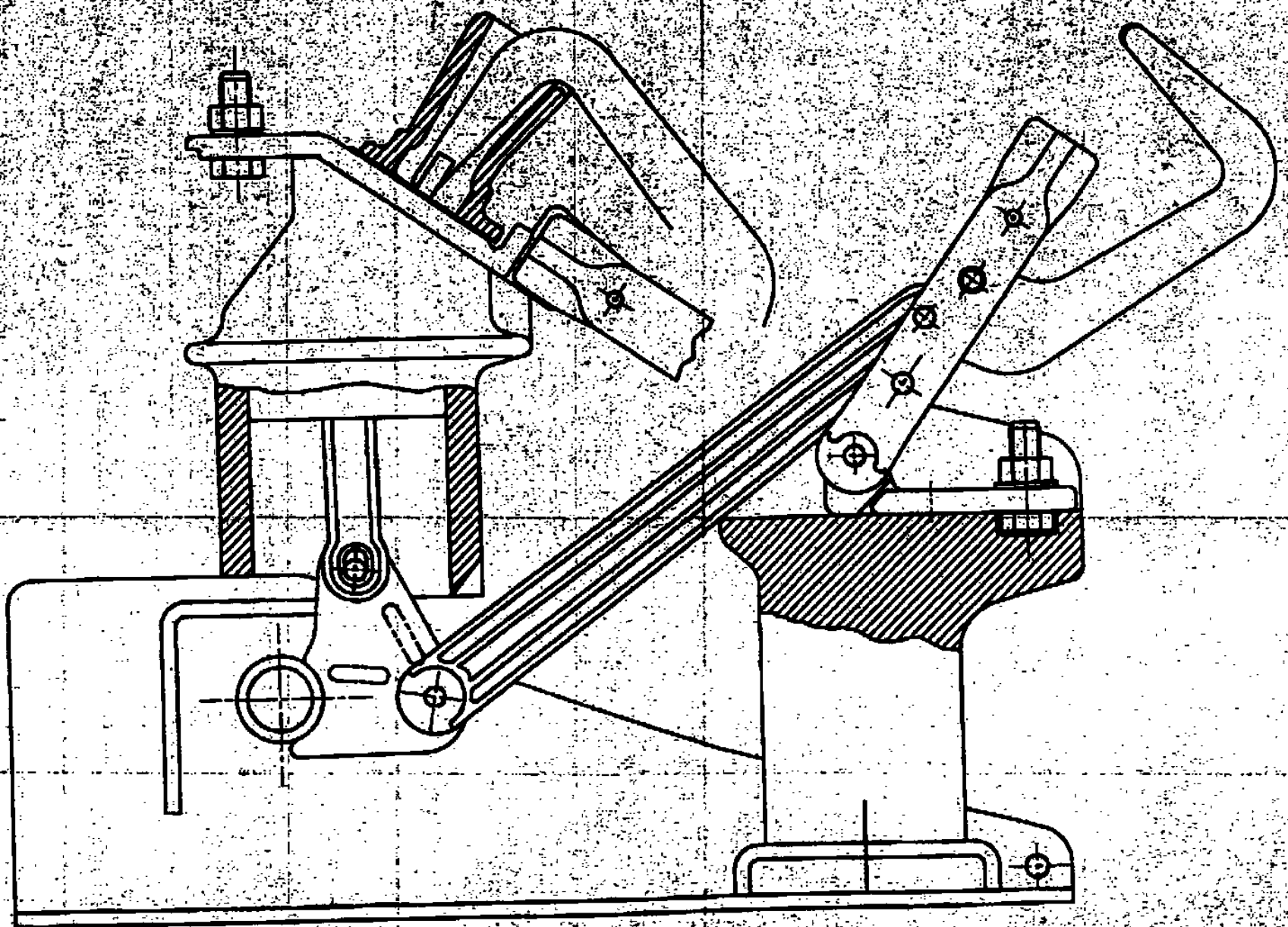


**Maintenance Manual
Switch Disconnect
type NAL**



ABB

Service and maintenance

Cleaning

After maintenance the switch disconnecter must be cleaned before being put into service. Strong solvents and alcoholic fluids must not be used.

After cleaning, the contact area of the main blades and the fixed contacts must be greased, Type Isoflex Topas NB 52. If the switch disconnecter is placed in a very humid and polluted area which will reduce the tracking resistance, we recommend to polish the insulators and insulated components with Silikon Type HS4.

Switch disconnectors in service

The switch disconnecter should be checked at least once a year by conducting a number of operations to check all the functions.

The frequency of maintenance depends on the service and environmental conditions.

- Moving- and fixed contacts are greased with - Isoflex Topas NB52.
- Mechanisms do not need any greasing under normal conditions.
- Arcing knives, piston and cylinder must not be greased.

Mechanical overhaul

After 1000 operations or 5 years in service a complete overhaul of the switch disconnecter should be carried out, preferably by ABB-personnel.

Electrical overhaul

The frequency of overhaul depends also on the number of operations and the magnitude of the breaking current.

After about 100 operations at rated current or about 500 operations at half the rated current the main contacts, the arcing contacts and the arc extinguishing chamber should be inspected and eventually replaced.

Replacement should take place when

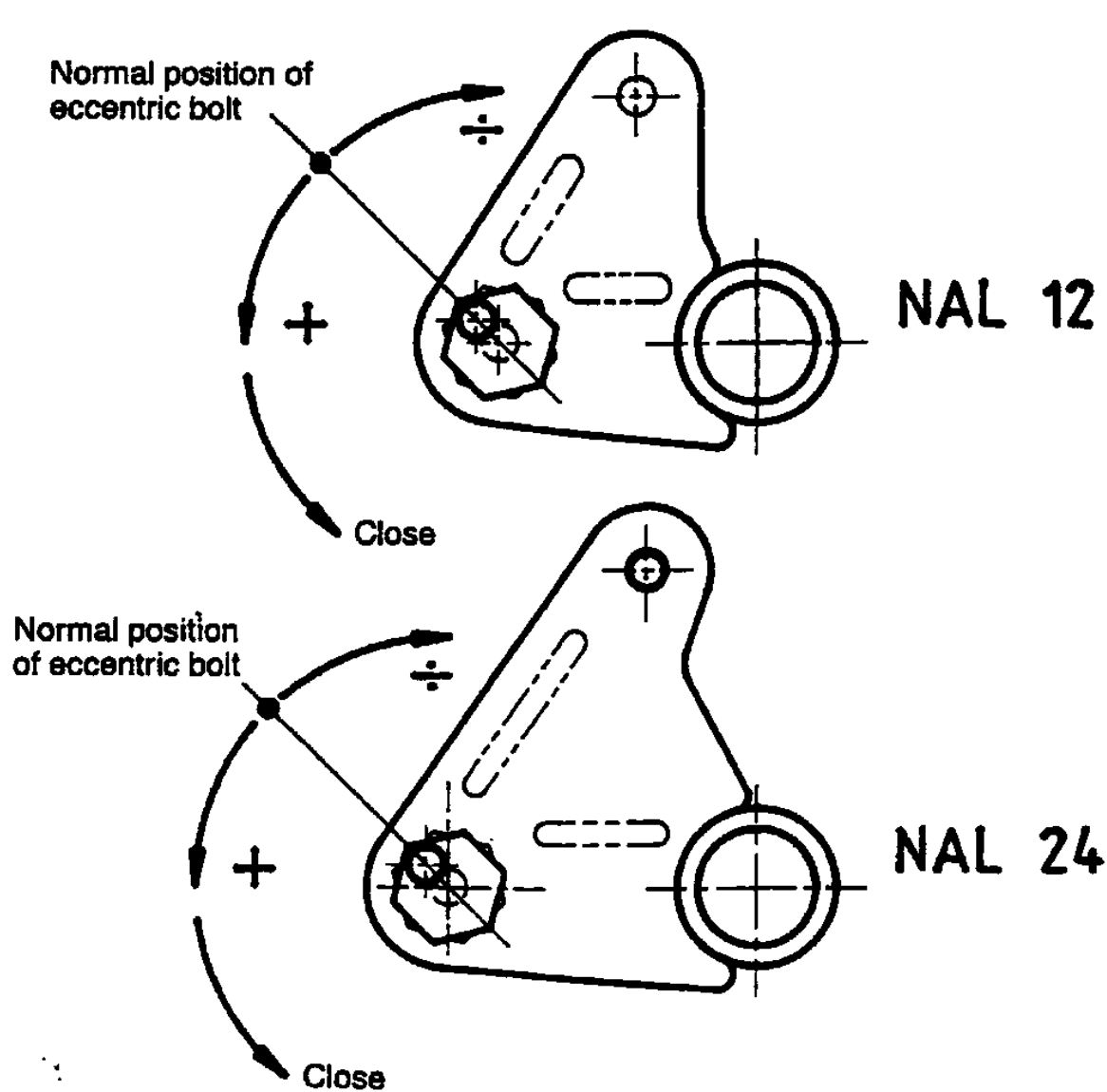
- The tip of the arcing contact knives has diminished approx. 3 mm. (By minor damages the arcing tip might only be polished)
- The fixed arcing fingers are burned or do not give any contact
- The width of the slot in the arcing chamber is more than 8 mm.

Adjustment of the switch disconnecter

Adjustment must be made when

- The main contact only gives partial contact
- The arcing knife does not run freely in the arcing chamber

The adjustment is made by the eccentric bolt on the main shaft, Fig. 1, and by adjustment of the pivot side insulator.



Adjustment of eccentric bolt.

10. Replacements of parts

The switch disconnecter type NAL is equipped with DMC insulators (Glassfibre-reinforced polyester) with selftapping screws for fixing of insulators and contacts.

If the same insulator and screws are to be used after exchange of parts, the following procedure must be followed:

- Unscrew the selftapping screws carefully and brush them clean, and blow out the small particles in the threaded hole. (Protect the eyes.)

When mounting, the screws must be entered carefully into the threads in the insulator and tightened with care.

- Correct torque, see page 7.

If new insulator shall be mounted, the holes in the insulator should be threaded about 10 mm deep by the selftapping screw before mounting. Remove the screw and blow the holes clean.

The mounting takes place acc. to the following procedures.

10.1 Replacement of contact knife with draw bar

Fig. 2.

Switch disconnecter in open position with both the operating springs uncharged.

- Remove the circlips 2.1. attaching the draw bar to the main shaft. (Eccentric bolt not to be loosened.)

- Unscrew the screw(s) 2.2 attaching the main contact to the insulator.
Remove the fixed contact with the contact knife and draw bar. (1 pc screw on 12 kV and 2 pcs screws on 24 kV).
- Attach the new main contact with the contact knife and draw bar to the insulator.
- Grease the new contact knife with ISOFLEX NB52, and check carefully that it enters the fixed main contact correctly, and also that the arcing knife moves freely in the arcing chamber when closing and opening. (The arcing knife does not have the same position related to the contact knife during the closing and opening movement.) The contact knife must rotate firmly at the pivot point, but without jerking.
- Attach the draw bar to the main shaft by the eccentric bolt 2.3 and secure with washer and circlips 2.1.
- The depth of the engagement between the fixed and the moving contact can be adjusted by the eccentric bolt 2.3 or by moving the insulator 2.4 back or forth.

10.2 Replacement of fixed contact on the pivot side

Normally the main contact with contact knife and draw bar is delivered as one unit.
Procedure as under 10.1.

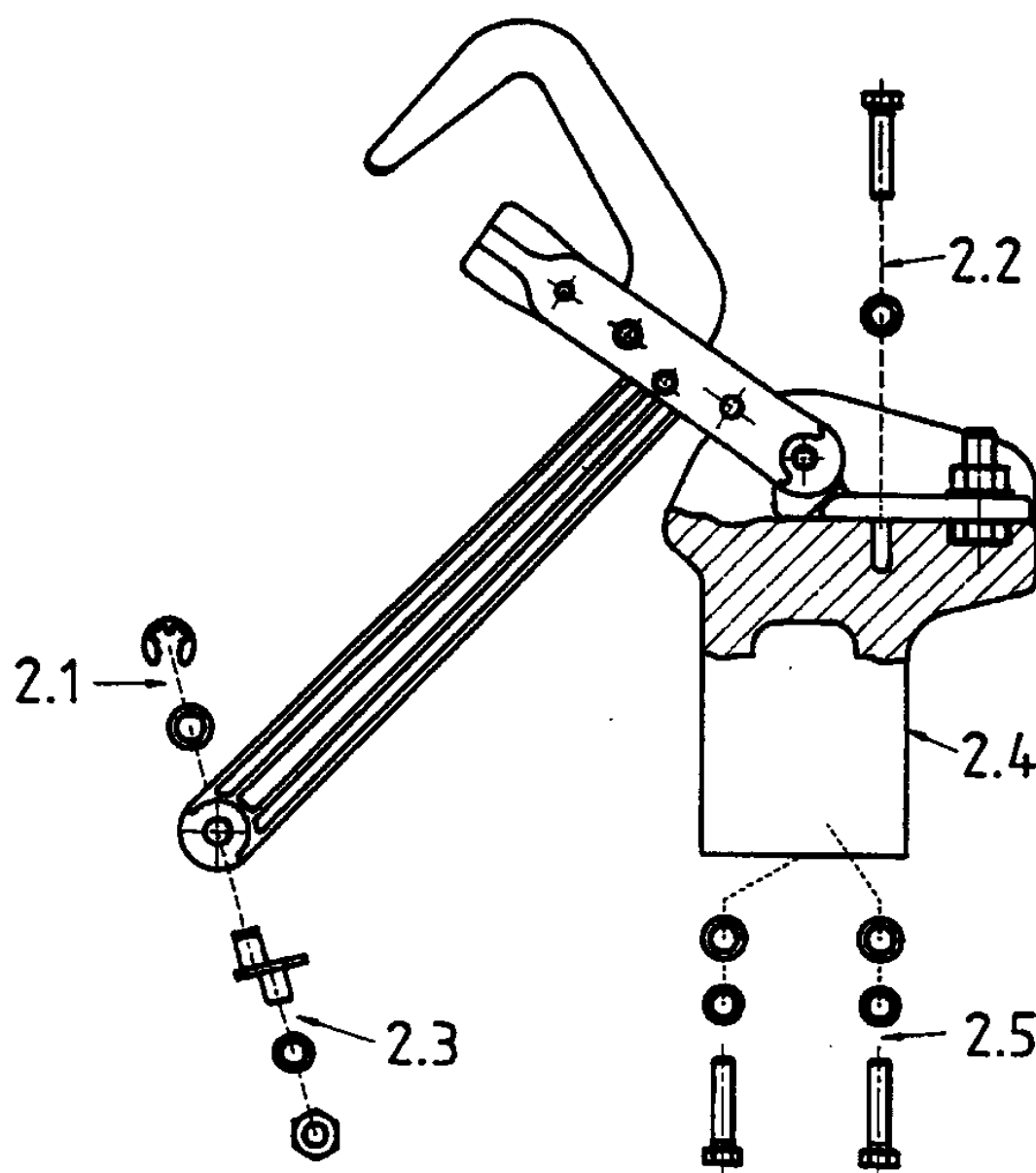


Fig. 2

on the opening side

Fig. 3.

Switch disconnecter in open position.

- a. Unscrew the two screws 3.1 and lift up the arcing chamber and the thermal disc 3.4 (for 630 A) while pressing the main contact 3.5 firmly against the hollow insulator 3.8.
 - b. Lift up the main contact 3.5 by the arcing contacts 3.6 which penetrate the main contact. Remove the pressure spring 3.7 and clean the top of the insulator and the hole, and blow out the threaded holes. (Protect the eyes.)
 - c. Attach the new main contact in reverse order as described above.
Damaged parts must be replaced.
- Take care that the arcing contacts 3.6 are correctly placed in the pressure spring 3.7.
 - By mounting the thermal disc 3.4 and the arcing chamber 3.3, the main contact 3.5 must be pressed firmly against the hollow insulator 3.8. Attach the whole assembly by the screws 3.1. For correct torque see page 7. Check correct position of the arcing contact and test correct function. Grease the contact area with ISOFLEX TOPAS NB52.

11. Replacement of the arcing chamber

Fig. 3.

Follow instructions under item 10.3.

12. Replacement of insulators

12.1 Hollow insulators with arcing chamber

Fig. 3.

- a. Unscrew 3.9 and detach the insulator.
- b. Attach the new insulator to the frame by the two selftapping screws. Remember to mount the piston with piston rod 3.10. For correct torque see page 7.
Note the washer and spring washer for the screws.

12.2 Pivot side support insulator

Fig. 2.

Detach the main contact with contact knives according to item 10.1 b.

- a. Unscrew 2.5 and detach the insulator.
- b. Attach the new insulator to the frame by the two selftapping screws 2.5.
For correct torque see page 7.
Note the washer and spring washer for the screws.
- c. Attach the main contact with the contact knife to the top of the insulator and adjust according to item 10.1.

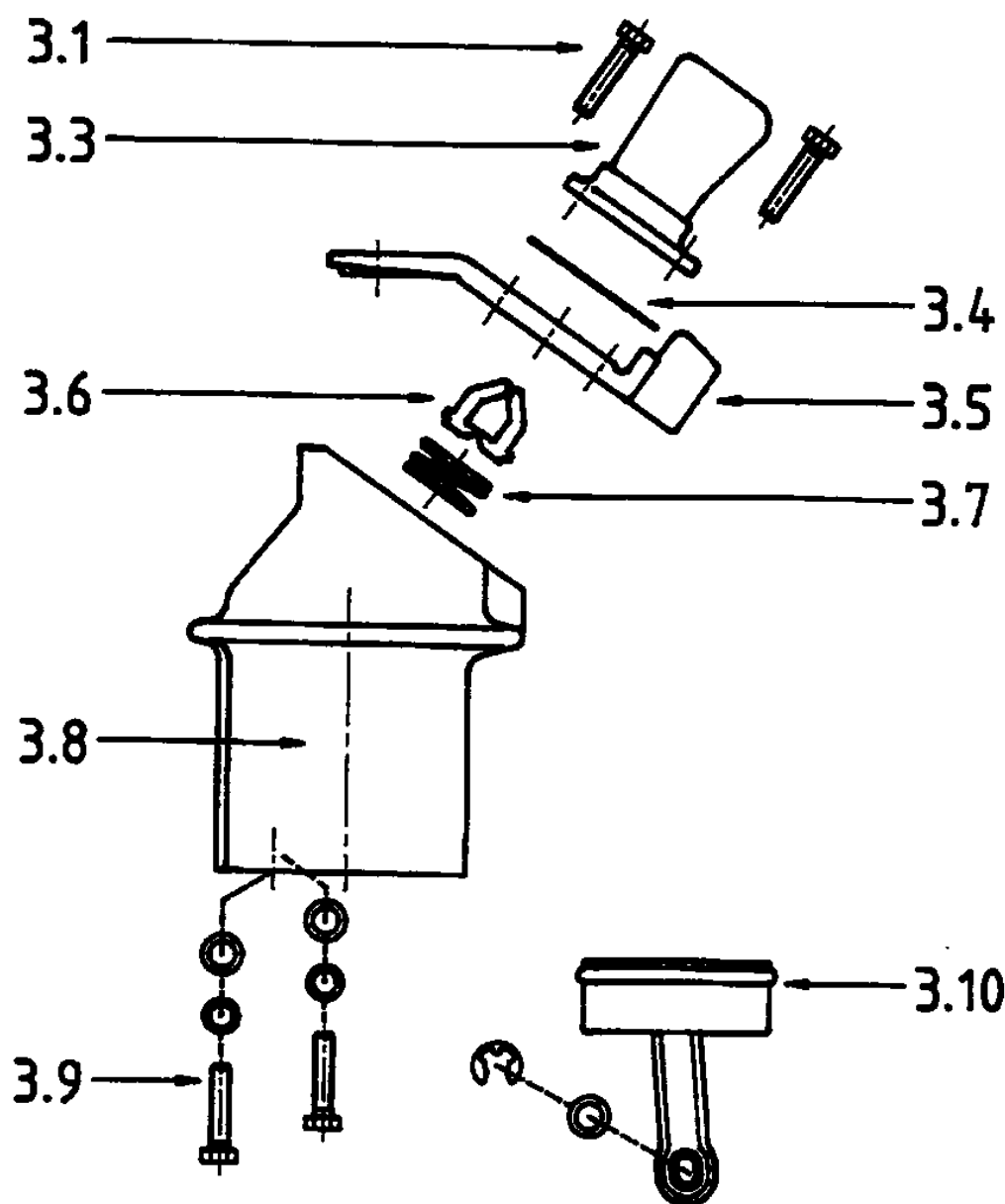
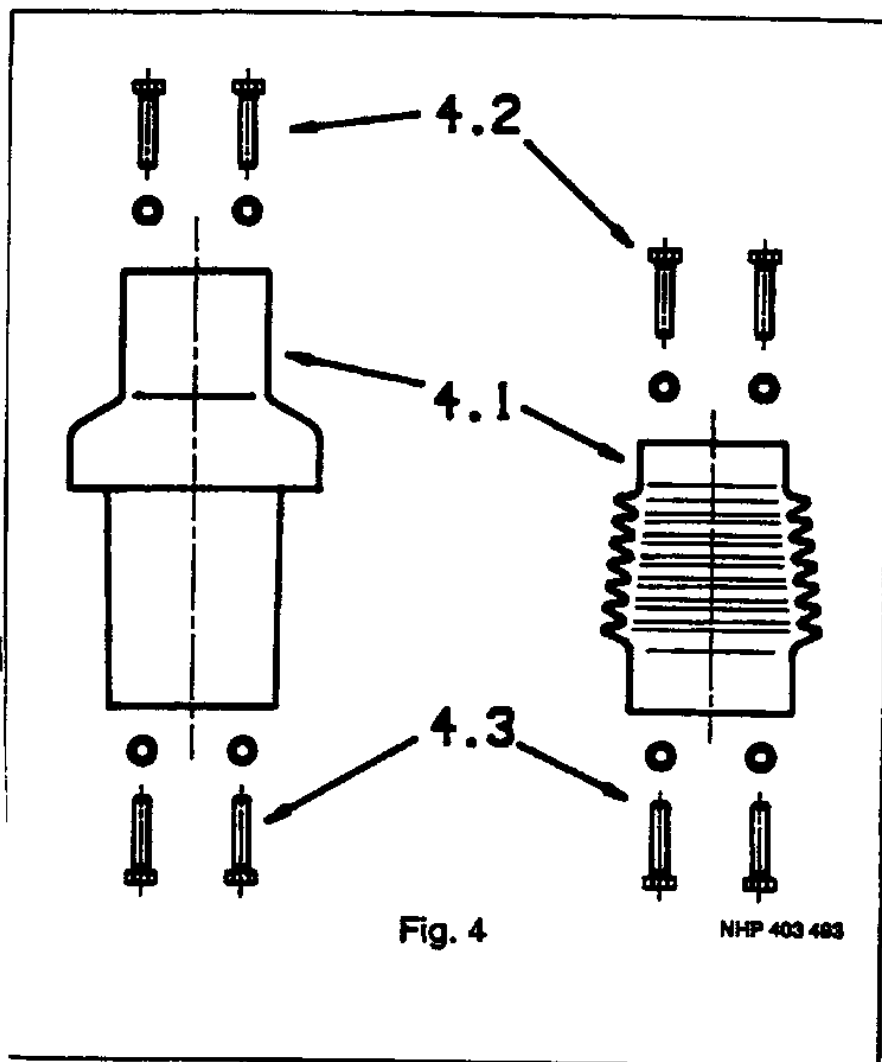


Fig. 3

13. Insulator for fusebase and quick make earthing switch

Fig. 4.

- Unscrew 4.2 and detach the fuse clips and contact block respectively.
- Unscrew 4.3 at the base of the insulator and detach the insulator.
- Attach the new insulator to the frame by the two selftapping screws 4.3. For correct torque see page 7. Note the washer and spring washer for the screws.
- Attach the fuse clips and contact block respectively to the top of the insulator by the screws 4.2. For correct torque see page 7.



14. Adjustment of the contact knives

Fig. 5 and 6.

- Switch disconnecter in open position.
- Detach the draw bar 5.1 from the main shaft 5.2.
- Grease the fixed and moving contacts with ISOFLEX TOPAS NB52.

14.1

With the draw bar detached, test by hand that the arcing knife moves freely in the arcing chamber 5.3. (See 10.1 d. and page 6.)

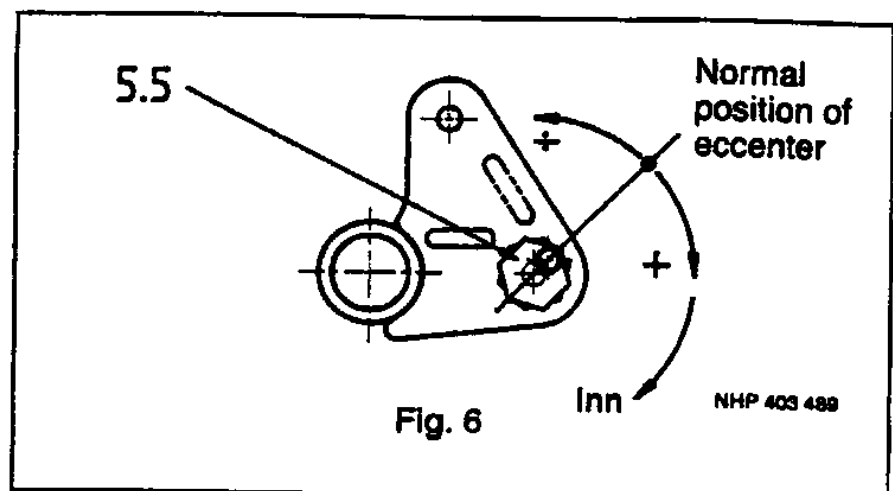
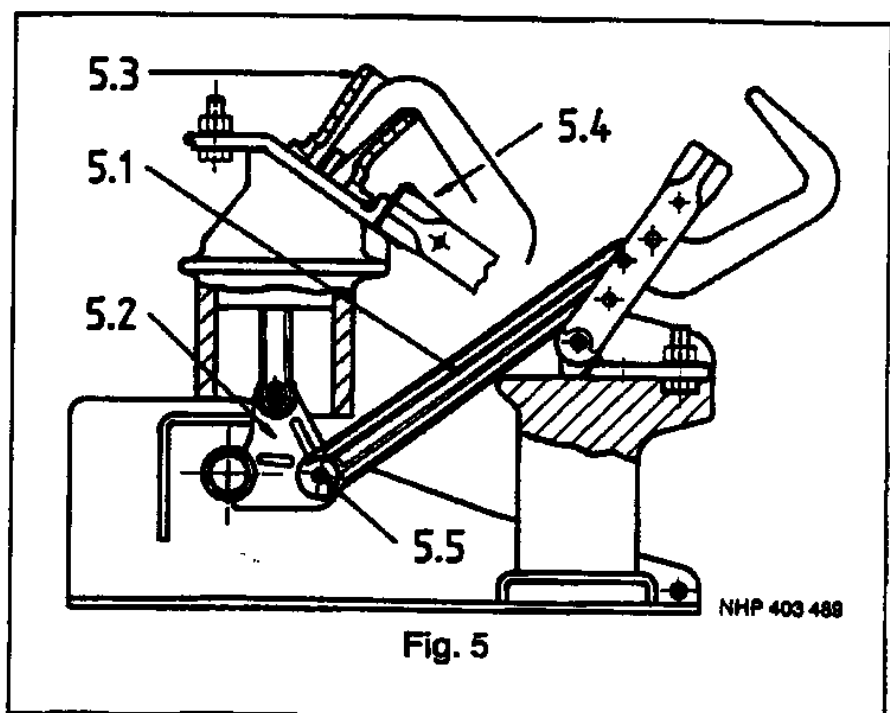
14.2

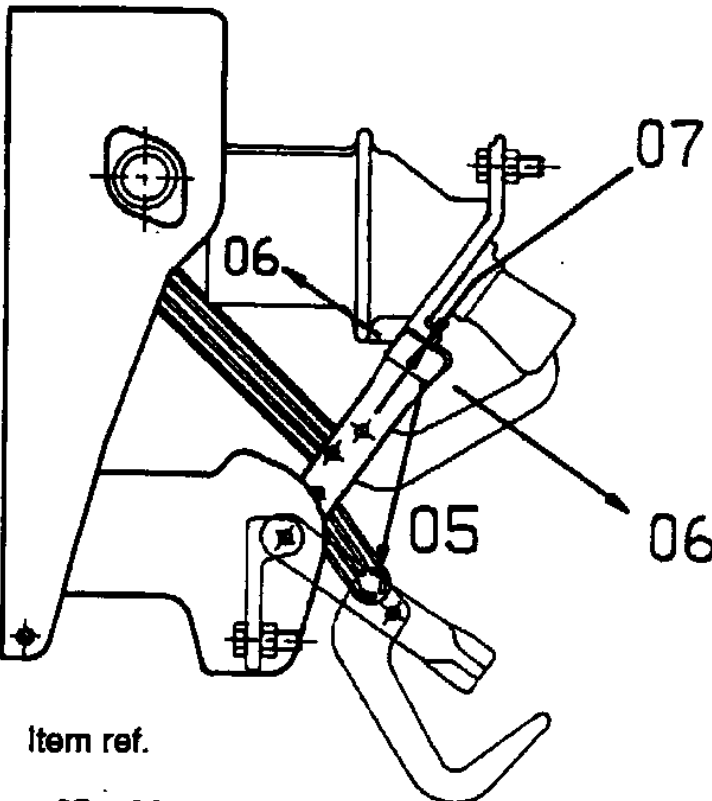
Fix the draw bars 5.1 to the main shaft 5.2 by the eccentric bolt 5.5. Check that the eccentric bolt is in the normal position. Fig. 6.

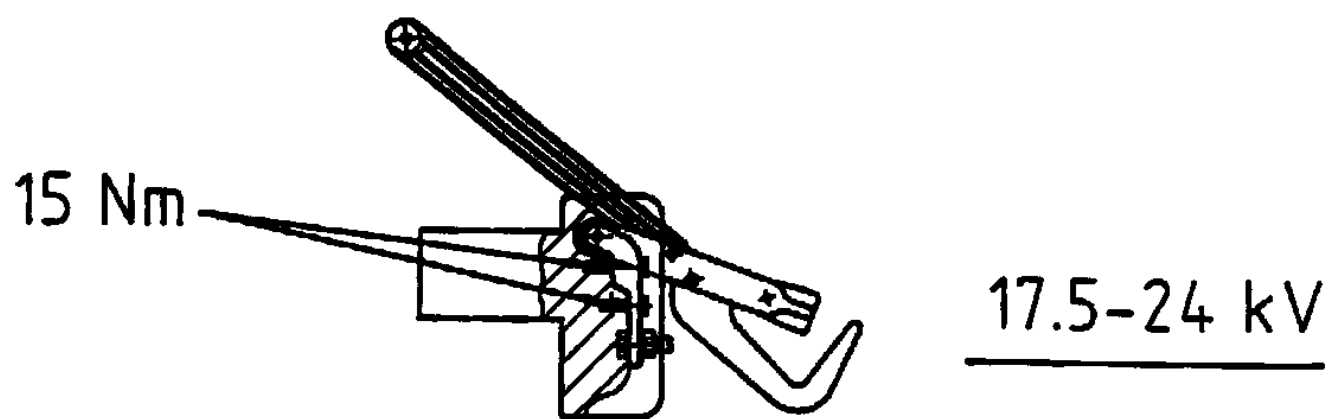
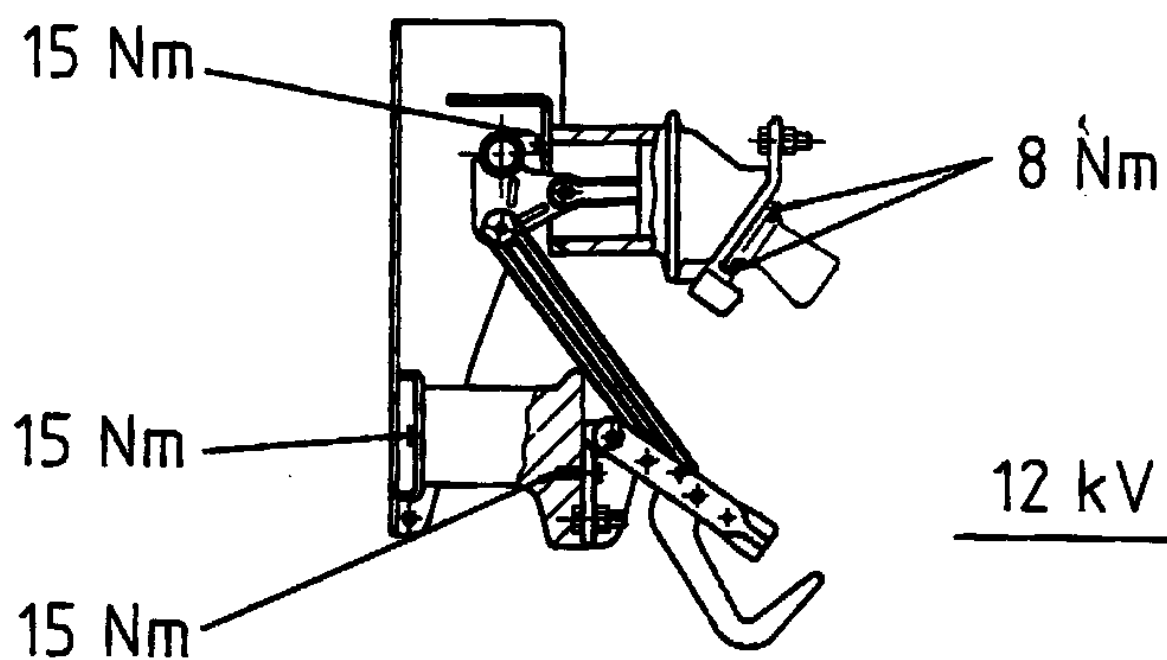
14.3

Close the switch disconnecter and check the engagement and the contact overlap. All the four contact points on the contact knives must be in contact with the fixed contact.

If the depth of the engagement between the fixed and the moving contact is outside the limit of ± 4 mm, it must be adjusted by means of the eccentric bolt. Fig. 6 resp. fig. 1.



Function and controlspecification						
NAL 12 – 17,5 – 24/6 – 12,5 A–K Main functions						
Item	Function/Dimendion			Function limits		Reference control
01	Closing speed		m/sec	5,5–5,8	6,5–6,8	Work sampling
02	Opening speed		m/sec	4,5–4,8	5,5–5,8	
03	Operating torque	K-mech	Closing kpm	6–8	8–10	To be controlled when assembling the mechanism Separate control
			Opening kpm	6–8	8–10	
		A-mech	Closing kpm	8–10	8–10	
			Opening kpm	0,3	0,3	
05	Min. distance open switch		05	120 mm	212 mm	Work sampling
06 07 08	Contact knife penetration Contact knife penetration Contact knife alignment		06	Both contact spots on each side MUST make contact Contact aera = 26 mm		Control 100% by sight
			07	Tolerances of contact engagement 2–5 mm		Control 100% by sight
			08	The alignment is controlled by: The main contact knife must be aligned with the main contact. The arching knife runs straight and moves freely in the arcing chamber, and make full engagement with the fixed arcing contact.		Controll 100% by sight Must be adjusted
						
Item ref. – 05 – 06 – 07 –			NHP 403 491			



NHP 403 482

NAL 12 – 17,5 – 24 kV. Switch Disconnecter.

Tightening torque for self tapping screws.