaphragm and stem during reassembly.

12) Remove retaining ring **(Item 18)** from yoke bushing **(Item 16)** on end closest to shaft seal **(Item 17)**. Replace with **new** retaining ring during reassembly.

13) Remove yoke bushing, o-ring (Item 15), shaft seal **(Item 17)**, and remaining retaining ring **(Item 18)** as an assembly from yoke **(Item 20)**.

14) Remove retaining ring from yoke bushing on end closest to o-ring. Replace with **new** retaining ring during reassembly.

15) Remove o-ring and shaft seal from yoke bushing. Replace with **new** o-ring and shaft seal during reassembly. Clean bushing bearing and sealing surfaces. Inspect bushing, if damaged or worn replace with new bushing during reassembly.

16) Remove 3/8-16 x 7/8 hex head capscrews **(Item 13)** from lower diaphragm chamber **(Item 7)**. Then remove lower diaphragm chamber from yoke.

17) Remove gasket **(Item 14)** from yoke. Replace with **new** gasket during reassembly. Clean gasket surfaces on lower diaphragm chamber and yoke. Be careful not to scratch gasket surfaces.

18) Remove 3/8-16 x 1 hex head capscrews **(Item 5)** from upper diaphragm chamber **(Item 7)**. Then remove upper diaphragm chamber from spring chamber.

Reverse Acting 115 Actuator Without Handwheel

1) Install **new** retaining ring **(Item 18)** on yoke bushing **(Item 16)** on end closest to groove for o-ring **(Item 15)**.

2) Apply light coat of aeroshell 6 grease **(Item 32)** to **new** shaft seal **(Item 17)**. Install shaft seal in yoke bushing. Watch orientation.

3) Apply light coat of aeroshell 6 grease to **new** o-ring. Install o-ring on yoke bushing.

4) Install yoke bushing, o-ring, shaft seal, and retaining ring as an assembly in yoke **(Item 20)**. Watch orientation of shaft seal.

5) Install **new** retaining ring **(Item 18)** on yoke bushing on end closest to shaft seal.

6) Place a **new** gasket **(Item 14)** and lower diaphragm chamber **(Item 7)** on the yoke in the orientation shown on the drawing. Line up the holes in the lower diaphragm chamber with the holes in the gasket and yoke. Install the 3/8-16 x 7/8 hex head capscrews **(Item 13)** in the lower diaphragm chamber. Tighten the capscrews in an alternating pattern first to 30 in lbs, then 70 in lbs, 110 in lbs, and finally 150 in lbs torque to secure the lower diaphragm chamber to the yoke.

7) Install the travel stop **(Item 12)** on the actuator stem **(Item 19)**. Watch orientation.

8) Install the diaphragm **(Item 11)** on the actuator stem in the orientation shown on the drawing.

9) Install the pressure plate (**Item 8)** on the actuator stem in the orientation shown on the drawing.

10) Apply Loctite 272 to threads of actuator stem, then install the ¾-10 hex jamnut **(Item 6)** on the actuator stem and tighten it to 50 ft lbs torque. Use flats provided on stem to hold it from turning. The remainder of the stem is a close tolerance fine finish bearing and sealing surface.

11) Invert the spring chamber **(Item 1)**. Place the upper diaphragm chamber **(Item 7)** on the spring chamber. Watch orientation. Line up the holes in the upper diaphragm chamber with the holes in the spring chamber. Install the 3/8-16 x 1 hex head capscrews **(Item 5)** in the upper diaphragm chamber. Tighten the capscrews in an alternating pattern to 170 in lbs torque to secure the upper diaphragm chamber to the spring chamber.

12) Apply a light coat of Aeroshell Grease 6 to the threads of the spring adjuster **(Item 2)** and to the surfaces of this part that make contact with the spring chamber.

13) Install the spring seat **(Item 3)** on the spring adjuster. Orient the spring seat so the largest pilot diameter possible fits inside the ID of the spring **(Item 4)** when the spring seat is installed on the spring (For an XR actuator, orient the spring seat so the largest pilot diameter possible fits inside the ID of the ½ orange ½ black spring **(Item 34)**. Thread spring adjuster into spring seat until the spring seat reaches the stop at the other end of the adjuster.

14) Install spring seat and spring adjuster as an assembly in spring chamber. The slotted ends of the spring seat must straddle the ribs inside the spring chamber. Use clamp on flats of adjuster to hold assembly in place.

15) Apply light coat of Aeroshell grease 6 to the actuator stem.

16) Line up the holes in the diaphragm with the holes in the lower diaphragm chamber.

17) Install the actuator stem, travel stop, diaphragm, pressure plate, and ¾-10 hex jamnut as an assembly in the actuator.

18) Install spring(s) in actuator (For an XR actuator install both the blue spring **(Item 33)** and the ½ orange ½ black spring **(Item 34)**. Center ID of spring(s) over raised spring pilot on the pressure plate.

19) Install two (2) **new** 3/8-16 hex nuts **(Item 10)** on both **new** 3/8-16 x 4 studs **(Item 26)**. Thread both jamnuts on each stud to the same end until the first jamnut is flush with the end of the stud. Jam the nuts together and peen the end of the stud protruding through the first jamnut to secure the assembly. This step may have been already done for you.

20) Install upper diaphragm chamber, spring chamber, spring seat, and spring adjuster as an assembly on the actuator. Orient the vent on the spring chamber as shown on the drawing. Center the raised spring pilot on the spring seat inside the ID of the spring(s). Line up the holes in the upper diaphragm chamber with the holes in the diaphragm and lower diaphragm chamber.

21) Place a washer **(Item 27)** on each stud. Insert the studs through correct holes in the upper diaphragm chamber so the studs are centered on each leg of the yoke. Space the studs 12 holes apart.

22) Apply a light coat of anti-seize lubricant to the threads on the studs. Install a **new** 3/8-16 hex nut on each of the studs. Tighten the hex nuts alternately in increments not exceeding ¼ inch until the upper and lower diaphragm chambers are approximately 1/16 inch apart.

23) Apply a light coat of anti-seize lubricant to the threads on the **new** 3/8-16 x 1-3/8 hex head capscrews **(Item 9)**. Install the capscrews through the holes along the circumference of the upper diaphragm chamber and through the holes in the diaphragm and lower diaphragm chamber.

24) Install the remaining **new** 3/8-16 hex nuts on the 3/8-16 x 1-3/8 hex head capscrews. Tighten the studs and all the capscrews along the circumference of the upper diaphragm chamber to 170 in lbs torque.

25) Remove clamp from spring adjuster.

26) Apply air pressure to verify actuator strokes smoothly and check for air leaks.

27) Install actuator on valve. See separate instructions.

Reverse Acting 115 Actuator With Handwheel

1) Remove actuator from valve. See separate actuator removal instructions.

2) Loosen 1-8 hex nut **(Item 39)**.

3) Thread 1-8 hex nut to top of upper handwheel shaft **(Item 40)**.

4) Operate handwheel **(Item 38)** until 1-8 hex nut makes contact with spring chamber **(Item 44)**.

5) There is significant preload on the spring in the actuator. Disassembling the actuator before removing the preload will release the spring force (preload) and may cause serious personal injury. Looking down on the actuator, begin removing the preload by turning the spring adjuster **(Item 45)** clockwise until spring seat **(Item 46)** reaches the stop on the spring adjuster and the adjuster can be turned no further. Turn the spring adjuster by using a wrench on the adjuster's flats. The flats are located where the spring adjuster exits the spring chamber. After the spring seat reaches the stop on the spring adjuster there is still significant preload remaining on the spring.

6) Rotate handwheel so coil spring pin **(Item 42)** connecting lower handwheel shaft **(Item 43)** to shaft coupling **(Item 41)** is accessible through legs of spring chamber. Use brass drift pin and lightly tap end of coil spring pin to remove it from shaft coupling. Separate lower handwheel shaft from shaft coupling.

7) Rotate handwheel so coil spring pin **(Item 42)** connecting upper handwheel shaft **(Item 40)** to shaft coupling is accessible through legs of spring chamber. Use brass drift pin and lightly tap end of coil spring pin to remove it from shaft coupling. Separate shaft coupling from upper handwheel shaft.

8) Remove ½ -20 self locking nut **(Item 36)** from upper handwheel shaft. Replace with **new** ½ -20 self locking nut during reassembly.

9) Remove washer **(Item 37)** from upper handwheel shaft.

10) Remove handwheel from upper handwheel shaft.

11) Remove 1-8 hex nut from upper handwheel shaft.

12) Thread upper handwheel shaft out of spring chamber.

13) Alternately loosen then remove the 3/8-16 x 1-3/8 hex head capscrews **(Item 9)** and their 3/8-16 hex nuts **(Item 10)** along the circumference of the diaphragm chambers. Replace with **new** hex head capscrews and hex nuts during reassembly.

14) The actuator uses two (2) 3/8-16 x 4 studs **(Item 26)** with six (6) 3/8-16 hex nuts **(Item 10)** and two (2) washers **(Item 27)**. To remove the remaining preload alternately loosen the single hex nuts on the long threaded portion of the studs in small increments, approximately ¼ inch at a time, then remove the studs, hex nuts, and washers. Replace with new studs and hex nuts during reassembly.

15) Remove the upper diaphragm chamber **(Item 7)** and spring chamber as an assembly from the actuator.

16) Remove spring adjuster and spring seat as an assembly from the actuator.

17) Remove spring adjuster from spring seat.

18) Remove the spring **(Item 4)** from the actuator (For an XR actuator remove both the blue spring **(Item 33)** and the ½ orange ½ black spring **(Item 34)**.

19) Remove the lower handwheel shaft assembly, pressure plate **(Item 8)**, diaphragm **(Item 11)**, travel stop **(Item 12)**, and actuator stem **(Item 19)** as an assembly from the lower diaphragm chamber **(Item 7)** and yoke **(Item 20)** assembly of the actuator.

20) By using a wrench on flats located on upper cage bushing, remove the lower cage bushing **(Item 55)** from the actuator stem. Use flats provided on actuator stem to hold it from turning. The remainder of the stem is a close tolerance fine finish bearing and sealing surface, take care to not mar the surfaces.

21) Remove pressure plate, diaphragm, and travel stop from the stem. Clean bearing and sealing surfaces on stem. Inspect diaphragm and stem, if damaged or worn replace with new diaphragm and stem during reassembly.

22) Remove either the upper cage bushing **(Item 47)** or the lower cage bushing **(Item 55)** from the cage **(Item 52).** A tool made to Warren Controls drawing number B6032000 may be used to turn lower cage bushing.

23) Remove the lower handwheel shaft, attached nuts and the roller thrust bearing as an assembly from the cage and upper cage bushing.

24) Remove roller thrust bearing **(Item 48)** from lower handwheel shaft. Clean and inspect roller thrust bearing, if worn or damaged replace with new roller thrust bearing during reassembly.

Reverse Acting 115 Actuator With Handwheel (Cont.)

25) Clean and inspect the ¾-16 precision jamnut **(Item 50)** and the ¾-16 recessed thread nut **(Item 49)** while they are attached to the lower shaft. If no wear or damage is found, and if nuts are not loose, leave the nuts attached if the lower handwheel shaft is being reused.

26) Clean and inspect the lower handwheel shaft. If it is decided to reuse the shaft, remove any burrs that may exist at the cross hole where the coil spring pin was pressed into it. If shaft is worn or damaged, replace with new lower handwheel shaft during reassembly.

27) Remove retaining ring **(Item 56**) from upper cage bushing. Replace with **new** retaining ring during reassembly.

28) Remove two (2) seal washers **(Item 58)** and shaft seal **(Item 57)** from upper cage bushing. Replace with **new** shaft seal during reassembly. Clean bearing and sealing surfaces on upper cage bushing.

29) Remove retaining ring **(Item 18)** from yoke bushing **(Item 16)** on end closest to shaft seal **(Item 17)**. Replace with **new** retaining ring during reassembly.

30) Remove yoke bushing, o-ring **(Item 15)**, shaft seal **(Item 17)**, and remaining retaining ring **(Item 18)** as an assembly from yoke **(Item 20)**.

31) Remove retaining ring from yoke bushing on end closest to o-ring. Replace with **new** retaining ring during reassembly.

32) Remove o-ring and shaft seal from yoke bushing. Replace with **new** o-ring and shaft seal during reassembly. Clean bushing bearing and sealing surfaces. Inspect bushing, if damaged or worn replace with new bushing during reassembly.

33) Remove 3/8-16 x 7/8 hex head capscrews **(Item 13)** from lower diaphragm chamber **(Item 7)**. Then remove lower diaphragm chamber from yoke.

34) Remove gasket **(Item 14)** from yoke. Replace with new gasket during reassembly. Clean gasket surfaces on lower diaphragm chamber and yoke. Be careful not to scratch gasket surfaces.

35) Remove 3/8-16 x 1 hex head capscrews **(Item 51)** from upper diaphragm chamber **(Item 7)**. Then remove upper diaphragm chamber from spring chamber.

Reverse Acting 115 Actuator With Handwheel

1) Install **new** retaining ring **(Item 18)** on yoke bushing **(Item 16)** on end closest to groove for o-ring **(Item 15)**.

2) Apply light coat of aeroshell 6 grease **(Item 32)** to **new** shaft seal **(Item 17)**. Install shaft seal in yoke bushing.

3) Apply light coat of aeroshell 6 grease to **new** o-ring. Install o-ring on yoke bushing.

4) Install yoke bushing, o-ring, shaft seal, and retaining ring as an assembly in yoke **(Item 20)**. Watch orientation of shaft seal.

5) Install **new** retaining ring **(Item 18)** on yoke bushing on end closest to shaft seal.

6) Place a **new** gasket **(Item 14)** and lower diaphragm chamber **(Item 7)** on the yoke in the orientation shown on the drawing. Line up the holes in the lower diaphragm chamber with the holes in the gasket and yoke. Install the 3/8-16 x 7/8 hex head capscrews **(Item 13)** in the lower diaphragm chamber. Tighten the capscrews in an alternating pattern first to 30 in lbs, then 70 in lbs, 110 in lbs, and finally 150 in lbs torque to secure the lower diaphragm chamber to the yoke.

7) Install first seal washer **(Item 58)** in upper cage bushing **(Item 47)**.

8) Install **new** shaft seal **(Item 57)** in upper cage bushing. Watch orientation.

9) Install second seal washer **(Item 58)** in upper cage bushing.

10) Install **new** retaining ring **(Item 56)** in upper cage bushing.

11) If the ¾-16 recessed thread nut **(Item 49)** and the ¾-16 precision jamnut **(Item 50)** are not already installed on the lower handwheel shaft **(Item 43)**, they must be installed such that the recess in **(Item 49)** is adjacent to the groove on the lower handwheel shaft and that the outer face of **(Item 50)** is even with the end face of the lower handwheel shaft within ± 0.02 inch when the nuts are locked together. Apply thread locking compound Loctite 272 to the threads of the lower handwheel shaft prior to installation and torque nuts against each other with a torque of 60 ft lbs.

12) Apply a thin coat of Aeroshell Greese 6 (**Item 32**) to the rollers of roller thrust bearing (**Item 48)**. Install roller thrust bearing onto the lower handwheel shaft with the two races straddling the rollers.

13) Apply a thin coat of Aeroshell Grease 6 to sealing and bearing surfaces of lower handwheel shaft where seal will pass over during installation.

14) Install upper cage bushing over the end of lower handwheel shaft with the cross hole in it. Watch orientation.

15) If the cage **(Item 52)** is not already installed on the upper cage bushing, it can be installed at this time after applying Loctite 272 to the threads of the upper cage bushing. The lower cage bushing **(Item 55)** should also be installed to the cage at this time (if not already installed to the cage) after applying Loctite 272 to threads. Do not get Loctite 272 on the diaphragm or seals. Torque both bushings to 100 ft lbs relative to the cage. A four-pin spanner wrench is required to torque lower cage bushing. See page 29 for the drawing of the spanner wrench (Drawing number B6032000).

16) Install the travel stop **(Item 12)** on the actuator stem **(Item 19)**. Watch orientation.

17) Install the diaphragm **(Item 11)** on the actuator stem in the orientation shown on the drawing.

18) Install the pressure plate **(Item 8)** on the actuator stem in the orientation shown on the drawing.

19) Apply Loctite 272 to threads of actuator stem, then install the lower cage bushing **(Item 55)** on the actuator stem and tighten it to 50 ft lbs torque. Use flats provided on stem to hold it from turning. The remainder of the stem is a close tolerance fine finish bearing and sealing surface.

20) Invert the spring chamber **(Item 44)**. Place the upper diaphragm chamber **(Item 7)** on the spring chamber. Watch orientation. Line up the holes in the upper diaphragm chamber with the holes in the spring chamber. Install the 3/8-16 x 1 hex head capscrews **(Item 51)** in the upper diaphragm chamber. Tighten the capscrews in an alternating pattern to 170 in lbs torque to secure the upper diaphragm chamber to the spring chamber.

21) Apply a light coat of Aeroshell Grease 6 to the threads of the spring adjuster **(Item 45)** and to the surfaces of this part that make contact with the spring chamber.

22) Install the spring seat **(Item 46)** on the spring adjuster. Orient the spring seat so the largest pilot diameter possible fits inside the ID of the spring **(Item 4)** when the spring seat is installed on the spring (For an XR actuator, orient the spring seat so the largest pilot diameter possible fits inside the ID of the ½ orange ½ black spring **(Item 34)**. Thread spring adjuster into spring seat until the spring seat reaches the stop at the other end of the adjuster.

23) Install spring seat and spring adjuster as an assembly in spring chamber. The slotted ends of the spring seat must straddle the ribs inside the spring chamber. Use clamp on flats of adjuster to hold assembly in place.

Reverse Acting 115 Actuator With Handwheel Cont.

24) Apply light coat of Aeroshell grease 6 to the actuator stem.

25) Line up the holes in the diaphragm with the holes in the lower diaphragm chamber.

26) Install the actuator stem, travel stop, diaphragm, pressure plate, and lower handwheel shaft assembly as an assembly in the actuator.

27) Install spring(s) in actuator (For an XR actuator install both the blue spring **(Item 33)** and the ½ orange ½ black spring **(Item 34)**. Center ID of spring(s) over raised spring pilot on the pressure plate.

28) Install two (2) **new** 3/8-16 hex nuts **(Item 10)** on both **new** 3/8-16 x 4 studs **(Item 26)**. Thread both jamnuts on each stud to the same end until the first jamnut is flush with the end of the stud. Jam the nuts together and peen the end of the stud protruding through the first jamnut to secure the assembly. This step may have been already done for you.

29) Hold onto the flats of the spring adjuster where it exits the spring chamber. Install upper diaphragm chamber, spring chamber, spring seat, and spring adjuster as an assembly on the actuator. Orient the vent on the spring chamber as shown on the drawing. Center the raised spring pilot on the spring seat inside the ID of the spring(s). Center the lower handwheel shaft assembly inside the ID of the spring adjuster. Line up the holes in the upper diaphragm chamber with the holes in the diaphragm and lower diaphragm chamber.

30) Place a washer **(Item 27)** on each stud. Insert the studs through correct holes in the upper diaphragm chamber so the studs are centered on each leg of the yoke. Space the studs 12 holes apart.

31) Apply a light coat of anti-seize lubricant to the threads on the studs. Install a **new** 3/8-16 hex nut on each of the studs. Tighten the hex nuts alternately in increments not exceeding ¼ inch until the upper and lower diaphragm chambers are approximately 1/16 inch apart.

32) Apply a light coat of anti-seize lubricant to the threads on the **new** 3/8-16 x 1-3/8 hex head capscrews **(Item 9)**. Install the capscrews through the holes along the circumference of the upper diaphragm chamber and through the holes in the diaphragm and lower diaphragm chamber.

33) Install the remaining **new** 3/8-16 hex nuts on the 3/8-16 x 1-3/8 hex head capscrews. Tighten the studs and all the capscrews along the circumference of the upper diaphragm chamber to 170 in lbs torque.

34) Remove clamp from spring adjuster.

35) Apply air pressure to actuator until lower handwheel shaft extends far enough through opening in spring chamber to allow for installation of shaft coupling **(Item 41)** and coil spring pin **(Item 42)**.

36) Install shaft coupling on lower handwheel shaft. Watch orientation. Line up holes for coil spring pin in shaft coupling with holes in lower handwheel shaft.

37) Install **new** coil spring pin in shaft coupling. Use brass drift pin and lightly tap end of coil spring pin to install coil spring pin through shaft coupling and lower handwheel shaft.

38) Remove air pressure from actuator.

39) Apply light coat of Aeroshell grease 6 to threads in spring chamber for upper handwheel shaft **(Item 40)**.

40) Thread 1-8 hex nut **(Item 39)** to center of upper handwheel shaft.

41) Thread upper handwheel shaft into spring chamber until 1-8 hex nut is in contact with spring chamber. Watch orientation. Temporarily tighten 1-8 hex nut against spring chamber.

42) Install handwheel **(Item 38)** on upper handwheel shaft.

43) Install washer **(Item 37)** on handwheel shaft.

44) Install **new** ½ -20 self locking nut **(Item 36)** on handwheel shaft and tighten to 50 ft lbs torque.

45) Loosen 1-8 hex nut and thread it against the handwheel.

46) Turn handwheel until 1-8 hex nut is in contact with the spring chamber. Turn handwheel in opposite direction until hole for coil spring pin in upper handwheel shaft is parallel to legs of spring chamber.

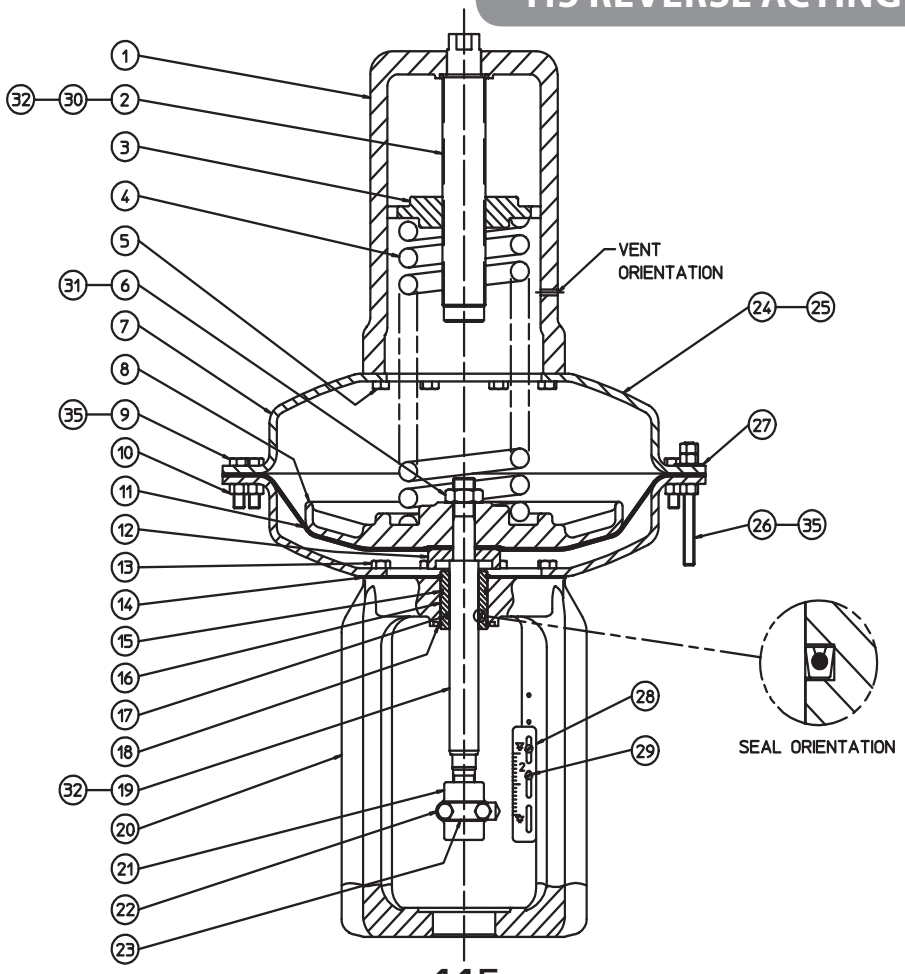
47) Place shaft coupling on lower handwheel shaft over upper handwheel shaft. Line up holes for coil spring pin in shaft coupling with holes in upper handwheel shaft.

48) Install **new** coil spring pin in shaft coupling. Use brass drift pin and lightly tap end of coil spring pin to install coil spring pin through shaft coupling and upper handwheel shaft.

49) Turn handwheel until 1-8 hex nut is in contact with the spring chamber. Apply air pressure to verify actuator strokes smoothly and check for air leaks.

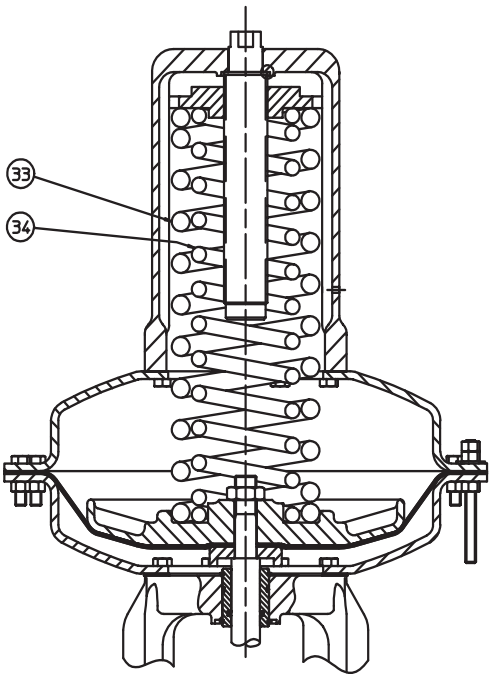
50) Install actuator on valve. See separate instructions.

115 REVERSE ACTING



115

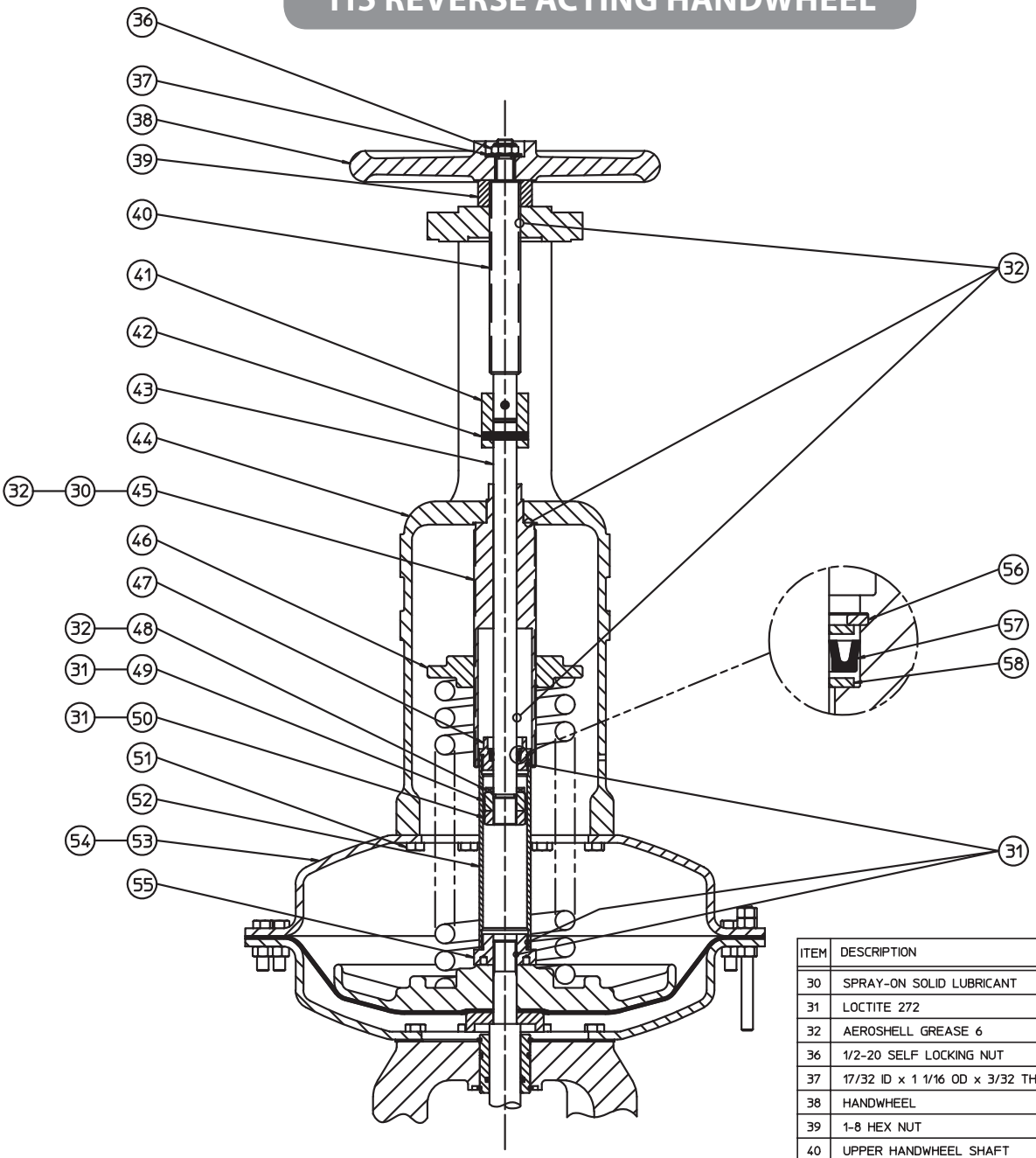
ITEM	DESCRIPTION
1	SPRING CHAMBER
2	SPRING ADJUSTER
3	SPRING SEAT
4	SPRING
5	3/8-16 x 1 LG HEX HD CAPSCREW
6	3/4-10 HEX JAMNUT
7	DIAPHRAGM CHAMBER
8	PRESSURE PLATE
9	3/8-16 x 1 3/8 LG HEX HD CAPSCREW
10	3/8-16 HEX NUT
11	DIAPHRAGM
12	TRAVEL STOP
13	3/8-16 x 7/8 LG HEX HD CAPSCREW
14	GASKET
15	O-RING -127
16	YOKE BUSHING
17	SHAFT SEAL
18	RETAINING RING
19	ACTUATOR STEM
20	YOKE
21	SPLIT STEM CONNECTOR
22	5/16-18 x 1 1/2 LG HEX HD CAPSCREW
23	TRAVEL INDICATOR POINTER
24	WARNING LABEL "DO NOT EXCEED 100 PSIG"
25	WARNING LABEL "PRELOADED SPRING"
26	3/8-16 x 4 LG FULL THD STUD
27	3/8 FLAT WASHER TYPE B REGULAR
28	TRAVEL SCALE
29	#6-18 x 1/4 LG SELF TAPPING SCREW
30	SPRAY-ON SOLID LUBRICANT
31	LOCTITE 272
32	AEROSHELL GREASE 6
33	115XR SPRING BLUE
34	115XR SPRING ORANGE & BLACK
35	ANTI-SEIZE



115 REVERSE ACTING XR
CONSTRUCTION

115XR

115 REVERSE ACTING HANDWHEEL



ITEM	DESCRIPTION
30	SPRAY-ON SOLID LUBRICANT
31	LOCTITE 272
32	AEROSHELL GREASE 6
36	1/2-20 SELF LOCKING NUT
37	17/32 ID x 1 1/16 OD x 3/32 THK FLAT WASHER
38	HANDWHEEL
39	1-8 HEX NUT
40	UPPER HANDWHEEL SHAFT
41	SHAFT COUPLING
42	Ø1/4 x 1 1/2 LG COIL SPRING PIN
43	LOWER HANDWHEEL SHAFT
44	SPRING CHAMBER & THREAD INSERT SUBASSEMBLY
45	SPRING ADJUSTER
46	SPRING SEAT
47	UPPER CAGE BUSHING
48	ROLLER THRUST BEARING
49	3/4-16 RECESSED THREAD NUT
50	3/4-16 PRECISION JAMNUT
51	3/8-16 x 1 LG HEX HD CAPSCREW
52	CAGE
53	WARNING LABEL "PRELOADED SPRING"
54	WARNING LABEL "DO NOT EXCEED 100 PSIG"
55	LOWER CAGE BUSHING
56	RETAINING RING
57	SHAFT SEAL
58	SEAL WASHER

Direct Acting 115 Actuator Installation on Direct Acting 2-Way Valve

1) If actuator is equipped with a handwheel, operate handwheel to stand-by position.

2) Pull valve stem up until plug is against travel stop in valve. Note stem location.

3) Push valve stem down until plug is seated. Note stem location.

4) Place actuator and yoke locknut over valve stem and onto bonnet, tapered side of yoke locknut toward bonnet. Do not tighten yoke locknut at this time.

5) Rotate actuator to desired orientation. Factory default is travel scale on downstream side of valve.

6) Tighten yoke locknut securely. Use a blunt chisel and hammer for final tightening.

7) Verify that the plug is against the seat. Refer to the location of the stem noted in Step 3.

8) Apply air pressure to the actuator until actuator stem is approximately a ¼ inch from the valve stem.

9) With the plug on the seat, install the split stem connector, travel indicator pointer, and hex head capscrews on the actuator and valve stems. Valve stem engagement with the stem connector should be a minimum of one valve stem diameter. Actuator stem engagement with the stem connector should be approximately one actuator stem diameter. Watch orientation. Tighten capscrews.

10) Remove air pressure from actuator. Verify that valve is fully open. Refer to the location of the stem noted in Step 2. If the valve is not fully open, do Steps 2 & 3 of the Actuator Removal instructions then repeat Actuator Installation Steps 3 & 7 thru 10.

11) Adjust start point of actuator. When the start point is correctly adjusted, the actuator stem should just start to extend when the air pressure to the actuator reaches the low end of the actuator's bench range; 3 psig for a 3 to 15 psig or 3 to 9 psig actuator, 9 psig for a 9 to 15 psig actuator. Slowly increase air pressure to the actuator until the actuator stem starts to extend. If the air pressure is less than the low end of the bench range, remove the air pressure and looking down on the actuator turn the spring adjuster CW to increase the start point. Use a wrench on the flats of the adjuster to turn the spring adjuster. If the air pressure is greater than the low end of the bench range, remove the air pressure and looking down on the actuator turn the spring adjuster CCW to decrease the start point. Repeat this step until the actuator stem just starts to extend when the air pressure to the actuator reaches the low end of the actuator's bench range.

12) Verify the actuator stem just starts to extend when the air pressure to the actuator reaches the low end of the actuator's bench range; if it does not, repeat the previous step.

13) Pressurize the actuator to the high end of its bench range, 9 psig for a 3 to 9 psig actuator, 15 psig for a 3 to 15 psig or 9 to 15 psig actuator. Verify that the plug is seated at or before the high end of the bench range. Refer to the location of the stem noted in Step 3. If the seating pressure is above the high end of the bench range the valve will not shut off its rated pressure; do Steps 2 & 3 of the Actuator Removal instructions then repeat Actuator Installation Steps 3 & 7 thru 13.

14) Adjust and secure the travel scale.

15) Restore original air connection to the actuator air connection.

16) If isolated, return line pressure to valve and check operation.

Direct Acting 115 Actuator Installation on Reverse Acting 2-Way Valve

1) If actuator is equipped with a handwheel, operate handwheel to stand-by position.

2) Pull valve stem up until plug is seated. Note stem location.

3) Push valve stem down until plug is against travel stop in valve. Note stem location.

4) Place actuator and yoke locknut over valve stem and onto bonnet, tapered side of yoke locknut toward bonnet. Do not tighten yoke locknut at this time.

5) Rotate actuator to desired orientation. Factory default is travel scale on downstream side of valve.

6) Tighten yoke locknut securely. Use a blunt chisel and hammer for final tightening.

7) Verify that the plug is down against the travel stop. Refer to the location noted in Step 3.

8) Apply air pressure to the actuator until actuator stem is approximately a ¼ inch from the valve stem.

9) With the plug on the travel stop, install the split stem connector, travel indicator pointer, and hex head capscrews on the actuator and valve stems. Valve stem engagement with the stem connector should be a minimum of one valve stem diameter. Actuator stem engagement with the stem connector should be approximately one actuator stem diameter. Watch orientation. Tighten capscrews.

10) Remove air pressure from actuator. Verify that the plug is against the seat. Refer to the location of the stem noted in Step 2. If the plug is not seated, do Steps 2 & 3 of the Actuator Removal instructions then repeat the Actuator Installation Steps 3 & 7 thru 10.

11) Adjust start point of actuator. When the start point is correctly adjusted, the actuator stem should just start to extend when the air pressure to the actuator reaches the low end of the actuator's bench range; 3 psig for a 3 to 15 psig or 3 to 9 psig actuator, 9 psig for a 9 to 15 psig actuator, for an XR actuator see Table 1. Slowly increase air pressure to the actuator until the actuator stem starts to extend. If the air pressure is less than the low end of the bench range, remove the air pressure and looking down on the actuator turn the spring adjuster CW to increase the start point. Use a wrench on the flats of the adjuster to turn the spring adjuster. If the air pressure is greater than the low end of the bench range, remove the air pressure and looking down on the actuator turn the spring adjuster CCW to decrease the start point. Repeat this step until the actuator stem just starts to extend when the air pressure to the actuator reaches the low end of the actuator's bench range.

12) Verify the actuator stem just starts to extend when the air pressure to the actuator reaches the low end of the actuator's bench range; if it does not, repeat the previous step.

13) Pressurize the actuator to the high end of its bench range, 9 psig for a 3 to 9 psig actuator, 15 psig for a 3 to 15 psig or 9 to 15 psig actuator, for an XR actuator see Table 1. Verify that the plug is down against the travel stop at or before the high end of the bench range. Refer to the location of the stem noted in Step 3. If the plug is not at the travel stop at or below the high end of the bench range, do Steps 2 & 3 of the Actuator Removal instructions then repeat Actuator Installation Steps 3 & 7 thru 13.

14) Adjust and secure the travel scale.

15) Restore original air connection to the actuator air connection.

16) If isolated, return line pressure to valve and check operation.

Direct Acting 115 Actuator Installation on 3-Way Valve

1) If actuator is equipped with a handwheel, operate handwheel to stand-by position.

2) Pull valve stem up until plug is seated at upper port. Note stem location.

3) Push valve stem down until plug is seated at lower port. Note stem location.

4) Place actuator and yoke locknut over valve stem and onto bonnet, tapered side of yoke locknut toward bonnet. Do not tighten yoke locknut at this time.

5) Rotate actuator to desired orientation. For a diverting/ mixing valve, the factory default is travel scale on lower port side of valve. For a mixing valve, the factory default is travel scale on common port side of valve.

6) Tighten yoke locknut securely. Use a blunt chisel and hammer for final tightening.

7) Verify that the plug is against the lower seat. Refer to the location noted in Step 3.

8) Apply air pressure to the actuator until actuator stem is approximately a ¼ inch from the valve stem.

9) With the plug on the lower seat, install the split stem connector, travel indicator pointer, and hex head capscrews on the actuator and valve stems. Valve stem engagement with the stem connector should be a minimum of one valve stem diameter. Actuator stem engagement with the stem connector should be approximately one actuator stem diameter. Watch orientation. Tighten capscrews.

10) Remove air pressure from actuator. Verify that the plug is seated at upper port. Refer to the location of the stem noted in Step 2. If the plug is not seated at the upper port, do Steps 2 & 3 of the Actuator Removal instructions then repeat Actuator Installation Steps 3 & 7 thru 10.

11) Adjust start point of actuator. When the start point is correctly adjusted, the actuator stem should just start to extend when the air pressure to the actuator reaches the low end of the actuator's bench range; 3 psig for a 3 to 15 psig or 3 to 9 psig actuator, 9 psig for a 9 to 15 psig actuator, for an XR actuator see Table 1. Slowly increase air pressure to the actuator until the actuator stem starts to extend. If the air pressure is less than the low end of the bench range, remove the air pressure and looking down on the actuator turn the spring adjuster CW to increase the start point. Use a wrench on the flats of the adjuster to turn the spring adjuster. If the air pressure is greater than the low end of the bench range, remove the air pressure and looking down on the actuator turn the spring adjuster CCW to decrease the start point. Repeat this step until the actuator stem just starts to extend when the air pressure to the actuator reaches the low end of the actuator's bench range.

12) Verify the actuator stem just starts to extend when the air pressure to the actuator reaches the low end of the actuator's bench range; if it does not, repeat the previous step.

13) Pressurize the actuator to the high end of its bench range, 9 psig for a 3 to 9 psig actuator, 15 psig for a 3 to 15 psig or 9 to 15 psig actuator, for an XR actuator see Table 1. Verify that the plug is seated at the lower port at or before the high end of the bench range. Refer to the location of the stem noted in Step 3. If the seating pressure at the lower port is above the high end of the bench range the valve will not shut off its rated pressure; do Steps 2 & 3 of the Actuator Removal instructions then repeat Actuator Installation Steps 3 & 7 thru 13.

14) Adjust and secure the travel scale.

15) Restore original air connection to the actuator air connection.

16) If isolated, return line pressure to valve and check operation.

XR BENCH RANGES		
VALVE TRAVEL (INCHES)	LOW END (PSIG)	HIGH END (PSIG)
3/4	19.7	22.3
1-1/8	18.3	22.3
1-1/4	17.9	22.3
1-3/8	17.5	22.3
1-1/2	17.0	22.3
1-3/4	16.2	22.3
2	15.3	22.3
2-1/2	13.6	22.3
3	11.8	22.3

Table 1

Reverse Acting 115 Actuator Installation on Direct Acting 2-Way Valve

1) If actuator is equipped with a handwheel, operate handwheel to stand-by position.

2) Pull valve stem up until plug is against travel stop in valve. Note stem location.

3) Push valve stem down until plug is seated. Note stem location.

4) Temporarily install a flexible air hose directly to the actuator air connection.

5) Place actuator and yoke locknut over valve stem and onto bonnet, tapered side of yoke locknut toward bonnet. Actuator must rest on bonnet. If necessary apply air pressure to the actuator to retract the actuator stem. Do not tighten yoke locknut at this time.

6) Rotate actuator to desired orientation. Factory default is travel scale on downstream side of valve.

7) Tighten yoke locknut securely. Use a blunt chisel and hammer for final tightening.

8) Verify that the plug is against the seat. Refer to the location noted in Step 3.

9) Apply air pressure to, or remove air pressure from, the actuator until actuator stem is approximately 5/16 inch from the valve stem.

10) With the plug on the seat, install the split stem connector, travel indicator pointer, and hex head capscrews on the actuator and valve stems. Valve stem engagement with the stem connector should be a minimum of one valve stem diameter. Actuator stem engagement with the stem connector should be approximately one actuator stem diameter. Watch orientation. Tighten capscrews.

11) Remove air pressure from actuator. Verify that valve is fully closed. Refer to the location of the stem noted in Step 3. If the valve is not fully closed, do Steps 2 & 3 of the Actuator Removal instructions then repeat Actuator Installation Steps 3 & 8 thru 11.

12) Adjust start point of actuator. When the start point is correctly adjusted, the actuator stem should just start to retract when the air pressure to the actuator reaches the low end of the actuator's bench range; 3 psig for a 3 to 15 psig or 3 to 9 psig actuator, 9 psig for a 9 to 15 psig actuator, for an XR actuator see Table 1. Slowly increase air pressure to the actuator until the actuator stem starts to retract. If the air pressure is less than the low end of the bench range, remove the air pressure and looking down on the actuator turn the spring adjuster CCW to increase the start point. Use a wrench on the flats of the adjuster to turn the spring adjuster. If the air pressure is greater than the low end of the bench range, remove the air pressure and looking down on the actuator turn the spring adjuster CW to decrease the start point. Repeat this step until the actuator stem just starts to retract when the air pressure to the actuator reaches the low end of the actuator's bench range.

13) Verify the actuator stem just starts to retract when the air pressure to the actuator reaches the low end of the actuator's bench range; if it does not, repeat the previous step.

14) Pressurize the actuator to the high end of its bench range, 9 psig for a 3 to 9 psig actuator, 15 psig for a 3 to 15 psig or 9 to 15 psig actuator, for an XR actuator see Table 1. Verify that the plug is at the travel stop in the valve at or before the high end of the bench range. Refer to the location of the stem noted in Step 2. If the plug is not at the travel stop the valve is not fully open; do Steps 2 & 3 of the Actuator Removal instructions then repeat Actuator Installation Steps 3 & 8 thru 14.

15) Adjust and secure the travel scale.

16) Remove temporary air connection and restore original air connection to the actuator air connection.

17) If isolated, return line pressure to valve and check operation.

Reverse Acting 115 Actuator Installation on 3-Way Valve

1) If actuator is equipped with a handwheel, operate handwheel to stand-by position.

2) Pull valve stem up until plug is against seated at upper port. Note stem location.

3) Push valve stem down until plug is seated at lower port. Note stem location.

4) Temporarily install a flexible air hose directly to the actuator air connection.

5) Place actuator and yoke locknut over valve stem and onto bonnet, tapered side of yoke locknut toward bonnet. Actuator must rest on bonnet. If necessary apply air pressure to the actuator to retract the actuator stem. Do not tighten yoke locknut at this time.

6) Rotate actuator to desired orientation. For a diverting/ mixing valve, the factory default is travel scale on lower port side of valve. For a mixing valve, the factory default is travel scale on common port side of valve.

7) Tighten yoke locknut securely. Use a blunt chisel and hammer for final tightening.

8) Verify that the plug is against the lower seat. Refer to the location noted in Step 3.

9) Apply air pressure to, or remove air pressure from, the actuator until actuator stem is approximately 5/16 inch from the valve stem.

10) With the plug on the lower seat, install the split stem connector, travel indicator pointer, and hex head capscrews on the actuator and valve stems. Valve stem engagement with the stem connector should be a minimum of one valve stem diameter. Actuator stem engagement with the stem connector should be approximately one actuator stem diameter. Watch orientation. Tighten capscrews.

11) Remove air pressure from actuator. Verify that plug is seated at lower port. Refer to the location of the stem noted in Step 3. If the plug is not seated at the lower port, do Steps 2 & 3 of the Actuator Removal instructions then repeat Actuator Installation Steps 3 & 8 thru 11.

12) Adjust start point of actuator. When the start point is correctly adjusted, the actuator stem should just start to retract when the air pressure to the actuator reaches the low end of the actuator's bench range; 3 psig for a 3 to 15 psig or 3 to 9 psig actuator, 9 psig for a 9 to 15 psig actuator, for an XR actuator see Table 1. Slowly increase air pressure to the actuator until the actuator stem starts to retract. If the air pressure is less than the low end of the bench range, remove the air pressure and looking down on the actuator turn the spring adjuster CCW to increase the start point. Use a wrench on the flats of the adjuster to turn the spring adjuster. If the air pressure is greater than the low end of the bench range, remove the air pressure and looking down on the actuator turn the spring adjuster CW to decrease the start point. Repeat this step until the actuator stem just starts to retract when the air pressure to the actuator reaches the low end of the actuator's bench range.

13) Verify the actuator stem just starts to retract when the air pressure to the actuator reaches the low end of the actuator's bench range; if it does not, repeat the previous step.

14) Pressurize the actuator to the high end of its bench range, 9 psig for a 3 to 9 psig actuator, 15 psig for a 3 to 15 psig or 9 to 15 psig actuator, for an XR actuator see Table 1. Verify that the plug is seated at the upper port at or before the high end of the bench range. Refer to the location of the stem noted in Step 2. If the seating pressure is above the high end of the bench range the valve will not shut off its rated pressure; do Steps 2 & 3 of the Actuator Removal instructions then repeat Actuator Installation Steps 3 & 8 thru 14.

15) Adjust and secure the travel scale.

16) Remove temporary air connection and restore original air connection to the actuator air connection.

17) If isolated, return line pressure to valve and check operation.

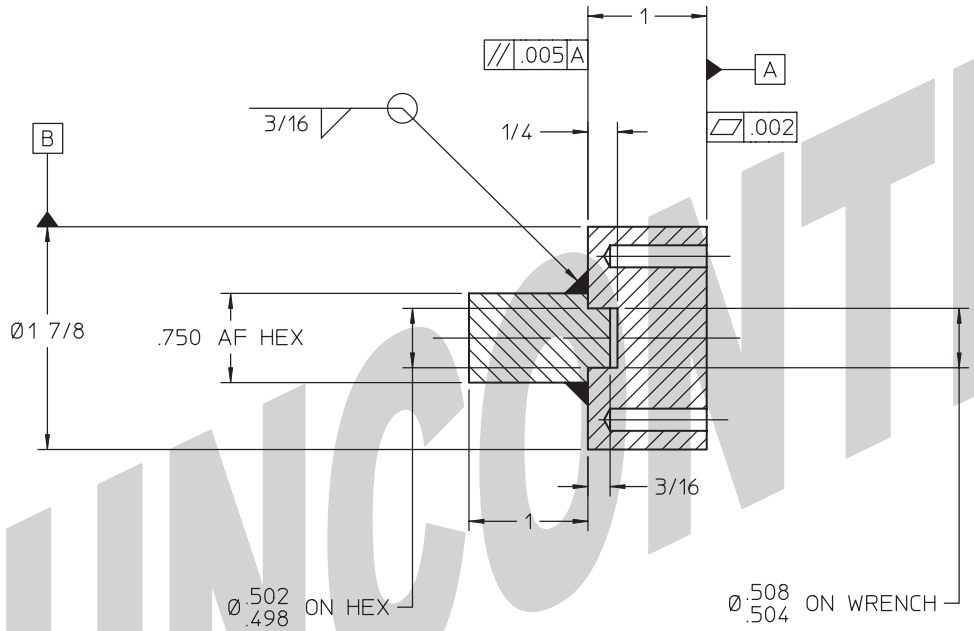
B6032000

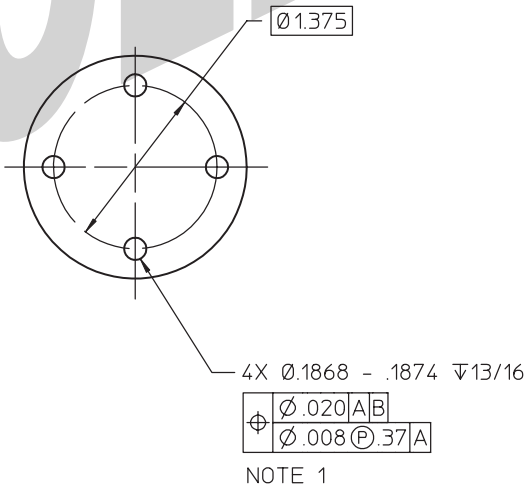
THIS DRAWING AND THE DEVICE, PROCESS, METHOD AND/OR PRODUCT SHOWN THEREIN ARE THE PROPRIETARY PROPERTY OF WARREN CONTROLS INCORPORATED. THIS DRAWING IS FOR REFERENCE PURPOSES ONLY. POSSESSION OF IT DOES NOT IN ITSELF CONVEY ANY RIGHT OR LICENSE TO MAKE, MANUFACTURE, USE AND/OR SELL THE DEVICE, PROCESS, METHOD OR PRODUCT SHOWN THEREIN NOR DOES IT CONVEY THE RIGHT OR LICENSE TO REPRODUCE THE DRAWING OR ANY PART THEREOF. SUCH RIGHTS OR LICENSES CAN ONLY BE GRANTED BY EXPRESS WRITTEN CONSENT OF WARREN CONTROLS INCORPORATED.

NOTES:

1) HARDENED STEEL Ø.1877 X 1 DOWEL PINS (NOT SHOWN) MUST BE PRESSED INTO THE Ø.1867 - .1874 HOLES SUCH THAT THEY PROTRUDE FROM DATUM "A" BY .20 - .23

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED





NOTE 1

REMOVE ALL SHARP EDGES AND BURRS	UNLESS OTHERWISE SPECIFIED:		MATERIAL	DRAWN DGS	DATE 5/10/05	WARREN CONTROLS INCORPORATED BETHLEHEM, PENNSYLVANIA 18020-8010
DIMENSIONED PER ASME Y14.5M-1994	DECIMAL .XX ±.010	DECIMAL .XXX ±.005	STEEL	CHECKED		SPANNER WRENCH FOR LOWER CAGE BUSHING 115 SQ INCH REVERSE ACTING ACTUATOR
THIRD ANGLE PROJECTION	FRACTION ± 1/64	ANGLE ± 1°	TREATMENT	APPROVED		SIZE B | FSCM NO 03847 | DWG NO B6032000 | REV
NEXT ASSEMBLY	ALL FILLET RADII 1/32 MAX 125 √ FINISH ON ALL MACHINED SURFACES ALL DIMENSIONS ARE IN INCHES		FINISH			SCALE FULL | WT | SHEET

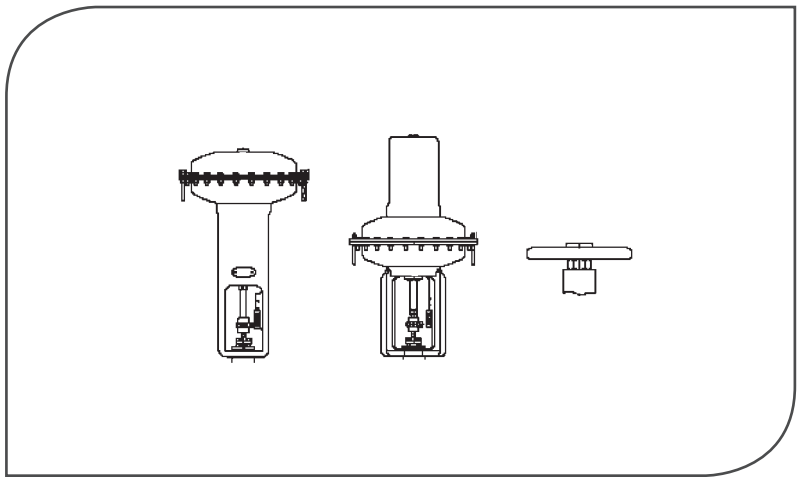
UNCONTROLLED

NOTES

NOTES

WARREN CONTROLS INC.

A VETERAN OWNED, PRIVATELY HELD, SMALL BUSINESS



115_IOM_RevA_1113

92500095 NoRev

WARREN CONTROLS

2600 EMRICK BLVD • BETHLEHEM, PA 18020 • USA •800-922-0085 • WWW.WARRENCONTROLS.COM

DEPENDABLE, RUGGED, PRECISION CONTROL VALVES AND ACCESSORIES