

ATI Piston Actuator with Fisher™ NS2 Yoke

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Figure 1. ATI Actuator Assembly



Introduction

Scope of Manual

This manual provides installation, adjustment, maintenance, and parts list information for the Fisher ATI actuator (figure 1). Refer to separate instruction manuals for information regarding the control valve and accessories.



Do not install, operate, or maintain an ATI actuator with Fisher NS2 Yoke without being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance. To avoid personal injury or property damage, it is important to carefully read, understand, and follow all the contents of this manual, including all safety cautions and warnings. If you have any questions about these instructions, contact your [Emerson sales office](#) before proceeding.

Table 1. ATI Piston Actuator Specifications

SPECIFICATION	UNITS	ACTUATOR SIZE 80A	ACTUATOR SIZE 80C
Nominal Effective Piston Area	cm ²	2452	3425
	Inch ²	380	531
Acceptable Valve Stem Diameters	mm	31.8	
	Inch	1.25	
Maximum Allowable Output Thrust (Spring Force)	N	69,162	154,746
	lbf	15,549	34,790
Nominal (Maximum) Travel	mm	101.6 (114.3)	
	Inch	4.0 (4.5)	
Maximum Casing Pressure for Actuator Sizing	bar	5.52	
	psig	80	
Maximum Casing Pressure	bar	10.3	
	psig	150	
Temperature Range (FKM Seals)	°C	-29 to 204	
	°F	-20 to 400	

Table 2. Actuator Mounting Bolt Torque Values Using Nuclear Grade Anti-Seize Lubricant

ACTUATOR SIZE	ACTUATOR MOUNTING STUD BOLT TORQUE	
	N•m	ft•lbf
ATI Actuator with Fisher NS2 80A Yoke	258	190
ATI actuator with Fisher NS2 80C Yoke ⁽¹⁾	929	685

1. Will require a calibrated torque-wrench up to 1,000 ft•lbf.

Description

The Spring Return Extend (SRE) ATI Actuator with Fisher NS2 Yoke is a reverse-acting, spring-opposed piston actuator that is used for operation of PV69 DS100 control valve. The Spring Return Retract (SRR) ATI Actuator with Fisher NS2 Yoke is a direct-acting, spring-opposed piston actuator that is used for operation of PV14 DS104 control valve.

The NS2 actuator yoke construction and special yoke-to-bonnet bolting provides a high structural resonant frequency that is seismically qualified for PV69 AP1000, CAP1000, and CAP1400 nuclear applications, as well as PV14 DS104 CAP1400 nuclear applications.

Specifications

Tables 1 and 2 provide specifications for the ATI Actuator with Fisher NS2 Yoke discussed in this instruction manual. All torque values given are ±5% unless otherwise specified. See the actuator nameplate for specific information for your actuator.

Educational Services

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 emerson.com/mytraining

Maximum Pressure Limitations

The piston of the ATI actuator is pressure operated. This air pressure provides energy to compress the spring, to stroke the actuator, and move the piston away from or towards the valve. The following explanations describe the maximum pressure limits for an actuator. Refer to table 1 for maximum values.

⚠ WARNING

To avoid personal injury or parts damage, do not exceed the Maximum Pressures listed in table 1.

Exceeding any of the maximum pressures can result in uncontrolled movement of parts, damage to actuator parts and the control valve, and loss of control of the process. Use pressure-limiting or pressure-relieving devices to prevent casing pressure from exceeding these limits.

- **Maximum Casing Pressure for Actuator Sizing:** This is considered the standard full operating pressure. A full stroke of 4.0 inches of the valve is expected at this pressure. If a full stroke is not achieved, consult the troubleshooting section of this manual.
- **Maximum Casing Pressure:** If the Maximum Casing Pressure is exceeded, damage to the actuator might result.

Principle of Operation

The ATI actuator positions the valve plug in response to varying pneumatic loading pressure on the actuator. For the SRE actuator, the actuator stem moves up as the loading pressure is increased on the bottom of the piston. As the loading pressure is decreased, the spring forces the actuator stem down. For the SRR actuator, the actuator stem moves down as the loading pressure is increased on the top of the piston. As the loading pressure is decreased, the spring forces the actuator stem up.

The piston actuator has been selected to meet the requirement of the application and, in service, the actuator will produce full travel of the valve with the piston pressure as indicated on the nameplate.

Lifting Guidelines

⚠ WARNING

Failure to follow these lifting guidelines and accepted lifting and rigging practices could result in property damage and personal injury or death.

All lifting and rigging must be completed in accordance with federal/national/provincial, state and local regulations and applicable lifting and rigging equipment standards. Only personnel trained in proper lifting and rigging practices shall perform valve/actuator assembly lifting, rigging and installation. Because each lift will be unique, the method of lifting the valve assembly, the correct location for attaching and lifting the valve assembly, and what the valve assembly will do when lifted shall be considered for each lift.

Lifting and rigging equipment used to lift, install or remove a valve assembly or component must be properly selected and sized for the weight and configuration of the valve assembly or component being lifted. The weight of the complete valve assembly, including attached accessories, must be taken in consideration for this purpose. The lifting and rigging equipment must be properly maintained and inspected for damage before each use.

If the valve is supplied with an actuator or handwheel, do not use the actuator or handwheel to lift the complete valve assembly. Lifting lugs attached to the actuator must not be used to lift the complete valve assembly unless clearly marked as being rated to support the complete valve assembly weight.

Lifting lugs or other lifting equipment attached to the valve or actuator must never be used to lift or support the weight of attached piping.

NOTICE

Care must be taken when lifting the valve/actuator assembly to ensure all accessories and tubing are not damaged in the process. Accessories and tubing may need to be removed prior to lifting to prevent damage and properly reinstalled before use. Protect valve flange faces, butt weld ends, and other connection surfaces from damage during lifting.

Lifting Valve/Actuator Assembly

To lift the valve assembly, ATI actuator and accessories, the assembly should not be lifted by the actuator alone. It is also necessary to place lifting slings around the inlet and outlet of the valve body for lifting. Use padding as needed to protect any painted surfaces. The valve/actuator assembly can be lifted using a hoist capable of leveling the lifting points.

Lifting Valve Only

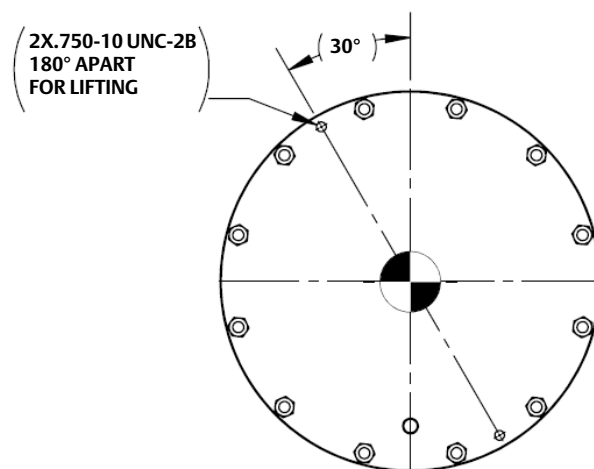
For guidance on lifting only the valve, please refer to the instruction manual for the applicable valve.

Lifting Actuator Only

The ATI L264.5SRE80 actuator with accessories may be lifted using the lifting ears located on the upper cartridge. The load rating for these lifting ears is 28.7 kN (6,400 lbf) and should not be exceeded. A single hoist lift point on the strap or chain will balance and lift the actuator, keeping it level. Use padding as needed to protect any painted surfaces.

The ATI L224.5SRR80 actuator with accessories may be lifted using appropriately rated hoist rings threaded into the two 3/4-10 UNC threaded holes provided in the upper head, see figure 2. The load rating for these threaded holes is 10,000 lbf (44.8 kN) combined and should not be exceeded. A single hoist lift point on the strap or chain will balance and lift the actuator, keeping it level. Use padding as needed to protect any painted surfaces.

Figure 2. Direct-Acting Piston Actuator (SSR) Top View



Installation

The actuator is normally shipped mounted on the valve body. Follow the applicable EWNS or HPNS valve instruction manual when installing the control valve in the pipeline. For information on mounting valve accessories, refer to the appropriate valve accessories instruction manual.

⚠ WARNING

Always wear protective gloves, clothing, and eyewear when performing any installation operations to avoid personal injury.

Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

If installing into an existing application, also refer to the WARNING at the beginning of the Maintenance section in this instruction manual.

⚠ WARNING

If the control valve and actuator are installed with the actuator in any position other than vertical, the actuator may not conform with safety-related qualifications. Certain nonvertical orientations can cause water to collect in the yoke and actuator spring areas, eventually causing degradation in product performance.

Note

The ATI actuator with Fisher NS2 yoke is intended to mount directly to the valve bonnet.

Mounting the Actuator on the Valve

NOTICE

The ATI SRE actuator spring load pushes the stem down out of the actuator yoke, and it can contact the valve stem during actuator mounting. It is possible to damage valve stem threads or bend the valve stem.

It may be necessary to apply a temporary loading pressure to the actuator to move the actuator stem away from the valve during installation. See the Disassembly section of this manual.

⚠ WARNING

When moving the actuator stem with loading pressure applied, exercise caution to keep hands and tools out of the actuator stem travel path. If the loading pressure is accidentally disconnected, personal injury and property damage may result if something is caught between the actuator stem and other control valve parts.

Adjustments

Bench Set

The ATI Assembly has a pre-loaded spring; therefore, there is no bench set adjustment.

Installing the Travel Limit Switch Bracket

Refer to figure 3 when installing the limit switch targets.

1. Apply Loctite® 242 (key 185) to hex cap screws (key 147).
2. Attach the proximity switch target mounting bracket (key 148) to the stem connector half (key 103B) using the hex cap screws (key 147) and washers (key 146).
3. Center the bracket vertically on the stem connector and tighten the hex cap screws, torque to 23 N•m (17 ft•lbf).
4. Adjust the travel scale vertically to align the closed mark on the scale with the pointer on the bracket and tighten the mounting screws.

⚠ WARNING

To avoid personal injury due to the sudden, uncontrolled movement of parts, do not loosen the cap screws (key 103C) when the stem connector has spring or loading pressure force applied to it.

Operation

In a SRE, an increasing loading pressure causes the actuator stem to move upward, compressing the spring. In the event of failure of the loading pressure to the piston of the actuator, the actuator stem moves to the extreme downward position, closing the valve.

In a SRR, an increasing loading pressure causes the actuator stem to move downward, compressing the spring. In the event of failure of the loading pressure to the piston of the actuator, the actuator stem moves to the extreme upward position, opening the valve.

The nameplate attached to the top of the piston provides information about the specific construction and operating range of the actuator.

When the control valve and actuator are installed, the actuator should be checked for correct travel, freedom from excessive friction, and correct action (air-to-open or air-to-close) to match the controlling instrument. For successful operation, the actuator stem and valve plug stem must move freely in response to the loading pressure change on the piston.

Maintenance

It is recommended that the ATI assembly be replaced every 10 years.

All maintenance operations can be performed with the valve in the line.

⚠ WARNING

Avoid personal injury or property damage from sudden release of process pressure or bursting of parts. Before performing any maintenance operations:

- Do not remove the actuator from the valve while the valve is still pressurized.
- Always wear protective gloves, clothing, and eyewear when performing any maintenance operations to avoid personal injury.
- Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.
- Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure from both sides of the valve. Drain the process media from both sides of the valve.
- Vent the power actuator loading pressure and relieve, as much as possible, any actuator spring precompression.

-
- Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.
 - The valve packing box may contain process fluids that are pressurized, *even when the valve has been removed from the pipeline*. Process fluids may spray out under pressure when removing the packing hardware or packing rings.
 - Check with your process or safety engineer for any additional measures that must be taken to protect against process media.
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Replacement of Elastomeric Parts

The ATI actuator assembly contains elastomeric parts; however, these parts cannot be repaired or replaced. Instead, the entire actuator assembly is replaced after the qualified life of 10 years.

Disassembly

ATI Piston Actuator with Fisher NS2 Size 80 Yoke

Key number references are shown in figures 3 and 4.

The ATI/Yoke Piston Actuator Assembly is manufactured as an assembly as shown in figure 3. This assembly should be replaced every 10 years.

Instructions are given below for removal of the ATI piston actuator assembly. Perform the disassembly only as far as necessary to accomplish the required maintenance; then, begin reassembly at the appropriate step.

1. Isolate the control valve from the line pressure, release pressure from both sides of the valve, and drain the process media from both sides of the valve. Shut off all pressure lines to the power actuator, release all pressure from the actuator. Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.

Note

The piston actuator spring compression is pre-set; therefore, there is not a way to act against the spring before disassembly of the stem connector assembly (key 103) without the use of controlled air.

2. Remove the limit switches and set aside.

NOTICE

It is advised to remove or protect the limit switches when working around them. Inadvertent contact can cause damage.

3. Remove the tubing or piping up from the solenoid to the piston actuator regulator. Construct a portable regulator assembly shown in figure 4 and connect it to the piston actuator input (3/4 inch NPT). This will be used during disassembly and lifting of the actuator assembly in the following steps.
4. Mark a line with a suitable marker just below the locknuts (key 115) on the valve stem. This will help in assembly of the stem-connector assembly (key 103). Loosen the locknuts (key 115) down away from the stem connector assembly (key 103).
5. Using the portable regulator assembly, reset the output pressure of the regulator to 0 psig, then open the three-way valve to the piston actuator and open the isolation ball valve to the plant air.

6. For the SRE actuator, dial up the regulator output pressure until the stem connector (key 103) just barely begins to move up. For the SRR actuator, increase the pressure until the plug is seated, then back off on the pressure until the stem connector (key 103) just barely begins to move up. At this pressure the valve plug is off the main seat and the compression is relieved from the stem connector assembly (key 103).
7. Prior to disassembly of the stem connector assembly (key 103), make a mark with a suitable marker just above the stem connector (key 103) on the piston actuator piston rod. This will aid in reassembly to ensure that proper travel and seat-load is achieved on the main seat.

⚠ WARNING

To avoid personal injury due to the sudden, uncontrolled movement of parts, do not loosen the cap screws when the stem connector (key 103) when spring force is applied without the aid of control air.

8. With controlled air to the casing, loosen the stem connector cap screws (key 103C). Remove the stem connector nut-half (key 103B) leaving the magnet target assembly (key 148) in place, if possible. Remove the stem connector bolt half (key 103A) and feedback arm. Carefully follow the positioner disassembly instructions for any feedback arm used on the stem connector. Set aside.
9. Loosen the yoke-to-bonnet bolting (keys 101 and 102). Remove nuts (key 102) and washers (key 143).

⚠ WARNING

Release of air from the actuator will cause movement of the actuator stem, to avoid personal injury and property damage, keep hands and tools out of the actuator stem travel path.

10. Lift actuator off the valve by following the recommendations in the Lifting Guidelines section. Shutoff control air and vent air from piston actuator. Reset portable regulator, secure and disconnect air hose.

Assembly

ATI Piston Actuator with Fisher NS2 Size 80 Yoke

The ATI/Yoke Piston Actuator Assembly is manufactured as an assembly as shown in figure 3. This assembly should be replaced every 10 years.

Instructions are given below for remounting of the ATI piston actuator assembly. Begin assembly at the appropriate step.

1. Ensure that the locknuts (key 115) are screwed down on the valve stem. If a mark was made from disassembly, use this as a guide at step 17 of this section.
2. Coat the threads of the actuator mounting studs (key 101) with Nuclear Grade anti-seize lubricant (key 27) up to the deformed thread. Thread the actuator mounting studs (key 101) into the valve bonnet until the deformed thread prevents further insertion.
3. Connect the portable regulator assembly to the piston actuator as shown in figure 4.
4. Using the portable regulator assembly, make sure the adjusting screw of the regulator is completely backed out to ensure that the regulator outlet pressure will be 0 psig when supply pressure is introduced, then open the three-way valve to the piston actuator. Open the isolation ball valve to supply plant air to the regulator.
5. For SRE actuators, increase the regulator output pressure until the stem connector (key 103) moves all the way up into the piston actuator (fully retracted) but do not exceed the Maximum Casing Pressure listed in table 1. SRR actuators will be fully retracted without air.

6. Lower the ATI Actuator assembly onto the mounting studs (key 101), make sure that the Fisher logo on the yoke is aligned to the Fisher logo on the valve body.

Note

The following two steps require a calibrated torque wrench up to 1356 N•m (1,000 ft•lbf) for SRE actuators and up to 407 N•m (300 ft•lbf) for SRR actuators. It is helpful to number the studs (key 101)/nuts (key 102) from 1 to 12 to accurately torque the studs.

7. Coat the remaining threads of the actuator mounting studs (key 101) and the contact faces of the nuts (key 102) with Nuclear Grade anti-seize lubricant (key 27). Place the washers (key 143) over the studs (key 101) and thread the nuts (key 102) onto the studs (key 101) and hand tighten. Torque the actuator mounting nuts (key 102) in a criss-cross pattern in increments of 25% up to the full actuator mounting bolt torque value listed in table 2.
8. Check the torque of nuts by performing one (1) circular pattern to applicable actuator mounting torque in table 2.

⚠ WARNING

Release of air in the actuator will cause sudden movement of the actuator piston. Do not place hands or any body parts between the valve stem and the piston rod, as this can cause severe injury.

9. To ensure that the valve plug is fully seated, place a flat metal block at least 1 inch thick or use a flat section of the bolt half (key 103A) on its side on the top of the valve stem between the stem and the piston rod.
10. Using the portable regulator and the air venting valve in figure 4, slowly release air of the piston actuator (SRE) or increase the regulator output pressure (SRR) to extend the piston and push down on the valve stem to ensure that the valve plug is seated. Immediately stop when the valve stem ceases movement.
11. Dial the air back up (SRE) or down (SRR) until the piston is fully retracted.
12. Remove the metal block or bolt half used in steps 9 and 10.
13. Using a measuring device next to the piston, slowly extend the piston from the actuator until the piston travels to 4.00-3.95 inches (Do not exceed 4.00 inches). Hold this pressure (piston position) of the actuator for the next steps. There should be a gap between the piston rod and the valve stem.

NOTICE

Piston travel greater than 4.00 inches will result in lower seating force on the valve plug from reduced spring force.

Piston travel less than 3.95 inches may result in an excessive gap between the piston rod and valve stem, which can result in less-than-full thread engagement on the valve stem and possible thread damage.

14. Connect the nut half (key 103B) and the bolt half (key 103A) with the cap screws (key 103C) of the stem-connector to the valve stem and the connector rod, ensuring to align the nut half in the guide notch of the yoke. If there are marked lines from disassembly on the stem and piston rod, use these as guides. If there are not marks, ensure that the stem connector (key 103) threads are fully engaged on the valve stem as a minimum. Some threads can be unused and visible on the piston rod.

NOTICE

Care should be used when engaging the threads, any cross-threading should be avoided, as this may require replacing the ATI assembly or the valve stem assembly. If cross-threading has occurred, contact your [Emerson sales office](#) for guidance.

Note

To avoid cross-threading, ensure that the bolt half (key 103A) threads are engaged by pressing against the threaded piston rod as the first step in tightening, then align the nut half (key 103B) to the other side. While holding these together start the cap screws (key 103C) and tighten evenly.

Manual clamps can be used to assist in holding the stem connector halves together.

The gap between the bolt half (key 103A) and the nut half (key 103B) should be the same on both sides of the threads as the cap screws (key 103C) are tightened. If there is misalignment visible, or it appears that the threads are not engaged, restart the previous step to avoid cross-threading.

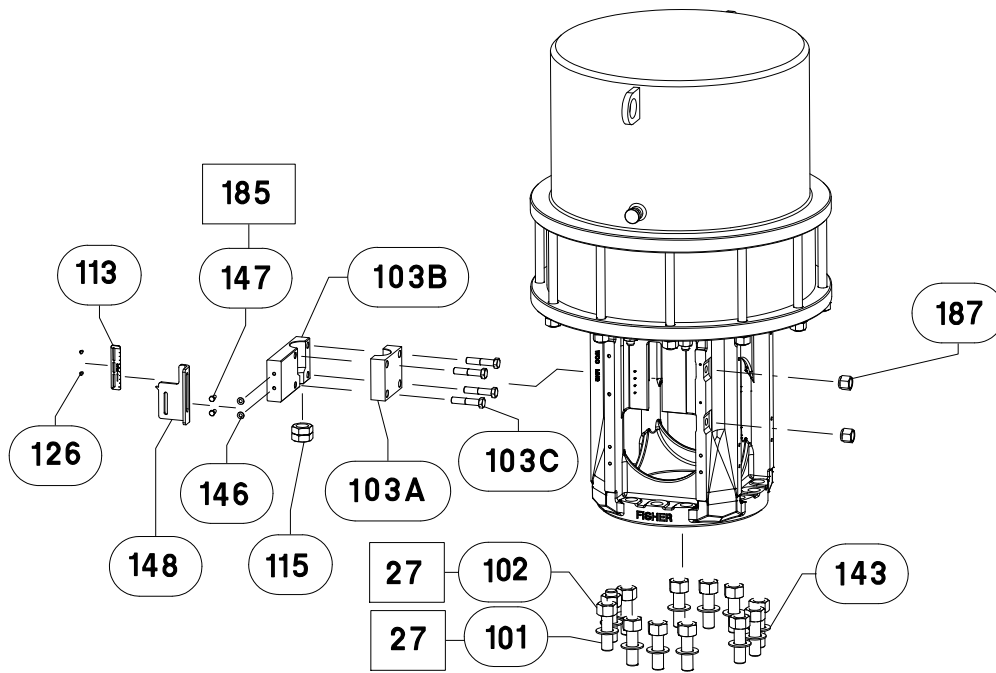
15. Tighten the cap screws (key 103C) evenly until just finger tight.
16. With the two bottom cap screws (key 103C) tight, remove the top cap screws and attach the feedback bracket to the stem connector bolt half (key 103A) with the cap screws (key 103C) and retighten. Torque the cap screws (key 103C) to 176 N•m (130 ft•lbf) in a criss-cross pattern. Carefully follow the positioner assembly instructions for any feedback arm used on the stem connector.
17. Screw the valve stem locknuts (key 115) up until the upper one contacts the bottom of the stem connector assembly (key 103). If a mark was made from disassembly, use this as a guide. Tighten until finger tight. Do not overtighten the locknuts.
18. Attach the travel scale (key 113) to the yoke using the pan head machine screws (key 126). Leave the screws finger-tight; they will be tightened after adjustment of the travel scale.
19. If not already attached, attached the target assembly per Installing the Travel Limit Switch Targets sections and align the travel scale.
20. Test the functionality of the limit switches and adjust as necessary. If significant changes to the position of the magnets appear necessary, then check the piston travel as it is likely that the travel measurement of the piston rod or thread engagement was not done properly.
21. Release pressure from the casing. Remove the portable regulator assembly.
22. Attach the air tubing provided to connect the solenoid valve to the piston actuator.

Troubleshooting

Table 3. ATI Actuator Troubleshooting

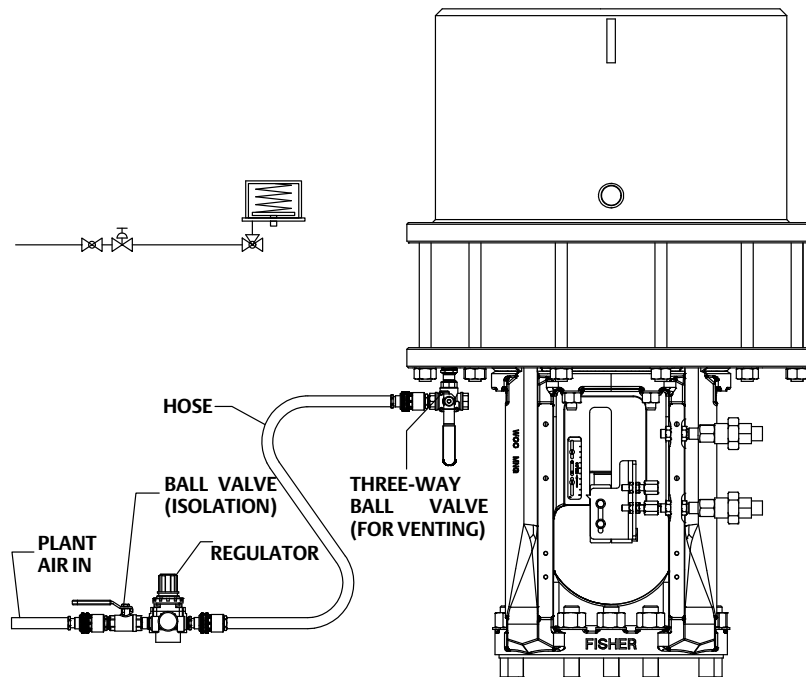
Problem	Possible Solution
Actuator Stroke is less than full rated travel	Ensure all parts are intact and assembled as specified.
	Check for debris or damaged parts that may be jamming actuator.
	Ensure stem connector is assembled as specified.
	Inspect valve, see EWNS instruction manual (D103551X012) or HPNS instruction manual (D103466X012).
Air leakage	Check for tightness of fittings.
	If leakage is from ATI seals, replace ATI assembly.
	Ensure stem connector is assembled as specified.
	Inspect valve, see EWNS instruction manual (D103551X012) or HPNS instruction manual (D103466X012).
Other	Inspect all air connections for leakage
	Contact Emerson sales office if more assistance is needed.

Figure 3. Fisher Size 80 Yoke/ATI Assembly



E1711

Figure 4. Fisher Size 80 Yoke/ATI Disassembly/Assembly Air Connection



E1712

Parts Ordering

Each actuator has a serial number stamped on the nameplate. Always refer to this serial number when corresponding with your [Emerson sales office](#) regarding replacement parts or technical information.

⚠ WARNING

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

Parts List

Key	Description	Part Number	Key	Description	Part Number
27	Nuclear Grade Anti-Seize Lubricant		103C	Hex Cap Screw, Stem Connector	see following table
101	Stud, Mounting	see following table	113	Travel Scale	see following table
102	Nut, Mounting	see following table	115	Hex Nut, Valve Stem	see following table
103A	Stem Connector Bolt Half	see following table	126	Machine Screw, Travel Scale	see following table
103B	Stem Connector Nut Half	see following table	143	Washer, Mounting Stud	see following table
			146	Washer, Pointer	see following table
			147	Shoulder Screw, Pointer	see following table
			148	Travel Pointer, Bracket	see following table
			185	Loctite 242	see following table
			187	Adapter Switch	see following table

Table 4. ATI Assembly with Fisher NS2 Size 80A and 80C Yoke

ACTUATOR SIZE	VALVE SIZE, NPS	PART NUMBER
ATI with 80A NS2 Yoke	10x14	GH10437X022
ATI with 80C NS2 Yoke	20x16	GE86793X022
	22x16	GE86793X042

Table 5. Keys 101 and 143 Yoke Mounting Studs and Washers

ACTUATOR SIZE	VALVE SIZE, NPS	QUANTITY	STUD SIZE, INCH	KEY 101 MOUNTING STUD PART NUMBER	MATERIAL	KEY 143 WASHER PART NUMBER
80A	10x14	12	3/4-10x4.50	1N6604X0242	SA 193 B7	1A375738982
80C	20x16		1-1/8-8x5.25	10A7290X102		GA25577X032
	22x16					

Table 6. Keys 102 Yoke Mounting Nuts

ACTUATOR SIZE	VALVE SIZE, NPS	QUANTITY	STUD SIZE, INCH	PART NUMBER	MATERIAL
80A	10x14	12	3/4-10	1A3520X1652	SA 192 2H
80C	20x16		1-1/8-8	1A4452X6132	
	22x16				

Table 7. Key 103 Stem Connector Assembly

ACTUATOR SIZE	VALVE SIZE, NPS	VALVE STEM SIZE, INCH	ASSEMBLY PART NUMBER
80A	10x14	1-1/4	GH10675X032
80C	20x16		GG08592X012
	22x16		

Table 8. Key 113 and 126 Travel Scale and Machine Screw

ACTUATOR SIZE	VALVE SIZE, NPS	VALVE TRAVEL	KEY 113 TRAVEL SCALE PART NUMBER	KEY 126 MACHINE SCREW PART NUMBER
		Inch		
80A	10x14	4	1U372738982	1A3431X0012
80C	20x16			1A3408K0012
	22x16			

Table 9. Key 115 Hex Nut, Valve Stem

ACTUATOR SIZE	VALVE SIZE, NPS	PART NUMBER
80A	10x14	0W0735X0022
80C	20x16	
	22x16	

Table 10. Keys 146, 147, 148, and 187 (Pointer Washer, Pointer Hex Cap Screw, Travel Pointer, Adaptor Switch)

ACTUATOR SIZE	VALVE SIZE, NPS	KEY 146 POINTER WASHER PART NUMBER	KEY 147 POINTER HEX CAP SCREW PART NUMBER	KEY 148/ KEY 208 TRAVEL POINTER PART NUMBER	KEY 187 ADAPTOR SWITCH PART NUMBER
80A	10x14	1B8659X0042	GE56486X012	GH10671X042	GE56473X012
80C	20x16			GG08595X032	
	22x16				

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