

Installation, Operating and Maintenance Instructions

XL Series Actuators

Models:

XL 26
XL 71
XL 131
XL 186
XL 221

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1 Important Safety Procedures

Qualified maintenance personnel should read and follow these straightforward instructions.

ALWAYS disconnect the Air and Electrical supplies before carrying out any form of maintenance on an Actuator.

Caution: When removing any ball valve or plug valve assemblies from a pipe system, isolate the piping system on which the Actuator is installed and relieve any media pressure that may be trapped in the valve cavities before removing the Actuator for maintenance.

Caution: Always contain the Spring tension with HYTORK Retractor Rods as explained in Section 6 (*Spring Return Actuators*). Follow instructions for using the Retractor Rod carefully. Only HYTORK manufactured or approved Retractor Rods are to be used for Spring removal. As with any threaded tool that is frequently used Retractor Rods should be checked to ensure that the threads are not worn or damaged in any way and greased regularly. Any damaged or worn Rods must not be used and must be destroyed.

Never attempt to 'BLOW OUT' the Pistons from the Actuator Body by using air pressure when the End Caps have been removed.

Numbers in brackets (#) refer to parts on the sectioned drawing (*Fig. 1*).

All HYTORK XL Spares Kits are supplied with SAFEKEY assemblies (13/14) cut to an exact length which will fit the circumference of the End Cap (21) when fully assembled into the Actuator. Any shortened SAFEKEY must not be used. If in doubt contact HYTORK.

Read the relevant sections carefully before continuing.

2 Spares Recommendations

When disassembling and carrying out maintenance work on the XL Actuator, a HYTORK Spares Kit must be used to replace all 'O' Rings, DURASTRIP Bearings, Washers etc. This Kit is available from HYTORK or its Stocking Distributors.

3 Actuator to Valve Installation

The Pinion drive, coupling device and Valve Stem should be centered and concentric to prevent any side loading to the Pinion Radial Bearing and Valve Stem Seat area. Ensure that the coupling shaft to be operated is a tight but free sliding fit into the female drive in the Actuator Pinion (19).

4 Operating Media, Pressures and Temperatures

Operating media:

Use clean and dry or lubricated air.

Operating pressures:

Not to exceed 8 bar (116 psi).

Operating temperature range:

Using standard seals and grease the operating temperature range is:
-20°C to + 100°C (-4°F to +212°F).

For operating media's, pressures and temperatures outside these ranges please consult HYTORK.

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Part No.	Component Description	Material	Quantity	Part No.	Component Description	Material	Quantity
1	Ball Bearing	Chromium Steel	2	16	Location Ring	Acetal	1
2	'O' Ring (End Cap)	Nitrile	2	17	'O' Ring (Pinion bottom)	Nitrile	1
3	Wear Ring (Piston)	DURASTRIP	2	18	Bearing (Pinion bottom)	DURASTRIP	1
4	'O' Ring (Piston)	Nitrile	2	19	Pinion	Steel	1
5	Thrust Bearing (Circlip)	DURASTRIP	1	20	Piston	Aluminum alloy	2
6	Circlip	Spring Steel	1	21	End Cap	Aluminum alloy	2
7	Indicator	Nylon	1	22	Travel Stop	Stainless Steel	2
8	'O' Ring (Pinion top)	Nitrile	1	23	Thread Seal	Steel/Rubber	2
9	Bearing (Pinion top)	DURASTRIP	1	24	Locking Nut	Stainless Steel	2
10	Bearing block (Piston)	DURASTRIP	2	25	Thrust Washer (Circlip)	Stainless Steel	1
11	Body	Aluminum alloy	1	26	Spring Outer	Spring Steel	2
12	'O' Ring (SAFEKEY)	Nitrile	2	27	Spring Inner	Spring Steel	2
13	SAFEKEY Head	Grivory	2	28	Sealing Bolt (End Cap)	Steel	2
14	SAFEKEY Wire	Stainless steel	2	29	'O' Ring (Sealing Bolt)	Nitrile	2
15	Thread Insert	Steel	2				

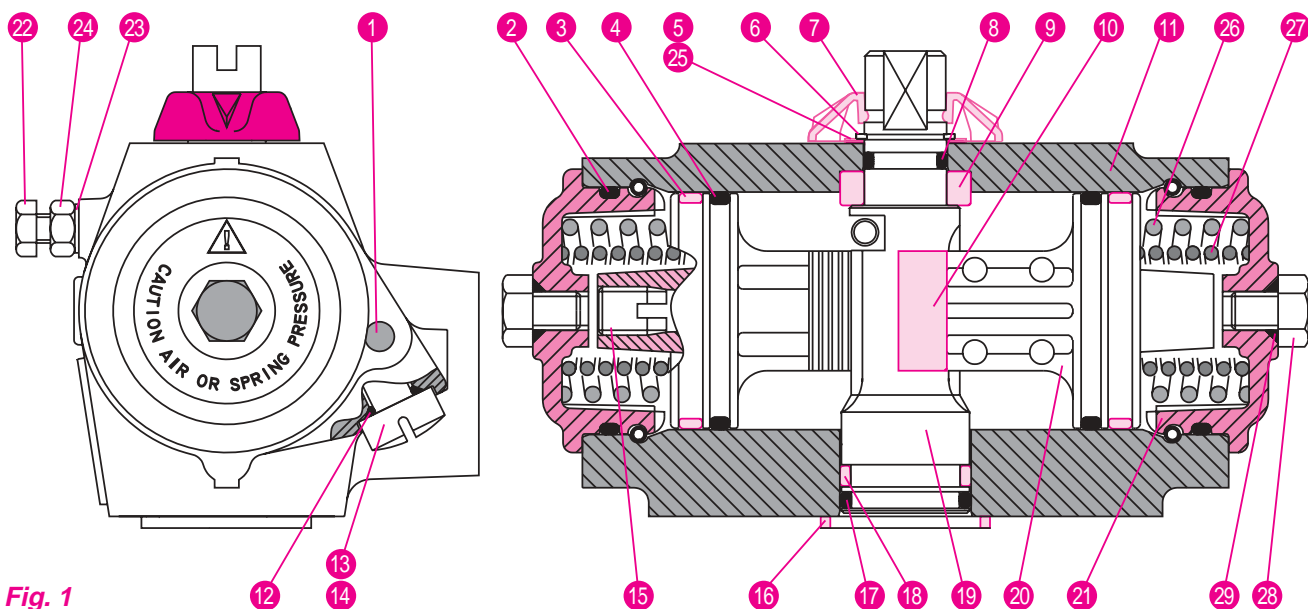


Fig. 1

5 Complete Disassembly & Safe Compression of Springs

1 Release Locking Nuts (24) and remove both Travel Stops and Thread Seals (22/23) which are located at the top of the Actuator Body (*cast identity numbers 1 & 2*), on the side opposite the Actuator air connections.

2 Remove both Sealing Bolts (28) and seals (29) from the End Caps (21).

3 Place the HYTORK Retractor Rod through the hole in the End Caps and screw the Rod into the Piston (20) until travel is stopped (DO NOT OVERTIGHTEN) and take care the nut and washer being free of the End Cap face (*see Fig 3a*).

4 Turn back the Rod 1/2 turn.

5 Screw the nut and washer clockwise down the Retractor Rod until they come up against the face of the End Cap.

6 While preventing the "hold-nuts" to rotate by one wrench, use another wrench, to screw the adjusting nut (*see Fig 3a*) clockwise down the Rod exactly two turns. This draws the Spring Retractor Cap away from the Piston head (3). This Spring-compression, releases the Spring force and un-locks the SAFEKEY for removal.

7 Repeat for the other End Cap.

8 Rotate the Caps to ensure that the Springs are retracted; if the Cap will not turn easily, screw the nut further.

9 Unscrew the two slotted SAFEKEYS (13/14) located on the Body (11) next to each End Cap (*cast identity letters C & D*), and gently pull each SAFEKEY from the Body.

10 If the SAFEKEY resists removal, gently tap the End Cap with a soft hammer to assist release.

11 When both SAFEKEYS have been removed, detach the Indicator (7) from the top of the Pinion (19) and use a wrench to rotate the Pinion, driving the pistons (20) apart until they partially push the End Caps from the Body.

Spring Return Actuators:

12 To keep the Spring Pack Assembly intact (Fig. 3b), leave the Retractor Rod in place. To disassemble the Spring Pack, unscrew the nut on the Retractor Rod relieving the Spring force, while preventing the rod from turning with a wrench on the hold nuts.

Double Acting Actuators:

13 Remove the SAFEKEY as described previously. The Retractor Rod is not required for Double Acting Actuators. Remove the End Caps by pulling them free from the Body keeping them square to the end face of the Body.

Removal of Pistons:

14 Rotate the Pinion using a wrench to drive the Pistons apart and remove from the Body by pulling the Pistons.

Removal of Pinion:

15 Remove the snap ring (Circlip) (6), Thrust Washer (25) and DURASTRIP Thrust Bearing (5) from the top of the Pinion and CAREFULLY push the Pinion from the Body through the bottom.

Take care that the Pinion does not damage the pinion bores on removal. If necessary, remove any burrs, etc. from the top of the Pinion before removal.

16 Carefully remove Pinion Top Bearing (9) from the Body.

Inspection:

17 Clean and examine all parts for damage and wear. HYTORK recommends 'O' Rings, DURASTRIP Bearings, SAFEKEYS, Washers, etc. are replaced using a HYTORK XL Spares Kit.

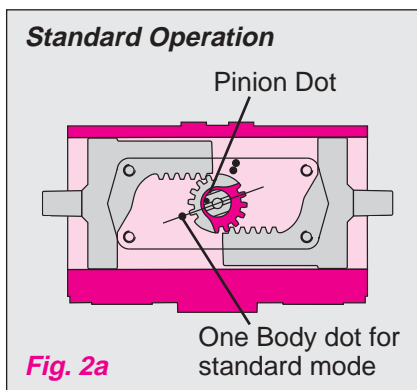
6 Assembly Instructions

Note: The grease used in ALL HYTORK Standard Model Actuators is a Lithium Based Grease. Check with HYTORK for high and low temperature applications.

Double Acting Actuators

Installing the Pinion.

- 1** Lightly grease all 'O' Rings, 'O' Ring grooves, bearing grooves and Pinion.
- 2** Assemble the Top Pinion Bearing (9) to the Pinion, ensuring that the recess openings are facing away from the gear form, then assemble items (8), (17) and (18).
- 3** Lightly grease the Pinion bores in the Body (11) and insert the Pinion being careful not to damage the 'O' Rings.
- 4** When the Pinion is in place, install the DURASTRIP Thrust Bearing (5), Thrust Washer (25) and the snap ring (*Circlip*) (6) into the narrow groove at the top of the Pinion (ensuring the snap ring fits properly into the groove).
- 5** Only open the snap ring (*Circlip*) enough to just clear the Pinion diameter as opening too far will damage the snap ring. If damage occurs replace with a new part.



Note: The snap ring (*Circlip*) has one side with bevelled edges which must go **DOWN onto the Thrust Washer (25)**; the square edge side must face **UPWARDS**.

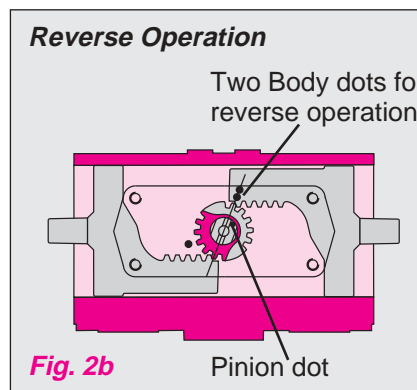
Alignment of Pinion for correct Piston installation.

(When viewed from above the slot at the top of the Pinion) (Fig. 2a & Fig. 2b). Standard rotation is clockwise with the Pistons moving towards each other.

Installing the Pistons.

Clockwise rotation with Pistons moving towards each other (Fig.2a).

- 6** Align the Pinion by lining up the center of the NAMUR slot in the top of the Pinion with the single dimple on the Body. The top of the Pinion is marked with a single identification dot to indicate the correct orientation of the stop faces.
- 7** Lightly grease all Piston grooves, gear form and Piston 'O' Rings (4) and fit the "O' Ring (4) and Wear Ring (3) to the Piston.
- 8** Fit the Bearing Block (10) to the back of the Piston.
- 9** Grease the Actuator body bore.
- 10** Insert the Pistons into the bore, ensuring the piston racks line up with the pinion gear. (*The part number in the front face of the Piston must be lined up parallel to the Pinion*).
- 11** Push both Pistons together until they are both in contact with the Pinion, so that when



the Pinion is rotated clockwise the Pistons are drawn together. When the Pistons are together and the racks are correctly engaged with the Pinion, the top Pinion drive flats should be at right angles to the axis of the Body.

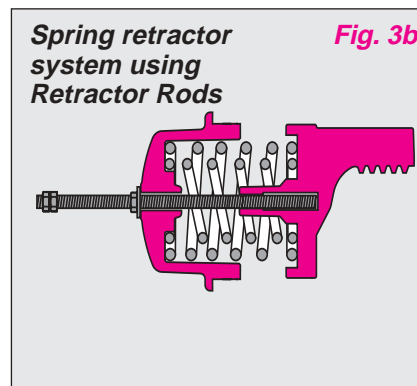
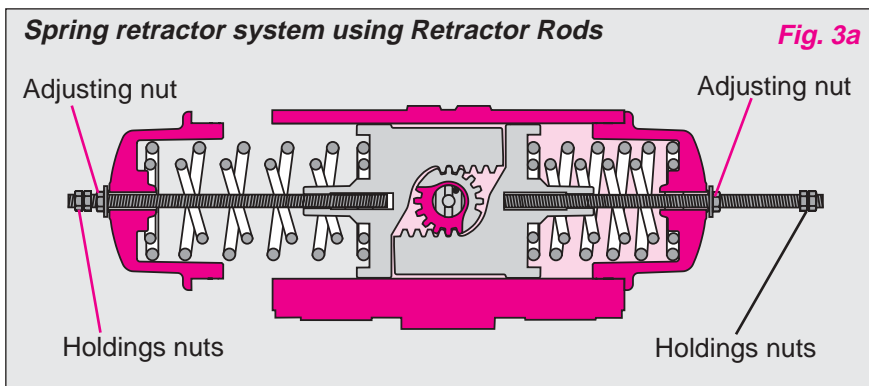
Anti-Clockwise rotation with Pistons moving towards each other (Fig. 2b)

12 Align the NAMUR slot in the top of the Pinion with the multiple dimples on the Body and assemble Pistons so that the Pinion rotates anti-clockwise as the Pistons are drawn together.

Installing the Travel Stops (Fig. 4).

- 13** With the Pistons together, screw in the CLOSING (*cast identity number 2*) Travel Stop (22), complete with Locking Nut (24) and Thread Seal (23), until it comes into contact with the Pinion stop face.
- 14** Rotate the Pinion through 90° only, driving the Pistons apart and screw in the OPENING (*cast identity number 1*) Travel Stop (22), complete with Locking Nut and Thread Seal, until it comes into contact with the pinion stop face.

For individual position requirements final adjustment is easily made when the Actuator has been mounted to its Valve, damper or other device. Ensure the Locking Nuts are tightened. HYTORK Actuators provide an overtravel of 3° at each end of the stroke.



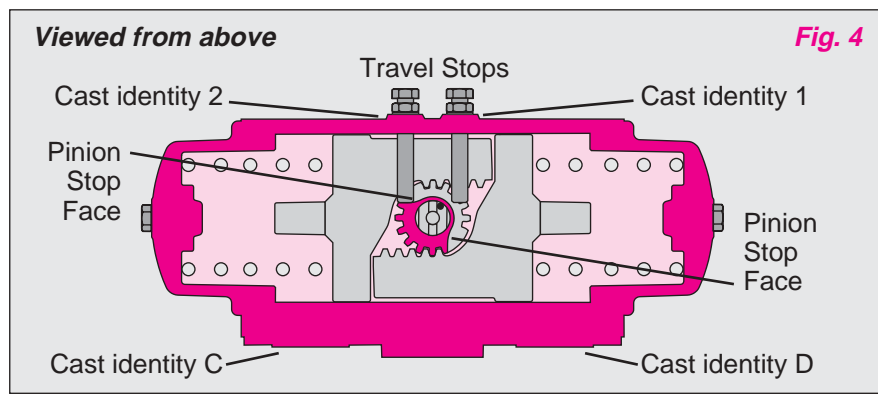


Fig. 4

8 Testing and Cycling of Infrequently Used or Stored Actuators

Actuators not in current use (*i.e. Actuators in storage or stock and/or not operated for at least a 3 month period*), should be cycled a minimum of ten times and tested against the possible 'pre-set' of the seals. This is a safety precaution recommended by the Seal manufacturers.

9 Service

It is the policy of HYTORK to give the best possible service to our customers. We are happy to assist you in any way we can and if you have any questions about HYTORK Actuators or other HYTORK Products please do not hesitate to contact any HYTORK VALVE AUTOMATION CENTER or your local HYTORK Stocking Distributor.



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Installing the End Caps.

- 15 Install the SAFEKEY 'O' Ring seals (12) to the SAFEKEY heads (13).
- 16 Lightly grease the End Cap 'O' rings (2), the End Cap grooves and the ends of the Body bore.
- 17 Taking one of the End Caps install its 'O' Ring and insert it into the Body.
- 18 Holding the SAFEKEY close to the entry hole (*cast identity letter C or D*) to prevent kinking, insert the SAFEKEY into the hole and gently push into place.
- 19 With the SAFEKEY Head in contact with the Body, tighten with a screw driver to gently compress the 'O' Ring and create a pressure seal.
- 20 Repeat the operation for the other End Cap. With the Pistons together, replace the Position Indicator (7) to the top of the Pinion.

- 2 Pass the correct HYTORK Retractor Rod through the End Cap (*Fig.3a*) and screw it into the Piston.
- 3 Line up the End Cap so that the safety symbol is correctly positioned for easy reading.
- 4 Continue to screw the adjusting nut on the HYTORK Retractor Rod in until the End Cap is completely engaged in the Body.
- 5 It will be necessary to push the End Cap into the Body to overcome the 'O' Ring compression.
- 6 When the End Caps are in place and the SAFEKEYS fitted correctly, remove the HYTORK Retractor Rods and replace the Sealing Bolts (28) and seals (29).

IMPORTANT: HYTORK Retractor Rods are made to a HYTORK design specification for safety reasons. HYTORK can not take any responsibility for any other design.

Spring Return Actuators

Installing the Springs.

(Other instructions are as Double Acting Actuators)

- 1 Insert the Springs (26/27) into the face of the Piston and then the End Cap onto the Springs.

7 Testing the HYTORK Actuator

Using compressed air at 80-100 psi (5.5 - 7 bar) check the seal areas with soapy water, ensuring there are no leaks and that the Pinion rotates smoothly over its full travel.

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UK Patents:

GB 2 102 887 B;
GB 2 123 517 B;
GB 2 138 505 B;
GB 2 216 229 B;
GB 2 225 079 B;
GB 2 229 254 B;
GB 2 253 459 B;
GB 2 268 574 B.

US Patents:

4,496,071;
4,651,627;
4,716,815.

Warranties:

Unauthorized modification to any Hytork Product totally invalidates all warranties.

Important:

We have endeavored in this publication to make the contents as accurate as possible, but being given as general information, it is not to be taken as binding unless specifically confirmed in writing. Due to Hytork's continuing commitment to engineered product advancement, the product specifications and data presented in this publication are subject to change without notice.

