

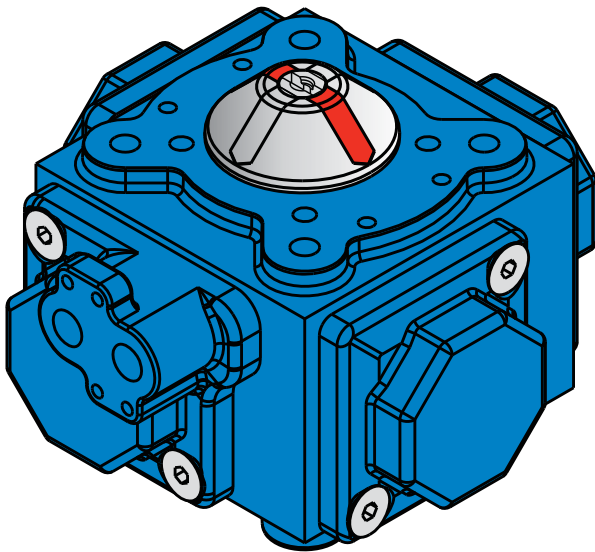
Installation, Operating & Maintenance

COMPACT

4 Piston Pneumatic Actuator

Sizes Included:

**C15, C20, C25, C30, C30M,
C35, C35M, C45, C45M, C60,
C60M, C75, C75M**



GENERAL

This Installation, Operation & Maintenance manual covers the instructions required for safe use of the **Compact** pneumatic actuator. *Read the entire IOM before using this product.*

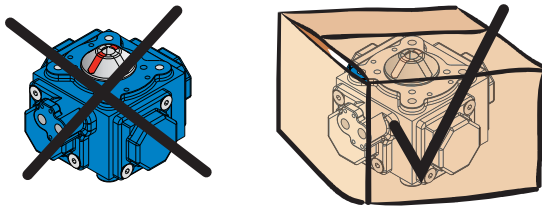
WARNINGS & SAFETY INSTRUCTIONS

The user of this product must know and follow all applicable industry specifications for the safe installation and use of these types of actuators. Improper use of the product may result in injuries or property damage. Refer to the Habonim **Compact** catalogue for additional product safety information or contact Habonim.

1. Assure that the actuator is isolated from the air supply or electrical ancillaries before attempting to perform any maintenance.
2. Before disconnecting the actuator from a valve, always be sure the line has been depressurized and drained. Cycle the valve a few times to relieve any pressure that could be trapped in the body cavity.
3. Utmost caution must be taken when handling the actuator. Only trained and qualified maintenance personnel who have read these instructions should disassemble or assemble the actuator.
4. Before operating an actuator which is connected to a valve in the pipeline make sure you know the valve function.
5. Do not attempt to remove the actuator pistons by use of air pressure when the covers have been removed.
6. Do not leave any grip key or shaft connection attached to the actuator, or try to manually operate the actuator while it is still connected to the air pressure.
7. Use the actuator within the pressure and temperature limits indicated on the nameplate or as specified in the product catalogue and IOM.
8. The operator must follow and observe any national or local safety laws and regulations.
9. Any product warranty will be invalidated in the case of improper operation resulting from misapplication or faulty maintenance.
10. Habonim bears no responsibility for external accessories attached to the Compact actuator.

STORAGE

The Compact actuator has been packaged to provide protection during shipment, however, it can be damaged in transport. Prior to storage, inspect the actuator for shipping damage. Keep the actuators in their original packing box during storage. It is recommended to keep the actuators in a clean and dry environment until ready for use. The actuator has two air ports, which should be plugged during storage to prevent liquids or other materials from entering the actuator during storage. If the actuators are to be stored for a long period of time before installation, it is recommended to cycle them periodically to prevent setting of the seals. Store the actuators indoors to protect them from humidity and dust.



OPERATING CONDITIONS

Lubricants

The actuators come lubricated from the factory and under normal operating conditions do not require re-lubrication. In the event of actuator maintenance it is recommended to use the following lubricants:

For NBR O-rings use EP1.

The lubricant is suitable for use from -20°C (-4°F) to +80°C (+176°F) with an AIT/ flashpoint > (T-class + 50K).

For Viton O-rings use Molykote 111 or OKS 1110 or Phalanx EP1. The lubricants are suitable for use from -20°C (-4°F) to +150°C (+302°F).

For EPDM O-rings use only Silicone grease (i.e. Molykote 111 or OKS 110).

The lubricants are suitable for use from -40°C (-40°F) to +140°C (+284°F).

For LT O-rings use KLT-2 The lubricant is suitable for use from -60°C to +140°C

Explosive Environment

The Compact can be installed in any appropriate potentially explosive hazardous area as listed on the identification nameplate on the actuator. The Compact is certified to category 1 according to the ATEX Directive 94/9/EC (Equipment intended for use in Potentially Explosive Atmospheres).

Special condition for safe use.

1. When connected to an air actuator the maximum rubbing speed of any component within the valve must not exceed 1 m/s
2. The ambient temperature range for which the equipment is suitable is dependent on the material it's constructed from the pressure at which they are to be used. Maximum withstand pressure is included within the Pressure Equipment Directive (PED) marking. Each piece of equipment has a lower ambient temperature value than is stated within the documentation provided with each individual item.
3. Layers of dust shall not be permitted to build up on the actuator. Process fluid temperatures shall not approach the layer ignition temperature (LIT) or cloud ignition temperature (CIT) of the dust atmosphere in which the equipment is to be used with

- a degree of safety of 50K (e.g. for dust atmosphere with LIT=CIT=400°C, the process fluid must not exceed 350°C).
4. Actuators that may be located in Zone 0 or Zone 20 potentially explosive atmospheres must be installed such that they are protected from risk of impact. Actuators shall be subject to routine inspection and replaced or repaired should any damage to the surface coating be noted.
5. Pressurised air supplied to this equipment shall be taken from a source known to be non-hazardous and free from ingress of foreign objects or liquids.
6. User shall ensure any lubrication medium used has an auto-ignition temperature greater than 50K above the maximum surface temperature of installed equipment and be resistant to carbonization.

Air Supply

Use clean dry air according to DIN.ISO 8573-1 class 4. Other inert gases may be used such as nitrogen, argon and natural gas. Thin hydraulic oil can also be used. Do not use water as a supply medium.

Oxygen or hydrogen must NOT BE USED.

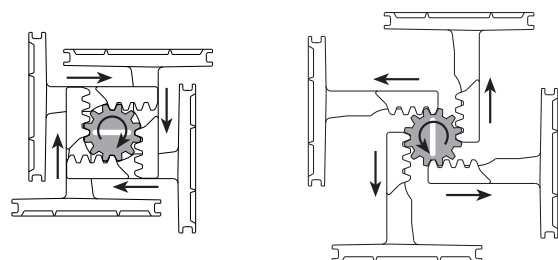
The operating medium is to be filtered to a particle size of 30 microns or less. Always consult with a representative of Compact for suitability and recommended practice. Piping connected to the actuator or accessories should be fitted according to recommended instrumentation piping practice. Prior to connection make sure all lines have no loops and are free of water, oil or other contaminants that may be trapped in the pipes. Pipes must be flushed with air to clean the passages. Where sealants have been used for threaded connections, care must be taken to avoid excess material being forced into the actuator ports.

Supply Pressure

The supply pressure for the Compact actuators are as follows:
 Double-acting: 2-8 barg (30-120 psig).
 Spring-return: 3-8 barg (40-120 psig).
 Spring-return actuators can also operate with air pressure of 2 barg (30 psig) by using the appropriate spring configuration as shown in the Compact catalogue. When sizing an actuator to the available air supply, make sure you have adequate power in the actuator to allow the valve to complete its operation and leave enough power for safety margin.

Temperature

The standard temperature limits for the Compact actuators are -20°C (-4°F) to +80°C (+176°F). For temperatures below or above these figures special preparation and materials are required such as grease, O-rings, pinion bearings and pads. The Compact maximum working temperature is 130°C (266°F) when used with Viton O-rings and HT grease. The Compact minimum working temperature is -60°C (-76°F) when being used with LT O-rings and LT grease.



When used in sub-zero temperatures it is essential to use an air dryer on the air supply line to prevent moisture. Always consult with a representative of Compact for suitability and recommended practice.

Humidity – Corrosion

In corrosive environments or in high humidity environments it is recommended to use a Breather Block to avoid contaminated air from the environment entering the actuator. (See Bulletin B370 Namur Breather Block).

Reducers

Habonim recommends using reducers to properly control the opening / closing speed of Compact actuators, especially if mounted on Butterfly valves or Dumpers.

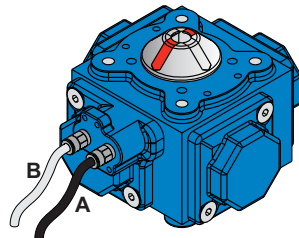
PRINCIPLE OF OPERATION

The Compact actuator is a pneumatic quarter-turn rack & pinion actuator. Air pressure applied to the piston surface area generates thrust which transforms linear motion to rotary motion of the pinion. The Compact has four pistons centrally located around one pinion. This means that the actuator can generate twice the torque of dual piston actuators, is lightweight, occupies minimum space and has minimal air consumption.

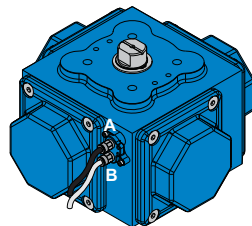
AIR CONNECTIONS

The actuator air connections are marked **A** and **B**. Port **B** connects via a series of holes to all the four pistons. The air passes into the Namur cover (or insert) and through holes which are connected to the two neighboring pistons. Each piston receives the air flow from two directions which ensures a quick response.

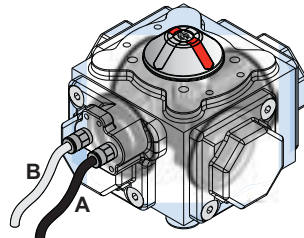
In sizes C15 to C45/C45M port **A** is to the right and port **B** to the left.



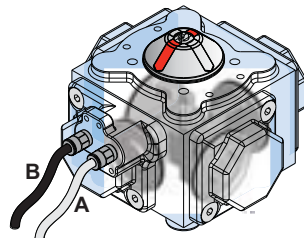
In sizes C60/C60M and C75/C75M the air connections are vertical where port **A** is above port **B**



Pressure entering port **A** into the center chamber pushes the pistons outward and rotates the pinion **CW**

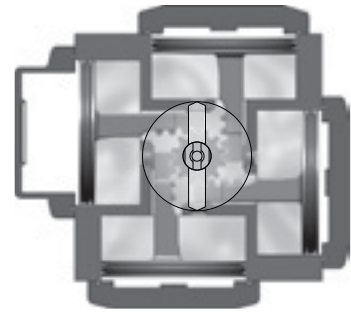
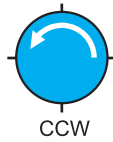


Pressure entering port **B** into the outer chambers pushes the pistons inward and rotates the pinion **CW**



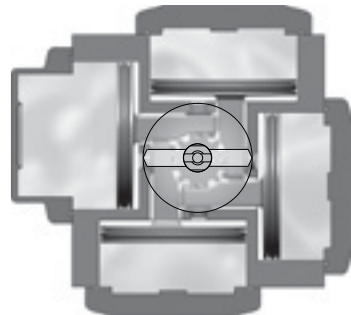
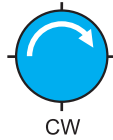
Double Acting (DA)

Pressure entering Port A to open:
Center chamber pressurized. Pistons move outward and the pinion rotates counter clockwise (CCW).



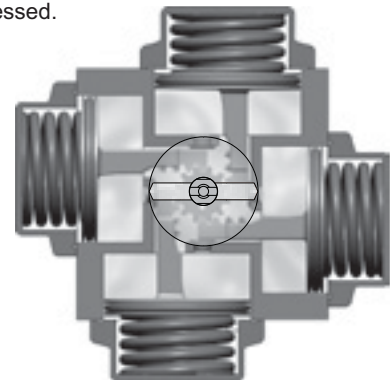
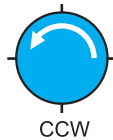
Pressure entering Port B to close:

Outside chambers pressurized. Pistons move inward and the pinion rotates clockwise (CW).



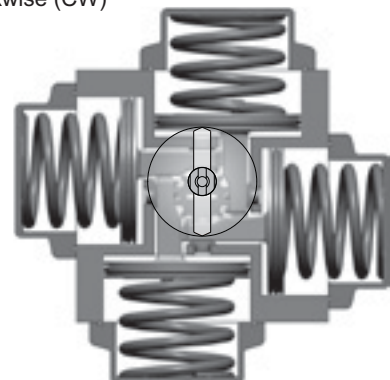
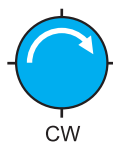
Spring Return (SR)

Pressure entering Port A to open:
Center chamber pressurized. Pistons move outward and the pinion rotates counter clockwise (CCW).
Springs are compressed.



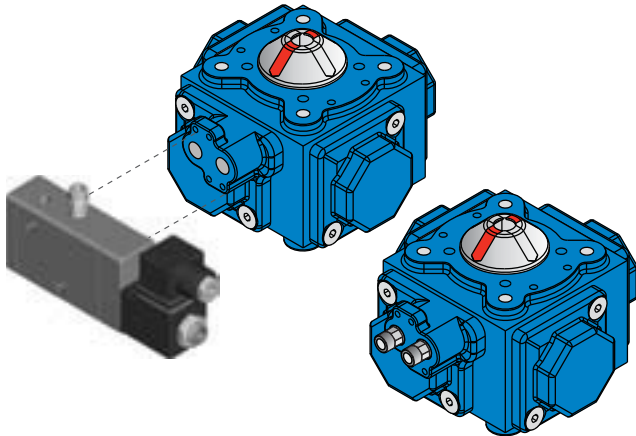
Pressure exiting Port A to close:

Air released from center chamber. Springs drive pistons inward. Pinion rotates clockwise (CW)



NAMUR Solenoid Mounting

Connection of the air supply is accomplished by mounting a solenoid directly onto the Namur cover which has a mounting pad conforming to the Namur standards. (Only Solenoids made to the NAMUR standard can be mounted in this way.) The Compact actuator can also be piped with solid or flexible tubing from remote solenoid valves.

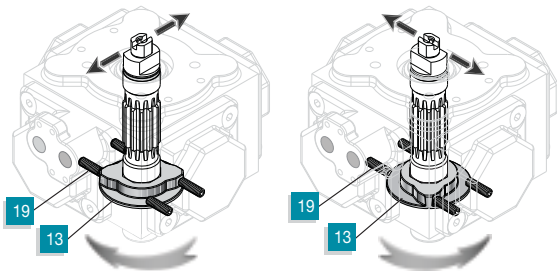


ISO 5211 or DIN 3337

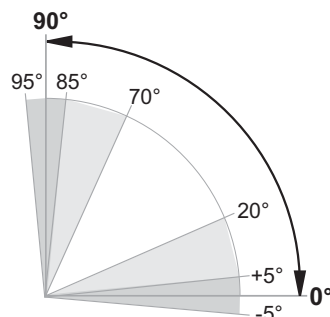
The actuator bottom flange is in accordance with ISO 5211 (or DIN 3337) international standards and incorporates a star shaped female drive for flexibility to fit various valve output shafts. The valve can be attached by a bracket or mounted directly onto the actuator using one of the various ISO hole patterns.

TRAVEL ADJUSTMENT

The actuator comes factory adjusted to produce a 90° rotation. The rotation is restricted by the stop (13) and four adjustment screws (19) which provide fine tuning or a limiting stroke. The screws are threaded into the actuator body and are diametrically opposed to create simultaneous and equal forces on opposite sides of the stop to eliminate off-center forces.



The standard stop screws allow adjustment of +/-5° in the travel limits. Other Intermediate positions can be achieved with a longer set of stop screws which will enable travel from 0° to 20° and from 90° to 70° rotation.



INDICATOR & PUCK

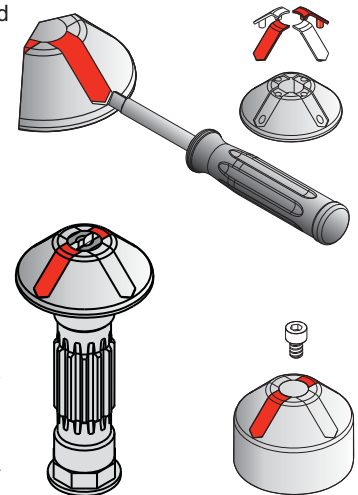
All actuators are assembled with a highly visible indicator or puck. The indicator and puck have interchangeable "snap-on" flow direction arrows to identify valve position. The arrows can be arranged to provide any pattern according to the valve ports.



Use a screw driver or sharp instrument at the arrow head to push it out and reposition as necessary.

The puck has three contact screws to allow signaling of any position. The puck is screwed to the pinion Namur thread.

(The indicator snaps to the pinion with its Namur interface projecting above it and enabling any ancillary to connect to the pinion). The indicator assembles on the pinion with its Namur interface projecting above the pinion enabling the connection of ancillary devices to the pinion.



IDENTIFICATION

Compact actuators are supplied with a nameplate located on the side of the body. The information includes actuator size, model, type, spring set, threads, indicator, additional options, date of manufacture, protection rating, pressure limits and company logo.

Actuator description
Compact "C" series

Work
Instruction

Week of
manufacture

Year of
manufacture



1 DISASSEMBLY

General

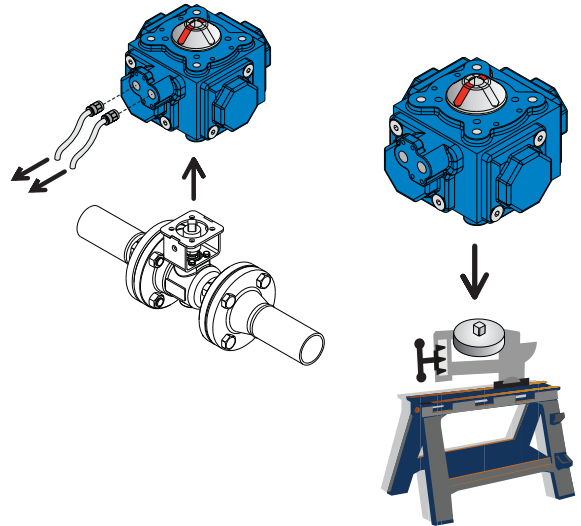
Before any disassembly, make sure you read all the warnings and safety instructions in this leaflet.

Do not attempt to disassemble the actuator while it is still connected to the valve or to any ancillary device.

Verify that the actuator is not pressurized. Check that the air ports are vented and that spring return actuators are in the fail close position.

Work in a clean area, free of dust, debris, grease, corrosives and moisture. For security and comfort perform repairs on a table equipped with a vice and an available air supply. Clamp an adaptor to the vice and place the actuator drive on it.

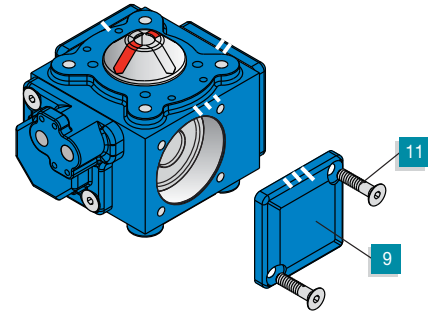
Use only Metric hex head wrenches and ensure the edges are not blunt.



2 Disassembly of Double Acting Covers

- 2.1 Before disassembly mark the covers (9) with the body. This is recommended so as to reassemble each cover to its original position when re-assembling the actuator.
- 2.2 Remove the cover screws (11). If initially the screws are jammed, strike the head lightly with a flat pin to loosen them.
- 2.3 Remove the covers making sure not to damage the O-ring seals (7, 7A, 10).
When removing the Namur cover (8A) ensure that the O-ring connecting to the inner chamber is secure in its groove. To convert to a SR actuator, go to Section 7 for instructions.

DA Cover Removal



3 Disassembly of Spring Return Covers

Caution: Springs in the actuator are under tension.

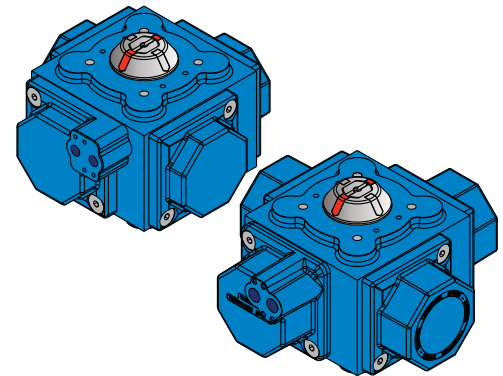
The compact actuator has 2 types of spring assemblies.

The standard spring assembly – used in models: C15, C20, C25, C30, C35, C45, C60, C75.

The loaded cartridge spring assembly– used in the M models: C30M, C35M, C45M, C60M, C75M.

Before disassembling a SR actuator you must identify the model type of the actuator according to the following:

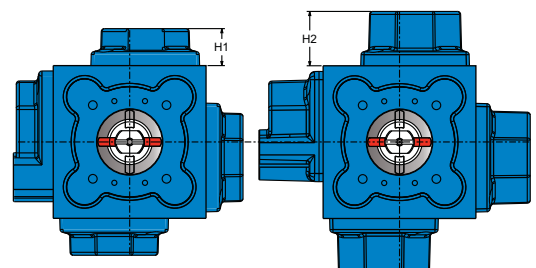
- 1. Identify by the attached tag.
- 2. Cartridge spring actuators can be identified by the "tensioned springs" warning on the Covers.
- 3. Cartridge spring actuators have a longer cup cover according to the following table:



Standard spring assembly	Cover height H1 (mm)	Cartridge spring assembly	Cover height H2 (mm)
C15	18.8	N/A	N/A
C20	22.5	N/A	N/A
C25	26.5	N/A	N/A
C30	30.1	C30M	45.1
C35	36.2	C35M	50.0
C45	43.2	C45M	60.2
C60	58.3	C60M	73.3
C75	71.0	C75M	86.0

Standard Spring Assembly

Cartridge Spring Assembly



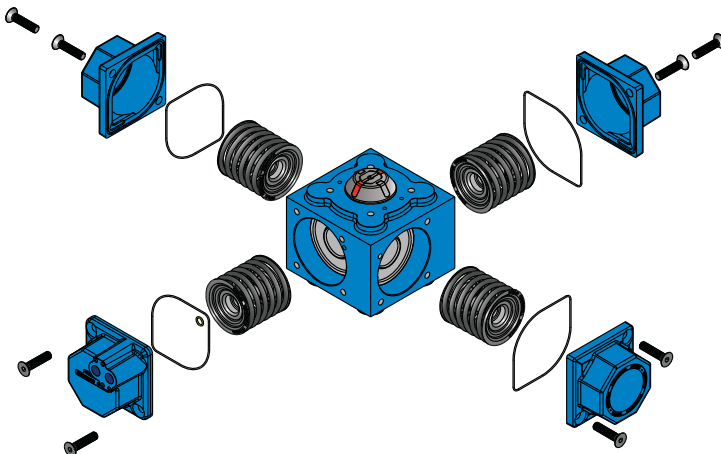
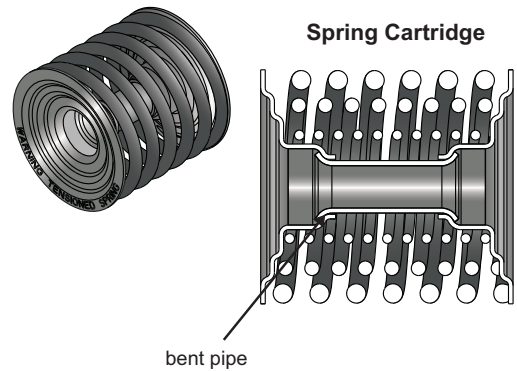
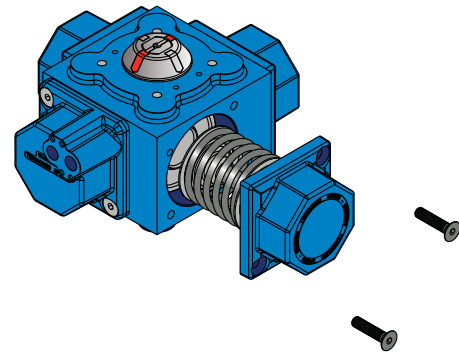
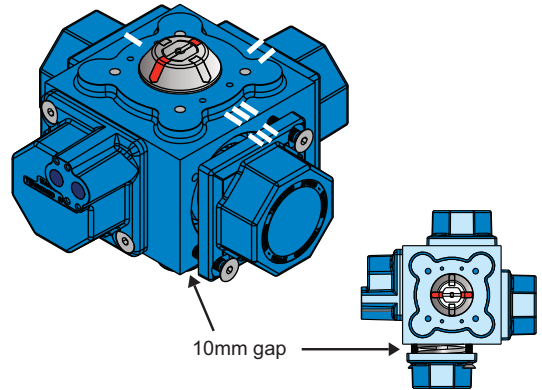
After identifying the actuator type, use the following disassembly instruction:

- For spring cartridge type CxxM – follow the disassembly instructions in Section 3.1-3.8
- For standard spring assembly type Cxx – follow the disassembly instructions in Section 4

Disassembly of Spring Return Covers for Cartridge Spring Assembly C30M, C35M, C45M, C60M, C75M

Caution: Springs in the actuator are under tension.

- 3.1 Before disassembly, mark each of the non-Namur covers (29) with the body. This is recommended to identify each cover and to reassemble it in its original position when re-assembling the actuator.
- 3.2 Open a gap of 10 mm maximum between the cover and the actuator body. Release the cover screws in sequence by turning each opposing screw two rotations at a time. After opening the gap there should be no tension on the cover, make sure the cover can be moved freely. Warning: If after opening a 10mm gap the cover is still under tension, close the cover by retightening the screws and contact Habonim. DO NOT release the cover completely.
- 3.3 Only after ensuring that the cover is loose, release the cover screw and remove the cover while supporting the spring cartridge to prevent it from falling out of cover.
- 3.4 Make sure that the Cover O-ring (7,7A) is secure in its groove. When removing the Namur cover (29A) make sure the air supply O-ring (10) is also secure in its groove.
- 3.5 Carefully examine the spring cartridge and make sure it's not damaged, special attention must be given to the bent pipe at the center which holds the complete unit together. **In case cracks or any other severe damage is observed, close the cover by retightening the screws and contact Habonim.**
- 3.6 **Warning: Under NO circumstances should the spring cartridge be cut or disassembled in order to change the spring set.** The only way to change the spring set is by changing to a different spring cartridge.
- 3.7 Place the spring cartridge in the cover for assembly with the seals.
- 3.8 Follow the same procedure for all four cylinders. **To replace only the seal or the spring configuration or to convert it to a DA actuator, go to Section 7.16 for instructions.**



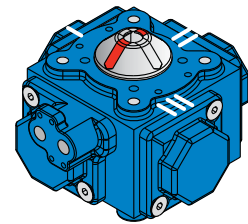
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Disassembly of Spring Return Covers for Standard spring assembly C15, C20, C25, C30, C35, C45, C60, C75.

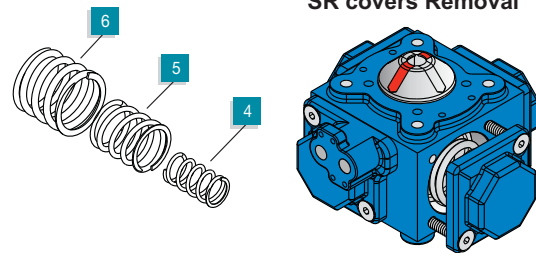
Caution: Springs in the actuator are under tension.

- 4.1 Before disassembly, mark each of the non-namur covers (8) with the body. This is recommended to identify each cover and to reassemble it in its original position when re-assembling the actuator.
- 4.2 Remove the cover screws in sequence by turning each opposing screw two rotations at a time. When removing the Namur cover (8A) ensure that the O-ring connecting to the inner chamber is secure in its groove. Before the screws leave the threads the springs become free of tension. The springs should be free of tension before the threads of the cover screws are completely undone. If during initial rotation the screws are jammed, strike them lightly on the head with a flat pin to loosen them. When there are 4 screws as described previously.
- 4.3 Remove the covers making sure not to damage the cover seals.
- 4.4 Remove the springs (4,5,6) from the cylinder and lay them together in their covers ready for the assembly stage.
- 4.5 Follow the same routine on all four cylinders.
To replace the spring configuration or to convert to DA actuator, go to Section 7.16 for instructions.

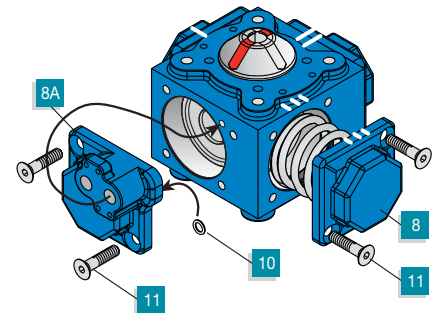
Mark the covers



SR covers Removal



Namur cover facing air hole



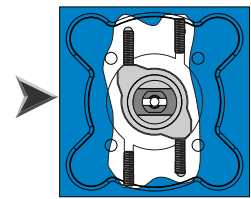
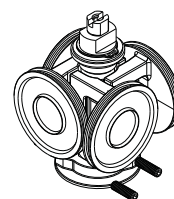
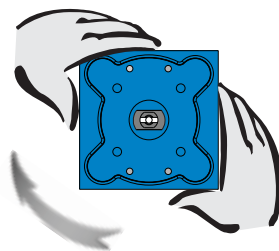
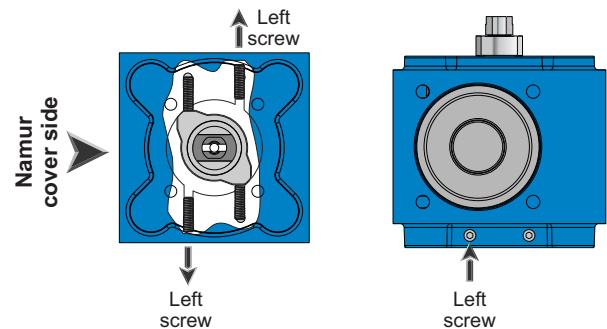
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Piston Disassembly

- 5.1 Looking at the actuator as shown to the left, back off the left most of each pair of stroke adjustment screws (19) approximately 6-10 mm outward. This will enable the stop to rotate beyond its 90° limit so the pistons can come out. It may require a little force to release the adjustment screws as they are assembled with a thin layer of Loctite® 221.
- 5.2 Grip the actuator body with both hands and rotate it in the CW direction to eject the 4 pistons from their cylinders. The 4 pistons will exit the actuator body as demonstrated to the right.

Top View

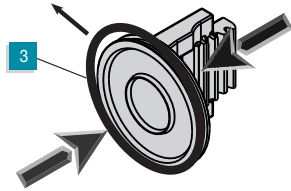
Side View



As the body is rotated CW, the piston moves out of the cylinder

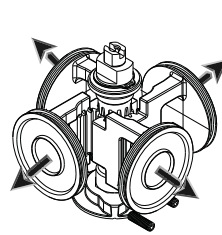
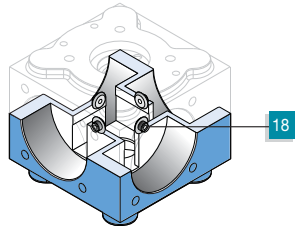
0°

- 5.3 Remove the piston O-rings (3) by pressing them slightly from both sides of the piston, creating a loop and pull them out of their groove. Do not use a sharp object to pry them out.

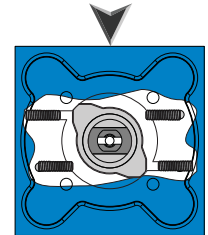


- 5.4 Push the four pads (18) in towards the pinion with a tool and remove them from body.

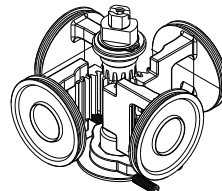
Note: Usually it is not required to remove the pads.



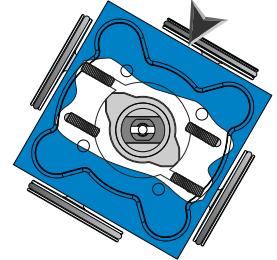
After 90° rotation the pistons are aligned with the body



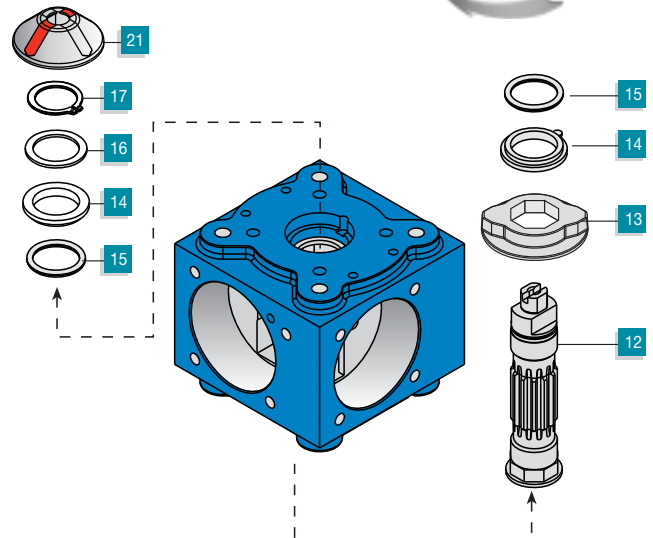
+90°



After another 30° rotation the pistons are ejected from the body



+30°



6 Pinion Disassembly

For C35/C35M to C75/C75M go to section 8.0

- 6.1 Remove the indicator (21). Use two screwdrivers to pry it off the pinion. Do not apply force to the indicator.
- 6.2 Remove the circlip (17).
- 6.3 Push the pinion (12) down and remove it from the body.
- 6.4 The stop plate (13), bottom bearing (14) and pinion O-ring (15) will drop out with the pinion. There is no need to separate the stop from the pinion. Make sure the stop and pinion stay together in the same orientation they came out.
- 6.4 Remove the disc bearing (16), upper bearing (14) and O-ring (15) from the body.

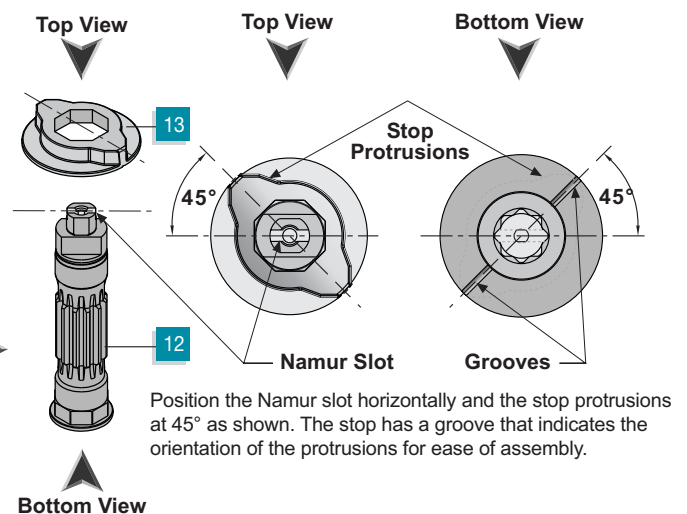
7 ASSEMBLY

General

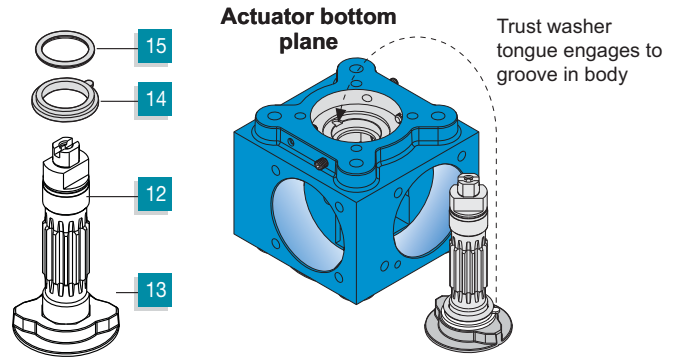
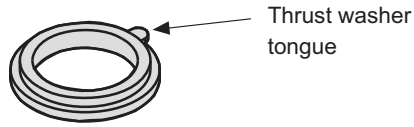
Before assembling assembly, clean the grease in the cylinders and all the actuator parts. Check the cylinder for any scratches. The surface should be smooth and without any damage, debris, rust or other contaminants. Apply grease to all the parts prior to assembly.

- 7.1 If you have removed the pads, push them back into their holes as shown in section 5.4.
- 7.2 If the stop (13) has been removed from the pinion (12), re-insert it while ensuring that sure the orientation of the two stop protrusions are at 45° to the Namur slot as shown in the drawing to the right. Use the two grooves which are cast on the bottom of the stop to identify the stop's orientation.
- 7.3 Fit the thrust washer (14) and pinion O-ring (15) to the pinion (12) and stop (13).

For C35/C35M to C75/C75M go to section 8.0

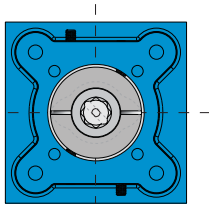


7.4 Insert the pinion assembly into the body. Ensure that the thrust washer tongue engages the opposing groove in the body.



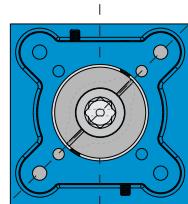
7.5 When inserting the pinion in the body, bring the grooves of the stop perpendicular to the adjustment screws to ensure the correct angle of rotation. Rotate the pinion CCW until the flats of the protrusion hit the adjustment screws and the grooves line up with the threaded holes as shown below.

Step 1
Grooves perpendicular to adjustment screws

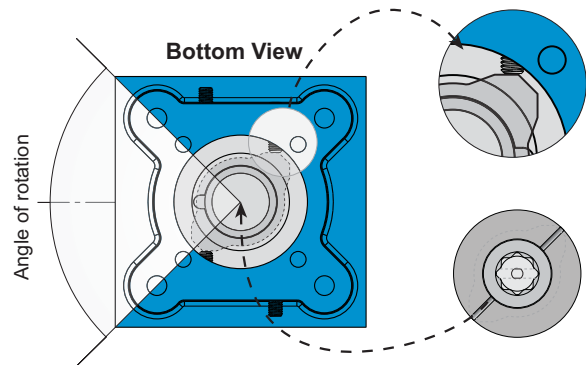


Bottom View

Step 2
Grooves aligned to adjustment screws

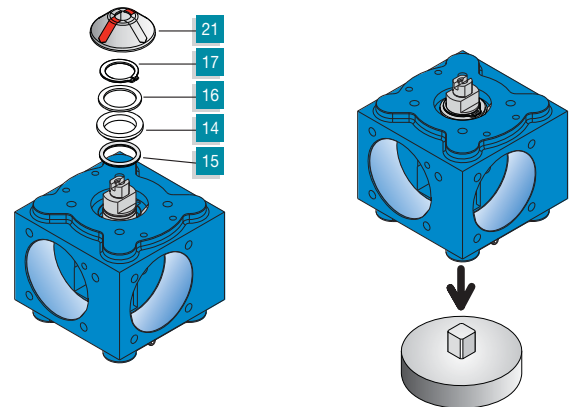


Bottom View



7.6 Fit the pinion O-ring (15), thrust washer (14) and disc bearing (16) to the pinion. Make sure that the thrust washer tongue engages the opposing groove in the body.

7.7 Always use a new circlip (17). Assemble it onto the pinion. If the pinion does not protrude enough, check that the bottom thrust bearing tongue has properly engaged into the body groove and the stop is recessed in the body. Clip the indicator (21) back onto the pinion.



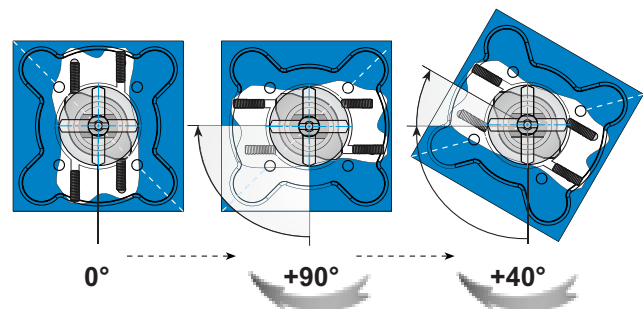
7.8 Place the assembled body with the pinion on the rig with the adaptor for inserting the pistons back in the cylinders.

7.9 Looking from the top of the actuator, rotate the body 90° CW and another 40° to bring it to the position for inserting the pistons.

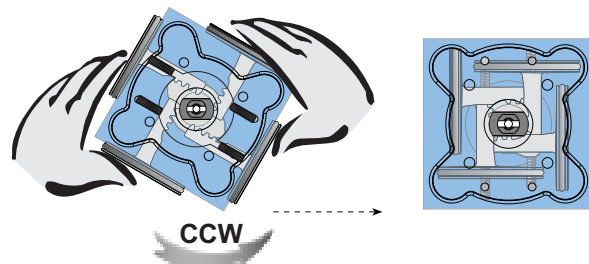
7.10 Fit the O-rings on the pistons.

7.11 Apply grease in the body cylinders, to the groove and rack of the pistons, and to the piston O-rings.

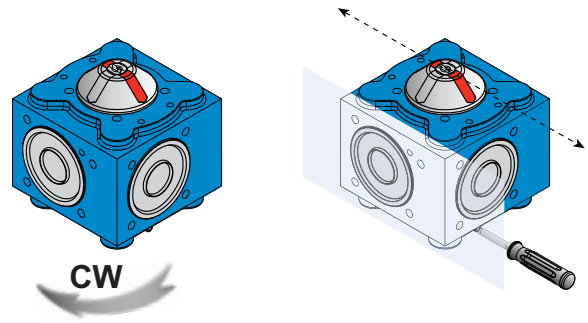
7.12 Insert the four pistons into the cylinders, keeping the orientation of the racks so the teeth engage with the pinion teeth.



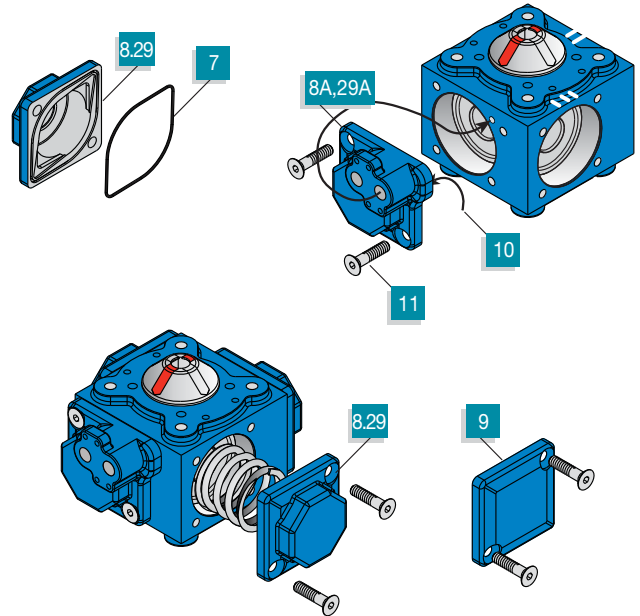
7.13 Holding all 4 pistons with both hands as shown, rotate the body CCW until it stops against the adjustment screws and all 4 pistons are pulled inside. Make sure that all 4 pistons have reached the same position in the cylinder.



7.14 Rotate the body back 90° CW to the open position so the pistons are now almost flush with the actuator body. Apply a drop of Loctite® 221 to the two backed off adjustment screws and screw them back until they both touch the stop. Adjust them until you visually see that the pinion flats are parallel with the body plane.

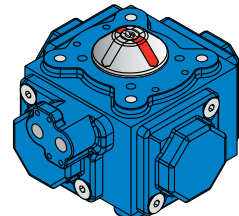


- 7.15 Rotate the body back and forth till the pistons run smoothly in the cylinders.
- 7.16 Bring the pistons in to the closed position and once again apply grease in the cylinders behind the pistons.
- 7.17 Apply grease to all the spring sets.
- 7.18 Push the cover O-rings (7) in the groove of the covers (8,9,29). If needed, replace them with a new set. Note that the Namur cover (8A, 29A) has an additional small O-ring (10) that should be in place.
- 7.19 Lubricate the cover screws (11).
- 7.20 Assemble the Namur cover first (8A, 29A). If this is a SR actuator, place the spring set in the cover and then tighten the cover (8,29).
- 7.21 Always tighten the screws in sequence.
- 7.22 Assemble the DA covers (9). Make sure the covers are put back according to the marks made during disassembly.
- 7.23 Assemble the SR covers with the spring set. The screws are long enough to engage the threads before the springs begin to compress. Tighten the screws in sequence only two turns at a time.
- 7.24 Finally torque the screws to the set figures in the table below.



Actuator Screws Torque Figures

Actuator Size	Screw	NM	Lb-ft	Lb-in
C15 - C20	M5	3.5	2.5	30
C25 - C30/C30M	M8	9.0	6.5	80
C35/C35M	M10	18.0	13.0	160
C45/C45M - C75/C75M	M12/M16	40.0	30.0	360



8

Sizes C35/C35M - C75/C75M

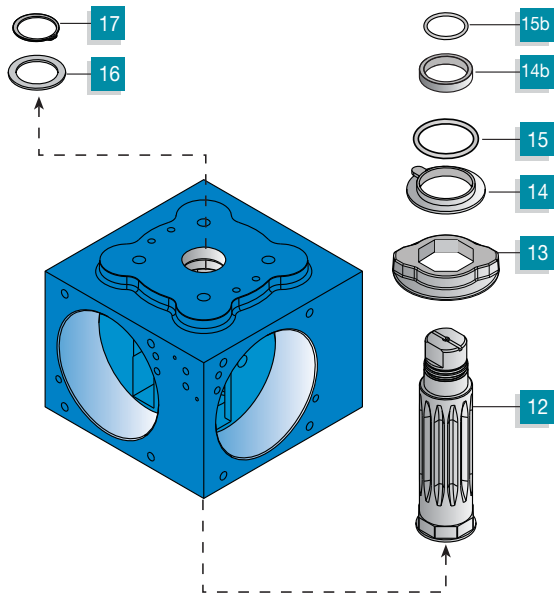
Sizes C35/C35M, C45/C45M, C60/C60M, and C75/C75M have a slightly different pinion assembly than the smaller sizes. The top bearing, O-ring disc bearing and circlip are smaller in diameter than those on the bottom. The top bearing and O-ring are assembled from the bottom and not the top as with the smaller sizes. The instructions below highlight the assembly differences.

Pinion Disassembly

- 8.1 Remove the circlip (17) and the disc bearing (16).
- 8.2 Push the pinion (12) down very carefully and remove it from the body.
- 8.3 The top bearing (14b) is inserted in the body and the top O-ring (15b) is fitted to the pinion. They should both come out with the pinion from the bottom.

8.4 The stop plate (13), bottom bearing (14) and bottom O-ring (15) will drop out with the pinion. There is no need to separate the stop from the pinion. Make sure the stop and pinion stay together in the same orientation they came out. The C75/C75M has an integral stop and will not separate.

For Assembly, return to section 7



Pneumatic Leak Test

The pneumatic test checks that there is no leakage across the pistons or to the environment.

Use commercial leak testing solution to check leakage to the atmosphere. A minimal leakage of one bubble every 10 seconds is considered acceptable. The pressure for the leak test will be 80 psig (5.5 barg). Use a calibrated pressure regulator to apply pressure to the actuator.

WARNING: Do not exceed the maximum operating pressure rating listed on the nameplate.

Cycle the actuator at least 5 times to allow the seals to find their position before commencing with the leak test.

Piston leakage

Any leakage across the piston is not acceptable.

- 1.0 Apply the pressure to port A and leave port B open.
- 2.0 Apply a leak testing soap solution to port B and check for leakage.
- 3.0 For DA actuators repeat this while applying pressure to port B and check port A for leakage.
- 4.0 If leakage is observed, disassemble the actuator again and check the seals, surface finish and cleanliness of the internal parts to find the cause of leakage. After doing the repair work, the leakage test must be performed again.

External leakage

For SR actuators apply the pressure to port A and leave port B open.

For DA actuators apply the pressure to port A and B. After applying pressure, wait a few seconds to let the pistons stabilize and then check for leakage. Apply the leak testing solution to the pinion output. For DA actuators apply the leak testing solution to the covers.

9

Pinion Assembly for C35/C35M to C75/C75M

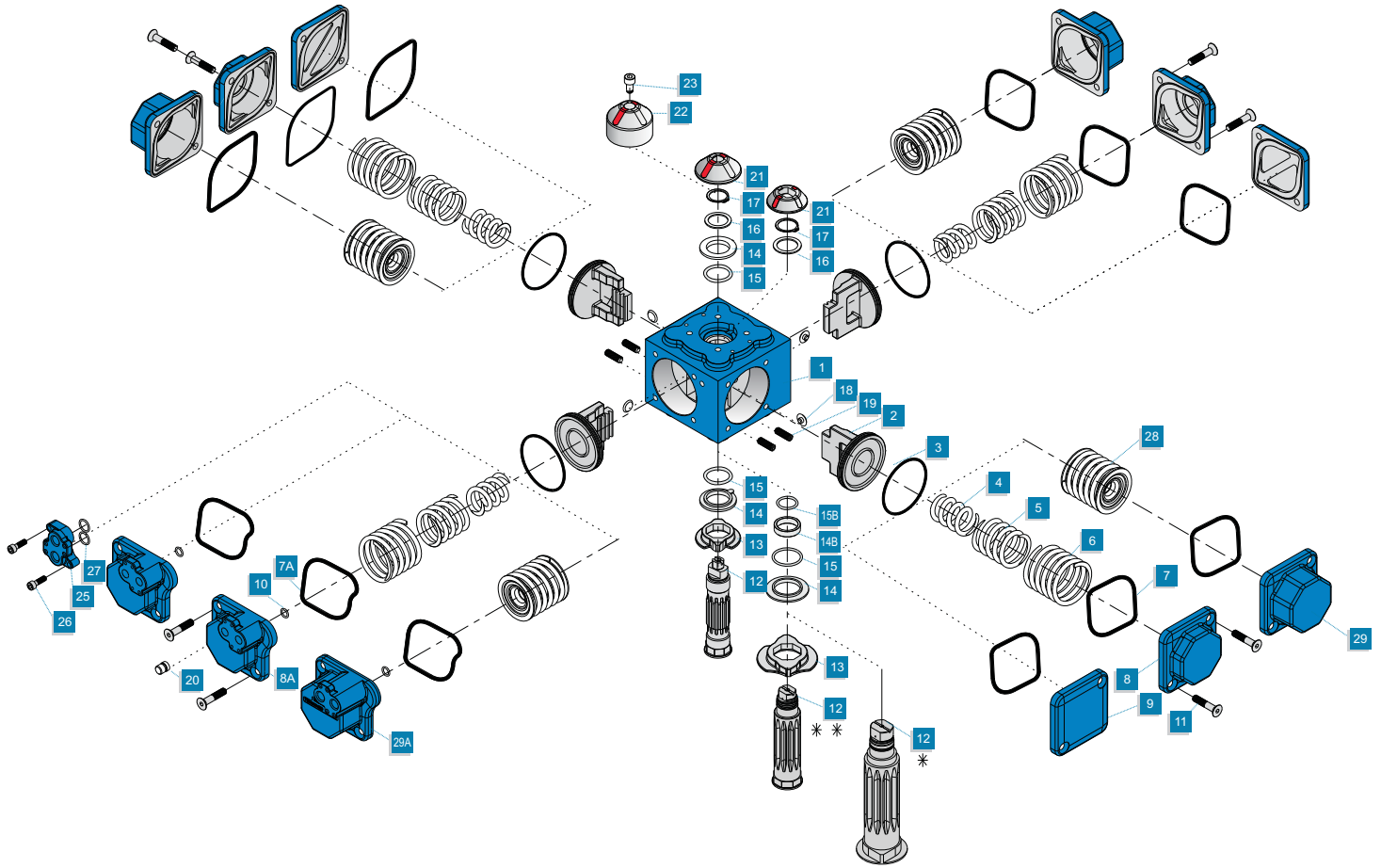
- 9.1 Assemble the stop (13), bottom bearing (14) and O-ring (15) as described in section 6.2.
- 9.2 Assemble the top bearing (14b) on the pinion (12) shoulder.
- 9.3 Fit the top O-ring (15b) on the pinion in its groove. Apply grease.
- 9.4 Insert the pinion assembly into the body. Make sure that the thrust washer tongue engages the opposing groove in the body. Be careful not to harm the top O-ring.
- 9.5 When inserting the pinion to the body, bring the grooves of the stop perpendicular to the adjustment screws to ensure the correct angle of rotation. Rotate the pinion CCW until the protrusion flats hit the adjustment screws and the grooves line up with the threaded holes as shown below. See illustrations in section 6.3.
- 9.6 Fit the disc bearing (16) to the pinion.
- 9.7 Always use a new circlip (17). Assemble it on the pinion. If the pinion does not protrude enough, ensure that the tongue of the bottom thrust bearing has properly engaged the body groove and the stop is recessed in the body.
- 9.8 Place the assembled body with the pinion on the rig with the adaptor for inserting the pistons back in the cylinders.

Return to section 7.9

ACTUATOR TESTING

After the actuator has been completely assembled, the following test procedures are necessary to ensure that it has been assembled correctly and to minimize personal risk.

PART LIST



*NOTE: C75/C75M PINION (12) & STOP PLATE (13) ARE ONE PIECE
** Pinion Assembly for Actuators C35/C35M - C75/C75M

Item	Description	Qty.	Material
1	Body	1	AL 356-T6
2	Piston	4	AL 356/380
3*	Piston O-Ring	4	Buna N. Viton, EPDM, HNBR
4	Inner Spring	4	Spring steel, Painted
5	Middle Spring	4	Spring steel. Painted
6	Outer Spring	4	Spring steel. Painted
7*	Cover O-Ring	3	Buna N, Viton, EPDM, HNBR
7a*	Namur Cover O-Ring	1	Buna N, Viton. EPDM, HNBR
8	Spring Return Cover	3	AL 380
8a	Namur Cover	1	AL 380
9	Double Acting Cover	3	AL 380
10*	Air Supply O-Ring	1	Buna N, Viton, EPDM, HNBR
11	Cover Screw	8-16	ST. ST.
12	Pinion	1	Steel E.N.Coated
13	stop plate	1	STST 316
14*	Thrust Washer	2	Delrin, CF PTFE, UHMWPE
14B*	Bearing	1	Delrin, CF PTFE, UHMWPE

Item	Description	Qty.	Material
15*	Pinion O-Ring	2	Buna N. Viton, EPDM, HNBR
15B*	Top Pinion O-Ring	1	Buna N. Viton. EPDM, HNBR
16*	Disc Bearing	1	ST.ST / Delrin
17*	Circlip	1	ST.ST, spring Steel Zinc Coated
18*	Pad	4	Delrin, CF PTFE, UHMWPE
19	Stroke Adjustment Screw	4	ST.ST
20	Exhaust Plug (Silencer)	1	Delrin, (Brass)
21	Indicator	1	Plastic (ABS), Red & White
22	Puck	1	Plastic (ABS), Red & White
23	Indicator Screw	1	ST.ST
24	Tag (not shown)	4	ST.ST
25	Namur insert	1	AL 380
26	Insert screw	2	ST.ST
27*	Namur Insert O-Ring	2	Buna, Viton, EPDM, HNBR
28	Spring Cassette	4	Spring steel, Painted
29	Spring Return Cover for M series	3	AL 380
29A	Namur Cover for M series	1	AL 380

*spare parts included in standard repair kit