

**NAF Control Valves**

**Contents**

**General** ..... **1**

**Maintenance** ..... **2**

Dismantling..... 2.1

Checking for damage and wear ..... 2.2

To change the piston rod bearings, size 0 ..... 2.3

To change the piston rod seal, sizes 1-3 and 4-5 ..... 2.4

To change the PTFE-coated bushes ..... 2.5

Assembly ..... 2.6

**Actuator with spring return** ..... **3**

Conversion of a double-acting actuator ..... 3.1

To dismantle and assemble the spring-return unit ..... 3.2

To dismantle the spring-return unit ..... 3.3

To assemble the spring-return unit ..... 3.4

**Accessories** ..... **4**

Stem sleeves, sizes 1-3..... 4.1

End position indication..... 4.2

Fitting the end position sensor ..... 4.2.1

Junction box ..... 4.3

Solenoid valves ..... 4.4

Valve positioner ..... 4.5

Manual operation device ..... 4.6

**Spare parts** ..... **5**

Part number of spare parts kits..... 5.1

Spare parts kits, sizes 0 and 1-3 ..... 5.2

Spare parts kits, sizes 4-5..... 5.3

**Parts list** ..... **6**

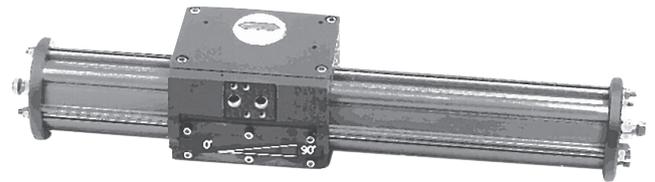
Double-acting actuator, sizes 0 and 1-3 ..... 6.1

Single-acting actuator, sizes 0 and 1-3 ..... 6.2

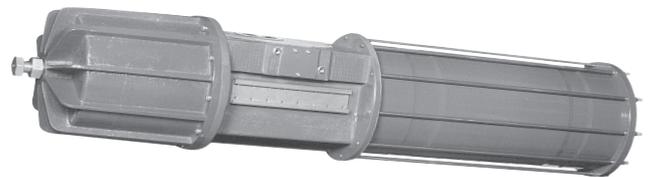
Single- or double-acting actuators, sizes 4-5 ..... 6.3



Size 0



Size 1 - 3



Size 4 - 5

**1. General**

The actuators are designed to withstand a long period of continuous operation at high loading, normally without the need for servicing.

Air or an inert gas must be used as the actuating medium. The air must be dried and thoroughly cleaned to prevent wear of the cylinder bores, pistons and sealing rings. Oil mist lubrication of the actuating medium is not recommended. The maximum permissible pressure of the actuating medium is 0.8 MPa (8 bar) and the maximum permissible temperature is 80°C.

From the operating viewpoint, the actuator can be installed in any position. However, it must not be subjected to excessive radiant heat, vibrations or other adverse circumstances that could damage its components.

The actuator delivered from NAF AB is in fully operational condition. For particulars of the correct connection/commissioning, refer to the commissioning instructions Fi 74.562 iGB.

These actuators normally require little or no maintenance. However, after a long period of service, certain parts may become worn or damaged, and will then have to be replaced.

To minimize the time needed for overhaul or repair, it is advisable to keep a suitable stock of spare parts. These are available as individual components, but it is economically preferable to purchase the spare parts kits recommended by NAF, the compositions of which are matched to different overhaul levels.

## 2. Maintenance

If the air consumption of the actuator is abnormally high or if its operating speed is low, this may be due to wear or damage to the cylinders, pistons or sealing rings. The bearings, bushes and guide rings may also be worn or damaged.

**The actuator must be removed from the valve for overhaul and repair!**

### 2.1 Dismantling

Dismantling of the actuator is described below. The item numbers within brackets refer to Fig. 19.9, 19.1 and 19.4 on pages 17, 18 and 19.

**Dismantling and maintenance of actuators with spring return must be carried out as described in section 3.**

**Note that the actuator must be depressurized before it is dismantled!**

#### Size 0 (Fig. 19.0)

1. Release the bolts (2) and remove them together with the washers (59). The end covers (4) with their O-rings (3) can now be removed. Also remove the cylinders (1, 16) by withdrawing them from the housing (30).
2. Remove the screws (18) from the top and underside of the actuator. Then remove the cover (29) and base (74).
3. Remove either of the circlips (11) and press out the pin (10). Now lift out the entire linkage mechanism (Fig. 1.0) from the actuator, but don't start dismantling it just yet.
4. If the actuator has two pistons (25), fit a ring spanner to each piston nut (24), and then turn the spanners anti-clockwise until one of the nuts is released. Remove the nut, washer (24.1) and piston (25). Then withdraw the piston rod (26) from the actuator.

After inspecting for damage and wear in accordance with section 2.2, re-assemble the actuator as described in section 2.6.

#### Size 1-3 (Fig. 19.0)

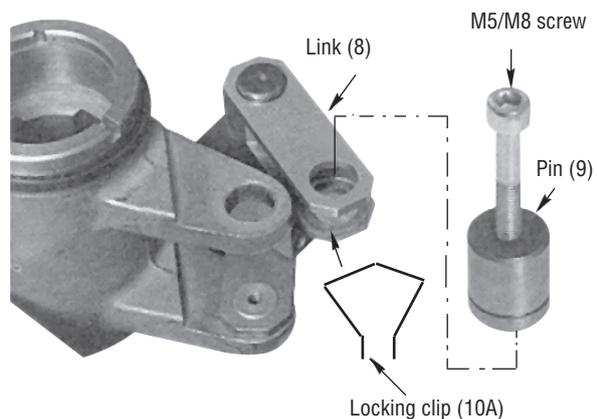
1. Release the nuts (6) and remove them together with the washers (5). The end covers (4), cylinders (1, 16) and O-rings (3) can now be removed.
2. Remove the screws (18) from the top and underside of the actuator. Then remove the cover (29).
3. Rotate the threaded pin (10), and then withdraw it straight out of the coupling (31).
4. If the actuator has two pistons (25), fit a ring spanner to each piston nut (24), and then turn the spanners anti-clockwise until one of the nuts is released. Remove the nut, washer (24.1) and piston (25). Then carefully withdraw the piston rod (26) from the actuator.
5. The linkage mechanism (Fig. 1.1) can now be lifted out of the actuator (Fig. 2.1). Further dismantling of the linkage mechanism is not normally necessary. See section 2.2



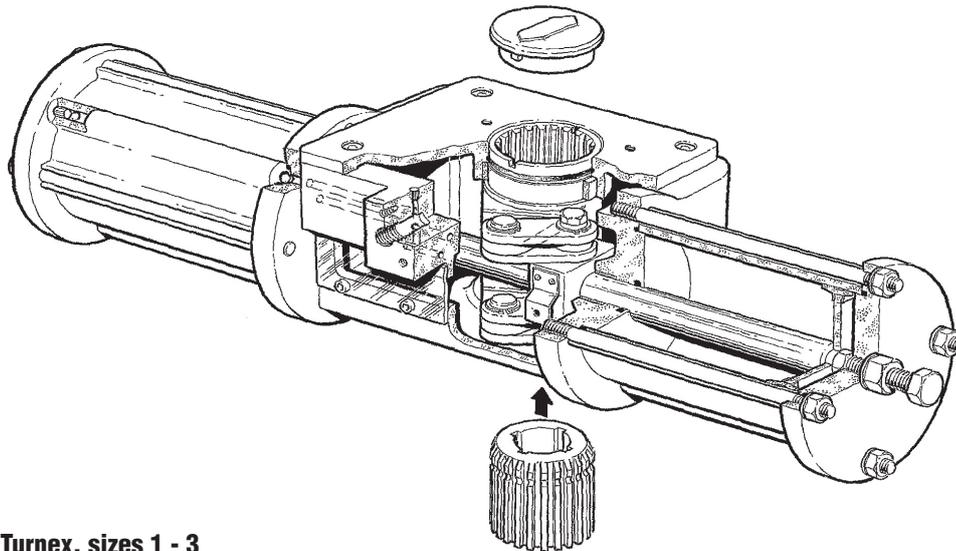
**Fig. 1.0. Linkage mechanism, size 0**



**Fig.1.1. Linkage mechanism, size 1 - 3**



**Fig.1.4. Linkage mechanism, sizes 4 - 5**



**Fig. 2.1. NAF-Turnex, sizes 1 - 3**

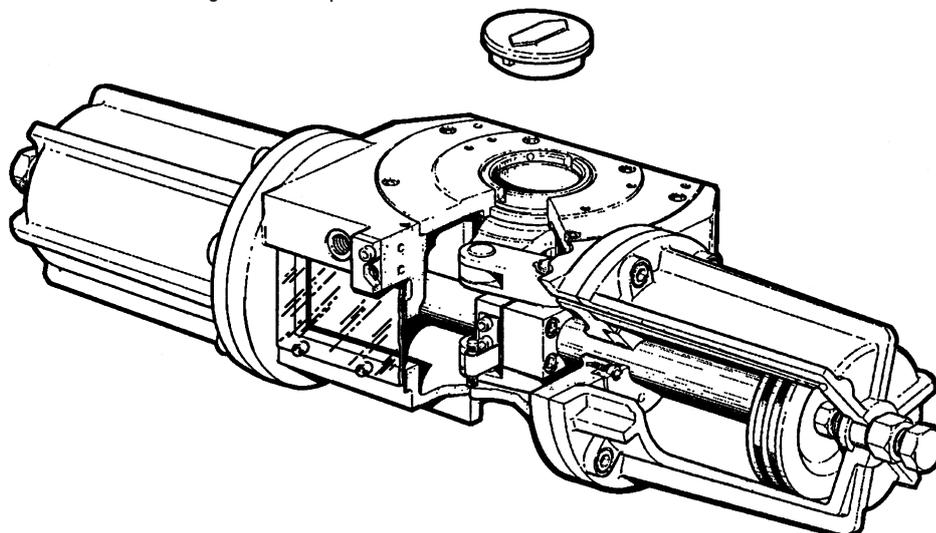
**Sizes 4-5 (Fig. 19.4)**

1. Remove the air cylinder retaining bolts (12) and carefully remove the cylinder.
2. Withdraw the cylinder straight up.
3. Remove the locking screws (45) and remove the cover (2).
4. Release the locking links (8) as shown in Fig. 1.4 and Fig. 19.4 by prising apart the locking clip (10A) by means of circlip pliers, and withdraw the pins (9A) by means of a screw (M5/M8) screwed into them.
5. Turn the links so that the lever lugs are exposed and lift out the lever.
6. If the actuator has two pistons (32), fit a ring spanner to each of the piston nuts (36) and then turn the spanners anti-clockwise until one of the nuts is released. Remove the nut and the piston.

- Take care not to scratch the piston rod. Scratches could cause damage to the piston rod seal.
7. If the actuator has only one piston, remove the piston nut by means of a slit nut as described above.
  8. Remove the screws (14) from the coupling (25).
  9. Pull away the coupling (25) and use circlip pliers to open up the circlip (26). At the same time, carefully withdraw the piston rod (31) from the seal holders (42), couplings (25 and 27) and circlip (26).

Inspect for damage and wear in accordance with section 2.2. Re-assemble the actuator as described in section 2.6.

**N.B. Never use the piston or piston rod as restraint** for releasing the other piston unit. Take a slit nut instead (with a slit width of 2-3 mm), and screw it onto the free end of the piston rod. Grip the slit nut with the pipe wrench and restrain it while releasing the other piston nut.



## 2.2 Checking for damage and wear

### Size 0

The following parts should always be replaced:

- Lever bearings (38)
- O-rings (3, 7, 17, 27, 37)

If the air consumption of the actuator is abnormally high, this may be due to wear of the O-ring (27). Always replace it as stated above. The following parts should also be inspected:

**Cylinders (1, 16).** Clean the cylinders with white spirit and blow them dry with compressed air. Inspect the cylinder bore for scratches and other internal damage. Fit a new cylinder if the existing one is damaged.

**Pistons (25).** Inspect the sealing lips of the piston. If these are damaged or heavily worn, fit a new piston. If one of the pistons is still on the piston rod, it can be removed by fitting two nuts to the opposite end of the piston rod (26) and locking them against one another. The inner of the two nuts can then serve as a restraint when the nut (24) at the opposite end of the piston rod is released with a ring spanner. Take care not to damage the piston rod surfaces.

**Piston rod (26).** If the piston rod has deep longitudinal scratches, the piston rod and piston rod bushes (28) must be replaced. However, minor scratches on the piston rod can be removed by carefully rubbing down with very fine emery cloth.

### Size 1-3

The following parts should always be replaced:

- Lever bearings (38)
- O-rings (3, 7, 17, 37)

If the air consumption of the actuator is abnormally high, check the following parts:

**Cylinders (1, 16).** Clean the cylinders with white spirit and blow them dry with compressed air. Inspect the cylinder bore for scratches and other internal damage. Fit a new cylinder if the existing one is damaged.

**Pistons (25).** Inspect the sealing lips of the piston. If these are damaged or heavily worn, fit a new piston. If one of the pistons still remains on the piston rod, it can be removed by fitting two nuts to the opposite end of the piston rod (26) and locking them against one another. The inner of these two nuts can then serve as a restraint when the nut (24) at the opposite end of the piston rod is released with a ring spanner. Take care not to damage the piston rod surfaces.

**Piston rod seals (27).** Inspect these for damage or find out whether the piston rod (26) moves very freely in the seals. If the seals are damaged or leaking, fit new seals. See section 2.4

**Piston rod (26).** If the piston rod has deep longitudinal scratches, a new piston rod must be fitted. Minor scratches can be removed by carefully rubbing down with very fine emery cloth.

### Sizes 4-5

The following parts should always be replaced:

- Lever bearings (4, 16)
- O-rings (7, 17, 30, 43)

If the air consumption of the actuator is abnormally high, check the following parts:

**Cylinders (35).** Clean the cylinders with white spirit and blow them dry with compressed air. Inspect the cylinder bore for scratches and other internal damage. Fit a new cylinder if the existing one is damaged.

**Lever (6) bearings (3, 4, 10 and 16).** Clean the bearings with white spirit, and fit new bearings if there is play in the existing bearings. Inspect the O-rings (7 and 17). Fit new O-rings if necessary. Grease the O-rings and bearings surfaces. Re-assemble.

**Pistons (32).** Inspect the piston guide ring (33) and faced O-ring (34). Fit new rings if the existing ones are scratched or have damaged edges, or if they are heavily worn. If no damage is visible, test the outside dimensions of the sealing ring by threading the cylinder onto the piston. If this is easy to do without significant resistance, this indicates that the O-ring and guide ring are heavily worn and new ones must be fitted.

Use a small screwdriver to prise carefully the old guide ring and faced O-ring. Place the new rings for 3-4 minutes in water at 60°C to soften them. Then quickly prise the rings over the guide edge of the piston and down into the groove. Don't use tools with sharp edges, and don't stretch the rings more than necessary, since they could otherwise be permanently deformed. The simplest procedure is to fit a spare piston and send the damaged piston back to NAF for replacement of the rings. This has the added benefit of a factory guarantee.

**Piston rod seals (42).** Inspect these for damage or find out whether the piston rod (31) moves very freely in the seals. If the seals are damaged or leaking, fit new seals. See section 2.4

**Piston rod (31).** If the piston rod has deep longitudinal scratches, a new piston rod and piston rod bearings (44) must be fitted. Minor scratches can be removed by carefully rubbing down the piston rods with very fine emery cloth.

### Sizes 0-3 and 4-5

**After a long period of service under difficult conditions,** it may be necessary to **change other component parts.** Check the following:

**Piston rod bearings (item 28 of sizes 0 and 1-3, and item 44 of sizes 4-5).** If the internal PTFE coating is damaged so that the metal to which it has been applied is visible through the coating, fit new bearings. See section 2.3.

**Linkage mechanism - Fig. 1.** This consists mainly of pins, links, lever and coupling. If play can be felt in the mechanism or if there is reason to suspect that some part may be damaged, the mechanism should be dismantled.

Remove the circlips (11 and 22, or 19 and locking clip 10A). The figures refer to sizes 0-3 and 4-5 respectively. The pins and links can now be removed.

Now check the following parts:

**Pins (23 and 9A).** If these are damaged or heavily scratched, fit new pins. Minor scratches can be removed by rubbing down with very fine emery cloth.

**Links (12-14 and 8A).** The link includes one or two bushes (14 or 18 respectively) of Glacier manufacture. This does not apply to size 3 actuator, in which the bushes are fitted into the link. If the internal PTFE coating is damaged so that the metal to which it has been applied is visible through the coating, fit new bushes. See section 2.5.

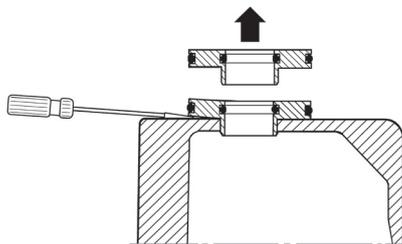
**Lever (21 and 6).** The lever includes two bushes (21.1 or 11 respectively) of Glacier manufacture. This does not apply to size 3 actuator, in which the bushes are fitted into the link. If the internal PTFE coating is damaged so that the metal to which it has been applied is visible through the coating, fit new bushes. See section 2.5.

**The coupling (31 or 25 and 27).** Check the pins of the coupling. If these are damaged or heavily scratched, a new coupling must be fitted. Minor scratches can be removed by rubbing down with very fine emery cloth.

### 2.3 To change the piston rod bearings

#### Size 0

To remove the piston rod bearing (28), insert a small screwdriver between the bearing and the outside of the housing (30) and prise away the bearing (see Fig.3). Press in a new bearing. This is best done in a vice and should be done quickly so that the bearing will not deform plastically. After fitting, the bearing should be free to rotate in the housing, but should be locked in the axial direction.



**Fig. 3. Removing the piston rod bearing**

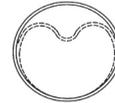
### 2.4 To change the piston rod seal

#### Size 1-3 and 4-5

The actuator must be dismantled as described in section 2.1.

1. On sizes **1-3**, remove the old piston rod seal (27 or 42) by means of a small screwdriver, for instance. If the piston rod bearing is to be replaced, this must be done as described in section 2.5 before continuing.

2. Clean the groove with white spirit and wipe it clean.
3. Fit the O-ring of the piston rod seal or, on sizes 4-5, fit a complete seal holder (42).
4. On sizes **1-3**, place the PTFE ring (27) of the O-ring piston rod seal in water at 60°C for 3-4 minutes, so that it will soften.



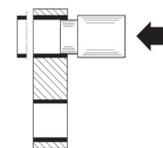
**Fig. 4. Forming the PTFE ring for the piston rod**

5. Grip the ring with your fingers and form it into the shape shown in Fig. 4.
6. Fit the PTFE ring into the groove and press it back into its circular shape.
7. Check that the piston rod (26 or 31) is free from scratches or burrs. If not, use very fine emery cloth to remove them before fitting the piston rod. Clean the piston rod with white spirit and then wipe it with a piece of lint-free linen cloth.
8. On **sizes 1-3**, push the piston rod into the seals and leave it there for at least 10 minutes. The PTFE ring will then have resumed its original shape and the piston rod can be removed.
9. On **sizes 4-5**, fit a complete new seal holder (42). Apply locking compound to the screws and tighten them.

### 2.5 To change the PTFE-coated bushes

#### Size 0

A drift is needed for changing only the bushes (14) in the links (12). Make a drift as shown in Fig.5. Use the drift and a mallet to remove the worn bushes. Use the same drift to fit the new bushes, using a vice for the purpose. However, we recommend that the entire link should be replaced by a new one.



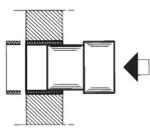
**Fig. 5. Changing the bushes in a link**

#### Sizes 1-3 and 4-5

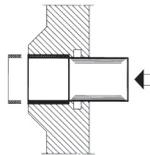
The piston rod bearings (28 or 44), lever bush (21.1 or 18) and link bush (14 or 11) may have to be changed after a long period of service under difficult conditions. Replacement must be carried out when the PTFE coating has become worn so that the metal to which it has been applied is visible through the coating.

**1. To remove the bush.** The easiest procedure is to make a drift as shown in Fig.6 for link and lever bushes, and a drift as shown in Fig.7 for the piston rod bearing. The bush can then easily be removed by means of this drift and a mallet.

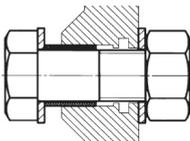
**2. To fit new bushes.** To fit the new bushes (21.1 or 18) into the lever and new bushes (14 or 11) into the links, use the same drift as that used for removing them. Use the drift and a vice, for instance, to press in the bush. The easiest way of fitting the piston rod bush (28 or 44) is to press it in by means of a bolt as shown in Fig.8.



**Fig. 6. Drift for the bushes**



**Fig. 7. Drift for the piston rod bearing**



**Fig. 8. Fitting the piston rod bush**

**2.6 Assembly**

Grease part No. 349 06 260, which has been tested by NAF and a leading lubricant manufacturer, is recommended for all surfaces that require greasing. This grease has proved to have by far the best properties for lubricating the contact surfaces between rubber/plastic and metal. These properties include high load-bearing capacity, good adhesion, and very low stick-slip effect.

**Size 0**

1. Make sure that all parts have been thoroughly cleaned. Wipe clean the cylinders (1, 16), bearing surfaces of the lever (21), and other sliding surfaces.
2. If the linkage mechanism (Fig.1) has been dismantled, re-assemble it. Fit the links (12, including the bushes 14) to the lever (21) using the pins (23) and circlips (22).
3. Grease the O-rings (37) and fit them onto the lever (21).
4. Grease the O-rings (27) and fit them into the piston rod bearings (28).
5. Rub a thin layer of grease onto the piston rod (26). Carefully push the piston rod into the bearing (28), past the O-ring (27) and out through the corresponding bearing on the other side of the housing.

**N.B.** The location of the hole in the piston rod is not symmetrical. The side of the piston rod which is longer (from the hole to the end) should be located on side A as shown in Fig. 19.0.

6. Coat the lips of the piston (25) with a thin film of grease, and make sure that the groove between the lips is filled with grease as shown in Fig. 9. Fit the pistons to the piston rod (26) with the rubbercoated side facing the nut. Apply locking compound to the piston rod thread. Fit the washer (24.1) and nut (24). When the pistons have been fitted, tighten the nuts simultaneously to the torque specified in Table 1.
7. Place the linkage mechanism (Fig.1) as shown in Fig.19.0. Fit one of the circlips (11) to the pin (10). Then push the pin in through the links (12) and piston rod (26), and lock the pin with the other circlip (11).
8. Fit the lever bearings (38) into the cover (29) and base (74). The easiest procedure for fitting the bearings is by using a press or a vice.
9. Apply a little medium-strength locking compound into the tapped holes, and use the screws (18) to secure the cover (29) and base (74). See Table 1.

**N.B.** Fit the cover and base as shown in Fig. 19.0, so that the linkage mechanism will open in the right direction.

10. Grease the O-rings (3, 17) and fit them into the piston rod bearings (28) and housing (30) respectively. Two of the O-rings (3) will be left over and can then be used in the end cover (4).
11. Apply a thin coat of grease to the surfaces of the cylinders (1, 16). Work the grease into the whole of the sliding surface by means of a clean piece of lint-free linen cloth. Carefully push the cylinders onto the pistons.
12. Fit the remaining two O-rings (3) into the end covers (4) and place the covers on the cylinders. Apply a little medium-strength locking compound into the M6 tapped holes at the cylinders. Fit the washers (5) and bolts (2). Tighten the bolts in diagonally opposite pairs (see Table 1). The tightening torque corresponds to tightening the bolts by hand until they come into contact with the end cover, and then tightening about a further quarter of a turn.

**N.B.** It is important not to overtighten the bolts since the tapped holes in the housing may otherwise be damaged.

13. Adjust the end-stop bolt (9) to the required end position.

Part	Actuator size			
	0	1	2	3
Piston rod nut (24, 56)	14	29	50	115
Pin (10)		7	50	115
Tie-rod nut (6)		7	35	35
Locking screw (18)	17	7	17	17
End-cover bolt (2)		7		

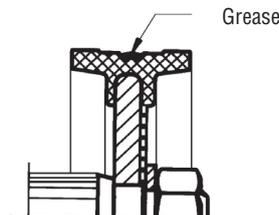
Table 1. Tightening torques, Nm, for the bolts and nuts of the actuator

**Sizes 1-3**

1. Make sure that all parts have been thoroughly cleaned. Wipe clean the cylinders (1, 16), bearing surfaces of the lever (21), and other sliding surfaces.
2. If the linkage mechanism (Fig. 1) has been dismantled, re-assemble it. Fit the links (12-14) to the coupling pins (31). Then fit the circlips (11) and assemble the links with the lever (21) and pins (23). Finally, fit the circlips (22).
3. Grease the bearings (38) and O-rings (37). Fit them into the housing (30) and cover (29), and to the lever (21). Fit the linkage mechanism into the housing. Make sure that the lever is fitted with the milled driver grooves facing upwards (towards the cover 29), and that the mounting plate (33) on the coupling faces outwards towards the window (35).
4. Rub a thin film of grease onto the surface of the piston rod (26). Carefully push the piston rod past the piston rod seal (27), through the bearing (28), coupling (31) and out through the opposite bearing and seal.

**N.B.** The location of the hole in the piston rod is not symmetrical. The side of the piston rod which is longer (from the hole to the end) should be located on side A as shown in Fig. 19.1.

5. Coat the lips of the pistons (25) with a thin film of grease, and make sure that the groove between the lips is filled with grease. See Fig. 9. Fit the pistons to the piston rod (26), with the rubber-coated side facing the nut. Apply locking compound to the piston rod thread. Fit the washer (24.1) and nut (24). After the pistons have been fitted, tighten the nuts simultaneously to the torque specified in Table 1.



**Fig. 9. Lubrication of the piston**

6. Align the hole in the piston rod (26) with the hole in the coupling (31). Apply some anti-galling agent, such as Molycote, to the unthreaded part of the pin (10), and then fit the pin into the coupling.

**The pin should enter easily into the hole. Never use force. It may sometimes be necessary to rotate the piston rod through half a turn. Tighten the pin to the torque specified in Table 1.**

7. Fit all the tie rods (2).
8. Grease the O-rings (3, 17), and fit two of the O-rings (3) and both O-rings (17).

9. Apply a thin film of grease to the surfaces of the cylinders (1, 16) and use a clean piece of lint-free linen cloth to work the grease into the whole of the sliding surface. Carefully push the cylinders onto the pistons.

**One actuator size 1, the cylinders on sides A and B are different.**

10. Fit the O-rings into the end covers (4) and fit the covers to the cylinders. Then fit the washer (5) and nuts (6) to the tie rods and tighten the nuts in diagonally opposite pairs to the torque specified in Table 1.
11. Fit the cover (29). Apply a little locking compound to the threads of the screws (18), and tighten the screws to the torque specified in Table 1.
12. Adjust the end-stop bolts (9) to the required end positions.

**Sizes 4-5**

1. Make sure that all parts have been thoroughly cleaned. Wipe clean the cylinders (35), bearing surfaces of the lever (6), and other sliding surfaces.
2. If the linkage mechanism (Fig. 1) has been dismantled, re-assemble it. Fit the links (8A) to the coupling pins (25). Then fit the circlips (19) and assemble the links with the lever (6) and pins (9A). Finally, fit the locking clips (10A).
3. Grease the bearings (3, 4, 15 and 16) and O-rings (7, 17). Fit them into the housing (1) and cover (2), and to the lever (6). Fit the linkage mechanism into the housing. Make sure that the lever is fitted with the milled driver grooves facing upwards (towards the cover 2).
4. Rub a thin film of grease onto the piston rod (26). Carefully push the piston rod past the piston rod seal (42), through the bearing (11), the coupling (25 and 27) and the opened-up locking clip 26) and out through the opposite bearing and seal.
5. Coat the faced O-ring (34) on the pistons (32) with a thin film of grease. Fit the piston to the piston rod (26) with the chamfered recess side towards the nut. Apply some locking compound to the piston rod thread. Fit the nut (36). After the pistons have been fitted, tighten the nuts simultaneously to the torque specified in Table 2.
6. Guide the circlip into the piston rod groove and lock it. Tighten the two halves of the coupling (25) and (27), using the screws (14).

Part	Actuator size	
	4	5
Piston rod nut (36)	400	800
Bolt (12)	50	80
Locking screw (45)	20	40
Stud (49)	50	80

Table 2. Tightening torques, Nm, for the bolts and nuts of the actuator.

7. Grease the O-rings (30, 43) and fit the rings into the cylinders (35).
8. Apply a thin film of grease to the surfaces of the cylinders (35), and use a piece of clean, lint-free linen cloth to work the grease into the whole of the sliding surfaces. Carefully push the cylinders onto the pistons.
9. Fit the bolts (12), and tighten them in diagonally opposite pairs to the torque specified in Table 2.
10. Fit the cover (2). Apply some locking compound to the threads of the bolts (12), and tighten the bolts to the torque specified in Table 2.
11. Adjust the end stop bolts (38) to the required end positions.

### 3. Actuator with spring return

The spring-return actuator is basically a double-acting actuator in which one of the cylinders has been replaced by a return spring cylinder. Double-acting actuators can thus easily be converted to spring-return actuators and vice versa.

#### CAUTION

**The spring-return cylinder contains one or more preloaded springs. To avoid the risk of injuries, handling and dismantling must be carried out in accordance with the instructions below.**

#### 3.1 Conversion of a double-acting actuator

##### Sizes 0 and 1-3

1. Determine the required operating mode of the spring-return actuator:  
**Spring closing/air opening NAF 791292.**  
**Spring opening/air closing NAF 791294.**
2. Start with a complete spring-return unit, i.e. items 50 to 62 inclusive and items 3, 5, 6, 8, 9 and 17. In addition to these items, the spring-return unit also includes a transport securing plate (61) shown in Fig. 10. Remove the end stops (8, 9) from the spring-return unit.
3. Remove the end stops (7, 8, 9) from the actuator which is to be converted.
4. Depending on the required operating mode of the converted actuator (see item 1 above), remove the nuts (6) on the selected side in accordance with the following and Fig. 19.0 and 19.1:  
**Spring closing/air opening. Side B (791292).**  
**Spring opening/air closing. Side A (791294).**
5. **Size 0** - When the bolts (2) have been removed, the cylinder (1 or 16) and the end cover (4) can be removed.  
**Sizes 1-3** - When the nuts (6) have been removed, the cylinder (1 or 16), end cover (4) and tie rods (2) can be removed.
6. Remove the piston rod nut (24) and remove the piston (25) and washer (24.1).
7. Push the projecting end of the piston rod as far as possible into the housing.
8. Release all nuts (6) on the complete spring assembly, but do not remove the nuts from the tie rods.

Make sure that the spring assembly does not point towards any person, since the assembly contains preloaded springs. Make sure that the spring cylinder is loose between the transport securing plate (61) and the end cover (4). Then remove the nuts from the tie rods (2). Now remove the end cover, plate and tie rods from the cylinder.

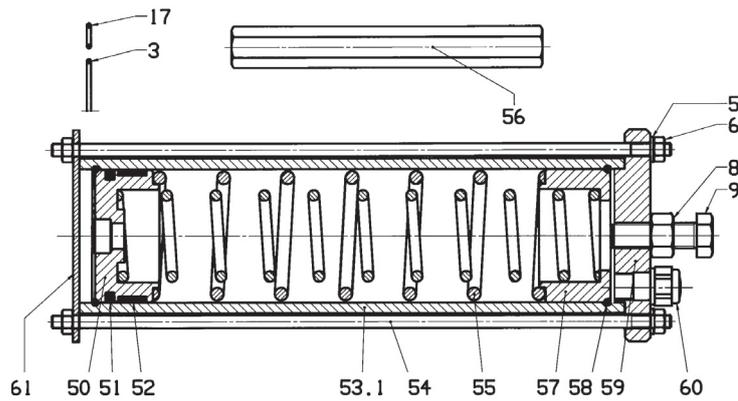
9. **Size 0** - Fit the new O-rings (3, 17) onto the piston rod bearing and fit the new tie rods (54).  
**Sizes 1-3** - Fit the new O-rings (3, 17) into the housing and fit the new tie rods (54).
10. Push in the new spring cylinder, so that the air passage is aligned with the O-ring (17) and so that the spring piston (50) is against the piston rod.
11. Apply locking compound to the thread of the long piston nut (56), and tighten the nut to the torque specified in Table 1.
12. Fit the end cover (59), washers (5) and nuts (6) and tighten the nuts in diagonally opposite pairs to the torque specified in Table 1.
13. Fit the end stops (7, 8, 9) and adjust them to the required end positions.

#### Size 4

1. Start with a complete spring-return unit, i.e. items 46 to 51 inclusive. Move the end stop (37 -39) from the cylinder (35) to the spring-return unit.
2. Place the actuator with the cylinder which is to be replaced so that the spring cylinder points upwards.
3. Remove the bolts (12) and remove the protective cover (20) or the corresponding cylinder (35). See Fig. 19.4.
4. Inspect the parts as described in section 2.2, and make sure that the contact surfaces of the spring cylinder and centre section have been thoroughly cleaned.
5. Grease and fit the new O-rings (30 and 43).
6. Apply a thin coat of grease to the internal surface of the spring cylinder, and use a piece of clean, lint-free linen cloth to work the grease into the whole of the sliding section.
7. Set the piston (32) in the position nearest to the centre section.
8. Place the spring assembly (47) on the piston and check that the guide fits the piston nut (36).
9. Carefully push the spring cylinder over the spring assembly and onto the piston.
10. Fit the spring cylinder nut sleeves (50) and studs (49). Tighten them gradually one turn at a time, and tighten finally to the torque specified in Table 2.

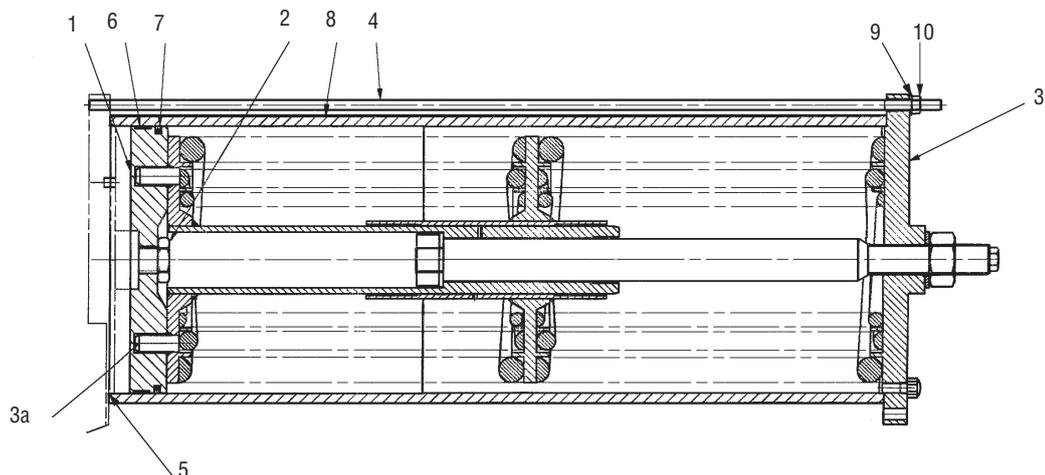
#### Size 5

1. Start with a double-acting actuator NAF 791290-51 or -52.
2. Remove the cylinder which is to be replaced by a spring return cylinder.
3. Remove the piston fitted to the piston rod.
4. Fit the new piston (1) to the piston rod, but do not tighten the piston rod nut (2). See Fig. 11.



**Fig. 10. Complete spring-return unit in sizes 0 and 1 - 3**

5. Place the complete spring assembly (3) with its guide pins (3a) in the corresponding holes in the piston. Turn the assembly and piston so that the tie rods (4) are at right angles to the end cover of the actuator box and so that they move freely in the end cover of the assembly. Without turning the piston, remove the spring assembly from the piston. Tighten the piston rod nut (2) without turning the piston.
6. Grease the end-cover O-ring (5) as described in section 2.6, and fit it to the end-cover guide of the actuator box.
7. Fit the piston guide (6- in two parts) into the piston groove. Lock the parts temporarily by means of a fitting O-ring.
8. Fit the faced O-ring seal (87) into the corresponding piston groove.
9. Grease the "pneumatic" part of the cylinder tube very sparingly as described in section 2.6.
10. Push the cylinder tube (8) onto the piston and remove the fitting O-ring when the cylinder has entered the piston guide. Push the cylinder further onto the guide, but take care at the point where the cylinder meets the O-ring on the end cover.
11. Insert the complete spring assembly (3) back into the cylinder tube (8). Make sure that the guide pin (3a) enters the corresponding hole.
12. Apply a little Loctite or equivalent locking compound into the M12 holes in the end cover of the actuator box.
13. Screw in the tie rod (49 end with the short thread so far into the end cover that only the last turn of thread is visible.
14. Grease the tie-rod ends with the long thread and the contact surfaces of the nuts with Molycote or some other anti-galling agent.
15. Fit the washers (9) and nuts (10) to the tie-rod ends with the long, free threads.
16. Tighten the nuts in diagonally opposite pairs, and make sure that the guide edge of the end cover enters the cylinder tube.
17. Tighten the nuts to the torque specified in Table 2 on page 7.
18. Test the actuator with compressed air at a maximum pressure of 5 bar.
19. Set the end position stops. Turn the end-stop bolts only when there is no load on them.



**Fig. 10. Complete spring-return unit in size 6**

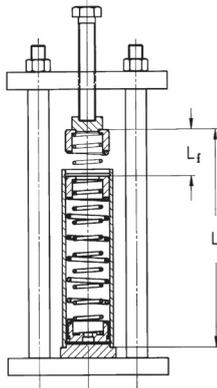
### 3.2 To dismantle and assemble the spring-return unit

If the air consumption of the spring cylinder in size **0** and **1-3** actuators is abnormally high, it may be necessary to dismantle the spring-return unit to replace the sealing ring.

The equipment shown in Fig. 12 is necessary for unloading or preloading the springs to enable the spring-return unit to be dismantled and assembled. Table 3 shows the compression force, free height and preloading travel necessary. In addition, the tool shown in Fig. 13 is necessary for fitting the piston into the spring-return unit in size 1-3 actuators.

Spring-return unit	Compression force N	Free height L, mm	Preloading travel Lf, mm
0	750	250	85
1	1200	350	110
2	3100	505	185
3	7900	645	195

Table 3. Assembly particulars for each size of spring-return unit



**Fig. 12. Spring unloading tool**

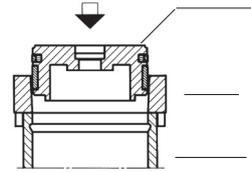
The spring-return unit in **sizes 4-5** actuators need not normally be dismantled. However, if this should be necessary for any reason, we would advise you to consult NAF.

### 3.3 To dismantle the spring-return unit

**Sizes 0 and 1-3**, see Fig. 10, 19.0 and 19.1

1. Remove the end stops (7, 8, 9) on both sides of the actuator.

**This must be done to ensure that the preloading which may remain in the spring will not project the spring cylinder and thus cause damage or injury.**



**Fig. 13. Assembly**

2. Release the nuts (6) in diagonally opposite pairs at the spring cylinder. However, leave all nuts in position until all spring load has been relieved. Then remove the nuts and the end cover (59).
3. Back off the long piston nut about two turns. Place a sturdy metal drift against the long piston rod nut, and hammer the drift until the piston rod is released from the piston in the cylinder. Unscrew the piston rod nut. The spring cylinder can now be removed.

**Make sure that the spring cylinder does not point towards any person, since it contains preloaded springs.**

4. Secure the spring-return unit in the spring unloading tool (Fig. 12). The spring guide (57) should be in contact with the push-rod of the tool. If necessary, place a protective plate under the push-rod.

**It is essential to secure the spring-return unit in the tool so that it is perfectly vertical and so that it will not become misaligned due to possible transverse forces from the spring.**

5. Press the spring guide (57) and springs (55) into the cylinder (53), so that the entire locking ring (58) is exposed.
6. Carefully remove the locking ring (58) without damaging it.
7. Unload the spring completely. Remove the spring guide (57) and the springs (55). Take care not to damage the cylinder bore.
8. Remove the cylinder from the tool and carefully remove the remaining locking ring (58). Then push the piston out from this side.
9. Clean the various parts and inspect them from wear. The part of the cylinder bore which is in contact with the piston must be free from scratches, although minor scratches are permissible on the part of the cylinder bore around the spring.

#### Size 4

1. If possible, place a spring-return actuator with the spring cylinder pointing upwards. Back off the nut sleeves (50) (see Fig. 19.4) gradually one turn at a time until all studs have been entirely relieved of load.
  2. Withdraw the cylinder straight up.
  3. Remove the spring assembly.
- N.B. Do not dismantle the spring assembly.** Special equipment is necessary for this purpose.

The spring assembly consists of springs, spring guide and guide rails which together form a preloaded spring assembly. If the assembly must be dismantled for any reason, get in touch with NAF.

- Inspect the piston and its guide and faced O-rings as described in section 2.2.

#### Size 5

Consult NAF if the spring return unit must be dismantled.

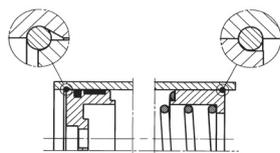
### 3.4 To assemble the spring-return unit

- Clean all parts and grease the cylinder bore (see section 2.5 for particulars of the recommended grease), using a piece of lint-free linen cloth.
- Fit a new spring piston assembly (50, 51, 52). For sizes 1-3, the special tool shown in Fig. 13 which serves as a "shoe horn" is necessary for assembly.

**The following instructions in section 3.4 are applicable only to actuators of Sizes 0 and 1-3**

**The best results will be achieved by replacing the entire spring piston. If only the faced O-ring (5) is replaced, first carefully remove the old ring and then thoroughly clean the groove. Then place the sliding part of the ring in water at 60°C for 3-4 minutes. During this time, fit the O-ring into the groove. Then firmly grip the sliding part of the ring, and quickly prise it over the guiding edge of the piston. Bear in mind that if the ring is stretched too far, it may remain permanently deformed.**

- Fit the locking ring (58) into the groove in the cylinder, and then push the spring piston against it so that the locking ring will be locked by the piston (see Fig. 13).



**Fig. 14. Position of locking ring**

- Insert the springs (55) into the cylinder so that their ends fit into the grooves on the inside of the spring piston. Take care not to damage the cylinder bore.
- Place the unit in the spring unloading tool shown in Fig. 12.  
**It is essential to secure the spring-return unit in the spring unloading tool so that it is perfectly vertical, to prevent it from becoming misaligned due to possible transverse forces from the spring.**
- Place the spring guide (57) on the ends of the springs. If necessary, place a protective plate under the push-rod, and then press down the spring guide so that the entire locking groove is exposed.
- Fit the locking ring (58) into the locking groove in the cylinder and then reduce the load very gradually until the locking ring has gripped the spring guide (see Fig. 14). Make sure that the spring guide is not misaligned in the cylinder.

- Release the spring unloading tool entirely and remove the unit from the tool.
- Then fit the spring-return unit to the actuator as described in section 3.1, items 9-13.
- Check that the warning plate (62) is fitted to the cylinder and is fully readable. If necessary, fit a new warning plate.

#### Size 4

- Fit the spring assembly.
- Push the cylinder into place.
- Screws on the studs (49) with the nut sleeves (50), and tighten them alternately one turn at a time. Finally tightening them to the torque specified in Table 3.

#### Size 5

See section 3.1, items 5-19.

## 4. Accessories

Size 0 and 4-5 actuators have a lever arm (21 and 6 respectively) with a keyway in the hub. Sizes 1-3 have stem sleeves as shown below.

### 4.1 Stem sleeves

#### Sizes 1-3

Separate stem sleeve with hole and keyway machined in accordance with DIN6885 (SS 2304). See Fig. 15. Sleeves with 16 mm or 25 mm holes without keyway are also available for each actuators size. See Table 4.



**Fig. 15. Stem sleeves for sizes 1 - 3.**

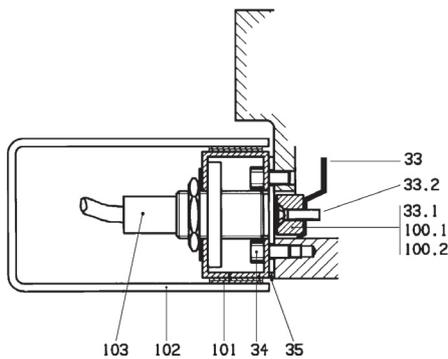
Always fit the sleeve from the underside of the actuator, with the centrepunch mark on the sleeve in line with the centrepunch mark on the lever side. However, if the actuator is installed in line with the pipe, the sleeve should be turned through 90°, although this is unnecessary for sizes 791290/92/94-2 which have 4 keyways. To remove, tap the sleeve out of the actuator in the opposite direction.

### 4.2 End position indication

Size 1-3 actuators can be equipped with side-mounted electrical end-position indicators of the type shown in Fig. 16. Two types of sensors are available, i.e. magnetic sensors of reed element type, and inductive sensors. Any inductive sensor with M18 thread and a sensing distance of at least 5 mm can be employed. Depending on the type of sensor, different sensing elements can be used.

Actuator size	For stem dia. (mm)	Part No.	
794290/94 - 0	∅ = 16	338 98 630	
(Lever with hub Applies to size 0)	20	333 98 631	
	25	333 98 632	
	∅ = 16, without keyway	733 94 170	
(Stem sleeve. Applies to all sizes 1-3)	16	333 94 170	
	20	333 94 160	
	25	333 94 150	
794290/92/94 - 2	∅ = 16, without keyway	733 94 360	
	16	333 94 360	
	20	333 94 370	
	25	333 94 380	
	30	333 94 390	
	35	333 94 400	
794290/92/94 - 3	∅ = 25, without keyway	722 69 420	
	25	322 69 420	
	30	322 69 430	
	35	322 69 440	
	40	322 69 450	
794290/92/94 - 4	45	322 69 460	
	50	322 69 470	
	794290/92/94 - 5	Third digit in actuator size designation specifies the stem hole in mm in the lever	
(Stem sleeve. Applies to all sizes 1-3)			

Table 4. Levers with hub- applies to sizes 0 and 4-5, and Stem sleeves- applies to sizes 1-3.



**Fig. 16. Installation of end position sensor.**

Type of sensor	Sensing element	Item No.
Magnetic sensor	Magnet	100.1
Inductive sensor	Steel	100.2

Table 5. Types of end position sensor

The end position indicator kit includes brackets (101), sensing elements (100.1 and 100.2), screw (33.2) and transparent protective cover (102) as shown in Fig. 16.

Art. nr.	Intended for actuator
349 06 611	791290/92/94-1
349 06 612	791290/92/94-2
349 06 613	791290/92/94-3

Table 6. Part numbers for end position sensors for actuator sizes 1-3

**4.2.1 Fitting the end position sensor**

Remove the screws (34) and the window (35). Remove the white indicating element 833.1) and fit instead the sensing element (see item 4.2) (100.1 or 100.2) with the screw (33.2) fitted into the mounting plate (33). Refit the window (35) together with the brackets (101). Refit the screws (34). Before tightening the screws, hold the brackets slightly apart, so that the distance between them will be at least 18 mm. Fit the selected sensor (103) and set the required end position. The sensor can be adjusted in height as well as sideways. Finally, fit the protective cover (102), and secure it in position with its Velcro locking.

**4.3 Junction box**

The actuators have mounting holes for fitting a junction box. The junction box (see Fig. 17) contains terminals for connecting one solenoid valve and two end position sensors. The junction box is made of cast aluminium and has a tightly-seating cover. Degree of protection: IP 65. If the junction box is factor-fitted to the actuator by NAF, it also contains a wiring diagram for the appropriate sensors.

Part No.	Description
349 04 460	Junction box

Table 7. Part number of junction box



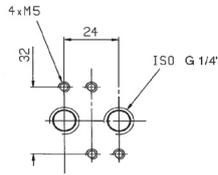
**Fig. 17. Junction box**

**4.4 Solenoid valves**

**Sizes 0-3**

The actuators have mounting holes in accordance with NAMUR (Fig. 18). Solenoid valves conforming to this standard can thus be mounted directly on the actuator. However, first consult NAF if both solenoid valves and end position sensors are to be fitted.

NAMUR valves are always delivered with an M5 set screw. This should be fitted into one of the eccentrically located M5 holes. This will ensure that the solenoid valves can only be fitted in one direction.



**Fig.18. Mounting holes for NAMUR solenoid valves**

Part No.	Type of valve positioner
370210	Pneumatic
370300	Electro-pneumatic

Table 8. Part numbers of valve positioners

For further information concerning these positioners, see catalogue sheet Fk 41.82.

## 4.6 Manual operation device

An extra screw designed for fitting instead of the end stop (7, 8, 9) is available for actuator sizes 0-3 for manual operation of the valve in the event of loss of compressed air supply. This screw should be stored in the vicinity of the actuator so that it will be close at hand whenever needed.

Part No.	Intended for actuator
349 06 240	791290/92/94-0
349 06 241	791290/92/94-1
349 06 242	791290/92/94-2
349 06 243	791290/92/94-3

Table 9. Part numbers of the manual operation devices

## 5. Spare parts

NAF has made up a number of complete spare parts kits to allow for quick and efficient delivery of spare parts for actuators. The kits are supplied in dust-tight plastic bags marked with particulars of the contents, actuator type and actuator series. See also chapter 4 "Accessories".

### 5.1 Part numbers of spare parts kits specified in sections 5.2 and 5.3

Kit	Description	Note	02	11, 12	21, 22	31, 32	41, 42	51, 52
1	Wear parts *	-	349 08 700	349 08 710	349 08 720	349 08 730	349 02 50	349 02 60
2	Piston kit *	1	017 35 040	017 35 060	017 35 090	017 35 120	-	-
2	Pin kit *	-	-	-	-	-	349 02 52	349 02 62
3	Link kit	-	349 08 702	349 08 715	349 08 722	349 08 732	-	-
3	Piston kit	-	-	-	-	-	349 02 53	349 02 63
4	Piston rod seal *	-	349 08 703	349 08 713	349 08 723	349 08 733	-	-
4	Piston seal	-	-	-	-	-	349 02 54	349 02 64
5	Lever	-	-	-	-	-	349 02 55	349 02 65
5.1	Cylinder assembly (side A) item 1	2	349 08 704	349 08 714	349 08 724	349 08 734	-	-
5.2	Cylinder assembly (side B) item 16	2	349 08 704	349 08 715	349 08 724	349 08 734	-	-
6	Service kit (complete repair kit)	3	349 08 800	349 08 810	349 08 820	349 08 830	-	-
6	Centre section	-	-	-	-	-	Consult NAF	
7	Stem sleeves/lever	See part No. in Chapter 4 Accessories, sec. 4.1 Stem sleeves for sizes 1-3				-	-	-
7	Cylinder with piston	-	-	-	-	-	Consult NAF	
8	Spring cylinder with piston	-	-	-	-	-	349 02 72	Consult NAF
8.1	Piston kit for spring-return unit	4	349 14 741	349 08 718	349 08 728	349 08 738	-	-
8.2	Piston seal kit for spring-return unit	4	349 14 742	349 08 7919	349 08 729	349 08 739	-	-
9	Complete repair kit for spring cylinder	4	349 14 743	349 08 741	349 08 742	349 08 743	-	-
9	Spring assembly	-	-	-	-	-	349 02 75	Consult NAF
10	Service kit for sizes 41 and 51	-	-	-	-	-	349 02 58	349 02 68
10	Service kit for sizes 42 and 52	-	-	-	-	-	349 02 59	349 02 69
10.1	Complete spring-return unit for 791292/94	2	349 14 740	-	322 69 310	312 04 190	Consult NAF	
10.1	Complete spring-return unit for 791292	2	-	322 69 050	-	-	-	-
10.2	Complete spring-return unit for 791294	2	-	322 69 060	-	-	-	-
-	Special grease for piston	-	349 06 260	349 06 260	349 06 260	349 06 260	349 06 260	349 06 260

- Not.**
- Two kits per actuator are needed for actuator sizes 02, 12, 22 and 32
  - Two cylinders for sides A and B (items 1 and 16 respectively) are different only on actuator size 1.
  - The service kit contains 2 piston kits.
  - Special tools are needed for dismantling/assembly (does not apply to size 02).

\*Recommend spare parts kits

### Ordering example:

Kit No. 1, Wear parts, Part No. 349 08 710 for NAF 791290-11 actuator.

**5.2 Spare parts kits for sizes 02 - 32**

Item No.	Description	Qty	Size
<b>Kit No. 1</b>	<b>Wear parts</b>		<b>0 1 2 3</b>
3	O-ring	4	x x x x
7	O-ring	2	x
7	Sealing washer	2	x x x
17	O-ring	4	x
17	O-ring	2	x x x
37	O-ring	2	x x x x
38	Lever bearing	2	x x x x
<b>Kit No. 2</b>	<b>Piston kit</b>		
25	Piston assembly	1	x x x x
<b>Kit No. 3</b>	<b>Link kit</b>		
10	Pin	1	x x x x
11	Circlip	2	x x x x
12	Link	2	x x x
14	Bush	4	x x x
12	Link plate	4	x x
13	Spacer	2	x x
14	Bush	2	x x
15	Washer	2	x x
21.1	Bush	2	x x
22	Circlip	4	x x x x
23	Pin	2	x x x x
<b>Kit No. 4</b>	<b>Piston rod seal</b>		
27	O-ring	2	x x x x
27	Faced O-ring	2	x x x
28	Piston rod bush	2	x x x x
<b>Kit No. 5.1</b>	<b>Cylinder assembly (side A)</b>		
1	Cylinder	1	x x x x
2	Bolt	4	x
2	Tie rod	4	x x x
4	End cover	1	x x x x
5	Washer	4	x x x x
6	Nut	4	x x x
7	O-ring	1	x
7	Sealing washer	1	x x x
8	End-stop nut	1	x x x x
9	End-stop bolt	1	x x x x
<b>Kit No. 5.2</b>	<b>Cylinder assembly (side B)</b>		
2	Tie rod	4	x x x x
4	End cover	1	x x x x
5	Washer	4	x x x x
6	Nut	4	x x x x
7	Sealing washer	1	x x x x
8	End-stop nut	1	x x x x
9	End-stop bolt	1	x x x x
16	Cylinder	1	x x x x
<b>Kit No. 6</b>	<b>Service kit</b>		
—	Wear parts, kit No. 1	1	x x x x
—	Piston kit, kit No. 2	2	x x x x
—	Link kit, kit No. 3	1	x x x x
—	Piston rod seal, kit No. 4	1	x x x x
18	Screw	8	x
18	Screw	4	x x x

Item No.	Description	Qty	Size
<b>Kit No. 7</b>	<b>Stem sleeves and levers</b>		
	Size 0 actuators have fixed levers (21) which must be changed to fit different stem diameters, while other actuator sizes have loose stem sleeves. The levers and stem sleeves (20) should be ordered by quoting the part number as specified in Chapter 4 Accessories, Section 4.1 Stem sleeves for sizes 1-3. The actuator can be made adaptable to a wide variety of valves by keeping a stock of a few different levers and sleeves.		
<b>Kit No. 8.1</b>	<b>Piston kit for spring-return unit</b>		<b>0 1 2 3</b>
3	O-ring	1	x x x x
50	Spring piston	1	x x x x
51	O-ring	1	x
51	Faced O-ring	1	x x x
52	Guide ring	1	x x x x
<b>Kit No. 8.2</b>	<b>Piston seal kit for spring-return unit</b>		
3	O-ring	1	x x x x
51	O-ring	1	x
51	Faced O-ring	1	x x x
52	Guide ring	1	x x x x
<b>Kit No. 9</b>	<b>Complete repair kit for spring cyl.</b>		
3	O-ring	1	x x x x
50	Spring piston	1	x x x x
51	O-ring	1	x
51	Faced O-ring	1	x x x
52	Guide ring	1	x x x x
55	Spring	Depending on size	
56	Spring guide	1	x x x x
58	Locking wire	2	x x x x
<b>Kit No. 10.1</b>	<b>Complete spring-return unit for NAF 791292 sizes 0, 2 and 3 NAF 791294 sizes 0 - 3</b>		
3	O-ring	1	x x x x
4	End cover	1	x
5	Washer	4	x x x x
6	Nut	8	x x x x
8	End-stop nut	1	x x x x
9	End-stop bolt	1	x x x x
50	Spring piston	1	x x x x
52	Guide ring	1	x x x x
53	Spring cylinder	1	x x x
54	Tie rod	4	x x x x
55	Spring	Depending on size	
56	Piston rod seal	1	x x x x
57	Spring guide	1	x x x x
58	Locking wire	2	x x x x
59	Cover for spring return	1	x x x
60	Silencer	1	x x x x
61	Transport securing plate	1	x x x x
62	Warning label	1	x x x x
63	O-ring	1	x
<b>Kit No. 10.2</b>	<b>Complete spring-return unit for NAF 791292 sizes 1</b>		

This kit is the same as kit No. 10.1, apart from the spring cylinder item 53

**5.3 Spare parts kits, sizes 41 - 52**

Item No.	Description	Qty	Size		Item No.	Description	Qty	Size	
<b>Kits No. 1</b>	<b>Wear parts</b>		<b>4</b>	<b>5</b>					
3	Upper thrust bearing, lever	1	x		19	Circlip (fitted)	2	x	x
4	Upper radial bearing, lever	1	x	x	22	Blank cover (fitted)	1	x	x
7	O-ring	1	x	x	23	O-ring (fitted)	2	x	x
15	Lower thrust bearing	1	x		24	Screw (fitted)	3	x	x
16	Lower radial bearing	1	x	x	25	Coupling I (fitted)	1	x	x
17	O-ring	1	x	x	26	Circlip (fitted)	1	x	x
30	O-ring, air passage	2	x	x	27	Coupling II (fitted)	1	x	x
42	Seal holder complete with seals and mounting screws	2	x	x	31	Piston rod (fitted)	1	x	x
43	O-ring, cylinder seal	2	x	x	42	Seal holder, complete with seals and mounting screw (42.1 och 42.2)	2	x	x
<b>Kits No. 2</b>	<b>Pin kit</b>				44	Piston rod bearing	2	x	x
9A	Pin	2	x	x	45	Screw	Qty depends on actuator series		
10A	Locking clip	2	x	x	71-74	Holder for position indicator (fitted)	1	x	x
11	Pin bearing	2	x	x	<b>Kits No. 7</b>	<b>Cylinder with piston</b>			
<b>Kits No. 3</b>	<b>Piston kit</b>				12	Bolt	Qty depends on actuator series		
30	O-ring, air passage	1	x	x	30	O-ring, air passage (not fitted)	1	x	x
32	Piston	1	x	x	32	Piston (not fitted supplied with protective ring)	1	x	x
33	Guide ring (fitted)	1	x	x	33	Guide ring (fitted)	1	x	x
34	Faced O-ring	1	x	x	34	Sealing ring (fitted)	1	x	x
43	O-ring	1	x	x	35	Cylinder	1	x	x
<b>Kits No. 4</b>	<b>Piston seal</b>				36	Piston nut (not fitted)	1	x	x
30	O-ring, air passage	1	x	x	37	Locknut (not fitted)	1	x	x
33	Guide ring	1	x	x	38	Stop bolt, piston travel (not fitted)	1	x	x
34	Faced O-ring	1	x	x	39	Sealing washer (not fitted)	1	x	x
43	O-ring	1	x	x	40	Bush (fitted)	1	x	x
<b>Kits No. 5</b>	<b>Lever</b>				43	O-ring, cylinder seal (not fitted)	1	x	x
6	Lever	1	x	x	<b>Kits No. 8</b>	<b>Spring cylinder with piston</b>			
11	Pin bearing (fitted)	2	x	x	30	O-ring, air passage (not fitted)	1	x	x
5	Visual indicator (not fitted)	1	x	x	32	Piston (not fitted, del. with protective ring)	1	x	x
7	O-ring (not fitted)	1	x	x	33	Guide ring (fitted)	1	x	x
17	O-ring (not fitted)	1	x	x	34	Sealing ring (fitted)	1	x	x
<b>Kits No. 6</b>	<b>Centre section</b>				36	Piston nut (not fitted)	1	x	x
1	Housing, centre section (fitted)	1	x	x	37	Locknut (not fitted)	1	x	x
2	Cover (fitted)	1	x	x	38	Stop bolt, piston travel (not fitted)	1	x	x
3	Upper thrust bearing, lever	1	x		39	Sealing washer (not fitted)	1	x	x
4	Upper radial bearing, lever (not fitted)	1	x	x	43	O-ring, cylinder seal (not fitted)	1	x	x
8	Link (one fitted and one not fitted)	2	x	x	46	Spring, cylinder	1	x	x
9	Pin (not fitted)	2	x	x	48	Filter (fitted)	1	x	x
10	Locking clip (not fitted)	2	x	x					
14	Screw (fitted)	4	x	x					
15	Lower thrust bearing, lever (not fitted)	1	x						
16	Lower radial bearing, lever (not fitted)	1	x	x					
18	Link bearing (fitted)	2	x	x					



## NAF Control Valves

Item No.	Description	Qty/ actuator	Remarks	Item No.	Description	Qty / actuator	Remarks
17	O-ring	2	4 for size 0	27	O-ring	2	(size 0)
18	Screw	4	8 for size 0	27	Faced O-ring	2	(size 1 - 3)
19	Visual indicator	1		28	Piston rod bush	2	
20	Stem sleeve	1	None for size 0	29	Cover	1	
21	Lever	1		30	Housing	1	
21.1	Bush	2	Not shown in figure. None for size 0	31*	Coupling	1	
22	Circlip	4		32*	Drive screw	2	
23	Pin	2		33*	Mounting plate	1	
24	Nut	2		33.1*	Indicating unit	1	
24.1	Washer	2		33.2*	Screw	1	
25	Piston	1	(size 11, 21, 31) Fitted on side A.	34*	Screw	6 or 8	Depends on size
			(size 02, 12, 22, 32)	35*	Window	1	
26	Piston rod	1		36*	Circlip	1	
				37	O-ring	2	
				38	Lever bearing	2	

\*Not in size 0, since there is no window and stem sleeve

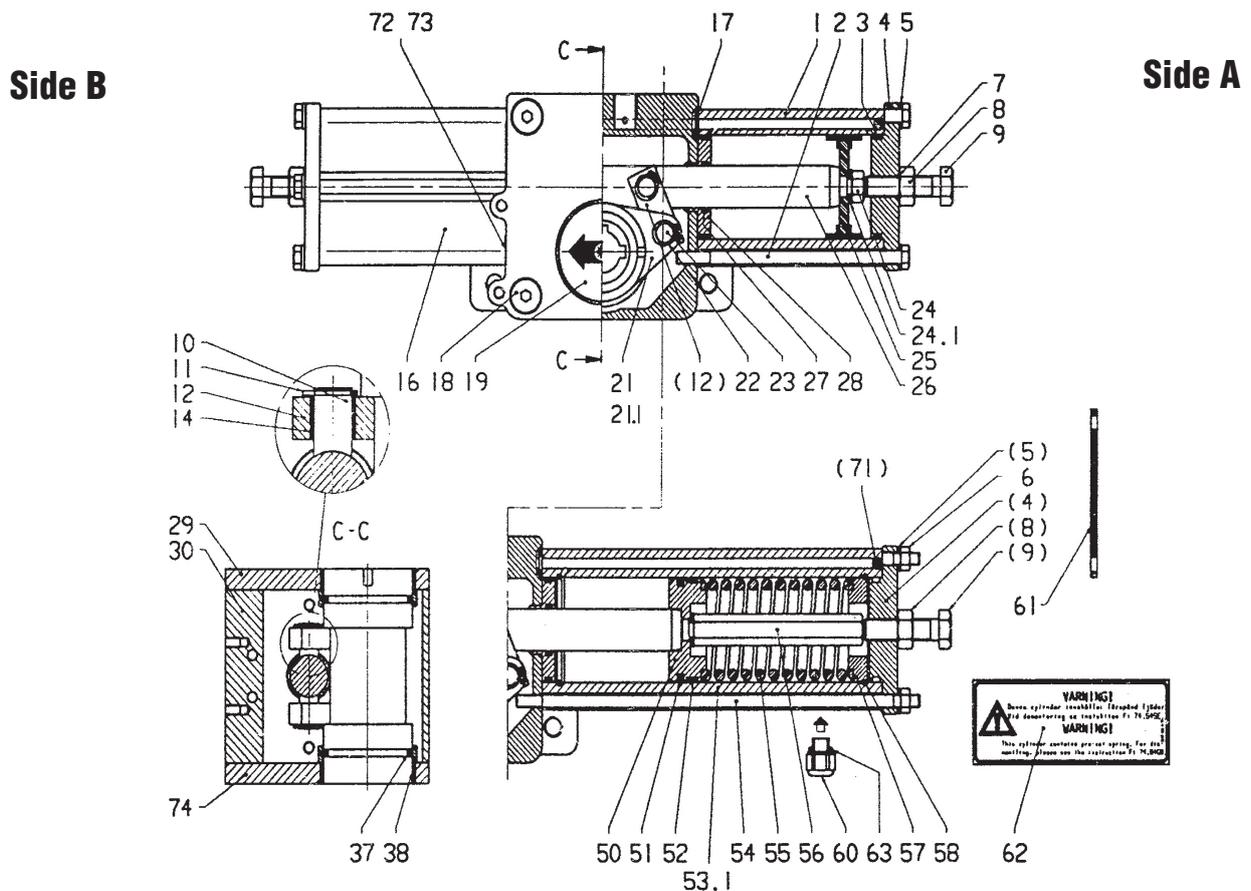


Fig. 19.0. Locations of components of size 02

### 6.2 Single-action actuator with spring return NAF 791292 and 791294

Item No.	Description	Qty/ actuator	Remarks	Item No.	Description	Qty/ actuator	Remarks
1-38**	See section 6.1			55	Spring	1, 2 o 3	Depends on size
50	Piston for spring return	1		56	Piston rod nut	1	
51	Sleeve	1	(size 0)	57	Spring guide	1	
51	Faced O-ring	1	(size1 - 3)	58	Locking ring	2	
52	Bearing	1		59	Cover for spring-return cylinder	1	(size 1 - 3)
53.1	Spring cylinder	1	791292 size 0 - 3 791294 size 0, 2 - 3	60	Silencer	1	
53.2	Spring cylinder	1	791294 size 1	61	Transport securing plate	1	Only for transport
54	Spring	4		62	Warning plate	1	To be clearly visible
				63	O-ring	1	Only for size 02

\*\*Pneumatic cylinder item 1 or 16 with associated parts is excluded.

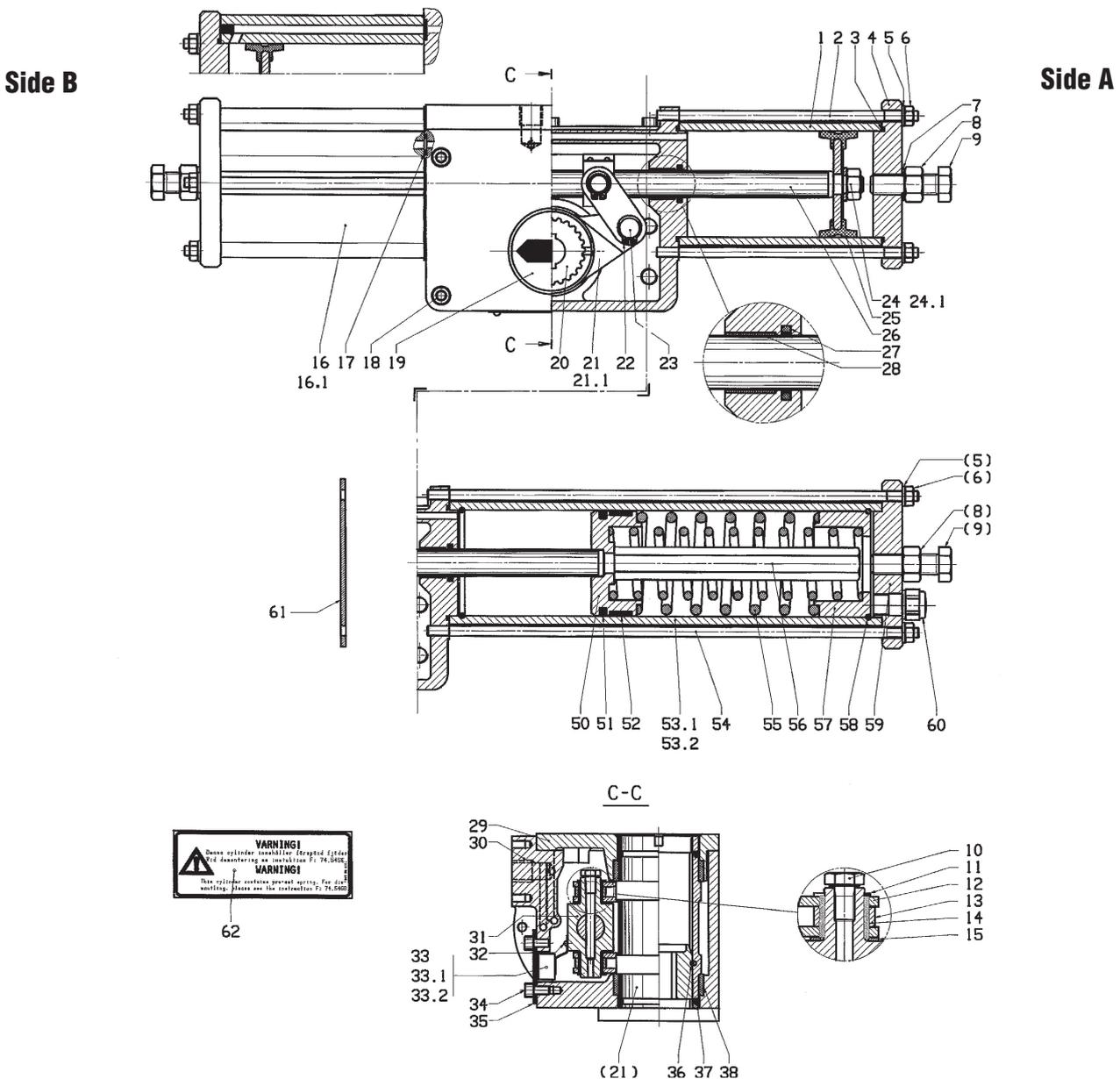
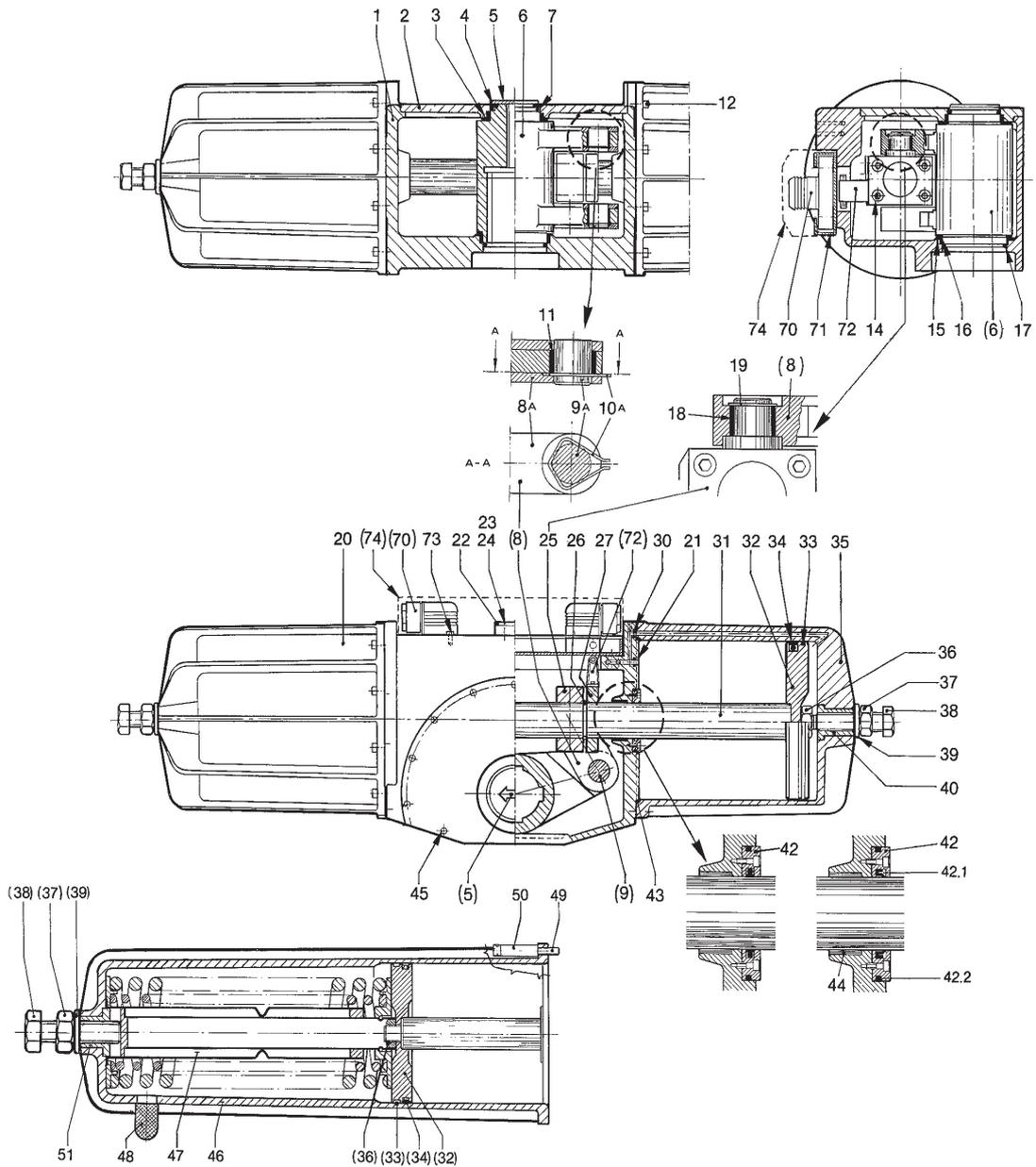


Fig. 19.1. Locations of components of sizes 11 - 32

**Size 41-42**

**6.3 Single- or double-acting actuators and spring-return actuators NAF 791290/92/94**

Item No.	Description	Qty/ actuator	Remarks	Item No.	Description	Qty/ actuator	Remarks
1	Housing, centre section	1		10A	Locking clip	2	
2	Cover	1		11	Pin bearing	2	
3	Upper thrust bearing, lever	1	Only 40-series	12	Bolt		Depends on actuator series
4	Upper radial bearing, lever	1		14	Screw	4	
5	Visual indicator	1		15	Lower thrust bearing, lever	1	Only 40-series
6	Lever	1		16	Lower radial bearing, lever	1	
7	O-ring	1		17	O-ring	1	
8A	Link	2		18	Link bearing	2	
9A	Pin	2		19	Circlip	2	



**Fig. 19.4. Locations of components of sizes 41 - 52**

## NAF Control Valves

Item No.	Description	Qty/ actuator	Remarks	Item No.	Description	Qty/ actuator	Remarks
20	Protective cover	1(0)*		40	Bush	2	
21	Plug	0(1)	For blanking-off the air passage*	42	Seal holder complete with seals item 42.1, 42.2 and mounting screws	2	
22	Blanking-off cover	1		43	O-ring, cylinder seal	2(1)	
23	O-ring	2		44	Piston rod bearing	2	
24	Screw	3		45	Locking screw		Depends on actuator series
25	Coupling I	1		46	Spring cylinder	1	
26	Circlip	1		47	Spring assembly	1	
27	Coupling II	1		48	Filter	1	
30	O-ring, air passage	2(1)		49	Stud		Depends on actuator series
31	Piston rod	1		50	Nut sleeve		Depends on actuator series
32	Piston	2(1)	Actuator sizes 430-439 have one active cylinder.	51	Bush	1	
33	Guide ring	2(1)		70	End-position switch	2(1)	(NAF 799908)
34	Faced O-ring	2(1)	In actuator series 40, the location of items 33 and 34 are transposed.	71	Rail	1	
35	Cylinder	1(2)		72	Magnet	1	Komplett med hållare
36	Piston nut	1(2)		73	Screw with end-position switch	2(4)	
37	Lock nut	2		74	Protective cover	1	
38	Stop bolt, piston travel	2					
39	Sealing washer	2					

\*Only for actuators with one active cylinder