Instruction
D-Type05P-1NE
December 2010

NOR'EAST
CONTROLS, INC.
A DIVISION OF ALLAGASH INTERNATIONAL, INC.

Operator's Manual

TYPE 05 PNEUMATIC ACTUATOR, USED WITH GLOBE VALVES

Previously manufactured by Dezurik® and Honeywell®

Instructions

These instructions are intended for personnel who are responsible for installation, operation and maintenance of your Nor'East Actuator.

Safety Messages

All safety messages in the instructions are flagged with the word Caution, Warning or Danger. These messages must be followed exactly to avoid equipment damage, personal injury or death.

Safety label(s) on the product indicate hazards that can cause equipment damage, personal injury or death. If a safety label becomes difficult to see or read, or if a label has been removed, please contact Nor'East for replacement label(s).

WARNING!

Personnel involved in the installation or maintenance of valves should be constantly alert to potential emission of pipeline material and take appropriate safety precautions. Always wear suitable protection when dealing with hazardous pipeline materials. Handle valves, which have been removed from service with suitable protection for any potential pipeline material in the valve.

Inspection

Your Nor'East Actuator has been packaged to provide protection during shipment. Carefully inspect the unit for damage upon arrival and file a claim with the carrier if damage is apparent.

Parts

Order parts from your local sales representative, or directly from Nor'East, as listed on the back cover. Recommended spare parts are listed on the assembly drawing. These parts should be stocked to minimize downtime.

Nor'East Service

Nor'East service personnel are available to install, maintain and repair all Nor'East products. Nor'East also offers customized training programs and consultation services.

For more information, contact your local Nor'East sales representative or visit our website at www.noreastcontrols.

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Description

The Type 05 Actuator is a long stroke, pneumatic diaphragm actuator with deep drawn aluminum case plates and rolling type diaphragm which provides increased sensitivity and maintains constant area throughout a full 1-1/2" stroke.

Action

With Type 05 Actuators, two actions, direct and reverse provide the necessary valve operating force in either of two directions. When air is applied to the diaphragm, a direct acting actuator will push down - while a reverse actuator will push up. See Figure 1.

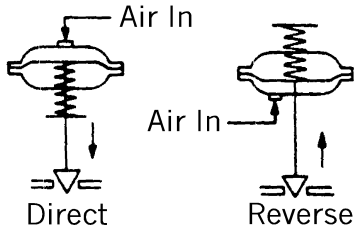


Figure 1 – Direct and Reverse Action

Pressure and Travel

Table A: Actuator Thrust (lbs)

Spring Range, psig				3-15	3-9	9-15	5-13	6-30	7-18
Stud Dia (Inches)	Actuator Action	Actuator Travel	Air Supply psig	Thrust (lbs)					
1-3/8 or 1-7/8	Direct	At Full Travel	18	120	360	120	300	-	-
			25	400	640	400	480	-	280
			35	800	1040	800	880	200	680
	Reverse	At Zero Travel	0	115	115	340	190	-	250
2-1/4	Direct	At Full Travel	18	120	360	120	200	-	-
			25	400	640	400	480	-	280
			35	800	1040	800	880	200	680
			50	1400	1640	1400	1480	800	1280
	Reverse	At Zero Travel	0	115	115	340	190	230	250

Table B: Available Spring Ranges

Spring Range psig	Actuator Travel (Inches)						
	1/4"	9/16"	3/4"	1"	1-1/8"	1-1/4"	1-1/2"
3-15	X	X	X	X	X	X	X
3-9	-	X	X	-	-	-	-
9-15	-	X	X	-	-	-	-
5-13	-	-	-	-	-	-	X
6-30	-	-	-	-	-	X	-
7-18	-	-	-	-	-	-	X

Maximum Allowable Air Pressure

CAUTION!

Do not exceed the maximum allowable air pressure for actuators as indicated in Table C.

Table C: Maximum Allowable Air Pressure

Valve/Actuator Model Number	Maximum Air Pressure
1001, 1401, 1405*, 1601, 1605*, 1611, 1605*, 1901, 2421, 9101, 9105*, 9201, 9205*, 9131, 9135*, 9501	50 psig
01 Actuator, 05 Actuator*, 01 Air-O-Motor, 05 Air-O-Motor	
4705*, 4805*, 4905*, 8105*, 8205*, 8305*, 8605*, 8905*	35 psig

***NOTES:**

1. When Type 05 actuator is Reverse Acting, the maximum allowable air pressure is 35 psig regardless of the valve model on which it is mounted.

Installation

CAUTION!

If valve is used in a water system, the water must be adequately treated to prevent the formation of rust, carbonates and other undesirable deposits on valve parts. Otherwise, deposit buildups can damage packing, seats or other internal valve parts.

- For maximum efficiency and minimum wear, install valve in the vertical position with valve stem pointing up.
- Be sure to leave a minimum of 4 inches clearance for actuator removal.
- Before installing, be sure valve and pipeline are clean inside and free of scale, chips and welding spatter.
- The valve must be installed with the fluid flow in the direction of the arrow on the valve body (pressure under plug). Pipes must be lined squarely with the valve at each connection. If they are forced into the valve, the body may become twisted, causing improper seating. Be sure there are no pockets in the line where condensate could accumulate and cause an undesirable water hammer.
- Be sure that the flow medium and ambient temperature and the selected location will not exceed the maximum temperature limitations for the valve or actuator.
- All air connections are 1/4-inch NPT. Corresponding size tubing and fittings are recommended for the rest of the lines.

Air Connections

NOTE: Air supply must be filtered and should never exceed 345 kPa (50 psi). A minimum constant air pressure will increase diaphragm life.

- Connect diaphragm case ("INSTRUMENT" Connection if positioner is used) to controller with 1/4-inch copper tubing.
- Install air pressure regulator in supply line, when positioner is used, to maintain steady air pressure and protect the diaphragm.
- With springless type actuators, connect supply line to air pressure regulator and gage (which should be piped to constant loading side of diaphragm).
- Check all air Connections for leaks.

Parts Identification

Nameplate Data

The nameplate gives vital information on valve construction and operation. Always reference the serial number when ordering spare parts.

The spring range (on spring diaphragm actuators) is factory set to specifications on the order. Note the type of trim material, packing and lubricant number ("NONE" means packing does not require lubrication.) Remember that a change in operating conditions may mean a change in trim material, packing and lubricant type. Keep a permanent record of all nameplate information.

Parts Identification
(Continued)

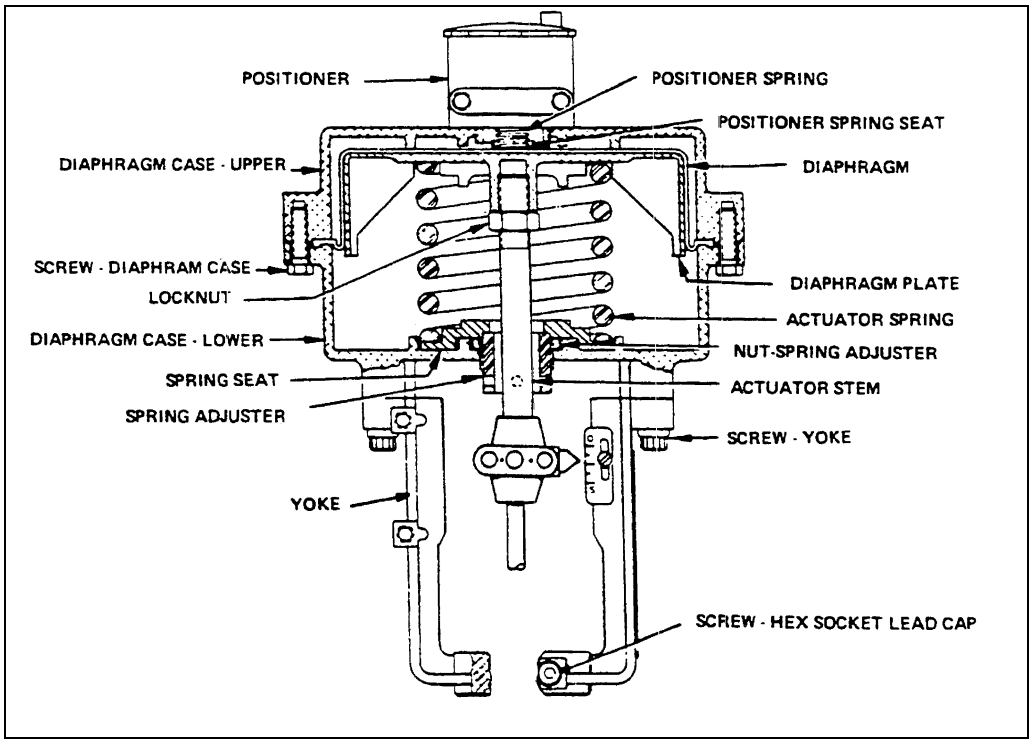


Figure 2 – Typical Air-to-Close (Direct Acting) Actuator Assembly

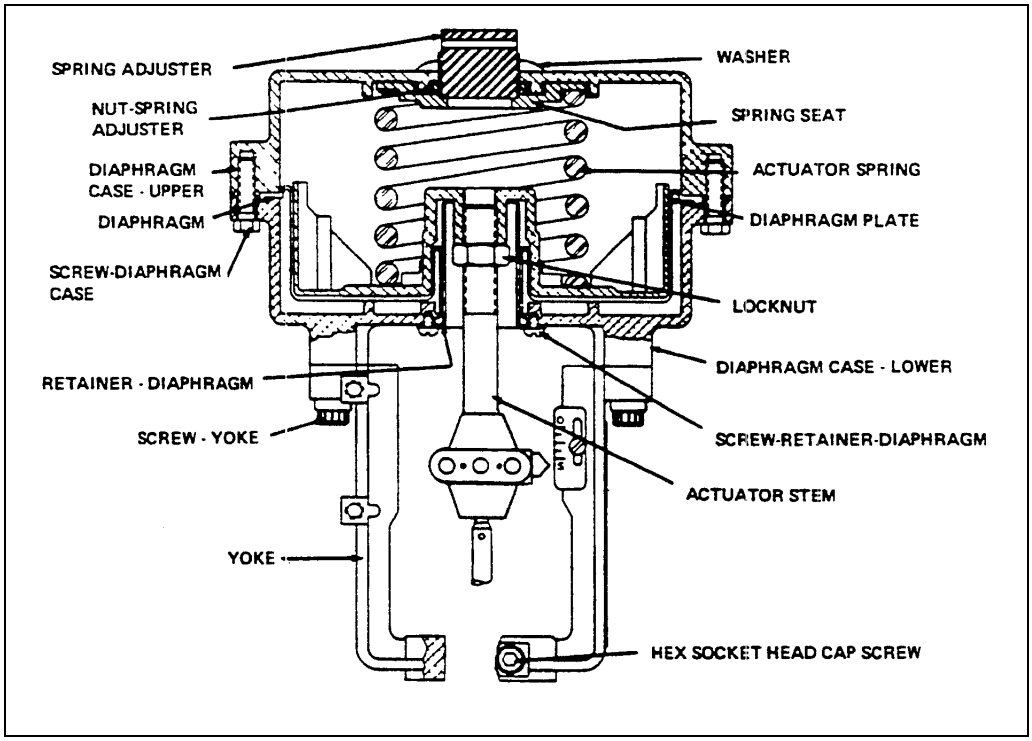


Figure 3 – Typical Air-to-Open (Reverse Acting) Actuator Assembly

Actuator Removal

- Stop pipeline flow and completely release pipe line pressure.

WARNING!

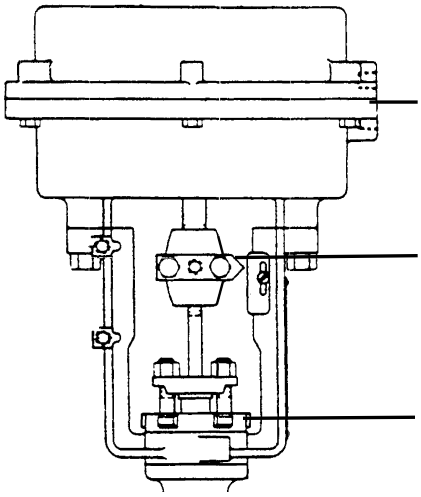
This valve is a pressure vessel. The bonnet will blow off the actuator if the bonnet bolts are removed with pressure in the valve. Completely release pressure before disassembling the valve.

- Disconnect and lock out the pneumatic or electrical power to prevent accidental operation of the actuator.

WARNING!

Moving parts from accidental operation of power actuator can cause personal injury or equipment damage. Disconnect and lock out power to actuator before removal.

- Remove actuator from valve. See Figure 4 for actuator removal.



2. Disconnect pneumatic connection.

1. Disconnect stems by removing stem clamp bolts and stem clamp. Remove air pressure.

3. Unscrew hex socket head cap screws and yoke lock nut and lift actuator off valve.

IMPORTANT: For **Air-to-Close** (Direct Acting) action, apply enough air pressure to almost close the valve but not seat the plug, to prevent damage.

For **Air-to-Open** (Reverse Acting) action, apply air pressure to lift the plug slightly off the seat to prevent damage.

Figure 4 – Actuator Removal

Diaphragm Replacement

Air-to-Close (Direct Acting) Actuator

See Figure 5.

1. Disconnect air supply from actuator.
2. Loosen spring adjustor.
3. Remove upper diaphragm case.
4. Remove and replace diaphragm.
5. Replace upper diaphragm case and reconnect air supply to actuator.
6. Re-adjust spring compression. See "*Spring Adjustment"* section.

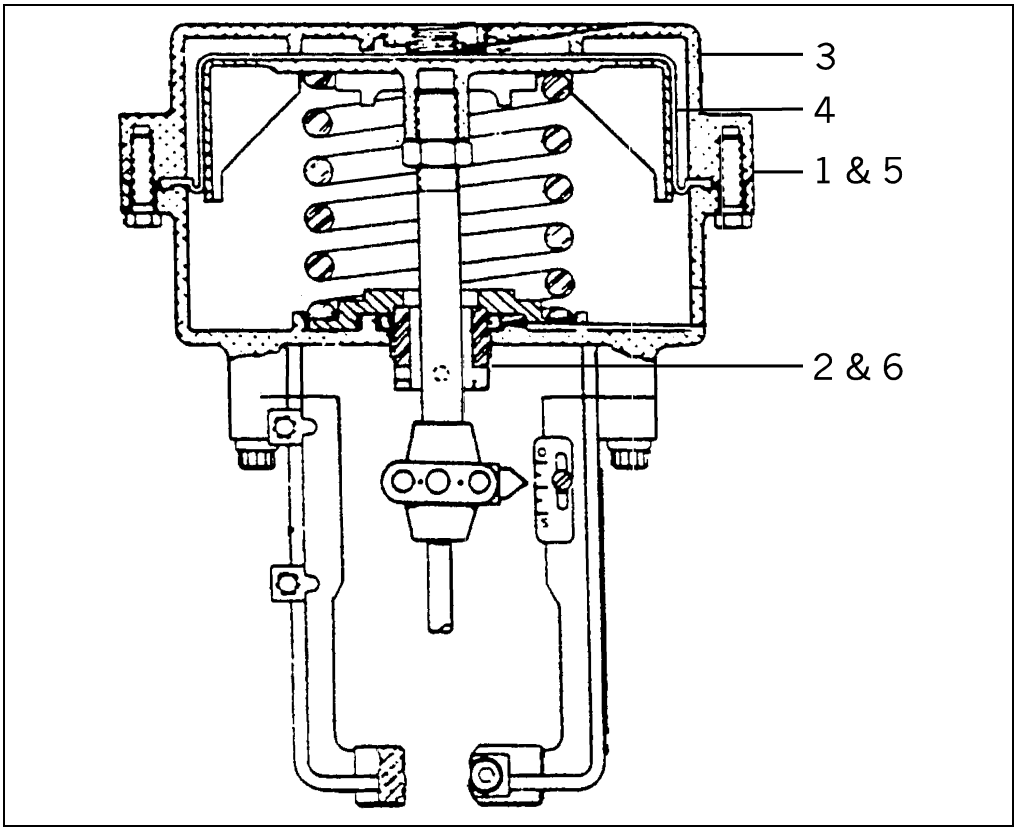


**Figure 5 – Diaphragm Replacement,
Air-to-Close (Direct Acting) Actuator**

Diaphragm Replacement *(Continued)*

Air-to-Open (Reverse Acting) Actuator

See Figure 6.

1. Disconnect air supply from actuator.
2. Loosen spring adjustor to relieve spring compression.
3. Remove stem clamp and disconnect actuator and valve stems.
4. Remove upper diaphragm case, spring flange (when provided) and spring.
5. Lift diaphragm plate, diaphragm and actuator stem out of lower case.
6. Remove the three diaphragm retainer screws and pull out the diaphragm retainer.
7. Place new diaphragm in lower diaphragm case so the center cylindrical section is up.
8. Pull center cylindrical section completely through hole in lower diaphragm case.
9. Wet the diaphragm retainer and insert it approximately 1/4 inch into the cylindrical section of the diaphragm.
10. Push diaphragm retainer up until flush with lower diaphragm case, making certain the beat is seated in the external groove on the diaphragm plate and a convolution is formed around the retainer on the inside. Secure with three diaphragm retainer screws.
11. Replace the diaphragm plate and actuator stem.
12. Replace spring and spring flange (when provided).
13. Replace upper case and secure with case bolts.
14. Connect actuator and valve stems. See *Mounting Actuator* section.
15. Reconnect air supply to actuator.
16. Re-adjust spring compression. See *Spring Adjustment* section.

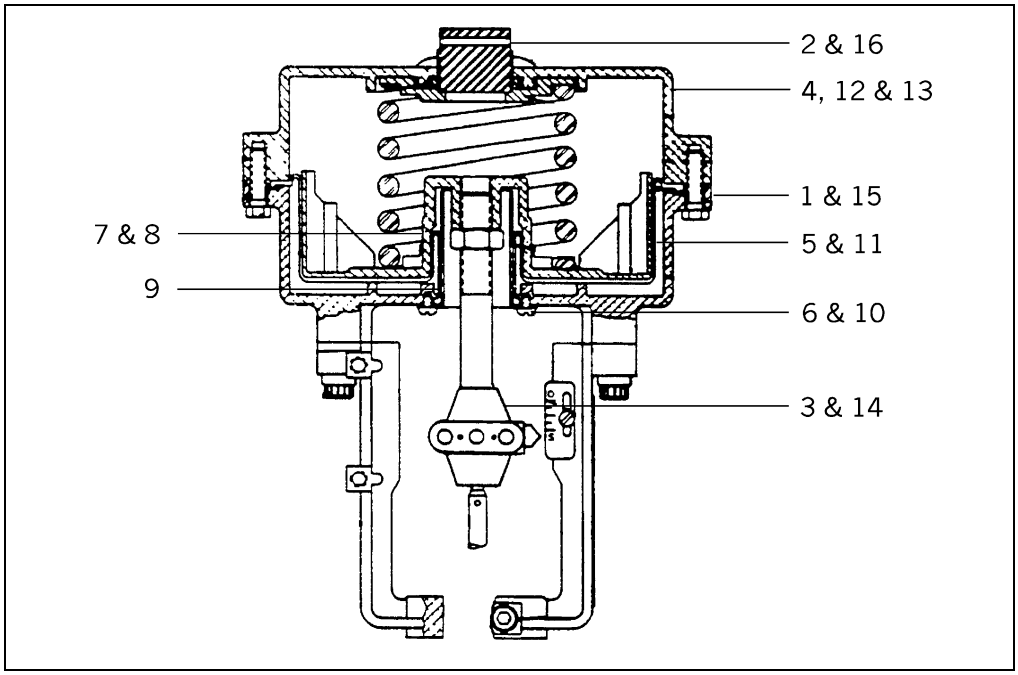


Figure 6 – Diaphragm Replacement, Air-to-Open (Reverse Acting) Actuator

Mounting Actuator

Normally the valve and actuator are factory assembled and adjusted before shipment. If the actuator needs to be field mounted, use the following procedures for Reverse or Directing Acting actuator and valve combination.

Single and Double Seated Valves

Air-to-Close Action (Direct Acting) Actuator and Valve

Stem Clamp Design

1. Mount actuator onto bonnet and lock in place.
2. With no air pressure on actuator, seat valve plug, raise stem and plug a distance equal to the travel specified on nameplate.
3. Lock valve stem to actuator stem with stem clamp.

Stem Head Design

1. Screw lock nut onto actuator stem.
2. Place stem connector onto stem head.
3. Mount actuator onto bonnet and lock in place.
4. Inset travel indicator, and raise valve stem to contact actuator stern.
5. Screw stem connector onto actuator stern until stem head is tight against actuator stem.
6. Hold stem connector with wrench, and tighten lock nut against travel indicator and stem connector.

Air-to-Open Action (Direct Acting) Actuator and (Reverse Acting) Valve

Stem Clamp Design

1. Mount actuator onto bonnet and lock in place.
2. Apply sufficient air pressure to actuator to lower actuator stem 1/16 inch.
3. Pull up valve stem and seat the plug. Lock valve stem to actuator stem with stem clamp.

Stem Head Design

1. Screw lock nut onto actuator stem.
2. Place stem connector onto stem head.
3. Mount actuator onto bonnet and lock in place.
4. Insert travel indicator and pull valve stem up to seat plug.
5. Apply sufficient air pressure to lower actuator stem; screw stem connector onto actuator stem until stem head is tight against actuator stem.
6. Tighten lock nut against travel indicator and stem connector.

Mounting Actuator *(Continued)*

Air-to-Open (Reverse Acting) Actuator and (Direct Acting) Valve

Stem Clamp Design

1. Push valve stem down and seat the plug.
2. Mount actuator onto bonnet and lock in place.
3. Apply sufficient air pressure to actuator to raise actuator stem 1/16 inch.
4. Lock valve stem to actuator stem with stem clamp.

Stem Head Design

1. Push valve stem down, and seat the plug.
2. Screw lock nut onto actuator stem.
3. Place stem connector onto stem head.
4. Mount actuator onto bonnet.
5. Insert travel indicator and screw stern connector onto actuator stem until stem head is tight against actuator stem.

   NOTE: Be sure there is clearance between bottom of yoke and top of bonnet.
6. Tighten lock nut against travel indicator and stem connector.
7. Apply air pressure to raise stern and permit actuator to seat on bonnet.
8. Lock actuator in place.

Three-Way Valves

Air-to-Close Action (Direct Acting) Actuator

Stem Clamp Design

1. Mount actuator onto bonnet and lock in place.
2. Apply sufficient air pressure to actuator to lower actuator stem 1/16 inch.
3. Pull valve stem up until valve plug seats.
4. Lock valve stem to actuator stem with stem clamp.
5. Reposition travel indicator scale if necessary.

Stem Head Design

1. Screw lock nut onto actuator stem.
2. Place stem connector onto stem head.
3. Mount actuator onto bonnet and lock in place.
4. Inset travel indicator, and raise valve stem to contact actuator stern.
5. Screw stem connector onto actuator stern until stem head is tight against actuator stem.
6. Hold stem connector with wrench, and tighten lock nut against travel indicator and stem connector.

Mounting Actuator *(Continued)*

Air-to-Open (Reverse Acting) Actuator

Stem Clamp Design

1. Push valve stem down until valve plug seats.
2. Mount actuator onto bonnet and lock in place.
3. Apply sufficient air pressure to actuator to raise actuator stem 1/16 inch.
4. Lock valve stem to actuator stem with stem clamp.
5. Reposition travel indicator scale if necessary.

Stem Head Design

1. Push valve stem down, and seat the plug.
2. Screw lock nut onto actuator stem.
3. Place stem connector onto stem head.
4. Mount actuator onto bonnet.
5. Insert travel indicator and screw stern connector onto actuator stem until stem head is tight against actuator stem.

   NOTE: Be sure there is clearance between bottom of yoke and top of bonnet.
6. Tighten lock nut against travel indicator and stem connector.
7. Apply air pressure to raise stern and permit actuator to seat on bonnet.
8. Lock actuator in place.

Stem Adjustment

Air-to-Close (Direct Acting) Actuator and Valve

1. With no air pressure in actuator, seat valve plug. Raise stem and plug a distance equal to the travel specified on the nameplate.
2. Lock valve stem to actuator stem with stem clamp.

   Note: If necessary, loosen travel indicator scale screws and align scale to travel indicator set at "0". See Figure 7.

Air-to-Open (Reverse Acting) Actuator and (Reverse Acting) Valve

1. Apply sufficient air pressure to actuator to lower actuator stem 1/16 inch.
2. Pull up valve stem and seat the plug. Lock valve stem to actuator stem with stem clamp.

Air-to-Open (Reverse Acting) Actuator and (Direct Acting) Valve

1. Apply sufficient air pressure to actuator to raise actuator stem 1/16 inch.
2. Lock valve stem to actuator stem with stem clamp.

   Note: If necessary, loosen travel indicator scale screws and align scale to travel indicator set at "S". See Figure 7.

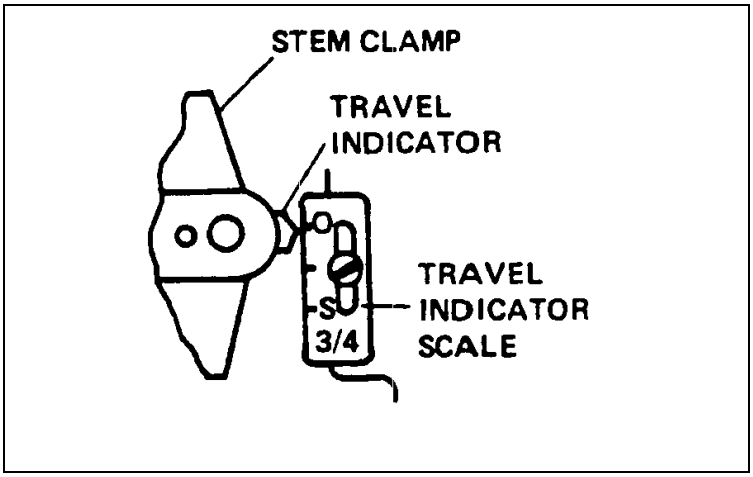


Figure 7 – Travel Indicator and Scale Alignment

Spring Adjustment

Factory adjustment provides for a complete actuator stroke for a pressure change from 21 to 103 kPa (3 to 15 psi) or 41 to 207 kPa (6 to 30 psi) with heavier spring. The operating spring can be shifted up or down if necessary. The starting point, with no external load, should not be adjusted more than 34 kPa (5 psi), for a 21 to 103 kPa (3 to 15 psi) spring, or 69 kPa (10 psi), for a 41 to 207 kPa (6 to 30 psi) spring. Adjustment of less than 1 psi is not recommended.

Air-to-Close (Direct Acting) Actuator

1. Using a 0-60 psig air regulator and gage, gradually apply initial air pressure to the actuator, (3 psig for 3-15 psig spring, 6 psig for 6-30 psig spring, etc.). Actuator stem will either move down or remain stationary.
2. If the actuator stem moves down, screw the spring adjustor into the lower case until stem starts to move up.
3. Keep turning adjustor until stem stops.
4. If stem remains stationary, unscrew spring adjustor until stem starts to move down.
5. Screw spring adjustor in, moving stem up until stem stops moving.
6. Gradually increase air pressure to maximum psig (15 psig for 3-15 psig spring, 30 psig for 6-30 psig spring, etc.). If actuator stem stops before reaching maximum psig, spring adjustor was not screwed up far enough on initial spring adjustment.
7. Adjust air regulator back to initial psig, and screw spring adjustor into lower case.
8. Reapply maximum psig. If stem stops at maximum psig, apply one more psig air to actuator.

   NOTE: If actuator stem moves down, adjustor was screwed up too far on initial adjustment or there is too much overtravel; check stem adjustment. (See *Stem Adjustment* section for adjusting stem.)
9. Reset initial psig, unscrewing adjustor.
10. When stem stops at maximum psig (not before or after), this adjustment is complete.

Air-to-Open (Reverse Acting) Actuator

1. Using a 0-60 psig air regulator and gage, apply initial psig air pressure to actuator actuator (3 psig for 3-15 psig spring, 6 psig for 6-30 psig spring, etc.). Actuator will either move up or remain stationary.
2. If the actuator stem moves up, turn the spring adjustor into the housing until the stem starts to move down.
3. Continue turning adjustor until stem stops.
4. If the actuator remains stationary, unscrew the spring adjustor until stem starts to move up.
5. Turn spring adjustor into upper case, moving stem down until stem stops moving.

Spring Adjustment *(Continued)*

Three-Way Valves

Direct Acting Actuator

1. Gradually increase air pressure to maximum psig (15 psig for 3-15 psig spring, 30 psig for 6-30 psig spring, etc.).
2. If actuator stem stops before valve travel is completed, spring adjustor was screwed in too far on initial spring adjustment. Adjust air regulator back to initial psig and turn spring adjustor out of yoke.
3. If valve travel s completed before maximum psig is applied, spring adjustor was not screwed in far enough on initial spring adjustment. Reset initial psig, screwing in adjustor.

Reverse Acting Actuator

1. Using a 0-60 psig air regulator and gage, apply initial air pressure to actuator (3 psig for 3-15 psig spring, 6 psig for 6-30 psig spring, etc.). Actuator stem will move up or remain stationary.
2. If the actuator stem moves up, turn spring adjustor into upper case until stem just starts to move down.
3. If the actuator stem remains stationary, unscrew spring adjustor until stem just starts to move up.

Trouble-Shooting

If the actuator does not function properly, check the following points while the actuator is still in service.

1. Are air connections tight?
2. Are diaphragm case bolts tight?
3. Is actuator firmly fastened to yoke or base plate?

Guarantee

Products, auxiliaries and parts thereof, of Nor'East Controls' manufacture, are guaranteed for a period of one year from the date of shipment against defective workmanship and material only, when properly installed, operated and serviced in accordance with Nor'East Controls' recommendations. Replacement for items of Nor'East Controls' manufacture will be made free of charge if proved to be defective within such time. No claim for special or consequential damages, transportation, or labor shall be allowed. Purchaser shall be solely responsible for determining suitability for use and in no event shall Nor'East Controls be liable in this respect. Equipment or parts manufactured by others but furnished by Nor'East Controls will be repaired or replaced, only to the extent provided in the original manufacturer's warranty to Nor'East Controls. Nor'East Controls does not guarantee resistance to corrosion, erosion, abrasion or other sources of failure, nor does Nor'East Controls guarantee a minimum length of service. Failure of the purchaser to give prompt written notice of any alleged defect under this guarantee forthwith upon its discovery, or use and possession thereof after an attempt has been made and completed by someone other than Nor'East Controls or an authorized representative to remedy defects therein, or failure to return products or parts for replacement as herein provided, of failure to install, operate, and maintain said products or parts according to instructions provided by Nor'East Controls, of failure to pay the entire contract price when due, shall be a waiver of all rights under these representations.

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