

Design 3024S Diaphragm Actuator - OBS Valve

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Introduction

The product covered in this document is no longer in production. This document, which includes the latest published version of the instruction manual, is made available to provide updates of newer safety procedures. Be sure to follow the safety procedures in this supplement as well as the specific instructions in the included instruction manual.

Part numbers in the included instruction manual should not be relied on to order replacement parts. For replacement parts, contact your [Emerson sales office](#) or Local Business Partner.

For more than 20 years, Fisher products have been manufactured with asbestos-free components. The included manual might mention asbestos containing parts. Since 1988, any gasket or packing which may have contained some asbestos, has been replaced by a suitable non-asbestos material. Replacement parts in other materials are available from your sales office.

Safety Instructions

Please read these safety warnings, cautions, and instructions carefully before using the product.

These instructions cannot cover every installation and situation. Do not install, operate, or maintain this product 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 of the contents of this manual, including all safety cautions and warnings. If you have any questions about these instructions, contact your Emerson sales office or Local Business Partner before proceeding.

Specifications

This product was intended for a specific range of service conditions--pressure, pressure drop, process and ambient temperature, temperature variations, process fluid, and possibly other specifications. **Do not expose the product to service conditions or variables other than those for which the product was intended.** If you are not sure what these conditions or variables are, contact your [Emerson sales office](#) or Local Business Partner for assistance. Provide the product serial number and all other pertinent information that you have available.

Inspection and Maintenance Schedules

All products must be inspected periodically and maintained as needed. The schedule for inspection can only be determined based on the severity of your service conditions. Your installation might also be subject to inspection schedules set by applicable governmental codes and regulations, industry standards, company standards, or plant standards.

In order to avoid increasing dust explosion risk, periodically clean dust deposits from all equipment.

When equipment is installed in a hazardous area location (potentially explosive atmosphere), prevent sparks by proper tool selection and avoiding other types of impact energy. Control Valve surface temperature is dependent upon process operating conditions.

⚠ WARNING

Control valve surface temperature is dependent upon process operating conditions. Personal injury or property damage, caused by fire or explosion, can result if the valve body surface temperature exceeds the acceptable temperature for the hazardous area classification. To avoid an increase of instrumentation and/or accessory surface temperature due to process operating conditions, ensure adequate ventilation, shielding, or insulation of control valve components installed in a potentially hazardous or explosive atmosphere.

Parts Ordering

Whenever ordering parts for older products, always specify the serial number of the product and provide all other pertinent information that you can, such as product size, part material, age of the product, and general service conditions. If you have modified the product since it was originally purchased, include that information with your request.

⚠ WARNING

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

Installation

▲ WARNING

- Personal injury or equipment damage caused by sudden release of pressure or bursting of parts may result if the valve assembly is installed where service conditions could exceed the limits given in the applicable product literature, the limits on the appropriate nameplates, or the mating pipe flange rating. Use pressure-relieving devices as required by government or relevant industry codes and good engineering practices. If you cannot determine the ratings and limits for this product, contact your [Emerson sales office](#) or Local Business Partner before proceeding.
- To avoid personal injury, always wear protective gloves, clothing, and eyewear when performing any installation operations.
- If hoisting the valve, use a nylon sling to protect the surfaces. Carefully position the sling to prevent damage to the actuator tubing and any accessories. Also, take care to prevent people from being injured in case the hoist or rigging might slip. Be sure to use adequately sized hoists and chains or slings to handle the valve.
- Personal injury could result from packing leakage. Valve packing was tightened before shipment; however, the packing might require some readjustment to meet specific service conditions.
- Many rotary shaft valves are not necessarily grounded to the pipeline when installed in a flammable, hazardous, oxygen service, or explosive atmospheres. An explosion is possible, due to the discharge of static electricity from the valve components. To avoid personal injury or property damage, make sure that the valve is grounded to the pipeline before placing the control valve assembly into service. Use and maintain alternate shaft-to-body bonding, such as a shaft-to-body bonding strap assembly.
- Rotary shaft valves are designed and intended for installation between flanges. Personal injury or property damage may result from improper installation. To avoid personal injury or property damage caused by the sudden release of pressure or bursting of parts, do not use or install rotary shaft valves (including single lug constructions) for dead-end service.
- 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 in the Maintenance section.
- When ordered, the valve configuration and construction materials were selected to meet particular pressure, temperature, pressure drop, and controlled fluid conditions. Responsibility for the safety of process media and compatibility of valve materials with process media rests solely with the purchaser and end-user. To avoid possible personal injury and because some valve/trim material combinations are limited in their pressure drop and temperature ranges, do not apply any other conditions to the valve without first contacting your Emerson sales office or Local Business Partner.

CAUTION

- When ordered, the valve configuration and construction materials are generally selected to meet particular pressure, temperature, pressure drop and controlled fluid conditions. Since some body/trim material combinations are limited in their pressure drop and temperature ranges, do not apply any other conditions to the valve without first contacting your Emerson sales office or Local Business Partner.
- Ensure that the valve and adjacent pipelines are free of foreign material that could damage the valve seating surfaces.

Maintenance

⚠ WARNING

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

- Always wear protective gloves, clothing, and eyewear.
- 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.
- Do not remove the actuator while the valve is pressurized.
- Relieve process pressure from both sides of the valve. Drain the process media from both sides of the valve.
- Vent the pneumatic actuator loading pressure and relieve any actuator spring pre-compression.
- Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.
- The valve packing box might contain process fluids that are pressurized, *even when the valve has been removed from the pipeline*. Process fluids might spray out under pressure when removing the packing hardware or packing rings, or when loosening the packing box pipe plug. Cautiously remove parts so that fluid escapes slowly and safely.
- Many valve parts that are moving can injure you by pinching, cutting, or shearing. To help prevent such injury, stay clear of any moving part.
- Never apply pressure to a partially assembled valve.
- To avoid personal injury or property damage caused by uncontrolled movement of a valve bonnet, loosen the bonnet by following these instructions: Do not remove a stuck bonnet by pulling on it with equipment that can stretch or store energy in any other manner. The sudden release of stored energy can cause uncontrolled movement of the bonnet. Loosen bonnet nuts approximately 3 mm (0.125 inch). Then loosen the body-to-bonnet gasketed joint by either rocking the bonnet or prying between the bonnet and body. Work the prying tool around the bonnet until the bonnet loosens. If no fluid leaks from the joint, proceed with bonnet removal.
- As you remove parts, such as valve shafts, other parts, such as disks can fall from the valve body or suddenly move to another position in the valve. To avoid injury from falling or moving parts, be sure to support parts and be sure they are in a stable position as you disassemble the valve.
- Personal injury could result from packing leakage. Do not scratch the drive shaft or packing box wall while removing packing parts.
- Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

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Emerson Automation Solutions
Marshalltown, Iowa 50158 USA
Sorocaba, 18087 Brazil
Cernay, 68700 France
Dubai, United Arab Emirates
Singapore 128461 Singapore

www.Fisher.com



Design 3024S Diaphragm Actuator

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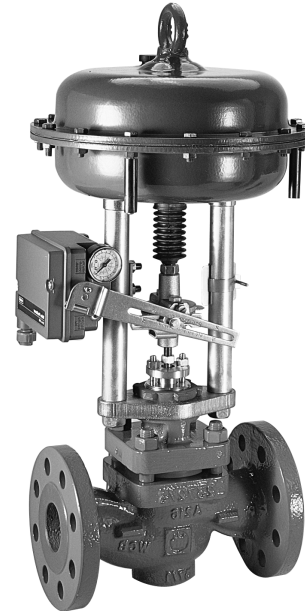
Introduction

Scope of Manual

This instruction manual provides information on installation, adjustment, maintenance and parts ordering for the Type GA 1.21, GA 1.31 and GA 1.41 actuators.

Description

The direct acting (extends stem) actuator (figure 6 and 9) and the reverse acting (retracts stem) actuators (figure 7 and 10) are spring-opposed pneumatic diaphragm actuators that provide throttling or on-off operation of sliding-stem control valves. The Type 3024S ATC actuator springs are



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Figure 1. Type 3024S Actuator with Design 1018S Valve.

located under the diaphragm plate, and they fully retract the actuator stem for fail action upon loss of diaphragm casing pressure. The Type 3024S ATO actuator springs are located on top of the diaphragm plate, and they fully extend the actuator stem upon loss of diaphragm casing pressure.

Only personnel qualified through training or experience should install, operate and maintain Type 3024S actuators.



Design 3024S Actuator

Table 1. Specifications

<p>Actuator Sizes</p> <p>GA1.21 GA 1.31 GA 1.41</p> <p>Maximum Actuator Travels</p> <p>Size GA 1.21 and GA 1.31: 16 mm (0.63 inch) Size GA 1.31 and GA 1.41 : 32 mm (1.26 inch)</p> <p>Standard Operating Pressure Range</p> <p>See table 2a (ATC) and 2b (ATO)</p> <p>Maximum Operating Pressure</p> <p>See table 2a (ATC) and 2b (ATO)</p> <p>Maximum Output Thrust</p> <p>(Maximum Actuator Stem Force) See table 2a (ATC) and 2b (ATO)</p>	<p>Material Temperature Capabilities</p> <p>With Nitrile Diaphragm and Steel studs and nuts : -40°C to +90°C (-40°F to 194°F)</p> <p>Signal Connections</p> <p>Standard: G1/4 inch Withworth female thread (ISO 7-1/BS 21/DIN2999)</p> <p>Actuator Stem Diameters</p> <p>Size GA 1.21 and GA 1.31: 12mm (0.472 inch) Size GA 1.41: 16mm (0.630 inch)</p> <p>Acceptable Valve Stem Threads</p> <p>Size GA 1.21 and GA 1.31: M12 X 1.75 (2 1/8" yoke boss & 16mm travel) Size GA 1.31 and GA 1.41: M16 X 2 (2 13/16" yoke boss & 32mm travel)</p> <p>Approximate Weights</p> <p>Size GA 1.21: 7.1 kg (15.6 pounds) Size GA 1.31: 16.5 kg (36.4 pounds) Size GA 1.41: 33.5 kg (73.9 pounds)</p>
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shown in table 1. Some of the specifications for a given actuator assembly as it originally comes from the factory are stamped on a nameplate (figure 2.) attached to the actuator.

Specifications

Specifications for the Type 3024S actuators are

Kennzeichnung Tag No.			Fabrik-Nr. Serial No.		
Typ Type		Sitz+Kegel Seat+Plug	Ma t.	Antrieb Actuator	Typ Type
DN / PN Size-Rating		Max.zul.Betr.Temp. Max.Allow.Work.Temp.		Federbereich Spring Range	
Sitz Port	Ø	Max.zul.Betr.Druck Max.Allow.Work.Pressure		Hub Travel	Luft Air
kvs <input type="checkbox"/> Cv <input type="checkbox"/>		Max.zul.DIFF.Druck Max.Allow.Work.DIFF.Press.		Max.Arbeitsdruck Max.Work.Press.	öffnet opens
Gehäuse Body	Ma t.	Packung Packing	Faltenbalg Bellows		schl. closes

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Figure 2. Type 3024S Actuator Nameplate

Table 2a. Additional Specifications, Action - Air to Close (ATC)

Type	Spring Set No. / Qty/ Color	Travel		Maximum Operating Pressure to Diaphragm		Range		Maximum Output Thrust (Maximum Actuator Stem Force) ⁽¹⁾	
		Inch	mm	Psig	Bar	Psig	Bar	Lb	N
GA 1.21	218 / 5 / R	0.63	16	19 – 33	1.3 – 2.3	87	6	461	2054
	218 / 7 / G	0.63	16	23 – 44	1.6 – 3.0	87	6	568	2528
GA 1.31	219 / 3 / B	0.63	16	3 – 15	0.2 – 1.0	87	6	214	954
	211 / 6 / R	0.63	16	6 – 15	0.4 – 1.0	87	6	429	1908
	212 / 5 / G	0.63	16	22 – 35	1.5 – 2.4	87	6	1608	7155
	212 / 7 / G	0.63	16	29 – 46	2.0 – 3.2	87	6	2144	9540
	211 / 3 / R	1.26	32	---	0.2 – 1.0	87	6	220	978
	212 / 5 / G	1.26	32	10 – 33	0.7 – 2.3	87	6	769	3423
GA 1.41	212 / 7 / G	1.26	32	13 – 46	0.9 – 3.2	87	6	989	4401
	220 / 4 / R	1.26	32	---	0.2 – 1.0	87	6	391	1742
	221 / 8 / G	1.26	32	10 – 26	0.7 – 2.3	87	6	1370	6097
	221 / 10 G	1.26	32	15 – 35	1.0 – 2.4	87	6	1958	8710
	221 / 12 / G	1.26	32	18 – 41	1.2 – 2.8	87	6	2349	10452
	221 / 14 / G	1.26	32	21 – 46	1.4 – 3.2	87	6	2741	12194

1. Based on zero operating pressure to diaphragm for Type 3024S actuator and valve travel 0%. This does not consider limitations to valve, such as stem buckling loads.

Table 2b. Additional Specifications, Action - Air to Open (ATO)

Type	Spring Set No. / Qty/ Color	Travel		Maximum Operating Pressure to Diaphragm		Range		Maximum Output Thrust (Maximum Actuator Stem Force) ⁽¹⁾	
		Inch	mm	Psig	Bar	Psig	Bar	Lb	N
GA 1.21	217 / 3 / R	0.63	16	3 – 15	0.2 – 1.0	87	6	1528	6800
	218 / 5 / G	0.63	16	19 – 34	1.3 – 2.3	87	6	1131	5032
	218 / 7 / G	0.63	16	23 – 44	1.6 – 3.0	87	6	917	4080
GA 1.31	219 / 3 / B	0.63	16	3 – 15	3 – 15	87	6	4395	19550
	211 / 6 / R	0.63	16	6 – 15	6 – 15	87	6	4395	19550
	212 / 5 / G	0.63	16	22 – 35	22 – 35	87	6	3164	14076
	212 / 7 / G	0.63	16	29 – 46	29 – 46	87	6	2461	10948
	211 / 3 / R	1.26	32	3 – 15	0.2 – 1.0	87	6	4519	20100
	212 / 5 / G	1.26	32	10 – 33	0.7 – 2.3	87	6	3344	14874
GA 1.41	212 / 7 / G	1.26	32	13 – 46	0.9 – 3.2	87	6	2531	11256
	220 / 4 / R	1.26	32	3 – 15	0.2 – 1.0	87	6	8161	36300
	221 / 8 / G	1.26	32	10 – 26	0.7 – 2.3	87	6	6855	30492
	221 / 10 G	1.26	32	15 – 35	1.0 – 2.4	87	6	5876	26136
	221 / 12 / G	1.26	32	18 – 41	1.2 – 2.8	87	6	5223	23232
	221 / 14 / G	1.26	32	21 – 46	1.4 – 3.2	87	6	4570	20338

1. Based on zero operating pressure to diaphragm for Type 3024S actuator and valve travel 0%. This does not consider limitations to valve, such as stem buckling loads.

Installation



Personal injury or equipment damage caused by sudden release of pressure may result if the valve assembly is installed where service conditions could exceed the limits given in table 1 and 2 or the appropriate nameplates. To avoid such injury or damage, provide a relief valve for overpressure protection as required by accepted industry or local, state and federal codes and good engineering practices.

A Type 3024S diaphragm actuator is normally shipped mounted on a valve. Refer to the appropriate valve instruction manual when installing the valve in the pipeline. If the actuator is shipped separately or if it is necessary to mount the actuator on the valve, perform the Actuator Mounting procedure given below. For information on mounting the positioner, refer to the positioner instruction manual.

Design 3024S Actuator

CAUTION

The Type 3024S actuators are designed to mount on push-down-to-close valves. Do not mount these actuators on any other type of valve without first contacting the Fisher sales office.

Actuator Mounting

The following procedure describes how to mount a Type 3024S actuator on a push-down-to-close valve so that the actuator stem and valve stem thread engagement allows full travel and proper shutoff. Refer to figure 5 for actuator dimensions. Key numbers referenced in the following steps are shown in figures 6, 7, 9 & 10.

1. Thread the stem hex nut (key 54/52) first and then the connector (key 50) onto the valve stem and run them down.
2. Push the valve stem down until the valve plug is fully closed.
3. Carefully place the actuator with the flange (key 45) on the valve bonnet.



WARNING

When moving the actuator stem with diaphragm loading pressure use caution to keep hands and tools out of the actuator stem travel path. Personal injury and/or property damage is possible if something is caught between the actuator stem and other control valve assembly parts.

CAUTION

Be sure that the length of the actuator stem or the valve stem in the connector (key 50 or 53) is equal to or greater than the diameter of that stem.

In the following procedure, do not rotate the valve plug while it is seated. This may damage the seating surface and thereby allow excessive leakage. Also, during adjustment, use tools carefully to avoid damaging the valve

stem. A damaged stem could cut the packing and allow leakage.

4. Perform one of the following procedures as appropriate:

For a Type 3024S Air-To-Close actuator with a push-down-to-close valve:

- a. Tighten the valve bonnet lock nut.
- b. Adjust the travel: rotate the connector halves (key 53 and 50) so that the distance between them (with the valve on the seat and the travel indicator-key 51 between the connectors) is equal to the valve travel.
- c. Pressurise the actuator slowly and adjust the stem connector half (key 50) so the connecting bolts will line up.
- d. Tighten all bolts (key 55/56) and nuts (key 56/57).
- e. Apply bench set pressure to the top of the diaphragm and check the valve stem travel.
- f. Tighten the valve stem hex nut (key 54/52) against the stem connector (key 50).

For a Type 3024S Air-To-Open actuator with a push-down-to-close valve:

- a. Apply approximately 0.5 bar above the highest setting of the bench set pressure to the bottom of the diaphragm. This positions the actuator stem (key 8) at the highest point.
- b. Tighten the valve bonnet lock nut.
- c. Adjust the travel: rotate the connector halves (key 53 and 50) so that the distance between them (with the plug on the seat and the travel indicator key 51 between the connectors) is equal to the valve travel.
- d. Exhaust the actuator slowly and adjust the stem connector half (key 50) so the connecting bolts will line up.
- e. Completely exhaust the actuator and tighten all bolts (key 55/56) and nuts (key 56/57).
- f. Apply approximately 0.5 bar above the highest bench set pressure to the top of the diaphragm and check the valve stem travel.
- g. Tighten the valve stem hex nut (key 54/52) against the stem connector (key 50).

For a Type 3024S Air-To-Open & Air-To-Close actuators:

5. Cycle the actuator several times to check for proper operation.
6. Adjust the travel indicator scale (key 26) up or down to correspond with the travel indicator.

Travel Adjustments

Although making travel adjustments should not be necessary if previous section on Actuator Mounting has been followed, use the following procedure when the actuator travel is different from that stamped on the actuator nameplate (figure 2).

When adjusting the travel of a push-down-to-close valve air-to-open actuator combination, slightly pressurise the actuator. This moves the valve plug off the seat, reducing the chance of damaging the valve plug or seat during adjustment.

1. Back off the stem hex nut (key 54/52) from the valve stem connector, and slightly loosen both/all 4 cap screws (key 55/56) from the connectors.
2. Screw the connector (key 50) clockwise (to lengthen travel) or counter-clockwise (to shorten travel).
3. Tighten the stem connector cap screw (key 55/56).
4. Cycle the actuator to check for the specified travel. If the travel is not equal to the specified travel, adjust and check it until it is correct. Tighten the stem hex nut (key 54/52) against the stem connector.

Maintenance

Actuator parts are subject to normal wear and must be inspected and replaced as necessary. The frequency of inspection and replacement depends upon the severity of the service conditions. Due to the care Fisher takes in meeting manufacturing requirements (heat treating, dimensional tolerances, etc.), use only replacement parts manufactured or furnished by Fisher.

This section describes how the actuator can be completely disassembled and assembled. When inspection or repairs are required, disassemble only

those parts necessary to accomplish the job; then start the assembly at the appropriate step.

Key numbers refer to figure 6 for a Size 1.21/1.31 Air-To-Close actuator, to figure 7 for a 1.21/1.31 Air-To-Open actuator, figure 9 for a Size 1.41 Air-To-Close actuator, to figure 10 for a 1.41 Air-To-Open actuator.

Disassembly



Avoid personal injury or damage to property from sudden release of pressure, uncontrolled process fluid, or precompressed spring force. Before starting disassembly:

- Isolate the valve from the process,
- Release process pressure,
- Vent all internal pressure from the actuator,
- Release all spring preloading force,
- Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.

1. For complete disassembly, the positioner and all accessories (if attached) must be removed from the actuator. Follow the appropriate removal procedures in the instruction manuals supplied with the positioner and accessories.

2. Bypass the control valve. Reduce the loading pressure to atmospheric, and for a bottom-loaded Type 3024S Air-To-Open actuator, remove the tubing or piping from the connection in the lower diaphragm casing (key 1). For a top-loaded Type 3024S Air-To-Close actuator, remove the piping or tubing from the connection in the upper diaphragm casing (key 16).

3. Slightly loosen all diaphragm casing cap screws (key 19 and 21). Remove the plastic hose (key 22). Unscrew the short and long diaphragm casing cap screws and nuts (key 19, 20 and 21) alternately, until only the long casing cap screws (key 21) remain engaged. Then allow the remaining spring compression to be slowly and evenly released by alternately unscrewing the long casing cap screws.

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4. When removing the diaphragm and actuator springs perform one of the following procedures as appropriate:

For a Type 3024S Air-To-Open actuator (figure 7 & 10):

- a. Lift off the upper diaphragm casing (key 16) and remove the springs (key 15).
- b. Using a strap wrench or soft-jawed vice and the actuator stem (key 8), remove the hex nut (key 14).
- c. Remove the diaphragm plate (key 13), diaphragm (key 11), O-Ring (key 12), pressure plate (key 10) and the ring halves (key 9).

For a Type 3024S Air-To-Close actuator (figure 6 & 9):

- a. Lift off the upper diaphragm casing (key 16).
- b. Using a strap wrench or soft-jawed vice and the actuator stem (key 8), remove the hex nut (key 14).
- c. Remove the pressure plate (key 10), O-Ring (key 12), diaphragm (key 11), diaphragm plate (key 13) and the ring halves (key 9).
- d. Remove the springs (key 15).

1. Carefully slide the actuator stem (key 8) out the bottom of the lower diaphragm casing (key 1) and set it on a protective surface to prevent damage to the O-ring sealing surface.
2. Remove the bellow (key 31), if used.
3. Unscrew the cheese head screws (key 7), then remove the bushing (key 6).
4. With the actuator disassembled, inspect all parts for excessive wear and replace as necessary.

Assembly

This procedure assumes that the actuator is completely disassembled. If it is not, start the instructions at the appropriate step.

For a Type 3024S Air-To-Open & Air-To-Close actuator :

1. Before starting assembly, apply Lubriplate MAG-1 lubricant or equivalent to the O-ring (in the bushing key 6 and key 12). Install the new bushing (key 6) and assemble with the cheese head screws

(key 7) onto the lower diaphragm casing (key 1). Use a torque of 0.4 N•m (0.25 lbf•ft)

2. Carefully slide the actuator stem (key 8) down through the bushing (key 6) .

3. When installing the diaphragm and actuator springs perform one of the following procedures as appropriate:

For a Type 3024S Air-To-Open:

- a. Assemble the ring halves (key 9), pressure plate (key 10), O-Ring (Key 12), diaphragm (Key 11) and diaphragm plate (key 13) as shown in figure 7 or 10.
- b. Apply Loctite 271 or equivalent to the actuator stem travel stop thread and tighten the travel stop as follows: Sizes GA 1.21/1.31 tighten to 37 N•m (28 lbf•ft), size GA 1.41 tighten to 90 N•m (66 lbf•ft).
- c. Position the actuator springs (key 15) symmetrical on the diaphragm plate (key 13) as shown in figure 3.

For a Type 3024S Air-To-Close:

- a. Assemble the ring halves (key 9), pressure plate (key 10), O-Ring (Key 12), diaphragm (Key 11) and diaphragm plate (key 13) as shown in figure 6 or 9.
- b. Apply Loctite or equivalent to the actuator stem travel stop thread and tighten the travel stop as follows: Sizes GA 1.21/1.31 tighten to 37 N•m (28 lbf•ft), size GA 1.41 tighten to 90 N•m (66 lbf•ft).
- c. Position the actuator springs (key 15) symmetrical on the diaphragm plate (key 13) as shown in figure 3.

CAUTION

Overtightening the diaphragm cap screws and nuts can damage the diaphragm. Do not exceed a torque of 11 N•m (8 lbf•ft) for Size GA 1.21 and 16 N•m (12 lbf•ft) for sizes GA 1.31 & 1.41.

For a Type 3024S Air-To-Close & Air-to-Open:

4. Install the upper diaphragm casing (key 16) using the long cap screws (key 21) and hex nuts (key 20) first. Then secure with cap-screws (key 19) and hex nuts (key 20). Be sure the supply connection is located directly above the vent in the lower diaphragm. Fit the plastic hose (key 22) over the cap screws (key 21).

Note

Be sure to use the long cap screws (key 21), first installing them on the opposite sides of the diaphragm casing. Tighten them evenly, using a crisscross pattern to ensure a proper seal.

5. Mount the actuator on the valve in accordance with the Installation procedures.

Changing Actuator Action

The Actuator can be changed from a Type 3024S ATO to a 3024 ATC or vice versa by removing the pressure plate, diaphragm, O-ring, diaphragm plate, hex nut, springs, spring locator, self tapping screws and vent assembly (key 10, 11, 12, 13, 14, 15, 17, 18 and 23) and installing them for appropriate action. See figures 6, 7, 9 and 10. For hex nut or travel stop (key 14) and pressure plate (key 10) selection refer to parts list. Follow the procedures in the Actuator Mounting section and the Travel Adjustment section for connection to the valve.

Side-Mounted Handwheel

A side-mounted handwheel assembly (figure 4) is usually used as a manual operator. When mounted on an ATC type 3024S actuator, turning the handwheel clockwise always closes the valve. When mounted on an ATO actuator, turning the handwheel clockwise always opens the valve, A lever (key 49, figure 12) on the handwheel assembly opens or closes the valve by moving the valve stem.

Instructions are given below for complete disassembly and assembly. Perform the disassembly only as far as necessary to accomplish the required maintenance; then begin the assembly at the appropriate step.

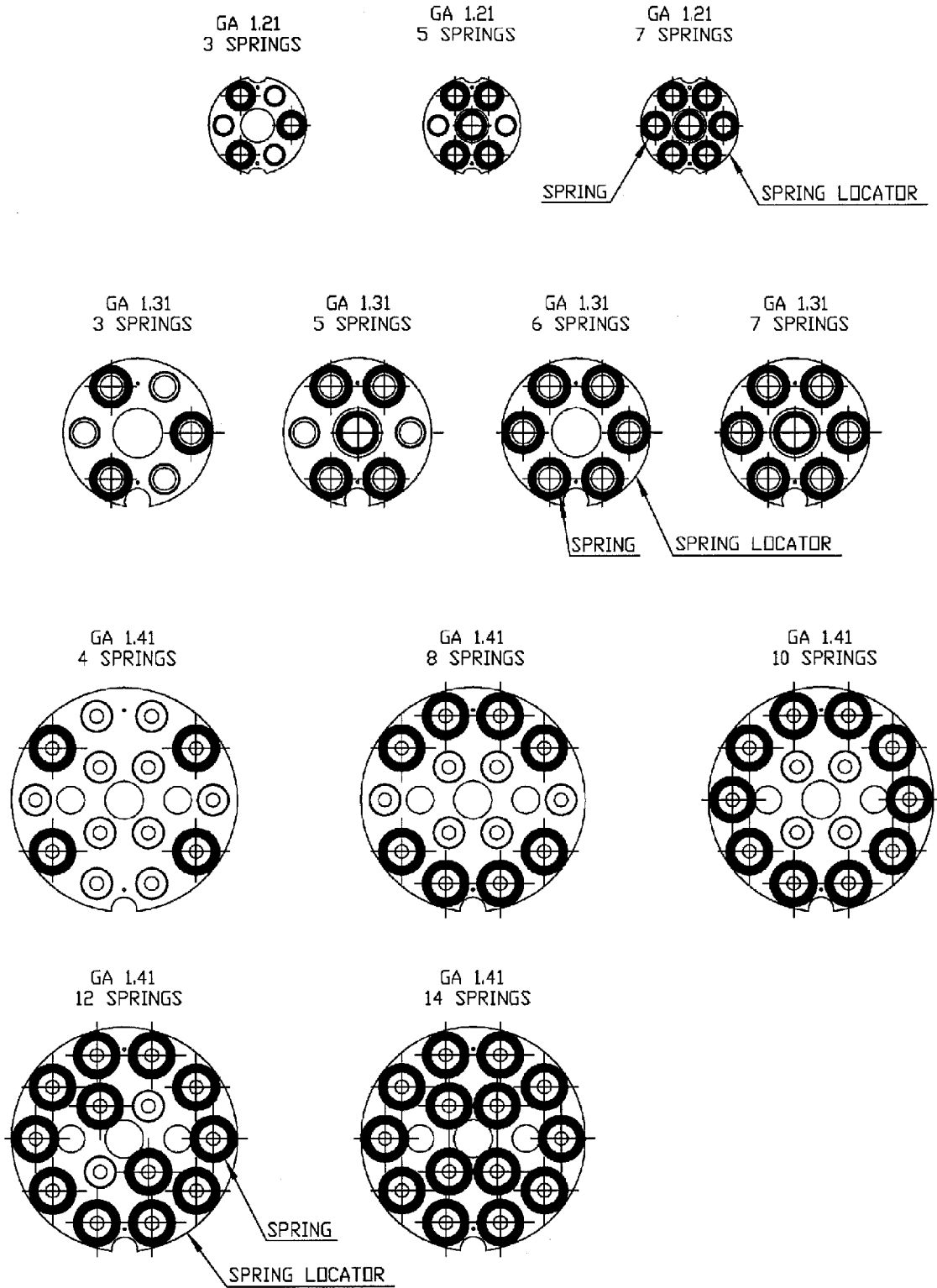
Refer to figure 12 for key numbers.

Disassembly

1. If desired, the handwheel assembly can be removed from the actuator leg post. To do this, remove the hex nuts (key 62) and back plates (key 64) from the U-bolts (key 61) that hold the assembly to the leg-post.
2. Loosen the lock (key 63) that secures the drive screw assembly (key 51).
3. Remove the retaining ring (key 58) and screw out the drive screw assembly (key 51).
4. Remove the retainer ring (key 56) and drive out the pivot pin (key 52).
5. Remove the bushings (key 55) from the body (key 48).
6. There is a cap screw (key 59), hex nut (key 60), and spacer (key 53) that hold the two levers (key 49) together. Remove the cap screw and hex nut and the two levers can be separated in order to remove the operating nut (key 50).

Assembly

1. Assemble the operating nut (key 50), the two levers (key 49), and the spacer (key 53) using the cap screw (key 59) and hex nut (key 60).
2. Install the bushings (key 55) in the body (key 48).
3. Attach the levers (key 49) to the body (key 48) using the pivot pin (key 52) and the retaining ring (key 56).
4. Apply lubricant Lubriplate MAG-1 or equivalent to the drive screw assembly (key 51) and screw it on to the operating nut (key 50).
5. Install the retaining ring (key 58) to secure the collar to the body (key 48).
6. If the handwheel assembly was removed from the actuator leg posts, position the U-bolts (key 61), back plate (key 64) and handwheel body (key 48) to the actuator leg posts as shown in figures 3 & 12. Tighten the hex nuts (key 62) to 19 N•m (14 lbf•ft). Clearance between the lower diaphragm casing and the handwheel body are shown in figure 4. With the actuator fully open the distance between the lower face of the actuator stem connector and the actuator flange should be shown in figure 4.



E0799

Figure 3. Type 3024S Spring Arrangements.

Actuator Size	Travel (mm)	A	B
		Millimeters	
GA 1.21	16	15	112
GA 1.31	16	5	112
GA 1.41	32	10	123
		Inches	
GA 1.21	16	1/2	4-1/2
GA 1.31	32	1/4	4-1/2
GA 1.41	32	1/2	5

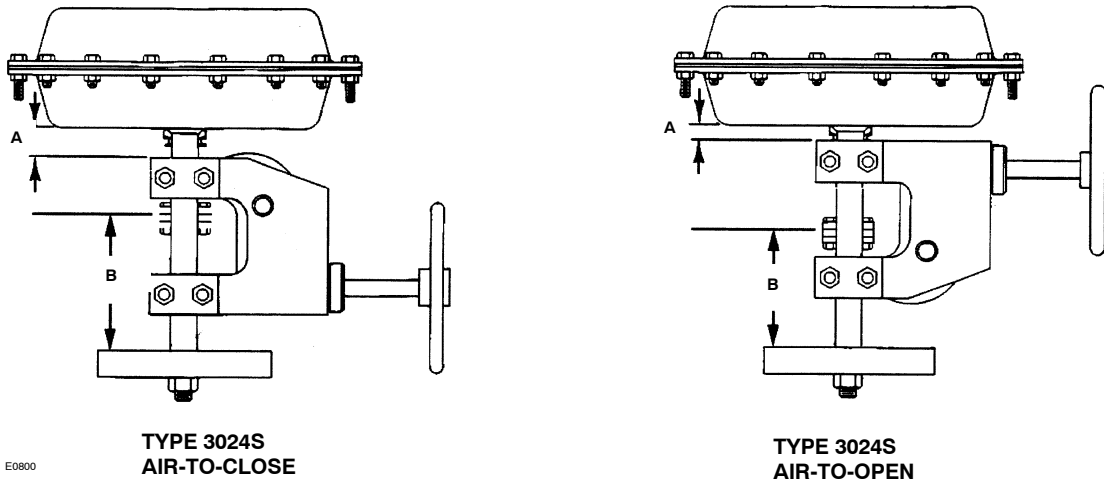


Figure 4. Type 3024S Actuator Handwheel Mounting (GA 1.21 and 1.31 Only).

Adjustable Travel Stops

The adjustable up travel stop (figure 8) for GA 1.21 and 1.31 actuators limits the actuator stroke in the upward direction (limits retraction of the actuator stem).

Loosen the hex nut (key 25) and turn the adjuster (key 24) clockwise into the diaphragm case to move the actuator stem downward or counter-clockwise to allow the actuator stem to move upward. Since the valve has push-down-to-close action, full opening can be restricted. Check the actuator travel and then tighten the hex nut (key 25).

For the GA 1.41 actuator up travel stop key numbers referenced in the following steps are shown in figure 11.

1. Loosen the head screws (key 8)

2. Unscrew the cap screws and nuts (key 5 and 7) and remove the cover plate (key 4)
3. Loosen the head screw (key 2) and turn the bushing (key 3) clockwise into the adjustment nut (key 1) to allow the actuator stem to move upward or counter clockwise to shorten the actuator travel.
4. Check the actuator travel and then tighten the head screw (key 2).
5. Assemble the cover plate (key 4) and tighten the cap screws and nuts (key 5 and 7).

CAUTION

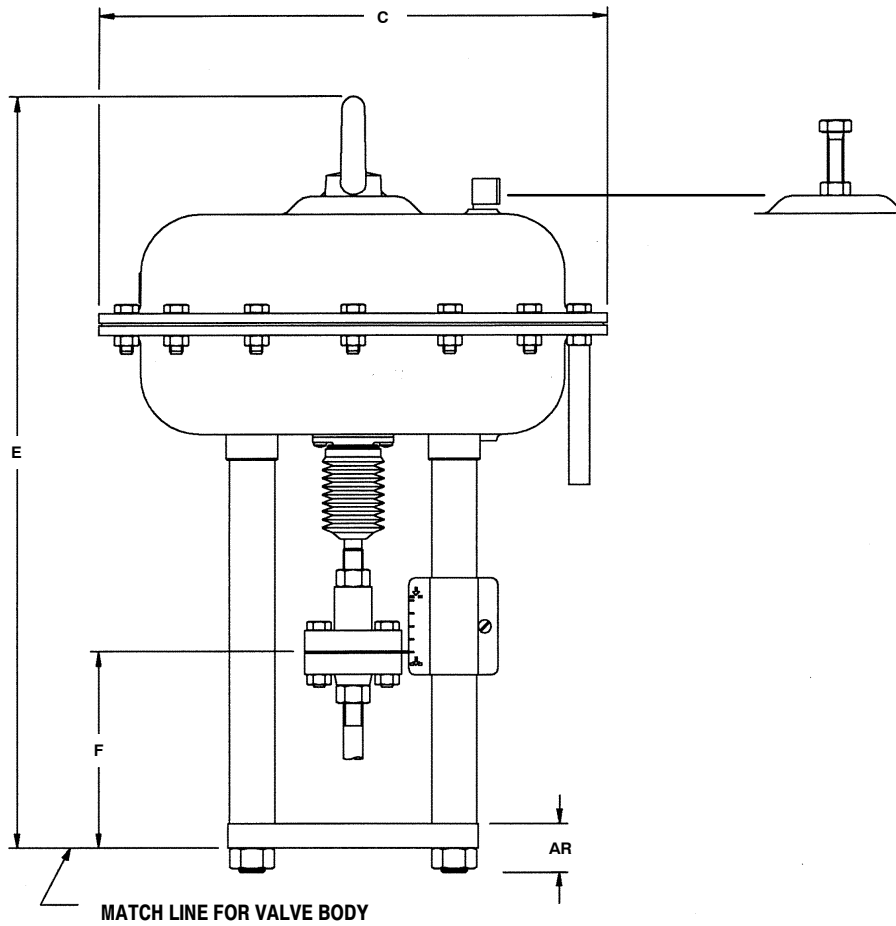
In the following adjustment procedures, take care to avoid injury while positioning components.

6. Adjust the cover plate (key 4) so that there is no gap between the diaphragm case and the cover plate.
7. Tighten the head screw (key 8).

Design 3024S Actuator

Actuator Size	Travel (mm)	C Diameter	E	F	AR
		Millimeters			
GA 1.21	16	215	360 ⁽¹⁾	105	45
GA 1.31	16	315	450		
	32	315	480	133	
GA 1.41	32	420	515		
Inches					
GA 1.21	16	8.46	14.17	4.13	1.77
GA 1.31	16	12.40	17.72		
	32	12.40	18.90	5.24	
GA 1.41	32	16.54	20.28		

1. Without lifting ring.



E0801

Figure 5. Actuator Dimensions (Reverse Acting).

Parts Ordering

Each actuator has a serial number stamped on the nameplate (figure 2 and key 34, figure 6, 7 and 10). Refer to the serial number when ordering replacement parts or when corresponding with your Fisher sales office or sales representative for technical assistance. Also, specify the complete 7 or 11-character part number from the following parts list when ordering replacement parts.

Parts List

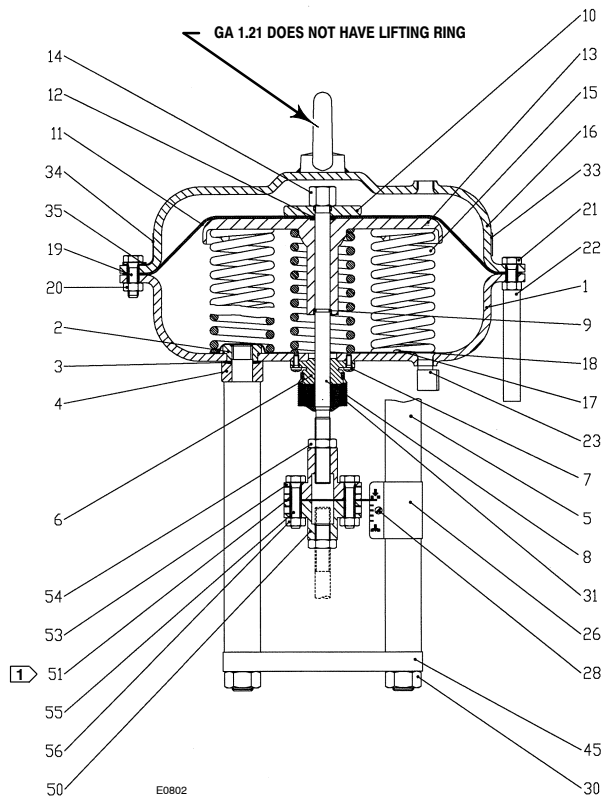
Actuator

Key	Description	Part Number
1	Lower Diaphragm Casing, steel	
	Size GA 1.21	0410632
	Size GA 1.31	0449660
	Size GA 1.41	0449687
3*	Gasket (2 required)	
	Size GA 1.21	0409081
	Size GA 1.31 & 1.41	0411426
4	Supporting Ring, steel	
	Size GA 1.21	---
	Size GA 1.31 & 1.41 (2 required)	0411434
5	Leg Post, steel (2 required)	
	Size GA 1.21, Travel 16mm	0409090
	Size GA 1.31, Travel 16mm	1066803
	Size GA 1.31 & 1.41, Travel 32mm	2539667
6*	Bushing	
	Size GA 1.21 & 1.31	0409065
	Size GA 1.41	0411159
7	Cheese Head Screw, stainless steel (6 required)	0119512
8	Actuator Stem, stainless steel	
	Size GA 1.21	0410713
	Size GA 1.31	0410284
	Size GA 1.41	0411752
9	Ring Half, stainless steel (2 required)	
	Size GA 1.21 & 1.31	0410365
	Size GA 1.41	0411876
10	Pressure Plate	
	Size GA 1.21, aluminium ATO and ATC	1136879
	Size GA 1.31, steel, Travel 16 mm	
	0.2 - 1.0 bar (3 - 15 psig) ATO and ATC	0410373
	0.4 - 1.0 bar (6 - 15 psig) ATO and ATC	0410373
	1.5 - 2.4 bar (22 - 35 psig) ATO	2139839
	1.5 - 2.4 bar (22 - 35 psig) ATC	0410373
	2.0 - 3.2 bar (29 - 46 psig) ATO	2139839
	2.0 - 3.2 bar (29 - 46 psig) ATC	0410373
	Size GA 1.31, steel, Travel 32 mm, ATO and ATC	0410373
	Size GA 1.41, steel, ATO and ATC	0411884
11*	Diaphragm, nitrile	
	Size GA 1.21	0410705
	Size GA 1.31	0410357
	Size GA 1.41	0411868

Key	Description	Part Number
12*	O-Ring, nitrile	
	Size GA 1.21 & 1.31	0409073
	Size GA 1.41	0411736
13	Diaphragm Plate	
	Size GA 1.21, aluminium	1136887
	Size GA 1.31, aluminium	2631032
	Size GA 1.41, cast iron	0444987
14	Hex Nut, steel	
	Size GA 1.21, Travel 16mm	
	1.3 - 2.3 bar (19 - 34 psig) ATO	0828939
	1.6 - 3.0 bar (23 - 44 psig) ATO	0828661
	0.2 - 1.0 bar (3 - 15 psig) ATC	0476986
	1.3 - 2.3 bar (19 - 34 psig) ATC	0476986
	1.6 - 3.0 bar (23 - 44 psig) ATC	0828939
	Size GA 1.31, Travel 16mm	
	0.2 - 1.0 bar (3 - 15 psig) ATO	0411108
	0.2 - 1.0 bar (3 - 15 psig) ATC	0476986
	0.4 - 1.0 bar (6 - 15 psig) ATO and ATC	0411108
	1.5 - 2.4 bar (22 - 35 psig) ATO	0127515
	1.5 - 2.4 bar (22 - 35 psig) ATC	0411108
	2.0 - 3.2 bar (29 - 46 psig) ATO	0127515
	2.0 - 3.2 bar (29 - 46 psig) ATC	0828661
	Size GA 1.31, Travel 32 mm, ATO and ATC	
	0.2 - 1.0 bar (3 - 15 psig)	0476986
	0.7 - 2.3 bar (10 - 33 psig)	0127515
	0.9 - 3.2 bar (13 - 46 psig)	0127515
	Size GA 1.41, Travel 32 mm	
	0.2 - 1.0 bar (3 - 15 psig) ATO and ATC	1768247
	0.7 - 1.8 bar (11-26 psig) ATO	0127531
	0.7 - 1.8 bar (11-26 psig) ATC	1768247
	1.0 - 2.4 bar (15-35 psig) ATO and ATC	0127531
	1.2 - 2.8 bar (17-41 psig) ATO and ATC	0127531
	1.4 - 3.2 bar (20-46 psig) ATO and ATC	0127531
15	Spring, steel	
	Size GA 1.2, Travel 16 mm	
	0.2 - 1.0 bar (3 - 15 psig) (3 required)	0410853
	1.3 - 2.3 bar (19 - 34 psig) (5 required)	0410861
	1.6 - 3.0 bar (23 - 44 psig) (7 required)	0410861
	Size GA 1.31, Travel 16 mm	
	0.2 - 1.0 bar (3 - 15 psig) (3 required)	0411086
	0.4 - 1.0 bar (6 - 15 psig) (6 required)	0409111
	1.5 - 2.4 bar (22 - 35 psig) (5 required)	0410411
	2.0 - 3.2 bar (29 - 46 psig) (7 required)	0410411
	Size GA 1.31, Travel 32 mm	
	0.2 - 1.0 bar (3 - 15 psig) (3 required)	0409111
	0.7 - 2.3 bar (10 - 33 psig) (5 required)	0410411
	0.9 - 3.2 bar (29 - 46 psig) (7 required)	0410411
	Size GA 1.41, Travel 32 mm	
	0.2 - 1.0 bar (3 - 15 psig) (4 required)	0411124
	0.7 - 1.8 bar (11 - 26 psig) (8 required)	0411132
	1.0 - 2.4 bar (15 - 35 psig) (10 required)	0411132
	1.2 - 2.8 bar (17 - 41 psig) (12 required)	0411132
	1.4 - 3.2 bar (20 - 46 psig) (14 required)	0411132
16	Upper Diaphragm Casing, steel	
	Size GA 1.21	0410756
	Size GA 1.31	0411060
	Size GA 1.41	0412007
	For adjustable up stop (optional)	
	Size GA 1.21	0478873
	Size GA 1.31	0478865
17	Spring Locator, stainless steel	
	Size GA 1.21	0411604
	Size GA 1.31	0410322
	Size GA 1.41	0411809

*Recommended spare parts

Design 3024S Actuator



1 FOR 32 mm TRAVEL, USE KEY 52 HERE INSTEAD OF KEY 54.

Figure 6. Size GA 1.21 and 1.31 Direct-Acting Actuator (ATC).

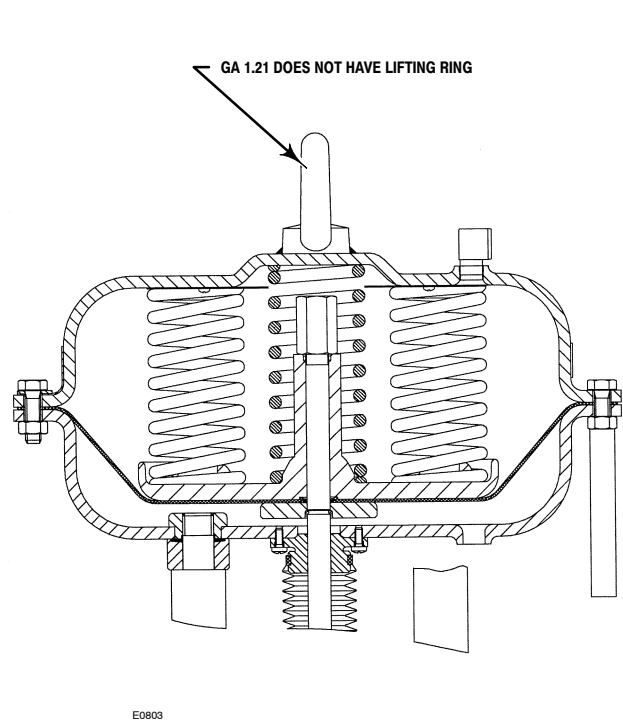


Figure 7. Size GA 1.21 and 1.31 Reverse-Acting Actuator (ATO).

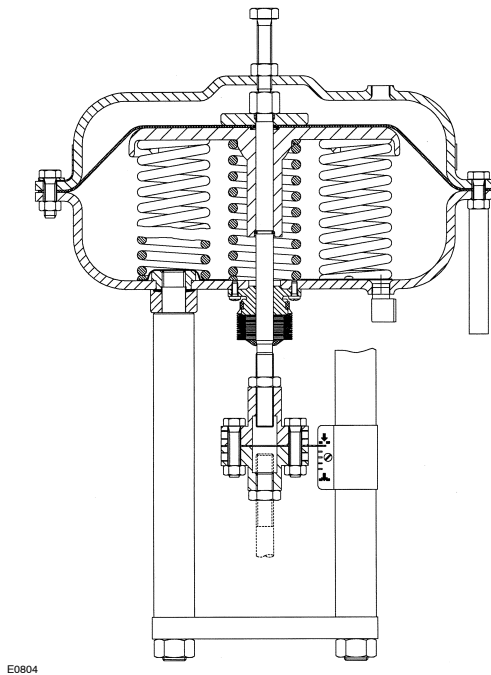
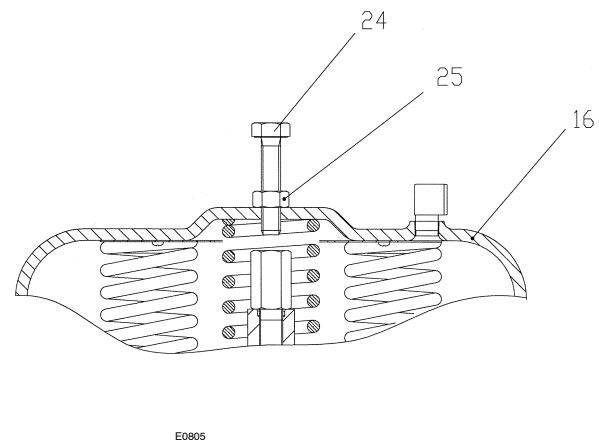


Figure 8. Adjustable Up Travel Stop for Size GA 1.21 and 1.31.



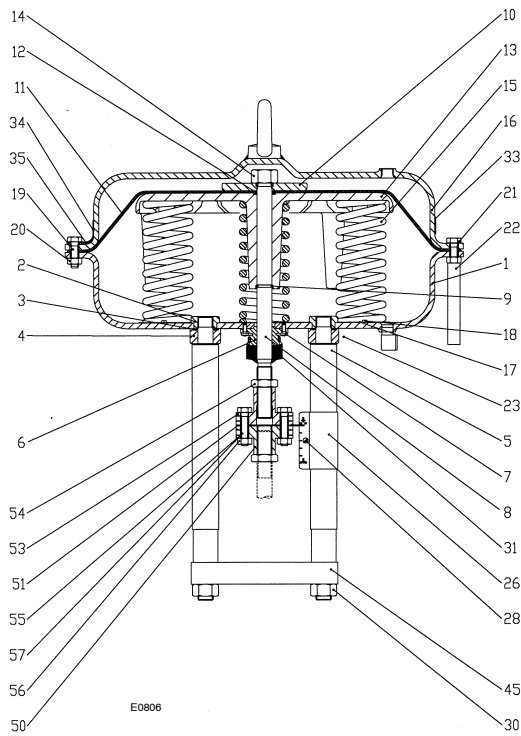


Figure 9. Size GA 1.41 Direct-Acting Actuator (ATC).

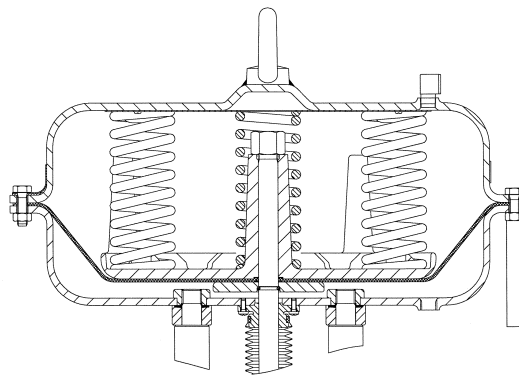


Figure 10. Size GA 1.41 Reverse-Acting Actuator (ATO).

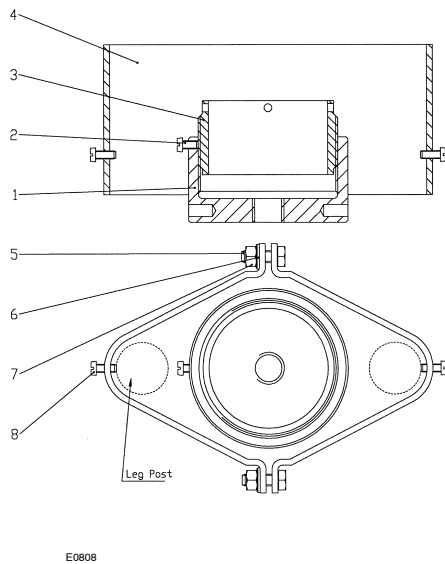
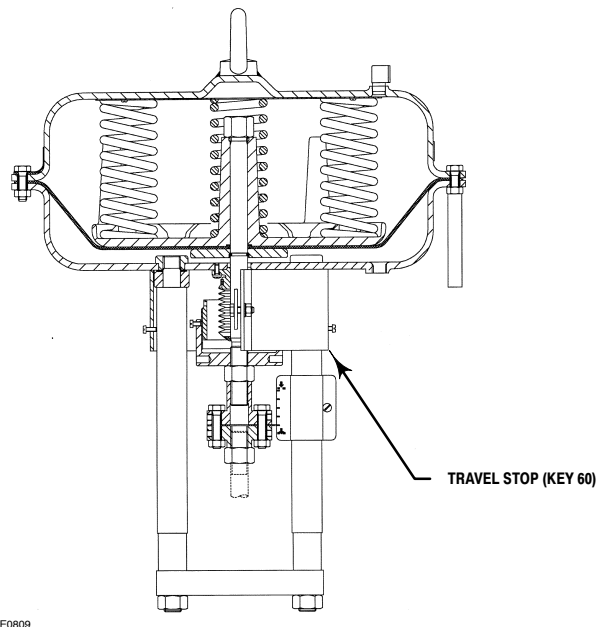


Figure 11. GA 1.41 Adjustable Up Travel Stop



Design 3024S Actuator

Key	Description	Part Number	Key	Description	Part Number
18	Convex Fillister Head Screw, steel (2 required)	0410403	51	Travel Indicator	0458180
19	Cap Screw, steel		52	Hex nut, GA 1.31, Travel 32 mm (1 required)	0127531
	Size GA 1.21 (7 required)	0125385	53	Actuator Stem Connector, steel	
	Size GA 1.31 (12 required)	0125490		Without Side Mounted Handwheel	
	Size GA 1.41 (17 required)	0125490		Size GA 1.21, Travel 16 mm ATO and ATC	1594842
20	Hex Nut, steel			Size GA 1.31, Travel 16 mm	
	Size GA 1.21 (10 required)	0127485		0.2 - 1.0 bar (3 - 15 psig) ATO and ATC	1594842
	Size GA 1.31 (15 required)	0127493		0.4 - 1.0 bar (6 - 15 psig) ATO and ATC	1594842
	Size GA 1.41 (20 required)	0127493		1.5 - 2.4 bar (22 - 35 psig) ATO	0458120
21	Hex Cap Screw, steel (3 required)			1.5 - 2.4 bar (22 - 35 psig) ATC	1594842
	Size GA 1.21	0467235		2.0 - 3.2 bar (29 - 46 psig) ATO	0458120
	Size GA 1.31	0464651		2.0 - 3.2 bar (29 - 46 psig) ATC	1594842
	Size GA 1.41	0464643		Size GA 1.31, Travel 32 mm, ATO and ATC	0458120
22	Plastic Hose, PVC (3 required)			Size GA 1.41, Travel 32 mm	
	Size GA 1.21	0479748		0.2 - 1.0 bar (3 - 15 psig) ATO and ATC	0458112
	Size GA 1.31	0479730		All except 0.2 - 1.0 bar ATO and ATC	0458139
	Size GA 1.41	0479721		With Side Mounted Handwheel	
23	Vent Assembly, plastic	0410233		Size GA 1.21, Travel 16mm ATO and ATC	0319678
24	Hex Cap Screw, steel 1.21 & 1.31 (optional)	0125628		Size GA 1.31, Travel 16mm ATO and ATC	1594842
25	Hex Nut, steel 1.21 & 1.31 (optional)	0410993		Size GA 1.31, Travel 32mm ATO and ATC	1594842
26	Travel Indicator Scale, stainless steel		54	Hex Nut, steel	
	Size GA 1.21, Travel 16 mm	2492431		Size GA 1.21 & 1.31, Travel 16 mm (2 required)	0127515
	Size GA 1.31, Travel 16 mm	2492474		Size GA 1.31, Travel 32 mm (1 required)	0127515
	Size GA 1.31, Travel 32 mm	2492466		Size GA 1.41 (2 required)	0127531
27	Nut	10B1272X012	55	Hex Cap Screws, steel (2 required)	
28	Screw	19A4786X012		Without Side-Mounted Handwheel	0125512
30	Hex Nut, steel (2 required)	0127531		With Side-Mounted Handwheel	1Q39761F012
31*	Bellows	0409154	56	Hex Nut, steel	
33	Warning Label	0444375		Size GA 1.21 & 1.31 (2 required)	0127493
34	Nameplate, stainless steel	2472503		Size GA 1.41 (4 required)	0127493
35	Tab Washer, stainless steel		57	Hex Cap Screw, steel (2 required)	
	Size GA 1.21	1167731		Size GA 1.41	0125490
	Size GA 1.31 & 1.41	1167758	60	Adjustable up travel stop for Size 1.41 (Optional)	
45	Actuator flange, steel			1 Nut, adjustment (1 required)	0625850
	2 1/8" Yoke Boss (Travel 16 mm)	2484307		2 Cap Screw (1 required)	0119504
	2 13/16" Yoke Boss (Travel 32 mm)	2539659		3 Bush	0625876
50	Valve Stem Connector, steel			4 Cover Plate (2 required)	1607758
	Without Side Mounted Handwheel			5 Cap Screw	0262226
	Size GA 1.21, Travel 16 mm, ATO and ATC	0319678		6 Washer	0120766
	Size GA 1.31, Travel 16 mm			7 Hex nut	0127752
	0.2 - 1.0 bar (3 - 15 psig) ATO	0319678		8 Cap screw	0450367
	0.2 - 1.0 bar (3 - 15 psig) ATC	1594842			
	0.4 - 1.0 bar (6 - 15 psig) ATO	0319678			
	0.4 - 1.0 bar (6 - 15 psig) ATC	1594842			
	1.5 - 2.4 bar (22 - 35 psig) ATO and ATC	1594842			
	2.0 - 3.2 bar (29 - 46 psig) ATO and ATC	1594842			
	Size GA 1.31, Travel 32 mm, ATO and ATC	0458112			
	Size GA 1.41, Travel 32 mm, ATO and ATC	0458112			
	With Side Mounted Handwheel				
	Size GA 1.21, Travel 16mm ATO and ATC	0319678			
	Size GA 1.31, Travel 16mm ATO and ATC	0319678			
	Size GA 1.31, Travel 32mm ATO and ATC	0458112			

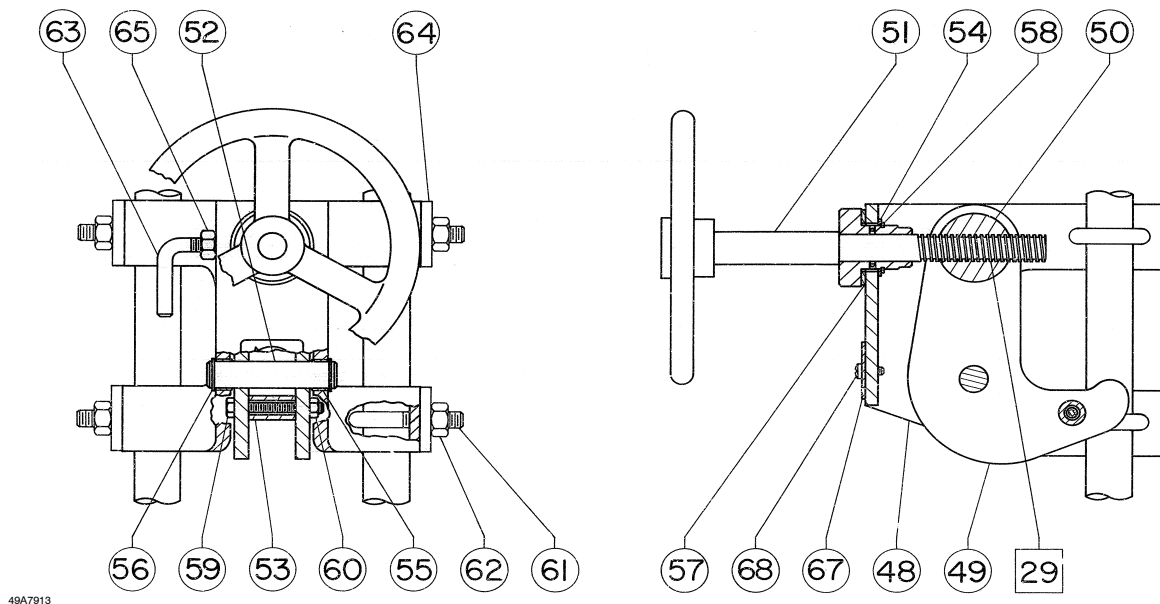


Figure 12. Size-Mounted Handwheel for Type 3024S GA 1.21 and 1.31 Actuators.

Key	Description	Part Number
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Side Mounted Handwheel (GA 1.21 & 1.31 only)

48	Body, steel	49A7900X012
49	Lever, steel	2317435
50	Operating Nut, brass	2317443
51	Drive Screw Assembly, steel/stainless steel	
	GA 1.21	29A7908X012
	GA 1.31	29A7912X012
52	Pivot Pin, stainless steel	19A7914X012
53	Spacer, steel (2 required)	2317427
54	Shim Ring, steel	19A7918X012
55	Bushing (2 required) composite	19A7919X012
56	Retaining Ring, steel (2 required)	19A7920X012
57	Thrust Washer, composite	19A7921X012
58	Retaining Ring, steel	19A7923X012
59	Cap Screw, steel (2 required)	0262072
60	Hex Nut, steel (2 required)	19A7927X012
61	U-Bolt, steel (4 required)	19A7930X012
62	Hex Nut, steel (8 required)	19A4838X012
63	Lock, stainless steel	19A7931X012
64	Back Plate, steel (4 required)	10B1554X012
65	Hex Nut, steel	19A4788X012
- - -	Stem Connector Spacer	1Y45607E012

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Emerson Process Management

Fisher

Marshalltown, Iowa 50158 USA

Cernay 68700 France

Sao Paulo 05424 Brazil

Singapore 128461

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