

Repair Kit For ALL NORBRO 39R and 40R Pneumatic Actuators Sizes 10 to 42

10-35 PINION Pre Rev. D  
40 & 42 PINIONS ALL REVISIONS

Only one off Item 2  
on size 40 & 42 (lower)

Item 3  
Omitted on  
size 40 & 42

10-35 PINIONS Rev. D

Star Drive pinions only, one off  
lower item 2 and one off item 3 omitted

END CAPS, PISTON, SUPPORT RODS  
SECTION A-A

END CAPS Style 1

'O' RING NOTE:  
Replace without removing  
interlocking ring or bearings

INTERLOCKING RING & BEARING  
Not supplied

Each size of actuator has its own repair kit.  
The appropriate column in the table below shows the contents of the repair kit.

**DO NOT REMOVE INTERLOCKING RINGS.** If bearings are loose or oval contact Flowserve Flow Control or official distributor.  
**NOTES:**  
Size 15 Actuators with Style 1 End Caps. This is an old design and if maintenance is required on units of this age we recommend you replace the actuator.  
Size 35 Actuator with Style 1 End Caps require one (1) Top bearing 84-35-109. If required contact Flowserve Flow Control.

| Actuator Size and Series |                             |     | 10-39R/40R        | 15-39R/40R        | 20-39R/40R        | 25-39R/40R        | 30-39R/40R        | 33-39R/40R        | 35-39R/40R        |     |  | 40-39R/40R   | 42-39R/40R   |
|--------------------------|-----------------------------|-----|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-----|--|--------------|--------------|
| Item No                  | Description/Repair Kit Code | Qty | 10-ARK40-0* Rev.D | 15-ARK40-0* Rev.D | 20-ARK40-0* Rev.D | 25-ARK40-0* Rev.D | 30-ARK40-0* Rev.D | 33-ARK40-0* Rev.D | 35-ARK40-0* Rev.D | Qty |  | 40-ARK40-0*  | 42-ARK40-0*  |
| 1                        | Spiral Retaining Ring       | 1   | Ø15.1 x 1.1       | Ø16.9 x 1.3       | Ø20.9 x 1.3       | Ø26.4 x 1.6       | Ø32.1 x 1.6       | Ø36.8 x 1.9       | Ø41.3 x 1.9       | 1   |  | Ø46.8 x 2.2  | Ø66.7 x 2.7  |
| 2                        | Thrust Washer               | 3   | B08410-52100      | B08415-52100      | B08420-52100      | B08425-52100      | B08430-52100      | B08433-52100      | B08435-52100      | 2   |  | B08440-52100 | B08442-52100 |
| 3                        | Thrust Bearing              | 2   | B08410-28300      | B08415-28300      | B08420-28300      | B08425-28300      | B08430-28300      | B08433-28300      | B08435-28300      | -   |  | N/A          | N/A          |
| 4                        | Support Rod Bearing         | 6   | B08410-28400      | B08415-28400      | B08420-28400      | B08425-28400      | B08430-28400      | B08433-28400      | B08435-28400      | 6   |  | B08440-28400 | B08442-28400 |
| 5                        | Top Bearing                 | 1   | B08410-28100      | B08415-28100      | B08420-28100      | B08425-28100      | B08430-28100      | B08433-28100      | B08435-28100      | 1   |  | B08440-28100 | B08442-28100 |
| 6                        | Bottom Bearing              | 1   | B08410-28200      | B08415-28200      | B08420-28200      | B08425-28200      | B08430-28200      | B08433-28200      | B08435-28200      | 1   |  | B08440-28200 | B08442-28200 |
| 7                        | 'O'-Ring Pinion Top         | 1   | R016              | R115              | R118              | R122              | R125              | R222              | R224              | 1   |  | R329         | R335         |
| 8                        | 'O'-Ring Pinion Bottom      | 1   | R020              | 0225-30           | R123              | R129              | R133              | R226              | R228              | 1   |  | R333         | R339         |
| 9                        | 'O'-Ring End Cap            | 2   | R038              | R152              | R155              | R158              | R161              | R262              | R264              | 2   |  | R268         | R274         |
| 10                       | 'O'-Ring Support Rod        | 6   | R014              | R114              | R117              | R120              | R122              | R220              | R222              | 6   |  | R328         | R330         |
| 11                       | 'O'-Ring Piston             | 2   | R229              | R234              | R240              | R348              | R354              | R440              | R441              | 2   |  | R674         | R448         |

\* **Repair Kit Temperature Ranges**  
Standard Temperature Kit -20°C to +100°C e.g. 10-ARK40-0S Rev.D (Rocol Sapphire Lo-Temp 2 Grease)  
High Temperature Kit -20°C to +150°C e.g. 10-ARK40-0H Rev.D (Rocol Premier Grease)

# Repair Kit For ALL NORBRO 39R and 40R Pneumatic Actuators Sizes 10 to 42

## SECTION 1. DISMANTLING

**WARNING:** Before starting to dismantle, the actuator must be depressurised and isolated pneumatically, electrically and mechanically.

### 1.0 Size 10 to 42 Non Limit stop and Size 10 to 42 Limit stop (White limit stop label on end cap) Double Acting Actuator (No Springs - Code A) e.g. 25-RDA40

- a) Remove end cap screws and then remove both end caps.
- b) Rotate pinion (anti-clockwise) until pistons disengage (reach their end of travel).
- c) Remove piston/support-rod assemblies from body by pulling longest protruding support-rod ends.
- d) Remove circlip or spiral retaining ring, thrust washer and bearing from pinion top.
- e) Push pinion out through the base of the body.
- f) It is unnecessary to separate the support-rod from the piston. If either component is damaged or worn to excess, a complete piston/support-rod set must be fitted.

### 1.1 Size 10 to 42 Non Limit stop and Size 10 to 42 Limit stop (White limit stop label on end cap) Spring Return Actuator (Springs - Code B, C, D or E) e.g. 25-RDC40

The conventional end cap screws used on spring return actuators are of sufficient length to safely release spring compression.

**CAUTION:** Disassembly under load after an extended period may result in bolt seizure.

To minimise the risk of bolt seizure during disassembly, the following preliminary procedure is recommended. Check to ensure all four end cap bolts are present and secure. Remove one end cap bolt completely, leaving the other three fully tightened. Thoroughly lubricate the bolt thread and under head surface with grease or heavy lubricant. Replace and fully tighten the bolt. Repeat each sequence with each of the remaining three bolts before proceeding below.

- a) Undo the end cap screws of one end cap at a time, diagonally, evenly and in small stages. N.B. If this is not done, the springs will tilt the end cap – preventing complete removal of the screws.
- b) Once both end caps are removed further dismantling procedures on all sizes of spring return actuator are identical to double acting units. Spring replacement procedure is detailed in Section 2.1.

### 1.2 Size 40 to 42 Limit stop (Yellow limit stop label on end cap) Double Acting Actuator (No Springs - Code A) e.g. 40-RDA40

- a) Remove inlet end cap screws and then remove inlet end cap.
- b) Remove limit stop nuts from limit stop end cap.
- c) Unscrew limit stop tie rods and remove from support-rods.
- d) Remove limit stop end cap screws and then remove limit stop end cap.
- e) Rotate pinion (anti-clockwise) until pistons disengage (reach their end of travel).
- f) Remove piston/support-rod assemblies from body by pulling longest protruding support-rod ends.
- g) Remove circlip or spiral retaining ring, thrust washer and bearing from pinion top.
- h) Push pinion out through the base of the body.
- i) It is unnecessary to separate the support-rod from the piston. If either component is damaged or worn to excess, a complete piston/support-rod set must be fitted.

### 1.3 Size 40 to 42 Limit stop (Yellow limit stop label on end cap) Spring Return Actuator (Springs - Code B, C, D or E) e.g. 40-RDC40

These actuators are fitted with encapsulated springs that do not require precompression tooling. Conventional end cap screws used on spring return actuators are of sufficient length to safely release spring compression.

- a) Follow the dismantling procedure in section 1.2

### 1.4 Remove all Bearings and 'O' rings taking care not to damage grooves or journals.

### 1.5 Carefully clean components and check for damage.

## SECTION 2. RE-ASSEMBLY

Where greasing is specified, use the grease provided within the repair kit

### 2.0 Size 10 to 42 Non Limit stop and Size 10 to 42 Limit stop (White limit stop label on end cap) Double Acting Actuator (No Springs - Code A) e.g. 25-RDA40

#### 2.0.1 Body

- a) Ensure that the piston and pinion bores in the body are clean and apply grease.
- b) Fit greased 'O' ring into groove in top pinion bore of body. Body top pinion bore groove will be found in Rev. D 10-35 and size 40 and 42 actuators, all Revisions.

**NOTE:** On pre-Rev. D size 10 to 35 actuators the top 'O' ring groove is created around the pinion by the stepped bearing (See note 2.0.2 c).

#### 2.0.2 Pinion

- a) Fit greased bearing and 'O' ring to bottom of pinion.
- b) Fit arrangement of thrust washer(s) and thrust bearing to top of pinion (See diagram overleaf). **NOTE:** Size 40 and 42 and star drive pinion size 10 to 35 have only one thrust washer and no thrust bearing at this position.
- c) On all size 10-35 prior to Rev. D, grease and assemble top pinion 'O' ring to pinion journal, above thrust washer.
- d) Grease the pinion top and bottom journals and insert pinion into the larger body pinion bore, simultaneously rotate and push into position, taking care not to trap or damage the 'O' ring(s).
- e.1) On all size 10-35 prior to Rev. D, grease and assemble stepped bearing over the pinion top to locate and secure 'O' ring.
- e.2) On all size 40 and 42, grease and assemble stepped bearing over the pinion top and into the body counter bore.
- e.3) On Rev. D size 10-35 actuators, grease and assemble the plain thrust bearing over the pinion top.
- f) Assemble thrust washer over the pinion and retain with the spiral retaining ring ensuring correct seating into groove.

#### 2.0.3 Piston Set (Stage 1)

- a) Check and identify the 'Inlet' piston/support-rod assembly - item with the 'cross hole' through the support-rod.
- b) Check and identify the 'Blank' piston/support-rod assembly - No 'cross hole' through rod.
- c) Check that all bearing and 'O' ring grooves are clean.
- d) Fit greased 'O' Ring and bearing into each piston short bore with the 'O' ring towards piston face.
- e) Grease and fit main piston 'O' ring to each piston support-rod assembly.
- f) Liberally grease the piston racks.
- g) Align pinion flats and groove with body length, rotate 30° anti-clockwise to achieve engagement position for insertion of piston support-rod assemblies. See re-assembly diagram.
- h) Position body 'side on' with Norbro label facing you.
- i) Select 'Inlet' piston assembly and insert rack end to the right of the body keeping support-rod nearest you, do not engage 'O' ring into body bore.
- j) Select 'Blank' piston assembly and insert rack end to the left of the body keeping the support-rod away from you. Engage both support-rod ends into the corresponding piston short bores.
- k) Push pistons together simultaneously ensuring the rack and pinion teeth engage correctly.
- l) Rotate the pinion clockwise so that the pistons come together. When fully together the pinion flats and groove should be square to body.

#### 2.0.4 End Caps (Stage 2)

- a) Check end cap 'O' ring/bearing grooves are clean. Fit one bearing into each support-rod bore. The bearing grooves are at a common level and are located deeper than the single 'O' ring groove
- b) Fit greased support-rod 'O' ring to remaining groove.
- c) Fit large 'O' ring to end cap over body location spigot. Ensure all bearings and 'O' rings are adequately greased.
- d) Identify the location of each end cap by reference to the foolproof pin in the flange face which must align with a location hole in the appropriate body end face. See re-assembly diagram.
- e) Slide the end caps over the support-rods, pushing in squarely to contact the end of the body. Secure with end cap screws tightened as follows:-
- f) Repeat for the other end cap.

| Actuator Size | Size 10 & 15 | Size 20 & 25 | Size 30 & 33 | Size 35 & 40 | Size 42 |
|---------------|--------------|--------------|--------------|--------------|---------|
| Torque        | 9NM          | 19NM         | 35NM         | 49NM         | 98NM    |

#### 2.1

### Size 10 to 42 Non Limit stop and Size 10 to 42 Limit stop (White limit stop label on end cap) Spring Return Actuator (Springs - Code B, C, D or E) e.g. 25-RDC40

- a) Follow the above procedure to step 2.0.4 d).
- b) Heavily grease one end of each spring and locate greased end into the spring pocket in the end cap. If actuator has less than 5 springs in each end cap, position according to the spring configuration detailed in the re-assembly diagram.
- c) Carefully invert end cap with springs onto body assembly ensuring correct orientation of fool proof pin, springs and support-rods.

- d) Insert two end cap screws diagonally and depress end cap by hand to engage screws. Engage Remaining two screws, ensuring support-rods locate in end caps.
- e) Tighten end cap screws diagonally, evenly and in small stages maintaining faces parallel, until tight to body. Repeat for second end cap using torques specified in 2.0.4 e).
- f) To ensure ideal internal location of spring ends, apply a gradually increasing air supply to the actuator up to 5.5bar. Actuator should open and close smoothly and silently thereafter.

### 2.2 Size 40 to 42 Limit stop (Yellow limit stop label on end cap) Double Acting Actuator (No Springs - Code A) e.g. 40-RDA40

- a) Follow the above procedure to step 2.0.4 d).
- b) Slide the limit stop end cap over the support-rods, pushing in squarely to contact the end of the body. Secure with end cap screws tightened as shown in table 2.0.4 e).
- c) Insert the limit stop tie rods through the support-rods and screw into limit stop end cap. Add seal washers to ends of rods followed by the limit stop nuts.
- d) Slide the inlet end cap over the support-rods, pushing in squarely to contact the end of the body. Secure with end cap screws tightened as shown in table 2.0.4 e).

### 2.3 Size 40 to 42 Limit stop (Yellow limit stop label on end cap) Spring Return Actuator (Springs - Code B, C, D or E) e.g. 40-RDC40

- a) This design of limit stop must be fitted with encapsulated springs. These springs do not require any special assembly procedure.
- b) Heavily grease one end of each spring and locate greased end into the spring pocket in the end cap. If actuator has less than 5 springs in each end cap, position according to the spring configuration detailed in the re-assembly diagram.
- c) Carefully invert the limit stop end with springs onto body assembly ensuring correct orientation of fool proof pin, springs and support-rods.
- d) Insert the limit stop tie rods through the support-rods and screw into limit stop end cap. Add seal washers to ends of rods followed by the limit stop nuts. Secure with end cap screws tightened as shown in table 2.0.4 e).
- e) Repeat 2.3 b & c with the inlet end cap. Secure with end cap screws tightened as shown in table 2.0.4 e).

